

80

microcomputing™

the magazine for TRS-80 users

80 Microcomputing

9/80

Tandy Shoots Back with Three New Computers

Inside 80 gives you the breakdown on Tandy's newest market entries:

- THE COLOR COMPUTER
 - THE POCKET COMPUTER
 - THE MODEL III
- Page 10



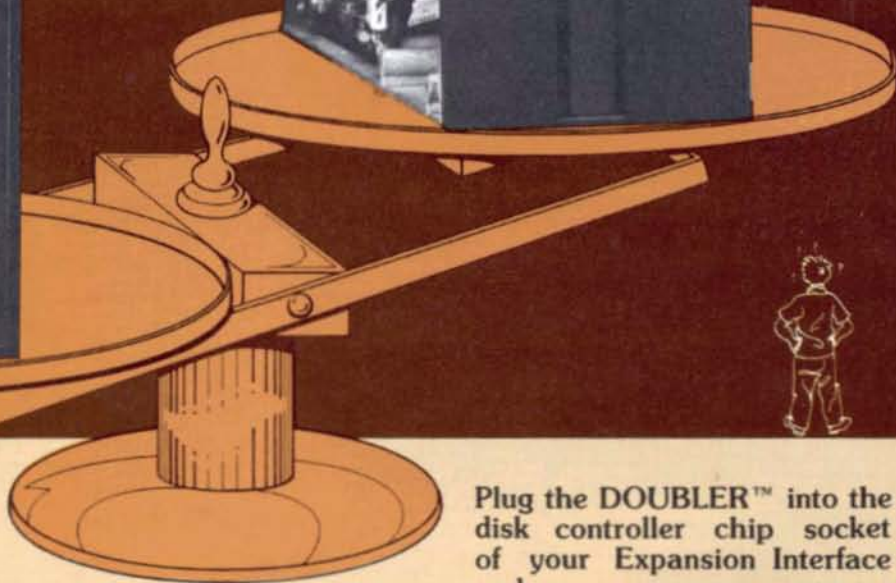
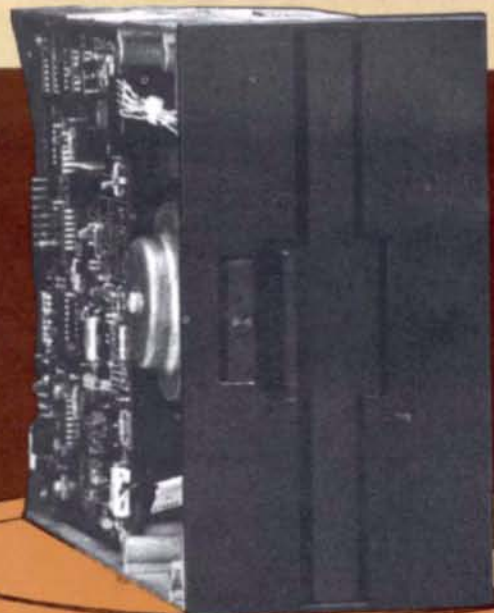
Plus:
More than 30 articles, reviews and columns
Complete contents on page 5.

Color Comes to Tandy

*TRS-80 is a trademark of the Tandy Corp.

#9

Store More Data on a 5"-Disk Than on an 8"-Disk



The Doubler™: Percom's new proprietary double-density adapter for the TRS-80* computer.

Plug the DOUBLER™ into the disk controller chip socket of your Expansion Interface and . . .

Store up to 354 Kbytes of formatted data on five-inch disks.

- Increase formatted storage capacity of your minidiskettes from 1½ to almost 4 times.
- Use with standard 5-inch drives rated for double-density operation.
- The DOUBLER™ reads, writes and formats either single- or double-density disks.
- Proprietary design allows you to continue to run TRSDOS*, NEW-DOS†, Percom OS-80™ or other single-density software without making any changes to software or hardware.

- 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.
- **Plug-in installation:** No strapping. No trace cutting. Restore your Expansion Interface disk controller to original configuration by simply removing the DOUBLER™ and re-installing the original disk controller chip.

- The DOUBLER™ circuit card includes high-performance data separator, write precompensation circuits for reliable disk read operations — even on 77-track drives.



Introductory price, including DBLDOS™ and format conversion utility on minidiskette, **only \$219.95**. Use the coupon for even greater savings.

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

†Percom TFD-200™ drive, OS-80D™ operating system



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, starting at only \$399.

PERCOM DISCOUNT COUPON
worth \$20
toward
The Purchase of a
DOUBLER™
Coupon No. 80M103
Expires December 30, 1980
Void where prohibited by law.



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



The easiest, least expensive way to generate spectacular multi-color graphics, sharp two-color alphanumeric: Your computer, a color tv set and the Percom Electric Crayon™.

Add the Electric Crayon™ to your system and your keyboard becomes a palette, the tv screen your medium.

You dab and stroke using one-key commands to create dazzling full-color drawings, eye-catching charts and diagrams.

Or you run any of innumerable programs. Your own BASIC language programs that generate dynamic pyrotechnic images, laugh-provoking animations.

From a combined alphanumeric-semigraphic mode to a high resolution 256- by 192-element full graphics mode, the microprocessor-controlled Electric Crayon™ is capable of generating 10 distinctly different display modes.

Colors are brilliant and true, and up to eight are available depending on the mode.

As shipped, the Electric Crayon™ interfaces a TRS-80* computer via your Expansion Interface or Printer

Adapter. It may be easily adapted for interfacing to any computer or to an ordinary parallel ASCII keyboard.

But that's not all

The Electric Crayon is not just a color graphics generator/controller.

It is also a complete self-contained control computer. With built-in provision for 1K-byte of on-board program RAM, an EPROM chip for extending EGOS™, its on-board ROM graphics OS, and a dual bidirectional eight-bit port — over and above the computer/keyboard port — for peripherals. The applications are endless.

Shipped with EGOS™, 1K-byte of display memory and a comprehensive user's manual that includes an assembly language listing of EGOS™ and listings of BASIC demo programs, the Electric Crayon™ costs only \$249.95.

Options include:

- LEVEL II BASIC color graphics programs on minidiskette: \$17.95.
- A 34-conductor ribbon cable to interconnect the Electric Crayon™ to a TRS-80*: \$24.95.
- RAM chips for adding refresh memory for higher density graphics modes: \$29.95 per K-byte.
- Electric Crayon™ Sketchpad, a sketching grid of proportioned picture elements (pixels) in a tv aspect ratio. For 128 x 192 or 256 x 192 graphics modes. 11-inch by 17-inch, 25-sheet pads: \$3.95 per pad.

SYSTEM REQUIREMENTS: the video circuitry of the Electric Crayon™ provides direct drive input to a video monitor or modified tv set. An internal up-modulator for rf antenna input may be constructed by adding inexpensive components to the existing video circuitry.

Prices and specifications subject to change without notice.



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

Get into computer color graphics the easy, low-cost way with a Percom Electric Crayon™. Available at Percom dealers nationwide. Call toll-free, 1-800-527-1592, for the address of your nearest dealer, or to order direct if there is no Percom dealer in your area.



META TECHNOLOGIES

FOR YOUR TRS-80® DISK SYSTEM



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

- COMPATIBLE with AIDS-II data files and AIDS subsystems.
- Move up from AIDS-II and EXPAND to 20 field capability WITHOUT REENTERING DATA.
- AIDS-II (Model I or II) owners may UPGRADE FOR ONLY \$25.00.

*WARNING! This program is written in BASIC and can be listed in the normal manner. Modification of program code is NOT RECOMMENDED due to its extreme complexity.

MTC AIDS - II

iling information? Doctor it up with AIDS-II. This Automated Information Directory System offers twelve user-defined fields with full feature editing when adding or changing records. Selective Loading, Updating, Deleting, Printing and Saving records may be accomplished using any of six relational comparisons. Also features machine code assisted sorting (200 records in about 5 seconds) by any combination of fields, and much more! Unique "windowing" capability allows directories of unlimited size. Window size is typically 200 or more records in 32K. Can be used for mailing lists, client reference reporting, appointment "calendars", inventory records and other information systems. Easy to use. Defining a system takes about a minute. MAPS-I (MTC AIDS PRINT SUBSYSTEM) is included at no charge. MAPS features full AIDS-II selection capabilities, prints user-specified fields down the page, produces user-specified columnar report formats with automatically generated column headings and paging, and allows user-defined print formats for custom forms, labels, etc. Add subsystems for additional capabilities. May be upgraded to AIDS-III when required.


MTC AIDS-II \$ 49.95
For Model II \$ 79.95

AIDS

CALCULATION SUBSYSTEM (CALCS)

MTC's most popular AIDS subsystem. Use for report generation involving basic manipulation of numeric data. Prints user-specified fields in titled, columnar report format, automatically generating column headings, paging and (optionally) indentation. Features full AIDS-III selection capabilities and can create a single report from multiple files. Provides the additional capabilities of user-specified balance forward computations, columnar subtotals, columnar totals and user-defined computations (allows multiplication, division, addition, and subtraction of field values and constants). Features may be used in combination. For example, the calculation of a user-defined quantity/cost column may simultaneously be listed by itself, used as part of a balance forward computation and as part of either (or both) a columnar subtotal or columnar total. Use for accounting, inventory, financial and other numeric-based information systems.

MTC CALCS \$ 24.95
For Model II \$ 39.95

MORE 
PRODUCTS ON PAGES 6 & 7

All products guaranteed for replacement only. Prices, Specifications & Offerings subject to change without notice.

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

QUANTITY DISCOUNT INQUIRIES INVITED

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

• Add \$2.50 for standard UPS shipping & handling
• \$2.00 EXTRA for C.O.D.
• Ohio residents add 5 1/2% sales tax.



TO ORDER CALL TOLL FREE

1-800-321-3552

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

META TECHNOLOGIES CORPORATION

26111 Brush Avenue, Euclid, Ohio 44132

✓ 405



800730

TRS-80 and Radio Shack are registered trademarks of Tandy Corp.

APPLICATION

- 162 **Doctor Your Records** From one who knows. *Wilbur A. Muehlig, M.D.*
 174 **Mind Your A's & P's** Super marketing fantasy. *Lois L. Leonard*

BUSINESS

- 212 **Down the Road** Maximize your profits. *Bill Vick*

DATA MANAGEMENT

- 146 **Reference Library Index** An easy method. *James P. Morgan*

EDUCATION

- 124 **Kidstuff** For children only. *Dan Keen and Dave Dischart*
 182 **Music Note Recognition** Orchestra, ready? *J. David McClung*

GAME

- 216 **Ping-Pong** Better than the original. *Ronald Moehlis*

GENERAL

- 58 **A Bout with the I.R.S.** How the 80 won. *Fred Blechman*
 187 **BINAX KIBUFF** Entering ROM. *John T. Blair*
 208 **The "Next" Trap** How to escape it. *Hubert C. Borrmann*

HARDWARE

- 84 **Teletype Interface** Versatility plus. *Jake Commander*
 102 **Selectric Hard Copy** Put it to use. *Michael W. Bickerton, M.D.*
 116 **Build Your Own Port** Then take off. *James S. Hawkes/Reese Grady*

MATH

- 170 **Divine Proportions** Beautiful graphics. *David R. Cecil*

REVIEW

- 154 **Eloquent Eighties** Tandy's machine. *Jim Wright*

STYLE

- 188 **Variations on a Theme** Deal with PRINT like a pro. *George R. Bullitt*

TUTORIAL

- 50 **Into the 80's** A beginning for beginners. *I.R. Sinclair*
 62 **Pulling Strings Together** Learn to manipulate. *John D. Adams*
 138 **My Way** May be better than your way. *Robert V. Meushaw*
 152 **Stringy Machine Code** How to pack it. *David D. Grimes*
 158 **Math Flash** Want to add and subtract? *Jim Barbarello*
 178 **An Article Called Intrepid** For secret agents. *Buzz Gorsky*

UTILITY

- 68 **Free Space** Beat your SYSTEM. *David Cornell*
 76 **Uni-key** Cut down entry time. *Rowland Archer, Jr.*
 88 **Document Those Variables** Save time and space. *William Noel*
 94 **Printer Calibration** Perfect alignment. *L.O. Rexrode*
 98 **Versatile Input** Input data with ease. *Tim Wilde*
 150 **Position Display** Look professional. *Jerry Frost*
 168 **Delay Loop** Waste time. *Allan S. Joffe*
 173 **Walking Words** Be sure to catch this one. *Hubert C. Borrmann*
 192 **Beyond Shell Metzner** Sort with authority. *Doug Walker*
 196 **Dafflower your Debug** Without reprisals. *Donald C. Walker*
 202 **Slow Scroll** For slow readers. *Peter A. Lewis*
 206 **QWIKDISK** Cut your access time. *Bruce Nazarian*
 210 **The Competition's Cursor** How to get it. *R. Daniel Bishop*

REGULARS

- | | |
|---------------------------------------------------|---------------------------------------------------|
| 8 Remarks <i>Wayne Green.</i> | 26 Education 80 <i>Earl R. Savage</i> |
| 10 Inside 80 <i>Ed Juge</i> | 28 80 Applications <i>Dennis Kitz</i> |
| 12 80 Input | 36 The Assembly Line <i>William Barden</i> |
| 20 Reviews <i>Emily Gibbs</i> | 42 80 News <i>Nancy Robertson</i> |
| 26 80 Accountant <i>Michael Tannenbaum</i> | 44 New Products |

PUBLISHER/EDITOR

Wayne Green

MANAGING EDITOR

Michael Comendul

TECHNICAL ADVISOR

Jake Commander

PRODUCTION EDITOR

Clare McCarthy

NEWS EDITOR

Nancy Robertson

REVIEW EDITOR

Emily Gibbs

ASST. TECHNICAL EDITOR

Chris Brown

EDITORIAL ASSISTANTS

Debra Marshall

Thomas Peabody

EDITORIAL ADMINISTRATION

Cresca Clyne

Nancy Noyd

DESIGN ASSOCIATE

Diana Shonk

DIRECTOR OF MANUFACTURING

Noel Ray Self

ASST. DIRECTOR OF MANUFACTURING

Dion Owens

ADVERTISING PRODUCTION

Robert Drew, Bruce Hedin, John White

MAKE-UP

Michael Murphy, Steve Baldwin, Linda Drew, Kenneth Jackson, Ross Kenyon, Bob Sawyer, Patrice Scribner, Sue Symonds

PHOTOGRAPHY

William Heydolph, Terrie Anderson, Tedd Cluff

TYPESETTING

Barbara Latti, Sara Bedell, Linda Locke

PUBLISHER

Wayne Green

ASSOCIATE PUBLISHER

Edward Ferman

ASSISTANT PUBLISHER

Jeff DeTray

EXECUTIVE VICE PRESIDENT

Sherry Smythe

CORPORATE CONTROLLER

Alan Thulander

ADVERTISING MANAGER

Kevin Rushaiko

CIRCULATION

Debra Boudrieau

EXECUTIVE ASSISTANT

Leatrice O'Neil

BULK SALES MANAGER

Ginny Boudrieau

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 1980 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 Street, Peterborough, NH 03458. Application to mail second class postage rate is pending at Peterborough, NH 03458 and at additional mailing offices. Phone: 603-924-3873. Subscription rates in the U.S. are \$18 for one year and \$45 for three years. In Canada, \$20—one year only. U.S. funds. Foreign subscriptions (surface mail), \$28—one year only. U.S. funds. Foreign subscriptions (air mail), \$60—one year only. U.S. funds. In Europe please contact Monika Nedela, Markstr. 3, D-7778, Markdorf, W. Germany. In South Africa contact *80 Microcomputing*, P.O. Box 782815, Sandton, S. Africa 2146. Australian Distributor: Electronic Concepts, Rudi Hoess, 55 Clarence Street, Sydney 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.



META TECHNOLOGIES



★★★ CUSTOMER APPRECIATION MONTH ★★★
TO OUR THOUSANDS OF CUSTOMERS WE WANT TO SAY

THANK YOU!

TEAR OUT AND MAIL US THIS AD PAGE AND \$19.80 (plus shipping & handling) and receive 1 Box of 10 VERBATIM single-sided, single-density, soft-sectored MD525-01 Diskettes; exactly the same as our regularly priced (\$23.95) diskettes.

READ THIS CAREFULLY

Include \$2.50 for shipping & handling. Ohio residents add \$1.09 sales tax. Diskettes will be shipped ONLY by standard UPS, with NO deliveries to P.O. Box addresses. NO phone orders, purchase orders or C.O.D. orders will be accepted. Actual ad page from this magazine MUST accompany order. NO facsimiles will be accepted. VISA and MASTER CHARGE will be accepted for payment (make sure cardnumber is correct). Order may include other products (these orders will be processed first). U.S. orders only-NO foreign orders. Our special apologies to our Canadian friends, but customs and shipping difficulties prevent us from including you. Orders MUST be postmarked between Sept. 1, 1980 and Sept. 30, 1980, inclusive-NO EXCEPTIONS. Shipping label MUST be complete. Orders will be refused and returned, in their entirety, if they are incorrect in ANY way. Allow 2 to 4 weeks for delivery. Offer limited to ONE ad page special per order.

Mail to: META TECH CORP., DEPT. CD, 26111 Brush Ave., Euclid, OH 44132

PRINT CAREFULLY! THIS WILL BE YOUR SHIPPING LABEL!

Name _____

Company _____

Address _____

City, State, Zip _____

MC/VISA NO _____

Signature _____ Exp. Date _____

Apparat, Inc. introduces

NEWDOS/80

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..... \$ 149.95
CALL REGARDING OUR NEWDOS+ UPGRADE PRICING.

★ PRODUCT PREVIEW ★

Random File Sort

This product will provide a very powerful, high-speed sorting capability for use either as part of an application system, or as a separate utility. Implemented as a combination of BASIC and machine language, it will offer flexibility, convenience, and high performance. Features will include:

- Ability to 'select' records to be included in the sort. Selection comparisons may be done against literal values or other fields in the record.
- Multiple selection fields may be specified to achieve selection using complex conditional relationships.
- The sorting 'key' may contain many fields of any combination in ascending or descending order.
- All available memory is utilized for higher performance. Sort and Merge operations are performed in machine language.
- Can be linked into a system by specifying the BASIC program to be run when sort is finished.
- Automatic deblocking of random files with multiple logical records in each sector.

← **MORE**
PRODUCTS ON PAGE 4

mTc-SHIRTS

HIGH-QUALITY, POLY-COTTON BLEND T-SHIRTS. White with Navy Blue neck and sleeve "ringers". MTC logo on sleeve. Top quality transfers of your choice on front.

Specify size (S, M, L, XL) and Transfer

- META TECHNOLOGIES MAKES EVERY BYTE COUNT!
- DON'T TOUCH MY BITS!
01111110
- RAM it!
- MICRO LOVERS TAKE SMALLER BYTES!

mTc-SHIRTS..... \$4.95

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

Transfer PROGRAMS and DATA
from MODEL I to MODEL II

TRAN-SEND

\$49⁹⁵ by MTC

Requires MODEL II and MODEL I with disk & RS-232. Simple to use, not a kit - nothing else to buy. Complete with custom cable, 5 1/4" & 8" floppies, instructions. May be used over phone lines. Custom Cable only \$19.95

Suitable for use with Radio Shack® transfer program(CT 9131)

MAKES EVERY BYTE COUNT

IN YOUR TRS-80[®] MODEL I OR MODEL II DISK SYSTEM

PROGRAMMING TOOLS

TDAM \$19.95
For Model II \$29.95
Includes MTC QUE Card!

Having trouble with RANDOM FILES? With MTC's Table-Driven Access Method (TDAM) you'll never fret over FIELDing again. No knowledge of random access files is required. Insert the TDAM "interpreter" into any BASIC program and type in a few DATA statements describing the information in your files. TDAM does the rest! Reads and writes fields and records of any type (even compresses a DATE field into 3 bytes!). Features automatic file buffer allocation/deallocation, memory buffering, sub-record blocking/deblocking, and handles up to 255 fields per record. Super fast and super simple! Complete with TDAM interpreter, instructions and demo program. Requires programming experience.

DIVERGE \$19.95
For Model II \$29.95

Compares two BASIC program files, showing the differences between them. Identifies & lists lines which have been inserted, deleted, & replaced. Use for version control.

REBUILD \$19.95
For Model II \$29.95

Reorganize programs for adding program code, faster execution, readability. Much more than simple renumbering. Rearrange groups of statements within a program - automatically updates references to line numbers. Use with SUPERSEDE and MINGLE for maximum effect.

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

SAVE Any 3, \$49.95
For Model II \$74.95

SIFTER \$19.95
For Model II \$29.95

Twelve in-memory high-speed sorts for use in any BASIC program: stable, non-stable, with/without tags, for numeric or string data. Random File Sort included. Some sorts written in machine code. Includes sort subroutines, demo programs and instructions. Relocate as needed with REBUILD. Requires programming experience.

SHRINK \$19.95
For Model II \$29.95

Makes Every Byte Count! Make programs smaller and faster! Combines lines & removes unnecessary code including remarks, without altering program operation. Typically reduces program size 25% to 40%.

SUPERSEDE \$19.95
For Model II \$29.95

A "must have" for the professional programmer or the serious amateur. Probably one of the greatest time-savers available. Write programs in shorthand - change variable names - generate program documentation - use with REBUILD and MINGLE to build new programs from old ones.

MINGLE-II \$19.95
For Model II \$29.95

Merge up to 14 files (Program or Data) into a single file. Data files may be merged in ascending or descending sequence with the ordering based on a user-specified comparison field. A very handy utility for consolidating data files.

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

Single sided, Single density, Soft-sectored

DISKETTES

Verbatim 5 $\frac{1}{4}$ -inch

\$23⁹⁵ Box of 10

Quantities of 10 boxes (each) \$22.95

Hard-sectored (10-hole), Box of 10 \$26.95

8-inch FLOPPIES

Single-density, Box of 10 \$29.95

Double-density, Box of 10 \$39.95

PLASTIC LIBRARY CASES

5 $\frac{1}{4}$ -inch or 8-inch diskette case \$3.00

50 (5 $\frac{1}{4}$ -inch) diskette file box \$19.95

FACTORY FRESH, ABSOLUTELY FIRST QUALITY

Minimum order 1 box, NO order limit!

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

NEWDOS +
\$69⁹⁵ by Apparat

40 TRACK VERSION \$79.95

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.

MTC QUE Card only \$1.50

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

All products guaranteed for replacement only. Prices, Specifications & Offerings subject to change without notice.

**MOST ORDERS
SHIPPED
WITHIN ONE
BUSINESS DAY**

**QUANTITY
DISCOUNT
INQUIRIES
INVITED**

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

• Add \$2.50 for standard UPS shipping & handling
• \$2.00 EXTRA for C.O.D.
• Ohio residents add 5 $\frac{1}{2}$ % sales tax.



TO ORDER CALL TOLL FREE
1-800-321-3552
IN OHIO call (216)289-7500 (COLLECT)

META TECHNOLOGIES CORPORATION

26111 Brush Avenue, Euclid, Ohio 44132



800730

TRS-80 and Radio Shack are registered trademarks of Tandy Corp.

80 REMARKS

by Wayne Green

"When Radio Shack announced the TRS-80, Ed must have been one of the first to appear at their door to get one."

Here Come de Juge

For many years, one of the top ham stores in the Southwest was Juge Electronics in Fort Worth. Thus, I've known Ed Juge for many years, as a ham and as an advertiser in my *73 Magazine*.

In mid-1975, my frustration with trying to understand and select a computer for handling magazine subscriptions led me to microcomputers. From this interest I developed a plan to put out a magazine for computer hobbyists. Thus was born the idea for *Byte* magazine.

Once I had located someone to edit the new magazine, there followed a frantic five-week period getting the first issue ready to print. Details such as designing and printing the letterhead and envelopes, composing subscription letters, writing possible authors, getting mailing lists from firms in the business, getting in touch with all of the clubs and their newsletter editors, etc., were almost endless.

Then, once the first issue was out, I grabbed a bunch of copies and flew to visit the major firms in the business to show them my new magazine and get their support. I visited Mits, the pioneer microcomputer firm, then Sphere. On my way down to San Antonio to see Southwest Tech, I stopped off in Dallas and drove over to Ft. Worth to say hello to Ed Juge. I talked with Ed enthusiastically about the future and what I saw as an industry which would have to grow very rapidly.

Apparently my enthusiasm did the trick, for Ed quickly sent away for an Altair and started in microcomputing. When Radio Shack announced the TRS-80, Ed must have been one of the first to appear at their door to get one. By this time he was out of the ham business.

The ham business was a real bummer during the 1964-1974 period, as a result of a proposal by the American Radio Relay League to change the ham regulations in a way that would take enormous frequency bands away from most hams. Sales of ham gear dropped to about 15 percent of their previous level and about 75 percent of the ham stores around the country quit the business. Not long after my visit, Ed got fed up with the slow ham sales and with most of the ham manufacturers going out of business (we lost Hallicrafters, National, Hammarlund, Barker & Williamson, Johnson, Harvey Wells, Multi-Elmac, World Radio, Galaxy—virtually every major ham manufacturer) and folded up his ham business. For a while he was manufacturing a fold-away mobile mount for car antennas and do-

ing well. But the micro bug had bitten.

It didn't take very long for Radio Shack to discover this sharp chap right in their backyard. Eventually Radio Shack lured Ed out of retirement and made him director of computer merchandising. That was one of the wiser moves made by Radio Shack. Ed is one of the reasons that Radio Shack has been able to move a bit faster than most of the other firms in the field.

I'm happy to have Ed writing a column for *80* and thus give all of us TRS-80 owners a look at what is happening in that otherwise very secretive Tandy Tower in Fort Worth. It will be a relief to get some honest information on what is happening and what may be in the works. The general tendency of large firms is to deny all rumors up until a new product is ready for sale. This is frustrating, particularly in a fast moving field such as microcomputers.

Tandy in Europe

Just in case you are under the impression that Tandy is not pushing hard in Europe, here is the back cover of their recent catalog distributed in the Netherlands. That price translates to about \$855 in U.S. funds at the

current rates, not a lot more than the U.S. price, considering the problems of shipping, duty, service and other distribution costs.

We stopped to visit a major Tandy store in Rotterdam and sure enough, they had a TRS-80 on display. We talked with them about getting some of our TRS-80 programs translated into Dutch and they put us in touch with a local programmer who was most interested. I think we'll be coming out in one more language in short order, if anyone wants to brush up on his Dutch.

The Belgian price translates to about \$866 at the current exchange rate, again a very reasonable price for the system when you figure all the expenses involved in supporting the system in a small country like that. The problems are somewhat simplified by the use of French in the catalog, but I suspect that most programs are still in English.

As we were driving through a very small town in Belgium, Malmedy, about the size of Peterborough, N.H. (population 5,000), Sherry spotted the Tandy store and we stopped.

We had a pleasant visit with the chap running the store and found that even in a town this small he was selling an average of two or so TRS-80 systems a month! We showed him some of the Instant Software packages we had

Continue to page 11

Tandy's Catalogs Distributed in the Netherlands and Belgium



SPECIAL DELIVERY with EXTRACT

A 100% Machine Language Word Processor

TRS-80® + Electric Pencil® or Radio Shack's Scripsit®

We can't stop improving and expanding the capabilities of your TRS-80®! By using SPECIAL DELIVERY with EXTRACT and either Electric Pencil® or Radio Shack's Scripsit® you can get even more out of your computer. From just one package, you will get all this:

MAILFORM: Create MAILFILE: The ONLY complete name and address list entry/editor program written in machine language. Instant search on any field, complete cursor control, just fill in the form!

MAILRITE: Print letters written with either the Electric Pencil® or Radio Shack's Scripsit® inserting information from a MAILFILE into the letter for personalizing and addressing. You can send a personalized letter to one person then a different personalized letter to a second person with true typist quality from your fine printer. Features: Indents, Underscore, Bold Type, End of Page Stop,

Address Envelopes, unlimited insertion from address list and More!

EXTRACT: Take out information from MAILFORM, the machine language mailing list. Find the names you need by Zip Code, Street Address, Gender, Age or any other way!

SORT: In-Memory sort on an entire address list using any field as the key. This program can sort an entire list in a matter of seconds!

LABEL: Prints labels from MAILFILE.

CONVERT: Make MAILFILE from RS mail list.

SPECIAL DELIVERY will run on your TRS-80® with TRSDOS,* NEWDOS* or any other TRS*-like DOS.

If you bought SPECIAL DELIVERY from us, send us the disk and we will update it to include EXTRACT for \$25. If you haven't already taken advantage of our SPECIAL DELIVERY program, we'll send you the complete program including EXTRACT for just \$125 (Disk). We can also send you the Electric Pencil® for \$150.

MOD II version now
available. Intro. price
\$275.00



Software Etc . . .
1839 Chamberlain Drive
Carrollton, Texas 75007.
Phone Orders: (214) 492-0515

Demand a Demonstration from your local Dealer or write for a brochure of our complete line of fine software.

INSIDE 80

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

"To those among you who didn't like TRS-80's modular design, and said we aren't responsive to our customers—may you bite your tongues."

Since I promised last month to tell you about some new products, you're expecting me to finally admit the TRS-90 rumor, aren't you? We heard so much about that here in Fort Worth that we *almost* used TRS-90 as a code name for one of our new computers.

TRS-80 Color Computer

I'm writing this prior to any announcements; bear this in mind when I say, we are about to announce our new TRS-80 Color Computer! The Color Computer attaches to any color TV—yours or ours. A video modulator is built-in, and radio frequency interference (RFI) shielding is excellent.

The screen is 16 lines deep by 32 uppercase characters across.

Color graphics are available in five formats from 32 times 64 pixels with eight colors, to 196 times 256 pixels with one color plus background. The Color Computer also offers sound.

The keyboard has 53 keys. Although they are smaller than those on professional keyboards, they are in the normal staggered typewriter layout. The processor is an MP 6809E.

The low-end Color Computer comes with 4K

RAM and an 8K ROM BASIC. Two joystick ports and an RS-232-C are built-in. Although a recorder is optional, a cassette port is provided for program and data storage at 1,500 baud (not compatible with our non-color TRS-80 software). There is also a port for ROM plug-in Program Paks and GO programs, which can include up to 16K of additional ROM.

Expansion options will include up to 16K RAM, which is required for some of the higher resolution graphics modes, a 16K extended BASIC, the joysticks, communications, printers and a disk drive.

Everything won't be available immediately. For example, the extended BASIC is expected in late November, and the disk drive in early 1981. Joysticks should be available by press time. The existing Quick Printer II already has a serial interface, and its 32-character lines match the Color Computer's format.

TRS-80 Color BASIC is more powerful than Level I and compares favorably with Level II. It includes commands for input from the joysticks, for color video, and for sound output. PEEK, POKE and USR(0) are included for the serious programmer. Accuracy is to nine digits. String handling, arrays and func-

tions (ABS, INT, RND, SGN, SIN, SQR) are also included.

Besides higher resolution in graphics, TRS-80 Extended Color BASIC adds rotating and zoom movement to your graphic blocks. You'll also get editing, tracing, specific error messages, user-definable keys, additional intrinsic functions and real-time clock access from BASIC.

I'll bet about now you're saying to yourself, "Just what the world needs—another thousand-dollar color computer!"

Not quite. The basic computer will sell for only \$399. The 16K RAM kit is \$119, and the Extended ROM for another \$99 plus installation charges. In late November a 16K Extended Color Basic computer will be available.

Because the new color computer utilizes a different kind of chip in ROM, it requires its own software. Initially, eight ROM Program Paks will be available from Radio Shack: Personal Finance, Quasar Commander, Checkers, Chess, Music, Math Bingo, Pinball and a diagnostic pack to check memory and functions. Several more are being developed.

The Model III

The smoke from our Color Computer did a fair job of covering up another new project. To those among you who didn't like TRS-80's modular design, and said we aren't responsive to our customers—may you bite your tongues.

There is now a bridge between the Model I and Model II. There is now a TRS-80 Model III!

A single housing contains a 12-inch high-resolution video monitor, 65-key professional keyboard with a 12-key datapad, computer and power supply (with only one power cord).

Model III will expand quite far without going outboard. You can start with the familiar 4K, Level I system at \$699, which is software compatible with existing Level I cassette programs. (The recorder is not included.)

Additionally, Model III Level I includes print commands to take advantage of Model III's parallel port. The processor is a Z-80, at 2.0 MHz.

One kit can be used to upgrade Level I to 14K extended Model III BASIC and increase 4K RAM to 16K. From there, RAM increases in 16K jumps to the maximum of 48K—all internally.

Model III BASIC offers two cassette speeds: 500 baud which is compatible with existing Level II programs; and a new reliable 1,500 baud mode. An expanded character set including upper- and lowercase is standard, as is a screen print function in ROM. Also, the

TRS-80 Color Video and Model III



BREAK key will now exit from a hung-up LPRINT or CLOAD—or any other lock-up.

There is a real-time clock, accessible from Model III BASIC or machine language. Also, an RS-232 board can be added inside the Model III.

Two internal disk drives can be added. The 5¼-inch drives are 40-track double-density drives, giving 178,944 bytes per data diskette (about 134K user space on drive 0). Two more drives can be added externally, for a total of four, and almost 600K of on-line storage. With two drives, single-density Model I disk software can be converted to Model III disks.

All Radio Shack software, and most non-Radio Shack software for the Model I should be compatible. Three Model III versions will be sold: the 4K Level I for \$699, the 16K Model III BASIC for \$999 and the 32K two-disk RS-232 system for \$2495. Other system configurations must be reached by installing upgrade kits.

Model III TRSDOS will contain all of the features of the Model I and many of those of the Model II DOS. It includes a BUILD command to create a DO file for automatic power-up command sequences. HELP gives you detailed instructions on any specified command. SETCOM initializes the RS-232 port, and CONVERT reads a Model I disk and converts its programs to a Model III disk and Model III format.

We've gone overboard to maintain compatibility with Model I programs. We also kept Model I's 16-line by 64-character video format, in the interest of compatibility. There are strong arguments for others formats, but we feel the compatibility of existing software is most important. We expect some vocal objections, but hope our choice reflects the choice of the majority.

The Pocket Computer

This year at Radio Shack good things are coming in threes. Our third new product is the TRS-80 Pocket Computer! That's right—a pocket-sized TRS-80.

It programs in BASIC, has a 24-character liquid crystal scrolling display, features ten-digit numeric accuracy, with exponential notation to plus or minus the 99th power of ten. It includes 1.9K of memory for program and data storage, which stays live even with power switched off. Program steps are stored in a compressed format that packs more commands into available memory than you will believe!

An automatic power saver feature turns the power off after 7 minutes of inactivity in case you have forgotten. An optional cassette interface allows external program and data storage.

The keyboard contains 57 keys, including an alphabetic keyboard in typewriter format, numeric keys in calculator layout and special functions. Eighteen of the alphabetical keys can represent reserved functions when used with the SHIFT key. Four type 675 mercury batteries (non-rechargeable) provide a nominal life of 300 hours.

The Pocket Computer can be used like a calculator. Formulas are input using parentheses and symbols, as you would on paper, rather than one operation at a time in typical calcula-



TRS-80 Pocket Computer.

tor mode. After an equation is solved, it can be recalled and edited.

We have seven programs already available for the Pocket Computer—with more to come. Or you can write your own BASIC programs. The Pocket Computer contains 11K of ROM, including a 7K BASIC and 4K monitor.

Pocket Computer BASIC is much like Level I. But it includes 15 arithmetic functions and no graphics. It allows limited string variables (up to seven characters), and limited string and numeric array variables.

The memory, which holds 1424 steps, is automatically partitioned for program and data storage. There is a 26-data element memory

and a 48-step reservable memory for storing frequently used functions. This six-ounce beauty is a true TRS-80—not just a programmable calculator with alpha capability. When you've tried one, I predict you'll give your programable to "Junior" to play with!

Well, I hope I've excited you. Obviously Wayne doesn't want me taking up the whole magazine.

Let me close by saying, once again, that as Radio Shack brings out new products, we don't intend to forget purchasers of our first TRS-80s. We intend to continue to support all models with new software and hardware products. ■

80 REMARKS

From page 8

for his system and he felt that if he had them available to help him, his sales would increase dramatically. Tandy stores are not yet permitted to sell any products not stemming from Tandy. ■

Twentieth Anniversary Issue

With the twentieth anniversary issue of *73 Magazine* (my first publication in the ham radio field) going to press, I find myself reflecting over the ups and downs of the past twenty years.

My ham magazine, like *80*, is for me a labor of love more than a way of making money. Amateur radio is beginning to grow again and there are some exciting prospects. Many of the changes I see coming in radio are tied to microcomputers and the circuits which microelectronics make possible. For those of you who have not yet been bitten by the hamming bug, I might explain that most of the important inventions and pioneering developments in radio communications have been made by amateurs, and there is no reason why this won't continue.

The list of ham developments is a long one—slow scan television, virtually every radiotele-type circuit being used today, circular anten-

nas, etc.

The pioneers of commercial television were amateurs too. I worked in the TV broadcasting industry back in the early days (1948-1950) and many of the people I worked with were graduates of W2XEL, an amateur television station out in Queens, NY.

Today, we are in the early days of microcomputers, and we are seeing most of the inventing and pioneering again being done by amateurs. This is one of the exciting aspects of this magazine. It is a medium for keeping everyone in touch with the latest ideas and the state of the art. People who depend on reading books are a year or more behind what is happening because it takes that long before books are published. Meanwhile, the art is staying ahead of the books and is reflected in magazine articles.

The art, in our case, is microcomputing—its hardware and software. In the hardware line we see improvements in the basic computer unit (CPU), in memories, in mass storage equipment such as disks and various tape systems, bubbles, in printers, modems, control systems. In software we are seeing continuous improvements in languages, in operating systems, and in applications programs of all sorts.

The basic purpose of *80 Microcomputing* is to let you know what is going on in all of these aspects. We aim to make the material as understandable as possible, and we are making a major effort to see that we have plenty of information to help the rank beginner grasp the fundamentals. But we also want to act as a medium for the front runners to communicate and let all of us know what is going on and what is. ■

80 INPUT

"...if you have a new set of ROMs at power on... The computer will ask MEM SIZE instead of MEMORY SIZE."

Shack Service

I was amused by a recent local advertisement for Radio Shack Computers that said, "We service what we sell." As a dealer in business systems, we are naturally interested in that line of equipment and purchased a Model II, primarily to get acquainted with it and find out just what using and supporting it involved. We found out.

First of all, it was DOA from a bad memory chip. We broke the seal as part of our self-imposed indoctrination and luckily had a chip on hand from a previous job. The next failure involved the CRT sweep circuitry, and we dug in to it again.

It turned out that the part we suspected (horizontal drive amplifier) had a house number that did not cross-reference to anything. It was then that we learned that Radio Shack stores are not permitted to stock parts for these computers, and that Tandy's standard advice is to send the entire machine to the nearest service center, roughly 600 miles away. That center verified that they were not authorized to service boards or sell parts.

Another call on the hot-line gained us the names of three other cities having service centers, but no names, addresses, or phone numbers. We did locate them through phone directory assistance, and eventually found one that would accept a board for repair.

The repair was prompt and well done, at a reasonable price. The fix, as nearly as we could determine, consisted of changing the value of several resistors. This apparently prevents instability when the drive is low, which was the case in our machine.

In summary, we can only tell our customers that yes, Radio Shack does have a service capability, but it is somewhat difficult and time-consuming to obtain when you need it.

*E. G. Brooner
Lakeside, MT*

Satisfied Subscriber

I am just writing to you to express my gratitude for your magazine. It is a truly superb publication, and I plan to subscribe to it for a long time to come. We get a few other TRS-80 related publications, but yours is the best.

Just the other day I received as a gift the Radio Shack Editor/Assembler and I have started learning assembly language.

I looked over my first issue of *80 Microcomputing* and was again amazed at the amount of useful information supplied to the reader. You

wrote in that issue, "...The editor of *80 Microcomputing* is not trying to impress you with his great knowledge of computers, I just want to provide you with entertainment, a way to learn more about your system, a way to save money on developing it." I believe you have done just that. Please continue to publish the fantastic magazine that you do.

*Brad J. Richter
Ridgefield, CT*

Multiple INKEY Entry

Entering more than one digit or character by means of the regular INKEY routine is not possible, since the system reacts to the last character entered. Using the INPUT routine displays a query symbol and also requires ENTER to be pressed: In my opinion, this is for the birds in any reasonable operator/machine interface.

The following routine permits two characters to be INKEYed:

```
100 GOSUB 500
110 BS = AS:AS = "" :PRINT BS:
120 GOSUB 500:PRINT AS
300 AS = INKEYS:IF AS = "" THEN 500 ELSE RETURN
```

Line 110 stores the first INKEY as BS, and resets AS to a null. This requires that two characters *always* be entered, e.g. 01 for 1, etc. The routine can be expanded for additional input if required.

The input can be restricted to digits only by modifying line 500:

```
500 AS = INKEYS:IF AS = "" THEN 500 ELSE IF ASC(AS) < 48 OR ASC(AS) > 57 THEN 500 ELSE RETURN
```

Any non-digit entry will be ignored.

*Michael Barlow
Pierrefonds, Quebec
Canada*

New ROMs

Did you know that Radio Shack has new ROMs in the latest models of the TRS-80? In case you don't I will tell what little I know and problems and fixes I have found.

First, Radio Shack did a software fix for the cassette loading problems. It works wonderfully!! Second, they added a control key which is the shift, down arrow. Therefore, shift, down arrow G will send a CHR\$(7) or what is known as a bell. This works for all 26 keys. However,

if you are using NEWDOS the shift, down arrow no longer works for the last program line, but shift, down arrow Z will, for the old code for shift, down arrow was 26.

You can determine if you have a new set of ROMs at power on. The computer will ask MEM SIZE instead of MEMORY SIZE. The second message will use R/S for Radio Shack. The keyboard will also have the new keyboard which is a wonderful improvement in itself.

I hope this information may be helpful to you. Also page 0 calls are all the same for other calls I don't know. Radio Shack will only say the calls listed in the editor/assembler are in the same place.

*Chess McKinney
Hermitage, TN*

Scriptit: Round Three

Perhaps I should not say anything, not having tried the Electric Pencil WP program, but since I saved about \$50.00 by buying Scriptit, I figure I have two cents I can spare to stick in here.

In his letter to *80*, Peter Brennan seemed somewhat incensed at Scriptit for a few of its shortcomings. Let me simply remind him in a blanket approach that Pencil was not written for the TRS-80. It is available for many machines and has probably undergone changes (for the better) as it metamorphosed.

More specifically, let me address myself to what he mentions as defects and see if we can't shed some light on them.

I am using Scriptit with a Teletype 43 until my 737 arrives. Mr. Brennan is correct, the program assumes the printer will supply a line feed with the carriage return. The only formatting problems I have run into using my 43 is that double spacing requires using the LS=3 command rather than LS=2.

Yes, it does play havoc with page length, but, and perhaps there is some other difference between the printers we use, I find that the page length setting should be full scale at 90, not the 75 he suggests, and the bottom margin somewhere around 86, again, not the 70 he mentions.

The paragraph formatting is simply set to the same dimension as the line space. Granted, one must then print the text using the (P)ause option, but I picked the printer, as I assume he did, and I knew full well what its limitations were in regard to its compatibility with my TRS-80 and the printers Radio Shack suggests for it.

I also have those sheets of paper Tandy claims will enable Scriptit to use "my own

driver." I also have no idea of what to do with them. I think his condemnation of Tandy might have been modified to read, "You should have bought a Radio Shack compatible printer," and in this instance they are right. You don't spit in the wind and you don't pull the mask of the old Lone Ranger. That only makes sense.

I can't vouch for the ability of the Pencil to keep up with the pace of typing, but it's definitely not true that Scripsit will keep up with a fast typist. I am not the fastest, but there are times when the program will not keep up with me, and times, since it allows continuous character print by holding down a key, that I get multiple characters when I don't want them.

I have typed some 90 pages using Scripsit, which makes me no expert in its operation, but I think the bulk of Mr. Brennan's comments might be clarified by concentrating on using Scripsit and discovering its finer points, rather than trying to play it off against Pencil. I would have rather he mentioned that selecting a particular spot in the text for printing requires re-entering the format instructions. That's an inconvenience, but that's about the only thing I can come up with that bothers me.

Scripsit is easy for me to use. After the first half hour of the tutorial cassette Tandy supplies I shut my deck off and started using Scripsit with the foldout of operating commands in front of me. I guess the decision as to which program depends on the matter of application, of use and of oneself.

William O'Brien
New York, NY

Micro Mystery

I am returning the Microsoft editor/macro-assembler/linkage-editor to my Radio Shack dealer because of totally inadequate documentation.

There is absolutely no discussion of concepts. How is the average Level II BASIC midnight coder supposed to know the difference between an assembler, a compiler, and an interpreter? How is he/she supposed to know what a macro is? How is he/she supposed to know the power and flexibility of a linkage-editor?

Being a multi-lingual independent commercial programmer, I have worked on most 3rd generation computers, including everything made by IBM. I am used to IBM manuals that deal with concepts prior to discussing bit-fiddling. Microsoft people have obviously never seen an IBM manual, which has wonderful little aids like examples, concept discussions, sample programs, graphs, hints, references to other manuals, etc., all of which are totally lacking in Microsoft's piece of literature which I am hesitant to call a manual.

User response prompting is non-existent. When the editor, assembler, or linkage editor are executed, they simply display an asterisk on the screen. If I wrote programs like that in industry, I'd be fired on the spot. How about prompting the user to enter the source file name, the object file name, the load address, the number of object modules to be linked, do I

want a cross reference, etc., etc., etc. I'm totally overwhelmed by their kindergarten code.

Can this manual really be from the same folks who gave us the Level I and Level II (w/o index) manuals? Why didn't Microsoft contract with David Lien to write their assembler manual instead of the incompetent trainees they used?

Dave Westfall, Pres.
Aries Computer Software, Inc.
Farmington Hills, MI

You are right, of course. I would perhaps be more critical of Microsoft if I had had any success in the last four years in getting an article written for any of my magazines which covered the material you are asking about. I have been promised dozens of times by writers that they would do this... and so far not one promise has been kept.

The difference between an interpreter and a compiler is a very difficult concept for both beginners and intermediate computerists.

This applies to macro anything, linked editors, and the lot. With the execution of the instructions which come with the Level I TRS-80, I would be hard put to find with pride to good documentation in our field. I can point to any number of ghastly disasters.—Wayne.

Tired Memory

If you're tired of continually having to re-serve memory for your commonly used machine language routines, or if you have more than one and have to figure out how much to reserve, you can let the 80 do all that for you by using the method shown in the listing below.

```
50 CLS
200 DEFINT A,I
300 DIM A(8)
500 FOR I=0 TO 7
550 READ A(I)
700 POKEVARPTR(A(0))+I,A(I)
800 NEXT I
1000 DATA 62,49,50,32,62,195,154,10
1200 DEFUSR = VARPTR(A(0)):X = USR(0)
1400 AS = INKEYS:IF AS = "" THEN 1400:ELSE STOP
```

Simply answer the MEMORY SIZE? with an <ENTER> and append the appropriate data statements to your program. The data in the program (line 1000) prints a 1 in the center of the screen.

The key to the program is in line 700 where the data in line 1000 is POKEd into memory, starting at the location where the array A begins. By setting the DEFUSR to that starting location and executing the USR, the 80 will perform the machine language steps and return to your BASIC program. For your routines, just replace the data statement with your data and change line 500 accordingly. Line 1400 was inserted so you can admire your handy work. Note that you can have several machine language routines.

A word of caution is needed. Since the 80 has a habit of rearranging its memory from time to time, the starting location of the A array may change. For this reason, it is necessary to reset DEFUSR each time the USR is called. I would

recommend carrying statement 1200 as a compound statement any time you need your machine language routine.

A. W. Maddox
Creve Coeur, MO

Simple Debounce

In the April issue of the magazine, you have an article written by C. W. Anderson which shows a relocation routine for the KBFIX routine. In this article the author makes a request for a debounce routine which only contains relative jump instructions. For some months now I have been using a debounce routine that can be directly located anywhere in memory, but which normally will not require relocation.

In my TRS-80 which does not have an expansion interface, the reserved RAM area from 405E to 407F does not seem to be used by any of the routines in ROM. Thus if a routine can be fitted into this area, then it can remain untouched during execution and the addresses in the high end of RAM can be used for other purposes. Since KBFIX apparently requires 55 bytes it won't fit in here, but there are fortunately less memory-consuming methods available. The method I am using requires 22 bytes of permanently allocated RAM, and will therefore easily fit into this area.

The extra instructions required to initialize the routine are only used once, and can therefore be placed in an area of RAM where they may be erased at some later stage. The most convenient area to use for this purpose is the I/O buffer area from 41E6 to 42E6. As long as the buffer is not used during the initialization process, the area is perfectly safe to use for such purposes.

The debounce routine may seem a little primitive, but during several months of use it has not let me down once. During normal processing it is even slightly faster in execution than the routine in ROM since it does not require as many instructions to determine whether the keyboard status has changed. When the status does change, however, a delay loop is invoked causing a delay in processing.

I can add that when I use the TRS-80 without the routine, there will be a repeated character on nearly every line, despite clean keyboard contacts.

The 22 bytes of permanent code are as follows:

```
406A 118038 LD DE,3880H
406D 213540 LD HL,4035H
4070 NXTCH:
4070 CB03 RLC E
4072 F8 RET M
4073 2C INC L
4074 1A LD A,(DE)
4075 AE XOR (HL)
4076 28F8 JR Z,NXTCH
4078 0605 LD B,5
407A CD6000 CALL 0060H
407D C3E303 JP 03E3H
```

The value loaded into B in line 4078 could possibly be changed to 4, 3 or 2 thus reducing the delay time, if this still provides adequate debounce.

The only purpose of the initialization routine is to put the starting address of the debounce routine into the keyboard DCB. Unfortunately this cannot be done in BASIC with POKE since the address is in constant use during execution and should therefore be done in an uninterrupted sequence of instructions or in a single instruction. The following lines can be used, at the same time setting the USR address back to the default value.

```
42D0 216A40 LD HL,406AH
42D3 221640 LD (4016H),HL
42D6 214A2E LD HL,2E4AH
42D9 228E40 LD (408EH),HL
42DC C9 RET
```

I use a short BASIC program to POKE these values into memory, call them with a USR(0), and then issue a NEW statement. I was also pleased to see in the April issue that others have found out that BASIC can be used to convert values from hexadecimal to decimal for the POKE statement (MACROPOKE monitor). It certainly saves a lot of conversion work and potential errors. Actually I use a format which includes the address at the beginning of each line, with the data bytes following, for example:

```
DATA 42D0,216A40 221640 214A2E 228E40 C9
```

Intervening spaces can be used to separate the individual instructions, making them even easier to interpret visually.

Obviously, since I have neither expansion interface nor a disk system, I cannot guarantee that the area used for the debounce is also unused when these are added, but for users without these extras (presumably still the majority) it should provide a trouble-free debounce that doesn't require MEMORY SIZE or interfere with other machine language routines.

Arne Rohde
Pilevej 31
7600 Struer
Denmark

Box Confusion

Thought your readers would like to know changes necessary to make "Ball Box" (April 80) work in Level II, since they are elusive and not covered in text.

- 1) PRINT AT in Level I can be followed by a comma or semicolon. PRINT@ in Level II must be followed by a comma, NOT a semi-colon. Therefore, add a comma before the semi-colon in lines 2010, 4900, 4920 & 4940.
- 2) POINT returns -1 in Level II, not 1 as in Level I. Therefore, add a minus sign before 1 in lines 4320, 4330, 4410, 4420, 5020 & 5120.
- 3) No graphics wraparound in Level II, so change line 5001 to Y=RND(48-4)+2 or you will get a FC (function call) error, line 5020 frequently (whenever Y>47).

Fred Blechman
Canoga Park, CA

Like Father, Like Son

I am 13 years old. I think that *80 Microcomputing* is one of the best books about microcomputers. My dad subscribes to it, and we both enjoy it.

I like the articles and columns that you have

printed. It has very interesting stories and programs, we both read and like this book very much.

Thank you for making such a fine product.

Martin Eisenhower
Margate, FL

DEBUg

Error in SCRNPRT

A small error in my SCRNPRT program in the May issue of *80 Microcomputing* got past me and effectively disabled the instruction that fools the computer into thinking that its RAM ends just below where SCRNPRT starts. When working properly, this instruction both protects the program against TRSDOS Disk BASIC's usage of the top few bytes of memory and obviates the need for answering MEMORY SIZE. Unfortunately, I left off the H in the instruction, so the program attempts to change a ROM decimal address instead of the correct RAM hex address. This would not have caused a problem in the program as printed, since it was assembled lower in RAM, but would cause a conflict with BASIC if the program were assembled at the very top of memory.

To correct the error, change the fourth through sixth bytes of the assembled program to 224940 instead of 22D10F, and change the corresponding instruction to read LD (4049H),HL.

My apologies to anyone who may have been inconvenienced.

Louise H. Frankenberg
Pasadena, MD

More Story

The addendum at the end of the text, "Get the Whole Story" (July 80) is not clear. The programs printed in the article are current, except for the Order Verification Program (Listing 1). This program requires frequent price updates. The cassette/wafer offered for \$25 includes the latest high-speed order verification with the prices in data in effect at the time of shipment. Those who order the whole package for \$25 may receive updates of the order verification program on cassette or wafer for \$10.

Program Listing 3, Bookkeeper, has an omission that will create a serious error. Line 340 should have:J1=0..... added.

I'm also including a suggested correction to the monthly Gross Profit Statement (Listing 4), which will allow a much simpler method of providing a printer option.

With over 160 magazine articles published, I've never had such enthusiastic reader response as I've had to this one!

Fred Blechman
Canoga Park, CA

```
CHANGE LINE 10 TO.....CLS:PRINT:INPUT"PRINTER? (Y/N)":A$
ADD LINE 11.....IF A$="N" POKE16423,4
ADD LINE 12.....CLS
CHANGE END OF LINE 31 TO.....GOTO99
DELETE LINES.....50,60,70,75,86,90,92,93
```

```
IF YOU ANSWER N TO THE QUESTION IN LINE 10, THE COMPUTER
WILL IGNORE ALL LPRINT STATEMENTS, AND YOU'LL HAVE SCREEN
DISPLAY IN THE ORDINARY WAY. TO ENABLE LPRINT AGAIN, JUST
POKE16423,5. NOTE! IF YOUR PRINTER NEEDS A SOFTWARE
DRIVER, PRINT PEEK(16423) AND NOTE THIS VALUE WITH THE
PRINTER DRIVER ACTIVE. THIS WILL THEN BE YOUR POKE VALUE
TO ENABLE PRINTER AFTER DISABLING WITH POKE16423,4 .....
```

Monthly Gross Profit Update

QUALITY

THAT'S WHAT SEPARATES THIS PRINTER FROM THE TOYS



MICROTEK MT-80 SOLID VALUE FOR YOUR DOLLAR

The market is flooded with low-cost printers that look and last more like toys.

The Microtek MT-80, our versatile alphanumeric line printer, has a high quality print mechanism that gives you solid value for your dollar. It has been designed with a superior brain resulting in more advanced features and more dependable performance. Our printer is so reliable that we offer you an incredible 365 days warranty.

We stand behind every printer we make because we build quality into each one. So stop tinkering with toys and get serious. Demand 100% value by specifying the MT-80.

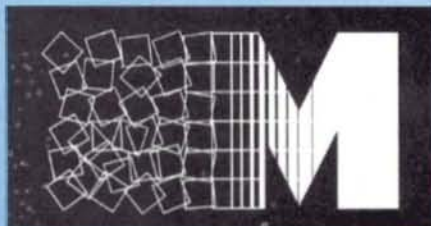
OUR UNIT PRICE

\$795 Parallel

\$895 Serial (RS-232C)

LOADED WITH INNOVATIONS

- 40, 80 or 120 columns (software selectable)
- Non-thermal paper, pin feed
- 125 CPS, 70 lines per minute
- 9 x 7 dot matrix
- Vertical format unit
- 96-character ASCII (upper and lower case)
- Adjustable forms width to 9½"
- Parallel and serial (RS-232C) interfaces available



MICROTEKinc. ✓360

For more information contact:
MICROTEK, Inc.,
9514 Chesapeake Drive,
San Diego, CA 92123
Tel.(714)278-0633
TWX 910-335-1269

Disgruntled Manufacturer

There might have been some confusion about the thrust of John Acres' article, "Saving Money," that appeared in the July issue of 80. The piece raised havoc at Microtek in San Diego.

Acres' piece in no way purported to be a review of Microtek's product or of the Percom drive mentioned. It seemed more of a caution to enthusiastic hobbyists not to let their affections for the hobby elude their better judgement. The Moral: Always read the manual.

Though 80 does not intend to shy away from controversy, we regret the lost energies on an article that apparently was misconstrued by some readers. The intent of the Acres article appears to our editors to satirize his own electronic abilities or lack thereof.

To help set the record straight, we're reprinting the original correspondence from Acres to Microtek, forwarded to us by Dan Obed, Microtek's president.—Eds.

Microtek:

Enclosed are the remains of a once-proud

Microtek printer that I killed by my own hand. Bad as that may sound, I am also responsible for the death of two Radio Shack disk drives, one Percom TFD-200 disk drive, a TRS-80 expansion interface and—perish the thought—a TRS-80 keyboard unit.

It was not cold-blooded murder though, it was an accident I swear! In my haste to see the Microtek unit in action, I used a Radio Shack number 26-1401 printer interface cable—the one normally used with the Centronics 779-2.

How was I to know that the Microtek has a separate signal and chassis ground (without having read the manual)?

Unfortunately, the interface cable mentioned above connects pin 17 to the signal ground of the TRS-80 expansion interface while deviously allowing the printer to function, giving no indication of the danger lurking ahead.

Although my intentions were good, I was overcome with the lust of a working system and—in a moment of insanity—disconnected the three-prong grounded ac plug of the TFD-200 from ac power. Somehow in that mysterious electronic twilight zone when an ac plug is somewhere between con-

nected and disconnected, a ground loop (or something!) got onto signal ground and caused 5 ICs in the TFD-200 to explode and several pc traces to vaporize.

Similar damage was done to the TRS-80 components. As for the Microtek printer—alas—it too had its luscious circuitry violated. The pc trace to pin 17 of the parallel interface connector evaporated. And that's not all. The 8155 seems to be very ill. When connected, it pulls the +5 volts to a helpless 3.2. Whatever ails it is contagious. When a known healthy 8155 is plugged in, it too soon develops identical symptoms. Without the squiggly diagrams outlining circuitry connections, further surgery on my part is fruitless.

I appeal to you then: Ye meadow, laid-back gods of California heal this printer and return it to me as quickly as possible. Charge me what you will—but do not make it over a hundred dollars without talking to me first.

If they have not been sent already, please send along a ribbon and spools. They were not included with the printer originally.

John Acres
New Palestine, IN

80AID

Teletype Interface

I have an old Model-15 Teletype Printer (with a 5-bit code and 60mA current loop) that I would like to use with my Radio Shack TRS-80 Model II. Unfortunately, Radio Shack has nothing that could or would help me concerning this type of operation. Please! Can you help me?

Milton J. Belle
2008 Wayside Street
Compton, CA 90222

Friden Schematic

Could you please print the following inquiry wherever it is appropriate?

I am looking for a schematic or information on the Friden Flexwriter Programmatic Typewriter. I have a model FPC-5P which has a 5 level baudot paper tape punch/read assembly. I would like to interface this for computer or RTTY.

Robert G. Gilman
Box 103
Hellertown, PA 18055

Cassette Confusion

I have a problem with which I hope you, your staff or 80's readers could help me. I have a copy of the excellent tape Micro Music. Unfortunately, it is very annoying to have to pull the cassette plug out, plug it into a speaker, then plug it into the cassette player to load another piece of music.

Since I own an expansion interface, I know that you can have two cassette recorders attached, and if you store one in address 37E4H all I/O will be done on cassette two. This works great with Babybeep (80, April, 1980), but it will not work with Micro Music.

Since I know little Assembly Language I can't change this. I would like to be able to load the data on cassette one and play it out of cassette two. Can this be done? If so, I would like to know about it.

Also, if anyone knows how to put any Radio Shack machine language tape on disk, I would appreciate it if he would drop me a line.

Tarus P. Balog
Asheboro, NC

Morse Code Mod

My Morse Code program in your July 1980 issue is correct for TRS-80s without the Radio Shack E-Z cassette load modification. This modification is installed in all TRS-80s sold after early '79 and was made available for no-cost installation in mid '79 to all earlier models. If you have this modification installed, change the following eight lines to the Receive Mode section to read:

```
1290 IFA<200 .....
1310 IFA>200 .....
1330 IFA<200 .....
1360 IFA>200 .....
1380 IFA>200 .....
1410 IFA>200 .....
1430 IFA>200 .....
1470 IFA>200 .....
```

A special thank you to Gene Steele K5EVE, in Orangefield, Texas for this suggestion. It has been mailed out to all the 2000+ purchasers of the W4UCH TRS-80 Morse Program and should prove useful to your readers that have the E-Z cassette load modification installed.

Also, users should be reminded that a minimum of one volt peak-to-peak audio is required during receive without any RFI (radio frequency interference) going into the cassette input line from the station receiver, as the program obviously cannot discriminate between a valid Morse code signal and interference from the TRS-80. Good quality coax cable and a remote antenna at least 60 feet away from the TRS-80 is an absolute must.

Robert M. Richardson
Chautauqua, NY
Input to Page 40

slaving too long over a hot computer?



**AUTOMATED
SIMULATIONS**

The Temple of Apshai

First in the *Dunjonquest*TM series. Undertake heroic acts within a labyrinth filled with treasures and fantastic monsters who guard these treasures and move in real time. The Book of Lore (included) fills in the background and describes the appearance of the temple. Over 200 rooms and 30 monsters. There are 16 million kinds of characters! The best of the dungeon computer games.

For TRS80 Cassette: 16K, Level II; Disk: 32K, TRSDOS • Apple Cassette: 48K Applesoft in cassette or in ROM; Disk: 48K Applesoft in ROM • Pet Cassette: 32K, old or new ROMs.

\$24.95 cassette • \$29.95 disk

Starfleet Orion

Fight space battles in your living room with 12 game scenarios (data files) using 2 to 15 spacecraft. Infinitely expandable, invent more game versions of your own. For 2 players. Includes Battle Manual and Ship Control Sheets.

For TRS80 Cassette: 16K, Level II; Disk: 32K TRSDOS • Apple Cassette: 16K or 32K, Integer BASIC in ROM; Disk: 32K, Integer BASIC in ROM • Pet Cassette: 8K, old or new ROMs.

\$19.95 cassette • \$24.95 disk

The Datestones of Ryn

Dunjonquest #2. Recover the datestones from the rogue Rex the Reaver and his cutthroats — who've stolen the stones from the calendar — before time runs out. Competitive scoring system: How well can you do compared to other players?

For TRS80 Cassette: 16K, Level II; Disk: 32K, TRSDOS • Apple Cassette: 32K Applesoft in ROM or 48K Applesoft on cassette; Disk: 48K Applesoft in ROM • Pet Cassette: 16K, old or new ROMs.

\$14.95 cassette • \$19.95 disk

Rescue at Rigel

New! Brings the *Dunjonquest* series to the final frontier. As Sudden Smith, with force shield and power gun, you make your way through several levels and scores of rooms to find and beam to safety the prisoners held by the evil High Tollah. Quickly, before your power pack dies and the Tollah and his minions can get to you!

For TRS80 Cassette: 16K, Level II; Disk: 32K, TRSDOS • Apple Cassette: 32K Applesoft in ROM or 48K Applesoft on cassette; Disk: 48K Applesoft in ROM • Pet Cassette: 16K, old or new ROMs.

\$19.95 cassette • \$24.95 disk

then it's time for a fun break!

TRIPLE WARRANTY

10 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 Defective warranty: Cassette not functioning within 30 days of receipt? Return it to us and we'll exchange it. No charge, of course.

forever Limited lifetime warranty: No matter what happens to your cassette: 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.

We believe that computer games should be fun, challenging, intellectually stimulating... and provide you with many alternatives and ways to affect the outcome. So our games are more complex in planning your playing strategy. But not in the mechanics and rules of play. With all these games, you take command. You determine the course of history.

Invasion Orion

Pit your skills against the computer! Same game system as "Starfleet Orion" but you can play it solo. 3 skill levels; the computer plays either side and takes care of the details. It has 10 fictional scenarios, 30 ship types, and 3 weapon systems.

For TRS80 Cassette: 16K, Level II; Disk: 32K, TRSDOS • Apple Cassette: 32K Applesoft in ROM; Disk: 48K Applesoft in ROM • Pet Cassette: 16K, old or new ROMs.

\$19.95 cassette • \$24.95 disk

Morloc's Tower

Dunjonquest #3. You'll find 3 kinds of rings, a magic sword, 2 amulets, 6 or so other treasures, 30 rooms, 18 real-time command options... and a dozen types of monsters including the heinous Morloc. Easy to learn, a challenge to master. Includes game program, 1.2 KB data file, 16 page manual.

For TRS80 Cassette: 16K, Level II; Disk: 32K, TRSDOS • Apple Cassette: 32K Applesoft in ROM or 48K Applesoft on cassette; Disk: 48K Applesoft in ROM • Pet Cassette: 24K, old or new ROMs.

\$19.95 cassette • \$24.95 disk

TO ORDER:

Master Charge or Visa card holders: charge these to your credit card. Just call the appropriate toll free number: (800) 824-7888, operator 861.

In California: (800) 852-7777, op. 861.

In Hawaii or Alaska: (800) 824-7919 op. 861.

Or use the handy coupon:

Automated Simulations

Department OM2

P.O. Box 4247

Mountain View, CA 94040

AUTOMATED SIMULATIONS

Please send me the following games:

Cass.	Disk	Game	
___	___	Temple of Apshai	\$ _____
___	___	Starfleet Orion	\$ _____
___	___	Invasion Orion	\$ _____
___	___	Datestones of Ryn	\$ _____
___	___	Morloc's Tower	\$ _____
___	___	Rescue at Rigel	\$ _____
Plus Shipping & Handling			\$ 1.00
Sales Tax*			\$ _____
Total			\$ _____

My computer is _____

I enclose my check in the amount of _____

Please charge to my

Visa Master Charge:

_____ expires _____

Name _____

Address _____

*California residents: add 6 or 6.5% tax

LOOKING FOR TRS~80*
BUSINESS SOFTWARE?
WE HAVE HUNDREDS
OF QUALITY BUSINESS
PROGRAMS IN STOCK!
AT PRICES YOU CAN
AFFORD.

◀ WHERE YOUR TRS~80* MEANS BUSINESS ▶

For the first time you can fill most of your software needs with one telephone call. Whether you are trying to find a specific program, custom software or just help with your system—give us a call. We have the people that count!

Invoicing • Inventory Control • Accounts Payable • Accounts Receivable • Payroll • General Ledger • Letter Writer • Word Processing • Mailing • Manufacturing Inventory • Cost Accounting • Sales Reporting • Stock Market • Business Statistics • Statistical Analysis • Data Base Systems • Medical Billing • Dental Billing • Special Industries • Advanced Accounting • Income Tax • Language • Personal Finance • Technical Programs • Insurance • CPA • Law Office • Asset Depreciation • Job Cost • Utility Programs • Education • Games • Home Programs • Loans • Credit Bureau • Electronics • Test Systems • Sports • Art • DOS Systems • BASIC lessons • and hundreds more!

Send for our free catalog or give us a call today. We also do custom programs as well as buy top quality programs.

Summer Special:

Complete business system \$299.95

**OVER 100 OF THE BEST
BUSINESS PROGRAMS FOR
THE TRS-80* **MODEL I**
AND **MODEL II** IN STOCK
READY FOR
IMMEDIATE DELIVERY.**

**LET US ANSWER YOUR
QUESTIONS TODAY.**

Software-Mart

286

In California Call (714) 768-7818 Call Toll Free 1 (800) 854-7115



24 Hour Service



OUR BEST ADS ARE NOT WRITTEN — THEY'RE RUNNING ON TRS-80'S

Prices and programs are subject to change without notice. All Software Mart Programs are sold on an "as is" basis and with "All Faults"

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

80 REVIEWS

edited by Emily A. Gibbs

"He assumes the reader has a fairly good understanding of Level II BASIC, although all his tests... operate on a 4K machine."



TRS-80 Interfacing

Johnathan Titus

Blacksburg Continuing Education Series

Howard W. Sams & Co., Inc.

\$8.95

by Ed Neister

In *TRS-80 Interfacing*, Titus provides the reader with a practical knowledge of input/output circuitry and its operations. It is a basic book that should be in the library of all hardware designers who wish to work with the TRS-80 system for input/output control.

The book is written for a general reader. Titus does not go too deeply into the basics. He assumes the reader has a fairly good understanding of Level II BASIC, although all his tests and experiments are designed to operate on a Level II 4K machine with read/write memory and data storage capability.

Operation Control

Titus introduces the reader to the control signals one by one and helps the reader grasp the purpose for this control system and how to use it. He then goes into the operational control of these signals by using Level II instructions in computer programming steps. Titus leads the reader from the initial concept to a point where the reader can write the programs and generate the control signals he desires. Titus and the Blacksburg Group have developed a circuit which allows the reader to do all the experiments presented in the book.

Command of the Language

In the first chapter, Titus discusses the Z-80 microprocessor, its memory capability and the setup and use of the diode devices used through the Z-80 processor. The information is presented quickly and in great detail.

In Chapter one, Dr. Titus talks about the simple diode commands, as well as how software commands and interface circuits are used. He briefly discusses the PEEK and POKE commands in relation to interface circuits. He also goes over assembly language vs BASIC programming, as far as data transfer and control are concerned.

TRS-80 interfacing and its hardware are presented in more detail in Chapter two. Diode device addressing and decoding, as well as how gates are used for addressing and decoding are discussed.

Chapter three contains a detailed discussion of the output and input ports, device interfacing and memory mapping. Chapter four focuses on flags. The input/output device synchronization, logical operations, software detection of flags and complex circuit flags are considered.

Readers are introduced to the breadboard circuit design in Chapter five. This allows testing of the logic probe device, memory coder bus buffers and control circuitry. Next Titus considers circuit construction.

Interface Experiments

Chapter six is the central theme of the book and delves into detailed discussion of interface experiments. After an introduction, eighteen experiments are presented to help the reader test and understand the concepts of input/output transfer. The experiments reinforce the concepts presented throughout the book.

For the size of the book, much information is presented. Several appendices are given. One presents logic functions concerning lamp monitors, logic switches and pulses. Another gives the parts required for the experiments. The last three appendices give the Z-80 microprocessor, the TRS-80 interface breadboard parts and PC artwork, so that the reader can easily build his experimental circuit.

The first eleven experiments provide a set of interfacing and programming investigations for readers interested in interfacing concepts. The last seven experiments provide additional lab investigations of advanced topics and pro-

jects to supplement the experiments. They cover logic probe, device address decoding, device selecting pulses, constructing an input port, handling multi-byte input port information and input port applications, constructing an output port, I/O interactions, data logging and display.

An analog-to-digital converter is maneuvered by the computer in Experiment 11. When the program is run, the operator should be able to make the meter needle swing between two preset voltages.

Experiments 12 through 18 get more involved with device address and decoder circuits, output ports, BCD and binary coding, using the output ports and a simple program as a traffic light controller circuit.

Experiment 15 is an important one, used to demonstrate how logic device testing can be done. Simple flag circuits are handled in Experiment 16. Experiments 17 and 18 are more detailed in working with programmable interface chips and interfacing the A/D converter to the TRS-80.

Experiment 18 is very interesting from the standpoint that the resistance capacitance (RC) curve can be observed on the TRS-80. An RC curve is typically used to measure pressure, temperature, speed, conductance or many other physical perimeters.

The reader can obtain an overview of the subject in a quick reading. Next the breadboard circuit can be assembled, and the TRS-80 should be put to use.

The most dramatic thing about the book is that it gives the reader practical experience and guidance with the TRS-80 with program examples and actual hardware. When the reader has completed the book, he should have a good understanding of I/O devices and interfacing. ■

Computer Games for Businesses, Schools and Homes

J. Victor Nahigian and William S. Hodges

Winthrop Publishers, Inc.

Cambridge, MA

Softcover, 157 pages

\$10.95

by Len Gorney

Are you looking for a good computer games book that will give you a solid core of coding from which to develop your own personalized computer games? Do you welcome the challenge of converting a program from any version of BASIC to your own machine's BASIC?

Do you enjoy debugging others people's programs? Do you like to play computer games just for the fun of it? If you answer yes to any or all of the preceding questions, you are a prime candidate to purchase *Computer Games for Businesses, Schools and Homes*.

In his foreword, Mr. Weinberg introduces *Computer Games* as Winthrop's "first sally into new territory—the personal computer." The programs contained in this 157 page book are for the personal computerist. However, the particular version of BASIC, which runs on PDP type machines, used in these programs is not within the grasp of the average personal computerist. Assuming you don't have a DEC-type BASIC or DEC machine, there are a few changes you must make before you power up.

The backslash is used as the multiple statement per line delimiter in these programs. You will have to replace it with whatever character your BASIC uses as a separator, or code each statement on a separate line. You may have to change the PRINT statements to LPRINTs, if you want a printout. Using INPUT\$ or INPUT in place of GET and PUT statements will eliminate some problems in your INPUT and PRINT statements.

A listing of the variable names and their uses within the programs follows a short description and history of each game. This is a nice touch, especially if you are the type who likes to tear apart a program. A typical sample run and a program listing in an easy to read 5 x 7 dot matrix round out the games' introductions.

More Winners Than Losers

As with any collection, some of the games are losers. "Bullet" is the old-click, click—computerized version of Russian Roulette. "Poem" randomly generates one, but with little literary value.

"Psycho" is a minor league attempt to output your personality profile based on a design. Other poor selections include a Star Trek game, "Taplab" and "Tic-Tac-Toe."

What remains, however, are 21 winners that can be divided into five general categories: calculation games, casino games, dice games, grid/math games, and the ever present miscellaneous category.

One of the more interesting calculation games is called "Date" which, when given today's date and any other date, calculates the number of days between today's date and the second date. A variation of this same logic is used in the next two programs.

"Biorythm" is a graph of those critical days! "Compat" is advertised as a biorythmic compatibility calculation for two people. Interestingly enough, for two people to be 100 percent compatible, they should either be born on the same day or their ages should differ by 59.86 years.

Casino games are the downfall of most personal computerists. *Computer Games* has "Blackjack", "Draw Poker" and "Jackpot", but done rather well. In addition to a fairly good description of each game, the authors have included probability tables which for "Blackjack", give the combinations and odds for hitting any particular count; for "Draw Poker", give the odds for being dealt each type of poker hand; and, for "Jackpot", a payoff table listing the odds for spinning a winner.

There are three interesting dice games, "Kismer", "Notone" and "Rollon"—if you go for the computer tossing dice, that is.

The grid/math/number games include "Boggle", a number-based Mastermind; "Escape", a grid game which pits you against five enemy attackers on a simulated battlefield; "Golf", a computer simulation; "Gunner", the old artillery game which teaches you a bit about trigonometry; "Skeedoodle", a math game; "Stock", a good stock market simulation.

Luck and Skill

The remaining four games require an equal amount of luck and skill. "Basket" is a

2-player basketball game. "Dogs" simulates a dog race for up to 13 bettors. This program even skims off 17 percent of the wager pool before it pays the win, place, show and perfecta wagers!

"Horse" pits up to 10 players, each having 12 horses. The object is to get one of your horses over the finish line before any of your opponents. "Tennis", anyone? Input your

position, the type of shot, and the area your shot should go to on the opponent's court and settle back.

The book is a good buy for anyone willing to accept the challenge of converting and debugging programs to expand his or her game library. It combines a learning experience with pleasure, and this, according to Weinberg, is the goal of *Computer Games*. ■

Planetary Lander
Instant Software, Inc.
Peterborough, N.H.
\$7.95

by John Warren

Space games are one of the most durable commodities of the microcomputer boom, and spaceship landing programs are a mainstay of the genre. One of the best of these is Planetary Lander by Instant Software, Inc.

While the early lander programs were limited to number displays, graphics are now in. Planetary Lander shows the position of your ship in relation to an altitude "yardstick," the scale of which changes as your ship approaches the planet's surface.

Next to the altitude display is a control readout that gives lapsed time, speed in meters per second, thrust and other indicators. Two of the readouts use horizontal bar graphs that give speed as a percent of terminal velocity and the amount of fuel remaining. These displays are updated at one second intervals.

Interlude: The Ultimate Experience
Syntonic Software Corp.
Houston, TX
\$14.95 tape, \$17.95 disk

by Chris Brown
80 Staff

Silicon pundits have told us for a long time that computers will play a major role in our changing lives. We will see the advent of electronic mail, electronic money, even electronic crime. It seems to me that if the devilish device is ever to be mainlined into our cultural envelope, it must service more basic needs than game playing and accounts payable. Something really basic, for example, like sex.

The time has come. The era of home computer sex is finally at hand, brought to you by Syntonic Software, a forward-looking subsidiary of Software Technology, Inc. These people are not above pandering to your prurient instincts for a buck, or fifteen bucks, actually.

Billed as the ultimate experience, the Interlude package is a curious piece of software for several reasons, not the least of which is the unmitigated gall the folks at Syntonic were able to muster to market this X-rated program



Instead of limiting itself to a single planet, Planetary Lander allows the player to attempt a landing on any of the nine planets (and the moon) in the solar system.

Both the thrust and its duration are input as a single statement eliminating the need to repeatedly enter identical inputs—an annoying feature of some other lander games.

Although Planetary Lander is only available in Level I, Radio Shack's conversion program transforms it to Level II by altering only two PRINT AT statements (lines 300 and 330).

Combined with Stellar Wars, a space warfare game, in a two program package (Star Trek III), Planetary Lander is an outstanding value. ■

in the first place.

What exactly is Interlude? Well, it isn't hard core, high resolution graphics, so if you're into blue movies, forget it. You won't get that sort of display with Interlude.

In essence, Interlude is a well-structured interview designed to plumb the depths of your sexual preferences in ten probing questions, after which it refers you to a book of "interludes" that accompanies the software.

The paper-bound, 96-page volume of interludes contains 106 elaborate sexual scenarios, written with acute attention to detail. Titles indicate content. For instance, "Wet Fun On A Hot Summer Night," "Good Vibrations," "Fellatio By Firelight," "Caveman," "My Way," "Satin Chains," "Macho Man." The list goes on.

If the computer-suggested interlude suits your fancy (or fantasy), you may opt to act out the scenario. In addition, certain interludes are stored in the computer and do not appear in the book. Getting one of these gems is apparently cause for self-congratulation. Your answers must have been outstanding!

This computerized extension of spin the bottle is not a revolutionary premise but is, one has to admit, an unusual application for the home computer and certainly not what the gang at Tandy had in mind.

The software algorithm of this machine lan-

guage program is straightforward. The interview format is logical, and all questions require a numerical answer, indicative of the degree of enthusiasm the respondent demonstrates. Some of the more mild examples are:

How complicated do you want this interlude to be?

1. Back to basics.
 2. Keep it fairly simple.
 3. I'm not choosy.
 4. Maybe a small production.
 5. I'm ready for a really big show!
- or—

If you were a movie, which would you be?

1. Pillow Talk
2. Tom Jones
3. Gone with the Wind
4. Superman
5. A Streetcar Named Desire
6. Fellini's Satyricon

After answering several of these thought-provoking questions, the computer gets down to the nitty-gritty and quizzes you on specifics, hopefully picking up on your mores, folkways and taboos. Your scalar answers are then processed, and an interlude indicative of your final tally is suggested.

The program is fairly interactive. Suzy, one of our foxiest secretaries here at *80 Micro*, displayed so little enthusiasm during one interview session that she was directed to interlude number 29. The scenario for this interlude instructed her to stay home alone and curl up with a good book.

If the interlude suggested is not quite what you had in mind (e.g., an acrophobic being assigned an interlude involving a high-flying swing), you may request an alternate interlude.

You may choose from about six alternates before the computer assumes you are a spoiled brat and gives up.

The disk-based version of Interlude we've been using even bombs out at this point, painting the screen with 2-byte stack symbols as the video memory fills. Although this seems like a bug to me, it does get the point across. Syntonic uses their own DOS boot, which may still contain a few bugs related to program termination.

For all its daring, the Interlude package is fairly tame in its attitude toward sexual encounters. The maximum number of participants in any interlude is limited to two, so no free-swinging, group gropes are possible. Furthermore, all interludes are strictly heterosexual. No gay or even bisexual interludes are allowed.

Syntonic hints that this is just the beginning. The last page of the book suggests that Interlude II is coming and requests that users send their favorite interlude to Syntonic for inclusion in the next edition. No mention of royalties is made, but the concept is certainly democratic. We may even feature the Interlude of the Month in *80 Microcomputing* someday.

Syntonic's marketing has caused raised eyebrows in the industry, and their full-page

living color ads have elicited both pro and con responses from readers. A few irate subscribers have taken offense at the quasi-naked lady approach Syntonic uses in their promotions and canceled. Generally, most readers seem curious or amused, rather than indignant. This may be just another indication of the decadence of the electronic age.

ISAM
Johnson Associates
Redding, CA
\$50.00

by William L. Colsber

ISAM (Index Sequential Access Method) is a set of BASIC subroutines and utilities that allow the programmer to create and maintain direct access files using keys, rather than the hardware-dependent numbers used by Radio Shack. For example, a program can access a library catalog by the title of a book, rather than by some arbitrary number. ISAM requires 32K and is available for the Model I or Model II.

The ISAM routines which must be merged into the application require about 4.5K. There are also minor restrictions on variable names used by ISAM and, of course, the line numbers used by the routines.

Efficient Disks

In return for these restrictions, ISAM pays off with greatly increased disk space efficiency. The Radio Shack random access file method wastes a large portion of space if your file has only a few records in it. If, for example, the file contains records numbered 1 and 100, you have actually grabbed space for 100 records, even though the file contains only two!

ISAM files with two records take up space for only two records.

In addition to BASIC subroutines, several utilities are provided on the distribution disk. INIT is used to create new ISAM files, REORG is used to free space taken up by deleted records and sorts the file in key sequence, and ISAM-PRNT enables you to list the entire file in key sequence on the printer or screen.

Most companies are content to simply provide the routines and utilities, but Johnson has included a demonstration program—a mailing list system. It may not be the most terrific mailing list program in the world, but it is more than adequate for my personal use and, I suspect, for some small businesses.

Suitability

ISAM does everything it promises very well. Anyone who has suffered the agony of trying to fit an existing numbering or naming system into Radio Shack's random access method, with everything but a shoehorn, should look into this package.

Finally, one of its best features is Johnson's delivery. I got my program six days from the day I mailed my check. ■

There you have it—Interlude: The Ultimate Experience. The first microcomputer-based adult computer program. Will it be a milestone in microcomputer software, or just another trendy diversion? Time will tell.

What's next? A microprocessor-controlled, RS-232-compatible love doll, perhaps. Welcome to the micro-millennia. ■

Z80ZAP/CMD
Org-Tex Industries
Lewisville, TX
\$29.95

by Bill Vick

Z80ZAP/CMD makes lost file recovery, file patches and file maintenance a real joy, primarily because of its Hash Index. Z80ZAP calculates the hash code for any file-spec instantly.

The Z80ZAP/CMD diskette comes with Backup on auto when it is booted up. This is a subtle way of telling the user to make a copy before he experiments with it. The diskette also contains a write protect tab, apparently one of those "protect us from ourselves" safeguards.

Automatic or Self-prompting

The documentation is contained in four brief, but comprehensive pages. Most of the commands are either automatic or self-prompting, making Z80ZAP a real breeze to use. Written in machine language, the run time is almost instantaneous in all modes, including power up.

When you load the program it waits two seconds for you to enter a command.

In the R (read) mode, having entered your drive, track and sector numbers, a well organized display appears on screen. The first column of numbers on the left side of the screen represents the drive number; the second column, the track number; and the third column, the sector you selected. Next is the column containing the byte numbers, or the location of the first byte of each row in the display. All columns are separated by a blank column for easy reading.

In the middle of the screen is a hex dump display of the sector you selected. To the right of the screen is an ASCII dump of the same sector. Each dump has its own flashing cursor. The cursors move relatively, indicating the ASCII byte that corresponds to the hex byte.

The most fascinating aspect of the program, the Hash Index Code, can be demonstrated while the display is on the screen. First, read a sector from the directory track, (11), sector 2-9. Choose a program listed in the directory and move the cursor down over the first letter of the filespec name.

By pressing H, a new column instantly appears on the screen between the hex and ASCII dumps. At the top of this column will be the Hash Code number for the filespec. Directly below it will be the words Hash Code spelled out vertically, with an arrow pointing to the

EXATRON STRINGY FLOPPY™

**SPEED
LOW COST
RELIABILITY**

Exatron is a California based corporation that has been in business since 1974. As well as the Stringy Floppy, Exatron designs, manufactures and sells state-of-the-art electro-mechanical equipment for a variety of commercial and industrial applications. Exatron is an established supplier of automatic test equipment to manufacturers, and large OEM users, of integrated circuits worldwide.

The software in every ESF adds a parity bit to every byte saved on tape, and a checksum to the end of every file. These are checked both after recording data and upon replay, any detected error is indicated by a message on the video display. This system of automatic error checking gives confidence in any data saved, also each wafer is rated for at least 2,000 complete passes past the record/replay head.

- ▶ Assembled and tested
- ▶ All operating software in ROM
- ▶ Fully automatic operation
- ▶ Professional quality
- ▶ No Expansion Interface required
- ▶ Large Owners Association
- ▶ High speed operation
- ▶ Extremely reliable
- ▶ No technical knowledge needed

WHAT IS IT?

The Exatron Stringy Floppy (ESF) is an extremely fast, reliable, economical alternative to cassette or floppy disk storage of computer programs or data.

Totally self-contained, the ESF has no buttons, switches, knobs or levers to adjust or forget. All of ESF's operations are under the computer's control.

HOW DOES IT WORK?

The ESF uses a miniature tape cartridge (called a 'wafer') as the data storage medium, about the size of a business card and 3/16th of an inch thick. The tape used inside the wafer is a special Mylar based Chrome Dioxide type, specially developed for digital applications. Wafers are available in several lengths, 5 feet being the smallest and capable of holding up to 4 thousand bytes of information — the 75-foot wafer is the largest available and can hold up to 64 thousand bytes of data.

The wafers contain a single reel of the special tape connected as a continuous loop, the ends being spliced together with a piece of reflective tape. In operation the ESF drive unit pulls the tape from the center of the reel inside the wafer, causing the entire reel to rotate. Thus, the tape automatically winds itself around the outside of the reel at the same rate as which it is pulled from the center. This process is similar to that found in an 8-track cartridge.

The ESF transport mechanism is very simple, consisting of a precision die-cast aluminum block — with a capstan, drive motor and magnetic record/replay head mounted on it. The wafer loads into a slot in the casting (it will only fit the correct way) and the tape is driven at a single point by the capstan, past the record/replay head.

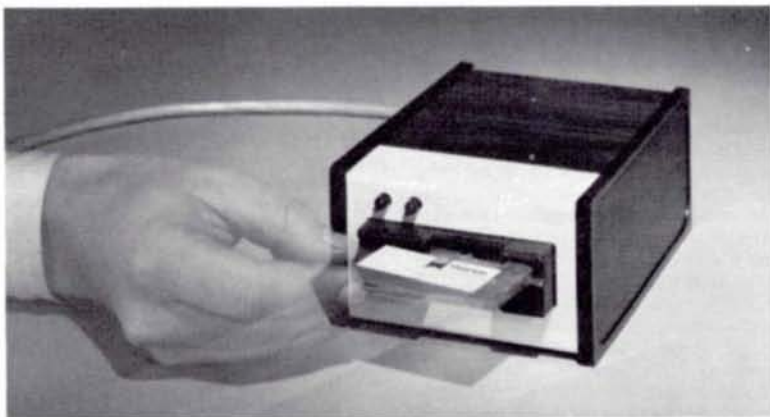


FIG. 86 is a trademark of the Radio Shack Division of Tandy Corporation.

HOW DO YOU USE IT?

Once connected to your computer the ESF operating system needs to be activated—simple. Just type 'SYSTEM'(enter), and in response to the '?' prompt type '12345'(enter). Your TRS-80 will instantly display the ESF sign on message 'EXATRON STRINGY FLOPPY VERSION 4.1', and from this point onwards you will have the extra commands '@LOAD', '@SAVE' and '@NEW' recognized by your TRS-80.

The ESF's operating system is built into the electronics of the unit, in much the same way that BASIC is built into the computer, so it is always available — the SYSTEM command is to let your computer know that the ESF has been connected. If you normally reserve some memory for subroutines then the ESF software will relocate itself under your selected top of memory. The ESF uses only 4 bytes of your available RAM, these bytes are used to 'point' to the 2048 bytes of software in the ESF unit itself.

WHAT'S THE CATCH?

Well, the only catch that most people find is that they have to actually pay Exatron for their unit! Even this is no big deal.

Starter Kits are available with the Exatron Stringy Floppy, a supply of wafers, a bus extender and a selection of useful programs — for \$299.50.

Through regular advertisements in both Kilobaud Microcomputing and 80 Microcomputing, owners are kept informed of the latest developments in wafer-based software. Plus hundreds of user 'workshops' are starting up over the country, so you can always be sure of being near to another ESF owner.

Exatron also gives a 30-day full money-back guarantee, with a 1 year parts and labor warranty on the unit.

If you have any questions about the ESF then give Exatron a call on the Hot Line (outside CA) 800-538-8559.

East Coast customers can call 800-343-4424 (inside MA 617-899-3862)

Open House Workshops take place from 9 am till 1 pm every Saturday at Exatron's factory in Santa Clara, and on the East Coast the last Saturday in each month at Micro Communications, 80 Bacon Street, Waltham MA 02154. All are welcome.

exatron

3555 Ryder Street
Santa Clara, CA 95051
408-737-7111

✓3

code at the top. Below this will be the track number, sector number and byte location to install the code to recover a killed file. By pressing the minus key you are able to page back to the first sector in the directory track, where you may apply the code to recover the file. The code, as well as all other information, remain on the screen as you page.

While in the display mode, pressing M, modify, allows you to change any byte in the display.

While in the modify mode, the hex cursor increases in size. Any key pressed (0-1, A-F) modifies the byte at the current location of the cursor. After each modification, the cursor advances one position.

While in the modify mode, you have access to the W, write, command. The W command does not immediately write to disk. Instead, the prompt comes up, asking you if you desire to write to a drive other than the one you read in. If the destination is the same, simply press ?ENTER? and the write takes place. You then return to the display mode.

Z80ZAP even makes sector compares easier by using the C key. Pressing C gives you a byte-for-byte comparison of any sector on any drive to the sector on the display. This function is nice to have, if a voltage spike or some other little gremlin got into your diskette. An example of this is a diskette that does not boot up because of a zapped byte in BOOT/SYS. The compare function compares this sector to a good diskette and pauses at each byte that is not the same. Pressing ?ENTER? continues the comparison.

Another invaluable function is the F, find, command. With a sector of data displayed on the screen, press F, followed by a two-digit hex byte. The flashing cursor goes off to look for the byte and resumes flashing directly over it—if it exists. If the sector does not contain the data, the cursor returns to the first location in the display. This function is great for apply patches or fixes.

Using the L, locate, function lets the program move the cursor for you. Press L, followed by the byte number you wish to pinpoint, and the cursor moves automatically over the location. This function also comes in handy in applying patches.

To escape any of Z80ZAP's modes, press X. This will return the flashing cursor to the first byte of the display.

Following are some of the other important functions of Z80ZAP:

- + or - Pages forward or backward, one sector at a time.
- Z Zeros out a sector, handy for cleaning up cluttered sectors on your diskettes.
- J Jumps to DOS READY. A word of caution here: After using Z80ZAP, always reboot the system, as the author resets the stack pointer to a different location than DOS does.
- D Puts you in debug: "G" [ENTER] returns you to Z80ZAP.

The documentation also includes easy instructions for removing passwords from all files, as well as extremely easy directions for recovering a killed file. ■



**Model 800 Printer
Base-2**
Fullerton, CA
\$499

by Milan D. Chepko

Shortly after adding a disk drive to my TRS-80, I decided it was time to turn it into a decent business system by adding a hard copy device.

I considered Radio Shack's price of over \$1000 for their line printer to be out of the question, so I started looking around in the computer journals. There are several companies producing less expensive line printers compatible with the TRS-80, but I finally settled on the Base-2 Model 800.

Among its many hardware and software features, perhaps the best is the low price—\$499 for the standard model with friction-feed paper drive.

The printer arrived about six weeks later than initially promised, and the paper rack arrived even later.

Lighter Than Centronics

Weighing 10 pounds and measuring 14 by 10 by 3 inches (six with tractors), the Base-2 printer is considerably smaller and lighter than the standard Centronics 779 printer from Radio Shack. It prints 60 lines per minute bidirectionally. Its ribbon cartridge is supposedly good for five million characters.

All the component subassemblies use connectors on the cables, so replacement should be relatively straightforward. The construction is generally sturdy and, though it should tolerate considerable use before needing repairs, I believe the Centronics 779 would stand up better under heavy day to day use.

The Base-2 printer uses an 8085 chip and two ROM chips, along with up to four RAM chips to achieve some sophisticated functions. For example, six different character densities are available per line (64, 72, 80, 96, 120, and 132), and can be selected by a back panel DIP switch or by a software control program.

The DIP switch on the back panel is used to establish a standard print density. This can be changed at any time. I generally leave mine in the 80 character position. This generates an automatic line feed after a carriage return, which is needed with the TRS-80.

In addition, the characters can be printed in double width in any of the densities, giving you 12 different type sizes. The double-width characters can start and stop in the middle of a line for highlighting. Also, lowercase characters can be printed by generating the proper ASCII code. (On the TRS-80, this is done by

holding down the shift key while typing the letters.)

The printer comes with two different sets of characters—standard and APL, both in ROM. There is room for three more character sets in ROM (although details are a little sketchy in the instruction book). A sixth set (maybe the TRS-80 graphics?) can be loaded into the on-board RAM by program software. Characters are printed in a 5 by 7 dot matrix.

Changing the different character sizes and fonts is relatively easy. Issue an escape character, followed by the control code describing the desired function. With the TRS-80, the sequence would be:

LPRINT CHR\$(27);CHR(X);

The codes are all described in the book that accompanies the printer.

Three options can be added to the standard Model 800. Option S controls the paper advance from one dot to more than full-character height. It permits rapid paper advance without forcing the print head to traverse the paper, which is important in printing graphics. Since this is a bidirectional printer, there is some variance in character position from line to line. Option S prints in one direction, which eliminates most of the wobble in the print-head-drive mechanism.

Option T is the tractor feed and I recommend it based on my limited experience with friction feed. Option M adds extra memory, enabling the printer to accept 1920 characters from the CPU in a burst, then print them out while the processor is doing something else.

Each of these options adds an extra \$50. But, in order to add the tractor feed (T), you have to add paper advance control (S). The tractor feed version ends up costing \$100 more than the standard model. However, this is still \$300 to \$400 less than the comparable Centronics model, which lacks many of the Model 800's features.

Versatile

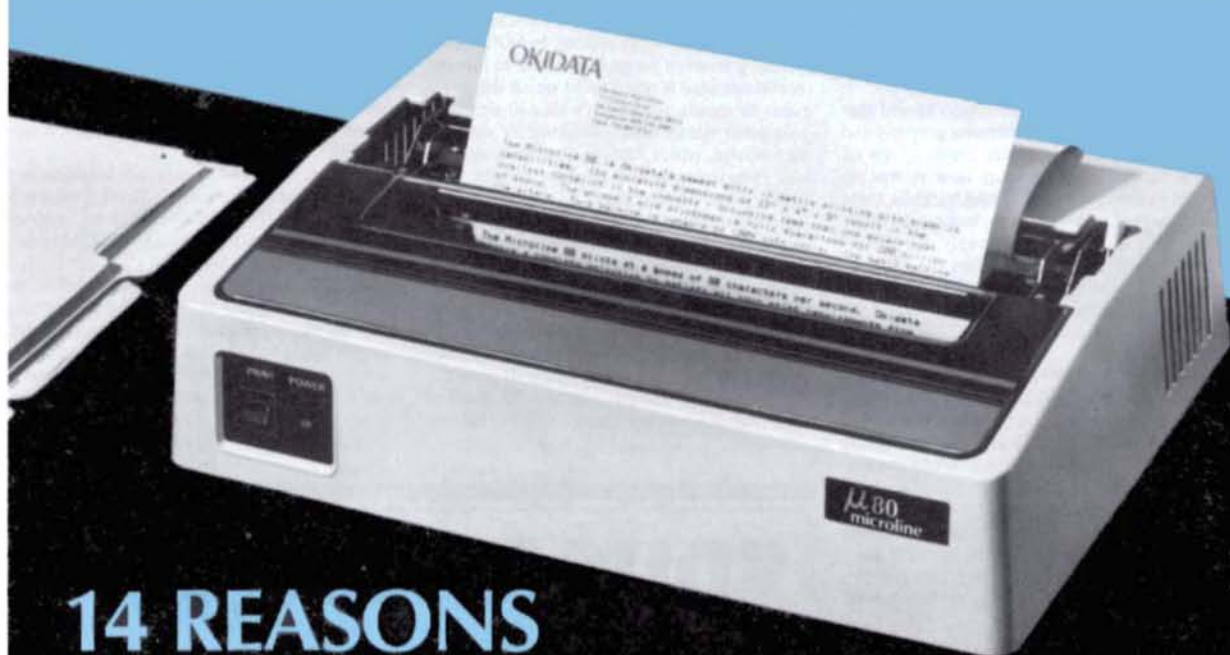
Unlike many printers, this one is versatile with a capital V. In addition to the Centronics port required by the TRS-80, there is a serial port handling baud rates up to 19,200 and accepting RS232 or 20 mA current loop signals, along with an IEEE 488 port that should be compatible with Pet systems.

In general, the Base-2 printer is an excellent product, and should provide good service for most TRS-80 owners. As an added gift, it is quiet. Unlike the Centronics 779, the Base-2 printer is completely silent when it is not printing. If your printing workload is light to medium, the Model 800 could be just what you're looking for! ■

120 CHARACTERS/LINE
132 CHARACTERS/LINE
ELONGATED

Sample printout from the Model 800.

1. Outlasts every competitor—200,000,000 character head warranty
2. No duty cycle limitations—even in demanding business applications
3. Professional print quality—9 x 7 matrix
4. Rugged business use construction—metal chassis—two motors
5. 80 characters per second
6. Upper and lower case—full 96 character ASCII set
7. Double width characters
8. Connects directly to TRS-80™ APPLE® and other computers
9. Block graphics—64 shapes for charts, graphs, diagrams
10. Friction and pin feed
11. Plain paper—up to 3 parts
12. 6 and 8 lines per inch—program controlled paper savings
13. 80 and 132 columns—program controlled
14. Price—the best value in the industry. Call or write today for the name of your local Microline 80 dealer.



14 REASONS WHY TRS-80™ OWNERS CHOOSE THE MICROLINE 80

All fourteen are standard with every Microline 80. The only options are snap-on tractors and a buffered (up to 2000 characters) RS232 interface.

OKIDATA

Okidata Corporation
111 Gaither Drive, Mount Laurel, New Jersey 08054
Telephone: 609-235-2600

TRS-80 is a registered trade mark of Radio Shack, a division of Tandy Corp.

80 ACCOUNTANT

by Michael Tannenbaum C.P.A.

"For the professional accountant or executive... (Visicalc) is a pure gift."

One of the most frequent questions that I have been asked is how the reliability of the Model II compares with the Model I. Until recently I was unable to give a reply. My Model II has performed virtually without a flaw since I acquired it. That is, until last week.

All of a sudden the program I was working on dropped out for no reason. When I attempted to reboot, the operating system gave me a memory fault error message. After several more tries, I gave up and brought the computer to my neighborhood computer center.

After a brief trial, the salesman agreed that the computer was not functioning properly and turned it over to the capable hands of the repairman. Twenty-four hours later it was returned properly repaired. Frankly, while I was not overjoyed to have the computer break down after it was out of warranty, the experience was not unpleasant. When the Model I had problems, the computer took so many trips to the repair center I thought they owned the machine.

Pioneered with Model I

Of course, to be fair, I was a pioneer with the Model I. Not only did I purchase one of the first 16K Model Is, but I also had one of the first interfaces and disk drives. When the machine broke down, the local repair center was unequipped to deal with it.

A major difference between the two computers lies in the diagnostics that the Model II automatically performs on power-up. This prevents you from using an improperly performing device.

Unfortunately, it is quite easy to use a sick Model I. Because much of its operating system is in ROM, a memory fault could remain undetected until a debugged program bombed. During the time the chip was inoperative, the owner could be quite unaware that the machine was causing problems. If the computer was just used for playing games, such a situation need not be fatal. However, if the Accounts Receivable or the General Ledger file was destroyed as a result of the flaw, recovery would certainly be painful.

I recommend that Model I owners acquire any of the diagnostic programs that are available and run them on a regular basis.

Well, now that we have covered the "unthinkable" system failure, let's get down to the subject of this month's column...Accounts Payable. Accounts Payable recordkeeping is a requirement for almost all businesses. Bills must be accumulated and paid for supplies, services and merchandise. Since this type of activity usually involves the analysis of invoices, cod-

ing for subsequent posting to the general ledger, posting to a vendor's payable ledger, preparation of a check and preparation of a remittance advice, much work is required. In fact, much of the data has to be written over and over again.

The tedious nature of this work has resulted in the development of many different Accounts Payable systems. One of the most common is the so-called One Write system. In a One Write system, a series of forms is designed so that the repetitious data is reproduced on all the documents by means of carbons with a single entry.

Another widely used method is the accounting machine, which, like the One Write system, uses special forms and requires careful positioning when posting data.

Recent models of electronic accounting machines are computers in almost every sense of the word. These electronic accounting machines, like their mechanical predecessors, maintain data on individual ledger cards, much like the generations of bookkeepers before them. Unfortunately, most computer systems do not generate a ledger-card type of record.

A ledger card contains not only the detail of open transactions, but also a record of histori-

cal closed transactions. Because a microcomputer does not have the capacity to retain closed transactions, a ledger card cannot be produced. If the lack of a ledger card makes it difficult for your staff to function, I'd advise against a microcomputer payable system.

At the end of last month's column, I indicated that the Radio Shack General Ledger system appeared to be the first element of a fully integrated accounting recordkeeping system. The Accounts Payable system catalogue #26-4505 is the second element. This system can stand alone or be used with the General Ledger. If it is to be integrated with the General Ledger, a second drive is required.

Prior to using the system, an initialization program must be completed. You are required to specify the firm's name, address, system password, internal ledger codes (GLCs) and accounting method to be used.

The GLCs are used by the payable system to identify ledger accounts. They are not compatible with the codes used in the General Ledger system. For example, an expense account requires two codes, one for Accounts Payable and one for the General Ledger. Both codes

continued to next page

EDUCATION 80

by Earl R. Savage

Education 80: The role the 80 plays in teaching/learning/educational experiences. This is the world of the classroom AND the homeowner learning to repair a leaky faucet; the driver learning to tune up his car; the new employee learning his job; the old employee learning new skills for a promotion.

Well, you have the idea. The young, old and in between are involved in teaching/learning/education at school, at home, work, play—everywhere. And the 80 can be the most effective aid to those learning situations if we can enlist its help.

That is exactly what we will be discussing in this space each month: using your 80 in all kinds of instructional situations. We will exchange ideas on planning, programming, evaluating and improving. We'll get into software, both home-grown and commercial, and even into hardware.

Sharing Techniques

In this column, we'll share thoughts and techniques for making the 80 a better teacher. That's right—*share*. We will discuss what I have found and the findings of others, including you. Each one of us knows something about the 80 and about a skill or process that others want to learn. Now is the time to begin to put it all together.

Me? Well, I've been in education and electronics more years than I care to admit. As far as the 80 is concerned, I am far enough "into" programming and computer assisted instruction (CAI) to have gained a bit of skill and glimpse its potential.

I am convinced that we are on the threshold of a real revolution in both formal and informal learning. The microcomputer will bring changes beyond our current imagining. Teach-

continued to next page

80 ACCOUNTANT

From page 26

must be available to Accounts Payable, if automatic posting is desired. Failure to do this accurately will automatically abort the General Ledger update at the end of the month.

When using an integrated Payable and Gen-

eral Ledger system, it is a good practice to specify a Miscellaneous Account. In the event that the specific code is not known, the operator of the system will have an account to use which is acceptable to both the payable and ledger systems.

Looking over the sample reports supplied with the system, I was quite pleased to note many "big" system features. In addition to an Invoice Listing, Posting Report and an Aging Summary, there are Cash Requirements Reports, Check Preview Reports and a Discounts

Lost Report. Invoices are specified where a discount could be lost through failure to make a prompt payment. This feature, if properly utilized, can easily pay for the whole system.

The information package includes a sample check and an order form for supplies. I do not see any way to customize the check printout, so you will probably be forced to order a supply of window envelopes. Using this envelope eliminates the need for addressing envelopes to the vendor.

The screen formatting and the controls available to the user are quite advanced. I especially like the file maintenance screens. If you cannot remember the number of a vendor, you can search by name. If you type just a few letters, the computer will automatically put you into the proper range for retrieving the information. You can then use the "previous" or "next" options to locate the precise number.

The system has a capacity of up to 500 vendors and 3,000 unpaid invoices can be accommodated. As indicated previously it will run on a one drive Model II.

Visicalc for Model I

Just before I completed this article, Radio Shack announced the availability of the Visicalc Software package for the Model I. This software package was originally developed for the Apple II and has proved so desirable that many Apples were sold on the strength of it.

For the professional accountant or executive who is responsible for planning and projections, this program is a pure gift. It turns the TRS-80 Model I into a multi-column, multi-line worksheet. Each column and line can be programmed so that a change in any one figure can automatically change all other related figures. For example, if you are budgeting a 12-month period, and each month's activity is related to a prior month, you can project an entire year's activity by simply entering the first month's data.

The program is designed so that the work area can be scanned either horizontally or vertically in columns one to sixty, or lines one to two-hundred-and-fifty-six. Any portion of the work area can be printed and the results of the calculations stored on the disk for recall at any time. I urge you to see a demonstration of this software. I'm sure you will be as enthused as I am.

In the several months that I have been preparing this column I have attempted to mix a little accounting theory with program reviews and recommendations. I am not sure how well this format has succeeded to date. I would certainly welcome any comment on how the column can be made more interesting. If you wish to contribute to the column, I will be glad to include your comments with the appropriate credits.

Since many of the TRS-80s currently being sold are disk systems, I am certain that there are many people who are using them for business purposes. Sharing experiences with others can be an excellent way to increase the value of the machine to all. I look forward to hearing from you. My address is: Michael Tannenbaum, CPA, 42 Bulaire Road, East Rockaway, NY 11518. ■

EDUCATION 80

From page 26

ing/learning will never be the same. We have barely scratched the surface.

All we have to do is apply our programming skills to create situations that help others learn most effectively.

You are invited—no, urged—to participate. I welcome your questions, comments and suggestions about this column. I and other readers will be most interested in *your* ideas, software techniques and hardware designs.

What have you found that works well? That doesn't work? The rest of us would like to know. Write me in care of *80 Microcomputing*, and they will send you letter along. If you would rather "write" on a cassette, that's all right, too.

Oh, yes; I will answer as many of your letters as time permits, especially if you have included a self-addressed stamped envelope.

Recording Progress

Suppose that you have an instructional program that the user studies independently in school, office or wherever. Further, the "instructor" wants to keep a record of the user's progress.

Often in such cases, the user and/or the instructor simply writes down the final score from the display. It is much more satisfactory to have a printout of that information and that can be done with the simplest printer.

The following few statements will do the job on the little RS Quick Printer II. (Change the commands to suit your printer.)

```
1030 PRINT "PLEASE SWITCH ON THE PRINTER AND
THEN PRESS ENTER."
1035 BS = INKEY$: IF BS = "" THEN 1035
1040 LPRINT "NAME"
1045 LPRINT "PROGRAM : AMATEUR THEORY II"
1050 LPRINT "SCORE : "R" RIGHT OF "T"
      ATTEMPTED"
1055 FOR X = 1 TO 4 : LPRINT : NEXT
1060 END
```

Certainly, the variable names will have to be made to agree with those in the program. Everything should be clear, except perhaps line 1055, which simply runs the paper up four lines so that the printout clears the tearbar.

This small section prints the essential information, but is easily expanded to include what-

ever you want on the record. Best of all, not only can you put it in programs that you write, but it can be inserted easily into any you wrote and any that you've bought.

Program Modifications

A well known expression states, in one form or another, that one should not waste time re-inventing the wheel. So it is with programs. If there is an existing program that meets your needs, why spend time writing your own? Better to use it, while writing one that does not exist.

There are instances, however, when a program does part of what you want. It may be a game which uses the information you wish to teach. It may be an instructional program but written for the wrong level—too easy or too hard for the student(s). It may have too much or not enough explanatory material.

My own approach in these cases is to modify the existing program rather than begin at zero. Let's look at an example.

Suppose you want a tutorial program on Newton's Laws of Motion. Suppose, also, that you have one of the many forms of that popular game in which the player attempts to land a space vehicle on a planet. The game provides excellent application and practice in using Newton's Laws. Your best bet is to use that program and add the instructional part.

Here are some of the elements you would consider adding:

- Title introduction including personalization;
- Tutorial material, *per se*, on the level and to the depth appropriate;
- Introduction to and rules of the "game";
- Choice within limits of the number of times to play;
- Reward/reinforcement frames for success;
- Review frames for failure;
- Scoring and score-keeping;
- Summary review and conclusion.

As you see, even a game of the entertainment type can be turned into a valuable instructional program. There are many such possibilities. Often, too, relatively minor modifications will turn a poor program into an excellent one.

Don't re-invent the wheel. Get in there and apply it in a different way. In later columns we'll discuss the elements listed above and find ways to make them easy to add.

I'll meet you here next month for more Education 80. ■

80 APPLICATIONS

by Dennis Kitz

"As you may have discovered when trying to install the high-speed modifications, Radio Shack has made some changes."

The gentleman in the back. Yes, in the green shirt. What was that? Customize your TRS-80? Sure, folks, just a few simple do-it-yourself changes can turn your computer into a funny-looking, but more powerful machine. Step right up, heat that soldering iron. It's time for the Autumnal Equinox Hardware Festival!

This month we will be adding a second video jack, putting a radio frequency (RF) modulator into an expansion box, getting rid of the RESET lockup in the expansion box, bringing RESET up front, adding Level I and Level II, adding a keyboard expansion socket, eliminating the LPRINT/LLIST hangup, and doing some preliminary thinking about real-time clocks. And you can get nearly everything you need at your local Radio Shack.

In Preparation

First I have some mixed news for those of you with newer TRS-80s.

As you may have discovered when trying to install the high-speed modifications, Radio Shack has made some changes. The two-chip ROM set is slow, and takes up both available ROM sockets; the cassette load improvement modification ("XRX") prevents data I/O at high speed; and the new expansion box is somewhat locked into standard speed. Also, the updated no-bounce keyboard style makes it harder to install top-mounted items such as a control key, and so forth. Radio Shack has gone through so many alterations to the computer that models now hardly look like my own antique machine.

Let me offer a few precautions before starting. Open the case carefully, setting aside each part in order (six screws and six white keyboard grommets). Work on a large surface, and set the unit on a towel to protect its finish. Flex the keyboard's cable as little as possible, and put absolutely no stress on it. And most of all, always make any changes with the power off and disconnected.

Let's start with an easy one, the installation of an extra video jack. You'll need a sub-miniature plug/jack pair, a video jack, wire, solder and cosmetic tools.

You can always use this extra video jack, especially if your machine makes frequent appearances before the general public. You may add almost any sort of jack for which you have abundant matching connectors; I used a simple coax jack. Since long wires will tend to make your video signal look messy, choose a point near the normal video outlet to mount the new jack.

The plastic used for the TRS-80 case is soft and very pliable, almost enjoyable to work

with. Exact-o knives, drills, wood or linoleum cutting tools, and even screwdrivers can be used to cut the plastic to the right shape and smooth out a hole.

Open the case and select the placement of the jack carefully so that the 80 will reclose without striking or binding on the new hardware. Cut or drill a mounting hole, and install the video jack. Be sure to blow out the bits of plastic, because these chips, which will cling by static, can cause havoc underneath keycaps.

Now examine the TRS-80's normal video output (DIN) jack; it has five pins, three of which are used. Fig. 1 shows the video area with the cover removed.

You will need only two pins because the five-volt output pin is used for activating the optical isolation circuitry in the video monitor. Isolation is necessary because, unlike most commercial monitors, this one has "hot" parts unisolated from potentially dangerous AC power.

On Fig. 1, locate the video and ground traces (D and B) where the DIN jack connects to the circuit board. Obtain a miniature audio connector, and mount it on the board, soldering the center (hot) lug to point D, and the ground lug to point B.

Solder a short piece of coax cable to the mating connector, and run this to your new video jack. I used phono cartridge mounting hardware for this process. In any event, if ease of getting in and out of the TRS-80 is important to you, then mating connectors will allow you to work on the computer without having to

clip, solder, or disentangle anything.

Insert the connectors, snap the case together, hook up your second monitor, and power up. Ahhhh.

Picture and Sound, Will Travel

Do you carry your video monitor everywhere you go with your TRS-80? There's no need to do all that lugging. Using a simple RF modulator available in kit form, you can put computer power in your back pocket (if you have very big pockets). The materials you'll need are the modulator, a case, two five-pin DIN jacks, one DIN cable.

Start with the RF modulator—Radio Shack sells a \$15 Project Board and complete surplus units are easily found. Assemble it according to the directions. Hook it to an ordinary television, and temporarily run computer video (from the new output jack) to it. The picture quality will be underwhelming, but that is mostly a function of the limited bandwidth of commercial TV receivers.

For simplicity, you can put the whole assembly in a small equipment box, driving it with either your new video output jack or the built-in one. For the modulator's case, I used the empty slot reserved for the RS-232 board in the expansion interface, although any classy box will do.

The center pin of the video DIN jack (pin C in Fig. 1) in the TRS-80 is not used. To it, attach a wire from the cassette port's audio output line (pin G on the cassette connection shown in the

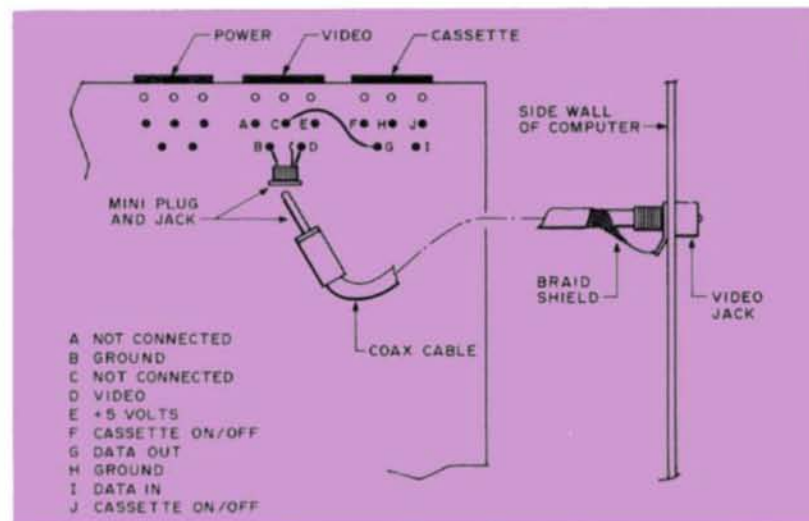


Fig. 1

TRS-80* OWNERS:

- Let the computer write your "Basic" program for you!
- Draw pictures, animated figures, data forms!
- Create a library of display forms!
- Produce "Commercial" gradesoftware!



The **Magic Cursor** is a Revolutionary Family of Products which provides a dramatic new method of reproducing drawings and displays that you create on your screen. It makes both simple displays and complex interactive data input forms. It stores a "BASIC PROGRAM" on disk (or tape) ready for you to execute alone or as a subroutine. It produces screens in both standard or wide screen.

It is available for any level 2, 16K or larger system with tape or disk. An optional version is now available which creates an assembly language program.

Be sure to pick out the system that fits your present needs and order it today. You may upgrade your original copy by paying the difference and a moderate service charge.

MAGIC CURSOR PROGRAMS

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. For the first time, a program for automatic generation of video display forms. (16K Tape or Disk) **\$24.95**

THE MAGIC CURSOR I additionally makes sophisticated Data Entry and Display easy. With Magic Cursor I you define the Data Entry or Display fields directly on your screen. The definition commands generate the BASIC instructions to implement the Data Entry and Display. The Magic Cursor I has commands which move, center, and duplicate blocks of graphical or alpha/numeric displays. You can even justify text. (16K Tape Only) **\$79.95**

THE MAGIC CURSOR II adds the power to write animated games easily in BASIC. The Magic Cursor II allows you to reload previous screens either from memory or from Disk. You can then modify them and store either the modified screen or only the changes. (32K Disk Only) **\$99.95**

THE MAGIC CURSOR III will be available soon for the new Model II Computer (32K One or more Disk) **\$149.95**

THE MAGIC CURSOR IV provides the features of Magic Cursor II but stores an assembly language program. (32K Disk Only) **\$99.95**

WRITE FOR OUR COMPLETE SOFTWARE CATALOG!!

Call 713-474-2484 or order by mail. Master Charge, Visa, Certified Check or Money Order accepted. Personal Checks require 14 days to clear. C.O.D. or collect calls not accepted. Software guaranteed for replacement only. Prices subject to change without notice. Some programs supplied on cassette tape. For disk versions, the cassette supplied will automatically create a disk file.

NEW RELEASES FROM CCC!!!

The Supply Room

A sophisticated program that is easy to operate. This unique system helps you manage your retail or wholesale inventory of up to 1000 line items. Cost may be fractions of a cent, item quantities may be decimal values. Automatic cost averaging of updated items and suggested sales prices based on gross profit. Transaction reports produced during posting functions. Printed reports include:

1. Transaction Listings.
2. Complete Inventory Listing.
3. Listings by Prefix.
4. Items on Order.
5. Items Out of Stock.
6. Suggested P.O.'s.

Requires Mod 1, 32K, 2 Disk **\$250.00**

The Filing Cabinet

Take that collection of Job Orders, Personnel Records, Reports, Etc. and get them organized. You define up to 14 data input fields specifying field type - alpha/numeric or \$\$\$, field length and field separators - such as slashes, etc. During data input, the cursor provides for character input and skips over the field separators.

But that's only half the story. Output reports are automatic formatted and program automatically requests column headings.

This means you can customize your own data base manager, complete with rapid data input and selective output reports. Comes complete with documentation.

Requires Mod 1, 32K, Disk & Printer **\$100.00**
Or Mod 2, 64K, 1 Disk & Printer **\$150.00**

The Restauranteur's Consultant

by Ty Halderman

This food and beverage management tool dramatically reduces the human factors in food cost analysis. Those tasks required to effectively operate any restaurant or food service business. Over a half dozen reports give uniform, accurate and up to the minute information for profitability. And, handling of daily cost changes requires only minutes per week instead of hours, because the Consultant makes all the necessary conversions from your case prices. Reports include:

1. Menu Recipes.
2. Ingredient Listing.
3. Supplier Master File.
4. Complete Listing of Food Cost Analysis.
5. Food Cost Summary.
6. Input Data Sheets.
7. Batch Update.

Mod 1, 32K, 2 Disk, Printer or Mod 2 **\$750.00**

*Trademark of Radio Shack, a Tandy Co.

Send Check or Money Order Payable to:

CUSTOM COMPUTER CENTER, INC.



Attn: Jim Martens
P.O. Box 58042 / Houston, Texas 77058
or call: (713) 474-2484

QUAN.	DESCRIPTION	SYSTEM (Size: Tape or Disk)	PRICE
	Handling Charge: \$1.50 Texas Res. add 6% Sales Tax	TAX & HANDLING	
		TOTAL	

MASTER CHARGE / VISA

SEND INFORMATION ONLY.

Card # _____ Expires _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

The Radio Shack catalog numbers, descriptions and prices for all the parts needed to compute the modification are shown below:

General stuff		
Wire-wrap wire	278-501-2,3	1.99
Solder-up	64-2090	1.49
Added video jack		
1 F-61 video connector	278-212	2/.89
1 Miniature plug/jack set	274-283	2/1.99
Added RF modulator		
2 5-pin DIN plugs	274-003	1.49
1 RF modulator (parts extra)	277-122	16.95
1 Case (optional)	270-232	2.49
1 DIN cable	42-2151	4.99
Modified E/I RESET		
1 Miniature SPST switch	275-612	1.69
1 10K ohm resistor	271-1335	5/.39
Added RESET button		
1 Pushbutton	275-1547	5/2.49
1 Miniature plug/jack set	274-283	2/1.99
Level I Addition		
1 Miniature DPDT switch	275-614	2.19
2 1K ohm resistors	271-1321	5/.39
1 Level I ROM set	(see text)	\$10 bribe
Keyboard addition		
2 16-pin wire-wrap sockets	276-1994	2/1.39
1 16-pin solder-tail socket	276-1998	2/.89
1 16-pin jumper cable	276-1976	3.99

Parts List

figure). Inside the RF box, wire two DIN jacks in parallel, hooking them up to the RF modulator as in Fig. 2.

A short DIN cable connects the computer to the RF box, the TRS-80's original monitor plugs into the box's other jack, and the RF output goes to an ordinary television. See Fig. 3. Picture and sound can now travel with me and my TRS-80.

Unlocking RESET

Speaking of the expansion box, I'm amazed that Radio Shack has let users suffer with a RESET button that locks up the computer when an E/I is connected. There's no good reason for leaving it that way, and fortunately the solution is very simple. You'll need a single-pole, single-throw switch and a 10K ohm resistor.

Open the expansion interface, and locate Z32 (near the power switch). If you have a newer expansion interface, this will be marked Z39. In either case the part is a 16-pin IC, type 74LS155. Now find pin 4, and identify the trace that leads underneath the IC and out its other side. Look carefully, using an ohmmeter to be sure it's the right trace.

Got it? Okay, take a sharp blade and cut through it. Run a 10K ohm resistor from the far side of the trace to pin 16 of Z32 (or Z39), and solder it carefully. Finally, run a pair of fine wires, one from each side of the cut trace. Solder one wire to each connection of the miniature toggle switch. When the switch is on, the cut trace is bridged, and the expansion interface acts normally. When the switch is off, the RESET button again works correctly.

Why did the expansion box hang up the computer in the first place? When you power up or hit the RESET button, the CPU clears a few internal items, and then sends out a signal to hex address 37EC, asking for information about the disk system. If it doesn't get anything (no

@	A	B	C	D	E	F	G
H	I	J	K	L	M	N	O
P	Q	R	S	T	U	V	W
X	Y	Z					
0	1	2	3	4	5	6	7
8	9	:	:	-	-	/	/
ENT	CLR	BRK	UPAR	DNAR	LFAR	RTAR	SPACE
SHIFT							

Table 1

expansion box), it continues to READY (or MEMORY SIZE? at power up). But if it does find something (the disk chip in the expansion interface responding with the proper value), it sits and waits for the disk to start rolling and the data to come in. No disk... no data.

When we cut that single trace, we took the disk system's answer from the circuit. The disk controller is still sending a signal, but the computer doesn't see it. The CPU goes happily on to READY. As for the 10K ohm resistor, it acts like an electronic rope, restraining the answer circuit from triggering because of the high-speed electronic madness inside the expansion box.

Even disk owners will find this modification valuable, because it allows the disk drives to be disabled without flipping a glitch-inducing power switch. Also, readers using the LNW research expansion board may make the same modification. The IC is marked U19, but the rest of the process is identical.

An Easy-to-reach RESET

Where is your RESET button, anyway? In frustration, have you torn off the computer's little silver port cover? Maybe bent the cable and crashed the system when reaching for RESET? Well, then, bring the button up front!

Following the same carpentry precautions used for the extra video jack, install a momentary-on pushbutton (get them in packs of five from Radio Shack) at the left side of the computer. Just two wires are needed, as only half of the TRS-80 double-pole RESET button is actually connected in the circuit. See Fig. 4.

As before, it is wise to use some sort of mating disconnect plug so that access to the machine innards is simplified.

Don't put the button too close to the top of the keyboard, as many an Apple user has shed tears over hitting its badly positioned RESET button. Imagine being on the 7,000th word using Electric Pencil, and accidentally swatting RESET!

Level I BASIC on Level II

Your kids are having trouble with triple-dimensioning strings? They can't make sense out of ?DD ERROR and holler about having to type long lines of command words? Then why not use that nice and easy starting language—Level I BASIC?

But you just upgraded to Level II, you say! Fear not, for the virtues of both are available to you for the price of a switch and two resistors. Let's hope you've saved your Level I ROM... you paid for it the first time. If not, seek out a cooperative (\$10 usually encourages coopera-

Column 1	— R8	— @	H P X 0 8	ENTER SHIFT
Column 2	— R5	— A	I Q Y 1 9	CLEAR
Column 3	— R3	— B	J R Z 2	BREAK
Column 4	— R2	— C	K S 3	UP-ARROW
Column 5	— R7	— D	L T 4	DOWN-ARROW
Column 6	— R1	— E	M U 5	LEFT-ARROW
Column 7	— R4	— F	N V 6	RIGHT-ARROW
Column 8	— R6	— G	O W 7	SPACE

Table 2

Row 1	— Z1 PIN 8	— @	A B C D E F G
Row 2	— Z1 PIN 2	— H	I J K L M N O
Row 3	— Z1 PIN 10	— P	Q R S T U V W
Row 4	— Z2 PIN 2	— X	Y Z
Row 5	— Z1 PIN 6	— 0	1 2 3 4 5 6 7
Row 6	— Z1 PIN 4	— 8	9 : ; , - /
Row 7	— Z1 PIN 12	— ENT	CLR BRK UPAR DNAR LFAR RTAR SPACE
Row 8	— Z2 PIN 4	—	SHIFT

Table 3

tion) Radio Shack manager and obtain a Level I ROM set from the upgrade pile in the back room.

The ROMs you want are marked National, and are identified by the numbers M2316E/MMS258ET R/N and S/N, or Motorola, marked 7807 and 7804. Best of all is the single-chip Motorola ROM, marked 7809. You do not want chips marked Intel; these were very early ROMs, and wiring is complex.

Check to see if you've got a two or three-chip Level II ROM set. If you've got the three-chip set, there will be a connector cable running to a separate board. If not, both ROM sockets will be filled, and that means no room for Level I.

Handle the ROMs carefully (use special black foam or aluminum-foil-covered vegetable trays). Mount a double-pole, double-throw switch conveniently, but not where you are likely to flip it while using the computer.

Open up and turn over your TRS-80. The Level II interconnect cable will be plugged into one of the two sockets, and several additional wires will be connected from the Level II board to various parts of the main circuit card. Find the following locations:

- The green wire from the Level II board, connected near the underside of dip shunt Z3.
- ROM Socket Z33 or Z34 (whichever is empty), pins 18 and 20. See earlier "Applications" columns if you need to know how to read pin numbers.

Cut the traces leading from pins 18 and 20 of the unused ROM socket. Add a short length of

Enjoying 80 MICRO? then read on...

Okay, now you've had a chance to see what I have in mind for you with *80 MICRO-COMPUTING*. Oh, I admit that we're just getting started and that the magazine will be improving a lot as we go along. We have some interesting ideas in the works for you.

With the TRS-80* (or 90... etc.) being the most popular microcomputer in the entire world, you are going to benefit from this in many ways. The more computers there are out there of one kind... the more good programs you are going to have for this system. I hope that is obvious. You may be sure that *80 MICROCOMPUTING* will be packed with the shorter programs and reviews of the larger ones. You can waste an awful lot of money on stuff that looks great in the ads, but fizzles out when you try to use it. You need our reviews.

The wealth of programs will also mean that there will be much better programs for the TRS-80* than any other system. Put yourself in the seat of a computer programmer and you'll understand this. If you are going to spend several months developing a comprehensive program, and it takes all of that to write and debug a big program, would you write it for a system which has sold one hundred units or one which has sold over 300,000 systems? The answer is obvious... and this is why we are already seeing programs coming out for the TRS-80* which are far better than anything for any other system on the market. This is tough for other systems... the law of the computer jungle.

Between our connections with Instant Software, the largest publisher of microcomputer programs in the world, and Kilobaud MICROCOMPUTING, you know that *80 MICROCOMPUTING* is going to be your most important link with software for the TRS-80*.

With Instant Software being sold and promoted in every country in the world where the TRS-80* is being sold, our input of programs is also the best in the world. We get programs submitted from everywhere...

*TRS-80 is a trademark of Tandy Corp.

often from 50 to 100 a week! You'll get the cream of the crop either published or reviewed in *80*.

HARDWARE TOO

The same law of the computer jungle holds for hardware. Would you, as a manufacturer, market an accessory for a system which has sold 100 units or would you go first for the one which has sold hundreds of thousands. It is, as with software, self-evident why the great bulk of the hardware accessories for computers are for the TRS-80* these days.

80 MICROCOMPUTING has the advantage of the use of the largest and most complete microcomputer lab in the world... the one developed for Instant Software and Kilobaud MICROCOMPUTING. This means that most new pieces of equipment are tested and in use by our staff... and this means that we can tell you what we think is outstanding... and where we find ripoffs. This lab is important to you.

SUBSCRIBE

If you are not already a subscriber to *80 MICROCOMPUTING*, please get signed up right now. The yearly rates are \$18, and that is a bargain. Just one single program of use to you can be worth much more than that. One review of an accessory could save you many times that much investment. I would appreciate it if you would

If the coupon below has been used, please fill out subscription form on the Reader Service card in the back of the magazine.



appoint yourself a committee of one to get more subscribers for the magazine. You will benefit even more than we do here at the magazine... because the more readers we have, the more ads we will be able to attract... and the more ads, the more pages of articles you will get every month.

The *80* market can, I think, support a couple of hundred pages of ads... and that would mean a magazine of nearly 500 pages a month. That should hold you. You may not have time left to use your computer.

ENCYCLOPEDIA

If you've read Kilobaud MICROCOMPUTING, you know that I try hard not to duplicate published material. My concept is that every reader should save every issue (we sell inexpensive boxes for this so they can sit on your library shelf) and treat the magazine as a continuing encyclopedia of computing. I make sure that much of the material in each issue is written in simple language so it will be understandable by even the rawest newcomer to computers. Oh, I have articles for the more advanced users too, so you'll have something to look back over later and use as your understanding of your system grows.

Try to think of *80 MICRO-COMPUTING* as more of a large club newsletter than an ivory tower high-level publication. I'll leave the pomp to other publishers... the ones with the well-deserved inferiority complexes who cater to their inadequacies by publishing esoteric baloney. This magazine is written by the readers and edited by people whose aim is to help you enjoy your TRS-80*.

SAVE

With each issue costing \$2.50 at your computer store, that's \$30 a year. For \$18 a year you can subscribe... at least for now. As the magazine expands, please do not be surprised if the cover price increases, along with the subscription price. I started *73 Magazine* for radio amateurs twenty years ago with a cover price of 37¢ (two for 73¢) and it is up to \$2.95 a copy now (and it is the largest of the ham magazines).

For you bargain hunters... and those who find that one year goes by all too rapidly, the three year rate for *80* is \$45. This, too, will be going up... reflecting the inflation, paper increases, postage increases, and a short vacation for me in Hong Kong next year. Someone has to pay for that.

YES! Sign me on as a subscriber to 80 Microcomputing for only \$18 a year!

Card # _____ Exp. _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

- 12 issues — \$18
- 36 issues — \$45
- Please bill me
- Payment Enclosed
- Master Charge
- VISA
- American Express

80 microcomputing
Peterborough, N.H. 03458

Subscription begins with next published issue.
Back issues, while available are \$3 each.
Canada: \$15 per year US funds.
All other foreign subscriptions \$28 one year only.

3d966

wire between pin 20 and the other end of the cut trace from pin 18. Solder a long white wire to trace 18.

Now remove the far end of the Level II ROM board's green wire from its connection point near shunt Z3, and solder a red wire in its place. A blue wire goes to the five-volt supply. I used Z57, pin 14. Run the other ends of the white, green, red and blue wires to the switch following Fig. 5.

Note also that two 1K ohm resistors are necessary to tie up the ROM chip-select leads when they are switched off. The resistors hold the chips inactive.

Now here comes the hard, or fun, part if you don't have the single-chip Level I set. Find the notch at the top of each ROM chip, and line up the two chips. Now piggyback one atop the other, and solder all 24 pin pairs, so that you've got a single, integrated circuit. Do it carefully, and be sure to keep the bottom IC anchored in some conducting material, like aluminum foil. The foil also acts as a heat sink, so work patiently and accurately; use good, fine solder, and always keep some Solder Up or Solder Wick handy in case a blob of solder fuses some neighboring pins together.

Insert this Level I hulk, or the single-chip ROM, in the empty socket. Snap the computer back together, and power up. You should either get MEMORY SIZE?, if it's switched to Level II, or a simple READY in Level I. You cannot switch back and forth; the languages get confused and "hang up." You must power up to the language you want.

Need a Second Keyboard?

It's an action game, and the youngsters are crowded about the keyboard. One youngster (balding, with grandchildren) complains, "Hey, I'm not close enough to the computer! It's rigged in his favor!"

Need another keyboard? No problem! You'll need two high quality wire-wrap integrated circuit sockets and one low quality solder-tail socket. All three are 16-pin types. You will also need some fine wire (wire-wrap is best), a 16-pin jumper cable, and a keyboard.

The type of keyboard is up to you. Perhaps you'll want a complete alphanumeric type (available in the \$40 range) or merely a \$10 numeric keypad. Whatever you choose, it should consist of individual keys, each with a single pole single throw (SPST) contact pair. Small calculator keyboards usually have matrix arrangements which aren't compatible with the TRS-80. Its keys are arranged in eight columns and eight rows, as shown in Table 1.

Depressed keys are identified in the TRS-80 software by column and row. Letter T, for example, is column five row three. That simplicity makes adding a keyboard a straightforward task, since no special encoding is needed. To identify any letter, you only need to know which column-row combinations produce it.

There is enough room on the far left side of the keyboard for a 16-pin socket in which to plug a jumper cable leading to the added keyboard. Inside the computer, this location is directly above a blank part of the keyboard's circuit card.

Use a flat screwdriver to snap out the black portion of the cover, and mark precisely where the free area is found on the baseboard. Using needlenose pliers, pull out all the pins from the solder-tail IC socket, and use the socket as a guide to mark the baseboard.

With a small hobby drill, make 16 holes in the board to match the 16 pins of the sockets. Slide one of the wire wrap sockets into the disemboved solder-tail socket, using the latter as a special-purpose grommet. Feed the wire-wrap pins through the circuit board, and fasten the sockets in place with fast-drying glue.

Now remove the entire cover, turn the board over, and identify pin 1 of the socket. This will attach to column one. On most versions of the 80, you can use the keyboard's resistors to identify columns. See Table 2.

Match column one with socket pin 2. Match column two with pin 2, etc. Solder a wire to the resistors, and wire-wrap (or solder) the other end to the socket pins. Be sure to solder to the ends of the resistors closest to the keys. You will see that the other ends of the resistors are all tied together.

The keyboard rows are found at the input pins of specific IC's on board, but there have been so many versions of the 80 keyboard that this sequence is far from consistent. The technical manual (good for better than half the

machines in use, but not mine) identifies the rows as shown in Table 3.

It's better to check it yourself. Look for the traces connecting @, A, B, C, D, E, F, and G. That is row one. Solder a wire to some point in this row, and run it to pin 16 of the socket.

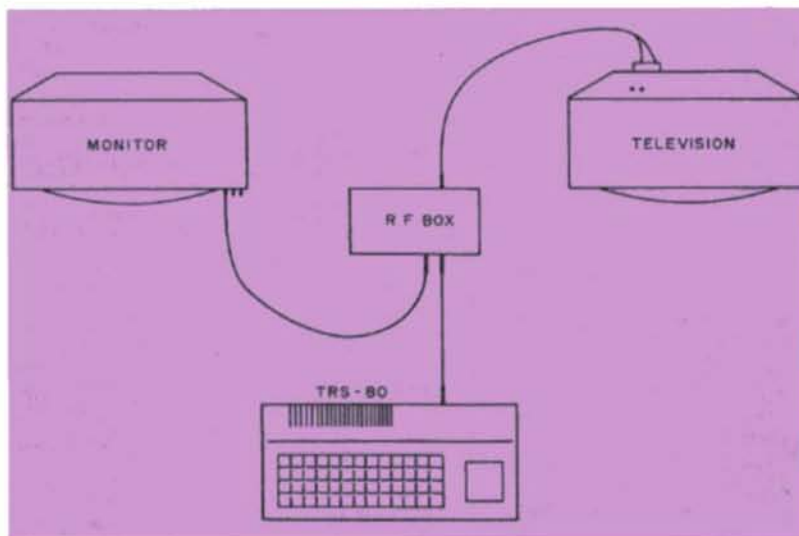
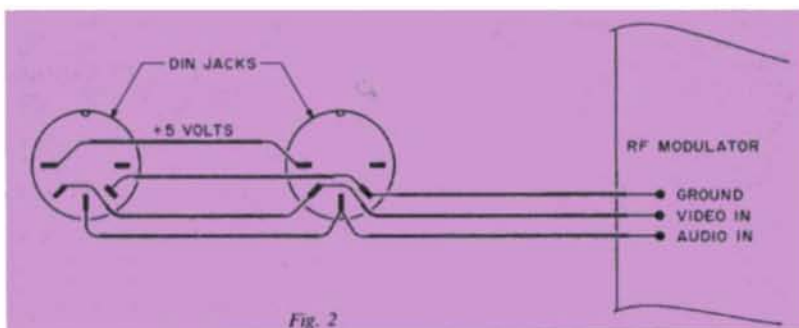
Locate row two, and solder to socket pin 15 and so forth down to row eight, soldering it to pin 9 of the socket. When viewed from the top, the arrangement will be as depicted in Fig. 6.

Once you have completed the wiring, clip the socket pins short, turn the board over, and place everything back in order. Leave the cover off, power up, and run through a few of the usual motions to make sure the computer is functioning properly.

Now take a short length of wire and, at the newly-installed socket, jumper each row across to column one. You should produce all the non-shifted keyboard characters, including the four arrows and the cursor.

Take a second length of wire and jumper row eight with column one. This simulates the shift key. Repeat the column-row test, and note that shifted characters appear. Any bizarre behavior, such as repeated letters, indicates that a wire may be shorted or attached to the wrong column or row.

Last of all, there are the cosmetics to deal with. Cut a rectangular hole the size of the



16-pin socket in the black plastic cover using a hot, sharp knife or razor blade. Work slowly and carefully to achieve a factory finish (whatever that is).

Piggyback the remaining wire-wrap socket into the first one, and snap the cover back on. The socket should fit perfectly, rising about 1/16 of an inch above the surface of the cover. The cable plugs in at a comfortable distance from the keycaps.

For each keyboard you wish to add, work out a row-column key matrix to match the TRS-80's, using Table 1. You can either make the jumper cable an integral part of each added keyboard, or include a socket on it as well. Better yet, put a cable *and* socket on each extra keyboard, so that they can be chained.

No-printer Lockup

If you've got the time and patience, there's a good hardware fix to cure the LPRINT/LLIST no-printer lockup. It involves a few ICs, an edge connector, and lots of wire. Instead, do this:

POKE 16422, PEEK (16414) : POKE 16423, PEEK (16415)

Now do a few LPRINTs and LLISTs. See, it sends your mistaken Ls to the screen. Where's the hardware?

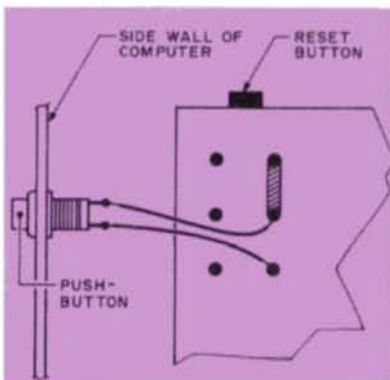


Fig. 4

The previous little item was included to make a point. With computers, there are many ways of achieving very similar goals. Software can run a printer without the mess of hardware used in the expansion box. Although a separate data generation circuit could have been used for cassette output, data is output via software instead. The whys and wherefores are rooted in economics, elegance and versatility. It was not too long ago that I built a nine-channel multimedia controller for a museum out of dozens of

discrete logic chips and transistors. A very simple CPU board and some software could have done 30 times that task. Time and technology make changes.

