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80microTM

A CWCII PUBLICATION

the magazine for TRS-80[®] users

Those #* \$& Messages!

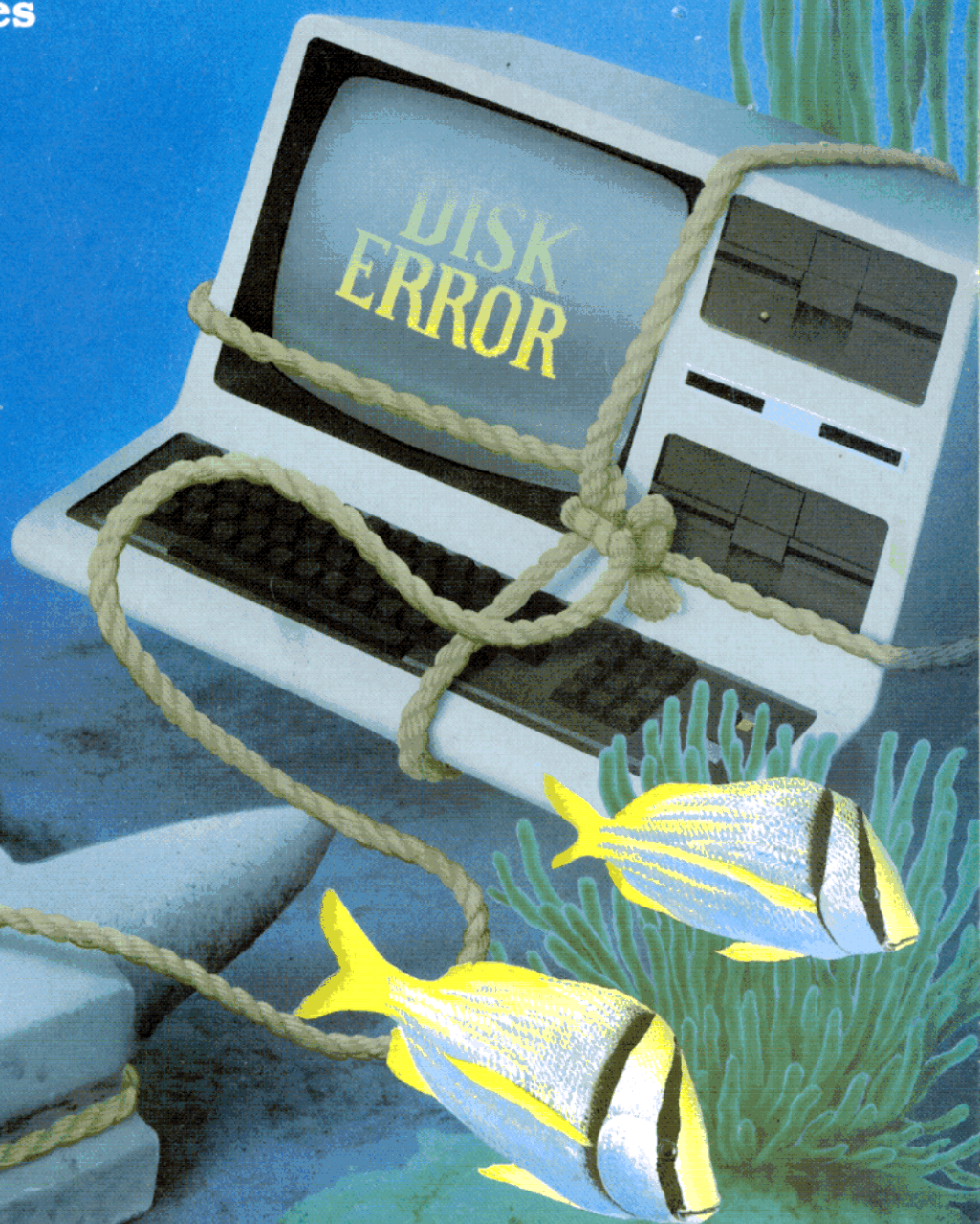
A Beginner's Guide
To Causes and Cures

The Model 4 Sort
That Tandy Forgot

Tandy's 1200 HD:
The Price Is Right

Is Your Micro
Tax Deductible?

Also:
The Next Step
BBS Express
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2000 Plus



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subLOGIC

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10. Battle of Zeigthy \$ 8.50

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(Model I/III or Mod 4)		
ZORLOF II	(79.95)	\$ 49.50
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(Model I/III or Mod 4)		
LESCRIPT CP/M	(199.95)	\$149.50
LazyWriter	(125.00)	\$ 92.50
(Model I/III or Mod 4)		
NEWSSCRIPT	(124.95)	\$ 74.50
Typeitall	(129.95)	\$ 99.50
(Model I/III or Mod 4)		
MScript	(79.95)	\$ 54.50
PowerScript	(39.95)	\$ 34.50
(Scripts Modification Patches)		
POWERDOT II	(59.95)	\$ 49.50
POWERDRAW	(39.95)	\$ 34.50
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PowerMail Plus	(150.00)	\$124.50
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The Analyst	\$ 19.50
The Collector	\$ 19.50
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LazyComm Terminal	\$ 29.50
Public Domain Disks	\$ 34.50
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80 MICRO (April, 1982)

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250	11.8	0.7	94
500	45.8	1.6	96.5
1000	179.6	3.5	98
2000	713.2	7.8	98.9

Note: Not to use with Tre-Hume Associates!