There are those computer users who, if they do not fear working with hardware, at least sneer at its apparent clumsiness. On the other hand, some folks cannot begin to understand the contortions (and labor-dollars) programmers go through to accomplish something in software that a 15¢ chip could do with ease. ■

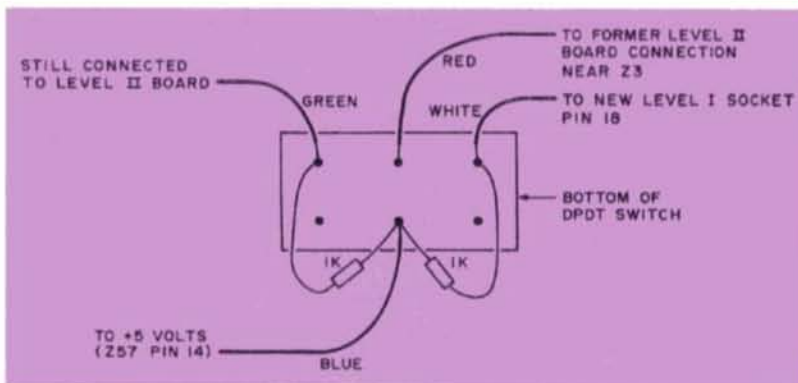


Fig. 5

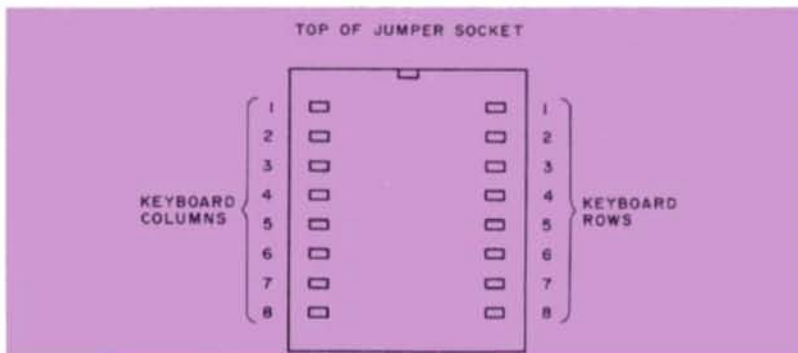


Fig. 6

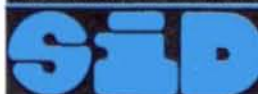
Features of the FATIGUE FIGHTER:

- 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
- FITS BOTH THE MODEL I AND MODEL II
- DOES NOT VOID THE COMPUTER WARRANTY
- ENHANCES THE APPEARANCE OF THE MONITOR
- PROVIDES A DURABLE, EASY TO CLEAN SURFACE

TO ORDER SEND:

* PRICE INCLUDES SHIPPING
TRS-80 IS A TRADEMARK OF TANDY

Name and Address Typed or Clearly Printed with Check or Money Order for \$9.95* Per Unit. COD's are \$2.50 Additional Per Order. Florida Residents Add 4% Sales Tax.



SOUTHERN INNOVATIVE DESIGN
1520 NORTHEAST 12TH STREET
GAINESVILLE, FLORIDA 32601 ✓ 373



New Releases for the TRS-80[®] Utilities

We're proud to present three disassemblers for the TRS-80. For speed and simplicity, we recommend The Disassembler. For complex disassemblies, especially if you wish to make alterations, you may prefer one of our Labeling Disassemblers, either TLDIS or DLDIS.

TLDIS & DLDIS

You've bought a super machine-code program, but now wonder how it works. Maybe you even used a quick PEEK routine to glance through it when it was in memory. If so, you definitely noticed the complete lack of comments in the code, making it almost impossible for you to decipher and understand it.

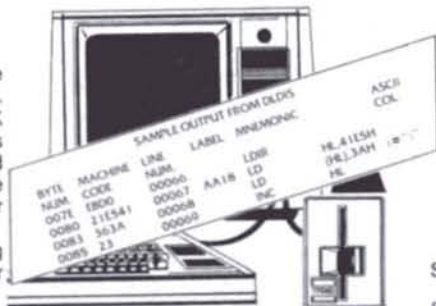
Well, Instant Software's Labeling Disassemblers are the answer to your problem.

TLDIS (Tape-based Labeling Disassembler) and DLDIS (Disk-based Labeling Disassembler) are three-pass, label-assigning disassemblers which 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.

You can send the disassembly to a lineprinter (Radio Shack parallel port) for either TLDIS or DLDIS. (The difference between these utilities is the storage mode of the disassembly.)

TLDIS can send the disassembly to cassette tape, DLDIS can send it to disk; both send it to the video monitor. The stored disassembly from TLDIS may be reassembled with Radio Shack's EDTASM[™]—the disassembly from DLDIS, with Apparat's extension of EDTASM[™].

Because of the use of labels, it is a simple matter to change any object code program by disassembling it and then



making changes to the resultant source code, without losing track of jump/load addresses. Labels start with "AA00" and increment up, in even numbered steps (AA02, AA04, etc.). The odd numbers (AA01, AA03, etc.) are left for you to use for the source code during reassembly.

The printing of the disassembly may be temporarily halted by using [SHIFT] @ (just as in BASIC) or it may be ended by pressing the [BREAK] key. It also has a comments column to display ASCII characters used in a LD or CP opcode.

Because TLDIS and DLDIS work only on in-memory programs, they may be relocated in memory to avoid conflict with the program you disassemble.

The next time you need to "climb inside" a machine-code program, take DLDIS or TLDIS with you. We promise that it will be an easier journey.

Order No. 0230R (TLDIS) \$14.95
Order No. 0231RD (DLDIS) \$19.95

The Disassembler

This is a single-pass, hex-notation disassembler that will send its output either to tape or to a lineprinter (Radio Shack parallel port). The tape output is directly compatible with Tandy's EDTASM[™]. Thus, you can take an object code tape, disassemble and output it to tape, then use EDTASM[™] to add, delete, change and even re-assemble your new version.

In addition, it displays the *displacement* and *absolute* address of any relative jumps made by the disassembled program. It also displays any ASCII characters used in a LD or CP opcode.

Sample output from the Disassembler

BYTE NUM	MACHINE CODE	LINE NUM	MNEMONIC	COMMENTS
706E	22057B	00053	LD	(7B05H),HL
7071	183B	00054	JR	\$ + 3DH ;70AEH
7073	FE52	00055	CP	52H ;="R"
7075	2007	00056	JR	NZ,\$ + 09H ;707EH
7077	C0BF70	00057	CALL	70BFH

H means the number is HEX
\$ means current location counter.

Since the Disassembler works only on in-memory programs, it has been made relocatable so that you may move it around in memory to avoid conflict with the program you wish to disassemble. As an added option, you may also jump to memory locations and transfer control between Disassembler and other utility programs in your computer.

The Disassembler, use it to examine and analyze any machine-code program!

Order No. 0232R \$9.95

Terminal-80

The Terminal-80 package lets your TRS-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. Your computer will accept input from the RS-232 port just as if it were entered from the keyboard. Thus, you can use your computer from a remote terminal without having to move your equipment.

The TRS-80 can also be transformed into a "dumb" terminal. You can use it in a time-sharing situation to talk to "big" computers via a modem. All data that you type in will go out through the RS-232 port and all incoming data will be

displayed on the screen.

You can transfer programs over the phone lines. Just load a program into the TRS-80. The LPRINT/LLIST command will transfer the program to a receiving computer via the RS-232 port.

Using the upper/lowercase modification of the TRS-80 is simplified. (You must have the modification kit installed first or follow the detailed instructions included in this package.) Control characters in Level II and Disk BASIC will be properly displayed and all functions such as CHR\$ will work correctly.

This package even includes a BASIC program to set the baud rate. You won't have to tear apart your Expansion Interface if you use more than one configuration.

There are thousands of TRS-80 computers in the world. Let's get together and talk to each other—with the Terminal-80 from Instant Software.

This package requires the following minimum system:

1. A TRS-80 with 16K of memory.
2. An Expansion Interface.
3. An RS-232 Serial Interface (e.g., Radio Shack's No. 26-1145 or the equivalent).
4. An optional upper/lowercase modification kit.

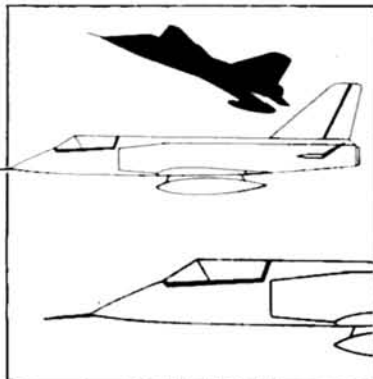
Order No.0130R (cassette-based) \$24.95.

WRITE FOR OUR NEW CATALOG!

Instant Software[™]

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

Great Simulations



Jet Fighter Pilot

The Jet Fighter Pilot package takes you as close to real combat flying as possible... without pulling G's.

In this brilliantly realistic simulation, you become the pilot of a high performance, twin turbo-jet fighter. Total control of the aircraft is yours.

At the start of your mission, you'll go through an entire engine start procedure before your flight (provided your ground maintenance is up to par). Your takeoff

will be from either the deck of an aircraft carrier (via a steam catapult) or from an airfield.

All controls respond the same as they would on a real jet fighter. You'll have to constantly monitor your display and make adjustments to your throttle, flaps, rudder and air spoilers. You decide when to retract flaps, landing gear and release the auxiliary fuel drop-tanks.

Your on-board navigational computer will direct you to your selected airport. The Glideslope/Localizer information will aid you in approaching and landing on an aircraft carrier deck or airfield.

The Weapons Control Computer will arm your missiles, provide you with the range and bearing to a target, and tell you when to attack. And, if things should get a little too hot, you have an ejection seat command for egress.

For a carrier-based landing, you'll have to deploy your tail hook. For a land-based landing, you'll need reverse thrust and your drag chute.

After you've flown a few missions with the Jet Fighter Pilot package, you'll know you've earned your wings.

Order No. 0159R \$14.95



Battleground

It is late 1944, and the Allied Forces are sweeping toward Berlin. As General in command of your sector, you study the map. At your command, are tanks, planes, artillery, infantry, engineers and vehicles—an awesome array of fighting men and the machines of war. From Intelligence reports you know that the enemy General is a shrewd tactician, not to be underestimated. It will take planning and strategy to outwit this wily old campaigner.

The battle map of your sector will fill with markers, each showing the deployment of your forces. You and another player will slip into the roles of opposing German and American commanders as yet another battle unfolds.

Battleground allows you to experience the awesome responsibility of a battle-area command. It will be up to you to deploy your tanks, planes, vehicles, weapons and men. On your shoulders rests the decision, whether to call for direct artillery gunfire, or to order your planes into the air. You will constantly be watching for an enemy air-drop, always carefully maneuvering your forces.

The stark reality of World War II comes alive in Battleground.

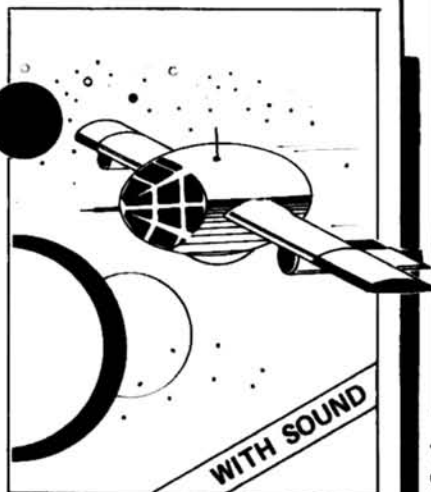
Order No. 0141R \$9.95

Cosmic Patrol

WARNING: PLAYERS OF THIS GAME SHOULD BE PREPARED FOR A STATE OF REALISM HITHERTO UNAVAILABLE ON THE TRS-80

The Cosmic Patrol program puts you in the command chair of a small interstellar patrol craft. Your mission is to defeat 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 games cartridges. Get Cosmic Patrol from Instant Software—and get the best for less!

Order No. 0223R \$14.95

TO ORDER: Look for these programs at the dealer nearest you (see list of dealers on page 199). If your store doesn't stock Instant Software send your order with payment to:

Instant Software

Order Dept.

Peterborough, N.H. 03458

(Add \$1.00 for handling) or call toll-free 1-800-258-5473 (VISA, MC and AMEX accepted).

Instant Software™

Prices subject to change without notice.
PETERBOROUGH, N.H. 03458
603-924-7296

THE ASSEMBLY LINE

by William Barden, Jr.

"Numeric computations are very tedious in assembly language, especially when floating-point numbers must be handled."

This month we're going to discuss interfacing assembly language code to BASIC—why it is desirable, what techniques are involved, and what kinds of problems will be encountered when it's done. We'll also be presenting the winner of the Great Second Assembly Line Programming Contest.

A Symbiotic Relationship

A program made up of both BASIC code and assembly language code takes advantage of both types of programming. BASIC can be used for all of the I/O bound processing, while assembly language can be used for the compute-bound processing, which must be as fast as possible.

An example of I/O bound processing is the portion of a mail list program that accepts user input for mail list entries. In this case, the high-speed processing of assembly language is unnecessary, as the data is being input at speeds no greater than 30 or 40 words per minute, and can easily be handled by BASIC code. A similar example is printing output, which proceeds at speeds in the area of 100 characters per second.

Assembly language code can be used in the compute bound, or "number crunching" portions of the program, where BASIC code is very slow. We've all seen or heard about mail list programs that take hours (or days) to sort entries. If the sort routines are coded in assembly language, this time critical portion of the program can be improved by a factor of 100 or so. Other examples of processing where assembly language can be used are high-speed graphics, searches, and array operations.

When one opts to use assembly language code, there are other trade-offs. BASIC code can be developed and debugged much faster than assembly language code. Numeric computations are very tedious in assembly language, especially when floating-point numbers (those larger than integer values) must be handled. String operations are not easily performed in assembly language.

However, in spite of its negative aspects pro-

grams of any significance can benefit greatly by having portions of the code in assembly language.

Level II BASIC and Disk BASIC allow BASIC code and assembly language code to be run together. The mechanism for this is the BASIC USR call. Let's illustrate the use of USR in Level II BASIC and Disk BASIC by some simple assembly language code. This code draws a line across the screen and is shown in Program Listing 1.

For reasons which we'll discuss later, the assembly language code here is relocatable. That is the machine code end result of the assembly (the hexadecimal data in the second column) can be moved anywhere in memory and will continue to draw that line on the screen. Non-relocatable code can only execute in one area in memory, the area for which it was assembled, controlled by the ORG pseudo-op in the assembly language statements. (For a more complete discussion of relocatability, see this column in the May, 1980 issue.)

Level II BASIC and Assembly Code USR Calls

Suppose that the 12 machine code bytes have been put into RAM memory at locations 8000H through 800BH. How do we execute the assembly language code at those locations while in the middle of a BASIC program? In Level II BASIC, the procedure is this:

1. POKE the address of the start of the machine language code into locations 16526 and 16527. The low order byte of the start address must be put into location 16526, and the high order byte must be put into location 16527. In this case 00H must be put into location 16526, and 80H must be put into location 16527. Locations 16526 and 16527 are simply a variable in BASIC that has been set aside specifically to hold the address of the machine code to be executed when a USR call is made.

2. At the point in the BASIC program at which you want to execute the "draw line" code, use the BASIC statement X=USR(M). When Level II BASIC encounters this state-

```
100 'LEVEL II CALL AND RETURN SEQUENCE
110 CLS 'CLEAR SCREEN
120 POKE 16526,0 'LS BYTE OF 8000H
130 POKE 16527,128 'MS BYTE OF 8000H
140 X=USR(0) 'CALL SUBROUTINE
150 GOTO 150 'LOOP HERE
```

Program Listing 2. Level II Machine-Language Calling Sequence.

ment, it takes the address value in locations 16526 and 16527 and calls that location. At the end of the machine language, a RET instruction pops the return address off the stack and causes a return to the BASIC interpreter, which picks up the BASIC code at the next statement after the USR call. This CALL and RETURN sequence is illustrated in Program Listing 2.

3. We've ignored variables X and M in the last two steps. If no arguments are to be passed, any dummy value can be used for M and variable X can be ignored. It's often necessary, however, to pass one or more arguments from the BASIC code to the machine language code and back again. For example, we might want to modify the assembly language routine to draw a line at any of the 16 screen lines, passing the line number of 1-16 from BASIC to the draw-line code. Conversely we might want to pass back to the result of a high-speed multiply routine to BASIC.

The USR call has a built-in provision for passing one argument to the machine code and for transferring one argument back from the machine code. The M in the statement X=USR(M) may be any variable or expression that resolves down to an integer value from -32768 to 32767. This argument is passed to the machine code in the HL register pair only if the assembly language code contains a CALL 0A7FH instruction. When the machine code executes the CALL, a ROM routine in Level II BASIC transfers the argument to HL.

To transfer an argument value of -32768 to 32767 back to BASIC, the value must be in HL and a JP made to ROM routine 0A9AH at the end of the machine language code; note that this "JP 0A9AH" replaces the normal RET.

Multiple Arguments and Multiple Routines

Multiple arguments may be passed from the BASIC code to the machine language code in a variety of ways. The arguments may be at some predefined location known to both the BASIC program and the machine language code, for example a list starting at location 9000H. A second way to pass arguments is to pass a pointer in HL; this pointer identifies the argument list, which has a predefined order. The pointer may

```
0000 0640 00100 ;ALL CODE HERE IS RELOCATABLE - NO ORG NEEDED
0002 21003E 00110 DRAWL LD B,64 ;64 CHARACTER POSITIONS
0005 3E8C 00120 LD HL,3C00H+512 ;START
0007 77 00130 LD A,8CH ;LINE
0008 23 00140 DRA010 LD (HL),A ;STORE SEGMENT
0009 18FC 00150 INC HL ;BUMP POINTER
000B C9 00160 DJNZ DRA010 ;GO IF NOT 64
000D 0000 00170 RET ;RETURN TO BASIC
000E 0000 00180 END
00000 TOTAL ERRORS
```

Program Listing 1. Line Drawing Program

```

0000 CD7F8A 00100 ;ALL CODE HERE IS RELOCATABLE - NO ORG NEEDED. THIS CODE
0001 29 00110 ;ASSUMED TO BE AT 8000H.
0002 C39A8A 00120 MULT2 CALL @A7FH ;GET M INTO HL REGISTER
0003 00130 ADD HL,HL ;MULTIPLY BY 2
0004 00140 JP @A9AH ;PASS BACK AS X
0005 00150 END
00000 TOTAL ERRORS

```

Listing 3A

```

200 'LEVEL II BASIC HERE. ASSUMES MACHINE LANGUAGE
210 'AT 8000H.
220 POKE 16526,0 'LS BYTE OF 8000H
230 POKE 16527,128 'MS BYTE OF 8000H
240 DEFINT M 'DEFINE M AS INTEGER
250 INPUT M 'INPUT INTEGER VALUE
260 X=USR(M) 'MULTIPLY BY 2
270 PRINT "X=";X 'PRINT RESULT
280 GOTO 250 'GO FOR NEXT
300 'DISK BASIC HERE. ASSUMES MACHINE LANGUAGE
310 'AT 8000H.
320 DEFINT M 'DEFINE M AS INTEGER
330 DEFUSR5=&H8000 'INPUT INTEGER VALUE
340 INPUT M 'MULTIPLY BY 2
350 X=USR5(M) 'PRINT RESULT
360 PRINT "X=";X 'GO FOR NEXT
370 GOTO 340

```

Listing 3B

be one established by the BASIC VARPTR command, and the pointer may point to an array or string containing multiple arguments. Another method is to pack arguments into HL. Four four-bit values could be put into HL, or one eight-bit argument could be in H and another in L.

More than one assembly language routine can be used with a Level II BASIC program; it's only necessary to put the starting address of the machine language routine to be called into 16526,7 before each new USR call is executed in BASIC. If there is only one machine language routine, its starting address needs to be placed into 16526, one time only, at the start of the BASIC program.

The calling sequence for Disk BASIC is somewhat more straightforward. Disk BASIC also uses the USR function, but it has a slightly different format. The format is X=USRn(M). The small letter n stands for any digit 0 through 9, which references one of ten possible machine code addresses. To call machine code routine 7, for example, the statement might be X=USR7(M). As in Level II BASIC, M may be used to pass one 16-bit argument, or it may be a dummy and X may be used to pass back one 16-bit argument, or it may be ignored.

Rather than POKEing the address of each machine language routine into 16526,7, Disk BASIC permits the addresses to be predefined by a new function, DEFUSRn. To define machine code routine 8 at 8000H, the statement DEFUSR8=&H8000 is executed sometime before the call X=USR8(M) is made. Everything else works as in Level II BASIC. CALL 0A7FH

is optionally made to pick up the M argument from BASIC, and a JP 0A9AH is optionally made to pass an argument in HL back to BASIC as variable X.

Another sample program with versions for both Level II BASIC and Disk BASIC is shown in Program Listing 3. This program takes one argument M from BASIC, multiplies it by two in the machine language code, and passes it

```

100 'DATA VALUES TO PREASSIGNED AREA METHOD
110 'MOVE DATA HERE
120 FOR X=32768 TO 32774
130 READ A
140 POKE X-65536,A
150 NEXT X
160 DATA 205,127,10,41,195,154,18
200 'LEVEL II BASIC HERE
210 POKE 16526,0
220 POKE 16527,128
230 DEFINT M
240 INPUT M
250 X=USR(M)
260 PRINT "X=";X
270 GOTO 240
300 'DISK BASIC HERE
310 DEFINT M
320 DEFUSR5=&H8000
330 INPUT M
340 X=USR5(M)
350 PRINT "X=";X
360 GOTO 330

```

Program Listing 4. DATA Values to Preassigned Area Example.

back to BASIC as variable X. It illustrates all of the concepts we've been talking about except for multiple argument passing.

There are basically two methods for interfacing machine language programs to BASIC programs. The first is the two program approach. The second is the embedded machine language approach. We'll discuss the techniques and advantages of each.

The Two Program Method

In the two program approach, the BASIC program contains no machine language code. The machine language code is separately assembled and loaded. To integrate the BASIC program and the associated assembly language program for a cassette based system, the following steps are performed:

1. Execute Level II BASIC. For MEMORY SIZE?, type in a memory address corresponding to the start of the assembly language program. Normally this would be in high memory, as everything above this address will not be used by the Level II BASIC interpreter.

```

100 'DUMMY STRING USING CHR$
110 A$=CHR$(205)+CHR$(127)+CHR$(10)+CHR$(41)+CHR$(195)+
CHR$(154)+CHR$(10)
200 'LEVEL II BASIC HERE
210 DEFINT M
220 B=VARPTR(A$)
230 POKE 16526,PEEK(B+1)
240 POKE 16527,PEEK(B+2)
250 INPUT M
260 X=USR(M)
270 PRINT "X=";X
280 GOTO 220
300 'DISK BASIC HERE
310 DEFINT M
320 B=PEEK(VARPTR(A$)+1)+PEEK(VARPTR(A$)+2)*256
330 IF B>32767 THEN DEFUSR5=B-65536 ELSE DEFUSR5=B
340 INPUT M
350 X=USR5(M)
360 PRINT "X=";X
370 GOTO 320

```

Program Listing 5. Dummy String Using CHR\$ Example.

THE ASSEMBLY LINE

```
100 'DATA VALUE TO DUMMY STRING
110 A$="DUMMY S"
120 B=PEEK(VARPTR(A$)+1)+PEEK(VARPTR(A$)+2)*256
130 IF B>32767 THEN B=B-65536
140 IF B>32767 THEN C=B+6-65536 ELSE C=B+6
145 IF B>32767 THEN D=-1 ELSE D=1
150 FOR X=B TO C STEP D
160 READ A
170 POKE X,A
180 NEXT X
190 DATA 205,127,10,41,195,154,10
200 'LEVEL II BASIC HERE
210 DEFINT M
220 B=VARPTR(A$)
230 POKE 16526,PEEK(B+1)
240 POKE 16527,PEEK(B+2)
250 INPUT M
260 X=USR(M)
270 PRINT "X=";X
280 GOTO 250
300 'DISK BASIC HERE
310 DEFINT M
320 B=PEEK(VARPTR(A$)+1)+PEEK(VARPTR(A$)+2)*256
330 IF B>32767 THEN DEFUSR5=B-65536 ELSE DEFUSR5=B
340 INPUT M
350 X=USR5(M)
360 PRINT "X=";X
370 GOTO 340
```

Program Listing 6. DATA Value to Dummy String Example.

```
100 'DATA VALUE TO ARRAY
110 DIM A%(6)
120 FOR X=0 TO 3
130 READ B,C
135 A=B+C*256
140 IF A>32767 THEN A%(X)=A-65536 ELSE A%(X)=A
150 NEXT X
160 DATA 205,127,10,41,195,154,10,-1
200 'LEVEL II BASIC HERE
210 DEFINT M
220 B=VARPTR(A%(0))
230 POKE 16526,B-INT(B/256)*256
240 POKE 16527,INT(B/256)
250 INPUT M
260 X=USR(M)
270 PRINT "X=";X
280 GOTO 250
300 'DISK BASIC HERE
310 DEFINT M
320 B=VARPTR(A%(0))
330 IF B>32767 THEN DEFUSR5=B-65536 ELSE DEFUSR5=B
340 INPUT M
350 X=USR5(M)
360 PRINT "X=";X
370 GOTO 340
```

Program Listing 7. DATA Value to Array Example.

2. Use the SYSTEM command to load a previously assembled machine language program into the protected memory area. Rather than typing slash to start executing the machine language code, hit BREAK to go back to the BASIC interpreter.

3. Execute the BASIC program with its USR calls to the machine language code. The ma-

chine language code loaded by the SYSTEM tape may contain many different routines, each of which can be specified by the proper POKE commands to 16526,7 and a subsequent USR call.

To utilize the two program approach with a disk based system, follow these steps:

1. LOAD the machine language program in-

to memory. The program must have been previously assembled with an object file to disk (Apparat assembler) or have been previously loaded and saved on disk (Radio Shack Macro Disk Assembler).

2. Execute Disk BASIC by the usual BASIC input. Protect the machine language code by entering the starting address of the machine language code for "MEMORY SIZE".

3. Execute the BASIC program with its DEFUSRn and USRn functions.

This method works well, but is best used for lengthy assembly language programs that cannot use the procedures for embedded code that we'll outline shortly. Since it is a two step loading process, it is somewhat awkward to use. Its main disadvantage is that the BASIC code must deal with absolute addresses; if the assembly language portion is reassembled, the addresses of its routines may change, and the corresponding addresses in the BASIC program will also have to be changed.

The second method of interfacing is the embedded machine code approach. This approach is best used when the machine code consists of short routines. The data representing the machine code instructions can be incorporated into the BASIC program directly, as DATA values, CHR\$ strings, or dummy strings. The advantage of this approach is that the BASIC program, complete with its embedded machine code, can be loaded or edited in one fell swoop.

The disadvantage is that some conversion is involved, to change the machine code from an assembly listing to corresponding decimal DATA or string values. There are a number of ways to embed the machine code; we'll discuss the most popular.

DATA Values to Preassigned Area

This is similar to the two program method in that the machine code is at a predefined area and should be protected by a MEMORY SIZE value. In this approach, the machine code in a DATA table is moved to its area sometime prior to the USR call. Since the area is predefined, the machine code does not have to be relocatable, but simply assembled to run at the specified memory area. An example for both types of BASIC is shown in Program Listing 4.

A dummy string consisting of CHR\$ values can also hold the machine code. The location of the string is found by the VARPTR function. As one reader pointed out, this approach has a potential problem. When the infamous "string garbage collection" mode is entered in BASIC, the location of strings may change. The garbage collection mode is entered when all string space has been used, and the interpreter must go back and clean up the string allocation area to create additional room. (Garbage collection is used in lengthy BASIC programs that manipulate many strings.)

When using this method, find the VARPTR location immediately prior to the USR call; it will work without problems except a 255-byte limitation on string size. Relocatable code must be used. This approach is shown in Program Listing 5.

DATA Value to Dummy String

INFLATION FIGHTER—ROUND # 2

KO Inflation With Our Knock-Out Prices

MPI 88T Impact Matrix Printer

Quality, Full-Page Printout

For Your TRS 80 Computer!

Unrivalled champion of the small business, educational, personal computing and professional user. Quality construction and continuous duty print head allow heavy usage. Attractive styling complements the most elegant of systems without sacrificing compact size.

• Type of Printing: Impact bidirectional 7x7 dot matrix • Print Rate: 100 characters per second (maximum) • Thruput: 80 characters per second (maximum) • Character Set: Full upper and lower case 96 character ASCII set, software selectable single or double wide character fonts • Character Height: 0.10 in. (0.25 cm) • Print Format: 8.0 in. (20.3 cm) line length, 80 characters per line at 10 CPI, 96 characters per line at 12 CPI, 120 characters per line at 15 CPI, 132 characters per line at 16.5 CPI • Paper Feed: 10 lines per second, stepper motor controlled. User selectable pressure roller or tractor feed • Line Spacing: 6 or 8 lines per inch, user selectable • Media: Roll paper: 8.5 in. (21.6 cm) wide by 5 in. (12.7 cm) diameter single ply or pressure sensitive multiple copy paper, 0.012 in. (3 mm) maximum thickness. Fan Fold paper: 1 in. (10.1 cm) to 9.5 in. (24.1 cm) sprocket (including sprocket margins), 0.012 in. (3 mm) maximum thickness. Cut Sheet paper: Maximum width, 9.5 in. (24.1 cm) • Ribbon: Continuous loop cartridge, 20 yds. 0.5 in. (1.27 cm) wide black ribbon, 5 million character line • Input Power: 115/230 VAC, ± 10%, 50/60 HZ • Data Input: Parallel: Centronics compatible 7-bit ASCII, TTL levels with strobe, acknowledge returned to indicate data was received. Serial: RS232C or 20 ma Current Loop with BUSY (RS232C only) handshake, 10 or 11 bits; 100, 150, 300, 600, 1200 baud • Data Buffer: 1K (2K optional) • Forms Control: Top of Form (eight selectable forms lengths) Skip over perforation • Physical Dimensions: 16.25 in. (41.3 cm) wide x 10.75 in. (27.3 cm) deep x 6.25 in. (15.9 cm) high. Dimensions exclude paper and paper holder. Weight: less than 15 lbs. (6.75 Kg)



SAVE \$150!

\$599

Reg. List \$749

ACCESSORIES

I/O Cable (Specify Computer Type and Serial or Parallel) \$19
Extra Ribbon Cartridge \$29
2K Buffer \$29
Roll Paper Holder \$24

Other Contenders . . .

PRINTERS	
NEC 5510 RO w/tractor List \$2950	\$2595
NEC 5520 KSR w/tractor List \$3270	\$2950
Double 1650 RO w/tractor List \$3425	\$2890
Double 1650 KSR w/tractor List \$3895	\$3285
TI 810 Basic Serial List \$1895	\$1645
TI 810 Basic Parallel List \$1940	\$1895
TI 743 KSR w/ ASCII List \$1395	\$895
Amdahl DPP9500 200 cps List \$1850	\$1448
Centronics 702 RO 120 cps List \$2440	\$1995
Centronics 703 RO 120 cps List \$3140	\$2395
Centronics 704 RO 180 cps List \$2350	\$1885
Sanders Mecha 127/7 50 200 cps List \$4100	\$3285

88 SUPER VALUES \$\$

(Equivalent or better performance than Radio Shack TRS80 Line Printer III)

ANACOM 150 List \$1395 NOW \$1195
• 150 cps, bidirectional logic Seeking * 80, 132 or 136 columns * 6 or 8 lines per inch * 5.5 cps slow speed * 9x9 Matrix upper and lower case with descenders * 10 char/inch * 5" to 14 7/8" fan fold paper, tractor feed * original plus 5 copies * 6 million character life snap-in ribbon cartridge * 120/240 VAC 50/60HZ power * Size 23" x 14" x 8" (58.4 cm x 35.5 cm x 20.3 cm metric) weight 30 lbs. (13 lbs shipping)

DATA ROYAL 5000
80 Column List \$1295 \$1150
136 Column List \$1395 \$1250
• 96 ASCII Characters * 125 cps * 6 lines per inch * 9x9 Matrix * Selectable expanded characters * True upper and lower case plus underlining * Short line capability * Dynamic Platen with adjustable character density * Prints original plus 5 copies * Front or bottom paper feed * Tractor feed * 5 IPS paper speed (independent of head motion) * Top of form * Ribbon cartridge * Parallel or Serial (110 to 9600 Baud) * Queued cabinet

TERMS Cash check or money order bank wire transfer C O D or credit cards \$10.00 minimum Charge orders must include expiration date Purchase orders also accepted from recognized institutions Include telephone number with all orders Advertiser prices are for prompt orders F O B shipping point Charge and credit orders add 2% CODs required 25% deposit California residents add 6% sales tax For shipping in U.S. add \$2.50 min (2% West U.S. 3% East of form * Ribbon cartridge * Parallel or Serial (110 to 9600 Baud) * Queued cabinet

COMPUTERS	
NEW! From Personal MicroComputers Inc.	
PWC-80 Computer \$579	
Functionally equivalent to TRS80 Model I Computer with Level II Basic and 16K Memory Has built in cassette recorder, TV modulator, TV monitor output plus additional features	
PWC-80 FastLoad Cassette System \$289	
Loads standard Level II Basic or System Cassette tapes 16 times faster at 8000 Baud. Includes modified cassette and I/O adapter	
TRS-80 ADD-ONS	
FCI-80 FastLoad Cassette Interface \$149	
Unlike other high speed cassette decks, our FCI loads in standard format cassettes at 16 times the normal speed. Yes, you can load "Blackjack" in less than 4 seconds. Plugs into the back of your keyboard or expansion interface and operates on ROM based program under TRS-80 control, called from Basic, System or Disk Basic. The built-in ROM also provides keyboard debounce, auto repeat and key-beep. A modified CTR-41 cassette tape recorder is used allowing play and fast forward buttons to latch down during read of tape. It can still be used for CSAVE at normal speed Comes with instruction booklet for modification of CTR-41 Powerpack and TRS-80 interconnect cable extra	

REX-80 ROM EXTENDER \$39
Enables use of the 2014 empty address locations between the end of Basic ROM and the TRS-80 RAM. It fully decodes them so there is no interference when a 2048 Byte ROM is used. Allows interchangeable ROMs with commonly used routines and programs to be accessed by System or USR command Internal jumpers allow use of most industry standard 24-pin plus 5 volts ROMs. A connector cable attaches REX-80 to 40 pin bus connector at back of keyboard or expansion box. All signals routed through REX-80 are buffered (except data) to allow expansion for other

devices off its output connector Power pack and TRS-80 interconnect cable extra

CAB-40 Flat Cable/40 PIN PWR-80 Power Pack (9V at 500 ma.)	\$25
MT 32—Printer/Memory Expansion Module. Drive any centronics compatible printer and add 16K or 32K of RAM.	\$80
Basic Unit With 16K	\$150
With 32K	\$199

NEW
MPC Microconnection List \$300 \$275
An integrated RS232 adapter and direct connect modem for any model TRS-80. Connects directly to computer bus eliminating a need for Radio Shack Expansion Box, RS232 Adapter and Acoustic interface Complete with bus connector and intelligent terminal software program

CYBERNETICS TRS-80 — CP/M BUSINESS SOFTWARE
The fastest Mod-II CP/M with the most features!!!
MOD-II CP/M \$249
• Over 610,000 bytes/disk * Downloading package included * 1,000 baud operation of serial printer without data loss * Single drive backup
MOD-I CP/M \$149
• Mixed single/double density on any of 4 drives (even a 1 drive system) * Ultra fast disk operation * Emulation of cursor addressing for any of several "dumb" CRTs
CBASIC-2 (Mod I or II) \$109
• Auto L F printer support & ASCII top of form software (LPHRR) * Supplemental document describing our implementation * User-settable function keys

The following software for Mod-II CP/M unless otherwise stated (requires CBASIC-2):
BBI/CBOL Only CBOL for CP/M with alternate keys

Imitkey (ISAM), CRT screen handling, interactive debug, Z80 code, and the most useful Level 2 features Compatible with Tandy's Cobol—but runs faster!

PMS (Property Management System) Interactive, menu-driven system includes full G/L, budgeting, cash journal, delinquency list, tenant activity/rent roll, complete audit trail and reports on vacancies, lost rent, and vendors	\$650
Demo disk and manual	\$75
APH (Automated Patient History) General purpose question-asking, answer-printing system furnished as self-administered review of systems general patient history (Mod-I also)	\$175
Magic Wand Full feature word processing, true proportional spacing, file merging, and use of full screen editor for source programs or data	\$399
RPA (Residential Property Analysis) Analyzes income and expense, financing, taxes, inflation and depreciation on home, condo, or apartments over a user-selectable time Shows payoff in terms of ROI, Cap rate, cash-on-cash Amortization schedules and worksheet	\$299
RBC (Rent/Buy Comparison) Sales or investment tool to compare renting and savings account investment vs. purchasing a particular property	\$249

Osborne CBASIC source programs (Mod-I also):
Payroll w/cost accounting \$249
Accts. Payable/Accts. Receivable \$249
General Ledger w/cash journal \$249
O&A (CBASIC Books (ea.) \$20.

GAMES	
Adventure	\$14
Bridge Challenger	\$14
Star Trek III	\$14
Cribbage	\$10
Sargon Chess	\$19
Sargon II (Cassette)	\$29
(Disk)	\$33
Hunt	\$19

PALOMAR COMPUTER PRODUCTS

Call or Write For Free Catalog
(714) 744-7314/744-9595

910 W. San Marcos Blvd. # 105, San Marcos, California 92069

```

0000          00100      ORG      8000H
0000 50      00110 ;FAST MULTIPLY BY STEVE NELICK, WASHINGTON, DC.
0001 1600    00120 MUL      LD      E,B      ;MULTPLICAND
0002 62      00130          LD      D,0      ;NOW IN DE
0003 62      00140          LD      H,D      ;ZERO HL
0004 6A      00150          LD      L,D
0005 07      00160          RLCA          ;ROTATE M'IER BIT TO CY
0006 3001    00170          JR      NC,S+3    ;GO IF M'IER BIT = 0
0007 19      00180          ADD     HL,DE    ;ADD M'CAND TO TOTAL
0008 29      00190          ADD     HL,HL    ;SHIFT RESULT ONE BIT POS LEFT
0009 07      00200          RLCA          ;SHIFT M'IER BIT
000A 07      00210          JR      NC,S+3    ;GO IF M'IER BIT = 0
000B 3001    00220          ADD     HL,DE    ;ADD M'CAND TO TOTAL
000C 19      00230          ADD     HL,HL
000D 29      00240          RLCA
000E 07      00250          JR      NC,S+3
000F 3001    00260          ADD     HL,DE
0010 19      00270          ADD     HL,HL
0011 29      00280          RLCA
0012 07      00290          JR      NC,S+3
0013 3001    00300          ADD     HL,DE
0014 19      00310          ADD     HL,HL
0015 29      00320          RLCA
0016 07      00330          JR      NC,S+3
0017 3001    00340          ADD     HL,DE
0018 19      00350          ADD     HL,HL
0019 29      00360          RLCA
001A 07      00370          JR      NC,S+3
001B 3001    00380          ADD     HL,DE
001C 19      00390          ADD     HL,HL
001D 29      00400          RLCA
001E 07      00410          JR      NC,S+3
001F 3001    00420          ADD     HL,DE
0020 19      00430          ADD     HL,HL
0021 29      00440          RLCA
0022 07      00450          RET      NC
0023 3001    00460          ADD     HL,DE
0024 19      00470          RET
0025 07      00480          END
0000 TOTAL ERRORS

```

Program Listing 8. Fast Multiply Winner.

This approach avoids the garbage collection problem by moving DATA values to a dummy string made up initially by legitimate string values. The location of this type of string is always within the statement itself, rather than being in the separate string area. (You may want to verify this by some experimentation with the VARPTR.) The size of the string must be at least equal to the number of machine code bytes to be stored. The 255 byte maximum size limitation remains. Relocatable code must be used. This approach is shown in Program Listing 6.

DATA Value to Array

A final method was suggested by Charley Butler of the Alternate Source. In this case, the DATA values are moved to an array. As arrays are allocated once and are not reshuffled, there is no garbage collection problem. Also, the arrays may be as large as is necessary, and any size machine language program may be used. Relocatable code must be used as the array location is not known beforehand. This approach is shown Program Listing 7.

The Great Second Assembly Line Programming Contest

There was an excellent response to the second contest problem posed in this column in June: Write the fastest subroutine possible to multiply two eight-bit unsigned numbers in the A and B registers with the result to appear in HL with A and B preserved.

Entries were in four categories; those that used huge tables to precompute the result, those that used repetitive addition (too slow), those that used standard eight-iteration loops

(some very elegant), and those that wrote inline code to repeat the computations eight times, avoiding the loop overhead.

As the decision of this bear-eyed judge is final, the winner belongs in the last group, having the fastest worst-case multiply that did not use extensive pre-computed tables in memory. He is Steve Nelick of Washington, DC and his fast 157.85 microsecond multiply is shown in Program Listing 8. He will shortly receive a copy of the new computer science bestseller *Godel, Escher, Bach* by Hofstadter and a copy of my new Radio Shack fiction book *Programming Techniques for Level II BASIC*.

Honorable mention goes to Foulk, Van Pelt, Mignery, Wallen, Lee, Craig, Thomas, and Smith.

I appreciate all of the entries. Some of you went to elaborate documentation and I am in awe of the amount of work you performed.

Many have asked me to keep the problems coming, so I am duty bound to pose a third problem: Write an assembly language subroutine to draw a line between any two screen character positions. (Not points! There are 16 lines of 64 character positions.) There will be two winners, one for the most elegant version, and one for the fastest version. Again, token prizes will be awarded. Send entries to the address at the end of this column.

Next month we'll discuss the mysteries of the Radio Shack Disk Assembler and review some assemblers for the Model II. ■

William Barden, Jr.
28182 Palmada
Mission Viejo, CA 92692

80 INPUTS

from page 16

Double Size Graphics

In Bertram Thiel's article, "Double Size Graphics" which (June 80), states that the only way to escape the double character mode is with a CLS, or as he goes on to describe later, a series of PEEKs. Actually, he is in error, the TRS-80 provides an escape from this mode via the CHR\$(28), which returns the cursor to home, and resets the screen back to 64 characters. It is the exact opposite of CHR\$(23) and can be used as such.

Jeff Eisen
Huntington Valley, PA

Super Program

I would like to commend Delmer Hinrichs for his super BASIC Word Processor program that appeared in the May issue of *80 Microcomputing*.

The program runs perfectly with just minor changes to accommodate my printer and provide for a stop between printed pages so that single sheets can be used. The changes I made are:

1. Use LPRINT" " at the end of line 1690
2. Add line 1675 to provide top margin of one inch on single sheets and paper advance on rolled paper.
1675 FORZ1 = 1T06:LPRINT CHR\$(138):NEXTZ1
3. Delete LPRINT CHR\$(28) and GOTO1680 from line 1740
4. Add new line 1745:
1745 INPUT"NEW PAGE--PRESS ENTER WHEN READY";Z1:GOTO1675

There is one apparent misprint in line 880 (a lowercase 'P'). I'm guessing, but I think that the misprint should be replaced with a zero.

Morris L. Krome
Owings Mills, MD

Recorder Variation

For the past three years Grant Union High School in Sacramento California has been developing a TRS-80 based microcomputer program as part of our math and science curriculum. During this period we have continued to acquire systems and build an extensive library of programs on tape and disk. Many of our programs were CSAVED on the CTR-41 recorder. Most of our recorders are now CTR-80s.

We developed an equation to convert reference numbers from one tape recorder to another. We checked our results on several different tape recorders and found the maximum variation to be one to two percent.

The equation relating the two systems is as follows:

$$\text{CTR-41} (\#) = (1.66)(\text{CTR-80}(\#))$$

$$\text{CTR-80} (\#) = (.6)(\text{CTR-41}(\#))$$

Madeleine Fish (Teacher)
Steven Emert (Student)
Sacramento, CA

Word Processing HMCT Style



Using the best in word processing software the **Magic Wand™**, the best in letter quality printers the **NEC Spinwriter™**, and the well-known **TRS-80™ MOD II**. You have looked and looked for the best and now it is available from the **Complete Computer Company, HMCT**. Word Processing at its best from \$7500.

Magic Wand available separately for the MOD II and other computers \$400.

HMCT The Complete Computer Company
5313 Bissonnet, Bellaire, Texas 77401 (713) 661-2005

✓ 33

"The two existing and complex sets of standards have led to classification chaos of the buyer."

COBOL on the 80: Prospects & Pitfalls

If the item about Tandy's new COBOL (Common Business Oriented Language) compiler didn't catch your attention in "80 News" last month, take another look. And take a peek at June's issue where you'll find the Nevada COBOL compiler. Then there's May with Microsoft's COBOL announcement.

Chairman of the American National Standards Institute (ANSI) COBOL Committee James Panttaja explains that the introduction of COBOL for microcomputers "may put micros in a different market place, taking them beyond the home, where they started their existence, into the business world."

One of the first things anybody hears about COBOL is that there are hundreds of thousands of business programs written in the language and hundreds of thousands of programmers trained in COBOL. Like Panttaja, many people believe that the TRS-80 compilers, which convert COBOL to machine code, will open the door for 80 owners to the wealth of tried and true COBOL business programs.

COBOL was first introduced to the market in 1959—about one and a half decades before the advent of microcomputers. The language was designed to be self-documenting. It is written in full English words, in statements and paragraph-like formation. The idea was that a group of people could develop programs jointly, with each program continually stating its objectives and progress in plain English.

Although COBOL originated from an effort to organize national libraries, Microsoft's Mike Orr explains that, "Over the years, COBOL has been tuned to be just what people want it to be." It began with good text movement capabilities and now exceeds BASIC and word processors in screen formatting, generating rows and columns of data, report generation, Indexed Sequential Access Method (ISAM) filing and graphs.

But because of its vocabulary and syntax, COBOL is a bulky language that can take up a great deal of memory. And it is a slow process to develop COBOL programs. Programming in BASIC is both faster and easier. Yet, BASIC cannot be applied to business applications as thoroughly.

The situation is not simple. In its short history, BASIC has already been written in many versions. There are BASICs for every level of the TRS-80, the Apple and the Pet. There are BASICs for disk operating systems

and others for cassette systems. In the long history of COBOL, it is hard to say how many versions of the language exist. Because of these differences in COBOL, programs will need to be translated, not only from machine to machine, but from one version of COBOL to another, to operate on the 80.

Languages dubbed COBOL range from scant, specific application languages to gargantuan languages that can operate in 12 modules serving countless applications. The price range of the three COBOLs with compilers that have been listed in "80 News" is indicative: Business Microproducts' Nevada COBOL for TRS-80 Models I and II with CP/M costs \$99. Tandy's TRSDOS COBOL for the Model II costs \$299. Microsoft's TRSDOS COBOL-80 compiler costs \$750.

"Programs will need to be translated, not only from machine to machine, but from one... COBOL to another."

In an effort to limit the confusion caused by the proliferation of COBOLs, ANSI established the first COBOL standards in 1968. They were updated in 1974, and a corollary set, the Federal Information Processing Standards (FIPS), was issued in 1978.

Deciphering COBOL types and standards is undoubtedly more difficult than programming in COBOL. The importance of this standards maze is its impact on the translation of the thousands of COBOL business programs already in existence.

The ANSI-74 standards divide COBOL into 12 possible modules and require only sufficient performance in the first three to classify a language as COBOL. These three modules are termed Nucleus, Table Handling and Sequential I/O. The complete ANSI standards are explained in the ANSI X3.23 manual. The 1978 FIPS standards separate COBOL into four

classes: low; low intermediate; intermediate, and high.

ANSI's Panttaja asserts, "If the levels of FIPS or the modules of ANSI-74 are the same, very little rewrite is necessary to write a comprehensive and comprehensible translation from any machine to another." Without the standards, COBOL translation can be just as difficult as any other machine translation.

The two existing and complex sets of standards have led to classification chaos for the buyer. Further, any distributor of COBOL will be quick to tell you that the standards do not account for non-standard extensions of their language. There are also factors of speed and run time programs to be considered.

When and if you get the standards sorted out, there's still a hitch. As Panttaja explains, "There's no means of verifying ANSI standards." And although the government, through FIPS, has devised tests to validate COBOL language compilers, they are administered by manufacturers. There is no government grading or verification of the test results.

New ANSI standards are being developed now and are expected to be released in the next few years. The *COBOL Information Bulletin*, citing what can be expected of the future standards, is available from the ANSI COBOL Committee, 1430 Broadway, New York, NY 10018.

Despite the lack of software, both Microsoft, Bellevue, WA, and Business Microproducts, Livermore, CA (who have had their separate TRS-80 COBOL compilers on the market for several months), are satisfied with their sales. Business Microproducts' Jim Smith says that they have found a market among high schools "and even universities" that are teaching COBOL programming. Mike Orr of Microsoft explains that despite a low advertising take off, their \$750 compiler has "sold in the dozens in its first two months on the market."

But unless the COBOL standards are quickly clarified, it's doubtful that the advent of COBOL for the TRS-80 will have the immediate and dramatic impact on the business market that many people are expecting. Those thousands of existing business programs can't be run on the TRS-80—yet. ■

By Nancy Robertson
80 Staff

Confused by the New Level II Two-chip ROM?

Know what? Radio Shack is selling a revised two-chip version of ROM for Level II BASIC machines. These new 6K chips have given some users problems because the new ROM does not function in quite the same manner as the old.

In their monthly newsletter, *Microcomputer News*, Radio Shack ran a list of command corrections for the new ROM, and some other interesting tidbits. They are rehashed here in an effort to clarify the confusing situation which has resulted from the introduction of this new two-chip ROM.

First, the new power-up query is: MEM SIZE? The BASIC sign-on prompt is: R/S L2 BASIC. The memory space saved by condensing these messages is now devoted to a key-bounce fix. The old KBFIX keyboard driver is no longer necessary and will not work with the new ROM.

Second, free memory space has been reduced by two bytes resulting in a 15570 answer to the MEM? query in a 16K machine.

Third, one can no longer CLOAD from either tape input when an expansion interface is being used. Only tape drive number one may be used. CSAVE#N procedures still allow the operator to select the destination drive in multi-recorder set-ups, however.

Fourth, pressing SHIFT and the down arrow simultaneously will result in control characters. You are in the control mode as long as both keys are depressed.

Fifth, you can now perform multiple PRINT@ operations by simply constructing your print statements as follows:

```
PRINT@10,"A",@50,"B",@200,"c"
```

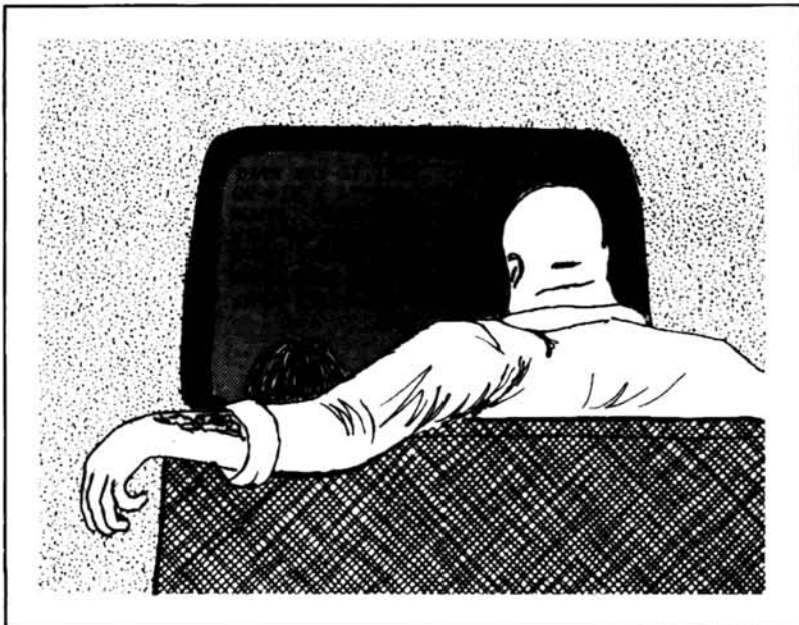
In addition, about ten of the Shack's tapes will not CLOAD with the new ROM. If you encounter this situation, a new tape will be supplied by Radio Shack.

This ROM is not interchangeable with previous ROMs. If you want it, be prepared to shell out \$150 (Level II) for a complete conversion kit. The kit is only available as an installed modification and, as one might expect, only certified Radio Shack service centers will be doing the installations. Installation is extra by the way, but how much extra is not mentioned. The model number for the new Level II ROM is #26-1120, and it is available now. ■

By Chris Brown
80 Staff

Please Be Patient

At 80 Microcomputing we are undergoing some staff changes that have resulted in a backlog of mail and manuscripts. We are reading manuscripts as quickly as possible. The editors apologize for any delay.



The Infancy of Electronic News Delivery

July 1, *The Columbus Dispatch* became the first newspaper in the country to offer electronic home delivery. Owners of microcomputers can now dial their phones, connect their modems and read the evening news from their video screen.

The Dispatch is one of 11 Associated Press (AP) newspapers which will be offering electronic home delivery through the CompuServe, Inc., Columbus, OH, data network. The other papers which will participate in electronic delivery are: *The Washington Post*; *The New York Times*; *Chicago Sun-Times*; *The St. Louis Post-Dispatch*; *The Minneapolis Star and Tribune*; *The Norfolk Virginian-Pilot and Ledger-Star*; *San Francisco Chronicle* and *The Middlesex News* (Framingham, MA).

CompuServe's president, Jeffrey Wilkins, explains that the 11 papers were chosen from more than 40 that were interested. Several of the publications are expected to join *The Dispatch* in electronic delivery sometime in September.

July 14 Knight-Ridder Newspapers, Inc. also began electronic delivery of their paper on an experimental basis in 30 homes. Calling the project Viewdata, Knight-Ridder is working in conjunction with American Telephone and Telegraph.

However, because microcomputers do not need to be dedicated to data sharing only, the prospects for the future of electronic delivery seem more likely to pivot on the reception of the CompuServe program. There are 1,300 daily papers and 3,500 radio and television stations who own AP. Most of them are curious: Does the public have any interest in microcomputer, electronic delivery of the news?

As it stands now, electronic delivery through

CompuServe begins with a local phone call from the subscriber, answered by a local computer, which in turn communicates with CompuServe's data base in Columbus. Via telephone wires and modems, news enters the home microcomputer at 300 words per minute. A directory or menu allows users to scan news sections and headlines. Stories can be called, read, saved or printed from each section.

However, computer subscribers will have to say good-bye to Mary Worth, Steve Canyon and Charlie Brown. The comics, political cartoons and photographs will not be transmitted.

For the time being, advertising is also absent from computer editions. Advertising generally accounts for about two-thirds of newspaper revenues. Although electronic delivery may prove less expensive than paper printing, it is argued by many people in the business that new concepts in advertising will be vital to the survival of computer news delivery.

The Dispatch has already made plans to incorporate classified ads in their CompuServe edition. They are also working on an advertising index system that will make it possible for space advertisers to sponsor several articles.

Philip Meyer, marketing director of Knight-Ridder's Viewdata project, does not believe computer delivery will completely replace paper delivery. "The newspaper is not an inefficient information retrieval device," he said. "You can scan it very quickly. The main threat to newspapers is not competition for information, but competition it (data sharing) provides for advertisers."

Publishers and advertisers may adjust to electronic delivery of the news, but what will become of Sundays without the Sunday comics? ■

NEW PRODUCTS

Utilities for Businesses

ACCT-M2 from Micro Architect, Inc. consists of five programs that carry out the on-line accounts receivable functions of a small business or a medical clinic.

The three basic functions are initialization, data base management and report generation. Initialization allows users to specify the system parameters, such as company name and address, late charge policy, etc. It also can sort the customer names or change most of the system parameters. The data base management lets users add, inquire, delete and adjust transactions and customer information.

Reports consist of sales journal, receipts journal, aging analysis, end of period processing, data base listing, labels, statements and deleted customer reports. A consistency check is included.

ACCT-M2 is priced at \$149, including a disk and user's manual. The user's manual is available separately for \$5. A simplified version of the program is available for the Model I and costs \$69.

L216 is another business package from Micro Architect for systems with at least 16K and Level II BASIC. It consists of the following programs: a cassette data base manager, a word processor, an inventory control system, a stock management program, a check balancing program, a label printer, a deposit calculator, a statistics program, a sort utility and a key-access utility.

The complete package costs \$59.

For more information on either of these products, contact Micro Architect Inc., 96 Dothan St., Arlington, MA 02174.

Reader Service ✓ 174

Color Graphics Circuit Board

Integrated Service Systems, 1011 W. Broadway, Minneapolis, MN, 55411 is selling a TRS-80 color graphics circuit board. It is designed for use with a standard color television receiver and a 4K to 48K Level II. The board is sold in two different packages: Model C-2000 and Model C-1000. Both include all electronic components. Minor assembly is required to complete the RF modulator section.

Models C-2000 and C-1000 are fully buffered and expanded to ten display modes. ASCII and eight-color semi-graphics can be mixed on the screen. Five four-color graphics modes and four two-color graphics modes are included.



Mikro-disc Disk Drives

COLPRT is a machine language program that allows ASCII and semi-graphics information to be displayed by LPRINT. COLSCREEN is the program which transfers the TRS-80 graphics to a color screen. (COLSCREEN is not available yet, but is expected to be on the market by October.)

Model C-2000 includes the circuit board, COLPRT and power supply for \$189.95. Model C-1000 costs \$129.95 for the circuit board and software without the power supply.

Reader Service ✓ 333

80 Music Synthesizer

Software Affair, Ltd. is selling Orchestra-80, a TRS-80 music synthesis system written for a 16K Level II TRS-80. The system consists of software and hardware.

The software is a five part machine language program: a digital synthesizer which produces four simultaneous voices in a six-octave range; a music language compiler, a full function text editor with blinking cursor, and a file manager.

The hardware is a single 1 1/2 by two inch PC board, completely assembled and tested, which plugs into the expansion connector of the TRS-80 keyboard or the screen printer connector on the expansion interface.

Tape and disk versions are supplied on cassette, with sample music programs. For more information, contact Software Affair, Ltd., 473 Sapena Court, Suite 1, Santa Clara, CA 95051.

Reader Service ✓ 340

Production to Begin on New Winchester Drives

New World Computer Company, Inc., 3176 Pullman St., Suite 120, Costa Mesa, CA 92626, has added the Minimikro-disc V Series of 5 1/4-inch fixed disk drives and an enhanced double-density system called Mikro-disc VIII-1TF to its product line.

According to the company, standard 5 1/4-inch floppy disk drives have an average access time of 298 milliseconds. The Minimikro-disc V-1TF can access data in an average of eight milliseconds.

The original Mikro-disc 211, has doubled storage capacity and has been renamed the Mikro-disc VIII-1TF.

The Minimikro-disc V-1TF and Mikro-disc VIII-1TF are priced at \$700 and \$1100 respectively, in dealer quantities. Production is scheduled to begin by the end of the year.

Reader Service ✓ 328

VTOS 4.0 Plus Manual

Virtual Technology, Inc., Dallas, TX 75234, has a new disk operating system available, the VTOS 4.0.

VTOS 4.0 will support five inch (35, 40 or 77 tracks), eight inch (single or dual density), or ten M hard disks. Speed-up kits that are on the market will also be supported. Backup is simplified so that users only need to indicate the type of drives used. Improved chaining offers 15 chaining commands that can handle most

I'M A BELIEVER !!

"I Love it !! . . . It's really a incredible O/S. It's just great!
Now I see why people who have seen it say they are now
believers. I know I am."

LANCE MICKLUS

- 1) Large (8") drive support.
- 2) Double Sided drive support.
- 3) Double Density drive support.
- 4) 80 Track drive support.

*NOTE all above drives may be mixed on any one system and can be configured at System time or during any Backup!

5) Winchester technology fixed drive support.

6) Supports any combination of the above drives up to a max. of 8 drives.

7) Supports double-speed processor clock modifications. (Archbold for example)

8) FASTER! — Improved overlay structure using ISAM accessing techniques improves loading times by up to 1400%.

9) General purpose output spoolers of a true, symbiotic design provide simultaneous output and program execution without any user intervention.

10) Keyboard Type-Ahead feature permits you to enter keystrokes before your programs need them.

11) User definable keys, all 26 letters.

12) Built in Graphic string packer lets you enter graphic symbols into a BASIC program from the keyboard through the use of the (Clear) key. The (Clear) key is simply held down (just like the (Shift) keys) during other keystrokes and via...graphics!

13) Dated files. — All files are accompanied by the date of their last modification (creation or write).

14) Marked files. — All files are accompanied by a 'mark' if they have been modified since they were last backed up. This permits the BACKUP utility to copy only those files which have actually been updated since a previous backup.

15) File transfer by class. Allows transferring of all files of a similar directory classification such as /CMD, /BAS, /PCL, etc.

VTOS 4.0

VTOS 4.0
Operating System
Diskette with
Operator's Guide
\$99.95

VTOS 4.0
Master
Reference Manual
\$29.95

VTOS 4.0
Combination -
4.0 disk,
Operator's Guide,
and Master
Reference Manual
\$125.00

16) Built-in SYSTEM command contains lower case display driver, screen print, break key disable, blinking cursor, disk drive stepping rate and motor-on delay modifications, and more.

17) User may SYSGEN a custom VTOS system configuration containing special I/O drivers, device LINKING and ROUTING, SPOOLING and DEBUG tasks, etc. which will be automatically loaded during the BOOT process without requiring a more lengthy AUTO and CHAIN procedure.

18) Non-BREAKABLE AUTO and CHAIN commands.

19) Wild-card DIRECTORY. Permits you to locate all files of a certain classification such as */BAS*. Uniformly indicates file size in K (1024 bytes) regardless of drive type. "DIR D" would give you all your files that start with "D".

20) Dynamic file name defaults in APPEND, COPY, and RENAME commands allow you to specify only minimal information about file names.

21) COPY and APPEND commands execute up to 300% faster.

22) ALLOCate command for pre-allocation and non-releasability of file space. File space will never shrink if this option used.

23) MEMORY command for directly setting upper memory limit.

24) Variable Length file support is incorporated which automatically blocks short user data records both within a sector and across sector boundaries thereby taking maximum advantage of disk file space.

25) No security disk needed to make backups or to run the system!

26) Though many O/S bear his design and code VTOS 4.0 is the only Fully Approved Operating System by Randy Cook! And it is FANTASTIC!

27) Endorsed by Scott Adams and Lance Micklus!

VTOS and VTOS 4.0 are registered trademarks of VIRTUAL TECHNOLOGY, INC. - Dallas, Texas 75234

Available from the following distributors or
your local computer store. DEALER INQUIRIES INVITED.

5% Discount Just For Mentioning This Ad. (Valid month of this publication ONLY)



QUALITY
SOFTWARE
DISTRIBUTORS

11234 Park Central Pl Suite C
Dallas Texas 75230
(214) 692-1055
Micronet - 70130,203
SOURCE - TCC293



ADVENTURE INTERNATIONAL
Box 3435, Longwood, Fla. 32750
(305) 862-6917 - Voice
after 8:00 - same number
as FORUM 80. (SOURCE - TCC957)



SMALL BUSINESS
SYSTEMS
GROUP

Main St. and Lowell Road
Dunstable, Mass. 01827
(617) 692-3800 - Voice
(617) 692-3973 - FORUM 80
Micronet - 70310,236

Prices subject to change without notice.

NEW PRODUCTS

types of routines, including timed functions.

There is a built-in graphics screen packer. Graphics can be designed on the screen, listed and combined with BASIC LOOK-AHEAD.

Printer and keyboard speed buffers make it possible to use the system for two functions at one time. For instance, it is possible to operate the printer and run a program simultaneously.

The VTOS 4.0 Master Reference Manual claims to offer "the detailed handholding information that so many people have been asking for."

Together, the manual and VTOS 4.0 are sold for \$125. The manual is available separately for \$29.95.

Reader's Service ✓ 330

Speed Loading Cassettes

Personal Micro Computers, Inc. (PMC), 475 Ellis St., Mt. View, CA 94043, is selling Fastload to input cassettes to Level II computers at one kilobyte per second. PMC claims this is 16 times the normal speed. Any cassette saved at normal speed (500 baud) can be loaded with Fastload at 800 baud.

Unlike other high speed program loading devices, Fastload does not require transferring programs to another media first. This PMC product is also able to search for BASIC programs at high speed, but it does not provide for high speed recording of cassettes.

The Fastload cassette interface plugs into either the back of the TRS-80 Level II 16K keyboard or expansion interface. PROM memory is located above ROM and below RAM. It also contains a keyboard debounce program.

A CTR-41 tape recorder must be used with Fastload. Modifications must be made on standard CTR-41s with instructions provided; a new recorder with the modifications is sold by PMC for \$95. The Fastload cassette interface is sold for \$188.

Reader Service ✓ 349



Fastload Interface and Cassette

Model II System Monitor

RSMII is a relocatable system monitor for the Model II sold by Small System Software, P.O. Box 366, Newbury Park, CA 91320.

RSMII includes commands to insert breakpoints, dump memory in hex and ASCII, test, search, modify, verify, zero and fill memory, etc. These features are also included in the company's Model I system monitors.

Features that are new with the RSMII include a video editor to modify both memory and disk sectors. Disk commands can access four drives and can read and write single and double-density disks. There are controls for split screen scrolling and adjustable scroll speeds.

RSMII will operate printers through either parallel or serial printer ports at baud rates from 110 to 9600. An image of the screen may be printed at any time. Page-length control and RS-232-C handshaking are supported.

The system monitor comes on a self-booting disk with a relocater. It is sold for \$39.95 with an instruction manual.

Reader Service ✓ 167

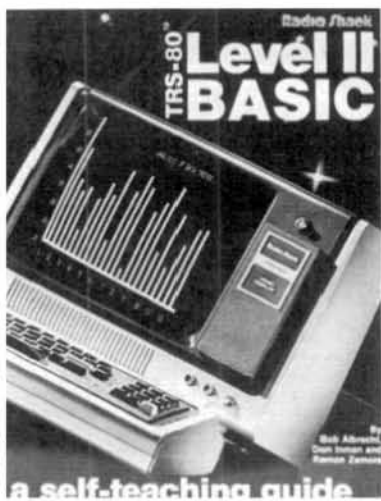
General Ledger System

Sturdivant & Dunn, Inc., 124 Washington St., Box 277, Conway, NH 03818 is selling Full Charge Bookkeeper, an advanced general ledger system for small businesses.

It gives users an efficient method of posting income, expense and adjustments to obtain financial statements plus cumulative detail on an annual basis. It can handle 12 characters of alpha and 4520 posted entries in up to five departments.

Full Charge Bookkeeper is written for a TRS-80 Level II with 48K, three disk drives and printer. The package, which includes manual and programs is priced at \$199.95. It will be sold for \$129.95 through September as an introductory offer.

Reader Service ✓ 181



Radio Shack's Self-teaching Guide to Programming

RS Game and Guide

A new game from Radio Shack, Dancing Demon, displays an animated figure dancing to music that can be heard by connecting the computer to an amplifier and speaker. The program is supplied on cassette and includes two preprogrammed selections. The user can also program other tunes of up to 248 notes and choreograph dance routines to go with the music.

The program is designed for a Model I Level II TRS-80 with at least 16K RAM. It is priced at \$9.95.

Radio Shack also has a compact 200 mW speaker-amplifier that can be used to produce the musical accompaniment for Dancing Demon. The Realistic Micro-Sonic Speaker-Amplifier is priced at \$11.95.

TRS-80 Level II BASIC, a self-teaching guide to programming and using a Level II microcomputer, is another new product from Radio Shack. Each chapter is composed of short, numbered sections which present ideas or topics on BASIC, the TRS-80, or a program that is being developed.

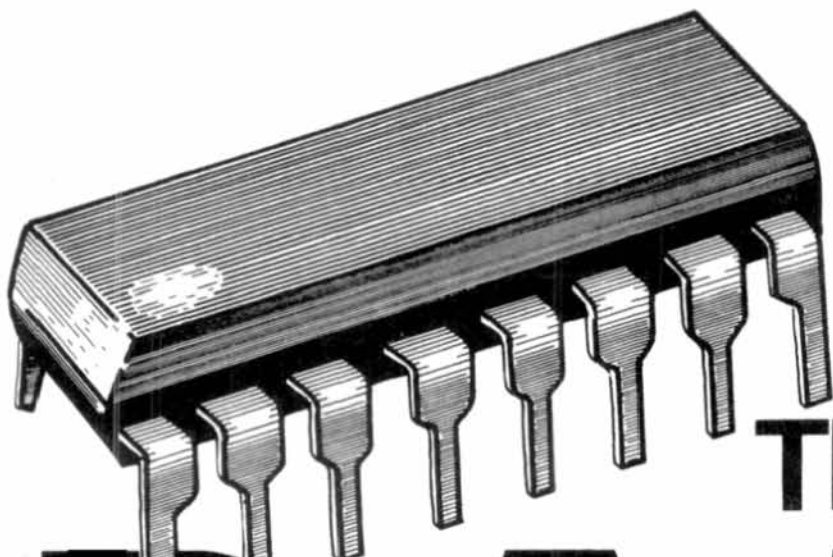
TRS-80 Level II BASIC, is priced at \$9.95.

Reader Service ✓ 326

Time-sharing Peripheral

The Micromint Inc. is selling a new data communications product, the Chatterbox. The Chatterbox is a combination of the presently available Comm-80 I/O interface for the TRS-80 and an acoustic modem, to turn TRS-80 into a timesharing terminal.

The Chatterbox includes a built-in programmable 50-19200 baud serial port, a Centronics compatible parallel printer port, a 300 baud acoustic originate modem, and a spare TRS-BUS expansion connector.



TRS-80*

RAM

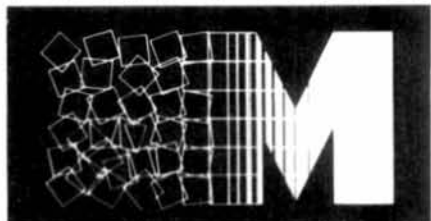
**EXPAND YOUR MEMORY AT
AN INCREDIBLY LOW PRICE**

16K RAM - \$59.50

32K RAM - \$109.50

- Pretested
- One year warranty
- Available now

NEW FROM



MICROTEK^{inc.}

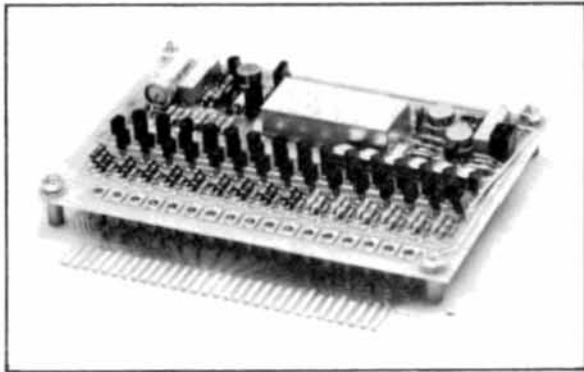
9514 Chesapeake Drive
San Diego, CA 92123
Tel. (714) 278-0633
TWX 910-335-1269 ✓ 362

*Trademark Radio Shack, Div. Tandy Corp.

NEW PRODUCTS



Comm-80 of Chatterbox Package



Model 1555S Analog-to-digital Converter

It comes with power supply, connection cable, user's manual, and terminal software for immediate operation. It is hardware and software compatible with existing TRS-80 products and connects either to the keyboard connector or screen printer port on the RS expansion interface. It does not require the RS expansion interface for operation.

The Chatterbox is sold for \$259.95 from The Micromint Inc., 917 Midway, Woodmere, NY 11598.

Reader Service ✓ 329

TRS-80 to H-14 Interface

The Model PTS-3 (for use with an expansion interface) and the Model PTS-4 (for use without an expansion interface) are printer interfaces from Multi Media Systems. They make it possible to connect the TRS-80 microcomputer with the H-14 Serial Printer.

The PTS-3 plugs into the parallel printer port of the TRS-80 interface. The PTS-4 can be used with the PTS-3 in systems that do not include a Radio Shack expansion interface. The H-14 is connected to the DB-255 connector of the PTS-3.

A software driver is not needed with this system, because it will support all printer commands in BASIC or machine language.

The PTS-3 and the PTS-4 are each priced at \$73.45 for an introductory period from Multi Media Systems, P.O. Box 41081, Indianapolis, IN 46241.

Reader Service ✓ 338

E.S.P. Lab for Research

E.S.P. Lab has been designed by Manhattan Software, Inc., P.O. Box 5200 Grand Central Station, New York, NY 10017, as a program for research into possible extrasensory phenomena, as well as for casual testing of the possibility of telepathy, clairvoyance, precognition and telekinesis.

Based on Duke University experiments,

E.S.P. Lab selects randomly from among a set of five symbols (square, triangle, cross, wavy lines and oval), presenting one symbol at a time on the screen for telepathy experiments. All symbols are programmed in machine language and appear on the screen instantaneously. For clairvoyance and precognition testing, the program selects the symbol before or after the response, prompting only with a question mark on the screen.

Complete records are kept in memory of each symbol and response for a series of ten trials of 25 symbols each. Tables of results are constructed, with analysis of matching symbols and responses. For TRS-80 Level II 16K, E.S.P. Lab costs \$9.95.

Reader Service ✓ 339

Packing Program

Data Assoc., Box 882, of Framingham, MA 01701, has released Pack8, designed to pack BASIC programs for faster loads and runs. Pack8 can reduce memory as much as 40 percent.

Pack8 is written for 32K and 48K Model I computers using one disk drive. All the lines in the program can be compacted, or a block of inclusive numbers. At the end of the packing, a summary is presented of the number of bytes and lines in the original program.

Pack8 is provided on cassette with instructions, and is sold for \$19.95.

Reader Service ✓ 169

1555S Analog-to-digital Converter

Tustin Electronics Co. has added the Model 1555S to its series 1500 analog-to-digital converter product line.

The new model provides a complete conversion of an analog voltage to a 15-bit digital number in less than five microseconds. It is a monotonic unit.

The Model 1555S can be used by itself or

with other analog modules to form a complete system. The converter price is \$1500 from Tustin Electronics, 1431 E. St. Andrews Pl., Santa Ana, CA 92705.

Reader Service ✓ 327

Software Programming Tools

PROgrammer by Rational Software, 963 E. California Blvd., Pasadena, CA 91106, provides professional-quality programming tools to users of Level II BASIC.

After a short machine language routine is read, five functions are continuously available. A single keystroke directs keyboard input, which interprets and executes the command line. After execution, control is automatically returned to Level II BASIC.

The program also includes a keyboard debounce routine. PROgrammer costs \$25.

Reader Service ✓ 336

Property Management System

A-T Enterprises has a new income property management software package for TRS-80 Model II. The Property Management System (PMS) is designed to meet the Institute of Real Estate Management recommended computer system capabilities.

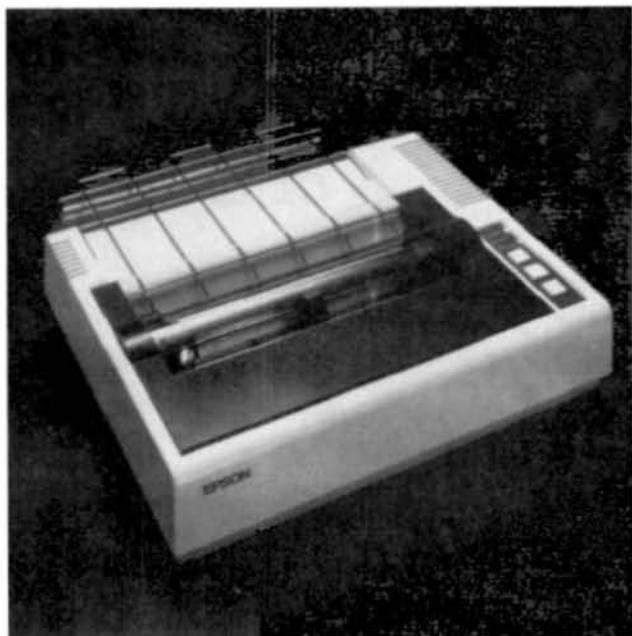
It is suitable for all types of income properties including apartments, mobile home parks, office buildings, warehouses, etc. The system is a full general ledger system that keeps track of all income and expenses providing formatted financial statements, management reports and exception reports upon request.

The PMS software operates on the Model II with 48K of RAM, two eight inch disk drives and a printer. It is written in CBASIC, runs under CP/M and is also compatible with most Z-80 and 8080 systems.

PMS, including one year maintenance, costs \$650. A demonstration disk is available for \$35 from A-T Enterprises, 221 North Lois, La Habra, CA 90631.

Reader Service ✓ 332

If you
just bought
another
printer,
boy are
you gonna
be sorry.



Epson.

The Epson MX-80. It's not just another worked-over rehash of last year's model. It's our top-of-the-line 80-column printer. It's new. From the ground up. And it's the most revolutionary printer to hit the market since Epson invented small printers for the 1964 Olympics in Tokyo. Don't take our word for it, though. Compare. There simply isn't a better value in an 80-column printer. Period.

But here's the fact that's going to stand the printer world on its ear. The MX-80 sports the world's first *disposable* print head. After it's printed about 50 million characters, you can throw it away. Because a new one costs less than \$30, and the only tool you need to change it is attached to the end of your arm.

Now that's revolutionary, but that's only the beginning. The MX-80 also prints bidirectionally at 80 CPS with a logical seeking function to minimize print head travel time

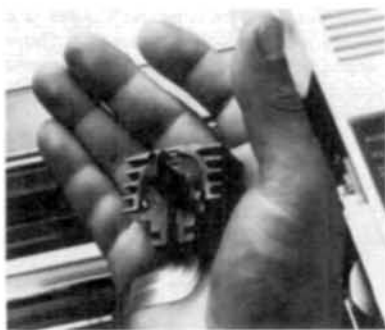
The world's first disposable print head. It has a life expectancy of over 50 million characters, yet it's so simple, you can change it with one hand. And it costs less than — repeat less than — \$30.

and maximize throughput. It prints 96 ASCII, 64 graphic and eight international characters in a tack-sharp 9x9 matrix. And it provides a user-defined choice of 40, 80, 66 or 132 columns and multiple type fonts.

We spent three long years developing the MX-80 as the first of a revolutionary series of Epson MX Printers. We employed the most advanced automatic assembly and machining techniques in existence to produce a printer that is incredibly versatile, remarkably reliable and extraordinarily inexpensive. It's a printer that could only come from the world's largest manufacturer of print mechanisms: Epson.

If it sounds like we're proud of the MX-80, we are. Not only does it do things some of the world's most expensive printers can't do, it'll do them for you for less than \$650. That's right. Under \$650.

And if that isn't revolutionary, we don't know what is.



EPSON
EPSON AMERICA, INC.

23844 Hawthorne Boulevard, Torrance, California 90505, Telephone (213) 378-2220



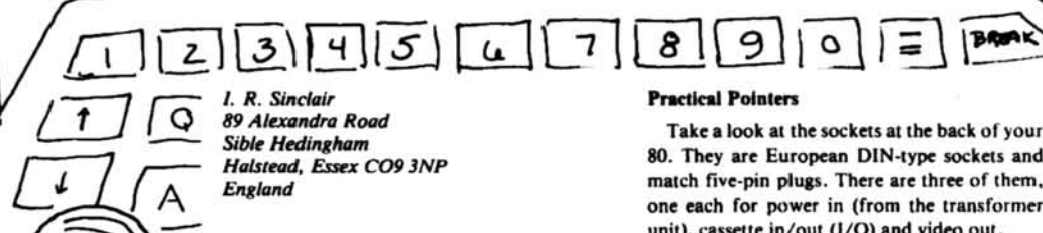
10 Print "The beginning
of a series"

20 Print

"Into the 80's"

30 Print

"by I R Sinclair"



*I. R. Sinclair
89 Alexandra Road
Sible Hedingham
Halstead, Essex CO9 3NP
England*

Many articles are written for those of you who have owned a TRS-80 for some time and know what programming is all about. So, this series is dedicated to the thousands of readers who are just about to buy a TRS-80—or have just bought one—and want to know what they've gotten into.

Throughout the series, we'll be talking about the Model I Level II TRS-80. Level II is Tandy's word to indicate the complexity of programming language its computer is able to understand. We're dealing with the Level II only for two good reasons. First of all, Level II is much more useful. And, secondly, the Level I computer is already accompanied by an excellent manual for the beginner.

One measure of a computer's power is its memory. Memory dictates the amount of information (data) a computer can store and is measured in units called kilobytes, shortened to K. The 4K computer can store four kilobytes of data. Nothing in this series will cause you to run out of memory space on a 4K TRS-80.

Before you proceed, be assured of one point. The computer does exactly as you instruct it, nothing less, nothing more.

If you have not put in the instructions to print letters or numbers on the video screen, then these letters or numbers just don't get printed. One of the humiliating things about being a computer owner is knowing that whatever goes wrong is your fault.

Practical Pointers

Take a look at the sockets at the back of your 80. They are European DIN-type sockets and match five-pin plugs. There are three of them, one each for power in (from the transformer unit), cassette in/out (I/O) and video out.

Before you start using your 80, take the advice of an old hand and label these plugs and sockets with differently colored tapes. I use red for the power plug, green for video and yellow for the cassette. If your 80 sits in the same place and you never unplug it, this isn't significant. The odds are, however, that some day you'll want to shift it, and you could easily end up with plugs in the wrong sockets, since they are identical and easily confused in poor lighting conditions.

Keeping your system cool is another useful tip. Try not to have a desk lamp shining on the keyboard, for instance. It doesn't help, either, if you've used the computer all day with bright sunlight heating up the keyboard casing and the electronics inside. High temperatures also damage cassette recordings.

I've found that a normal room temperature of 70-75 degrees won't cause the TRS-80 any distress, even if you use it all day. It's another story if you have an expansion unit attached, but we won't go into that. Just make sure that that little black box which is the transformer unit is on the bench or on the floor, with room for air to circulate around it; don't put it inside a box or surround it with books.

Power It Up

You're ready to power up. Plug all the line plugs into the wall sockets and switch on. DON'T switch on the keyboard first—always have power on the cables before you turn on the

"If you have not put in the instructions to print letters or numbers on the video screen, then these letters or numbers just don't get printed. One of the humiliating things about being a computer owner is knowing that whatever goes wrong is your fault."



units, because the switch for the keyboard does more than just switch power.

Start the countdown by switching on the monitor. (On the one I use, the brightness control must be pulled to switch on.) Let the monitor warm up for a minute, then switch on the computer keyboard. The ON/OFF switch is at the back, next to where the power supply plug enters the casing. It's deliberately made a bit hard to find, because when you switch off a computer, all the program material you had stored in it is lost, gone forever, unless you recorded it on a cassette previously.

As you press the ON/OFF switch, you'll see the video screen suddenly filled with a mixture of numbers, letters and odd shapes. That's "garbage," caused by the computer memory being activated. Each little cell of memory can store a bit of information; zero voltage represented by a zero, or +5V represented by a 1.

Upon power up, when all of these cells are activated, some come on as 1s, some as 0s. About 8192 of these memory cells send signals to the video screen, the cells which are set to 1 cause parts of the video screen to light up, and the cells which are left at 0 keep the screen dark.

The result is a display of light and dark pieces at random or almost at random. Circuits inside the computer force these light and dark places into patterns, the patterns which we call letters, numbers and graphics blocks, and this is the pattern we see just as we depress the ON/OFF switch. When you release the power switch, the garbage clears, because the switch operates a memory clear routine for the video screen and memory—that's why it isn't a good idea to switch the keyboard on before plugging in the line and powering up.

The Mystery Message

Shining on the video screen in all its glory is the message MEMORY SIZE? It has floored many a beginner. Did no one back at Fort Worth tell the machine what its memory size is, you ask? Ignore it for the moment, press the ENTER key, and these more reassuring words appear:

```
RADIO SHACK LEVEL II BASIC  
READY  
>
```

Your computer is prepared for programming in the BASIC program language.

What about the MEMORY SIZE? message? Well, as it happens, a lot of computer tasks can be performed faster and more efficiently by giving instructions directly to the microprocessor chip inside the computer. This chip needs special instructions, called machine code or object code, and these instructions can't be loaded into the computer in the same way as an ordinary BASIC program.

Unless you're going to use machine code programs right away, though, you can ignore the MEMORY SIZE? question.

The one time you can't ignore it is when it appears while you're running a program. When that happens, it's an unwelcome sign, called a re-boot, that something is very wrong with your program. The computer has started its power-on sequence again. There's no harm in it, but you will have lost your program unless you saved it on cassette earlier.

The READY signal is an invitation, but unless you know what it's inviting you to do, you can't take advantage of it. At the READY signal, you can either load a program from a

cassette or you can type one yourself. Since you'll learn more about the 80 from writing your own programs, however simple, we'll start there and leave the frustrations of cassette loading for a later date.

READY is an invitation for a BASIC program. BASIC is an acronym for Beginners All-purpose Symbolic Instruction Code, and it's the easiest of programming languages to learn.

Why should we have to learn BASIC?

It's all bound up with the way computers work and are designed. The fastest and most efficient programs are written in machine code, but learning and using machine code is a painful business, and writing machine code is a frustrating experience.

For these reasons, computer designers have continually sought to make it possible to give instructions in simpler forms, using English words (or Spanish, French, Italian and others) and stringing them together in a way which is reasonably simple to understand.

If you've looked at some of the programs printed in the back of the TRS-80 Manual or published in *80 Microcomputing*, you might not quite believe this last statement, but compared to most other computer languages, BASIC is reasonably easy to understand. We can devise simpler languages, but the penalty for using a simpler language is either that it doesn't do as much as we would like, needs more memory or takes longer to run. Right now, your TRS-80 comes with its BASIC language built in.

Like any other language (and I've had to cope with Latin, French and Greek in my time), BASIC is best learned by using it. Unless you intend to use your computer simply to run programs written by other people and obtainable

on cassette, you haven't much choice—learn BASIC!

Unlike other computer languages, BASIC isn't standardized. A program written in BASIC for another computer may not run on the TRS-80, and vice versa, unless you make a few changes.

It is possible to write BASIC programs that will run on any computer equipped with the BASIC language (the Adam Osborne programs are good examples of this), but you can get a lot more out of your 80 if you know the peculiarities of its dialect of BASIC.

This dialect, incidentally, is one of the most advanced BASICs fitted to a small computer. We can't hope to show all the features of BASIC programming in this series, but we can try to fill the gap between elementary BASIC textbooks and Radio Shack's *Level II Reference Manual* that comes with your computer.

Program Proverbs

If you've never programmed a computer before, learning BASIC on your own can create as many ulcers as guarding a bank during a revolution. Computers are fussy about the way you use the language. If the manual says that a word must be followed by a comma, then it really must be followed by a comma, or your program won't run.

If, on the other hand, a word needs a semi-colon after it, you can't get by with just a comma or a colon. This punctuation is translated into instructions by the computer, and different marks denote different instructions.

Translated? That's just what happens. There are about twelve thousand bytes of memory inside your TRS-80 which you can't alter. The professionals call it ROM, or read-only memory. It reads your BASIC program and converts each letter or word into machine code instructions to the microprocessor. Because each instruction is converted and then carried out, the instructions are much more long-winded than those in a machine code program.

Bigger computers can do what's called compiling, which means translating the entire pro-

gram into machine code in one run, and then running the machine code. The TRS-80, like all small computers, only interprets—it converts each instruction in the BASIC program into code, runs it and then goes on to the next part. The difference is between dictating directly to a secretary, with all the um's and er's of speech and delivering an edited tape to an audio typist.

Let's start again with the READY signal staring us in the face. Your first response toward writing a program is to type a line number. The line number is a tag we can attach to an instruction so that we and the computer know where to find that instruction.

Take any number between 1 and 65529. Normally, you start at 10 or 100. It doesn't matter what numbers you choose, since you don't use more memory by numbering lines 100, 200, 300 than by numbering them 10, 20, 30. Important to remember is that the program should flow from the lowest numbered line to the highest.

Since we have to start somewhere, type 10 and a space. Your program now starts at the line numbered 10. Since it's a bit depressing to stare at a blank screen, we'll get the computer to PRINT my name.

```
10 PRINT "IAN R. SINCLAIR"
```

Remember, the quote marks must be in place, because they indicate to the computer that the words between them are to be printed on the video screen and are not part of an instruction. Marks that divide one kind of word from another are called delimiters, and the quote marks are the easiest of these delimiters to work with. Make sure that anything you want printed to the video screen starts and ends with quote marks.

Made a mistake? We're not all trained typists, so the TRS-80 is very forgiving. Use the backspace, the arrow which points to the left, on the key next to the @. Each time you press this key, one letter of your instruction is wiped out, and you can type another one. Keep on until the line is perfectly typed.

Now that you've typed the line, you must press ENTER to make certain that it's planted in the computer's memory. Even if you forget the line number, you still get a result—the words which were inside the quote marks will be printed, but you don't have a program because it won't repeat, and you must start again. If your line was entered correctly, it is now a very simple program. We can run the program by typing the word RUN and then hitting ENTER again.

All right, so it's not impressive, but each time you type the word RUN and hit ENTER, you'll get my name printed on the screen. Makes me feel good at least.

Try typing the instruction with no space between the 10 and the PRINT, so that it reads 10PRINT "IAN R. SINCLAIR". Does it make any difference in the way the program runs? Did I say that computers were fussy?

Now type LIST10 and hit ENTER. This prints your instruction line on the screen again. Notice anything about it? Right, the space has been put in again between the 10 and the PRINT. You can't cheat your TRS-80 this way!

Now try some more deliberate errors. It's just as well to know at this stage what effects they have, rather than be tangled up with an unfamiliar error message later on. For a start, leave out the first set of quote marks. Then try typing PPRINT or PRIINT instead of PRINT. Doesn't run, does it?

Instead, you get the words SN ERROR. SN is a shortened version of SYNTAX, a word that language teachers use to mean the way in which a language is constructed. If you say in English, "I am here since yesterday," your syntax in English is poor, but the same phrase in French is grammatically correct.

Syntax is a matter of rules, and a SN error means you have broken a rule of BASIC, by leaving out a delimiter, or misspelling an instruction word. Some newer computers, incidentally, reject a syntax error the moment it is entered, but the TRS-80, like its entire generation of home computers, doesn't spot the error until you try to RUN.

Rat's Revenge! Featuring 3-D Graphics!

Rat's Revenge allows you to run a maze from the inside! Exceptional use of the TRS-80's often maligned graphics capabilities produces 3-dimensional pictures of hallways, dead-ends, openings to right and left, and more. Rat's Revenge generates a new maze for each game. You must find the cheese before you starve. As starvation approaches, hallucinations appear and mysterious poems are heard. At the end of each game, the maze is displayed and your wanderings traced out. Additional features include help, hint, quit, and acceleration commands, two levels of difficulty, and two sizes of maze. Either the four arrow buttons or a numeric keypad can be used for movement.

TRS-80 Level II 16K cassette \$12.95

Med Systems Software unconditionally guarantees satisfaction. Orders are mailed within two days of order receipt. Write for our complete catalog of software.

Med Systems Software
P.O. Box 2674 Chapel Hill, NC 27514
(919) 933-1990

VISA
A
M.C.

TRS-80SOL-20

CASSETTE
SOFTWARE

Home and Light Business Applications

These popular, professionally developed applications are low-priced. Guaranteed performance! Detailed booklet included.

• BUDGET & INVESTMENT	\$17.95
• BUDGET & CHECKING	\$14.95
• HOME INFO RETRIEVAL	\$11.95
• MATH (ages 5 and up)	\$ 7.95
• STOCK PORTFOLIO	\$18.95
• AUTOMOBILE	\$12.95
• MASTERMIND game	\$10.95
• MONTE CARLO game	\$ 7.95
• and others from	\$ 4.95

Send order, or \$1.00 for descriptive catalogue (free with order) to: ✓ 116

NEWBY SOFTWARE DEVELOPMENT CO
299 DAWLISH AVE. TORONTO, CANADA M4N 1J8

779 UPPER CASE/lower case "Conversion Kit I"

Expand the capabilities of your 779 line printer to include word processing! Available to all Centronics 779/ TRS 80 Printer I owners is the option of lower case and changing slash 0 Zero to standard 0. No etch cuts or soldering needed. Installs in minutes with a screwdriver. No program modification or additional interface is required. **Price \$125.00**

Motor Control "CONVERSION KIT II"

FOR ALL CENTRONICS 779/ TRS 80 PRINTER I LINE PRINTERS!! Our "CONVERSION KIT II" Motor Controller gives your 779 the ability to turn the motor on and off automatically. Removes the annoying noise of constant run, increasing the life span of your 779/ TRS 80 line printer motor! No soldering, software or hardware changes needed. Installs easily. **Price \$95.00**

SAVE! Buy Service Technologies' Conversion Kit I and Conversion kit II together for the single price of **\$199.00**

To order, please send check or money order in the proper amount to

Service Technologies, Inc.
32 Nightingale Rd.
Nashua N.H. 03062 ✓ 287
(603) 883-5369

Visa and Master Charge accepted (please include signature, expiration date and phone number)

Service Technologies will pay all shipping and handling

64K RAM

FOR YOUR MODEL 1 TRS-80

Release your software chains with the **NEW FREEDOM OPTION**, a pluggable board that restructures the TRS-80's on command, to perform like a large Z80 system. All the TRS-80's features are retained. All TRS-80's software will run without interference. The option has a **FREEDOM BOARD & TBOS** on a 5 1/4" disk. TBOS allows your TRS-80 to execute software originally written for CDOS, TSAIOS, & CP/M operating systems. TBOS opens the door to higher level languages such as COBOL, FORTRAN & UCSD PASCAL.

To further enhance your TRS-80's 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 54K of user RAM with TBOS loaded & 61K with BIOS only. Both options assume a 48K disk system & both fit into the keyboard case. 6 month board warranty.

FREEDOM OPTION.....\$245

MEMORY EXPANSION OPTION.....\$295

TRANSLATOR.....\$ 22

TRANSLATOR is a DOS compiler that provides a universal character translation for the printer. It solves the alien character problem.

Send Check or Money Order to:
(MASS. RESIDENTS, PLEASE INCLUDE 5% TAX)

F.E.C. Ltd. ✓141

P.O. Box 2368, Woburn, Mass. 01888
(617) 944-5329



TRG-80 LVR. 16K

STAT-BALL Baseball Simulation



STAT-BALL is not an arcade type game, but a comprehensive 3 part statistical baseball simulation package that uses real life pitcher and batter statistics to simulate game play.

During the game, 12 performance categories are computed and displayed for batters, 10 for pitchers. These stats reflect the player's game performance and will follow closely a player's actual ability. Stats may be viewed on a per game basis or kept for many games.

Agonize when your best power hitter drops a routine fly, feel the thrill of victory when he hit's a deep fly over the wall. All action is described as it happens to add tension and excitement to this engrossing game.

YOU'RE THE MANAGER! Select your own lineup, make all types of substitutions, call your own strategy and live with it! Play modern, old timer, or mixed teams.

This package consists of 3 programs:

- (1) GAME
- (2) RECORDS (Sorts up to 150 players into 14 categories based on relative performance)
- (3) WORKUP/EDIT (Establish, edit, or mix players)

Features include:

- Solitaire or head to head competition
- Batters' ability ratings include bunting, running, and errors
- Pitcher bring factor
- 3 offensive and defensive strategy options
- Full 25 man rosters
- Printer option (32 ch/ln or more)
- Top quality tape
- Detailed instructions
- FREE 79 Pirates and Orioles for series replay

For prompt, 1st class delivery send \$25.00 check or money order to:

J.L.S. SOFTWARE
P.O. Box 10385
Chicago, Illinois 60610

(We pay shipping and handling)

(*Trademark, TANDY CORP.)

SOFTWARE CPU™

If you're learning an instruction set, or analyzing an alien machine code program, or creating your own super software structures, then you are keeping instructional effects of CPU architecture and RAM all together in your head in a complex running mental map. Whew! Instrument your imagination! TBUG-linking SOFTWARE CPU™ series of microprocessor simulations on the Level II 16K TRS-80™ display a complete parallel before/after set of Processor Programming Models with scrolling disassembler, CPU Registers, flags and stack, plus an intelligent RAM Window reacting selectively to RAM-interactive instructions. It's your entire imaginative overhead, clicking away in Single-step or variable speed TRACE modes under your dynamic control. Plus a slug of debugging features you'd never imagine would be available in such low cost development software. Reify program flow with a 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

EMU 02: Animated 6502 Programming Models, Disassemblies 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 & SYNTEREK card, it's a 6502 Software CPU. 16K Level II TRS-80, TBUG required No. BL-1 \$24.95

ACCEL: from Southern Software of England, is a COMPILER for Level II TRS-80 INTEGER BASIC. Properly structured (no dynamic redefinitions, correctly nested loops etc.) error-free BASIC programs are compiled by ACCEL to fast Z80 machine code for potentially spectacular speedups.

ACCEL Compiler for 16K Level II TRS-80 \$44.95

Include 75 each
postage CA add 6%
ALLEN GELDER SOFTWARE
Box 11721 Main Post Office
San Francisco, CA 94101

TRS-80, TBUG in Radio Shack/Tandy Corp.
Software CPU™ in Allen Gelder Software
✓79

Omikron's Mapper + NEWDOS/80 8" Drives for the TRS-80

NEWDOS/80 is Apparat's latest upgrade to NEWDOS. Features include variable length records, chaining, and drivers specifically configured for Omikron's MAPPER II. \$150.

MAPPER II adapts the TRS-80 to run both 5" and 8" drives. With NEWDOS/80, storage is increased to 300K per 8" drive. \$99 plus \$10 per cable connector.

MAPPER I adapts the TRS-80 to run the vast library of CP/M software as well as the TRS-80 software. All Lifeboat Software may be ordered for the MAPPER I. All MAPPER I CP/M software is compatible with the CP/M for the Model II. With MAPPER II and 8" drives, the Model I becomes disk compatible with the Model II.

Standard features include lower case support, serial and parallel printer drivers, and an addressable cursor. MAPPER I is supplied with complete utilities including a memory test, a disk test, a copy program, and a proprietary program for converting TRS-DOS files to CP/M files. \$199.

WORD PROCESSING—MAPPER I supports professional word processors like the Magic Wand and Word Star (see reviews in June 80 Kilobaud). Omikron's implementation includes a blinking cursor, auto repeat, shift lock, debouncing, and an input buffer that eliminates missed characters. Magic Wand super discount price \$299.

FIELD PROVEN DESIGNS—After one year of MAPPER production, Omikron has established an impeccable reputation for reliability, integrity, and user support. Omikron's customers include the US Government, major corporations, universities, medical doctors, and professionals in all fields.

SYSTEMS—Omikron sells complete systems featuring Model II compatible Shugart disk drives. Call for prices and delivery.

FOREIGN ORDERS must include full payment in US funds plus \$25 for air shipping and handling.

See reviews in July 80 and August 80 BYTE By Jerry Pournelle.



*CP/M is a TM of Digital Research. TRS-80 is a TM of Tandy Corporation. ✓367

How much can you PRINT in one instruction? Try it! Type 20 PRINT "....." and then type as many words as you like. You'll find that the words don't run off the edge of the video screen, but form new lines of text on the monitor. The video monitor accepts only 64 characters/line, while the computer allows up to 250 characters/line. The computer no longer responds to keyboard input when the 250 character limit is reached.

PRINT Plus Spaces

Now try the one-liner below:

```
10 PRINT"   SPACED ALONG"
```

Because we've labeled this line as line 10, it has wiped out the old line 10. Notice that the

space between the first set of quote marks and the first letter of the word affects the way it prints. This is one way of adding spaces.

Another way is by indicating tabs. Tab means the same as it does on a typewriter, tabulation. The width of the video screen is divided into 64 starting points, numbered from 0 to 63. Using TAB() selects one of these as a starting point for what you print.

```
10 PRINT TAB(25)"IN THE CENTER"
```

Notice the syntax—parentheses after TAB enclose the number, between 0 and 63. The quote marks surround the words to be printed.

If you had put the first set of quote marks between PRINT and TAB, you would have printed, at the left-hand side of the screen, the phrase

*A trademark of the Tandy Corporation



A year ago, when nobody had ever heard of me, I said these disks could turn a TRS-80* into a serious computer.

Now they tell me I'm "the standard of the industry."

I'm Irwin Taranto, and times have changed.

In the first twelve months, almost a thousand businesses put me to the test.

You can buy my TRS-80 systems all over the country—dozens of companies sell them. Some are my dealers, some aren't. And this creates a new set of problems.

You see, learning to use a computer — any computer — is like learning anything else. It takes some getting used to. If you sit down with a computer program and the manual and try to figure it out all by yourself, you'll probably just give up and feel you've been had.

You have to hang in there for a month, make a few phone calls, and have somebody who really understands the system help you work it out.

That's why I still answer the phone. And why, I guess, people say all those nice things.

The Model I systems

So far, I have six systems for the Model I, at \$99.95 each, plus \$20 each for the books where required. For the Cash Journal option on the General Ledger, add another \$50.

Accounts Payable
Accounts Receivable
Invoicing
General Ledger (Cash Journal optional)
Payroll
Inventory Control

And the Model II programs

Some brand new, highly-sophisticated programs for the TRS-80 Model II, at \$249.95 each, plus \$20 for the book where required.

General Ledger/Cash Journal
Accounts Payable/Purchase Order
Accounts Receivable/Invoicing
Payroll/Job Costing

For the Model I programs, you can tell us what you need in a letter or by phone. You get the disk and all the instructions you need. Any problems, just call me.

For the Model II programs, I ask you to fill out a questionnaire before I send you any materials. The systems have so much flexibility we tailor them to your needs.

That way, I make sure you get a system that works. If you have any doubts about that, I'll give you the names of some people in your area who've already been through the process.

Let them tell you whether I really deserve that fancy new reputation.

45

Taranto
& ASSOCIATES, INC

121 Paul Drive, San Rafael CA 94903 • (415) 472-2670.
Add \$4.00 per order for handling. 6% sales tax in California only. Master Charge, Visa, C.O.D.

TAB(25) IN THE CENTER, which isn't exactly what we wanted.

Why TAB(25)? Well, I counted the letters and spaces in IN THE CENTER and made it 13 characters. I rounded that to an even number, 14, then subtracted from 64, leaving 50. Half of 50 is 25, and that's the tab number. Why? Well, the number of letters and spaces gives the number of positions on the line which are used to print. If we want these words to be centered, then there has to be an equal number of spaces on each side, and we find this by dividing the number of unused places, 50 in this example, by two.

Try printing your own name centered on the screen.

Notice, by the way, that we're still entering each one-line program as line 10, deleting the previous program in line 10. Later on, we'll look at other ways of removing old programs, getting rid of unwanted lines or running only the lines we want.

TAB is one of the BASIC commands or functions that not all small computers have, but it's only the start of the options which are available to the TRS-80 owner. Type the next line very carefully.

```
10 PRINT "SPACE", "THE", "WORDS", "OUT"
```

See the commas? Each comma lies outside the quote marks that set off the words, because we don't want the commas printed. If we type:

```
10 PRINT "SPACE, THE, WORDS, OUT"
```

hit ENTER, type RUN and hit ENTER again, the printout on the video screen would be:

```
SPACE, THE, WORDS, OUT
```

As it is written, the effect is quite different, as you will see. The commas have commanded the computer to space the four words across the width of the screen. Each comma instructs the computer to start printing the next word at the next print zone. There are four print zones, each of which can take up to sixteen characters (letters, numbers or spaces). If you PRINT more than sixteen characters in a zone, the comma causes a skip to the next zone. Try the following program.

```
10 PRINT"SEE THE EFFECT";  
20 PRINT"OF A SEMICOLON";  
30 PRINT"ON THE PRINTOUT"
```

Example 1

```
10 PRINT "SPACE"TAB(POS(0) + 5)"THE"TAB  
(POS(0) + 5)"WORDS";TAB(POS(0) + 5)  
"EVENLY"
```

Example 2

```
10 CLS  
20 PRINT TAB(28)"HEADING"  
30 PRINT  
40 PRINT TAB(5)"THIS IS A  
NEATER WAY OF PRINTING"
```

Example 3

The comma is used as a print delimiter. We can also use the semicolon as a delimiter, but with a very different action. Try entering the program in Example 1. With more than one line of program, you must remember to push ENTER at the end of each typed program line. When you run the program (type RUN and hit ENTER), what happens?

The semicolon is another signal to the computer when it's used in this way. Typed after a printed quantity, the semicolon means: use the same line and keep printing, so that the words we typed in three separate instruction lines end up on one single line of type. This would happen, incidentally, even if we had several other lines of instructions between these PRINT instructions, so watch carefully for these semicolons if you are entering a program which has been written in BASIC by someone else. All small computers use this form of instruction.

What happens if you leave out the semicolons? Try it! Each PRINT command causes the video to start on a new line. This is one way you can space out your printing vertically.

Meanwhile, look at Example 2 for a very powerful command which few small computers have in their BASIC. It's the POS function. POS means position, and it means the position of the cursor mark, that short line which shows where the next letter will appear on the screen when you type a program line.

As a result of the POS instruction, the computer makes a note of how far along a line you have printed. Add five to that place number, as we've done in Example 2 and the result is five spaces between each word.

When you type line 10, by the way, don't hit ENTER until the end of the instruction after the last set of quote marks. If you hit ENTER before then, you're indicating that you want to start another numbered instruction line. The other point is that you should type DELETE 20-30, and hit ENTER before running the program. If you don't, you'll print the words in lines 20 and 30 of the previous program, unless, of course, you have switched off between working Examples 1 and 2.

By this time, your video screen must be look-

```
10 CLS
20 PRINT@475;"GREETINGS"
30 PRINT@704;"THIS USES THE PRINT@
  COMMAND TO SPACE LINES"
```

Example 4

```
10 CLS
20 PRINT USING "##.##";21.471
```

Example 5

```
10 CLS
20 PRINT USING"##.##";2.736
```

Example 6

ing a bit cluttered, so let's look at another useful function that helps clear things up. Example 3 shows a four-line program (we're getting more adventurous) which makes your video printouts look better. The new instruction, CLS, means, simply, clear the screen.

When the program is run, the screen clears, removing the program lines. After the CLS instruction has been used, the next PRINT instruction will place the words in quote marks on the top line.

In line 30, I've used the word PRINT by itself. What does that do? Try leaving it out by typing DELETE 30 and hitting ENTER. Then type RUN and hit ENTER again. See the difference? The PRINT command in line 30 causes a one-line space between HEADING and the words in line 40. Want a two-line space? Then type 30 PRINT, hit ENTER, type 40 PRINT and hit ENTER again. Now run this one and watch the larger gap appear between the heading and the line of words.

Time to take a look at the program. Type LIST and hit ENTER. Your program appears under the last lot of printing, with the lines in correct order. That's just one example of why the BASIC language uses these line numbers. We can place any line number against a line, and the computer sorts them into order. If we use the same number for two different lines, then the last one typed and entered wins, the older one is deleted. We can also delete lines by typing DELETE, then the line number and hitting ENTER.

Can we delete more than one line at a time? Sure we can. Just type DELETE 10-40, and every line of the program in Example 3 will be rubbed out. The other way we can remove a whole program, but this time without needing to know how many lines it has or what their numbers are, is to type NEW and then hit ENTER.

More Spaces

Suppose we want to print a word at the center of the screen. There are sixteen lines of print on a full screen, so we could print on line eight. We could type seven lines with PRINT, but no words, to make the print position move down one line at a time. We could then use the commands PRINT TAB() to space the word to the center of line eight.

There's a much easier way of doing this sort of thing with a TRS-80, by using the PRINT@ command. It must be entered correctly, with no space between the T of PRINT and the @ sign, and a comma immediately after the @. If you put an unwanted space in, you'll get the SN error message when you try to run it. A much less obvious error is typing @ with the SHIFT key depressed. If you hit SHIFT and @ at the same time, the @ appears as usual on the video screen, but the code number which is fed into the computer is NOT the correct one. You'll get the SN error report when you try to run it, but the line will look good on the screen.

With these warnings in mind, try the program in Example 4. Remove the previous programs by typing NEW and entering. Now type in the three lines of the new program and run it. Interesting? The word GREETINGS appears around the center of the screen, and the next

line of print is four lines under that.

Take a look at page E1 at the back of your Level II manual. Turn the page so that the numbers are all correct way up, and you can read off the PRINT@ numbers and the TAB numbers. The numbers in heavy type at the top are the TAB numbers for each line, and also the PRINT@ numbers for the first line, the top line. For the second line of PRINT@ the numbers start at 64 (see the columns down the left and right-hand sides), for the third line, 128, and so on.

To find a PRINT@ starting number for any position on the screen, pick your spot, locate the TAB number at the top of the page and the PRINT@ number for the start (at the left or right-hand side), then add the two. For example, if you want to start around the center, try TAB(31) on the line starting at 448. That gives us a PRINT@ on the number $448 + 31 = 479$, so we type PRINT@479, then add the quote marks and the message. Remember the syntax: PRINT, no space, @, no space, comma, then quote marks for the message, and keep your fingers off that shift key when you are typing the @.

Using More

The TRS-80's big, big BASIC allows us yet another way of printing which isn't available to people with other types of machines. The new instruction this time is PRINT USING, and it instructs the computer to arrange the printing to suit some definite pattern which must be specified in the PRINT USING command. PRINT USING is most useful when you have to print out a number in standard form, such as a price or a sum on a check. It's also useful when you want to round off a fraction.

Since the number of times you are likely to want to use this command in your own programs is limited, compared to the everyday ones such as TAB and PRINT@, we'll look at only a few of the PRINT USING commands.

Example 5 shows PRINT USING applied to rounding off a fraction. Enter the program and run it to see how the number is printed. This is a smart way of making sure that your printout doesn't contain lots of figures after the decimal point. After all, you wouldn't like to think that you had just printed a check for \$56.2357.

Another useful feature of the PRINT USING command is that it can insert a floating dollar sign. Now, if you thought that the dollar was sinking rather than floating these days, let me explain that phrase. You might want to print out something like amounts of \$1.50, \$26.40, \$147.50 and so on. What the floating dollar sign does is position itself ahead of the first figure of the number, so that you don't print \$127.50 and \$02.40. Try it out with the program in Example 6.

The Level II manual has a large number of examples of PRINT USING, so we'll leave this one, which is a more specialized command than most of the ones we shall be using in this series.

Bug BBreak

Depending on the age of your 80, you may already have met the dreaded kkeybounce. You type PRINT, and it appears on the video screen as PPRINT or PRIINT or some other

```
1 POKE 16553,255: CLEAR: FOR N = 16480 TO 16492: READ K: POKE N,K: NEXT FOR N = 16435 TO 16
437: READ K: POKE N,K: NEXT: POKE 16405,0: DELETE 1 2
2 DATA 205,227,3,183,200,14,40,16,254,13,32,251,201,195,96,64
```

Listing 1

weird combination of repeated letters.

When you try to run a program with an unwanted double letter in a command word, you'll get a SN error message, meaning that the internal circuits of your computer simply don't recognize the word. Of course, if you have an unwanted double letter in a message which is enclosed in quote marks, then it will simply be printed out that way.

Keybounce is a problem that plagues any mechanical switch, like keyboard switches. You press a key, and the electrical contacts close. But, because they're made from springy material, they bounce open again before finally closing and staying closed. Each time the switch closes, it completes an electrical connection, and if that happens to be the electrical connection which prints the letter P on the video screen, then you get two of them.

Every manufacturer of computers gets around this by using a time delay each time a key is pressed. The computer takes no notice of the key until the time delay is over. Only a small time delay of about a thousandth of one second (one millisecond) is needed.

Radio Shack seems to have given short measure to this problem on the older TRS-80s. On some models, keybounce can be fixed by

pulling off the keycaps and cleaning the contacts. That's what Radio Shack says, anyway, but my own TRS-80 has fixed keycaps that don't come off easily, and it bounces very badly. The keybounce is so bad, in fact, that if there were no cure for it, I would have scrapped the whole thing months ago.

Yes, there is a cure, and it works. Radio Shack supplies a program on a machine code tape entitled KBFIX. Enter this one, and your keybounce troubles are over until the next time you switch on. Incidentally, more recent TRS-80s have no trace of keybounce.

Sometimes keybounce is just a nuisance. Other times it can cause a complete hangup of your computer, and one of these other times is when you type LIST and get LLIST. LLIST is a command word which was unfortunately chosen for printing a list on the Radio Shack line printer. Run LLIST and the result is—nothing. No keys have any effect, nothing appears on the screen, and the computer appears to have died on you, with just that accusing word LLIST staring at you from the screen.

What's happened is that you have commanded the computer to print a list on the printer, and because there's no printer connected, it's

waiting for you to connect one. Don't rush out with a fistful of dollars, because you can recover from this stall in two ways.

One is to switch off completely, but that way you'll lose any program you had in the computer. The easier way is to push the RESET button at the back of the computer, at the opposite end from the ON/OFF switch. On my 80, this is under a small flap which also houses the connector for expanding memory. Pushing and releasing this switch removes the hangup, and the computer is ready to run again. Whatever your manual says, you don't lose your BASIC program when you use RESET unless the Radio Shack expansion interface is connected.

The keybounce problem can also be avoided by using a short BASIC program, shown in Listing 1. It's a sight longer than the others we've used in this part, and you have to be sure that you've typed each character correctly. Run it, and it sorts out the keybounce and then deletes itself!

At this stage, it's not easy to explain how it works, because it makes use of parts of memory we don't normally use, the reserved RAM. The purpose of these memory parts is kept a close secret, and it's only when someone with a bit of time to spare investigates them that we even get to know about them.

Keybounce is just one example of what folks in the computing business call a bug—a flaw in a system. A bug may be in the operating system, or it may be in a program. Wherever it is, these articles will show you how to stamp out some of the most active bugs. ■

SOFTSTUFF, established by Heath Company, offers you a selection of software tools at affordable prices. All SOFTSTUFF programs have been checked and confirmed on the hardware indicated. Documentation, though not as extensive as standard Heath Company documentation, has been completely reviewed and judged acceptable. All SOFTSTUFF products come on a 5¼-inch diskette and all initial offerings require HDOS. For value and performance...SOFTSTUFF is good stuff.

Full Screen Editor: The SOFTSTUFF text editor uses H89 or H19 screen as a window into a file. Cursor motion keys position the cursor so changes can be typed anywhere on the screen. Function keys perform character and line insert and delete, string search, move and copy single and multiple lines, and scrolling of text in the window. For H89 and H8+H19. HDOS Model #SF-9000: \$49.95

Text Formatter: Performs fill and justification (straight right margins) of text previously prepared by your editor. Page numbering, headers and footers, indents, hanging indents, centering and underlining. **INCLUSION** feature allows automatic insertion of up to 26 user defined strings and merging of documents. HDOS/H19/H89. HDOS Model #SF-9001: \$54.95

Microsoft Macro 80: 8080/Z80 MACRO Assembler. Intel and Zilog Mnemonics supported. Relocatable linkable output. Package includes LINK 80 and Cross Reference List utilities. Complete documentation and HDOS common deck MACRO included. For H8 and H89. HDOS Model #SF-8002: \$69.95

TELINK: A utility which provides file transfer between the H89 or H8/H19/H17 and Information Services (MicroNET). Features include user defined keys which provide for auto-login, mail check, etc. Full error checking and elapsed time clock on screen. Very easy to use. Use on other time sharing systems too. HDOS Model #SF-9003: \$39.95

SORT: An extremely fast assembly language routine that sorts records up to 255 characters in length with user defined sort fields. Could be called by MBASIC or stand-alone. Source code provided. HDOS Model #SF-8004: \$29.95

To order:

1. Send check or money order to Heath Company, Dept. 351-698 Benton Harbor, MI 49022. Michigan residents add 4% sales tax. Write model numbers clearly.
2. Call toll-free 800-253-0570 and use VISA or Master Card. In Michigan, Alaska, & Hawaii, call (616) 982-3411.
3. Visit your Heathkit Electronic Center where SOFTSTUFF is on display. See your telephone white pages for the location nearest you.

SOFTSTUFF is a trademark of Heath Company. ✓ 383

SF-101

SOFTSTUFF
Affordable Software Tools™

SIMPLE AS BASIC BUT VERY FAST—BALCODE

You can now program your Model I TRS-80 using Op codes based on IBM 370 BAL. Why devote your time to BASIC or to Z-80 assembly language when the BALCODE editor/assembler is now available for only \$79? We mail you a monthly Newsletter covering all the fine points of assembly language programming. This package comes with a Programming's Manual and a Demo program to walk you through all the BALCODE commands.

Our EDITOR is tops. Includes COPY, MOVE, FIND and CHANGE Commands with stop at CRT fill-up.

Our BALCODE MACRO Assembler assembles floating point numbers.

Our System all resides in memory at the same time. You edit, assemble and run without reloading. Origin is at 7000H and object code is 12,000 bytes.

BALCODE 80A \$79. CHECK, MO, VISA OR MASTER CHARGE.



Write for free listings or send \$10 for Programmer's Manual. Applies towards purchase.

BALCODE SOFTWARE, INC.

12 LEEDS LANE, N. BABYLON, N.Y. 11703 (516)-242-1665 EVES. ✓391

Introducing.....**.....60 Cycle Sine Wave U.P.S.**

(Uninterruptible Power Supply)

..... for those systems that need 60 cycle sine wave keeps computer & disk systems on when the power goes out **For less than \$500.00***

- Rated 250 Watt continuous operation
- will provide 400 Watts for 5 minutes (Model II TRS-80 with 4 disk drives)

* Standard MAYDAYS available starting at \$195.00 for 150 Watt

Mayday™

from.....



Sun Research, Inc.

Box 210 New Durham, NH 03855
(603) 859-7110 TWX 510-297-4444

✓151

Blow by blow accounts.

A Bout with the I.R.S.

Fred Blechman
7217 Bernadine Ave.
Canoga Park, CA 91307

In one corner, weighing 29 pounds, in black with gray trim, we have the \$750 Radio Shack TRS-80 Level II 16K Microcomputer. In the other corner, weighing *tons*, in red, white and blue, we have the multi-million dollar IRS worldwide computer network. Come out fighting, and may the better machine win!

Round 1: Getting it together

It wasn't a referee who introduced me to the IRS. It was a plain brown envelope advising me of an office audit appointment and detailing the items I should bring. Needless to say, that bit of mail destroyed my day—and most of the next few weeks!

I have had a small business with no employees for 15 years and always wondered when the day of reckoning would come. My tax preparer told me many times that my records were complete and accurate and that I would coast through an audit.

Still, there were always gnawing doubts about whether I could provide satisfactory verification for various expenses. Like everyone, I had heard IRS audit horror stories, and my impression was that no one comes through unscathed. Furthermore, I assumed the auditor would be nasty, intimidating and threatening.

The audit was for 1977. In the three-year interim, we had moved and still had not unpacked cardboard boxes with business records going back 15 years! To further complicate the picture, my wife, Ev, had her own retail business before we married in 1977, so we had filed a joint return, with separate Schedule C's for each business.

The auditor's letter specified that we furnish,

to my surprise, not only our business records and checking account statements, but all personal checking account statements and checks and *all* savings account passbooks!

Yes, *all!* That meant *every* statement and savings passbook from December 1976 to January 1978!

For many people this might only amount to a few accounts, but for Ev and me this meant eight checking accounts and four savings accounts that showed activity in that time period. It took considerable time and effort to get everything together, especially since Ev had closed her business at a considerable loss (that's what triggered the audit!) and delegated, in disgust, a lot of records to the round file!

Finally it looked like we were ready to face the almost infinite resources behind the IRS paper tiger.

Round 2: The \$45,000 Punch

The auditor, Edward, was very congenial, as he led us to his cubical on the third floor of the imposing local Federal Building. Edward spent the first half-hour or so interviewing us about our individual businesses and establishing background information.

"Any inheritances received in 1977? Gifts? How much cash do you keep around the house? Why so many checking and savings accounts? Any loans?"

I suppose if I were cheating, or more paranoid than I had already become, I would have objected to some of the questions as being too personal (practically the only thing he didn't cover was our sex life!)

Instead, I was fascinated by his thoroughness. I did not realize he was slowly but surely peeling away my defenses, preparing for a blow to the solar plexus!

During this time, he was furiously making notes of our replies to his questions. Reading upside down, I saw "T/P claims" in various places. "T/P" means taxpayer.

Asking for our bank statements, he proceed-

ed to list every monthly deposit total on a sheet of lined paper! He did this with *every* bank statement for *every* month in 1977! Then he did the same thing with the savings passbooks, listing *every single deposit* by date!

He used eight sheets of paper and took almost three hours—into his lunch hour—and came up with a grand total of \$141,531.86 deposited in all our accounts in 1977.

Then he checked our 1977 Federal Income Tax Return and added the gross income: \$96,091.

"Mr. Blechman," Edward said, "We have a difference of \$45,440.86 between your deposits and your reported income. Some of this difference may be transfers between accounts or non-reportable income we may not have covered in our initial discussion—loans, social security, gifts, unemployment insurance and so forth. Any of this \$45,000 plus you can't identify and verify will have to be considered non-reported taxable income. Our next appointment is"

The fact that it rained that day, that my raincoat had a big hole in it, and that I lost my rainhat, only added to the feeling that I was down for the count!

Round 3: The Pussycat's Claws

Wondering what I'd look like in stripes and how the food was in Leavenworth, I carefully assessed my situation. I knew we moved money around to pay bills, kept balances equalized and made major purchases through the checking accounts. I had a policy of keeping small balances in the checking accounts, since they earn no interest. Sometimes cash-flow needs required transfers from my savings accounts. But \$45,000 worth of transfers? That much? It didn't seem possible.

I looked for errors in the auditor's figures and couldn't find any. Still over \$45,000 unaccounted for. I felt helpless and overwhelmed, so I picked up my February copy of *80 Microcomputing* to escape and let my subconscious

BUSINESS CONTROL PROGRAMS

PAYROLL GENERAL LEDGER ACCOUNTS PAYABLE ACCOUNTS RECEIVABLE

These business systems are designed with the business manager in mind. Major changes in your current bookkeeping methods are not necessary to make these programs work for you. Data may be entered into any one of the systems either directly or through subprograms, so that duplicate data entry is not required. This avoids mistakes.

Accurate reports of financial activity may be obtained on a scheduled basis or at irregular intervals.

The systems require CP/M and CBASIC. Customization, installation and training are available at additional cost. WRITE FOR SAMPLE REPORT AND TRIAL DISK—\$25.00 (credited toward purchase price).

- A Totally Linked Single Entry Accounting System
- Completely Screen Oriented Systems Provide User Prompting for Each Entry
- User Assignable Account Numbers
- Flexible, Reliable and Efficient
- Installation and Training Available

AS LOW AS **\$300⁰⁰** ea.

CP/M 2.2 Control Program for Microcomputers
Enabling You to Run Software Published for
CP/M 1.4 on the TRS-80 Model II (Including Communications Programs)

CP/M[®] 2



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. FMG CORPORATION NOW OFFERS THE CP/M 2.2 FOR THE TRS-80 MODEL II. The latest in the evolution of a reliable and efficient software system, CP/M 2.2 features an enhanced upward compatible file system and powerful new random access capabilities. From minidisks and floppy disks, all the way to high-capacity hard disks (when available), the flexibility of CP/M 2.2 makes it a truly universal operating system. The package includes an 8" system disk, editor, assembler, debugger and communication software for the TRS-80 Model II. Special utilities not available with other CP/M systems are also included in FMG's CP/M 2.2.

(CP/M is a registered trademark of Digital Research Corp. TRS-80 is a registered trademark of Radio Shack)

\$200⁰⁰

From the
ORIGINATOR
of the

TRS-80[®] PROJECT



THE PASCAL/MT™ As Low As \$250.00

PASCAL/MT™, a native code PASCAL compiler designed for 8080/8085 and Z80 microcomputer systems, provides an efficient development cycle as well as efficient execution of object programs.

- Compiler executes under the CP/M operating system in as little as 32 K bytes of RAM
- Interactive Symbolic Debugger which enables the programmer to examine variables, set a breakpoint, and trace procedure calls interactively at run time
- Compiles at the rate of 600 lines per minute on a 2 MHz 8080
- Programs Execute up to 10 TIMES FASTER than popular interpretive Pascals
- The code generated is 8080 object code which is ROMable with a minimum run time overhead of 1.5K bytes
- Interrupt procedures allow the programmer to write interrupt drivers for I/O and other real time tasks in Pascal/MT
- Bit manipulations of variables may be performed with the built-in procedures: SETBIT, CLRBIT, TSTBIT, SHL, SHR, SWAP, LO, HI
- Assembly language subroutines may be called from Pascal/MT
- Business arithmetic version of Pascal/MT is also available
- Pascal data structures supported are: ENUMERATION AND SUBRANGE TYPES, RECORD, ARRAY, REAL, INTEGER, CHAR, and BOOLEAN
- Not implemented are: SETS, GOTO, GET, PUT

P.O. Box 16020
Ft. Worth, Texas 76133
Phone (817) 294-2510



MAK2

Send for FREE CATALOG

PASCAL/MT™ includes compiler and a real time symbolic debugger. The system requires 32K minimum and 2 mini disks or one 8" disk.

To add string function to "Household Accountant," change the following program lines:

```
540 Change C to CS
550 Change -1 to END
950 Change C to CS
960 Change -1 to END
1000 Change C to CS
2000 Change -1 to END
```

Example 2.

mind look for a solution.

Fate smiled on me, as I turned to page 114 and saw David C. Andreasen's "Household Accountant" with the kicker "Keep track of how much, to whom and when—up to 32,767 accounts."

Well, I didn't have *that* many accounts, so I looked closer. I got excited—this could do it. This could sort out and add transfers between accounts!

I sprang into action. I keyed the program on page 116 into my 16K Level II TRS-80 pussycat. She almost purred as I ran and tested the program, using dummy DATA. It worked!

Then, I realized, I was limited to check number entries only, so I made a few program changes (Example 1) to accommodate strings (loan, cash, etc.).

I started with one checking account and entered each check that transferred money to another account. I assigned a category number to each "path" (Bank one to Bank two was category one, Bank one to Savings one was category two, and so on). I ended up with 18 different paths, or categories, between accounts!

I made some additional changes to the program (Example 2) to accommodate my printer. The program added and printed the totals for all categories, for each month and for the year, listed all transfers individually, printed and added each category—fourteen pages on my printer!

With the help of this program, I was able to account for almost \$43,000 of the \$45,000 plus "unexplained income"!

Round 4: The Technical K.O.

Armed with my computer printouts, plus six cardboard boxes full of records, wheeled in on my dolly, we faced Edward a second time. Once he understood what I was showing him, he was delighted. He said it saved him hours of work!

However, just to make sure I was correct (after all, how can a \$750 computer do anything but play games?), he spent two hours going over the figures, asking me for checks, deposit books, etc., to verify the printout. It was not one penny off! Personal computing had scored a technical knockout!

You may wonder about the other \$2,000 plus that was not accounted for in my analysis. We explained that it was probably garage sale cash and checks deposited in checking accounts, since Ev sold a lot of her furniture and housewares before we got married that year. No problem. You usually sell things at garage sales for less than you paid, so this is usually not taxable income.

Round 5: The Next Match

Forewarned is forearmed! Keep good records. The burden of proof is on the taxpayer, not the IRS. Despite the fantastic help

the "Household Accountant" provided, it is useless without correct data.

Fortunately for me, I have a habit of jotting remarks next to every deposit or withdrawal in my savings passbooks, so I can identify the purpose of each transaction. Without these remarks I doubt if I would have been able to discover a lot of transfers, and that would have been more unreported income on which tax would be due, plus penalty and 12 percent interest for two years!

An auditor told me that the majority of taxpayers end up paying extra taxes as the result of an audit simply because they can't identify, document or verify deductible or non-taxable income.

While an IRS audit is about as pleasant as swimming with a bleeding leg in shark-infested waters, it can be a real challenge and a learning experience. ■

To add printer output for "Household Accountant" add the following program lines:

```
105 CLS:PRINT:INPUT "PRINTER(YES = 1,
NO = 0)";PR
790 IF PR = 1 GOSUB 2000
1025 IF PR = 1 GOSUB 2000
2000 FOR T=0 TO 15
2010 SS(T) = ""
2020 POKE VARPTR(SS(T)),64
2030 POKE VARPTR(SS(T))+1, (T*64 + 15360)
AND 255
2040 POKE VARPTR(SS(T))+2, (T*64 + 15360)/
256
2050 NEXT T
2100 FOR T=0 TO 15:LPRINT$M(T);NEXT
2110 RETURN
In line 470, change -1 to END
```

Example 1.

For Canadian Owners

Lower Case Modification . . \$65.00
Cassette Load Modification . \$20.00
Radio Shack Numeric Keyboard
Installation \$50.00
(You supply numeric pad)

RS232C Serial I/O Port for Printer
etc. (Complete with connectors)
For Use With or Without Expansion
Box \$169.95

For a complete catalog and credit
vouchers worth \$25.00 on future
purchases send \$5.00 to:

*All Quotes in Canadian Funds

ORTHON COMPUTER
(ESTABLISHED 1974)

12411 Stony Plain Rd.,
Edmonton, Alta, T5N 3N3

Test your mind—not your reflexes—with **SQUADRON LEADER Games**

Command a Fighter Squadron in any of six of the decisive campaigns of World War II

RAF - The Battle of Britain
Oct 1940 (UK and France)

M4 and Messerschmitts
Subsidiary of Germany on the Eastern Front

Imperator
The Douglas Bomber (Germany over Germany)

Winged Samurai
The Zero (Japan over the Southwest Pacific)

Wallo Shrike (Canadian Bomber 1942)
Renowned British Bomber on Moscow & Dresden

Chennault's Flying Tigers (C-47 over Burma 1942)
The US War Plane (China 1942)

Squadron Leader games are not just shoot 'em up arcade games, but detailed historical simulations. Each of these games gives you a choice of dozens of combinations of friendly aircraft (controlled by you) and enemy aircraft (controlled by the computer). Each is carefully researched and simulated for factors of speed, maneuverability, firepower, sturdiness, and rate of climb. Success or failure depends on your ability to learn and exploit the advantages and weaknesses of every aircraft.

Each game includes an audiotape cassette for 16K TRS80 Level II, Apple II (16K or larger), and the new 16K PET, loading instructions, a tactics reference card, and player's manual, in an attractive bookshelf box. Price is \$19.95.

Discovery Games • 936 W. Hwy. 36 • St. Paul, MN 55113

Real World Interface

(Available A/D and D/A That Works in BASIC)

Real World (Analog) to Digital Conversion for use in your BASIC programs with better than 0.5% accuracy. Digital to Analog real world audio, test, and control voltages generated with same accuracy by your programs. Easily incorporated into your present BASIC programs. Support software from TRS-80* to run other programs concurrently, updating only when voltage changes occur. Expansion interface not required, BASIC or Machine Language with Level II. Usable with Level I-4K and TRUG (Machine Language only).

Ready to connect and use. Includes interface hardware, software documentation, and complete instructions. Assembled and tested: \$129.95. Florida residents add 4% sales tax.

Rand Laboratories ✓ 408
p.o. box 552
melbourne, florida 32901
*Tandy Corp. trademark.

At Last! Orchestra-80

A TRS-80™ MUSIC SYNTHESIS SYSTEM

WRITTEN BY JON BOKELMAN

Turns Any 16K Level II TRS-80 Into A High Quality Musical Instrument

The Software

A five part machine language program consisting of:

1 Digital synthesizer—produces up to four simultaneous voices in a six-octave range. For example, you could have a trumpet, oboe, clarinet, and organ playing in four-part harmony or alter any of the voices to imitate other instruments.

2 Music language compiler—a simple and easy to use language allows you to enter your favorite written music in any key or time signature. Plays all note values from whole notes to sixty-fourth notes which may be single, double, or triple-dotted and/or played as triplets. Supports single and double accidentals, staccato, pizzicato, two forms of articulation, repeats, second endings (with or without retard), and modulation.

3 Full screen editor—a full function text editor with blinking cursor is provided for easy entering and modifying of music programs. Functions include insert/delete characters, insert/delete line and global character string search, and automatic error detection/display.

4 File manager—provides the orderly storing and retrieval of named program files on tape or disk. You can even sequence several songs for automatic loading and playing.

5 Initialization—this set-up routine allows you to alter the voices, select the standard four-voice synthesizer or a special high resolution, three-voice version and choose the standard (1.77 MHz) or the enhanced (2.66 MHz) clock rate.

The Hardware

A single 1½" by 2" PC board plugs into the expansion connector on the TRS-80 keyboard or the screen printer connector on the expansion interface. This board contains the electronics required to convert the computer output into a high fidelity audio signal. Just plug in the board and connect to the aux/tape/tuner input of any audio amplifier. No external power supply is required.

Includes:

- Tape and disk versions on cassette
- Completely assembled and tested PC board
- Detailed and complete instruction manual
- Sample music programs

Orchestra-80

\$79.95

PLUS \$2.00 POSTAGE AND HANDLING
CALIFORNIA RESIDENTS ADD 6% SALES TAX

SEND CHECK OR MONEY ORDER TO:

Software Affair

473 SAPENA COURT SUITE 1, SANTA CLARA, CALIFORNIA 95051

SPECIAL DEMO LINE! HEAR ORCHESTRA-80 ON (408)727-8194

*TRS-80 IS A TRADEMARK OF TANDY CORPORATION

Manipulate your world.

Pulling Strings Together

John D. Adams
13126 Tripoli Ave.
Sylmar, CA 91342

Computers differ from calculators in a number of ways. One of the most significant differences is in the computer's ability to process alphanumeric data (data containing letters, signs and symbols as well as numbers) and to handle "strings."

In computerese, a string is a group of alphanumeric data which is regarded as a single unit. A "prompt line," such as ENTER YOUR NAME, in a program is entered and stored as a string. In a program which must stop to allow manual input of data, the line PRESS ENTER TO CONTINUE might be added to continue execution, after needed data has been typed. Again the line is treated as a string.

A Giant Leap

As with arrays, the distance from Level I to Level II is a giant leap. Level I allows two strings, A\$ and B\$, each of which can be up to 16 characters long. Now we suddenly have hundreds of string locations available, each of which may contain up to 255 characters.

An extensive set of string handling instructions has also become available, allowing us to make some pretty classy moves. We will deal with those instructions in detail in part two. As a beginning we will discuss some basic facts about strings and how computers "recognize" them.

String and non-string data are handled differently by the TRS-80. Because of this difference we must tell the computer how we want information stored. One way to do this is to use a declaration sign in the variable name. In many

dialects of BASIC, the dollar sign is used for this purpose.

With this sign we can use the names A\$, A(1)\$, A1\$ and AA\$, and these variables will all be designated as different string variable names. This is a simple way to indicate string input, if you have only one or two strings, and they will not be referred to very often in the program. An example of this might read:

```
10 D$ = "DISTRICT # 1"
```

A second and more efficient method involves the DEFSTR instruction. Inserting the line 10 DEFSTR A - D at the beginning of a program causes the computer to automatically regard any variable starting with A, B, C or D as a string variable, and the dollar sign may be omitted. Combinations such as B(1), DW, A7 or single letters such as C are now valid string locations.

Using these methods makes getting strings into and out of the computer quite easy. We can simply put the string into a program line, such as 10 A\$ = "JANUARY". Note that the data must be enclosed in quotation marks. If you omit the quotes, when the RUN starts the computer responds with a ?TM (type mismatch) error message. Even though the dollar sign is there, the computer does not "see" the word JANUARY as proper input. We must remember that a computer uses complex procedures to convert those letters into numbers, after which it proceeds with operations.

Strings may also be entered using the INPUT instruction. Very often this is done with a prompt line, such as: 10 INPUT "ENTER MONTH";A\$. Inputting strings this way does not require quotation marks, unless the string contains commas, colons or leading spaces. If any of these conditions exist, quotes must be used.

When you enter a lot of string information,

perhaps the best method is to utilize the READ and DATA pair. The line, 10 READ A1\$: DATA JANUARY" loads the name of the month into string location A1\$. Once again, quotes must be used if commas, colons or leading spaces are part of the string.

The following lines illustrate three ways of loading strings:

```
10 A$ = "JANUARY"
20 INPUT "ENTER SECOND MONTH";B$
30 READ C$
40 DATA MARCH
50 PRINT A$,B$,C$
```

Line 10 loads the string manually through insertion in a program line, line 20 by using the INPUT instruction, and lines 30 and 40 by using the READ/DATA pair. Output is shown in line 50. The comma after the PRINT instruction places the three strings in zones two, three and four on the monitor screen.

Loading large numbers of strings may be done quickly and efficiently by using the READ/DATA instructions along with a FOR-NEXT loop. The following lines load the days of the week into an array:

```
10 DEFSTR N
20 FOR A = 1 TO 7
30 READ N(A)
40 NEXT
50 DATA SUNDAY,MONDAY,TUESDAY,
WEDNESDAY,THURSDAY,FRIDAY,
SATURDAY
```

The commas in line 50 separate the data into individual "portions" which are picked up in order as the loop cycles. As each portion is stored, the computer marks it off so that it will not be used again without a RESTORE statement. When the loop finishes, the word SUNDAY will be stored in N(1), MONDAY in N(2), etc. through SATURDAY in N(7). Outputting these strings is also accomplished with a loop. Add the following lines and RUN them:

at last, a
*****PROGRAM EDITOR
 FOR TRS-80 BASIC*****

Tired of 'one line at a time' program editing? Now, with the help of **THE SOUTHEASTERN TEXTAN**, you can enter your BASIC programs in a video oriented text editor. Simply start typing. To make a change, just move the non-destructive cursor over the character and type on top of it!

This editor was written for TRS-80 BASIC, not adapted to it. **THE SOUTHEASTERN TEXTAN** is totally in machine code for speed and compactness.

FEATURES INCLUDE:

- Reads tapes written in BASIC
- Returns to BASIC with program ready
- One key entry of key words like PRINT
- Selectable auto line numbering
- Edit any line while in insert mode
- Append programs
- Block delete
- Search and replace
- Full cursor movement
- Auto repeat any key

Requires Level II and 16K or more

REPEAT KEY

Repeats any key held down for more than one second until key is released. Requires Level II BASIC. Will work with almost any amount of memory.

THE SOUTHEASTERN TEXTAN... \$40.00
SOUTHEASTERN TEXTAN MAN. \$ 7.50
AUTO REPEAT KEY..... \$ 7.50

Both are tape only
 Disk to be released soon.

Southeastern Software ✓316
 1604-9th Ave. S., Apt. 9B
 Birmingham, AL 35205
 Atten: Jeff Lyons, DEPT M

**NOW EVEN
 LOWER!**

**SPECIAL
 PRICE**

**TRS-80* -I or -II
 MEMORY EXPANSION
 CHIP SET: \$59!!**

We've done it again... 8 low power, 250 ns 16K dynamic RAMs at a trend-setting price. Expands memory in TRS-80*, Appie, Heath H89, Exidy Sorcerer, newer PETS, etc. Don't be impressed with fancy packaging or four color ads; our chip set gives all the performance you want at a price you can afford. Offer good while supplies last. Add \$3 for TRS-80* compatible DIP shunts and complete installation instructions.

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

TERMS: Call me add tax. Allow 3% shipping, excises refunded. VISA/Mastercharge! Call our 24 hr. order desk at (415) 562-0636. COD OK with street address for UPS. Prices subject to change without notice.

**WE ALSO MANUFACTURE AN EXTENSIVE
 LINE OF S-100 PRODUCTS; SEE COMPUPRO
 S-100 BOARDS IN PERSON AT FINER
 COMPUTER STORES WORLD-WIDE.**

CompuPro™

from **GODBOUT**
 ELECTRONICS

Blip. 725, Oakland Airport, CA 94614

The **ASSISTANT**

Get Control of Your Level II

Add 8 new and 3 user definable commands. Break key control (on/off) - enable/disable all monitor printing - 245 computer speeds and more. Use as programming tool and under software control... includes debounce routine.

Special Introductory 1/2 Price Offer until September. Basic listing \$5.00. Tape \$7.50. Complete documentation and sample applications. Specify 4, 16, 32, 48k, 449 byte utility.

The **GREAT CRANE
 GAME MACHINE**

"ACTION GRAPHICS" - machine language speed. In this construction skill game you pick up beams and columns with the crane, then lower them into position... but be careful if not properly supported -

DESTRUCTION!

Watch out for the trolls. \$7.50. 16k tape. Add \$1.50 tape orders.

Where proven software is still affordable
FREE CATALOG

The Berg Works
 BOX 742 A ✓351
 JANESVILLE, WI 53545

LYNX 
 makes your TRS-80
 a whole new
 animal.

LYNX isn't just a telephone coupler.

LYNX is a one-piece total telephone linkage system for TRS-80 Level I and II computers. It contains all the functions you need to tap The Source. Engage your business computer. Play games with a computer friend. Or do nearly anything you wish.



Best of all... LYNX costs only \$239.95*. A mere fraction of what you used to have to pay for equipment to do the same job.

LYNX. To get your paws on one, call or write:

ESI **EMTROL
 SYSTEMS, INC.** ✓278

1262 LOOP ROAD LANCASTER, PENNSYLVANIA 17601
 Phone 717/291-1116

VISA or Master Card Welcome

  *Add \$2.50 for shipping and handling. (IL residents add 6% sales tax. Includes "terminal" program or cassette, instruction manual.



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

```
60 CLS:FOR A = 1 TO 7
70 PRINT N(A)
80 NEXT
```

String Handling

Now that we have had a look at inputting and outputting strings, we can stop to discuss some idiosyncracies of string handling. Earlier, I mentioned that string and non-string data are handled differently. What is this all about? As a visual aid to our discussion of "string literals," enter and RUN the following lines:

```
10 A = 5
20 AS = "5"
30 PRINT A + A
40 PRINT AS + AS
```

Hmmmm. I'm pretty certain that $5 + 5 = 10$, but look what line 40 has produced! What happened? When a number is introduced into a string it is thereafter regarded as a *symbol* and not as a *value*. No computation may be done with that number as it exists in memory. You may recall the figure 5, but not the value 5. Level II does give us a way to get around this problem and it will be dealt with later.

Line 40 illustrates an operation called "concatenation," a fancy word for joining or linking strings together. In line 30, the computer took the value 5, added it to the value 5 and returned the value 10. Line 40, however, took the symbol 5 and linked it with the symbol 5 to produce a new string which reads 55. We could change line 40 to read; $BS = AS + AS$ and the new string (55) would then be stored in BS.

This brings us back to the string/non-string matter. You will recall that we could not load $AS = "JANUARY"$ without using quote marks. Trying to load $A = "5"$ results in the same mismatch error message. The dollar sign and quote marks *must* be used in conjunction with each other.

In the JANUARY case we had specified a string location by using a dollar sign with A. The quotes said, in effect, "We contain the string to be stored, *not the values*." The quotes around the 5 say the same thing, but using A without the dollar sign indicates that the location is set aside for a value and not a string, so the line is rejected. The computer *does not* know the difference; you must tell it. We must be constantly aware that string data cannot be loaded into a non-string location and vice versa.

String operation is also quirky about spaces. Enter and RUN the following lines:

```
10 READ AS,BS,CS
20 DATA JANUARY, FEBRUARY, MARCH
30 PRINT AS;BS;CS
```

Hey wait a minute! I put semicolons in line 30 like I was supposed to do for spaces between the words. Why are they all run together? When using strings, the computer neither assumes nor furnishes spaces, unless you put them in. There are good reasons for this. As an example, enter and RUN these lines:

```
10 AS = "GROSS RECEIPTS FOR 1979 ARE $"
20 INPUT "ENTER GROSS RECEIPTS FOR 1979";R
30 PRINT AS;R
```

Why is there a space between the dollar sign and the amount? I didn't want it there. How can I get rid of it? When the TRS-80 prints a number, it allows a space for the sign of the number. Numbers without signs are assumed to be positive, and we use a sign only if the number is negative.

The computer follows the same rules. Our unwanted space was provided for a sign that we didn't need. To get rid of it, edit lines 20 and 30 to read RS instead of R . Now we get the first digit snuggled up to the dollar sign like we wanted. Putting the number in a string eliminates the space for the sign, because the number is now regarded as a *symbol* and not a *value*.

Of course, now we cannot do any computation with the number, but we'll get around to that. By not furnishing spaces, we are allowed more flexibility in building strings. Here is a simple example of the potential acquired by using concatenation and space allotment:

```
10 READ AS,BS,CS,DS,ES,FS
20 DATA TRS,-80,COM,PUT,ING
30 PRINT AS + BS + CS + " " + DS + ES + FS
```

Notice the " " in line 30. That space is the only one I wanted in the string.

We are ready to get our JANUARY, FEBRUARY, MARCH problem unraveled. Remember how they were all run together? There are two ways to fix this. The first is to include the spaces as part of the string so that line 20 reads:

```
20 DATA JANUARY, " FEBRUARY", " MARCH"
```

February and March need quotes and not January, because of the leading spaces. An alternate method to handle this, instead of quote marks, is with concatenation. Change line 30 to read:

```
30 PRINT AS + " " + BS + " " + CS
```

We have accomplished the same goal. This short example merely scratches the surface of what can be done with the various string handling instructions and routines furnished by Level II.

No Arguments

There is one last thing that should be cleared up before moving on. The CLEAR instruction has two uses. Used without an argument (with no number following it) it zaps all data out of variable locations and sets all strings to null (erases them).

Used with an argument, as in CLEAR 1000, it still zeros all memory locations containing data, but in addition it sets aside 1000 bytes of space for strings in memory. When the TRS-80 is powered up, it automatically reserves 50 bytes for strings, and if you attempt to enter more than that you will get an ?OS (out of string space) error message.

When you need more than 50 bytes you must reserve such space with the CLEAR(n) instruction, preferably at the very beginning of the program. Should the computer encounter a CLEAR after data has been entered, all such data will be lost. And that can get irritating—fast.

Strings may be tested or compared, just as numbers can in Level II. This makes possible such operations as alphabetizing or searching files for a particular name. This process normally involves using the IF-THEN instruction and what are called the "relational operators." There are six of these operators: equal to, not equal to, greater than, less than, greater than or equal to and less than or equal to.

In string comparisons, these operators work exactly as they do for numerical operations. This brings up an interesting question. We know that the TRS-80 operates on numerical data and that before numbers can be operated on, they must be converted to base 2 or binary numbers. So, how can it tell the difference between A and B or know that the name Brown should come before the name Williams? For an answer we must digress for a moment and take a quick look at what are called the ASCII codes.

The letters ASCII stand for American Standard Code for Information Interchange. Looking at pages C/1 and C/2 of your Level II manual, you see that certain control operations (page C/1) and all signs, symbols, letters and digits (page C/2) are assigned a code number. The dollar sign, for instance, is assigned code # 36, uppercase letters numbers 65 through 90, lowercase letters numbers 96 through 127, digits 0 through 9 numbers 48 through 57, and the graphics characters numbers 129 through 191.

These code numbers were assigned to assist in transferring information between various pieces of equipment, but they also carry some fringe benefits. The computer cannot tell the difference between G and M, but it can differentiate between 71 and 77. The ASCII code numbers are compared when working with alphanumeric information.

To compare the letters G and M for alphabetical precedence, the BASIC language looks at the ASCII codes and not the letters themselves. Since the letters' codes are in ascending numerical order it simply finds the lower number. The computer then sends, on the basis of some test, execution to a specified location or address.

If the strings to be compared contain more than one character each, the computer begins by comparing the first character in the strings, then the second, third and so on, until a match is either found or not. By using multiple IF-THEN tests, very intricate directions can be given; for example, if the first letter precedes the second, go to location A, if the letters are the same, go to location B, and if the second precedes the first, go to location C. Let me stress that strings must be *identical* to be

FROM PROGRAMMA

HI-RESOLUTION GRAPHICS FOR THE TRS-80®



LOWER CASE

The 80-GRAFIX board includes two sets of lower case characters at no additional cost.



INVERSE VIDEO

The 80-GRAFIX board allows you to do inverse video to high-light your screen displays.



DEMONSTRATION PROGRAMS

The 80-GRAFIX board is supplied with a Character Generator software and several demonstration programs.

FINALLY, AT LAST...

HI-RESOLUTION GRAPHICS is available for your TRS-80 computer system. The 80-GRAFIX board from PROGRAMMA International, Inc. gives your TRS-80 high resolution capability that is greater than the Commodore CBM/PET or even the revered APPLE II.

80-GRAFIX gives the TRS-80 an effective screen of 384X192 pixels, versus the normal 127X192 for the TRS-80, 80X50 for the CBM/PET, or the 280X192 of an APPLE II. As an added feature, 80-GRAFIX offers you lower case characters at no additional cost. Of course, you can also create your own set of up to 64 original characters using the supplied Character Generator software.

The 80-GRAFIX board is simple to install (note that this voids your Radio Shack warranty), and programming is done through BASIC. 80-GRAFIX opens up a whole new realm of software development and excitement never dreamed of for the TRS-80!



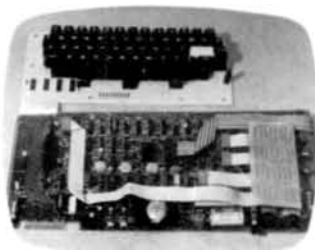
CHARACTER GENERATOR

The supplied character generator software allows you to create your own character set of up to 64 original characters.



REAL-TIME GRAPHIC GAMES

With the 80-GRAFIX board you can write exciting real-time games using BASIC.



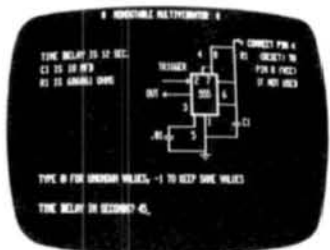
EASY INSTALLATION

The 80-GRAFIX board is simple to install and fits inside the TRS-80 case.



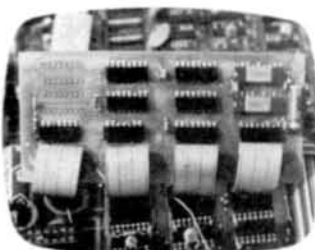
GRAPHICS GALORE

The 80-GRAFIX board and the supplied Character Generator allow you to become an artist.



ELECTRONIC DESIGN

The 80-GRAFIX board has unlimited application in Electronic design and Education.



80-GRAFIX HI-RESOLUTION

Finally, the only means to protect your computer investment is to order an 80-GRAFIX board TODAY!



EXCITEMENT & FUN

Open up a new realm of software development with the 80-GRAFIX board.

Available exclusively through PROGRAMMA at the cost of \$149.95
Please check with us for availability prior to ordering
VISA and MASTERCARGE accepted
TRS-80 is a registered trademark of the Tandy Corp.

PROGRAMMA INTERNATIONAL, INC.
3400 Wilshire Blvd.
Los Angeles, CA 90010
(213) 384-0579 • 384-1116 • 384-1117

```

10 DEFSTR A,B:DEFINT I,J
20 FOR J=1 TO 7:READ A(J):NEXT
30 DATA B,E,A,D,G,C,F
40 F=0
50 FOR I=1 TO 6
60 IF A(I) <= A(I+1) THEN 90
70 B=A(I):A(I)=A(I+1):A(I+1)=B
80 F=1
90 NEXT
100 IF F=1 THEN 40
110 CLS:PRINT"HERE ARE THE LETTERS
    IN ORDER:"
120 FOR I=1 TO 7:PRINT A(I)+" ";:NE
    XT

```

Listing 1

matched, down to the last space or period. In a long string one character can prevent a match-up.

Applications

Program Listing 1 illustrates a very simple sort routine that takes seven letters and alphabetizes them. In computer jargon a sort is a program which can put data into some specified order. There are numerous sorting routines, including Shell sorts, bubble sorts, ripple sorts, quicksorts and binary search sorts. All depend on string comparisons and branch instructions.

Line 10 of the routine designates A and B as string locations and I and J as integer locations. Sorts run a little faster if the loop counters are defined as integers, as this eliminates some of the computation necessary for single precision numbers. Lines 20 and 30 read data into the computer using an array loop.

Lines 40 and 80 have to do with setting and resetting a flag in the variable location F. This flag defines an escape route from the loop when all of the data is in alphabetical order.

The heart of the program is the loop in lines 50 through 90. After the flag is set to zero in line

40, line 50 establishes the loop and sets I to 1. Line 60 compares the letter in A(1) with the letter in A(2). Remember, the letters are not being compared, but rather their ASCII numbers. If the letters are in the right order, execution branches to line 90, then to line 50, which increments I by one and then tests to see if the letters in A(2) and A(3) are in the right order.

If all of the letters had been in the right order originally, this process would continue until I had been incremented to seven, dropping execution to line 100. Since the flag is still set at zero, the test fails, and lines 110 and 120 are executed to print the results.

If, however, line 60 uncovers two letters which are not in order, execution proceeds to line 70. Let's say that the letters in A(3) and A(4) were not in proper order. The computer then puts the letter in A(3) into a temporary location named B, transfers the letter in A(4) to A(3), and then puts the original letter which is stored in B into A(4). The two letters are now reversed in position. The letter which was in A(3) is still in B, but will either be written over or ignored.

After line 70 has completed the exchange, line 80 sets the flag to 1, and line 90 returns execution to line 50, which increments I and starts the loop cycling again. The I in location F told the computer that a change had been made and that it was not finished. This continues until all letters are in order, at which time line 60 sends execution to line 90, until the loop completes and line 100 sends execution to line 40, resetting the flag.

On the next pass the computer escapes to lines 110 and 120 for printout. One of the disadvantages of this routine is operating time. With only seven letters it loads, sorts, and prints out rather quickly. It takes more time relative to the elements increasing in number and/or complexity.

The ability to compare strings is very handy in locating a particular name or file stored in an array. Program Listing 2 shows an elementary example. Line 10 defines variables by type. Lines 20 to 40 load five names into an array named N. Line 60 allows you to enter the name to be found and stores that name into location A(\$). Lines 70 through 90 set up a loop and compare what is in A to each member of the arrays. If it cannot find the name, line 100 sets up a default instruction and returns you to line 60 for another try. If the name is found in line 80, execution branches to line 110 to return the file number. Any other information that was in that file could, of course, be retrieved at this point.

Try adapting or changing these routines to accomplish a specific task. A good exercise is to combine Listing 1 with Listing 2 to allow you to enter names in any order. Then have the computer alphabetize them and search for a particular name. As you gain fluency in handling strings, you will be amazed at what this little machine can do. ■

```

10 DEFINT I:DEFSTR A,N
20 FOR I=1 TO 5
30 READ N(I)
40 DATA BROWN T.,CARVER J.,FRANK J.,
    HILLER J.,WILLIAMS R.
50 NEXT
60 INPUT"ENTER NAME YOU WANT FOUND"
    A
70 FOR I=1 TO 5
80 IF A=N(I) THEN 110
90 NEXT
100 CLS:PRINT"THE NAME YOU SPECIFIED
    IS NOT LISTED":GOTO 60
110 CLS:PRINT"THE NAME YOU SPECIFIED
    IS IN FILE #":I

```

Listing 2

COMPUCOVER®

COVER YOUR INVESTMENT

- Cloth Backed Neoprene Vinyl
- Waterproof & Dustproof
- Improved Reliability
- Two Decorator Colors
- Longer Life
- Sandwich Tan • Black

TRS-80 Model II	Full Cover \$12.99	TRS-80 Model II	Complete Cover \$19.99
TRS-80 Model I	Full Cover \$11.99	TRS-80 Model I	Complete Cover \$18.99
TRS-80 Model III	Full Cover \$13.99	TRS-80 Model III	Complete Cover \$20.99
TRS-80 Model IV	Full Cover \$14.99	TRS-80 Model IV	Complete Cover \$21.99
TRS-80 Model V	Full Cover \$15.99	TRS-80 Model V	Complete Cover \$22.99
TRS-80 Model VI	Full Cover \$16.99	TRS-80 Model VI	Complete Cover \$23.99
TRS-80 Model VII	Full Cover \$17.99	TRS-80 Model VII	Complete Cover \$24.99
TRS-80 Model VIII	Full Cover \$18.99	TRS-80 Model VIII	Complete Cover \$25.99
TRS-80 Model IX	Full Cover \$19.99	TRS-80 Model IX	Complete Cover \$26.99
TRS-80 Model X	Full Cover \$20.99	TRS-80 Model X	Complete Cover \$27.99

Send check or money order to: **CompuCover 100**
 Include \$1.00 for postage and handling
 Overseas orders include \$3.00 postage
 DEALER INQUIRES INVITED

AT LAST

TRS-80™
SOFTWARE AT

DISCOUNT

TRS-80 is a trademark of Tandy Corp.

20%

List		D S Price
\$24.95	Temple of Apshi	\$19.96
14.95	Morloc's Tower	11.96
14.95	System Savers	11.96
19.95	Disk Utility (Acorn)	16.96
14.95	Pinball	11.96

send check or MO plus \$1.00 p&h (per order)
 -or- 25¢ & s&se for complete list to:

Discount Software® 424
 PO Box 9985
 Washington DC 20015

SYSTEM CRASH

Your TRS-80™ Mod I May Not Be The Problem!

Normal household and commercial electrical power (AC) can vary as much as 200% and can VANISH for a half second or more! The TRS-80™ Power Supply was not designed to cope with this typical AC condition!

P & L BUSINESS/COMPUTER SYSTEMS

Power modification stabilizes system voltages allowing up to 2 seconds' uninterrupted operation with AC OFF! (Depending on power supply you use.)

Detailed Instructions for Processor & Expansion Interface (w/parts list & pwr. supp. selection data) \$9.95

Level 1 Kit For Processor Only
 (instructions, parts, cables & power supply selection data) **\$31.95**

Level 2 Kit For Processor and Expansion Interface
 (instructions, parts, cables & power supply selection data) **\$49.95**

Send check or money order to:
P & L BUSINESS/COMPUTER SYSTEMS
 P.O. Box 333, Ramona, Calif. 92065 ✓354
 California Residents please add 6% sales tax

FILL IN THE BLANKS!!

REF	DATE	REV	DESC	QTY	PRICE	AMOUNT
RELTY	8/25/79	00000	SWR	45-4	33	1485.00
RELTY	8/25/79	00007	SWR	746	9	6714.00
RELTY	8/25/79	00008	SWR	258	181	46590.00
RELTY	8/25/79	00009	SWR	711	58	41258.00
RELTY	8/25/79	00010	SWR	13-4	161.87	2125.00
RELTY	8/25/79	00011	SWR	400	25	10000.00
RELTY	8/25/79	00012	SWR	45-1	21	945.00

Get rid of those cumbersome INPUT statements and fill in the blanks, tables or forms drawn on the screen of your TRS-80 Model I. Allows you to enter data more quickly with fewer errors.

Easily adaptable to any Level II BASIC program, the package includes a machine language program for cursor control and a lightning fast procedure for reading data from the TV screen.

The four 'arrow' keys gives fantastic editing power...Makes entering data fun. You'll wonder how you ever did without it! Machine language code is relocatable too. Use it with any size memory and/or other machine language program without modification.

Package 1—Complete written documentation, instructions, examples and program listings. \$19.95

Package 2—Pkg. 1 plus programs on Level II cassette. Saves about 90 minutes of typing. \$24.95

Package 3—Same as package 2 but with diskette. \$26.95

VISA and MASTERCHARGE accepted. Phone-orders welcome.

ACR Consultants ✓ 282

1000 North Bitner Road
New Palestine, IN 46163 317-861-6319

ANNOUNCING THE FIRST TRUE ELECTRONIC MUSIC SYNTHESIZER FOR THE

TRS-80*

NOT A SIMPLE SOUND EFFECTS
GENERATOR BUT A COMPLETE
MUSIC SYSTEM!

TRS-80* Synthesizer

- 3 SIMULTANEOUS NOTES PER BOARD
- PLUGS INTO ANY STEREO SYSTEM
- NO EXPANSION INTERFACE NEEDED
- DEMO CASSETTE INCLUDED

\$130 KIT \$190 ASSEMBLED

DEMO CASSETTE \$3.00 SEPARATELY

MUSIC EDITOR

ENTER SHEET MUSIC VIA WELL TESTED ENTRY SYSTEM

\$10 CASSETTE \$15 DISK

TRS-80 Hardware:

2 Plug in Game Paddles	74.95
Lowercase Modification	18.95
Light Pen	19.95
Beeper	25.00

NEW WAVE ELECTRONICS, INC.

CUSTOM PROGRAMMING
AND
SYSTEM DESIGN

✓ 323

ALL ORDERS POST PAID
COD'S REQUIRE 30% DOWN
VISA ACCEPTED

P. O. BOX 1245
METairie, LA. 70002
(504) 388-8214

TRS-80 is a registered trademark of Tandy Corp.

TRS-80* TRS-80* TRS-80* TRS-80

Model I system owners
SYSTEM TOO SMALL?

We take trade-ins on Model II

We also buy used systems outright

Call or write for quotation

USED TRS-80 SYSTEMS

We sell used keyboards, exp.int.,

disk drives, etc.

Call or write for quotes

NEW HARDWARE IN STOCK

16K Level II \$749.00

Radio Shack disk drives \$449.00

16K Memory-Lifetime warranty \$89.00

Centronics 730-1 \$749.00

IDS 440 Paper Tiger \$949.00

SOFTWARE

Data Management System-Mod I or II

An excellent design-it-yourself

software package—\$99.00

Utilizes and requires Racet Computers

GSF and COMPROC

PENCILFIX

Save your warranty. Use Pencilfix to avoid custom control key on your keyboard. Uses Radio Shack lowercase mod with electric pencil—\$14.95

Completely integrated automatic

letter writer for Model II

Consists of WORDSCRIBE, WORDMAIL,

MAILLIST—\$250.00

PRINTER SPOOLER FOR MODEL I

Increases throughput of printer operations Fully relocatable

Buffer size user defined Emulates a BASIC program

A must when using Radio Shack printers

\$14.95

VERN STREET PRODUCTS

114 W. Taft Sapulpa, OK

74066 (918)224-4260

✓ 111

We handle a full line of

Radio Shack products.

TERMS-COD WELCOME, CASH, CHECK, OR MONEY ORDER

ADD 1% FOR MASTER CHARGE AND VISA

Surprise!

Electrolabs

Announces ✓ 369

User Friendly, Big Software for your Micro;

THIRD GENERATION SOFTWARE for your

S-100, Multi-Bus, TRS-80, Zilog, Mostek or Prolog

NEW "UNIX-like" Operating System for Z-80

OS-1

OS-1 is truly a breakthrough in the micro world! OS-1 is NOT a "control program for micros" but is, instead a large, professional operating system designed to lower the cost and improve the quality of programming efforts. OS-1 provides a "friendly" human interface for both system programmers and users. Finally, with OS-1, the capability of a Z-80 system is vastly expanded.

OS-1 appears exactly like UNIX to the user, and includes virtual i/o, "set tty" and "login" commands, a shell, a hierarchical "tree" type file structure with 16Mby file size and an unlimited no. of files and devices. OS-1 allows the extremely useful "pipes" and "filters" to be implemented. OS-1 also provides for up to 1024 users and 64 groups and security for users, groups, files and devices. OS-1 occupies 12Kby and comes with a 4Kby "enhanced" cp/m adapter which runs ALL cp/m and most CDOS programs. Source code is supplied with adapter.

OS-1 (Including Debugger, "UNIX-type" editor, Linker-Loader & 1 Yr. update)

\$249

"C" Compiler (Whitesmiths')

\$600

Microsoft Compiler Interface (Interfaces MS Fortran & Cobal compilers directly to OS-1. This allows compiler output to "Command" OS-1 Routines. The Electrolabs' Software Group considers this interface indispensable. Contains over 100 separate routines!)

\$49

Manuals:

(price applies to OS-1 purchase)

Introduction to OS-1 (60pg) \$15

OS-1 Users' Guide (150pg) \$35

Sys-Gen Manual for OS-1 (40pg) \$10

SET \$45

TRS-80
CP/M*
COMPATIBLE!

EXTRA!

8" Dual Floppy Add-On for TRS-80 Now Available! Now Available Exclusively Through:
Runs CP/M Programs! Includes: Dual/Single Density
(Up to 1 mBy), RS232 Port. All for \$2495.00

SOFTWARE LABS

735 Loma Verde, Palo Alto, Ca. 94303
Phone: 415 493-8186, TLX: 345567

*Name Property of Digital Research **Name Property of Western Electric

Use your input buffer to beat the SYSTEM.

Free Space

David Cornell
335 Parkside Rd.
Harrington Park, NJ 07640

Sooner or later you'll get an out of memory message from your computer. Then what?

The simplest way to increase space is to use a utility program that deletes spaces, line feeds and remarks. There is, however, an interesting catch: When the utility is most needed, there is

no place to put it. Having it permanently reside in memory only contributes to the problem and may be the cause of the OM ER-ROR in the first place.

The solution is to load this utility into the input buffer, as this part of RAM is always available. The program can be loaded and run after an out of memory message is received without disturbing the BASIC program.

This also means that this utility program must be executed immediately after it has been loaded and can be used only once per load.

As a practical matter, this presents no problem. A utility of this type is not needed continually. It can be loaded and run

when needed and will take up no memory when it is not.

Clever Idea

Using part of the buffer in this manner is such a clever idea that the SYSTEM command uses it for its stack area during system loads—so much for originality. The utility, therefore, must straddle the SYSTEM stack to avoid being wiped out by it.

When the tape has loaded, its execution follows directly. There is no prompt for a / or entry point.

The program offers one user option: Remarks may be retained or deleted. Before the program executes, a prompt is

displayed and the option is selected. For purposes of debugging or documentation, it may be desirable to retain remarks; in some programs a remark may be the target of a GOTO or a GOSUB.

Upon completion, the number of bytes deleted from the BASIC program will be displayed at the upper left of the screen.

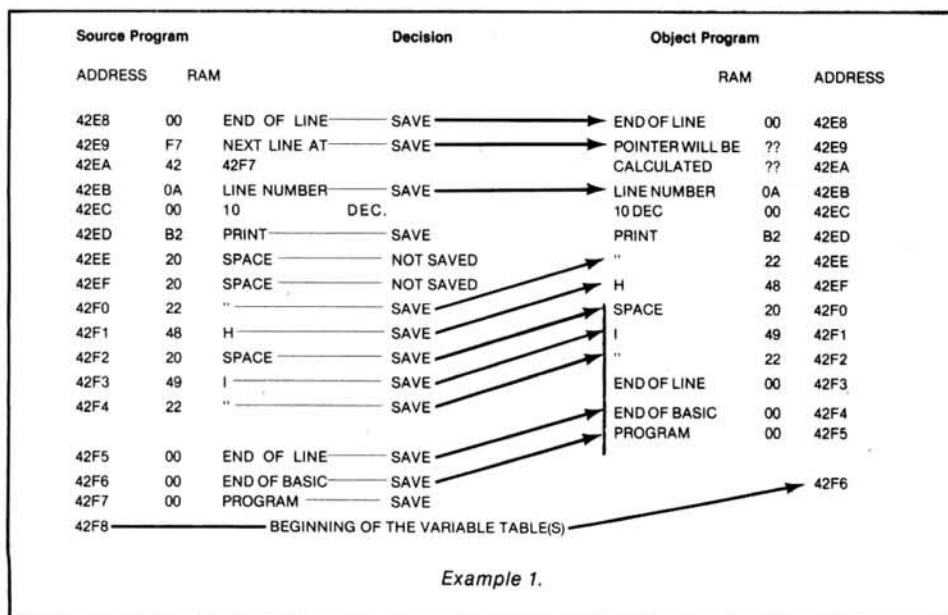
The discussion has been directed toward a Level II system. But it applies as well to a disk-based system, with the exception that there are other areas of RAM available in disk systems.

BASIC

Basic Commands are stored in RAM as one-byte tokens. When a BASIC program line is keyed, it is first written in the input buffer. Then, routines in ROM rewrite the line, substituting one-byte tokens for each reserved word found. Numbers 80H and above are used. These will be greater than the ASCII character set, and when the BASIC interpreter encounters a number in this range, it knows that it has found a command.

The end of line marker is 0. Zeros never appear in the text. When the interpreter encounters 0, it knows it has reached the end of the line. (A 0 may, however, be part of a line number or line pointer.)

While you can find the end of the current line by advancing until 0 is encountered, you cannot back up to find the end of the previous line as the 0 encountered could be part of a line num-



ber or pointer.

The first two bytes of a line point to the address of the next line. The next two bytes of the line are the number of the line. A line pointer of 0000 indicates the end of the BASIC program.

The Z-80 stores two-byte numbers, least significant byte first. 40A4 would appear in RAM, or in the assembler program listing, as A4 40. All bytes which have no program function will be deleted. The BASIC program is altered as described in the following text.

Formatting Commands

Any byte in the range 1 to 32 decimal is deleted. These are usually a space (ASCII 32) or a line feed (ASCII 10, entered from the keyboard or by the down arrow). The tab (right arrow), entered when the line is initially keyed, also writes spaces (ASCII 32s) in the line which will be deleted.

Formatting bytes preceded by a DATA token or a comma will be deleted, not saved. All other bytes will be unaffected, or protected.

Remarks can be deleted or saved depending upon user option. The remark begins with the REM or ' command and preced-

ing bytes may be deleted.

There are some special cases. A legal BASIC line with no text will be deleted. For example: 100 :. This would be accepted by BASIC, but does nothing. Superfluous colons will also be deleted, as in the example below:

```
100 FOR I = 1 TO 6:
```

How it Works

The original BASIC program is treated as a source program and is used to write an object program. Each source byte is examined and is either saved or not saved in the object program.

HL is the source program pointer for the byte of the source program which is being examined. DE is the object program pointer that points to the location where the next byte of the object program will be written.

A byte is saved by writing it in the address indicated by the object program pointer and incrementing both the source and object program pointers. A byte is deleted by incrementing the source pointer without writing the byte to the object program.

The BASIC source program,

10 PRINT "H I", produces the object program. Example 1 illustrates the pointers.

The main program is controlled by TEXT. TEXT sets itself as the return address by pushing its address into the stack. On RET, the top of the stack is popped into the Z-80 program

counter. This allows the program to be arranged into small callable blocks and it always returns control to the same point after whatever branching takes place.

TEXT then checks for the cases which will be handled by special processing routines: the end of the source program line

BASIC PROGRAM	APPEARS IN RAM AS
REM	93
'	3C 93 FB
10 :	0A 00 3C 3C 93 FB
10 '	0A 00 3C 93 FB
15360 REM	00 3C 93
15360 '	00 3C 3C 93 FB
15360 :	00 3C 3C 3C 93 FB
15538 REM	B2 3C 93
PRINT:REM	B2 3C 93
PRINT:'	B2 3C 3C 93 FB

Table 1.

AUTO	Auto execute
START	Start the program
DISPR	Display prompt
DISSTR	Display string (pointed to by HL)
SCAN	Scan the keyboard
REMOPT	Remark option chosen (save remarks)
NOREM	No remarks to be saved
TEXT	Text of BASIC line
SAVE	Save byte in Object Program
NOSAVE	Do not save byte in Object Program
ENDLINE	End of the line (in Source Program)
NOTEND	Not the end of the BASIC program
FIRST	First byte of the text
BEGSMT	Beginning of the BASIC statement
EXITSP	Exit the SPACE program (sorry!)
QUOTE	Quote found in Source Program
REMDL	Remarks to be deleted
REMSAV	Remarks to be saved
DATA	DATA statement found in BASIC program
PROMPT	Prompt

Table 2. Assembler Mnemonics and Derivations.

```
1 "
      THIS IS A TEST FOR THE UTILITY PROGRAM 'SPACE'
"
10 PRINT "H E L L O": H E L L O
20 PRINT "HELLO : GOOD-BYE
30 DATA 1, 2, 3:DATA 1, 2, 3
40 DATA 1, 2, 3, "":DATA "T E S T": T E S T
50 REM TEST
60 'TEST
70 "TEST
80 A: 'TEST
90 B: 'TEST
100 AA: 'TEST
110 BB: 'TEST
120 :
130 :
140 A:REM TEST
150 B: REM TEST
160 AA:REM TEST
170 BB: REM TEST
180 DATA MONDAY, TUESDAY, WEDNESDAY,
      THURSDAY, FRIDAY, SATURDAY,
      SUNDAY
190 X$="
      MONDAY
      TUESDAY
      WEDNESDAY
      THURSDAY
      FRIDAY
      SATURDAY
      SUNDAY"
15360 : 'TEST
20000 END
```

Source program.

```
1 "
      THIS IS A TEST FOR THE UTILITY PROGRAM 'SPACE'
"
10 PRINT"H E L L O":HELLO
20 PRINT"HELLO : GOOD-BYE
30 DATA1,2,3:DATA1,2,3
40 DATA1,2,3, "":DATA" T E S T":TEST
80 A
90 B
100 AA
110 BB
140 A
150 B
160 AA
170 BB
180 DATAMONDAY, TUESDAY, WEDNESDAY, THURSDAY, FRIDAY, SAT
      URDAY, SUNDAY
190 X$="
      MONDAY
      TUESDAY
      WEDNESDAY
      THURSDAY
      FRIDAY
      SATURDAY
      SUNDAY"
20000 END
```

Object program.

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.....

PHONE ✓44

(503) 476-1467

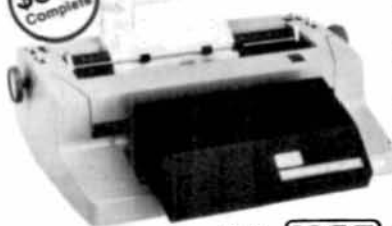
840 N.W. 6th STREET, SUITE 3
GRANTS PASS, OREGON 97526

*Trademark Radio Shack, Div. Tandy Corp.

†Product Digital Research, Inc.

TRS-80 Owners: Turn Your Typewriter Into A Printer

\$599
Complete



✓149

KGS KOGYOSHA CO., LTD.

Dealer Inquiries Invited.

179 Riveredge Rd., Tenafly, N.J. 07670 (201) 568-8769

...With the KGS~80 Keyboard Actuator

- Plug-in compatibility with the TRS-80... attractive enclosure contains actuator and interface.
- Least expensive way to get letter quality printing.
- No mechanical modifications to the typewriter are necessary.
- Rests firmly above the typewriter keyboard. Can be installed or removed in 5 seconds.
- Does not require any software to operate... works with Pencil, Scripsit and other word processing programs.
- Solenoids with soft plastic tips strike typewriter keys with the same force a typist would exert.

MANAGEMENT SYSTEMS SOFTWARE ANNOUNCES TWO NEW BUSINESS PROGRAMS FOR THE SMALL BUSINESSMAN

BY
JEROME S. OSTERYOUNG, PH.D.

RENOWNED BUSINESS EDUCATOR AND AUTHOR OF 5 BUSINESS TEXTS

PROFORMA CASH-FLOW PROGRAM
FORECASTS CASH NEEDS AND LIQUIDITY
FOR UP TO 12 PERIODS
\$125.00

* LEASE-PURCHASE PROGRAM
EVALUATES LEASE VS PURCHASE DECISION
INCORPORATES LATEST TAX IMPLICATIONS
NEW LOW PRICE \$50.00

EXTENSIVE DOCUMENTATION WITH EACH PROGRAM
CASSETTE OR DISK
WRITE FOR BROCHURE

MANAGEMENT SYSTEMS SOFTWARE

5200 BRITTANY DRIVE, #1006 ST. PETERSBURG FL 33715

✓87

COMPUTEX 17710 HERITAGE CI. WEBSTER TEXAS

✓415

(713) 332-4359

77598

This Month Only LNW KITS

BUILD YOUR OWN TRS80*
EXPANSION INTERFACE
COMPLETE KIT LESS RAM
CASSETTE RELAY & CASE
\$229.00

ASSEMBLED - \$299.95
Custom Cabinets
FOR LNW SYSTEM EXPANSION
CABINET no. 1 \$89.95
HOLDS LNW BOARD & POWER
SUPPLIES
CABINET no. 2 \$99.95
HOLDS LNW, POWER SUPPLIES
& UP TO 2 DISK DRIVES

TRS80 DISK DRIVES *\$325*

Your : Tandon, MPI
Choice: or Shugart
INCLUDES CASE & SUPPLY
DISK DRIVE CABLES \$21.95

**NEW!! mpi -
PRINTER MODEL 88T**
• ADJUSTABLE TRACTOR FEED
• 100 cpi / UPPER-LOWER CASE
• BIDIRECTIONAL PRINTING
• RS232 & PARALLEL I/F
• FRICTION FEED
• PLUS MORE FOR **\$749**

COMPONENTS

FOR LNW SYSTEM EXPANSION
74LS00 - 5.33 74S04 - 5.35
74LS08 - 3.3 74S32 - 5.0
74LS14 - 1.05 7490 - 4.0
74LS30 - 3.3 7492 - 4.0
74LS74 - 5.0 7493 - 4.0
74LS139 - 1.00 7805 - 9.9
74LS155 - 1.00 7812 - 9.9
74LS181 - 1.00 7912 - 9.9
74LS175 - 1.00 75452 - 3.5
74LS240 - 1.95 1488 - 9.9
74LS241 - 1.95 1489 - 9.9
74LS244 - 2.25 74LS367 - 6.6
FD1771B-01 DISK CTRL. 23.95
TR1602 D.A.R.T. 3.65
MPJ 131 - 8.9
10,000 uF AXIAL CAPACITOR 3.85

• ORDERING INFORMATION • PERSONAL CHECKS • CODs REQUIRE 10% DOWN
• VISA & MASTERCARD • TAKE 2 WEEKS TO • TEXAS RESIDENTS ADD 4% TAX
• ORDERS ADD 4% • CLEAR



THE MICRO CLINIC ✓214

SYSTEM DIAGNOSTICS FOR THE MODEL I TRS-80*

THE FLOPPY DOCTOR 2.2

- Complete writeread testing for 35 or 40 track drives
- Tests all controller functions and status bits
- Tests drive motor speed and allows adjustment
- Complete error logging and summary for 1 to 4 drives

MEMORY DIAGNOSTIC 2.1

- Write/Read section tests each address 260 times per pass
- Checks for correct refresh operation and address uniqueness
- "M1 Worm" test executes machine code from each address
- Complete error analysis is performed when errors occur

Both diagnostics are written in Z-80 machine code and can be run continuously to verify long-term system reliability. Complete instruction manual includes hints to troubleshooting. Supplied on diskette for a minimum 16K single disk system. *TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORPORATION

PRICE \$19.95 CA residents add 6% Sales Tax. Add \$1.00 P/H.

THE MICRO CLINIC • 17375 Brookhurst • No. 114 • Fountain Valley CA 92708



or a quote. If neither is encountered, a check is made for a formatting command.

If the byte is a formatting command, there is a jump to NOSAVE in the object program. If the byte is not, it is considered necessary to the BASIC program and is saved.

RET returns to TEXT to begin the process all over again for the next byte. Note that SAVE and NOSAVE also update the pointers, return the source byte in the

accumulator and set the Z flag if the end of the source line has been reached.

Endline

This module is entered if the end of the source line has been reached. On entry A=0; HL points to the end of the source line; and DE points to the address where the end of the object program line will be written.

A check is also made to determine if this is also the end of the

BASIC program. If this is the case, a jump is made to the exit routine, EXITSP.

In the first byte of a statement a number of unique situations may occur. These are treated as special cases and handled by BEGSMT. A check is made for DATA and REMARK commands, which occur only at the beginning of a statement. Also, a statement may have no text, as mentioned earlier. In this case, it is treated as a remark and is deleted by the remark delete routine. Extra colons may have been entered through user error or keyboard bounce and are not saved. A RET is used again to return to TEXT.

Remarks present a problem. Processing remarks is made complicated by the fact that there are two different remark formats. REM is stored in RAM as 93H (REM token). "" is stored in RAM as 3C 93 FB (: REM FB). The colon may also indicate the end of a statement which in turn may precede a REM token.

Things are further compli-

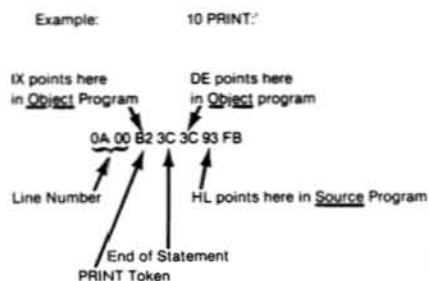
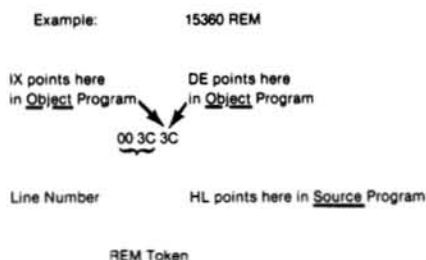
cated by the need to know whether the remark is at the beginning of a line or at the beginning of a statement in a multiple statement line. Once all this has been figured out, the source and object program pointers are adjusted accordingly. Table 1 shows several example remarks as they appear in RAM.

Table 1 also shows the problems of backing up. One solution is to save the address of the first byte of the object text in register pair IX. If, on entry to the remark processing routine, DE=IX, then the remark processing routine, DE=IX, then the remark is at the beginning of the line. If DE is not equal to IX, then the remark is in a statement in a multiple statement line. Note that the colons as the first character of the text will not be saved. Example 2 shows remarks with pointers.

In addition to containing the display message SAVE REMARKS Y/N ?, the prompt string contains a number of ASCII control codes. When the prompt is

EXAMPLES OF REMARKS WITH POINTERS

On entry to the remark processing routine, the pointers will be as follows:



Example 2. Remarks with pointers

```

42D1 53 S 15600 DEFM 'SAVE REMARKS Y/N ?'
42D2 41 A
42D3 56 V
42D4 45 E
42D5 20
42D6 52 R
42D7 45 E
42D8 4D M
42D9 41 A
42DA 52 R
42DB 4B K
42DC 53 S
42DD 20
42DE 20
42DF 59 Y
42E0 2F /
42E1 4E N
42E2 20
42E3 3F ?
42E4 00 15700 DEFB 0 :END OF MESSAGE MARKER

```

00000 TOTAL ERRORS

Example 3. Hexadecimal Representation of ASCII Characters.

Our new program package for the TRS-80™ sounds terrific.

So does the price.

There are lots of programs with sound that are worth about a dollar. Trouble is, they cost a lot more.

But at Basics & Beyond we've just developed Microcosm III, 20 programs with sound—each just as good as our competition's \$15 and \$20 programs—for \$24.95. That's a 20-program package for \$24.95.

It includes "Pinball," replete with ringing bonuses, spinners, buzzers and flippers; torpedo-firing "Submarine" that explodes with underwater excitement; and the right/wrong buzzer in "Long Division" teaches step by step.

At Basics & Beyond we underscored our point that most other program packages are overpriced with Microcosm I and Microcosm II, \$19.95 each. Now a lot of people will start hearing about our third package and stop listening to high prices.

You see, it's not that our program packages for the TRS-80™ microcomputer are so cheap. It's just that theirs are so expensive.

BASICS & BEYOND, INC.

Box 10 • Amawalk, N.Y. 10501 • Or call 914-962-2355 ✓ 49

Mastercharge and Visa accepted.

No charge for postage or handling. N.Y. residents add 5% sales tax.

TRS-80 is a trademark of the Radio Shack division of Tandy Corp.

Program Listing

```

40A4      00500 BPRPTR EQU      40A4H ;BASIC PROGRAM POINTER
0093      00600 REMTOK EQU      93H  ;REMARK TOKEN
0088      00700 DATOK EQU      88H  ;DATA TOKEN
40F9      00800 SCLRPT EQU     40F9H ;POINTER TO VARIABLE TABLE (SCALARS)
0021      00900 FORMAT EQU     ' +1 ;ASCII CONTROL CODE & SPACE, 1 TO 32 DEC.
01C9      01000 CLS EQU       01C9H ;CLS ROUTINE IN ROM
28A7      01100 DISSTR EQU     28A7H ;DISPLAYS STRING AT HL UNTIL BYTE=0
0FAF      01200 DISNUM EQU     0FAFH ;DISPLAYS DECIMAL REPRESENTATION OF NUMBER
          01300
41E2      01400 ORG          41E2H
41E2 C3E641 01500 JP          AUTO
          01600
41E6      01700 ORG          41E6H
          01800
41E6 3EC9   01900 AUTO LD      A,0C9H ;'RETURN' COMMAND
41E8 32E241 02000 LD      (41E2H),A ; TO RAM
41E8 21CB42 02100 DISPR LD      HL,PROMPT ;POINT TO MESSAGE
41EE CDA728 02200 CALL     DISSTR ;DISPLAY MESSAGE
41G1 CD4900 02300 SCAN CALL     0049H ;SCAN UNTIL KEYBOARD INPUT
41F4 FE4E   02400 CP      'N' ;="N" ?
41F6 2809   02500 JR      Z,NOREM ;YES, DELETE REMARKS
41F8 FE59   02600 CP      'Y' ;="Y" ?
41FA 20F5   02700 JR      NZ,SCAN ;NO, UNACCEPTABLE INPUT
41FC 3E52   02800 LD      A,REMSAV-REMJP-2 ;JR OFFSET
41FE 324742 02900 REMOPT LD      (REMJP+1),A ;MODIFY PROGRAM
4201 CDC901 03000 NOREM CALL     CLS ;CLEAR SCREEN
4204 2AA440 03100 LD      HL,(BPRPTR) ;POINT TO BASIC PROGRAM
4207 28     03200 DEC     HL ;
4208 E5     03300 PUSH    HL ;
4209 D1     03400 POP     DE ;HL AND DE POINT BEG. PROG. -1
420A AF     03500 XOR     A ;SET AS FOR END OF LINE
          03600
420B E5     03700 TEXT  PUSH    HL ;SET 'TEXT'
420C 210B42 03800 LD      HL,TEXT ; AS
420F E3     03900 EX      (SP),HL ; RETURN ADDRESS
4210 B7     04000 OR      A ;A = 0 ?
4211 2817   04100 JR      Z,ENDLNE ;YES, END OF LINE
4213 FE3A   04200 CP      ':' ;= ':' ?
4215 2005   04300 JR      NZ,TEXT1 ;NO, NOT END OF STATEMENT
4217 CD2442 04400 CALL     SAVE ;SAVE END OF STATEMENT MARKER
421A 1822   04500 JR      BEGSMT ;CHECK FIRST BYTE OF TEXT
421C FE21   04600 TEXT1 CP      FORMAT ;SPACE OR LINE FEED ?
421E 3806   04700 JR      C,NOSAVE ;YES, DO NOT SAVE
4220 FE22   04800 CP      '"' ;QUOTE ?
4222 283F   04900 JR      Z,QUOTE ;YES, JUMP TO QUOTE ROUTINE
          05000
4224 12     05100 SAVE  LD      (DE),A ;BYTE TO OBJECT PROGRAM
4225 13     05200 INC     DE ;INC. OBJ. PROG. POINTER
4226 23     05300 NOSAVE INC     HL ;INC. SOURCE PROG. POINTER
4227 7E     05400 LD      A,(HL) ;SOURCE BYTE TO A
4228 B7     05500 OR      A ;RETURNS Z FLAG IF END OF LINE
4229 C9     05600 RET ;RETURN
          05700
422A E5     05800 ENDLNE PUSH    HL ;END
422B 23     05900 INC     HL ; OF
422C 7E     06000 LD      A,(HL) ; BASIC
422D 23     06100 INC     HL ; LINE
422E B6     06200 OR      (HL) ; ?
422F E1     06300 NOTEND POP     HL ;- FIVE BYTES
4230 010500 06400 LD      BC,05 ;- TO
4233 EDB0   06500 LDIR ;- OBJECT PROGRAM
4235 281A   06600 JR      Z,EXITSP ;END OF PROGRAM, EXIT
4237 D5     06700 PUSH    DE ;SAVE ADDRESS OF
4238 DDE1   06800 POP     IX ; OBJECT PROG. TEXT
423A 2B     06900 DEC     HL ;FUDGE FACTOR
423B CD2642 07000 FIRST CALL     NOSAVE ;INC SOURCE PROGRAM POINTER
423E 2849   07100 BEGSMT JR      Z,REMDL ;NO TEXT, DELETE LINE
4240 FE3A   07200 CP      ':' ;= ':' ?
4242 28F7   07300 JR      Z,FIRST ;YES, DO NOT SAVE
4244 FE93   07400 CP      REMTOK ;IS IT A REMARK ?
4246 2841   07500 REMJP JR      Z,REMDL ;YES, JUMP TO REMARK PROCESSING
          ROUTINE
4248 FE21   07600 CP      FORMAT ;SPACE OR LINE FEED ?
424A 38EF   07700 JR      C,FIRST ;YES, DO NOT SAVE IN OBJ.PROGRAM
424C FE88   07800 CP      DATOK ;DATA STATEMENT ?
424E 2859   07900 JR      Z,DATA ;YES, JUMP TO PROCESSING ROUTINE
          ROUTINE
4250 C9     08000 RET ;RETURN
          08100
4251 1B     08200 EXITSP DEC     DE ;POINT DE TO NEW
4252 1B     08300 DEC     DE ; VARIABLE (SCALAR) POINTER
4253 D5     08400 PUSH    DE ;SAVE ADDRESS OF NEW SCLRPT
4254 2AF940 08500 LD      HL,(SCLRPT) ;OLD POINTER TO HL
4257 ED52   08600 SBC     HL,DE ;COMPUTE DIFFERENCE
4259 CDAF0F 08700 CALL     DISNUM ;DISPLAY NUMBER
425C CDFE20 08800 CALL     20FEH ;CURSOR TO NEXT LINE
425F E1     08900 POP     HL ;NEW POINTER TO HL
4260 C3772C 09000 JP      2C77H ;INITIALIZE FOR BASIC
          09100
4263 CD2442 09200 QUOTE CALL     SAVE ;SAVE (OPENING '"' ON ENTRY)
4266 C8     09300 RET     Z ;RETURN IF END OF LINE
4267 FE22   09400 CP      '"' ;CLOSING '"' ?
4269 20F8   09500 JR      NZ,QUOTE ;NO, SAVE BYTE
426B C32442 09600 JP      SAVE ;SAVE CLOSING '"'

```

Program continues

printed by routines in BASIC ROM, these are recognized as control codes and the appropriate function is performed.

The first six bytes of the prompt would be duplicated in BASIC by:

```

PRINT CHR$(28);CHR$(31);
PRINT CHR$(13);CHR$(13);CHR$(13);
(or PRINT:PRINT:PRINT)
PRINT TAB(16);

```

The ASCII control codes are described on page C/1 of the TRS-80 Level II Manual.

Auto Execute

After the tape has been loaded, control goes directly to the program. The system command calls 42E2. BASIC initializes this as a RET. Using a new ORG, the system tape changes this to a jump to assembler routine AUTO. AUTO restores the return command so that system will not attempt a disastrous jump to this program the next time it is invoked.

For those interested in understanding the program in more depth, the assembler listing is commented and, in addition to the usual flow charts, an "organization" chart has been provided.

The program uses a number of routines in BASIC ROM. For the purposes of this article, they are treated as "black boxes." However, by reading the comments and seeing how they have been used their function and application may be understood.

T-BUG and Space

Although the assembler listing uses multiple origins and the

```

#M 41E2 C9 C3
41E3 00 E6
41E4 00 41
41E5 3A 3A
41E6 B3 3E
41E7 48 C9
41E8 00 32
41E9 19 E2
41EA 80 41
41EB 44 21
41EC C3 CB
41ED 63 42
41EE 0B ETC....

```

Example 4.


```

09700
09800 ;NEW ORG IF LOADED INTO BUFFER AREA
09900 ;SYSTEM COMMAND USES 4287 TO 426E FOR STACK
10000 ;ON ENTRY TO 'SYSTEM', SP SET TO 4288
10100
4289 10200 ORG 4289H
4289 DDE5 10400 REMDEL PUSH IX ;IX TO HL
428B E3 10500 EX (<SP>),HL ; HL TO STACK
428C DF 10600 RST 18H ;HL = DE ?
428D E1 10700 POP HL ;RESTORE HL
428E 1B 10800 DEC DE ;DEC OBJ PROG POINTER
428F 2004 10900 JR NZ,REM1 ;REM IS NOT AT BEGINNING OF LINE
4291 1B 11000 DEC DE ;REM IS AT BEGINNING OF LINE
4292 1B 11100 DEC DE ; DEC OBJECT PROG. POINTER
4293 1B 11200 DEC DE ; TO END OF
4294 1B 11300 DEC DE ; PREVIOUS LINE
4295 AF 11400 REM1 XOR A ;COMPARISON BYTE FOR SEARCH
4296 EDB1 11500 CPIR ;SEARCH
4298 2B 11600 DEC HL ;POINT TO END OF LINE
4299 C9 11700 RET ;RETURN
11800
429A 23 11900 REMSAV INC HL ;WHICH
429B 7E 12000 LD A,(HL) ; FORM
429C 2B 12100 DEC HL ; OF
429D FEFB 12200 CP 0FBH ; REMARK ?
429F 2001 12300 JR NZ,REMSA0 ;SIMPLE 'REM', NOT ' '
42A1 2B 12400 HL ;POINT TO PRECEDING ':'
42A2 7E 12500 REMSA0 LD A,(HL) ;BYTE TO A
42A3 CD2442 12600 CALL ;SAVE UNTIL
42A6 20FA 12700 JR NZ,REMSA0 ; END OF LINE
42A8 C9 12800 RET ;RETURN
12900
42A9 062C 13000 DATA LD B,' ' ;SET FOR "OK TO DELETE FORMAT"
42AB CD2442 13100 DATA1 CALL SAVE ;SAVE DATA TOKEN
42AE C8 13200 DATA2 RET Z ;END OF LINE
42AF FE22 13300 CP "' ' ; = "'
42B1 CC6342 13400 CALL Z,QUOTE ;YES, PROCESS QUOTE
42B4 B7 13500 OR A ;END OF LINE ?
42B5 C8 13600 RET Z ;YES, RETURN
42B6 FE3A 13700 CP ':' ;END OF STATEMENT ?
42B8 C8 13800 RET Z ;YES, RETURN
42B9 FE21 13900 CP FORMAT ;SPACE OR LINE FEED ?
42BB 300B 14000 JR NC,DATA4 ;NO, SAVE BYTE
42BD 78 14100 LD A,B ;PREVIOUS OBJECT
42BE FE2C 14200 CP ',' ; BYTE A ',' ?
42C0 2005 14300 JR NZ,DATA3 ;NO, SAVE BYTE
42C2 CC2642 14400 CALL Z,NOSAVE ;YES, OK TO DELETE
42C5 18E7 14500 JR DATA2 ;NEXT DATA BYTE
42C7 7E 14600 DATA3 LD A,(HL) ;RESTORE CURRENT BYTE
42C8 47 14700 DATA4 LD B,A ;SAVE FOR COMPARISON
42C9 18E0 14800 JR DATA1 ;NEXT BYTE
14900
42CB 1C 15000 PROMPT DEFB 28 ;HOME CURSOR
42CC 1F 15100 DEFB 31 ;CLEAR TO END OF FRAME
42CD 0D 15200 DEFB 13 ;CURSOR TO NEXT LINE
42CE 0D 15300 DEFB 13
42CF 0D 15400 DEFB 13
42D0 D0 15500 DEFB 208 ;TAB(16)
42D1 53 15600 DEFM 'SAVE REMARKS Y/N ?'
42E4 00 15700 DEFB 0 ;END OF MESSAGE MARKER
15800
0000 15900 END

```

```

AUTO 41E6 01500 00200
BEGSMT 423D 06600 04100
BPRPTR 40A4 00600 02700
CLS 01C9 01100 02600
DATA 42A9 12500 07400
DATA1 42AB 12600 14300
DATA2 42AE 12700 14000
DATA3 42C7 14100 13800
DATA4 42C8 14200 13500
DATTOK 0088 00800 07300
DISNUM 0FAF 01300 08200
DISPR 41EB 01700
DISSTR 28A7 01200 01800
ENDLINE 422A 05400 03700
EXITSP 4250 07700 06100
FIRST 423A 06500 06800 07200
FORMAT 0021 01000 04200 07100 13400
NOREM 4201 02600 02100
NOSAVE 4226 04900 04300 06500 13900
NOTEND 422E 05800
PROMPT 42CB 14500 01700
QUOTE 4262 08700 04500 09000 12900
REM1 4295 10900 10400
REMODEL 4289 09900 06600 07000
REMJMP 4245 07000 02400 02500
REMOPT 41FE 02500
REMSA0 42A2 12000 11800 12200
REMSAV 429A 11400 02400
REMTOK 0093 00700 06900
SAVE 4224 04700 04000 08700 09100 12100 12600
SCAN 41F1 01900 02300
SCLRPT 40F9 00900 08000
TEXT 420B 03300 03400
TEXT1 421C 04200 03900

```

program lies in noncontiguous memory, it may be entered by T-BUG or another monitor program.

At the time when the byte read from the tape is written into RAM, the stack is at its highest position, and therefore no damage will be done. Bytes will be loaded into the stack area, but will immediately be overwritten by the stack operations of the system load.

The assembler does not print out the ASCII values for DEFM commands. These values are given in Example 3.

After the program has been entered, punch a tape with P 41E2 42E4 0000 SPACE (enter). Any value may be entered for the entry point as it is never used.

If all of this is still a little new to you, compare Example 4 with the assembler listing. This will show how the two relate and how to enter the listing with T-BUG.

Be careful that 41E5 is not changed. The column on the right is the program from the assembler listing. The column in the middle is whatever was in the input buffer.

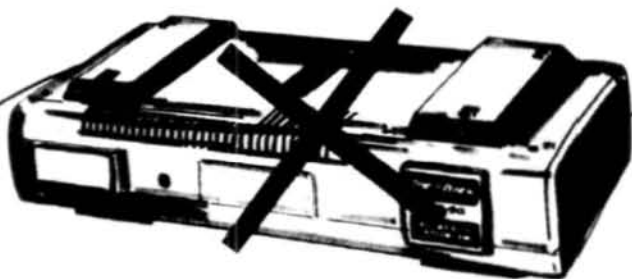
Disk BASIC and Space

This program is intended primarily for the Level II user. It is, however, currently being used with a recently acquired disk operating system with no noticeable ill effects.

However, 41E6 to 42E7 is no longer the input buffer area. I have no idea what it becomes. The buffer may be found by looking in 40A7 and 40A8. These two bytes hold the address of the input buffer.

Three bytes of RAM will be changed. In Level II, 41E2 is a RET (c9). In NEWDOS, it is a jump to another address which is a RET. Changing 41E2 to RET, obviously, performs the same function from a different address. This change has yet to cause trouble.

With an input buffer, an overlay area and a number of disk input buffers to play with, other areas of RAM could be called in to use for this utility; and, the auto execute feature could be removed. ■



TRS-80* interfacing alternatives...

Featuring the Quality Engineering and Manufacturing of THE MICRO MINT



COMM-80

- FULL 8-BIT PARALLEL PORT
 - RS-232-C SERIAL PORT (up to 19,200 baud)
 - UP TO 16 UNITS CAN BE CHAINED TOGETHER
 - TRS-BUS CONNECTOR FOR FUTURE EXPANSION
 - CONNECTS TO KEYBOARD OR E.I.
 - INCLUDES TERMINAL SOFTWARE
- ONLY \$179.95

CHATTER BOX



- FULL 8-BIT PARALLEL PORT
 - RS-232-C SERIAL PORT (up to 19,200 baud)
 - ACOUSTIC MODEM — 300 BAUD
 - TRS-BUS CONNECTOR FOR FUTURE EXPANSION
 - CONNECTS TO KEYBOARD OR E.I.
 - CAN BE CHAINED TOGETHER WITH COMM-80
 - INCLUDES TERMINAL SOFTWARE
- ONLY \$259.95



DISK-80

- DISK CONTROLLER (up to 4 drives)
 - DATA SEPARATOR INCLUDED
 - INCLUDES 16K OF RAM
 - PROVISION FOR AN ADDITIONAL 16K RAM
 - TRS-BUS CONNECTOR FOR FUTURE EXPANSION
- ONLY \$299.95

BUSY BOX



- ALLOWS TRS-80 TO CONTROL AC APPLIANCES
 - CABLE AND CONNECTOR FOR TRS-80 KEYBOARD OR E.I.
 - WORKS WITH THE POPULAR BSR X-10 SYSTEM
 - INCLUDES BASIC LISTING FOR CONTROL ROUTINE
 - LEVEL II MINIMUM SYSTEM
- ONLY \$109.95

ALL INTERFACES ARE RADIO SHACK HARDWARE AND SOFTWARE COMPATIBLE.

MAIL ORDER OR INFORMATION
WRITE OR CALL: (516) 374-6793
The MicroMint Inc.
917 Midway
Woodmere, NY 11598
Dealer inquiries invited.

CALL OUR QUICK
TOLL FREE NUMBER:
1-800-258-1790

*TRS-80 is a trademark of Tandy Corp.

Single stroke entry of BASIC keywords.

Uni-key

Rowland Archer Jr.
Flint Ridge Apt. 59
Hillsborough, NC 27278

One night while I was trying to massage some life into my tired fingers after a couple of hours at the keyboard, it occurred to me that typing programs is the sort of drudgery a

computer is supposed to take out of life, not put into it. Typing a BASIC program repeats many of the same BASIC keywords over and over again.

To pass some of this work off on the TRS-80, I needed a way to let it know which keyword I wanted with a single-key abbreviation. Using computerized keywords would also cut down on syntax errors and tedious editing.

Lowercase ASCII Code

Even though BASIC is uppercase only on the TRS-80, the keyboard will generate lowercase ASCII character codes. Try this short BASIC program and see what happens:

```
10 CLS:
20 AS = ""
30 AS = INKEYS: IF AS = "" THEN GOTO 30
40 PRINT@0,ASC(AS);: GOTO 20
```

Run the program and press any alphabetic key, say "A." The ASCII code for uppercase A, 65, should appear on the screen. Now press SHIFT A; the code printed should be 97, which is lowercase a.

To get lowercase letters on a TRS-80, you press the SHIFT key. Although it may seem backwards to shift for lowercase, would you rather have to shift for uppercase? You would have to hold down the SHIFT key to enter every BASIC keyword. A SHIFT-lock key would get around this problem, but apparently Radio Shack didn't feel the need for one. This article, however, will relate a software fix.

A routine, which examines every pressed key before the character value is returned to the BASIC interpreter program, is necessary. When the TRS-80 appears to be doing nothing, it is actually reading the keyboard over and over, waiting for a key to be pressed.

Assuming it is possible to intercept characters from the keyboard and look them over before they reach BASIC; then it

is possible to decide whether to send the character on to BASIC as is, send back some other character instead, or even send BASIC a stream of two or more characters in its place.

To accomplish this, it is necessary to install a filter between the keyboard and the BASIC interpreter. This would be a device whose action filters input data streams to produce output data.

We need a filter which translates some input characters to BASIC keywords, and leaves others alone. If the character we intercept from the keyboard is an uppercase letter, a number or a special symbol (@, <, +, etc.), our program should pass the character on to the caller unchanged.

However, if it is a lowercase letter (a-z), which is transmitted when the user hits the SHIFT key and a letter, the filter should

SHIFT for Keywords:

A PRINT@	N NEXT
B ELSE	O POKE
C CHR\$(	P PEEK(
D DATA	Q LEFT\$(
E RIGHT\$(	R RETURN
F FOR	S GOSUB
G GOTO	T TAB(
H RND(	U USING
I INPUT	V STRING\$(
J READ	W MID\$(
K INKEY\$	X SET(
L LEN(	Y THEN
M ASC(	Z RESET(

CLEAR—START/END Definition
Down Arrow—User String

Table 3. Reference chart to tape on your monitor.

Input	ASCII Value	Output
Special characters	0-25	Same as input
SHIFT/Down Arrow	26	Substitute user-defined string (up to 64 chars)
Special characters	27-30	Same as input
SHIFT/CLEAR	31 & Shift*	None (Start/end user string definition)
Special characters and numbers	32-64	Same as input
Uppercase letters	65-90	Same as input
Special characters	91-96	Same as input
Lowercase letters	97-122	Substitute a BASIC keyword
Special characters	123-127	Same as input

* Since the keyboard driver returns 31 for both SHIFT/CLEAR and CLEAR, we must test for the Shift key separately.

Table 1. Function of keyboard filter routine.

Input	ASCII Value	Output
Special characters	0-25	Same as input
Shift-Down Arrow	26	Substitute user-defined string (up to 64 chars)
Special characters	27-30	Same as input
Shift-Clear	31 & Shift*	None (Start/end user string definition)
Special characters	32-64	Same as input

RAM Size	ORG of Program	Answer	MEMORY SIZE?
16K	7E58H		32361
32K	BE58H		48745
48K	FE58H		65129

Table 2. Origin of program and MEMORY SIZE for different RAM sizes.

Program Listing

```

00010 ; ONESTR - ONE STROKE KEYWORD ENTRY PROGRAM. INTERCEPTS
00020 ; LOWER-CASE CHARACTERS AND REPLACES THEM WITH
00030 ; KEYWORD STRINGS. ALSO ALLOWS THE USER TO ASSIGN A
00040 ; STRING OF UP TO 64 BYTES TO 'SHIFT-DOWN ARROW'.
00050 ; DEFINITION OF THIS STRING IS INITIATED AND
00060 ; TERMINATED BY 'SHIFT-CLEAR'.
00070 ;
00080 ; REV 2.2          2/9/79
00090 ;
00100 ; BY ROWLAND ARCHER
00110 ; FLINT RIDGE 59
00120 ; HILLSBOROUGH, NC 27278
00130 ;
4016 00140 KEYDRV EQU 4016H ;ADDRESS IN KEYBOARD DCB
00150 ; OF DRIVER ROUTINE
3880 00160 SHIFT EQU 3880H ;(3880H) IS 1 IF 'SHIFT'
00170 ; KEY IS PRESSED
003A 00180 PUTC EQU 033AH ;PUT CHAR IN A ON SCREEN
00CD 00190 CALL EQU 8CDH ;'CALL' OPCODE VALUE
001F 00200 DEFKEY EQU 31 ;'SHIFT-CLEAR' KEY
001A 00210 UDSKEY EQU 26 ;'RETURN USER-DEF STRING'
00220 ; KEY = 'SHIFT-DOWN ARROW'
0040 00230 USTLEN EQU 64 ;USER-DEFINED STRING LENGTH
00240 ;
00250 ;THE FOLLOWING INITIALIZATION CODE IS PERFORMED ONLY
00260 ;WHEN THIS ROUTINE IS LOADED AND RUN THE FIRST TIME.
00270 ;
7E58 00280 ORG 07E58H ;ORG FOR 16K SYSTEM
7E58 2A1640 00290 INIT LD HL,(KEYDRV) ;GET ADDR OF KEYBRD DRIVER
7E5B 224E7F 00300 LD (KEYDR1),HL ; ROUTINE AND BUILD TWO
7E5E 22B07F 00310 LD (KEYDR2),HL ; CALL INSTRUCTIONS IN
00320 ; THIS CODE WITH IT
7E61 21477F 00330 LD HL,ONESTR ;NOW PUT THE ADDRESS OF THE
7E64 221640 00340 LD (KEYDRV),HL ; ENTRY PT TO THIS ROUTINE
00350 ; INTO THE KEYBOARD DCB
00360 ;*****
00370 ;YOU MUST CHOOSE ONLY ONE OF THE FOLLOWING TWO JUMP
00380 ;INSTRUCTIONS TO EXIT THIS INITIALIZATION CODE.
00390 ;IF YOU ARE GOING TO LOAD THIS PROGRAM FROM DISK WHILE
00400 ;IN DOS, USE
00410 ; JP 402DH ; TO RETURN TO DOS
00420 ;IF YOU ARE GOING TO LOAD FROM TAPE WHILE IN BASIC, USE
00430 ; JP 1A19H ; TO RETURN TO BASIC
7E67 C3191A 00440 ;*****
00450 ;
00460 ; ABOVE CODE IS ONLY USED ONCE AND CAN BE OVERRITTEN
00470 ; AFTER IT RUNS - SO 'MEMORY SIZE?' PROTECTIONS STARTS
00480 ; WITH THE FOLLOWING DATA STRUCTURES:
00490 ;
7E6A 52 00500 USTR DEFM 'RUN' ;USER STRING; INITIALLY
7E6D 00 00510 DEFB 0DH ; 'RUN <ENTER>'
7E6E 00 00520 DEFB 0 ;END OF STRING
0005 00530 USED EQU $-USTR ;SIZE OF PREDEFINED STRING
003B 00540 REST DEFS USTLEN-USED ;ALLOCATE SPACE FOR REST
00550 ; OF USER-DEFINED STRING
7EAA 00 00560 DEFB 0 ;FORCE END OF STRING
7EAB 00 00570 OSFLAG DEFB 0 ;ONE-STROKE FLAG: = 1 WHILE
00580 ; WE ARE SUBSTITUTING FOR A
00590 ; LOWER-CASE CHARACTER
7EAC 0000 00600 OSPTR DEFW 0 ;ADDRESS OF CURRENT CHAR
00610 ; IN SUBSTITUTE STRING
00620 ;
00630 ;TABLE OF STRINGS TO SUBSTITUTE FOR LOWER-CASE CHARS.
00640 ;STRINGS ARE TERMINATED BY NULL (0) BYTES. STRING
00650 ;LABELLED 'LA' IS SUBSTITUTED FOR 'SHIFT-A', 'LB'
00660 ;FOR 'SHIFT-B', ETC. EXCEPT FOR 'LA', LABELS
00670 ;ARE NOT REQUIRED, AND ARE ONLY INCLUDED FOR EASE IN
00680 ;DETERMINING THE STRING TO BE SUBSTITUTED FOR EACH LETTER.
00690 ;
7EAE 50 00700 LA DEFM 'PRINT@'
7EB4 00 00710 DEFB 0 ;ZERO BYTE END OF STRING
7EB5 45 00720 LB DEFM 'ELSE'
7EB9 00 00730 DEFB 0
7EBA 43 00740 LC DEFM 'CHR$(
7EBF 00 00750 DEFB 0
7EC0 44 00760 LD DEFM 'DATA'
7EC4 00 00770 DEFB 0
7EC5 52 00780 LE DEFM 'RIGHT$(
7ECC 00 00790 DEFB 0
7ECD 46 00800 LF DEFM 'FOR'
7ED0 00 00810 DEFB 0
7ED1 47 00820 LG DEFM 'GOTO'
7ED5 00 00830 DEFB 0
7ED6 52 00840 LH DEFM 'RND('
7EDA 00 00850 DEFB 0
7EDB 49 00860 LI DEFM 'INPUT*'
7EE1 00 00870 DEFB 0
7EE2 52 00880 LJ DEFM 'READ'
7EE6 00 00890 DEFB 0

```

Program continues

replace that letter in the input stream with a BASIC keyword.

To do this, when a lowercase letter is read from the keyboard set a substitution flag in the routine, indicating that keyword substitution has begun. Use the ASCII value of the letter as an index to a table of BASIC keywords. Pass BASIC the first letter of the indexed keyword instead of the lowercase letter read from the keyboard.

When BASIC calls for input from the keyboard again, the routine will note that the substitution flag is set and will send back the next character of the keyword, without bothering to look at the keyboard to see if any keys are pressed. This continues until the entire keyword is sent. Then the flag is reset to normal operation until the next lowercase letter code is received. All this happens so quickly that the keyword seems to appear on the screen the instant the key is pressed.

Note that only 26 keywords can be handled with this method. However, it is possible to select a group of keywords which are either frequently used, difficult to type or both. You can experiment by including different keywords until you find the best subset for your needs. I have found the set of 26 chosen here to be very useful.

Intercepting Input

Since the routine will be used while editing BASIC programs, the easiest approach is to write an assembly language routine to look at characters before the BASIC editor scans them.

Take a look at the memory map in the back of your Level II BASIC manual. At location 4015H (hexadecimal) in the BASIC Reserved RAM area, there is a device control block for the keyboard.

Location 4016H is initialized by BASIC with the address of the keyboard driver routine. A call to this routine returns with 0 in the A register if no key is pressed, or the ASCII value of the key if one is pressed (like an assembly language INKEY\$ routine).

Load the routine into high

```

7EE7 49      00900 LK      DEFB   'INKEYS'
7EED 00      00910      DEFB   0
7EEE 4C      00920 LL      DEFB   'LEN('
7EF2 00      00930      DEFB   0
7EF3 41      00940 LM      DEFB   'ASC('
7EF7 00      00950      DEFB   0
7EF8 4E      00960 LN      DEFB   'NEXT'
7EFC 00      00970      DEFB   0
7EPD 50      00980 LO      DEFB   'POKE'
7F01 00      00990      DEFB   0
7F02 50      01000 LP      DEFB   'PEEK('
7F07 00      01010      DEFB   0
7F08 4C      01020 LQ      DEFB   'LEFT$('
7F0E 00      01030      DEFB   0
7F0F 52      01040 LR      DEFB   'RETURN'
7F15 00      01050      DEFB   0
7F16 47      01060 LS      DEFB   'GOSUB'
7F1B 00      01070      DEFB   0
7F1C 54      01080 LT      DEFB   'TAB('
7F20 00      01090      DEFB   0
7F21 55      01100 LU      DEFB   'USING'
7F26 00      01110      DEFB   0
7F27 53      01120 LV      DEFB   'STRINGS('
7F2F 00      01130      DEFB   0
7F30 4D      01140 LW      DEFB   'MIDS('
7F35 00      01150      DEFB   0
7F36 53      01160 LX      DEFB   'SET('
7F3A 00      01170      DEFB   0
7F3B 54      01180 LY      DEFB   'THEN'
7F3F 00      01190      DEFB   0
7F40 52      01200 LZ      DEFB   'RESET('
7F46 00      01210      DEFB   0
              01220 ;
              01230 ;MAIN ROUTINE ENTRY POINT:
              01240 ;
7F47 3AAB7E  01250 ONESTR LD   A,(OSFLAG) ;IF FLAG<>8 WE ARE IN THE
7F4A B7      01260      OR   A ;MIDDLE OF A SUBSTITUTION
7F4B 2038    01270      JR   NZ,SUBST ;CONTINUE SUBSTITUTION
              01280 ;
              01290 ;CALL NORMAL ROUTINE TO GET CHARACTER FROM KEYBOARD
              01300 ;
7F4D CD      01310      DEFB   CALL ;BECOMES 'CALL GET-CHAR'
7F4E 0000    01320 KEYDR1 DEFB   0 ;WHEN INITIALIZATION CODE
              01330 ; ; PUTS ADDRESS OF KEYBOARD
              01340 ; ; DRIVER ROUTINE HERE
7F50 B7      01350      OR   A ;CHARACTER RETURNED IN A
7F51 C8      01360      RET  Z ;0 MEANS NO KEY PRESSED,
              01370 ; ; SO JUST RETURN TO CALLER
              01380 ;
              01390 ;A KEY HAS BEEN PRESSED, HANDLE IT IF IT IS 'DEFKEY',
              01400 ;'UDSKEY' OR LOWER-CASE LETTER; ELSE JUST RETURN IT.
              01410 ;
7F52 FELF    01420      CP   DEFKEY ;DEFINE USER STRING?
7F54 2040    01430      JR   Z,DEFINE ;YES, GO DO IT
7F56 FELA    01440      CP   UDSKEY ;REQUESTING USER STRING?
7F58 2000    01450      JR   Z,SUBMOD ;YES, START SUBSTITUTION
7F5A FE61    01460      CP   97 ;KEY < LOWER-CASE A?
7F5C D8      01470      RET  C ;YES, RETURN UNCHANGED
7F5D FE7B    01480      CP   123 ;KEY < LOWER-CASE Z + 1?
7F5F 3001    01490      JR   C,SUBMOD ;YES, SUBSTITUTE
7F61 C9      01500      RET ;NO, RETURN UNCHANGED
              01510 ;
              01520 ;START NEW SUBSTITUTION - SET OSFLAG = 1,
              01530 ;SET POINTER TO STRING TO SUBSTITUTE
              01540 ;
7F62 E5      01550 SUBMOD PUSH   HL ;USER-DEFINED STRING?
7F63 FE1A    01560      CP   UDSKEY ;NO, IT'S KEYWORD
7F65 2005    01570      JR   NZ,KEYWRD ;YES, GO SAVE POINTER TO
7F67 216A7E  01580      LD   HL,USTR ;STRING AND SET MODE FLAG
7F6A 1810    01590      JR   SRCHDN ;
              01600 ;
              01610 ;KEY PRESSED WAS A LOWER-CASE LETTER. SET POINTER TO FIRST
              01620 ;CHARACTER OF KEYWORD TO SUBSTITUTE FOR IT.
              01630 ;
7F6C 21AE7E  01640 KEYWRD LD   HL,LA ;BASE OF SUBST-STRING TABLE
7F6F D661    01650      SUB  97 ;SUBTRACT ASCII(LOWER-CASE
              01660 ; A) FROM KEY PRESSED
7F71 B7      01670      OR   A ;ZERO => LOWER-CASE A
7F72 2000    01680      JR   Z,SRCHDN ;PRESSED, END SEARCH
7F74 47      01690      LD   B,A ;ELSE A HOLDS NUMBER OF
7F75 7E      01700 NXTC LD   A,(HL) ;KEYWORDS TO SKIP OVER TO
7F76 23      01710      INC HL ;FIND STRING TO SUBSTITUTE
7F77 B7      01720      OR   A
7F78 20FB    01730      JR   NZ,NXTC ;INNER LOOP FINDS NULL
              01740 ; ; END-OF-STRING BYTES
7F7A 10F9    01750      DJNZ NXTC ;OUTER LOOP COUNTS KEYWORDS
              01760 ;
              01770 ;END SEARCH - HL HAS POINTER TO DESIRED STRING
              01780 ;
7F7C 22AC7E  01790 SRCHDN LD   (OSPTR),HL ;SAVE POINTER TO STRING
7F7F 3E01    01800 SETMD LD   A,1 ;SUBSTITUTION MODE STARTS

```

Program continues

memory, where it can be protected from BASIC by answering the MEMORY SIZE? prompt appropriately on startup. When it is first run, it will grab the address of the keyboard driver routine from location 4016H and save it for later use. It then stores the address of its own entry point at 4016H, so that every routine (in ROM or elsewhere) which used to call the keyboard driver directly will now call this routine instead.

The normal keyboard driver is called as a subroutine to read from the keyboard. If no key is pressed, the subroutine will return a zero to the accumulator (register A); in this case we return to the caller without changing a thing.

If a key has been pressed, it is examined as discussed above, and if it is a lowercase alphabetic code, the keyword substitution routine begins.

A User Defined Key

The above technique allows entry of 26 BASIC keywords with a single keystroke, and by itself will save a lot of typing. But many BASIC programs use the same expression over and over again; it would be convenient to enter a phrase once and then recall it with a single keystroke.

To do this, a key must be defined whose substitution value can be changed dynamically, without having to reassemble and reload the assembly language routine. This feature is easily added by declaring one key as the "define user string" key. This routine uses SHIFT/CLEAR. The "substitute user defined string" key is the shifted down arrow.

These keys can be located in the input stream in the same way shifted alphabetic characters are intercepted. When SHIFT/CLEAR is pressed, a START DEFINITION prompt is printed on the screen. Each character typed, up to 64 characters, is saved in memory until SHIFT/CLEAR is hit again. This terminates the definition of the string. END DEFINITION is written on the screen.

Now when SHIFT plus the down arrow are pressed, the defined string is returned. Table 1 gives a summary of the actions the filter routines will perform for the range of possible keyboard inputs.

The origin shown in the Program Listing of ONESTR is for a 16K machine. Table 2 gives the ORG value to substitute, as well as the appropriate answers to the MEMORY SIZE? prompt, for 32K and 48K machines.

At label INIT you will find the initialization code, which must be executed once when ONESTR is loaded. This code retrieves the address of the current keyboard driver routine from the keyboard device control block and stores it after the CALL opcodes at labels KEYDR1 and KEYDR2.

```

7F81 32AB7E 01810 LD (OSFLAG),A
7F84 E1 01820 POP HL ;RESTORE HL
01830 ;
01840 ;BRANCH HERE WHEN WE ARE DOING A SUBSTITUTION
01850 ;
7F85 E5 01860 SUBST PUSH HL ;SAVE HL
7F86 2AAC7E 01870 LD HL,(OSPTR) ;GET CURRENT CHARACTER
7F89 7E 01880 LD A,(HL) ;OF SUBSTITUTION STRING
7F8A B7 01890 OR A ;NULL END-OF-STRING?
7F8B 2003 01900 JR NZ,NOTEND ;NO, MORE TO GO
7F8D 32AB7E 01910 LD (OSFLAG),A ;YES, END SUBSTITUTION
7F90 23 01920 NOTEND INC HL ;BUMP POINTER TO NEXT
7F91 22AC7E 01930 LD (OSPTR),HL ; CHARACTER AND SAVE IT
7F94 E1 01940 POP HL ;RESTORE HL
7F95 C9 01950 RET ;RETURN CHARACTER IN A
01960 ;
01970 ;DEFINITION OF USER STRING
01980 ;
7F96 3A8038 01990 DEFINE LD A,(SHIFT) ;SHIFT DEPRESSED?
7F99 B7 02000 OR A ;(DEFINE ON 'SHIFT-CLEAR')
7F9A 2004 02010 JR NZ,DEF ;YES, DEFINE IT
7F9C 3E1F 02020 LD A,DEFKEY ;NO, RETURN 'CLEAR'
7F9E B7 02030 OR A ;SET FLAGS FOR CALLER
7F9F C9 02040 RET ;RETURN CHAR IN A
02050 ;
7FA0 C5 02060 DEF PUSH BC ;SAVE CALLER'S BC
7FA1 E5 02070 PUSH HL ;SAVE CALLER'S HL
7FA2 21DE7F 02080 LD HL,STRTDF ;PUT PROMPT FOR START OF
7FA5 CDD57F 02090 CALL PUTSTR ;USER STRING DEFINITION
7FA8 216A7E 02100 LD HL,USTR ;POINTER TO USER STRING AREA
7FAB 0640 02110 LD B,USTLEN ;MAX SIZE OF USER STRING
7FAD E5 02120 GETC PUSH HL ;SAVE OUR HL
7FAE C5 02130 PUSH BC ;SAVE OUR BC
7FAF CD 02140 DEFB CALL ;BECOMES 'CALL GET-CHAR'
7FB0 0000 02150 KEYDR2 DEFW 0 ;ADDR OF KEY DRIVER HERE
7FB2 C1 02160 POP BC ;RESTORE OUR BC
7FB3 E1 02170 POP HL ;RESTORE OUR HL
7FB4 B7 02180 OR A ;IS A NON-ZERO?
7FB5 20F6 02190 JR Z,GETC ;LOOP UNTIL KEY PRESSED
7FB7 FE1F 02200 CP DEFKEY ;END DEFINITION?
7FB9 2000 02210 JR NZ,NTENDF ;NOT END DEFINITION CHAR
7FBB 3A8038 02220 LD A,(SHIFT) ;SHIFT KEY PRESSED?
7FBE B7 02230 OR A ;NOT ZERO IF IT IS
7FBF 2009 02240 JR NZ,ENDDEF ;YES, END DEFINITION
7FC1 3E1F 02250 LD A,DEFKEY ;RESTORE A
7FC3 77 02260 NTENDF LD (HL),A ;ADD CHAR TO USER STRING
7FC4 23 02270 INC HL ;BUMP POINTER TO USER STRING
7FC5 CD3A03 02280 CALL PUTC ;ECHO KEY PRESSED
7FC8 10E3 02290 DJNZ GETC ;REPEAT IF MAX STRING
02300 ;
7FCA AF 02310 ENDEF XOR A ;LENGTH NOT YET EXCEEDED
7FCB 77 02320 LD (HL),A ;PUT NULL END-OF-STRING
7FCC 21EF7F 02330 LD HL,ENDMSG ;MARKER AFTER USER STRING
7FCF CDD57F 02340 CALL PUTSTR ;PUT OUT 'END OF DEF' MSG
7FD2 E1 02350 POP HL ;ALSO LEAVES 0 IN A
7FD3 C1 02360 POP BC ;RESTORE CALLER'S HL
7FD4 C9 02370 RET ;RESTORE CALLER'S BC
02380 ;
02390 ;PUTSTR: PUT STRING AT (HL) ON SCREEN. STRING IS
02400 ; TERMINATED BY A 0 BYTE.
02410 ;
7FD5 7E 02420 PUTSTR LD A,(HL) ;GET CHARACTER FROM STRING
7FD6 B7 02430 OR A ;IF CHARACTER IS NULL (0)
7FD7 C8 02440 RET Z ;THEN FINISHED
7FD8 CD3A03 02450 CALL PUTC ;ELSE PUT CHAR ON SCREEN
7FDB 23 02460 INC HL ;POINT AT NEXT CHARACTER
7FDC 18F7 02470 JR PUTSTR ;AND GO GET IT
02480 ;
02490 ;PROMPT MESSAGES:
7FDE 0D 02500 STRTDF DEFB 0DH ;CARRIAGE RETURN
7FDF 44 02510 DEFM 'DEFINE STRING:' ;
7FED 0D 02520 DEFB 0DH ;
7FEE 00 02530 DEFB 0 ;
7FEF 0D 02540 ENDMMSG DEFB 0DH ;END OF STRTDF
7FF0 45 02550 DEFM 'END DEFINITION' ;CARRIAGE RETURN
7FFE 0D 02560 DEFB 0DH ;
7FFF 00 02570 DEFB 0 ;END OF ENDMMSG
7E58 02580 END INIT
00000 TOTAL ERRORS

```

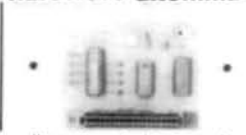
```

CALL 00CD 00190 01310 02140
DEF 7FA0 02060 02010
DEFINE 7F96 01990 01430
DEFKEY 001F 00200 01420 02020 02200 02250
ENDEF 7FCA 02310 02240
ENDMSG 7FEF 02540 02330
GETC 7FAD 02120 02190 02290
INIT 7E58 00290 02580
KEYDR1 7F4E 01320 00300
KEYDR2 7FB0 02150 00310

```

Program continues

The solution to your hardware dilemma:



You could spend a lot of money for TRS-80® peripherals — OR — spend a lot of time developing your own — BUT here's a better choice. The **UI80** parallel input port costs little more than you would pay for parts alone AND lets you focus your design time on applications.

Hook up sensors, switches, joysticks, lightpens, keyboards... without modifying the computer or tying up the cassette port. Plugs into card edge at back of keyboard or an expansion interface.

Features 8 bit, TTL/CMOS compatible input. Jumper address programming. Can be powered by inexpensive AC adapter available from Radio Shack and elsewhere.

Includes all IC's, sockets, resistors, capacitors, voltage regulator, jack, instructions/documentation, etc. — plus free joystick plans. As you would expect of a good solution, all parts are guaranteed. For LIL.

Kit (one evening)..... \$35.00 ppd
Assembled & tested..... \$45.00 ppd

*a Tandy Corp. trademark

GRAPHICS UTILITIES

PCTWDD (Picture Window) allows you to create, edit, display, save on cassette, and recall last action graphics. The powerful machine code sub-routines are easily accessed from BASIC or assembler. Scan images larger than the screen, display multiple images, create animations and more. Includes: system code, BASIC image editor, 5 demo animations, and source code (for assembler programmers) on cassette, and complete instructions/documentation.

Add exciting visuals to your next education, game, or business program. Lots of graphics power at a low price. For 16K LIL..... \$12.00 ppd

WWI Aviation Game

FRANK LUKE is a simulation based on the exploits of the American Ace Frank Luke Jr. Take your S.P.A.D. on a solo mission behind enemy lines. Fly through the menacing skies, dodging the flak, in search of observation balloons. Will you survive to experience a well earned trip to Paris (created by PCTWDD)? Sign up now to fly in France. For 16K LIL..... \$10.00 ppd

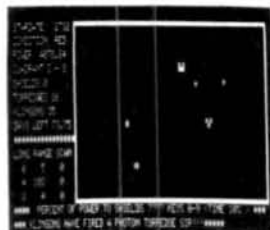
Order PCTWDD, FRANK LUKE, & UI80 from:

UNIVERSAL INTERFACE

P.O. BOX 1077
GLENDALE HEIGHTS,
IL 60137
(312) 469-6921

We accept VISA & MC (IL residents add 5% tax)

SOFTWARE → TRS-80 ← SOFTWARE



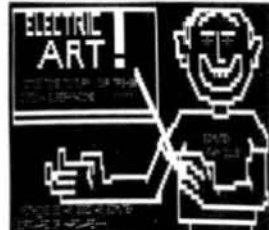
PACKAGE ONE INCLUDES: GRAPHIC TREK "2000" — This full graphics, real time game is full of fast, exciting action! Exploding photon torpedoes and phasers hit the screen! You must actually navigate the enterprise to dock with the alien space stations as well as to avoid kluge torpedoes! Has shields, galactic memory readout, damage reports, long range sensors, etc! Has 3 levels for beginning, average, or expert players! • **INVASION WORG** — Time: 3059, Place: Earth's Solar System Mission: As general of Earth's forces, your job is to stop the Worg Invasion and destroy their outposts on Mars, Venus, Saturn, Neptune, etc! Earth's Forces: Androids — Space Fighters — Laser Cannon — Neutrino Blasters! Worg Forces: Robots — Saucers — Disintegrators — Photon Destroyers! Multi level game lets you advance to a more complicated game as you get better! • **STAR WARS** — Maneuver your space fighter deep into the nucleus of the Death Star! Drop your bomb, then escape via the only exit. This graphics game is really fun! May the Force be with you! • **SPACE TARGET** — Shoot at enemy ships with your missiles. If they eject in a parachute, capture them — or if you're cruel, destroy them! Full graphics, real time game! • **Saucers** — This fast action graphics game has a time limit! Can you be the commander to win the distinguished cross! Requires split second timing to win! Watch out!

ONLY 14.95



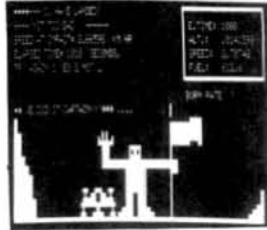
PACKAGE TWO INCLUDES: CHECKERS 2.1 — Finally! A checkers program that will challenge everyone! Expert as well as amateur! Uses 3-ply tree search to find best possible move. Picks randomly between equal moves to assure you of never having identical games. • **POKER FACE** — The computer uses psychology as well as logic to try and beat you at poker. Cards are displayed using TRS-80's full graphics. Computer raises, calls, and sometimes even folds! Great practice for your Saturday night poker match! (Plays 5 card draw). • **PSYCHIC** — Tell the computer a little about yourself and he'll predict things about you, you won't believe! A real mind bender! Great amusement for parties. • **TANGLE MANIA** — Try and force your opponent into an immobile position. But watch out, they're doing the same to you! This graphics game is for 2 people and has been used to end stupid arguments. (And occasionally starts them!) • **WORD SCRAMBLE** — This game is for two or more people. One person inputs a word to the computer while the others look away. The computer scrambles the word, then keeps track of wrong guesses.

ONLY 14.95



PACKAGE THREE INCLUDES: POETRY — This program lets you choose the subject as well as the mood of the poem you want. You give TRS-80 certain nouns or names, then the mood, and it does the rest! It has a 1000-word + vocabulary of nouns, verbs, adjectives and adverbs! • **ELECTRIC ARTIST** — Manual: draw, erase, move as well as, Auto: draw, erase and move. Uses graphics bits not bytes. Saves drawing on tape or disk! • **GALACTIC BATTLE** — The Swineus enemy have long range phasers but cannot travel at warp speed! You can, but only have short range phasers! Can you blitzkrieg the enemy without getting destroyed! Full graphics — real time! • **WORD MANIA** — Can you guess the computer's words using your human intuitive and logical abilities? You'll need to, to beat the computer! • **AIR COMMAND** — Battle the Kamikaze pilots. Requires split second timing. This is a FAST action arcade game.

ONLY 14.95



PACKAGE FOUR INCLUDES: LIFE — This 2-80 machine language program uses full graphics! Over 100 generations per minute make it truly animated! You make your starting pattern, the computer does the rest! Program can be stopped and changes made! Watch it grow! • **SPACE LANDER** — This full graphics simulator lets you pick what planet, asteroid or moon you wish to land on! Has 3 skill levels that make it fun for everyone. • **GREED II** — Multi-level game is fun and challenging! Beat the computer at this dice game using your knowledge of odds and luck! Computer keeps track of his winnings and yours. Quick, fast action. This game is not easy! • **THE PHAROAH** — Rule the ancient city of Alexandria! Buy or sell land. Keep your people from revolting! Stop the rampaging rats. Requires a true political personality to become good! • **ROBOT HUNTER** — A group of renegade robots have escaped and are spotted in an old ghost town on Mars! Your job as "Robot Hunter" is to destroy the pirate machines before they kill any more settlers! Exciting! Challenging! Full graphics!

ONLY 14.95



PACKAGE FIVE INCLUDES: SUPER HORSEACE — Make your bets just like at the real racetrack! 8 horses race in this spectacular graphic display! Up to 9 people can play! Uses real odds but has that element of chance you see in real life! Keeps track of everyone's winnings and losses. This is one of the few computer simulations that can actually get a room of people cheering! • **MAZE MOUSE** — The mouse with a mind! The computer generates random mazes of whatever size you specify, then searches for a way out! The second time, he'll always go fastest route! A true display of artificial intelligence! Full graphics, mazes & mouse! • **AMOEBA KILLER** — You command a one man submarine that has been shrunk to the size of bacteria in this exciting graphic adventure! Injected into the president's bloodstream, your mission is to destroy the deadly amoeba infection ravaging his body! • **LOGIC** — This popular game is based on Mastermind but utilizes tactics that make it more exciting and challenging — has 2 levels of play to make it fun for everyone. • **SUBMARINER** — Shoot torpedoes at the enemy ships to get points. Fast action graphics, arcade type game is exciting and fun for everybody!

ONLY 14.95

HARDWARE → TRS-80 ← HARDWARE

MICRO SPEED MICRO BEEP

Upgrade your "slow" TRS-80 to a SUPER FAST MACHINE!! (2.66 MHZ) over 50% FASTER! Some of the features:

Auto turn-off during cassette or disk access. (This means NO lost programs EVER!) (Turns back on automatically too!) MANUAL control. (Unit may be turned on or off at any time. Yes even during program execution!) Keyboard indicator light "blinks" when micro-speed is on. Stops blinking when off! Don't wait for SARGON II or any other program!! Comes with easy to follow instructions. (Some soldering required.) OR take to your local computer store or TV-Appliance Center for quick installation. (5-10 minutes!!) Works with any model, TRS-80.

ONLY 29.95 complete

Simple hook up: Just plug cassette remote jack into unit.

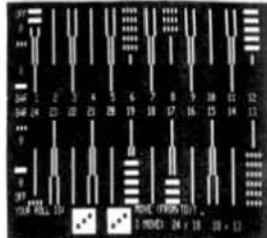
EASILY CONTROLLED FROM BASIC:

OUT 255,4 = on
OUT 255,0 = off

MICRO-BEEP make games more fun as well as provide useful sound output for professional applications!

Works with Any Model I TRS-80

ONLY 15.95 complete



PACKAGE SEVEN INCLUDES: BACKGAMMON 5.0 — 2 different skill levels make this game a challenge to average or advanced players! FAST (15 second avg) Looks for best possible move to beat you! FANTASTIC GRAPHICS. Plays doubles and uses international rules. • **SPEED READING** — Increases your reading speed. Also checks for comprehension of material. Great for teenagers and adults to improve reading skills. • **PT 109** — Drop depth charges on moving subs. Lower depths get higher points in this fast action graphics game. • **YAHITZEE** — Play Yahitzee with the computer. This popular game is even more fun and challenging against a TRS-80! • **WALL STREET** — Can you turn your \$50,000 into a million dollars? That's the object of this great game! Simulates an actual stock market!

ONLY 14.95

PACKAGE SIX INCLUDES: 20 HOME FINANCIAL PROGRAMS — Figures amortization, annuities, description rates, interest tables, earned interest on savings and much, much more. These programs will get used again and again. A must for the conscientious, inflation minded person.

ONLY 14.95

SIMUTEK

Exceptional Products through Research & Imagination
Send Check, Money Order or Bank Card No. orders to:

SIMUTEK
P.O. Box 13687
Tucson, AZ 85732

FREE Postage and Handling

Master Charge 24 HOUR (7 days) HOTLINE (602) 886-5880 Visa
(C.O.D. \$3 extra)

Same Day Shipment on Bank Cards, Money Orders & C.O.D.

All Tape Programs Require a Minimum of 16K Level 2 Packages Available on Diskette (32K System) \$4.25 Extra
3 or More Packages Get 10% Discount

Dealer Inquiries Invited

TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORP.

KEYDRV	4016	00140	00290	00340
KEYWRD	7F6C	01640	01570	
LA	7EAE	00700	01640	
LB	7EB5	00720		
LC	7EBA	00740		
LD	7EC9	00760		
LE	7EC5	00780		
LF	7ECD	00800		
LG	7ED1	00820		
LH	7ED6	00840		
LI	7EDB	00860		
LJ	7EE2	00880		
LK	7EE7	00900		
LL	7EEE	00920		
LM	7EF3	00940		
LN	7EF8	00960		
LO	7EFD	00980		
LP	7F02	01000		
LQ	7F08	01020		
LR	7F0F	01040		
LS	7F16	01060		
LT	7F1C	01080		
LU	7F21	01100		
LV	7F27	01120		
LW	7F30	01140		
LX	7F36	01160		
LY	7F3B	01180		
LZ	7F40	01200		
NOTEND	7F90	01920	01900	
NTENDF	7FC3	02260	02210	
NXTC	7F75	01700	01730	01750
ONESTR	7F47	01250	00330	
OSFLAG	7EAB	00570	01250	01810 01910
OSPTR	7EAC	00600	01790	01870 01930
PUTC	033A	00180	02280	02450
PUTSTR	7FD5	02420	02090	02340 02470
REST	7E6F	00540		
SETMD	7F7F	01800		
SHIFT	3800	00160	01990	02220
SRCHDN	7F7C	01790	01590	01680
STRTRDF	7FDE	02500	02080	
SUBMOD	7F62	01550	01450	01490
SUBST	7F85	01860	01270	
UDSKEY	001A	00210	01440	01560
USED	0005	00530	00540	
USTLEN	0040	00230	00540	02110
USTR	7E6A	00500	00530	01580 02100

Level II BASIC, TRSDOS 2.1, 2.2 and NEWDOS all use different keyboard drivers. By picking up the address they have already put in the device control block, it is possible to reap the benefits (debounce, etc.) of these drivers and the benefits of ONESTR at the same time. The address of label ONESTR is installed in the device control block so that it is called in the future for keyboard input.

Choose an instruction

Choose one of two instructions, depending on whether you will be loading ONESTR from tape or disk. If you will load ONESTR from disk, you must use JP 402DH to return to TRSDOS or NEWDOS. If you will be loading from tape with the SYSTEM command in BASIC, use a JP 1A19H to return to BASIC.

Note that the space taken up by this initialization code can be reused after it is run, since the

code is no longer needed. The answers to the MEMORY SIZE? prompt are given in Table 2 and reflect this reuse of space.

At label USTR allocate 64 bytes for the user-defined string and give it an initial value of RUN. Until redefined, this will run a BASIC program by typing SHIFT/down arrow. This may be changed to any other initial value you like, and the code at label REST will allocate the remainder of the 64-byte buffer. A zero byte after the string serves as the string terminator.

Beginning at label LA the table of strings to be substituted for the lowercase letters are listed. Except for LA, the labels are included strictly for convenience in determining which keyword gets substituted for which letter; they are not needed by the code.

This is where you would substitute assembly language mnemonics, Pascal keywords or

anything else you would like to type with one key stroke. If you do make substitutions which cause the length of the program to change, be sure to change the program origin so it will fit in your machine! Adjust your answer to the MEMORY SIZE? prompt in this case to protect the new size of the program. Again, a zero byte at the end of each string in the table serves as a terminator.

Selecting Keywords

I chose not to include an entry for PRINT, which is certainly a commonly used BASIC keyword. The Level II BASIC handbook explains that a question mark is a built-in abbreviation for PRINT.

I did choose to include PRINT@ as a keyword, even though typing ?@ works as well and is almost as easy. The reasoning behind this is that @ and SHIFT @ appear the same on the screen, but SHIFT @ doesn't work as a PRINT qualifier. It's a nasty bug to catch

since a listing appears normal. Including PRINT@ as a one-stroke entry avoids the problem.

ONESTR is the main entry point to the program, and this is where control is transferred whenever keyboard entry is requested. The OS FLAG is tested to see if the routine is in the middle of a keyword substitution. If so, it branches to SUBST and continues with the substitution. Otherwise, the routine whose address was in the keyboard device control block before ONESTR was loaded is called for keyboard input. If no key has been pressed, it returns to the caller. If a key has been pressed, a decision is made about the next action to take, based on the key's ASCII value (as shown in Table 1).

If the keyboard input is a lowercase letter, the OS flag is set on. Search the keyword table sequentially to find the start of the keyword to substitute.

The number of keywords to skip is calculated from the ASCII value of the lowercase let-



TRS-80 MODEL I

SYSTEM DESK

- Turn-key power up, provides security access and controls power to all components. The CPU and all accessories power-up together, ready for processing.
- Built-in cooling fan keeps disk drives, expansion interface, and CPU/keyboard in optimal temperature operating range.
- Built-in power outlet strip (10 grounded outlets, UL approved) leaves room for complete expansion of the TRS-80 computer. One AC power cord (10 feet) external to desk powers all components.
- Solid teak wood construction throughout with beautiful walnut grain laminate inserts. Burns, mar, etc. while blending perfectly into any office or home decor.
- All cables, power cords, and connectors are completely hidden from view and in accessible to tampering.
- Recessed and lowered keyboard facilitates more relaxed (and therefore more accurate) data entry.
- Holds the full complement of TRS-80 Model I components:
 - up to 4 mini-disk drives
 - expansion interface
 - keyboard
 - CRT display
 - 2 cassette player/recorders
 - almost any printer
- Built-in and recessed RESET button eliminates fumbling with pens or pencils trying to restart your system yet does not attach to your TRS-80 in any way.
- Absolutely no modification whatsoever to TRS-80 hardware; your warranty remains intact!
- Two full size drawers provide plenty of storage space. Top drawer is 5 1/2" high for easy vertical storage of mini-disks and bottom drawer is perfect for suspension filing systems.
- Forms may be fed thru printer from bottom of desk (sample slots are provided) or rear of printer. If printer is not used, a matching filler is provided for slot in top of desk.
- Dimensions same as original desk: 46" L x 35" W x 29" H
- Removable top allows access to electrical connectors and cables.
- PRICE — \$1999.00

312

COMPUTER BUSINESS SYSTEMS

329 S. Highland Avenue
Lombard, Illinois (312) 932-1344

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

ter read from the keyboard, minus the ASCII value of lowercase a. Since each keyword is terminated by a zero byte, start at the head of the table and check each character. Continue until you pass as many zero bytes as the number of keywords you are supposed to skip.

Don't moan and groan about the inefficiency of a sequential search—it's easy to build an index for the address table and to put it into the routine so that the appropriate address may be computed.

To do this, use a DEFV pseudo-op instruction for each label whose address is included in the following table:

```
ADTABL DEFV LA
        DEFV LB
        ...
        DEFV LZ
```

The offset into the table for a lowercase letter, say b, is 2 * (ASCII(b)-ASCII(a)). The factor of 2 is used because of the two

bytes each entry takes. Load the HL register pair with the contents of this location and you've got the address of the first letter of the keyword.

Why not use this technique, then, instead of the sequential search? Because the address table takes up space. And although it does give faster results, the difference isn't noticeable at the keyboard.

Test the Shift Key

The code at the label DEFINE is executed when the CLEAR key is pressed. Since the keyboard driver routine returns the same value whether CLEAR is pressed alone or shifted, a test must be done to verify that the SHIFT key is indicated. Location 3880H contains a 1 if SHIFT is pressed, and a 0 otherwise. Checking 3880H determines whether to start user string definition, which is triggered by SHIFT/CLEAR.

Assuming SHIFT/CLEAR was pressed, the program types

DEFINE STRING: on the screen and waits for input. Each key pressed is tested to see if it is SHIFT/CLEAR, which ends the definition. If not, it is added to the user string buffer at USTR.

If 64 characters are typed without a SHIFT/CLEAR, then definition mode is automatically terminated. User string definition ends by returning a zero to the caller, indicating that no key was pressed. Thus the entire process is invisible to the calls. This process can be used with any program (BASIC, etc.) requesting keyboard input.

Note that most of the Level II BASIC string input editing is not implemented. The back arrow will delete a character, but SHIFT plus the back arrow will not delete the whole line.

Another design trade-off is reflected here. The ROM routines for string input editing could have been used, but they terminate input when BREAK or ENTER are pressed. The approach taken allows entire commands to be typed with one key-

stroke, including ENTER at the end of the command.

Running ONESTR

If you are loading from disk, run ONESTR from the DOS READY prompt. You can test it at this point by typing shifted letters; keywords should appear.

With either disk or tape, bring BASIC up, answering MEMORY SIZE? as shown in Table 2. Disk users should be in business at this point.

Tape users should enter the SYSTEM command, and load the object tape. Once loaded, run the program by hitting ENTER.

Table 3 is a handy listing of the keys to press for each keyword. Cut it out and tape it to your monitor for quick reference while you are getting used to the system.

Now it's time to find those back issues of *80 Microcomputing* and start enjoying all the programs that you were too lazy to type. ■

E · X · P · A · N · D



YOUR TRS-80*

INTRODUCING THE XTD-TRS INTERFACE CARD FOR THE STD BUS

This card permits direct connection between the TRS-80* and the STD BUS system. The TRS-80* can even be used as a development system for Z-80 STD BUS. QC MicroSystems distributes a full line of STD BUS products from a number of manufacturers including Mostek, Xitex, Intelligence Systems and Spurrier.

Xitex XTD-TRS Interface Card

DDT-80 ROM



\$260 Includes: DDT-80 ROM

OFF THE SHELF STD BUS PRODUCTS

AVAILABLE NOW:

MDX-CPU1	\$260	Z80 CPU/RAM/PROM
MDX-CPU2	\$295	Z80 CPU/RAM/PROM
MDX-DRAM 8/32	*	Dynamic RAM
MDX-PIO	\$250	Parallel I/O
MDX-A/D 8, 10, 12	*	A/D Converter
MDX-DA 8, 12	*	D/A Converter
SYS-CPM*	\$699	CP/M 2.2 Disk S.W.
MDX-MATH	\$260	Floating Point Math
MDX-SIO	\$235	Serial I/O
MDX-SV1-1	\$165	Video Interface
PROM-1	\$225	PROM Programmer
MDX-EPROM/UART	\$135	Combination PROM/UART
CARD CAGES		8-22 Slot with MotherBoard
POWER SUPPLY		

*Contact QC for Pricing Options

—200 NS MEMORY!!—

High speed 4116 RAMs for Maximum Reliability from your TRS-80*.

SET OF 8 FOR \$57

OTHER RAMS	\$ (1-9)
2114 UCB 1K X 4 450 NS	5.00
4118N-4 1K x 8 250 NS	24.00
4104N-4 4K x 1 250 NS	10.50

PROMS		
2716T-12 2K x 8 650 NS	24.50	
2716T-8 2K x 8 450 NS	27.00	

Z80 PARTS	2.5 MHZ	4.0 MHZ
	\$ (1-9)	\$ (1-9)
Z80-CPU	11.00	15.00
Z80-PIO	8.50	11.00
Z80-CTC	8.50	11.00
Z80-DMA	29.00	37.00
Z80-SIO	37.50	45.00

MISC.	
12" Video Monitor B&W	\$149.00

Micro Computer Systems, Components and Service

MasterCharge, Visa, American Express, Check, C.O.D. accepted. Add \$3.00 for U.S. Shipping & Handling. Allow two weeks for shipment. Min. order of \$10.00. All products covered by a 90 day OEM warranty. Prices subject to change without notice.



Dealer Inquiries Welcome!
Micro Systems P.O. BOX 401326
GARLAND, TEXAS 75040
(214) 343-1282

Ask for our complete catalogue!

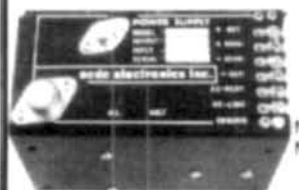
**RONDURE COMPANY**

191

2522 BUTLER ST
DALLAS, TEXAS 75235
214-630-4621**the computer room****SPECIAL
Printer for your
Microcomputer****GE TERMINET
300 PRINTER**

Pin feed—9" paper

- 80 Print positions
 - Receive only
 - ASCII code
 - RS-232 interface
 - 30 CPS
 - Upper & lowercase
 - Shipping w/ 75#
- Shipping containers \$15.00
(used)
(good working condition)

Will run on serial RS232 port of
most micros including TRS-80. **\$450.00****WE HAVE FLAT-PACK
ACOUSTIC**Modem
pickup**\$19.50****USED FANS**Muffin—8.00
Sprite—4.00**NEW
POWER
SUPPLY**5V at 3 Amp
12V at 6 Amp
-12V at 3 Amp**USED
POWER
SUPPLY**5V at 12 Amp
15V at 6 Amp
5V at 2 Amp**NEW
POWER SUPPLY**
(AC-DC Brand)Model 1-22V @ 1.9a \$20.00
Model 2-15V @ 2.4a \$30.00**MICRO SWITCH KEYBOARD
USED BUT LOOKS VERY NICE**

ASC II

\$40.00
(With Print)**USED
OMNITEK**MODEM
ORIGINATE
ONLY
TESTED**\$90.00 Sale****ORDERING INFORMATION:**

We ship the same day we receive a certified check or money order. Texas residents add 5% sales tax. Write for our CATALOG of many parts, terminals, printers, etc. All items subject to availability. Your money returned if we are out of stock. Mail order hours 9-4 Monday thru Thursday (closed Friday).

SHIPPING INFORMATION:Modems: \$3.00 each; Key Boards \$4.00; Power Supply \$7.00
Large Items & Parts: Specify Freight or Air Freight Collect
Foreign Orders: Add appropriate freight or postage.
We now take Master Charge and Visa orders. Specify full number, bank number and expiration date.**SimpleSort—DBM
TRS-80[®] SORT UTILITY
DATA BASE
MANAGEMENT SYSTEM**

SimpleSort—A machine code text-cographic sort utility designed for TRSDOS and NEWDOS to efficiently order files created by the BASIC field statement. The DOS statement

"SORT ZB 1 - FACT 1 V A 64 E 165-BASIC

will move the 64 byte records (16 sort keys) with a 10 byte key offset 5 from beginning from FACT 3 to ZB 1 in ascending order—verifying all entries, and then order BASIC. The destination file can be the source file, there are no intermediate files created, and the source file can fill the entire diskette and still be sorted. Simple, efficient, convenient, extremely fast (with even more features). Simple Sort.

DBM: A menu driven data base management system of BASIC and machine code programs that allow the user to easily, conveniently, and logically perform the following functions:

- Dynamically define record formats
- Dynamically define grid formats for defined records
- Build files using record formats
- List files with or without print formats, boards or specific select code
- Merge files with the same record format
- Sort files using a BASIC marked command line for SimpleSort
- Sortability: scan key field and modify any field in records using list
- Key selection of record for modification (20-000 record limit, any record in 5 lines)
- SimpleSort DBM package with manual **\$140.00**
- SimpleSort alone with manual **\$75.00**
- Manual only applicable to purchase **\$25.00**

*MS-80 is a trademark of the Microtrak Division of Tandy Corporation.

SimpleSort—DBM413 1300 DELAWARE
LAWRENCE, KANSAS 66044
913-841-2333**NOBODY CAN MATCH OUR
DOLLAR/QUALITY RATIO!****MS-204 PRINTER**

INTRODUCTORY PRICE:

\$795

CABLE: \$34.50

**Compatible with TRS-80, Apple, Pet
or any other Centronics-type system****Features**

- 132/80 Columns, 63 LPM, Bi-Directional, Nominal Thruput
- 100% Heavy Duty Cycle - High Reliability, 100 Million Character Print Head Life
- Sprocket Feed; Variable Forms Width, 2.5" - 9.5"
- Double Width Characters, 40,66 Characters per line
- 9 x 7 Dot Matrix Character Font
- 6-Channel Electronic Vertical Format Unit
- Documentation included

Ask about our 8-inch Drives & Software**MATCHLESS
SYSTEMS**18444 S. Broadway
Gardena, CA 90248
(213) 327-1010

© 1980 Matchless Systems & MarketPlan

More versatile than a line printer.

Teletype Interface

*Jake Commander
Shadow Lane, Apt. 2
Peterborough, NH 03458*

This article describes how to build and use a simple teletype (TTY) interface to work with a TRS-80 (Level II and up). By interrupting the normal TRS-80 input/output driver software, we can: output line print commands (including LLISTS) to the TTY, have a keyed option to direct screen print commands simultaneously to the video and TTY, input characters to the computer from the TTY.

The following is a 110 baud version, but a few simple adjustments will allow I/O at other speeds.

Cheap Hard Copy

This design provides cheap, high quality hard copy.

In this interface, hardware and software work in conjunction; however, the bulk of the work rests with the software, allowing a greater degree of flexibility.

The hardware consists of a 556 dual timer I.C. and one medium gain NPN transistor, which draw their minimal power from the TRS-80 video socket, pin 1. The circuit is shown in Fig. 1, and a suitable layout on

0.1-inch matrix board in Fig. 2.

To avoid opening up the TRS-80, all signals are carried to the unit via DIN plugs from the video and cassette sockets. These signals are tapped off in the interface and made available again through DIN sockets at the rear. Fig. 3 shows this arrangement.

The only difficulty is that the TRS-80 cassette DIN plug is a non-standard plastic type and will not mate with the standard DIN socket in the interface. The simplest expedient is to remove this plug and replace it with a normal DIN type. The I/O to the TTY is via only three contacts of a 25-way socket. This provides a tidy, compact unit which may be

left hooked-up to the computer, even when the TTY is not in use.

Input to the TTY driver section comes from the cassette output port. This part of the circuit receives pulses determined by the software, then stretches them to the required pulse width, which in a 110 baud system is 9.09 ms.

A description of an ASCII character output shows how things happen. Suppose we wish to output to the TTY the letter J, which is 0100 1010 in binary. This is odd parity, so to make it even, the software adds a bit, and it now appears as 1100 1010. Before this is output, we need a zero start bit which indicates to the TTY that a byte follows. Now bits 0-7 of the byte are output, followed by two stop bits. The final output is a string of bits as follows:

```

0      01010011      11
start bit  J      stop bits
  
```

All the timing, data bits and start/stop bits are manipulated by the software (Program Listing), which receives characters by interrupting the normal flow of I/O. This I/O in the TRS-80 is handled by ROM driver routines which are pointed to by vectors in RAM. By placing our own routine addresses in these vectors we can handle I/O as we like. The vectors are at these locations:

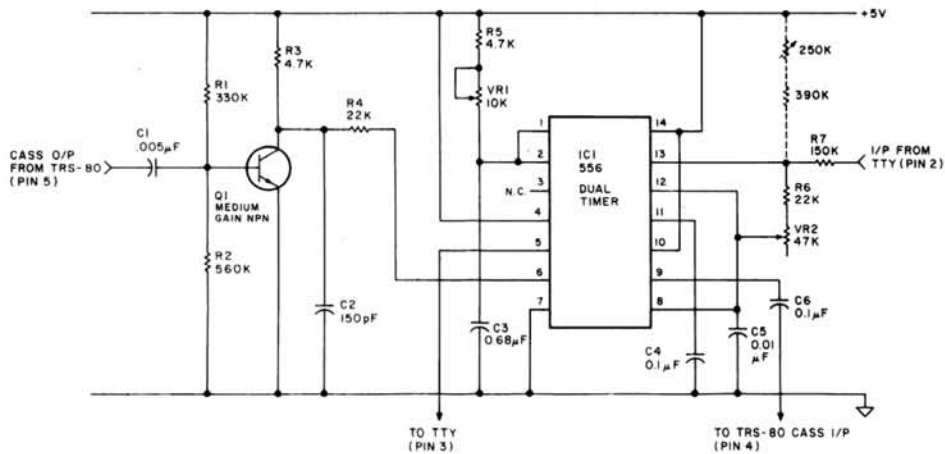


Fig. 1.

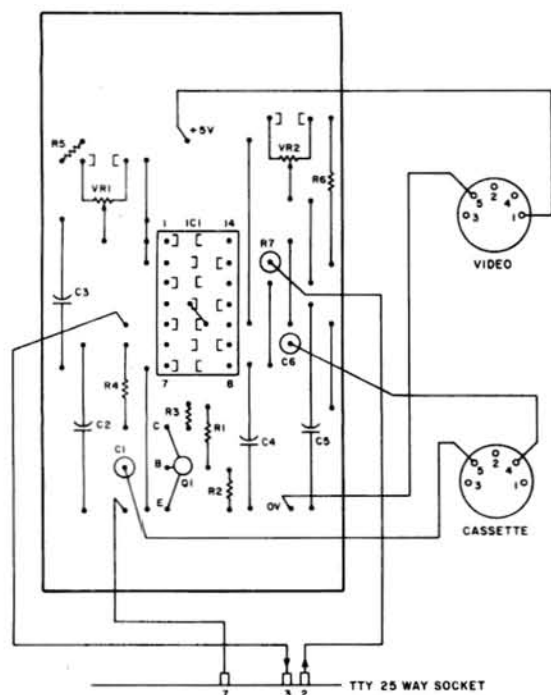


Fig. 2.

16406 + 7 - keyboard driver
16414 + 5 - video driver
16422 + 3 - line print driver

The heart of the TTY output software is the routine called OUT, which is called every time a zero bit is to be output. This issues a positive-going pulse of about 0.1 ms. to transistor Q1, inverting the pulse to trigger the pulse-stretcher half of the 556.

This, in turn, switches high for

9.09 ms. (determined by time-constant R5/VR1/C3) satisfying the requirement of the TTY. To output a one, the routine is merely ignored for 9.09 ms., as the 556 reverts from a zero after its time-constant has expired. The rest of the routine shifts the character and tests each bit to see if a zero or one is required.

Adjusting VR1

When the software is loaded

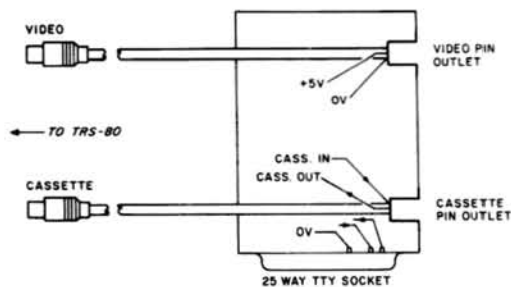


Fig. 3.

and the TTY hooked up, the simplest way to adjust preset VR1 is to line print an unbroken string of U*. These two characters have bit patterns of 01010101 and 10101010, which are ideal for testing.

VR1 should then be adjusted for a mid position that prints the string with no errors. To increase the baud rate to 300, the time constants at NBIT and WT are altered to 218 and 652, respectively. VR1 is then adjusted as above to give a 3.33 ms. pulse. Other baud rates can be accommodated in the same way.

To perform LPRINTS and LLISTS, the line print vector at 16422 is replaced with the address of the TTY driver routine described above. To get the option of screen print to TTY, the vector at 16414 is then pointed at the routine SPRINT. This routine always prints on the screen first, and, before outputting to

the TTY, checks to see if the character is either an up arrow or a shift @. If it is a shift @, the routine disables itself from any further screen-to-TTY output; if it is an up arrow, the output is enabled. Keying or printing these characters allows this option to be switched on or off.

The keyboard input from the TTY is handled by the other half of the 556, which triggers an unstable pulse. When the TTY outputs zero bits, the 556 chops the voltage into pulses that can be detected when input through the cassette port.

If the voltage wasn't chopped, then there would be no way of knowing whether consecutive bits were zeros or ones. The cas-

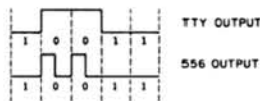


Fig. 4.

Program Listing.

```

00050      ORG      7E00H
00060 SETU  LD      HL,SPRINT
00070      LD      (16414),HL;SCRN PRNT DR ADDR
00080      LD      HL,LPRINT
00090      LD      (16422),HL;LINE PRNT DR ADDR
00100      LD      HL,START
00110      LD      (16406),HL;KBD DR ADDR
00120      JP      6CCH ;TO TRSDOS DO A 'RET'
00130
00140 SPRINT CALL   1112 ;PRINT ON SCREEN
00150      PUSH  AF
00160      CALL  CHKIT ;CHECK TTY PRNT
00170      POP   AF
00180      RET
00190 ;***ENTERS WITH CHAR. IN C***
00200 CHKIT LD      A,C
00210      LD      HL,LP
00220      CP      96 ;SHIFT @ - DISABLE
00230      JR      NZ,CHK27
00240      LD      (HL),201 ;RET
00250 CHK27 CP      91 ;UP-ARROW - ENABLE
00260      JR      NZ,LP
00270      LD      (HL),183 ;OR A
00280 LP    RET      ;INITIALLY DISENGAGED
00290      LD      HL,CHAR
00300      CP      (HL)
00310      LD      (HL),0 ;TURN OFF TTY FLAG

```

```

00320      RET      Z ;DON'T PRNT IF TTY CHR
00330      CP      14
00340      JR      C,LPRINT ;C/R L/F ETC
00350      CP      16
00360      RET      C ;CSRSR ON/OFF
00370      CP      28
00380      JR      C,LPRINT ;CSRSR MOVES
00390      CP      32
00400      JR      C,CRLF ;SCREEN CNTROLS
00410 LPRINT LD      A,C ;LINE PRINT ENTRY
00420      CP      10
00430      JR      C,NOLF
00440      CP      14
00450      JR      C,CRLF
00460 NOLF LD      A,C
00470      AND    0C0H ;TAB?
00480      CP      0C0H
00490      LD      A,C
00500      JR      NZ,TBC ;NO
00510      PUSH  BC
00520      LD      A,3FH ;MASK
00530      AND    C ;= # TAB SPACES
00540      LD      B,A
00550      LD      C,20H
00560 TAB  CALL   LPRINT
00570      DJNZ  TAB
00580      POP   BC

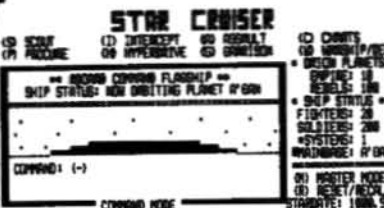
```

Program continues

All programs for TRS-80
16k, Level II computer.

SUPER NOVA

by Bill Hogue from Big Five
This arcade game of shooting asteroids and alien ships is written in machine language and is the best we have seen on any computer. There are five different types of alien ships including the very deadly Flagship. You shoot from your ship, rotate it, use your thrust key to move, and in emergencies you go into hyperspace. Level 1 or 2 - \$14.95



Star Cruiser

from Computer Simulations
You are on the side of the bad guys, the Empire. Program includes fighter combat, ground action, hyperdrive, garrisoning, retaking the 10 system capitals and avoiding the Rebel Star Fighter groups. The Star Cruiser is your last hope. \$14.95

Checker King

by Michael Marks from Personal
Play checkers against the computer in one of eight levels of skill. Features include saving board positions, switching sides, going back a move and letting it play against itself. Also includes three checker puzzles. Level 1 or 2 - \$19.95



Pigskin

by John Laurence, Rick Sothen and Walter Gavenda from Acorn
In this football game you call the plays, watch the thirty-second clock, and get called for penalties if you aren't careful. There are eleven offensive and seven defensive plays. Features graphic display of field, the ball, and statistics on the scoreboard. You can play against the program, against a friend, or watch the play in the spectator mode.
Protected cassette \$14.95
Protected diskette \$20.95



Scene from QUEST
SIGN SAYS 'NO PARKING'.

Adventures

with GRAPHICS & SOUND

by Robert Nicholas from Mad Hatter
These two adventures are similar to most others where you use two word sentences to explore. But these also show you the 'rooms' and have sound effects!
In QUEST you travel in search of fame, fortune, treasures, monsters and more. Three levels of play with a random set up of each game.
As the detective in SLEUTH you try to solve a murder. The victim, weapon and murderer will be different each game.
On cassette \$14.95 each.
On disk \$24.95 for both.

COMPUTER Bismark

from Strategic Simulations
The historic wargame that accurately simulates the epic battle between the German battleship and the British Home Fleet. Features a computer controlled mapboard of the North Atlantic, hidden movement, ship vs. ship combat and shadowing, firepower and damage, historic setup of the ships, and both two-player and solitaire scenarios.
Cassette \$49.95 Disk \$59.95
Coming soon Computer Ambush

Microcosm II

from Basics & Beyond
Combined these two packages contain fifty solid programs.
MICROCOSM I contains 16k-Memory Test, Atlantis, Biorhythms, Calories, Food, Calories Ingredients, Challenge Match-em, Checkbook Balancing, Country Guess, Day Of The Week, Divisor Game, Driver, Eliminate, Factorials, Fakeout, Flowering Houseplants, Home Insurance, Instruction Test, Magic Squares, Match-em, Math Tables Drill, Metric Conversion, Morse Code, Mortgage, Music Transposition, News Photographer, Remainder, South Pole, Spelling Drill, Spelling Review, Wipe-out.
MICROCOSM II contains Algebraic Factoring, Base Conversion, Blank Slate, Decipher, Doodle Art 1, Electrical Use, Explore, Fish, Foliage Houseplants, Isolation, Perspective Racer, Planet Finder, Prefix Study and Quiz, Roman Numerals, Shooting Gallery, Spelling Bee, Stains, State Guess, Suffix Study and Quiz, Trivia Quiz.
Each available on two cassettes for \$19.95

DISK SCOPE

from Instant
This diskette contains three programs to check out your disks. You can find the tracks and sectors where a file is stored with FILELOCK. With CDISK you can read the ASCII and hex representation of any sector. PASSWORD will give you the password for any file or any disk. \$19.95

DISK EDITOR

from Instant
Access to any byte on a diskette is possible with the machine language utility. You just give either the track and sector or the filename in order to alter, add, delete, or view information.
You can also search a diskette for string of characters. And the data can be dumped to a printer. Both the 35 and 40 track versions are on the same diskette. \$39.95

SuperSTEP

by Allan Gelder
Single-step/TRACE/Disassembler for TBUG. Variable speed TRACE mode lets you run any Z80 machine language program under total control. Includes intelligent RAM window, foreground background breakpointing, and more. TBUG required. \$19.95

FORTRANslator

by Peter Charlton
You can literally translate BASIC programs into Fortran with this program which assumes that you know Disk BASIC and Fortran. It will not do a complete translation because of the differences between the languages. For example, subroutines, 'THEN,' string handling and disk operations are different. But for a programmer this utility is a good start. Requires Microsoft FORTRAN. \$24.95 on disk.
FORTRAN available for \$95.00



THE PROGRAM STORE
4200 Wisconsin Ave NW
P.O. Box 9609 Dept. K 3
Washington DC 20007



VISA AND
MASTERCARD



TO ORDER
TOLL FREE
800-424-2738

For program information call
(202) 337-4691

Mail orders: Send check or money order for total purchase price, plus \$1.00 for shipping & handling. Charge card customers, please include card number, expiration date, and your name as it appears on the card.

```

00590 RET
00600 TBC CALL PRNT
00610 LD A,0 ;WILL BE CHR CNT
00620 CRCNT EQU $-1
00630 DEC A
00640 LD (CRCNT),A
00650 RET NZ
00660 CRLF LD A,13 ;C/R
00670 CALL PRNT
00680 LD HL,5000 ;TIME FOR
00690 CALL WAIT ;CARRIAGE RETURN
00700 LD A,10 ;LINE FEED
00710 CALL PRNT
00720 LLEN LD A,64 ;CHRS PER LINE
00730 LD (CRCNT),A
00740 RET
00750 PRNT DI
00760 OR A ;CHK PARITY
00770 JP PE,P1 ;NO PRTY BIT NEEDED
00780 OR 128 ;IF ODD PARITY
00790 P1 LD D,A
00800 CALL OUT ;0 START BIT
00810 LD E,0
00820 NBIT LD HL,625 ;110 BAUD DLY
00830 CALL WAIT
00840 LD A,D
00850 AND 1 ;0 BIT TO BE O/P?
00860 JR NZ,SHIFT;IF NOT
00870 CALL OUT ;O/P 0 BIT
00880 SHIFT SRL D
00890 DEC E
00900 JR NZ,NBIT
00910 EI
00920 WT LD HL,2300 ;TIME FOR STOP BITS
00930 WAIT DEC HL ;*
00940 LD A,L ;* DELAY
00950 OR H ;* LOOP
00960 JR NZ,WAIT ;*
00970 RET ;*
00980 OUT LD A,1
00990 OUT (255),A ;PULSE LOW
01000 LD A,14 ;PULSE
01010 PLSE DEC A ;WIDTH
01020 JR NZ,PLSE ;DELAY
01030 LD A,2
01040 OUT (255),A ;PULSE HIGH
01050 RET
01060
01070 START DI
01080 IN A,(255)
01090 AND 80H ;TEST, AND..
01100 JR NZ,GBIT ;GOT A START BIT
01110 EI
01120 JP 995 ;TRY TRS-80 KBD
01130 GBIT LD B,8
01140 NXBIT CALL INBT ;GET I/P BIT
01150 LD HL,CHAR ;ADDR OF CHR
01160 SRL (HL) ;SHT RDY FOR
01170 OR (HL) ;NEXT BIT
01180 LD (HL),A ;RE-STORE
01190 DJNZ NXBIT ;IF MORE BITS
01200 PUSH AF
01210 CALL INBT ;1ST STOP BIT
01220 CALL INBT ;2ND STOP BIT
01230 EI
01240 JR NZ,STOP ;MUST BE NZ
01250 POP AF ;ASSUME BREAK
01260 LD A,1 ;LIKE ROM
01270 PUSH AF
01280 JR LF
01290 STOP POP AF
01300 INC A ;TEST CHR
01310 JR Z,START ;IGNORE IF DEL
01320 DEC A ;TEST CHR
01330 JR Z,START ;IGNORE IF NUL
01340 AND 7FH ;CHOP PARITY BIT
01350 LD (CHAR),A ;STORE WITH NO PARITY
01360 PUSH AF
01370 CP 13 ;C/R?
01380 JR NZ,FINI
01390 LF CALL CRLF
01400 FINI POP AF
01410 RET
01420 INBT PUSH HL
01430 LD HL,15AH ;WAIT FOR RESET
01440 CALL WAIT
01450 OUT (255),A ;RESET LATCH
01460 LD HL,12DH ;WAIT FOR I/P
01470 CALL WAIT
01480 IN A,(255) ;GET LATCH STATE
01490 CPL ;GET RIGHT WAY RND
01500 AND 80H ;ELIM OTHER BITS
01510 POP HL
01520 RET
01530 CHAR DEF B 0 ;TTY CHR STORE
01540 END SETU

```

sette input latch is only set when a pulse is input to it. If a steady voltage caused by a sequence of zeros or ones is input, then it just remains in its latched state. Fig. 4 shows how this is overcome.

Fig. 4 shows that the cassette input latch will be set/reset during a zero and reset during a one. This is detected by the software and merged into a byte.

If the software does not detect a start byte during its scan, then the TRS-80 keyboard is strobed, allowing either keyboard to be used. The timing of this part of the circuit (VR2) must be set up with care. If the frequency from the 556 is too high, an extra transition is possible, which gives a false zero; if it is too low, then the software is likely to detect a pulse hanging over from the previous one.

Break Detection

A simple break detection may be employed by connecting a 390K resistor in series with a

250K preset between the positive rail and the junction of R6 and R7. This causes the 556 to free-run if the TTY is disconnected, and the frequency can be set to represent a train of zeros, which can then be detected by software.


One useful bonus from using cassette pulses to drive the TTY is an off-line print facility. By recording the driver pulses on cassette and replaying them through the record jack, a print-out can be stored on cassette and output from cassette player to TTY as often as required without re-running the original program.

This gives you a unit which is even more versatile than a normal printer and can be used with or without an expansion interface. ■

Parts List

C1 005 µF	R1 330K
C2 150 µF	R2 560K
C3 68 µF	R3, R5 4K7
C4, C6 1 µF	R4, R6 22K
C5 01 µF	R7 150K
VR1 10K	Q1 medium gain NPN
VR2 47K	IC1 556 dual timer

WE ALSO PUBLISH . . .



Kilobaud
MICROCOMPUTING™

What microcomputing magazine has the most pages of articles every month? Right Kilobaud MICROCOMPUTING. If you're interested in learning more about computers and what is going on with the Apple, PET, and all the other popular systems, you should have KM. Remember that your monthly magazines are your best computer library. Subscribe now.

New subscription Renewal 12 issues for \$25.00
 Payment enclosed \$ 24 issues for \$38.00
 VISA MC AE Bill me 36 issues for \$53.00

Card # _____ Interbank # _____
 Signature _____ Exp. date _____
 Name _____
 Address _____
 City _____ State _____ Zip _____

—for even faster ordering service call toll free (800) 258-5473

Canadian: \$27, one year only, U.S. funds. Other foreign:
 \$35, one year only, U.S. funds. Please allow 6-8 weeks for **309B8**
 delivery.

MICROCOMPUTING • POB 997 • Farmingdale NY 11737

A hardworking utility that saves time and space.

Document Those Variables

William Noel
15 Kingswood Ct.
Columbus, GA 31907

You've just received someone's advanced Star Trek game and want to soup it up a little or maybe update it to the movie version. Now comes the tedious part. You must sift through the program trying to figure out how and what variable names are used.

One long night I sat peering at the screen with bloodshot eyes trying to shift @ the program

list, while trying to remember what had disappeared ten lines ago. Either inspiration or desperation hit me: Why not get my TRS-80 to help with this lengthy effort?

Program Text Area

First, I had to figure how the information was coded in the BASIC text area. Program Listing 1 helps examine this area of memory. It begins at location 17129, where the memory contents are PEEKed and printed. If the memory byte contains a normal screen character, this sym-

bol is also shown.

After much trial and error in analyzing memory displays I have discovered that the first two positions of each line point to the memory location beginning the next line. The BASIC interpreter can use this, for exam-

ple, to avoid the delay of trying to decode remark lines during a program run.

The third and fourth locations represent the line number itself. Table 1 shows this coding for the first two lines of our memory display program.

239	66	B	1	0	66	B
132	0		250			
5	0		73	I	32	
213	73	I	205		49	1
0	14		67	C	10	
0	72	H	32		213	
32	229		40	(	49	1
55	49	1	50	2	57	9
205	71	G	71	G	41)
0	26		67	C	20	
0	71	G	71	G	213	
71	71	G	205		49	1
0	40	(	67	C	30	
0	178		32		72	H
59	34	"	32		32	
?						
34	59	;	0		76	L
67	40	(	0		143	
32	72	H	212		51	3
49	32		210		32	
72	214		57	9	49	1
32	202		32		178	
32	247		40	(	72	H
41	44	,	32		58	:
149	32		178		34	"
34	44	,	0		96	
67	50	2	0		143	
32	73	I	213		54	6
48	32		137		32	
81	58	:	32		73	I
213	48	0	0		104	
?						
67	60	<	0		141	
32	53	5	0		0	
0	4		0		73	I

Fig. 1. Out of Memory Display.

```

65000 AS L M N AS C S
65005 D T D T D E T E T E J T S F E E
65010 D U Z S S U U
65012 D U U U Z S S T
65015 F Z Z
65020 F Z U D
65030 W Z W
65040 W Z W
65050 W
65060 Z J
65080 Z J
65090 J
65100 Z Z
65110 Y S Z S S S S S
65120 Y S Y S S T Y S Y S T
65140 Y S F A
65150 AS A Y S
65160 AS A Y S
65170 B C A
65180 AS B AS B L B L B M B M B N B N B B
65190 C C C
65200 AS A Y S L A E M A E N A
65210 M A E M A E N A N A
65220 A
65230 A
65240 A C
65250 AS A L A M A N A K K K R K
65260 A
65270
65280 T U U U

```

Fig. 2. Variable Hunt.

```

1 CLS
5 I =I+1
10 H = PEEK(17129+GG)
20 GG=GG+1
30 PRINT H; " ";
40 IF H>31 AND H<91 THEN PRINT CHR$(H), ELSE PRINT "",
50 IF I=60 INPUT Q: I=0
60 GOTO 5

```

Listing 1.

Listing 2.

```

65000 'RESET BEGINNING OF TEXT & DEFINE TABLE'
      POKE 16548,233:POKE 16549,66:CLEAR 200:CLS:DIM AS(
      100), L(100), M(100), N(100):AS(1)="":C=1:S=1
65005 'GET NEXT LINE, THIS LINE, PRINT, AND CHECK IF THROUGH'
      GOSUB 65200:D=T:GOSUB 65200:D=T*256+D:GOSUB 65200:
      E=T:GOSUB 65200:E=T*256+E:PRINT":PRINT E;J=0:
      T=1:S=1:F=8:IF E=65000 GOTO 65240
65010 'FINISH LAST CHARACTER OF TEXT LINE'
      IF D=17129+U THEN Z=S:S=1:U=U+1:GOTO 65015
65012 'CHECK IF LINE HAS ENDED; OTHERWISE GET NEXT LOCATION'
      IF D=17128+U THEN U=U-1:GOTO 65005:ELSE Z=S:S=T:
      GOSUB 65200
65015 'IF LONG VARIABLE NAME, SKIP REST'
      IF F=1 AND Z>64 AND Z<91 GOTO 65010
65020 'WHEN A REMARK COMMAND, JUMP TO NEXT LINE'
      F=0:IF Z=147 THEN U=D-17129:GOTO 65005
65030 'BEGIN SKIP OF CHARACTERS FOLLOWING A "'
      IF W=0 AND Z=34 THEN W=1:GOTO 65010
65040 'END SKIP WHEN THE 2ND " IS REACHED'
      IF W=1 AND Z=34 THEN W=0:GOTO 65010
65050 'SKIP CHARACTERS BETWEEN'
      IF W=1 GOTO 65010
65060 'WHEN : IS REACHED, RESET THE DATA COMMAND SKIP'
      IF Z=58 THEN J=0
65080 'SET TO SKIP IF A DATA COMMAND'
      IF Z=136 THEN J=1
65090 'DATA COMMAND SKIP'
      IF J=1 GOTO 65010
65100 'ALLOW ONLY LETTERS IN 1ST CHARACTER'
      IF Z<65 OR Z>90 GOTO 65010
65110 'BUILD 1ST LETTER, CHECK IF VALID 2ND CHARACTER'
      Y$=CHR$(Z):IF(S<48 OR S>57) AND (S<65 OR S>90) AND
      S<>36 GOTO 65140
65120 'ADD 2ND CHARACTER, ADD 3RD CHARACTER IF $'
      Y$=Y$+CHR$(S):IF T=36 THEN Y$=Y$+CHR$(T)
65140 'PRINT VARIABLE AND BEGIN TABLE SEARCH'
      PRINT Y$," ";F=1:FOR A=1 TO 100
65150 'TRY AGAIN IF VARIABLE NOT YET REACHED'
      IF AS(A)<Y$ GOTO 65230
65160 'FIND THE MATCHING VARIABLE'
      IF AS(A)=Y$ GOTO 65210
65170 'BEGIN SHIFT TO MAKE ROOM FOR NEW VARIABLE'
      FOR B=C TO A STEP-1
65180 'SHIFT OVER 1 WORKING RIGHT TO LEFT'
      AS(B+1)=AS(B):L(B+1)=L(B):M(B+1)=M(B):N(B+1)=N(B)
      :NEXT B
65190 'INCREASE TABLE ENTRY COUNT AND CHECK IF OUT OF ROOM'
      C=C+1:IF C=100 STOP
65200 'INSERT NEW VARIABLE'
      AS(A)=Y$:L(A)=E:M(A)=E:N(A)=1:GOTO 65220
65210 'WHEN THE SAME VARIABLE, UPDATE FOR THIS LINE'
      IF M(A)>E THEN M(A)=E:N(A)=N(A)+1
65220 'CAUSE AN EARLY END TO THE TABLE SEARCH'
      A=100
65230 'CONTINUE TABLE SEARCH OR GET NEXT TEXT POSITION'
      NEXT A:GOTO 65010
65240 'BEGIN DISPLAY OF VARIABLE SUMMARY'
      PRINT":FOR A=1 TO C-1
65250 'PRINT SUMMARY AND WAIT IF A FULL SCREEN'
      PRINT AS(A),L(A),M(A),N(A),:K=K+1:IF K=15 THEN
      INPUT R:CLS:K=0
65260 'PRINT THE NEXT LINE'
      NEXT A
65270 END
65280 'GET THE CURRENT POSITION OF TEXT & MOVE COUNTER TO NEXT'
      T=PEEK(17129+U):U=U+1:RETURN

```

Note: Up arrow appears as left bracket in listings.

Note: Line 65005 allows the program to run independently.

As you can see, the line number code has the least significant value first. This seemingly backwards way of coding in the manner the TRS-80's microprocessor handles two-byte numbers.

Look a little closer at the next line pointer which also has this reverse sequence.

A byte, of course, has eight bits that can be turned either off or on representing either zero or some numeric value. A code of two bytes gives a total of 16 bits to represent a memory address in the next line pointer's case.

Each of these 16 bits are numbered 0-15 and represent, when on, a value based upon their location number. Beginning with bit 0 having a value of $1(2^0 = 1)$, two is multiplied times the prior bit value. These values are shown in Table 2.

Looking at byte 1, you can create total values from 0 to 255 by adding different bit combinations. This matches the range of values generated by PEEKs into memory. After looking at both bytes together in this manner, it is easy to see why the first byte should represent the low order value.

Adding all 16 of these bit values together results roughly in the largest memory value and line number that can be represented in two bytes. This figure totals to 65535.

When I say it is a rough maximum, I am referring to the line number. For some reason that I have yet to find, we are restricted to an upper line number limit of 65529, although the coding possibilities will allow six more. But who's going to need them with over 65000 available?

Of course, in BASIC we must deal with one byte at a time while using the PEEK statement. It is possible to convert the second byte to its proper value by multiplying it by 256.

Convert line one's next line pointer:

$$239 + (66 \cdot 256) = 17135$$

This result matches the first memory byte of line five.

Text Coding

Fig. 1 shows the complete text area for the memory display program. The variables I, H, GG, and Q are kept in normal screen and keyboard coding.

But the statements and functions CLS, PEEK, PRINT, IF, AND, ELSE, INPUT, GOTO, =, +, >, <, CHR\$ have all been converted to a one-character special code.

This conversion in addition to saving memory also makes it easier to identify program variable names. PEEK won't be confused with the variable name PE. The same is true of other statements and variables.

Listing 2 shows a program that picks out variables. At the same time the program saves the first line number, last line number, and number of total line occurrences for each variable.