"...in those programs that use hundreds of strings arrays, the time saved is outstanding." 80 MICRO, Jan. '83

Works great, had 45 sec. delays in printing, now almost no delays. D.T.

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

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

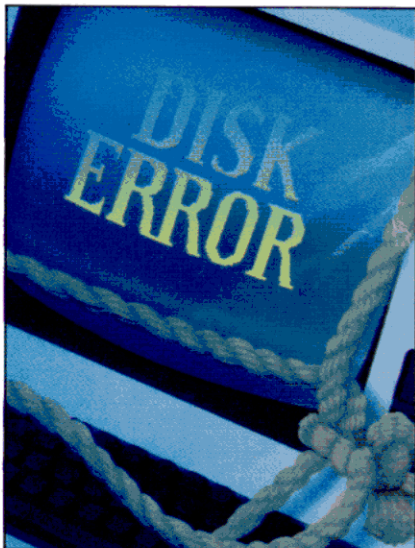
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How to fathom disk error messages and salvage flawed disks. (Models III and 4)

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74. **Reasonable Deductions**

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44. **Grade-A Graphics** *by Michael Letbow*

Our Young Programmer's Grand Prize winner is a deluxe graphics editor loaded with options. (Model III; Load 80)

58. **A La CRT** *by Ken Schweim*

A better way to cook up menu-driven programs. (Models I and III; Load 80)

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LOAD 80

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

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

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the instructions provided. If you own a Model I or III disk system, you boot the Load 80 disk and transfer the files to a TRSDOS system disk according to sim-

ple on-screen directions. If you own a Model 4, you must convert the programs from Model III TRSDOS to Model 4 disk using the Model 4 CONV command.

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

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly subscriptions to Load 80 are \$199.97 for disk, or \$99.97 for cassette. Individual loaders are available on disk for \$21.47 or on cassette for \$11.47, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-645-9559 between 9 a.m. and 5 p.m. Or, you can write to *80 Micro*, Subscription Department, P.O. Box 981, Farmingdale, NY 11737.

Directory

Graph

Article: Grade-A Graphics (p. 44)
System: Model III, 48K RAM, one disk drive
Language: Assembly/Disk Basic
This versatile graphics generator won grand prize in *80 Micro*'s 1984 Young Programmer's Contest.
Cassette filespec: GRAPH, B, C, D, LOAD, SAVE, DISPLAY
Disk filespec: GRAPH/CMD (object code), UTIL1/BAS, UTIL2/BAS, UTIL3/BAS, LOAD/CMD (object code), SAVE/CMD (object code), DISPLAY/CMD (object code)

List

Article: A La CRT (p. 58)
System: Models I and III, 16K RAM cassette, 32K RAM disk
Language: Basic
These Basic subroutines create professional-looking menus for your programs.
Cassette filespec: E, F, G, H, I, J, K, L, M, N, O, P
Disk filespec: LIST1/BAS, LIST2/BAS, LIST3/BAS, LIST4/BAS, LIST5/BAS, LIST6/BAS, LIST7/BAS, LIST8/BAS, LIST9/BAS, LIST10/BAS, LIST11/BAS, LIST12/BAS

Sort

Article: A Sort Story (p. 70)
System: Model 4, 64K RAM
Language: Disk Basic
A string sort for Model 4 Basic.
Cassette filespec: Q, R
Disk filespec: SORT4/BAS, SRT4DEMO/BAS

BBS

Article: BBS Express (p. 88)
System: Model III, 48K RAM, two drives
Language: Disk Basic
This module gets your bulletin board up and running.
Cassette filespec: S
Disk filespec: BBS/BAS

Help

Article: The Next Step (p. 100)
System: Model 4, 64K RAM
Language: Disk Basic
A help file generator program.
Cassette filespec: T
Disk filespec: HELPFIL/BAS

Alien Shuffle

Article: Special to Load 80
System: Models I and III, 32K RAM, one disk drive
Language: Disk Basic
Try to rearrange these aliens into peer groups.
Cassette filespec: U
Disk filespec: ALIEN/BAS

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Circle 175 on Reader Service card

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- Send **any** control or graphic/special character to the printer.
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A complete course in assembly language, written for the **beginner**. Contents include:

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Considered Opinions: 80's Readers Speak Out

I'm always impressed by the numerous constructive and intelligent comments we receive on our reader surveys. So I'm going to dedicate this month's Side Tracks to some of the remarks we got on our most recent survey, and try to address a few of the most frequent complaints.

"80 Micro is becoming fragmented by trying to cover all of Tandy's computers."

Five years ago, covering TRS-80s was simple—the Model I was pretty much all we had to worry about. Tandy now has more systems than we can fit in one room. Our dilemma is how to cover as many bases, and satisfy as many readers, as possible.