When a program line contains a remark, everything following it will be ignored by Level II machines. When you enter these program lines, either leave out the remarks or enter them at different line numbers.

Figs. 2 and 3 show the screen results of this program analyzing itself. Fig. 2 shows the program as it progresses through the text identifying each line and the variables found in that line. Fig. 3 shows the screen summary displayed when that run is finished.

Table 3 defines each variable used in the variable documentation program.

Now that we have a program that documents variables, another bothersome detail crops up. This program must be in the same text area as the program it will analyze.

The July, 1979, issue of Radio Shack's *Microcomputer Newsletter*, includes a method for adding a BASIC program by keying it in at the end of existing text contents. The flowchart in Fig. 4 shows the steps involved.

After trying it a few times, I looked for an easier way. What was this PEEKing and POKEing really accomplishing?

With our knowledge of the coding technique for current line number and next line location, let's convert the last two

WE MEAN BUSINESS!
BUSINESS SOFTWARE, THAT IS

**USE YOUR TRS-80*
FOR MORE THAN FUN AND GAMES**

THE DATA DUBBER \$49.95
Duplicates any program tape to TRS-80 quality. Reconstructs date pulses to ensure accurate CLOADs. Permits easy loading of even poor quality commercial tapes without constant volume adjusting. Money-back guarantee if not satisfied.

THE ELECTRIC SECRETARY \$75.00
A powerful word processor to turn your TRS-80 into an automatic typewriter. Features page numbering, movable margins, headers, variable page length, and title centering. Enter text, revise, correct, and output to printer page for matted, justified, even hyphenated as required. Cross-coupling files permits individually addressed form letters. Complete with upper/lower case conversion information on diskette. Specify if RS-232 adapter is installed in interface.

MAILROOM PLUS \$75.00
A versatile and powerful mailing program to print labels by sequential coding: zip, city, state, customer ID code, even last name. Sorts by any code in minutes and stores sequentially in a single string (approx. 1500 records per diskette). Includes AUTOPRINT. Supplied on diskette.

MINIMAIL \$50.00
A compact version of MAILROOM PLUS but without customer coding. Features alpha-lookahead for duplicates. Supplied on diskette.

FORMLET \$35.00
Generates form letters from MINIMAIL records. Prepare your letter, bulletin, notice, advertisement, etc., then load the MINIMAIL files. Your printer will print the inside address, letter, and repeat for each name in the file—all properly spaced and justified. Supplied on cassette.

AUTOBOOT \$15.00
Simplifies automatic BASIC program loading from your DOS. Permits sequencing through your choice of DOS commands, selects files and memory size you specify, and loads or runs selected program. Allows user to see directory and free space before program runs automatically. Supplied on cassette.

SIR ECHO \$10.00
A handy program to make your printer work like an electric typewriter. Use alone or merge with your programs to make what appears on the screen echo to the printer. Supplied on cassette.

TELEFON \$20.00
Make your TRS-80 a smart terminal. Communicate with time-share and other computers, bulletin boards, etc. Transfer programs over the phone. For disk systems with modem.

UPPER/LOWER CASE CONVERSION \$20.00
Reprint of KILGALD article explaining how to modify the TRS-80 to display both upper and lower case characters. Kit contains step-by-step instructions, parts, and necessary software on cassette for case reversal, echo, and automatic line feed routines.

User group discounts available
Dealer inquiries invited

*TRS-80 is a trademark of the Tandy Corp.



TERMS Check money order, Visa, Mastercard
Washington residents add 5.3% for tax



THE PERIPHERAL PEOPLE

P.O. Box 524, Dep't. M
Mercer Island, WA 98040

43 (206) 232-4505

LOWER CASE & GRAPHIC SYMBOLS GENERATOR KIT FOR TRS-80™ CG 16 \$94.50



TRUE 2 LINE DECENDER LOWER CASE, ELECTRONIC SYMBOLS, THIN LINE GRAPHICS, GAME SYMBOLS, TEXTURED BACKGROUNDS AND MANY MORE. DEMO CASSETTE IS INCLUDED. FULLY ASSEMBLED WITH DETAIL INSTRUCTION FOR EASY INSTALLATION. REQUIRES ELECT PENCIL TYPE LC MOD OR ORDER MEMORY AND SWITCH KIT. SMK. FOR \$18.50

SYNCHRONOUS DATA SEPARATOR FOR DISK USERS. SDS \$34.50

THE SYNCHRONOUS DATA SEPARATOR WILL ELIMINATE 100% OF THE SOFT READ ERRORS AND SPEED UP DISK ACCESS TIME BY ELIMINATING RETRIES BY THE DISK CONTROLLER.

THE SDS PLUGS INTO THE DISK CONTROLLER'S SOCKET AND HAS ONLY TWO WIRES TO CONNECT. NO TRACES HAVE TO BE CUT. IT IS THE MOST RELIABLE AND ACCURATE DATA SEPARATOR AVAILABLE.

ADD \$2.50 FOR S & H. CALIF RES ADD 6% SALES TAX. SEND CHECK OR MONEY ORDER TO:

G.P. ASSOCIATES ✓203
P.O. BOX 22822, SACRAMENTO, CA 95822 (916) 392-0257
TRS-80 IS A TRADE MARK OF TANDY CORP

\$3,499.00 TRS-80 MODEL II
10% OFF

4K Level I ONLY \$449
List \$499.00

16K Level II ONLY \$759
List \$849

Also BELOW LIST PRICES on disk drives, printers, software, peripherals.

SEIDEL'S ELECTRONICS
Rt. 94 & Vail St., Blairstown, N.J. 07825
(201) 362-6191 ✓195

Radio Shack DEALER

CASIO
Calculator Watch
Time - Calendar Display
8 Digit Calculator
Stopwatch

\$42.95

F 80 Alarm Chronograph \$26.95

Mattel Intellivision
\$239.95

ALSO: Atari Sharp Cobra JVC
SONY Panasonic

TELEPHONE ANSWERING
SANYO M139N \$99
SANYO 9918 Remote \$239
RECORD A CALL 80A \$199
RECORD A CALL 90A NEW! WRITE

GTE FLIP-PHONE
\$36.95

Master Card VISA
SYNAPSE VIDEO ✓266
P.O. BOX 962
NEW YORK, N.Y. 10009

THE BOOKKEEPERS
FOR INFO CALL (603)-447-2745

Full Charge Bookkeeper—48K, 3 DRIVE, w/ALPHA \$199.95
Intermediate Bookkeeper—48K, 2DRIVE & Printer \$189.95
Cheap Bookkeeper—32K, 2DRIVE & Printer \$175.00

All Above Are Daily Journal—G/L Systems

Hex Code Converter, Loan Payment Finder, & Amortization Table, 16K, 1DRIVE & Printer—ALL 3 \$29.95

STURDIVANT & DUNN, INC. ✓82
BOX 277, 124 WASHINGTON ST., CONWAY, NH, 03818

A	65140	65260	11
AS	65000	65250	6
B	65170	65180	2
C	65000	65240	4
D	65005	65020	4
E	65005	65210	3
F	65005	65140	4
J	65005	65090	4
K	65250	65250	1
L	65000	65250	4
M	65000	65250	5
N	65000	65250	5
R	65250	65250	1
S	65000	65120	6
T	65005	65280	4
U	65010	65280	4
W	65030	65050	3
YS	65110	65200	6
Z	65010	65110	10

Fig. 3. Variable Summary.

Line Number	Next Line Pointer	Current Line Number	Line Program Statements	Trailing Character	
1	Memory				
	Location:	17129 30	31 32	33	34
	Value:	239 66	1 0	132	0
	Character:	B			
5	Memory				
	Location:	17135 36	37 38	39 40 41 42 43 44	45
	Value:	250 66	5 0	73 32 213 73 205 49	0
	Character:	B		1 Space 1 1	

Table 1. First two lines of Memory Display Program.

Byte	Bit No.	0	1	2	3	4	5	6	7
1:	Value	1	2	4	8	16	32	64	128
2:	Value	256	512	1,024	2,048	4,096	8,192	16,384	32,768

Table 2. Two Byte Numbers.

A	Counter for table search
AS	Table for variable name
B	Present location during table shift
C	Pointer for last table entry
D	Next line beginning memory address
E	Current line number
F	Switch to skip rest of long variable name
J	Switch to skip after DATA statement
K	Line count for screen summary
L	Table for first line occurrence
M	Table for last line occurrence
N	Table for number of total line occurrences
R	Fake input variable
S	Next to oldest text character (1 ago)
T	Current text character
U	Counter for current position in text
W	Switch to skip from first "to 2nd"
YS	Current variable name
Z	Oldest text character (2 ago)

Table 3. Variable List.

Line number	Change
65000	delete the two POKES
65010	change 17129 to 26302
65012	change 17128 to 26301
65020	change 17129 to 26302
65280	change 17129 to 26302

Then type SAVE "VARDOC,"A

Table 4. Program Changes for Disk BASIC.

PET[®] TRS 80[®] THE SANYO[®] LEEDEX[®] GREEN SCREEN

- IMPROVE IMAGE CONTRAST
- REDUCE EYE FATIGUE
- ENHANCE SCREEN LEGIBILITY
- PROVIDE A MORE PLEASING DISPLAY
- GIVE A DISTINCTIVE PROFESSIONAL LOOK TO YOUR SYSTEM

The GREEN SCREEN is custom molded to fit nicely over the picture tube. It ingeniously mounts in seconds without any tools.

CALL: (212) 296-5916

or send \$12.50 + \$2 S&H



ALPHA product co.
85-71, 79th St., Woodhaven, N.Y. 11421

NEW T=BUSS

BUS EXTENDER FOR TRS 80[®]
LIKE HAVING 5 EDGE connectors

TO ACCESSORIES
TO KEYBOARD
OR EXPANSION INT.
(screen printer port)



\$80
+\$2s&h

in stock

ALL GOLD PLATED CONTACTS

ANALOG 80 \$140

8 channel ANALOG TO DIGITAL converter. Anything that can be electrically measured can be interfaced to your TRS-80 - voltage, current, temperature, pressure, light level, No assembly language needed.

(212) 296-5916
ALPHA product co.
85-71, 79th St., Woodhaven, N.Y. 11421



Flow Chart.

POKEs to

$$233 + (66 * 256) = 17129$$

Voila! That is the beginning text memory location we have been using. Therefore, locations 16548 and 16549 must be where Level II BASIC keeps this pointer.

The comparison of location 16633 to 2 and the two POKEs on either route afterwards, are going to be a little more difficult to decipher.

If you have the two-byte number 1 67 and want to subtract 2 from it, you run into trouble right away. One minus 2 gives -1, which isn't within the 0-255 code range. So borrow 1 from the second byte making it 66 and add its multiplied value 1*256 to the first byte. This manipulation gives you the number 257 66. Now subtract 2, giving 255 66.

If the first byte were 2 or larger, you wouldn't have to borrow from the second. Two minus 2 gives 0 which is a valid result.

Suppose, somewhere in memory, Level II BASIC keeps track of the memory location that follows the last program line. It could then point two bytes beyond the final program line.

Double VOILA!! The beginning of text pointer (locations 16548 and 9) is replaced with the position new text should begin (locations 16633 and 4 minus 2). When this is done, Level II BASIC is tricked into loading a new program after the current

text program. Finally, the beginning text pointer must be reset back to the correct value of 17129.

Assembler Help

Program Listing 4 shows an assembler program which replaces the beginning text pointer. The decision-element (DE) register pair is loaded with the value 2 while the HL register pair is loaded with the hexadecimal address of the end of text pointer.

The DE pair is subtracted from this address, and any borrowing is automatic. It then stores this adjusted value in the hexadecimal address of the beginning text pointer and jumps to the Level II READY message.

This program loads just below Radio Shack's debounce routine on a 16K system.

The beginning text pointer is then reset to its correct value by the two POKEs in line 65000 as shown in Program Listing 2.

The steps to run variable documentation are:

1. CLOAD the program to be analyzed.
2. Enter SYSTEM, ADTXX and / (or follow the steps in Fig. 4).
3. CLOAD the variable documentation program in Program Listing 2.
4. Enter RUN 65000.

If the screen becomes completely full during the summary display, hit ENTER to continue.

To run variable documentation with Disk BASIC, make the program changes shown in Table 4.

The execution steps are 1) LOAD the program to be analyzed; 2) enter MERGE "VARDOC"; and 3) enter RUN 65000.

There are several things that could cause complications in running the variable documen-

tation program. Remember that the program to be analyzed should not have lines numbered 65000 or greater.

Program tables allow only 99 entries. They must be increased to record more variable names. Also the CLEAR must be increased correspondingly. These changes will naturally use more memory.

If there is not enough memory to do the run, delete the following from the program to be analyzed:

- REM lines
- Lines that don't have variables
- DATA statements
- Characters between double quotes

If you want a printout of the summary, insert the following program line:

65255 LPRINT AS(A), L(A), M(A), N(A)

Saving Memory

Understanding how program lines are coded in the text area makes it easier to see what to avoid for programs tight on memory. Remember that spaces in the text line use one byte each; each program line adds five bytes (VS one byte for a ;); and REM lines use a full byte for each comment character. It is better to choose single-letter variable names than two character names.

Now that you have a program and an understanding of how to document variables, how about a challenge? Who out there can develop a program to effectively document GOTOs, GOSUBs, and RETURNS? ■

```

65000 POKE16548,233:POKE16549,66:CLR200:CLS:DIMAS(100)
      ),L(100),M(100),N(100):AS(1)="*":C=1:S=1
65005 GOSUB65280:D=T:GOSUB65280:D=T*256+D:GOSUB65280:E=
      T:GOSUB65280:E=T*256+E:LPRINT"*":J=0:T=1:S=1:F=0:IF
      E=65300GOTO65240ELSELPRINT:
65010 IFD=17129+UTHENZ=S:S=1:U=U+1:GOTO65015
65012 IFD=17128+UTHENZ=U-1:GOTO65005:ELSEZ=S:S=T:GOSUB6
      5280
65015 IFP=1ANDZ>64ANDZ<91GOTO65010
65020 F=0:IFZ=147THENZ=D-17129:GOTO65005
65030 IFW=0ANDZ=34THENZ=1:GOTO65010
65040 IFW=1ANDZ=34THENZ=0:GOTO65010
65050 IFW=1GOTO65010
65060 IFZ=58THENZ=0
65080 IFZ=136THENZ=1
65090 IFJ=1GOTO65010
65100 IFZ<650RZ>90GOTO65010
65110 Y$=CHR$(Z):IF(S<48ORS>57)AND(S<65ORS>90)ANDS<>36G
      OTO65140
65120 Y$=Y$+CHR$(S):IFT=36THENZS=Y$+CHR$(T)
65140 LPRINTY$;" ":F=1:FORA=1TO100
65150 IFAS(A)<Y$GOTO65230
65160 IFAS(A)=Y$GOTO65210
65170 FORB=CTOASTEP-1
65180 AS(B+1)=AS(B):L(B+1)=L(B):M(B+1)=M(B):N(B+1)=N(B)
      :NEXTB
65190 C=C+1:IFC=100STOP
65200 AS(A)=Y$:L(A)=E:M(A)=E:N(A)=1:GOTO65220
65210 IFM(A)<ETHENM(A)=E:N(A)=N(A)+1
65220 A=100
65230 NEXTA:GOTO65010
65240 STOP:LPRINT"*":FORA=1TOC-1
65250 LPRINTAS(A),L(A),M(A),N(A):K=K+1:IFK=15THENINPUTR
      :LPRINT"?":LPRINT" ":LPRINT" ":LPRINT" ":LPRINT" "
      :CLS:K=0
65260 NEXTA
65270 END
65280 T=PEEK(17129+U):U=U+1:RETURN
65300 REM
  
```

Listing 3.

```

7FBA 110200 00100 ORG 7FBAH ;BEGIN AT 32698
7FBA 110200 00105 BEGIN LD DE,2 ;LOAD IN 2
7FBD 2AF940 00110 LD HL,(40F9H) ;LOAD CONTENTS OF 16633 & 4
7FC0 ED52 00120 SBC HL,DE ;SUBTRACT 2
7FC2 22A440 00130 LD (40A4H),HL ;LOAD RESULT IN 16548 & 9
7FC5 C3191A 00140 JP 1A19H ;JUMP TO READY MESSAGE
7FBA 00150 END BEGIN
00000 TOTAL ERRORS
  
```

Listing 4.

UTILITY PACK

CPU: Compress Program Utility. Removes all unnecessary spaces and remarks from a Basic program, and will compress lines if specified. Complete regard for unclosed strings and unusual commands. Fast Z-80 speed/Level II or DOS. **\$19.95/\$21.95**

SEARCH: Lists any Basic program lines containing any occurrence you select. Break at any time to make changes, or continue. Option allows for LPRINTed listing. Written in Z-80/Level II or DOS. **\$19.95/\$21.95**

SPECIAL DOS OFFER: All of these utilities, on one diskette, can be purchased for just **\$49.95!** THAT'S HALF PRICE!

BTRACE: Makes the TRON command easier to utilize by placing the current line being executed in one convenient location. Preserves your screen display. Level II or DOS. Written in Z-80. **\$19.95/\$21.95**

CHANGES: Generates a screen or printed listing of differences between versions of programs you are developing. DOS only. **\$14.95/\$16.95**

REPLACE: Allows you to search and replace occurrences in your Basic programs (saved in ASCII format). DOS ONLY. **\$14.95/\$16.95**

SPECIAL LEVEL II OFFER: CPU, SEARCH, and BTRACE, together on one cassette, can be purchased for just **\$29.95!** THAT'S HALF PRICE!

NEWEST PRODUCTS!

IRV	\$24.95
BOSS	\$29.95
TUNNEL OF FAHAD	\$9.95
JOIN THE "SOURCE"	\$100.00
RESCUE AT RIGEL	\$14.95

BOOKS

The Book, Vol. 1	\$14.95
Supermap	8.95
Disk & Other Mysteries	19.95
Disassembled Handbook, Vol. 1	10.00
Disassembled Handbook, Vol. 2	15.00
Inside Level II	15.95

MEDIA

Nashua diskettes	\$24.95/10
Verbatim diskettes	26.50/10
C-10 Agfa cassettes (5 screw)	10.95/13
Storage boxes	3.00/ 1

BEST SELLING GAMES

MENTAL LAPSE — by Brandon Rigney III. A graphic lovers delight, with action to tax your abilities to the limit! **\$12.95/\$15.95**

JUNGLE — by Brandon Rigney III. Getting back to camp may not be as easy as you think! Six different levels of complexity make this a game for the entire family. **\$9.95/\$12.95**

CURTAINS — by Brandon Rigney III. A concentration game with several unique twists, great graphics, too! **\$9.95/\$12.95**

GOMOKU — by Peter Lewis. Can you beat the computer at this one? Similar to tic-tac-toe, only you need five in a row to win. The rules are simple, but there is a strategy! **\$9.95/\$12.95**

OTHELLO — by Jack Decker. An excellent implementation of the popular board game. One or two players, different skill levels. Option for keeping score thru the game. **\$9.95/\$12.95**

CRIBBAGE — by Richard Vossel. Plays by Hoyle. Fast response times. Guaranteed debugged. Excellent for learning (use the HELP function), or for the expert. Satisfaction guaranteed! **\$16.95/\$19.95** (versions are different)

Specify Level II or DOS.

THE ALTERNATE SOURCE
The magazine of advanced applications and software
for the TRS-80

Know what the three T's of computing are? Tips, Tutorials, and Techniques. That's what **The Alternate Source News** is all about. Teaching you to become a better programmer, both in Basic and Assembly Language. Published bi-monthly, six issues are just **\$9.00**.

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

VARKEEP

VARKEEP is a new memory management utility which adds the following powerful commands to Level II or Disk Basic: NAME SAVE, NAME RESTORE, NAME DELETE and NAME CLEAR. Using these commands will allow the Basic programmer to protect the values of all variables from erasure by LOAD, RUN, NEW and clear. You'll be able to restore to a program all variables used by a previous program (easily simulate the powerful CHAIN command found in other Basics), delete variables no longer needed in order to reclaim valuable memory space, redimension arrays, & change amount of the string space available to a program while it is running. Written in machine language to work with Level II or Disk Basic, **VARKEEP** is now available for just **\$14.95** on cassette, **\$16.95** on diskette.

ABSOLUTELY FREE!

For every single item over \$15.00 that you order, select one of the **FREE** programs below! (Available separately for \$5.95 each.)

SYSLoad: A patch to DOS to allow V/CMD file execution via the Basic SYSTEM command. By Jesse Bob Overholt.

RAMTEST: Level II or DOS. In Z-80 using reliable techniques. By Allan Moluf.

SUPERKEY: A graphics typewriter like you've never seen before! By Brandon Rigney III.

BILLBOARD: Generate posters for social occasions and friends. By Brandon Rigney III.

WORKING: Never have you seen a program work so hard and get so little done! By Bill Brown.

KILLER: A DOS utility that allows you to KILL more than one file at a time! By Allan Moluf.

PENRAM: A utility which allows RAM manipulation never before possible! By Roxton Baker.

FILEFIX: Direct statement in file? Fix it the easy way, with this short program! By Ken Edwards.

PERSONAL PAYABLES: A DOS personal finance management system, using random files. By Charles Butler.

CONVERT: Basic programs to Pencil files and back. Basic remark statements to either Pencil or EDTASM format and back. And more. By Bruce Hansen.

Level-80 Basic: First there was Level I, then came Level II, and there's even some Level III's. But you've never seen anything like Level-80! You'll be amazed (that we would even give this program away!). By KJ Software.

Space-Out: Will remove spaces from your Basic programs. Not all the features of the more expensive versions, but it'll get the job done! Written in Z-80 for fast execution. By Jack Decker.

EDTASM Mods: Four programs to provide various enhancements to your EDTASM. Replace spaces with tabs and remove comments to save room. Convert any block of RAM into EDTASM DEFB statements. Convert Appar EDTASM files to MACRO-80 files. By Roxton Baker.

SIMPLE SORT

What are the best qualities of a sorting utility? The sort must be fast. (Simple Sort is written in Z-80!) The sort must be efficient. (Simple Sort occupies less than 3K of machine code and requires less than 1K for buffers!) The sort must be kind to the diskette. (Simple Sort does all its sorting in memory, with a minimum of reads and writes!) The sort must not use any extra storage space. (Simple Sort does not require any intermediate files!) The sort must be easy to use. (Simple Sort only needs to know the bare particulars!) Simple Sort — it's easy, it's fast and it's efficient! The perfect answer for single drive owners, and great for dual drive owners who prefer to use formatted-only diskettes!

\$79.95 on diskette with manual.

ORDER BLANK

Ship U.P.S. Ship First Class Mail

Please send:

Name _____
Address _____
City _____
State, Zip _____

Shipping \$2.00
Total _____

Mail To: **The Alternate Source**
1806 Ada Street
Lansing, MI 48910

Master Charge/VISA
517-485-0344
517-487-3358

We will ship C.O.D.
(add \$1.25 please)

TRS-80 is a trademark of the Tandy Corporation

Check here for FREE issue of The Alternate Source with any order.
 Enclosed is \$9.00. Begin my subscription with issue # _____

Michigan residents add 4% sales tax. Foreign, please send U.S. funds. Foreign orders welcome but please include additional postage.

Get perfectly aligned printouts every time.

Printer Calibration

L. O. Rexrode
35026-A Turtle Trail
Willoughby, OH 44094

If you use more than one type of paper with your printer, this simple modification makes a lot of sense.

At the office my TRS-80 and Centronics 779 with tractor feed are used primarily for handling advertising mail inquiries and our normal operation uses five different types of forms.

In the interest of saving time and improving efficiency, the need for a method that starts every print routine exactly where it is intended, regardless of who is operating the system, was apparent.

Three Variables

With the Centronics 779, three variables are of primary importance in printing a professional looking form: left margin setting, top-of-form setting and the "density" setting. Any, or all of these, may require different

settings for various print routines or form sizes. The length of form (number of lines) is not included, since a program is usually written with this factor as a constant.

The simplest variable is the left margin setting. The printer's roller/tear-bar assembly has an engraved scale in one-eighth-inch increments from -15 on the left to 90 on the right. This scale should be used to set the left edge of the form to be printed. The value is determined by a trial run.

To set the top-of-form requires the addition of a scale to the 779. This is done quite easily if you use the hold down clamp on the left pin feed assembly. As shown in Photo 1, use a three and one-half-inch peel-off label and type a column of numbers, say, from 1 to 21. Trim off the excess margins and place the label right along the edge of the hold down clamp. The resultant scale now allows you to set the top-of-form to a specified position.

The third variable is the print

density control. This sets the number of characters-per-inch printed. For maximum legibility you usually want this set as wide as the form will allow. The control, located on the rear of the printer, is not only difficult to reach but requires several lines of print, with trial and error adjustments, to get the optimum settings. A calibrated dial knob solves this problem easily.

The dial knob I used is Radio Shack's part no. 274-413. However, on some printers, the shaft may not protrude quite far enough to get a good bite when the set screw is tightened. If so, use a coarse file on the rear face of the knob, removing about 1/32 of an inch to 1/16 of an inch.

Cut a sliver from the adhesive-backed label to make a pointer for the dial and place it approximately as shown (Photo 2). Rotate the adjustment shaft fully counterclockwise (lowest density setting) and push the knob onto the shaft, setting the number one mark to the arrow. Tighten the set screw and you're through.

Find Your Values

Run each of your print routines and determine the optimum value of the three variables: left margin, top-of-form and density. Note these values for use with the routines. The best place to note them is in your program, immediately preceding the first LPRINT statement. If you are new to programming, here is the statement I use to get the results shown in Photo 3 (your line number, title and values will relate to your own program, of course):

```
1000 CLS:PRINT@320;"READY TO PRINT
MAILING LABELS DIRECTLY FROM
DISC":PRINT:PRINT"SET TOP-OF-
FORM TO 20":PRINT"SET LEFT
EDGE OF FORM TO -4":PRINT
"SET DENSITY CONTROL TO 4":
INPUT"ENTER TO CONTINUE":X
```

When LLISTING a program in BASIC, it is not possible to use such a prompting message, and I am constantly LLISTING with the density set too low, which results in my losing the ends of long program statements. As a reminder to myself to set the density before starting a LLIST, I



Photo 1

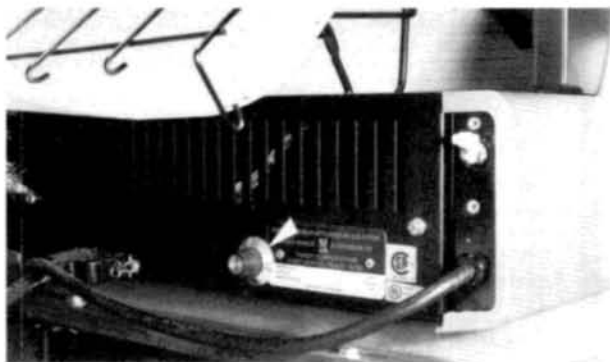


Photo 2

READY TO PRINT MAILING LABELS DIRECTLY FROM DISC

SET TOP-OF-FORM TO 20
SET LEFT EDGE OF FORM TO -4
SET DENSITY CONTROL TO 4
'ENTER' TO CONTINUE? _

Photo 3

used another label, placed prominently on the top front of the printer that almost shouts, "For Listings Set the Density to 7 inches. It works.

We have been using this method for several months now, and it is quite gratifying to see the results. No matter who is operating the system, and regardless of how often we change forms or paper, the first line of print goes down exactly where we want it to.

A couple of other time savers we have added to our program are worth the time and the slight additional memory required. The first one resulted from our operator having spent over an hour trying to figure out why the computer wouldn't run and finally realizing that the "out of paper switch was off, due to a small tear in the form which wasn't readily apparent.

To prevent this from happening again, I added a GOSUB in

front of every LPRINT statement. The subroutine checks the status of both the "out of paper switch and the print switch. If either is off, a prompting message is displayed telling the operator what is wrong and allowing him to correct before continuing. My subroutine reads as follows:

```
750 IFPEEK(14312)<128 RETURN ELSE 751
751 CLS:PRINT@468:"PRINTER NOT
  READY":PRINT@583,"R"—RETURN
  TO MENU 'O'—OK TO CONTINUE"
752 QS=INKEY$:IF QS="R"THEN 511
753 IFQS="O"THEN RETURN
```

This simple solution has saved us hours.

Add Top-of-form

Since the 779 doesn't have front panel controls that allow either a line feed or a top-of-form, I added these as a part of my program. Since each program has a menu, this was the obvious place to access these routines.

The menu uses the INKEY\$ function, so it was just a matter

of adding the up arrow as the selection to advance one line and adding the letter "T" to go to top-of-form. I did not include these two symbols in the menu table to prevent clutter. They are blind selections. Here are the routines:

```
620 IFQS="↑"THEN 800
625 IFQS="T"THEN 810
```

```
800 IF PEEK(14312)<128 GOTO 805 ELSE
  511
805 POKE 16424,1:POKE 16425,0:LPRINT
  CHR$(11):GOTO 511
810 IF PEEK(14312)<128 GOTO815 ELSE
  511
815 POKE 16424,51:POKE 16425,0:LPRINT
  CHR$(11):GOTO511
```

In either of these routines, if the printer is not ready, nothing happens except returning you to the menu. The ↑ advances the paper one line. The T advances the paper 51 lines, then you are returned to the menu.

In all the examples given, my menu routine begins at line 511. ■

CP/M^{®1} - based Business Software for TRS-80^{®2} computers on the fastest Mod-II CP/M with the most features!!!

- Over 610,000 bytes/disk
- Downloading package included
- 1,200 baud operation of serial printers without data loss
- Single drive backup

MOD-II CP/M \$250.00

- Mixed single/double density on any of 4 drives (even a 1-drive system)
- Ultra-fast disk operation
- Emulation of cursor addressing for any of several "dumb" CRTs

MOD-I CP/M \$150.00

- Auto-LF printer support & ASCII top-of-form software (LPIII)
- Supplemental document describing our implementation
- User-settable function keys

CBASIC2^{®3} (Mod I or II) \$110.00

The following software for Mod-II CP/M only unless otherwise stated (*-requires CBASIC2):

RM/COBOL^{®4} - Only COBOL for CP/M with alternate keys (multi-key ISAM), CRT screen handling, interactive debug, Z80 code, and the most useful Level 2 features. **Compatible with Tandy's COBOL-but runs faster!** \$495.00

PMS (Property Management System) - Interactive, menu-driven system includes full G/L, budgeting, cash journal, delinquency list, tenant activity/rent roll, complete audit trail and reports on vacancies, lost rent, and vendors \$650.00*
demo disk & manual 75.00*

APH (Automated Patient History) - General-purpose question-asking, answer-printing system furnished as self-administered review-of-systems general patient history (Mod-I also) ... \$175.00*

Osborne & Assoc. CBASIC source programs (Mod-I also):

Payroll w/Cost Accounting \$250.00*
Accts. Payable/Accts. Receivable \$250.00*

Verbatim^{®6} media: (Qty. 100 prices)

5 1/4" single density \$2.50 ea.
8" certified double density \$4.00 ea.

MAGIC WAND^{®5} - Full-feature word processing, true proportional spacing, file merging, and use of full-screen editor for source programs or data \$400.00

RPA (Residential Property Analysis) - Analyzes income and expense, financing, taxes, inflation and depreciation on home, condo, or apartments over a user-selectable time. Shows payoff in terms of ROI, Cap rate, cash-on-cash. Amortization schedules and worksheet \$300.00*
demo disk & manual 35.00*

RBC (Rent/Buy Comparison) - Sales or investment tool to compare renting and savings account investment vs. purchasing a particular property \$250.00*
demo disk & manual 35.00*

General Ledger w/Cash Journal \$250.00*
O&A CBASIC Books (ea.) \$ 20.00

8" single density \$ 3.00 ea.
450' tape cartridges \$20.00 ea.



8041 Newman Ave., Suite 208
Huntington Beach, CA 92647
(714) 848-1922

Registered trademark of:

- *1 Digital Research
- *2 Tandy Corp.
- *3 Compuser Systems, Inc.
- *4 Ryan-McFarland Corp.
- *5 Small Business Applications, Inc.
- *6 Verbatim Corp.



Distributed in U.K. by:
Microcomputer Applications Ltd.
11, Riverside Court,
Caversham, Reading, England
TEL: (0734) 470425

The DATA-TRANS 1000

A completely refurbished
IBM Selectric Terminal with
built-in **ASCII** Interface.

***FOR YOUR TRS-80 WITH OR WITHOUT
EXPANSION INTERFACE.**

Features:

- 300 Baud
- 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.

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



Desk and table top models also available.

For orders and information
DATA-TRANS
2154 O'Toole St. 274
Unit E
San Jose, CA 95131
Phone: (408) 448-0800

**SMALL
SOFTWARE
SYSTEM**

PRODUCTS FOR THE TRS-80

**SMALL
SOFTWARE
SYSTEM**

NEW!

PENMOD - \$19.95. Adapts Disk-Pencil to Radio Shack lower case modification. Also adds single page printing and several other new features.

SCRIPMOD - \$14.95. Add TRS232 print driver, or add handshake/linefeed control to RS-232-C driver in Radio Shack's SCRIP51T (disk version only).

WHISTLER: HOME CONTROLLER INTERFACE - \$34.95. New hardware product that controls lights, appliances, computer peripherals, darkroom timers and other 115 volt devices anywhere in your house! Software controlled by cassette cable. Use with Sears or BSR Home Control System with ultrasonic option. Assembled, tested, self-contained, and includes Basic software.

UTILITIES

RSM-2: MACHINE LANGUAGE MONITOR FOR 16K TRS-80'S - \$26.95

RSR-2D: THREE VERSIONS OF RSM-2 FOR DISK SYSTEMS - 29.95

RSR-2 RELOCATOR: PUT RSM-2/2D ANYWHERE IN MEMORY - 9.95

Machine Language monitors with Z-80 disassembler! HEX and ASCII memory dumps; EDIT, MOVE, EXCHANGE, VERIFY, FILL, ZERO, TEST, or SEARCH memory, read/write SYSTEM tapes, enter BREAKPOINTS, PRINT with TRS232 or Centronics, read/write disk sectors directly! RSM-2 tape loads at top of 16K LEVEL 1 or II; RSM-2D disk includes 3 versions for 16K, 32K and 48K.

DCV-1: CONVERT SYSTEM PROGRAMS TO DISK FILES - \$9.95. Execute Adventure, Air Raid, RSL-1, ESP-1, T-BUG, etc. from disk, even if they interfere with TRSDOS! New version works with TRSDOS 2.3.

BASIC-1P: LEVEL-1 BASIC WITH PRINTING! - \$19.95. Run any LEVEL-1 BASIC program on your 16K Level-2. PLUS LPRINT and LLIST with our TRS232 or Centronics. Furnished on tape; can be used from disk.

MACHINE LANGUAGE GAMES

AIR RAID, BARRICADE or RSL-1: - \$10.00 each, all 3 for \$25.00

AIR RAID: A super shooting gallery; our most popular game. Ground based missile launcher shoots high speed aircraft! Hours of fun!

BARRICADE: "BREAKOUT" for the TRS-80! Break through 5 walls with high-speed ball and keyboard controlled paddle! 96 different options!

RSL-1: Enter patterns with repeating keyboard! Save patterns on tape (4 furnished). Play John Conway's LIFE. FAST - about 1 second per generation!

SMALL SYSTEM SOFTWARE P.O. BOX 366 NEWBURY PARK, CA 91320

PROFESSIONAL SOFTWARE

NEW! ELECTRIC PENCIL-11B FOR MODEL-11. Super Pencil version runs under TRSDOS or CP/M. Automatic centering, dynamic print formatting, single-page printing, etc. Buffered keyboard eliminates missed characters at line ends! Diablo, NEC, Qume versions include bold face print, variable pitch, & more! **TRSDOS PENCIL:** Standard printer - \$325; Diablo, NEC, Qume (specify) - \$350 **CP/M PENCIL:** Standard printer - \$275; Diablo, NEC, Qume (specify) - \$300

ELECTRIC PENCIL FOR MODEL-1: TAPE-\$99.95, DISK-\$150.00. Popular video editor for creating and saving text files. Prints formatted copy with right justification, page titling & numbering, etc. Upper case only, or lower case with modification. Requires at least 16K.

RSN11: ENHANCED RSN MONITOR FOR THE MODEL-11 - \$39.95. Relocatable version of RSM-2D plus screen editor for modifying either memory or disk sectors in both Hex and ASCII, split screen scrolling, and formatted serial or parallel printing. Sold on self-booting disk; directions to save as TRSDOS file.

CP/M OPERATING SYSTEM: MODEL-1 - \$145.00; MODEL-11 - \$170.00. The 8080/780 "Software Bus" for TRS-80's. Model-1 includes TRS232 and RS-232-C software. Model-11 supports single and double density disks, and reads TRSDOS files. Many unique utilities included in both versions!

PRINTER SUPPORT

TRS232 PRINTER INTERFACE - \$59.95 Assembled & tested printer interface for RS232 or 20-mil current loop printers. Expansion interface not required. Print from Level-11 BASIC, CP/M, BASIC-1P, ELECTRIC PENCIL, etc. Standard cassette software included. Add \$2.00 for shipping.

TRS232 "FORMATTER" SOFTWARE PACKAGE - \$14.95. Adds page and line length control, printer pause, "smart" line termination, etc. to TRS232.

RSR232: Adds RS-232-C capability to RSM-2/2D monitors - \$9.95

PEN232: RS-232-C for cassette version Electric Pencil - 9.95

EDT232: TRS232 and RS-232-C for tape version of EDTASM - 9.95

OTHER PRODUCTS FOR THE TRS-80

ESP-1: \$29.95. Assembler, Editor, Monitor (8080 micro)!

LST-1: 8.00. Listing of Level-1 BASIC with some comments

CP/M by Digital Research, Inc. TRS-80 by Tandy Corp.

See your dealer or order direct. Calif. Residents add 6% tax

SMALL SYSTEM SOFTWARE P.O. BOX 366 NEWBURY PARK, CA 91320



Puts sophisticated business strategies at the fingertips of all TRS-80 Level II owners! **FINPLAN: A Financial Planning Program for Small Businesses** is the most complete financial planning program available.

Here's why . . . **Developed by an expert:** The author, Robert Montgomery, is president of a management consulting firm and a recognized authority on new product planning. **Easy to use:** Data can be entered from normal balance sheet statements. Within seconds, **FINPLAN** will provide financial projections for up to 5 years. **Versatility:** Are you thinking about modernizing equipment, expanding into a new product line, or starting a new business from scratch? Will your plans run you out of business, out of cash, or on to the Fortune 500 list? **FINPLAN** will answer these and other financial questions before you invest a dime. **Extensive documentation:** You don't have to be a financial wizard to use **FINPLAN** because it comes with 80 pages of documentation.

Presented in a step-by-step format, the documentation is a great learning tool for those who need it or a dynamic applications tool for getting the most out of **FINPLAN**. And, **FINPLAN** is reasonably priced. #05103, TRS-80 Level II cassette, \$69.95; #05108, TRS-80 Level II Disk, \$74.95.

**Available at your
local computer store!**

or **Call Toll Free**, 24 hours a day,
(1-800-827-3777, ext. 302)* **TO CHARGE**
YOUR ORDER TO Master-Charge or Visa!
Minimum order is \$10.00; Customer pays
postage and handling.

*From Missouri, call 1-800-892-7655, ext. 302

Hayden Book Company, Inc.

50 Essex Street
Rochelle Park NJ 07662

✓ 419

Useful software for easy data input.

Versatile Input

Tim Wilde
Box 8775
Universal City, CA 91608

I don't know about you, but for me the greatest joy from my computer comes during the development of some useful software. Each time I write a new program I try to be more creative, using lessons learned from past programs plus new techniques and subroutines that I've run across in the many magazines and club newsletters that I read.

Advancing from SET (X,Y) graphics to POKE and then string-packing techniques, you also advance in the artful use of BASIC. It's a very satisfying experience.

More Elegant INPUT

So with this noble goal in mind I decided to come up with an alternative to the INPUT statement. What originally prompted me to do this was my desire to have the majority of the screen "painted" white, with only a block of darkness in the center where input questions or prompts would appear.

With the INPUT statement, after typing in the data, you would hit ENTER, at which time the rest of the line (which I wanted to keep white) would be erased. Not only that, but I wanted a blinking cursor along

with other automatic features I'll describe later.

Another negative aspect of the INPUT statement is that you can't enter commas and other string delimiters. Disk BASIC gives the LINE INPUT statement which solves that problem, but it's still basically the old inelegant INPUT statement.

The resulting input subroutine was developed and its first application was in a program for recording customer sales data for my own company.

The overall scheme uses an input subroutine to enter data into a temporary array I(EC). During the course of a single pass through the subroutine, I use 14 variables in array I(EC). I'll call these variables INPUT LINES I(EL).

After completing a pass through the input subroutine, the contents of I(EC) will be transferred to a master array for later output to tape or disk. Following this transfer, all the elements of I(EC) will be nulled (I(EC) = "") and the program will return to the beginning of the INPUT subroutine for new customer data.

After initialization, I run a program called Screen that creates and stores various graphic forms that will be recalled in the subroutine as well as other parts of Customer Sales Program, using the GSF Package by Racet Computes. One of GSF's many features is the ability to store a display in protected memory, so that it can be recalled by a simple BASIC state-

ment.

At the end of Screen program I have the statement RUN SALES/BAS, which loads and runs the Customer Sales Program. This is where the INPUT subroutine comes in.

For purposes of this article I've added lines 1000 to 1020 to create a simple version of the graphic display used during data input.

The Subroutine

Line 20 clears 1000 bytes of string space and predefines the variables used as string or integer. Array I(EL) is dimensioned to hold 14 data items, and array S(N,X) is dimensioned for 20 customers.

Line 30 calls or creates a screen print routine. You can paint your screen however you like. For demonstration purposes, I'll use the subroutine at line 1000 for screen painting.

In line 100 PC% stands for the blinking cursor. Initially it's set equal to 32, which when inserted into a PRINT CHR\$(PC%) statement prints a blank space. I'll discuss the cursor further at line 130. EL is the subscript for array I(EL) and is initially set for INPUT LINE #1 [EL(1)].

Line 110 is the FOR-NEXT loop that makes the whole thing work. Each I(EL) has a number, 1 to 14. The first time through the program, EL = 1. Therefore, the FOR-NEXT loop reads EP (EP = "print @ location" where I want the cursor to begin) and ES (ES = maximum number of characters allowed for an input line).

As the program progresses EL increments, or decrements. The FOR-NEXT loop rereads DATA lines 270-275 ending up with EP and ES equal to the correct data for I(EL).

RESTORE enables you to start from the beginning of the DATA line for each READ session. EZ counts the number of spaces over from the original position (EP). Initially it's set to zero.

The PRINT@ EP statement prints a string of blanks equal to the maximum number of characters (ES) allowed for that line. This is my way of clearing the line without erasing any of the white boundary.

Each I(EL) is defined below:

- I(1) - customer number (3 characters)
- I(2) - customer name (20 char.)
- I(3) - customer business name (20 char.)
- I(4) - address line 1 (20 char.)
- I(5) - address line 2 (20 char.)
- I(6) - address line 3 (20 char.)

The remaining lines are for customer phone numbers.

- I(7) and I(11) - "H" for home or "W" for work (1 char.)
- I(8) and I(12) - area code (3 char.)
- I(9) and I(13) - 3-digit prefix (3 char.)
- I(10) and I(14) - 4-digit number (4 char.)

As you can see, each phone number is made up of four separate variables. The reason for this is to allow for punctuation during data input, and yet end up with a single variable for each phone number containing no punctuation (or at least limited to 11 characters).

Later, in line 290 each set of

four variables is added together to create these two phone number variables (I(7) and I(11)).

In line 120 when EL is equal to, or greater than 7, this statement POKES the necessary punctuation to the screen for the phone numbers. Since line 120 is within the main FOR-NEXT loop this punctuation will remain on the screen for the duration of the telephone number input.

The INKEY\$ Loop

Line 130 is very important. It starts the INKEY\$ loop. PC% = 175 - PC% creates a blinking cursor.

You'll recall that in line 100 PC% was set equal to 32. During the first pass of the INKEY\$ loop, PC% becomes equal to 143. This is a graphic block when used in a PRINT CHR\$(PC%) statement. The next time line 130 is executed, PC% equals 32 again, resulting in a blank and so on. Voilà—a blinking cursor!

The statement PRINT @ EP + EZ, CHR\$(PC%) therefore prints the cursor at (EP + zero) the first time, then EZ increments or decrements as characters are entered.

Lastly there's the statement I = INKEY\$ which scans the keyboard setting string variable I equal to whatever the keyboard sees.

In line 140, PEEK (14400) and (14464) check to see if both the shift key and ← are pressed. If they're both down, the program branches to LINE 280.

If both keys are down the cursor will move backward erasing characters from the screen and memory. If you continue to hold the keys down, they act like a repeat key.

This is the only occasion where I PEEK the keyboard memory for control keys. For the remaining control keys I test the ASCII value of I [ASC(I)], for reasons you'll see later.

Line 150, as with any INKEY\$ statement, tests for no key being depressed, in which case the INKEY\$ loop is repeated. This no-key test must come before you test for the ASCII value of string variable I, because if I is null, you'll get an FC ERROR. On

the other hand, it must come after the statement in line 140 in order to get the repeat backspace.

Line 160 checks the cursor character. If it's the graphic block, a blank gets printed in its place. This eliminates a possible stray cursor after hitting ENTER, CLEAR, ←, etc.

Lines 170 to 230 check to see if the key being depressed is a control key. These keys are SHIFT/E, SHIFT/S, CLEAR, ←, ↑ and ENTER. I test for the ASCII value, since it gives a single discrete value for individual keys or any combination of keys.

While writing this program I used a subroutine in line 9000: I\$ = INKEY\$: IF I\$ = "" THEN 9000 ELSE PRINT @ 0, I\$, ASC(I\$): GOTO 9000. Every time I wanted to find out the ASCII value of a key or combination of keys, I'd run line 9000.

In line 170 if EL is greater than 6, we must be in the telephone number segment of the program. At that point, if SHIFT and the S key are held down, the program won't enter that particular set of four phone number variables. Instead it goes to the next phone number, or, if it happens to be skipping the second and last phone number entry, it

branches to line 290, where the phone numbers are assembled.

Starting Over

At line 180 if ASC(I) = 32, you've hit the CLEAR key, indicating that you want to erase the line and start over. A string of blanks is printed at the cursor starting position (EP) for that time. The number of blanks is the same as the maximum number of characters allowed (ES). EZ is set to zero, and the temporary input, I(EL), is nulled. Note that EL stays the same.

At line 190 if ASC(I) = 8, you've hit the ← causing the cursor to backspace one step and

```
20 CLEAR (1000) : DEFINT E,N : DEFSTR I,P,Q,S,T : CLS : DIM I(15), S(20,B)
30 CLS : GOSUB 1000 : REM *** CREATE OR RECALL SCREEN DISPLAY HERE ***
100 PC% = 32 : EL = 1
110 RESTORE : FOR EC = 1 TO EL : READ EP,ES : NEXT : EZ = 0 : PRINT @ EP, STRINGS(ES,32);
120 IF EL > 6 POKe 15833,62 : POKe 15837,45 : POKe 15841,45 : POKe 15897,62 :
    POKe 15901,45 : POKe 15905,45 : PRINT @ 599, " + HOME OR WORK";
130 PC% = 175 - PC% : I = INKEY$ : PRINT @ EP + EZ, CHR$(PC%);
140 IF PEEK(14400) = 32 AND PEEK(14464) = 1 GOTO 280
    REM *** SHIFT/LEFT ARROW = REPEAT BACKSPACE ***
150 IF I = "" GOTO 130
160 IF PC% = 143 PRINT @ EP + EZ, CHR$(32);
170 IF (EL > 6) AND (ASC(I) = 115) THEN IF EL = 7 THEN EL = EL + 4 : GOTO 110 ELSE GOTO 290:
    REM *** SHIFT/S TO SKIP PHONE NUMBER ***
180 IF ASC(I) = 31 PRINT @ EP, STRINGS(ES,32); : I(EL) = "" : EZ = 0 : GOTO 130 :
    REM *** CLEAR KEY = ERASE AND START OVER ***
190 IF ASC(I) = 8 GOTO 280 : REM *** LEFT ARROW = SINGLE BACKSPACE ***
200 IF ASC(I) = 91 THEN EL = EL - 1 : I(EL) = "" : PRINT @ EP, STRINGS(ES,32); : GOTO 110 :
    REM *** UP ARROW = REDO LINE ABOVE ***
210 IF ASC(I) = 13 THEN PRINT @ EP, I(EL) + STRINGS(ES - LEN(I(EL)) + 1, 32); : EL = EL + 1 :
    IF EL < 15 GOTO 110 ELSE 290 : REM *** ENTER KEY = SAVE ENTRY ***
220 IF ASC(I) < 32 GOTO 130
230 REM *** RESERVED FOR SHIFT/E = EDIT MODE ROUTINE ***
240 IF EZ < ES THEN I(EL) = I(EL) + 1 : EZ = EZ + 1 : PRINT @ EP, I(EL); : GOTO 130
250 IF EL < 7 THEN 130 ELSE IF EL < 14 THEN PRINT @ EP, I(EL); : EL = EL + 1 : GOTO 110
260 GOTO 290
270 DATA 88,3,152,20,216,20,280,20,344,20,408,20,472,1,474,3,478
275 DATA 3,482,4,536,1,538,3,542,3,546,4
280 IF EZ > 0 THEN I(EL) = LEFT$(I(EL), EZ - 1) : PRINT @ EP + EZ - 1, STRINGS(ES - EZ + 2, 32);
    EZ = EZ - 1 : GOTO 130 : ELSE GOTO 130
290 I(7) = I(7) + I(8) + I(9) + I(10) : I(11) = I(11) + I(12) + I(13) + I(14)
300 FOR X = 1 TO 7 : S(N,X) = I(X) : NEXT : S(N,X) = I(11) : CLS :
    FOR X = 1 TO 15 : I(X) = "" : NEXT : N = N + 1 :
    CLS : PRINT @ 320, "TO CONTINUE ENTERING DATA [ENTER C]":
    INPUT "TO PRINT IT OUT [ENTER P]": Q : IF Q = "C" GOTO 30
305 FOR X = 0 TO N - 1 : FOR E = 1 TO 8 : PRINT "ENTRY:"; X + 1, "ITEM:"; E, S(X,E) : NEXT E :
    PRINT STRINGS(60,42) : NEXT X : END
1000 T1 = STRINGS(22,191) : T2 = STRINGS(24,128) : T3 = STRINGS(18,191)
1010 PRINT STRINGS(64,191); : FOR X = 1 TO 9 : PRINT T1 + T2 + T3; : NEXT : FOR X = 1 TO 5 :
    PRINT STRINGS(64,191); : NEXT
1020 RETURN
```

Program Listing.

erase the last character. The erasing is done by a branch to line 280.

At line 200 if $ASC(I) = 91$ you hit f. This means you want to erase the line above. I put this in the program in the event you prematurely hit ENTER.

Line 210 responds to ENTER by processing the data contained in I(EL). First, I(EL) plus some cleanup blanks are printed at the proper location (EP). Subscript EL is incremented by one in preparation for entering the next INPUT line $I(EL + 1)$.

If EL is less than 15 then the program branches to line 110 to begin entering the new I(EL). However, if EL is greater than 15, then all I(EL) have been entered and we branch to line 290 to complete data processing.

Line 220 acts as a protection against entering certain TRS-80 control characters. Refer to page C1 of the Level II manual.

Line 230 is reserved for my SHIFT/E, edit/correction sub-

routine. Normally, it would say "IF $ASC(I) = 101$ GOTO ... the editing subroutine."

At line 240 if the number of characters in E(EL) is less than the maximum number allowed (ES), then the new character (I) is concatenated to the tail of I(EL). Since I(EL) is now longer by one character, EZ is incremented by one. Then I(EL) is printed at EP. This completes the INKEY\$ loop so the program returns to line 130.

If, in the above line EZ equals ES, then the program drops to line 250. You won't be able to add any more characters to I(EL). However, if you're working on INPUT lines 7 through 13, the second half of line 250 comes into play. Basically, whatever you type after each of the four elements of the phone number will trigger an advance to the next input line.

Line 260 lets you jump over line 280.

Lines 270 and 275 are the DATA statements for reading in line 110.

Testing the Cursor

The first instruction in line 280 tests whether the cursor can move any further to the left. You'll recall that EZ increments every time the cursor moves to the right of the original starting position. As long as EZ is greater than zero, there's room to move backwards or left. If EZ is greater than zero then the backspacing and erasing occurs.

This is accomplished by the statement $I(EL) = LEFT$(I(EL), EZ-1)$ which chops off the last character in string I(EL). The new value of I(EL) is printed, followed by a string of blanks equal to the maximum string length (defined by ES), minus the length of I(EL). The blanks are for erasing the rest of the line.

The new cursor position becomes EZ minus one, then the program returns to line 130.

Line 290 combines the four telephone number variables into two master variables I(7) and I(11).

Lines 300, 305 and 1000 through 1020 are included in order to make the program work for demonstration purposes.

Data is processed in line 300. The contents of the eight temporary storage variables $I(1)$ through $I(7)$ and $I(11)$ are transferred to permanent storage in two-dimensional array S(N,X).

Line 305 prints out the contents of array S(N,X).

Lines 1000 through 1020 simply create a screen image.

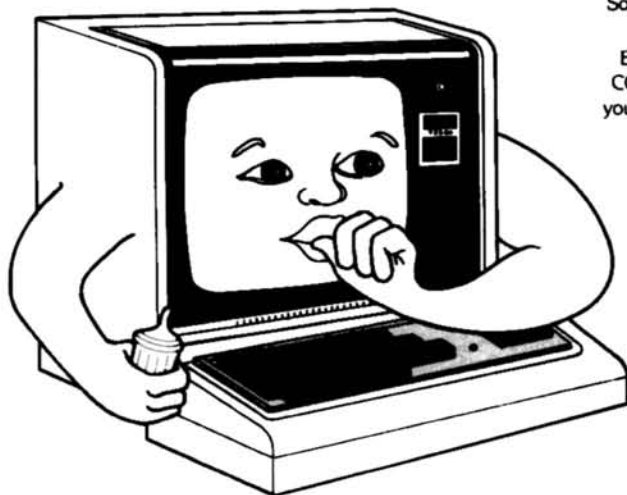
In my Customer Sales Program line 300 is the beginning of the error correction and editing subroutine mentioned in line 200. Following that, I enter the remaining sales data and then store it all on disk.

All of these later program segments draw from the input subroutine. ■

Addendum

Since writing this article, Wilde has written a machine language version of the program. It is available from the author.

GOO-GOO, GAA-GAA, REA-DEE...



The Fine Print:

Overseas rates a tad 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 Lvl I 4K and Lvl II 16K. After Oct 1, Lvl II 16K only.

So your new TRS-80 just said its first word. REA — DEE. Now what? Are you thinking of its future? About its education?

Before you run out and get an ANSI standard FORTRAN or a CODASYL data base management system, think back to when you were less than a year old. How would you have handled the bewildering plethora of data you are possibly thinking of handing to your computer? No, you have to **CLOAD** before you can RUN — we all know that. So put away all those COBOL routines and Pascal texts, and get a subscription to **CLOAD MAGAZINE**

CLOAD has just the right mix of nutritious programs for a healthy, happy new computer. Once a month, a new cassette will arrive at your door by First Class Mail, full of software that will provide a solid learning foundation for both you and your computer.

PRICES	Now	Oct 1
1 year subscription	\$36.00	\$42.00
6 month subscription	\$20.00	\$23.00
Single copies	\$ 3.50	\$ 4.50
Anthology-volume 1	\$10.00	\$10.00
Anthology-volume 2	\$15.00	\$15.00

✓32 **CLOAD**
MAGAZINE, INC.
P. O. Box 1267 • Goleta, CA 93017
(805) 964-2761

SPOOLER FOR THE TRS-80*

A proven TRSDOS* / NEWDOS* / NEWDOS80* extension which greatly improves the 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. No changes to your programs.

Specify: Mod I (TRSDOS/NEWDOS) or Mod I (NEWDOS80) or Mod II (TRSDOS 1.2). \$100.

Model II XBASIC

The best of Apparat's ideas for enhancing Microsoft Basic, with some of our own. Ten one-letter abbreviations for commonly used commands, six single-key (immediate) commands, and an extremely powerful cross-reference facility. \$50.

HOST II / TERM II

Allows "remote control" of one Model II from another, which may be miles away. Designed for remote software support at customer locations from our office. \$50.

DUMP

Shows every active variable in the resident Basic program, along with its current value. Indispensable for the tough de-bugging tasks. Requires XBASIC. \$60.

FRIEND

A CP/M* like set of shorthand notation utilities which stretch the power of TRSDOS. Copy, kill, print, display a group of files based on generic and wildcard selection. Example: move */BAS:1 to =/OLD:2 will copy all the */BAS' files on Drive 1 to Drive 2, renaming them to '/OLD.' \$75.

SKRUNCH

Compress your Basic programs to an absolute minimum. Typically saves 30-40% memory, and 7-10% run time. Very, very quick. \$35.

SAVE

Retrieve the resident Basic program following a system crash. Don't be without this one, when you need it! \$35.

AND NOW UNDER DEVELOPMENT:

SUPERCOBOL: A high level, structured language preprocessor designed to work with Radio Shack's new COBOL compiler (RSCOBOL). Greatly improves the usability of the world's most popular business computer language.

MASTER / SLAVE

Used for transferring files from one Mod II to another. All formats, and baud rates to 9600 are supported. "Slave" system can be unattended! More convenient when used with Host II/Term II. \$150.

BUGZAP

A powerful machine language utility modify / print memory, disk sectors. An invaluable part of the programmer's toolkit. \$50.

SBASIC (Model I or Model II)

From Ultimate Computer Systems. A high-level structured pre-processor for Basic. Perform named subroutines. Conditional case structure. While loops. Until loops. And much more! Just forget about line numbers! Model II version is compiled, and super fast. Model I \$50.
Model II \$75.

DOSFIX

A collection of patches to TRSDOS and Basil to enhance their usability and functions. Includes our well-known BREAK7E patches to keep the break key from being used by mistake. Free with any Model II software purchase.

TERMS: Shipments normally made same day. Terms: Visa, MC add 4%. C.O.D. orders add \$5.00. Ohio residents add 4 1/2%.



ORDER NOW!

Snapp, Inc. ✓232
8160 Corporate Park Drive
Cincinnati, Ohio 45242
513 - 891-4496

*TRS-80 and TRSDOS are trademarks of The Radio Shack division of Tandy Corp.

*NEWDOS and NEWDOS/80 are trademarks of Apparat, Inc.

*CP/M is a trademark of Digital Research.



A high quality alternative.

Selectric Hard Copy

Michael W. Bickerton, M.D.
2631 Wharton St.
Philadelphia, PA 19146

It didn't take long after buying my TRS-80 for me to realize that I needed hard copy.

As a surgical intern, I didn't have \$700 for a quality printer. But I did have \$75 for a broken-

down, used input-output IBM Selectric.

Although the typewriter was in bad shape, it had the electromagnets and contacts for use with a computer. All I had to do was figure out how to interface the two.

The only information I could find was Emerson Brooks' article, "Taming the I/O Selectric" (*Kilobaud*, June-July 1978). But

Brook's method has several drawbacks.

First, he relies on software to perform all decoding and timing functions. Every carriage return uses 500 ms, even from mid-page.

Also, the software must be loaded every time you want to use the printer. I wanted a driver that would allow the Selectric to operate at its maximum speed of 15 characters per second. I also wanted to be able to simply turn on my TRS-80 and go to work.

My driver solves both problems. It will work with BASIC's LLIST and LPRINT commands without any software patches. It will also decode both upper and lowercase characters, and will work well with such programs as the Electric Pencil. You can even write your own word processor in BASIC, since the TRS-80 will output upper and lowercase strings.

If you don't have a TRS-80, an interface circuit will still let you use this driver.

The Selectric Typewriter

The Selectric mechanism has been used in computer terminals for years.

The models 731 (Photo 1) and 735 are available on the surplus market. The only difference is the 735's wider fifteen-inch mechanism.

The basic Selectric mechanism is sturdy and well de-

signed. A type element the size of a golf ball rotates as you hit each key and types the characters. The printing quality is second to none and is suitable for everything from business letters to hardcopy memory dumps. Also, a number of different typefaces are available.

The Selectric uses a series of electromagnets to activate the proper mechanical clutches. A seven-bit Selectric code directly represents units of ball rotation (R1, R2, R2a and R5) and ball tilt (T1 and T2). The seventh bit is a shift that is actually a 180-degree rotate operation.

For example, the character "s" is represented by 0010001 (the format is shift/T2/T1/R5/R2a/R2/R1, zeros being active in all but shift and R5). To print an "s" the ball tilts two units (T2) and rotates four units (R2 + R2a). The character "S" is represented by 1010001, which is shift, tilt two and rotate four.

The standard Selectric code is called correspondence code, but many Selectrics use BCD (Binary Code Decimal) coding. These codes are not interchangeable, and use different balls. For example, the character "S" is represented by 0100110 in BCD. Also, BCD type balls have only upper case letters, numbers and special symbols.

To tell which kind your Selectric is, buy a standard type ball (correspondence). If your type-



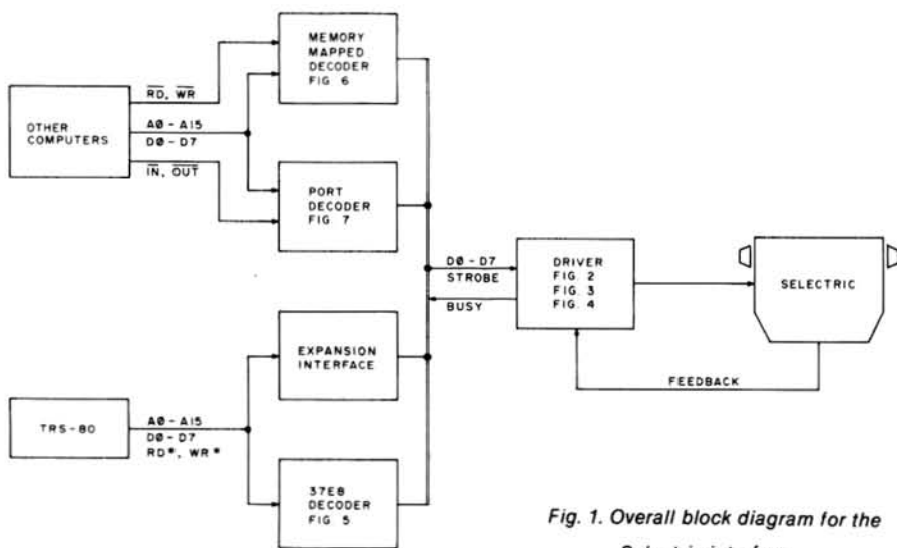


Fig. 1. Overall block diagram for the Selectric interface.

writer prints characters different from those on the keys, you have a BCD machine.

If you use the typewriter as an output device only, a BCD machine works fine. But if you wish to type from the keyboard, you must convert to correspondence. (See Robert M. Weil's "Converting Selectric Keyboards to Correspondence Code," *Kilobaud*, Dec. 1979 and Jan. 1980.)

The Selectric code is shown in Table 1. Note that the characters "<," ">," and "!" are not available on standard type balls. My interface substitutes "l" for "less than," "g" for "greater than" and "E" for "exponentiation."

Photo 2 shows the undersurface of the Selectric mechanism and Photo 3 shows a close up of the printing (T1, T2, R5, R2a, R2 and R1) electromagnets. Input-output Selectrics also contain a bank of switch contacts, which are directly above the printing electromagnets (Photo 2). These input data from the Selectric to a computer. Since most microcomputers have their own keyboards, you can disconnect the switch bank.

Driver Circuitry

Fig. 2 is a block diagram and Fig. 3 is a schematic of the driver circuit. IC1 and IC2 form the heart of the driver. They are bipolar read-only memories that

convert ASCII into correspondence code. A clever arrangement decodes control commands. If a control function is input D07 goes high. This is fed back to the input through R1 and C2. This serves to re-configure the read-only memories for decoding control commands.

When a strobe pulse is received, the decoded data is latched into eight-bit latch IC3 and IC4. Flip-flop IC11a is also set, providing a busy signal. The strobe pulse propagates through a series of monostable multivibrators. If a control command (carriage return, space, backspace, tab and index) is decoded, pin 2 of IC15 is high and the pulse from IC9a triggers IC10a. IC10a in turn strobbs the

control command to the proper relay through IC7 and half of IC6.

If a printing command is received, the situation is more complex. This time pin 4 of IC15 is high and the pulse from IC9a passes through IC12a to trigger IC9b. (IC10b is also triggered but has no effect.) IC9b activates IC5 and half of IC6 and prints the character. It also provides a strobe out to the strobe electromagnet.

If the typewriter is in the incorrect case the pulse triggers only IC10b and shifts up or down. IC12b detects the shift. IC9b then prints the character.

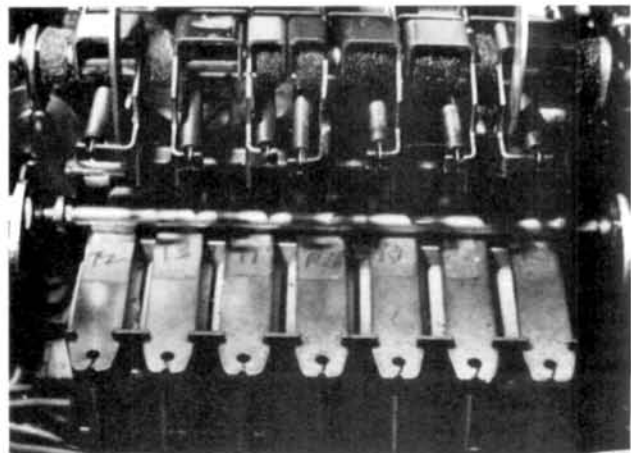
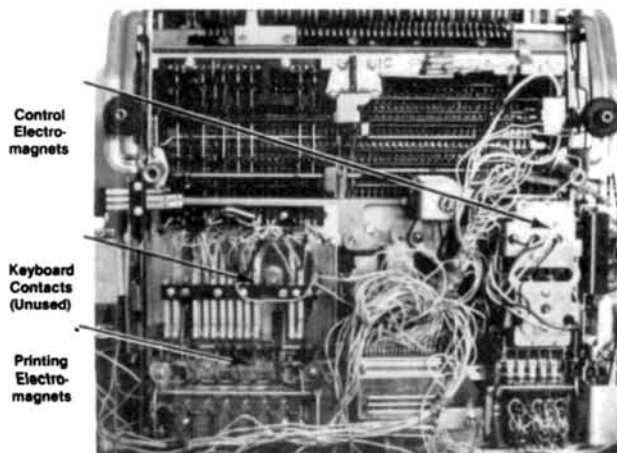
Any print or control operation activates one of five contacts in the typewriter. This is debounced by IC11b and clears IC11a, resetting the busy signal.

The 14 electromagnet drivers (Fig. 4) are identical, and use MJE6043 darlington transistors. The diodes in parallel with the relays protect the transistor from the high voltage induced when the electromagnet is turned off. Since the duty cycle is low, the transistors do not require heat sinking.

The power supply is a conventional full-wave rectifier with a regulated +5 V supply for the TTL integrated circuits. My Selectric had 48 V electromagnets that measure 475 ohms. If your electromagnets measure 125 ohms, then use the alternate 24 V supply.

Photo 2. Bottom view of the Selectric showing keyboard contacts (left), printing electromagnets (left lower) and control electromagnets (right).

Photo 3. Closeup view of printing electromagnets. From left to right they are T2, Strobe, T1, R2a, R1, R2 and R5.



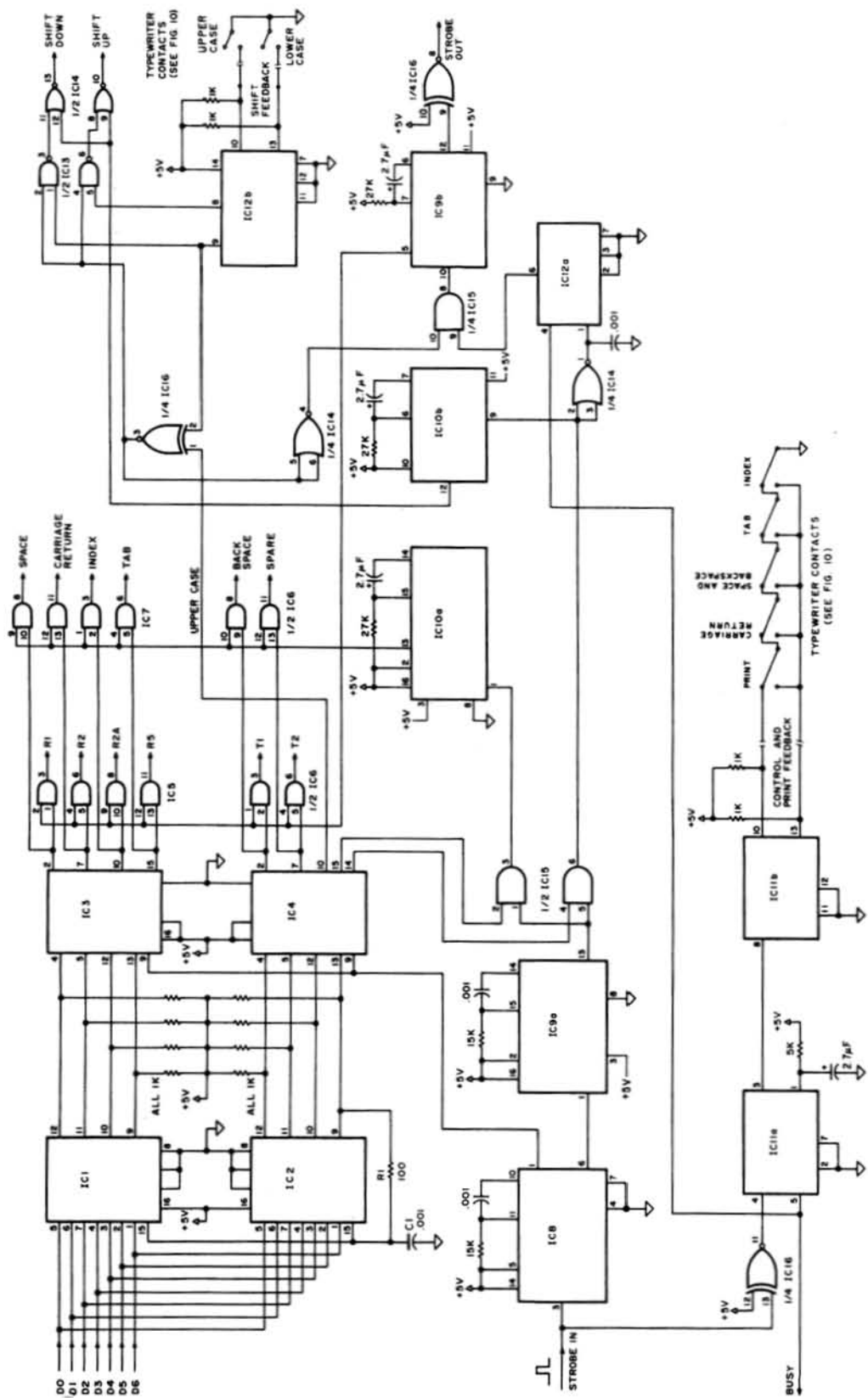


Fig. 3. Schematic diagram of the driver logic. The upper and lowercase contacts and the feedback contacts are located in the typewriter and should be connected as shown.

★★★ A PERCOM BULLETIN ★★★

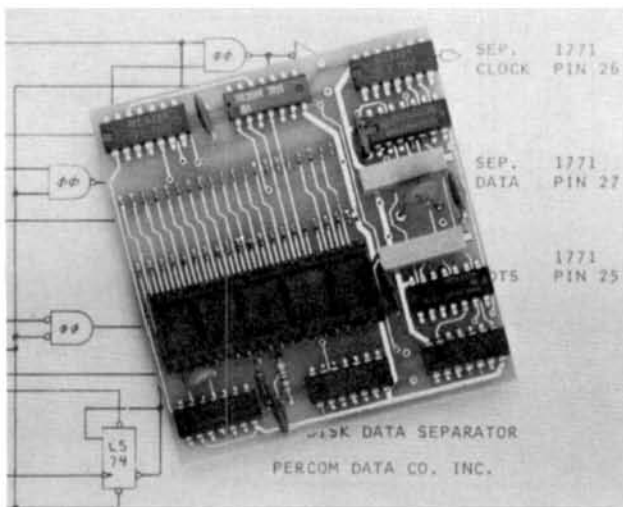
Adapter for TRS-80* computer eliminates disk read errors

Garland, Texas — Harold Mauch, president of Percom Data Company, announced that the company is marketing a simple plug-in adapter for TRS-80* computers that corrects a design deficiency in the disk controller circuit.

The problem, which causes disk read errors, has been traced to Tandy's reliance on a circuit internal to the FD1771 controller IC to perform the function of separating clock and data pulses.

As explained in the *Backgrounder*, use of the internal chip circuit for reliable data-clock separation is a design shortcut which the manufacturer of the controller IC warns against.

The Percom solution, a PC card adapter called the SEPARATOR™, eliminates the problem by substituting an explicit data separator circuit



Percom adapter fixes TRS-80* computer disk controller.

— one which has been used reliably in Percom disk controllers since 1977 — for the internal IC separator circuit.

The SEPARATOR™ is installed without modifying the host system. The user merely removes the FD1771 IC from

the host controller, installs the IC in the DIP socket on the SEPARATOR™ card, and plugs the adapter into the vacated socket of the host controller.

Percom cautions that opening the Expansion Interface of the TRS-80* computer, which is required to install the SEPARATOR™, may void the computer's limited 90-day warranty.

The SEPARATOR™, which sells for \$29.95, may be purchased from Percom dealers or ordered direct from the factory. The Percom toll-free order number is 1-800-527-1592.

Payment for mail orders may be made by certified check, cashier's check or money order, or charged to a Master Card or VISA account. Texas residents must add 5% sales tax.

Percom Mini-Disk Drives Store More, Cost Less.



Percom mini-disk drives store more data, are more reliable, yet a 40-track Percom drive costs \$100.00 less than a 35-track Tandy drive.

You can store over 102 Kbytes per side on Percom TFD-100™ 40-track drives; 197 Kbytes on one side of a TFD-200™ 77-track drive. A patch — supplied free on minidiskette — upgrades TRSDOS* for operation with the newer 40- and 77-track drives.

Both TFD-100™ and TFD-200™ models are available in one-, two- and three-drive configurations.

Prices start at \$399 for a single-drive TFD-100™, \$675 for a single-drive TFD-200™. Drives are supplied with heavy-duty power supplies. Metal enclosure is finished in compatible silver enamel.

See your nearby Percom dealer or order direct by calling toll-free 1-800-527-1592.

Five-Inch Disks Store More Than Eight-Inch Disks!

Garland, Texas — June 25, 1980 — Percom Data Company has begun production of a double-density disk controller adapter for TRS-80* Model I computers.

Harold Mauch, president of Percom, made that announcement here today, saying that data storage capacity using the adapter and double-density disk operating system — which is included — can be increased to as much as 294 Kbytes per minidiskette.

By comparison, the maximum storage for larger eight-inch disk systems used with the TRS-80*

Model I computer is about 290 Kbytes.

Mauch said the PC card adapter, which plugs into the controller chip socket of the computer Expansion Interface, works equally well for either single-density or double-density storage, and users may continue to run programs under TRSDOS*, OS-80™ and other single-density operating systems with the adapter installed.

Price, for the plug-in adapter, the TRSDOS*-like double-density DOS and a utility for converting files and programs from single- to double-density format is expected to be \$219.95.

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

✓ 258 PERCOM DATA COMPANY, INC. 211 N. Kirby Street 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.

BACKGROUNDER

CRC ERROR! TRACK LOCKED OUT!

by the Technical Staff
Percom Data Company

This problem started while we were studying an annoying problem with the TRS-80* computer. Disk drives sold by Percom are realigned and tested before shipment. We noticed, however, that some disk drives would pass the Percom inspection but just would not work reliably on the inner tracks with a TRS-80* computer. These drives were within the manufacturer's specifications, and would function perfectly on other disk systems Percom manufactures — "perfectly" here meaning more than 50 million bytes read without error!

The disk read data separation arrangement in the TRS-80* computer Expansion Interface uses an internal data separator of the FD1771 disk formatter/controller IC. Use of the FD1771 internal data separator is not recommended by Western Digital, the IC manufacturer. The following note appears on page 17 of the FD1771 data sheet:

Internal data separation may work for some applications. However, for applications requiring high data recovery reliability, WDC recommends external data separation be used.

We suspected the data separator because the problem was most severe on disk inner tracks where storage density is highest and data separation is most critical.

To prove our point, a technician breadboarded a standard Percom data separator circuit, and configured it to plug directly into the FD1771 IC socket of the TRS-80* computer controller.

When connected to the TRS-80* computer, a troublesome drive functioned perfectly! We ran a BACKUP utility many times and never got a track lock-out. Before we added the external data separator circuit to the computer, this same drive would always lock out tracks, and would have difficulty reading from the inner (higher number) tracks.

The Percom data separator circuit fixes the mini-disk controller of the TRS-80* computer. The type of drives being used is irrelevant; the circuit eliminates disk read errors resulting from the inability of the Tandy controller design to reliably separate clock and data signals when reading high density inner tracks.

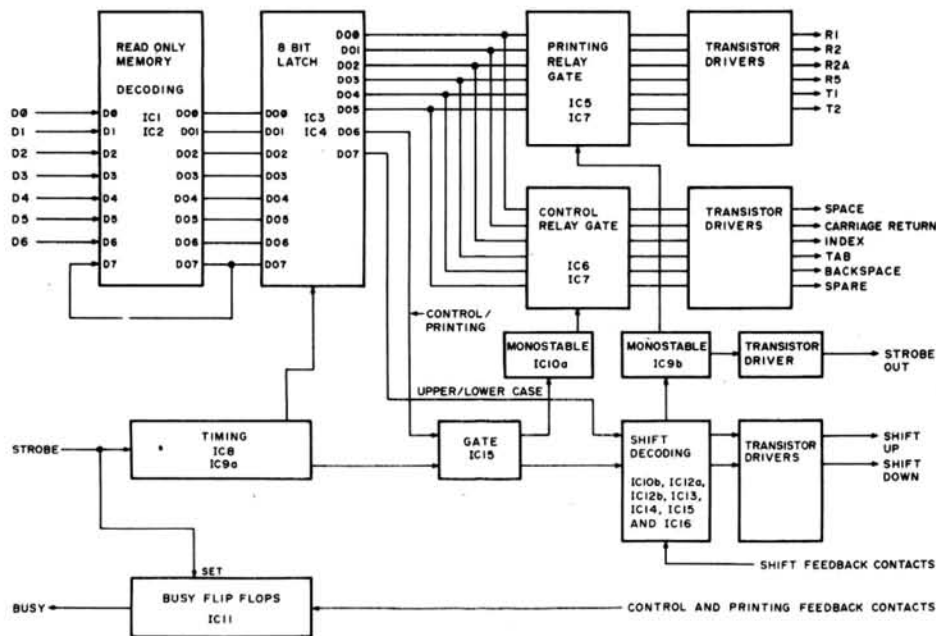


Fig. 2. Block diagram of the driver circuitry. With the exception of the feedback connections, all outputs on the right side of the diagram go to the Selectric electromagnets.

Interface Circuitry

The driver connects directly to the TRS-80 expansion interface. If you don't own the interface, Fig. 5 presents a suitable one.

Radio Shack Level II BASIC reserves memory position 14312 decimal (37E8 hexadecimal) for the line printer. IC20, IC21 and IC22 decode this signal, and pin

6 of IC22 goes low when memory position 14312 is addressed.

Any time the TRS-80 outputs to the line printer, it places the ASCII code on the data bus, outputs 14312 to the address lines and pulses the WR* line low. ("*" denotes a signal that is normally high and goes low when active. Thus, WR = WR*.) When this happens pin 1 of IC23 goes high, latching the data into

eight-bit buffer IC18 and IC19 and triggering the monostable IC24 to produce a strobe signal.

Then Level II Basic looks at memory position 14312 by pulsing the RD* line low, and waits until D7 (the busy signal) goes low before outputting another character.

To use another computer, you need to know if your language uses memory mapping or port addressing. Either of the circuits in Figs. 6 or 7 should be suitable.

Fig. 6 is a memory-mapped interface that uses four cascaded 74LS85 four-bit magnitude comparators. When the input address lines A0-A15 are equal to the address programmed on the dip switches SW1 and SW2, the cascade output (pin 6 of IC25) goes high. If the write line WR* goes low, then the data lines D0 to D7 are latched into eight-bit latch IC18 and IC19.

At the same time, IC24, a monostable multivibrator, gives a strobe signal. If the read line RD* goes low, the busy signal is input to the computer. On the TRS-80, D7 inputs the busy status, and D6, D5 and D4 input other status information (which I defeated by tying the lines to the appropriate logic levels). If your

CHAR.	ASCII	CORR.
CR-LF	10-13	128
BS	24	128
INDEX	26	128
SPACE	32	128
!	33	127
"	34	85
#	35	126
\$	36	121
%	37	117
&	38	125
'	39	21
(	40	112
)	41	113
*	42	124
+	43	70
,	44	12
-	45	0
.	46	22
/	47	9
0	48	49
1	49	63
2	50	54
3	51	62
4	52	57
5	53	53
6	54	52
7	55	61
8	56	60
9	57	48
:	58	77
;	59	13
< (1)	60	41
=	61	6
> (g)	62	15
?	63	73
@	64	118
A	65	92
B	66	96
C	67	108
D	68	109
E	69	101
F	70	78
G	71	97
H	72	79
I	73	84
J	74	71
K	75	100
L	76	105
M	77	95
N	78	102
O	79	89
P	80	69

Table 1. ASCII and correspondence codes. All values are decimal. When decoded into binary the correspondence code represents (MSB)Control Character/Shift/T2*/T1*/R5/R2a*/R2*/R1*(LSB).

language uses another arrangement, connect pins 3, 5, 7 and 9 of IC17 to the appropriate data lines.

Fig. 7 shows a port-based interface circuit. 74LS85 magnitude comparators are again used to compare A0 through A7, with the programmed port address on dip SW1. Instead of RD* and WR* signals, the port interface uses IN* and OUT* lines. Restrictions on status information are the same as for the memory-mapped interface.

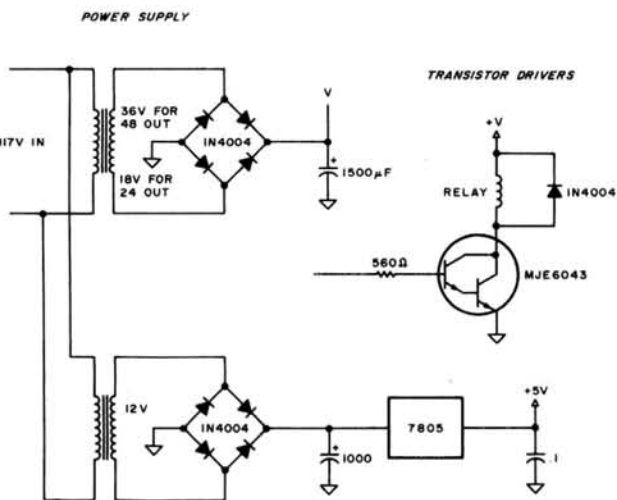


Fig. 4. The transistor drivers are all identical and use MJE6043 transistors. There are 14 transistor drivers; six for T1, T2, R1, R2, R2a and R5, one for the strobe electromagnet, five for the carriage return, space, backspace, tab and index electromagnets and one each for shift up and shift down electromagnets.

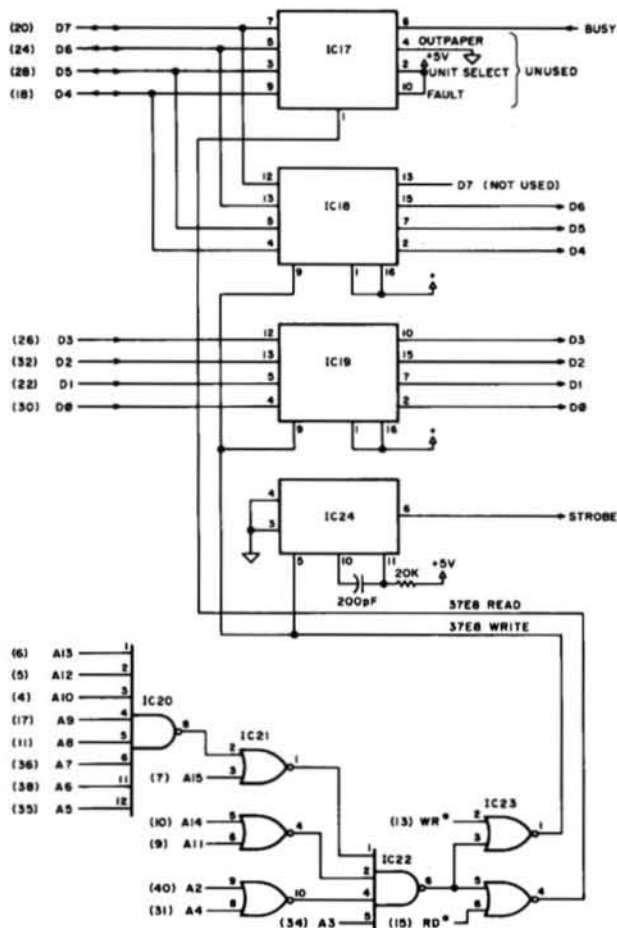


Fig. 5. The interface for the TRS-80. If you have the expansion interface, this circuit is not needed since the signals, D1 to D7, busy and strobe, are available from the expansion interface. Numbers in parentheses correspond to the TRS-80 expansion port edge connector.

Construction

Use any convenient method. The layout isn't critical, so printed circuitry or perfboard is suitable. I used wire-wrap sockets and a slit-n-wrap tool (Photos 4 and 5).

I brought all logic signals out through a 44-pin edge connector for use in a homemade card cage. The transistor drivers, interface circuit and power supply were constructed on separate perfboards.

I had some difficulty locating a 40-pin connector to plug into the TRS-80 expansion port. I finally used an AP edge connector (part number APP924065-36) with a 36-inch ribbon cable permanently attached.

Fig. 8 shows the TRS-80 expansion port pin designations. The TRS-80 uses odd pin num-

bering, which is printed on the circuit board.

Be especially careful when wiring the 40-conductor ribbon cable. I used an ohmmeter to trace each wire and engraved the word "top" on the upper surface of the 40-pin connector to ensure that I would not insert it upside down.

I used 25-pin D plugs and sockets with a 25-conductor ribbon cable to connect the Selectric. Fig. 8 shows my pin designations for the D connectors. My Selectric had a 50-pin plug attached to a heavy metal bracket. I substituted the 25-pin D socket and hooked up the cable.

I wanted to build the complete circuitry into the Selectric typewriter cabinet, but didn't have enough room. If you have the space, you might consider this option.

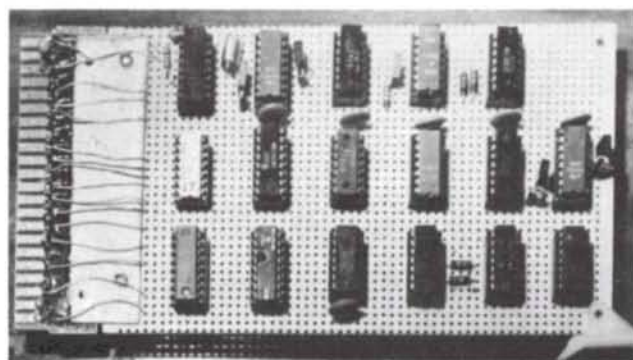


Photo 4 and Photo 5. The driver circuit board. Wire wrap sockets and a slit-n-wrap tool were used. The 44-pin edge connector is for use in a home made card cage.

THE LOWEST

prices on this high-quality software. Buy direct and save 50%. Now, also available for CBASIC on CP/M and MBASIC on HEATH HDOS.

DATA BASE MANAGER Mod-I \$69 Mod-II \$199
You can use it to maintain a data base & produce reports without any user programming. Define file parameters & report formats on-line. Key random access, fast multi-key sort, field arith., label, audit log. No time-consuming overlays. 500 happy users in a year. Mod-II version with over 50 enhancements.

A/R Mod-I \$69 Mod-II \$149
Invoices, statements, aging, sales analysis, credit checking, form input, order entry. As opposed to most other A/R, ours can be used by doctors, store managers, etc.

WORD PROCESSOR Mod-I \$49 Mod-II \$49
Center, justification, page numbering... Used for letters, manuals, and reports. Mod-I version features upper/lower case without hardware change!

MAILING LIST Mod-I \$59 Mod-II \$99
The best! Compare and be selective. Form input, 5-digit selection code, zip code ext., sort any field, multiple labels. Who else offers a report writer?

INVENTORY Mod-I \$99 Mod-II \$149
Fast, key random access. Reports include order info, performance summary, E.O.Q., and user-specified reports. Many converted their inventory to ours!

PAYROLL, A/R, A/P, and GL available for the Mod-II DOS and CP/M. L216, a cassette package of 10 business programs for Level II 16K systems, \$59.

All programs are on-line, interactive, random access, virtually bug free, documented and delivered on disks. Mod-I programs require 32K TRSDOS, and credit is allowed when you upgrade to Mod-II. We challenge all software vendors to offer low cost manuals so you can compare and avoid those high-priced, undocumented, 'on-memory' programs. Manuals alone \$5 for Mod-I, \$10 for Mod-II. Don't let our low prices fool you!

Mod-II programs are extensively modified, guaranteed to run with 1 year newsletter and updates. 10% off for ordering more than 1 Mod-II program.

MICRO ARCHITECT, INC. 54
96 Dothan St., Arlington, MA 02174

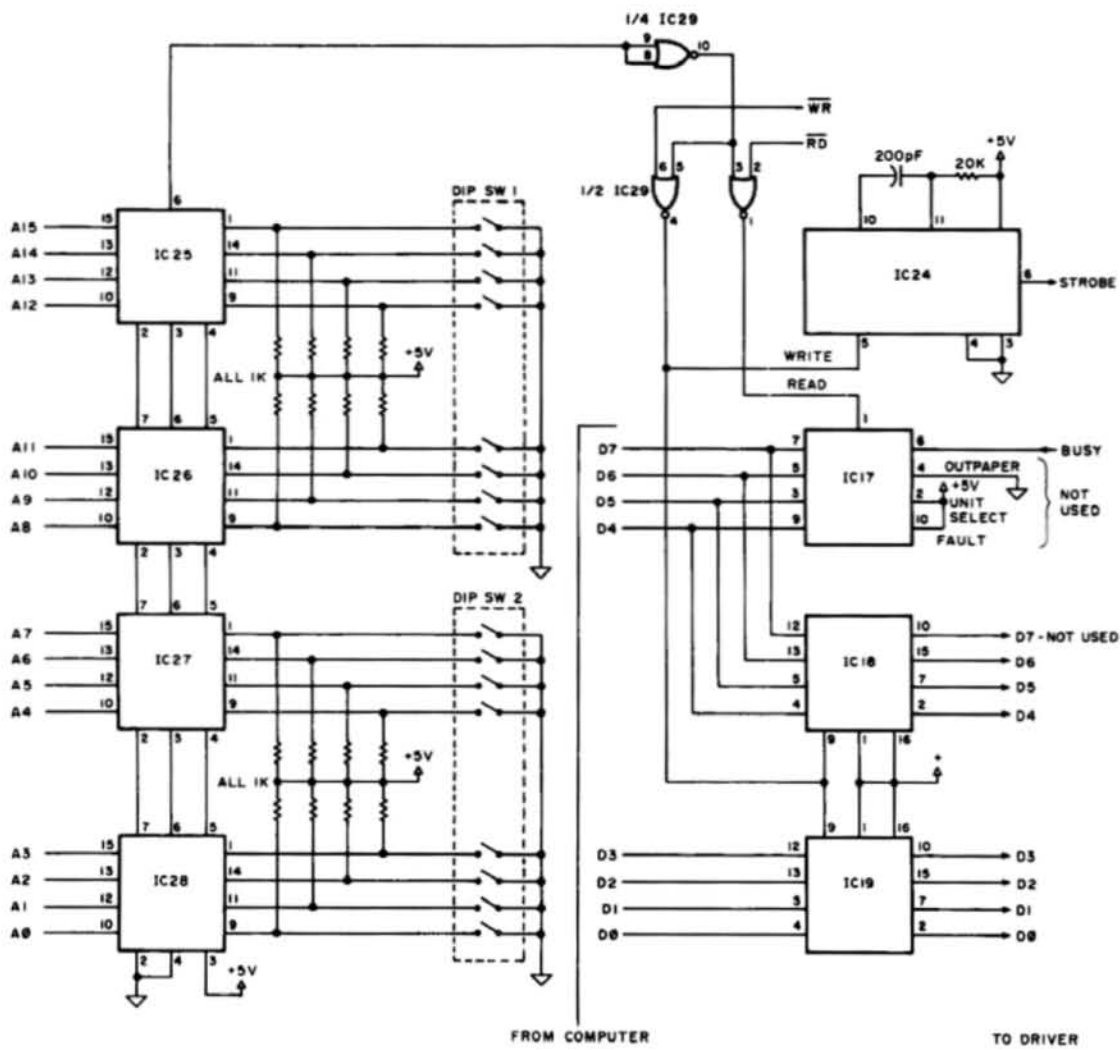


Fig. 6. This circuit will operate with computers that use a memory mapped output to the line printer. The memory location is programmed on SW1 and SW2.

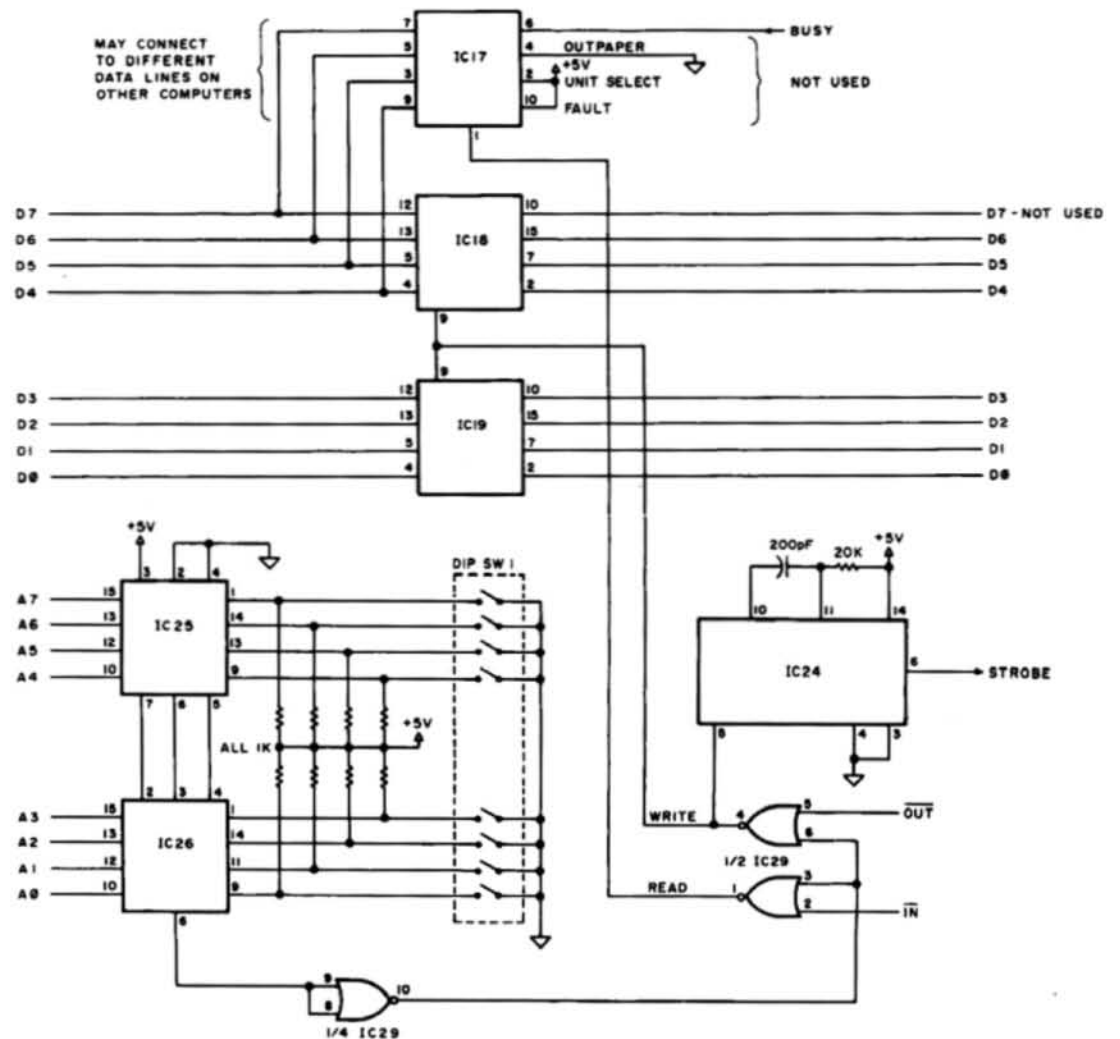


Fig. 7. This circuit will operate with computers that use a port addressing scheme to output to the line printer. The port address is programmed on SW1.



AUTHORIZED TRS-80[®] DEALER A301



COMPUTER SPECIALISTS

**10%
DISCOUNT
Off
List**
26-4002
64K 1 Drive
\$3499.00

26-1056 16K Level II System with Keypad	\$688.00
26-1145 RS-232 Board	84.00
26-1140 "O" K Interface	249.00
26-1141 "16" K Interface	365.00
26-1142 "32" K Interface	476.00
26-1160 Mini Disk - Drive O	424.00
26-1161 Mini Disk - Additional	424.00
26-1154 Lineprinter II	720.00
26-1156 Lineprinter III	1799.00
26-1180 Voice Synthesiser	339.00
26-1181 VOXBOX	145.00
26-1104 Factory Upper Lower	
Case Modification Installed	70.00
26-1506 Scripsit - Tape	60.00
26-1563 Scripsit - Disk	85.00

**15%
DISCOUNT
Off
List**
26-1054
4K Level II
\$552.00



CENTRONICS

Fast 100 CPS Centronics
730 Printer - \$675.00
Text Quality Centronics
737 Printer - \$850.00

ALL OTHER R.S. SOFTWARE
FURNITURE, STANDS, CABLES
AND ACCESSORIES DEDUCT
10% FROM CATALOG PRICE

Model II Cobol Compiler
\$360.00
Cobol Run Time Package
\$36.00

Novation Cat Modem... \$149.00
CCA Data Management
System... 72.00
Adventure Games
Games 1-9 each... 14.00

 **Acorn
Software
Products, Inc.**

GAMES:

Alien Invasion	\$9.00
Stock Market	9.00
Star Trek	9.00
Block 'Em	9.00
Ting-Tong	9.00

UTILITIES:

System Savers	14.00
---------------	-------

EDUCATION:

Language Teacher	18.00
------------------	-------

MICROSOFT

Model I Basic Compiler... \$180.00
Model II Basic Compiler... 360.00



BASF

10-5" Diskettes... \$45.00
10-8" Diskettes... 47.00

1-800-841-0860 Toll Free Order Entry

MICRO MANAGEMENT SYSTEMS, INC.⁷²

No Taxes on Out Of
State Shipments

Immediate Shipment
From Stock.

DOWNTOWN PLAZA SHOPPING CENTER
115 C SECOND AVE. S.W.
CAIRO, GEORGIA 31728
(912) 377-7120 Ga. Phone No.

Full Factory Warranty
on All Items Sold.

Largest Inventory
In the S.E. U.S.A.

*TRS-80 is a registered trademark of the Tandy Corp.

PIGSKIN

by John Laurence,
Rick Sothen,
Walter Gavenda



Don't Get Enough on Sunday?

With *Pigskin* you work on your offense and defense any day you choose. This football game for the TRS-80* has most of the elements of the games you watch every weekend. But in *Pigskin* you call the plays, watch the thirty-second clock, and get called for penalties, if you aren't careful. Featuring a graphic display of the field, the ball, and statistics on the scoreboard, *Pigskin* has eleven offensive plays and seven defensive formations.

You compete against a friend or battle against the program in *Pigskin*. If you go against the program, there are five levels of difficulty. And they aren't easy. You can even save a game if you need to go out for beer!

Acorn produces several games for the TRS-80.* These include *Pinball*, a graphic arcade-like game; *Invaders from Space*, a fast action program with sound; *Quad*, a three-dimensional strategy game; and *Gammon Challenger*, the popular backgammon program. Each is available at only \$14.95 on tape and \$20.95 on disk for a 16k, Level II TRS-80.* Ask for these and other quality Acorn programs at your local computer store.

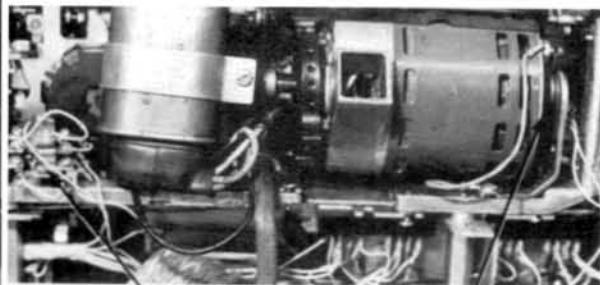
*TRS-80 is a trademark of Tandy Corp.



DEALER INQUIRIES INVITED

Acorn ✓34
Software Products, Inc.

634 North Carolina Avenue, S.E., Washington, D.C. 20003



ix Feedback Contact
Space/Backspace Feedback Contact
Tab Feedback Contact (partially hidden from view) the two wires are going to this contact

Photo 6. Rear view of the Selectric showing location of the index, space/backspace and tab feedback contacts.

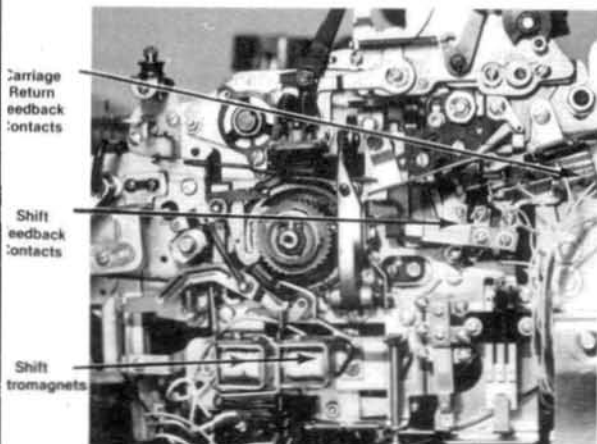


Photo 7. Right side view of the Selectric showing shift feedback contacts, shift electromagnets and carriage return feedback contacts.

My Selectric had a maze of wiring to feedback contacts, electromagnets and keyboard contacts, which I removed or disconnected. I brought the common connection to the electromagnets out to pin 1 on the D socket. My Selectric already has suppression diodes. Check the polarity of these diodes since it might be connected differently. If you have any questions, use suppression diodes on the transistor driver board instead.

Locate the printing and operational electromagnets and wire them to the D socket. Fig. 9 shows the location of these electromagnets. Next, locate all five of the feedback contacts and the two shift feedback contacts, and wire them according to the schematic diagram (Fig. 3). See Photos 6, 7 and 8 and Fig. 10 to locate these contacts.

The final connection is the ground. Attach it directly to the

frame. I used the connector bracket screw.

You can program the read-only memories with the data in Table 5. If you don't have the facilities, I will sell preprogrammed 74S387 ROMs. I'll also consider programming these memories for special features.

Operation

This interface can be used directly with Basic's LLIST and LPRINT commands. Therefore, programs that use the TRS-80 line printer will work without modification.

If you have a program with a large number of PRINT statements that you wish to output to the Selectric, you can retype all PRINT statements, substituting LPRINT.

Here's a neat trick that will accomplish the same thing:

Address	Data	115	137
12	200	116	146
13	200	117	131
14	200	120	105
15	200	121	104
30	200	122	135
32	200	123	121
40	200	124	147
41	177	125	156
42	125	126	136
43	176	127	120
44	171	130	157
45	165	131	101
46	175	132	167
47	025	133	145
50	160	136	200
51	161	137	100
52	174	140	066
53	106	141	034
54	014	142	040
55	000	143	054
56	026	144	055
57	011	145	045
60	061	146	016
61	077	147	017
62	066	150	041
63	076	151	024
64	071	152	007
65	065	153	044
66	064	154	051
67	075	155	037
70	074	156	046
71	060	157	031
72	115	160	005
73	015	161	004
74	051	162	035
75	008	163	021
76	017	164	047
77	111	165	056
100	166	166	036
101	134	167	020
102	140	170	057
103	154	171	001
104	155	172	067
105	145	212	202
106	116	213	202
107	117	214	202
110	141	215	202
111	124	230	220
112	107	232	204
113	144	240	201
114	151	336	210

Table 5. Programmable read only memory (PROM) programming data. A 1702 or 2708 ultraviolet erasable PROM could be used, but I recommend a more permanent bipolar PROM such as the 74S387. All values in this table are octal for easy decoding into binary.

This Weekend: STIK IT... ..to your

That's right! Esmark's VIDIET-STIK light pen has the TRS-80 CONNECTION for LEVEL I & II. Your 4K to 48K TRS-80 System will come alive under your VIDIET-STIK within minutes of its arrival. That's because there are no wires to solder or traces to cut. You're up and running as fast as you can plug the interface into your system's cassette EAR-jack. LOAD our custom LIGHT-WAVE demonstration software and RUN. And because the interface has a plug for your recorder, you won't have to unplug it again when loading your other software tapes. The interface allows them to pass right thru whenever you're not using the pen. It's exclusive "switched tip" design means the pen's electrically isolated from your system when it's not in use. Just point & press! It's that simple. Plug, LOAD and RUN. And here we got the software for you to RUN with! Our demonstration tape includes a calibration program (used to adjust the CRT's brightness and contrast) plus STIK-TAC-TOE, AWARI and TOWERS. Two challenging games and a puzzle that will keep grownups and children Stik'ing it to your TRS-80 for hours. And there are instructions provided so you can begin writing your own light pen programs (lightware) for fun or profit (Level II). Or, just sit back and enjoy our LIGHT-WAVE tapes each month. Esmark's unmatched commitment to lightware can bring you up to five new games, puzzles, drills & educational quizzes or simulations each month. Our current LIGHT-WAVE releases are:

- LIGHT-PAK 2 — LIGHTPEG (4 peg-jump puzzles)
ENDRUN (Othello with a twist)
(LEVEL II) LIFE8 (Conway's LIFE with mutations)
Price: \$19.95 (including postage & handling)
- LIGHT-PAK 3 — LITEGAMMON (Backgammon you'll Stik with)
(LEVEL II) STIKWUMPUS (Caves with a little 'ite')
MAZEMASTER (Maze after maze to poke thru)
PRICE \$19.95 (including postage & handling)

Order yours now and we'll include a free copy of FLASHBACK, Esmark's newsletter dedicated to the latest news in lightware applications. And, don't forget to tell your friends. The VIDIET-STIK can also be ordered for use on most other micro systems using the following processor chips:

8080 Z80 6800 6502

All that's required is a standard cassette jack leading to Ground and a readable single bit input port. Driver software is provided along with instructions for writing lightware applications. And tell your local Dealer that Esmark's got a Dealer package he won't want to miss out on. Delivery is 3 to 6 weeks from receipt of your order. C.O.D.'s are \$3.00 extra but will be shipped within two weeks. All prices are F.O.B. Mishawaka, Indiana. Indiana residents add 4% state sales tax.

ALSO COMING FROM ESMARK:

- [] TRS-80 Printer Interface (Cassette AUX-jack interface for all RS232 printers. Includes LLIST & LPRINT software)
 - [] TRS-80 RS232 Communications Interface (Makes your TRS-80 a full I/O terminal to timesharing systems the world over. Gives you intelligent or dumb terminal capabilities at 110 or 300 BAUD. Also includes Printer Interface above with 20 mA current loop & TTL level I/O options.)
- TRS-80 is a trademark of the Tandy Corporation —



ESMARK ^{INCORPORATED}

507 1/2 E. MCKINLEY HWY. MISHAWAKA, IN 46544
(219) 255-3035

\$62.95

*ELECTRONIC SYSTEMS MARKETING

PLUS \$1.50
POSTAGE &
HANDLING

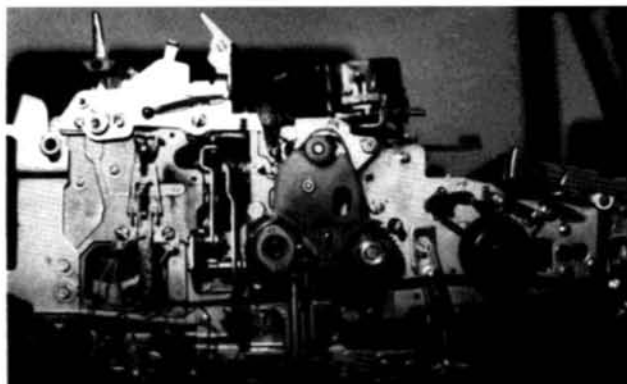


Photo 8. Left side view of the Selectric. The set of contacts in the middle of the photo operate off of the bilobed cam. The inner contacts and cam are used for the print feedback contacts.

TRS-80

VIDIET • STIK™
ESMARK, INC. MISHAWAKA, IN 46544

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 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

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 ✓88

P.O. Box 938 • Pacifica, CA 94044

Send for yours NOW: (415) 355-4635

Name _____ Photopoint \$19.95

Address _____ Pen Basic \$14.95

City _____ St. _____

Zip _____

Card # _____ Money

Ex. _____ CK. _____ Order _____ Visa MC _____

Date _____



SILVER & BLACK

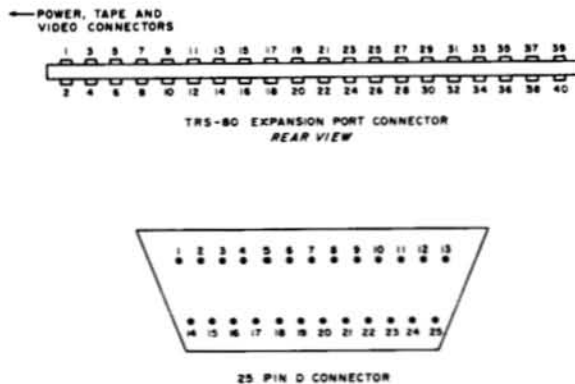


Fig. 8. Pin numbering for the TRS-80 expansion port edge connector and the 25-pin D connector used to connect the driver to the Selectric typewriter.

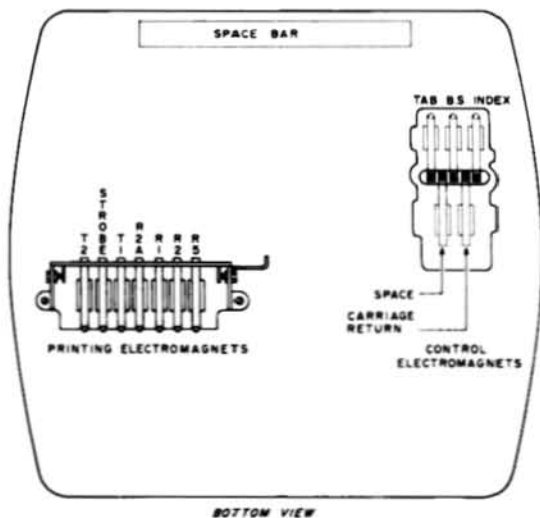


Fig. 9. Location of the printing and control electromagnets viewed from the bottom of the typewriter.

Now, all output ordinarily displayed on the video screen is typed by the Selectric.

If you type these POKE statements while in the command mode in BASIC, be sure to type them together with a colon separating them. Otherwise, after entering the first POKE, you will lose the video display.

If this happens, correctly type the second POKE statement (with the video screen blank) and the Selectric will respond with the familiar READY. Now, anything typed on the TRS-80 keyboard will be echoed by the Selectric.

A better way to use this feature is to place the POKE commands as the first statement in the BASIC program you wish to

alter. This will change all PRINTs to LPRINTs. If you wish to disable this feature (PRINT = PRINT) then use the following command:

POKE 16414,88:POKE 16415,4

This can be used anytime in a program, in the command mode, or in the final statement to re-activate the video before terminating the program.

In addition, these POKE commands can be used to change LPRINTs to PRINT by using:

POKE 16414,88:POKE 16415,4

To revert back to normal

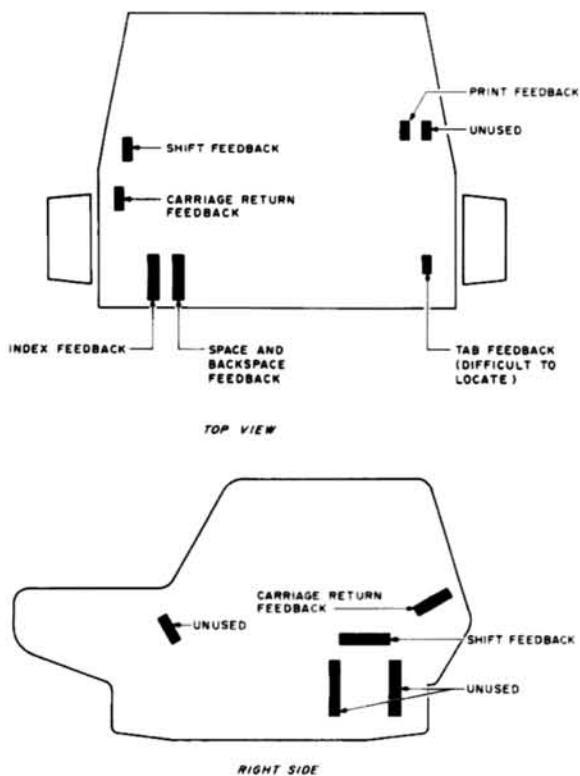


Fig. 10. Location of the feedback contacts.

(LPRINT = LPRINT) use:

POKE 16414,141:POKE 16415,5

Another way to output to the Selectric is by POKEing to memory location 14312. Program Listing 1 causes the Selectric to type all printable characters.

This program outputs ASCII values 33 to 91 and 97 to 122. After POKEing each number to location 14312, the program must wait until D7, the busy signal, is cleared. This is done by the PEEK command in line 50, which causes an endless loop to line 50 until the busy signal goes low.

You can also tell the Selectric

to carriage return and line feed: POKE 14312,10, back space: POKE 14312,24, index: POKE 14312,26, space: POKE 14312,32 and tab: POKE 14312,94. These features may be valuable if you are writing a word processor in BASIC.

To demonstrate upper and lowercase characters, try the following program:

10 INPUT ST\$:LPRINT ST\$

When you run this program you will be asked to input any string. Suppose you respond by typing "Kilobaud Microcomputing," pressing the shift button for "K" and "M," as you would on a normal typewriter. The Selectric will respond by typing "KILOBAUD MICROCOMPUTING."

The TRS-80 will invariably switch cases. To correct this you must write your own input routine.

To display and output upper and lowercase characters properly, you'll need to modify the TRS-80's hardware and soft-

ware. A number of modification kits are on the market. The one I have been using is KVP by Lance Micklus.

Conclusion

I've been using the Selectric with my interface and driver for several months and it has performed flawlessly.

At first, an occasional mistyped character, or an extra space or dash inserted itself at random, but these mistakes resulted from a misaligned typewriter. I carefully realigned my Selectric and, other than a broken rotate tape, I have had no further problems.

Excellent references for this project include IBM's Service Manual (part no. 241-5257-0), Parts Manual (241-5990-0) and their Price List (241-5158-3).

The Service Manual is particularly well written and well illustrated, and is almost a necessity if your machine needs adjusting. Since IBM will not service machines that do not bear the IBM decal, you may have to make your own adjustments. ■

```
10 FOR I = 33 TO 91:GOSUB 40:NEXT I:I = 10:GOSUB 40
20 FOR I = 97 TO 122:GOSUB 40:NEXT I:I = 10:GOSUB 40
30 END
40 POKE 14312,I
50 IF PEEK (14312) > 100 GOTO 50 ELSE RETURN
```

Program Listing 1.

EDUCATIONAL SOFTWARE TRS-80*

80+ Programs In:

ELEMENTARY	MATH
SCIENCE	BIOLOGY
GEOGRAPHY	HISTORY
ECONOMICS	ACCOUNTING
FOREIGN LANG.	BUSINESS ED.
GAMES	FARM RECORDS

Programs are grouped into packages of 4 to 7 programs priced at \$14.95 per package including shipping and handling. Available on disk or tape.

Write for catalog: ✓ 89

MICRO LEARNINGWARE, BOX 2134, N. MANKATO MN 56001, 507-625-2205

*TRS-80 is a registered trademark of TANDY CORP.™

MAXELL® OR Dysan

Some computers are not compatible, but may not be. Please check your IBM support disk.

5" SINGLE SIDE DOUBLE DENSITY.....Box of 10 for \$60

5" DOUBLE SIDE DOUBLE DENSITY.....Box of 10 for \$70

5 1/4" MINI.....Box of 10 for \$80

DYSAN® DISKS

5 1/4" MINI.....Box of 8 for \$28

(Specify: 5" Soft or Hard Sector/5 1/4" 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

ATARI TI/99-4 PET

***** SECURITY CONTROL CENTER *****

You can control light when you're not at home, at random times. Turn video or recording equipment, appliance, bell, loud alarm device on and off at preset times, even months advance. * Comes with program, control module, and ac adaptor * (\$29.50)*

*** AUTOMATIC TELEPHONE DIALER ***

You can dial telephone automatically 500 or more. Even if you forgot telephone number, if you remember part of it, you can find the number through search command.

* Comes with program, control module and ac adaptor * (\$29.50)*

***** 80-BEEP *****

To be used to signal the end of long sort and signal you in case of loading error. It also lets you know with one beep, two beeps, etc. Exactly what part of the program you are in.

* Comes with instruction, control module and ac adaptor * (\$29.50)*

✓ 271

** 5-C COMPUTER TECHNOLOGY **

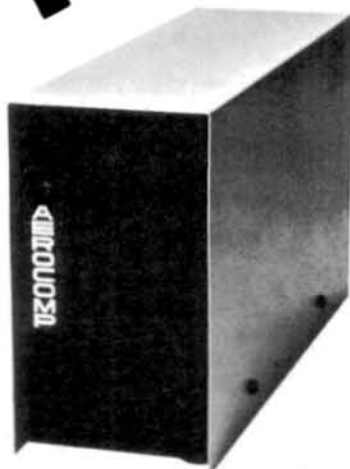
P.O. Box 1246, Covina CA 91722

Phone (213) 332-2216 or 966-9868

—Visa and Mastercharge accepted—

NEW

DISC DRIVES FOR TRS-80* "FLIPPY"—250K bytes/disc FAST—5ms Track to Track Access



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).

***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 useable 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 recorded 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 separate drives to the controller.

***CAPACITY** unformatted capacity is the total amount of storage space available on a diskette. Typically 125K bytes on a 40 track 5.25in. diskette. Formatted capacity is the total USABLE storage space on a diskette. Typically 102K bytes on a 40 track 5.25in. diskette.

***ACCESS TIME** the time required for the head to move from one track to the next. Typically 5 to 40 milliseconds (ms).

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. We have complete confidence in our products and we know you will be satisfied! ORDER TODAY!

WARRANTY

We offer you a 90 day unconditional warranty on parts and labor against any defect in materials and workmanship. In the event service, for any reason, becomes necessary, 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

***MODEL 40-1 DISC DRIVE \$339.95ea.**
Single-sided, "Flippy", 48TPI.
(40 track; single density unformatted 125K bytes/side; double density unformatted 250K bytes/side).

***MODEL 80-2 DISC DRIVE \$439.95ea.**
Double-sided, 48TPI.
(80 track/40 per side; single density unformatted 250K bytes; double density unformatted 500K bytes).

***MODEL 80-1 DISC DRIVE \$439.95ea.**
Single-sided, "Flippy", 96TPI.
(80 track; single density unformatted 250K bytes/side; double density unformatted 500K bytes/side).

***MODEL DISC DRIVE \$395.95ea. 160-2**
Double-sided, 96TPI.
(160 track/80 per side; single density unformatted 500K bytes; double density unformatted 1 megabyte).

All models are capable of single or double density and are complete with power supply and silver enclosure. Send for information on AEROCOMP 2- and 3-drive systems available in 40 and 80 track.

SELECT EITHER A 2-DRIVE OR 4-DRIVE CABLE FOR USE WITH YOUR DRIVE(S):

2-DRIVE CABLE (for use with 1- or 2-drive systems) \$24.95ea.

4-DRIVE CABLE (for use with 1-, 2-, 3- or 4-drive systems) \$34.95ea.

Add \$1.25 shipping and handling.

***MINI DISKETTES** (5.25 in.) Box of 10 \$29.95 add \$1.25 shipping and handling.

***DISC OPERATING SYSTEMS**
NEWDOS+(40 TRACK) \$109.00
NEWDOS/80 (80 TRACK) \$149.00

* SPECIAL COMBINATION OFFER *

* Model 40-1 Disc Drive \$339.95
* 2 Drive Cable 24.95
* Disc Operating System (NEWDOS+) 109.00
* Freight 5.25

Reg. \$479.15
Special \$399.95

SPECIAL COMBO EXCEPT WITH NEWDOS/80
Reg. \$519.15 Special \$429.95

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 COD shipment. Texas residents add 5% sales tax. ADD \$4.00 per drive for shipping and handling. Please allow 2 weeks for personal checks to clear our bank. No personal checks will be accepted on COD shipments-cash, money orders or certified checks only. You will receive a card showing the exact COD 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 deposit your money order or charge your bankcard until the day we ship!

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 inquiries invited

AEROCOMP

Redbird Airport, Bldg. 8
P.O. Box 24829
Dallas, TX 75224

387

COMPARE AND BUY AEROCOMP!

	"FLIPPY"	ACCESS TIME (track to track)	HEAD LOAD SOLENOID	DISC EJECTOR	CAPACITY (unformatted 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
SIEMENS	NO	25ms.	YES	NO	125K bytes	YES	NO
TANDON	NO	5ms.	NO	NO	125K bytes	NO	NO
PERTEC	YES	25ms.	YES	NO	250K bytes (both sides)	NO	NO
BASF	NO	12ms.	YES	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.

Fastload

FOR TRS-80* MODEL I USERS ONLY

16 Times
Normal Speed



*TRS-80 is a trademark of Tandy Corp.

- High speed load TRS-80* Level II cassettes
- Input 15K byte Level II program in 15 seconds
- Search BASIC or SYSTEM programs by name

Unlike other high speed tape input devices, FASTLOAD uses standard format cassettes. Therefore, there is no need to re-record on other media. At 8000 baud, FASTLOAD is faster than disk for short programs. FASTLOAD reads tapes at the fast-forward speed of the CTR-41 cassette recorder. The recorder can also be used for CSAVE at the normal speed.

FASTLOAD connects to the 40 pin I/O or to the Expansion box. The control program does not use computer memory because it is in a built-in PROM. Other valuable features are keyboard debounce program, automatic key repeat routine and key-beep via cassette speaker. Price is \$188.00 for FASTLOAD and \$95.00 for the modified CTR-41 recorder.

112

Personal Micro Computers Inc.

475 Ellis Street, Mountain View, CA 94043 (415) 968-1604

An interface to the outside world.

Build Your Own Port

James S. Hawkes, Ph.D. and
Grady Reese

A computer port is similar to a sailing port, because both serve as points of exchange. At a port a ship unloads its cargo onto the dock where it is stored and later shipped to its main-

land destination.

Similarly, the computer port receives information from an external device and holds it until it is called by the controlling machine. It also stores information sent by the controlling machine, which it can later send to an external device.

A port that only transmits information is an output port; while a port that can only receive information is an input port. Certain bi-direction ports can both receive and transmit.

The Parallel Port

A port permits you to communicate with external devices. Frequently, ports are used in conjunction with other equipment to monitor environmental conditions such as temperature,

wind velocity, voltage, and pressure.

Ports can also be used to control simple on-off functions for hot water heaters, televisions and lights. Through a parallel port eight bits of information (in most microcomputers) are transmitted simultaneously. In some ports data transmission can reach speeds of over 100,000 bytes per second. Because of these high speeds control signals are necessary between the computer and the external device. These are called handshaking signals.

There are two types of parallel I/O. One is called "accumulator I/O" because the byte to be handled by the port must be loaded into the accumulator before it can be transmitted to the port.

The second is called "memory mapped I/O" because a memory read or write instruction is used to access the peripheral. The TRS-80 parallel printer port on the expansion interface is a memory mapped port.

With a small investment of time and money you can build your own port, which can be directly attached to the TRS-80 expansion bus located at the rear of the keyboard, or to the screen printer bus on the expansion interface.

The simple application is made possible by a large scale integrated circuit called a programmable peripheral interface (PPI). The PPI used in this design is the Intel 8255.

The 8255 PPI Chip

The 8255 PPI, originally cre-

INPUT 1	INPUT 2	OUTPUT
LOW	LOW	LOW
LOW	HIGH	HIGH
HIGH	LOW	HIGH
HIGH	HIGH	LOW

Table 1.

Table 2 Port Selection		
TRS-80 Address Lines	8255 Port	
A1	A0	Selection
0	0	A
0	1	B
1	0	C
1	1	Control

Table 2. Port Selection.

```

10 REM *** TESTING AND DEMO PROGRAM FOR THE PPI-80 ***
20 REM *** OPS - RECEIVING PORT ***
30 REM *** P - PORT NUMBER ***
40 REM *** N --- NUMBER TRANSMITTED ***
50 REM *** E --- VALUE RECEIVED ***
60 REM *****
70 OUT 131,137:REM *** INITIALIZE PORT ***
80 CLS:N=0:OPS="":P=0:E=0:REM *** INITIALIZE VARIABLES ***
90 INPUT "ENTER NUMBER TO BE TRANSMITTED";N
100 IF N>255 OR N<0 THEN 90
110 INPUT "SELECT OUTPUT PORT (A OR B)";OPS
120 IF OPS="A" THEN P=128:REM *** SET PORT NUMBER ***
130 IF OPS="B" THEN P=129:REM *** SET PORT NUMBER ***
140 IF P<>128 AND P<>129 THEN 110:REM *** TESTS FOR ILLEGAL ENTRY ***
150 OUT P,N:REM *** SEND NUMBER TO SELECTED OUTPUT PORT ***
160 E=INP(130):REM *** READ PORT C ***
170 PRINT @ 120,E
180 FOR I=1 TO 1000:NEXT I:REM *** DELAY LOOP ***
190 GOTO 80

```

Program Listing.

ated to be used with the 8080A microprocessor, can be used with most of the current micro-computer chips including the Z-80.

By sending the appropriate control word in BASIC or machine language to the 8255's control port, you configure the chip's 24 I/O pins in one of three ways: as three independent uni-directional input or output ports; as two uni-directional input or output ports with handshaking signals; or as one uni-directional input or output port plus one bi-directional port with complete handshaking signals on both.

The three major parts of the 8255 (see Fig. 1), are the computer interface, the peripheral interface and the internal control logic.

The computer interface consists of eight data lines, six control lines, and two power supply lines. The data lines D0-D7 are connected to the computer's data lines and are used to transfer

data to and from the computer's data bus.

Next there are the address lines A0 and A1. These two lines use their four possible binary combinations (00,01,10,11) to select one of the four ports within the 8255.

A fundamental requirement for the parallel port is that it must reside at a specific address or addresses. The address chosen is a function of the type of parallel I/O you select. The chip select active low line makes use of the decoded address to select the PPI for an I/O operation.

This brings us to the read (active low) and the write (active low) lines. These two lines are used to tell the chip whether to read or write. They are connected to the computer's memory read (RD) and memory write (WR) lines for memory mapped I/O or to the IN and OUT lines for accumulator I/O. The RESET (active high) will set all ports to their input mode. This initializes the chip and allows it to be

reconfigured.

The next group of pins supports the peripheral interface. Data is transferred to and from external I/O devices through 24 pins which constitute three eight-bit ports. These are called port A (PA0-PA7), port B (PB0-PB7), and port C (PC0-PC7). The user is able to control the function of the I/O lines by sending a control word to the chip's programmable control port.

As stated above, the control word determines for each port one of three operating modes:

- (1) Mode 0—Simple input and output. In this mode the 8255 provides two eight-bit I/O ports (A and B) and two four-bit ports which can operate as one eight-bit port (C). Each port is latched in its output configuration and unlatched in its input configuration. Additionally, each port can be individually defined as input or output.
- (2) Mode 1—Strobed input and output. This mode provides

two uni-directional 8-bit input or output ports (A and B) with port C providing the necessary handshaking signals. Data is latched for both input and output at ports A and B.

- (3) Mode 2—Strobed bi-directional I/O. In this mode there are two usable ports: one bi-directional I/O port (A) and one uni-directional I/O port (B), both with full handshaking provided by port C.

PPI-80 Port Design

The port contains four fundamental parts: the decoder logic, the 8255 PPI, the reset logic, and the power supply.

Because the port is designed to be used with accumulator I/O, only eight address lines A0-A7 must be decoded. Normally, addresses are decoded by using inverters and eight input NANDs (see Rod Hallen's article in *Kilobaud Microcomputing*, January, 1980). While this technique is both straightforward and inexpensive, there is one drawback; the port address cannot be changed without physically re-wiring the circuit.

To be able to use the port for a number of different applications, and because of other peripherals which could conflict with some of the four addresses needed to implement the port, it would be advantageous to make it easy to change the port's address.

A simple and inexpensive way to do this uses a DIP switch (S1), a small resistor network (R1-R6), and two exclusive-OR (XOR) ICs, U3 and U4, instead of the traditional inverter. (See Fig. 1.)

The decoding circuit utilizes two 74LS86 integrated circuits, which are quad-two input XOR gates. Remember that the XOR gate produces 1 (high) if the two input signals are of the opposite type, and 0 (low) otherwise. See Table 1, XOR truth table.

If one of the inputs is high, then the other input must be low to obtain a high as an output. Setting the DIP switch (S1) changes the input to one side of XOR gate and causes it to function as an inverting or non-inverting buffer with respect to

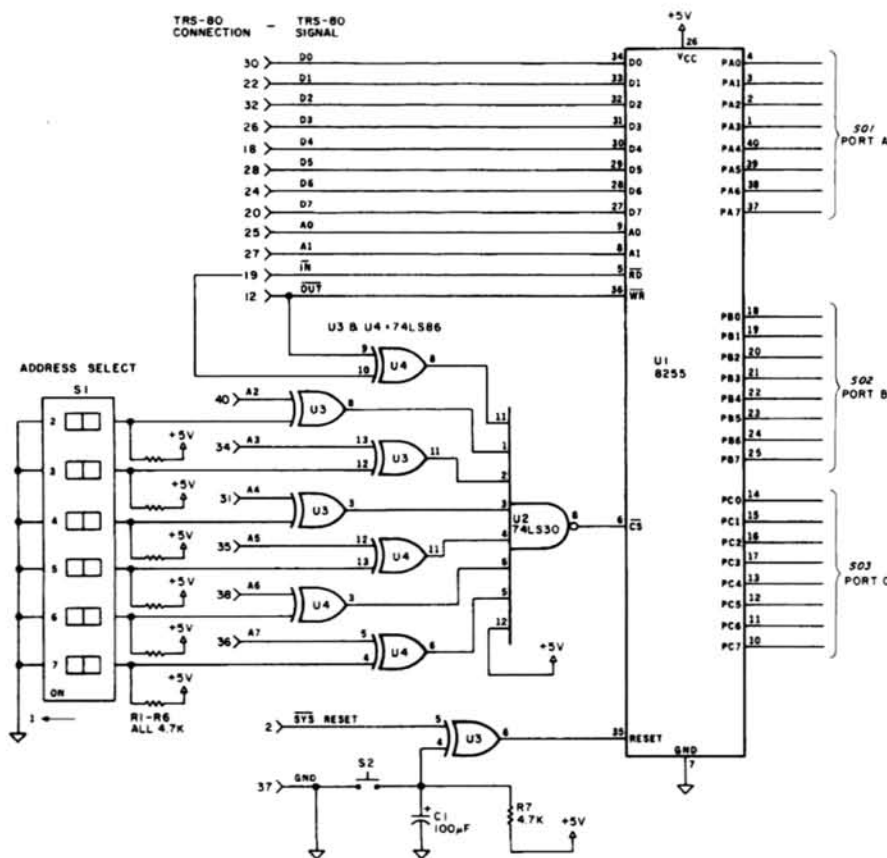
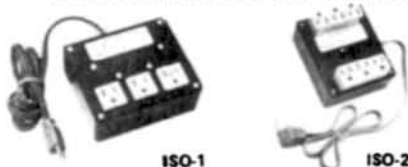


Fig. 1

**DISK DRIVE WOES? PRINTER INTERACTION?
MEMORY LOSS? ERRATIC OPERATION?
DON'T BLAME THE SOFTWARE!**



ISO-1

ISO-2

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-1A) 3 filter isolated 3-prong sockets; integral Surge/Spikes Suppression; 1875 W Maximum load, 1 KW load any socket \$56.95
- *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 \$56.95
- *SUPER ISOLATOR (ISO-3), similar to ISO-1A except double filtering & Suppression \$85.95
- *ISOLATOR (ISO-4), similar to ISO-1A except unit has 6 individually filtered sockets \$96.95
- *ISOLATOR (ISO-5), similar to ISO-2 except unit has 3 socket banks, 9 sockets total \$79.95
- *CIRCUIT BREAKER, any model (add-CB) Add \$ 7.00
- *CKT BRKR/SWITCH/PILOT any model (-CBS) Add \$14.00

PHONE ORDERS 1-617-655-1532

Electronic Specialists, Inc.

171 South Main Street, Natick, Mass. 01780

Dept. 8M

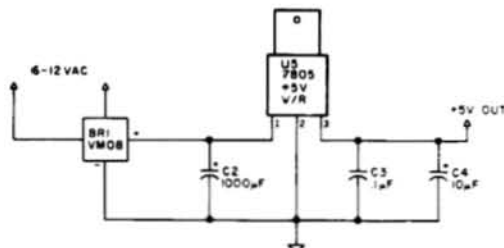


Fig. 1a.

the other input presented at the gate.

To invert an address line, set the appropriate switch on S1 so that the input line to the XOR gate is pulled high (one). Then if one is presented on the other input, an address line, the gate will output at 0, and if a low is presented, it will output a 1. In this state the XOR is functioning as an inverter. Similarly, by setting S1 so that one of the inputs to the gate is low, it acts as a noninverting buffer. By setting S1 switch to invert or not to invert, you can select the address at which you wish to locate your port.

Since the TRS-80 is continuously selecting ROM and RAM addresses, the address lines are always changing. It is likely that the address you select with S1 will be decoded, since the port decodes the lower eight lines only. For this reason we XOR'd the input (IN active low) and Out (OUT active low) signals and used the resulting output as an input to the 8-input NAND.

For the correct address to be decoded and supplied to the 8255 as the CS (active low), it must be present, and either the IN or OUT lines must be low. When the port is properly addressed by the TRS-80, all of the inputs at U2 will be high, and the resulting output will enable the PPI.

After the 8255 is enabled, it must be told what function to perform. That is, if the TRS-80 should read information from the PPI, the IN line must be low. When the CS and IN go low, all that is left to be done is to specify whether I/O port PA, PB, PC or the control port is involved.

The address lines A0 and A1 define which of these ports will be selected. (See Table 2.)

In order to affect an input to the TRS-80 from port C; IN, CS, and A0 must be low while A1 is high. When this condition occurs, the 8255 latches the contents of port C on the data lines, D0-D7, until IN goes high. Amazingly, all this can be done with one BASIC statement.

Sending data to the PPI from the TRS-80 is accomplished in much the same fashion except the OUT (active low) is used instead of the IN.

If you are wondering whether the PPI will be able to receive the data as fast as it can be sent by the CPU, rest your fears. All 8255 input and output can be done in less than 500 nanoseconds. Moreover, all of the 8255's inputs and outputs are TTL compatible.

But, the output drive capability of any port line is limited to one milliamp. This will not even light an LED. Consequently, if you plan to drive more than one TTL load you must provide the proper buffer and/or level shift.

The reset logic utilizes an XOR gate in a very unique way. TRS-80 reset (active low) is tied to one of the inputs of the gate while the other input is tied to an RC network consisting of C1 and R7 (see Fig. 1). This second input of the XOR is also connected to system ground through S2.

During normal operations, the system reset line is held high and the input from the RC network will normally be held high. Thus, the resulting output from the XOR gate will be low. The output of the XOR gate is then fed to pin 35 (reset active high) of the 8255, enabling normal operation of the chip.

This design allows the PPI-80 to be reset in several ways. First, by pressing the TRS-80 reset

ADVANCED BUSINESS SOFTWARE FOR THE TRS-80

(Now Available For Model II Also)

* FORECASTING * RISK ANALYSIS * U.S. MACRO MODEL

If you're serious about improving your business with a computer, why not use the best business planning software available? Dr. David M. Chereb has made the most powerful and successful business analytical techniques available to micro computer users.

All programs listed below are in Basic, for 32K (or more) disk based TRS-80 systems.

BUSINESS PLANNING PACKAGE for FORECASTING - An integrated set of forecasting programs to handle a variety of business forecasting needs from Trend Analysis to Advanced Multiple Regression (100 pg. User Manual) \$99.

INVESTMENT RISK ANALYSIS - The major ingredient in any investment is uncertainty. This program accounts for cost changes, shifting revenue streams and interest rate fluctuations. Now you can manage risk. (35 pg. User Manual) \$99.

U.S. SIMULATION MODEL - Knowing where the economy is going and how it reacts to government fiscal and monetary actions can save you a lot of money. This is a user oriented economic situation model constructed to professional standards (50 pg. User Manual) \$199.

NOTICE TO CUSTOMERS:

Because of the tremendous increase in recent orders, our shipping response time has slowed. We are expanding in order to correct this situation. But for the next month our shipping date will average one week after receipt of your order.

To order CALL 213/424-3852, or write to APPLIED ECONOMIC ANALYSIS, 4005 Locust Ave., Long Beach, CA 90807.

button, driving the system reset line low, you cause the XOR output to go high, resetting the 8255. The same condition will occur on power up of the TRS-80.

During power up the RC time constant, formed by C1 and R7, is sufficiently long to insure that the RC input to the XOR gate will remain low longer than the system reset. This causes the 8255 to reset. Thus, the PPI-80 will be reset whenever it is powered up. S2 can also be used to manually reset the PPI-80 by forcing the output of the RC network low.

The remaining part of the PPI-80 is the power supply. Refer to Fig. 1b. The construction is simple because of a 7805 IC. This is a single-package, three-terminal voltage regulator. It contains all the electronics to implement tight voltage regulation plus over voltage and thermal-shutdown protection. The remainder of the circuitry consists of a full-wave bridge rectifier (BR1) and filter capacitors (C2-C4).

Software Considerations

The primary purpose of a port is to communicate with the outside world. The 8255 can do this in one of its three modes.

Mode 0 represents simple I/O. That is, each of the ports in Fig. 1 can perform input or output,

but not both. In this mode the data to be transmitted is latched to the ports.

In other words, if you write a byte to Port A, that bit pattern would stay on the pins PA0-PA7 until another was transmitted. When the TRS-80 reads port C, whatever is latched to pins PC0-PC7 is transferred to the TRS-80.

This type of I/O is used primarily for controlling devices that can be turned on or off. An input port can sense the condition of an on-off switch, and an output port can close or open the switch. This mode is the simplest of the three.

Mode 1 offers one important additional feature—handshaking. In this mode port A and port B can be assigned to input or output data. Port C provides the handshaking signals that synchronize the dialog between two machines. (The handshaking signals present on the 8255 in Modes 1 or 2 are given in Table 3.)

Suppose Port A is an output port. When writing data to an output port, previously transmitted information may not have been read by the external device, causing an overwrite. To prevent overwriting, the 8255 produces a standard handshaking signal, output buffer full (OBF) which is active low. This signal is produced on PC1 for

Resistors		
R1-R7	4700 ohm, 1/4 watt, 5%	RS# 271-1330
Capacitors		
C1	100 uf, 25V electrolytic	RS# 272-1028
C2	1000 uf, 35V electrolytic	RS# 272-1032
C3	1 uf, 50V ceramic disc	RS# 272-135
C4	10 uf, 16V tantalum cap	RS# 272-1071
Semiconductors		
BR1	1A, 50PIV full wave bridge	RS# 276-1161
U1	8255 PPI	Jameco Electronics
U2	74LS30 8-input NAND gate	RS# 276-1914
U3-U4	74LS86 Exclusive OR gate	Jameco Electronics
U5	7805 voltage regulator	RS# 276-1770
Miscellaneous		
S1	6-position DIP switch	RS# 275-1301
S2	SPST momentary switch	RS# 275-1547
IC sockets	3 14-pin IC sockets	RS# 276-1999
	3 16-pin IC sockets	RS# 276-1998
	1 40-pin IC socket	RS# 276-1996
	1 modular wall plug type	RS# 60-3053
Transformer	1 modular wall plug type	AP# 924065-36-R
Cable	1 40 conductor cable	RS# 276-152
Board	1 suitable perf board	

NOTE: A drilled and etched board is available from Quant Systems, P.O. Box 626, Charleston, SC 29402.

Parts List.

TRS-80* — CONDENSE

The Ultimate in BASIC Compression Utilities

** Release 1.3 Now Available **

- Write BASIC programs using single statement lines for ease of maintenance.
- Write BASIC programs with unlimited remarks and comments to improve program readability and documentation....

— AND STILL GET — OPTIMUM USE OF MEMORY — FASTER PROGRAM EXECUTION

- Compresses programs up to 70% of original size
- Improves execution time by as much as 30%
- Creates multiple-statement program lines
- Blank compression
- Remark and comment deletion
- Renumbers GOTO, GOSUB, THEN, ELSE, and RESUME statements which reference deleted line numbers
- PLUS THESE NEW USER REQUESTED OPTIONS:
 - Retention of low numbered remark statements
 - Checkpoint / Restart Facilities
 - Phase 1 work file

Model I \$21.95
(Diskette)

Model II \$24.95
(Diskette)

INTERNATIONAL SOFTWARE ASSOCIATES
P.O. Box 14805 ✓ 187
Omaha, Ne. 68124

Tandy Corporation*

Memory Chips For Your TRS-80!

ONLY **\$59.95!**

Don't spend \$150.00 at Radio Shack when you can install these prime, tested, guaranteed, ram chips yourself for less than half that price!

Features:

- 1) We guarantee all our ram chips!
- 2) Comes with clear, easy to understand, instructions!
- 3) Chips will work in keyboard or expansion interface!

Catalog #:

2701	16K Ram Chips for the TRS-80 Keyboard	59.95
2702	16K Ram Chips for TRS-80 Expansion Int	59.95
2708	Dip Shunts for Keyboard (required)	2.00

Simutek's Sensational Best Sellers: MICRO-BEEP

Micro-Beep is a simple sound device that operates off your aux. plug from your cassette cable. Now you can have inexpensive, easy to use, sound for an excellent price!

Micro-Beep works with Basic using simple commands!
OUT255.4 ON OUT255.0 OFF

Requires No Extra Software! Requires Level II Basic or Disk Basic. Will work with 4K 48K. Comes completely assembled! (Requires transistor radio battery)

Catalog #:

2001	Micro-Beep Sound	only 15.95
------	------------------	------------

Micro-Beep is being used by TRS-80 Owners all over the world!

* FREE POSTAGE AND HANDLING * ✓ 19

Order #2000 Micro-Speed Mod. Makes Computer 5% Faster **\$29.95**

We accept VISA - Master Charge - Money Orders - Checks or I.C.O.D. \$3.00 extra! Send orders to: Simutek, P.O. Box 13687-Z, Tucson, AZ 85732

Name _____

Address _____

City _____

State _____

Zip _____

Phone orders welcome 24 hours! (602) 886-5880. Simutek offers a number of other fine products especially for TRS-80's! Send for "FREE" catalog TRS-80 is a TM of Radio Shack, A Tandy Corp. Arizona residents add 4% sales tax



SCANNED SOFTWARE & THE CAN IS A TRADE MARK OF BCC.

TRS-80TM SOFTWARE!

Yes! Quality Software for the TRS-80 is now written & available. BCC is pleased to be able to present some very fine software now with even more available in the very near future. Also we develop custom designed software for your very need. Write us for a FREE price quote.

TRS-80 is a trade mark of the Radio Shack Div. of Tandy Corp.
For Software Think BCC

- o **Mail Base 80** Model I (Requires 4MB & 4 drives) \$69.95
Model II (Requires 4MB & 4 drives) \$129.95
A RANDOM ACCESS program which keeps track of an unlimited number of entries. Plus it allows direct access of information in any order. Today, list all people who have outstanding bills & tomorrow produce a list in zip-code order. EXCELLENT!!!
- o **Oil Delivery** Model II (REQUIRES 4MB & 4 drives) write for price quote. A system for the 800. This system handles everything for the heating industry.
- o **Vendor** Model I (Requires 4MB & 2 drives) \$39.95
This program keeps track of an unlimited number (650 per disk) of vendors. Allows direct access of coded information by vendor number, & also permits access by various other fields.

For Supplies Think BCC

- o **Disks & Tapes** 5 1/4 inch diskettes 3M Brand \$49.95 (10 in plus. case)
8 inch diskettes 3M Brand \$64.95 (box of 10) 5 1/4" Verbatim \$39.95 (box of 10)
Cassettes Very High Quality \$16/dor C20's. ADD 1/2" STAC stackable cassette holders. Each holds 8 cassettes. \$3.49 ea.
- o **Printers** The fabulous BASE 2 PRINTER 96 char ASCII with Tractor Feed & 2K Buffer. This printer just can't be beat!!! \$649.00 (2 for \$1200.00)
RECONDITIONED CENTRONICS 102A (130 char/asc)!!! \$1500.00

Master Charge Exp. Date _____ Card No. _____
 Visa Signature _____

ORDER NOW! All programs come on quality cassettes. Programs are available on diskette for an additional charge of \$7.00 per order. NYS residents add 7%. Check boxes of items being ordered:
of items ordered _____ Total amount enclosed _____ (All items must be prepaid)

Bourrout Consulting Corporation

21 Friendly Rd. Smithtown, NY 11767

✓57



MICRO-SPEED TRS-80 SPEED UP MODIFICATION THE BEST ON THE MARKET!

Simutek's Micro-Speed increases computer operating speed by 50%.

- 1) Speeds up your TRS 80 from 1.77Mz to a hefty 2.66 Mz!
- 2) Shuts down during disk or cassette I/O to end lost programs, then turns back on automatically when disk or cassette I/O is finished. (Provided, of course, it was on to begin with)
- 3) Connects to keyboard L.E.D. and blinks when unit is operating. Stops blinking when turned off!
- 4) Comes with illustrated instructions. (Some soldering required)
- 5) Average person can install in 10-20 minutes!
- 6) All work is done in hardware! Absolutely no software drivers needed!
- 7) Operates with any TRS 80, (except Model II) works with TRSDOS, NEWDOS or any other operating system or software. Works with RS 232 and telephone modems!
- 8) Comes completely assembled and ready to install. All wires are stripped, switch installed!
- 9) **There are no hidden extra costs to you!**
May be turned on or off at any time! Even during program execution!
- 10) Money back guarantee!!

order #2000 Micro Speed Mod. **29.95**

We accept Visa - Master Charge - Money Order - Check (C O D. \$3.00 extra) Send orders to:

Simutek, P.O. Box 13687-Z, Tucson, AZ 85732 ✓19

Name _____

Address _____

City _____ State _____ Zip _____

Phone orders welcome 24 hours! (602) 886-5880 Simutek offers a number of other fine products especially for TRS 80's! Send for "FREE" catalog. TRS 80 is a TM of Radio Shack. A Tandy Corp. Arizona residents add 4% sales tax.

NO CHARGE FOR SHIPPING

port B and PC7 for port A in Mode 1.

The user must know when the external device has received the byte sent from the TRS-80; the acknowledge (ACK), which is active low, provides this information. The logic for this signal must be available on the external device.

The remaining signal usually found on an input port is interrupt (INTR), which is active high. This signal goes high when the TRS-80 outputs a byte to the 8255 and remains in this state until the ACK is received from the external device.

When functioning in Mode 1 as an input port, the roles of the handshaking signals are reversed. The 8255 must be signaled when a device is ready to transmit information. This is done by the strobe (STB), which is active low. Upon receiving a strobe, the 8255 stores the byte and sets the input buffer full (IBF) at active high.

The IBF is monitored by the sending device to determine when it can transmit the next byte. As long as this signal remains high, it must wait; but once the TRS-80 reads a byte, this signal is driven low.

By now you must be wondering how the TRS-80 becomes aware of data waiting at the port. Polling techniques can be used for software while the active high interrupt request signal (INTR) is used for hardware. After data is received the INTR is set high (logic 1), but just like the IBF, the INTR is reset by the 8255 after a read.

The most sophisticated form

of parallel I/O is bi-directional, which is provided by the 8255 in Mode 2. Bi-directional I/O is used with an intelligent external device, such as another computer. The 8255 permits port A to function as the data port, while port C provides all the handshaking signals discussed earlier: OBF, IBF, STB, ACK, and INTR. They function in exactly the same manner as in Mode 1 except they are bi-directional.

Using the Port

To read the contents of a port in BASIC you must use INP(port number). This statement is used like a function, such as ABS(X) or SQR(124). It must be used in conjunction with another statement.

In the following example

```
10 G = INP(127)
```

the variable G would be assigned the value of the contents of the port 127.

To send a value to the port use the statement OUT port number, value. Any value that is sent must be between 0 and 255. The OUT statement is a complete BASIC statement and requires only a line number to be included in a program. See line 70 in Fig. 2.

Four port addresses must be reserved. The two low-order address lines, A0 and A1, define which port is being addressed. The remaining address lines can be configured to suit your own needs, if they do not conflict with other port definitions.

Bit	Mode 1		Mode 2	
	INPUT Function	OUTPUT Function	INPUT/OUTPUT Function	
0	INTR	INTR	Unused	} Unused
1	IBF	OBF	Unused	
2	STB	ACK	Unused	} B
3	INTR	INTR	Unused	
4	STB	Unused	Unused	} PORT A
5	IBF	Unused	Unused	
6	Unused	ACK	Unused	} A
7	Unused	OBF	Unused	

Depend on Port B definition

Table 3. Port C Functions in Modes 1 and 2.

For example, look at addresses 128, 129, 130, and 131. The decimal address 128 is equivalent to 10000000 binary. Notice that the two least significant bits are 0. Table 2 reveals that if the two low-order bits, corresponding to A0 and A1, are 0 then port A is selected. Ports B, C, and the control port are selected by 129, 130, and 131 respectively.

The 8255 is a programmable port. That is, before using it you must define the mode of operation for each of the ports. By sending the control port the appropriate message, you select the mode of operation for each port.

Table 4 contains control-word bit definitions for the three modes. This is the beauty of the 8255. With a simple software command you can configure the ports as you need to use them.

The software you develop will depend upon the port's application. In Mode 0 the principal operation will be sensing and operating switches. BASIC permits this to be done with relative ease with the INP and OUT instructions discussed earlier.

In Mode 1, however, handshaking signals are required.

Polling Handshake Signals

One technique for handling the handshaking signals is called polling. This requires the controlling program to periodically read the handshaking signals at port C and act on them. The INP command described earlier retrieves the status byte located at port C.

After the TRS-80 sends a byte

to port A, it must not send another until the receiving device retrieves that byte. This can be monitored by scanning the OBF bit in port C. If the OBF bit for port A is low (logic 0), then the TRS-80 should not send a byte because the previous byte has not been read yet. A program can perform some other task and check the status of the bit periodically or can check it continuously.

When the external device receives the byte, it must return the ACK signal to the 8255 which drives the OBF high.

To use port B as an input port, the TRS-80 must know when the external device has sent a byte. This can be determined by checking the IBF signal associated with port B.

Since the IBF is an active high signal, the TRS-80 must scan port C until IBF goes high, which means port B has received a new byte from the external device. Reading the contents of port B will cause the 8255 to drive the IBF low. The sending device must have sufficient logic to send data only when IBF is low.

In Mode 2 operation, port A becomes a bi-directional I/O port. Handshaking signals on port C must be monitored in exactly the same fashion as Mode 1, checking the status of the IBF and OBF signals.

One of the most exciting possibilities of the port is the rapid exchange of information between two computers. The software required is very simple and even BASIC software can create transmission speeds so fast

Bit	Definition
0	Port C Lower PC0-PC3, used in Mode 0 or 1 1 = INPUT 2 = OUTPUT
1	PORT B Definition PB0-PB7, used in all modes 0 = OUTPUT, 1 = INPUT
2	Mode Select for Group B: PC0-PC3 and PB0-PB7 0 = MODE 0, 1 = MODE 1
3	Port C Upper PC4-PC7, used in Mode 0 or 1 0 = OUTPUT, 1 = INPUT
4	Port A Definition PA0-PA7, used in Mode 0 and 1 0 = OUTPUT, 1 = INPUT
5-6	Mode select for Group A: PC4-PC7 and PA0-PA7 00 = Mode 0, 01 = Mode 1, 10 = Mode 2, 11 = Mode 2
7	Operation CODE 1 = Mode Set (write control word) 0 = Bit SET/RESET (used to generate clock signals)

Table 4. Control Port Bit Definition.

COMPUTER PIRATES & DATA THIEVES ARE HERE...



Don't let computer pirates: **DIVINE** your DATA
FILCHE your FILES
PERUSE your PROGRAMS

Protect them all with CRYPTTEXT, the hardware encryption module that brings ultra-high level security to the small computer user. Once encrypted, your files can be stored or transmitted in strictest privacy. A single CRYPTTEXT unit will differentially control the medical, legal or financial records, mailing lists, and design data for an entire firm.

Breaking CRYPTTEXT encrypted data is like unscrambling an egg. We don't say its impossible but we have 3 oz. of fine gold waiting for the first person who succeeds in breaking our test message.

SECURITY SYSTEMS FOR USE WITH:

TRS-80 APPLE II SUPERBRAIN NORTHESTAR



P.O. Box 428
Northgate Sta.
Seattle, WA 98125

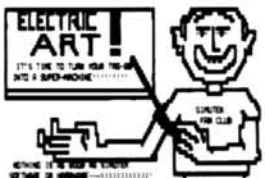
(206) 364-8888

OKIDATA PRINTER

The Best Printer in the World for the TRS-80!
We'll Stake Our Reputation On It!

Look at the Features!

- 200 million character head warranty! Better than any competitor!
- Works under the most demanding business applications!
- A "Real" 9x7 DOT Matrix Impact Printer!
- 80 characters per second!
- Full upper and lower case!
- Double width characters!
- Supports TRS-80 Graphics! See illustration. (These graphics are exactly the same graphic codes as the TRS-80's. No special software required!)
- Connects directly to TRS-80 with standard cable!
- Friction & pinfeed, use roll paper, stationary or regular data paper!
- 6 or 8 lines per inch
- 80 and 132 columns.
- Quiet operation.



Actual photo of printout from Okidata Printer! From Smutek's Electric Artist's 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 Smutek Customer Price Only — \$638.00!
(Tractor Feed \$125.00 Extra)

Catalog #:		
90001	Okidata Microline 80	638.00
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 Accepted 24 Hours (602) 886-5880. Smutek 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.

TRS-80 COMPATIBLE DISK DRIVES AT GREAT DISCOUNTS!

- These MPI drives are completely compatible with Radio Shack's and may be mixed and matched! (i.e. you may use Radio Shack drives and MPI's together with no problems! They are totally compatible with TRS-80, NEWDOS, or any other TRS-80 software!)
- These MPI's have doors that close and keep dust out!
- These MPI's have auto diskette eject!
- These drives are one of the fastest on the market: 5 milliseconds versus Radio Shack's 40 milliseconds!
- These drives come complete with power supply and case and are ready to use immediately. They are compatible with Radio Shack's disk cable or you may purchase our cable.
- Dual drive is same as two drives but uses only one diskette! Save money on expensive diskettes! It may be used as drive 0 and 1, 1 and 2 or 2 and 3! This is a fantastic buy!
- **SAVE \$116 (Single drive) or \$451 (Dual drive)**
Over Radio Shack's single drive prices!

WE SHIP FAST! ORDER YOUR DRIVE TODAY!!!

Order #	Description	Price
8000	MPI Single Drive	384.00
8001	MPI Dual Drive	549.00
8002	4 Drive Cable	39.95
8003	2 Drive Cable	24.95
8005	TRSDOS Manual and TRSDOS 2, 3	19.95
8006	NEWDOS* (includes editor assembler that works with tape or disk, dsassembler, superzap, basic variable reference, renumber, disk commands from basic, screen to printer command, and much more)	99.95
8016	NEWDOS 80 and NEWDOS* ("NEW" NEWDOS* and more)	149.95
8007	TRS-80 Disk and other mysteries by H.C. Pennington gives explicit descriptions of TRSDOS, NEWDOS, SUPERZAP, DEBUG etc.	22.00
8008	Ten pack diskettes	29.95
8009	Single diskettes	2.99
8010	Disk holders (hold ten each)	2.99

Please add \$5.00 per drive for shipping & handling

No tax on out of state orders.
We accept Visa, MasterCard, Money Orders, Checks, I.C.O.D. \$3.00 extra!
Send orders to: **Sumatek, P.O. Box 13687-Z, Tucson, AZ 85712**

Name _____
Address _____
City _____ State _____ Zip _____
Phone orders accepted 24 hours (602) 886-5880 Foreign orders add \$20 postage and handling per drive. TRS-80 is a TM of Radio Shack. A Tandy Corp.
Arizona residents add 6% sales tax.

that the two machines appear to function as one.

Construction

The prototype circuit for this article (Fig. 1) was built on a Radio Shack board (part #276-152). However, since the operation of the circuit is not critical, a good perf board or vectorboard, with either point-to-point wiring or wire wrap should produce good results. It is also possible to purchase an etched and drilled circuit board from Quant Systems, Charleston, SC. IC sockets are recommended regardless of the construction method you use.

Begin assembly by installing the IC sockets for U1-U4 and S1, then solder the resistors in place. Next, mount C2 and wire it into the circuit as indicated in Fig. 1.

Choose connectors for the three 8-bit ports then mount them to the board and wire them to the peripheral interface pins of the 8255. Sixteen-pin IC sockets make convenient connectors for the three I/O ports.

In addition to the eight I/O lines, you may want two power supply lines to provide power to a satellite board. Depending on software definition, you may require as many as three handshaking signals.

Since 13 of the 16 available lines may be utilized, connection to an external device will require a 16-line jumper cable. This method of connection should always yield several spare lines for those oversights that always come up at the last minute.

The circuit requires a +5 volt power supply. While this is available on the TRS-80 bus, it is not recommended for the source because of its limited current capability. Build your own by following the schematic in Fig. 1b, or purchase a suitable plug-in modular supply. Use a +5 volt regulator chip as a safety feature for the ICs.

Switch S2 is used to reset the PPI-80 at the project board. If this capability is not desired, S2 may be omitted. The same reset function is accomplished at power up of either the TRS-80 or the PPI-80 and can also be ac-

complished by pushing the TRS-80 reset button.

Connecting the board to the TRS-80 is straightforward (see Fig. 1). First you need a 40-pin edge connector with cable. These cables were as scarce as dinosaurs, but now are available from several sources, including Hobby World, 19511 Business Center Drive, Northridge, CA 91324.

After making the connections to your board, double-check your work. The TRS-80 edge connector is numbered with even numbers on the bottom, starting at the edge nearest the center of the keyboard. Check the edge connector to the associated IC socket using an ohmmeter.

Testing

Determine if the PPI-80 is working properly by using one of the ports to send data to another. All you need to do is connect the corresponding port lines. (For example, connect PC0-PC7 to PA0-PA7.) Make sure the dip switch is set for port A, to be located at port 128, and enter Program Listing 1.

Note that line 70 writes the control word 137 to the 8255's control port at address 131. This specifies Mode 0 for all ports and defines port C as an input port and ports A and B as output ports.

The remainder of the program permits selection of a number between 0 and 255 to be sent to either port A or B and then to be read by port C. The number received by port C will be displayed and should be equal to the number entered.

Applications

Applications for the PPI-80 are numerous. It can be used to create real time computer games. It can be used for analog to digital conversion to monitor and control a home heating system. Connected to a Sears or Radio Shack remote home controller, it can switch lights and appliances on and off in an empty house. The authors are using their PPI-80 to construct a music synthesizer.

The possibilities are up to you. ■

TRS-80 is a registered trademark of TANDY CORP.

SYSTEM EXPANSION FOR THE TRS-80™

AT **\$69.95** [PC BOARD & USER MANUAL]

- SERIAL RS232C/20 mA 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

8 Hollowglen St. Irvine CA 92714
714-552-8946

TO ORDER
P.O. Box 16216 Irvine CA 92713
Add \$3 for postage and handling.
CA residents add 6% sales tax.

Card No. _____ Expiration Date _____ Signature _____

WE WILL NOT BE UNDERSOLD

16K MEMORY UPGRADE KITS

for TRS-80*, Apple II, (specify): **Jumpers \$2.50**

PRINTERS



NEC Spinwriter

Letter Quality High Speed Printer
Includes TRS-80* interface software, quick change print fonts, 55 cps, bidirectional, high resolution plotting, graphing, proportional spacing: R.O. **\$2689**

R.O. with Tractor Feed **\$2789** KSR with Tractor Feed **\$3200**

779 CENTRONICS TRACTOR FEED PRINTER

Same as Radio Shack line printer I **\$969**

737 CENTRONICS FRICTION & PIN FEED PRINTER

9 x 7 matrix **\$839**

730 CENTRONICS FRICTION & PIN FEED PRINTER

7 x 7 matrix Same as Radio Shack line printer II **\$639**

P1 CENTRONICS PRINTER

Same as Radio Shack quick printer **\$269**

PAPER TIGER (IP440)

Includes 2K buffer and graphics option **\$939**

TI-810

Faster than Radio Shack line printer III
Parallel and serial w/TRS-80* interface software
with upper and lower case and paper tray **\$1575**

OKIDATA Microline 80 Friction and pin feed

Tractor Feed, friction, and pin feed **\$559**

EATON LRC 7000 + 64 columns, plain paper

\$679

ANADIX

DP-9500 **\$1389** DP-8000 **\$869**

DISK OPERATING SYSTEMS

PATCHPAK #4 by Percom Data

CP/M for Model I, Zenith **\$145** for Model II, Altos **\$169.00**

NEWDOS Plus — with over 200 modifications 35track **\$89.00**

and corrections to TRS-DOS 40 or 70 Track **\$99.00**



DISK DRIVES

More capacity than Radio Shack 35 Track (80 K Bytes) drives. Fully assembled and tested. Ready to plug-in and run the moment you receive it. Can be intermixed with each other and Radio Shack drive on same cable. TRS-80* compatible silver enclosure. **External card edge included.**

\$314

90 DAY WARRANTY. ONE YEAR ON POWER SUPPLY.

FOR TRS-80*

CCI-100 5 1/4", 40 Track (102K Bytes) for Model I **\$314**

CCI-200 5 1/4", 77 Track (197K Bytes) for Model II **\$549**

CCI-800 8" Drive for Model II (1/2 Meg Bytes) **\$795**

For Zenith Z89

CCI-189 5 1/4", 40 Track (102K Bytes) add-on drive **\$394**

Z-87 Dual 5 1/4" add-on drive system **\$995**

DISKETTES — Box of 10 (5 1/4") — with plastic library case **\$24.95**

8" double density for Model II (box of 10) **\$36.49**

COMPLETE SYSTEMS

TRS-80* LEVEL II-16K with keypad **\$709**

TRS-80* Expansion Interface **\$269**

HEWLETT PACKARD HP-85 **\$3199**

ZENITH Z89, 48K all-in-one computer **\$2595**

ZENITH Z19 **\$740**

TELEVIDEO 912B **\$745** 920B **\$769**

ATARI 400 **\$489** ATARI 800 **\$799**

MATTEL INTELLIVISION **\$249**

Software available for the above systems

CAT MODEM Originate and answer same as **\$148**

Radio Shack Telephone Interface II

LEEDEX MONITOR Video 100 **\$119**

SOFTWARE FOR THE TRS-80*

Software / Manual
w/Manual / Alone

INVESTMENT PORTFOLIO MANAGER: This is what investors have been waiting for! This powerful program was developed by security analysts working with software designers. It comes on one cassette — 16K LEVEL II BASIC on one side, 32K DISK BASIC on the other. Store and report data. Review your portfolio. Produce detailed status, value, gain, and security analysis. Compare alternatives **\$48.95/\$10**

INTELLIGENT TERMINAL SYSTEM ST-80-III BY LANCE MIKLUS: Enables a TRS-80* to act as a dial-up terminal on any standard time sharing network. Provides a TRS-80* with control key, ESC, Key Repeat Key, Rub Out Key, Break Key, full upper and lower case support, selectable printer output and program selectable transmission rates **\$139/\$10**

CCA-DATA MANAGEMENT SYSTEM: Automate your information processing tasks. You can create a file of customer information, quickly and easily add, delete or update records; search a file, keep a file in order of the value in any field; and print records and labels in any desired sequence or from just a part of a file. Requires 32K TRS-80 and one drive **\$74.95/\$10**

CSA-MAILIST SYSTEM: Creates, maintains and efficiently utilizes a name, address and telephone number file. 400 individual name/address entries can be maintained on a single density mini-floppy, and are manipulated directly by record number (direct access file method). Sorts can be performed, name + address combinations can be coded. Listing directories and labels can be printed. A conversion facility is provided to convert most sequential name address file formats into direct. Requires 32K TRS-80 and one drive **\$48.95/\$10**

S & M SYSTEMS

INSEQ-80™: Indexed Sequential Access Method (ISAM) for the TRS-80 Model I. A must for anyone writing business programs. Eliminates wasted disk space from direct record processing. Split second access to any record. Access data records instantly via alpha-numeric "key" eg Part No., zip code or sequentially in ascending key sequence. Add/modify records in any order. Access up to three files per program — Files may be spread over multiple disks. Machine language processing from your basic program. Utility program to convert direct files to INSEQ-80 format. **\$48.95/\$10**

FULLY INTERACTIVE ACCOUNTING PACKAGE: ISAM (INSEQ 80) based. Includes General Ledger, Accounts Payable, Accounts Receivable and Payroll. System runs "stand alone" or "co-ordinated G/L" at users option. Based on Osborne accounting method. Requires 32K TRS-80, 2 or 3 drives. NIA CA. **\$99/\$10**

General Ledger **\$99/\$10**
Accounts Receivable **\$99/\$10**
Accounts Payable **\$99/\$10**
Payroll **\$99/\$10**
Osborne books. Req'd as additional documentation **\$20 ea**

INVENTORY: Requires 32K TRS-80, 1 drive **\$125/\$10**

INSORT-80: Callible form BASIC via USR. Sorts "Random" Disk Files "Disk" to "Disk" sort times — 350 records in 35 sec, 1000 records in 6 minutes, 3500 records in 12 minutes. Machine language processing. Up to 35 sort keys ascending/descending. Utility to build BASIC program. Runs under NEWDOS. **\$48.95/\$10**

MICROSOFT

BASIC-80: Disk Extended BASIC ANSI compatible with long variable names, WHILE/WEND, chaining, variable length file records. **\$225/\$25**

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. **\$550/\$25**

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). **\$425/\$25**

COBAL-80: Level 1 ANSI 74 standard COBAL, 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. **\$700/\$25**

Z-80 SOFTWARE CARD FOR APPLE: Your key to future software expansion. Get the best of both worlds, Apple's 8002 and CP/M Z-80. Plug in the card and get a Z-80. Supports Apple language card and all Apple peripherals. Comes with set of three manuals. **\$358/\$75**

CCI-TELNET VERSION 5: A communication Package which enables microcomputer users to communicate both with Large Mainframes and other microcomputers. Extensive commands make it useful in many applications where communication between computers is necessary. Powerful terminal mode enabling

user to save all data from a session on disk. Completely CP/M compatible. Multiple communication protocols supported. Able to transfer files in both directions without protocol where the other machine does not support any protocol. Extensive ON SCREEN help. Source code provided. **\$149/\$15**

MICROPRO-WORD-STAR: Menu driven visual word processing system for use with standard terminals. Text formatting performed on screen. Facilities for text pagination, 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. **\$399/\$40**

BDS 'C' COMPILER: Supports most features of language, including structures, arrays, pointers, recursive function evaluation, and overlays. Package contains compiler, linker, library manager, sample source files include games, a terminal emulator with disk I/O plus the source for many standard library functions. BDS C User's Guide Book — The C Programming Language by Dennis Ritchie and Brian Kernighan. Requires at least 24K of RAM. **\$125/\$20**

CONFIGURABLE BUSINESS SYSTEM BY DMA: CBS is a data management system that allows true transaction processing. The system features a screen menu generator and a comprehensive report generator which can be used to produce invoices, purchase orders, re-order reports, mailing labels or other special reports specific to the application. Good documentation and a demonstration inventory system supplied. Requires at least 48K memory. Does not require support language. **\$295**

AC LINE CORD FILTER & 6 PRONG POWER STRIP **\$38.00**

DISK DRIVE CABLES: 2 drive **\$29.00** 4 drive **\$35.00**

DUST COVERS: TRS-80/Apple **\$ 7.95**

TRS-80 & OTHER MYSTERIES **\$18.95**

RF MODULATOR: Adapts video to TV **\$35.00**



DEALER (NATIONAL/INTERNATIONAL) INQUIRIES INVITED

Send for FREE Catalogue

The CPU SHOP

298

TO ORDER CALL TOLL FREE 1-800-343-6522

Massachusetts residents call (617) 242-3361

For detailed technical information, call 617/242-3361

Hours: 10AM-6PM (EST) M-F (Sat. till 5)

*TRS-80 is a Tandy Corporation Trademark

5 Dexter Row, Dept. K9M
Charlestown, Massachusetts 02129

Massachusetts residents add

5% sales tax

Quantities on some items are limited

Children associating with a computer?

Kidstuff

Dan Keen
 Dave Dischart
 RD 1, Box 432
 State Highway 83
 Cape May Ct. House, NJ 08210

Small kids can be hard on things. But with proper supervision, a microcomputer can

be a powerful teaching aid.

This program, for example, will help your preschooler associate objects with sounds. It's a crucial skill, if he is to learn how to read. The program also makes the child pick out letter shapes on the keyboard.

He'll have fun, too; many of the objects are animated. A car travels down the highway, an

airplane takes off, a train chugs down the tracks, and a dragon breathes fire.

Kid Testing

We designed the program for kindergarten children. But "kid testing" proved that even 2- and 3-year-olds like it. They may not know the letters, but with parental supervision they quickly learn to associate the shapes with names. In fact, they soon learn the sequence and will frequently tell you what object will be displayed before it is even drawn.

Since most children in this age bracket can't read, the com-

puter has trouble communicating with them. An adult must show the child how to respond.

Once into the program, operation is simple. The program uses INKEY\$ so that the child never has to hit the enter key. When he sees a flashing question mark, he types the letter that the object displayed begins with. If he is right, the word RIGHT and a smiling face appear.

If he's not, the screen prints WRONG—TRY AGAIN and draws a sad face. The computer then waits for him to type another letter. He can make any number of guesses.

Before an object is shown, a dummy INKEY\$ picks up any

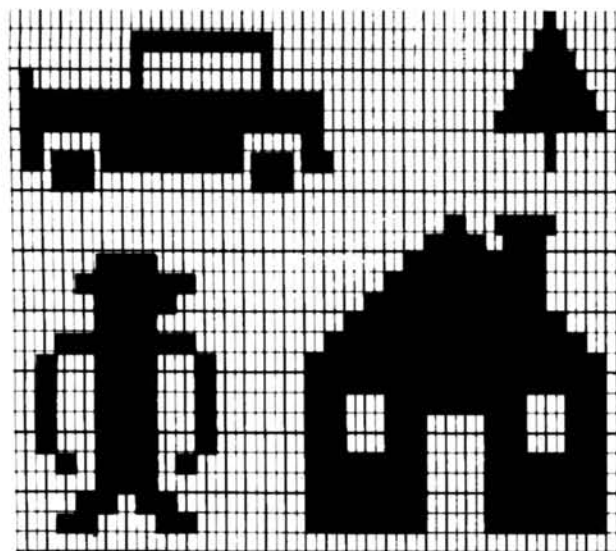


Fig. 1. Sample Shapes

OBJECT	ACCEPTABLE LETTERS
plane	Airplane, Plane, Jet
boat	Boat, Choo-choo
heart	Heart, Valentine
tree	Tree, Christmas tree
cowboy	Cowboy, Bandit, Man, Outlaw
house	House, Building
car	Car, Automobile
castle	Castle, Building
Santa	Santa
dragon	Dragon, Monster
steps	Stairs
clock	Clock, Watch
letter	Letter, Mail, Postcard
toothbrush	Toothbrush, Brush

Table 1. Objects and Their Answers


```

, 24, 24, 24, 24, 24, 24, 128, 130, 135, 128, 128, 128, 128, 130, 135
315 FORP=0T050: READX: POKERD+P, X: NEXTP
320 CLS: LO=450: FORP=640T03STEP2: PRINT@P0, CHR$(151), : PRINT@P0+1, CHR$(131), : NEXT: PRINT@704, STRING$(64, 131),
325 PRINT@LO, TR#: GOSUB375
330 PRINT@LO, TR#: PRINT@LO-57, "*", : GOSUB375
335 PRINT@LO, TR#: PRINT@LO-58, " ", : PRINT@LO-123, "*", : GOSUB375
340 PRINT@LO, TR#: PRINT@LO-124, " ", : GOSUB375
345 IFLO:500THEN400ELSEGOTO325
375 FORDE=0T010: NE: TDE: LO=LO+1: RETURN
400 CLS: PRINT@400, TR#: GOSUB60000
410 IFA#="T"ORAF#="C"THENGOSUB62000: GOTO1000
420 GOSUB61000: GOSUB60000: GOTO410
1000 CLS: LO=582: SH=0
1010 PRINT@LO, F1#: GOSUB1100
1020 PRINT@LO, F2#: GOSUB1100
1030 PRINT@LO, F3#: GOSUB1100
1035 IFLO<452THEN1500
1040 SH=SH+1: IFSH<2THEN1010ELSEPRINT@LO, F4#: GOSUB1100: SH=0: GOTO1020
1100 FORQ=1T015: NEXTQ: LO=LO-1: RETURN
1500 CLS: PRINT@400, F1#: GOSUB60000
1600 IFA#="F"THENGOSUB62000: GOTO2000
1700 GOSUB61000: GOSUB60000: GOTO1600
2000 HE#="XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
2010 K=VARPTR(HE#): AD=PEEK(K+2)*256+PEEK(K+1)
2020 DATA168, 131, 131, 137, 152, 131, 131, 169, 26, 24, 24, 24, 24, 24, 24, 24, 137, 144, 128, 128, 128, 152, 129, 26, 24, 24, 24, 24, 24, 138, 164, 168, 134, 26
, 24, 24, 129
2030 FORP=0T057: READX: POKERD+P, X: NEXTP
2040 CLS: PRINT@400, HE#: GOSUB60000
2050 IF(A#="H")OR(A#="Y")THENGOSUB62000: GOTO3040
2060 GOSUB61000: GOSUB60000: GOTO2050
3040 TE#="XXXXXXXXXXXXXXXXXXXX"
3050 K=VARPTR(TE#): AD=PEEK(K+2)*256+PEEK(K+1)
3060 DATA128, 160, 190, 180, 26, 24, 24, 24, 24, 24, 128, 136, 143, 175, 143, 141
3070 FORP=0T015: READX: POKERD+P, X: NEXT
3080 CLS: PRINT@400, TE#: GOSUB60000
3090 IF(A#="C")OR(A#="T")THENGOSUB62000: GOTO3100
3095 GOSUB61000: GOSUB60000: GOTO3090
3100 CO#="XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
3110 K=VARPTR(CO#): AD=PEEK(K+2)*256+PEEK(K+1)
3120 DATA176, 188, 188, 188, 176, 176, 26, 24, 24, 24, 24, 24, 24, 24, 176, 176, 191, 191, 191, 179, 176, 26, 24, 24, 24, 24, 24, 24, 24, 24, 191, 32, 32, 191, 191, 19
, 32, 32, 191
3130 DATA26, 24, 24, 24, 24, 24, 24, 24, 24, 143, 176, 32, 191, 191, 191, 32, 176, 143, 26, 24, 24, 24, 24, 24, 24, 24, 24, 176, 188, 143, 131, 131, 131, 143, 1
88, 176
3140 FORP=0T076: READX: POKERD+P, X: NEXTP
3174 CLS: PRINT@400, CO#: GOSUB60000
3176 IF(A#="C")OR(A#="M")OR(A#="B")OR(A#="0")THENGOSUB62000: GOTO4000
3180 GOSUB61000: GOSUB60000: GOTO3176
4000 HH#="XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
4010 K=VARPTR(HH#): AD=PEEK(K+2)*256+PEEK(K+1)
4020 DATA128, 176, 128, 168, 176, 176, 144, 26, 24, 24, 24, 24, 24, 24, 24, 24, 128, 176, 188, 191, 191, 191, 188, 191, 191, 26, 24, 24, 24, 24, 24, 24, 24
, 24, 24, 24, 128, 176, 188, 191, 191, 191, 191, 191, 191, 191, 191, 188, 176, 26, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24
4030 DATA128, 191, 191, 143, 143, 191, 191, 191, 191, 191, 191, 143, 143, 191, 191, 26, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 128
4035 DATA191, 191, 176, 176, 191, 191, 131, 131, 131, 191, 191, 176, 176, 191, 191, 26, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 128, 191, 191
, 191, 191, 191, 128, 128, 128, 191, 191, 191, 191, 191
4050 FORP=0T0151: READX: POKERD+P, X: NEXT
4060 CLS: PRINT@336, HH#: GOSUB60000
4070 IF(A#="B")OR(A#="H")THENGOSUB62000: GOTO4100
4080 GOSUB61000: GOSUB60000: GOTO4070
4100 CC#="XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
4110 K=VARPTR(CC#): AD=PEEK(K+2)*256+PEEK(K+1)
4120 DATA156, 148, 148, 148, 148, 148, 172, 26, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 178, 188, 188, 188, 188, 189, 188, 188, 188, 188, 190, 188, 188
, 188, 148, 26
4130 DATA24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 24, 138, 133, 188, 188, 138, 143, 143, 143, 143, 143, 143, 133, 188, 188, 138, 141
4140 FORP=0T068: READX: POKERD+P, X: NEXT

```

Program continues

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 usage, 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**

TELECOMMUNICATIONS PROGRAM

This 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). One drive and 32K required. **INDEX.....\$19.95**

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, 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**

4 SPEED OPTIONS FOR YOUR TRS-80!

The SK-2 is the most versatile clock modification available for the TRS-80. Speeds may 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**

RAM SPOOLER AND PRINT FORMATTER

This program is a full feature print formatting package featuring user definable line and page length (with line feeds inserted between words or after punctuation), screen dump, and printer pause control. The serial version allows baud rate selection from the keyboard. 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. Please specify PARALLEL or SERIAL (RS-232 interface) version. **SPOOLER.....\$16.95**

DUPLICATE SYSTEM TAPES WITH CLONE

Make duplicate copies of ANY tape written for Level II. They may be SYSTEM tapes (continuous or not) 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**

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. **FFTASM.....\$49.95**

FOR THE MODEL II LYNC

from Midnight Software

High level data communication for the Model II with CP/M. **LYNC** will send and receive any file with automatic error checking and retries. Either end may initiate file transfers, and multiple files may be sent with wildcard filenames. Remote or local directories may be called from within the program. Allows full protocol, non-protocol, and real-time conversation modes. May be used over phone lines at 300 baud or direct to another computer at up to 9600 baud. Also available for other CP/M computers. **LYNC.....\$95.00**

**MUMFORD
MICRO
SYSTEMS**

144

ORDERING: Complete satisfaction is guaranteed or a full refund will be made. All Model II 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, MasterCard and COD orders accepted.

Box 435-E Summerland, California 93067 (805) 969-4557

```

1150 CLS:PRINT#400,CC#:GOSUB#60000
1160 IF(A#="A")OR(A#="C")THEN#GOSUB#62000:GOTO#5000
1170 GOSUB#1000:GOSUB#60000:GOTO#1160
5000 CLS:PRINT#704,STRING$(64,131)
5100 PO=455:SH=0
5110 PRINT#695,"*";:PRINT#635,"*";:GOTO#5130
5120 PRINT#695,"*";:PRINT#635,"*";
5130 PRINT#PO,TE#:PRINT#554,CC#:PO=PO+1
5140 IFFD#503THEN#5160
5150 SH=SH+1:IFSH#1THEN#SH=0:GOTO#5110ELSE#5120
5160 PRINT#500,CHR$(C0):PRINT#564,CHR$(C0):PRINT#620,CHR$(C0):PRINT#692,CHR$(C0);
5200 PO=338:SH=0
5210 PRINT#695,"*";:PRINT#635,"*";:GOTO#5230
5220 PRINT#695,"*";:PRINT#635,"*";
5230 PRINT#PO,HH#:PRINT#554,CC#:PO=PO+1
5240 IFFD#370THEN#5300
5250 SH=SH+1:IFSH#1THEN#SH=0:GOTO#5210ELSE#5220
5300 CLS:FORX=88T0127:FORY=21T047:SET(X,Y):NEXTY,X
5302 FORX=90T091:FORY=20T022:RESET(X,Y):NEXTY,X
5304 FORX=94T095:FORY=21T022:RESET(X,Y):NEXTY,X
5306 FORX=98T0117:FORY=21T028:RESET(X,Y):NEXTY,X
5308 FORX=120T0121:FORY=21T022:RESET(X,Y):NEXTY,X
5310 FORX=124T0125:FORY=21T022:RESET(X,Y):NEXTY,X
5312 FORX=98T099:FORY=34T035:RESET(X,Y):NEXTY,X
5314 FORX=116T0117:FORY=39T040:RESET(X,Y):NEXTY,X
5316 FORX=118T0122:FORY=15T016:SET(X,Y):NEXTY,X
5318 FORX=17T020:SET(122,Y):NEXT
5320 S=1:GOSUB#60000:IF(A#="C")OR(A#="B")OR(A#="F")THEN#GOSUB#62000:GOTO#5400
5340 GOSUB#1000:GOSUB#60000:GOTO#5330
5400 CLS:SET(50,0):SET(51,0):FORX=46T049:SET(X,1):NEXT:SET(52,1):SET(53,1):SET(44,2):SET(45,2):SET(54,2):SET(55,2):FORX=41T043:SET(X,3):NEXT
5410 SET(56,3):FORX=37T040:SET(X,4):NEXT:SET(56,4):SET(57,4)
5420 FORX=34T036:SET(X,5):NEXT:SET(58,5):SET(59,5):FORX=31T033:SET(X,6):NEXT
5430 SET(60,6):SET(61,6):FORX=28T030:SET(X,7):NEXT:SET(62,7):SET(63,7):FORX=22T024:SET(X,8):NEXT:SET(26,8):SET(27,8)
5440 FORX=68T066:SET(X,8):NEXT:SET(21,9):FORX=25T042:SET(X,9):NEXT:FORX=52T059:SET(X,9):NEXT:FORX=67T071:SET(X,9):NEXT
5450 SET(20,10):SET(27,10):FORX=10T014:SET(30,Y):NEXT:FORX=49T051:SET(X,10):NEXT:SET(55,10):SET(72,10):SET(73,10):SET(19,11):SET(20,11):SET(26,11)
5460 FORX=46T048:SET(X,11):NEXT:SET(74,11):FORX=20T025:SET(X,12):NEXT:FORX=42T045:SET(X,12):NEXT:FORX=63T065:SET(X,12):NEXT
5470 SET(72,12):SET(74,12):SET(22,13):SET(41,13):FORX=55T057:SET(X,13):NEXT:SET(60,13):SET(62,13):FORX=65T067:SET(X,13):NEXT
5480 SET(71,13):SET(73,13):FORX=37T040:SET(X,14):NEXT:SET(47,14):SET(53,14):SET(54,14):FORX=57T059:SET(X,14):NEXT:SET(61,14)
5490 FORX=68T070:SET(X,14):NEXT:SET(72,14):SET(37,15):SET(39,15):SET(46,15):SET(48,15):SET(49,15):SET(51,15):SET(52,15):SET(61,15):SET(72,15):SET(73,15)
5500 SET(38,16):SET(45,16):SET(50,16):SET(66,16):SET(67,16):SET(74,16):SET(75,16):SET(82,12):SET(81,13):SET(81,14):FORX=13T016:SET(83,Y):NEXT
5510 SET(79,15):SET(80,15):SET(78,16):FORX=35T037:SET(X,17):NEXT:SET(44,17):SET(64,17):SET(65,17):FORX=49T051:SET(X,17):NEXT:FORX=68T070:SET(X,17):NEXT:SET(76,17):SET(77,17)
5520 SET(82,17):SET(42,18):SET(43,18):SET(54,18):FORX=71T075:SET(X,18):NEXT:SET(80,18):SET(81,18):SET(36,19):SET(37,19):SET(41,19):FORX=45T048:SET(X,19):NEXT:SET(54,19)
5530 FORX=57T060:SET(X,19):NEXT:FORX=63T070:SET(X,19):NEXT:SET(78,19):SET(79,19):SET(36,20):SET(40,20):FORX=44T049:SET(X,20):NEXT:SET(53,20):SET(56,20):SET(61,20):SET(62,20)
5540 FORX=75T077:SET(X,20):NEXT:SET(80,20):FORX=58T040:SET(X,21):NEXT:SET(56,21):SET(60,21):SET(61,21):FORX=72T074:SET(X,21):NEXT:SET(81,21):SET(33,22):SET(41,22)
5550 FORX=53T055:SET(X,22):NEXT:FORX=57T059:SET(X,22):NEXT:FORX=63T070:SET(X,22):NEXT:SET(82,22):SET(34,23):SET(35,23):SET(42,23):FORX=50T052:SET(X,23):NEXT:SET(66,23):SET(68,23)
5560 SET(82,23):SET(34,24):FORX=36T039:SET(X,24):NEXT:SET(42,24):FORX=45T049:SET(X,24):NEXT:FORX=61T065:SET(X,24):NEXT:SET(68,24):FORX=24T026:SET(83,Y):NEXT
5570 SET(35,25):SET(36,25):FORX=40T043:SET(X,25):NEXT:SET(57,25):SET(58,25):SET(60,25):SET(66,25):SET(67,25):FORX=37T041:SET(X,26):NEXT
5580 FORX=46T056:SET(X,26):NEXT:FORX=61T065:SET(X,26):NEXT:FORX=42T045:SET(X,27):NEXT:FORX=27T033:SET(84,Y):NEXT:SET(43,28):SET(44,29):SET(45,30):SET(46,31):SET(47,31)
5590 SET(47,32):SET(48,32):SET(82,33):FORX=34T042:SET(80,Y):NEXT:SET(82,36):SET(81,35):FORX=34T036:SET(83,Y):NEXT:SET(81,38):SET(52,31):SET(51,32):SET(52,32):FORX=49T051:SET(X,33):NEXT:SET(53,33)
5594 SET(51,34):SET(54,34):SET(55,35):SET(56,36):SET(57,37):SET(58,37):FORX=59T061:SET(X,38):NEXT:FORX=62T064:SET(X,39):NEXT:FORX=64T067:SET(X,40):NEXT

```

Program continues


```

5596 FORX=68T071:SET(X,41):NEXT:FORX=72T075:SET(X,42):NEXT:FORX=76T080:SET(X,43):NEXT:SET(81,44)
5600 GOSUB60000:IFR#="S"THENGOSUB62000:GOTO6800
5700 GOSUB61000:GOTO6400
5800 MG#=#CHR$(188)+CHR$(191)+CHR$(189)+CHR$(188)+STRING$(2,140)+CHR$(26)+STRING$(8,24)
5810 MG#=#MG#+CHR$(176)+STRING$(3,191)+CHR$(135)+STRING$(2,131)+CHR$(26)+STRING$(12,24)
5820 MG#=#MG#+CHR$(160)+CHR$(184)+CHR$(188)+STRING$(4,191)+CHR$(159)+CHR$(129)+CHR$(26)+STRING$(13,24)
5830 MG#=#MG#+CHR$(176)+CHR$(188)+CHR$(190)+STRING$(7,191)+CHR$(135)+CHR$(26)+STRING$(13,24)
5840 MG#=#MG#+CHR$(176)+CHR$(190)+STRING$(10,191)+STRING$(3,188)+CHR$(132)+CHR$(26)+STRING$(19,24)
5850 MG#=#MG#+CHR$(176)+CHR$(188)+STRING$(10,191)+CHR$(135)+STRING$(5,131)+CHR$(129)+CHR$(26)+STRING$(22,24)
5860 MG#=#MG#+CHR$(176)+CHR$(188)+STRING$(11,191)+CHR$(159)+CHR$(129)+CHR$(26)+STRING$(18,24)
5870 MG#=#MG#+CHR$(176)+CHR$(188)+STRING$(13,191)+CHR$(135)
5880 ML#=#CHR$(160)+CHR$(184)+CHR$(190)+STRING$(6,143)+CHR$(191)+CHR$(159)+STRING$(5,143)+CHR$(191)+CHR$(159)+CHR$(133)+CHR$(26)+STR
ING$(25,24)
5890 ML#=#ML#+STRING$(3,176)+CHR$(184)+CHR$(190)+CHR$(143)+CHR$(131)+*      *+CHR$(191)+CHR$(181)+*      *+CHR$(191)+CHR$(181)
5900 CLS:PRINT#416,MG#:PRINT#903,ML#
5910 RESET(67,19):X=422
5920 R#=#INKEY#:IFR#="D"ORR#="M"THENGOSUB62000:GOTO6800
5925 IFR#="O"THENGOSUB61000:GOTO5900
5930 PRINT#448,"?":PRINT#X,"*":FORDE=1T010:NEXT:PRINT#448,"*":PRINT#X,"*":FORDE=1T010:NEXT
5940 X=X+1
5950 IFX>434THENX=422
5960 GOTO5920
6000 CLS:X=86:FORQ=XT099:SET(Q,20):SET(Q,21):NEXT
6010 X=X-4:FORQ=XT099:SET(Q,22):SET(Q,23):NEXT
6020 X=X-4:FORQ=XT099:SET(Q,24):SET(Q,25):NEXT
6030 X=X-4:FORQ=XT099:SET(Q,26):SET(Q,27):NEXT
6035 X=X-4:FORQ=XT099:SET(Q,28):SET(Q,29):NEXT
6040 GOSUB60000:IFR#="S"THENGOSUB62000:GOTO6100
6050 GOSUB61000:GOTO6040
6100 CLS:PRINT#165,"1":PRINT#232,"2":PRINT#361,"3":PRINT#488,"4":PRINT#558,"5":PRINT#606,"6":
6110 PRINT#535,"7":PRINT#468,"8":PRINT#339,"9":PRINT#212,"10":PRINT#151,"11":PRINT#94,"12":
6120 FORX=61T075:SET(X,16):NEXT:FORX=6T015:SET(61,Y):NEXT
6130 SET(60,7):SET(59,8):SET(62,7):SET(63,8):SET(73,14):SET(74,15):SET(74,17):SET(73,18)
6140 FORX=36T086:SET(X,2):SET(X,30):NEXT:FORX=38T02STEP-1:SET(34,Y):SET(35,Y):SET(86,Y):SET(87,Y):NEXT
6150 GOSUB60000:IFR#="C"ORR#="M"THENGOSUB62000:GOTO6200
6160 GOSUB61000:GOTO6150
6200 CLS:FORX=48T0127:SET(X,11):SET(X,33):NEXT:FORX=33T011STEP-1:SET(48,Y):SET(49,Y):SET(126,Y):SET(127,Y):NEXT
6210 FORX=115T0122:SET(X,13):SET(X,18):NEXT:FORX=14T017:SET(115,Y):SET(122,Y):NEXT
6220 PRINT#378,".15":PRINT#282,"CLARK KENT":PRINT#346,"DAILY PLANET":PRINT#418,"METROPOLIS":PRINT#487,"SANTA CLAUS":PRINT#551,"
RD1 BOX1":PRINT#615,"NORTH POLE"
6230 GOSUB60000:IFR#="P"ORR#="L"ORR#="M"THENGOSUB62000:GOTO6300
6240 GOSUB61000:FORX=48T0127:SET(X,33):NEXT:GOTO6230
6300 CLS:V#=#STRING$(16,176)+STRING$(5,186)+CHR$(144):PRINT#468,V#
6310 GOSUB60000:IFR#="B"ORR#="T"THENGOSUB62000:GOTO6400
6320 GOSUB61000:GOTO6310
6400 END:DELETE THIS LINE IF YOU WANT AN ENDLESS LOOP
6410 GOTO100
50000 DEFINA=2:CLS:PRINTCHR$(23):PRINT      NON & DAD:"
50010 PRINT:PRINT"INSTRUCT CHILD TO HIT THE":PRINT"APPROPRIATE KEY. IF A"
50020 PRINT"TRAIN APPEARS HE SHOULD HIT":PRINT"THE LETTER T WHEN":PRINT"A QUESTION MARK FLASHES."
50030 PRINT:PRINT"HIT ENTER WHEN CHILD IS READY."
50040 R#=#INKEY#:IFR#=""THEN50040ELSECLS:RETURN
54000 BREAK
60000 DUMMY#=#INKEY#
60005 R#=#INKEY#:PRINT#448,"?":FORX=1T0100:NEXT
60010 PRINT#448,"*":FORX=1T0100:NEXT:IFR#=""THENGOSUB61SERRETURN
61000 SET(16,41):SET(17,40):SET(26,40):SET(27,41):FORX=18T025:SET(X,39):NEXTX
61005 SET(21,37):SET(17,35):SET(18,35):SET(24,35):SET(25,35):PRINT#904,"WRONG!":PRINT#967,"TRY AGAIN"
61008 IFS=1THENS=0:FORX=8T030:FORX=35T042:RESET(X,Y):NEXTV,X:RETURN
61010 FORDE=8T080:NEXT:PRINT#704,CHR$(38):PRINT#768,CHR$(38):PRINT#832,CHR$(38):PRINT#896,CHR$(38):PRINT#960,CHR$(38):
61020 RETURN
62000 FORX=18T025:SET(X,40):NEXT:SET(17,39):SET(16,38):SET(26,39):SET(27,38)
62005 SET(21,37):SET(17,35):SET(18,35):SET(25,35):SET(26,35)
62010 PRINT#904,"RIGHT!":FORDE=1T080:NEXT:PRINT#704,CHR$(38):PRINT#768,CHR$(38):PRINT#832,CHR$(38):PRINT#896,CHR$(38):
62020 RETURN

```

THE ORIGINAL MAGAZINE FOR OWNERS OF THE TRS-80™* MICROCOMPUTER

SOFTWARE
FOR TRS-80™
OWNERS

COMPUTRONICS INC.

MONTHLY
NEWSMAGAZINE
FOR TRS-80™
OWNERS

MONTHLY NEWSMAGAZINE Practical Support For Model I & II

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS
- AND MORE

PROGRAMS AND ARTICLES PUBLISHED IN OUR FIRST 12 ISSUES INCLUDE THE FOLLOWING:

- A COMPLETE INCOME TAX PROGRAM (LONG AND SHORT FORM)
- INVENTORY CONTROL
- STOCK MARKET ANALYSIS
- WORD PROCESSING PROGRAM (FOR DISK OR CASSETTE)
- LOWER CASE MODIFICATION FOR YOUR VIDEO MONITOR OR PRINTER
- PAYROLL (FEDERAL TAX WITHHOLDING PROGRAM)
- EXTEND 16 DIGIT ACCURACY TO TRS-80™ FUNCTIONS (SUCH AS SQUARE ROOTS AND TRIGONOMETRIC FUNCTIONS)
- NEW DISK DRIVES FOR YOUR TRS-80™
- PRINTER OPTIONS AVAILABLE FOR YOUR TRS-80™
- A HORSE SELECTION SYSTEM***ARITHMETIC TEACHER
- COMPLETE MAILING LIST PROGRAMS (BOTH FOR DISK OR CASSETTE SEQUENTIAL AND RANDOM ACCESS)
- RANDOM SAMPLING***BAR GRAPH
- CHECKBOOK MAINTENANCE PROGRAM
- LEVEL II UPDATES***LEVEL II INDEX
- CREDIT CARD INFORMATION STORAGE FILE
- BEGINNER'S GUIDE TO MACHINE LANGUAGE AND ASSEMBLY LANGUAGE
- LINE RENUMBERING
- AND CASSETTE TIPS, PROGRAM HINTS, LATEST PRODUCTS COMING SOON (GENERAL LEDGER, ACCOUNTS PAYABLE AND RECEIVABLE, FORTRAN 80, FINANCIAL APPLICATIONS PACKAGE, PROGRAMS FOR HOMEOWNERS, MERGE TWO PROGRAMS, STATISTICAL AND MATHEMATICAL PROGRAMS (BOTH ELEMENTARY AND ADVANCED) AND

FREE



WORD PROCESSING PROGRAM (Cassette or Disk) For writing letters, text, mailing lists, etc., with each new subscriptions or renewal

LEVEL II RAM TEST (Cassette or Disk) Checks random access memory to ensure that all memory locations are working properly.

DATA MANAGEMENT SYSTEM (Cassette or Disk) Complete file management for your TRS-80™

CLEANUP (Cassette or Disk) Fast action Maze Game

ADVENTURE (Cassette or Disk) Adventure #0 by Scott Adams (From Adventureland International)

* TRS-80™ IS A TRADEMARK OF TANDY CORP

FREE

SEND FOR OUR NEW 48 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.

COMPUTRONICS!

150 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 • #7 - January 1979 • #12 - June 1979 • #18 - January 1980)

NEW SUBSCRIPTION RENEWAL



**24 HOUR
ORDER
LINE**

(914) 425-1535



NEW TOLL-FREE

ORDER LINE

(OUTSIDE OF N.Y. STATE)

(800) 431-2818

**NEW!!!
MOD-II NEWSLETTER
\$12/year (or 12 issues)**

CREDIT CARD NUMBER EXP. DATE

SIGNATURE

NAME

ADDRESS CITY STATE ZIP

*** ADD \$6/YEAR (CANADA, MEXICO) - ADD \$12/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

★ All Orders processed within 24-Hours

★ 30-Day Money Back Guarantee on all Software (less a \$3 penalty for handling)

★ 10-Day Money Back Guarantee on Disk Drives and Printers PLUS 120-Days Free Service

<p>LEARNING LEVEL II By David Lien The Original Author Of The Level Manual A Step By Step approach to Learning Level II especially geared to new TRS-80™ Owners \$15.95</p>	<p>FROM RACET COMPUTES</p> <ul style="list-style-type: none"> • REMODEL-PROLOAD - Renumbers program lines, combines programs. The only renumber program that will renumber the middle of a program. Specify 16K, 32K or 48K. Works with Cassette or Disk \$34.95 • GSF - Use in your Basic Programs for Instant Sorting (will sort 1000 items in 9 seconds). Other commands include Compress and Uncompress Data, Duplicate Memory, Display Screen Controls and Fast Graphic Controls \$24.95 (For Cassette or Disk, specify 16K, 32K or 48K) • DOSORT - All G S F commands plus special Multiple Disk Sorting Routines (Specify 32K or 48K) \$34.95 • INFINITE BASIC - Adds 70 commands to your TRS-80™ including Instant Sort, Matrix Commands, String Commands, Left and Right Justification, String Centering, Simultaneous Equations, Upper and Lower Case Reverse and more. (For Cassette or Disk) \$49.95 • INFINITE BUSINESS (Requires Infinite Basic) Eliminate Round-off error, 127-Digit Calculation Accuracy, Insert New Elements in Sorted Arrays, Automatic Page Headings, Footings and Pagination, Multiple Precision Arithmetic and more. (For Cassette or Disk) \$29.95 • COPYSYS - Copy Machine Language Programs (For Cassette Only) \$14.95 • DSM (Disk Sort Merge) \$75.00 	<p>FROM APPARAT NEW DOS • \$99.95 35, 40 and 77 Track Versions available</p> <ul style="list-style-type: none"> • NEW DOS/80 (With variable record length files, chainings and many other features) \$149.95
<p>TRS-80™ DISK AND OTHER MYSTERIES Over 100 pages of indispensable information for disk owners. Learn to recover information from bad disks, how to make Basic programs unlistable and 12 more chapters of never published tips and information. Written by H.C. Pennington. (For all Disk Owners). \$22.50</p>	<p>FROM SMALL SYSTEM SOFTWARE</p> <ul style="list-style-type: none"> • RSM-2 Machine Language Monitor \$26.95 • RSM-2D Disk Version of RSM-2 \$29.95 • DCV-1 Converts Machine Language Programs from tape to disk \$9.95 • AIR RAID - The ultimate TRS-80™ game converts your TRS-80™ into a real time shooting gallery \$14.95 • BARRICADE - A fast pong style game \$14.95 • CPM - (For Disk Only) \$150.00 • TRS-232 INTERFACE - Interface with Software driver RS-232 printers to your TRS-80™ \$49.95 • TRS-232 FORMATTER - Additional (optional) Software for TRS-232 owners. Adds many printer commands to your TRS-80™ \$14.95 (With purchase of TRS-232) \$9.95 • PENMOD - Use the Electric Pencil with RS's lower case modification \$19.95 	<p>FROM THE BOTTOM SHELF</p> <ul style="list-style-type: none"> • CHECKBOOK II (For Cassette or Disk) \$39.95 • SYSTEM DOCTOR (A complete diagnosis of your TRS-80™ Checks memory, video, cassette, disk, ROM, and all other parts of your system) For Cassette or Disk \$26.50 • CHECKBOOK REGISTER ACCOUNTING SYSTEM (Requires 2 disk drives) \$75.00 • LIBRARY 100 - 100 established business, game and educational programs plus FREE Tiny Pilot all for \$49.50 • BASIC TOOL KIT - Lists all variables, GOTO's and GOSUB's in your program \$19.80
<p>NEW SBSG BUSINESS SYSTEM FOR MODEL I OR MODEL II - IN STOCK</p> <ul style="list-style-type: none"> - General Ledger - Accounts Receivable - Accounts Payable - Payroll - Inventory Control with Invoicing <p>Each module can be operated individually or as a coordinated SYSTEM. Turn-Key error catching operation for beginners</p> <ul style="list-style-type: none"> • Complete manual and documentation accompany each program • Minimum System requirements 2-Disk Drives for Model I, 1-Disk Drive for Model II • Each module can be formatted to span data on up to 4-Disk Drives • Free 30-Day telephone consultation • Call for complete specifications <ul style="list-style-type: none"> • Model I Version \$125.00 Per Module • Model II Version \$495.00 Per System \$225.00 Per Module \$995.00 Per System 	<p>FROM GALACTIC SOFTWARE</p> <ul style="list-style-type: none"> • MAIL PAC - For Model I Disk Systems only \$99.95 • Quick-sorting full user control over mailing list from Galactic Software • STOCK MARKET PAC \$99.95 	<ul style="list-style-type: none"> • SOUNDWARE - Adds sound to your TRS-80™ Just plus it in \$29.95 • Sample programs included • TING TONG - Can be used with Soundware for a Sound version of pong \$9.95 • VIC - The Carta Visual Instructional Computer Program \$19.95 <p>The Level II 16K Cassette is designed to teach beginners the Basics of Machine Language and Assembly Language Programming. See every Machine Language Instruction Display on your video. VIC includes Step By Step 55 page manual</p>
<p>DATA MANAGEMENT SYSTEMS</p> <ul style="list-style-type: none"> - DMS replace index cards or any data requiring long lists of information • TBS In-Memory Information System (For Cassette Systems) \$39.95 • TBS Disk Data Manager (Requires 1 or more disk drives). Set up fast random access, files in minutes. Stores up to 320K of information on 4 Drives. Up to 10 fields and 255 characters per record. Supports upper and lower case RS-232 or TRS-232. Features complete editing \$49.50 • Personal Software CCA Data Management System. Completely user oriented, menu drive, 130 page Step By Step Manual. Capable of inventory control, sorting data, reporting data in nearly any form (for reports and mailing labels). Sorts data by up to 10 fields for zip code, balance due, geographic location or whatever. Prints reports with subtotals and totals automatically calculated. Fast random access \$75.00 	<p>VISTA V80 DISK DRIVE - 110K of Storage \$395.00 Add \$29.95 for Cable (Free with purchase of 2-Disk Drives). 10 day money back guarantee</p> <p>FROM HOWE SOFTWARE</p> <ul style="list-style-type: none"> • MON-3 - Machine Language Programming for beginners. MON-3 is a complete System Monitor with Users Manual \$39.95 • MON-4 - Disk Version of MON-3 \$49.95 <p>FROM MICROSOFT</p> <ul style="list-style-type: none"> • LEVEL III BASIC \$49.95 <p>Now Cassette owners can add Disk Commands to their TRS-80™ without owning a Disk Drive</p> <ul style="list-style-type: none"> • MICROSOFT DISK ADVENTURE \$29.95 • TRSDOS BASIC COMPILER \$195.00 <p>Run Basic Programs up to 15 times faster</p> <ul style="list-style-type: none"> • NEC BUSINESS QUALITY PRINTERS (For MOD-I or MOD-II) \$2,995.00 <p>THE ELECTRIC PENCIL</p> <ul style="list-style-type: none"> Cassette \$99.95 Disk \$150.00 MOD-II Version \$325.00 	<ul style="list-style-type: none"> • HORSE SELECTOR II By Dr Hal Davis The TRS-80™ version updated for the TRS-80™ and originally reviewed in Systems and Methods \$50.00

COMPUTRONICS
MATHEMATICAL APPLICATIONS SERVICE

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

HOURS: 9-5

Monday thru Saturday

48-Page Catalog \$2 FREE With Any Order

Order By Phone Or Mail

Add \$1 Per Order For Shipping Within UPS Areas

Add \$3 For C.O.D.

Add \$3 For All Foreign And Non-UPS Shipments

Add \$3 For UPS Blue Label



24 HOUR ORDER LINE

(914) 425-1535



NEW TOLL-FREE ORDER LINE

(OUTSIDE OF N.Y. STATE)

(800) 431-2818

••• EVERYTHING ••• FOR MOD-II OWNERS

NEW MOD-II NEWSLETTER	
MOD-II Catalog Free w/subscription	\$12/year
MAIL PAC	\$199.95
MICROSOFT BASIC COMPILER	\$395.00
MICROSOFT BASIC	\$325.00
GSF SORT ROUTINE	\$50.00
CP/M	\$170.00
PEACHTREE BUSINESS SOFTWARE	Call
WORD STAR	\$495.00

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

- EACH MODULE CAN BE OPERATED INDIVIDUALLY OR AS A COORDINATED SYSTEM.
- TURN-KEY ERROR CATCHING OPERATION FOR BEGINNERS
- FREE 30-DAY TELEPHONE CONSULTATION WITH SBSG
- EACH MODULE CAN BE FORMATTED TO SPAN DATA ON UP TO 4 DISK DRIVES.
- COMPLETE MANUAL AND DOCUMENTATION ACCOMPANY EACH MANUAL
- MINIMUM SYSTEM REQUIREMENTS - 2 DISK DRIVES FOR MODEL I...1-DISK DRIVE FOR MODEL II

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 a 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
- ★ invoice 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 timely 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
 - customer P.O. #
 - description of P.O.
 - billing date
 - general ledger account number
 - invoice amount
 - shipping/transportation charges
 - tax charges
 - payment
 - progress payment information
 - transaction print and 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: debits A/R, credits account you specify

PAYROLL

Payroll involves 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 accurate 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, on-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

(Continued on next page)

(PAYROLL CAPABILITIES CONTINUED)

- * employees can be paid using any combination of pay types (except, hourly cannot receive salary & salary cannot receive hourly)
- * special non-taxable or taxable lump sums can be paid regularly or one time (bonus, reimbursements, etc)
- * health & 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

- OVER 1000 ITEMS ON MODEL I
- OVER 3000 ITEMS ON MODEL II
- LOW STOCK ALARM
- INVOICING DEDUCTS FROM INVENTORY
- COMPLETE INVENTORY REPORTS
- REORDER POINT REPORT
- QUICK ITEM ACCESS

CLIENT BILLING, STOCK CONTROL, DENTAL BILLING, COMMODITIES
Medicare/Medicaid billing also available

MODEL I \$125 Per Module
\$495 Complete System

MODEL II \$225 Per Module
\$995 Complete System

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND WITHIN 30 DAYS ON ALL SOFTWARE (H & E COMPUTRONICS MONTHLY NEWSMAGAZINE SUBSCRIBERS ONLY). WE DO CHARGE A \$3 PENALTY TO COVER POSTAGE AND HANDLING.

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 your 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 designed 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



50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977



24 HOUR
ORDER
LINE
(914) 425-1535



PLEASE SEND ME:

MODEL I \$125 PER MODULE _____
 \$495 COMPLETE SYSTEM _____

MODEL II \$225 PER MODULE _____
 \$995 COMPLETE SYSTEM _____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

*** ADD \$6/YEAR (CANADA, MEXICO) - ADD \$12/YEAR AIR MAIL - OUTSIDE OF U.S.A. CANADA & MEXICO ***

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

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

- CHECKBOOK MAINTENANCE
- TIME FOR MONEY TO DOUBLE
- FEDERAL FICA & WITHHOLDING TAX COMPUTATIONS
- HOME BUDGET ANALYSIS
- ANNUITY COMPUTATION
- UNIT PRICING
- CHANGE FROM PURCHASE
- NEBS CHECK PRINTER
- DAYS BETWEEN DATES
- MORTGAGE AMORTIZATION TABLE
- INVENTORY CONTROL
- PORTFOLIO VALUE COMPUTATIONS
- VALUE OF A SHARE OF STOCK
- SALES RECORD KEEPING SYSTEM
- FUTURE VALUE OF AN INVESTMENT
- EFFECTIVE INTEREST RATE (LOAN)
- PRESENT VALUE OF A FUTURE AMOUNT
- RATE OF RETURN VARIABLE INFLOW
- RATE OF RETURN CONSTANT INFLOW
- REGULAR WITHDRAWAL FROM INVESTMENT
- STRAIGHT LINE DEPRECIATION
- SUM OF DIGITS DEPRECIATION
- DECLINING BALANCE DEPRECIATION
- BREAK EVEN ANALYSIS
- SALVAGE VALUE OF INVESTMENT
- PAYMENT ON A LOAN
- FUTURE SALES PROJECTIONS
- CREDIT CARD FILE
- ECONOMIC ORDER QUANTITY (EOQ) INVENTORY MODEL
- VALUE OF HOUSE CONTENTS
- TEXT EDITOR
- MONTHLY CALENDAR
- DAY OF WEEK
- CASH FLOW VS. DEPRECIATION
- COMPLETE MAIL SYSTEM
- INTEREST RATE ON A LEASE

BUSINESS

PERSONAL

FINANCE

STATISTICS AND MATHEMATICS

- RANDOM SAMPLE SELECTION
- ANGLOMETRIC CONVERSION
- MEAN, STANDARD DEVIATION, MAXIMUM AND MINIMUM
- SIMPLE LINEAR REGRESSION
- MULTIPLE REGRESSION ANALYSIS
- GEOMETRIC REGRESSION
- EXPONENTIAL REGRESSION
- SIMPLE MOVING AVERAGE
- SIMPLE T-TEST
- CHI-SQUARE TEST
- NORMAL PROBABILITIES
- BINOMIAL PROBABILITY
- POISSON PROBABILITY
- MATRIX ADDITION AND SUBTRACTION
- MATRIX TRANSPOSE
- MATRIX INVERSE
- MATRIX MULTIPLICATION
- SOLUTION OF SIMULTANEOUS EQUATIONS
- QUADRATIC FORMULA
- LINEAR EQUATION SOLUTIONS
- ROOT HALF INTERVAL SEARCH
- ROOTS OF POLYNOMIALS
- ROOTS-NEWTON'S METHODS
- PRIME FACTORS OF INTEGER
- LEAST COMMON DENOMINATOR
- RADIAN DEGREE CONVERSION
- NUMERICAL INTEGRATION

STATISTICS

MATH

UTILITIES

- QUICK SORT ROUTINE
- PROGRAM STORAGE INDEX
- MULTIPLE CHOICE QUIZ BUILDER
- FORM LETTER WRITER
- SHELL SORT
- CASSETTE LABEL MAKER
- CODES MESSAGES
- MERGE TWO FILES
- SORT WITH REPLACEMENT

GRAPHICS

- DRAWS BAR GRAPH
- DRAWS HISTOGRAM
- MOVING BANNER DISPLAY

GAMBLING AND GAMES

- RANDOM SPORTS QUIZ
- GOVERNMENT QUIZ
- HORSE RACE
- MAGIC SQUARE
- ARITHMETIC TEACHER
- HIGH LOW GAMBLE
- UNSCRAMBLE LETTERS
- HANGMAN
- GAME OF NIM
- RUSSIAN ROULETTE
- ROULETTE GAME
- ONE ARMED BANDIT
- HIT THE TARGET
- WALKING DRUNK
- STATE CAPITAL QUIZ
- TIC-TAC-TOE
- DICE GAME
- LUNAR LANDAR GAME
- BIORHYTHM
- HORSE SELECTOR (CLASS CALCULATOR)
- RANDOM DICE ROLL
- RANDOM ROULETTE ROLL
- RANDOM CARD DEALER
- GUESS THE NUMBER
- WHITE OUT SCREEN

GAMBLING

INCLUDES 110 PAGE USER MANUAL

GUARANTEED SATISFACTION

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND WITHIN 30 DAYS ON ALL SOFTWARE (H & E COMPUTRONICS INC. MONTHLY NEWSMAGAZINE SUBSCRIBERS ONLY). WE DO CHARGE A \$3 PENALTY TO COVER POSTAGE AND HANDLING.

COMPUTRONICS
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 (MODEL II DISKETTE VERSION).....\$99.95



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
(less a \$3 penalty for handling)

CREDIT CARD NUMBER EXP. DATE.....

SIGNATURE

NAME

ADDRESS CITY STATE ZIP

*** ADD \$2 FOR POSTAGE AND HANDLING (\$4 OUTSIDE OF THE U.S.A.) ***

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 32% AT ALL TRACKS-1978 SHOWS

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 RENJUMBER 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 and 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.

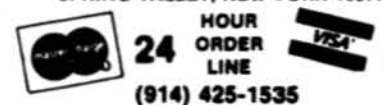
COMPUTRONICS

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 (less \$3 penalty for handling)

ADD \$2.00 FOR SHIPPING IN UPS AREAS
ADD \$3.00 FOR C.O.D. OR NON-UPS AREAS
ADD \$4.00 OUTSIDE U.S.A., CANADA & MEXICO

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 (less a \$3 penalty for handling)

(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 EXPRVAL	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 QJUE1E1	Single server queueing (waiting line) model
49 CVP	Cost-volume-profit analysis
50 CONDPFOP	Conditional profit tables
51 OPTLOSS	Opportunity loss tables
52 FQJQOQ	Fixed quantity economic order quantity model

59 WACC	Weighted average cost of capital
60 COMBAL	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	Laspeyes 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 TIMJSAH	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 INSFIL	Insurance policy file
94 PAYROLL2	In memory payroll system
95 DILANAL	Dilution analysis
96 LOANAFD	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 convertible bond
100 PORTVAL9	Stock market portfolio storage-valuation program

- CASSETTE VERSION \$ 99.95
- DISKETTE VERSION \$ 99.95
- MODEL II VERSION \$149.95

ADD \$2.00 FOR SHIPPING IN UPS AREAS
 ADD \$3.00 FOR C.O.D. OR NON-UPS AREAS
 ADD \$4.00 OUTSIDE U.S.A., CANADA & MEXICO

COMPUTRONICS
 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

**24 HOUR
 ORDER LINE**
(914) 425-1535



- Review of the latest Software for the TRS-80™ Model II Microcomputer
- Tips for running your Model II
- Latest announcements and updates

The Newsletter For Owners Of The TRS-80™ MODEL II MICROCOMPUTER

SPECIAL CHARTER SUBSCRIPTION RATE \$12.00 □ (For 12 Issues)

MOD-II PROGRAMS CURRENTLY AVAILABLE

- ELECTRIC PENCIL** (Michael Shroyer Software)..... Complete word processor with extensive editing and printer formatting features.....\$275 (STANDARD CP/M VERSION).....\$300 (DIABLO, NEC OR QUME CP/M VERSION).....\$325 (STANDARD TRSDOS VERSION).....\$350 (DIABLO, NEC OR QUME TRSDOS VERSION).
- GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL AND PAYROLL** (Small Business Systems Group).....works under TRSDOS.....can be used one module at a time or as a coordinated system.....\$225 per module.....\$995 for the complete system.
- GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL AND PAYROLL** (Peachtree Software).... requires CP/M and MICROSOFT BASIC.....professional business systems.....turn key operation.....discounts available..... \$1000 per module\$5000 for the complete system.
- 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 and CP/M\$295.
- GLECTOR** (Micro-Ap).....add on package to the SELECTOR III.....general ledger that allows the user to define a customized chart of accounts.....\$250.
- 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.
- 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 or 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.
- 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.
- CP/M** (Lifeboat Associates)..... an alternative operating system to TRSDOS that allows users to use hundreds of programs currently available to CP/M owners..... This is the only version of CP/M for the MOD-II that comes with an elementary CP/M guide written especially for MOD-II owners.....\$170.
- MICROSOFT BASIC** (Microsoft)..... an enhanced version of the MICROSOFT BASIC found on TRSDOS..... works under CP/M..... 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).....\$350.
- CBASIC-2**.....a non-interactive BASIC used for many programs that run under CP/M..... requires CP/M..... allows user to make more efficient use of disk files..... eliminates the use of the most line number references..... required for programs such as SELECTOR and GLECTOR..... \$120.
- MAILING ADDRESS** (Peachtree Software)..... requires CP/M..... keeps track of name and address information and allows the selective printing of the information in the form of mailing lists or address labels..... unique key structure and formatting structure allows for a multitude of retrieval alternatives.....\$790.
- PROPERTY MANAGEMENT** (Peachtree Software)..... requires CP/M..... keeps track of all financial records related to property management\$1500.
- FORTRAN-80** (Microsoft).....ANSI 66 (except for COMPLEX) plus many extensions..... requires CP/M.....\$425.
- 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.
- MEMOREX OR WABASH CERTIFIED DISKETTES**.....\$49.95 (per box of 10).
- FLEXI-MATIC DISKETTE STORAGE TRAY**.....Stores 110 diskettes.....comes complete with index-dividers, dust cover, tilt plates and adjustable spacing.....\$55.00.
- 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.
- 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 any CP/M based mail program.....\$150.
- EDITOR ASSEMBLER** from Galactic Software Ltd. is 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.
- 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 alphanumeric 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 extensions).....works under TRSDOS.....\$199.

TRS-80™ IS A TRADEMARK OF TANDY CORPORATION

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

Self help routines for frustrated programmers.

My Way

Robert V. Meushaw
4188 Brittany Dr.
Ellicott City, MD 21043

I'm sure that many of you have been faced with situations in which the program you were writing just wouldn't perform to your expectations because of limitations which seemed beyond your control. In some cases, processor speed or inefficient data storage techniques may limit your capabilities; but in almost every hopeless situation I work on, I find that, with perseverance, there is always a better way.

One of the most important lessons I have learned while programming is that you should use your computer to help you analyze and resolve your programming problems.

I would like to describe several programming applications I have faced with my Level I TRS-80 and the approaches that I used to investigate such limitations.

Problem One

Computing vector magnitudes when given the X and Y-coordinates (Fig. 1) requires a

square root function that is unfortunately not built-in to the Level I. Fortunately, the appendix of the Level I manual includes a square root function (Listing 1), but it performs much slower than I would have liked. Watching the results being printed, I can almost feel the burden of the routine. After this I begin to investigate how to improve the speed of my program.

Looking at Listing 1, you can see that the routine makes successive approximations to the square root of X which eventually converge (within the limits of the computer's accuracy) to the square root of X. The first approximation, Y, is taken as $X/2$.

The value of W keeps track of the error in the approximation and whenever the error is zero or is the same as the previous iteration, the subroutine returns with Y as the square root of X.

This seems fairly straightforward, but, as you can see, there is really quite a lot going on in one iteration, which is reason enough for its lack of speed.

Wondering how many iterations of such a routine are necessary to compute a square root, I decided to make some tests.

The test program is shown in Listing 2. It generates random

numbers to be input to the square root subroutine. Each time a new number is generated, a counter is set to zero. Then the square root subroutine is called, and modified to increment the counter with each iteration.

When the subroutine returns, C contains the number of iterations necessary to compute the square root of X. The value of C is used to increment the array element A(C).

Using this technique, the array element A(i) keeps count of the number of values of X which require iterations in the square root subroutine to return an answer.

The first three lines in the program initialize the array elements to zero. Line 50 deter-

mines the value of X.

This line is not fully specified in the listing because I ran the program a number of times with different expressions for X. In each case the program examines 15,000-20,000 values of X. This often requires several hours of run time. (On several occasions I let the test run overnight.)

Usually, when a reasonable number of samples has been examined, I interrupt the program and execute the routine beginning on line 2000 which displays the percentage of samples requiring iteration counts of one to one hundred.

Some Interesting Results

The program is first run with $X = \text{RND}(0)$. This sets X equal to

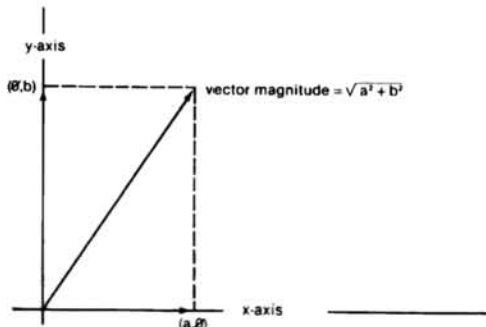


Fig. 1

a random number between 0 and 1. The resulting iterations are shown in Table 1. Beside each iteration value is its percentage.

We can see that 34.6 percent of the numbers require six iterations, 48 percent require seven iterations, and so on. The high-

est number of iterations recorded is fourteen, and no number requires five or less.

Table 2 shows the results using $X = 1/\text{RND}(30000)$. The range of iterations is between seven and fourteen, with the largest percentage of the numbers requiring more than twelve.

Table 3 shows the results of $X = \text{RND}(30000)$. These results appear similar to those of Table 2 except that the range of iterations is offset slightly.

The last set of results, shown in Table 4, is the result of using $X = \text{RND}(0)*1\text{E}10$. I chose this to give some very large values for X. Again, the results appear similar to those in Table 2 with a larger offset than in Table 3.

The Search Begins

Now that I have a reasonable understanding of how the square root subroutine is working, and why it is consuming so much time, the problem remains to find a technique to reduce the time.

My first thought is to investigate other methods of computing the square root. One technique, which often yields good results, is a power series approximation. These approximations are used in calculating many functions including sine, cosine, natural log and other functions. The advantage of such a technique is the elimination of the numerous iterations the computation requires—thus saving time.

Since it has been many years since I encountered such approximation techniques, I find myself digging out college books, which I had hoped never to see again. Though it was not as clear to me now how a Taylor Series or Maclaurin Series approximation works, I eventually convinced myself that there is no simple expansion which I can use.

As is clear from Tables 1-4, larger numbers require more iterations to compute the square root. Part of the reason for this is that the first approximation to the square root is taken as $X/2$, which becomes a worse approximation as X increases or decreases. Again, I consider a power series approximation such as:

IF (X <= 10) THEN Y = X/2
IF (X > 10) AND (X <= 100) THEN Y = X/4
IF (X > 100) AND (X <= 1000) THEN Y = X/20

I experiment with several variations of this form, but none yield a significant reduction in the number of iterations.

A Glimmer of Light

Finally, I realize that I need to look for a solution to my specific application and not a general one.

Looking back at Fig. 1, I notice that I am not trying to find the square root of just any number, I am trying to find the length of the hypotenuse of a right triangle—knowing the length of each side!

Eureka!! I have found the first approximation—the sum of the lengths of the sides of the triangle (i.e., $A + B$).

My next task is to determine how good my approximation method really is. Listing 3 shows the program which I used

```

30010  REM *SQUARE ROOT* INPUT X, OUTPUT Y
30020  REM ALSO USES W AND Z INTERNALLY
30030  IF X=0 THEN Y=0: RET.
30040  IF X>0 THEN 30060
30050  PRINT "ROOT OF NEGATIVE NUMBER?": STOP
30060  Y=X*.5: Z=0
30070  W=(X/Y)*.5
30080  IF (W=0) + (W=Z) THEN RETURN
30090  Y=Y+W: Z=W: GOTO 30070

```

Listing 1. TRS-80 Level I manual square root subroutine (shorthand notation has been expanded).

```

10  FOR I=1 TO 100
20  A(I)=0
30  NEXT I
40  J=1
50  X=(...one of several statements...)
60  C=0
70  GOSUB 1000
80  A(C)=A(C)+1
90  PRINT J;" VALUES HAVE BEEN USED"
100 J=J+1
110 GOTO 50
120 END

1000 Y=X*.5: Z=0
1010 W=(X/Y)*.5
1020 C=C+1
1030 IF (W=0) + (W=Z) THEN RET.
1040 Y=Y+W: Z=W: GOTO 1010

2000 T=0
2010 FOR I=1 TO 100
2020 T=T+A(I)
2030 NEXT I
2040 FOR K=1 TO 100
2050 PRINT K, 100*A(K)/T
2060 NEXT K

INITIALIZE ARRAY WHICH
COUNTS NUMBER OF SAMPLES
FOR EACH ITERATION COUNT
J COUNTS NUMBER OF SAMPLES
PICK RANDOM VALUE FOR X
INITIALIZE NUMBER OF ITERATIONS
COMPUTE SQUARE ROOT
UPDATE PROPER COUNTER
PRINT NUMBER OF SAMPLES USED
UPDATE SAMPLE COUNT
KEEP GOING

COMPUTE APPROX. TO SQ. ROOT
COMPUTE ERROR
UPDATE ITERATION COUNT
IF DONE, RETURN
ELSE COMPUTE NEW APPROX.

SET TOTAL TO ZERO
COMPUTE THE SUM
OF THE NUMBER OF SAMPLES
FOR ALL ITERATION COUNTS
SET LOOP TO PRINT ALL
ITERATION COUNTS IN
PERCENTAGE OF TOTAL

```

Listing 2. Program used to investigate the operation of the square root subroutine. The program was run with the value of X in line 50 given as $X = \text{RND}(0)$, $X = 1/\text{RND}(30000)$, $X = \text{RND}(30000)$, and $X = \text{RND}(0)*1\text{E}10$. The program starting at line 2000, run after a sufficient number of samples were taken, prints the percentage of numbers for each iteration count.

```

10  FOR I=1 TO 100
20  A(I)=0
30  NEXT I
40  J=1
50  A=(...various expressions...)
51  B=(...various expressions...)
60  X=A*A+B*B
70  C=0
80  GOSUB 1000
90  A(C)=A(C)+1
100 PRINT J;" VALUES HAVE BEEN USED"
110 J=J+1
120 GOTO 50
130 END

1000 Y=A+B: Z=0
1010 W=(X/Y)*.5
1020 C=C+1
1030 IF (W=0) + (W=Z) THEN RET.
1040 Y=Y+W: Z=W: GOTO 1010

INITIALIZE ARRAY WHICH COUNTS
NUMBER OF SAMPLES FOR EACH
ITERATION COUNT
J COUNTS NUMBER OF ITERATIONS
PICK RANDOM VALUES
FOR A AND B
COMPUTE SQUARE OF VECTOR MAG.
INIT. NUMBER OF ITERATIONS
COMPUTE SQUARE ROOT
UPDATE PROPER COUNTER
PRINT MESSAGE
UPDATE SAMPLE COUNT
KEEP GOING

COMPUTE FIRST APPROX.
COMPUTE ERROR
UPDATE ITERATION COUNT
IF DONE, RETURN
ELSE MAKE NEW APPROX.

```

Listing 3. Program used to compute the square root of X using the first approximation $Y = A + B$.

DOSPLUS 3.0

Faster And More Efficient Than:

- TRSDOS
- NEWDOS +
- VTOS

DOSPLUS Uses less memory and still offers all the commands of the other major operating systems, AND some innovative and useful features of our own design.

DOSPLUS is now available for the TRS - 80* Model I, II, and III

LIBRARY OF COMMANDS:

APPEND	ATTRIB	AUTO	BOOT	BUILD
CLEAR	CLOCK	COPY	CREATE	DATE
DEBUG	DEVICE	DIR	DO	DUMP
FOAMS	FREE	KILL	LIB	LIST
LOAD	PAUSE	PROT	RENAME	RS232
TIME	TRACE	VERIFV		

BUILT - IN FEATURES:

AUTOMATIC LOWERCASE	COPY 1	TRANSFER
SCREEN PRINTER	RESTORE (DEAD FILES)	PURGE
KEYBOARD DEBOUNCE	DISH DUMP/CMD	CLEARFILE
REPEATING KEYBOARD	FORMAT	BACK-UP

UTILITIES:

NEW FROM MICRO-SYSTEMS!!!

Master Diskette Directory Ver 1.0 -

This program will read the directories of up to 160 diskettes or 5000 files! Insert your diskette in the drive, press enter, and it works automatically to read, store, and categorize your files. No more looking through box after box of diskettes looking for those favorite programs that are "Around Here Somewhere". You can get a listing of all the files on all the diskettes. In addition, you can list them by file extension, diskette number, or program category. With master directory, you need never again worry about the frustration of not being able to locate a particular program. Master directory will search for a particular file name and give you every occurrence of that file, its size, and the diskette number that contains it.

A totally self contained, machine language program on a self-booting diskette; master directory will work equally well on single or multiple drive systems.

DOSPLUS—\$99.95

MASTER DIRECTORY—\$29.95

Please Contact:
Micro Systems Software Inc.
5846 Funston Street
Hollywood, Florida 33023
1 (305) 983-3390

384



Coming Soon: Dosplus 4.0 for 10 - Megabyte TRS - 80s*

* TRS - 80 is a trademark of Tandy Corp

NUMBER OF ITERATIONS % OF NUMBERS TESTED

<= 5	0
6	34.6
7	48
8	13
9	3.3
10	.87
11	.16
12	.056
13	.01
14	.004
>= 15	0

Table 1. Distribution of square root iteration counts for $X = RND(0)$.

NUMBER OF ITERATIONS % OF NUMBERS TESTED

<= 6	0
7	.03
8	.04
9	.33
10	1.2
11	5.4
12	19.3
13	47.8
14	25.9
>= 15	0

Table 2. Distribution of square root iteration counts for $X = 1/RND(30000)$.

NUMBER OF ITERATIONS % OF NUMBERS TESTED

<= 3	0
4	.004
5	.02
6	.076
7	.3
8	1.15
9	4.85
10	19
11	47.4
12	27.2
>= 13	0

Table 3. Distribution of square root iteration counts for $X = RND(30000)$.

NUMBER OF ITERATIONS % OF NUMBERS TESTED

<= 14	0
15	.05
16	.17
17	.95
18	3.51
19	14.12
20	47.1
21	34.1
>= 22	0

Table 4. Distribution of square root iteration counts for $X = RND(0) * 1E10$.

NUMBER OF ITERATIONS % OF NUMBERS TESTED

<= 2	0
3	1.1
4	13
5	52.3
6	33.6
>= 7	0

Table 5. Distribution of square root iteration counts using $A = RND(0)$ and $B = RND(0)$ and modified first approximation.

to generate the lengths of each side of the right triangle and the number whose square root I needed. As in the previous set of test cases, program statements 50 and 51 are incomplete because I used four sets of values to test the same conditions as before.

The program is first run using $A = \text{RND}(0)$ and $B = \text{RND}(0)$. The value of X is computed as $(A^2 + B^2)$. Table 5 shows the result of using the new first approximation for the square root.

Compared with Table 1, the number of iterations is significantly reduced. In this case, most numbers require five or fewer iterations whereas Table 1 shows that most numbers require seven or more iterations.

Table 6 shows the results of the new approximation when $A = \text{RND}(3000)$ and $B = \text{RND}(3000)$. Notice that the results are remarkably similar to those obtained in Table 5.

Table 7 shows the results obtained using $A = 1/\text{RND}(30000)$ and $B = 1/\text{RND}(30000)$, and Table 8 shows the results obtained using $A = \text{RND}(0) * 1E10$ and $B = \text{RND}(0) * 1E10$.

I am astounded that the results obtained using the new approximation are almost identical in the four cases that I tested. I noticed two other important facts. Most of the num-

bers required five or six iterations, and also no numbers more than six iterations.

This second fact is most important since it tells me that I can construct a new square root routine eliminating the logical tests necessary to determine completion of the routine.

Referring to Listing 1, I can remove line 30080 by changing the basic structure of the routine to

"The savings in storage amounts to about 25 bytes, which is enough to give me the breathing room I need."

a FOR-NEXT loop using six iterations. Listing 4 gives the resulting square root routine, a faster version.

It seems wasteful to perform six iterations when some numbers require less, but looking at the statistics of Tables 5-8 you can see that 85 percent of the numbers require five or six iterations. Therefore, the instances of inefficiency are small.

NUMBER OF ITERATIONS	% OF NUMBERS TESTED
<= 2	0
3	1.1
4	12.7
5	52.1
6	34.1
>= 7	0

Table 6. Distribution of square root iteration counts using $A = \text{RND}(3000)$ and $B = \text{RND}(3000)$ and modified first approximation.

NUMBER OF ITERATIONS	% OF NUMBERS TESTED
1	0
2	.01
3	.96
4	13.16
5	51.6
6	34.27
>= 7	0

Table 7. Distribution of square root iteration counts using $A = 1/\text{RND}(3000)$ and $B = \text{RND}(3000)$ and modified first approximation.

MARK GORDON COMPUTERS

DIVISION OF MARK GORDON ASSOCIATES, INC. ✓270
16 KENWOOD ST., CAMBRIDGE, MASSACHUSETTS 02138
(617) 242-2749 (617) 491-7505

COMPUTERS

Level-II 4K System.....	529.00
Level-II 16K System.....	659.00
Model-II 64K System.....	3499.00

DISK DRIVES

40 Track 5 1/4 inch drive.....	319.00
77 Track 5 1/4 inch drive.....	549.00
4 Disk Drive Cable.....	39.00

PRINTERS

Centronics 730.....	899.00
Centronics 779-2.....	999.00
Comprint 912p.....	599.00
Integral Data 440G.....	999.00
NEC 5510 w-tractor.....	2679.00
TI 810 Basic.....	1895.00

MISC HARDWARE

Expansion int. TRS-80(Ok).....	249.00
Novation Cat modem.....	159.00
16K Memory Kit.....	49.00
Leedex Monitor.....	109.00
Printer Cable for above.....	49.00
ISO-2 Isolator.....	54.00
AC LINE FILTER.....	24.00

STORAGE MEDIA

Verbatim-box 10-5 1/4.....	25.00
Memorex-box 10-5 1/4.....	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.....	64.95

DISKETTE TRS-80* BUSINESS SOFTWARE 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 Shrayner	\$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 Mastercharge. We will ship C.O.D. certified check or money orders only. Massachusetts residents add 5 percent sales tax.

The Company cannot be liable for pictorial or typographical inaccuracies.

Now that I am over the major hurdle, I want to make my computations even more efficient. My primary target is the parentheses which appear in line 120 of Listing 4.

I first experiment with alternate methods of writing the approximation equations. Fig. 2 shows some of the equation derivations. The first equation shows the value of the second approximation to the square root of X. In this equation, Y2 is the second approximation and Y1 is the first. As you can see, Y2 can be simply computed from Y1.

Continuing to the next approximation, Y3 is simply expressed in terms of Y2. In equation 3, the substitution is made for Y2. This equation reveals something very interesting. If

$$Y_2 = Y_1 + \frac{1}{2} \left(\frac{X}{Y_1} - Y_1 \right) = \frac{1}{2} \left(\frac{X}{Y_1} + Y_1 \right)$$

$$Y_3 = Y_2 + \frac{1}{2} \left(\frac{X}{Y_2} - Y_2 \right) = \frac{1}{2} \left(\frac{X}{Y_2} + Y_2 \right)$$

$$= \frac{1}{2} \left[\frac{X}{\frac{1}{2} \left(\frac{X}{Y_1} + Y_1 \right)} + \frac{1}{2} \left(\frac{X}{Y_1} + Y_1 \right) \right]$$

$$= \frac{X}{\frac{X}{Y_1} + Y_1} + \frac{1}{4} \left(\frac{X}{Y_1} + Y_1 \right)$$

Fig. 2. Equations for the second and third approximations to the square root of X.

we assign the value of $(Y_1 + X/Y_1)$ to Z, then two successive approximations can be simply computed using the equations shown in Fig. 3.

The fact that we have condensed two approximations into this set of equations allows us to rewrite the square root routine as shown in Listing 5. Notice that only 3 iterations of the FOR-NEXT loop are required and that the parentheses are no longer included.

My final modification to increase the speed of the routine is shown in Listing 6. Here, the FOR-NEXT loop is replaced with three sets of equations which compute six approximations. This straight line coding requires more bytes of storage than the previous routine, but is slightly faster.

Listing 7 is a test of the various modifications which I have developed. It times them. Five subroutines are used for the various tests. The first subroutine is an immediate RETURN. I use this to determine how much time the main routine requires.

The four other routines are the normal square root routines from the Level I manual: the normal routine, using a modified

first approximation and a FOR-NEXT loop, the routine using the modified approximation equation, and the routine using the straight line coding of the ap-

$$Z = Y + X/Y$$

$$Y = Z/4 + X/Z$$

Fig. 3. Equations which combine two successive approximations to the square root of X.

```

100 Y=A+B      COMPUTE APPROX. TO SQ. RT.
110 FOR K=1 TO 6  SET LOOP FOR SIX ITERATIONS
120 M=(X/Y-Y)*.5 COMPUTE ERROR
130 Y=Y+M      COMPUTE NEW APPROX.
140 NEXT K      LOOP
150 RET.

```

Listing 4. Modified square root routine using first approximation and FOR-NEXT loop.

```

100 Y=A+B      COMPUTE APPROX. TO SQ. RT.
110 FOR K=1 TO 3  SET LOOP FOR THREE ITERATIONS
120 Z=Y+X/Y     COMPUTE T=O APPROXIMATIONS
130 Y=Z/4 + X/Z USING MODIFIED EQUATIONS
140 NEXT K      LOOP
150 RET.

```

Listing 5. Revised square root routine using new first approximation and combined approximation equations. Note that only three loop iterations are required.

```

100 Y=A+B      COMPUTE APPROX. TO SQ. RT.
110 Z=Y+X/Y     USING THREE SETS OF
120 Y=Z/4 + X/Z MODIFIED EQUATIONS TO
130 Z=Y+X/Y     COMPUTE SIX
140 Y=Z/4 + X/Z APPROXIMATIONS
150 Z=Y+X/Y
160 Y=Z/4 + X/Z
170 RET.

```

Listing 6. Final square root routine which eliminates FOR-NEXT loop to maximize speed.

WHAT IS "THE PATCH"?

We asked ourselves: WHY should our computer be as bland as everybody else's? Why not unlock the unused and wasted abilities available within each and every TRS-80 Model I. These abilities allow the display to be dressed up and the computer to be effectively easier to use.

Now we have developed the means for getting the most from our computers and we know you need it too. With "THE PATCH", a new age of simplicity and convenience has arrived. You don't want to be left out, so don't kid yourself, you need the enhancements which "THE PATCH" provides.

* Does your keyboard bounce?

Some say, "I have a software fix for that!"

* Does your display still have that standard, dull, underline cursor?

Some brag, "We have a program which will give you a Block cursor, and it even blinks!"

* Does your Dualcase printer make you look foolish when you tell it to print lowercase because you could only see UPPERcase on the display?

Most cry, "We have a kit you can install . . . and a program to run it!!!"

* Don't you have better uses for protected memory than to waste it on programs which are TOTALLY UNNECESSARY?

You sob, "I need all those advantages but they are just too much trouble to have all at once so I'll make do with what I have. FORGET ALL THAT . . . make your life easier."

What we are trying to tell you is:

1. You CAN have Keyboard debounce if you need it!
2. You CAN have Block cursor with NO distracting blinking!
3. You CAN have FULL TIME Dualcase display!
4. You CAN have typewriter style keyboard operation!
5. You CAN have faster cassette data files, up to four and one-half times faster!
6. You CAN have even more features as we make them available.

All this from THE INSTANT you power up your computer, without making your other programs unusable because some unnecessary driver program is eating that memory.

"THE PATCH" is not a ROM. "THE PATCH" is not a PROM. "THE PATCH" is a microprocessor which modifies the Level II ROM to repair changes made by TANDY when they designed your computer. This state-of-the-art technology makes these changes possible without using ANY of your computer's memory. That means, any program you use on your computer now, will still work after you install "THE PATCH", including word processors.

"THE PATCH" fits easily into the Level II ROM sockets inside your computer, no cables or switches to install.

Sound too good to be true?? Call us. Tell us your innermost fears. Let us answer your questions. Do not cheat yourself out of using ALL of your computer's abilities ALL of the time.

"THE PATCH", \$69.97 plus \$2.50 ship and hand
Options: Block cursor N/C, Debounce N/C
Cassette File \$10.00
VISA or Master Card accepted

TRS-80 is a trademark of Tandy Corp.
"THE PATCH" is a trademark of C.C.D.M., Inc.

CALL 208-883-0611
WHITE CEDAR "THE PATCH"
Box 8964
Missoula, ID 83843

COMPUTER PAPER AND LABELS

9 1/2 x 11
(8 1/2 x 11 Detached)
\$21.95

1 PART BLANK
3,000 to Box
(Add \$2.00 Shipping)

14 7/8 x 11
(Same Detached)
\$26.95

Pressure Sensitive Labels

15/16 x 3 1/2
1 Across.....\$9.95/5M - 2 Across.....\$19.95/10M



655
MESCALERO

FORM VILLAGE

293 ST. LOUIS, MO
63013

TOLL FREE 800 325-8987 IN MISSOURI: 314-831-3535

UTILITY SOFTWARE FOR TRS-80 USERS

MARIGOLD ASSOCIATES
P. O. BOX 20822
HOUSTON, TEXAS 77025

NOW AVAILABLE FOR THE TRS-80... BASIC SEARCH AND REPLACE

NEWCMD adds FOUR new command words to your LEVEL II BASIC Language:

- CHANGE..... Changes BASIC line numbers from one number to another, and reorders BASIC text accordingly.
- DUPLICATE... Duplicates a BASIC line at another location without retyping.
- SEARCH..... Searches the resident BASIC program for every occurrence of a specified ASCII character string from 0 to 240 characters long, and screenprints each line containing those characters.
- REPLACE..... Searches the entire BASIC program as above, then replaces the specified ASCII string with another string of your choice which can be from 0 to 240 characters long. Replace all PRINT's with LPRINT's, remove blank spaces, etc.. Changes take place on the screen and in the program while you watch.
- IN ADDITION The command "LIST" is modified to allow variable speed forward and backward scrolling.

NEWCMD is a 1200 byte machine language program. Available on cassette tape for LEVEL II, 16K TRS-80 machines at \$14.95 plus \$1.50 postage and handling (foreign orders \$3.00 P&H). Texas residents please add 90c tax. Sorry, no credit cards.

TRS-80* SOFTWARE! THE BEST THE DATA ORGANIZER

*Variable length records 64 K Mod II \$250.00 Max. 20 field per record 32 K Mod I \$150.00

MAGAZINE DISTRIBUTION PROGRAM

- 500 titles
- Invoices
- 200 Vendors
- Reports

64 K Mod II \$750.00

AMBULANCE BILLING SYSTEM

- 100 Calls/month
- Reports unpaid, medicare
- Tracks cars/drivers

64 K Mod II \$750.00

DEALER OF TARANTO & ASSOCIATES MODEL II SOFTWARE

A/R G/L P/R each \$249.00

All programs error free and fully documented. User tested.

Client list available. Custom programming/consulting for TRS-80*.

CMS, INC. 3132 N. BROADWAY, CHICAGO, IL 60657
(312) 327-7550

*A trademark of Tandy Corp.

IMAGINE.

A computer game that has drawn the attention of the national news media.

A computer game that has people around the world clamoring for it.

A computer game that turns your love life into a *menage a trois*... you, your mate, and your computer!

That's Interlude—the hottest new software program for personal computers.

But it's more than just a game. It's an experience that will tantalize you...romanticize you...fantasize you...and often surprise you.

Interlude begins with a unique computer interview of the participants to determine their mood. Then it searches its memory to select the best Interlude for the occasion. You may be referred to the instruction manual which describes most of the 106 Interludes, or your instructions may appear on your screen if you've chanced to hit upon one of the many surprise Interludes buried within the program. (When you discover secret Interlude #99, your love life may never be the same again!)

Interlude...it's fun...it's fanciful...it's fantastic. It's the computer game for adults. Are you ready for it?

Interlude™ The Ultimate Experience.

INTERLUDE Dept. 80 10428 Westpark, Houston, TX 77042. Rush me my copy of Interlude.

Name _____ Age _____
Address _____
City _____ State _____ Zip _____

Apple II* (16K) TRS-80** (Level II-16K) \$14.95 for cassette \$17.95 for diskette. Add \$1.50 for shipping. Texas residents add 6% sales tax.

My check (payable to Interlude) is enclosed.

Charge my Mastercharge Visa

Account No. _____

Expiration Date _____

MasterCharge Bank Code _____

Signature _____

(Charge customers must sign.)

CHARGE CUSTOMERS: Order by phone toll-free! 1-800-327-9009 Ext. 306 (FLA: 1-800-432-7999, Ext. 306)

*Registered trademark of Apple Computers, Inc.

**Registered trademark of Radio Shack, a Tandy Co.

AVAILABLE FOR IMMEDIATE DELIVERY.

ROM

Wasn't built in a day!

And you need a good guide to explore it. SUPERMAP is an invaluable aid in discovering the hidden secrets of Level II ROM. SUPERMAP is a long detailed and commented memory map of ROM routines giving register setups for calling them. Reserved RAM is revealed along with DOS RAM usage. There are notes on the significant addresses in the Radio Shack Editor/Assembler, T800, and the Electric Fencil. Tape and memory format are given too. Leads which version of Level II ROM you have and what the differences are. All this and more for only

SIX.XCV

✓ 102

TUTIL Examine, clear, initialize, move, and modify data in memory. Compare two blocks or search for up to 24 byte HEX or ASCII string. Patch, load, verify, or execute DISKEM tapes. Set breakpoints and jump. Display and modify registers. Output to printer if desired. TUTIL tape has a bonus program. MODIFY improves EDITASM(1,1 or 1,2) by allowing return to BASIC without loss of source file. Also uses Level II I/O to allow keyboard, serial drivers, etc. (16-48K) \$15.00. **NOTE:** Use all the above plus disk read and write. (16-48K) \$20.00

DISKEM Modify EDITASM (1,1 or 1,2) under T8000, T8000V, when T8000 runs in type E/A. Adds block move, global search, page output to printer with optional page prompt, sorted symbol table, and ODFM instructions. Protect memory, use Level II I/O block, recover from reboot, and branch to any address. T28, EMS, and F211 available without installing the modified E/A (12K+DOS required) \$20.00

DASMBL 1 Disassemble T80 code to video, printer or tape. Provides EQUATES, ORG, and even labels. Tapes load into E/A to allow you to modify machine code programs easily. (12K and 32K) \$15.00

DASMBL 2 DOS version writes E/A or MACROS disk file. (12K+DOS) \$20.00

NOTE BOOKS

THE BOOK The vast comprehensive and complete book yet on the math routines in Level II ROM. Has a commented disassembly of addresses 708 to 14D7. This is the ROM for the serious assembly programmer. \$14.95 plus \$1.50 postage and handling

INSIDE LEVEL II An excellent manual containing chapters on using ROM routines with many examples and explanations. It shows how to make complete program load under SYSTEM but execute in ROM. BASIC and its machine language. Problems of using ROM from a disk program are shown and solved. Expanded OSN, relocate BASIC programs, and interface BASIC variables after reading these chapters. \$14.95 plus \$1.50 postage and handling



Fuller Software
830 E. Spryville
Grand Prairie, TX 75051
(214) 649-0441

proximation equations.

The results of the test are shown in Table 9. After subtracting the five second time of the main routine from the individual test times, the subroutine times can be compared. Execution speed is cut by a factor of more than eleven in going from the normal square root routine to my final specialized version. An improvement of this magnitude makes the work involved seem

well worth the trouble.

Problem 2

The second example I want to discuss involves an application in which my primary concern is program space and accuracy. Because of the limits of the TRS-80 to slightly more than 3500 bytes of usable storage, some programs can become pretty cramped.

My problem is to construct an

array which contains values of $\sin(X)$ over a range of 0 to $\pi/2$ (i.e., 0° – 90°). As in the case of the square root function, Level I BASIC does not contain the sine function. So, again I turn to the Level I manual's sine function subroutine. This routine is shown in Listing 8.

The basic sine routine calculation is performed using a power series approximation. Many mathematics text books

will show that $\sin(X)$ can be expressed as the infinite series:

$$\sin(X) = X - (X^{**3})/6! + (X^{**5})/5! - (X^{**7})/7! + (X^{**9})/9! - \dots$$

In the case of listing 8, the power series is computed using terms up to X^{**9} .

The Approach

When it becomes apparent that I need a few more bytes of storage for data, I examine the sine subroutine to see how many bytes I can squeeze out.

Computing the terms of the power series seems fairly repetitive and they seem to lend themselves to a FOR-NEXT loop. After several tries, I arrive at the routine shown in Listing 9.

The variable Q generates the terms of the power series. Each successive value of Q is computed by multiplying the previous value by $-X^{**2}$ and dividing by the product of O, the loop index and (J-1). The variable Y keeps a running sum of the power series terms.

The savings in terms of storage amounts to about 25 bytes, which is enough to give me the breathing room I need. In fact, more savings are possible if unnecessary lines in the resulting sine routine are eliminated.

There is an added benefit to the modified sine routine. It is very simple and costs nothing in terms of storage, to obtain more accuracy. All that is necessary is to replace the nine in line 120 of Listing 9 with the value of the highest power term desired in the approximation. For example, 15 can be used.

The Final Test

Just to satisfy my curiosity, I decide to try the routine with more terms. I first try using 11 as the highest power term. The test routine is shown in Listing 10. It uses the parameter N to specify for the sine routine the highest power term in the approximation.

For each value of X, the sine routine is called twice—once using terms up to X^{**9} and once using terms up to X^{**11} . The values obtained using each approximation are printed, and in

```
10 FOR I=1 TO 100
20 A=NRND(30000): B=NRND(30000)
30 X=A*A + B*B
40 GOSUB 100
50 NEXT I
60 PRINT "TIMING TEST COMPLETED"
70 END
SET LOOP FOR 100 ITERATIONS
PICK VALUES FOR A AND B
COMPUTE SQUARE OF VECTOR MAG.
COMPUTE SQUARE ROOT
LOOP
PRINT MSG. WHEN DONE
```

Listing 7. Program used to test the efficiency of the various square root subroutines.

```
30370 REM *SIN* INPUT X IN DEGREES, OUTPUT Y
30371 REM ALSO USES Z INTERNALLY
30376 Z=ABS(X)/A: X=Z*X
30380 IF X>360 THEN X=X/360: X=(X-INT(X))*360
30390 IF X>90 THEN X=X/90: Y=INT(X): X=(X-Y)*90: ON Y GOTO
30410, 30420, 30430
30400 X=X/57.29578: IF ABS(X)<2.4861E-4 THEN Y=0: RET.
30405 GOTO 30440
30410 X=90-X: GOTO 30400
30420 X=-X: GOTO 30400
30430 X=X-90: GOTO 30400
30440 Y=X-X*X*X/6+X*X*X*X*X/120-X*X*X*X*X*X*X/5040
30450 Y=Y+X*X*X*X*X*X*X*X/362880: IF Z=-1 THEN Y=-Y
30460 RET.
```

Listing 8. TRS-80 Level I manual sine function subroutine.

```
100 Q=X
110 Y=X
120 FOR J=3 TO 9 STEP 2
130 Q=-Q * X/J *X/(J-1)
140 Y=Y+Q
150 NEXT J
160 RETURN
Q IS SET TO FIRST TERM IN PWR. SERIES
Y IS SUM OF POWER SERIES TERMS
SET LOOP TO USE TERMS UP TO X**9
COMPUTE NEXT PWR. SERIES TERM
ADD TERM TO SUM
LOOP
```

Listing 9. Modified sine routine. The statements of this routine could be used to replace the power series expression on lines 30440 and 30450 of Listing 8.

```
10 FOR I=0 TO J2
20 X=1.5707963 * I/32
30 T=X
40 N=9: GOSUB 1000
50 A(1)=Y
60 X=T
70 N=11: GOSUB 1000
80 A(2)=Y
90 PRINT A(1),A(2)
100 IF A(1)<>A(2) P."DIFFERENT":P.
110 NEXT I
120 END
SET LOOP FOR 32 SINE VALUES
X IS INPUT (0<=X<= /2)
SAVE X
COMPUTE SQUARE ROOT
SAVE ANSWER
RESTORE X
COMPUTE NEW SQUARE ROOT
SAVE ANSWER
PRINT RESULTS
PRINT MSG. IF VALUES DIFFERENT
LOOP
COMPUTE SINE OF X
USING THE HIGHEST
POWER TERM SPECIFIED
BY THE CALLING
ROUTINE
```

Listing 10. Program used to test the effect upon $\sin(X)$ of different power series approximations.

NUMBER OF ITERATIONS % OF NUMBERS TESTED

< = 2	0
3	1
4	13.5
5	51.3
6	34.2
> = 7	0

Table 8. Distribution of square root iteration counts using $A = \text{RND}(0) * 1E10$ and $B = \text{RND}(0) * 1E10$ and modified first approximation.

SUBROUTINE USED	TOTAL TIME	TOTAL SUBROUTINE TIME
Immediate RETURN	5 sec.	—
Normal square root	107 sec.	102 sec.
Listing 4 routine	26 sec.	21 sec.
Listing 5 routine	16 sec.	11 sec.
Listing 6 routine	14 sec.	9 sec.

Table 9. Execution times of the various square root routines.

addition the two values are compared and a message is printed when the values are different.

The results of this test are both interesting and confusing. The approximation using the X^{**11} term is more accurate, as I had hoped. However, some results which appear to be the same when printed, produce a message which says that they are different.

I took this to mean that the internal binary representations of the values are slightly different. A portion of the results of the test is shown in Table 10. The confusing part of the results appears in the last computed value. The printed value displays 1.0000008, which contains more digits than I have ever been able to print for a number (the normal number of digits is six).

Next, I try adding another term to the power series approximation (i.e., $(X^{**13})/13!$)

but it produces no further improvement in accuracy.

Aside from these few puzzling occurrences, which I have yet to fully resolve, the results of my experiments are successful. I have achieved a savings in program space and an increase in accuracy.

The Moral

I hope that the two examples that I have presented will encourage you to find new and better ways to program routines in your applications. Don't assume that the method someone else uses is necessarily the best way for you. I'm sure that you too will discover that finding a better way is perhaps one of the most rewarding aspects of programming.

Most important of all, however, remember to make use of all your resources—including your computer—to improve your work. ■

VALUE OF SIN(X) USING X**9 TERM	VALUE OF SIN(X) USING X**11 TERM	TEST RESULT
.903989	.903989	different
.92388	.92388	different
.941544	.941544	different
.956941	.956941	different
.970032	.970031	different
.980786	.980785	different
.995186	.995185	different
.998798	.998795	different
1	1.0000008	different

Table 10. Partial listing of results from test program shown in Listing 10. Note that some values are not equal in a logical equivalence test even though the printed values are the same.

for the TRS-80 from Micro-Mega

CASSETTE CONTROL UNIT

Speed up your cassette tape handling. Pinpoint program locations on tape with an audio monitor. Get protection from recording and playback glitches resulting from ground loops. Eliminate the tedious rewinding and unplugging of recorder cables. The Micro-Mega Cassette Control Unit does all this and more. You get instant manual control of the recorder at the flick of a switch. Want to find the beginning or end of a program? Flip another switch and you'll hear it. All cables remain plugged in all the time. The Micro-Mega Cassette Control Unit does a lot to improve the appearance of your TRS-80 system. As shown, it's in a 2 1/2" x 5" box which snugly fits between the keyboard and your recorder. There is no need to move the recorder, and all cables come neatly into the unit. The Cassette Control Unit is tailored to the CTR-41 recorder, but may be used with most other recorders as well.



CASSETTE CONTROL UNIT.....\$37.95
Add \$1.00 for postage and handling

CPU MONITOR

Ever find yourself with a blank screen wondering what your computer is up to? The Micro-Mega Monitor can tell you, for example: if your CPU is in a loop with not exit, if when a long sort is nearing completion, or if a key bounces during keyboard input. The CPU Monitor lets you listen to all CGAVs and CLOADs and will help you quickly find the correct recorder volume setting. If you have an expansion interface, you will always know whether the real-time clock is on or off because you can hear it.

The Micro-Mega CPU Monitor gives a voice to the Z-80 microprocessor in your TRS-80 by using AM radio circuitry to pick up the computational rhythms of the CPU, which are amplified and played through a loudspeaker. The pickup unit of the CPU Monitor, shown at left in the photo, goes under your TRS-80 keyboard. It is connected by a 30' cable to the speaker and control unit, which includes an on/off volume control and an LED "power-on" indicator. The Monitor is powered by an AC adapter, shown at right in the photo. No batteries are needed and no electrical connections to your TRS-80 are required.



By listening to the CPU Monitor, you will soon become familiar with the "personalities" of the programs you run and whether they are executing in a normal way. (See "Gaming Environment" below.)

CPU MONITOR.....\$47.95
Add \$2.00 for postage and handling

THE ORIGINAL GREEN-SCREEN

The eye-saving Green Screen fits over the CRT 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 very expensive CRT units. The Green Screen is closely matched to the color and texture of the TRS-80 Video Display and improves the overall appearance of your system. It is attached with adhesive strips, which do not mar your display unit in any way. The Micro-Mega Green Screen gives improved video display visibility for all applications and is especially effective in creating dramatic, high-impact displays for computer games. (See "Gaming Environment" below.)



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 Michels' 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 182 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 star-days, 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 a few brave 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

CREATE YOUR OWN SPECTACULAR GAMING ENVIRONMENT (and save \$5.00)

The Enterprise is in battle trim with deflector shields at full power. As her captain, you are taking her into combat. The battle stations siren rings in your ears and "CONDITION RED" flashes on your monitor screen. You call for warp drive and key in the coordinates of the quadrant where your scanners have detected Klingon ships. As you select the warp factor, you hear the reassuring clicking of your navigational gear as it activates the warp drive.

Suddenly, you break out of hyperspace and your monitor displays the chilling sight of three Klingon Battle Cruisers floating on your screen! Their evil shapes glow in luminous green against the black void of space. Moments later, you hear the characteristic rasping sound of Klingon laser weapons, and, as you watch, high-energy beams come knitting toward the Enterprise in succession from each of the Klingon ships.

You have been hit! You hear the dismal sound of the damage control alarm as "DAMAGE TO WARP DRIVE" and "DAMAGE TO PHASERS" flash on your screen. The Klingons have stopped firing! The Enterprise is crippled, but your best weapon is still intact, and it's your turn now! You key in the command for photon torpedoes. As your screen again displays the position of the Klingon ships, you select a long vector from your torpedo chart and key it in. Now you hear the buzz of your photon torpedoes as you see it speeding toward a Klingon ship. It strikes him dead-center! As you watch, the Klingon Battle Cruiser disintegrates, accompanied by a satisfying crackling sound.

Does the above scenario sound far-fetched? Not at all. It's a small sample of what you will experience with Micro-Mega's Gaming Environment, which consists of: The STAR TREK PACKAGE, THE GREEN SCREEN and THE CPU MONITOR. The fast-paced and dynamic action reflects the superb Star Trek III program together with the "Voyage Log" and "Torpedo Chart" of the Star Trek Package. All of the unique graphic displays are greatly enhanced by the Green Screen. Finally, the uncanny sound effects are produced by the CPU Monitor, which faithfully picks up the FOR, NEXT loops and other CPU patterns, which create the distinctive siren sounds that accompany the ALERT and DAMAGE messages along with the harsher notes of the weapons salvo. Once you've tried it, you won't any longer be satisfied with silent computer games.

Remember that with the Gaming Environment you also get all of the other excellent features of the CPU Monitor and the Green Screen for non-gaming applications. You also save \$5.00 off the combined cost of the individual items.

GAMING ENVIRONMENT.....\$79.85
Add \$3.50 for postage and handling

Terms: Check or money order, no CODs or credit cards, please. Add amount shown for postage and handling to price of the item. All items shipped within 48 hours by first class or priority mail. Virginia residents, add 4% sales tax.

✓29

Micro-Mega · P.O. Box 6265 · Arlington, Va 22206

Article storage and retrieval made easy.

Reference Library Index

James P. Morgan
2386-B Ash Creek
Scott AFB, IL 62225

Tired of wading through a foot-high stack of computer publications looking for a specific article? Why not let your computer do it for you?

Better yet, put your micro to work building a cross-index of your entire inventory of computer publications—past, present and future.

The following program provides a system of cataloging,

storing and retrieving specific articles from your library. It is designed for the TRS-80 Level II with 16K.

Program Details

The program begins with a menu. They are as follows: A—instructions, B—retrieve list from internal data, C—read tape file and list and D—create data file on tape. Selection is made from the keyboard using IN-KEY\$ (lines 110 to 150). An error trap is located at line 150.

The instructions provide general information about the program.

The retrieve list from internal data option first prints the indexing format (Table 1) called

from subroutine 1000.

Next, the program asks for three inputs, used to retrieve selected articles from an internal data source beginning at line 3000. Enter the system number, the category number and the topic number in turn. These three codes are compared to each READ execution at line 250 for a positive match. If all three match the data provided, the article is printed by line 260.

By entering a 0 at line 190, the user can select all the articles pertaining to a specific system. This is accomplished at line 245 which branches directly to the PRINT line at 260.

A paging routine using the variable D as a counter is provided by lines 220, 260 and 270 through 300. The advantage of retrieving data from internal storage is speed; its disadvantage is the memory overhead required. I have listed a sample block of data starting at line 3000 which pertains to my own particular interests. A more comprehensive, although appreciably slower, option is discussed in the next paragraph.

The C option, "read tape file and list," allows the user to select and list articles from tape storage. The listing begins at line 440 and runs through line 660. This routine is essentially

the same as the internal option, but uses a tape file to provide data.

Once again, the indexing scheme is presented via subroutine 1000. The user enters the system, category and topic numbers that select articles at line 540.

If the user selects 0 in response to the category input, the program provides a complete listing of all articles filed under a specific system. Paging is provided at lines 560-580. An escape option is found at line 585 which allows the user to return to the menu during the paging routine.

Although this method of data storage is not as fast as an internal data bank, it is fast enough to scan an entire file of *Microcomputing* articles for a year's period in about 20 minutes. I've spent about twice that time digging out an article of interest from past issues, so the program results in definite time savings.

The final option is the routine that creates a tape data file. As with the rest of the program, it is self prompting. This segment begins at line 2000 and ends at line 2160. The indexing scheme is presented prior to input so you can assign index values to a given article.

SYSTEM	CATEGORY		
	1. HARDWARE	2. SOFTWARE	3. LANGUAGE
1. TRS-80	1. INTERFACE	1. BUSINESS	1. BASIC
2. KIM	2. CASSETTE	2. HOME	2. MACHINE
3. PET	3. DISK	3. GAMES	3. FORTRAN
4. APPLE	4. PRINTERS	4. GRAPHICS	4. PASCAL
5. HEATH	5. DISPLAYS	5. EDUCATIONAL	5. GENERAL
6. SWTP	6. I/O	6. GENERAL	
7. ALTAIR	7. KEYBOARDS		
8. ELF	8. SYNTHESIZERS		
9. GENERAL	9. GENERAL		

The user first enters the system number, then one of the three categories, and finally the specific topic from the category selected. If a complete listing of all articles for a given system is required, enter a 0 when asked to input the category.

Table 1

I found it very easy to load data using the table of contents of most magazines. Once I had loaded my entire library of publications, it only required about ten minutes to write each new issue's articles to tape storage.

Other modifications could be made to include disk storage in place of cassettes and line or screen printer options. As written, it should prove a more than adequate method of cross-indexing for the TRS-80 owner. ■

Program Listing

```

10 REM *** ARTICLE INDEXER ***
20 REM *** BY JAMES P. MORGAN SEP 79 ***
30 REM *** FOR TRS-80 LEVEL 11, 16K ***
40 CLS: CLEAR 200
50 REM *** POKE STATEMENT FOR REVISION G, TRS-80 ***
60 POKE 16553,255
70 PRINT@20,"COMPUTER ARTICLE CROSS INDEXER":PRINT
80 PRINT"SELECT YOUR OPTION FROM THE FOLLOWING LIST. JU
ST
90 PRINT"PRESS THE KEY CORRESPONDING TO YOUR CHOICE.":P
RINT
100 PRINT"A=INSTRUCTIONS","B=RETRIVE LIST FROM INTERNAL
DATA"
105 PRINT"C=READ TAPE FILE AND LIST","D=CREATE DATA FIL
E ON TAPE"
110 BS=INKEY$:IF BS="" THEN 110
120 IF BS="A" THEN 1200
130 IF BS="B" THEN 170
140 IF BS="C" THEN 440
145 IF BS="D" THEN 160
150 CLS:PRINT"I DON'T UNDERSTAND. SELECT A,B,C,OR D.":G
OTO 80
160 GOTO 2000
170 RESTORE:CLS:GOSUB 1000
180 PRINT:INPUT"ENTER SYSTEM #";A1
190 INPUT"ENTER CATEGORY #. ENTER '0' TO SEE ALL SYSTEM
ARTICLES.":B1
195 IF B1=0 THEN 220
200 INPUT"ENTER TOPIC #";C1
210 REM *** READ AND PRINT DATA ***
220 D=0:CLS: PRINT@20,"SELECTED ARTICLES":PRINT
230 READ A,B,C,AS
240 IF A=0 THEN 310
245 IF A=A1 AND B1=0 THEN 260
250 IF A=A1 AND B=B1 AND C=C1 THEN 260 ELSE 230
260 PRINTA$;D=D+1
270 IF D=12 THEN 200 ELSE 230
280 PRINT"PRESS ANY KEY WHEN FINISHED WITH THIS PAGE."
290 BS=INKEY$:IF BS="" THEN 290
300 GOTO 220
310 RESTORE:PRINT:PRINT"OUT OF DATA. TYPE 'A' FOR NEW L
IST, 'B' TO INPUT ADDITIONAL
320 PRINT"DATA FROM TAPE, OR 'C' TO EXIT PROGRAM."
330 BS=INKEY$:IF BS="" THEN 330
340 IF BS="A" THEN 170
350 IF BS="B" THEN 450
360 IF BS="C" THEN 1500
370 CLS:PRINT"I DON'T UNDERSTAND. TRY AGAIN.":GOTO 310
440 PRINT"PREPARE RECORDER FOR DATA INPUT.":FORX=1TO150
0:NEXT
450 CLS:GOSUB 1000
460 PRINT:INPUT"ENTER SYSTEM #";A1
470 INPUT"ENTER CATEGORY #. ENTER '0' TO SEE ALL SYSTE
M ARTICLES":B1
475 IF B1=0 THEN 510
480 INPUT"ENTER TOPIC #";C1
490 CLS
510 CLS:D=0:PRINT@20,"SELECTED ARTICLES":PRINT
520 INPUT#-1, A,B,C,AS
530 IF A=0 THEN 600
535 IF B1=0 AND A1=A THEN 550
540 IF A=A1 AND B=B1 AND C=C1 THEN 550 ELSE 520
550 PRINTA$;D=D+1
560 IF D=11 THEN 570 ELSE 520
570 PRINT:PRINT"HIT 'E' TO ESCAPE. HIT ANY KEY WHEN FIN
ISHED WITH THIS PAGE."
580 BS=INKEY$: IF BS="" THEN 580
585 IF BS="E" THEN 40
590 GOTO 510
600 PRINT"OUT OF DATA. TYPE 'A' FOR NEW LIST, 'B' TO IN
PUT ADDITIONAL
610 PRINT"DATA FROM ANOTHER TAPE, OR 'C' TO EXIT PROGRA
M."
620 BS=INKEY$:IF BS="" THEN 620
630 IF BS="A" THEN 450
640 IF BS="B" THEN 500
650 IF BS="C" THEN 1500
660 CLS: PRINT"i DON'T UNDERSTAND, TRY AGAIN.":GOTO 600
1000 CLS:PRINT"SYSTEM
CATEGORY":PRIN
T
1010 PRINTTAB(16)"1. HARDWARE","2. SOFTWARE","3. LANGUA
GE"
1020 PRINT STRINGS(60,"-")
1030 PRINT"1. TRS-80","1. INTERFACE","1. BUSINESS","1.
BASIC"

```

```

1040 PRINT"2. KIM","2. CASSETTE","2. HOME","2. MACHINE"
1050 PRINT"3. PET","3. DISC","3. GAMES","3. FORTRAN"
1060 PRINT"4. APPLE","4. PRINTERS","4. GRAPHICS","4. PA
SCAL"
1070 PRINT"5. HEATH","5. DISPLAYS","5. EDUCATIONAL","5.
GENERAL"
1080 PRINT"6. SWPT","6. I/O","6. GENERAL"
1090 PRINT"7. ALTAIR","7. KEYBOARDS"
1100 PRINT"8. ELF","8. SYNTHESIZERS"
1110 PRINT"9. GENERAL","9. GENERAL"
1120 RETURN
1200 REM *** INSTRUCTIONS ***
1210 CLS:PRINT"THIS PROGRAM PROVIDES YOU WITH A METHOD
OF STORING AND
1220 PRINT"RETRIVING SELECTED ARTICLES FROM YOUR REFERE
NCE LIBRARY.
1230 PRINT"YOU CAN STORE DATA INTERNALLY, CREATE A TAPE
DATA FILE, AND
1240 PRINT"SEARCH A TAPE FILE FOR SPECIFIC ARTICLES. TH
E KEY TO THE
1250 PRINT"PROGRAM KS AN INDEXING SYSTEM WHICH CATEGORI
ZES THE ARTICLES
1260 PRINT"SYSTEMATICALLY. INTERNAL DATA CAN BE STORED
FROM LINE
1270 PRINT"3000 ON. IT IS LIMITED ONLY BY THE MEMORY AV
AILABLE. THE
1280 PRINT"TAPE STORAGE METHOD IS UNLIMITED IN SPACE, B
UT IS A SLOWER
1290 PRINT"METHOD OF EXTRACTING DATA. THE PROGRAM IS SE
LF-PROMPTING
1300 PRINT"THROUGHOUT. JUST FOLLOW THE DIRECTIONS AND Y
OU SHOULD HAVE
1310 PRINT"NO TROUBLE CATELOGING YOUR ENTIRE LIBRARY."
1320 PRINT:PRINT"PRESS ANY KEY TO RETURN TO THE MENU."
1330 BS=INKEY$:IF BS="" THEN 1330
1340 CLS:GOTO70
1500 CLS:END
2000 REM *** CASSETTE DATA WRITE ***
2010 CLS:PRINT"CASSETTE DATA WRITE":PRINT
2020 PRINT"PREPARE CASSETTE AND TAPE FOR RECORDING."
2040 PRINT:PRINT"ENTER SYSTEM #, CATEGORY #, TOPIC #, A
ND ARTICLE TITLE,
2050 PRINT"PUBLICATION, DATE, AND PAGE. THE ENTIRE ARTI
CLE MUST BE
2055 PRINT"ENCLOSED IN QUO
2060 PRINT"MARK THE END OF A TAPE WITH A SERIES OF ZERO
S."
2061 PRINT"TYPE AN 'E' TO LEAVE THE WRITE ROUTINE. HIT
ANY KEY TO CONTINUE."
2062 BS=INKEY$:IF BS="" THEN 2062
2064 IF BS="E" THEN 2130
2068 CLS:GOSUB 1000
2070 PRINT:INPUT"SYSTEM #";A
2080 IF A=0 THEN 2130
2090 INPUT"CATEGORY, TOPIC #. SEPARATE WITH A COMMA";B,
C
2100 INPUT"TITLE, PUBLICATION, ISSUE, AND PAGE#--ALL IN
QUOTES";AS
2110 PRINT#-1, A,B,C,AS
2120 CLS:GOTO 2060
2130 CLS:PRINT"DATA WRITE COMPLETE. NOTE TAPE COUNTER A
ND LOG IN."
2140 PRINT"HIT ANY KEY TO RETURN TO THE MENU."
2150 BS=INKEY$: IF BS="" THEN 2150
2160 CLS:GOTO 70
3000 DATA 1,2,1,"INVENTORY,TRS-80,KB; FEB 79, P 64"
3010 DATA 9,2,2,"SIMPLER INTEREST, KB, FEB 79, P 116"
3020 DATA 9,2,1,"SIMPLER INTEREST, KB, FEB 79, P 116"
3030 DATA 1,2,3,"KEYBOARD INTERRUPT-TRS 80, KB, MAR 79,
P.128"
3040 DATA 1,1,9,"A LOOK AT 80 PERIPHERALS, KB, APR 79,
P. 22"
3050 DATA 1,2,3,"FREE SPEACH LESSONS, 80, KB, APR 79,P.
66"
3060 DATA 1,1,2,"TWIN CASSETTES FOR 80, KB, APR 79, P.
84"
3070 DATA 1,2,6,"A LOOK INSIDE THE 80, KB, APR 79, P. 1
20"
3080 DATA 1,2,1,"A TRS-80 CROSS INDEX, KB, MAY 79, P. 9
4"
3090 DATA 1,2,4,"GRAPHING WITH THE 80, KB, MAY 79, P. 1
00"
3100 DATA 1,1,4,"80 SELECTRIC WORD PROCESSOR, KB, JUN 7
9, P. 32"
3110 DATA 1,2,3,"SARGON MEETS 80, KB, JUL 79, P. 58"
3120 DATA 1,2,4,"GETTING THE MOST OUT OF 80, KB, JUL 79
, P. 112"
3130 DATA 1,1,2,"TELEPRINTER OUTPUT FOR 80, KB, AUG 79,
P. 30"
3140 DATA 1,3,2,"MACHINE LANG MONITOR FOR 80,KB, AUG 79
,P.114"
3150 DATA 1,1,9,"TRS SPEED UP, KB, SEP 79, P. 130"
3160 DATA 9,2,3,"SUPER MASTER MIND, KB, FEB 79, P.100"
3170 DATA 9,2,3,"CHESS PANN, KB, MAR 79, P. 76"
3180 DATA 9,2,3,"TWO DIAMONDS, KB, APR 79, P. 115"
3190 DATA 9,2,3,"A GAME OF DARTS, KB, MAY 79, P. 70"
3200 DATA 9,2,4,"VECTOR GRAPHING TECH. KB, JUN 79, P. 6
4"
3210 DATA 9,2,4,"A CIRCULAR HANDLE ON GRAPHICS, KB,JUL
79,P.76"
3220 DATA 9,2,3,"NERVES, KB, AUG 79, P. 100"
3230 DATA 0,0,0,"0"

```

SAVE / add-ons for TRS-80® Software and Hardware

NEWDOS 80

A new enhanced NEWDOS for the TRS-80.

The most powerful Disk Operating System for the TRS-80, designed for the sophisticated user and professional programmer who demands the ultimate.

NEWDOS/80 is the planned upgrade from NEWDOS 2.1. Some of the features are:

- New BASIC commands for files with variable record lengths up to 4095.
- Mix or match drives. Use 35, 40 or 80 track 5" disk drives or 8" disk drives, or combo.
- Security boot-up for BASIC or machine code application programs.
- New editing commands.
- Enhanced RENUMBER that allows relocation.
- Command chaining.
- Device handling for routing to display and printer simultaneously.
- DFG function; striking of D, F and G keys allows user to enter a mini-DOS without disturbing program.
- Compatible with NEWDOS & TRSDOS.
- Machine language Superzap/80 2.1 utilizes and enhanced debug and copy.

\$149

NEW

TF-8 80 TRACK DISK DRIVE **\$639**
Double Your Capacity
TF-9 DUAL 80 TRACK DISK DRIVE **\$799**
Quadruple Your Capacity

FACTORY CLEARANCE



Demo single or dual head MPI disc drive, complete with Power Supply and Chassis. Full warranty.

TF5D 40 TK **\$279**
TDH-1D Dual 35 TK **\$419**
LIMITED QUANTITIES

Announcing

8" Floppy Disk Drive System for Model I



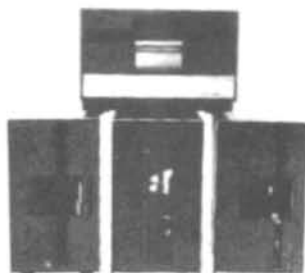
- One SA801 Floppy
- NEWDOS 80
- Cable & Adapter

\$1095

Disk Drive Sale!

Complete with power supply and chassis.

TF-3 Shugart SA400	\$359
Pertec FD200, 40 track	\$389
TF 5 MPI B51, 40 track	\$379
TF7 Micropolis 77 track	\$595
TDH-1 Dual Sided drive 35 track	\$499
NEWDOS+ 40 track	\$110
35 track	\$99
Microconductor, Data Base Mgr.	
Mod I	\$249
Mod II	\$399
AJA Business Pkg.	\$289
Disk Head Cleaner	\$16.95
Disk Alignment Pgm.	\$109



Disk Expansion System

- 2 Shugart SA400 TF-3 **\$718**
- 1 Two-Drive Cable **\$ 25**
- 1 Expansion Interface-32K **\$489**
- 1 35-track DOS+ **\$ 99**

TOTAL LIST PRICE **\$1331**

SPECIAL PRICE ONLY **\$1,199**
Same as above but includes TRS-80® Dual II **\$1984**

- MOD II 8" Disk System
- 1 Drive System **\$899**
 - 2 Drive Expansion System **\$1,399**

Drives for any Microcomputer

Does not include power supply & cabinet.

Pertec FD200	\$282	FD250	\$399
Shugart SA400	\$279	SA800/801	\$479
MPI B51	\$279	B52	\$349

Printers

Centronic 779	\$1,069
Base 2	\$599
Centronic 737	\$899
Centronics 702-9	\$1,895
Anadex 9501	\$1,595
Malibu	\$2,495



Spinwriter **\$2,549**

More Savings



Introductory Offer—
Save \$250 TRS-80
Graphics Okidata
Microline 80 ...
List \$949

Our Price **\$699**

Memory Kit (16K)	\$64.00
AC Isolator (6 socket)	\$47.95
Modem	\$164.00
Diskettes (10)	\$30.00



Apparat, Inc.

(303) 741-1778

7310 E. Princeton Ave. • Denver, CO 80237 • (303) 758-7275



MICROCOMPUTER
TECHNOLOGY
INCORPORATED

28



TX 67840
TAB-IRN

3304 W. MacArthur • Santa Ana, CA 92704 • (714) 979-9923

All prices cash discounted / Freight: FOB factory. Ask for our free catalog.

Apparat, Inc.
introduces

NEWDOS 80

For the 80's —
an enhanced NEWDOS
for your TRS-80™
Model 1.



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 files 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 disks 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 the duplication of a program line with the deletion of the original.
- Enhanced and improved RENUMBER that allows relocation of subroutines.
- Powerful chaining 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.)

• Upward compatible with NEWDOS 2.1 and TRSDOS 2.3.

- Includes machine language Superzap/80 and all Apparat 2.1 utilities.
- 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.

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.

As with 2.1, NEWDOS/80 relies on the TRSDOS and Disk Basic Reference Manual published by Radio Shack. NEWDOS/80 documentation supports its enhancements and upgrades only.

✓ 254

 Apparat, Inc.

 MICROCOMPUTER
TECHNOLOGY
INCORPORATED ✓ 28

TO PURCHASE NEWDOS/80, COMPLETE AND MAIL TO:

Apparat, Inc. — OR — Microcomputer Technology, Inc.
4401 S. Tamarac Parkway 3304 W. MacArthur Blvd.
Denver, CO 80237 Santa Ana, CA 92704
303/758-7275 303/741-1778 714/979-9923

Check Money Order Master Charge Visa

Card No. _____ Expiration Date _____

Color residents add 5.5% sales tax Cal residents add 6% sales tax

Add \$10.00 postage and handling

Please rush _____ NEWDOS/80 @ \$149 EACH TO:

Name _____

Address _____

City _____ State _____ Zip _____

Phone _____

0/1A

Professionalize your program titles.

Position Display

Jerry Frost
3398 Sir Henry Street
East Point, GA 30344

Taking the lead from James J. Brennan, whose "Digital Time Clock" program appeared in the "Little Bits" column of *Kilobaud* in the January 1979 issue, I have written a subrou-

tine for the TRS-80. I call it POSDIS, an acronym for Position Display. It is useful and saves time.

POSDIS will let you: display a title in your program or have a message stand out from the rest of the text; to left and right justify the title; to position it on the screen by a PRINT@ statement; and finally, to graphically draw a border around it.

Type the Program

To show you the advantages of POSDIS, and to let the subroutine speak for itself, type in the routine (see Program Listing 1), SAVE it, and type the following program:

```
10 CLS
20 A$="THIS IS WHERE YOUR
MESSAGE GOES"
30 GOSUB 30380
40 GOTO 40
```

Now, RUN the program. Notice that your message is automatically left and right justified, a graphic border is drawn around it for a stand-out effect, and the whole thing is displayed at the center of the screen. In a couple of seconds you have a nice looking display heading.

Here is what happened. First, you defined GOSUB A\$ as "This is where your message goes." Then you decided you wanted the message to appear at the center of the screen, so you entered GOSUB 30380, which is the routine that transported the

message, justified it, sent it to line 30900 to calculate the graphic border and drew it before returning to the next line in your program (in this case line 40).