For a while, we tried to provide some coverage for nearly all the TRS-80s. We realized, however, that to do so was to cheat the core of our readership—owners of Model I's, III's, and 4's. So about a year ago, we made some painful but necessary decisions to end coverage of certain systems, including the Color Computer, Model 100, and Models II/12/16. These micros are, we felt, too incompatible with the I/III/4 family to be covered adequately in the same magazine.

The result is that we've lost a certain number of subscribers. But we feel it's better to satisfy most of our readers than none at all. The I, III, and 4 are our bread and butter, and we're committed to covering them as well as we can.

As for the Model 1000, we'll watch its performance closely in 1985, and evaluate whether we can cover it without compromising our I/III/4 coverage.

"You seem to be reducing to next to nothing your support of Model I systems."

The Model I is a great old machine, and its users are among microcomputing's most diehard. Model I owners still make up nearly one-third of our readership. We'll therefore ensure that



as many of our programs as possible run on the Model I.

We recognize, however, that Model I owners are abandoning their machines for Model 4's and MS-DOS systems. Consequently, the number of Model I users among our readership is declining rapidly. They now rank third behind the Models 4/4P and III owners. Simple math tells us that we must give the bulk of our coverage to the latter two machines.

"It's not business-oriented; it seems to be hobby-oriented."

"It's moving too much toward business and away from hobby."

We seem to have a difference of opinion here.

Much depends, of course, on your perspective. New readers who own Model 4's are more likely to want business programs, while I/III users tend to want home/hobby programs.

We still have more hobbyists than businessmen. Our survey shows that personal and hobby use out-polls business use by 64 to 51 percent. Some 81 percent of our readers use their micros at home, while 57 percent use one at work.

The upshot is that 80 Micro will continue to focus on home and personal uses. We recognize, however, the growing number of TRS-80s in business, and will try to provide more applications for those machines.

"Games—YUK."

There was a time when our August games issue outsold all others. Alas, no more—games are now at the bottom of our readers' want lists. This will translate into fewer games and an end to the annual games issue. We have, however, scheduled several Basic games that demonstrate interesting programming techniques, and we will also include some games on Load 80 as bonuses.

"Getting too small. Fear it may fold. Please don't!!"

It's natural that some people equate size with health. Actually, 80 Micro is in better shape than it ever was. Do you have any idea how much it cost to print and mail those 3-pound suckers?

The reduced size of the magazine is directly related to the enormous shakeout in the TRS-80 third-party market. Fewer companies mean fewer ads, which mean fewer pages.

Keep in mind that the TRS-80 market and 80 Micro are much more mature than other markets and magazines. We've gone through the initial explosion, and are now stabilizing. Don't be jealous of those who own other, seemingly more glamorous, systems. They'll eventually be in the same boat.

In the meantime, rest assured that 80 Micro is here to stay.

"Many programs published by readers are so full of bugs that they become useless."

Our tech staff checks each program several times before it goes into the magazine, and the result has been a significant reduction in the number of bugs. Nevertheless, we recognize that still too many slip through, so we're revamping our tech-check system. We'll not only be looking for syntax and typographical errors, but for errors in logic that pop up only after a program has been used for a while. We'll never be perfect, but we promise to do better in the future. ■

NEW!



Circle 91 on Reader Service card.

These were printed by DOTWRITER on an Epson MX-80.

See What You Can Do With DOTWRITER 4.0!

Now available for the Model 4, too!

DOTWRITER lets you create **spectacular, eye-catching letterheads, catalogs, invitations, or even books.** It is just what you need to turn your dot-matrix printer into a versatile typesetting machine. And it's available for the Model 4 (yes, in native mode) as well as for the Models I and III.

What is DOTWRITER?

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

DOTWRITER includes the printing program, complete documentation, and fourteen useful sets of typefaces (60 to 90 characters in each set). We will also give you the 105-page Letterset Reference Catalog free with your order.

To use DOTWRITER, just write your text with any popular TRS-80 Word Processor, add the necessary format-

ting commands, and DOTWRITER will do the rest.

25 more disks are available separately. Each has 3-12 complete typefaces (60-95 characters in each set).

These disks cost less than \$25 each, and may be purchased at any time.

If you want to create your own logos, modify our typefaces, or even design entirely new typefaces, then you will also want to order the "Letter-set Design System" (LDS). We offer LDS at half-price when you order it along with DOTWRITER. LDS operates in Model III mode on the Model 4.

Versions are available for Epson MX-80 with Graftrax, MX-100 with Graftrax-Plus, RX-80, FX-80, C. ITOH 8510/1550, Microline 84/92/93; Radio Shack's DMP series 200-2100, CGP-220 & Gemini 10X, 15X. Please specify printer and computer!

Our print samples were done on an Epson. Sizes vary on other printers. Some of the samples shown here are taken from the additional Letterset disks.

Two disk drives and at least 48K of memory are required. LDS is not available in native Model 4 mode.



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We've only shown you a few of the 180 DOTWRITER fonts. If you want the best in graphics printing, we suggest you order DOTWRITER today, toll-free.

Please specify printer and computer when ordering.