Suppose you want the message at the top of the screen. Just retype line 30 GOSUB 30140. If you want the message at the bottom of the screen, retype line 30 GOSUB 30620. Try it and see what happens.

The subroutine at lines 30140 through 30620 will print your message at 13 different screen display positions and must follow your A\$ message as shown in the sample program.

Three Subroutines

Three other subroutines have been added. Two timing loop series for an automatic effect, and a routine, which will hold the display until the keyboard operator presses ENTER.

For example, retype line 40 GOSUB 30680. Run the program and notice that the message appears with "PRESS ENTER TO CONTINUE" added to the bottom of the screen.

If you want an automatic effect, retype line 40 GOSUB 30820 and add line 50 A\$="THIS IS WHERE A SECOND MESSAGE GOES": GOSUB 30380: GOSUB 30680.

By using various screen display positions, timing loops, and PRESS ENTER TO CONTINUE your next program will have a professional look, ease of operation and simplicity. ■

Program Listing

```
30000 .....
30010 ' "POSDIS" SUBROUTINE - VERSION 1.0
30020 '
30030 '
30040 '
30050 ' .....
30060 '
30070 '
30080 REM ** SUBROUTINE LINES TO LEFT AND RIGHT JUSTIFY
30090 REM ** <A$> AT 13 DIFFERENT SCREEN POSITIONS
30100 '
30110 '
30120 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 64
30130 '
30140 P=32-LEN(A$)/2+64:TH=0:BH=8:LV=32-LEN(A$)/2:RV=32
+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
30150 '
30160 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 128
30170 '
30180 P=32-LEN(A$)/2+128:TH=3:BH=11:LV=32-LEN(A$)/2:RV=
32+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
30190 '
30200 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 192
30210 '
30220 P=32-LEN(A$)/2+192:TH=6:BH=14:LV=32-LEN(A$)/2:RV=
32+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
30230 '
30240 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 256
30250 '
30260 P=32-LEN(A$)/2+256:TH=9:BH=17:LV=32-LEN(A$)/2:RV=
32+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
30270 '
30280 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 320
30290 '
30300 P=32-LEN(A$)/2+320:TH=12:BH=20:LV=32-LEN(A$)/2:RV=
32+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
30310 '
30320 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 384
30330 '
30340 P=32-LEN(A$)/2+384:TH=15:BH=23:LV=32-LEN(A$)/2:RV=
32+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
30350 '
30360 ' JUSTIFY <A$> AND DISPLAY AT SCREEN POSITION 448
(SCREEN CENTER)
30370 '
30380 P=32-LEN(A$)/2+448:TH=18:BH=26:LV=32-LEN(A$)/2:RV=
32+LEN(A$)/2+64:GOSUB30900:PRINT@P,A$;:RETURN
```

```

30390 '
30400 ' JUSTIFY <AS> AND DISPLAY AT SCREEN POSITION 512
30410 '
30420 P=32-LEN(AS)/2+512:TH=21:BH=29:LV=32-LEN(AS)/2:RV
=32+LEN(AS)/2+64:GOSUB30900:PRINT@P,AS;:RETURN
30430 '
30440 ' JUSTIFY <AS> AND DISPLAY AT SCREEN POSITION 576
30450 '
30460 P=32-LEN(AS)/2+576:TH=24:BH=32:LV=32-LEN(AS)/2:RV
=32+LEN(AS)/2+64:GOSUB30900:PRINT@P,AS;:RETURN
30470 '
30480 ' JUSTIFY <AS> AND DISPLAY AT SCREEN POSITION 640
30490 '
30500 P=32-LEN(AS)/2+640:TH=27:BH=35:LV=32-LEN(AS)/2:RV
=32+LEN(AS)/2+64:GOSUB30900:PRINT@P,AS;:RETURN
30510 '
30520 ' JUSTIFY <AS> AND DISPLAY AT SCREEN POSITION 704
30530 '
30540 P=32-LEN(AS)/2+704:TH=30:BH=38:LV=32-LEN(AS)/2:RV
=32+LEN(AS)/2+64:GOSUB30900:PRINT@P,AS;:RETURN
30550 '
30560 ' JUSTIFY <AS> AND DISPLAY AT SCREEN POSITION 768
30570 '
30580 P=32-LEN(AS)/2+768:TH=33:BH=41:LV=32-LEN(AS)/2:RV
=32+LEN(AS)/2+64:GOSUB30900:PRINT@P,AS;:RETURN
30590 '
30600 ' JUSTIFY <AS> AND DISPLAY AT SCREEN POSITION 832
30610 '
30620 P=32-LEN(AS)/2+832:TH=36:BH=44:LV=32-LEN(AS)/2:RV
=32+LEN(AS)/2+64:GOSUB30900:PRINT@P,AS;:RETURN

```

```

30630 '
30640 '
30650 '
30660 REM ** ROUTINE TO HALT DISPLAY UNTIL OPERATOR INP
UT **
30670 '
30680 PRINT@32-25/2+960,"PRESS <ENTER> TO CONTINUE";:IN
PUTAS:CLS:RETURN
30690 '
30700 '
30710 '
30720 REM ** TIMING LOOP **
30730 '
30740 FOR X=1 TO 500: NEXT X: RETURN
30750 FOR X=1 TO 1000: NEXT X: RETURN
30760 FOR X=1 TO 1500: NEXT X: RETURN
30770 FOR X=1 TO 2000: NEXT X: RETURN
30780 '
30790 REM ** TIMING LOOP THEN CLOSE SCREEN <CLS> **
30800 '
30810 FOR X=1 TO 500: NEXT X: CLS: RETURN
30820 FOR X=1 TO 1000: NEXT X: CLS: RETURN
30830 FOR X=1 TO 1500: NEXT X: CLS: RETURN
30840 FOR X=1 TO 2000: NEXT X: CLS: RETURN
30850 '
30860 '
30870 '
30880 REM ** SUBROUTINE TO DRAW BORDER AROUND <AS> **
30890 '
30900 FOR X=LV TO RV:SET(X,TH):SET(X,BH):NEXT X:FOR Y=
TH TO BH:SET(LV,Y):SET(RV,Y):NEXT Y:RETURN

```

this publication
is available in
microform



Please send me additional information.
University Microfilms International
300 North Zeeb Road Dept. P.R.
18 Bedford Row Dept. P.R.
Ann Arbor, MI 48106 London, WC1R 4EJ
U.S.A. England

Energy Conservation Module for IRS-80

Get A Tax Credit up to 30% of the Cost of Your Entire System!

Temperature measurement at up to four indoor or outdoor locations. Controls up to four remote devices. Expandable to 255.

BASIC and Machine Language software documentation supplied. Runs in either with Level II, Level I and TBUG machine language only.

Support software frees system to run other programs concurrently, updating only when changes occur.

Ready to connect and use. Includes interface hardware, software documentation, and complete instructions. Assembled and tested. Under \$200.00

Think Tank Labs ✓376
p.o. box 552
melbourne, florida 32901

*IRS-80 is definitely not a trademark of the Internal Revenue Service.

"EASY-WORD"

A WORD PROCESSOR

for only \$21.95

Required: TRS-80, 16K, TAPE, PRINTER

Some of "EASY WORD" many features

- JUSTIFY • STANDARD KEYBOARD
- UPPER CASE INDICATOR • VISUAL TABS
- LINE, CHANGE, DELETE, INSERT, APPEND
- WORD, CHANGE, DELETE, INSERT, APPEND
- CENTER, SORT, AND MORE

CONN. RESIDENTS ADD 7%



HANSON HOUSE
55 HANSON PLACE
STRATFORD, CT 06497 ✓317



16K MEMORY EXPANSION KIT FOR YOUR TRS-80, APPLE, AND S-100 COMPUTER

only \$59

- 200 Nsec Access, 375 Nsec Cycle
- Burned-in and Fully Tested
- 1 yr. Parts Replacement Guarantee
- Qty. Discounts Available

BETA
COMPUTER DEVICES

1230 W. COLLINS AVE.
ORANGE, CA 92668
✓417 (714) 633-7280

BUSINESS/ACCOUNTING SOFTWARE

Flexible client write-up/general ledger system designed by a CPA and developed by a computer specialist for CPA's, accountants and general businessmen provides large-scale computer features at micro-computer software costs:

- * designed for use by present employees
- * allows for up to 500 accounts
- * departmental financial statements including budgets
- * retains standard journal entries
- * automatic balancing of transactions
- * fast entry & posting of transactions
- * easy to follow audit trail
- * conventional accounting symbols used

For 9-program package on diskette with user manual send \$495 to:

TASK COMPUTER APPLICATIONS
Dayton, Ohio PO Box 24001
45424
(513) 233-5515 ✓147

MODEL II SOFTWARE HOST

HOST allows you complete control of your Model II system from a remote location. **HOST** will allow you to perform any Model II function as though you were actually sitting at the keyboard, yet still allows the Model II to operate normally. With **HOST** you can send and receive programs, data files, access disk and printer. Just connect your Model II via telephone or direct line, to any standard terminal. You can even use a second Model II or a Model I as terminal! **HOST** gives you the power of a second computer system for only \$139.00

SPRINT

SPRINT adds a screen print command to your Model II. The contents of the screen will be sent to your printer at the press of a key, or by software control. **SPRINT** is loaded in via DOS, and remains in the system, letting you print out in DOS, or BASIC. **SPRINT** requires no modification to your programs. Only \$19.95

Order now from:

COMPU-SERVICES
P.O. Box 324
Somerset, MA 02725
✓363

TERMS Cash or Money Order. Personal checks require 3 weeks processing time. Add \$2.00 for postage and shipping. Mass. residents add 5% Sales Tax.

A case for string packing.

Stringy Machine Code

David D. Grimes
12949 W. Montana Dr.
Lakewood, CO 80228

For BASIC programs with machine language routines you no longer need to load a separate SYSTEM tape, specify a power up MEMORY SIZE or modify programs for different RAM sizes.

String packing takes care of these problems, making it possible to wed BASIC and machine languages.

Eliminates SYSTEM Tape

For example, printing game instructions on the screen in machine language is difficult and tedious, but in BASIC it's

The string packing technique for embedding machine language code in BASIC programs offers exciting possibilities and convenience to TRS-80 users.

easy. Computing generations in the game of Life can take thirty seconds or more in BASIC, while it takes only fractions of a second in machine language.

Having both languages in one program eliminates the need for SYSTEM tapes, because all data formerly on the SYSTEM tape can be CSAVED as part of the BASIC program, and the BASIC program knows exactly where to find the machine language in RAM, via theUSR command.

Furthermore, since the machine language is stored as part of the BASIC program, it isn't going to overlay itself, so no upper RAM need be saved at power-up time.

Let's examine a practical application using string packing — an audible prompt. The audible prompt (beep) is used when a program needs keyboard input, when an error is detected, or when a program has come to the end of its job, etc.

Listing 1 is a listing of a short BASIC program that packs a 24 byte machine language pro-

gram into \$\$\$. The BASIC portion of the program controls the flow and execution, the machine language contributes only the beep. The audio signal is output to the plug, which normally goes to the AUX jack in the cassette recorder. This plug must connect with an audio amplifier, such as a Radio Shack Micro-sonic Speaker Amplifier (277-1008).

Table 1 gives a detailed description of the packing of the machine language routine. Note that it is executed only once, not each time that a prompt is sounded.

The Program

Lines 120-210 (Listing 1) set up a prompt for keyboard input. If no entry is made, a prompt sounds every four seconds. If an incorrect entry is made, the prompt sounds instantly.

Line 150 jumps to the packed subroutine, which generates the sound and then returns to BASIC at the next line. If the correct entry is made, the program

```

10 POKE 16553,255 'FIXES ROM DATA READ BUG
20 $$="THIS STRING LENGTH IS 24"
30 I=VARPTR($$)
40 JJ=PEEK(I+2)*256+PEEK(I+1)
50 IF JJ>32767 THEN JJ=-1*(65536-JJ)
60 FOR P=JJ TO JJ+23
70 READ D:POKE P,D:NEXT
80 DATA 205,127,10,14,60,65,62,01,
        211,255,16,254,65,60,
        211,255,16,254,43,124,181,32,238,201
90 POKE 16526,PEEK(I+1):POKE 16527,PEEK(I+2)
100 '
110 '
120 CLS
130 PRINT@0,"ENTER 'Y' OR 'N' ?"
140 IF DE<100 GOTO 170
150 X=USR(100) 'I BEEP HERE
160 DE=0
170 Z$=INKEY$
180 IF Z$="" THEN DE=DE+1:GOTO 130
190 PRINTZ$
200 IF Z$<>"Y" AND Z$<>"N" THEN 150
210 PRINT"THANK YOU !"
220 FOR DE=1 TO 500:NEXT
300 PRINT"I AM SIMULATING BEING HARD AT WORK ON A PROGR
AM.
310 PRINT"I WILL TELL YOU WHEN I HAVE FINISHED BY 'BEEP
ING'."
320 PRINT"YOU CAN STOP THE BEEP AND RETURN TO THE LEVEL
II
330 PRINT">READY BY PRESSING ANY KEY.
340 FOR DE=1 TO 5000:NEXT
350 X=USR(200) 'I BEEP HERE
360 FOR DE=1 TO 500
370 A$=INKEY$
380 IF A$<>" " THEN 410
390 NEXT
400 GOTO 350
410 END

```

Program Listing 1

Line	Description
10	Fixes ROM bug for reading DATA statements
20	Defines string of sufficient length into which machine language will be packed
30	Finds address of \$\$ information block
40	Computes decimal address of location of \$\$
50	Adjustment for RAM sizes up to 16K
60	Sets up loop
70	POKEs DATA into string
80	Machine language code in decimal
90	POKEs address of \$\$ into USR area, so that BASIC program can find it when USR call is made

Table 1. Subroutine Initializer

continues to line 210.

Lines 300-410 could, as in this case, be put at the end of any program to announce an audible end of job. The beep continues every few seconds until any key is depressed.

Once the program is working, any attempt to LIST it causes the screen to roll and looks somewhat like a bad load from tape. This is because BASIC is attempting to print something which it does not normally see, namely machine language in \$\$.

At this point, you should CSAVE the program, because we are going to delete part of it to save RAM. After the program has run successfully, the DATA in line 80 are obviously packed into \$\$ as a working machine language subroutine, so lines 40 through 80 are redundant and can be deleted.

When we CLOAD the program again, the subroutine will be in \$\$, just as it is now and needn't be packed again. After deleting lines 40 through 80, CSAVE the program again (see Restriction).

tions).

The argument in the USR command determines the length of the tone. Larger values (up to 32767) cause longer beeps. A value of more than 1000 or so causes a very long tone.

The pitch is controlled by the fifth DATA element in line 80. In the example it is 60. Larger values give a lower pitch. The value must not exceed 255.

Restrictions

1. DATA elements to be packed must not have the value 0 or 34. Either terminates the string when packed.

2. If lines 40 through 80 are deleted after the string is packed, certain conditions can cause the program to bomb; if you modify the BASIC program, for example. This can be avoided by not deleting the string packing code until a final version of the program is produced, or by not deleting the lines at all, if RAM use is not a consideration. ■

TRS-80 LEVEL II \$685.

COMPLETE SYSTEM
Limited quantity in stock

The world's most popular microcomputer, with 16K of memory and Level II BASIC for only \$685.00 complete with full 90-day Radio Shack warranty.

We accept check, money order or phone orders with Visa or Master Charge. (Shipping costs added to charge orders).

Disk drives, printers, peripherals, software & games... you name it, we've got it (both Radio Shack & other brands). Write or call for our complete price list.

C&S
ELECTRONICS
MART, LTD.



AUTHORIZED
DEALERSHIP

Radio Shack

32 EAST MAIN • MILAN, MICHIGAN 48160 • (313) 439-1508

PRINTERS & CRT'S

From **Orange Micro**



base 2 inc.



IMPACT PRINTER

\$649.00

(LIST \$699.00)

"The BASE 2 outperforms every printer in its price range. Do a comparison and see for yourself..."

★ GRAPHICS ★ TRACTORS / FRICTION FEED

• 2K Input Buffer • RS-232 Serial, Centronics® Parallel, IEEE-488, 20 ma • TRS-80 Cable option • 60 LPM - 100 CPS • Fast form feed • User programmable character set • 64, 72, 80, 96, 120, 132 Columns / line • Expanded characters • 9.5" wide paper • Automatic skip-over-perforation • Horizontal & Vertical tabs • Programmable vertical line spacing • Intel 8085 Microprocessor — over 40 software commands • Self test • 15 Baud rates to 9600 Baud • Optional foreign character sets

Interfaces to TRS-80, Apple, Atari, PET, Northstar, and most other computers.



TELEVIDEO CRT'S PRICES SLASHED!

TVI 912C }
TVI 920C }

Please Call Toll Free
Prices are too low to
advertise

PRINTERS

CENTRONICS
779 w/tractors \$ Call
730 \$ Call
737 849
COMPRINT
912 Parallel 499
912 Serial 535

OKIDATA
Microline 80 639
w/tractors 739

PAPER TIGER
w/graphics 948

QUME
Lette, Quality 5/45 2499
w/tractors 2684

TOLL FREE (800) 854-8275

CALIF. (714) 630-3322

Phone orders WELCOME. Same day shipment for VISA, MASTER CHARGE, and AMERICAN EXPRESS. Personal checks require 2 weeks to clear. Add 3% for shipping and handling. California residents add 6%. Manufacturer's warranty included. Prices subject to revision.

Call for FREE CATALOG

**Orange
Micro** 296
3148 E. La Palma, Suite E
Anaheim, CA 92806

A look at Tandy's talker.

Eloquent Eighties

TRS-80 Voice Synthesizer
Radio Shack
Tandy Corporation
Ft. Worth, TX 76102
\$399

Jim Wright
10140 N.W. 43rd St.
Coral Springs, FL 33065

It's magic, absolute magic! A 12" x 6" x 4" box of capacitors, resistors, transistors and integrated circuits is talking to me in plain English. Not only is it talking, but it says anything that I ask it to, including some very funny sound effects.

I suppose my engineering background and our nation's ability to put men on the moon should have prepared me for this. Nonetheless, I am still amazed at the marvels in our growing level of consumer technology.

Loading the Demo Tape

I picked up one of Radio Shack's Voice Synthesizers, in spite of its \$399 price tag.

The Voice Synthesizer is a completely self-contained unit.

Like its host, the TRS-80, it uses a separate in-line step-down transformer. The synthesizer can be used on any Level I or II TRS-80 and attaches by a ribbon cable and 40-pin connector expansion port.

For those of you who have the expansion interface, the synthesizer connects to your parallel interface port on the left side of the unit. Once connected, you turn on the synthesizer, adjust the volume and begin programming.

Radio Shack was thoughtful enough to include a demonstration cassette tape with the synthesizer. Unfortunately, the manual I received made no mention of the cassette! However, by increasing the tape player's volume level to about 6.5, the cassette finally loaded.

After typing RUN, the TRS-80 started talking! The program takes several minutes, during which time you get a good idea of what synthesized speech sounds like, as well as how it is structured in a program. While the audio output is quite intelligible, the synthesizer produces a stereotype computer sound much like the Battle Star Galactica's Cylons.

Using the Synthesizer

While the manual that accompanies the synthesizer contains

only 13 pages, it provides adequate information for anyone who can program in BASIC to be able to use the synthesizer. Radio Shack's approach to programming their synthesizer is interesting.

First of all, they do all the programming in BASIC. Although this may not be the most efficient method, it certainly makes using the synthesizer very simple.

Secondly, they used 32 bytes of the video monitor's memory map to store the synthesized voice message. The storage is only temporary, in that the synthesizer contains a 32-byte buffer that is filled from the lower portion of the video monitor's memory. Once the synthesizer's buffer is loaded, the memory can be erased or written over. This is done so rapidly that you can't even see what is happening on the monitor.

After the voice programming has been transferred to the synthesizer, the TRS-80 continues with its program, while the synthesizer is speaking. This allows for some very exciting graphics. For example, the rockets may fizzle as your Lunar Lander is in motion. Or a spelling program can draw a word as the synthesizer pronounces it. Business programs can verbally explain

sales, as the computer draws a graph.

How does the synthesizer know when it has a message to relate? Based on the program description, it appears that the voice synthesizer acts as a 32-byte block of memory paralleling the video monitor locations 16352D to 16383D. This block, referred to as a "window" in the instruction manual, is opened and closed by the control character, ?.

When a ? appears in memory locations 16352D to 16383D, the synthesizer opens or closes its window. An LED on the synthesizer lets you know if the window is open or closed.

Once the window is opened, any character or characters appearing between the window locations is copied into the synthesizer's buffer, and the synthesizer produces the character's phonetic sounds.

Maximum message length is 32 characters at a time. Depending on the words used, 32 characters produces from one to five seconds of speech. If you desire a longer message, you can string together several groups of characters, separated by a software time delay, allowing the first segment of speech to be completed before the second begins.

This sequencing can be done

```

5 REM *** SET UP PROMPTING PHRASE "PLEASE ENTER YES OR NO" ***
10 RS = "PL.EZ 3NTR V4355 0/ NBOU"
15 REM *** PLACE PHRASE IN SYNTHESIZER ***
20 PRINT#992, "? "JRB1" ?"
25 REM *** CLEAR SCREEN "WINDOW" ***
30 PRINT#992, "

```

Program Listing 1.

indefinitely to produce as long a message as your memory allows. Based on an average of three seconds for each group of 32 characters, 1K of memory produces approximately one and a half minutes of speech. This can be increased substantially by using a "dictionary array" of commonly used words.

Add Sound to Your Character

In printed text, a single symbol is called an ASCII character. The "characters" used in the spoken message are called phonemes (f0-n6ms). A phoneme is a single unit of sound. It is the combination of phonemes that produces the words the voice synthesizer pronounces.

The TRS-80 Voice Synthesizer contains 62 phonemes that can be combined to pronounce virtually any word in the English language, as well as some foreign words and phrases.

The correct programming method for the synthesizer is to type the ASCII character that represents the phonetic sound desired, for example: TEE ;BR3SS @ + &DY VO85&SS SIN = 85;&Z/ is TRS-80 Voice Synthesizer.

The manual includes a table that cross references the phoneme symbol and its ASCII character. The manual suggests that you sound out the word you are trying to program and then select the correct phonemes to use. I have found that this works quite well but still requires some trial and error experimentation.

```

10 CLS
20 PRINT#404, "ENTER PHONETIC PHRASE"
30 PRINT#464, "-----"
40 PRINT#464, "
50 INPUT RS
60 GOSUB 100
70 GOTO 10
100 PRINT#992, "? "JRB1" ?"
110 PRINT#992, "
120 RETURN

```

Program Listing 2.

While the manual does provide a dictionary, with correct phoneme constructions, it includes only 34 words.

You can also cross-reference any dictionary's phonetic symbols with the manual's phoneme symbols/ASCII characters.

Using a Dictionary

I found some phonetic symbols that could not be referenced as single phonemes. These sounds, such as the long /i/, are represented as diphthongs, a combination of vowel phonemes. With a little experimentation, you soon find that by changing or adding a single phoneme you can also create different inflections, such as the word beer, which can be coded BEER or BEIR.

BASIC Programming

Program Listing 1 demonstrates how simple it is to add verbal responses to a BASIC program. It prompts you to enter yes or no. To change the message, it is necessary to change only the A\$. Lines 20 and 30 can be a called subroutine using various A\$ messages.

Program Listing 2 can be used to experiment with different phoneme structures. Be careful to keep the number of phonemes to less than 28.

If you should type more than 28, the LED on the synthesizer stays lit. This is because the second ? was truncated from the buffer, and the synthesizer's window was not closed.

If this happens, just press the

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 \$2795

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 (3" x 5") eliminates envelope addressing.

Product 9062 — Size 6" x 8 1/2" 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 _____

If you wish us to BILL and SHIP differently from above please indicate.

AUTHORIZED SIGNATURE _____

Nebs Computer Forms 194

78 Hollis Street, Groton, Mass. 01450
A Division of New England Business Service, Inc.



INTEGRATED KEYPLUS UTILITY PACKAGE

Keyplus is a collection of utilities that can be enabled directly from the keyboard of a Level II TRS-80. Seven different keyboard entry modes include BASIC shorthand (2 modes), direct graphic character input (3 modes), typewriter style input and standard TRS-80 entry.

Keyplus supports auto-repeat, lowercase video (optional hardware modification required), restoration of lost programs, keyboard debounce, single key stroke user definable strings and more!

Designed for ease of use, Keyplus routines may be enabled or disabled in two key strokes.

The Level II version of Keyplus is available for \$14.95 and a more powerful disk version (32 or 48K) sells for \$19.95. Pennsylvania residents add 6% sales tax.

TRS-80 is a registered trademark of TANDY CORP.



SJW, INC.



P.O. BOX 438 ✓244
HUNTINGDON VALLEY,
PA 19006
215-947-2057

? key and ENTER, and the window closes. The reason for this is that the open window sees the ? as a toggle off-control character. Remember that the first ? toggles the window open and a second toggles the window closed. There are several other examples of useful subroutines included in the synthesizer's manual.

A list of potential applications is included in the manual. These include:

- Computer-Aided Instruction
- Intrusion - Fire Alarm
- Games
- Talking Clock
- Blind User's Terminal
- Verbally Impaired Prosthetic Aid
- Home Environment Audio Response (I programmed mine to ask for a beer!)
- Computer - Phone Voice Interface

But once you've used the Synthesizer, you're going to be intrigued with its other possibilities. How about a verbal calculator? Or a typing instruction program?

Finding fault with the TRS-80 synthesizer is like telling Henry Ford that his first automobile rode rough. True, it is a marvelous invention, but several areas can be improved. The first is the monotone computer sound. It would be nice to have an option for changing the pitch.

Secondly, some control is needed over the speed. I can envision a version of the synthesizer that will be able to sing, as well as speak.

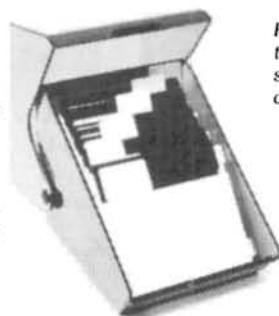
Several phonemes do not really sound as one would expect. The *g* sounds almost identical to the *d* and causes words like *gig* to sound more like *deed*. The *L* has what I call an Elmer Fudd sound, that is, a soft type *L*, rather than a hard *L*. The *K* also has a tendency to sound a little soft.

While some of these sounds are not perfect, the synthesized voice for the most part is very intelligible. I'd recommend the synthesizer for most any application where an audible prompt is desired. ■

MAGNETIC MEDIA DISTRIBUTORS ✓59

596 Taylor Way Belmont, California 94002 (415) 595-0684

Flip Sort™ DISK STORAGE SYSTEM



Keeps dust off of disks

Built-in plastic file separators

Formed from transparent smoke colored acrylic

50 to 60 Disk capacity

For Mini-Disks \$34⁹⁵
For 8" Disks \$44⁹⁵

plus \$3.00 shipping for each Flip Sort™

DEALER INQUIRIES INVITED

FLOPPY DISKS FOR ALL COMPUTERS

5 1/4" DISKETTES

Diskettes available in Soft Sector, 10 or 16 hole Hard Sector		
	1-99	100-UP
Single Side-Single Density (Certified 35 tracks)	\$ 2.85	\$ 2.80
Single Side-Double Density (Certified 40 tracks)	\$ 3.75	\$ 3.55
Double Side-Double Density (Quad Density)	\$ 4.50	\$ 4.30
Single Side-Double Density (Certified 77 tracks)	\$ 4.00	\$ 3.80

8" DISKS

Single Side-Single Density (Soft Sector)	\$ 3.40	\$ 3.20
Single Side-Double Density (Soft Sector)	\$ 4.60	\$ 4.40
Double Side-Single Density (Soft Sector)	\$ 4.95	\$ 4.75
Double Side-Double Density (Soft Sector)	\$ 5.10	\$ 4.90

Single Side-Single Density (Hard Sector 32 hole)	\$ 3.60	\$ 3.40
Single Side-Double Density (Hard Sector 32 hole)	\$ 4.00	\$ 3.80
Single Side-Single Density (Hard Sector 32 hole) (MRX 651 compatible OD holes)	\$ 4.65	\$ 4.50

We stock VERBATIM, WABASH, KYBE, KEYLINE & ATLANTIS Disks and Diskettes at LOW, LOW, prices. Write for our mini catalogue.

VINYL DISK SLEEVES for 5 1/4" and 8" Disks	\$ 9.00	10pk
PLASTIC LIBRARY CASES 8"	\$ 4.50	5 1/4" \$ 3.50
FLOPPY SAVER (Hub Reinforcing Rings)		
5 1/4" with applying tool	\$ 14.95	pk of 25 Refills \$ 7.95
8" with applying tool	\$ 16.95	pk of 25 Refills \$ 8.95

CALL TOLL FREE TO ORDER
800 227-7362
IN CALIFORNIA 415 595-0685



PROFESSIONAL

HALF A MILLION TAX RETURNS CAN'T BE WRONG!
(OR THEY HAD BETTER NOT BE)



INCOME TAX SYSTEM FOR TRS-80* MODEL I OR II

Our system, which prepared 500,000 1979 returns, features the following:

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. Change of a single amount item automatically changes and re-computes entire return.
4. All printout formats IRS and state approved.
5. Stores Preparer's Identification for automatic printing at bottom of page 2.
6. Built-in Validation Check tests entire system, hardware and software.
7. Special Printer Adjustment routines, Line Length, etc.
8. Selection of closed or open output formats—for standard Form 1040 or open name-box types.
9. **Software control of text position on page.** Makes forms-alignment simple. Permits use with non-adjustable printers.
10. Fills in pre-printed Forms or you can use overlays. Your choice.
11. Automatically computes: Tax - SDI Overpayment - Wages Total from W-2's - Earned Income Credit - Income Averaging - Maximum/Minimum Tax - Least Tax Method - All Percentage of Income Limitations - All Fixed Limitations - many, many more.
12. Full support through the tax season — no charge.
13. Inexpensive yearly updates in accordance with tax-law changes.
14. Modular construction — lets you order only the type and size system you need.

PRICING STARTS AT \$189.95 (1040 & SCHEDULE A)

25-PAGE DESCRIPTIVE MANUAL \$7.50 (Refunded on Order)

MINIMUM SYSTEM REQUIRED: MODEL I, 32K, 1 DISK DRIVE

*TRS-80 IS A TRADEMARK OF TANDY CORP.

CONTRACT SERVICES ASSOCIATES

706 SOUTH EUCLID

ANAHEIM, CA 92802

TELEPHONE (714) 635-4055

★ ★ ★ 20 YEARS OF SERVICE ★ ★ ★

A tutorial trip through addition and subtraction.

Math Flash

Jim Barbarello
RD #1, Box 241H
Tennent Rd.
Englishtown, NJ 07726

Traditional math flash cards have always been a very useful tool for young students in learning math fundamentals. The math flash card program here helps the student practice and learn on his own without a tutor. The program creates all the requisites of a conventional math drill: random addition or subtraction problems presented with bold, easily readable numerals; a set response time limit; positive reinforcement for correct answers, and a chance to redo an incorrectly answered problem.

For each problem, two variables between 0 and 49 are selected. These variables are either added or subtracted on a random basis and then presented as the problem. The variables' upper limit of 49 restricts the answer to a two digit value.

After each set of nine prob-

lems is completed, an interim score is presented. If the student chooses to continue, the next set of nine problems is presented. If the student chooses not to continue, a total score for all problems attempted is provided.

The variables are selected so as to minimize repetition of problems and to maximize exposure to all possibilities. If, for example, the student is encountering specific difficulties, the program can be easily modified to present a specific set of problems. The program presents up to 81 different problems per run.

A Typical RUN

When the program is RUN, the message "GET READY—HERE WE GO!" appears as the random variables are selected. The screen then clears, and the first problem is displayed (ex: $14 + 23 =$) in two-inch high numerals. The student has approximately four seconds to enter an answer. The entered answer is displayed to the right of the equals sign in normal height ($\frac{1}{4}$ inch) numerals. Since the answer is entered via the INKEY\$ function, the student need only press the appropriate numeric

keys to input an answer.

A correct answer causes the reinforcement message "*** VERY GOOD***" to appear above the problem. If the student's answer is incorrect, it is removed from the screen and the message "XX IS WRONG. THE RIGHT ANSWER IS:" is displayed in the upper left hand corner of the screen.

At the same time, the correct answer is displayed to the right of the equals sign in bold (two-inch high) numerals. In either event, the problem remains on the screen for an additional three seconds. A correct answer allows a new problem to be displayed. For an incorrect answer, the same problem is repeated, giving the student another chance to answer correctly.

If the student does not respond to any problem in the allotted four seconds, the message "TIME'S UP" appears in the upper left hand corner of the screen and the correct answer is displayed in bold numerals. A "TIME'S UP" situation is treated as an incorrect answer.

If the student does not provide the correct answer in two tries, an incorrect response is scored. At the end of nine prob-

lems, the screen clears and the message "YOU GOT X RIGHT OUT OF 9 TRIES THIS TIME. WANT TO TRY AGAIN (YES OR NO)" is displayed.

If the student responds with lems, the screen clears and the message "YOU GOT X RIGHT OUT OF 9 TRIES THIS TIME. WANT TO TRY AGAIN (YES OR NO)" is displayed.

About The Program

Fully half of the program consists of subroutines to create the bold numerals, plus, minus and equals signs (Lines 1000 through 2200). These subroutines use the variable S to position the numerals on the screen. S is initially set to 15682 in Line 65 and is continually readjusted during the program to allow the problem to be serially presented (one character after another). The program automatically adjusts for single or double digit variables/answers so that gaps are not left in the presentation.

The program can be easily customized to a specific student's needs in a number of areas. For the very young student, the variables can be limited to a single digit (0 to 9) by changing the statement A(K) =

RND(49) in line 10 to A(K) = RND(9) and B(K) = RND(49) in line 30 to B(K) = RND(9).

The response time allowed for each problem can be adjusted by varying the FOR-NEXT loop in line 140. As shown, the keyboard is scanned for a response 25 times (FOR M = 1 TO 25). Increasing the loop increases the allowable response time—decreasing it shortens the time allowed.

If a specific set of problems is desired instead of the presently available random selection, lines 10 through 40 can be deleted and replaced with:

```
10 DATA A,B,C,D,E,F,G,H,I,J,K,L,M,N,O,P,
Q,R
20 FOR I=1 TO 9: READ A(I):READ B(I):
NEXT I
(with A through R being numbers you
select)
```

With this modification, A,C,E,G,I,K,M,O and Q will be the numerals of the first variable and B,D,F,H,J,L,N,P and R will be the numerals of the second variable. For example, if A = 19 would be 19 + 43 (or 43 - 19 if subtraction was randomly selected). If only addition or only subtraction is desired, lines 60 and 70 may be deleted and replaced with 60 C = A + B (for addition, or) 60 C = A - B (for subtraction).

It is possible to multiply and/or divide. However, special care must be taken such that the variable produce an integer answer that is no larger than 99. In addition, appropriate subroutines for the times (x) and divide (÷) signs would need to be added. ■

Program Listing.

```
1 REM*****
2 REM*****
3 REM***** MATH FLASH CARDS
4 REM*****
5 REM***** A PROGRAM BY
6 REM***** JIM BARBARELLO
7 REM*****
8 REM*****
9 REM
10 CLS:PRINT"GET READY - - HERE WE GO!":RANDOM:FOR K=1 TO 9:A(K)=
RND(49)
20 FOR J=0 TO K-1:IF A(K)=A(J) THEN K=K-1:NEXT K ELSE NEXT J,K
30 FOR K=1 TO 9:B(K)=RND(49)
40 FOR J=0 TO K-1:IF B(K)=B(J) THEN K=K-1:NEXT K ELSE NEXT J,K
50 FOR K=1 TO 9
60 FOR J=1 TO 9:IF CT=0 THEN D=RND(2)
65 AS="":BS="":S=15682:CLS:A=A(K):B=B(J):C=0:F=0
70 IF D=1 THEN C=A+B ELSE C=A-B
75 IF C<0 THEN A=B(J):B=A(K):C=A-B
80 IF A>9 THEN W=INT(A/10):Y=A-W*10 ELSE Y=A:S=S-8
85 ON W GOSUB 1000,1100,1200,1300,1400,1500,1600,1700,1800
90 S=S+8
95 ON Y GOSUB 1000,1100,1200,1300,1400,1500,1600,1700,1800
100 IF Y=0 THEN GOSUB 100
105 ON D GOSUB 2000,2100,2200,2300,2400,2500,2600,2700,2800
110 S=S+16:IF B>9 THEN W=INT(B/10):ON W GOSUB 1000,1100,1200,1300,
1400,1500,1600,1700,1800
115 IF B>9 THEN Y=B-W*10 ELSE Y=B:S=S-8
120 S=S+8:ON Y GOSUB 1000,1100,1200,1300,1400,1500,1600,1700,1800
125 IF Y=0 THEN GOSUB 1900
130 S=S-17:GOSUB 2200:S=S-1:W=0:Y=0:AS=INKEY$
140 FOR M=1 TO 25
150 AS=INKEY$
160 IF AS="" THEN 170 ELSE 200
170 FOR L=1 TO 50:NEXT L,M
180 PRINT#498," ";PRINT#0,"TIME'S UP"
190 CT=CT+1:GOTO 240
200 IF C<0 AND BS="" THEN BS=AS:M=5:PRINT#498,B5:NEXT M:ELSE PR
INT#499,AS:
210 G=VAL(AS)+VAL(B5)*10:IF G=C THEN CT=0:PRINT#84,"** VERY GOOD
**":GOTO 290
220 IF G<C THEN PRINT#0,"G;" IS WRONG. THE RIGHT ANSWER IS":CT=C
T-1:PRINT#498," ";GOTO 240
230 CT=0
240 S=S+36
250 IF C=0 THEN GOSUB 1900:GOTO 290
260 IF C>9 THEN W=INT(C/10):Y=C-W*10 ELSE Y=C:S=S-8
270 ON W GOSUB 1000,1100,1200,1300,1400,1500,1600,1700,1800
275 S=S+8
280 ON Y GOSUB 1000,1100,1200,1300,1400,1500,1600,1700,1800
285 IF Y=0 THEN GOSUB 1900
290 FOR N=1 TO 750:NEXT N
300 IF CT=0 THEN TTL=TTL+1:NEXT J:GOTO 330
310 IF CT=2 THEN J=J-1:NEXT J:GOTO 330
320 CT=0:NEXT J:GOTO 330
330 CLS:PRINT"YOU GOT";TTL;" RIGHT OUT OF 9 TRIES THIS TIME":TTL=T
L+TTL:TTL=0
340 PRINT:INPUT"WANT TO TRY AGAIN (YES OR NO)";BLS
350 IF LEFT$(BLS,1)="Y" THEN NEXT K
360 IF LEFT$(BLS,1)="N" THEN CLS:PRINT"YOUR TOTAL IS";TL;" RIGHT
OUT OF";K*9;" TRIES. BYE!":END
370 GOTO 340
1000 REM** ONE
1010 FOR I=0 TO 4
1020 POKE S+I*64,191:POKE S+I+1*64,191:NEXT
1030 POKE S+62,191:FOR I=1 TO 6:POKE S+253+I,191:NEXT
```

```
1040 RETURN
1100 REM** TWO
1110 FOR I=-2 TO 3
1120 POKE S+I,191:POKE S+128+I,191:POKE S+256+I,191:NEXT
1130 POKE S+67,191:POKE S+190,191
1140 RETURN
1200 REM** THREE
1210 FOR I=-2 TO 3
1220 POKE S+I,191:POKE S+128+I,191:POKE S+256+I,191:NEXT
1230 POKE S+67,191:POKE S+195,191
1240 RETURN
1300 REM** FOUR
1310 POKE S+128,191:POKE S+129,191
1320 FOR I=0 TO 4:POKE S+2+I*64,191:POKE S+3+I*64,191:NEXT
1330 FOR I=0 TO 2:POKE S-2+I*64,191:POKE S-1+I*64,191:NEXT
1340 RETURN
1400 REM** FIVE
1410 FOR I=-2 TO 3
1420 POKE S+I,191:POKE S+128+I,191:POKE S+256+I,191:NEXT
1430 POKE S+62,191:POKE S+195,191
1440 RETURN
1500 REM** SIX
1510 FOR I=-2 TO 3
1520 POKE S+I,191:POKE S+128+I,191:POKE S+256+I,191:NEXT
1530 POKE S+62,191:POKE S+190,191:POKE S+195,191
1540 RETURN
1600 REM** SEVEN
1610 FOR I=-2 TO 3:POKE S+I,191:NEXT
1620 FOR I=0 TO 4:POKE S+2+I*64,191:POKE S+3+I*64,191:NEXT
1630 RETURN
1700 REM** EIGHT
1710 FOR I=-2 TO 3
1720 POKE S+I,191:POKE S+128+I,191:POKE S+256+I,191:NEXT
1730 POKE S+62,191:POKE S+67,191:POKE S+190,191:POKE S+195,191
1740 RETURN
1800 REM** NINE
1810 FOR I=-2 TO 3
1820 POKE S+I,191:POKE S+128+I,191:POKE S+256+I,191:NEXT
1830 FOR I=0 TO 4:POKE S+3+I*64,191:NEXT
1840 POKE S+62,191
1850 RETURN
1900 REM** ZERO
1910 FOR I=-2 TO 3
1920 POKE S+I,191:POKE S+256+I,191:NEXT
1930 FOR I=0 TO 4:POKE S-2+I*64,191:POKE S+3+I*64,191:NEXT
1940 RETURN
2000 REM** PLUS SIGN
2010 FOR I=1 TO 3
2020 POKE S+8+I*64,191:POKE S+9+I*64,191:NEXT
2030 FOR I=0 TO 5:POKE S+134+I,191:NEXT
2040 RETURN
2100 REM** MINUS SIGN
2110 FOR I=0 TO 5:POKE S+134+I,191:NEXT
2120 RETURN
2200 REM** EQUALS SIGN
2210 FOR I=0 TO 5:POKE S+88+I,191:POKE S+216+I,191:NEXT
2220 RETURN
```

MULLEN Computer Products

NEW TRS-80* CONTROL BOX

Special introductory price
M-80 OCTOPORT
\$159. Assem./Tested

- 8 Reed relay - OUTPUTS
- 8 opto-isolated - INPUTS
- Selectable port address
- Power supply
- Assembled cable & connectors

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) 781-2886. VISA/MASTERCARD ACCEPTED.
INCLUDE \$1.50 FOR SHIPPING & HANDLING. CALIFORNIA RESIDENTS ADD TAX.
#285
Order Direct or Contact your Local Computer Store.

MORE FOR YOUR RADIO SHACK TRS-80 MODEL I!

- ★ **MORE SPEED**
10-20 times faster than Level II BASIC.
- ★ **MORE ROOM**
Compiled code plus VIRTUAL MEMORY makes your RAM act larger.
- ★ **MORE INSTRUCTIONS**
Add YOUR commands to its large instruction set!
Far more complete than most Forths: single & double precision, arrays, string-handling, more.
- ★ **MORE EASE**
Excellent full-screen Editor, structured & modular programming
Optimized for your TRS-80 with keyboard repeats, upper/lower case display driver, single- & double-width graphics, etc.
- ★ **MORE POWER**
Forth operating system
Interpreter AND compiler
Internal 8080 Assembler
(Z80 Assembler also available)
VIRTUAL I/O for video and printer, disk and tape
(10-Megabyte hard disk available)

MMS FORTH

THE PROFESSIONAL FORTH FOR TRS-80

Prices:
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
Programming staff available
Many demo programs aboard
MMSFORTH User Groups

FLOATING POINT MATH (L2 BASIC ROM routines plus complex numbers, Rectangular-Polar coordinate conversions, Degrees mode, more), plus a full Z80 ASSEMBLER; all on one diskette ... **\$29.95***

THE DATAHANDLER, a very sophisticated database management system operable by non-programmers (requires 1 drive and 32K RAM); with manuals **\$59.95***

Other packages under development

FORTH BOOKS AVAILABLE

MICROFORTH PRIMER — comes with MMSFORTH; separately **\$15.00***
USING FORTH — more detailed and advanced than above **\$25.00***
URTH TUTORIAL MANUAL — very readable intro. to U/Rochester Forth **\$19.95***
CALTECH FORTH MANUAL — good on Forth internal structure, etc **\$6.95***

* — Software prices are for single-system user license and include manuals. Add \$2.00 S/H plus \$1.00 per additional book; Mass. orders add 5% tax. Foreign orders add 15%. UPS COD, VISA & M/C accepted; no unpaid purchase orders, please.

Send SASE for free MMSFORTH information.
Good dealers sought.

MMSFORTH is available from your computer dealer or
MILLER MICROCOMPUTER SERVICES (B1) ✓112

61 Lake Shore Road, Natick, MA 01760
(617) 653-6136

Micro Computers and Civil Engineering

The machine can do it — but you need the application package to make it work for you.

We have brought together the most powerful civil engineering tools available, USA-COGO (Civil Engineering Coordinate Geometry), USA-EARTH (Earthwork Design Quantities), and USA-STRESS (Structural Engineering System Solver). Each system provides a complete data entry and change system in addition to the powerful problem analyzer tied together through a common menu driver.

It's available to you now on your choice of CP/M or TRSDOS in source code BASIC or FORTRAN. For additional information, call us at (314) 878-1277, or write:

*Universal Software
Applications, Inc.* ✓301

13001 Cannes Drive
St. Louis, Missouri 63141

"Turning Dreams Into Reality"

PUREZZAP

is a machine language, highly advanced disk sector modifier. Incorporating 4 additional utilities most desired by users. 35 or 40 track. 1 or 2 drives.

- Zero out all unallocated sectors.
- Zero out all killed directory entries.
- Hash code displayed upon entering any filespec.
- Instantly kill format, copy, basic and all system files except boot and dir.
- PUREZZAP reads, modifies and writes any sector.
- Lightning fast cursor movements in 4 directions whether modify mode or not.
- Instant toggle between drives.
- Continues sector compare of any two locations.
- Continues search for the occurrence of any byte.
- Automatic single or multiple duplication of a modified byte.
- Forward or backward 1 to 9 sectors at a time >>instantly<<.
- Fantastic, easy to read, visual display with the relative byte position displayed and updated continuously during any function.
- A super menu and more with easy to understand documentation.

Shipped within 24 hours on a diskette for only \$12.95. Add \$1.00 for handling in USA—\$3.00 outside.

Make check or money order payable to:

COMPUTER CONSULTANTS ◆
9411 Cedartree Rd.
Downey, California 90240 ✓220

Versatile Information Manager

Thinking of buying specialized programs for applications such as mailing lists, inventory, or maintaining personnel records? VIM can perform these and many other tasks, and the best part of it is that you only pay for it once!

Simplify the task of maintaining your data by putting VIM to work on your system. VIM is very easy to use and its flexibility will permit you to perform a great variety of data processing jobs with no extra programming. It runs on the TRS-80* Model I, 32K (or more) disk based system.

MODULE 1 (database manager) **\$59.95**

- database definition with up to 240 character records and 30 fields
- alphanumeric and numeric fields
- add, update, and delete records
- search on any fields or their combinations using 3 logical and 10 relational operators
- modify, unload, or delete records retrieved by a search

MODULE 2 (sort utility) **\$29.95**

- written entirely in assembly language for fast operation
- sort on any combination of fields in ascending or descending order

MODULE 3 (report generator) **\$29.95**

- user defined record and page formats
- optional summary for numeric fields

VIM (modules 1, 2 and 100 = page manual) **\$99.95**

Add 2% shipping and handling

Dealer inquiries invited

FOR MORE INFORMATION WRITE: ✓307

MICROCOSM INC.

P.O. Box 2034 Dearborn, MI 48123

*Trademark of Tandy Corp.

SURVEYORS:

We have a fantastic package for the TRS-80! All of the programs perform calculations to full double precision accuracy. Here are some of the many features:

- *FIELD ANGLE TRAVERSE (with stadia reduction, inverse, etc.) store a traverse, with elevations, on disk
- *STADIA REDUCTION
- *UNIVERSAL TRIANGLE SOLUTIONS
- *VOLUME BY AVERAGE END AREA
- *CIRCULAR CURVE SOLUTIONS
- *HORIZONTAL CURVE LAYOUT (with tangent offsets)
- *UNIVERSAL INTERSECTIONS
- *VERTICAL CURVES AND GRADES
- *BORROW PIT VOLUME
- *COORDINATE TRANSFORMATION
- *AREA FROM POINT COORDINATES
- *INVERSE FROM COORDINATES
- *RADIAL TRAVERSE (coming soon)

Disk version (32K with Disk) **\$275**
Cassette version (16K Level II) **\$225**
Manual (refunded with purchase) **\$5**



✓309
Judson D. McClendon
844 Sun Valley Road
Birmingham, AL 35215

SURPLUS TRS-80* EXPANSION INTERFACES WITH 32K RAM

Due to changes in Product Structure American Business Computers is offering 14 Expansion Interfaces (All w/32K RAM) at closeout prices.

\$450

American Business Computers guarantees expansion Interfaces to be Brand New, still in original boxes with original documentation and in perfect working condition.

AMERICAN BUSINESS COMPUTERS ✓397

*TM TANDY CORP.

118 S. MILL ST. - PRYOR, OK 74361 - 918-825-4844

Please note: Our CRT SCREENS have been purchased by thousands of individuals, the Department of the Navy, several government agencies, and dozens of the country's top corporations and universities.

- Give your CRT the luminous green characters found on the very expensive computer systems
- Add a professional look to your system and your programs
- Dramatically improved contrast for easier reading and improved graphics

We manufacture an optically correct, 1/8" plexiglas* screen that mounts easily over the CRT on your video monitor. This is a quality accessory that enables your TRS-80* monitor to produce the luminous green characters identical to those found on expensive terminals. For business applications this means enhanced appearance and reduced eye strain, for the hobbyist, graphics are brighter and bolder. The screen may be easily removed - no modification to monitor.

Screen for Model I... \$19.95

Screen for Model II... \$24.95

We ship within
24 hours
30-day money
back guarantee



✓142

VISA - Mastercharge

National Tricor, Inc. / 3335 Greenleaf Blvd., Kalamazoo, MI 49008 / 616-375-7519

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



REMSOFT, Inc.
571 E. 185 st.
Euclid, Ohio 44119
(216)531-1338



Include \$1.50 for shipping and handling.
Ohio residents add 5 1/2% sales tax.

✓70

TRS-80* is a trademark of the Tandy Corp.

SPIDER MOUNTAIN ADVENTURE

Beyond the desolate outback of GRAYLOCKLAND lies the lair of the spider SHELBO. Once a wizard's cavernous fortress, SPIDER MOUNTAIN is now a deadly trap from which only the most skilled adventurers emerge. Treasure awaits the fortunate. DEATH stalks the foolish.

Can YOU solve the riddle of the SPIDER MOUNTAIN ADVENTURE, and come back alive?

\$14.95 on tape

\$19.95 on disk

LOST DUTCHMAN'S GOLD

Deep in Arizona's Superstition mountains, under the watchful eye of Apache Indians, the fabled LOST DUTCHMAN'S GOLDMINE awaits the adventurer bold enough to challenge the fates. With only a mule and a Winchester, and the ghost of an old gold prospector named BACKPACK SAM to guide you, do you dare to venture into the misty mountains, where it is said that the Devil himself protects the LOST DUTCHMAN'S GOLD?

\$14.95 on tape

\$19.95 on disk

DEATH DREADNAUGHT ADVENTURE

This mind chilling thriller will freeze the blood in your veins. You are trapped aboard an ancient alien battleship whose entire crew was murdered brutally. You are the scout team's only survivor. Your ship's been smashed, but one alien shuttlecraft remains intact. As you move about the wreck the danger increases. You must secure air, food, fuel, and batteries. Now, as precious seconds of your life tick away you suddenly realize YOU ARE NOT ALONE! The creature that ripped this ship apart is ALIVE and waiting for you to make a mistake. CAN YOU ESCAPE? Or will YOU be the creature's next victim.

\$14.95 on tape

\$19.95 on disk

WARNING: DEATH DREADNAUGHT IS RATED R due to EXTREME descriptions of VIOLENCE

SEND CHECK OR MONEY ORDER WITHIN FIVE DAYS OF RECEIPT

SPECIAL
TRIPLE ADVENTURE DISKETTE
\$35.00
DOUBLE TAPE OR DISKETTE
(ADVENTURES OF YOUR CHOICE)
\$24.95
DEALER INQUIRIES INVITED ✓364

The
Programmer's
Guild

PO Box 66
Peterboro, NH 03458
PH (603) 924-8065

THE BLINKING CURSOR

MACHINE LANGUAGE ROUTINE
FOR TRS-80 16K LEVEL II

LOADS IN SECONDS FROM CASSETTE
INTO LESS THAN 1/2K BYTES OF PROTECTED
MEMORY AND TIES INTO ROM KEY SCAN

Customize Your Cursor:

SELECT ANY CHARACTER OR GRAPHICS BLOCK
AND WATCH IT BLINK!
CHANGE AS OFTEN AS YOU LIKE.

FEATURES:

- FAST REPEATING ← KEY AND SPACE BAR
- INSTANT SWAP WITH RESIDENT CURSOR
- UNAFFECTED BY NEW OR RESET
- WORKS IN COMMAND - EDIT - EXECUTE MODES
- KEY DEBOUNCE

* TM TANDY CORP.

A System Cassette from Semisoft ✓290



SEND \$9.95 CHECK OR MONEY ORDER TO:
SEMISOFT
121 MADISON AVENUE
NEW YORK, N.Y. 10018

TRS-80*

HELP ?

"...how did I get along without it?" is the usual reaction to this advanced disk indexing program.

- AUTOMATICALLY create, sort, print, search a Master Index of all disk files.
- AUTOMATICALLY read file names, disk numbers (no hand entry)
- AUTOMATICALLY print disk labels (optional)
- AUTOMATICALLY update Index from revised disks
- AUTOMATICALLY add optional file descriptions
- AUTOMATICALLY label disks as 'DOS' or 'DATA' NEW
- AUTOMATICALLY purge disks of unwanted files. NEW

• **FINDISK-II** (on disk or tape 32K min - now works with RS 1 c mod) \$20.00

Other powerful programs from Documan available on tape or disk:

- **STRUCT-I** beam design and moment transfer w/ graphics (16K) \$15.00
- **SOLAR-I** essential calculations for passive solar design (32K) \$30.00
- **RIA-I** complex analysis of real estate investments (32K) \$30.00
- **DEPRECIATE-I** calculate, print 12 facts on depreciable items (32K) \$15.00

✓88 **VISA / MASTER CHARGE** Shipping \$1.00 each (Mich. add sales tax)

DOCUMAN SOFTWARE BOX 387-A KALAMAZOO, MI 49005 (616) 344-0805

An M.D.'s bookkeeping system.

Doctor Your Records

Wilbur A. Muehlig, M.D.
726 N. 91 Plaza, #305
Omaha, NE 68114

When I was practicing medicine, my secretary kept a "daybook," entering each payment made by a patient, adding totals for the day, the month and, finally, the year.

When I left private practice, I continued the same general

method of keeping track of income checks, but my usual practice was to let the arithmetic go until the end of the year when my tax was due. At this time totaling my income was a rather discouraging job, but ideally suited to a computer.

This bookkeeping program should be of interest to anyone owning a few stocks and bonds. It was written with the retired person in mind, and therefore includes Social Security income, and annuity payments.

The program, which handles up to 35 entries a month, accepts eight types of entries: earned income, dividends, in-

terest, annuity funds, tax-free interest, Social Security, life insurance dividends, and miscellaneous items. The first four are taxable, the next three untaxable and the last is for your records only.

The program is written in Level II BASIC for a TRS-80 with 32K and a single disk drive. But it can be easily modified to use a cassette. The printer has a line length of 61 characters, but can be compressed to fit into 40 columns. Though the program can be used without a printer, much of its benefit is lost.

First Steps

Choose MAKE A FILE ENTRY (number three in Table 1) when first using the program. Enter the day, the month and the source of the income; choose the type of entry, the amount (Table 2), and press enter.

When you have finished making your entries, save them to disk using the first menu option and the disk option—SAVE MONTH'S FILE TO DISK (one in Table 1). Before adding more entries, load the previous ones with disk option two.

You can use menu options

WHAT DO YOU WANT TO DO?

- 1—DISK OPERATIONS
- 2—COMPUTATIONS
- 3—MAKE A FILE ENTRY
- 4—CORRECT AN ENTRY
- 5—DELETE AN ENTRY
- 6—SEE A PRINTOUT ON VIDEO
- 7—MAKE A HARD COPY
- 8—LEAVE THE PROGRAM

CHOOSE? 1

WHAT DO YOU WANT TO DO?

- 1—SAVE MONTH'S FILE TO DISK
- 2—LOAD MONTH'S FILE FROM DISK
- 3—SAVE YEARLY TOTALS TO DATE
- 4—LOAD YEARLY TOTALS
- 5—RETURN TO MENU

CHOOSE? 1

Table 1

1
TO END FILE ENTRIES, TYPE 99

DAY OF MONTH? 5

SOURCE OF INCOME (NOT OVER 24 SPACES)

? AT & T

WHAT TYPE OF ENTRY?

- | | |
|-----------------|---------------------------|
| 1—EARNED INCOME | 5—TAX FREE INTEREST |
| 2—DIVIDEND | 6—SOCIAL SECURITY |
| 3—INTEREST | 7—LIFE INSURANCE DIVIDEND |
| 4—ANNUITY | 8—MISCELLANEOUS ITEM |

CHOOSE? 2

AMOUNT OF DIVIDEND? 345.67

1 DATE 5 AT & T DIVIDEND \$ 345.67

IF THE ABOVE IS INCORRECT, TYPE 1. IF THE PART THEN DISPLAYED IS CORRECT, PRESS ENTER, OTHERWISE TYPE THE CORRECTION.

NOTE, IF THE ERROR IS IN THE TYPE OF INCOME, DELETE THE WHOLE ITEM AND REENTER.

IF THE ABOVE IS CORRECT, TYPE 2 TO GO ON? ...

Table 2

Program Listing

```

1 REM * PERSONAL INCOME LEDGER PROGRAM *
2 REM * WILBUR A. MUEHLIG, M.D. *
3 REM * 726 N. 91 PLAZA, APT. 385,
4 REM * OMAHA, NE 68114
11 REM * OCT. 1979.
12 CLS
13 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
15 PRINTTAB(23)"INCOME LEDGER PROGRAM":PRINT:PRINT:PRINT
16 T
20 INPUT "DO YOU WANT INSTRUCTIONS FOR USE (Y/N)";Z5
30 IF Z5="Y" GOTO 4000
40 CLEAR 500:DEFDBL E,D,I,A,T,G,L,C,F,R,Q:DEFINT B,J,K,
H,X,Z,P:P1=1
45 DEFSTR S,M,V,Y,U
50 DIM S(35),E(25),DA(35),D(25),I(25),A(25),T(25),G(25),
L(35),C(25),F(35),R(35),M(12)
52 DATA JAN,FEB,MAR,APR,MAY,JUN,JUL,AUG,SEP,OCT,NOV,DEC

53 FOR H=1 TO 12:READ M$(H):NEXT
55 CLS:PRINT:PRINT:PRINT:PRINT
60 INPUT"YEAR OF THIS REPORT (####)";YS
80 PRINT:INPUT"NUMBER OF THIS MONTH (1 TO 12)";H
100 CLS:PRINT
110 PRINT"WHAT DO YOU WANT TO DO?"

      1-DISK OPERATIONS
      2-COMPUTATIONS"
112 PRINT"          3-MAKE A FILE ENTRY
          4-CORRECT AN ENTRY
          5-DELETE AN ENTRY
          6-SEE A PRINTOUT ON VIDEO"
113 PRINT"          7-MAKE A HARD COPY
          8-LEAVE THE PROGRAM"

114 PRINT:INPUT"CHOOSE";J
120 ON J GOTO 200,1262,600,800,1000,1225,1400,1600
200 CLS:PRINT:PRINT:PRINT:PRINT:PRINT"WHAT DO YOU WANT
TO DO?"

      1-SAVE MONTH'S FILE TO DISK
      2-LOAD MONTH'S FILE FROM DISK
      3-SAVE YEARLY TOTALS TO DATE"
210 PRINT"          4-LOAD YEARLY TOTALS
          5-RETURN TO MENU"

220 PRINT:INPUT"CHOOSE";J
230 ON J GOTO 240,270,299,349,235
235 GOTO100
240 IF S(1)=" THEN PRINT"FILE EMPTY.":INPUT"PRESS ENTER";Z5:GOTO200
241 OPEN"O",1,M(H)
242 PRINT"SAVING MONTHLY FILE TO DISK...."
245 PRINT#1,P1
250 FOR X=1 TO P1-1
255 PRINT#1,S(X):PRINT#1,X;DA(X);E(X);D(X);I(X);A(X);T(X);G(X);F(X);C(X)
260 NEXT:CLOSE
265 PRINT:PRINT"MONTHLY FILE SAVED TO DISK";FOR I=1 TO
500:NEXT:GOTO 100
270 ON ERROR GOTO 1000
272 OPEN"1",1,M(H)
275 INPUT#1,P1
280 FOR X=1 TO P1-1
285 INPUT#1,S(X):INPUT#1,X,DA(X),E(X),D(X),I(X),A(X),T(X),G(X),F(X),C(X)
287 PRINTX;S(X)
290 NEXT:CLOSE
291 FOR X=1 TO P1-1:L(X)=E(X)+D(X)+I(X)+A(X):R(X)=T(X)+G(X)+F(X)+C(X):NEXT
295 PRINT:PRINT"MONTHLY FILE LOADED.":INPUT" PRESS ENTER";Z5:GOTO 100
299 IF ES=0 AND DS=0 AND IS=0 AND AS=0 AND TS=0 AND GS=0 AND FS=0 AND CS=0 THEN INPUT"FILE EMPTY. PRESS ENTER.":Z5:GOTO200X
300 VS=M(H)+YS:OPEN"O",2,VS
305 PRINT:PRINT"SAVING YEARLY TOTALS TO DISK..."
320 PRINT#2,ES;DS;IS;AS;TS;GS;FS:CLOSE
330 GOTO 100
349 ON ERROR GOTO 1000
350 VS=M(H-1)+YS
355 OPEN"1",2,VS
360 PRINT:PRINT"LOADING YEARLY TOTALS...."
370 INPUT#2,ES,DS,IS,AS,TS,GS,FS:CLOSE
380 GOTO 100
599 REM * TO MAKE A FILE ENTRY *
600 CLS:PRINT:PRINT:PRINT
602 FOR X = P1 TO 50
610 CLS:PRINT:PRINT:PRINT
612 PRINTX
613 PRINT:PRINT"TO END FILE ENTRIES, TYPE 99"
615 PRINT:IF DA(X) <> 0 PRINT DA(X);" ";
620 INPUT"DAY OF MONTH";DA(X)
622 IF DA(X)=99 THEN P1=X:GOTO 100
630 IF S(X)<>" THEN PRINTS(X);" ";
640 PRINT:PRINT"SOURCE OF INCOME (NOT OVER 24 SPACES)":INPUT S(X)
645 IF LEN(S(X)) > 24 PRINT"TOO LONG. TRY AGAIN.":GOTO6
40
660 PRINT"WHAT TYPE OF ENTRY?
1-EARNED INCOME          5-TAX FREE INTEREST

```

```

2-DIVIDEND              6-SOCIAL SECURITY
3-INTEREST              7-LIFE INSURANCE DIVIDEND
4-ANNUITY              8-MISCELLANEOUS ITEM
662 ON ERROR GOTO 1700
665 PRINT:INPUT"CHOOSE";B
670 ON B GOTO 6100,6200,6300,6400,6500,6600,6700,6800
680 CLS:PRINT:PRINT
690 PRINT:PRINTX;" DATE";DA(X);" ";S(X)" ";
691 IF E(X)>0 PRINT"EARNED INCOME ";:PRINTUSING"$$$",
##,##;E(X)
692 IF D(X)>0 PRINT"DIVIDEND ";:PRINTUSING"$$$",##,##
";D(X)
693 IF I(X)>0 PRINT"INTEREST ";:PRINTUSING"$$$",##,##
";I(X)
694 IF A(X)>0 PRINT"ANNUITY ";:PRINTUSING"$$$",##,##
";A(X)
695 IF T(X)>0 PRINT"TAX FREE INTEREST ";:PRINTUSING"$
###,##,##";T(X)
696 IF G(X)>0 PRINT"SOCIAL SECURITY ";:PRINTUSING"$##
,##,##";G(X)
697 IF F(X)>0 PRINT"LIFE INS. DIV. ";:PRINTUSING"$###
,##,##";F(X)
698 IF C(X)>0 PRINT"MISC. DEPOSIT ";:PRINTUSING"$###,
##,##";C(X)

700 PRINT:PRINT"IF THE ABOVE IS INCORRECT, TYPE 1. IF
THE PART THEN DISPLAYED"
705 PRINT"IS CORRECT, PRESS ENTER, OTHERWISE TYPE THE C
ORRECTION."
707 PRINT:PRINT"NOTE: IF THE ERROR IS IN THE TYPE OF IN
COME, DELETE THE WHOLE"
708 PRINT"ITEM AND REENTER."
709 REM * INCOME TYPE ERROR CAN CAUSE CONFUSION IF NOT
DELETED *
710 PRINT:INPUT"IF THE ABOVE IS CORRECT, TYPE 2 TO GO O
N";Z
720 IF Z=1 GOTO 610
730 IF Z<>2 GOTO 710
740 NEXT:GOTO100
799 REM * USES SAME CORRECTION SECTION AS FILE ENTRY *
800 CLS:PRINT:PRINT:PRINT:PRINT
810 PRINT"WHICH NUMBER DO YOU WISH TO CORRECT"
815 PRINT:PRINT" (0 TO RETURN TO MENU)
";:INPUT K
817 IF K=0 GOTO 100
820 FOR X=1 TO P1-1
830 IF X=K GOTO 600
840 NEXT
850 GOTO 100
999 REM * DELETES ENTRY AND RENUMBERS *
1000 PRINT"WHICH NUMBER DO YOU WANT TO DELETE?"
1002 PRINT" (0 TO RETURN TO MENU) ";:INP
UT X
1005 IF X=0 GOTO100
1010 DA(X)=0:S(X)="":E(X)=0:D(X)=0:I(X)=0:A(X)=0:T(X)=0
:G(X)=0:F(X)=0:C(X)=0:L(X)=0:R(X)=0
1020 FOR X=X+1 TO P1:DA(X-1)=DA(X):S(X-1)=S(X):E(X-1)=E
(X):D(X-1)=D(X):I(X-1)=I(X):A(X-1)=A(X):T(X-1)=T(X):G(X
-1)=G(X):F(X-1)=F(X):C(X-1)=C(X):L(X-1)=L(X):R(X-1)=R(X)
1025 NEXT
1030 P1=P1-1
1040 PRINT:PRINT"ENTRY DELETED.":FOR I=1 TO 700:NEXT:GO
TO 100
1200 CLS:PRINTTAB(16)"INCOME LEDGER FOR ";M(H);" ";YS:P
RINT
1210 PRINT"## DAY SOURCE OF INCOME TAXABLE
NONTAX."
1220 PRINT STRINGS(54,45):RETURN
1225 GOSUB 1200 REM * ALLOWS REPRINTING OF HEADING ON
EACH
PAGE OF VIDEO *
1230 FOR X = 1 TO P1-1
1235 IF X/11=INT(X/11) PRINT:INPUT"PRESS ENTER TO CONTI
NUE";Z5:CLS:PRINT:GOSUB 1200
1240 IF R(X)=0 PRINT USING"## ## \
$###,##,##";X;DA(X);S(X);L(X)
1250 IF L(X)=0 PRINT USING"## ## \
$###,##,##";X;DA(X);S(X);R(X)
1260 PRINT:PRINT:INPUT"ENTER 1 TO RETURN TO MENU, 2 TO S
EE YEARLY TOTALS.":Z:IF Z=1 GOTO 100 ELSE 1279
1262 CLS:PRINT:PRINT:PRINT:PRINT"THE FOLLOWING COMPUTES
INCOME TOTALS FOR THE MONTH AND FOR"
1263 PRINT"THE YEAR. THE MONTH'S ENTRIES SHOULD BE COM
PLETE, YOUR PRINTER"
1264 PRINT"READY, AND THE YEARLY TOTALS INPUT FROM DISK
BEFORE CONTINUING."
1265 PRINT:PRINT"TO RETURN TO MENU, TYPE 1, TO CONTINUE
WITH THE COMPUTATION,"
1266 PRINT"TYPE 2.":PRINT:INPUT Z
1267 IF Z=1 GOTO 100
1268 IF Z<>2 GOTO 1262
1270 GOSUB 7000
1279 CLS
1280 PRINT" TOTALS FOR ";M(H);" ";YS;" MONTH
YEAR TO DATE"
1282 PRINT
1285 PRINT"TOTAL EARNED INCOME ";:PRINTUSING"$##
,##,## $###,##,##";ET,ES

```

Program continues

```

1290 PRINT"TOTAL DIVIDENDS          ";:PRINTUSING"500
00,000.00 $0000,000.00";DT,DS
1300 PRINT"TOTAL INTEREST          ";:PRINTUSING"500
00,000.00 $0000,000.00";IT,IS
1310 PRINT"TOTAL ANNUITY FUNDS     ";:PRINTUSING"500
00,000.00 $0000,000.00";AT,AS
1320 PRINT"TOTAL TAX FREE INTEREST ";:PRINTUSING"500
00,000.00 $0000,000.00";TT,TS
1330 PRINT"SOCIAL SECURITY          ";:PRINTUSING"500
00,000.00 $0000,000.00";GT,GS
1340 PRINT"TOTAL LIFE INS. DIV.    ";:PRINTUSING"500
00,000.00 $0000,000.00";FT,FS
1355 PRINT:US="$0000,000.00"
1360 PRINT"TOTAL TAXABLE INCOME TO DATE "":PRIN
TUSINGUS;LS
1370 PRINT"TOTAL NONTAX. INCOME TO DATE "":PRIN
TUSINGUS;RS
1380 PRINT"TOTAL INCOME TO DATE   "":PRIN
TUSINGUS;Q
1390 PRINT:INPUT"PRESS ENTER TO CONTINUE";ZS:GOTO 100
1400 CLS:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT"IF YOUR PR
INTER ISN'T READY, ENTER 1 TO RETURN TO MENU,"
1402 PRINT:INPUT"          OTHERWISE ENTER 2.":Z:IF Z=1
GOTO 100
1405 CLS:LPRINTTAB(32)"INCOME LEDGER FOR ";M(H);" ";YS:
LPRINT""
1410 LPRINTTAB(19)"** DAY SOURCE OF INCOME
TAXABLE NONTAX."
1420 LPRINTTAB(19) STRING$(54,45)
1430 FOR X=1 TO P1-1
1440 IF R(X)=0 LPRINTTAB(19) USING"00 00 %
% $000,000.00";X;DA(X);S(X);L(X)
1450 IF L(X)=0 LPRINTTAB(19) USING"00 00 %
% $000,000.00";X;DA(X);S(X);R(X)
1460 NEXT:LPRINTTAB(19) STRING$(54,45):LPRINT""
1480 LPRINTTAB(19)" TOTALS FOR ";M(H);" ";YS;"
MONTH YEAR TO DATE"
1482 LPRINT""
1485 LPRINTTAB(19)"TOTAL EARNED INCOME "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";ET,ES
1490 LPRINTTAB(19)"TOTAL DIVIDENDS "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";DT,DS
1500 LPRINTTAB(19)"TOTAL INTEREST "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";IT,IS
1510 LPRINTTAB(19)"TOTAL ANNUITY FUNDS "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";AT,AS
1520 LPRINTTAB(19)"TOTAL TAX FREE INTEREST "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";TT,TS
1530 LPRINTTAB(19)"SOCIAL SECURITY "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";GT,GS
1540 LPRINTTAB(19)"TOTAL LIFE INS. DIV. "":LPRINT
TAB(19)USING"$0000,000.00 $0000,000.00";FT,FS
1555 US="$0000,000.00"
1557 LPRINT""
1560 LPRINTTAB(19)"TOTAL TAXABLE INCOME TO DATE
":LPRINTTAB(19)USINGUS;LS
1570 LPRINTTAB(19)"TOTAL NONTAX. INCOME TO DATE
":LPRINTTAB(19)USINGUS;RS
1580 LPRINTTAB(19)"TOTAL INCOME TO DATE
":LPRINTTAB(19)USINGUS;Q
1590 PRINT:INPUT"PRESS ENTER TO CONTINUE";ZS:GOTO100
1600 CLS:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:INPU
T"HAVE YOU SAVED FILES TO DISK (Y/N)";ZS
1610 IF ZS="N" GOTO 100
1620 PRINT:PRINT"OK. SO LONG!";END
1700 PRINT:INPUT"ENTRY ERROR. PRESS ENTER AND TRY AGAI
N.":ZS:GOTO 665
1800 PRINT:INPUT"NO FILE ON DISK. PRESS ENTER.":ZS:GOT
O100
4000 CLS:PRINT:PRINT
4010 PRINT"          PERSONAL INCOME LEDGER":P
RINT
4020 PRINT"1) DISK FILES ARE NAMED AUTOMATICALLY. THE
MONTHLY FILES ARE"
4030 PRINT"JAN, FEB, ETC. THE YEARLY TOTAL FILES ARE J
AN1979, FEB1979,"
4040 PRINT"ETC., AND ACCUMULATE THE FIGURES FOR THE YE
AR TO DATE."
4060 PRINT
4090 PRINT"2) MAKE ENTRIES FOR THE MONTH. SAVE TO DISK
WITH DISK OPTION"
4100 PRINT"#1. BEFORE ADDING ENTRIES FOR THE SAME MONT
H, USE DISK OPTION"
4110 PRINT"#2 TO LOAD THE PREVIOUS ENTRIES."
4130 PRINT:INPUT"PRESS ENTER";ZS:CLS:PRINT:PRINT:PRINT
4140 PRINT"3) UNDER TYPES OF INCOME, THE FIRST FOUR ARE
TAXABLE, THE LAST"
4150 PRINT"FOUR NONTAXABLE AND ARE SO RECORDED BY THE P
ROGRAM."
4160 PRINT"MISCELLANEOUS TYPES SHOULD INCLUDE SUCH THIN
GS AS LOAN"
4170 PRINT"REPAYMENTS, GIFTS, REFUNDS, ETC. MISCELLANE
OUS ITEMS ARE NOT"
4180 PRINT"TOTALLED INTO NONTAXABLE INCOME SINCE THEY DO
N'T REPRESENT"
4190 PRINT"INCOME.":PRINT
4200 PRINT"4) MENU CHOICES 4, 5 AND 6 MAY BE USED DURIN
G PREPARATION OF"
4210 PRINT"MONTHLY FILES."
4220 PRINT:INPUT"PRESS ENTER";ZS:CLS
4230 PRINT:PRINT"5) WHEN A MONTHLY FILE IS COMPLETE, U
SE DISK OPTION"

```

four (CORRECT AN ENTRY), five (DELETE AN ENTRY), or six (SEE A PRINTOUT ON VIDEO) at any time while making these entries. Option four is also useful for checking the income type you have chosen, since it is not printed by either the video or hard copy printouts.

After the month's entries are on disk, disk option four loads the yearly totals from the previous month. Menu option two totals each type of income for the month and the year and displays the results. You can use disk option three to save the totals, menu option six for a complete video printout, and seven for hard copy (see Table 3 for sample).

Changes

Change to cassette data files

will require alterations between lines 240 and 370. Sequential disk files, which are used, are quite similar to cassette files, and use of the Level II Basic Reference Manual should make this change simple.

Taxable items can be changed to nontaxable or vice versa in lines 7000-7070 and 6099-6820. Note that L() and R() collect the taxable and nontaxable items for printing in columns. Refer to the list of variables (Table 4) as necessary.

Miscellaneous entries include loan repayments, refunds, and money from the sale of stocks and bonds. The program doesn't handle capital gains because of their special requirements, but you can type the data on the back of the monthly pages.

```

4240 PRINT"#1 TO SAVE IT TO DISK. NEXT, GET YOUR PRINT
ER READY. IF THIS"
4245 PRINT"RESULTS IN LOSS OF THE PROGRAM AND/OR MONTHL
Y FILE, RELOAD"
4250 PRINT"THEM. THEN USE DISK OPTION #4 TO LOAD THE Y
EARLY TOTAL FILE"
4255 PRINT"AND MENU OPTION #2 FOR COMPUTATIONS. AT THI
S TIME, THE RESULTS"
4260 PRINT"MAY BE CHECKED ON VIDEO (MENU OPTION #6) OR
HARD COPY MADE"
4270 PRINT"(OPTION #7). THE YEARLY TOTAL SHOULD BE SAV
ED TO DISK BEFORE"
4280 PRINT"LEAVING THE PROGRAM."
4290 PRINT
4310 PRINT"6) IT IS DESIRABLE TO KEEP A SET OF FILES ON
A SECOND DISK"
4320 PRINT"FOR BACKUP."
4330 PRINT:PRINT"7) REENTRY TO THE PROGRAM, IF NEEDED,
IS AT LINE 100."
4340 PRINT:INPUT"PRESS ENTER";ZS:CLS:GOTO 40
6000 END
6099 REM * CLASSIFY INCOME AND SEPARATE INTO TAXABLE, L
(X),
AND NONTAXABLE, R(X) *
6100 IF E(X)<>0 PRINT E(X);
6110 PRINT:INPUT"AMOUNT OF EARNED INCOME";E(X)
6120 L(X) = E(X):GOTO 600
6200 IF D(X)<>0 PRINT D(X);
6210 PRINT:INPUT"AMOUNT OF DIVIDEND";D(X)
6220 L(X) = D(X):GOTO 600
6300 IF I(X)<>0 PRINT I(X);
6310 PRINT:INPUT"AMOUNT OF INTEREST";I(X)
6320 L(X) = I(X):GOTO 600
6400 IF A(X)<>0 PRINT A(X);
6410 PRINT:INPUT"AMOUNT OF ANNUITY";A(X)
6420 L(X)=A(X):GOTO 600
6500 IF T(X)<>0 PRINT T(X);
6510 PRINT:INPUT"AMOUNT OF TAX FREE INTEREST";T(X)
6520 R(X)=T(X):GOTO 600
6600 IF G(X)<>0 PRINT G(X);
6610 PRINT:INPUT"AMOUNT OF SOCIAL SECURITY";G(X)
6620 R(X)=G(X):GOTO 600
6700 IF F(X)<>0 PRINT F(X);
6710 PRINT:INPUT"AMOUNT OF LIFE INSURENCE DIVIDEND";F(X)
6720 R(X)=F(X):GOTO 600
6800 IF C(X)<>0 PRINTC(X);
6810 PRINT:INPUT"AMOUNT OF MISCELLANEOUS ITEM";C(X)
6820 R(X)=C(X):GOTO 600
7000 REM * COMPUTATIONS *
7005 FOR X=1 TO P1-1
7010 ET=ET+E(X):DT=DT+D(X):IT=IT+I(X):AT=AT+A(X)
7020 TT=TT+T(X):GT=GT+G(X):FT=FT+F(X)
7025 NEXT
7030 ES=ES+ET:DS=DS+DT:IS=IS+IT:AS=AS+AT
7040 TS=TS+TT:GS=GS+GT:FS=FS+FT
7050 LS=ES+DS+IS+AS
7060 RS=TS+GS+FS
7070 Q=LS+RS
7075 RETURN

```

Games from **BIG FIVE** will
turn your computer into a

TRS-80 HOME ARCADE

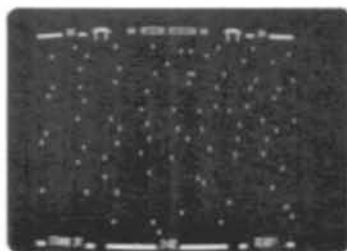
SUPER NOVA[®]



"Huge ASTEROIDS have invaded the galaxy! Your mission is to destroy them and the alien saucers before they destroy you!" *Our #1 top selling game!*

\$14.95 16K Level I or II

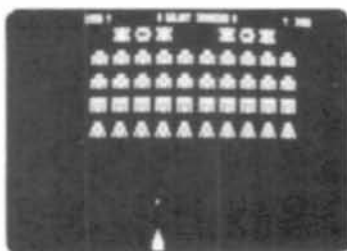
METEOR MISSION[®]



"The second Big Bang has occurred and the galaxy is full of stray meteors and asteroids. Can you survive to dock your ship with the space station?"

\$9.95 4K Level I or II

GALAXY INVASION[®]



The newest and most exciting Invaders-type game yet! Smooth sound effects, sharp graphics, and the "Flagship" alien from Super Nova combine to make this our finest TRS-80 game!

\$14.95 16K Level I or II

BIG FIVE SOFTWARE CO.

P.O. Box 9078-185 • Van Nuys, CA 91409

✓ 357

All games © 1980 by Bill Hogue & Jeff Konyu
TRS-80 is a trademark of Tandy Corp.
When ordering specify Level I or II.
Please add \$1.00 for handling, Calif. res. add 6%
10% discount for two games. All 3 for \$34.00.
Dealer inquiries invited.

SAVE
TRS-80's



TRS-80's

DISCOUNTS of 10%, 15% and More
available.

WE PAY Domestic U.P.S. shipping and
insurance on minimum orders.

NO TAXES are collected on out-of-state
shipments.

TOLL FREE Order Number 800/531-7466.

OPEN 8:00 a.m. to 6:00 p.m., Central
Time, Monday through Friday;
9:00 a.m. to 6:00 p.m., Saturday.

Pan American Electronics

Incorporated

A **Radio Shack**

AUTHORIZED SALES CENTER

✓ 64

1117 CONWAY MISSION, TEXAS 78572

TOLL FREE ORDER NUMBER 800/531-7466

TEXAS AND PRINCIPAL TELEPHONE NUMBER 512/581-2765



This program considers life insurance dividends as nontaxable income, although they are actually premium refunds. You can change this by omitting "+ FS" from line 7060.

Annuity payments can also be modified to record a second earned income by changing the entry name in lines 660, 694, 1310, 1510 and 6410.

The printout is for five and one-half by eight and one-half-inch paper at 12 characters per inch. The printout itself is 54 characters wide with a seven-character margin.

You can narrow the printout by as much as 14 characters by reducing the Source of Income heading from 24 to 10 and removing the same number of spaces from between the percentage signs in lines 1440 and 1450. Abbreviate other terms such as Total Earned Income (line 1485), and decrease the first number in STRING\$(54,45) (lines 1420 and 1460).

To use a 40 column printer, get rid of the margin by removing TAB(7) after each LPRINT.

If you decrease the hard copy width and want your video printout to match, make the same

changes in lines 1200 to 1390.

About the Program

The program asks for the year and month and automatically generates data files. In any month but January, the yearly total file will be from the preceding month.

The program will allow you to return to the menu if you choose a wrong number. If you press the break key and get into BASIC, type GOTO 100 to get back to the menu without losing data files.

Line 240 saves the original file if you accidentally choose SAVE MONTH'S FILE TO DISK instead of LOAD MONTH'S FILE FROM DISK. Without some such safeguard the program could file a string of zeros and erase the original file. Line 299 gives a similar safeguard for SAVE YEARLY TOTALS TO DATE.

An ON ERROR GOTO prevents data loss if you choose LOAD MONTH'S FILE FROM DISK when there is no such file or pick LOAD YEARLY TOTALS.

Using TRSDOS 2.2 or 2.3 instead of NEWDOS and without the ON ERROR protection, the above causes the program to be

Y\$	Year
V\$	Yearly file name
M()	String, name of month
H	Number of month
DA()	Day of month
S()	String, source of income
E(),ET,ES	Earned income, monthly total, yearly total
D(),DT,DS	Dividends, monthly total, yearly total
I(),IT,IS	Interest
A(),AT,AS	Annuity
T(),TT,TS	Tax free interest
G(),GT,GS	Social Security
F(),FT,FS	Life insurance dividend
C()	Miscellaneous items
L()	All taxable items
LS	Total taxable income to date
R()	All nontaxable items
RS	Total nontaxable income to date
O	Total income to date
U\$	Formatter
X	File counter
B,J,K,Z	Counters and null
P1	Number of items plus one (99 to end entries)

Table 4. Variables for Ledger Program

booted out to BASIC rather than to DOS. If that should happen, the files can easily be saved by typing GOTO 100. The protection, however, works the same with TRSDOS as with NEWDOS.

In regard to disk space, none of my summary data has taken

up more than one gran. Since the program requires nine gran, the total disk space, including the program, for a year comes to 32 gran and fits nicely onto one disk. Using hard copy, the same disk can be used year after year. ■

##	DAY	SOURCE OF INCOME	TAXABLE	NONTAX.
1	1	TIAA	\$ 225.68	
2	1	IA PS	\$ 153.00	
3	3	NW PS	\$ 212.50	
4	3	SS (PD TO BANK)		\$ 418.10
5	3	MASS MUT DIV		\$ 33.15
6	5	GAS SERV	\$ 160.00	
7	10	NE INV TRUST	\$ 178.52	
8	10	TEXACO	\$ 50.00	
9	15	OMAHA NAT'L CORP	\$ 225.00	
10	15	MUNI INV TRUST		\$ 58.10
11	15	TESORO	\$ 108.00	
12	17	CORP INC FUND	\$ 35.05	
13	21	KC P & L	\$ 256.00	
14	29	JAPAN FUND	\$ 15.00	

TOTALS FOR MAR 1979			MONTH	YEAR TO DATE
TOTAL EARNED INCOME			\$ 0.00	\$ 0.00
TOTAL DIVIDENDS			\$ 1,393.07	\$ 1,740.12
TOTAL INTEREST			\$ 0.00	\$ 0.00
TOTAL ANNUITY FUNDS			\$ 225.68	\$ 677.04
TOTAL TAX FREE INTEREST			\$ 58.10	\$ 495.10
SOCIAL SECURITY			\$ 418.10	\$ 1,254.30
TOTAL LIFE INS. DIV.			\$ 33.15	\$ 99.67
TOTAL TAXABLE INCOME TO DATE			\$ 2,417.16	
TOTAL NONTAX. INCOME TO DATE			\$ 1,849.07	
TOTAL INCOME TO DATE			\$ 4,266.23	

Table 3. Income Ledger for Mar 1979

MORE FROM MANHATTAN

APPLICATIONS

CALCULATOR PLUS makes your TRS-80 a printing calculator, or an excellent on-screen calculator without a printer. Chain and mixed calculations, memories for answer storage or calculations with constants. On-screen or printed review of long add-and-subtract operations. Optional dollar format. MPC-1 \$9.95

CHECKBOOK PLUS solves the problem of monthly bank statement reconciliation, without cumbersome tape record-keeping. Just do your checkbook once a month and let Checkbook Plus handle all the details and find the errors. MCB-1 \$9.95

CALCULATOR & CHECKBOOK PLUS on one cassette MC-2 \$14.95

THE LISTMAKER Powerful, versatile program allows entry of 400 names or items, with codes, in 16k. Lists by code on-screen or to printer. Sorts, provides editing of entry or code, dumping, loading lists. Pull any category from list in seconds. MLM-1 \$9.95

DIVERSIONS

GIN RUMMY 2.0 plays a strong game, good enough to challenge an expert player. Plays a full regulation game, keeps score to game and changes strategy to counter opponent's play. A program you'll enjoy playing against and trying to beat. MGR-1 \$14.95

LABYRINTH RUN A fast action game, racing through sharp turns, slaloms and narrowing passages. Set a record time—or hit a wall and you're out. Each labyrinth has Sprint and Full courses, with three levels of skill. A fascinating test of coordination and skill. High speed graphics. MLR-1 \$9.95

E.S.P. LAB Based on the famous Duke University experiments. The computer selects symbols at random to display on the screen for E.S.P. trials. Analyzes trial results for direct telepathy, precognition, postcognition. Special tests for precognition and telekinesis. Machine-language graphics. MTL-1 \$9.95

MANHATTAN SOFTWARE, Inc. 90
P.O. Box 5200 Grand Central Station
New York City, New York 10017

A real time waster.

Delay Loop

Allan S. Joffe
1005 Twining Road
Dresher, PA 19025

The Zero Flag

Consider Listing 1, loaded using T-BUG.

The C2 instruction in memory location is a JPNZ,NN which signals the computer that if the comparison of the contents of the D and A registers is not zero that it should go back to the location specified by the NN which in our case is 4A02. This is the location of the decrement instruction.

One thing that this routine does not take into account is that when decrementing a single register, the zero flag is operative. (This is not true when we come to the case of decrementing a pair of registers.)

You notice that to continue the decrementing process, we had to tell the program to go back to a specific location. This means that if you did not load the program into the memory locations specified, you would have had to change the return

If you've ventured into the world of assembly programming you'll eventually need a delay or timing loop. Though there is no "best way" to delay a program, we can explore various methods.

Basically a time delay loads a value into a register (or values into a pair of registers) and then decrements this value to zero. This means we also need a mechanism that tells the computer when it has decremented the initial value to zero, so that it can continue the program.

4A00	16	Load register D with N (value to decrement)
4A01	FF	Hex for 255
4A02	15	Decrement value in D register
4A03	3E	Load the A register with zero... this is
4A04	00	the test value to show loop is done
4A05	BA	Compare value in D with value in A
4A06	C2	If this test shows A and D both zero the
4A07	02	loop is finished. If not pgm goes to 4A02
4A08	4A	and continues decrementing value in D
4A09	C3	When decrement is finished the program
4A0A	80	returns to T-BUG which is at 4380.
4A0B	43	

Listing 1.

FF	-1
FE	-2
FD	-3
FC	-4
FB	-5
FA	-6
F9	-7
F8	-8
F7	-9
F6	-10
F5	-11
F4	-12
F3	-13
F2	-14
F1	-15
F0	-16

Table 1.
Minus Relative Jump Values
(twos complement form)

locations in 4A07 and 4A08.

In Listing 2 we will use a relative jump instruction that obviates the need for such changes. This allows the program to relocate, for with the relative jump, the computer knows where it should go even if you change the origin of the routine.

In this listing I've introduced the mnemonic form of the instruction.

This listing is considerably shorter than the first one for

4A00	16	LD D,N
4A01	FF	
4A02	15	DEC D
4A03	20	JRNZ
4A04	FD	
4A05	C3	
4A06	80	
4A07	43	

Listing 2.

several reasons. One is that the first example is used to illustrate the idea of comparing the contents of one register with another to determine when the zero condition is reached. The first listing tells the program where to go if the zero condition has not been reached. This takes three locations, while the new method uses but two locations in memory.

The jump relative instruction in location 4A03 works in conjunction with the FD information in location 4A04. We know that to make the loop decrement we have to keep returning to location 4A02. Location 4A02 is three steps back from location 4A04, counting location 4A04 as step one. You have signaled the computer that this is what you want by inserting FD.

What is the significance of FD? It is a minus three in twos complement form. If you had needed a relative jump of minus seven, then the FD would have become F9. Table 1 shows the relative jump values from minus one to minus 16.

The absolute delays produced by the simple timing loop using a single register is just about maximum when the register initial value is FF (255 decimal). I say "just about" because if the initial value in the register is 00, then you have 256 iterations of the loop, because the first decrement takes you from 00 to FF.

This is a bone for the nit-pickers in the group.

Longer Delays

If we need longer delays, we can insert another identical loop after the first one, but there is another route to travel. This method decrements a pair of registers. If one register can be packed with FF, then two registers can be packed with FFFF.

Remember, if we use a pair of registers we will have to resort to some sort of a compare operation as with Listing 1, because when you decrement a pair of registers, the zero flag is not automatically working in your behalf. Thus we need some program steps to get the zero flag back from vacation.

Since the idea of the jump relative code seems to have merit we will go that route as well. When possible, I like to use the BC register pair for decrementing. BC seems to shout out "byte counter" and is, for me, a memory jogger.

Running Listing 3, you notice that it takes more time before the program returns to T-BUG.

4A00	01	LD BC,NN
4A01	FF	
4A02	FF	
4A03	0B	DEC BC
4A04	78	LD A,B
4A05	BO	OR B
4A06	B1	OR C
4A07	20	JRNZ
4A08	FA	
4A09	C3	
4A0A	80	
4A0B	43	

Listing 3. Decrementing the BC register pair.

This tells us that we have achieved a much longer delay than when decrementing the contents of a single register. The delay is in the neighborhood of 1.1 seconds.

The listing also uses the OR function, which is why we had to do what we did in memory location 4A04.

To operate any of the logic functions, you have to call on the services of the A register.

The jump relative figure in location 4A08 is equal to minus six (see Table 1), the proper

value to get back to location 4A03, which contains the DEC BC instruction.

The above is but one viable routine, not the only one.

The Interrupt

Now let us get down to the business of combining a single register decrement and the register pair decrement to achieve significantly longer time delays. The game plan is to interrupt the decrement of the register pair while a single register decrements to zero. BC is the register pair in Listing 4 and the D register is used as the interrupt register.

When you load Listing 4 and RUN, be prepared to sit back for two minutes and 32 seconds before it returns you to T-BUG. The key element of the time delay is the value in location 4A05, the value being decremented in the D register.

If you change this value from FF to AA, then the delay time becomes one minute and 43 seconds. If it is changed to 64,

then the time delay is one minute and one second. Changing this value to OA is going to give you a total time delay of about eight seconds. Thus this delay routine is quite flexible and should satisfy all but the most unusual needs.

You will get the most good out of this exercise if you use the Breakpoint of T-BUG to examine the program at various points. ■

4A00	01	LD BC,NN
4A01	FF	
4A02	FF	
4A03	0B	DEC BC
4A04	16	LD D,N
4A05	FF	
4A06	15	DEC D
4A07	20	JRNZ
4A08	FD	
4A09	78	LD A,B
4A0A	BO	OR B
4A0B	B1	OR C
4A0C	20	JRNZ
4A0D	F5	
4A0E	C3	
4A0F	80	
4A10	43	

Listing 4.



CalData Systems 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 create "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 \$26. (Cal. Res. add tax.)

CalData Systems



P.O. Box 178446

San Diego, CA 92117 (714) 272-2661

STOCK CHECKS & STATEMENTS

NOW YOU CAN GET THE QUALITY IMPRINTED FORMS CERTAIN TO ENHANCE YOUR PROFESSIONAL IMAGE. THERE'S NO NEED TO RE-FORMAT — ORDER THE FORMS DESIGNED TO FIT YOUR SOFTWARE.

• RADIO SHACK* • OSBORNE • TCS • MANY OTHERS.

PEACHTREE •

THE BEST CHOICE FOR TRS-80* USERS!

SEND FOR YOUR FREE SAMPLES TODAY!

Check To-Go

***Competitive prices**
***Minimum orders of 500**
***9 day RUSH delivery available**
***Conscientious, reliable service**
***Factory direct**

46

8384 Hercules, P.O. Box 425, La Mesa, CA 92041 (714) 460-4975

*Registered trademark of the Tandy Corp.

A graphics generator with emphasis on aesthetics.

Divine Proportions

David R. Cecil
Texas A&I University
Kingsville, TX 78363

Have you ever wondered about the size and shape of things, why paintings, books and cards have the dimensions they do?

The programs included with this article are designed to help

readers explore aesthetics. The programs generate rectangles, ellipses and boxes. Decide which ratio of adjacent sides—minor to major axis—presents the most pleasing figure to you.

Diminishing Ratios

The programs generate figures of any size within bounds of the video display. The figures will then sequentially shorten one or more sides. Using the square as an example, it becomes a rectangle, then a smaller rectangle and so on with the ratio of width to length going from 1:1 to 0:1. As the video pauses between changes, any

key can be pressed to read the current width to length ratio from the screen.

If preferences for this ratio were randomly distributed, there wouldn't be much point to this experiment. The interesting and remarkable fact is that most people prefer the same width to length ratio. This preference falls into a fairly narrow range centered at 0.618.

Studies as far back as 1876 by G. T. Fechner in Germany confirm this attraction. He found a definite preference at 0.62 and most results in the range 0.57 to 0.67.

An aesthetic preference for 0.618 (actually $2/(1+\sqrt{5})$) was known even before the time of Pythagoras. Its reciprocal is of fundamental importance.

Called the golden ratio or divine proportion, it appears in many and diverse ways throughout mathematics, nature, art and architecture. This golden ratio is an irrational number 1.61803398 and is often expressed algebraically as $a:b = b:(a+b)$. The number is also known as Φ , taken from the first letter of the name of Phidias, the Greek sculptor and planner under Pericles, who utilized the golden ratio in his work.

```

0 REM PROGRAM TO DRAW SUCESSIVELY SMALLER RECTANGLES
1 REM BY DAVID R. CECIL
2 REM A SQUARE IS FORMED FIRST
3 REM IF THE SCALE FACTOR IS ONE THEN THE SQUARE
4 REM IS APPROX. 14.4 CM. PER SIDE
10 INPUT " SCALE FACTOR BETWEEN 0 AND 1";N
20 INPUT " T (FOR TOP) OR L (FOR LEFT)";V$:CLS
21 REM T DENOTES THAT THE TOP IS APPROACHING THE BOTTOM
22 REM (THE HORIZONTAL DIM. IS DECREASING), WHILE
23 REM L DENOTES THE LEFT APPROACHING THE RIGHT (THE
24 REM VERTICAL DIM. IS DECREASING)
30 X1=20+90*N;Y1=41-40*N
35 REM FORM THE TOP LINE FROM (20,Y1) TO (X1,Y1)
40 FOR X=20 TO X1
50 SET(X,Y1):NEXT X
55 REM FORM THE RIGHT SIDE FROM (X1,Y1) TO (X1,40)
60 FOR Y=Y1 TO 40
70 SET(X1,Y):NEXT Y
75 REM FORM THE BOTTOM FROM (X1,40) TO (20,40)
80 FOR X=X1 TO 20 STEP -1
90 SET(X,40):NEXT X
95 REM FORM THE LEFT SIDE FROM (20,40) TO (20,Y1)
100 FOR Y=40 TO Y1 STEP -1
110 SET(20,Y):NEXT Y
120 GOSUB 300
125 REM LINES 140 TO 210 RE USED FOR CHANGING THE TOP,
126 REM WHILE LINES 220 TO 290 ARE FOR CHANGING THE LEFT
    T SIDE
130 IF V$="L" THEN 220
135 REM ERASE TOP LINE
140 FOR Y=Y1 TO 40
150 FOR X=20 TO X1
160 RESET(X,Y):NEXT X
165 REM FORM NEW TOP LINE 1 LINE BELOW OLD TOP LINE
170 FOR X=20 TO X1
180 SET(X,Y+1):NEXT X
190 GOSUB 300
200 NEXT Y
210 END
215 REM ERASE LEFT LINE
220 FOR X=20 TO X1
230 FOR Y=Y1 TO 41
240 RESET(X,Y):NEXT Y
245 REM FORM NEW LEFT LINE 1 LINE TO RIGHT OF OLD LEFT
    LINE
250 FOR Y=Y1 TO 40
260 SET(X+1,Y):NEXT Y
270 GOSUB 300
280 NEXT X
290 END
291 REM SUBROUTINE 300 PRODUCES A PAUSE AND ALLOWS YOU
292 REM TO READ, BY PRESSING ANY KEY, THE RATIO OF
293 REM SHORTER SIDE TO LONGER SIDE
300 FOR I=1 TO 300
310 IF INKEY$="" THEN 340
320 IF V$="L" THEN PRINT#950,(X1-X)/(90*N);:GOTO 340
330 PRINT#950,(40-Y)/(40*N);
340 NEXT I
350 RETURN

```

Program Listing 1. The Square

The Divine Proportion by H. E. Huntley and *The Geometry of Art and Life* by M. Ghyka have numerous examples of the occurrence of the golden ratio; such as multiple reflections of light, arrangement of leaves on plants, the musical chromatic scale, the great pyramid, the human figure, dynamic symmetry, and on and on. (Both books are published by Dover Books.)

Take a look at the computer programs. The first one generates a square of any desired size. Then, having asked wheth-

er to shorten the vertical or the horizontal dimension, it proceeds to do so.

Note that the ratios given on the screen are approximations. Pixels are not square and scale factors are used in evaluating each ratio. If the lengths of lines are measured directly on the video screen, the ratios obtained may differ slightly from those of the program.

The second program generates nine ellipses, pausing after each one. The major axis stays constant and may be designated horizontal or vertical. Use

the break key to terminate this program.

Most people prefer an ellipse with a minor to major ratio in the range .57 to .67. The 5.4 value used in line 90 can be changed to something a bit smaller (such as 5.1) to shorten the horizontal width. If it is made higher (such as 5.6), the horizontal dimension is lengthened. Keep this in mind if you find that the ratios are not quite true in the video representation.

Changing the 90 in step 60 to a smaller value will display fewer points (try 45), while more points will be displayed for values larger than 90 (such as 180). The program will only display one ellipse at a time, if 60 is changed to 50 in line 170.

To generate other ellipses, change line 190. Be sure all data values are less than 10 so that the ellipse does not exceed the size of the video screen.

The Parallelepiped

The last program generates a

box (rectangular parallelepiped) with square front and back. The top is gradually lowered. Ratios of vertical to horizontal and slant (depth) to the vertical dimension are given.

Fig. 1 should be used in conjunction with Program Listing 3. The numbers in the program's REM statements refer to lines of the box represented in the figure.

Preferences for box sizes are not nearly as pronounced as for the rectangle, but four of the more interesting box dimensions are:

- $1, \phi, \phi$ —used for the Golden Chamber containing the tomb of Rameses IV.

- $1, 1, \phi$ —found for the volume of a stool of Tutankhamen's tomb.

- $1, \phi, \phi^2$ —called the "Golden Solid" and often used for Egyptian tombs.

- $1, \phi^2, \phi^3$ —found to be the volume in many pieces of furniture of the Queen Anne and Chippendale styles. ■

```

18 INPUT"ENTER SCALE FACTOR BETWEEN 0 AND .865";N
20 X1=20+90*N:X2=(X1-20)/3
30 Y1=41-40*N:Y2=(40-Y1)*(4/21):CLS
35 REM DRAW FRONT TOP LINE 1
40 FOR X=20 TO X1
50 SET(X,Y1):NEXT X
55 REM DRAW FRONT RIGHT SIDE 2
60 FOR Y=Y1 TO 40
70 SET(X1,Y):NEXT Y
75 REM DRAW FRONT BOTTOM LINE 3
80 FOR X=X1 TO 20 STEP -1
90 SET(X,40):NEXT X
95 REM DRAW FRONT LEFT SIDE 4
100 FOR Y=40 TO Y1 STEP -1
110 SET(20,Y):NEXT Y
115 REM DRAW RIGHT TOP LINE 5
120 FOR X=X1 TO X1+X2
130 SET(X,Y1-(Y2/X2)*(X-X1)):NEXT X
135 REM DRAW RIGHT BACK VERTICAL LINE 6
140 FOR Y=Y1-Y2 TO 40-Y2
150 SET(X1+X2,Y):NEXT Y
155 REM DRAW RIGHT BOTTOM LINE 7
160 FOR X=X1+X2 TO X1 STEP -1
170 SET(X,40-(Y2/X2)*(X-X1)):NEXT X
175 REM DRAW LEFT TOP LINE 8
180 FOR X=20 TO 20+X2
190 SET(X,Y1-(Y2/X2)*(X-20)):NEXT X
195 REM DRAW BACK TOP LINE 9
200 FOR X=20+X2 TO X1+X2
210 SET(X,Y1-Y2):NEXT X
215 REM DRAW LEFT BACK VERTICAL LINE 10
220 FOR Y=Y1-Y2 TO 40-Y2 STEP 2
230 SET(20+X2,Y):NEXT Y
235 REM DRAW BACK BOTTOM LINE 11
240 FOR X=20+X2 TO X1+X2 STEP 2
250 SET(X,40-Y2):NEXT X
255 REM DRAW LEFT BOTTOM LINE 12
260 FOR X=20 TO 20+X2 STEP 2
270 SET(X,40-(Y2/X2)*(X-20)):NEXT X
272 FOR Z=1 TO 300:NEXT Z
275 REM LOWER THE FRONT TOP LINE 1
280 FOR X=20 TO X1
290 RESET(X,Y1):SET(X,Y1+1):NEXT X
295 REM LOWER RIGHT TOP LINE 5
300 FOR X=X1 TO X1+X2
310 RESET(X,Y1-(Y2/X2)*(X-X1))
320 SET(X,1+Y1-(Y2/X2)*(X-X1)):NEXT X
325 REM LOWER BACK TOP LINE 9
330 FOR X=X1+X2 TO 20+X2 STEP -1
340 RESET(X,Y1-Y2):SET(X,Y1-Y2+1):NEXT X
345 REM LOWER LEFT TOP LINE 8
350 FOR X=20+X2 TO 20 STEP -1
360 RESET(X,Y1-(Y2/X2)*(X-20))
370 SET(X,1+Y1-(Y2/X2)*(X-20)):NEXT X
375 REM REDRAW TOP PART OF LEFT BACK VERTICAL LINE 10
380 FOR Y=Y1 TO Y1-Y2+2 STEP -1
390 RESET(20+X2,Y):NEXT Y
400 FOR Y=Y1 TO Y1-Y2+1 STEP -2
410 SET(20+X2,Y):NEXT Y
415 REM ROUTINE TO PRINT RATIOS IF DESIRED
420 FOR I=1 TO 300
430 IF INKEY$="" THEN 450
440 PRINT#950,(40-Y1)/(40*N);SQR(X2[2+Y2[2]/(40-Y1)]/1.9
5;
450 NEXT I
460 Y1=Y1+1
470 IF Y1<40-Y2 THEN 280 ELSE STOP

```

Program Listing 2. The Ellipse

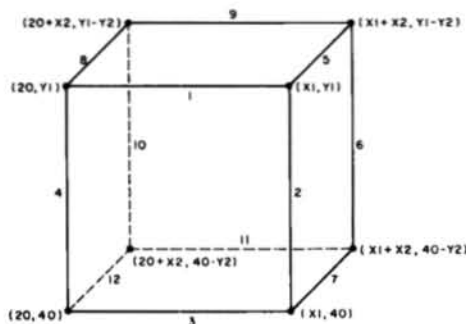


Fig. 1

```

0 ON ERROR GOTO 200
10 PRINT"CHOOSE SCALE FACTOR BETWEEN 0 AND 1":INPUT N
20 W=10*N:A=W:B=W
30 PI=3.14159:WW=10
40 PRINT"INPUT H FOR CONSTANT LENGTH MAJOR AXIS TO BE H
    ORIZONTAL,V FOR CONSTANT LENGTH MAJOR AXI
    S":INPUT DS
50 CLS
60 FOR I=0 TO 2*PI STEP 2*PI/90
70 IF DS="" THEN A=W ELSE B=W
80 X1=A*COS(I):Y1=B*SIN(I)
90 X=65+5.4*X1
100 Y=23-2.3*Y1
110 SET(X,Y)
120 NEXT I
130 FOR P=1 TO 300
140 IF INKEY$="" THEN 160
150 PRINT#59,WV/10;
160 NEXT P
170 READ WV:W=WW*N:GOTO 60
180 GOTO 100
190 DATA 8.3,8,7.5,6.7,6.2,5.7,5,4
200 RESUME 100

```

Program Listing 3. The Box

The Micromatic 80, a step ahead for your TRS-80™ and other microprocessors.



The Micromatic 80 is a TTL based interface unit designed to integrate the popular Radio Shack TRS-80®, and many other processors with parallel Centronics™ compatible output, to the IBM manufactured Selectric™ terminal.

- Used IBM Selectric terminals are cleaned and functionally checked before shipping.
- 90 day warranty on interface only.
- No software required.
- \$795. plus \$25. for shipping and handling.
- TRS-80 to Centronics cable \$29.00.
- Mail or phone orders accepted.
- Certified Check, Money Order.



Write or call for Free Brochure

(317) 299-8614

The MICROMATIC Corporation

5747 W. 85th Street • Indianapolis, Indiana 46278

✓ 425

TRS 80

TRS-80 Model I



699

Level II 16K. 26-1056

MODEL 3
call today!

Model II



\$3499

64K, 1-Disk TRS-80
Model II System

We accept check, money order or phone orders with Visa or Master Charge. (Shipping costs added to charge orders).



Computers Unlimited

1524 OAK HARBOR ROAD, FREMONT, OHIO 43420

419-332-4881

✓ 321 Collect

TRS-80 is a Trademark of Tandy Corp.



--frq:-- LEVEL II

SOUND STX

REAL TIME DISPLAY OF SOUND INPUT WITH RECORDER MIKE
MACHINE LANGUAGE PROGRAM LISTING OF LESS THAN 100 BYTES
FULL LOUDNESS DEPTH FROM UNMODIFIED '80 WITH CTR-41 RECORDER
DISPLAY MOVES TO MUSIC OR VOICE FOR EXPERIMENTS OR LAZY VIEWING SEND 6.00 CK OR MO WITH STAMPED SELF AD-DRESSED ENVELOPE TO

EDF ✓ 359

BOX 3054
BRANFORD CT.
06405



Earn an
EXTRA
Income
with your TRS-80*

Everyone is feeling the bite of inflation but some TRS-80 owners have found a way to ease the pain. Some are making a few hundred extra dollars and a few are making thousands of dollars in their spare time. Our booklet "Money Making Ideas for the TRS-80" is a collection of these money making methods, along with program sources, program hints, getting started suggestions and pit-falls to avoid. Send \$9.95 to:

J&R Electronics

P.O. Box 492 ✓ 398

Crystal City, MO 63019

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

Write a moving story.

Walking Words

Hubert C. Borrmann
2840 South Circle Dr. #209
Colorado Springs, CO 80906

The value of whatever key has been pressed will be returned to the main program in S6\$; and S1\$ will not be destroyed at exit.

Pressed for Space

There are several comments in the subroutine which you may leave out if pressed for space, but the comments are in fact very handy in any subroutine. The subroutine will shorten messages to 58 positions and will insert one period in front of the message, and two periods at the end. This will make it appear as an unbroken band. The time delay after each execution of the print instruction may be changed in line 10180.

Entry point 10000 will print the message on the bottom line, while entry point 10100 or 10110 bypasses loading the SA. These lines assume that SA was loaded in the main program with the starting address.

Line 10110 fills the "background" with periods. The next three lines adjust the length, determine the highest print position on the line for centering and insert the periods in the message variable.

Line 10150 resets several variables so that S4\$ extracts the characters to be printed out of S1\$ until S4\$ is equal to S1\$. On every pass the effective print position is advanced by one.

S3, which points to position 1 in S1\$, remains one. S2 indicates the number of positions to be extracted and is increased

by one on each pass.

After the complete message appears on the screen (S7 = S9), the length of S4\$ is reduced by one on each pass, controlled by S2.

S3 is increased by one each pass, so that S4\$ extracts the second to the last character out of S1\$. Then the third to the last is extracted etc., until its length is zero. The effective print position remains unchanged.

The program then branches to 10150 and the process is repeated until the test of S6\$ indicates a key or space is depressed. The print line is reset to spaces and the periods are removed from S1\$. This allows a subsequent GOSUB without reloading S1\$.

At this point the subroutine then returns to the main program. I find this routine quite handy, and you might, too. ■

The subroutine described here moves several instructions, or a message, across the TRS-80 screen from right to left, and repeats until any key is pressed. It shortens messages to 58 positions and inserts one period in front of the message and two periods at the end to show messages as unbroken bands.

To use the subroutine, a message is placed in variable S1\$. The variable is linked to the subroutine as follows:

```
100 S1$="TYPE 'SPACE' WHEN
READY"
110 GOSUB 10000.
```

This will move your message on the bottom line from right to left and repeat it. Should you desire to have the message move on another line, place the beginning address of this line into variable SA and link to entry point 10100, as follows:

```
100 S1$="TYPE 'SPACE' WHEN
READY"
110 SA = 512
120 GOSUB 10100.
```

```
10 CLEAR 200 : CLS
20 PRINT@ 128,"INSTRUCTIONS # 1"
30 S1$="PRESS 'SPACE' WHEN READY"
40 GOSUB 10000
50 CLS : PRINT@ 512,"INSTRUCTIONS # 2"
60 SA=640
70 GOSUB 10100
80 CLS : PRINT@ 0,"AND MORE INSTRUCTIONS"
90 S1$="TYPE 'SPACE'-BAR TO CONTINUE, 'E' TO END"
100 GOSUB 10000
110 IF S6$="E" THEN END ELSE 20
10000 SA=960:GOTO 10110 'MOVING-BAND-SUBROUTINE
10010 ' AT ENTRY S1$ CONTAINS THE MESSAGE, UP TO 58 CHARACTERS
10020 ' AT EXIT S6$ CONTAINS VALUE OF DEPRESSED KEY
10030 ' OTHER : S2 = LENGTH OF MESSAGE TO BE DISPLAYED
10040 ' VARIABLES : S3 = STARTING POSITION IN STRING
10050 ' : S4$ = WORKING STRING
10060 ' : S5 = HIGHEST PRINT ADDRESS ON SCREEN
N
10070 ' : S7 = WORK VARIABLE
10080 ' : S8 = "
10090 ' : S9 = LENGTH OF S1$
10100 ' : SA = START ADDRESS OF LINE ON SCREEN
N
10110 PRINT@ SA,STRING$(63,".");
10120 S2=LEN(S1$) : IF S2 > 58 THEN S2=58
10130 S5=INT((SA+(64-S2)/2)+S2)
10140 S4$=MID$(S1$,1,S2) : S1$="."+S4$+".."
10150 S7=0 : S9=LEN(S1$) : S2=S9 : S3=1
10160 IF S2=> S7 THEN S2 = S7+1
10170 S4$=MID$(S1$,S3,S2)
10180 PRINT@S5-S7,S4$ : FOR S8=1 TO 15 : NEXT S8
10190 S6$=INKEY$ : IF S6$ <> "" THEN 10230
10200 IF S7=S9 THEN 10220
10210 S7=S7+1 : IF S7 < S9 THEN 10160
10220 S2=S2-1 : S3 = S3+1 : IF S2 < 0 THEN 10150 ELSE 10160
10230 PRINT@ SA,STRING$(63," "); : S1$=MID$(S1$,2,LEN(S1$)-3)
10240 RETURN ' END OF THIS SUBROUTINE
```

Program Listing

A supermarketing program for creatures of impulse.

Mind Your A's & P's

Lois L. Leonard
12733 Stone Canyon Rd.
Poway, CA 92064

Ah, the joys of grocery shopping! Your delight at finding the local social club is meeting in the aisles of your store. The rapture when you realize the next item on your list is on the other side of the market. The treasure hunt to locate where they hide capers.

If that's how you feel about grocery shopping, maybe this article is not for you. This program produces a grocery list that leads you past aisles that contain nothing you need — preventing your buying all those nifty impulse items — and gets you to the check-out counter quickly, saving both time, steps and money.

Groceries Are Data

The program, written on a 16K TRS-80, loads in 7K and runs in over 10K. It requires a printer and a light pen, but can be easily

re-written for keyboard input. The light pen is a simple device that plugs into the tape recorder input port in the back of the keyboard. My pen is from Oasis System and the routine in this program is taken from their instruction manual.

The DATA statements are groceries listed by aisle number. Unless you have the same store layout, a trip to the store with pen and paper is in order. On the same trip study how you shop. Do you like to start at one end or the other?

List each aisle and beneath these headings list the items

you normally use. Leave a blank for novelty foods and rarely purchased items.

If there are a large assortment of items normally purchased on one aisle, make each side a sub-category. For example, see Aisle 11 in the program.

The data for each heading is laid out beginning with an asterisk. The second and third characters are the number of items in the aisle. The remaining characters name the aisle. If an item is dropped or added, the number of items in the list must be changed. Also, an "end" must be used, and it must be counted

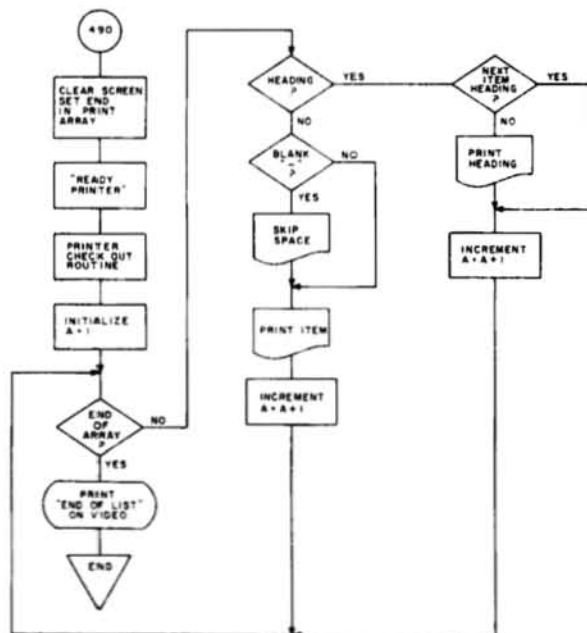


Fig. 1. Printer Routine

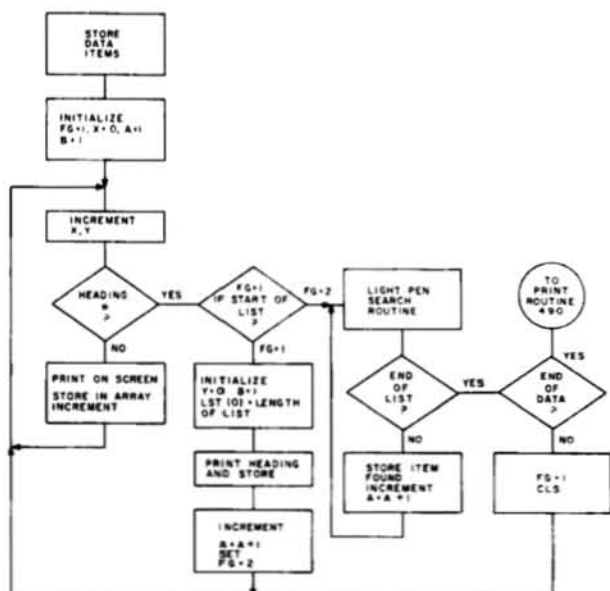


Fig. 2. Grocery List by Light Pen

as an item.

The program is set up with a maximum of 20 items per aisle. More than 20 slows down the light pen search. If the program is to be rewritten for keyboard input, items would be limited only by your screen space.

On items that need further explanation put "—" in front of them. Examples of this are "—Jello", "—spices", "—jelly". There are too many

varieties of spices to list separately. When "—spice" is chosen, the printer skips a line before the item and leaves you room to write the name of the spice.

Some of the benefits of this program surprised me. On my first test trip, I was able to do my ordinary shopping minus one-half hour of time. After using it for a month, I found I was buying fewer impulse items. ■

Program Listing

```
10 REM          GROCERY LIST USING THE LIGHT
11 REM          PEN
20 REM          WRITTEN BY LOIS L. LEONARD
30 REM          SEPTEMBER 1979
40 REM
50 DIM LT(25),LTS(350),STS(350),LST(40),LSTS(40)
55 REM
60 REM          READ DATA STATEMENTS INTO
        ARRAYS
70 REM
75 CLS:PRINT# 466,"LOADING DATA"
76 FOR Y = 1 TO 20:READ LT(Y):NEXT Y
80 FOR X = 1 TO 350
100 READ LTS(X)
105 IF LTS(X)="*END" THEN GOTO 130
110 NEXT X
130 X=0:A=1:FG=1:B=1
140 REM
150 REM          PRINT ARRAYS AND TEST FOR
        HEADING
160 REM
165 CLS
170 X=X+1:Y=Y+1
180 IF LEFT$(LTS(X),1)="" THEN GOTO 260
190 PRINT# LT(Y)+4,LTS(X);
195 LST(B)=LT(Y):LSTS(B)=LTS(X):B=B+1
200 GOTO 170
220 REM
230 REM          HEADING ROUTINE
240 REM
260 IF FG=2 THEN GOTO 360
265 C=LEN(LTS(X)):Y=0
270 PRINT# 20, RIGHT$(LTS(X),C-3)
280 J15=MID$(LTS(X),2,2)
282 LST(0)=VAL(J15)
285 B=1
290 STS(A)=LTS(X)
300 A=A+1
310 FG=2
320 GOTO 170
330 REM
340 REM          LIGHT PEN SEARCH
350 REM
360 GOSUB 9100
370 IF LST$(SCAN)<"*END" GOTO 430
375 IF LTS(X)="*END" THEN GOTO 490
380 FG=1
385 CLS
390 GOTO 180
400 REM
410 REM          STORE ITEM FOUND
420 REM
430 STS(A)=LST$(SCAN)
440 A=A+1
450 GOTO 360
460 REM
470 REM          PRINT OUT GROCERY LIST
480 REM
490 CLS
495 STS(A)="*END"
500 PRINT"READY PRINTER"
510 PRINT"HIT ENTER WHEN READY"
520 AS=INKEY$: IF AS="" THEN 520
530 A=PEEK(14312) : 'PRINTER CHECK OUT ROU
        TIME
540 IF A=63 GOTO 600
550 IF A=255 PRINT"PRINTER IS TURNED OFF":GOTO500
560 IF A=223 PRINT"YOU HAVE A PAPER PROBLEM":GOTO 500
600 A=1
610 IF STS(A)="*END" THEN PRINT "END OF LIST":END
620 IF LEFT$(STS(A),1)="" GOTO 660
625 IF LEFT$(STS(A),1)="-" THEN LPRINT " ": 'ALLOWS SPACE
        TO WRITE
630 LPRINT STS(A)
640 A=A+1
```

```
650 GOTO 610
660 IF LEFT$(STS(A+1),1)="" GOTO 700
670 C=LEN(STS(A))
680 LPRINT TAB(5) RIGHT$(STS(A),C-3)
700 A=A+1
710 GOTO 610
9000 OUT 255,0
9010 FOR Z=0 TO 6:NEXT Z
9020 LP=(INP(255) AND 128)
9030 RETURN
9100 REM          MAGIC LIGHT PEN S
        UBRoutine
9110 L=LST(0)
9120 C$=CHR$(140)
9130 FOR I=1 TO L
9140 PRINT# LST(I),C$;
9150 NEXT I
9160 GOSUB 9000
9170 IF LP=0 GOTO 9160
9180 SCAN=1
9190 PRINT# LST(SCAN), " ";
9200 GOSUB 9000
9210 IF LP=0 GOTO 9260
9220 PRINT# LST(SCAN),C$;
9230 SCAN=SCAN+1
9240 IF SCAN=<= L GOTO 9190
9250 GOTO 9160
9260 PRINT# LST(SCAN),C$;
9270 GOSUB 9000
9280 IF LP=0 GOTO 9160
9290 CNT=2
9300 PRINT# LST(SCAN), " ";
9310 GOSUB 9000
9320 PRINT# LST(SCAN),C$;
9330 IF LP<= 0 GOTO 9160
9340 GOSUB 9000
9350 IF LP =0 GOTO9160
9360 CNT=CNT-1
9370 IF CNT<= 0 GOTO 9300
9380 PRINT# LST(SCAN)-2,"=";
9390 PRINT# LST(SCAN)+1,"<=";
9400 GOSUB 9000
9410 IF LP<> 0GOTO9400
9420 RETURN
10000 REM          GROCERY STORE ITEMS
10010 REM          ALL ITEMS ARE IN GROUPS AS THEY APPEAR
        IN THE
10020 REM          STORE. ALL HEADINGS HAVE A "*" BEFORE
        THE
10030 REM          HEADINGS. THE NUMBER AFTER THE "*" WIL
        L
10040 REM          BE THE NUMBER OF ITEMS IN THE LIST. IF
        YOU
10050 REM          ADD OR DELETE AN ITEM, REMEMBER TO CHAN
        GE THE
10060 REM          NUMBER.
10070 REM
10080 DATA 138,202,266,330,394,458,522,586,650,714
10090 DATA 168,232,296,360,424,488,552,616,680,744
10100 DATA *20AISLE 13 - PRODUCE
10110 DATA CANTALOUPE, MUSHROOMS, APPLES, CELERY
10120 DATA CARROTS, PEARS, LETTUCE, CUCUMBERS
10130 DATA TOMATOES, AVOCADOES, SQUASH
10140 DATA BANANAS, POTATOES, CORN, CABBAGE
10150 DATA ONIONS, GRAPEFRUIT, GRAPES, -----
10160 DATA END
10170 DATA *07 BAKERY - REAR OF STORE
10180 DATA BREAD, COFFEE CAKE, WIENER BUNS
10190 DATA HAMBURGER BUNS, BAGELS, -----
10195 DATA END
10200 DATA *11AISLE 13 - DRY FRUIT AND NUTS AND WINES
10210 DATA RAISINS, DATES, PEANUTS, PRUNES
10230 DATA BURGUNDY, CABERNET, SAVIGNON, ROSE
10240 DATA LAMBRUSCO, CHABLIS, -----
10250 DATA END
10260 DATA *18AISLE 12 -SOFT DRINKS - DRESSINGS AND SAU
        CES
10270 DATA DIET ROOT BEER, DIET COLA, GINGER ALE
10280 DATA 7-UP, DR. PEPPER
10300 DATA ITALIAN DRESSING, FRENCH DRESSING
10310 DATA GOOD SEASON MIX, MUSTARD, MAYONNAISE
10315 DATA SPAGHETTI SAUCE, TOMATO SAUCE
10320 DATA TOMATO PASTE, CATSUP
10330 DATA BAR-B-Q SAUCE, A-1 STEAK SAUCE
10340 DATA -----, END
10350 DATA *18AISLE 11 - GELATIN AND BAKING SUPPLIES
10360 DATA ----- JELLO, -----PUDDING MIX
10370 DATA FLOUR, WHOLE WHEAT FLOUR, PANCAKE MIX
10380 DATA YEAST, CAKE MIX, FROSTING
10390 DATA DATE NUT BREAD MIX, BANANA BREAD MIX, MAPLE SY
        RUP
10400 DATA CORN STARCH, BAKING POWDER, BAKING SODA
10410 DATA CHOC. CHIPS, CORN SYRUP, -----
10420 DATA END
10430 DATA *13AISLE 11 - SALAD OIL PASTAS SPICES
10440 DATA STOVE TOP STUFFING MIX, RICE
10450 DATA MACARONI AND CHEESE, NOODLES, SPAGHETTI
10460 DATA PARMESAN CHEESE, -----SPICE
10470 DATA SALAD OIL, SHAKE N BAKE, VINEGAR
```

Program continues

for the TRS-80 from Micro-Mega

The Original GREEN-SCREEN



The eye-pleasing Green-Screen fits over the front of your TRS-80 Video Display and gives you improved contrast with reduced glare. You get bright luminous green characters and graphics like those featured by more expensive CRT units.

Don't confuse the Original Green-Screen with a piece of thin film stuck to the face of your video tube, such as that advertised by others. The Original Green-Screen is mounted in a full frame perfectly matched to the color and texture of the TRS-80 Video Display. It is attached with adhesive strips which do not mar your unit in any way.

The full frame design of the Original Green-Screen "squares off" the face of your video display and greatly improves the overall appearance of your system.

THE GREEN-SCREEN.....\$13.95
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. ✓ 29

Micro-Mega · P.O. Box 6265 · Arlington, Va 22206

Stop fiddling with your cassette cables! Install our TBEEP and forget it forever!

TBEEP™ 1



For Level II and Disk Users — A self-contained audio alert beeper with a pager-like tone. Plugs in-line with "AUX" cable from your TRS-80 (Requires 9V Battery).

\$ 19.95

TBEEP™ 2



A TBEEP kit you install inside your TRS-80 keyboard.

- Completely assembled and tested.
- Attach to keyboard's PC board with double-sided foam tape (included) and solder three wires to easily located points on keyboard unit. Installs in minutes.
- Uses power from your TRS-80. No battery required.
- DEALERS! Install when modifying your customer's TRS-80, and include TBEEP's simple four word BASIC command in your off the shelf Software.

TBEEP 2 Kit (with complete instructions) \$ 12.95

Send Check or Money Order to
Phone Orders

WEB ASSOCIATES ✓ 27

New Mail Order Address
P.O. Box 9601
Corona Del Mar CA 92625
(Calif. Residents add 6% tax)

(714) 494-2869
Dealer Inquiries Invited
UPS/COD — Add \$3.00

SEND FOR FULL LINE CATALOG

18488 DATA SALT,-----,END
18490 DATA *13AISLE 18 - TEA - COFFEE - SOUP - CEREALS
18500 DATA GROUND COFFEE, INSTANT COFFEE, TEA BAGS
18518 DATA INSTANT TEA, TOMATO SOUP, VEGETABLE SOUP
18520 DATA MUSHROOM SOUP,-----SOUP
18550 DATA RAISIN BRAN, SUGAR, BROWN SUGAR
18560 DATA -----,END
18570 DATA *15AISLE 9 PAPER PRODUCTS
18580 DATA KOTEX, TOILET PAPER, TISSUES
18605 DATA PAPER TOWELS
18610 DATA PAPER NAPKINS, PAPER CUPS, PAPER PLATES
18620 DATA ALUMINUM FOIL, LARGE TRASH BAGS
18630 DATA SMALL TRASH BAGS, PLASTIC WRAP
18640 DATA SANDWICH BAGS, CIGARETTES,-----
18650 DATA END
18660 DATA *12AISLE 8 - TOILETRIES
18670 DATA TOOTH PASTE, BUFFERIN, RUBBING ALCOHOL
18680 DATA TOOTH BRUSH, HAND LOTION, SHAMPOO
18690 DATA CREAM RINSE, DEODORANT, SHAVING CREAM
18700 DATA AFTER SHAVE,-----,END
18710 DATA *13AISLE 8 - FROZEN VEGETABLES
18720 DATA SOY SAUCE, SQUASH, BROCCOLI
18730 DATA PEAS, CARROTS, CORN, SPINACH
18740 DATA BEANS, MIXED VEGETABLES, CUP OF NOODLES
18750 DATA MATZO BALL SOUP MIX,-----
18760 DATA END
18770 DATA *09BACK OF STORE - DAIRY
18780 DATA BEER, MILK, LOWFAT MILK, BUTTER MILK
18790 DATA YOGURT, SOUR CREAM, COTTAGE CHEESE
18800 DATA -----,END
18810 DATA *15AISLE 7 - FROZEN FOOD & JUICES - PICKLES
18820 DATA TV DINNER, CHICKEN PIE, PIZZA
18830 DATA BEEF PIE, LASAGNA
18860 DATA ORANGE JUICE, LEMONADE, COOL WHIP
18870 DATA FROZEN WAFFLES, GREEN OLIVES, BLACK OLIVES
18880 DATA DILLS, GERKINS,-----,END
18890 DATA *16AISLE 6 FROZEN PIES CANDY PRESERVES
18900 DATA ICE CREAM,-----TOPPING, FROZEN PIE
18910 DATA SACCHARIN
18930 DATA POP CORN, CANNED MIXED NUTS, WALNUTS
18940 DATA ALMONDS, MARSHMALLOWS, PEANUT BUTTER
18950 DATA -----JELLY,-----PRESERVE
18960 DATA BATTERIES, LIGHT BULBS,-----
18970 DATA END
18980 DATA *10BACK OF STORE - DELECATESSEN
18990 DATA EGGS, MARGARINE, BUTTER
11000 DATA -----CHEESE, DINNER ROLLS, BISCUITS
11010 DATA CREAM CHEESE, SLICED AMERICAN CHEESE
11020 DATA -----,END
11030 DATA *08AISLE 5 - PET FOOD AND HARDWARE
11040 DATA CANNED CAT FOOD, DRY CAT FOOD, KITTY LITTER
11050 DATA DOG BISCUITS, SULFODENE, COFFEE FILTERS
11060 DATA -----,END
11070 DATA *13AISLE 4 - WAX - BLEACH
11080 DATA BLEACH, SOFTENER - SHEETS
11090 DATA SOFTENER - LIQUID, RAID, S.O.S PADS
11100 DATA LYSOL, PLEDGE, SILVER POLISH
11110 DATA LIQUID GOLD,-----SHOE POLISH
11120 DATA RUBBER GLOVES,-----,END
11130 DATA *11AISLE 4 - DETERGENT
11140 DATA HAND SOAP, DISH WASHING LIQUID
11150 DATA DISHWASHER DETERGENT, DETERGENT
11160 DATA FANTASTIC, TOILET BOWL CLEANER
11170 DATA COMET CLEANER, PINE SOL
11180 DATA POTATO CHIPS,-----,END
11190 DATA *11AISLE 3 - JUICE - CANNED MILK
11200 DATA NYLONS, TOMATO JUICE, TANG
11210 DATA APPLE JUICE, LEMON JUICE, LIME JUICE
11220 DATA CIDER
11240 DATA EVAPORATED MILK, DRY MILK
11250 DATA -----,END
11260 DATA *13AISLE 2 - CANNED FRUIT - CANNED FISH
11270 DATA PINEAPPLE, PEACHES, PEARS
11280 DATA FRUIT COCKTAIL, GRAPES, APPLE SAUCE
11290 DATA PUMPKIN, TUNA, SARDINES, SALMON
11300 DATA CHILI CON CARNE,-----,END
11310 DATA *12AISLE 2 - CANNED VEGETABLES
11320 DATA WHOLE MUSHROOMS, SLICED MUSHROOMS
11330 DATA -----TOMATOES, GREEN BEANS
11340 DATA PEAS, BEETS, CORN, KIDNEY BEANS
11350 DATA PORK & BEANS, PIMENTOES,-----
11360 DATA END
11370 DATA *17AISLE 1 - MEATS
11380 DATA HAM, TONGUE, CORNED BEEF, PORK CHOPS
11390 DATA LAMB CHOPS, PORK LINKS, ROAST, NY STEAK
11400 DATA RIB EYE STEAK, ROUND STEAK, BEEF CHUCK
11410 DATA -----FISH, CHICKEN - WHOLE
11420 DATA CHICKEN - PARTS, GROUND BEEF,-----
11430 DATA END
11440 DATA *08AISLE 1 - CRACKERS
11450 DATA WHEAT THINS, BREAD CRUMBS, CROUTONS
11460 DATA RITZ CRACKERS, SALTINES, GRAHAM CRACKERS
11470 DATA -----,END
11480 DATA *08FRONT OF STORE - COLD CUTS - FROZEN FISH
11490 DATA BACON, BOLOGNA, SLICED HAM
11500 DATA TURKEY, SHRIMP,-----FISH
11510 DATA -----,END
20000 DATA *END

DONE

MANAGEMENT SCIENCE OPERATIONS RESEARCH

TRS-80™ MATHEMATICAL PROGRAMMING SYSTEM.

A collection of programs which implement the simplex algorithm, the transportation algorithm, and a network flow optimization algorithm. (Comes with documentation.) \$25.00

TRS-80™ DECISION SYSTEM.

A collection of programs which implement break-even analysis, decision analysis, insurance analysis, element-ordering, and game theory. (Comes with documentation.) \$25.00

TRS-80™ SIMULATION SYSTEM.

A program which facilitates the simulation of continuous dynamic systems described by differential or difference equations. Provides for integration, printing and plotting of the output on video or printer. (Comes with documentation.) \$25.00

**SOFTWARE
ENGINEERING
SYSTEMS
INC.**

✓ 238

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

3214 75th Street

Lubbock, Texas 79423 (806) 792-9310

"Consultants in Software
and Systems Engineering"

Computers & Gambling Magazine

PRESENTS: PROBABILITY HANDICAPPING DEVICE I

A 16K BASIC PROGRAM FOR: HORSE RACE HANDICAPPING!

This amazing program was written by a professional software consultant to TRW Space Systems and is being introduced by the publishers of Computers and Gambling Magazine. PHD-1 is a large complex basic program requiring a full 16K. It is carefully human factored for easy use. PHD-1 is a comprehensive horse racing system for spotting overlays in thoroughbred sprint races (less than 1 mile). You simply sit down with your computer and the Racing Form the night before the race and answer 5 or 6 questions about each horse's past performance. Your computer then accurately predicts the win probability and odds-line for each horse allowing you to spot overlaid horses while at the track. The user's manual contains a complete explanation of overlay betting.

Statistics for thousands of horses were used to develop this handicapping system. The appendix of the manual contains a detailed tab run of a 100 consecutive race system workout showing an amazing 45% positive return (45¢ for each \$1.00 wagered). A graph is also included showing PHD-1's close fit to the ideal predicted probability vs. actual win percentage curve.

This program features: Win probability and odds for each horse. Verification display of each horse's parameters prior to entry for easy error correction. Bubble-sort routine for final display. Facility for line printer output. Cassette ARCHIVE routine to store PHD-1's output for later analysis. Complete user's manual.

The user's manual may be ordered separately for your purchase for \$7.95 and will be credited if you purchase PHD-1.

PHD-1 User's Manual and 16K Cassette for:
Apple II Applesoft, Challenger (Specify Type),
TRS-80 Level II, Pet

\$29.95

Make checks payable to: Ca res. add 6%

✓ 193 JOE COMPUTER

22713 Ventura Blvd., Suite F, Woodland Hills, CA 91364

*BE A WINNER: Get on the Computers and Gambling Products Magazine mailing list for \$3.00 and receive available back issues.

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



OUR MICROCOMPUTER SAVES ME
TWO HOURS EVERY DAY!!

HERE'S HOW! 1. Input data to secretary
2. Into computer 3. Printout back to me.
PRESTO! Subdivision calcs in 1/2 the time
of a programmable calculator.

OUR MICROCOMPUTER SOFTWARE DOES:

- TRAVERSE GEOMETRY
- COORDINATE GEOMETRY
- PROFILE GRADES
- RADIAL STAKEOUT
- CIRCULAR CURVE GEOMETRY
- CIRCULAR CURVE STAKEOUT

DEVELOPED AND SUPPORTED BY ANDREW
MAGHEN REGISTERED CIVIL ENGINEER.

Complete Program Package
With Instruction Manual **\$260**

MICRO SOFTWARE SYSTEMS
CIVIL ENGINEERING COMP ✓ 95

Call or write for FREE INFORMATION PACKET (714) 755-4033
143c So. CEDROS, SOLANA BEACH CA, 92075

The CREATOR

In the beginning your computer was to make life easy. Then you found that you had to become a programmer to make your computer do the tasks you want it to do.

Now, you can relax! The **CREATOR** is here. This program will create **BASIC**, error free program text for you. All you need to do is answer the questions. The Creator even checks for errors.



JIG COMPUTER SERVICES

309 N. Rosemead Ave. • Suite B • Upland, CA 91786 U.S.A.

✓ 37

The Creator will generate reports, perform calculations, and even interface with other program routines. No need to become a professional computer programmer. The Creator, under your command, will create custom programs for you.

The **CREATOR** is available on disk for the TRS-80 model One and Two. Also available for the Apple II and CP/M. Complete with an easy to read, well documented bound manual.

TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORP.

A cryptic look at coding.

An Article Called Intrepid

Buzz Gorsky
2449 Derbyshire Rd.
Cleveland, OH 44106

If I got 55515255545663877991
9056427336453989798144717
042623356408587926282585037
667841584289885964513482664
245605446486568837350595244
56623893368354 as a message, I
would probably say "Yes that's
true." Of course I would have the
benefit of knowing that the
message decodes to "80 Micro-
computing contains many inter-
esting programming articles."

How did I know that?

In his book *A Man Called Intrepid* (Ballantine Books, New York, 1976), William Stevenson describes some of the effort during World War II by the British to decode German military transmissions. The German code changed with the transmission of each character of a message. Another complicating factor was that a single code machine might send different codes to different recipients.

I have written a series of three

programs which provide the same type of coding and decoding. The first program will generate an original code; the second will encode a message, changing the code for each character of the message; and the third will decode an encoded message.

Simple Principles

The principles of the code are quite simple. A list called C(I) is

maintained in memory. It has a code value for each ASCII value used by the TRS-80. This represents the initial code at the start of a message.

als at random and using the ASCII representation of each. Three of these six carry no significance and exist to confuse things. However, the value of the encoded digit corresponding to the second pair, the third pair and the fifth pair are used by the program.

The value obtained from the sixth pair tells the program how many times to adjust the code in a given direction. Direction im-

plies that the code can be changed by adding or subtracting a fixed amount from each C(I). The value of the second pair is the amount which will be added to C(I). The value of the fifth pair is the amount which will be subtracted.

code changes with each letter. Further, the way the code changes depends on three of the first six data pairs sent.

In Program Listing 1, (lines 1-90), line 5 prints a big question mark on the screen as a symbol for the encoding program. In line 20 string space is set aside, variables are typed and C is dimensioned.

Line 30 generates a random number between 32 and 95, that is, between the limits for the ASCII set. The first value chosen is assigned to C(1), and each subsequent new value will be assigned to each subsequent C(I) until all values from 32 to 95 are represented.

In line 40, if a new random number (N) is the same as any of the C(I) already in memory, then that N is discarded and a new random number is picked. J counts the number of C(I) existing and when J equals 63 the task is done. Line 50 prints J on the screen so that you can follow the progress of the program.

In line 60 the C(I) are represented as a string Y. This string consists of the concatenated strings of the numerical values

*"The German Code changed
with the transmission
of each character of a message."*

maintained in memory. It has a code value for each ASCII value used by the TRS-80. This represents the initial code at the start of a message.