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Letterset Design System	39.95
Special: DOTWRITER and LDS	99.95
Additional Letterset disks (4-12 per disk)	17.95 and 24.95
Letterset Reference Catalog	10.00

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Mr. Roger Lewis
Box 1000
123 Main Street
Los Angeles, CA 90001

Dear Mr. Lewis:

We shipped your last shipment right on time and to the correct address. We will be glad to receive everything by March 1, so if you want it...

Yours truly,
PROSODY

RECURRING TEXT SYSTEM FAILURE

The words used to compare people for a system failure. Actually, these aren't the words that we happen to use when they are there. A system failure is a fancy way of saying, really saying, with the equipment or the software, and this can be caused by a momentary power failure or a large fault in a refrigerator is a wonderful way to demonstrate the importance of a computer. In a "bug" is a small mistake or error.

Now, as everyone who has used a computer for a while knows, crash when you are writing the first page of a paper that is a computer is going to crash. It will do so right before your eyes when you are writing the first paragraph, and so on until you reach the last line of the paper. Then it will crash, or if it's really bad, it will crash in the middle of the paragraph.

If (when) this ever happens to you, don't panic, because sometimes, even if you are sure of everything, the text that will appear on your computer. This is what you should do:

1. DO NOT TURN OFF THE COMPUTER. If you do, or if it crashes, the text cannot be recovered.
2. Press the "RESET" button on the computer while holding down the "F1" key to prevent any "RESET" command from occurring. If you do, the "RESET" command won't harm the text area. It's OK to do so, as long as you don't know what it will do. Hold down "RESET" or "F1" until the message for your Operating System appears on the screen.
3. Type "AL" *
4. The editor will report and then display on the screen whatever is currently in what it displays today, and then you should "RESET" the editor to make sure it's OK. If it's safe to do so, then under "EDIT", choose it again, and if it's OK, then "OK", change to "OK".
5. After the "SAVE" is done, press the "RESET" button again, then report the status of the editor, and then edit for the "RECOVER" text. "RECOVER" text, choose it again, and if it's OK, then "OK", change to "OK".

CHANGES TEXT/TEXT

READ DISK

Read the disk of the...

File names appropriate to name a disk...

Mr. Roger Lewis
Box 1000
123 Main Street
Los Angeles, CA 90001

Dear Mr. Lewis:

We received your last shipment right on time and in good condition. We need to re-order several items, and would like you to ship these to us by March 1, so if you can, please let us know.

Yours truly,
PROSODY

ADVANCED FEATURES

PRINT ALL FOOTNOTES, REGARDLESS OF ANY SUBSEQUENT PAGES, MARGINS, EMPHASIS, OR LINE LENGTH CHANGES. No, you should be careful to place the "F1" after the word. Based on your document has been defined.

Each actual footnote must be activated by the control word:

1. F1 (to start)

2. F1 END (to end)

The footnote itself goes on screen lines of its own, not on the "F1" lines. Since a "control" word is placed in the margin of the text, following the footnote, will be printed only after the other, with only a footnote reference the general number added between them.

SPECIFYING FOOTNOTE FORMATS

Before getting into this, a notation from Parris is in order:

No description of the form of footnotes means their use same number as it really is.

The man knows what he means, because the simple method we showed above is all you are likely to ever need. However, if you want to define control words are available for the purpose:

2. (See p. 395).

We are proud to offer you the one Word Processor that will satisfy all your writing needs: ALLWRITE. It sets new standards for text editing and printing, and will give new life to your TRS-80. Let us tell you why...

In an attempt to push the public into expensive 16-bit computers, many manufacturers have been saying that the TRS-80 is obsolete. The truth is that the software, not the hardware, makes the difference. And the best word processor of all is now available *only* on the humble TRS-80, not on those expensive 16-bit machines!

ALLWRITE is based on the proven methods that made NEWSRIPT the most popular independently produced TRS-80 word processor, but it also has the speed and new features our customers have asked us for. ALLWRITE will save you time and let you produce the highest-quality, most professional-looking letters, term papers, and reports available on a micro-computer.

Allwrite Can Save You Time!

Reads a 25,000 character file (10 printed pages) from disk in SIX SECONDS...does a global search-and-replace in FOUR SECONDS...outruns even the fastest popular micro-printer.

ALLWRITE'S Screen Handling Makes Word Processing Easier Than Ever

Change text width at any time; wide lines shift left and right as you type. ALLWRITE preserves double-blanks between sentences, uses the entire screen for text, and displays a complete Status Screen at the touch of a key. Scroll by line, partial screen, full screen, to top or end of file, or to any marked point. Move cursor by character, word, tab, line, or screen.

You can set and change on-screen tabs and store them on disk. The print-time tabbing features are incredibly versatile: they allow left, right, and centered tabs, and even line up your decimal points.

ALLWRITE shows you where you forgot to turn off underlining, boldface, italics, or double-width. Special on-screen Preview feature shows page breaks and page layouts...including underlining and boldface...without annoying blinking or screen flicker. In "Summary" mode, ALLWRITE quickly flags formatting errors without

These were printed by ALLWRITE; shown 20% actual size.

wasting time printing all the text. These standard features make document preparation faster and easier than ever!

State-Of-The-Art File Handling

There is no upper-limit on document size with ALLWRITE, because it chains files *backwards* as well as forwards, even across diskettes. Switch from one chained file to another in less than six seconds by pressing two keys. Select portions of other files for inclusion at print time...great for stock paragraphs.

ALLWRITE salvages text from bad disks! If a sector goes bad, you won't lose the entire file, because it will skip bad sectors, read the rest of the file,

TAKES FULL ADVANTAGE OF YOUR MODEL 4.

The model 4 version of ALLWRITE uses the entire 80-by-24 screen. On a 64K machine, you can edit over 34,000 characters of text. On a 128K machine, you can edit **THREE FILES AT THE SAME TIME!** The second and third files can be over 32,600 characters each, for a total of **almost 100,000 characters** of text in memory.

and then show you where the lost text belongs. This advanced error recovery turns a disaster into a feeling of profound relief.

User-Definable Soft Keys Reduce Typing Time

You can store 22 phrases or commands at a time into "soft-keys," then press just two keys to retrieve them. This makes frequently-used phrases and formatting controls a snap to use. You can store these definitions on disk and build a library of hundreds of pre-programmed keys to fit every one of your applications.

Our specially-designed templates fit right on your keyboard to let you see your settings at all times. Each template is also a Reference ("Cue") Card, so it is always right in front of you when you need it, without using up valuable screen space.

ALLWRITE Is Easy To Learn

ALLWRITE's commands and control keys are easy to remember because they use the first letters of common English words: 'CE' stands for 'Center,' 'Search' and 'Replace' do just that, and so forth. The on-line HELP menu offers over fifty screens of topics.

NEWSSCRIPT's documentation was acclaimed in every review, and ALLWRITE's 350-page book is even better. Portions of it are designed for beginners, with every feature clearly explained in step-by-step tutorial style. Since you won't always be a beginner, other parts of the book offer advanced topics. There is a cross-reference summary chapter, a 14-page comprehensive index, and a detailed Table of Contents. We've been developing computer programs and manuals for over 20 years, and understand the importance of good documentation.

To make installation easy, we include Tiny DOSPLUS for the Models I and III, and special, pre-tailored versions of both TRSDOS 6.2 and DOSPLUS IV for the Model 4, all at no extra charge. The Model I and III versions work equally well with all major DOS's.

PROSOFT'S On-Going Customer Support

Perhaps the best reason of all for having ALLWRITE is the continuing support we offer you: friendly, expert, direct support that is unsurpassed in the micro-computer industry. There is no time limit to our support: if you are our customer and you need help, just call or write. We give free updates for 90 days, and charge little or nothing for minor updates thereafter.

Customer Comments

"This is the best software package I have ever received...superb, easy to use, fast, and has more features than the business word-processor at the office." (E.R.L.)

"ALLWRITE is a professional system that sets a new standard in word processing. It's powerful and easy to learn and use."

80 MICRO, Nov., 1984

"Your company and products have to be one of the strongest factors I can think of for keeping me with the TRS-80!" (J.R.H.)

"NEWSSCRIPT is the Cadillac of word processors. ALLWRITE is the Mercedes Benz!" (B.E.)

"...a very readable manual." (D.S.)

BENEFITS OF OWNING ★ ★ ALLWRITE ★ ★

If Word Processing is important to you, PROSOFT's ALLWRITE is the best choice you can make. The clean, professional appearance it adds to your letters and reports will make an excellent impression on people. We will be happy to send you free print samples so that you can see for yourself how good ALLWRITE will make you look.

You probably know that quality word processors for CP/M and the IBM-PC sell for \$300-500, and they don't have ALLWRITE's capabilities or speed...or PROSOFT's proven, on-going support. Now, for a fraction of the cost of a new computer, you can have the most complete word processor of all. And you won't have the headaches of starting all over again with a new, different computer.

Note to college students: with its Footnote, Table of Contents and Index features, ALLWRITE is ideal for your reports and Term papers.

Circle 30 on Reader Service card.

HUNDREDS OF USEFUL CAPABILITIES

ALLWRITE comes with just about every useful word processing feature...standard. Here are some highlights: excellent right-justified proportional printing on most printers having that ability; powerful Form Letter and Mailing Label preparation; Instant counts of words, characters, lines, changes; block Move, Copy, Delete, Putfile, Getfile, and List; delete by character, word, line, sentence, paragraph, or block; insert and one-key insert; great RS-232 printer support; accepts all 256 ASCII codes from keyboard; intermix pitches on same line (printer-dependent); 1.5 line spacing, 6, 7, 8, 12 lines per inch (printer-dependent); does multiple-columns on all printers; perfect alignment of hanging indents; variables, logic statements, conditional printing; wildcard Directories; integrated with Electric Webster and DOTWRITER for Models I, III, and 4 (these are sold separately); "Legal" line numbering; paragraph, list, and figure numbering; supports most popular printers (all "printer drivers" included); compatible with high-memory drivers; fully explains all DOS and ALLWRITE error messages; wildcard search-replace; tabs, search-replace, other settings remembered across files; word reversal; up to nine levels of boldface; flexible page titles; footnotes at bottom of page or end of document; Table of Contents and Index generation; and PROSOFT's unmatched text formatting and printing capabilities.