Each message consists of a string of numerals that may be considered as pairs, each pair representing an encoded ASCII value. The first six pairs are special. These six are chosen by selecting six single-digit numer-

als at random and using the ASCII representation of each. Three of these six carry no significance and exist to confuse things. However, the value of the encoded digit corresponding to the second pair, the third pair and the fifth pair are used by the program.

The value obtained from the sixth pair tells the program how many times to adjust the code in a given direction. Direction im-

of each C(I). Then, in lines 70 and 80, Y is saved on tape. The C(I) could be saved on tape directly, but this method is much faster.

Saving to Tape

The second program, shown in Listing 2, (lines 100-410), acquires the message, encodes it and provides for saving the message on tape and saving the final code on tape. Line 110 takes care of the housekeeping. It retrieves the code from tape and separates Y into the C(I) again.

Line 120 tells the operator that the message can be typed and must not exceed 100 characters. This is a somewhat arbitrary figure, but the message will be stored as a single string and that cannot exceed 255 characters. Since each character of the message is coded as a two-character string representing an encoded ASCII value, the message length can actually reach 127 characters.

The operator is also told that hitting * will erase a character just typed and that hitting / will terminate the message. As the message is entered, the count will change, and the screen will show how many characters are left. The message will appear on the screen in its text and ASCII forms.

In line 130, I is set equal to 94 which is the number of characters remaining. Remember that the first six characters are generated by the program. Line 140 generates the start of the string. A value K is generated randomly as an integer between zero and nine, and a string is made. The string will include a space and a numeral, since the space was saved for the symbol K. Only the right character is taken to get a single character string.

The ASCII value of the string is found, and then a string of the ASCII value is formed. All of that is done by $X = \text{RIGHTS}(\text{STRS}(\text{ASC}(\text{RIGHTS}(\text{STRS}(K), 1))), 2)$. It may seem like a lot of work, but this results in a two-character string that represents the ASCII value of K.

While each of the six Ks is randomly generated, Y is set

equal to $Y + X$. Y is an ever growing string of all the Xs. In line 150 each character of the message is entered using the INKEYS function.

If an * is hit, I is increased so that the previous character will be replaced by the next character entered. When / is hit, or when I is zero, the message is ended.

In line 180 the encoding process begins. Y is the uncoded message represented as a string of ASCII values. Since each element of Y is two characters long, J, which equals one-half the length of Y, indicates how many ASCII pairs there are.

In lines 190 to 225 the second, third and fifth ASCII pairs are evaluated to see what numerals they represent. I1, I2 and I3 are set equal to these numerals. I1 will eventually be added to C(I) values when the code is changed, and I2 will be subtracted. I3 will tell how many addition functions to do before switching to subtraction, or vice versa.

In line 230 the construction of Z begins. Z will be a character string representing the encoded ASCII values, and the final message in code. It begins as the first 12 characters of Y, then the rest is the encoded values obtained from the message.

In line 240, X is set equal to two-character string taken from the middle of Y. As I moves along, X will be set sequentially to be each ASCII pair in Y, beginning with the seventh pair, which is where the text of the message actually begins. K is set equal to the value of X minus 32, and then equal to C(K), which is the coded value corresponding to K. For example, $X = 32$, the value of X would be 32 and K would first be set equal to 0 and then to C(0). That would be the coded ASCII value for the space character.

Lines 270 to 350 check how many times the code has been shifted in a given direction and then make the appropriate shift. K0 is a variable which keeps track of whether the code is being shifted by addition or subtraction. When K0 is 0 the code

is being shifted by addition, when it's 1, the code is being shifted by subtraction.

K1 keeps track of how many shifts have been made. This number is compared with I3 and when it equals 13 it is then reset to 0. K0 receives a new value and the opposite shift begins. In 290 to 320 the code is adjusted by adding I1 to each C(I). If any C(I) is then larger than 95 the value is adjusted by subtracting 64. In this way the complete set is maintained.

In lines 330 to 360 the code is adjusted by subtracting I2 from each C(I) value and adding 64 to any which would be less than 32 otherwise. In line 370, I is printed on the screen so that you can see the progress as each character of the code is generated. Following line 380 the coded message and the new code can be saved on tape.

Decoding

Program Listing 3 begins on line 500. This program reads in the original code and the coded

message and then decodes the message. It is analogous to many parts of the second program. First it looks at the first six ASCII pairs and from the second, third and sixth pairs, obtains the values of I1, I2 and I3. It will know how the code is shifted during decoding.

Next it decodes each ASCII pair beginning with the seventh pair. This is done by finding which C(I) equals the value of the particular ASCII pair.

$I = 32$ is the decoded ASCII value and $\text{CHR}(K = 32)$ on line 650 finds the decoded character. The string Y is built up of these characters, so that Y will be the decoded message.

K0 and K1 are used, as in the encoding routine, to keep track of how the code is changed. It is changed with the decoding of each character, so that there is a correct code for decoding the next character.

Finally in line 770 the decoded message is displayed. The code is prepared and stored on tape as a single string again. ■

Program listing

```
1 REM 'ENIGMIZER'--CRYPTOGRAPHIC PROGRAM BY BUZZ GORSKY
2 REM FOR 80 MICROCOMPUTING
5 CLS:Y=1:FOR X=35 TO 80:SET(X,Y):NEXT:FOR Y=1TO20:SET(
  X,Y):NEXT:Y=20:FOR X=80 TO 48 STEP -1:SET(X,Y):NEX
  T:X=48:FOR Y=20 TO 35:SET(X,Y):NEXT:SET(X,Y+1):SET
  (X,Y+2):FOR I=1TO5000:NEXT
10 CLS:REM ROUTINE TO GENERATE ORIGINAL CODE
20 CLEAR450:DEFINT C,I,J:DEFSTR X,Y,Z:DIM C(63):RANDOM
30 N=RND(95):IF N<32 THEN 30
40 FOR I=0 TO J:IF N=C(I) THEN 30
50 NEXT I:C(J)=N:IF J<63 THEN J=J+1:PRINT#540,J:GOTO30
60 FOR I=0 TO 63:X=RIGHTS(STRS(C(I)),2):Y=Y+X:NEXT
70 INPUT"PREPARE TAPE TO SAVE CODE";Z
80 PRINT#-1,Y
90 END
100 REM ROUTINE TO ENCODE MESSAGE THEN SAVE MESSAGE, EN
  CODED MESSAGE, AND NEW CODE
110 CLEAR 1000:DEFINT C,I,J,K:DEFSTR X,Y,Z:DIM C(63):RA
  NDOM:INPUT"TAPE READY TO INPUT CODE";X0:INPUT#-1,Y
  :FOR I=0 TO 63:C(I)=VAL(MIDS(Y,I*2+1,2)):NEXT:Y=""
120 CLS:PRINT "ENTER MESSAGE. DO NOT EXCEED 100 CHARACTER
  S.":PRINT "END WITH '/'"; USE '*' TO DELETE LAST L
  ETTER"
130 PRINT "CHARACTERS REMAINING--":PRINT:I=94
140 FOR J=1TO6:K=RND(9):X=RIGHTS(STRS(ASC(RIGHTS(STRS(K
  ),1))),2):Y=Y+X:NEXT J
145 PRINT#152,I:IF I=0 THEN 170
150 X=INKEYS:IF X="" THEN 155 ELSE IF X="/" THEN 170 E
  LSE IF X="" THEN 150 ELSE 160
155 Y=LEFTS(Y,LEN(Y)-2):Z=LEFTS(Z,LEN(Z)-1):I=I+1:GOTO1
  45
160 Z=Z+X:Y=Y+RIGHTS(STRS(ASC(X)),2):PRINT#512,Y:I=I-1:
  PRINT#768,Z:GOTO145
170 CLS
180 J=LEN(Y)/2:FOR I=2 TO 5:IF I=4 THEN NEXT I
190 X=MIDS(Y,2*I-1,2)
200 IF I=2 THEN I1=VAL(CHR$(VAL(X)))
210 IF I=3 THEN I2=VAL(CHR$(VAL(X)))
220 IF I=5 THEN I3=VAL(CHR$(VAL(X)))
225 NEXT I
230 Z=LEFTS(Z,12):FOR I=7 TO J
240 X=MIDS(Y,2*I-1,2)
250 K=VAL(X)-32:K1=K1+1
```

Program Continued

```

260 K=C(K):Z=Z+RIGHTS(STR$(K),2)
270 IF K0<0 THEN 280 ELSE IF K1<13 THEN 290 ELSE K1=0:
    K0=1:GOTO330
280 IF K1<13 THEN 330 ELSE K1=0:K0=0
290 FOR J1=0 TO 63
300 IF C(J1)+I1>95 THEN C(J1)=C(J1)-64
310 C(J1)=C(J1)+I1
320 NEXT J1:GOTO370
330 FOR J1=0 TO 63
340 IF C(J1)-I1<32 THEN C(J1)=C(J1)+64
350 C(J1)=C(J1)-I2
360 NEXT J1
370 PRINT#564,I:PRINT#1
380 CLS:PRINT"ENCODING COMPLETE":INPUT"TAPE READY TO SA
    VE CODED MESSAGE";X0:PRINT#-1,Z:INPUT"LINEPRINT OF
    CODED MSG";X0:IF X0="Y" THEN LPRINT Z
390 FOR I=0 TO 63:Y0=Y0+RIGHTS(STR$(C(I)),2):NEXT
400 INPUT"TAPE READY TO SAVE NEW CODE";Z:PRINT#-1,Y0
410 END
500 REM ROUTINE TO DECODE MESSAGE AND SAVE NEW CODE
510 CLEAR 1000:DEFINT C,I,J,K:DEFSTR X,Y,Z:DIM C(63)
520 INPUT"TAPE READY TO ENTER CODED MESSAGE";X:INPUT#-1
    ,Z:INPUT"TAPE READY TO INPUT CODE";X0:INPUT#-1,Y0
530 FOR I=0 TO 63
540 C(I)=VAL(MID$(Y0,2*I+1,2)):NEXT
550 J=LEN(Z)/2:FOR I=2 TO 5:IF I=4 THEN NEXT I
560 X=MID$(Z,2*I-1,2)
570 IF I=2 THEN I1=VAL(CHR$(VAL(X)))

```

```

580 IF I=3 THEN I2=VAL(CHR$(VAL(X)))
590 IF I=5 THEN I3=VAL(CHR$(VAL(X)))
600 NEXT I
610 FOR I=7 TO J
620 X=MID$(Z,2*I-1,2)
630 K2=VAL(X):K1=K1+1
640 FOR K=0 TO 63:IF C(K)<X2 THEN NEXT K
650 Y=Y+CHR$(K+32)
660 IF X0<0 THEN 670 ELSE IF K1<13 THEN 680 ELSE K1=0:
    K0=1:GOTO720
670 IF K1<13 THEN 720 ELSE K1=0:K0=0
680 FOR J1=0 TO 63
690 IF C(J1)+I1>95 THEN C(J1)=C(J1)-64
700 C(J1)=C(J1)+I1
710 NEXT J1:GOTO 760
720 FOR J1=0 TO 63
730 IF C(J1)-I1<32 THEN C(J1)=C(J1)+64
740 C(J1)=C(J1)-I2
750 NEXT J1
760 PRINT#564,I:PRINT#1
770 CLS:PRINT"DECODED MESSAGE":PRINT:PRINT#1
780 Y0="":FOR I=0 TO 63:Y0=Y0+RIGHTS(STR$(C(I)),2):NEXT
790 INPUT"IS TAPE READY TO RECORD NEW CODE";X0:PRINT#-1
    ,Y0

```

DONE

— Professional —
Real Estate Software

For Apple or TRS-80

Property Management System
(32K, 1 Disk System)

Features:

- Tenant Information
- Late Rent Reports
- YTD & Monthly Income
- Handouts
- 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) APN Loan Analysis
- 6) Property Sales Analysis
- 7) Loan Amortization

\$35 Per Module



At Computer Stores Everywhere
Or Order CDD Direct
Cal Residents Add 6% Sales Tax
(213) 372-0419

✓ 372

Dept. M 2045 Manhattan Ave., Hermosa Beach, CA 90254

WHY PAY CUSTOM PRICES?

SMALL QUANTITY

STOCK CONTINUOUS

FORMS

- STATEMENTS
- INVOICES
- CHECKS
- BILL OF LADING
- SPEED-O-GRAM

IMPRINTING AVAILABLE

STOCK PRINTOUT PAPER
STOCK CONTINUOUS LABELS

Call or Write for Prices & Samples

✓ 366

DDF DISCOUNT DATA FORMS, INC.
407 BESE/HOLLER LANE SOUTH
LOMBARD, ILLINOIS 60148
(312) 629-6850

GENEALOGY

Compiling Roots and Branches
An extensive family tree system
for the Radio Shack TRS-80

64K 1-disk Model II

STORES AND REVIEWS 1000 FAMILY MEMBERS' names, dates, places, marital statuses (2), relationships (father, mother, spouses (2), children (16)), and footnotes (2)

OUTPUTS complete Family Books of info for yourself and others, new and revised pages for Family Book recipients, indices to names and their ID numbers, indented format B-generation pedigree and descendent charts, lists of dates and footnotes, and blank and filled-in forms to solicit info. Includes comprehensive indexed 70+ page manual.

Diskette with manual \$250.00
Manual & 9-program 81K BASIC listings \$50.00*
Manual alone \$25.00*

*applicable toward diskette purchase

Brief description with example printouts \$1.00
Send check or money order or call for more details.

John J. Armstrong
3700 Whispering Pine Rd. #47B ✓ 414
Mobile, AL 36608

Phone evenings 205/342-7642
From the original author of *Roots and Branches*
Personal Computing magazine September 1979
*TRS-80 is a registered trademark of Tandy Corp.

UCSD* System for TRS-80 Model II†

The most portable operating system now supports FORTRAN, Pascal and/or FORTRAN modules are compiled in universal P-code, so they can run on most microprocessors, often without recompiling. Programs execute up to 10 times faster than comparable BASIC programs, and use much less memory. Ready to run on TRS-80 Model II (64K).

FEATURES

- Interactive operating system—dynamic overlays, disk file handling, run-time support and block I/O routines.
- Fast, one pass compilers.
- Two Editors—one screen oriented for programming and text editing, one character oriented for hard copy terminals.
- File handler to manipulate disk files.
- Macro-assembler that produces code for linking with Pascal or Fortran programs.
- Linker for link-editing of object and assembly code modules.
- Library of program modules and utilities.

PLUS, from PCD Systems

- Disk formatting program to initialize diskettes in single or double density formats.
- Configuration program for serial I/O.
- Disk-set program to permit separate assignment of density and format characteristics for each disk drive.

DOCUMENTATION

- UCSD System Manual (400 pages).
- Beginner's Guide To UCSD Pascal.
- Pascal User Manual & Report.
- Fortran User's Manual with Fortran systems.

PRICES

- UCSD System with Pascal Compiler \$350
- UCSD System with Fortran Compiler \$500
- Fortran Compiler alone (requires Version II.0) \$200
- P-Code Interpreter alone (either LSI-11 or Z-80) \$ 85
- Optional Utility Programs
 - CP/M² to Pascal file conversion \$ 50
 - TRSDOS³ to Pascal file conversion \$ 50
 - Z-80 Disassembler/Dump program \$ 50

ALSO AVAILABLE

- UCSD System for MINC⁴ or PDT⁴.
- Z-80 Adaptable System (you write BIOS).
- UCSD System for CP/M environments.

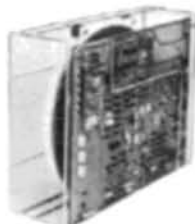
PCD Systems is a licensed distributor of the UCSD System for Pascal and Fortran. Dealer inquiries are invited.

PCD Systems, Inc. ✓ 96

PO Box 143 Penn Yan, NY 14527 315-536-3734

*Trademark of the Regents of the University of California †Trademark of Tandy Corporation ²Trademark of Digital Research ⁴Trademark of Digital Equipment Corporation

PRIAM Hard Disks Now Available from SIRIUS SYSTEMS!



PRIAM's high-performance, low-cost Winchester disc drives speed up throughput and expand data storage from 20 megabytes to 154 megabytes. And a single controller can be used to operate 14-inch-disc drives with capacities of 33, 66, or 154 megabytes or floppy-disc-size drives holding 20 and 34 megabytes. So it's easy to move up in capacity, or reduce package size, without changing important system elements or performance.

- Fast, Linear Voice Coil Positioning
- 10 ms track-to-track positioning
- Fully servoed head positioning
- Defeat/zero tracks
- DC Power required only!
- Simple, parallel interface
- Optional SMD interface
- 50 ms Average Positioning time
- 90 ms Maximum Positioning Time
- 5.4 ms Average Latency

THE PRIAM LINEUP

Model/Disc Size	Capacity	Size	Weight	Price
DISK05 3350 (14")	33Mbytes	7" x 17" x 20"	33 lbs.	\$2995
DISK05 6650 (14")	66 Mbytes	7" x 17" x 20"	33 lbs.	\$3749
DISK05 15450 (14")	154 Mbytes	7" x 17" x 20"	33 lbs.	\$4695
DISK05 2050 (8")	20 Mbytes	4.52" x 8.50" x 14.25"	20 lbs.	\$2995
DISK05 3450 (8")	34 Mbytes	4.52" x 8.50" x 14.25"	20 lbs.	\$3745
DISK05 570	5.3 Mbytes	Floppy-size	(low)	(low)
DISK05 1070	10.6 Mbytes	Floppy-size	(low)	(low)

All PRIAM DISK05 Drives have a Transfer Rate of 1.00 Mbytes/Sec. Optional SMD interface available for \$150.
SIRIUS SYSTEMS offer cases and enclosures for all PRIAM Hard Disk Drives. All 14" Winchester Drives will mount in our 14" Standard Case. The 8" Winchester drives have two alternatives: a single drive case and a dual drive case. All SIRIUS SYSTEMS Winchester drive cases include Power Supply, internal cabling, switches, fan, extra AC outlet (not switched, but fused) and possess very adequate ventilation. Drive addressing is done on the rear of the Case and not on the drive itself to provide ease of use during operation. All WINCHESTER DRIVE Cases are Warranted for a full year and come in our standard blue-black color scheme. Consult us for current availability and pricing.

Remex RFD 4000/4001 8" Floppy Disc Drives Double sided... Double density!!

\$549⁹⁵

RFD 4001, \$569.95



Offers quality and features found in drives costing much more! ■ Single or Double Density ■ Double-Sided Drive ■ Door Lock INCLUDED ■ Write-Protect INCLUDED ■ 180 Day Warranty ■ Compatible with Shugart 850/851 ■ Low Power Operation ensures LONGER LIFE!! ■ Model RFD 4001 offers Data and Sector Separator

RFD 4000/4001 Technical Manual	6.95	RFD 4000C/B Cabinet (for use with Connector Set #4 (AC and DC)	29.95
Connector Set #3 (AC, DC, Card Edge)	10.95	Power Modules)	
Connector Set #4 (AC and DC)	2.95		

Remex 1000B... If you've been looking for a less expensive floppy disc drive, but not wanting to sacrifice quality — this is it!

\$419⁹⁵

You get both in the Remex 1000B! For only \$419.95 look at what you get: ■ 8" Floppy Drive ■ Single or Double Density ■ Hard or Soft Sectoring ■ Media Protection Feature ■ Single Density Data Separator ■ 180 Day Factory Warranty



Door Lock Option	\$19.95	Write Protect Option	\$19.95	RFD 1000B Technical Manual	\$5.95
Interface Adapter (REMEX-to-Shugart)	\$14.95	Connector Set #1 (AC, DC, & Card Edge)	\$16.95	RFD 1000B CASE (for use with Power Modules)	\$29.95

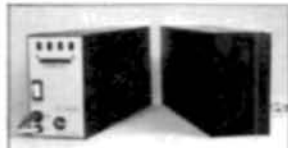
SIRIUS 8" DISK POWER MODULES

The Single and Dual Drive Power Modules are designed to provide DC and (switched) AC power for one (the Single Drive Power Module) or two (the Dual Drive Power Module) of the SIRIUS 8" Floppy Disc Drives. Many features are included for safe and reliable operation and the Power Modules come with our stan-

dard 180 day WARRANTY (the Open Frame Power Supply warranty is for 2 years). All Power Modules will work with either the RFD 4000C/B or RFD 1000B case (color schemes match also).

Dual Drive Power Module (DOPM)	\$139.95
Single Drive Power Module (SDPM)	119.95

SIRIUS 80+ Perfect Add-Ons for Your Computer System!



The SIRIUS SYSTEMS 80+ Series of Floppy Disk add-ons are designed to provide unmatched versatility and performance for your computer. Consisting of four different add-ons, there is a 80+ Series Floppy Disk to meet your need. All 80+ Series Floppy Disk are compatible with the TRS-80+ and come ready to plug in!

COMMON CHARACTERISTICS

- 5 ms track-to-track access time
- Auto-eject
- 180 day WARRANTY
- Exceptional speed stability — 11%
- Single density (FM) or double density (MFM/MFM)
- Ultra-high reliability
- 2 year Power Supply Warranty
- Mix any or all 80+ Series on the same cable!
- Includes user accessible plugboard for drive reconfiguring

SPECIFIC CHARACTERISTICS

The SIRIUS 80+ 1 is a single sided, 40 track, highly reliable Floppy Disk add-on. Offering 5 more tracks than the Radio Shack model, it cost \$140 less! Formatted data storage is 100K/20K bytes single/double density.

SIRIUS 80-1 \$359.95

The SIRIUS 80+ 2 is a dual sided, 70 track (35 per side), highly versatile Floppy Disk unit. It appears to the TRS-80+ as TWO 35 track drives, yet COST LESS THAN HALF THE PRICE! Even greater savings result, since data is recorded on both sides of the media instead of only a single side. Using the plug board, it may be reconfigured for other computer systems! (The 80+ 2 operates as Drive 0 and any of the other three addresses (with the standard Radio Shack Cable) or as any of four drives (with the SS Standard Cable).) Formatted data storage is 80.5K/161.2K bytes single/double density.

SIRIUS 80-2 \$449.95

The SIRIUS 80+ 3 is a single sided, 80 track, "Quad" density Floppy Disk unit. Offering 2 1/2 times the storage of a Standard Radio Shack drive, the 80+ 3 greatly reduces the need for diskettes correspondingly. Additionally, because of the increased storage and faster track-to-track access time, the 80+ 3 allows tremendously increased throughput for disk based programs!! The 80+ 3 INCLUDES SIRIUS's TRAKS-PATCH on Diskette. Formatted data storage is 204K/408K bytes single/double density.

SIRIUS 80-3 \$489.95

The SIRIUS 80+ 4 Floppy Disk add-on is a double sided, 160 track (80 per side), 5 1/4" floppy Disk technology, to 80+ 4 is seen by the TRS-80+ as two single sided disk drives, each with 80 tracks. Thus, in terms of capacity one 80+ 4 is equivalent to 4x standard Radio Shack drives — a savings of over 73% (not to mention diskettes!!!) (With a double density converter the available memory is huge!) The 80+ 4 is similar to the 80+ 2 in that it arrives configured as Drive 0 and any of the other three addresses (with the standard Radio Shack Cable) or as any of four drives (with the SS Standard Cable). The 80+ 4 INCLUDES TRAKS-PATCH on Diskette (The plug board is also included.) Formatted data storage is 405K single density or 810K bytes double density.

SIRIUS 80+ 4 \$624.95

All 80+ Series Floppy Disk add-ons operate a 5 milliseconds track-to-track access time (eight times faster than the SA 400) and an Expansion Interface Limited to 12 milliseconds for the TRS-80+.

*TRS-80(B); Tandy Corp.

MPI 51/52... A Great Reliable Mini-Drive!

- Fast! 5ms track to track access
- Exclusive Pulley-Band Design
- Unique Door/Ejector Mechanism
- Reliable 1% Speed Stability
- Single/Double Density Operation
- Industry/ANSI Standard interface

MPI 51 (Single Head, 40 tracks, 120K/24K bytes, Single/Double Density) \$259.95

MPI 52 (Dual Head, 70 tracks, (35/35K), 216.5K/432.5K Single/Double Density) \$349.95



MPI 91/92... NEW STATE-OF-THE-ART DISK DRIVE!

MPI 91 (Single Head, 80 tracks, 204K/408K Single/Double Density) \$389.95

MPI 92 (Single Head, 160 tracks (80/80), 408K/816K Single/Double Density) \$499.95

**Unformatted data storage

Introducing the Versatile, Low-Cost OMEGA Series Controller

As new technological advances bring down the cost of fast, reliable mass data storage, the need for an inexpensive, versatile controller have become greater and greater. To meet this need, SIRIUS SYSTEMS' OMEGA Series Controller was designed.

The SIRIUS OMEGA Series Controller Module utilizes an on-board microprocessor to mediate data transfer to a wide variety of peripherals from an equally wide variety of host computer systems. Up to four Winchester Hard Disks (8" or 14"), four 5 1/4" Floppy Disk Drives and/or up to eight 8" Floppy Disk Drives may be in use at one time. Host systems interfacing is accomplished via a parallel or a serial interface. With the addition of a Personality module, the OMEGA Series Controller Module is directly compatible with many popular computer systems (among them the TRS-80+, Apple, Heath, and others). Provision is made for the addition of a streaming tape drive, also.

SPECIFIC HARDWARE FEATURES INCLUDE:

- Control of up to twelve Floppy Disk Drives (eight 8" and/or four 5 1/4")
 - 8" and/or 5 1/4" Disk Drive Utilization
 - Single (FM) or Double (MFM) density data storage
 - Hard or Soft sectored diskette usage
 - Utilization of "Quad" density (96 to) 6" or 5 1/4" Disk Drives
- Control of up to four WINCHESTER type PRIAM DISK05 Drives
 - 8" or 14" stay interface on the same cable
 - Accommodates 8" and/or 14" drives of 5.3Mbytes to 15.4Mbytes
 - Ultra-fast data transfers
 - Extremely flexible host-controller interfacing

SPECIFIC SOFTWARE FEATURES INCLUDE:

- Dynamic format modifications via command words
- Extremely flexible format acceptance for unusual data storage formats
- Easily interfaces to standard operating systems (TRS-80+, CP/M+, etc.)
- Operates in either get/set sector mode or data string mode
- Performance parameters may be changed by EPROM replacement or Dynamic Reprogramming

Dedicated systems cards are also available on a limited basis for the STD-BUS and the S-100. These cards feature shared memory also (again, software selectable) in addition to the regular OMEGA Series Controller Module features. Consult SIRIUS SYSTEMS for current price and availability for the entire line of OMEGA Series Memory Units and Controllers. Dealer inquiries are invited.

SIRIUS SYSTEMS

7528 Oak Ridge Highway
Knoxville, Tennessee 37921

TO ORDER CALL (615) 693-6583

Phone Orders Accepted 9AM-7PM (ESDT)

We accept MC, VISA, AE, COD (requires Certified Check, Cashier's Check or Cash) and Checks (personal checks require 14 days to clear). SHIPPING AND HANDLING: \$7.00 per Floppy Disk Drive or 80+ Module ■ 5% for other items (any excess will be refunded) ■ Foreign Orders add 10% for Shipping & Handling. Payment in U.S. currency ■ Tennessee residents add 6% Sales Tax ■ VOLUME DISCOUNTS AVAILABLE

Bach to BASIC!

Music Note Recognition

J. David McClung
P.O. Box 1590
Dallas, TX 75221

My wife and I bought our TRS-80 partly to help with our children's educations. We didn't realize then how very little educational software was available. I turned, therefore, to writing my own.

Music Note Recognition is a program I wrote to teach my two oldest children how to read music. The program displays either a treble clef or a bass clef with a single whole note. The child is asked to name the note within a previously selected time. After 20 notes, the responses are evaluated and the incorrect ones reviewed.

Six Steps

I follow six steps when debugging a program. Step one clearly defines the lesson. Children learn more quickly when lessons are simple. For example, in Music Note Recognition I could have included sharps, flats or fractional notes. Instead, I

limited the lesson to whole natural notes.

Step two presents the lesson facts. Most educational programs I have seen fail by asking questions before the student has a chance to study the material. My children quickly lose interest in a program, if it asks them several questions in a row that they cannot answer. Programs are more effective if the lesson is presented before testing begins.

In Music Note Recognition, line 240 lets the child review the lesson. In the subroutine beginning at line 1400, each note is presented with its name. The child can study as long as necessary before beginning the test.

Step three tests the child's knowledge. The test is the heart of any educational program. The student should be allowed to demonstrate his knowledge of the material.

I try to make the test questions active, varied and interesting. My children lose interest, if the program repeats the same questions in the same sequence

each time the program is run. I use the TRS-80 random generator to vary the order of the questions. I also include protection to prevent repeating the same question too often.

In Music Note Recognition, lines 420-440 select the sequence of questions. Each question is compared to previously selected questions to prevent duplication. Thus, 20 of the 33 possible questions are presented each time the program is run, but in different sequences.

Children respond best to programs that have a lot of action on the CRT. For example, this music program redraws the entire staff for each test question rather than merely moving the note. The extra action helps hold the child's attention.

Include Challenges

If the program is going to be useful for more than a few runs, the test must become more difficult as the student masters the lesson. You can challenge the student by limiting the time allowed for each answer.

The value of H selected in line

320 determines the time allowed. In my computer, I must multiply the number of seconds selected by 40. If the program is used without a keyboard debounce routine, the 40 must be increased. The correct value can be established by experimentation.

The program responds to each answer immediately, correcting a child's responses. This feature makes the computer especially valuable as a teaching tool. Lines 560-580 confirm the answer given or tell the child what the correct answer was.

Step four evaluates the results. An evaluation should encourage the student to study. An effective educational program will evaluate how well the child has learned the lesson and encourage the child to perform better. I try to present the evaluation in a positive manner.

For my older children, I use their school's grading scale. They are shown the percentage correct and a letter grade. For younger children, I use "Great," "Good," "Fair" or "Need more

the electric pencil II™

© 1980 Michael Shroyer

for the TRS-80 Model II* Computer



The Electric Pencil is a Character Oriented Word Processing System. This means that text is entered as a continuous string of characters and is manipulated as such. This allows the user enormous freedom and ease in the movement and handling of text. Since lines are not delineated, any number of characters, words, lines or paragraphs may be inserted or deleted anywhere in the text. The entirety of the text shifts and opens up or closes as needed in full view of the user. Carriage returns as well as word hyphenation are not required since each line of text is formatted automatically.

As text is typed and the end of a screen line is reached, a partially completed word is shifted to the beginning of the following line. Whenever text is inserted or deleted, existing text is pushed down or pulled up in a wrap around fashion. Everything appears on the video display screen as it occurs thereby eliminating any guesswork. Text may be reviewed at will by variable speed or page-at-a-time scrolling both in the forward and reverse directions. By using the search or the search and replace function, any string of characters may be located and/or replaced with any other string of characters as desired. Specific sets of characters within encoded strings may also be located.

When text is printed, The Electric Pencil automatically inserts carriage returns where they are needed. Numerous combinations of Line Length, Page Length, Character Spacing, Line Spacing and Page Spacing allow for any form to be handled. Right justification gives right-hand margins that are even. Pages may be numbered as well as titled.

the electric pencil

—a Proven Word Processing System

The TRSDOS versions of The Electric Pencil II are our best ever! You can now type as fast as you like without losing any characters. New TRSDOS features include word left, word right, word delete, bottom of page numbering as well as extended cursor controls for greater user flexibility. BASIC files may also be written and simply edited without additional software.

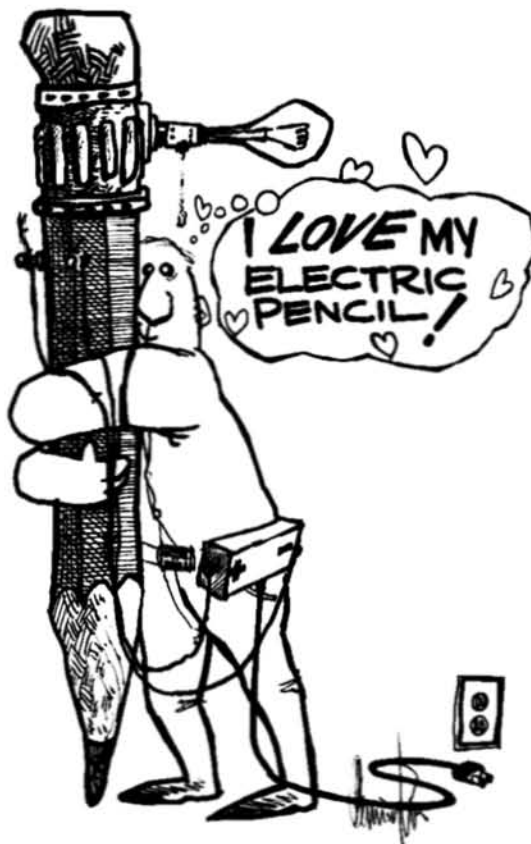
Our CP/M versions are the same as we have been distributing for several years and allow the CP/M user to edit CP/M files with the addition of our CONVERT utility for an additional \$35.00. CONVERT is not required if only quick and easy word processing is required. A keyboard buffer permits fast typing without character loss.

	CP/M	TRSDOS
Serial Diablo, NEC, Gume	\$ 300.00	\$ 350.00
All other printers	\$ 275.00	\$ 325.00

The Electric Pencil I is still available for TRS-80 Model I users. Although not as sophisticated as Electric Pencil II, it is still an extremely easy to use and powerful word processing system. The software has been designed to be used with both Level I (16K system) and Level II models of the TRS-80. Two versions, one for use with cassette, and one for use with disk, are available on cassette. The TRS-80 disk version is easily transferred to disk and is fully interactive with the READ, WRITE, DIR, and KILL routines of TRSDOS.

TRC	Cassette	\$ 100.00
TRD	Disk	\$ 150.00

✓ 255



Features

TRSDOS or CP/M Compatible * Supports Four Disk Drives * Dynamic Print Formatting * Diablo, NEC & Gume Print Packages * Multi-Column Printing * Print Value Chaining * Page-at-a-time Scrolling * Bidirectional Multispeed Scrolling * Subsystem with Print Value Scoreboard * Automatic Word & Record Number Tally * Global Search & Replace * Full Margin Control * End of Page Control * Non Printing Text Commenting * Line & Paragraph Indentation * Centering * Underlining * Boldface



*TRS-80 is a registered trade mark of Radio Shack, a division of Tandy Corp.



MICHAEL SHROYER SOFTWARE, INC.

1198 Los Robles Dr.
Palm Springs, CA. 92262
(714) 323-1400

practice." For pre-schoolers I use a smiling face or a sad face.

Reviews and Invitations

Step five reviews incorrect answers. When the child answers a test question incorrectly, the computer provides the correct one. In addition, the

questions answered incorrectly are reviewed following the evaluation. Line 800 repeats each missed question, until answered correctly.

Step six concludes with an invitation to try again. I try to end every educational program this way. The student should be

praised for good work, but encouraged to achieve higher scores or shorter response times. Such challenges keep the program interesting.

My children have enjoyed learning by computer so much that my 12-year-old daughter, LeEtta, and my 10-year-old son,

Denny, are beginning to write their own simple programs. The educational usefulness of the TRS-80 is limited only by the availability of software. With a little practice any computer owner can write programs that challenge and teach the student. ■

Program Listing

```
40 CLEAR 150:GOTO 210: 'SKIP INPUT ROUTINE
100 'INPUT ROUTINE AND TIMING LOOP
110 FOR L=1 TO I$=INKEYS
120 IF I$>"A" AND I$<"G"PRINT I$;RETURN
130 IF I$<"*" PRINT @, "ANSWER A,B,C,D,E,F OR G
      .
140 NEXT :RETURN
200 'BEGIN PROGRAM
210 CLS:MS=STRING$(63,"-"):DIMA(20):DIME(20):R=0:W=0:K$
   =STRING$(3,CHR$(191))
220 CLS:PRINT@20,"MUSIC NOTE RECOGNITION":PRINT:PRINT@7
   4,"(C) 1988 BY DAVE MCCLUNG, RICHARDSON, TX"
230 PRINT:PRINT"THIS PROGRAM IS DESIGNED TO TEACH MUSIC
   STUDENTS THE NAMES":PRINT"OF EACH LINE AND SPACE.
   ":PRINT:PRINT"THE QUIZ WILL CONSIST OF 20 QUESTION
   S.":PRINT:PRINT
240 PRINT:INPUT "DO YOU WANT TO REVIEW ";Z$
250 IF LEFT$(Z$,1)="Y" GOTO 1400
300 'GET INFORMATION
310 CLS:INPUT "WHAT IS YOUR NAME ";N$
320 PRINT:INPUT "HOW MANY SECONDS FOR EACH QUESTION ";H
   :H=H*40
330 '59 SECONDS MAXIMUM
340 IF H>2360 PRINT"YOU CAN'T HAVE THAT LONG":PRINT:GOT
   O 320
400 'SELECT TEST QUESTIONS -- NO REPEATS
410 PRINT:PRINT"STANDBY -- THE COMPUTER IS SELECTING TH
   E QUESTIONS"
420 FOR X=1 TO 20
430 A(X)=RND(23):FOR Y=0 TO (X-1):IF A(Y)=A(X) GOTO 430
   ELSE NEXT Y
440 NEXT X
500 'TEST
510 FOR G=1 TO 20:N=A(G)
520 GOSUB 1000:GOSUB 1110
530 IF C=1 GOSUB 1210 ELSE GOSUB 1310
540 IF S=924 OR S=156 PRINT@S,"--*K$+--"; ELSE PRINT@
   S,K$;
550 PRINT@S,"*";G; " "; "WHAT IS THE NAME OF THIS NOTE";
   :GOSUB 110
560 PRINT@S,STRING$(63," "):IF I$=Q$ R=R+1:PRINT@S,"COR
   RECT":GOTO 590
570 IF I$<>Q$ AND I$<"*"PRINT@S,"WRONG! THE NOTE IS ";
   Q$;P=P+1:E(P)=A(G)
580 IF I$="" PRINT@S,"YOUR TIME IS UP! THE NOTE IS ";Q
   $;P=P+1:E(P)=A(G)
590 GOSUB 1600:NEXT
600 'EVALUATE TEST RESULTS
610 CLS:PRINTCHR$(23):PRINT"TEST RESULT":PRINT:PRINT$;
   " ,YOUR TEST RESULT IS:"
620 PRINT:PRINT"NUMBER CORRECT = ";R
630 W=20-R
640 PRINT"NUMBER MISSED = ";W
650 PRINT"SCORE = ";U=((R/20)*100):PRINTUSING
   "###";U
660 PRINT"GRADE = ";
670 IF U<60PRINT"F"
680 IF U>59 AND U<70 PRINT"D"
690 IF U >69 AND U<80 PRINT"C"
700 IF U>79 AND U<90 PRINT"B"
710 IF U>89 PRINT"A"
720 PRINT:IF U=100 PRINT"YOU DID GREAT!":GOTO 900
800 'REVIEW THE QUESTIONS MISSED
810 PRINT:PRINT"TO RECHECK THE ONES YOU MISSED -- HIT E
   NTER";:INPUT Z$
820 CLS:FOR O=1 TO (20-R)
830 N=E(O):GOSUB 1000:GOSUB 1110
840 IF C=1 GOSUB 1210 ELSE GOSUB 1310
850 IF S=924 OR S=156 PRINT@S,"--*K$+--"ELSEPRINT@S,K
   $;
860 PRINT@S,"TRY THIS ONE AGAIN ";:GOSUB 110:PRINT@S,"ST
   RINGS(63," "):IF I$=Q$ PRINT@S,"CORRECT! ":GOTO 88
   0
870 PRINT@S,"WRONG!":GOSUB1600:GOTO 860
880 GOSUB1600:NEXT O
890 CLS:PRINTCHR$(23):PRINT"CONGRATULATIONS, ";N$:PRINT
   :PRINT:PRINT"YOU GOT THEM ALL":GOSUB 1600:PRINT:P
   RINT"FINALLY":PRINT:GOSUB 1600:PRINT"AFTER MUCH EF
   FORT"
900 PRINT:PRINT"TO TAKE THE TEST AGAIN -- HIT ENTER":IN
   PUT Z$:RUN
1000 'SELECT NOTE
1010 ON N GOTO 1020,1021,1022,1023,1024,1025,1026,1027,
   1028,1029,1030,1031,1032,1033,1034,1035,1036,1037,
   1038,1039,1040,1041,1042,1043
1020 Q$="G":S=222:C=1:RETURN
1021 Q$="F":S=286:C=1:RETURN
1022 Q$="E":S=350:C=1:RETURN
1023 Q$="D":S=414:C=1:RETURN
1024 Q$="C":S=478:C=1:RETURN
1025 Q$="B":S=542:C=1:RETURN
1026 Q$="A":S=606:C=1:RETURN
1027 Q$="G":S=670:C=1:RETURN
1028 Q$="F":S=734:C=1:RETURN
1029 Q$="E":S=798:C=1:RETURN
1030 Q$="D":S=862:C=1:RETURN
1031 Q$="C":S=924:C=1:RETURN
1032 Q$="C":S=156:C=2:RETURN
1033 Q$="B":S=222:C=2:RETURN
1034 Q$="A":S=286:C=2:RETURN
1035 Q$="G":S=350:C=2:RETURN
1036 Q$="F":S=414:C=2:RETURN
1037 Q$="E":S=478:C=2:RETURN
1038 Q$="D":S=542:C=2:RETURN
1039 Q$="C":S=606:C=2:RETURN
1040 Q$="B":S=670:C=2:RETURN
1041 Q$="A":S=734:C=2:RETURN
1042 Q$="G":S=798:C=2:RETURN
1043 Q$="F":S=862:C=2:RETURN
1100 'PRINT STAFF
1110 CLS:PRINT@256,MS:PRINT:PRINTMS:PRINT:PRINTMS:PRINT
   :PRINTMS:PRINT:PRINTMS
1120 RETURN
1200 'DRAW TREBLE CLEF
1210 FOR D=9 TO 40:SET(21,D):NEXT D
1220 RESTORE
1230 FOR D=1 TO 61:READ A,B:SET(A,B):NEXT D
1240 DATA 10,30,10,31,11,29,10,32,10,33,11,34,12,28,12,
   35,13,27,13,36,14,26,14,36,15,25,15,31,15,32,15,37
   ,16,24,16,30,16,37,17,23,17,29,17,37,18,22,18,28,1
   8,37,19,21,19,27,19,37,20,20,20,26,20,37
1250 DATA 22,9,22,19,22,26,22,37,23,10,23,18,23,26,23,3
   6,23,37,24,11,24,17,24,27,24,35,24,36,25,12,25,16,
   25,27,25,28,25,34,25,35,26,13,26,14,26,15,26,28,26
   ,29,27,30,27,31,27,32,26,33,26,34
1260 RETURN
1300 'BASS CLEF
1310 RESTORE:FOR X=1TO61:READA,B:NEXTX:FOR X=1 TO 92:RE
   AD V,K:SET(V,K):NEXT X:RESTORE:RETURN
1320 DATA9,18,9,19,10,17,10,18,10,19,11,16,11,17,11,19,
   11,20,12,15,12,16,12,19,12,20,13,15,13,19,13,20,14,
   14,15,13,15,14,15,38,15,39,16,13,16,37,16,38,17,1
   3,17,36,17,37,18,13,18,35,18,36
1330 DATA19,13,19,35,19,34,20,13,20,34,20,33,21,13,21,3
   3,21,32,22,14,22,32,22,31,23,14,23,15,23,31,23,30,
   24,15,24,16,24,30,24,29,25,16,25,17,25,28,25,29,26
   ,17,26,18,26,27,26,28,27,18,27,19,27,26,27,27
1340 DATA28,19,28,20,28,21,28,22,28,23,28,24,28,25,28,2
   6,29,28,29,21,29,22,29,23,29,24,29,25,30,21,30,22,
   30,23,30,24,32,15,32,16,32,17,32,21,32,22,32,23,33
   ,15,33,16,33,17,33,21,33,22,33,23
1400 'REVIEW TREBLE
1410 CLS:PRINT@S,"TREBLE CLEF"
1420 GOSUB 1110
1430 GOSUB 1210
1440 FOR N=1 TO 12:GOSUB 1000:
1450 IF N/2=INT(N/2) S=S+10
1460 IF S=934 OR S=166 PRINT@S,"--*K$+--" "+Q$; EL$
   E PRINT @S,K$+" "+Q$;
1470 NEXT N:PRINT@988," TO REVIEW BASS CLEF - HIT ENTE
   R ";:INPUT Z$
1480 CLS
1490 GOSUB 1110
1500 GOSUB 1310
1510 PRINT@S,"BASS CLEF"
1520 FOR N=13 TO 24:GOSUB 1000
1530 IF N/2=INT(N/2) S=S+10
1540 IF S=924 OR S=156 PRINT @S,"--*K$+--" "+Q$; EL
   SE PRINT @S,K$+" "+Q$;
1550 NEXT N:PRINT@988," TO PROCEED WITH QUIZ - HIT ENTER
   ";:INPUT Z$
1560 GOTO 310
1600 'PAUSE
1610 FOR Y=1 TO 1000:NEXT:RETURN
1700 END
```


PROPERTY MANAGEMENT SOFTWARE

This professional software designed to meet the exacting requirements of the Institute of Real Estate Management. This software is user engineered and has been thoroughly developed in actual nationwide use managing all types of income properties. The software is written in CBASIC, requiring dual drives and 48K of memory (also TRS-80, Apple compatible). We feel this is the most extensive property management software written for a microcomputer. The system includes:

- Full General Ledger
- Checkwriter
- manual check can also be used
- Budgeting
- Tenant Information
- Rent Roll
- Delinquency List
- Vacancy List
- Lease Expiration Report
- Lost Rent Report
- Vendor Report
- Full Audit Trail
- Real Estate Support
- Plus much, much more

Demonstration diskettes with manual is \$35.00 and can be applied toward full software price of \$650.00. MasterCard, Visa and COD orders welcome. Dealer inquiries invited.

A-T Enterprises ✓ 418

221 No. Lois, La Habra, CA 90631
(213) 947-2762

"TRS-80 is a registered trademark of TANDY CORP."

Call about our fantastic price on 4-drive complete system.	
Level II 4K	\$557.10
Level II 16K	\$720.00
Expansion Interface	
Expansion Interface 16K	\$269.00
Expansion Interface 32K	\$403.20
16K Memory Kit for TRS-80 or Apple	\$524.00
	\$79.95

TRS-80 & NORTH STAR ADD-ON DRIVES

CUSTOM ENCLOSURE



CABLE INCLUDED

Single drive system in custom enclosure	\$400.00
Single drive system in metal enclosure	\$375.00
Double drive system in custom enclosure	\$806.00

MPI	\$275.00
MPI, B52, dual headed	\$349.00
Shugart SA400	\$275.00
Shugart SA800	\$479.00
Tandem single sided	\$279.00
Tandem double sided	\$425.00
Hozeltine 1000	\$450.00
Single tier walnut enclosure for Shugart	\$ 35.00
Double tier walnut enclosure for Shugart	\$ 32.00
Atari 400	\$548.49
Atari 800	\$795.00
Hozeltine 1410	\$749.00
Centronics PI Printer (TRS-80 add on)	\$398.95
Centronics 779-2 tractor (TRS-80 add on)	\$1049.95
TI Printer	\$1599.00
Base 2	\$649.00
Horizon 1, 32K	\$2290.00
Televideo 912	\$775.00
SPECIAL! MINI FLOPPY DISKS, box of 10 (with plastic box) only \$28.00 (without plastic box) only \$26.50. Box of 10, 8" disks (in plastic box) \$30.00. Centronic 779 ribbons \$3.50 each.	

Atora Systems ✓ 303 INC.

WE ACCEPT BANK AMERICAN, VISA, MASTER CHARGE
29-02 23rd Ave., Astoria, N.Y. 11105
TWX 7105822107 (212) 728-5252
(800) 221-1340

NEVER UNDER SOLD

Find the best price you can in this magazine on a box of 10, Verbatim 5 1/4 inch Floppies and subtract \$.50; THAT'S OUR PRICE— We include the shipping (please figure the competitor's shipping and handling charges in your computation).* Compare our prices on other equipment; if we're not the least expensive, give us a call.

THIS MONTH'S SPECIALS

SPECIAL #1

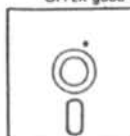
If you purchase the "TRS-80 DISK AND OTHER MYSTERIES" Book for the regular price of \$22.50 you can buy 10 VERBATIM DISKETTES AND a plastic library case for \$22.00
TOTAL \$44.50

SPECIAL #2

If you purchase APPARAT NEWDOS+ for the regular price of \$99.95 you can buy 10 VERBATIM DISKETTES AND a plastic library case for \$5.00
TOTAL \$104.95

PRICE LIST

Blank Diskettes		Fast Gammon	CALL
Verbatim 5 1/4"	\$26.50	Securities Graphics	29.95
Verbatim 8"	30.00	Job Costing Package	74.95
Verbatim 8" Double Density	44.00	Complete accounting package for MODEL I and MODEL II	CALL
Aids		Hardware	
Flippy Kit	11.95	TI-99/4	880.00
16K Ram Kit (200ns)	69.00	SOROC IQ120	775.00
Whistle Switch	23.95	SOROC IQ140	1125.00
BSR System X-10	74.95	CENTRONIX 730	750.00
BSR Modules	13.95	ANADEX DP-8000	855.00
Floppy Saver refills (25)	6.95	PAPER TIGER	CALL
Hard Hole Tool refills (50)	4.00	QUME 5/45, 5/55	CALL
Photo Point Light Pen	19.95	LEDEX VIDEO 100 12"	124.95
Plastic Storage Box 8"	3.00	SHUGART SA 400 (35 track same as Tandy)	349.00
Plastic Storage Box 5 1/4"	2.50	Books	
Web T-BEEP	19.95	TRS-80 Disk and Other Mysteries	22.50
Diskette Frames	4.00	Supplies	
Plastic Diskette Sheets (10)	8.95	9 1/2" x 11" Paper, 11" x 14" Paper, Labels, Forms; Print wheels, print thimbles and ribbons for DIABLO, QUME, NEC, TI and others	CALL
Software		Send for FREE catalogue	
Apparat Newdos+ 35tr	88.00	Free shipping for orders over \$20.00.	
40tr	98.00		
WEB TSHORT	9.45		
Electric Pencil	CALL		
Dungonquest	CALL		
*OFFER good as supply lasts.			



Alpha Byte Storage ✓ 69



4636 Park Granada 159
Calabasas, California
91302 (213) 883-8594



KRELL SOFTWARE
presents for the TRS-80*
PET, Apple II, and Apple II Plus

ELECTORAL COLLEGE 1980

The Tool for forecasting the outcome of the 1980 presidential Election. Will it be CARTER? REAGAN? ANDERSON? or will the election be forced into the House of Representatives? This program, developed by a professor of Political Science is built to be used in two ways:

1. During the political campaign prior to the election and,
 2. On Election Night, as the partial returns roll in on network news.
- Using the state by state data on previous elections that the program provides, simulated elections are run and the probability of outcomes calculated. \$14.95

COLLEGE BOARDS

The best way to sharpen your skills for the College Board SAT Exams is to work on actual examinations. Each of these 4 programs confronts the user with a virtually limitless series of questions and answers. Each program is based on past SAT exams and presents material of the same level of difficulty and in the same form as used in the verbal and mathematical portions of the College Board Examinations. Scoring on each exam is provided in accordance with the formula used by College Boards.

COLLEGE BOARD - VOCABULARY	19.95
COLLEGE BOARD - WORD RELATIONSHIPS	19.95
COLLEGE BOARD - MATH PART A	19.95
COLLEGE BOARD - MATH PART B	19.95
COMPLETE SET	59.95

TIME TRAVELER

The best of the adventure games. Confronts player with complex decision situations and at times, the demand for real time action. Using the time machine, players must face a challenging series of environments that include: the Athens of Pericles, Imperial Rome, Nebuchadnezzar's Babylon, Ikhnoton'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, the Vikings, etc. Involve yourself with historical military and government operations, markets, etc. in fascinating game situations. Each game is unique! \$24.95

THE 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 struggle as you encounter wolves, dwarves, elves, dragons, bears, owl, orcs, giant bats, trolls, etc. Each game is unique in this spectacular and complex world of fantasy. \$24.95

REALTIME SUPER STAR BASEBALL

Performance is based on the interaction of actual batting and pitching data. Players select rosters and lineups and exercise strategic choices including base stealing, pinch hitting, bunting, intentional walks, hit and run plays, etc. Games include double plays, wild pitches, infield errors, hit batsmen and pick offs. \$14.00.
ALSO AVAILABLE ALL TIME SUPER STAR BASEBALL \$14.95.

PRIME TIME

Players compete as network executives. Each selects T.V. shows for competing time slots. Choose from a range of programs including sit-coms, dramas, soaps, westerns, sci-fi, news and documentary shows, etc. Up to three players compete for ratings and advertising revenue. Program simulates fan loyalties and industry events including FCC rulings and criticism from civic groups. Exciting and realistic. In game package #3.

HOSTAGE

Negotiate and/or stage military raids in this contest between the Authorities and the Terrorists.

Terrorists select their target; choosing to seize hostages at foreign embassies, the U.N. Building, Airlines, Hospitals, School Buses, or even Nuclear reactors.

As in real life, public opinion counts and shapes the players actions. Players have a dramatic and realistically wide range of tactical options. This game accurately reflects the intricacies of threat, promise and all facets of negotiations. In game package #1.

GAME PACKAGE #1
HOSTAGE, BLACK GOLD, PRIMARY
FIGHT 19.95

GAME PACKAGE #3
PRIME TIME, STAR CLIPPER,
BULLS AND BEARS 19.95

GAME PACKAGE #2
BANZAI, BANZAI II, SUPER BANZAI,
THE BLACK DEATH 19.95

GAME PACKAGE #4
WORDSWORTH, HARDSCRABBLE, BIBLE QUOTE,
SHAKESPEARE QUOTE, BILL OF RIGHTS
QUOTE 19.95

*All programs require 16K • TRS-80 Programs requires Level II Basic • Apple programs require Microsoft Basic

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

Send check or money order to **Krell Software** ✓ 375

21 Millbrook Drive, Stony Brook, NY 11790 (516) 751-5139

**BY THE
TIME
YOU
READ
THIS
AD,**



dial (617) 373-1599 and order Insort-80, your TRS-80* microcomputer would have sorted 1,200 names and addresses, 10,000 numbers, or any other Random Disk File from your Basic program... for only \$49.95!

"Let us sort things out for you!"

S&M SYSTEMS, INC.

P.O. Box 1225
2 Washington Street
Haverhill, Massachusetts 01830

Approximate Sort Time for Insort-80 is eight minutes.
TRS-80 is a registered trademark of the Tandy Corporation.

TSHORT +TM from WEB Associates

**THE MOST
POWERFUL
BASIC
SHORTHAND
EVER!**



TRS-80 Keyboard with decals installed

- 11 "SAVEABLE" KUSTOM keys. Ten 10-character and one 64-character
- 41 preprogrammed LV II and DOS statement keys.
- Complete decal set (see picture) included for both LV II and DOS systems.
- Includes DEBOUNCE and AUTO REPEAT
- Hold "SHIFT or CLEAR" and press desired key — entire statement is typed on screen.
- Includes LOWER CASE DRIVER. "@" key substitutes for "SHIFT"
- Less than 1K bytes machine language, relocatable in hi or low memory.
- Features self-entering commands. I.E. CONT, GOTO10, KUSTOM.
- Includes comprehensive instruction manual.

TSHORT + (one cassette includes Level II & single drive DOS) \$ 19.95

TSHORT + on formatted diskette (DOS only, requires 2 or more drives) \$ 24.95

Send Check or Money Order to
Phone Orders

WEB ASSOCIATES

New Mail Order Address ✓ 27
P.O. Box 9601
Corona Del Mar CA 92625
(Calif. Residents add 6% tax)

(714) 494-2869
Dealer Inquiries Invited
UPS/COD — Add \$3.00



SEND FOR FULL LINE CATALOG

Deep in the heart of ROM.

BINAX KIBUFF

John T. Blair
122 Dumont Ave.
Norfolk VA 23505

In an attempt to break Microsoft's BASIC for the TRS-80, several of our club members have spent many sleepless nights tearing through the listings of the Level II ROM's. What follows is some of the fruits of their labors and we hope that some of the newer machine language programmers can save some time by calling on the following information.

DELAY is used for time delays. Load the BC registers with a number between one and FFFF Hex (H). When DELAY is called, a return will occur approximately

$(28 \cdot (N - 1) + 31) \cdot 563.67$ Nanoseconds

later. This routine is located at 0060H.

LD BC,XXXX ;where XXX = delay time
CALL 0060H

CLS is used to clear the screen and home the cursor. It is located at 01C9H.

KIBUFF reads the keyboard into a buffer until a carriage return (CR) is entered, then it returns to the calling routine. The starting address of the buffer is contained in 40A7H, noted by programmers as (40A7H) and is initialized to 41E8H. This can be changed by the user if desired. This routine resides at 0361H.

CALL 0361H

BINAX is used to convert a binary number in the HL register to its ASCII equivalent. The ASCII value is in a buffer beginning at 4130H. The contents of 4130H, (4130H), is always equal to 20H.

The contents of 4131H to 4135H will have the decimal ASCII characters. (4136H) will always be 00H.

CALL 0FAFH

AXBIN converts from ASCII to binary. Load the HL register pair with the address of the first ASCII character to be converted. On return the DE register contains the binary equivalent. The maximum number which can be converted is 65529. This routine is located at 1E5AH.

LD HL,XXXH ;XXX is address of char. to be converted
CALL 1E5AH ;call convert routine
LD A,(DE) ;Acc. contains the binary value

OUTSTR will output a string of characters from memory to the CRT. Load the HL register with the address of the first character. Characters are outputted until either a OOH or 22H is found. OUTSTR is located at 28A7H. (Note: Since the addition of a disk I have found this routine may or may not work. It will work if the system is brought up in BASIC2, non disk based BASIC.)

VIDEO displays any character in the 'A' on the CRT. You must push the DE register onto the stack before calling this routine. It is located at 0033H.

PUSH DE ;save DE
CALL 0033H ;display character

POP DE ;restore DE

PRNTR, the printer driver routine, located at 058DH, is CALLED from 003BH. This routine locates the printer at 37E8H, and checks its ready status by reading 37E8H for a 30H.

This routine is very poor because it is not useful with many printers other than Centronic's. (Radio Shack has assumed that a smart printer will be used.)

You can capture the routine and use your own by changing the address stored at 4026H and 4027H to the address of your printer driver. (Note: Be sure to PROTECT your printer driver program by answering the MEMORY SIZE question.)

SCANKE scans the keyboard for an entry (key closure) and returns the ASCII value of the key in the 'A' register. SKANKE is located at 002BH, you must exchange registers before calling this routine.

EXX ;save registers
CALL 002BH ;scan the keyboard
EXX ;restore registers
AND 7FH ;mask out bit 8

Cursor control table is located from 0506H to 0540H.

1. Backspace and delete character—04CEH.
2. Delete last character—04CE. HL point to video memory of character.
3. Cursor on—048BH
4. Cursor off—04BDH
5. Convert to expanded characters—04F6H
6. Backspace cursor—04DAH
- 6a. Advance cursor—04ECH
7. Down feed cursor—04E7H
8. Up feed cursor—04F1H
9. Cursor home—04C0H
10. Cursor to beginning of line—04A1H
11. Erase from cursor to end of line—0573H

12. Clear all after cursor—057CH

Relocated to RAM on power up:

1. Vectors for interrupts—06D2 to 06E6H
2. Keyboard device control block—06E7-06EE
3. Video DCB—06EF to 06F6H
4. Printer DCB—06F7 to 06FEH
5. 4080 to 191CH (uncertain)

Basic command table—1650 to 181FH

(Note: This is ASCII text, however, the first character in a word has the most significant bit (8) set to indicate new word.)

Jump table—1820H to 18C9H. These are two word address, i.e., AE 1D means that the routine is located at 1DAEH. This table is a one for correspondence for the BASIC command table.

Error messages—18C9 to 18F6H. The data here is ASCII code and two words each, i.e., 4E 46 is the ASCII for the NF code.

If any of you readers have uncovered any more of the secrets and would like to share them, then please send addresses of the routines and any other information you have.

One last note, Radio Shack's RS-232 card has several locations for its addressing. The control of the Baud rate, parity, number of bits to be sent, etc., are a combination of both hardware and software selection. Its data port is located at port EBH.

I wish to express my thanks to Bob Coble, Dwane Saylor and Geogre Higson for their assistance in locating and defining the routines. ■

The intricacies of PRINT statements.

Variations On A Theme

George R. Bullitt
Route 82
East Haddam, CT 06423

Since becoming hooked on the TRS-80 in July 1978, it has been my singular objective to collect all the available reference material I could find on programming that wonderful machine. At best the collected works cover the more obvious routines, ignoring what I consider to be the fundamentals that can change a good program into a better one.

Printing a Line

One of those fundamentals is the printing of a line. Have you ever found in a book even one paragraph on the printing of a simple line?

Well, turn on your set, because here it is! Get yourself into BASIC, type and RUN the following:

```
10 CLEAR 100
20 PRINT STRING$(63,"-")
```

How about that!

Let's analyze the code. Line 10 clears string space. (Delete line 10 and see what happens.) Line 20 utilizes strings which

print almost anything, as many times as you want. In this instance it printed 63 dashes (-) which is the maximum for the TRS-80 screen. Just remember that the number is placed left of the comma, and the character you want printed is on the right side, enclosed in quotes (except for control codes).

Type and RUN this mini program:

```
10 CLEAR 100
20 PRINT STRING$(21,"X");STRING$(21," ");STRING$(21,"")
```

See what I mean about the STRING\$ function?

In case you have forgotten, the semicolon between statements prints everything on the same line and eliminates the need to repeat the PRINT statement for each command. On the other hand, typing a colon between statements, followed by PRINT, prints each statement on a different line. If you are a skeptic try it by retyping line 20 to read:

```
20:PRINT STRING$(21,"X");PRINT
STRING$(21," ");PRINT STRING$(21,"")
```

Okay, now that you know how to print a line, let's get more specific and print a line at the

top of the screen then another one 1/2 inch below it. Type and RUN:

```
10 CLEAR 100
20 L$ = STRING$(63,"-")
30 PRINT L$
40 PRINT CHR$(138)
50 PRINT L$
```

In spite of those funny looking bar graph lines, it works! CHR\$(138) is the ASCII code instructing the computer to print three blank lines. It also happens to be the graphics code to print that up and down bar on the screen. However, when that code is sent to a printer it prints only the three blank lines.

If you write a program strictly for the video display use the PRINT statement to print blank lines instead of CHR\$(138). If you include a routine that also writes to a printer, then use it in that part of the program to save time and memory.

Notice in line 20 that STRING\$(63,"-") is made equal to a smaller string character (L\$) again saving time and memory.

It was stated earlier that the STRING\$ function prints almost anything, so why not a control code such as CHR\$(138)? Retype line 40 to read:

```
40 PRINT STRING$(1,CHR$(138))
```

Remember, since we are using a control code, the quotes are not used to the right of the comma. Run the program and you will find that it does the same job, printing three blank lines. Each additional increase in the number to the left of the comma will print one more line and add 5/32 of an inch between the printed lines.

Changing the number to two will print four lines or 5/8 of an inch and changing it to four will print six lines or approximately 1 inch between lines and so on.

More Sophistication

To expand the theme and make our program more sophisticated, type and run:

```
10 CLEAR 100
20 L$ = STRING$(63,"-")
30 INPUT "NO. OF LINES TO PRINT":L
40 FOR X = 1 TO L
50 PRINT L$
60 NEXT X
```

Lines 40 through 60 set up the FOR-NEXT loop, ending it when the number of lines you entered have been printed. Entering 14 fills up the screen. Seven fills half the screen. This type of program is especially useful for making up ruled lines on a page with your printer. If

ΩMEGA
SALES
CO.

**"WHOLESALE COMPUTER PRICES"
DIRECT TO THE PUBLIC**
12 Meeting St., Cumberland, R.I. 02864



TRS-80
Model II - \$3,500



Apple II
16K - \$1049



INTERTEC SUPERBRAIN
32K RAM - \$2449.00
64K RAM - \$2649.00



For TRS-80, Apple, IBM
Interface Included

Epson TX-80 - \$745



NEC Spinwriter
5510-5530 - \$2449



Soroc 120 - \$699

PRODUCT SPECIAL OF THE MONTH!!



**Atari 800
\$749.00**

Products are
**NOW
IN
STOCK
AT
ΩMEGA
Sales
Co.**

CALL TOLL FREE FOR ΩMEGA'S PRICE!

ΩMEGA OFFERS THE BEST DELIVERY AND PRICE ON:
APPLE • ATARI • TRS-80 MODEL II • INTERTEC •
T.I. 810 • HEWLETT-PACKARD-85 • SOROC •
COMMODORE • NEC • QUME • CENTRONICS

ΩMEGA sells only factory fresh, top 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.

1-401-722-1027 or

1-800-556-7586

ΩMEGA ships via UPS, truck, or air. COD's, VISA, Mastercharge accepted.



ΩMEGA TOLL FREE

you want to double space the lines change line 50 to read:

70 PRINT NS
80 PRINT LS

50 PRINT LS: PRINT

An easier way, however, is to increase the number in line 20 from 63 to 64. Increasing the number adds a dash (-), which pushes the invisible cursor around the corner to the head of the next line, completing the command. Then it moves to the line below, creating the double space, to wait for another command, which in this case is to print 64 dashes.

Now, how about printing a line at the top of the screen and then another one two inches below it with a message in between. Type and RUN:

```
10 CLEAR 100
20 LS = STRING$(63," ")
30 NS = STRING$(4,CHR$(138))
40 PRINT LS
50 PRINT NS
60 PRINT TAB
(22);REPORT TO THE BOARD
```

Not bad! But what if I want to vary the report heading? In that case, add the following:

```
35 INPUT "TYPE IN YOUR REPORT HEADING";RS
```

Since the number of letters in the report heading will vary, a formula has to be built into the program so that the computer can figure the correct tab position, regardless of the number of letters.

The way we arrived at the tab position (22) in line 60 was to subtract the number of letters in our heading (19) from the total number of spaces (63) dividing the answer by two. Translating that into a formula the computer will understand is relatively easy. Simply stated the formula is: 63 minus the length (LEN) of the heading (RS) divided by two (/2).

In computerese it is written

63-LEN(RS)/2. Since the computer has to calculate the value of 63-LEN(RS), before it can divide the answer by two, it must be enclosed in brackets.

Now the formula looks like this: (63-LEN(RS))/2. It follows that the answer will be our final tab position. The formula itself will have to be enclosed in brackets. Retype line 60 and RUN:

```
60 PRINT TAB ((63-LEN(RS))/2);RS
```

For the finale, use the same formula to print a line across the screen with the report heading embedded in the middle. Type and RUN (clear the previous program by typing NEW and press ENTER):

```
10 CLEAR 100
20 INPUT "TYPE IN YOUR REPORT HEADING";RS
30 LS = STRING$(63-LEN(RS))/2," "
40 PRINT LS;RS;LS
```

Simple but effective!

Note that the formula is placed to the left of the comma in line 30, giving the computer the same information as in line 60. However, instead of printing blank spaces to reach the tab position, it prints dashes (-).

To leave a blank space on either side of the report heading change lines 30 and 40 adding line 35:

```
30 LS = STRING$(63-LEN(RS))/2," ");
35 BS = STRING$(1," ");
40 PRINT LS;BS;RS;BS;LS
```

In order to leave room for a blank space, one dash is subtracted from the formula in line 30, and STRING\$(1," ") is added to print that blank space on either side of the heading.

If you would like to do the exercises in this article on your printer change all PRINT statements to LPRINT. Also, you can change the number 63 to the number of characters (columns) your printer is capable of printing across the page. ■

PROFESSIONAL

TRS-80 Business Software from 49⁰⁰

TRS-80 MODEL II

All of our Model II Software Requires CP/M and CBASIC. This allows you to take full advantage of your Model II.

CP/M \$250

CBASIC \$100

OSBORNE WITH OUR ENHANCEMENTS

GENERAL LEDGER \$125.00

Handles up to 8000 transactions to as many as 750 operator defined accounts. Formal report formatting at report print time. It stores a full year of posting by Month, Year and Quarter. Handles Departmentalization. Integrates with Accounts Receivable and Accounts Payable.

PAYROLL \$125.00

Computes pay, Taxes. Handles Multiple Pay Types, keeps Employee Records, handles Multiple Reoccurring Deductions, Prints Checks, Prints Payroll Journal, W-2s, 941a, Complete Job Cost with Overhead Distribution.

ACCTS REC & PAY \$125.00

Accounts Payable has complete Purchases Journal which creates Purchase Orders that post to Payables when goods are received. Calculates checks by due date or by demand. Aged Ledger Accounts Receivable has a complete Sales Ledger and handles open items with Balance Forward type payments allowed. Gives true aging plus more.

OUR PROGRAMS

INVENTORY \$350.00

CPA CLIENT WRITE UP \$650.00

TRS-80 MODEL I

All these programs run with TRSDOS and Radio Shacks Level II Disk Basic.

Osborne
General Ledger, Payroll, Accts Rec & Payable. Each \$49.00 or \$129.00 for all three.

Manuals for the Osborne programs and ours \$20 each

.....
These programs are already running and can be working for you now. Just call or write and we will answer your questions as to how it can work for you.

Full Service Accounting & Processing

5423 Crows Nest, Fairfax, Va. 22030
VISA/MASTER CHARGE ✓ 133

(703) 573-7300

NEW!
MODEL II

RM Cobol with Multi Key ISAM
\$ 495.00 Manual \$ 39.00

We deduct 2.00 from phone orders
to cover your call for you!

Build your own microcomputer as you learn computer technology at home.

New from NRI! The First Interdisciplinary Home Study Course Ever Offered

As the microprocessor revolutionizes the computer world and microcomputers appear almost everywhere, NRI brings you a new, convenient, and effective way to keep up with this expanding technology. It's NRI's courses in Microcomputers and Microprocessors, created and designed exclusively for learning at home in your spare time.

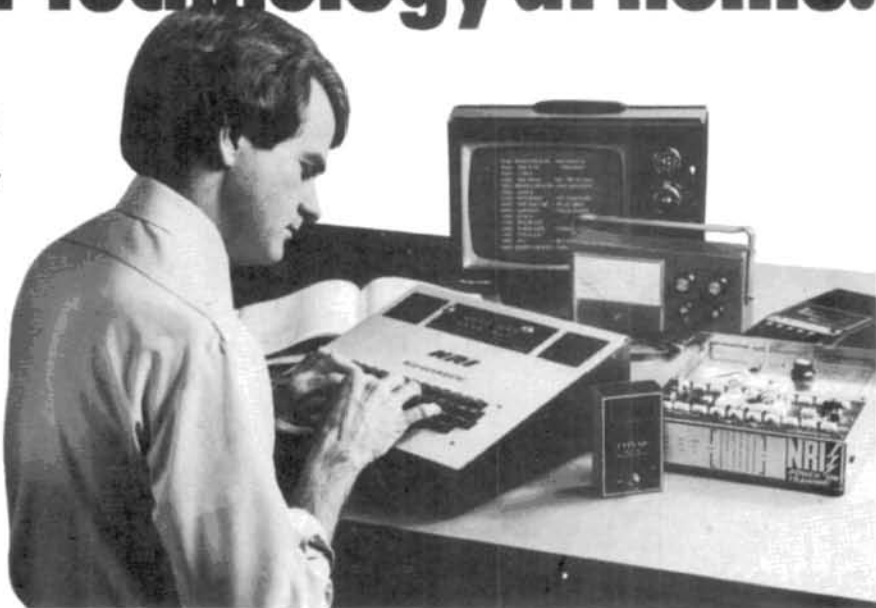
Designed for the New Breed of Computer Technician

It's no longer enough to be just a programmer or technician. With microcomputers moving into the fabric of our lives as low-cost, easily available tools for business and home, both the programmer and technician must become total professionals. With practical knowledge of hardware, the programmer can design simpler, more effective programs. And with advanced programming skills, the technician can test and debug systems quickly and easily. The NRI course gives you simultaneous training in both skills...makes you one of this rare new breed.

Build Microcomputer, Test Instruments

NRI goes far beyond book learning to give you practical, "hands-on" experience. As you learn, you actually assemble NRI's designed-for-learning microcomputer. It performs like the finest of its kind, and features both assembly and basic language capabilities.

Every assembly step's a learning step. Using the NRI Discovery Lab® plus the NRI transistorized volt-ohm meter and CMOS digital frequency counter you also build, you perform meaningful experiments throughout your course...trace circuitry, interface components,



introduce and correct problems, design your own programs, and more.

The Proven Way to Learn at Home

You don't have to worry with travel, classes, or time lost from work when you learn the NRI way. As they have for more than 60 years of teaching technical subjects, NRI brings the material to you. You study in your spare time, at your convenience, using "bite-size" lessons that program material into logical segments for easier assimilation. You perform experiments and build equipment using kits we supply. And your personal NRI instructor is always available for consultation should you have questions or problems. Over a million students have already shown the effectiveness of NRI training.

Choice of Courses

Several courses are available, depending upon your needs and background. NRI's Master Course in Microcomputers and Microprocessors starts with the fundamentals, explores basic electronics and digital theory, the total computer world, and the microcomputer. The Advanced Course, for students already

versed in digital electronics, concentrates on software and the world of the microprocessor and microcomputer. In both courses, you build all instruments and your own computer.

Send for Free Catalog... No Salesman Will Call

Get the details on these exciting new courses in NRI's free, 100-page catalog. Shows all kits and equipment, lesson outlines, and full information, including facts on other electronics courses. Mail the coupon today and we'll rush your catalog. No salesman will ever call. Keep up with the latest technology as you learn on your own computer. If coupon has been removed, write to NRI Schools, Computer Department, 3939 Wisconsin Ave., Washington, D.C. 20016.



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

- Computer Electronics Including Microcomputers
- TV/Audio/Video Systems Servicing
- Complete Communications Electronics with CB • FCC Licenses • Aircraft, Mobile, Marine Electronics
- CB Specialists Course
- Amateur Radio • Basic and Advanced



All career courses approved under GI Bill.
 Check for details.

- 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

179-030

A sort program with options plus.

Beyond Shell Metzner

*Doug Walker
3485 Mock Orange Ct. S.
Salem, OR 97302*

I needed a BASIC sort utility for my TRS-80, and not wanting to reinvent the wheel, I reviewed available literature in the hopes of finding a printed utility that met my business needs. I went

looking—without success—for a utility that could perform user-specified major to minor field sorts in ascending or descending order on alphanumeric or numeric fields.

I did learn that the Shell-Metzner sort algorithm provides the fastest average BASIC sorting benchmarks.

Also, records can be rearranged by swapping or by using record pointers in a separate array or within a field of a multiple dimension array that is being sorted. In general, pointers

allow faster BASIC sort speeds than record swapping, but more computer memory is needed to hold them and the expanded BASIC coding.

Both alphanumeric and numeric sorts can be readily accommodated, if a character string array holds the file to be sorted. The BASIC VAL function is used for numeric field sorts.

If the record swapping method is used, it is much faster to use the BASIC VARPTR function to swap character string field addresses than to ex-

change field values. This approach minimizes time consuming string space reallocations.

Develop Your Own Sort

Armed with these ideas, I developed a Level II, BASIC sort utility of my own.

Within a two-dimensional array, it allows you to specify an unlimited number of sort fields in major to minor sort sequence. You can also specify whether the sort on each field is to be ascending or descending, and whether numeric or alphanumeric.

The user specifies the sort parameters through INPUT and INKEY\$ statements; but the program can be modified easily to assign the parameters for your business application program and then branch to the BASIC sort utility.

Program Listing 1 contains the BASIC program. Lines 140 through 250 are not part of the sort utility, but generate random character string data that is input for demonstration sorts.

Lines 260 through 480 prompt the user to input the sort parameters. Notice that the single dimension array AS() contains the data field names. Lines 500 through 660 contain the coding

```

ENTER AMOUNT OF STRING SPACE TO RESERVE? 2000
ENTER NUMBER OF RECORDS TO GENERATE? 5
BNBQMOQ      82      M      97055
NT            18      F      97052
DD            69      F      97054
THOGGZS      51      M      97051
QTFMRZTX     61      F      97054
ENTER NAME SORT FIELD 1 ('NAME', 'AGE', 'SEX', OR 'ZIP CODE') OR
ENTER 'STOP'? SEX
IS THE FIELD NUMERIC (Y/N)?N
ASCENDING OR DESCENDING SORT (A/D)?A
ENTER NAME SORT FIELD 2 ('NAME', 'AGE', 'SEX', OR 'ZIP CODE') OR
ENTER 'STOP'? AGE
IS THE FIELD NUMERIC (Y/N)?Y
ASCENDING OR DESCENDING SORT (A/D)?D
ENTER NAME SORT FIELD 3 ('NAME', 'AGE', 'SEX', OR 'ZIP CODE') OR
ENTER 'STOP'? STOP
DD            69      F      97054
QTFMRZTX     61      F      97054
NT            18      F      97052
BNBQMOQ      82      M      97055
THOGGZS      51      M      97051

```

Example 1. A Sample Run

BRING YOUR TRS-80 KEYBOARD TO LIFE!

More than a year ago we used this headline to introduce AUTOK and QEDIT, the keyboard autorepeat and quick edit utilities for Level II BASIC. They've been very popular. But we couldn't resist working them over anyway, in response to customer suggestions. The result? KEYEDIT, a vastly improved AUTOK, QEDIT and a few things more.

With KEYEDIT and your Level II or Disk BASIC system, you get:

- Debourning: No need to use Radio Shack's KBFIX.
- Autorepeat on every key. Just hold a key down, and after a half-second delay, the character repeats about eight per second.
- Single-keystroke keyword entry. Hold down SHIFT for a letter key, and an entire BASIC keyword is spelled out or omits. Plus, you can sign any keyword to any key!
- Keyboard macro facility. Any frequently-typed pattern can be defined and later invoked in a single keystroke. You just fill in the blanks. Takes the drudgery out of repetitive keying.
- Screen-oriented editing. KEYEDIT's cursor moves anywhere in a display, all program listing for instant corrections and deletions. Plus, whole statements can be copied to other parts of the program or combined to form longer ones, without retyping the text. Makes BASIC's EDIT function obsolete!
- Easy loading. KEYEDIT loads from cassette using CLOAD (even though it's written in machine language), and may be saved on disk. Features can be deleted selectively just by deleting lines. Once RUN, KEYEDIT protects itself in memory and links into BASIC, where it unobtrusively awaits your command.
- Thorough documentation. Each feature is explained in detail along with instructions for user modifications.

KEYEDIT will save you hours of effort in BASIC program development. So why waste another minute? Bring your keyboard to life today with KEYEDIT!

KEYEDIT Level II cassette and instructions

\$19



DISCOVERY BAY SOFTWARE CO.
P.O. Box 464 Port Townsend, WA 98368

Bankcards welcome. Dealer inquiries invited. Write us directly for more information.

CPT EXPANSION INTERFACE'S
FOR TRS80'S FROM COMPUTEX



FEATURES

- PROVEN LNW SYSTEM EXPANSION BOARD
- RS232/20mA SERIAL INTERFACE
- MEMORY EXPANSION TO 32K BYTES
- CUSTOM FINISHED WOOD CABINET
- REMOVEABLE FRONT PANEL ALLOWS EASY DISK DRIVE ADDITIONS
- BUILT IN MUFFIN FAN AND DISK DRIVE POWER SUPPLIES
- 15 DIFFERENT CONFIGURATIONS FROM \$249 KIT TO \$1300 for 2-DOUBLE DRIVE 32K ASSEMBLED SYSTEM

✓392

COMPUTEX (713) 332-4359
17710 Heritage Ct Webster, Tx. 77598

SUPERIOR SOFTWARE PACKAGES FOR THE DISK BASED **TRS-80*** SMARTTERM •\$79.95

UNQUESTIONABLY THE BEST SMART TERMINAL PACKAGE FOR THE TRS-80

- True Break Key
- Auto Repeat (Typomatic) keys
- Programmable 'soft' keys
- Forward/Reverse Scrolling
- Multipage Display
- Transmit from Disk File, Screen or Buffer
- Receive to Disk File, Buffer or printer
- Multi Protocol Capability

SPOOL-80 • \$39.95

A TRUE DISK-TO-PRINT DESPOOLER FOR THE TRS-80

- Print Disk Files While Running Other Programs
- Prints Compressed Basic Files
- Includes RS-232 Driver for Serial Printers

CALL US FOR YOUR CUSTOM SOFTWARE REQUIREMENTS

MICRON, INC.
10045 Waterford Drive
Ellicott City, MD 21043
(301) 461-2721

Model II Versions Available Soon

*TRS-80 is a Trademark of Tandy Corp.

— TRS-80 MODEL II USERS —
Preserve — Protect — Display

your equipment with
CRYSTAL CLEAR PLASTIC COVERS



- Keyboard and CRT..... \$24.95 ea
- Line Printer III..... \$14.95 ea

plus \$1.50 postage each
(Indiana residents add 4% sales tax)

Introductory Offer, Buy both covers & save

Combination price \$34.95
including postage

MODEL I covers also available.
DEALER INQUIRIES INVITED.

Crown Plastic Co. ✓119
3746 N. College 317-925-5566
Indianapolis, IN 46225



"HISPED" TAPE OPERATION

2K Baud PLUS for the TRS-80™

- Save, verify and load programs up to 4 times faster than normal
- Save, verify and load array data up to 30 times faster than PRINT#
- User variable hardcopy formatting (3 output routines work with most printers)
- "HISPED" is a machine language program (not a hardware add-on)
- 2 copies plus a free basic test program supplied on high quality cassette—for level 2, 16K, 32K or 48K.

Write for full specifications or send \$24.95 (ck or mo) + \$1.00 P/H (Calif. residents add 6% sales tax)

24 Hour Ordering Line (415) 366-5340

VISA PALOMAR SOFTWARE master charge

170 S. Palomar Dr.
Redwood City, Ca. 94062

✓228

TRS-80 is a registered trademark of TANDY CORP.

Turn your Micro into an electronic and security controller with our new...
TRS-80 INTERFACE



To Order: Send \$59.95 plus \$2.05 for shipping and handling

(Illinois Residents add 6% tax)

TRS-80 Software (Specify Tape or Disk) \$10 with purchase of Micro Commander

\$59.95 90 Day Warranty Assembled & Tested:

COMPUTER CONTROLLED - REMOTE CONTROL
Now an inexpensive and direct carrier current interface between the TRS-80 and the BSR X-10 remote control modules. The MICRO COMMANDER, X-10 modules and your computer can control your lights, appliances, motors, TV, stereo, heaters, alarms, fans, pumps, etc.

COMPUTER CONTROLLED - SECURITY
Add a new dimension to your security system. Place your home under control of your computer real time clock while you are on vacation. Add an input port to your computer and intelligence looms. With switches on doors or windows your computer can welcome guests or frighten intruders.

EASY TO USE - NO WIRES TO RUN
Total control of all X-10 modules. Utilize all 256 house and unit code combinations. Direct interface to AC power line. No command console to purchase. No sonic link. Plugs directly into TRS-80 Model I (Level II or Disk) cassette jack or any 1 bit input and 1 bit output TTL port.

MANUAL INCLUDES ALL SOFTWARE LISTINGS
The 14K basic 4 in 1 program does the following:
Leads machine language driver.
Simulates command console.
Provides sequential operation.
Utilizes real time clock for control.
Complete documentation includes 8080 source listing.

INTERFACE TECHNOLOGY ✓319
P.O. Box 383, Des Plaines, IL 60017
Phone (312) 297-2265



for the sorts.

The Shell-Metzner sort algorithm¹ has been used with a subroutine in lines 930 through 1010. Using the VARPTR, this subroutine compares sort field values (that switch record address pointers) in line 1030 through 1090.² Notice in the sort field value comparison that VAL is used to perform numeric sorts. The relational operators ">" and "<" are used for ascending and descending sorts.

Lines 680 through 690 check to see if there is another sort field. If not, the sort is completed and lines 850 through 870 display the sorted records.

If there is another sort field, lines 710 through 830 identify ranges of records in the prior sort which are equal to those in the second field. The beginning and ending record numbers of the previous sort field ranges, which equal the ranges in the second field, are input to the Shell-Metzner algorithm. These records are then re-sorted to the current field specifications.

Line 560 ignores record comparisons that are outside the current range of interest. This process is repeated until all records are processed.

A Sample Run

Example 1 is a sample run of

Sort Sequence	Field Name	Sort Order	Data Type
Major	Sex	Ascending	Alphanumeric
Minor	Age	Descending	Numeric

Program Listing 1

five records generated by random field values. Next, a sort is specified in the order shown in Table 1.

Finally, the sorted records are displayed. Note that all "F" sex field records are ordered before all "M" sex field records (ascending sort sequence on major sort field). Within "F" and "M" ages are ordered from oldest to youngest (descending sort order

on the minor sort field).

This BASIC sort has proved reliable and a real time-saver when writing business programs. Hopefully, you will be able to put it to good use with your system. ■

1. Thomas E. Doyle, *Kitabaud Microcomputing*, "5 Minutes Or 5 Hours—Sorting Routines Compared," May 1978, pages 100-102.
2. T. R. Dettman, *80-US Journal*, "Super Sorting," November/December 1979, pages 28 and 62.

```

10 REM * USER DEFINED MULTIPLE FIELD SORTS *
20 REM * * * ASCENDING OR DESCENDING *
30 REM * * * ALPHANUMERIC OR NUMERIC *
40 REM * * * MAJOR TO MINOR *
50 REM      DOUG WALKER
60 REM      3485 MOCK ORANGE COURT SOUTH
70 REM      SALEM, OREGON 97303
80 REM      (503) 393-2685
90 REM * HOUSEKEEPING *
100 CLS:DEFINT A-Z
110 INPUT"ENTER AMOUNT OF STRING SPACE TO RESERVE";D
120 CLEAR D
130 REM * GENERATE RANDOM SORT RECORDS *
140 INPUT"ENTER NUMBER OF RECORDS TO GENERATE";A
150 DIM CS(A,4),AS(4):AS(1)="NAME":AS(2)="AGE":AS(3)="S
    EX":AS(4)="ZIP CODE"
160 FOR I=1 TO A
170 B=RND(8)
180 FOR C=1 TO B
190 CS(I,1)=CS(I,1)+CHR$(RND(26)+64)
200 NEXT C
210 E=RND(85):CS(I,2)=STR$(E)
220 IF RND(2)=1 THEN CS(I,3)="M" ELSE CS(I,3)="F"
230 E=97050 + RND(5):CS(I,4)=STR$(E)
240 PRINT CS(I,1),CS(I,2),CS(I,3),CS(I,4)
250 NEXT I
260 REM * USER SPECIFIES SORT PARAMETERS *
270 FOR C=1 TO 4:C1(C)=1:C2(C)=0:D(C)=0:NEXT C
280 R=1:J=A:K=1
290 PRINT"ENTER NAME SORT FIELD";R;:INPUT('NAME', 'AGE
    ', 'SEX', OR 'ZIP CODE') OR ENTER 'STOP';S$
300 IF S$="STOP" AND R=1 GOTO290
310 IF S$="STOP" GOTO480
320 FOR C=1 TO 4
330 IF S$=AS(C) GOTO360
340 NEXT C
350 GOTO290
360 C1(R)=C
370 PRINT"IS THE FIELD NUMERIC (Y/N)?"
380 GOSUB1100
390 S1$=CH$
400 IF S1$="Y" THEN C2(R)=1:GOTO420
410 C2(R)=2
420 PRINT"ASCENDING OR DESCENDING SORT (A/D)?"
430 K$=INKEY$:IF K$="" GOTO430 ELSE PRINT K$
440 IF K$="A" THEN D(R)=1:GOTO460
450 IF K$="D" THEN D(R)=2 ELSE GOTO420
460 IF R=4 GOTO480
470 R=R+1:GOTO290
480 Z6=1
490 REM * SORTS USING SHELL METZNER ALGORITHM **
500 Z3=J
510 Z3=INT(Z3/2)
520 IF Z3=0 THEN 650
530 Z4=K:Z5=J-Z3
540 Z7=Z4
550 Z8=Z7+Z3
560 IF Z6>1 AND (Z7<K OR Z7>J OR Z8<K OR Z8>J) THEN 620
570 GOSUB920
580 IF F1=2 GOTO620 ELSE GOSUB1020
590 Z7=Z7-Z3
600 IF Z7<1 THEN620
610 GOTO550
620 Z4=Z4+1
630 IF Z4>Z5 THEN 510
640 GOTO540
650 IF Z6=1 THEN 680
660 IF Z6>1 AND M=A THEN 680 ELSE 720
670 REM * SEE IF THERE IS ANOTHER FIELD TO SORT *
680 Z6=Z6+1
690 IF C1(Z6)--1 THEN 840
700 REM * SORT SEGMENT COMPUTATION ON INTERMEDIATE TH
    RU MINOR FIELD SORTS *
710 M=1
720 Z7=M:Z8=M+1:J=1:L=0
730 IF C2(Z6-1)=1 THEN 760
740 IF CS(Z7,C1(Z6-1))=CS(Z8,C1(Z6-1)) THEN J=J+1 ELSE
    L=1
750 GOTO770
760 IF VAL(C$(Z7,C1(Z6-1)))=VAL(C$(Z8,C1(Z6-1))) THEN J
    =J+1 ELSE L=1
770 IF L=0 THEN 800
780 IF L=1 AND J>1 THEN K=M:J=Z7:M=Z8:GOTO500
790 L=0:M=Z8
800 Z7=Z7+1:Z8=Z8+1
810 IF Z7<A THEN 730
820 IF L=0 THEN K=M:M=Z7:J=Z7:GOTO500
830 GOTO680
840 REM * DISPLAY SORTED RECORDS *
850 FOR I=1 TO A
860 PRINT CS(I,1),CS(I,2),CS(I,3),CS(I,4)
870 NEXT I
880 REM * CONTINUATION CHECK *
890 PRINT"DO YOU WANT TO SORT THESE RECORDS AGAIN (Y/N)
    ?";
900 GOSUB1100
910 IF CH$="Y" THEN 270 ELSE END
920 REM * RECORD ADDRESS POINTER SWITCH CHECK *
930 IF D(Z6)=2 GOTO970
940 IF C2(Z6)=1 GOTO960
950 IF CS(Z7,C1(Z6))<CS(Z8,C1(Z6)) THEN 1000 ELSE 1010
960 IF VAL(C$(Z7,C1(Z6)))<VAL(C$(Z8,C1(Z6))) THEN 1000
    ELSE 1010
970 IF C2(Z6)=1 THEN 990
980 IF CS(Z7,C1(Z6))>CS(Z8,C1(Z6)) THEN 1000 ELSE 1010
990 IF VAL(C$(Z7,C1(Z6)))>VAL(C$(Z8,C1(Z6))) THEN 1000
    ELSE 1010
1000 F1=2:RETURN
1010 F1=1:RETURN
1020 REM * RECORD ADDRESS POINTER SWITCH *
1030 FOR C=1 TO 4
1040 I1=PEEK(VARPTR(C$(Z7,C))):I2=PEEK(VARPTR(C$(Z7,C)
    )+1):I3=PEEK(VARPTR(C$(Z7,C))+2)
1050 J1=PEEK(VARPTR(C$(Z8,C))):J2=PEEK(VARPTR(C$(Z8,C)
    )+1):J3=PEEK(VARPTR(C$(Z8,C))+2)
1060 POKE(VARPTR(C$(Z7,C)),J1):POKE(VARPTR(C$(Z7,C))+1
    ,J2):POKE(VARPTR(C$(Z7,C))+2,J3)
1070 POKE(VARPTR(C$(Z8,C)),I1):POKE(VARPTR(C$(Z8,C))+1
    ,I2):POKE(VARPTR(C$(Z8,C))+2,I3)
1080 NEXT C
1090 RETURN
1100 REM * Y/N INPUT CHECK *
1110 CH$=INKEY$:IF CH$="" THEN 1110
1120 IF CH$="N" OR CH$="Y" THEN PRINT CH$:RETURN ELSE 1
    110

```

Table 1

TUBE

The Ultimate Buffered Editor
for TRS-80 Disk Systems

TECO like, 21 edit commands, direct cursor control, block move, multiple input lines, file size limited only by available disk space. This is A FULL SCREEN EDITOR UTILIZING CURSOR CONTROL.

● On TRS-80 Disk with Manual \$40.00
Also available for TRS-80

SBASIC Structured Basic Pre-Processor \$50.00

● BASOPT Basic program optimization program \$20.00

UNIVERSAL COMPUTER SYSTEMS

313 Meadow Lane
Hastings, Michigan 49058
(616) 945-5334

(Dealer inquiries invited)

✓84

VISA & MASTERCARD ACCEPTED

*TRS-80 is a trademark of Tandy Corp.

NEW INTERACTIVE DISASSEMBLER

INTER-DIS80

A Z-80 disassembler designed specifically for the TRS-80* Model I. With it you can obtain the original mnemonics from Z-80 machine code. You can also follow the logic of machine language programs like the routines in your ROM, and unravel the secrets of the BASIC interpreter.

Features:

- Enables you to follow jumps and sub-routine calls.
- Continuous or one line at a time disassembly.
- Outputs to screen or to printer, at user's option.
- You can insert your own comments during disassembly.
- Completely relocatable. Relocator program included.

INTER-DIS80 requires a 16K machine with Level II BASIC. Disassembler and relocator supplied on cassette only.

Price: \$14.95. Cheques or money orders accepted. (Quebec residents add 8% sales tax.)

OKTOLOGIK ✓426

674 NANTEL, LONGUEUIL
QUEBEC, CANADA J4L-1Z9

Dealer inquiries welcome.

*TRS-80 is a trademark of Tandy Corporation.

INTELLIGENT TERMINAL

Use your TRS-80* as a dial-up terminal on any standard timeshare system. Includes control keys. Print command lists data on printer. Store command writes data to disk file. Write command reads disk file and outputs to RS232 interface. \$49.95

ADDITIONAL SOFTWARE AVAILABLE:

ACCOUNTS RECEIVABLE \$49.95

Maximum 9000 customers with up to 3000 transactions per customer per billing period. Includes customer status reports, past due billings, mail list, etc. Reports may be run at any time as often as desired. High-quality, professional software.

GENERAL LEDGER \$49.95

For medium sized business. Designed and proven impossible to unbalance books. IRS auditable. Up to 9 departments. High-quality, professional software.

PAYROLL \$49.95

For up to 120 people per year. Some high-quality, professional software.

MAIL LIST \$9.95

Basic, no-frills program. Easy to use. Lists all (or range of) addresses. Prints 4 lines by 30 chars on standard 3 1/2" x 15/16" label.

UNILOGIC ✓423

P.O. Box 160
PARIS, KY 40361

(606) 987-2678

(606) 987-4310

(32K TRS-80* with disk drive required.)

*TRS-80 is a trade mark of Tandy Corp.

TRS-80™ SOFTWARE

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 \$49.95
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!

GAME OF LIFE \$5.95
John Conway's game of 'life' shows patterns evolving and changing swiftly before your eyes. A dazzling demonstration program!

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.

HOME BUDGET \$49.95
Checkbook maintenance combined with records of income and monthly bills. Monthly and year-to-date summaries showing tax deductions.

DATABASE MANAGEMENT \$29.95
Defines files of any description and maintain on cassette or disk. Add, change, delete, find, sort, justify, print, line print, total fields, write.

HOWE SOFTWARE ✓103

14 Lexington Road
New City, New York 10956

(*) TRS-80 is a registered trademark of Tandy Corp.

COTTAGE SOFTWARE

FOR TRS-80™ Micro Computers

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 and SHORT, then packs lines into multiple statement lines; maintains program logic. RENUM - renumbers program lines including all GOTO's, etc. 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 Level II or Disk Basic \$29.95
DISASSEMBLER: Read, write, and copy system tapes. Display and modify memory contents. Disassemble ROM, DOS, and system tapes into Z-80 mnemonics. Search for strings in memory. Much more!! Includes 32 pages of documentation and information.

For 16K Level II \$19.95

SYSTEM TAPE DUPLICATOR: Copy your system format tapes. Includes verify routine.

For any Level II \$14.95

CHESDISK: Transfers your copy of Microchess to disk for quick and easy access.

For any Level II Disk system \$8.95

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 16K Level II and printer \$15.95

INSTRUCTION MANUALS for any Cottage Software original programs available for 20% of program list price. Refundable when program purchased.

TRS-80* repairs and modifications. Call or write for info. MANY MORE items available. Call or write for catalog. DEALER inquiries invited.

Kansas residents add 3% sales tax. Foreign orders in US Currency only.

Call our 24-hour phone: 316-683-4811 or write

"TRS-80 is a registered trademark of TANDY CORP."

COTTAGE SOFTWARE

614 N. Harding ✓233
Wichita, KS 67208

SO YOU WANT TO USE YOUR TRS-80 TO:

Relearn French. Help your children with their reading. Teach your entire family to program. But Interaction is So Awkward In BASIC.

BPILLOT IS THE LANGUAGE FOR YOU

BPILLOT is a version of PILOT written especially for the TRS-80 with either Level II or Disk BASIC. PILOT was developed by teachers for Computer Aided Instruction. PILOT allows you to concentrate on the instructional goals, not the computer.

BPILLOT HAS 3 VERY IMPORTANT FEATURES:

1. BPILLOT is a complete PILOT. It includes the eExecute indirect command, a complete Match instruction, and long labels.
2. You create BPILLOT programs using the TRS-80 commands you are familiar with (AUTO, EDIT, LIST, TRON...). There are no new (and confusing) system commands.

3. BPILLOT allows you to use both PILOT and BASIC instructions in your programs. Besides increasing the power of PILOT, this makes it easy to learn PILOT if you know BASIC, and easy to teach your children BASIC once they know PILOT.

BPILLOT is a concise assembly language program making extensive use of the Level II ROMs. On a 4K system, the Level II version of BPILLOT leaves 2K for programs. On a 16K system, the Disk version leaves 4K for programs. At \$24.95 for either version, including a reference manual and 3 demonstration programs, BPILLOT is a true bargain. For more information or to order, contact:

Computer Aided and
Managed Instruction
P.O. Box 2030
Goleta, CA 93018

Access forbidden memory locations in your Model II.

Deflower Your Debug

Donnal C. Walter, M.D., Ph.D.
Departments of
Pediatrics & Pharmacology
Univ. of Kansas Medical Center
Rainbow Boulevard
Kansas City, KS 66103

tests RAM above hexadecimal F300, its own starting address. The Debug Monitor displays and modifies the user area between hexadecimal 2800 and F2FF only.

In order to gain access to the entire RAM, one must either write an independent debug program or disable the memory protection system of the TRSDOS Debug Monitor. The latter may be accomplished with the procedure described in this communication.

Memory Protection System

Five debug commands (ra(M), (B)rk, (J)ump, (L)oad and (F)ind share an address-entry subroutine from hexadecimal F9C0 to FA19 which contains a protection segment (Table 1). The simplest way to disable this segment is to load 00 (NOP) into hexadecimal addresses FA01 to FA06 and 80FF into FA09-FA0A.

Unlike ROM-based operating systems, the TRS-80 Model II operating system (TRSDOS version 1.2) is loaded from disk into internal memory on power up. Since the supervisor program and input/output drivers always reside in the lower 7K of RAM, this software should be easily accessible for inspection or temporary modification.

The TRSDOS Debug Monitor, however, is programmed to conceal memory locations below hexadecimal 2800. It also pro-

Address	Object Code	Instruction	Comments
F9FF	AF	XOR A	CLEAR ACCUMULATOR
FA00	21 FF 27	LD HL,27FF	LOWER LIMIT OF USER AREA
FA03	ED 52	SBC HL,DE	DE CONTAINS THE SELECTED ADDR.
FA05	30 CD	JR NC,disp	IF DE<HL DO NOT CONTINUE
FA07	AF	XOR A	CLEAR ACCUMULATOR
FA08	21 FF F2	LD HL,F2FF	UPPER LIMIT OF USER AREA
FA0B	ED 52	SBC HL,DE	DE STILL CONTAINS SELECTED ADDR.
FA0D	38 C5	JR C,disp	IF DE>HL DO NOT CONTINUE

Table 1

Address	Object Code	Instruction	Comments
2800	21 01 28	LD HL,2801	
2803	E5	PUSH HL	LOAD STACK FOR RETURN
2804	3E 00	LD A,0	CLEAR ACCUMULATOR
2806	21 01 FA	LD HL,FA01	ADDRESS OF PROTECT IN DEBUG
2809	77	LD (HL),A	CLEAR MEMORY 'FA01'
280A	23	INC HL	
280E	77	LD (HL),A	CLEAR MEMORY 'FA02'
280C	23	INC HL	
280D	77	LD (HL),A	CLEAR MEMORY 'FA03'
280E	23	INC HL	
280F	77	LD (HL),A	CLEAR MEMORY 'FA04'
2810	23	INC HL	
2811	77	LD (HL),A	CLEAR MEMORY 'FA05'
2812	23	INC HL	
2813	77	LD (HL),A	CLEAR MEMORY 'FA06'
2814	23	INC HL	
2815	23	INC HL	
2816	23	INC HL	
2817	36 80	LD (HL),80	PUT '80' IN 'FA09'
2819	23	INC HL	
281A	36 FF	LD (HL),FF	PUT 'FF' IN 'FA0A'
281C	21 A5 F6	LD HL,F6A5	STEPMODE PROTECTION ADDR.
281F	36 FF	LD (HL),FF	PUT 'FF' IN 'F6A5'
2821	C3 77F3	JP F377	ENTER DEBUG MONITOR

Table 2

The step-mode loader (ra(M)) has a protection segment at hexadecimal F6A3 to F6AC which may be disabled by loading FF into address F6A5.

There are two protection segments which should not be disabled. These are at F4A0 for (L)oad (TOP) and F930-F93D for (U)load.

The program in Table 2 makes the proper changes to disable the protection segments. It is written in linear fashion for simplicity, but a loop may be substituted for the repetitive sequence. Implement it as follows:

1. In TRSDOS READY mode,

type DEBUG ON and press ENTER.

2. TRSDOS READY will return. Then type DEBUG and press ENTER.

3. RAM from 2800 will be displayed. To enter ra(M) command, press M.

4. The prompt A = will appear. To modify RAM, press the F1 key.

5. Now enter the object code program from Table 2.

6. To effect this change in memory, press the F2 key.

7. To execute the program press C.

The monitor will then access

any area of RAM desired. The modified debug program may be saved on disk with the following steps.

8. To return to TRSDOS press S.

9. In TRSDOS READY mode type DUMP BUGGY (START=F300, END=FF80, TRA=3000) and press ENTER.

Now the command BUGGY may be used in place of DEBUG after DEBUG ON. The command DEBUG ON sets the proper calling parameters in the supervisor area, and the command BUGGY loads the modified program in high RAM. BUGGY will not run if DEBUG is OFF.

With BUGGY the entire RAM is available for inspection. The user who wants to study the architecture of TRDOS should first become familiar with the Debug Monitor. The debug program is a good introduction to supervisor calls (SVCs) and interaction with the operating system. Important addresses are listed in Table 3.

TRSDOS consists of a set of

supervisor functions which reside in RAM and an overlay system which loads auxiliary code into a specified area as needed. Many of the supervisor functions can be called from user programs using RST 8 (SVCs).

The SVC calling segment is located between hexadecimal 0145 and 018A. Because the Debug Monitor uses an SVC to set breakpoints, the monitor command (B)rk cannot be executed in the SVC calling routine itself. The address table for the SVCs starts at hexadecimal 01A2 (Table 4). The stack pointer starts at 1F00, and the overlay area is above 2000.

Conclusion

Model II TRSDOS (version 1.2) is a versatile and powerful disk operating system which appears to be relatively free of errors. Since the system is user-oriented, most users (such as businesses and schools) will not require direct access to the operating system itself.

Computer hobbyists and systems' programmers, however, will benefit from easy access to the TRSDOS machine code (especially the supervisor func-

tions). Until independent debuggers and disassemblers become available for the Model II, the TRSDOS Debug Monitor can be used. ■

START ADDR	FUNCTION or OPERATION	START ADDR	FUNCTION or OPERATION
F300	Initialization	F467	(L)oad Command Routine
F377	Program Entry Segment	F467	(P)rint Command Routine
F386	Main Command Mode Routine	F4D2	(E)mpty Command Routine
F422	(D)ecimal Command Routine	F4EE	(F)ind Command Routine
F429	he(x) Command Routine	F562	(B)rk Command Routine
F438	(J)ump Command Routine	F5DF	(C)ontinue Command Routine
F43F	(O)ut Command Routine	F7C7	ra(!) Command Routine
F445	(H)elp Command Routine	F8A5	(R)egister Command Routine
F457	(S)ystem Command Routine	F8A5	(U)pload Command Routine

Table 3

SVC NAME	START ADDR	SVC NAME	START ADDR	SVC NAME	START ADDR	SVC NAME	START ADDR
0 INITIO	02A2	11 VDREAR	094B	25 TIMER	0342	41 KILL	13EF
1 KBINIT	037A	12 VIDKEY	094D	26 CURSOR	069D	42 CLOSE	13F5
2 SETUSR	0518	15 DISKID	0EA3	27 SCROLL	09AA	43 WRITNX	10B9
3 SETBRK	04E6	17 PRINT	0EA4	33 LOCATE	1896	44 DIRWP	182C
4 KBCHAR	039A	18 PRCHAR	0F44	34 READNX	172F	45 DATE	1C09
5 KBLINE	03DB	19 PRLINE	0F25	35 DIRRD	1746	46 PARSER	1201
6 DELAY	08B7	20 BINDEC	09E6	36 JP2DOS	1237	49 STSCAN	1CC6
7 VDINIT	0560	21 BINDEC	0A35	37 DOSCMD	1388	52 ERRMSG	139D
8 VDCHAR	063D	22 STCMP	09D3	38 RETCMD	138D	55 RS232C	1408
9 VDLINE	092C	23 MPDVI	0ABD	39 ERROR	13A6		
10 VDGRAF	0799	24 BINHEX	08B2	40 OPEN	13E9		

Table 4

BRIZZERK

PACKAGE #1 \$9.95
BOXING

IT'S YOU AGAINST BRUISER IN THE FIGHT OF THE CENTURY! YOU CONTROL ONE BOXER ON THE SCREEN AND YOUR TRS-80* CONTROLS BRUISER. BUT WATCH OUT! BRUISER GETS BETTER AS THE FIGHT PROGRESSES AND YOU MAY GET KNOCKED OUT! WITH SOUND EFFECTS.

RUSSIAN ROULETTE

AN ANIMATED CARTOON PROGRAM WITH INCREDIBLE GRAPHICS. YOU'LL LOVE IT!

PLUS — A BONUS PROGRAM

00000
PACKAGE #3 \$18.95
(BOTH PACKAGES #1 AND #2)

00000
USE THE HANDY COUPON OR CALL (24 HOURS)
(415) 538-3784

BRIZZERK 
P. O. Box 373
SAN LORENZO, CA 94580

*TM OF TANDY CORP.



PRESENTS

PACKAGE #2 \$9.95
THE BATHROOM KEY

A TOUGH BATTLE OF QUICK THINKING! YOU AND YOUR OPPONENT TEST YOUR KNOWLEDGE AND INTELLIGENCE IN THIS GAME OF DUELING QUESTIONS. THE GOAL? TO GET THE COVETED BATHROOM KEY. WHY? YOU'LL FIND OUT! TRICKS, TRIVIA, GENERAL KNOWLEDGE, T.V. — JUST ABOUT EVERY SUBJECT IMAGINABLE!

AN INTERACTIVE QUIZ PROGRAM FOR TWO PERSONS.

16K LEVEL II OR 32K DISK REQUIRED

BRIZZERK P.O. Box 373, SAN LORENZO, CA 94580

QUICK! SEND ME THE FOLLOWING

- PKG. #1 AT \$9.95 (\$10.60 FOR CA RES.)
- PKG. #2 AT \$9.95 (\$10.60 FOR CA RES.)
- PKG. #3 AT \$18.95 (\$20.18 FOR CA RES.)
- ENCLOSED IS MY CHECK OR MONEY ORDER.
- CHARGE MY VISA MASTERCARD

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

EXPIRATION DATE _____

PLEASE INCLUDE CREDIT CARD EXPIRATION DATE

New Releases for the TRS-80*

Oracle-80

Oracle-80 will provide you with business analysis and forecasting capabilities previously available only in large computer and time-sharing systems. Oracle-80 is a flexible, professional time series analysis and forecasting package that can be used in sales analysis and forecasting, product planning, business planning, etc. Investors can analyze stocks, company trends and growth rates. Financial managers and economists can analyze the general economic climate and investigate business cycles. Even families will find Oracle-80 useful in analyzing spending or energy consumption trends. Oracle-80 should be used by anyone who needs to analyze and forecast monthly, quarterly or annual data.

Even though this package uses advanced statistical analysis, you don't have to understand statistics to use it. Oracle-80 was designed to be used and understood by the typical business person. While Oracle-80 is designed for ease of use, its powerful analytical capabilities will satisfy even the professional forecaster. All input and output are written in plain English and the package documentation carefully explains all the functions of the program.

Adding, deleting and modifying your data is accomplished with a very flexible editor program, integral to Oracle-80. Automatic scaling of inputted numbers,

the ability to choose from several output formats, a calendar format that identifies all your data by month/quarter/year, and the ability to add and subtract values while inputting from the keyboard provide added user flexibility. You can use moving average, rate of change, seasonal indices or cycle indices methods to analyze your data. The unique graphing capability of Oracle-80 lets you visualize your historic data or any of the modified data series you calculate. Additionally, you can direct any chart or graph to your printer.

Oracle-80 will forecast future data values using trend, moving average or seasonal methods. You may choose either a constant unit trend or a constant percentage growth trend forecast for even more flexibility.

Oracle-80 is one of the most powerful and useful business tools you will ever use. It puts the future in your hands.

This package requires the following minimum system:

1. A TRS-80 Level II with 16K RAM.
2. An Expansion Interface with 16K RAM.
3. One or more disk drives.
4. Any compatible Disk Operating System.
5. An optional line printer.

Order No. 0152RD
(disk-based version)
\$99.95.

Order No. 0140R
(cassette-based version)
\$75.00

Bowling League Secretary

Instant Software answers the prayers of harried bowling league scorekeepers everywhere by presenting the Bowling League Secretary package, a comprehensive system that lets you use your TRS-80 to maintain a computer-based statistics system for any bowling league.

The 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 puts at your fingertips all individual weekly scores, team cumulative scores, bowler cumulative scores, and individual leaders in the following categories: high average, high series, high game and high points.

You can even start your own bowling league scorekeeping business. Bowling leagues will be happy to secure your services if you can provide a detailed print-out of their league statistics. Speed, convenience and profitability are the bywords for the Bowling League Secretary package.

This package requires the following minimum system:

1. A TRS-80 with 16K of memory.
2. An Expansion Interface with 16K or more of memory.
3. One minidisk drive, two drives recommended.
4. Any compatible DOS.
5. A tractor-feed line printer.

Order No.0095RD disk-based \$49.95.

Other Programs Available from Instant Software

TRS-80* LEVEL I & II

0001R	Basic and Intermediate Lunar Lander.....	\$7.95
0002R	Space Trek II.....	\$7.95
0004R	Beginner's Backgammon/Keno.....	\$7.95
0007R	Ham Package I.....	\$7.95
0008R	Electronics I.....	\$7.95
0009R	Golf/Cross-Out.....	\$7.95
0017R	Air Flight Simulation.....	\$7.95
0019R	Business Package IV.....	\$9.95
0023R	Oil Tycoon.....	\$7.95
0033R	Bowling.....	\$7.95
0043R	Santa Paravia and Fiumaccio.....	\$7.95
0046R	Othello.....	\$9.95
0050R	Grade Book.....	\$9.95
0057R	Chessmate-80.....	\$19.95
0099R	Typing Teacher.....	\$9.95

TRS-80* LEVEL II

0028R	Ramrom Patrol/Tie Fighter/Klingon Capture.....	\$7.95
0034R	Space Trek IV.....	\$7.95
0047R	Who-Dun-It?.....	\$7.95
0049R	Demo II.....	\$7.95
0051R	Ball Turret Gunner.....	\$9.95
0055R	Demo III.....	\$7.95
0056R	Bowling League Statistics System.....	\$24.95
0058R	Programmer's Converter.....	\$9.95
0063R	Cards.....	\$7.95
0065R	Teacher.....	\$9.95
0066R	Mimic.....	\$7.95
0068R	Your Cribbage and Checkers Partner.....	\$9.95
0069R	Household Accountant.....	\$7.95
0070R	Skirmish-80.....	\$9.95
0072R	Financial Assistant.....	\$7.95
0078R	TRS-80* Utility II.....	\$7.95

0077R	Enhanced BASIC.....	\$24.95
0081R	TRS-80* Utility I.....	\$7.95
0082R	Daredevil.....	\$9.95
0084R	Music Master.....	\$7.95
0089R	Energy Audit.....	\$49.95
0092R	Archimede's Apprentice.....	\$9.95
0100R	Video Speed-Reading Trainer.....	\$9.95
0103R	Personal Bill Paying.....	\$7.95
0106R	Airmail Pilot.....	\$7.95
0111R	Wordwatch.....	\$7.95
0117R	Night Flight.....	\$9.95
0125R	Investor's Paradise.....	\$9.95
0127R	Surveyor's Apprentice.....	\$9.95
0129R	The Wordslinger.....	\$29.95
0132R	Energy Consumption.....	\$9.95
0135R	Executive Expense Report Generator.....	\$9.95
0136R	Beginner's Russian.....	\$9.95
0137R	Everyday Russian.....	\$9.95
0156R	Money Madness.....	\$9.95
0171R	Flight Path.....	\$9.95
0250R	IRV.....	\$24.95

TRS-80* DISKS

0052RD	Energy Audit.....	\$75.00
0075RD	Accounts Payable/Receivable.....	\$199.95
0095RD	Bowling League Secretary.....	\$49.95
0123RD	The One-D Mailing List.....	\$24.95
0139RD	Disk-Scope.....	\$19.95
0147RD	Check Management System.....	\$39.95
0180RD	Disk Editor.....	\$39.95
0212RD	The Russian Disk.....	\$24.95

PROGRAMS IN GERMAN:

The programs listed here can be purchased through:
MicroShop Bodensee
Markstrasse 3,
7778 Markdorf, West Germany

6004R	Beginner's Backgammon/Keno
6007R	Ham Package I
6008R	Electronics I
6009R	Golf/Cross-Out
6017R	Air Flight Simulation
6028R	Ramrom Patrol
6031R	Space Trek III
6034R	Space Trek IV
6043R	Santa Paravia and Fiumaccio
6065R	Teacher
6069R	Household Accountant
6072R	Financial Assistant
6076R	Utility II
6081R	Utility I

TO ORDER: Look for these programs at the dealer nearest you (see list of dealers on page 199). If your store doesn't stock Instant Software send your order with payment to:

Instant Software

Order Dept.

Peterborough, N.H. 03458

(Add \$1.00 for handling) or call toll-free
1-800-258-5473 (VISA, MC and AMEX accepted).

*A trademark of Tandy Corporation

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

Instant Software™

Ask for Instant Software at a computer store near you.

Alabama

Anderson Computers
3156 University Dr., Huntsville
Computerland of Huntsville
3020 University Dr., Huntsville
Olensky Bros.
3763 Airport Blvd., Mobile

Arizona

Professional Data Systems
4506-A N. 16th St., Phoenix
Miles TV & Radio
621 East Broadway, Mesa
Computerland
635 E. Arrow Hwy., Azusa

California

Byte Shop
8038 Clairmont Mesa Blvd., San Diego
Byte Shop
123 E. Yorba Linda, Placentia
Byte Shop of Mt. View
1415 West El Camino Real, Mt. View
Byte Shop of Sacramento
6041 Greenback Ln., Citrus Heights
Capital Computer Systems
3396 El Camino Ave., Sacramento
Computers Made Easy
819 East Ave. Q8, Palmdale
Computer Store of San Leandro
701 MacArthur Blvd., San Leandro
Computer World
6791 Westminster Ave., Westminster
Computerland
16720 S. Hawthorne, Lawndale
Computerland of W. LA
6840 La Cienega Blvd., Inglewood
Coast Electronics
3118 No. Main St., Morro Bay

Computerland

24001 via Fabricante No 904, Mission Viejo
Computer Mart of California
315 Diamond Bar Blvd., Diamond Bar
Hobbytronics
1378 So. Bascom Ave., San Jose
Hobby World
18511 Business Ctr. Dr., Unit 6, Borthridge
Huntington Computing
2020 Charles St., Corcoran
L.C.E. House Inc.
386 North E. St., San Bernardino

Jade Computer

4901 W. Rosecrans, Hawthorne
Malibu Microcomputing
23910A Deville Way, Malibu
Marfan Co.
6351 Almaden Rd., San Jose
Opamp/Technical Books
1033 N. Sycamore Ave., Los Angeles
PC Computers
10186 San Pablo Ave., El Cerrito
Q.I. Computers, Inc.
15618 Hawthorne Blvd., Lawndale

Radio Shack Dealer

6250 Mira Mesa Blvd., San Diego
Radio Shack Dealer
50 N. Cabrillo Hwy., Half Moon Bay
Santa Rosa Computer Center
604 7th St., Santa Rosa
Silver Spur Elect. Comm.
13552 Central Ave., Chino
The Computer Store
820 Broadway, Santa Monica

Colorado

Colorado Computer Systems
311 W. 74th Ave., Westminster
Computerland of North Denver
8748 Wadsworth Blvd., Arvada
Computer Shack
1635 South Prairie, Pueblo
The Computer Store
2300 Welton St., Denver

Connecticut

American Business Computers
454 Thames St., Groton
Computerlab
130 Jefferson, New London
Computerland
1706 Post Rd., Fairfield
Computerland
60 South St., Hamden
Computer Works
1439 Post Rd. E., Liberty Plaza, Westport
Instructional Systems Computers
807 Hartford Rd., Manchester

D.C.

The Program Store
4200 Wisconsin Ave. N.W., Washington, D.C.

Florida

AI Personal Computer
178 Oxford Rd., Fern Park

AMF Electronics

11146 N. 30th St., Tampa
Boyd-Ebert Corporation
1328 West 15th St., Panama City
Computer Center
6578 Central Ave., St. Petersburg
Computer Junction
5450 So. State Rd. 7, Ft. Lauderdale
Computerland
7374 S. Tamiami Trail, Sarasota
Computerland of Ft. Lauderdale
3953 N. Federal Hwy., Ft. Lauderdale
Computerland of Jacksonville
2777-6 University Blvd. W., Jacksonville

Computerland of Tampa
1520 E. Fowler Ave., Tampa
Computerland of West Palm Beach
4275 Okeechobee Blvd., West Palm Beach
Computer Shack
3336 Beach Blvd., Jacksonville
Computer System Resources Inc.
3222 S.W. 35th Blvd., Gainesville
Curtis Waters Enterprises
236 Talbot Ave., Melbourne
Heath Kit Electronic
4705 W. 16th Ave. Center, Hialeah

HIS Computeration
1295 Cypress Ave., Melbourne
Luban Computer Store
Airport Rd., Destin
Williams Radio & TV Inc.
2062 Liberty St., Jacksonville
Your Basic Computer Store
971 Seaway Dr., Ft. Pierce

Georgia

Atlanta Computer Mart
Atlanta
Computerland of Atlanta
2423 Cobb Parkway, Smyrna
Micro Computer Systems
3104 E. Shadowlawn N.E., Atlanta

Hawaii

Computerland of Hawaii
567 N. Federal Hwy., Honolulu
Radio Shack Assoc. Store
1712 S. King St., Honolulu

Idaho

Electronic Specialists
8411 Fairview Ave., Boise

Illinois

Computerland
4507 North Sterling, Peoria
Computerland
9511 N. Milwaukee Ave., Niles
Computer Station
3659 Namecki Rd., Granite City
Garcia & Associates
230 No. Wabash Ave., Suite 1510, Chicago

Indiana

Midwest Micro Computers, Inc.
708 S. Main St., Lombard
Computer Center of South Bend
51591 US 31 North, South Bend
Data Domain
221 W. Dodds, Bloomington
Fair Creek Electronics Store
732 Center St., Pendleton

Iowa

Memory Bank
1721 Grant St., Bettendorf

Kansas

Central Kansas Computers
6 S. Broadway, Herington

Maine

Main Computerics
Intown Plaza, Bangor
Radio Shack
315 Main Mill Rd., So. Portland
Jack Fives Electronics
4608 Deblon Circle, Pikesville
The Comm Center
8624 Ft. Meade Rd., Laurel

Massachusetts

ComputerCity
175 Main St., Charlestown
ComputerCity
50 Worcester Rd., Framingham
Computerland of Boston
214 Worcester Rd., Wellesley
Computer Packages Unlimited
342 Boston Turnpike, Westbury
Lighthouse Computer Software
14 Fall River Ave., Rehoboth
Main Gordon Computers
15 Kenwood St., Cambridge
New England Electronics Co.
679 Highland Ave., Needham
Small Business System Group
Main St., Dunstable
The Computer Store
120 Cambridge St., Burlington

Tufts Radio & Electronics

206 Mystic Ave., Medford
Michigan
Computer Center
28251 Ford Rd., Garden City
Computer Connections
38437 Grand River, Farmington Hills
Computerland of Grand Rapids
2927 28th St. S.E., Kentwood
Computerland of Southfield
29673 Northwestern Hwy., Southfield
Computer Mart
560 W. 14 Mile Rd., Clawson

Computer Room
455 E. Michigan Ave., Kalamazoo
Computronics Corp.
423 S. Saginaw Rd., Midland
Hobby House
1035 W. Territorial Rd., Battle Creek
Main Systems Inc.
1161 No. Ballenger Hwy., Flint
The Alternate Source
1806 Ada, Lansing
The Eight Bit Corner
722 Evanston Ave., Muskegon
Ye Olde Teacher Shoppe
1823 Wilmyre St., Ypsilanti

Minnesota

Computerland of Hopkins
11319 Hwy F., Hopkins
Digital Den
Burnsville Center
Minnesota Software Inc.
5422 Fisher St., White Bear Lake
Zim Computer
5717 Xerxes Ave., N. Brooklyn Center

Mississippi

Dyer's, Inc.
200 E. Main St., West Point
Softwarehouse
816 Foley St., Jackson
W. Vernon Foster Inc.
816 Foley St., Jackson

Missouri

Century Next Computers
1001 E. Walnut, Columbia
Comp-U-Tr Software Center
51 Florissant Oaks Shopping Center
Florissant
Software Shack
16501 Greenwald Court, Belton

Montana

Intermountain Computer
529 So. 9th St., Livingston
Personal Computer
121 Red Oak Dr., Carl Junction

Nebraska

Computerland of Omaha
11031 Elm St., Omaha
Midwest Computer Co. Inc.
8625 I St., Omaha
Midwest Computer Co. Inc.
4442 S. 84th St., Omaha
Midwest Computer Co. Inc.
4403 S. 87th St., Omaha
Scottbluff Typewriters Inc.
1624 Broadway, Scottbluff

Nevada

Century 23
4566 Spring Mountain Rd., Las Vegas

New Hampshire

Bisnbytes Computer Center
568 Pleasant St., Concord
ComputerCity
1525 S. Willow, Manchester
Paul's TV
Main St., Fremont
Portsmouth Computer Center
31 Raynes Ave., Portsmouth
Radio Shack Assoc. Store
Fairbanks Plaza, Keene

New Jersey

Computer Corner of NJ
439 Rte. 423, Pompton Plains
Computer Encounter
2 Nassau St., Princeton
Computerland
35 Plaza Rte. 44, W. Parahus
Computer Mart of NJ
501 Rte. 27, Iselin
Crowley's
Rd. #3, Whitehouse Station

Dave's Electronics
Pennsville Shopping Ctr., Pennsville
GHB Enterprises Inc.
Rte. 38, Rudersaw Ave., Mapleshade
Lashen Electronics Inc.
21 Broadway, Denville
Personal Computing Inc.
51 Center St., Linwood
Radio Shack/J&J Electronic
Rt. 57 Allen Rd., Hackettstown

The Bargain Brothers
Glen Roc Shopping Center
216 Scotch Road, Trenton
The Computer Emporium
Bldg. 103, Avenues of Commerce
2428 Rte. 38, Cherry Hill

New Mexico

Auel Electronics Co.
232 Wisconsin N.E., Albuquerque
South West Computer Center
121 Wyatt Drive, Suite 7, Las Cruces
Thomas E. Carr Jeweler
13004 Tenth St., Alamogordo

New York

Aristo Craft
314 Fifth Ave., NYC
Berliner Computer Center
102 Jericho Turnpike, New Hyde Park
Bits & Bytes
2800 Straights Rd., Fredonia
Computer Corner
200 Hamilton Ave., White Plains
Computer Era Corp.
1570 3rd Ave., New York
Computer Factory
485 Lexington Ave., NYC
Computer House, Inc.
721 Atlantic Ave., Rochester
Computerland of Nassau
79 Westbury Ave., Carle Place
Computerland of New York City
58 W. 44th St., New York

Computer World
519 Boston Post Rd., Port Chester
Comtek Electronics, Inc.
2666 Coney Island Ave., Brooklyn
Comtek Electronics, Inc.
Staten Island Mall
Store 225A, Staten Island
Digitbyte Systems Corp.
31E, 31st St., New York

80 Microcomputer Services
115 Maitland Ave., Cohoes
Home Computer Center
671 Monroe Ave., Rochester
Mr. Computer
Imp. Plaza, Rte. 9, Wappingers Falls
Softson Systems
308 Columbia Turnpike, Ramapo
The Computer Tree Inc.
409 Hooper Rd., Endwell
Uptate Computer Shop
629 French Rd., Campus Plaza
New Hartford

North Carolina

Byte Shop of Raleigh
1213 Hillsborough St., Raleigh
Sound Mill
Slocum Shopping Ctr., Hawick
Ohio

Altair Business Systems, Inc.
5252 North Dixie Dr., Dayton
Astro Video Electronics
504 E. Main St., Lancaster
Cincinnati Computer Store
4816 Interstate Dr., Cincinnati
Computerland
4578 Great Northern Blvd., N. Olmstead
Computerland
6429 Busch Blvd., Columbus

Computerland
1288 Som Rd., Mayfield Heights
Computer Store of Toledo
18 Hillwayk Dr., Toledo
Forbes Microsystems Inc.
35 N. Broad, Fairborn
Microcomputer Center
7900 Paragon Rd., Dayton
Micro-Mini Computer World
74 Robinwood, Columbus

21st Century Shop
16 Convention Way, Cincinnati
Universal Amateur Radio, Inc.
1280 Aida Dr., Columbus

Oklahoma

Sound's, Etc.
Hwy. 33, Watonga
Vern Street Products
Radio Shack Dealer
114 W. Tenth St., Sapulpa

Oregon

Computerland of Portland
12020 S.W. Main St., Tigard
Computer Pathways Unlimited, Inc.
2151 Duvor St. S.E., Salem
TRIS-80 Products Ltd.
3520 S.E. Vineyard Rd., Portland

Pennsylvania

Artco Elect.
302 Wyoming Ave., Kingston
Artco Elect.
Back Mountain Shop Ctr
Shavertown

Audio Mart
518 Fifth Ave., New Brighton
Computer Workshoppe
3848 William Penn Hwy., Monroeville
Computerland of Harrisburg
4644 Carlisle Pike, Mechanicsburg
Computerland of Pittsburgh
5499 William Flynn Hwy., Gibsonia

Erle Computer Co.
2127 West 8th St., Erie
Mighty Byte Computer Center
537 Easton Rd., Horsham
Personal Computer Corp.
34-26 West Lancaster Ave., Paoli
Personal Computer Corp.
Frazier Mall, Lancaster Ave., Frazier

Rhode Island

Computer City
165 Angell St., Providence
Digital World, Inc.
329 Bald Hill Rd., Warwick
South Dakota
CB Radio Shack
21st and Broadway, Yankton

Tennessee

ACS
1100 8th Ave. So., Nashville
Computerlab
671 S. Menden Hall Rd., Memphis
H & H Electronics Inc.
509 N. Jackson St., Tullahoma

Texas

Computer Fort
2142 N. Collins, Arlington
Houston Computer Tech
5313 Bissonnet, Bellairie
Interactive Computer
7620 Dashwood, Houston
K.A. Elect.
9090 Simmons Fwy., Dallas

Fan American Elect. Inc.
1117 Conway, Mission
Radio Shack Dealer
21969 Katy Freeway, Katy
The Compuls Shop
8353 Camp Bowie Blvd., Ft. Worth
Waghalter Books Inc.
3 Greenway Plaza E., Houston

Utah

DC Computer Co.
1911 West 70 South, Provo
Quality Technology
470 E. 2nd St., Salt Lake City

Virginia

Computer Works
Rte. 6, Box 65A, Harrisonburg
Home Computer Center
2927 Virginia Beach Blvd., Virginia Beach
Southside Radio Comm.
135 Pritchard Ave., Colonial Heights

Washington

American Mercantile Co. Inc.
2418 1st Ave. S., Seattle
Byte Shop of Bellevue
14701 N.E. 20th St., Bellevue
Computer Connection Inc.
3100 NW Bucklin Hill Rd., Silverdale
Computerland of South King Co.
1500 S. 338 St., Suite 12
Federal Way

Personal Computers
5 104 Freya, Spokane
Ye Old Computer Shop
1301 G. Washington, Richland

West Virginia

The Computer Corner Inc.
22 Beechurst Ave., Morgantown
The Computer Store
Municipal Parking Bldg., Charleston

Wisconsin

Byte Shop Of Milwaukee
6019 West Layton Ave., Greenfield
Computerland
690 S. Whitney Way, Madison
Computerworld
3015 W. Wisconsin Ave., Appleton
Magic Lantern Computer
3313 University Ave., Madison
Perid Microsystems
4265 W. Loomis Rd., Milwaukee

Wyoming

Computer Concepts
1104 Logan Ave., Cheyenne

Puerto Rico

The Microcomputer Store
1568 Ave. Jesus T. Pineró
Caparra Terrace

Canada

CANADIAN DISTRIBUTORS:
Micro Distributing
409 Queen St. W. Toronto, Ont.
MSV 2A5

YOU'VE LOVED OUR WAR GAMES AND OUR FANTASY GAMES,
...AND NOW YOU'LL GO CRAZY FOR OUR

5 new COMPUTER GAMES

AVALON HILL'S new Microcomputer Games Division lets you square off against the computer as your opponent in five new cassette games, each with a complete set of instructions and software for use with TRS-80 Level II, 16K; Apple II APPLESOFT Basic, 16K; or PET, 16K.

MIDWAY CAMPAIGN—You command the US Naval forces as the computer commands the invading Japanese.

NORTH ATLANTIC CONVOY RAIDER—Can you cripple the British Home Fleet and force a surrender, or will the computer sink the Bismarck?

NUKEWAR—Strategic conflict from 'cold war' to 'hot'...and your foe is controlled by a cold and calculating computer.

B-1 NUCLEAR BOMBER—Be the Captain of a B-1 bomber in this tactical-level operation, as the computer springs Soviet defenses on your mission.

PLANET MINERS—Four giant corporations engage in intensive exploration and political maneuvering to exploit the resources of space. For one to four players, with the computer playing the part of the other competitors.

All these titles are available for only \$15.00 each, plus \$1.00 for shipping and our complete listing of computer games.

OVER 35 TITLES AVAILABLE

ASK ABOUT OUR 180-DAY GUARANTEED-SALES POLICY
DEALER & DISTRIBUTOR INFORMATION
AVAILABLE ON REQUEST
MAIL ORDERS WELCOME!



01956 Pass Road
Gulfport, MS. 39531
(601) 896-8600



QUALITY TRS-80 SOFTWARE

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 pointers
- *deletion of non keywords from index by system
- *"and" or "not" logic for inquiries
- *Interface for user written inquiries

KEYWORD INDEX—2 disc 32K DOS 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 HD)
- *Supports user I/O routines
- *User calls (SORT HD only)

SORT II—16K Level II in memory sort **\$19.95**
SORT HD—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**

Manuals 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

BEST SELLING INFORMATION MANAGEMENT SYSTEM IN MICROS TODAY!!

SELECTOR III-C2

- Powerful
- Creates and Maintains Multi-key data bases.
- Prints FORMATED, SORTED REPORTS with numerical summaries.
- Source code supplied
- Prints MAILING LABELS — and more!
- Comes with APPLICATIONS PROGRAMS including:
 - Sales Activity
 - Expense Register
 - Inventory
 - Checks Register
 - Payables
 - Client/Patient Record
 - Receivables
 - Appointments
 - NAD
 - Library

File management and report writing modules contain linkage to user subroutines to add virtually any special purpose application.

STATE OF THE ART in information management systems!

NEW — "Ready-to-run" version for the TRS-80® Model I, only from Business Microproducts. Also available for Model II.

Requires CP/M operating system or derivative and CBASIC2.

Offered on 5 1/4" or 8" all versions... **\$295.***
CBASIC2 with Selector Purchase... **\$75.***

TRSDOS → CP/M

FILE TRAN

"BRIDGES THE GAP"

- Machine language COM FILE directly compatible with your CP/M system
- Automated Terminal Configuration
- 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
- And more
- Newly created files scanned for potential errors between level II BASIC & 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

From CP/M: TRSDOS now available for TRS-80 Model I
Both directions... **\$149.00**

FILETRAN Disk and Manual **\$99**
Manual alone (manual price credited to system) **\$20**



A DIVISION OF THE READY CORPORATION
LIVERMORE FINANCIAL CENTER
1838 Catalina Court • Livermore, CA 94550

(415) 449-4412

VISA _____ M/C

NEW • NEVADA COBOL

- ✓ A POWERFUL subset of ANSI-74
- ✓ A PRICE that's UNBEATABLE—\$99
- ✓ EXTENDED arithmetic & I/O features
- ✓ FAST compilation and execution
- ✓ EASY to use — Generates small executable object modules
- ✓ UNIQUE — Easily understood error messages
- ✓ CP/M compatible
- ✓ Also available ON TRS-80
- ✓ REQUIRES only 16K-RAM
- ✓ Designed for PORTABILITY

STANDARD FEATURES

- Random access file structure
- Sequential files — Fixed and variable length
- Debugging capability
- Copy statement
- Data types & character string, 16 Bit Binary and packed decimal (Comp-3)
- 18-Digit accuracy
- Hexadecimal non-numeric literals
- Powerful editing
- Interactive accept/display

Offered on both 5 1/4" and 8" diskette, all versions **\$99***

*CA residents add 6% sales tax; continental shipping \$3.00 Allow 2 weeks delivery

TRS-80 is a trademark of the Tandy Corp
CP/M is a trademark of Digital Research

MARK GORDON COMPUTERS

A DIVISION OF MARK GORDON ASSOCIATES, INC.
15 Kenwood Street, Cambridge, Massachusetts 02139, (617) 491-7505

SORT-80

Produced exclusively for
Mark Gordon Computers by SBSG

TRS-80* disk files may be sorted and merged using SORT-80, the general purpose, machine language, sort program. Written in assembly language for the Z-80 microprocessor, it can:

- Sort files one disk in length
- Sort Direct Access, Sequential Access and Basic Sequential Access files
- Reblock and print records
- Recontrol files from disk
- Be executed from DOS
- Be executed from BASIC
- Be inserted in the job stream
- Allow parameter specification
 - input/output file specification
 - input/output record size
 - lower/upper record limit
 - print contents of output file
 - input/output file key specifiers

The minimum requirement is a 32K TRS-80* Level II computer with one disk drive or a single drive Model II computer. It will operate on 35, 40 and 77 track drives, and has been tested on TRSDOS 2.1, 2.2, 2.3, NEWDOS 2.1, 3.0, and VTOS 3.0.1. It is compatible with most machine language printer drivers. Sort time is fast; for example, a 32K file will sort in approximately 40 seconds. \$59.

PCS

Program Catalog System from SBSG

This menu driven system provides the TRS-80* user with a computerized method to keep track of all programs and data files. The idea is to build and maintain on a file a disk detailing each program including program name, size, creation date, and a brief narrative as to function. Programs are provided to:

- create, update, or display
- print in disk number order
- print in alphabetical order
- print file listing
- create a file automatically

With a 32K system you can catalog 150 programs; with a 48K system you can catalog 300 programs; or you can catalog 650 programs without sort. \$29

*TRS-80 is a registered trademark of Radio Shack, a division of Tandy Corp

InfoBox

The information manager

InfoBox is the easiest-to-use information manager available for the TRS-80*. It's ideal for keeping track of notes to yourself, phone numbers, birthdays, inventories, bibliographies, computer programs, music tapes, and much more. This fast assembly language program lets you enter free-format data, variable length items and lets you look up items by specifying a string of characters or words that you want to find. You can also edit and delete items. Items entered into InfoBox can be written to and read from cassette and disk files. All or selected items can be printed on a parallel or serial printer. InfoBox occupies 3K. Specify cassette or disk version. Special introductory price \$24.95 until June 15; \$29.95 after.

DEBUG+

The ultimate monitor/disassembler

Compare the features and price of DEBUG+ with other monitor/disassembler programs. It offers nine true, single-byte breakpoints, single step program execution, hex and decimal arithmetic including multiply and divide and conversions, ASCII dump that distinguishes all 256 codes, disassembly to screen and printer in full Zilog mnemonics, and register set command. It also has the usual port I/O, hex and decimal memory dump, change, move, copy and exchange memory features offered by others. Ideal for the user who wants to experiment with assembly language or to write subroutines to call from BASIC; essential for the serious programmer. Special introductory price \$24.95 to June 15; \$29.95 after.

FMS

File Management System by SBSG

This menu driven program allows you to define and create files for your own use. You can:

- sort these files in:
 - ascending order
 - descending order
 - on up to 3 separate fields
- scan the files
- summarize any numeric or dollar data fields
- print the field records
- create, add to or delete field records

\$49.00

Model II versions of SBSG software available. Dealer inquiries invited.

A video driver mod for those whose hands are no quicker than their eyes.

Slow Scroll

Peter A. Lewis
5850 Belt Line Road #1811
Dallas, TX 75240

Having converted from Level I to Level II, I am extremely pleased with all the new features of the more advanced language. One wrinkle that I don't appreciate, however, is the way the program files by on the

screen when you list it. In this regard, Level I has a superior system by stopping the list when the screen is almost full and allowing you to hit the up arrow key to move the display up the screen.

I know you can press Shift @ to freeze the display, but I am invariably fumble-fingered and find that the part of the program that I wanted to see has somehow whisked by before I could stop it.

Another thing that bothers me

about automatic scrolling is that whenever I write a program that displays more than one screen full of data, I need a "Press Enter to Continue" routine to stop the display.

There are three things I don't like about that procedure. First, you have to keep track of the lines that your program is displaying so you know where to insert the pauses. Second, you cannot use the bottom line of the screen because it is needed for the "PRESS ENTER..." message. Third, if the user has the option to output to the printer, your program has to bypass the pause messages in that case.

A small modification to the Level II video driver solves all of the above. With this modification installed, any line that ends with a new line character (ASCII 13), normally causing the screen to scroll, now has the following effect:

- The display freezes after that line is printed.

- Pressing the up arrow allows normal printing to continue until the next new line character (just like Level I LIST).

- Pressing CLEAR clears the screen and a new screen of data is displayed.

- Pressing Break stops the program or the list and the ready

message is displayed.

- Any other key is ignored.

The modification is not active when the cursor is turned on. This allows the screen to scroll normally when you are inputting a long program. You can also use this feature to temporarily turn off the modification within a program. By executing a PRINT CHR\$(14) the cursor is turned on and normal scrolling is in effect until you turn it off with a PRINT CHR\$(15).

The cursor will also be turned off after an INPUT statement or if the program is restarted from Ready.

Three Methods

You can load the modification in three ways. With any method, the program is completely relocatable. My version ends at the top of a 16K machine, you may want to load it at a different location to accommodate a larger memory size or other machine language routines.

If you have the Editor/Assembler, enter the source code shown in Program Listing 1, assemble it and create a SYSTEM tape. Then initialize the system by entering SYSTEM followed by /0 and set memory size to 32678. Load the SYSTEM tape and enter a / to execute it. Enter CLEAR, and you're in business.

Program Listing 1. Source Code

```

00100 ; SCREEN CONTROL - 11/85/79 - PETER A. LEWIS
00120 ;
00140 ; SET UP DCB DRIVER ADDRESS
00160 ;
7FA7 00180 ORG 32679
7FA7 C0800 00200 INIT CALL 0000H ;PUT LOCH IN HL
7FAA 11800 00220 LD DE,SCREEN-S
7FAD 19 00240 ADD HL,DE
7FAE 221240 00260 LD (481EH),HL ;ENTRY ADDR TO DCB
7FB1 C3C06 00280 JP 06C0E ;RETURN TO READY
00300 ;
00320 ; CHECK FOR FLAG CHARACTER (06H = OFF, 01H = ON)
00340 ;
7FB4 75 00360 SCREEN PUSH AF ;SAVE FLAGS
7FB5 C0800 00380 CALL 0000E ;PUT LOCH IN HL
7FB8 1801 00400 JR BYPFLG ;BYPASS FLAG
7FBA 88 00420 DEFB 8 ;ON/OFF FLAG
7FBC 23 00440 BYPFLG INC HL ;HL POINTS TO FLAG
7FBD 23 00460 INC HL
7FBD 79 00480 LD A,C ;CHARACTER TO A
7FBE 06FE 00500 AND 0F0H ;LOW BIT OFF
7FC0 2003 00520 JR NI,NOFLAG ;NOT A FLAG
00540 ;
00560 ; SAVE NEW FLAG
00580 ;
7FC2 71 00600 LD (HL),C ;STORE NEW FLAG
7FC3 182D 00620 JR BYPDRV ;BYPASS DRIVER
00640 ;
00660 ; TEST FLAG
00680 ;
7FC5 7E 00700 NOFLAG LD A,(HL) ;FLAG TO A
7FC6 B7 00720 OR A ;TEST FOR ZERO
7FC7 202B 00740 JR I,RSTRA ;ZERO - BYPASS ROUTINE
00760 ;

```

Program continues.

```

00700 ; TRAP NEW LINE CHARACTER
00800 ;
7FC9 3A2240 00820 LD A,(4022H);CURSOR CHAR
7FCC B7 00840 OR A ;IS CURSOR ON?
7PCD 2025 00860 NZ,RSTRA ;YES - GO TO DRIVER
7FCF 79 00880 LD A,C ;CHARACTER TO A
7FD0 FE8D 00900 CP 0DH ;NEW LINE?
7FD2 2020 00920 JR NZ,RSTRA ;NO - TO DRIVER
7FD4 2A2040 00940 HL,(4020H);CURSOR ADDR
7FD7 114000 00960 LD DE,40H ;LINE SIZE
7FDA 19 00980 ADD HL,DE ;ADD 1 LINE
7FDB 7C 01000 LD A,H ;NEW HSB
7FDC FE40 01020 CP 40H ;SCREEN OVERFLOW?
7FDE 2014 01040 JR NZ,RSTRA ;NO - TO DRIVER
01060 ;
01080 ; WAIT FOR KEYBOARD ENTRY
01100 ;
7FE0 CD4000 01120 KBDIN CALL 49H ;WAIT FOR KEYBD
7FE3 FE01 01140 CP 01H ;BREAK?
7FE5 2011 01160 JR Z,READY ;YES - SEND READY
7FE7 FE5B 01180 CP 5BH ;UP ARROW?
7FE9 2009 01200 JR Z,RSTRA ;YES - TO DRIVER
7FEB FE1F 01220 CP 1FH ;CLEAR?
7FED 20F1 01240 JR NZ,KBDIN ;NO - READ KEYBD AGAIN
01260 ;
01280 ; PROCESS CLEAR KEY
01300 ;
7FEF CDC901 01320 CALL 01C9H ;CLEAR SCREEN
01340 ;
01360 ; BYPASS DRIVER
01380 ;
7FF2 F1 01400 BYDRV POP AF ;RESTORE FLAGS
7FF3 C9 01420 RET ;BYPASS DRIVER
01440 ;
01460 ; RETURN TO DRIVER
01480 ;
7FF4 F1 01500 RSTRA POP AF ;RESTORE FLAGS
7FF5 C35004 01520 JP 0450H ;TO DRIVER
01540 ;
01560 ; RETURN TO READY
01580 ;
7FF8 3E0E 01600 READY LD A,0EH ;TURN ON CURSOR
7FFA 322240 01620 LD (4022H),A
7FFD C3191A 01640 JP 1A19H ;TO READY MSG
7FA7 C7 01660 END INIT
00000 TOTAL ERRORS

BYDRV 7FF2 01400 00620
BYDFLG 7FB0 00440 00400
INIT 7FA7 00200 01660
KBDIN 7FE0 01120 01240
NOFLAG 7FC5 00700 00520
READY 7FF0 01600 01160
RSTRA 7FF4 01500 00740 00860 00920 01040 01200
SCREEN 7FB4 00360 00220

```

```

100 REM - SCREEN CONTROL - 11/8/79 - PETER A. LEWIS
120 DEFINT A-Z
140 CLS:INPUT "ENTER STARTING ADDRESS FOR LOAD";A
160 IF A=0 THEN A=32679
180 FOR X=0 TO 88
200 READ D
220 POKE A+X,D
240 NEXT X
260 PRINT "TO ACTIVATE, ENTER:"
280 PRINT:PRINT,"SYSTEM":PRINT,"/";A:PRINT,"CLEAR":PRI
NT
300 PRINT "PRINT CHR$(1) TO TURN ON, PRINT CHR$(0) TO T
URN OFF"
320 PRINT
340 END
1000 DATA 205,11,0,17,10,0,25,34,30,64,195,25,26,245
1020 DATA 205,11,0,24,1,0,35,35,121,230,254,32,3,113
1040 DATA 24,45,126,183,40,43,58,34,64,183,32,37,121
1060 DATA 254,13,32,32,42,32,64,17,64,0,25,124,254,64
1080 DATA 32,20,205,73,0,254,1,40,17,254,91,40,9,254
1100 DATA 31,32,241,205,201,1,241,201,241,195,88,4,62
1120 DATA 14,50,34,64,195,25,26

```

Program Listing 2. BASIC

If you want the program to be loaded at a different location in memory, just change the ORG statement. Remember to set memory size to one less than that address.

If you have T-BUG, you can enter the object code shown on the left side of Listing 1 by using the M command. Then use the P command to create a SYSTEM

tape.

The third method of loading is the BASIC program shown in Program Listing 2. This routine allows you to specify the load address. (Entering 0 loads the program at the top of 16K.)

The modification can be turned on or off by executing a PRINT CHR\$(1) or PRINT CHR\$(0), respectively. ■

SWEEPSTAKES • OVER \$1700.00 IN PRIZES

SUPERBRAIN
64K \$2995.00
• IN STOCK •

**77 TRACK
DISK DRIVES**
\$599.00

**LETTER-QUALITY
PRINTER**
BY EITOH
\$2195.00

**TRS-80
64K MODEL II**
\$3626.00

ORDER NOW TOLL FREE • 1 (800) 345-8102

PRINTERS		DISK DRIVES		MOD I TRS 80 COMPATIBLE
CENTRONICS 730 • 8000 MEC 5510 5530 W TRACTORS	737 • 8005 778 • 81175 2990 FROM \$119	MODEL II DRIVES 1 DRIVE SINGLE ENCLOSURE 1 DRIVE MULTIPLE ENCLOSURE ADDITIONAL DRIVES FOR MULT ENC	\$350.00	8099 \$1069.50 8640 \$995 \$14.95 \$575.70 \$199.80 \$92.10 \$278.10 \$474.10 \$179.95 \$90
SOFTWARE	OWNER'S MANUAL	MOD II	MOD II	
MEDICAL DENTAL PATIENT ACCOUNTING WORD PROCESSING (MAGIC WAND) GENERAL LEDGER PAYROLL DATA BASE	\$25 \$60 \$6 \$149.95 \$6 \$149.95	\$1500 \$200 \$249 \$199 \$299	TAPE DISK \$19.95 \$24.95 \$34.95	CRS HEAD CLEANING KIT 4K L II TRS 80 16K L II RS 232 0 K EXPANSION INTERFACE 16K EXPANSION INTERFACE 32K EXPANSION INTERFACE TELEPHONE MODEM CRT EMULATOR BY INTERACT CRT STANDS ANTI-STATIC MATS
UPPER LOWER CASE MODIFICATION COMPREHENSIVE DIAGNOSTICS C P M		\$175		FROM \$139 \$160

OTHER PRODUCTS AVAILABLE • CALL IF YOU DON'T SEE WHAT YOU NEED
DEALER INQUIRES INVITED • SERVICE CENTER OPEN NOW
ABOVE PRICES ARE CASH DISCOUNTED • CALL FOR OTHER TERMS

VRData

777 HENDERSON BLVD
FOLCROFT, PA 19032

ORDER TOLL FREE
1 800 345 8102

LOCAL CALL
(215) 461 5300

V R DATA'S TRS-80™ SWEEPSTAKES

Celebrating V. R. DATA's 8th Anniversary

OVER \$1700.00 in PRIZES
GRAND PRIZE - 16K LII TRS-80
TWO SECOND PRIZES - DISK DRIVES
FOUR THIRD PRIZES - \$50.00 Gift Certificates

SWEEPSTAKES RULES

- 1 ALL ENTRIES MUST BE SUBMITTED ON ORIGINAL ENTRY BLANK
- 2 ONE ENTRY PER PERSON
- 3 WINNERS SELECTED BY RANDOM DRAWING NOTIFIED BY MAIL
- 4 ENTRIES MUST BE RECEIVED BY 10 31 80
- 5 VOID WHERE PROHIBITED BY LAW NO PURCHASE NECESSARY

MAIL NOW TO ENTER V. R. DATA'S SWEEPSTAKES

NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
TELEPHONE _____ OCCUPATION _____
COMPUTER EQUIPMENT OWNED _____

INTENDED USE _____

M SEND FREE CATALOG

ENTER NOW!
EXPIRES 10 31 80

TRS-80® MODEL II

Professional Software NOW AVAILABLE!

BASIC CROSS REFERENCE: Prepares a listing of your BASIC program. Heading contains program name, date, time, & page #. All "REM" statements print ELONGATED & are easy to spot. The cross-reference report is then printed. It shows you at a GLANCE what line #'s within your program are referenced and where, all variable names used & where. Know what is available. Find DEAD spots. We wrote this for ourselves...you can use it too.!

Documentation * \$10.00 Total = \$59.99 **
DISK SORT: Sorts thousands of "random file" records. Capacity is dependent on your disk space. Answer the question and sort now or later in your job stream. 1000 records = 20 bytes, sorting 16 bytes = 2.26 min.! Input files are not clobbered by the sort. All stored specs. can be displayed, printed or changed.

Single or multiple drives and 64K required.
 Documentation * \$10.00 Total = \$69.99 **
INVENTORY FLOORING MANAGEMENT. Send for details.

BASIC COMPILER TRSDOS®/BASIC compat. Faster by 7-30 times! Written by Microsoft. (Augmented with our documentation).

Easy to use! Complete package: \$350.00 **
 Use our Compiling Service to try it out. Send for details. We use it and have found it to be absolutely FANTASTIC!

ANADIX PRINTERS: DP-9501 \$1,599.00 Delivered! (48 contiguous states only)
 2K buf., graphics, 10-16.7 cpi, 11x9 matrix, all three interfaces, & much more a FANTASTIC printer/price!
WORD PROCESSING: Complete editing capability including center, right, left, or full line justification, tabs, margin, length and width control. Lines automatically overflow from line to line. All file specifications stored on disk. A complete, sophisticated system.

Requires 64K & printer of your choice.
 Documentation * \$10.00 Total = \$299.00 **
 *Deductible on software purchases.

** Plus postage & handling.
 (All software is in machine language or extra high speed)

Send for documentation & order form.

GOOD-LYDDON Data Systems
 5486 Riverside Dr., Chino, CA 91710 ✓218

TRS-80® & TRSDOS® are registered trademarks of Tandy Corp.

Master Charge or Visa accepted.

pattern generator

The program, "SSTV", is a slow scan TV pattern generator designed to run in a TRS-80 Level II with 16K of RAM. It is a machine language program that produces 9 gray-scale and checkerboard patterns in addition to test tones of 1200, 1500, and 2300 Hz. Each function is called by a single keyboard entry. Its output is directed to the tape "AUX" plug, with the resulting audio to be used in a manner similar to that of the tape player in your slow-scan station. Just load and run the program, connect the tape "AUX" plug to your transmitter or tape recorder and select the desired slow-scan output.

Cassette & Documentation.....\$35.00

Cassette, Documentation & Source Listing...\$40.00

N.Y. Residents add sales tax

solutions 80

Route 55 ✓277

La Grangeville, New York 12540

HOMES for the TRS-80



Featuring
 High Quality, Customized, and Economy Models.
 Computer Consoles for \$125.00.
 Printer Stands \$29.95.
 Complete TRS-80 Business System, built in.

Custom furniture for the TRS-80 office or home decor.
 —FOR 24 HOUR INFORMATION—
 PHONE: 408-946-1285

AVS 408-946-1285 2485 AUTUMNVILLE AVE
 85114 SAN JOSE, CA. 95132
 Dealer inquiries invited.

COMPUTER FORMS ✓240

Distributor of Computer Paper Products
 All paper products are white, blank, tractor feed, (pinfeed) fanfold continuous stock.

6" x 4" Postcard Stock (7" width with 1/2" margins) Use as in or trim for 3 1/2" x 5 1/2"
 Pkg 1000 cards \$17.95 Pkg 2000 \$29.95
 Box 4000 \$49.95

Standard 9 1/2" x 11" Computer Paper (8 1/2" x 11" sheet)
 Pkg 500 sheets \$5.95 Box 3500 sheets \$27.95
 Box shipping weight 31 lbs.

Try our mini-paper! 6" x 8 1/2" sheet size (7" width includes 1/2" tractor margins)
 Box 3200 sheets... \$23.95 sh. wt. only 17 lbs.

Cash Order: Include \$2 for shipping, excess will be billed with your order.
 Credit card Order: Shipping will be added to your order. Include all credit card information.

Send for FREE CATALOG of paper products. Postcard stock, address labels, many sizes & types of paper.

Computer Forms. (616) 429-7922
 5588 Caribou, Stevensville, MI 49127



PAKSECTOR V

BREAK THROUGH TO NEW DIMENSIONS IN INTERGALACTIC WARFARE! \$19.95

- UNIQUE DISPLAY split screen gives each player a private display.
 - INTELLIGENT OPPONENT pit your skill against another human!!
 - ACTION SOUNDS & GRAPHICS explosions, weapons, etc.
 - FLEET BATTLE CRAFT they seek out & engage evil enemy patrols.
 - CHALLENGING conquering the galaxy requires bold strategy!
- TRS 80 L2 16K REQUIRED. For cassette and instructions send check or money order.
SYNERGISTIC SOLAR INC. PO Box 580595
 Miami FL 33156

INTERFACE EXPANSION BOARD

For the TRS 80



The Interface Expansion Board gives your computer these features:

- 32 K Memory
- Real-Time Clock
- Parallel Port
- RS-232 Port
- 2K E-Prom Option
- Phone Modem
- Dual Cassette Line
- On Board Supply
- Silk Screen
- Solder Mask
- Expansion Port
- Manual

PC Board & user manual
 INTRODUCTORY OFFER
59.95

Add 3.00 for shipping & handling. Texas residents add 5% sales tax.

FREE PAMPHLET AVAILABLE
 Call or write

MICRO-DESIGN ✓378
 P.O. Box 18054
 Austin, Texas 78760
 1-512-458-2937

Expire Date _____ Card # _____
 Signature _____

TRS 80 is a Trademark of Tandy Corp.

DISASSEMBLED HANDBOOK FOR TRS-80

VOLUME 1—\$10. POSTPAID

Using ROM Calls in assembly language programming
 Self-programmed learning course—10 Chapters
 All BASIC ROM Calls—ROM ancillary functions
 CINT, CSNG & CDBL arith/trig/log/etc. demo pgms

VOLUME 2—\$15. POSTPAID

Advanced assembly language course—13 Chapters
 Storing video in MEM for later use & recall
 Split-screen video with scroll/store/recall
 Decoding single & double precision numbers

COMMENTS

COMPUTER INFORMATION EXCHANGE—ship 100 Vol. 2
 George Blank—Vol. 1 good intro. to ROM CALLS
 SOFTSIDE—will reprint 3000 copies of Vol. 1
 Allan Moluf—I especially recommend this book
 S-80 BULLETIN—A must for every 80 bookshelf
 Charles Butler—most informative and accurate
 INTERFACE—save you 1 year's avy. lang. study
 Joni Kosloski—we sold over 500 first 30 days
 THE ALTERNATE SOURCE—std. text for using ROM
 Miller Microcomputing—ship us a carton ASAP
 CHICATRUG—ship us another carton via Air Mail
 Bill McLaughlin—ship another 300 air freight

RICH CRAFT ENGINEERING LTD. ✓278
 Drawer 1065, Wahmeda Industrial Park
 Chautauque, New York 14722
 phone (716) 753-2654 for COD orders

SOFTWARE for the TRS-80

- PROGRAMS for TRS-80™ Level II. Call, Mailorder and PC
- SIGNING** - Learn to talk with the hearing impaired. Type in any phrase up to 1,400 characters long. It then reads back one letter at a time, showing the hand positions for each letter. You have control over the speed, and whether or not the phrase shows on the screen, if so the letter being signed is highlighted. \$18.95
 - TIC-TAC-TOE-2.2** - This game has only built your interest, it won't give it back. It's really fun. It makes a winning move and you need to be ready. Set your own time limit for thinking, if you're too slow you will lose a turn. Game session plays same way twice. This combination makes it a challenging game. \$6.50

BANJO PLAYER 1.0 - Learn to chord the banjo by placing your choice of 110 chords in any order, for any length of time. Up to as many as 250, play any song you want. A graphic banjo neck is displayed on your CRT showing how to place each chord, always on the correct order helping with the timing. \$14.95

FORM 007 - This form is on clear plastic. It is a CRT mask sheet that comes with an 1% of matching the 17" screen graphics. Find any location on the screen by: The set (in, of) Row, The dot (in, of) Row, In, he or dot the POKE ##### and PEEK (#####) Row. Also on the side a chart to define any combination of the six part block used in POKE-ing graphics. \$2.95

ENJOY COMPUTER PROGRAMS
P.O. BOX 18054
AUSTIN, TEXAS 78760
 TRS-80 is a trademark of Tandy Corp.

THE SOFTWARE DIRECTORY

A Comprehensive Guide to Programs

Now, you can have access to hundreds of computer programs, quickly and easily.

The Software Directory lists available programs for major home and small business computers, including Apple...Atari...North Star...Radio Shack...PET...CP/M Systems and more.

Indexed for fast and easy reference, Directory categories include games, education, utilities, home accounting, and professional business programs. It's organized according to computer type, so you can find the programs designed for your computer, fast.

The Software Directory describes each program, and lists the minimum required system, program price, ordering information and vendor address.

The Software Directory has all the information you need for ordering any of the hundreds of software programs available. To get it, send a check or money order for \$9.95 to Software Central. We'll send you a software reference book you'll use time and again.



Software Central
P.O. Box 30424 Dept. M
Lincoln, NE 68503

✓416



MACO MICRO MODULE ... TRS-80 USERS ...

Expand the horizons of your Level II R-5 system with the M3 Interactive Interface

HARDWARE FEATURES:

- Two 8-bit hand-controller input ports.
- 1/10 second interrupt generator for use as a timer or Real-Time clock.
- Audio generator with speaker.
- Connects to expansion connector with provided cable.
- Self-contained power supply.
- Presents only one LSTTL load on the TRS-80 Bus.

SOFTWARE FEATURES:

- Software package includes:
 TRS-80 Brickyard
 Real-Time Clock
 Micro-Organ
 Comput-a-Sketch
- Complete programming instructions for BASIC and Assembly Language provided.

All M3 units are factory burnt in and CPU tested. Please specify memory size when ordering. Dealer inquiries are invited.

Ordering: Money Order or Check — we pay freight charges. VISA, MC, or C.O.D. — freight added to bill. On charge cards please include complete number as well as your complete address.

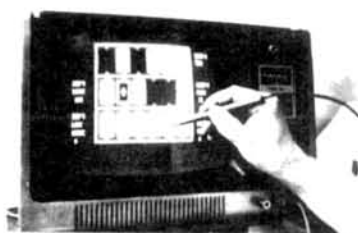
MACO MANUFACTURING ✓318

1383 Airways Blvd. • Memphis, Tenn. 38114 • (901) 452-9510

"TRS-80" is a trademark of Tandy Corp.

SUMMER SALE!
\$99.95

SOFTWARE FOR THE TRS-80*



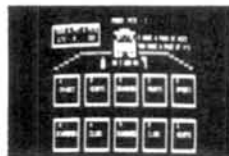
**NOW!
A LIGHT PEN
FOR THE TRS-80
AND
SOFTWARE
THAT USES IT!**

QS LIGHT PEN. We have taken the excellent Photopoint™ light pen and packaged it with our own custom software. Use the light pen to draw on the video screen, make multiple choice selections, or add zip to your game programs. You get the light pen, which plugs into your tape recorder, and an instruction booklet that includes the software you need to interface to your own BASIC programs. Our software routines are in BASIC and a simple GOSUB puts the light pen in action. These routines include a "menu selection" routine and a "screen location" routine. Two BASIC programs that demonstrate these routines are also included. One 9V battery required, not included.
Light Pen — \$19.95

SKETCH-80™ by Bob Christiansen. Use the QS light pen to draw figures on the TRS-80 video screen. Figures are drawn at three times normal size. Then save your sketch in memory and start another one. Your sketch can be displayed at normal size or at the enlarged size at which they were drawn. Combine two or more sketches on the same screen. Ask the computer to print out the POKE values required to produce your sketch using BASIC. Save your sketches on diskette. This system program figures out how much memory your TRS-80 has and allocates storage accordingly. Requires level II, 16K.
On Cassette — \$14.95

THE FOLLOWING PROGRAMS REQUIRE LEVEL II, 16K, AND CAN BE PLAYED WITH OR WITHOUT A LIGHT PEN

POKER PETE™ by Dave Gubser. Play five card draw poker one-on-one against an animated PETE. Watch PETE shuffle and deal the cards. He will challenge you with bluffs, raises, calls and folds in this winner take-all showdown. And watch out — PETE's got a gun! Three levels of skill. Written in BASIC.
On Cassette — \$11.95



LOWBALL POKER by Danny Shea. How low can you go? It's you against Micro Molly and the lowest hand wins. That's the rule in lowball poker. This version plays the popular Gardenia, California rules. Don't take her for granted — Molly plays an excellent game. Written in BASIC.
On Cassette — \$11.95

RUMMY MASTER by Dave Gubser. Play rummy against the computer. Exceptional graphics display your hand, the discards, and the cards that have been melded. You see your opponent shuffle and deal out the cards. Tested in an arcade, this program was a big hit. Written in BASIC.
On Cassette — \$11.95

MATCH CARDS by Danny Shea. **BANKSHOT** by Bob Christiansen. Two programs on one cassette. **MATCH CARDS** is a concentration-type game where you match numbers, letters, or graphic shapes. For 1 or 2 players. Automatic scoring rates your recall ability. Written in BASIC. **BANKSHOT** is a billiard-like game for those who think they know all the angles. Hit the ball into the pocket, but you must hit a wall first. Written in BASIC with machine language subroutines. Just CLOAD and RUN. For 1 or 2 players.
On Cassette — \$9.95

THE FOLLOWING PROGRAMS REQUIRE LEVEL II, 16K, AND DO NOT USE A LIGHT PEN.

FASTGAMMON™ by Bob Christiansen. Our popular machine language backgammon game that started us in business. The computer plays against you and makes good moves instantaneously. Option to replay dice rolls from the previous game. An eight-page instruction booklet is included.
On Cassette — \$19.95
On Diskette — \$24.95

DEBUG by Bob Pierce. Debug machine language programs by stepping through one Z-80 instruction at a time. Relocatable. Several display options. Multiple break points. Modify memory and registers.
On Cassette — \$14.95

Z-80 DISASSEMBLER by Vic Tolomei. Decode machine language programs, including TRS-80 ROM with this Z-80 Disassembler written in BASIC. Instruction mode prints out machine code and Zilog mnemonics in standard format. Or use the ASCII mode which converts machine language code to ASCII.
On Cassette — \$14.95



QUALITY SOFTWARE ✓188

6660 Reseda Blvd., Suite 105, Reseda, CA 91335
Telephone 24 hrs., 7 days a week: (213) 344-6599

HOW TO ORDER: MasterCharge and Visa cardholders may telephone their orders and we will deduct \$1 from orders over \$19 to compensate for phone charges. Or mail your order to the address above. California residents add 6% sales tax. **Shipping Charges:** Within North America orders must include \$1.50 for first class shipping and handling. Outside North America the charge for airmail shipping and handling is \$5.00 — payable in U.S. currency.

*"TRS-80" is a registered trademark of Tandy Corp.
"Photopoint" has been trademarked by Micro Matrix.

Halve track access time with a software patch.

QWIKDISK

Bruce Nazarian, WD8DRK
GNOME Computerworks
9918 Lauder
Detroit, MI 48227

While doing my homework on the various Disk Operating Systems available for a new pair of mini-floppy disk drives I just acquired, I ran across Apparat's NEWDOS and NEWDOS+. Each looked like an improvement over the TRSDOS 2.2 I was using, so I scraped up some money and took the plunge.

NEWDOS made disk operations simpler and more reliable. But this was not to be its only benefit.

While researching NEWDOS+, I read an article by Lance Micklus describing the track-to-track access time used in TRSDOS and NEWDOS (40 ms) and how this time could be improved by a factor of two or four. After reading further, it turned out the changes involved

POKEing new values into the DOS from BASIC. The article mentioned that a patch to incorporate these changes would be available as soon as the author had time to work on it.

The Interim

In the interim, I tried everything to get QWIKDISK, as I called it, to operate efficiently.

I wrote a short BASIC program to POKE the values, but that meant I had to load BASIC, fix the access times and return to DOS.

I then tried converting the POKES into Z-80 machine language and executing the code automatically each time the DOS booted up. This was much faster than BASIC, but still not very elegant.

Then I decided to attack the problem from a different angle. Why wait? After all, the DOS is just a Z-80 machine language program, like any other machine language program. I had done much machine language programming, on 6502 as well as Z-80, so I figured, if the guy who

found the fixes could write a patch, maybe I could, too.

First of all, I used a machine language monitor program to dump portions of the DOS around the fixes. That gave me the hex machine code for the program at those points. I also dumped those same locations in ASCII for convenience.

Next, using Superzap (part of NEWDOS+) I examined the system programs on a DOS disk. Since Superzap dumps each disk sector in both hex and ASCII, I used the ASCII I had dumped beforehand to search for a character string that was identical.

Examining sector after sector, I finally hit paydirt in Sector 7. This sector is part of the module called SYS0SYS. There it was, the identical ASCII string! Looking at the hex dump of that section, I compared it byte-for-byte to be sure I had the identical code. Then, using Superzap, I carefully replaced that one byte with its new value. Superzap wrote the sector back to disk with the new value in place.

With that sector done, I began

searching for the ASCII string identical to the second one I dumped. I found it in Sector 9. Checking against my hex dump once more, I ascertained that this was indeed the second POKE point. Again, I used Superzap to correct the value in that sector to the new one and write the sector back to disk.

Now for the acid test. Would the fixed DOS boot up correctly from disk? With some uncertainty I pressed RESET. To my delight the disk bootstrapped at normal speed, then took off like a buzzsaw when the modified program was loaded.

How to Do It

Before I explain in detail how and where to modify your DOS diskettes, a word of warning: Superzap is a very powerful utility and, if used improperly, can easily destroy the system information on your diskette. Be sure you know how to use it correctly.

In addition, this modification is for **SYSTEM** diskettes, i.e. DOS diskettes only. Ordinary formatted data diskettes will not have the system programs

```

000700 A847 C356 47C3 0047 C337 47C3 5F47 3E8B .G.VG..G.7G..G>
000710 F5CD 0046 F1CD 5846 CDF3 45E6 813D C269 ...F..XF..E...
000720 463A 0943 32E1 3718 EP01 1467 44C3 CF44 F..C2.7.....D..D
000730 C3DF 44C3 B74C C3D2 4C3E D3EF 3EE3 EP01 ..D..L..L>...>...
000740 7180 444E 414D 454E 414D 452F 4558 542E ..DNAKNAME/EXT.

000700 A847 C356 47C3 0047 C337 47C3 5F47 3E8A .G.VG..G.7G..G>
000710 F5CD 0046 F1CD 5846 CDF3 45E6 813D C269 ...F..XF..E...
000720 463A 0943 32E1 3718 EP01 1467 44C3 CF44 F..C2.7.....D..D
000730 C3DF 44C3 B74C C3D2 4C3E D3EF 3EE3 EP01 ..D..L..L>...>...
000740 7180 444E 414D 454E 414D 452F 4558 542E ..DNAKNAME/EXT.

```

Fig. 1. Partial dump of NEWDOS, Track 0, Sector 7 showing (top) byte #0F before modification and (bottom) the same byte after modification to 20 ms access time. Columns at left indicate Drive #(0), Track #(00), Sector #(7) and starting byte number of each line (00, 10, 20, etc.)

```

000900 0046 CD69 463A ED37 BAED 53EE 37C8 3E1B .F..F:7..S.7.>
000910 F5CD 6946 F132 EC37 C907 3005 3ED8 32EC ...F.2.7..0.>.2.
000920 37CD F345 CB47 C818 F032 9446 E3C5 4623 7..E.G...2.F..F#
000930 7E23 32C9 467E 2366 6F22 AB46 E1E3 CD47 .#2.F.#..*.F...G
000940 46CD 5544 C5D5 E521 EC37 F336 0011 EF37 F.UD...1.7.6...7

```

```

000900 0046 CD69 463A ED37 BAED 53EE 37C8 3E1A .F..F:7..S.7.>
000910 F5CD 6946 F132 EC37 C907 3005 3ED8 32EC ...F.2.7..0.>.2.
000920 37CD F345 CB47 C818 F032 9446 E3C5 4623 7..E.G...2.F..F#
000930 7E23 32C9 467E 2366 6F22 AB46 E1E3 CD47 .#2.F.#..*.F...G
000940 46CD 5544 C5D5 E521 EC37 F336 0011 EF37 F.UD...1.7.6...7

```

Fig. 2. Partial dump of NEWDOS, Track 0, Sector 9 showing (top) unmodified and (bottom) modified second byte of Qwikdisk modification. Same modification may be made to either 35 or 40 track versions.

```

000700 B920 042C 7E18 1871 2643 6PCD 6946 3AED .....4C...F1.
000710 3777 796F 7E32 ED37 79CD 3946 3289 436F 7....2.7..9P2.C.
000720 3AEC 3787 7D32 E137 3088 2188 082B 7CB5 1.7..2.70.1..+..
000730 20FB E1C9 E687 8787 87F6 C732 4546 AFCB .....2EF...
000740 C7C9 C080 46CD 6946 3AED 37BA E053 EE37 ....F..P1.7..S.7
000750 C83E 1EF5 CD69 46F1 32EC 37C9 CD58 46F5 >...F.2.7..XP.
000760 F188 0808 CDAC 43CB 47C8 18F8 3293 46E3 >...C.G...2.F.
000770 C546 237E 2332 D346 7E23 666F 22A7 46E1 .P8.02.P8..".F.
000780 E3CD 4746 CD69 46C5 D5E5 21EC 3736 0811 ..GP.F...1.76..
000790 EF37 C1C5 C1C5 F318 038F 308C 7ECB 4F28 7.....0..0(
0007A0 F8F3 0808 83C3 A146 F87E E67C 36D8 E1D1 (.W....>.2.
0007B0 C128 23CB 5728 13FE 2828 11F5 38FF 3288 (W....>.2.
0007C0 43CD 0846 3E88 CD58 46F1 1885 473E 08CB C..F>..XP..G>
0007D0 0838 033C 18F9 C1C9 3E88 CD71 468A 811A 8....>..F..
0007E0 823E ABCD 7146 8589 8A12 3EA9 18F5 3E88 >..F...>..>
0007F0 CD71 4685 811A 0801 8542 44C3 0847 8139 ..F.....BD..G.9

```

```

000700 B920 042C 7E18 1871 2643 6PCD 6946 3AED .....4C...F1.
000710 3777 796F 7E32 ED37 79CD 3946 3289 436F 7....2.7..9P2.C.
000720 3AEC 3787 7D32 E137 3088 2188 082B 7CB5 1.7..2.70.1..+..
000730 20FB E1C9 E687 8787 87F6 C732 4546 AFCB .....2EF...
000740 C7C9 C080 46CD 6946 3AED 37BA E053 EE37 ....F..P1.7..S.7
000750 C83E 1EF5 CD69 46F1 32EC 37C9 CD58 46F5 >...F.2.7..XP.
000760 F188 0808 CDAC 43CB 47C8 18F8 3293 46E3 >...C.G...2.F.
000770 C546 237E 2332 D346 7E23 666F 22A7 46E1 .P8.02.P8..".F.
000780 E3CD 4746 CD69 46C5 D5E5 21EC 3736 0811 ..GP.F...1.76..
000790 EF37 C1C5 C1C5 F318 038F 308C 7ECB 4F28 7.....0..0(
0007A0 F8F3 0808 83C3 A146 F87E E67C 36D8 E1D1 (.W....>.2.
0007B0 C128 23CB 5728 13FE 2828 11F5 38FF 3288 (W....>.2.
0007C0 43CD 0846 3E88 CD58 46F1 1885 473E 08CB C..F>..XP..G>
0007D0 0838 033C 18F9 C1C9 3E88 CD71 468A 811A 8....>..F..
0007E0 823E ABCD 7146 8589 8A12 3EA9 18F5 3E88 >..F...>..>
0007F0 CD71 4685 811A 0801 8542 44C3 0847 8139 ..F.....BD..G.9

```

Fig. 3. Full sector dump of TRSDOS 2.2, Track 0, Sector 7. Both bytes to be modified are present in this sector and the figure shows (top) unchanged and (bottom) changed information.

on them.

This modification further assumes that the SYS0/SYS module will be at the same location on each system diskette. If you find that the byte at the specified location is not what I have indicated, *don't change it*. First, make sure you have the right track and sector before you alter any program bytes.

For NEWDOS or NEWDOS +, the bytes to change are located in two different sectors, as described in the story above. First, modify Track #0, Sector 7, relative byte # OFH (Fig. 1).

The original value should be OBH. This gives 40 ms track access time. For 20 ms change this byte to 0AH, and for 10 ms change it to 09H.

The second location is Track

#0, Sector 9, relative byte # OFH (Fig. 2). Normally, this byte would be 1BH. For 20 ms access, change it to 1AH, and for 10 ms make it 19H.

Modifying TRSDOS 2.2

If you have TRSDOS 2.2, you will need the Superzap utility included in NEWDOS+. But, if you can acquire it your disk changes are easy.

Both of the TRSDOS changes are made in one sector. First: Track 0, Sector 7, relative byte # 52H (Fig. 3). Its 40 ms value is 1FH. Change this to 1AH for 20 ms or 19H for 10 ms. Then change relative byte #C5H. Its 40 ms value is OBH. Change it to 0AH for 20 ms, or 09H for 10 ms. That's all there is to it. (Fig. 3).

It will save a lot of time and ef-

```

000700 B920 042C 7E18 1871 2643 6PCD 6946 3AED .....4C...F1.
000710 3777 796F 7E32 ED37 79CD 3946 3289 436F 7....2.7..9P2.C.
000720 3AEC 3787 7D32 E137 3088 2188 082B 7CB5 1.7..2.70.1..+..
000730 20FB E1C9 E687 8787 87F6 C732 4546 AFCB .....2EF...
000740 C7C9 C080 46CD 6946 3AED 37BA E053 EE37 ....F..P1.7..S.7
000750 C83E 1EF5 CD69 46F1 32EC 37C9 CD58 46F5 >...F.2.7..XP.
000760 F188 0808 CDAC 43CB 47C8 18F8 3293 46E3 >...C.G...2.F.
000770 C546 237E 2332 D346 7E23 666F 22A7 46E1 .P8.02.P8..".F.
000780 E3CD 4746 CD69 46C5 D5E5 21EC 3736 0811 ..GP.F...1.76..
000790 EF37 C1C5 C1C5 0818 038F 308C 7ECB 4F28 7.....0..0(
0007A0 F8F3 0808 83C3 A146 F87E E67C 36D8 E1D1 (.W....>.2.
0007B0 C128 23FE 2828 15CB 5728 08FF 38FF 3288 (.W....>.2.
0007C0 43CD 0846 3E88 CD58 46F1 1885 473E 08CB C..F>..XP..G>
0007D0 0838 033C 18F9 C1C9 3E88 CD71 468A 811A 8....>..F..
0007E0 823E ABCD 7146 8589 8A12 3EA9 18F5 3E88 >..F...>..>
0007F0 CD71 4685 811A 0801 8542 44C3 0847 8139 ..F.....BD..G.9

```

Fig. 4. Full sector dump of TRSDOS 2.1, Track 0, Sector 7. Similar to TRSDOS 2.2, relative byte #52 has original value of 1BH rather than 1FH as in TRSDOS 2.2. The remaining byte is the same in both TRSDOS's.

```

000000 00FE 11F3 31FC 4121 E242 CD9A 423E 0132 ....1.A1.B..B>.2
000010 E137 3A82 4257 1E04 0100 4DCD AA42 2078 71..BW....M..B..
000020 3A80 4DE6 1021 E542 2869 D92A 164D 557C 1..M..1.B(..*..MU.
000030 0787 07E6 0767 0787 845F 81FF 4D09 CD75 .....M....
000040 423D 2817 CD75 4247 CD75 426F 85CD 7542 B.....BG..B..B
000050 6785 288A CD75 4277 2318 F63D 288B CD75 ..(.B..B..B..
000060 4247 CD75 4218 FB18 D5CD 7542 CD75 426F BG..B..B..B..
000070 CD75 4267 E9D9 8C28 14C5 3E01 32E1 37CD ..B.....>.2.7.
000080 AA42 208C C11C 7BD6 8A28 825F 148A D9C9 ..B.....
000090 21F1 42CD 9A42 CD40 0876 E57E FE83 2088 1..B..B..0.....(
0000A0 CD33 0823 F88D 20F3 E1C9 C5CD B242 E1C8 3..0.....B..
0000B0 444D E053 EE37 21EC 3736 18F5 1F7E DW.S.71.76.....
0000C0 0F38 PC36 88D5 11EF 37C5 C118 088F 308A 8..6.....7.....0.
0000D0 7ECB 4F28 F81A 0283 18F6 7E8E 5CD1 C836 ..0.....>.6
0000E0 D8C9 1C1F 8317 E84E 4F28 5359 5354 454D .....NO.SYSTEM
0000F0 8D17 E844 4953 4828 4552 524F 528D E85F .....DISK.ERROR

```

Fig. 5. Full sector dump of BOOT/SYS, Track 0, Sector 0. Relative byte BAH is underlined. See footnote for more information on this modification.

fort if you try both of these access times out first. Some drives (Shugart, for example) are not capable of 10 ms access times, but can take 20 ms. Other drives (Percom, M.P.I., etc.) are capable of 5 ms access times.

Try the different times with your drives, and then Superzap the appropriate values onto your DOS diskettes. ■

Footnotes

* Recent information from APPARAT also mentions a third modification that is neces-

sary for this fix. It involves a change to 1 byte in the BOOT/SYS module. This will make the BOOTSTRAP loader work at the higher step times also. This change may be made to TRSDOS 2.1, 2.2 or NEWDOS. In Track 0, Sector 0, change the relative byte BAH as follows: Retain original value (1FH in TRSDOS 2.2; 1BH in 2.1 and NEWDOS) for 40 ms step time. For 20 ms, change to 1AH. For 10 ms, change to 19H.

** Further information also indicates values for 5 ms step times (which may not work on other than MPI drives). For bytes that are changed in the 1BH, 1AH, 19H, sequence, 1BH will give 5 ms step times. For bytes that use the 0BH, 0AH, 09H sequence, 0BH gives 5 ms step time. Both values should correlate: If one byte is 1BH, the other should be 0BH. If one byte is 1AH, the other should be 0AH. Likewise for 19H; 09H, and 18H; 08H.

What is...!

BEYOND A SCOTT ADAMS' ADVENTURE ?

ADAMS' ODYSSEY

- * ITEMS NOW HAVE 3-D-ability (Insides, Outsides, etc)
- * MULTI-PLAYER - up to 12 and they can be friend or foe
- * UNRESTRICTED COMMANDS up to full paragraphs!

COMING SOON... Bug Your Dealer!

Box 3435 • Longwood, Fla. 32750
(305) 862 6917

The solution to a loopy problem.

The "Next" Trap

Hubert C. Borrmann
2840 South Circle Drive #209
Colorado Springs, CO 80906

I fell into the "NEXT" trap when I tried to run the big ROM and RAM test in appendix C of the Level II manual.

Have you fallen into this sneaky trap yet? If not, you surely will sooner or later. What astounds me is, that I have so far seen no reference to this, not even in the *Learning Level II* book by D. A. Lien. ?NF ERROR was looking at me from the screen.

If you want to fix this program, insert the following line:

```
280 X = 99:NEXT X
```

Level II is a good interpreter, but reminds me of one of my teachers many many years ago who had an astounding memory for things that should have been

forgotten. To explain this, type Listing 1, RUN and type 10.

OK, this is the way it should work. Now RUN it and type in a 5.

```
NF ERROR
```

Unfinished Business

This is a simple program, containing three FOR-NEXT loops. The first one in line 30 and 40,

The program then enters two nested loops and everything

works fine until the Variable B is checked in line 110; where B should be changed from one or two for the second pass through the B-loop. But the interpreter won't let you do this and out executes nine times unless your entered number makes you jump out of the loop to line 50, and the loop will not run its course, leaving behind "unfinished business." (This is what the interpreter remembers, but should have forgotten.)

comes the message ?NF ERROR IN 110.

You see, the interpreter remembers that unfinished business with Variable A and won't accept NEXT B until A is cleared. You know that a NEXT statement will let the program fall through if the variable involved is larger than the TO figure given in the FOR-TO statement. The NEXT statement adjusts the variable and then makes this test. So, fortunately our fix is easy for situations where you jump out of FOR-NEXT loops. Insert this line in our little program, and we are in business:

```
55 A = 99:NEXT A
```

Now RUN and type a 5.

Don't be misled if you enter the number 9! It still jumps out of the loop! I hope that this may clear up some unexplained phenomena and help you avoid the NEXT trap. ■

```
10 CLEAR 200 : CLS
20 PRINT@ 128,"INSTRUCTIONS # 1"
30 S1$="PRESS 'SPACE' WHEN READY"
40 GOSUB 10000
50 CLS : PRINT@ 512,"INSTRUCTIONS # 2"
60 SA=640
70 GOSUB 10100
80 CLS : PRINT@ 0,"AND MORE INSTRUCTIONS"
90 S1$="TYPE 'SPACE'-BAR TO CONTINUE, 'E' TO END"
100 GOSUB 10000
110 IF S6$="E" THEN END ELSE 20
```

Program Listing

BUSS EXTENDER FOR TRS-80™

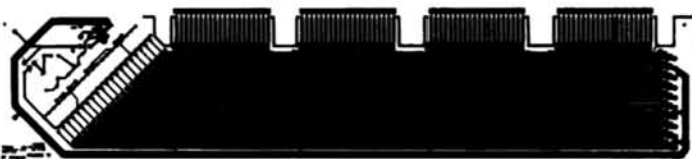
ELCOMP CO Microcomputer Peripherals
P.O. Box 6133, Albany, CA 94706

DEALER INQUIRIES INVITED

C.O.D.



Now you can hook up to
Four Accessories
to the TRS-80™!



- * with Active Buss Termination
- * Reduces Ringing and Noise
- * Increases Reliability

\$95 available for immediate delivery

TRS 80™ is a trademark of Tandy Corp

« MISOSYS »

diskmod Turn your Editor Assembler into a disk package. This patch modifies EDTASM 1.1 & 1.2 under 32K TRSDOS, NEWDOS, or VTOS! Features? Add full disk I/O, block move, global change, printer pagination with optional prompting, sorted symbol table, display memory utilization, correct DEFM expansion, protect memory, and recover after BOOT. From within the EDTASM you will have DIR, KILL, & FREE. This package is a must for assembler programmers! Priced at \$20.

dsmblr ii Complement your assembly language tools with this Z80 disassembler which produces screen, printer, or disk file output. A 2-pass process provides SYMBOLS for 16-bit address and 8-bit relative references. EQUates & ORG are generated. New version reads SYSTEM programs & displays load addresses. Priced at \$20 for disk systems. A 16K Tape Version (DSMBLR I) is available for \$15.

cmdfile Now you can append 2 or more CMD files and/or SYSTEM tapes. Perform transfer to & from disk/tape of SYSTEM/CMD modules with offset capabilities. Provides PATCH, TAPEDISK, & LMOFFSET capabilities as well as adds a few of its own. Get CMDFILE today! 16K req'd. \$20.

dutil All-purpose utility to examine, clear, initialize, move, and modify data in memory. Load, punch, verify SYSTEM tapes. Disk sector I/O. More! \$20 (TUTIL, for the non-disk user available at \$15).

MISOSYS Department K
5904 Edgemoor Drive
Alexandria, Va. 22303
703-960-2998



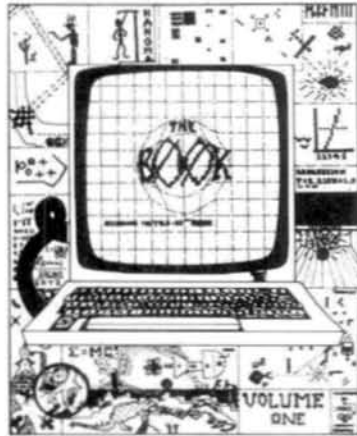
THE BOOK

THE BOOK 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. A fully-commented listing of math routines provides detailed explanation of how they work. Included is a symbol table of the entire machine noting over 500 addresses. THE BOOK will save you hours of assembler program development time. Don't start programming without THE BOOK. Order your copy for \$14.95+\$1.50 S&H.

BACK TO BASIC

THE BOOK

ACCESSING THE TRS-80* ROM



If you ever do Assembly language programming, or you just want to know more about your TRS-80 ROM, "THE BOOK" is for you.

Volume I will give you access to over fifty machine language subroutines in the Radio Shack Level II BASIC. It includes information on the numeric data formats and a commented listing of the ROM routines.

"THE BOOK, Volume I", encompasses all arithmetic functions and mathematical operations. There are separate routines for integers, single precision, and double precision numbers and the data format for each of these number types is explained. The routines that perform ASCII to binary and binary to ASCII conversion are identified and explained to provide you a means of data I/O.

A fully commented listing provides the details on the step-by-step execution of these ROM routines. Although a complete disassembly is not provided in order to avoid copyright infringement, you can obtain a complete disassembly using the disassembler program listed in "THE BOOK." Volume I also includes a complete, detailed memory map of the entire machine and a symbol table noting over 500 addresses.

"THE BOOK" will save you hour upon hour of assembler program development time. Don't start programming without it.

Order your copy of "THE BOOK", today!

DEALER INQUIRIES INVITED

Insiders Software Consultants, Inc.
P.O. Box 2441, Dept. M 1
Springfield, VA 22152 305 *TRS-80 is a trademark of Tandy Corp.

Please send me Volume I of THE BOOK at \$14.95 plus \$1.50 for postage.

NAME: _____
ADDRESS: _____
CITY, STATE _____ & ZIP CODE: _____

Check payable to Insiders Software Consultants, Inc.
 MASTER CHARGE MC Bank Code:
 VISA Exp. Date: _____ Card Number: _____

Signature: _____

IF YOUR CUSTOMER MAILING LIST HAS YOU NAILED...



behind a desk for hours at a time because of constant updates and changes, dial (617) 373-1599 and we'll explain our Customer Control Mail List System that has 670 customers per diskette; will store name and address information, reference code, plus variable selection codes for each customer; will display customer information of a video screen, print reports and mailing labels; will sort 670 names in less than 30 seconds; select, sort, and print 670 mailing labels in just over 30 minutes; has Partial Key Lookup and instantaneous display; has select/sort options by record sequence, last name, city, state, zip code or reference code; **and has a low price of only \$99.00!**

S&M SYSTEMS, INC.
P.O. Box 1225 • 2 Washington Street
Haverhill, Massachusetts 01830

Get it with an Inkey\$.

The Competition's Cursor

R. Daniel Bishop
Department of Chemistry
The School of the Ozarks
Point Lookout, MO 65726

Surely you know how it is when you select one gadget or machine from among a variety of competing models, wishing all the while that the model you chose had some of those dandy options offered by the competition. Buying a microcomputer requires choices and compromises, and even though I felt the TRS-80 had enough of the options I wanted in a microcomputer, I still found myself taking sidelong glances at that infernal, insistent flashing cursor that the competition offered.

Well, those feelings are a thing of the past, because now I can write my own flashing cursor into TRS-80 Level II BASIC programs.

INKEY\$ Command

The key to the flashing cursor is the INKEY\$ command and the graphics character printed out by the CHR\$(143) command. While writing the main program, you need to determine the display position (0 to 1023) where the blip is supposed to appear each time it is used. Assign the value of this position to the variable CR and then use a GOSUB 1000 to transfer to the Flashing Cursor Subroutine (Listing 1).

Each character in the input string is stored sequentially in the NS\$(j) array while the counter J keeps track of how many characters have been typed.

Once the enter key is depressed, the subroutine is transferred to the loop (lines 1012 to 1015) which adds these characters one at a time onto the string variable NS\$, so that the complete input information can be used later in the program.

CR is incremented by one after each keyboard entry except when the backspace or the enter keys are depressed (having ASCII values of 8 and 13, respectively). The flashing cursor moves one more space, awaiting the next input.

A simple program, using this routine, follows:

```
1 CLEAR 500
2 DIM NS$(30)
5 CLS
10 PRINT "WHAT IS YOUR
NAME?"
15 CR = 20
20 J = 0
25 GOSUB 1000
30 PRINT
35 PRINT "I AM VERY GLAD TO
MEET YOU. "; NS$; " "
40 END
```

In addition to specifying the starting cursor position, CR, in the main program, the input counter J must be initialized, and the array NS\$(J) is DIMensioned. The four lines, 2, 15, 20 and 25, take the place of the usual INPUT NS\$ statement. Note that the input NS\$ is returned as a character string. However, since INKEY\$ was used to construct this character string, commas and quotation marks can all be used as valid input. The enter key is the only string delimiter that is recognized. If the input is used as numeric data, one additional instruction, 27 N = VAL(NS\$), must be inserted.

If only a single letter or number is to serve as the total input, as in selecting an option from a menu, the flashing cursor subroutine can be streamlined using only lines 1000 through 1005 and adding 1006 RETURN.

The input character is re-

turned in this case as R\$ rather than NS\$. This requires little more memory than INKEY\$ normally uses and provides a far superior visual addition to the program.

Natural Restrictions

There are some natural restrictions imposed by using this routine in place of the INPUT command. The first is that the routine slows down keyboard response. A rapid-fire touch typist would go crazy trying to slow down to the computer's speed.

A second limitation is the size of the NS\$(J) array. Obviously, if an input string exceeds the array size chosen, the program crashes. Also, although the same array may be used (without clearing) for all input in the program, it still consumes some memory which may be put to better use.

A way around this problem is to use the video monitor as the array and read these characters directly from the display, adding them one at a time to NS\$. The routine that performs this task is a simple loop using the PEEK function.

```
1012 NS$ = ""; CR = CR - J
1013 FOR I = 15360 + CR TO 15360
+ CR + J
1014 NS$ = NS$ + CHR$(PEEK(I))
1015 NEXT I
1016 RETURN
```

This loop replaces lines 1012-1016 in Listing 1. Line 1009 can be deleted and :NS\$(J) = " " in line 999 should be removed. This allows lines 1 and 2 in the main program to also be removed. All other lines remain the same. ■

```
998 END
999 J=J-1:IF J>=0 THEN CR=CR-1:NS$(J)=" "ELSE J=J+1
1000 PRINT@CR,CHR$(143)
1001 FOR I=1TO5:NEXT I
1002 PRINT@CR," "
1003 FOR I=1TO5:NEXT I
1004 R$=INKEY$
1005 IF LEN(R$)=0 THEN 1000
1006 IF ASC(R$)=13 THEN 1012
1007 IF ASC(R$)=8 THEN 999
1008 PRINT@CR,R$
1009 NS$(J)=R$
1010 CR=CR+1
1011 J=J+1:GOTO1000
1012 NS$=""
1013 FOR I=0 TO J-1
1014 NS$=NS$+NS$(I)
1015 NEXT I
1016 RETURN
```

Program Listing 1



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 9040 CHECKS
- NO SPECIAL PAYROLL CHECKS
- SPECIAL HOURS—SPECIAL PAY
- TWO SAVINGS—INCLUDING IRA
- 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

CREDIT CARD ADD 5%
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

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



✓ 70

Includes \$1.50 for shipping and handling.
Ohio residents add 5% sales tax.
TRS-80® is a trademark of the Tandy Corp.

GP1B-488 to TRS-80® INTERFACE
Mod. 488-80B
\$225.00
+ shipping, insurance & tax



Everything needed to add powerful controller capability to TRS-80, Model 1, Level 2 or DOS

SCIENTIFIC ENGINEERING LABORATORIES ✓ 291
11 NEIL DRIVE • OLD BETHPAGE, NEW YORK 11804
TELEPHONE (516) 694-3205

*Trade Mark of Tandy Corp.
There is no affiliation between Scientific Engineering Laboratories and Tandy Corporation or Radio Shack

SOFTWARE WANTED

If you are an inventive programmer and could use an extra income, please call:
(213) 894-9154

We are interested in Games and Business software.

Royalty or Cash-out basis.

DATASOFT ✓ 407
16606 Schoenborn St.
Sepulveda, Ca. 91343

MICRO BUSINESS WORLD
MAIL ORDER PHONE (213) **371-1660**

NEC Model 5530 spinwriter
for the NEW TRS-80 word processing software



The SPINWRITER prints up to 55 characters per second. The unique print element, called a print thimble, contains up to 128 fully formed characters. Print thimbles that contain up to 125 characters have a cutout so that the last characters printed are fully visible to the operator.

\$2.695

DYSAN DISKETTES
The CADILLAC of the Floppy Disks at these low prices

8" (box of 10) 3740/1 sgl side/sgl density	\$4.50
8" (box of 10) 3740/10 sgl side/dbl density	6.95
5" (box of 5) 104/1 soft sector of 107/1 10 sectors or 105/1 16 sectors	4.50

EPSON TX-80 DOT MATRIX PRINTER

64 Graphic characters. 7 5 dot matrix (7 6 in graphic) double width characters. TRACTOR and FRICTION feed models with interface and cable for PET, APPLE, RS232 available at OUR low prices.



TRS SOFTWARE: MICROSOFT ADVENTURE — The sophisticated fantasy/logic game... Our low price \$27.

FILE MANAGEMENT SYSTEM — The professional data base software by the business software company... \$20.

16K 4116 RAM for the TRS-80, APPLE II, PET, ZENITH and other computers

Prices subject to change without notice.
VISA and MASTER CHARGE WELCOME. Allow 2 weeks for cashiers check to clear, 4 weeks for personal checks. Add 2% for shipping and handling. Calif. residents add 6% sales tax. (Sorry, no C.O.D.)

Phone (213) **371-1660**

MICRO BUSINESS WORLD
15818 Hawthorne Boulevard
Lawndale, California 90260

Copyright 1980 • MICRO Business WORLD

✓ 250

A stock and sales plan designed to maximize profit.

Down the Road

Bill Vick
3325 Landershire Ln.
Plano, TX 75023

As a regional sales manager with a major consumer products company, I am constantly challenged with finding new and creative ways of filling the product pipeline between my company and the consumer. This pipeline, or channel of distribution, consists of depart-

ment stores.

The way a store projects its future sales and determines the stock needed to support those sales is a basic financial planning concept, applicable to large or small businesses.

Our company now furnishes a stock and sales plan designed to maximize profits, as well as a profitability and return on investment analysis. These reports are generated on my TRS-80, and this article covers the planning process and its application.

The Retail Season

Retailers periodically go through a planning process forecasting sales for a given

period of time, called a season. Normally a season runs six months and is referred to as a "spring" or "fall" season. Whether the sales forecast is done with linear regression, exponential smoothing, S.O.T.P. (seat of the pants), or any other means, the end result is that merchandise must be purchased in advance of planned sales. The control and management of the flow of inventory through a retailer determines whether or not a profit is made.

Plans are normally drafted for both seasons and the fiscal year. A turnover ratio of stock to sales is predetermined, based on the needs of both the retailer and the vendors involved. In a simplified way, turnover is the number of times an average inventory will replace itself as it is sold.

As an example, if over a six

month period, or season, sales were \$10,000, with an average inventory of \$8,000, the turnover ratio would be 1.25 for the season. The turnover ratio is critical. Too fast a turnover means in all probability sales were lost as a result of being out of stock, while too slow a turnover can eat into profit and increase your overhead. Generally, the faster the turnover, the greater the profit.

Two Seasons

In my business, we work on two seasons a year, which go from February to July and August to January. The average inventory turnover is 3.0 per year, or 1.4 turns in the spring and 1.6 in the fall.

The following program determines monthly stock levels and planned purchases needed to maintain stock levels. A sales

WHAT YEAR IS THE PLAN FOR (YY) ? 80
WHAT IS THE CHAIN'S NAME ? ANY STORE
WHAT IS THE BRANCH/DOOR'S NAME ? MAIN ST.
WHICH SEASON WILL THIS PLAN COVER (FALL OR SPRING) SPRING

ENTER THE 79 SALES FOLLOWED BY A COMMA, THEN THE 80 SALES
79/80 SALES FOR FEB? 11.1,12.2
79/80 SALES FOR MAR? 10.9,13.1
79/80 SALES FOR APR? 11.5,10.7
79/80 SALES FOR MAY? 12.4,15.2
79/80 SALES FOR JUN? 9.2,9.9
79/80 SALES FOR JULY? 11.6,11.9

PLANNED SEASON TURN? 1.39
IF YOU HAVE AN ACTUAL BOM ENTER IT.
IF YOU DO NOT PRESS ENTER ?_

Example 1.

- 1980 STOCK/SALES PLAN FOR ANY STORE - MAIN ST.

	FEB	MAR	APR	MAY	JUN	JLY	TOT
79 SALES	11.1	10.9	11.5	12.4	9.2	11.6	66.7
80 SALES	12.2	13.1	10.7	15.2	9.9	11.9	73.0
BOM	52.6						
EOM	53.5	51.1	55.6	50.3	52.3	52.5	
OTR	13.1	10.7	15.2	9.9	11.9	12.2	
TURN 1.39	AVG INV 52.5		TOTAL SALES 73.0			+ 9%	

Example 2.

its...SOFTWARE SE Search Entry

SE is a super fast, general purpose information retrieval program for the TRS-80*. The uses of SE are limitless. It can be a file system, a matching service, an inventory control, or a message center. Whenever fast searching of large amounts of data is needed, SE can be your program.

Written in Z80 machine language, SE compares tens of thousands of characters in a few seconds. Simple commands add, change, or remove data entries. To search for entries, up to 64 characters can be combined as targets for immediate retrieval. SE occupies only 4K, the rest is storage and can be saved on tape or disk.

The tape version for 16K level II, SE2.0, is \$24.95, while the disk version for DOS up to 48K, SE3.0, is \$49.95. The price includes full documentation.

Other TRS-80 its...Products

COMPU DIET - Weight Loss System
Behavior Mod. Forecast. Database

MINIVENT - Minimal Inventory Control
1400 items, 16K Level II

BASICIO - Machine Language I/O for BASIC

Data and Programs to Tape or Disk

Please send

SE2.0(tape) @ \$24.95 COMPU-DIET 1.2 @ \$19.95
SE3.0(disk) @ \$49.95 MINIVENT 2.0 @ \$49.95
BASICIO 1.5 @ \$14.95 Additional Information

Fla. Res. add 4% Sales Tax - Total \$

Check/Money Order VISA MASTERCARD

Card No. Exp. Date

Name Bank No. (MC)

Address

✓300

its... Information Technology Systems
POB 2667 Sarasota FL 33578
(813) 366-0064

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

If you're serious
about the stock market,
you need
Tickertec™



Watch 48 to 400 of your favorite
stocks without a 15 minute delay.

Tickertec™ is a computer program that displays the NYSE or AMEX tickertape on your TRS-80™ Model I or both exchanges as an option on the Model II. You see every trade as it is reported by the exchange and track the last ten trades, tickertape reported volume, and high and low limits on the stocks you are watching. Tickertec program prices start at \$1,000.00 with many optional features available including hard copy and portfolio management systems. Programs may be purchased for cash (i.e., hard dollars) or payment can be arranged in the form of discounted brokerage commissions (i.e., Soft Dollar Software™). Exchange fees are extra. Call for FREE brochure TOLL-FREE at (800) 223-6642; in New York call (212) 687-0705; or circle the reader service number.

MaxUle & ✓428
Company Inc.

6 East 43rd Street, N.Y., N.Y. 10017

THE
ALTERNATE
SOURCE
The magazine of advanced applications and software
for the TRS-80

If you keep this up, you'll not only have a winner, but you will also provide a valuable service to many, many TRS-80 computerists.
HOUSTON, TX

I think your approach is terrific; a magazine devoted to someone other than the beginner has been sorely needed on the market for a long time.
PENDLETON, IN

Along with the OCTUC Newsletter, yours is the best I've seen for important info on the TRS-80.
ATLANTA, GA

I'd like to say that I'm very glad I took the gamble and subscribed to The Alternate Source News; it looks like I made the right choice. Keep up the good work!
MAKAWAO, HI

Of the several TRS-80 publications I take, I like The Alternate Source News the best so far!
STUDIO CITY, CA

I was so pleased at being approached as if I knew something about computers and programming, that I not only read every word, but am also enclosing a check for nine dollars.
CANOGA PARK, CA

I just received my copy of issue #2 of TAS. I'm really impressed. You've done a great job!
WALKEGAN, IL

Okay, I'm hooked. Enclosed is my \$9.00 check.
FRANCONIA, VA

IF YOU'RE SERIOUS ABOUT PROGRAMMING, YOU SHOULD SERIOUSLY CONSIDER THE ALTERNATE SOURCE NEWS.

Sounds good! Enclosed is \$9.00 for six issues. Please start my subscription with issue number _____

Yeah, it sounds good, but I'd like to see a copy before I subscribe. Enclosed is \$2.00 for the current issue.

NAME _____

ADDRESS _____

CITY, STATE, ZIP _____

Mail to: The Alternate Source, 1006 Ada Street, Lansing, MI 48910

Leaders
Games
Pins
Handicaps
Blind Scores
Teams
Players

BOWLING LEAGUE STATISTICS

High Game
High Series
Lanes
Substitutes
Points
Scratch
Averages

TRS-80*
32K — DOS — PRINTER

BOWLSTAT 1.1 will generate team standing sheets suitable for posting with full team and player statistics, and also print league scoring sheets. Printing format is optimized for the 779 printer, but a modification for any printer with 80 characters minimum per line is provided. A wide range of handicapping and scoring options meets almost any league's requirements. Entry of weekly scores is fast and simple with extensive prompting and error detection.

Supplied on Diskette with manual
\$49.95

Manual Only
(deductable on purchase
of diskette)
\$5.95

Pa. residents add 6% tax

Datascor ✓193
P. O. Box 995 Sharon, Pa. 16146

*Trademark of Tandy Corp.

16K MEMORY

TMS 4116-30JDH

16K x 1 Dynamic RAMs
for: TRS-80™, Apple,
Exidy and others.

8 \$59.00

8 \$74.00

for Canadian customers

Add \$3 to help cover postage and handling. Sask. residence add 5% sales tax.

TRS-80™ installation information is available on request.

TAITRONICS ENTERPRISES

1263 Wallace St. ✓380

Regina Sask. Can.

S4N 3Z2 ph. (306) 527-2088

FINALLY!

PROFESSIONAL
PROGRAMMING
TOOLS FOR EVERY
BASIC PROGRAMMER

Do you write Basic programs with your TRS-80? Then you know there are times when you need to:

- RENUMBER part or all of your program.
- DELETE many lines with one command.
- APPEND common routines from tape.

Now, with PROgrammer, you can do all these things! And COMPRESS your programs to speed execution and reduce size. And MOVE blocks of lines within your program quickly and efficiently. Moreover, load PROgrammer just once, and these commands are always available!

PROgrammer: \$25 on cassette with complete instructions. Level II required. Please indicate memory size with order. Calif. residents add 6% sales tax. *TRS-80 is a trademark of Tandy Corp.

RATIONAL SOFTWARE™
963 E. California Pasadena, CA 91106

✓241

history for the prior period is shown, along with the B.O.M. (beginning of month) inventory, the E.O.M. (end of month) inventory, and the allowed monthly receipts or O.T.R. (open to receive).

Additionally, the average inventory carried on hand and the percent of increase or decrease planned is also shown. It is an

interactive program designed to be used by people not versed in either computerese or retailing.

The advantages of this type of planning are many. Not only can the retailer's stock and sales plans be done with speed and accuracy, but a number of "what if" situations can quickly be accomplished to determine viable alternatives. ■

Program Listing

```

100 CLEAR 1000 : CLS
110 REM * STOCK AND SALES PLANNING
120 REM * BILL VICK / 1/30/80
130 REM * (214) 596-0533
140 PRINT TAB(20)"STOCK & SALES PLANNING"
150 PRINT TAB(25)"BY BILL VICK"
160 PRINT TAB(22)"ALL RIGHTS RESERVED"
170 FOR T=1 TO 500 : NEXT T
180 DIM M(13), MS(13), EOM(13), ZS(2), OTB(13), S(13)
190 RESTORE : CLS
200 INPUT"WHAT YEAR IS THE PLAN FOR (YY) " ; YEARS
210 YEARS=RIGHTS(YEARS, 2) : LYEAR=VAL(YEARS) : LYEAR=YE
AR-1
220 INPUT"WHAT IS THE CHAINS NAME " ; CHAINS
230 INPUT"WHAT IS THE BRANCH/DOOR'S NAME " ; BRANCHS
240 FOR M=0 TO 12 : READ MS(M) : NEXT M : REM * READ IN
MONTHS
250 DATA JAN, FEB, MAR, APR, MAY, JUN, JULY, AUG, SEP, O
CT, NOV, DEC, JAN
260 PRINT"WHICH SEASON WILL THIS PLAN COVER (FALL OR SP
RING) " ;
270 GOSUB 820 : REM * INKEY SUBROUTINE
280 IF KBS="S" THEN PRINT"SPRING" ELSE PRINT"FALL"
290 PRINT
300 IF KBS="S" THEN SB=1 : SE=6 : S=1 : GOTO 330
310 IF KBS="P" THEN SB=7 : SE=12 : S=2 : GOTO 330
320 IF KBS<>"S" OR KBS<>"P" THEN CLS : GOTO 260
330 PRINT"ENTER THE " ; LYEAR ; " SALES FOLLOWED BY A COMMA
, THEN THE " ; YEAR ; " SALES"
340 FOR T=SB TO SE
350 PRINT LYEAR ; " ; " ; YEAR ; " SALES FOR " ; MS(T) ;
360 INPUT S(T), M(T)
370 ST=ST+S(T) : REM * TOTALS SALES THIS YEAR
380 TS=TS+M(T) : REM * TOTALS SALES LASY YEAR
390 NEXT T
400 AV=(INT(TS-ST)/ST)*100 : REM * PERCENT INCREASE
IN SALES
410 PRINT : INPUT"PLANNED SEASON TURN",TURN
420 PRINT"IF YOU HAVE AN ACTUAL BOM ENTER IT."
430 INPUT"IF YOU DO NOT PRESS ENTER " ; BOM
440 AS=TS/6 : REM * AVERAGE MO SALES=TOTAL SALES/SI

```

```

X MONTHS
450 AI=TS/TURN : REM * AVERAGE INVENTORY=TOTAL SALES
/PLANNED TURN
460 IF BOM<=0 THEN 470 ELSE 480
470 IF M(SB)>AS THEN BOM=(M(SB)-AS)+AI ELSE BOM=(AS-M(S
B))+AI
480 ZS(1)=" FEB MAR APR MAY J
UN JULY TOT"
490 ZS(2)=" AUG SEP OCT NOV D
EC JAN TOT"
500 NS=" EOM " 000.0 000.0 000.0 000.0 000.0
000.0
510 BYS=" OTR " 000.0 000.0 000.0 000.0 000.0
000.0
520 OS=" BOM " 000.0
530 RS=" SALES " 000.0 000.0 000.0 000.0 000.0
000.0 000.0
540 LS=" SALES " 000.0 000.0 000.0 000.0 000.0
000.0 000.0
550 QS=" TURN " 000.0 AVG INV 000.0 TOTAL SALES
000.0 +00000
560 FOR T=SB TO SE-1 : REM * COMPUTES END OF MONTH
INVENTORY
570 EOM(T)=(M(T+1)-AS)+AI
580 EOM=EOM+EOM(T) : REM * TOTALS EOM FOR SEASON
590 NEXT T
600 CN=(AI*7)-(BOM+EOM) : REM * COMPUTES ENDING PERIO
D INVENTORY
610 EOM(SE)=CN
620 YEAR=YEAR+1900
630 CLS : PRINT YEAR ; " STOCK/SALES PLAN FOR " ; CHAINS ;
" " ; BRANCHS
640 YEAR=YEAR-1900
650 PRINT
660 PRINT ZS(S)
670 PRINT
680 PRINT USING LS ; LYEAR, S(SB), S(SB+1), S(SB+2), S(S
B+3), S(SB+4), S(SB+5), ST
690 PRINT USING RS ; YEAR, M(SB), M(SB+1), M(SB+2), M(SB
+3), M(SB+4), M(SB+5), TS
700 PRINT : PRINT USING OS ; BOM
710 PRINT USING NS ; EOM(SB), EOM(SB+1), EOM(SB+2), EOM(
SB+3), EOM(SB+4), EOM(SB+5)
720 PRINT : PRINT USING BYS ; M(SB+1), M(SB+2), M(SB+3),
M(SB+4), M(SB+5), M(SB)
730 PRINT
740 AI=(EOM+EOM(SE)+BOM)/7 : REM * AVERAGE INVENTORY
750 PRINT USING QS ; TURN, AI, TS, AV
760 PRINT : GOSUB 840
770 PRINT" DO YOU WANT TO PRINT THIS (Y/N) "
780 GOSUB 820 : REM * INKEY SUBROUTINE
790 IF LEFTS(KBS, 1)="Y" THEN GOSUB 850 : GOTO 620 : RE
M * IF YES LPRINTS
800 IF KBS="N" THEN 190 : REM * IF NO RERUNS PROGRAM
810 IF KBS<>"N" OR KRS<>"Y" THEN 770
820 KBS=INKEY$ : IF KBS="" THEN 820 ELSE 830 : REM *
INKEY ROUTINE
830 KB=VAL(KBS) : RETURN
840 POKE 16414, 88 : POKE 16415, 4 : RETURN : REM * L
PRINT TO PRINT
850 POKE 16414, 141 : POKE 16415, 5 : RETURN : REM *
PRINT TO LPRINT

```

TEACH YOUR CHILDREN

\$5.95 Each—Two For \$11.00

ALPHA—Alphabet recognition for pre-schoolers

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

A computer is for more than business or games.

Level II—Minimum 16K

Mercer Systems Inc.
87 Scooter Lane ✓ 104
Hicksville, N.Y. 11801

THE GREEN SCREEN THING

(The Green Thing is a color display for your TRS-80. It means no words in either eye and.)

Model SC-80

The Green Thing, from the manufacturer of Home for the TRS-80, is powered on our CF-80 High Quality console to the normal display, as seen on our CF-90 Economy console. (For further information on consoles, see our other ad.)

List \$795 (Add \$100 for shipping & handling, and California customers 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

AVS

AUDIO-VIDEO SYSTEMS
2485 Autumnval Ave.
San Jose, CA 95122

ENGINEERING SOFTWARE

New from SUPERIOR
Structural Analysis Design Engineering
STRUCTURAL MATRIX ANALYSIS PROGRAM

SECTION PROPERTIES PROGRAM

19 95

14 95

LEISURE PROGRAMS

BOWLING SECRETARY Let your computer tally fees, total pins, games won/lost, hi-10, hi-30, men and women hi-10, hi-30 scratch and handicap, lane assignments with individual data, and next week's lanes 32K, Level II, one disc 14.95

Life 2-A A mathematical simulation of cell colony evolution at a rate of 50 generations per minute by John Conway. Patterns can be stored on disc or tape for recall at any time. Program can also be slowed to 1/3 normal speed or paused indefinitely for closer inspection 4K, Level II Tape, 6.95 Disc, 6.95

TUMBLING CARDS Mix mind-challenging math, memory, and word skill problems with the fun, competition, and luck of an exciting casino-style game of cards. Pyramid your skills into imaginary big-money winnings in the winner's circle. 16K, Level II Tape, 6.95 Disc, 16.95

Postage paid Missouri residents add 4 1/2% sales tax.

Write SUPERIOR for information about marketing your SOFTWARE.

P.O. BOX 11675
KANSAS CITY, MO 64138

****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

CHALLENGING
NEW—EXCITING



AND NOW A SPECIAL GAME OFFER
WAR GAME PACKAGE

● **BLACK KNIGHT**—A TRS-80 Level II 16K Basic cassette game with sound. A super dungeon game in a maze complete with traps, treasures and monsters. You will never be bored with over a MILLION random dungeons. (KB-1) \$7.95

● **ACTION PACKAGE**—One TRS-80 Level II Basic cassette with TWO new games:
 1) **BOMBER**—Taking off, dodging obstacles, bombing targets, and landing safely, will require your skill in the pilot's seat.

2) **TORPEDO**—You'll have hours of fun trying to torpedo a fleet of assorted deadly enemy ships. (AP-1) \$8.95

Both games with graphics & sound.

FAST DELIVERY

(PA residents—add 6% tax)

Send your check or money order now to:

JMS Corp. Box 18083 ✓249
Pittsburgh, Pa. 15236

THE ALTERNATE SOURCE
 The magazine of advanced applications and software for the TRS-80

Presents: TRAKCESS!

by: Roxton Baker

- Most powerful disk utility yet!
- "Smart" DUPLICATE command analyzes every track! (2 drives)
- Super Pencil-type Editing!
- Read/Write/Dir/Create—any—track or sector, standard or not!
- A great tool for learning about disk structures—including the formerly little documented info!
- Fingertip control of all disk functions on 1-4 drives.
- Recover damaged disks. Oddball tracks and sectors don't faze it. Feed it TRSDOS, CPM, protected disks, almost anything!
- Use it to create special disks interactively!

An experiment!

An experiment to make this incredible program available to all. Add 1 cent for each copy (up to 5) you want to make and resell for your friends. We license you. The idea is to make TRAKCESS available to everyone who needs it. Appreciate this effort? Make it a success—Order now! \$24.95 on Disk. Trakcess is over 21K of code. It requires 48K to run. Handles any number of tracks.

MC/VISA/COD—Add \$1.25

Phone: 517/485-0344

TAS, 1806 Ada, Lansing, MI 48910

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

from **ELCOMP CO**

DUAL DISK DRIVE CASE KIT

✓63 for Shugart, MPI, & other minis

includes

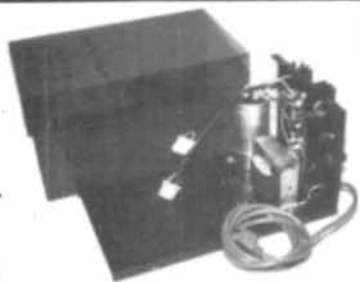
- CHASSIS
- PLEXIGLASS COVER
- ALL PARTS POWER SUPPLY

(Disk Drives & Connecting Cables—extra)

Easy Assembly (1-2 hrs.)
 Enough Power for 2 Mini Drives
use one now—one later

\$125

Block off for Drive—\$5 extra
 DEALER INQUIRIES INVITED



COMPLETED UNIT

ELCOMP CO
 Microcomputer Peripherals
 Post Office Box 6133
 C.O.D. Albany, CA 94706



A return of serve from the bouncing dot.

Ping-Pong

Ronald Moehlis
3621 Clearview Dr.
Cedar Falls, IA 50613

This article contains five short programs to demonstrate the SET, RESET, POINT and INKEY\$ features of the TRS-80 computer with Level II BASIC. The sequence of programs begins with a dot moving across the screen and each subsequent program adds additional instructions until you find yourself playing pong.

Program Listing 1 moves a dot horizontally across the

screen. To plot a point with coordinates (X,Y) use SET(X,Y). The X value must range from 0 to 127 and the Y value from 0 to 47.

Statement 30 displays the dot before it is turned off by the RESET in statement 40. Statement 60 determines if the dot has reached the right edge of the screen and moves it back to the left edge.

Program Listing 2 adds two vertical "walls" in statement 6. When the dot reaches a wall it bounces in the opposite direction. Line 60 checks for this and line 68 changes the direction. Line 60 could be

added to provide the other walls. Since the dot now moves in two directions, the position variable Y and its increment variable K, is added to the program.

The paddles which can be moved to deflect the dot, are added in Program Listing 4. Also INKEY\$ is added in statement 41 to allow real-time paddle action.

The O and L keys control the right paddle, while Q and A keys control the left. Statements 100 and 120 move the right paddle and statements 130 and 140 the left paddle.

Variable O is the Y value of the upper edge of the right paddle. L is the Y value of the lower edge. Q and A serve the same functions for the left paddle. Lines 55 and 63 determine if the dot has hit a paddle. If so, position variables X or Y change.

Program Listing 5 is the simple Pong game. Statements 53, 54, 60 and 61 determine if the dot is beyond the paddle. If so, a point is added to either score—variable RR or LL in lines 80 to 90. Now line 12 provides for a dot to appear at random from the top wall after a score.

Note that in the programs with the paddles, the movement of the dot is slower. This is because statements are executed to move the paddles.

More elaborate Pong programs can, of course, be written, but this set of programs demonstrates the idea to a beginner. ■

Note: Sound effects can be added to Pong using Babybeep by Dennis Kitsz. See *80 Microcomputing*, April, 1980.

```
1 REM PROGRAM 1
2 REM MOVEMENT OF A DOT
5 CLS
10 X=0
20 SET(X,25)
30 FOR I=1 TO 5:NEXT I
40 RESET(X,25)
50 X=X+1
60 IF X>127 THEN X=0
70 GOTO 20
```

Program Listing 1.

IF POINT(X,25) THEN 68

which demonstrates the POINT feature. If the wall is directly ahead of the dot POINT(X,25) is TRUE; otherwise it is FALSE.

Program Listing 3 moves the dot diagonally and bounces it off walls in a rectangular box. Line 6 is modified and line 11 is

```
1 REM PROGRAM 2
2 REM DOT BOUNCING OFF WALLS
5 CLS
6 FOR Y=0 TO 47:SET(0,Y):SET(127,Y):NEXT Y
7 C=1
10 X=1
20 SET(X,25)
30 FOR I=1 TO 5:NEXT I
40 RESET(X,25)
50 X=X+C
60 IF X>126 OR X<1 THEN 68
65 GOTO 20
68 C=-C
70 GOTO 50
```

Program Listing 2.

```
1 REM PROGRAM 3
2 REM DOT BOUNCING IN A RECTANGULAR BOX
5 CLS
6 FOR Y=9 TO 39:SET(0,Y):SET(127,Y):NEXT Y
7 C=1
8 Y=10
9 K=1
11 FOR X=1 TO 126:SET(X,9):SET(X,39):NEXT X
12 K=1
20 SET(X,Y)
30 FOR I=1 TO 5:NEXT I
40 RESET(X,Y)
50 X=X+C
51 Y=Y+K
53 IF Y<39 AND Y>9 THEN 60
57 GOTO 66
60 IF X>126 OR X<1 THEN 68
65 GOTO 20
66 K=-K
67 GOTO 51
68 C=-C
70 GOTO 50
```

Program Listing 3.


```

1 REM PROGRAM 4
2 REM DOT BOUNCING IN A RECTANGULAR BOX WITH PADDLES
3 Q=20:A=25
4 L=25:O=20
5 CLS
6 FOR Y=9 TO 39:SET(0,Y):SET(127,Y):NEXT Y
7 C=1
8 Y=10
9 K=1
10 FOR J=20 TO 25:SET(7,J):SET(120,J):NEXT J
11 FOR X=1 TO 126:SET(X,9):SET(X,39):NEXT X
12 X=1
20 SET(X,Y)
30 FOR I=1 TO 5:NEXT I
40 RESET(X,Y)
41 AS=INKEYS
42 IF AS="" THEN 50
44 IF AS="O" THEN GOSUB 100
45 IF AS="L" THEN GOSUB 120
46 IF AS="Q" THEN GOSUB 130
47 IF AS="A" THEN GOSUB 140
50 X=X+C
51 Y=Y+K
53 IF Y<39 AND Y>9 THEN 50
55 IF POINT(X,Y) THEN 66
60 IF X>126 OR X<1 THEN 68
63 IF POINT(X,Y) THEN 68
65 GOTO 20
66 K=-K
67 GOTO 51
68 C=-C
70 GOTO 50
100 RESET(120,L):O=O-1:L=L-1:SET(120,O):RETURN
120 RESET(120,O):O=O+1:L=L+1:SET(120,L):RETURN
130 RESET(7,A):Q=Q-1:A=A-1:SET(7,Q):RETURN
140 RESET(7,Q):Q=Q+1:A=A+1:SET(7,A):RETURN

```

Program Listing 4.

```

1 REM PROGRAM 5
2 REM PONG
3 Q=20:A=25
4 L=25:O=20
5 CLS:LL=0:RR=0:PRINT@132,LL;:PRINT@186,RR
6 FOR Y=9 TO 39:SET(0,Y):SET(127,Y):NEXT Y
7 C=1
8 PRINT@158,"PONG";
9 K=1
10 FOR J=20 TO 25:SET(7,J):SET(120,J):NEXT J
11 FOR X=1 TO 126:SET(X,9):SET(X,39):NEXT X
12 Y=10:X=RND(100)+10
20 SET(X,Y)
30 FOR I=1 TO 5:NEXT I
40 RESET(X,Y)
41 AS=INKEYS
42 IF AS="" THEN 50
44 IF AS="O" THEN GOSUB 100
45 IF AS="L" THEN GOSUB 120
46 IF AS="Q" THEN GOSUB 130
47 IF AS="A" THEN GOSUB 140
50 X=X+C
51 Y=Y+K
52 IF Y<39 AND Y>9 THEN 60
53 IF X>122 THEN 90
54 IF X<6 THEN 80
55 IF POINT(X,Y) THEN 66
60 IF X>122 THEN 90
61 IF X<5 THEN 80
63 IF POINT(X,Y) THEN 68
65 GOTO 20
66 K=-K
67 GOTO 51
68 C=-C
70 GOTO 50
80 RR=RR+1:IF RR>15 THEN 96
85 PRINT@186,RR;:GOTO12
90 LL=LL+1:IF LL>15 THEN 96
95 PRINT@132,LL;:GOTO12
96 PRINT@970,"":INPUT"PLAY AGAIN";B$
97 IF LEFT$(B$,1)="Y" THEN 5 ELSE END
100 RESET(120,L):O=O-1:L=L-1:SET(120,O):RETURN
120 RESET(120,O):O=O+1:L=L+1:SET(120,L):RETURN
130 RESET(7,A):Q=Q-1:A=A-1:SET(7,Q):RETURN
140 RESET(7,Q):Q=Q+1:A=A+1:SET(7,A):RETURN

```

Program Listing 5.

80
microcomputing™
mention
when you query an advertiser

THE ALTERNATE SOURCE
The magazine of advanced applications and software
for the TRS-80

Meta-Trek!

by: Brandon Rigney III

A space game like no other! Meta-trek is not a cassette game loaded to disk — it is written and only executes on disk! Requires 32K. Features include:

- Unique graphics as demonstrated by Mr. Rigney's past projects
- Machine language patches for speed
- A 16 by 16 environment
- An on-board computer vaguely resembling an advanced TRS-80 with it's own special commands
- Well documented users manual
- A modified video and keyboard driver
- Special routines for graphics and passing information during program chaining.
- Source code for Z-80 routines available separately from the author

Meta-trek comes on disk for \$19.95

COD/BAC/MC add \$1.25

Phone: 517/487-3358 or order from
TAS, 1806 Ada, Lansing, MI 48910

QWORDFORMATTERRBGCYPQGZIVJBPCB
SHNOBTXADOFREEIDEASEEDSRPVYXXON
VLTWGYROSGREDPVJKLMRHECTVXHNAFH
BJELFEQAZGZPPCRYPTOUPZAXZQJEJTS
ZDQINKFNSAGTHLGFJSEYWTVNPFFJVZVC
BVLFGULMNSNEKOTTSCYMBGQWBQOFMPO
UOVKBXBFIOEPUYASEXMOLECRZJXACHYRU
PKBMYUCWOCGLDAMPXRSEMECZTIONGULYK
ZMHOUXPBLKACAPJJUKBFLIPCNEFQAFE
JWTAJCYJGWHETMNAHQZQJLOWERCASETH
HRSSKVCDCGBCBOAPTGTHTXTPLLEILRETQ
EYINDLXXCBCVXDZHOPRYVYPRVADNTOL
FREE IDEA SEEDS!™

Have you ordered yours? If not, you better reconsider. More than 5000 happy subscribers think you don't know what you are missing. These are FREE programs for your TRS-80 and all you have to do to get them is send us a legal size SASE. That is all there is to it. Simple? You bet! Every month there's a new program and you really don't want to miss any of them! When you stop and think about it there are only three ways to build your software library. One way is to write the program yourself. Another way is to purchase programs. The best way is to have the programs given to you and that is just what we are doing! All FREE IDEA SEEDS are our own original programs and we want you to have them to use, rewrite, and expand.

Send your legal size SASE to:

CECDAT, Inc. ✓62 PO Box 8963 Moscow, ID 83843

Sortfile, A Professional Sort . . .

- BASIC program with assembler routines
- Internal sort time of 4 seconds for 500 multi-keyed items
- Any combination of data types and ascend-descend directions for keys
- Six output options:
 - a) New data file
 - b) New data file with selected and/or rearranged data fields
 - c) Tag file (keys + record pointers)
 - d) Pointer file (record pointers only)
 - e) Data records displayed on screen
 - f) Data records printed on printer
- Runs with 1 disk and 16K memory
- Sorts files too large for memory
- Free "SEEFIL" utility included

. . . at a hobbyist price!

Diskette: \$23.95
 Cassette: \$19.95
 Documentation: \$3.00 (refundable)

SOFTWARE EFFICIENCY
 7800 Stanford Ave. St. Louis, MO 63130

**HEATH H14
 TRS 80
 NO SOFTWARE
 REQUIRED**

Serial interface mounts inside and is powered by expansion interface. Connects at parallel printer port. Easy installation. May be used externally but requires +5 V and +/- 9 to 12 V.

Uses printer driver in Level II ROM. No software driver needed in high RAM. No more software compatibility problems.

- RS-232-C Interface Free for Other Uses
- Baud Rate Adjustable From 1200 to 4800
- Handshaking Prevents Lost Characters
- Output Meets EIA RS-232-C

May be used with other serial printers which send Line Feed after Carriage Return. Data format is 1 Start Bit, 8 Data Bits, 2 Stop Bits.

--- Ordering Information ---

Kit With All Parts \$29.95
 Printed Circuit Board With Instructions 12.95
 Assembled & Tested With 90 Day Warranty 44.95

Please Include \$1.50 Shipping and Handling
 (NOTE: RS-232 Connector Not Supplied)

SPEEDWAY ELECTRONICS
 1354 Auburn
 Speedway, Indiana 46224

PHONE (317) 925 0496
 MASTER CHARGE VISA ✓ 275

**NIXON'S*
 FAVORITE
 TAPES**



**BLANK CASSETTES
 PREMIUM GRADE C-20'S
 5 SCREW HOUSINGS**

89¢ ea. 10/\$8.95 100/\$75.95
ORDERS UNDER \$20
ADD\$2 - IN OHIO ADD5-1/2%TAX

**JOHNSON
 DATA PRODUCTS**

P.O. BOX 17176 ✓ 226
 CLEVELAND, OHIO 44117
 © 1987 JOHNSON

For Quiz Kids and Card Sharks
MOTIVATIONAL NEW 2-PLAYER

With Hi Level
**"TUMBLING
 CARDS"**
 Animated Graphics

3 QUIZ CATEGORIES . . .
 Elementary Math • Spelling • Geography
2 GAMES IN 1 . . . With Casino-Style card Competition

A great new family game for kids and adults. Mix mind-challenging math, memory, and word skills problems with the fun, competition, and luck of an exciting game of cards. Pyramid your skills into imaginary big-money winnings in the winner's circle. Level II, 16K.

**SUPERIOR
 SOFTWARE
 INC.**
 P. O. BOX 11676
 KANSAS CITY, MO 64138

✓ 403
 Write Superior for information about marketing your Software.

**ONLY
 8.95**
 Postage Paid
 Missouri residents
 add 4% (40¢)
 sales tax. Formatted
 disc price, 18.95.
 Missouri residents
 add 4% sales tax.

**INTERACTIVE
 FICTION**

*The Literature of the Future—
 Here Today*

*If you like fiction you'll love
 Interactive Fiction—tales told on a
 computer, so that you, the reader,
 become a character in the story!*

**For TRS-80 with DISK and 32K
 (TRS-80 is a trademark of Tandy Corp)**

Six Micro-Stories
 A good introduction to Interactive Fiction.
 Become a financial tycoon, a WW-II spy, and
 more . . . \$15.00

His Majesty's Ship "Impetuous"
 You are the captain of a ship-of-the-line in
 the glorious days of fighting sail . . . \$20.00

Two Heads of the Coin
 You are confronted with a psychological
 mystery that taxes your imagination to the
 utmost . . . \$20.00

INTERACTIVE FICTION
 BOX 603 ✓ 429
 INVERNESS CA 94937
 (Calif. residents add 6% tax)

THE COMP CASE



ATTACHE STYLE CASES FOR CARRYING AND PROTECTING THE TRS-80 COMPUTER, HIGH QUALITY LUGGAGE CONSTRUCTION. ONE CASE FOR COMPUTER, EXPANSION UNIT, TAPE RECORDER OR DISK DRIVES. SECOND CASE FOR PRINTER WITH EXTRA SPACE FOR PAPER OR MONITOR. NEVER A NEED TO REMOVE EQUIPMENT FROM CASE. SIMPLY REMOVE COVER, CONNECT POWER AND OPERATE. COVER CAN BE REPLACED AND LOCKED FOR SECURITY WITHOUT DISCONNECTING CABLES. OPTIONAL RF-MODULATOR CONVERTS ANY TV SET INTO A MONITOR MAKING IT UNNECESSARY TO CARRY MONITOR.

85201 TRS-80 Computer case . . . \$109
 85202 TRS-80 Monitor Case . . . 84
 85203 RF Modulator . . . 25
 P402 Line Printer II Case . . . 89
 C200 Matching Attaché Case . . . 75

CASES ALSO AVAILABLE FOR APPLE, ATARI, CENTRONICS AND EPSON TIGER

COMPUTER CASE COMPANY ✓ 159
 5650 INDIAN HOLLOW CT., COLUMBUS, OHIO 43213
 (614) 868-9464

**BIG 48 INCH SCOTTSDALE
 5 SPEED CEILING FAN**

- Wood Blades
- Antique Brass Trim
- Full 5-Year Warranty
- No Plastic Parts

\$99

LIGHT OPTIONAL 15.00

USE YOUR CEILING FAN WINTER AND SUMMER. VARIABLE SPEED FANS LIKE THIS CAN BE SET TO TURN SLOWLY AND RECLAIM LOST CEILING TRAPPED HEAT.

American Fan Distributors ✓ 396
 118 So. Mill St.
 Pryor, OK. 74361
 918-825-4844

MFG. SUGG.
 LIST 179.95



9.95
SOFTWARE
 P.O. BOX 521 Lowell, MA 01853

1 • Memory based printer spooler, overlap processing and I/O.

2 • IBM based terminal driver, EBCD and correspondence code. Full ASCII character set with overstrikes. Scripts ZAPS.

3 • Disk timing program. Meter Type numerical and statistical screen displays. Very easy calibration of all type drives.

4 • Cassette test programs. Writes test data to tape, then displays all errors on screen. Use to check all facets of cassette operation and duplication quality.

SEND FOR FREE FLYER

— The bottom line —
 COST: \$9.95 Each + .75 postage
 MA Orders + 5% tax ✓235

THE WAIT IS OVER

Now for the first time, Cpaids, is making available its **Federal 1040 Tax** package for the TRS-80 Model II.

Featuring-1% and 3% medical limitation incorporated, auto checks for FICA over withholding, auto earned income credit, auto dividend exclusions, types tax preparer's Fed. ID and SSN; proformas all forms for subsequent years.

Schedules - A, B, C, D, E, F, G, R/RP, SE, TC, ES

Forms - 2106, 2119, 2210, 2441, 3468, 3903, 4625, 4972, 4726, 4797, 5695, 6521

Requires 64 K with dual disks using CP/M.

CALL TOLL FREE
800-321-2430

✓388
CPAIDS.
 1640 Franklin Ave., Kent, Ohio 44240

We've got the FASTEST!!!

GLIDERS & SPACESHIPS

GLIDERS & SPACESHIPS at 1800* per/min
 J.N. Conway's famous Game of Life is animated !!!
 The most advanced life program features: full screen 63x14 matrix
 • 32 preprogrammed patterns • special pattern generators •
 create, edit, and save your patterns on data tape • sound • single
 key functions: erase, save, single step, delay, scroll eight ways

TRS-80™ L2 16k REQUIRED
 FOR CASSETTE AND INSTRUCTIONS
 SEND CHECK OR MONEY ORDER TO:

Synergistic Solar, Inc.
 PO Box 560595, Miami, FL 33156

For more information about our programs
 please mail us a postcard *TRS-80 is a trademark of Tandy Corp

SPEED TABLE 1.77MHz	RAM SIZE	MINIMUM RAM
5	2290	
10	2070	
50	1110	
100	860	
500	310	
1000	190	

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

✓148
SALES COMPANY
 1412 WEST FAIRFIELD DR.
 P.O. BOX 8098 PENSACOLA FL 32505
 904/438-6507
 nationwide 1-800-874-1551

PPI-80

PARALLEL I/O FOR THE TRS-80

The PPI-80 is a complete parallel I/O interface designed specifically for the TRS-80, consisting of 3 complete 8 bit I/O ports including such features as:

- switch selectable address decoding
- complete on board regulated power supply
- TTL compatible I/O lines conveniently available through 16 pin sockets
- +5 volts and ground at each socket
- 3 software selectable modes of operation
- handshaking
- plugs into keyboard or expansion interface
- on board kluge area for experimenting
- provisions for interlocking Sears-BSR-RS home controller

Possible applications include:

- bidirectional communication between microcomputers
- parallel printer interface
- wireless home control via BSR home controller
- direct control of lights, appliances, and motors
- interfaces to many popular boards including A/D-D/A converter and an EPROM Programmer

PPI-80 is available now and can be purchased in several forms

Completely assembled and tested	\$119.95
Complete kit with all parts	89.95
Bare board drilled and etched with assembly manual	25.95

Accessories:

8 channel A/D - 2 channel D/A by Optimal Technology	\$115.00
EPROM Programmer Model EP-2A-79 by Optimal Technology	155.00

To order, send payment plus \$2.00 shipping and handling to:

QUANT SYSTEMS
 P.O. BOX 628
 CHARLESTON, S.C. 29402

✓280
Quant Systems
 p.o. box 628
 charleston sc
 29402

accounts receivable

The program was developed for our family business. The goal was an orderly transfer from hand kept books to computerized bookkeeping. Accounts receivable including sales tax was the most time consuming, thus the beginning. Time spent on accounts receivable has been cut in half. More detailed statements sent earlier have increased the outstanding receivables.

The program is designed for business people, not computer or accounting experts. All inputs are structured for fast and efficient operation. If a math check is required, returns and totals are checked before they are calculated. If a math check is not required, only the amount of sale, less any tax, is entered. The program stores sales tax information on all customers and will display the proper tax, if any, as required. Non-taxable customers making a taxable purchase, customers from a tax district other than the place of business, packing up at the place of business are easily handled by the program. Amount of tax and taxable sales are computed and stored for up to 100 sales tax districts.

Every entry can be edited at any time. If an incorrect or missing transaction is found after statements are printed, the corrections can be made and the statement reprinted. Sales tax and receivable data on disk files are adjusted to this process.

Rate of service charge and customer to invoice service charge are selected by the user

Overview and Sample Reports..... \$5.00
 Documentation..... \$95.00
 Program Disk & Documentation..... \$995.00

solutions 80

✓277 Route 55
 La Grangeville, New York 12540

2 new books from the editors of KB & 80 Microcomputing

● **40 COMPUTER GAMES**—BK7381—At last! Here is an unbeatable game collection from the folks at your favorite computer magazine. Forty games in nine categories including: gambling, board games, space games, puzzles, card games and calculator games. These are the best game programs that have recently appeared in Kilobaud/Microcomputing magazine, and truly offer something for everyone.

Many versions of BASIC are represented including: North Star, Radio Shack, MITS and Tiny. Systems used are as diverse as Altair, H8, Tandy and KIM. Even the calculator set has something to cheer about with games for the HP-67, TI-59 and SR56.

A 'must have' edition for the serious computer gamesman. \$7.95*

● **UNDERSTANDING AND PROGRAMMING MICROCOMPUTERS**—BK7382—This easy to follow text brings you the work of several, well known authors in the computer field. Understanding and Programming is divided into two parts. The first covers microcomputers and their associated software starting with the fundamentals of system architecture and ending with an introduction to programming languages. Section two addresses the thinking processes essential to good programming and gives detailed examples of well written software. The articles were selected from the 73 and Kilobaud Microcomputing library of fine articles and represent the best that has been written on the topic in recent years. A valuable addition to your computing library. \$10.95*

Other Books

● **INSIDE LEVEL II**—BK1183—For machine language programmers! This is a comprehensive reference guide to the Level II ROMs, allowing easy utilization of the sophisticated routines they contain. It concisely explains set-ups, calling sequences, variable passage and I/O routines. Part II presents an entirely new composite program structure which unloads under the SYSTEM command and executes in both BASIC and machine code with the speed and efficiency of a compiler. Special consideration is given to disk systems. \$15.95.*

● **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.*

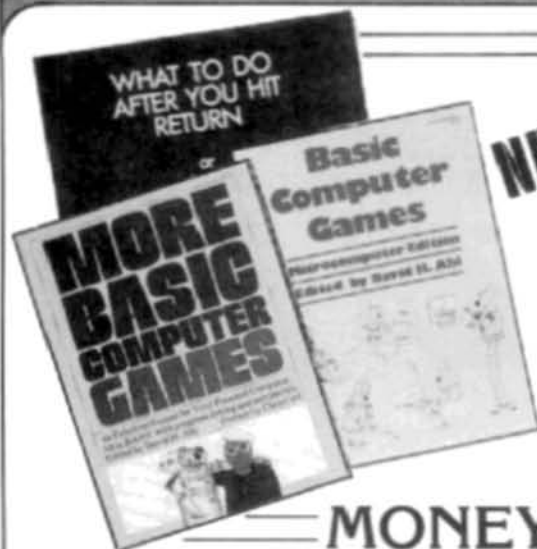
● **LEARNING LEVEL II**—BK1175—by David Lien. Written especially for the TRS-80, this book concentrates on Level II BASIC, exploring every important BASIC language capability. Updates are included for those who have studied the Level I User's Manual. Sections include: how to use the Editor, dual cassette 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.*

*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

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.*

MONEY-MAKING

● **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.*

● **FREELANCE SOFTWARE PUBLISHING**—BK1179—by B. J. Korites. "This book is about money and how to make it by writing and selling computer programs," (author's foreword). If you have the skills to write a saleable program, you now need to acquire the skills to sell that program. This compact book comprehensively covers the entire publishing process and many aspects of software salesmanship. \$14.95.*

● **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. \$12.50 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.*

*Use the order card in the back of this magazine or fill out your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf • Petalburgh, 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

74L\$

Order by Cat No. 999 and Type

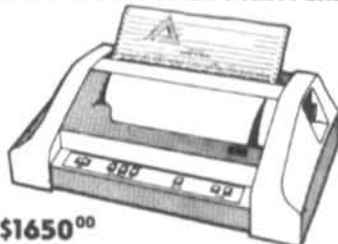
74L500	\$ 33	74L574	\$ 99	74L5161	\$ 75	74L5257	\$ 99
74L501	\$ 29	74L575	\$ 59	74L5162	\$ 19	74L5258	\$ 66
74L502	\$ 49	74L576	\$ 44	74L5163	\$ 15	74L5259	\$ 99
74L503	\$ 29	74L583	\$ 88	74L5164	\$ 15	74L5260	\$ 66
74L504	\$ 49	74L585	\$ 15	74L5165	\$ 69	74L5261	\$ 50
74L505	\$ 35	74L586	\$ 99	74L5166	\$ 95	74L5266	\$ 66
74L506	\$ 44	74L590	\$ 99	74L5167	\$ 99	74L5273	\$ 33
74L509	\$ 29	74L592	\$ 75	74L5169	\$ 33	74L5275	\$ 66
74L510	\$ 44	74L593	\$ 75	74L5170	\$ 25	74L5279	\$ 49
74L511	\$ 29	74L595	\$ 88	74L5173	\$ 25	74L5283	\$ 75
74L512	\$ 29	74L5107	\$ 55	74L5174	\$ 10	74L5293	\$ 99
74L513	\$ 55	74L5109	\$ 55	74L5175	\$ 99	74L5295	\$ 99
74L514	\$ 10	74L5112	\$ 55	74L5181	\$ 20	74L5298	\$ 10
74L515	\$ 35	74L5113	\$ 55	74L5190	\$ 69	74L5324	\$ 75
74L520	\$ 29	74L5114	\$ 55	74L5191	\$ 15	74L5365	\$ 99
74L521	\$ 39	74L5122	\$ 55	74L5192	\$ 99	74L5366	\$ 89
74L522	\$ 29	74L5123	\$ 10	74L5193	\$ 15	74L5367	\$ 99
74L526	\$ 77	74L5124	\$ 55	74L5194	\$ 15	74L5368	\$ 99
74L527	\$ 55	74L5125	\$ 88	74L5195	\$ 15	74L5373	\$ 25
74L528	\$ 44	74L5126	\$ 88	74L5196	\$ 99	74L5374	\$ 50
74L530	\$ 39	74L5132	\$ 88	74L5197	\$ 99	74L5377	\$ 25
74L532	\$ 66	74L5138	\$ 25	74L5221	\$ 99	74L5378	\$ 69
74L533	\$ 69	74L5139	\$ 99	74L5240	\$ 95	74L5386	\$ 77
74L537	\$ 39	74L5145	\$ 99	74L5241	\$ 95	74L5393	\$ 25
74L538	\$ 59	74L5147	\$ 95	74L5242	\$ 95	74L5395	\$ 99
74L540	\$ 33	74L5151	\$ 88	74L5243	\$ 95	74L5399	\$ 55
74L542	\$ 88	74L5153	\$ 88	74L5244	\$ 25	74L5424	\$ 25
74L547	\$ 88	74L5154	\$ 50	74L5245	\$ 50	74L5670	\$ 25
74L548	\$ 88	74L5155	\$ 99	74L5247	\$ 88	81L595	\$ 95
74L551	\$ 39	74L5156	\$ 25	74L5248	\$ 99	81L596	\$ 95
74L554	\$ 29	74L5157	\$ 25	74L5251	\$ 99	81L597	\$ 95
74L555	\$ 55	74L5158	\$ 49	74L5253	\$ 99	81L598	\$ 95
74L573	\$ 44	74L5160	\$ 99	74L5256	\$ 25		

TTL's

Order by Cat No. 999 and Type

7400	\$ 35	7445	\$ 77	74109	\$ 55	74176	\$ 79
7401	\$ 35	7446	\$ 69	74116	\$ 89	74177	\$ 77
7402	\$ 35	7447	\$ 56	74120	\$ 99	74179	\$ 88
7404	\$ 44	7448	\$ 77	74121	\$ 44	74180	\$ 77
7405	\$ 44	7450	\$ 29	74122	\$ 50	74181	\$ 88
7406	\$ 39	7451	\$ 50	74123	\$ 32	74182	\$ 99
7407	\$ 39	7453	\$ 50	74126	\$ 52	74184	\$ 99
7408	\$ 35	7454	\$ 20	74126	\$ 69	74185	\$ 99
7409	\$ 35	7460	\$ 29	74132	\$ 69	74190	\$ 19
7410	\$ 35	7470	\$ 29	74141	\$ 77	74191	\$ 19
7411	\$ 39	7472	\$ 29	74143	\$ 33	74192	\$ 77
7412	\$ 49	7473	\$ 36	74145	\$ 77	74193	\$ 89
7413	\$ 44	7474	\$ 49	74148	\$ 29	74195	\$ 89
7414	\$ 66	7475	\$ 49	74150	\$ 88	74196	\$ 88
7415	\$ 45	7476	\$ 39	74151	\$ 59	74197	\$ 88
7417	\$ 29	7479	\$ 39	74153	\$ 69	74198	\$ 49
7420	\$ 35	7480	\$ 99	74155	\$ 49	74199	\$ 49
7422	\$ 44	7481	\$ 59	74156	\$ 99	74221	\$ 99
7423	\$ 44	7483	\$ 59	74157	\$ 63	74251	\$ 77
7425	\$ 39	7485	\$ 85	74168	\$ 77	74273	\$ 10
7426	\$ 39	7486	\$ 35	74161	\$ 79	74278	\$ 25
7427	\$ 35	7489	\$ 66	74162	\$ 79	74279	\$ 82
7430	\$ 35	7490	\$ 44	74163	\$ 88	74365	\$ 69
7432	\$ 39	7491	\$ 59	74164	\$ 88	74366	\$ 69
7437	\$ 39	7492	\$ 45	74165	\$ 88	74367	\$ 69
8438	\$ 39	7493	\$ 45	74166	\$ 29	74368	\$ 69
7440	\$ 20	7495	\$ 45	74170	\$ 59	74393	\$ 50
7441	\$ 77	7496	\$ 65	74173	\$ 109	8726	\$ 50
7442	\$ 49	74100	\$ 69	74174	\$ 79	8797	\$ 25
7433	\$ 69	74107	\$ 44	74175	\$ 79		

ANADIX DP9500 / DP9501 PRINTERS

\$1650⁰⁰

New from Anadix! Two low cost, high performance printers designed for all applications, including standard high-density graphics capability. Both models feature a 9 mm print head with an incredible life expectancy of 650 million printed characters! Full 96 character ASCII set with lower case descenders, double width printing, bi-directional with shortest distance sensing logic. Adjustable-width tractor feed, forms control, horizontal and vertical tabbing, and print up to five copies. Easy interfacing with parallel, RS-232 serial or current loop choices.

The DP9500 is the choice when you require mostly printing and occasional graphics. Select between a 9 x 9 character font and 132 columns, or a 7 x 9 font for 175 columns. Printer speed: 150/200 CPS. Wt. 35 lbs.

The DP9501 is mainly for graphics applications. The 11 x 9 character font produces superb graphics reproductions on 132 columns, and the 7 x 9 character font in 220 columns provides maximum graphics potential. Both models operate at 110VAC, and 220 VAC for European use. Wt. 35 lbs.

Cat No. 2551 DP9500 printer
Cat No. 2552 DP9501 printer

HOBBYWORLD[®] ELECTRONICS, INC.

19511 BUSINESS CTR. DR. DEPT V9
NORTHRIDGE, CALIFORNIA 91324

Send For Your Free Flyer Today!

ATARI HOME VIDEO SYSTEM



\$183.00

The nation's best selling home video entertainment center is here! Currently supports a library of 32 game cartridges with over 1500 game variations and options. Now you can enjoy all the fun and excitement of an arcade in your own home whenever you wish. Terrific for party entertainment, developing coordination and dexterity, education, or just plain family fun. Comes with interchangeable joystick and paddle controllers, special circuits to protect home T.V., and ATARI'S realistic "combat" game with 108 variations and options. ATARI'S realistic sound effects and crisp, bright colors make the home video center your number one entertainment choice.

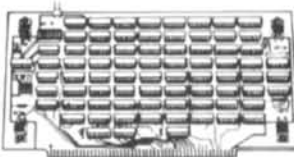
CAT NO.	DESCRIPTION	WT	PRICE
2275	ATARI Home Video System	8 lb.	183.00
2206	Driving Controller-Pair	2 lb.	19.95
2207	Paddle Controller-Pair	2 lb.	19.95
2208	Joystick Controller-Pair	2 lb.	19.95

ATARI GAME CARTRIDGES

2376	Starship	6 oz.	19.50
2377	Black Jack	6 oz.	18.75
2378	Space War	6 oz.	12.95
2379	Surround	6 oz.	12.95
2380	Shot Machine	6 oz.	18.75
2381	Outlaw	6 oz.	19.50
2382	Slot Racer	6 oz.	19.50
2383	Video Olympics	6 oz.	19.50
2384	Breakout	6 oz.	19.50
2385	Canyon Bomber	6 oz.	19.50
2386	Street Racer	6 oz.	19.50
2387	Homerun	6 oz.	19.50
2388	Basketball	6 oz.	19.50
2389	Football	6 oz.	19.50
2390	Bowling	6 oz.	19.50
2391	Skyliver	6 oz.	19.50
2392	Fut with Numbers	6 oz.	18.75
2393	Brain Game	6 oz.	19.50
2394	Superman	6 oz.	25.00
2395	Cosmo	6 oz.	25.00
2396	Backgammon	6 oz.	37.95
2397	Voice Chess	6 oz.	37.95
2500	Space Invaders	6 oz.	25.00
2609	Adventure	6 oz.	25.00
2611	Isly 500	6 oz.	37.50
2634	Human Cannon Ball	6 oz.	19.50
2635	Codebreaker	6 oz.	19.50
2636	Flag Capture	6 oz.	19.50
2637	Air-Sea Battle	6 oz.	19.50
2638	Hunt and Score	6 oz.	19.50
2639	Miniature Golf	6 oz.	19.50
2640	Hangman	6 oz.	18.75
2653	Tic Tac Toe	6 oz.	19.50
2654	Circus	6 oz.	19.50

Note: Not for use with ATARI Programmable Computers

SSM MB68 8K STATIC RAM BOARD \$135



8K bytes by 8 bits fully buffered compatible with 8080, 8085, and Z80. Dip switch addressing of independent 4K halves lets the MB68 think like two 4K boards, or one 8K board. Independent 4K addressing allows the flexibility to meet varying software memory needs. Uses low power 21L02 RAM & operates at 2 or 4MHz and is compatible with direct memory access controllers.

Cat No.	Description	Price
*1400-A	450ns kit	\$135.00
*1400-B	250ns kit	\$147.50
1401-A	450ns v & t	\$205.00
1401-B	250ns v & t	\$225.00
*1402	Bareboard	\$ 23.75

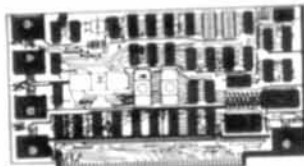
SSM OB1 VECTOR JUMP & PROTOTYPING CARD \$41.25*



Plug compatible for S-100 bus systems, features full 16 bit vector jump address with dip selection of 8080 or Z80. Can be set to jump on power-on-clear, reset, or both. Prototyping areas on the card for 16-pin IC's & three 24-pin IC's and two spare regulator patterns.

*Cat No. 1429 OB1 kit	\$41.25
Cat No. 1430 OB1 v & t	\$85.00
Cat No. 1431 OB1 bareboard	\$37.00

Call Toll-Free: USA (800) 423-5387
In California: (800) 382-3651
Local & Outside USA: (213) 886-9200



SSM CB1-A 8080 CPU BOARD

Just add an I/O board and it's a computer! 256 bytes of on board RAM, with option for 2K of on board PROM. Includes a power-on, preset jump circuit, and MWRITE is available, allowing use without a front panel. There's a parallel input port with status and AIP controlled addressing, or PROM in 2K blocks, vector jump in 2K increments. RAM in 256 byte increments. RAM in 256 byte increments. input port for addresses 0-31 in decimal.

* Cat No. 1403 CB1-A kit \$159.00
* Cat No. 1441 CB1-A bareboard \$28.75

* Denotes excess inventory sale. No further discounts shall apply.

\$159 kit

INVENTORY 'S'

Allows the inclusion of alphabetic information and a data index code in the form of data statements within the program. Includes: 1) Reports; User specifies up to three numeric, and either or both alpha informations to be listed. Can be vendor specific. 2) Cost/value summary; Searches all stock areas and reports cost/value quantity, total value by line item, and grand total. 3) Recorder search; Compares current stock level against specified reorder point, and displays all line items in need of reorder, along with tentative reorder information. 4) Index; Uses arbitrary file numbers reflecting the order in which the data codes are stored. Reveals file names and numbers in groups of 24. 5) Detailed Rept.; Stock files can be called by file number to reveal memory information. 6) Read and write file; Stores and reenters the data from day to day. 7) Data change; Updates Data Base.

Cat No. 2058 TRS-80 L2, 16K, cassette

\$24.95

MICROSOFT TRS-80 FORTRAN PLUS

Create your own subroutines, assembler source files, data files, and FORTRAN files. Fully compatible with TRS80S, the FORTRAN compiler can operate 1200 lines per minute on a single pass. Also generates a fully symbolic listing of the machine language generated. Macro assembler accepts 280 opcodes, and supports complete intel standard macro facility. Linking loader provides a variety of capabilities, executed by means of easy command lines and switches. Any number of programs may be loaded with just one command. Text editor random access, line oriented. Only the library routines required to run a particular FORTRAN program need be loaded before execution. Non-standard I/O drivers for each Logic Unit Number may be written, simplifying the task of interfacing non-standard devices to TRS-80 FORTRAN programs.

Cat No. 1341 TRS-80 L2, 32K w/disk

\$185

PROGRAMMA TIELINE \$24.95

The most complete communications for the TRS-80, featuring Host computer. Turns your TRS-80 into a timeshare main frame. Smart Terminal. Operate another TRS-80 or maintain timeshare system from your TRS-80. Send/receive BASIC programs and data. Allows exchange of programs over phone lines (modem required). Operate a serial printer, text your modem and RS232, and much more! Complete with extensive manual on telephone communications.

Cat No. 2137 TRS-80 L2, 32K modem, DOS 2.1, RS232 cassette, used w/disk

Introduction to TRS-80 GRAPHICS

Bob Albrect and Don Inman

One of the most outstanding capabilities of the small computer is the ability to provide graphical data displays that formerly cost thousands of dollars. This book provides a basic introduction to graphic programming using dozens of real examples which run on the Radio Shack TRS-80 Computer. The book begins with basic concept line drawing, then leads the reader to more complex geometric shapes, moving figure animation, and other more advanced topics. No mathematics is required, but an understanding of BASIC language is assumed. A TRS-80 Computer for running examples is recommended, but concepts will apply to almost any cost computer with graphics capabilities. (175 pages)

Cat No. 2544 **\$8.95**

PROGRAMMA DATA BASE MANAGEMENT 5 \$49.95

An easy method of creating data files and storing them in disk memory for future use. Allows you to store and manipulate data for maximum productivity, and modify or incorporate your own routines. Uses Radio Shack's TRS705/BASIC language.

Cat No. 2146 TRS-80 L2, 16K

TRS-80 ELECTRIC PENCIL

Allows you to produce mailing lists, forms, large numbers of original correspondence, etc. A character-oriented word processing system, providing maximum freedom and simplicity in the handling of text. Eliminates the need for word hypernotations or carriage returns. Line formatting is done automatically. Insert, delete, or relocate any text using simple keyboard commands.

Cat No. 1338 TRS-80, L1 & L2, 16K, cassette 8 oz. \$ 95.00
Cat No. 1338-D TRS-80, L1 & L2, 16K, disk 8 oz. \$145.00

TRS-80 CP/M

\$149.95

A file-oriented disk operating system that provides a common set of utilities for program development and operation. There are six built-in commands, plus utilities called in from disk. Runs on as little as 16K of memory and one disk drive. Complete with us manuals. CP/M is a registered trademark of Digital Research.

Cat No. 1679 TRS-80 L2, 16K w/disk

VERBATIM 525 SERIES

5 1/4" Diskettes

- Double Density
 - Single sided
 - Perfect for commercial and general applications.
- | Cat No. | Description | Type | Use for | 10 for |
|---------|---------------|--------|-------------------|---------|
| 1147 | Soft sector | 525-01 | TRS-80 | \$33.00 |
| 1148 | 10 hole, hard | 525-10 | North Star, Apple | \$33.00 |
| 1149 | 16 hole, hard | 525-16 | Micropolls | \$33.00 |

VERBATIM 577 SERIES

10 PER BOX

- Certified twice, 77 tracks
 - Single sided, double sided
 - Built-in hub protector ring
 - For critical data applications
- | 2330 | Soft sector | 577-01 | TRS-80, etc. | \$49.95 |
|------|---------------|--------|-------------------|---------|
| 2331 | 10 hole, hard | 577-10 | North Star, Apple | \$54.95 |
| 2332 | 16 hole, hard | 577-16 | Micropolls, etc. | \$49.95 |

DISK / DISKETTE DRIVE HEAD CLEANING KIT

Diskette drive heads require periodic maintenance to assure efficient and error free operation. Unlike other peripheral devices, the read/write heads on disk drives are extremely difficult to clean without partially disassembling the unit. But now, with Hobbyworld's disk drive head cleaning kit, the user can clean these hard-to-reach heads in just minutes! Available for both 5 1/4" and 8" drives, single and double sided. Comes complete with two cleaning disks, 4 oz of CS-85 cleaning solution, and easy-pour dispenser. Wt 12 oz.

Cat No. 2499 8" disk **\$30**
Cat No. 2534 5 1/4" diskette

HAYDEN SARGON II

• Available in Cassette or Diskette

Sargon II has seven levels of play! When setting up the board the user can scan up and down, left and right before choosing a move. The computer displays the level in which it is thinking, shows the moves that it is contemplating, and then displays the move it has chosen. It comes with a randomized bank of opening moves for all 7 levels of play, and a special hot mode that will suggest moves for players who may need some help.

Cat No.	Description	Weight	Price
2082	TRS-80, L2 16K Cassette	6 oz.	\$29.95
2083	Apple II, 24K Cassette	6 oz.	\$29.95
2352	TRS-80, L2 16K Diskette	6 oz.	\$35.95
2342	Apple II, 24K Diskette	6 oz.	\$35.95

TRS-80 and APPLE 16K MEMORY ADD-ON \$55.00

Everything you need to upgrade your system! Includes 4 pages of illustrated instructions. Complete with RAM's and pre-programmed jumpers. No special tools required! Wt 4 oz.

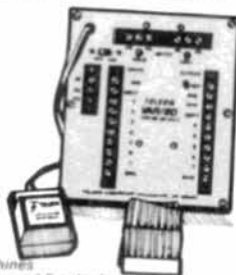
Cat No.	Description
1156	For TRS-80 Keyboard Unit
1156A	For TRS-80 Exp. Interface purchased before 4/1/79
1156B	For TRS-80 Exp. Interface purchased after 4/1/79
1156C	Apple II
1156D	EXIDY

TRS-80 EDGE CONNECTOR

• 40 contacts (2 x 20)
• .01" spacing

For expansion or main unit. Wt. 4 oz. **\$4.75**
2 for \$9

TELESIS VAR/80 TRS-80 I/O UNIT \$105



- For level II machines
 - Provides 8 inputs and 8 outputs
 - Plugs directly into your TRS-80
- Now you can use your TRS-80 as a digital door lock, burglar alarm, power manager, frequency counter, light dimmer, dark room timer, just to name a few! Comes fully assembled and tested. Use it with or without the expansion interface! Data pack includes instructions, applications, sample circuits, and several programs. With power supply. Wt. 5 lbs.

Cat No. 1092

SEND FOR FREE FLYER FEATURING . . .

Page after page of impressive state-of-the-art products. Included in flyer are computers, terminals, disk drives, printers and many more electronics peripherals that can add dimension to your personal computing. We also stock computerized games and toys, application boards, a large selection of comprehensive software, electronics books, electronics parts, integrated circuits, P.C. & soldering accessories and much, much more.

For all your electronics' or hobbyist's needs, circle our Reader Service number or write/phone us for your free illustrated flyer today!

HOW TO ORDER

Minimum Order \$15.00. Order by phone, mail, or at our retail stores. Pay by check, Mastercharge, Visa or C.O.D. Please include expiration date with charge card orders. U.S. \$5 only. Include phone number and magazine issue you are ordering from. Add \$1.25 for C.O.D. and shipping charges from rates below.

Shipping Rates: U.S.A.

Ground: Add \$2.25 for first 2 lbs. and 40c each add'l. lb.

Air: Add \$3.25 for first 2 lbs. and 70c each add'l. lb.

Shipping Rates: Foreign

Ground: Add \$3.00 for first 2 lbs. and 80c each add'l. lb.

Air: Add \$11.25 for first 2 lbs. and \$5.00 each add'l. lb.

Prices Valid through month of issue. Not responsible for typographical errors. Some items subject to prior sale or quantity limits. 120 day guaranteed satisfaction.

Exception: Partially assembled kits, abuse or misuse.

HOBBYWORLD® ELECTRONICS INC.

19511 BUSINESS CTR. DR. DEPT V9 NORTHRIDGE, CALIF 91324

TRS-80 SERIAL I/O

- Can input into basic
- Can use LIST and LPRINT to output, or output continuously
- RS-232 compatible
- Can be used with or without the expansion bus
- On board switch selectable baud rates of 110, 150, 300, 600, 1200, 2400, parity or no parity odd or even, 5 to 8 data bits, and 1 or 2 stop bits. D.T.R. line
- Requires +5, -12 VDC
- Board only \$19.95 Part No. 8010, with parts \$59.95 Part No. 8010A, assembled \$79.95 Part No. 8010 C. No connectors provided, see below.



EIA/RS-232 connector Part No. DB25P \$6.00 with 9' B conductor cable \$10.95 Part No. DB25PS



3' ribbon cable with attached connectors to fit TRS-80 and our serial board \$19.95 Part No. 3CAB40

COMPUCRUISE



\$129.95, with cruise control \$169.95

PAPER TIGER



Prints address labels, multicopy invoices and legal-size reports. Adjust the tractor width from 1-3/4 to 9-1/2 inches. 8 switch-selectable forms lengths. Print 6 or B lines per inch. Add the software-selectable full dot plotting graphics option to print illustrations, block letters, charts, graphs. Part No. 162172 \$899.95 with graphics option Part No. 162173 \$1099.95

GAME PADDLES & SOUND



Includes: 2 game paddles, interface, software, speaker, power supply, full documentation including: schematics, theory of operation, and user guide, plus 2 games on cassette (Pong and Starship War). \$79.95 Complete Part No. 7922C

DIGICOM DATA PRODUCTS INC. Series 312 Acoustic Coupler



300 BAUD Originate, Part No. AC3122, \$219.95 300 BAUD Answer, Part No. AC3122, \$219.95 300 BAUD Answer/Originate, Part No. AC3123, \$229.95

IBEX LIGHT PEN



Comes with Backgammon and Tic-Tac-Toe on tape with full documentation and program listing. Requires 9v. battery. Part No. IBEX \$19.95

SYSTEM EXPANSION from LNW Research

- Serial RS232C/20 mA 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, PC board and user manual, Part No. LNW80, \$69.95

DISKETTES



Box of 10, 5" \$29.95, 8" \$39.95. Plastic box, holds 10 diskettes, 5" - \$4.50, 8" - \$6.50

16K RAMS

For the Apple, TRS-80 or Pet \$8 each Part No. 4116/2117.

LEEDEX MONITOR



12" Black and White • 12 MHz Bandwidth • Handsome Plastic Case • \$139.00

S-100 INTERFACE



AN S-100 bus Adapter—Motherboard for the TRS-80. Kit, Part No. HUH81DLXK, \$295.95. Assembled, Part No. HUH81DLXA, \$375.95.

NOW! A FULL SUPPORT SYSTEM FOR TRS-80



- 32K of RAM
- EPROM firmware
- Disk control
- Data acquisition
- Parallel I/O
- Serial I/O
- Plug into GPA's Motherboard. GPA's quality design includes: 6-44 pin edge connectors • +5V, -5V, +12V, -12V external power supply required • Active termination. The Motherboard, Part No. GPA80, is only \$149.95.

TAKE ADVANTAGE OF GPA-EXPANSION CARDS FOR THE GPA80

Memory cards: Now with Fortran compilers available for your TRS-80, additional expansion memory is a must! Card with sockets only, Part No. GPA801, \$119.95. Card with 16K of 4116 Dynamic Ram, Part No. GPA802, \$224.95. Card with 32K of 4116 Dynamic Ram, Part No. GPA803, \$329.95. All cards come equipped with sockets to accommodate 32K of Ram.

EPROM firmware card. Put those valuable subroutines in firmware. Don't waste time loading and unloading tapes and disks. For 2708 or 2716 EPROMS, Part No. GPA806, \$79.95.

Serial I/O card. Here's what you've been asking for, a full serial terminal interface, with RS-232C or 20 mA. Current loop. Input/output capabilities. Part No. GPA807, \$79.95.

Parallel I/O Card. Control functions in the outside world, monitor and store real time events. Two parallel output ports. Dip switches select ports (0-254). Part No. GPA808, \$79.95.

FLOPPY DISK STORAGE BINDERS



Three ring binder comes with ten transparent plastic sleeves which accommodate either twenty, five-inch or ten, eight-inch floppy disks. Binder & 10 holders, Part No. 810B—\$9.95 • Extra holders, Part No. 810—69¢ each



Three-ring binder with ten 5 1/4 inch jackets Part No. 510B—\$9.95 • Jackets only, fits standard 3-ring binders, Part No. 510—69¢ each

DIGITAL CASSETTE



5 min. each side. Box of 10 \$9.95. Part No. C-5.

TRENDCOM PRINTER



TRENDCOM 200, Part No. TRC0200 \$495.95 **Interface** for TRS-80, Part No. TBOA \$49.95. For Apple II, Part No. TRCALL, \$75.95. For PET, No. TRCP2, \$79.95. For Scanner, TRCSR1 \$45.95.

SARGON: A Computer Chess Program

Features the complete program that won the 1978 West Coast Computer Faire Tournament. Part No. 00603 — TRS-80 Level II; Part No. 00604 — Apple II (24K). \$19.95

SPINWRITER MODELS 5510 and 5520



Features—EIA RS-232C/CCITT V24 Interface Standard • 55 Characters Per Second Maximum Print Rate • Impeccable Print Quality (OCR Quality) • Microprocessor Electronics • High Resolution Plotting/Graphing • Lowest Operating Noise Level • Self-Test Printing • Operator Engineered Control Panel • Prints Original and up to Seven Copies • NEC Information Systems new Model 5510 Receive Only and Model 5520 Keyboard Send/Receive SPINWRITER terminals are microprocessor controlled serial, impact terminals designed for remote printing applications where impeccable print quality is required. Model 5510 RD, Part No. NECA30759 \$2795.95 • Model 5520 KSR, Part No. NECA30762 \$3095.95

Send for FREE Catalog...a big self addressed envelope with 80¢ postage gets it fastest!

To Order:

Mention part no., description, and price. In USA shipping paid by us for orders accompanied by check or money order. We accept C.O.D. orders (U.S. only) or a VISA or Master Charge no., expiration date, signature and phone no., shipping charges will be added. CA residents add 6.5% for tax. Outside USA add 15% for air mail postage and handling. Payment must be in U.S. dollars. Dealer inquiries invited. Prices subject to change without notice.



26

Order Line: (408) 448-0800

ELECTRONIC SYSTEMS

Dept. 80, P.O. Box 21638, San Jose, CA USA 95151

... We have them All!

All the Disks and Printers that interface to the TRS-80[®]

CENTRONICS PRINTERS



NEW 737
Text Quality
Parallel
List \$995 **ONLY \$849**

NEW 730 w/friction and tractor . . . ONLY \$679!
779 (TRS-80 Line Prtr. I), List \$1245 **949***
779 w/tractor, List \$1350 **1049***
702 120 cps, bi-directional, tractor, VFU **1995**
703 180 cps, bi-directional, tractor, VFU **2395**
*same as Line Printer I *same as Line Prtr. II
(Shipping for 730 and 737 \$7.50. Other models shipped freight collect)

NEC SPINWRITER[™]



A fantastic 55 cps letter-quality printer
A fantastic value . . . Call for Price!

TI-810 w/serial/parallel interf. (outperforms Line Printer III).
List \$1940 (shipped freight col.) **\$1735**

CP/M[®] OPERATING SYSTEM

for Mod I CP/M 1.4, List \$145 **\$129**
for Mod II CP/M 2.2, List \$170 **\$149**
Shipping \$2.50
Complete line of CP/M software available at discount prices — Call us!

TPM — a disk operating system which runs CP/M compatible programs, written specifically for Z80 based systems — more efficient and less expensive than CP/M[®].
List \$79.95 — specify Mod I or Mod II

OUR PRICE \$59.95

RADIO SHACK[®] TRS-80[®]

with standard Radio Shack warranty through Radio Shack stores.



10% off on Mod I and Mod II

Mod I, 4K, List \$499 **OUR PRICE \$449**
Mod I Level 2, 16K, List \$849 **764**
Mod II w/64K, List \$3899 **3499**
Expansion-Interface with 0 RAM **\$269**



Paper Tiger, List \$995 **\$895**
w/graphics option, incl. buffer, \$1194 **\$989**
TRS-80 cable **\$ 45**
(Add \$7.50 for shipping and insurance.)

OKIDATA PRINTER MICROLINE 80

9x7 dot matrix, 6 or 8 lines per inch, prints 132 columns using compressed print. Prints block formatted graphics as displayed by TRS-80, u/lc, friction feed (prints from roll) or will feed standard 9 1/2" pin-feed fanfold paper. Uses Centronics style parallel interface; plug compatible with all TRS-80's. List \$949.



OUR PRICE ONLY \$649
Adjustable Tractor Feed Option \$99

Printers for TRS-80 require Level II machines. Printer cables extra. Call for price and order number.

Disk Drive for the TRS-80[®]

Save over \$100 on Radio Shack Price

Percom, Lobo, Vista

Full compatible with expansion interface and TRSDOS software.

OUR PRICE \$369

NEW Digital Innovations Drive — complete w/case and P.S. Your choice of Shugart or MPI (40 track) drive

A Fantastic Value \$349

2-Drive Cable \$24.95
4-Drive Cable \$34.95
(Add \$6 for shipping and insurance)

CORVUS 10 megabyte hard disk for Mod. I or II
ONLY \$4795

ESCON CONVERSION FOR IBM SELECTRIC

Complete w/microprocessor controller and power supply. Factory built. User installs solenoid assembly or it can be done at Escron factory at nominal cost.

Parallel version/TRS-80, \$575 **Only \$514**
TRS-80 Cable (specify Mod I or II) \$25
(Add \$6 for shipping)

PERCOM ELECTRIC CRAYON

List \$249.95 **ONLY \$229.95**

Prices in this ad are for prepaid orders. Charge cards and C.O.D. 2% higher. Deposit may be required with C.O.D. All prices subject to change and offers subject to withdrawal without notice. Radio Shack and TRS-80 are trademarks of the Tandy Corporation. CP/M is a trademark of Digital Research.

— WRITE FOR FREE CATALOG —

MiniMicroMart, Inc.

1618 James Street, Syracuse, NY 13203 (315) 422-4467

TWX 710-541-0431



ADVERTISERS

RS Number	Page	RS Number	Page	RS Number	Page
282 ACR Consultants	87	75 Godbout Electronics	63	108 Orthon Computer	80
418 A-T Enterprises	185	218 Good-Lyddon Data Systems	204	96 PCD Systems	180
332 A-T Enterprises	48	270 Mark Gordon Computers	141, 201	354 P & L Business Computer Systems	86
34 Acorn Software Products	110	317 Hanson House	151	420 Palomar Computer Products	39
97 Adventure International	45, 207	419 Hayden Book Company, Inc.	97	228 Palomar Software	193
387 Aerocomp, Inc.	114	383 Heath Company	56	64 Pan American Electronics	165
69 Alpha Byte Storage	185	23 Hobby World Electronics	222, 223	207 Pensadyne Computer Services	166
401 Alpha Products Co.	91	13 Houston Micro-Computer Tech. Inc.	41	1 Percom Data Company	Cov. II
210 Alpha Products Co.	91	103 Howe Software	195	1 Percom Data Company	3
138 The Alternate Source	93, 213, 215, 217	37 IJG Computer Services	177	258 Percom Data Company	105
397 American Business Computers	161	300 Information Technology Systems	213	43 The Peripheral People	90
396 American Fan Distributors	218	305 Insiders Software Consultants Inc.	209	422 Personal Micro Computers Inc.	115
264 Apparat Inc.	148, 149	2 Instant Software	34, 35, 198, 199	349 Personal Micro Computers Inc.	46
414 John Armstrong	180	333 Integrated Service Systems	44	17 The Program Store/Realsoft	86
47 Applied Economic Analysis	118	429 Interactive Fiction	218	21 Programma International	65
146 Audio Video Systems	204, 214, 219	246 Interface, Inc.	215	364 Programmers Guild	161
48 Automated Simulations	17	319 Interface Technology	193	395 QC Microsystems	82
391 Balcode Software	57	287 Interlude	143	188 Quality Software	205
49 Basics and Beyond, Inc.	71	187 International Software Assoc.	119	269 Quant Systems	219
351 The Berg Works	63	315 JLS	53	41 Racet Computers	73
417 Beta Computer Devices	151	249 JMS Corp.	215	326 Radio Shack	46
357 Big Five Software Co.	165	398 J & R Electronics	172	406 Rand Labs.	60
235 The Bottom Line	219	193 Joe Computer	177	241 Rational Software	213
57 Bourrut Consulting Corp.	120	226 Johnson Data Products	218	336 Rational Software	48
427 Brizzerk	197	* Kilobaud Microcomputing	87	372 Realty Software Co.	180
382 Business Micro Products	200	149 Kogyosha Company	70	70 Remsoft Inc.	161, 211
366 CAMI	195	375 Krell Software	186	276 Richcraft Engineering Ltd	204
393 CMS, Inc.	143	53 LNW Research	122	191 Rondure Company	83
298 The CPU Shop	123	14 Level IV Products Inc.	166	271 S-C Computer Technology	113
388 CPAlids	219	15 Lobo Drives International	Cov. III	373 SID	33
145 C&S Electronics Mart Ltd	153	318 Maco Manufacturing	205	244 SJW, Inc.	156
294 Caldata Systems	169	59 Magnetic Media Distributors	156	* S&M Systems Inc.	186, 209
62 Ceccat, Inc.	142, 217	87 Management Systems Software	70	291 Scientific Engineering Lab.	211
46 Checks To-Go	169	90 Manhattan Software, Inc.	167	195 Seidel's Electronics	90
32 Cload Magazine	100	339 Manhattan Software, Inc.	46	290 Semisoft	161
363 Compu-services	151	156 Manigold Associates	143	297 Service Technologies, Inc.	52
100 CompuCover	66	16 Matchless Systems	83	255 Michael Shrayar Software, Inc.	183
312 Computer Business Systems	81	309 Judson McClendon	160	413 Simple Sort-DBM	85
199 Computer Case Company	218	128 Med Systems Software	52	19 Simutek	80, 119-122
220 Computer Consultants	160	421 Medfield Computer Software	211	67 Sirius Systems	161
240 Computer Forms	204	104 Mercer Systems Inc.	214	30 Small System Software	96
321 Computers Unlimited	172	20 Meta Technologies Corp.	6, 7	167 Small Systems Software	46
392 Compuex	193	405 Meta Technologies Corp.	4	232 Snapp Inc.	101
415 Compuex	70	54 Micro Architect	107	356 Software Affairs	61
9 Computronics, Inc.	130-137	174 Micro Architect	44	340 Software Affair Ltd.	44
10 Contract Services Assoc.	157	250 Micro Business World	211	416 Software Central	205
233 Cottage Software	195	214 The Micro Clinic	70	399 Software Efficiency	218
119 Crown Plastics	193	95 Micro Comp Software Systems	177	238 Software Engineering Systems Inc.	177
* Cryptext Corporation	121	379 Micro-Design	204	42 Software Etc.	9
7 Custom Computer Center	29	89 Micro Learningware	113	286 The Software Mart	18, 19
121 Custom Electronics	113	72 Micro Management Systems Inc.	109	277 Solutions 80	204, 219
* Cybernetics, Inc.	95	68 Micro Matrix	112	316 Southeastern Software	63
169 Data Associates	48	29 Micro Mega	145, 176	275 Speedway Electronics	218
44 Data Train, Inc.	70	310 Micro Mint	75	82 Sturdivant & Dunn Inc.	90
274 Data Trans	96	384 Micro Systems Software Inc.	140	181 Sturdivant & Dunn Inc.	46
193 Datascore	213	28 Microcomputer Technology Inc./Apparat	148, 149	217 Sumware	166
407 Datasoft	211	307 Microcosm, Inc.	160	151 Sun Research, Inc.	57
424 Discount Software	86	425 The Micromatic Corp.	172	403 Superior Software	214, 218
366 Discount Data Forms	180	329 The Micromint Inc.	46	266 Synapse Video	90
* Discovery Bay Software	193	* Micron, Inc.	193	* Synergistic Solar Inc.	204, 219
412 Discovery Games	60	360 Microtek	15	358 Syracuse R & D Center	166
88 Documan Software	161	362 Microtek	47	148 Tab Sales Co.	219
359 EDF	172	112 Miller Microcomputer Services	160	380 Taitronics Enterprises	213
* Eighty Microcomputing	31, 215, 220, 221, 226	24 Mini Micro Mart Inc.	225	45 Taranto & Associates	54
63 Elcompo	206, 215	221 MISOSYS	209	147 Task Computer Applications	151
369 Electrolabs	67	285 Mullien Computer Products	159	376 Think Tank Labs	151
58 Electronic Specialists	118	338 Multi Media Systems	48	303 Tora Systems Limited	185
26 Electronic Systems	224	144 Mumford Micro Systems	127	327 Tustin Electronics Co.	48
278 Entrol Systems Inc.	63	* NRI Schools	191	428 Max Use Advertising & Marketing Inc.	213
225 En Joy Computer Programs	204	142 National Tricor, Inc.	161	84 Ultimate Computer Systems	195
404 Epson America	49	194 New England Business Service Inc.	155	423 Unilogic	195
40 Esmark, Inc.	111	323 New Wave Electronics, Inc.	67	292 Universal Interface	79
3 Exatron	Cov. IV, 23	328 New World Computer Co., Inc.	44	301 Universal Software Applications	160
141 FEC Ltd.	53	116 Newby Software Development Co.	52	31 VR Data Corporation	203
12 FMG Corporation	59	74 Northeast Microware	200	111 Vern Street Products	67
293 Form Village	143	245 Okidata Corp.	25	330 Virtual Technology Inc.	44
133 Full Service Accounting & Processing	190	426 Oktoklog	195	27 Web Associates	176, 186
102 Fuller Software	143	389 Omega Sales	189	355 Zocchi Distributors	200
203 G.P. Associates	90	367 Omikron	53		
79 Allen Gelder Software	53	296 Orange Micro	153		

*This advertiser prefers to be contacted directly.

Selling Lobo Drives Disk Memory Systems makes a lot of 'cents'.

Yes, becoming a LOBO DRIVES Dealer can make a lot of sense. For one thing, the demand for disk drive memory systems is growing . . . and will continue to grow for the next several years. Let LOBO DRIVES help you get your share of this expanding market.

- **DEALER DISCOUNTS** – LOBO offers a discount schedule that lets you increase your profitability.
- **DEALER SUPPORT** – LOBO backs its dealers with leads generated by national advertising; local, regional, and national trade shows; special promotions; outstanding documentation; quick response to phone calls; and delivering a quality product at a fair price, on time.
- **1 YEAR WARRANTY** – LOBO is so confident in the quality of its drives, it offers your customers a 1 year 100% parts/labor warranty. How's that for a selling point?
- **LARGE FAMILY OF PRODUCTS** – Only LOBO offers you a large selection of 5.25- and 8-inch floppy disk drives, and Winchester hard disk drives for TRS-80, APPLE and S-100 bus computers.

- **TECHNOLOGY LEADERSHIP** – All LOBO products represent the latest in the state-of-the-art technology. When there is something new in disk drive technology, LOBO will be the first to have it.

USING LOBO DRIVES MAKES GOOD SENSE...SELLING LOBO DRIVES MAKES MORE...

Call or write today for your dealer information kit.



935 Camino Del Sur
Goleta, California 93017
(805) 685-4546

"CAN YOU REALLY AFFORD
TO PAY LESS?"

INTERNATIONAL

TRS-80 is a registered trademark of Radio Shack, a Tandy Company.





STARTER KIT

EXATRON STRINGY FLOPPY FOR THE TRS-80

Recommended initial purchase:

Exatron Stringy Floppy	\$249.50	SPECIAL PRICE FOR THIS STARTER KIT	\$299.50
3 Wafers each: 5', 10', 20', 50'	40.00	Sales Tax (California only)	
Bus Extender, 2-for-1	15.00	Shipping and Handling	5.50
ESF Machine Language Monitor	9.95		
Wafer Organizer	5.00		
	<u>\$319.45</u>	TOTAL	<u> </u>

For more information see the current Exatron Stringy Floppy Owners Association Newsletter in *Microcomputing*.

If you have any questions about the product, about Exatron, or ESFOA, please call the Hot Line. Address letters to ESFOA, 3559 Ryder St., Santa Clara, CA 95051.

Stringy Floppy is a trademark of Exatron Corporation.

HOT LINE (For Calls Outside CA) 800-538-8559



excellence in electronics

exatron

3555 Ryder Street ■ Santa Clara, California 95051
(408) 737-7111