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Model 4 version available at Radio Shack: Cat. No. 90-0242

T/Maker Talks

Eric Grevstad's review of T/Maker (January 1985, p. 34) is somewhat misleading. First, Grevstad seems overly influenced by what he assumes to be the correct method of implementing features. We at T/Maker feel that it's more useful to rate software according to its ease of use and efficiency. T/Maker software exhibits useful features that are easy to use; we'll let other companies specialize in features and functions their customers will never use.

The slow screen response and the keyboard bounce are problems attributable to the particular screen implementation Digital Research chose for CP/M Plus. T/Maker's word processor, for instance, running on the Models 4 and 4P under TRSDOS, behaves quite differently. The TRSDOS version is currently selling at \$299.

Where value and usefulness are concerned, T/Maker is an excellent alternative to purchasing three or four separate programs.

*Royal Farros
Marketing Director
T/Maker Co.
Mountain View, CA*

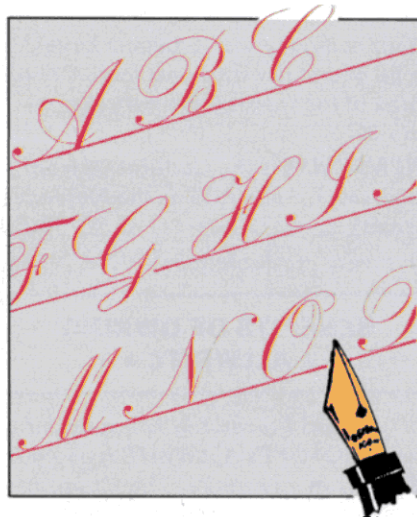
I Protest

I protest the exclusion of Model I programs from 80 Micro's annual Young Programmers Contest. I'm well aware that support for the Model I is rapidly decreasing. However, I urge you to remember your roots and let the Model I die a slow and natural death without encouragement from 80 Micro.

*R. Don Robinson
Hobbs, NM*

Demanding Pascal

The Alcor Pascal compiler is efficient and takes full advantage of Models III and 4 capabilities, including the Model 4's optional second 64K RAM bank. The two-stage compiler lets you



compile your Pascal program into p-code that's then translated into machine instruction for execution directly by the hardware features of the Models III and 4.

Alcor Pascal, in my opinion, includes what most programmers want in a computer language. Unfortunately, however, it doesn't support the high-resolution graphics board option. It's up to us to try to convince Tandy/Radio Shack that a graphics enhancement for the Alcor Pascal compiler would be a popular software package.

*David A. Smith
Berkeley Heights, NJ*

Reference Point

I'd like to clarify a few of John B. Harrell III's criticisms in his review of Nanos Systems' CP/M Reference Card (October 1984 p. 187). Harrell states that the card doesn't specifically address Radio Shack's version of CP/M Plus. The reason for this is that Radio Shack's CP/M Plus is actually CP/M 3.0, a vastly upgraded version of CP/M 2.2.

Unfortunately, the differences between the two versions are so extensive that it would be foolish to include both on the same reference card. Many commands that are built into CP/M 2.2 are transient programs in CP/M 3.0, complete with different

command syntax, in addition to new utilities and commands. For this reason, the card states that it applies exclusively to CP/M-80 1.3, 1.4, 2.2, MP/M, and CP/M-86.

Harrell's comments regarding the missing ASM parameter lead me to believe that he accidentally compared Nanos Systems' CP/M Reference Card to CP/M Plus instead of CP/M 2.2. This parameter doesn't exist in CP/M-80. The PRN file is the Assembly listing file; when printing, you use the PIP utility to send this from disk to your printer. CP/M-86 does have a printer parameter for ASM86 which is listed on the reference card.

Despite these two problems, Harrell's review is accurate and helpful.

*Terry Kepner
Co-author of the
CP/M Reference Card
Peterborough, NH*

A-B-SEE Congrats

Based on Gary Ludwick's review of A-B-SEE (August 1984, p. 34), I recently purchased the most powerful piece of software ever written for the Model III. Among A-B-SEE's many outstanding features is its ability to enter any of the 256 ASCII characters from the keyboard. In addition, A-B-SEE lets you change the contents of a Do file without having to reenter it. A-B-SEE is also great for making global changes to Basic as it lets you specify whether or not each occurrence of a string or variable is to be altered.

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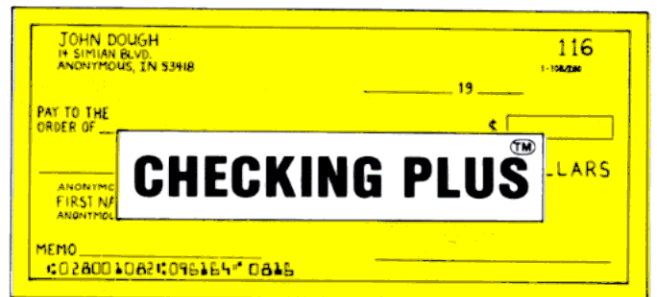
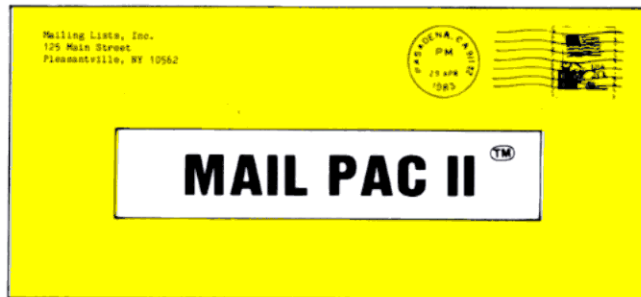
*John M. Taylor
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*Send correspondence to Input, c/o
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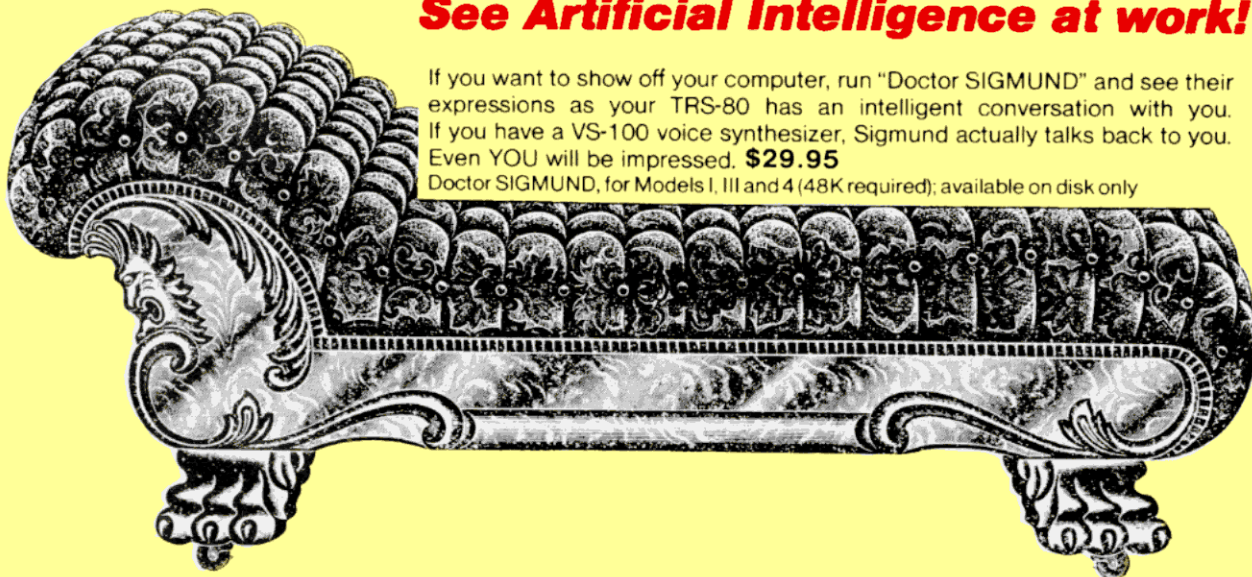
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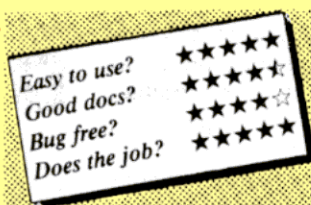
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December 1984.



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80-Micro (December 1984).

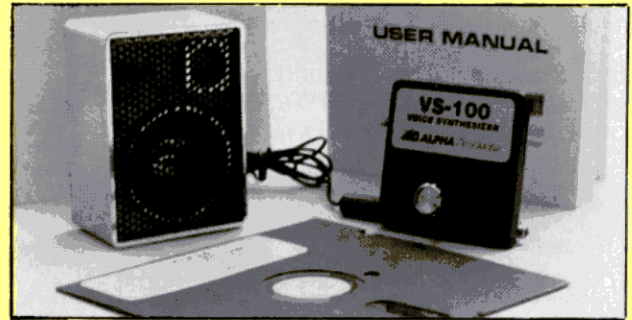


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Q: I have a Model III with three disk drives. Drive 1 reads only disks formatted and backed up in that drive; with other disks, I get a CRC error. I get the same error message if I try to use a drive 1 back-up in another drive. What is a CRC error and how does it affect my system? (Mac Olsen, Kamloops, BC, Canada)

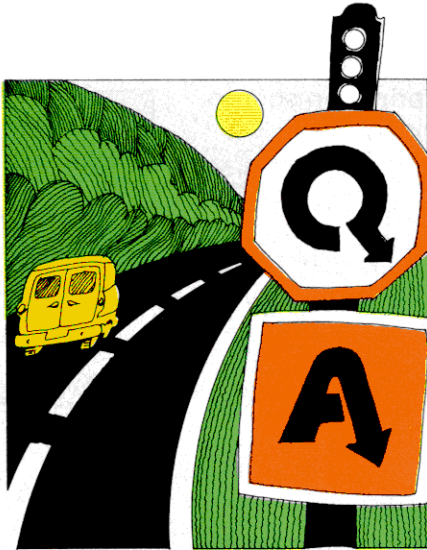
A: The problem is definitely with the drive's alignment. The drive head has drifted from its proper position so that it no longer sits directly over the disk tracks. The CRC (cyclic redundancy check) error refers to a special checksum maintained on every disk sector. If the computer gets a checksum different from the one on the sector, you get a CRC error.

The fact that disks backed up in drive 1 are the only ones that work proves head alignment is the problem. The drive head wrote the disk to match its own misaligned format. This means that after you have the drive head realigned, disks written by drive 1 will give CRC errors.

Also, you should make sure that the drive head is securely in place: If it's loose and drifts in and out of alignment, it's difficult for a technician to pinpoint your alignment problem.

Q: Until recently, I've used a Model 16B in Model II mode to run Microsoft Basic programs under the CP/M operating system. I switched over to Xenix and find that the same programs run slower than they did under CP/M: It takes up to five times longer to load a data file in Xenix M-Basic. Could you explain why this is so?

Second, is there some way to bypass



Xenix's built-in print spooler? Xenix forces all printer output to spool to the hard disk before it goes to the printer. This slows down output tremendously. It also prohibits my using LPRINT or LLIST statements in M-Basic.

Finally, the print spooler won't accept more than three output files from a program. If I try to send a fourth output file, the program stops executing. (Craig C. Stephan, Westchester, IL)

A: Xenix's optimum configuration is 2.5 megabytes of RAM with 60 megabytes of hard disk storage. With smaller amounts of RAM, Xenix slows down, becoming almost useless on a 512K system. This is because Xenix itself requires almost 1 megabyte of RAM and uses a special memory swap area to load and use special modules for purposes like loading disk file data into Basic. If Xenix lacks sufficient RAM space, it must store these modules on disk, loading them as it needs them.

At 512K, Xenix spends a lot of time swapping modules into RAM, slowing everything down considerably. Basic exacerbates the situation by grabbing memory away from Xenix. The only solution is to buy more memory and give Xenix some breathing room in your computer.

The printer spooler is necessary because Xenix is a multiuser system, and

direct printing might interrupt another job in progress. Xenix requires that you open and name a disk file before you print. The LLIST and LPRINT commands, when used directly, don't have file names, which causes errors. However, you can link Basic to the printer so that LPRINT goes immediately to the printer when it arrives in the spooler. To do so, use the CAT command and Pipe option like this: CAT file name.doc (PIPE symbol) LTR. The LPRINT statement still sends data to the spooler file on disk, but you don't see it.

You can have up to 15 output files in M-Basic, with three automatically buffered when you enter Basic. If you want more output files, you have to open buffers for them. Maybe you haven't properly opened additional buffers; I suggest you reread your manual's instructions.

Q: When I use my Model I for long periods of time, it gets very hot and the keyboard freezes up. I tried using a small fan behind the computer but that doesn't help. Do you know what the problem might be, and what I can do about it? (Paul Strasser, Mayfield Heights, OH)

A: You don't say if you're using an expansion interface (EI). If you are, remove both of the interface's power supply units and place them behind the interface.

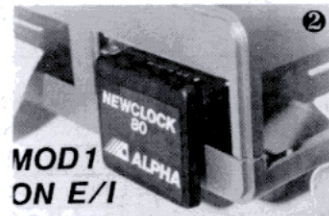
Also, cleaning your computer might help. Get a vacuum cleaner and thoroughly go over the keyboard and the EI, as dust could be shorting out some of the circuits.

Another possibility is that the keyboard unit's on-board power supply is beginning to give out. My advice is to take the computer to Radio Shack for repair.

Q: I'd like to use my Model 4P and DMP-110 printer at sporting events held off the beaten

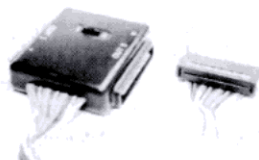
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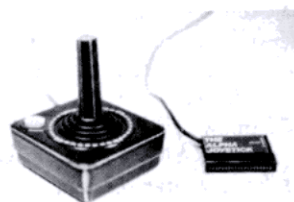
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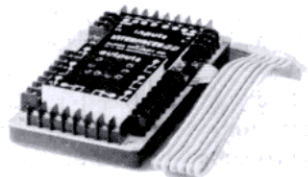
Alpha Joystick \$27.95

When it's time for fun, don't be without your Alpha Joystick. Do you know that most action games are Joystick compatible? Stop pounding on your keyboard and enjoy real arcade control. The joystick can also be used with BASIC programs; simply do J=INP(0) to read the joystick position (8 directions and fire button). Model I: plugs into keyboard or expansion interface. Model III, 4 and 4P: plugs into 50-pin I/O bus. The Alpha Joystick comes fully assembled and tested, ready to plug in and enjoy. (Specify Model I, or Model III, 4).



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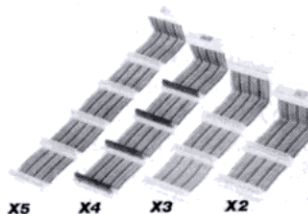
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track, far from reliable power supplies. I've heard that you can run a micro off an automobile battery. Have you any idea how I could do this? (Mike Meenehan, West Lafayette, IN)

A: What you want is a 12-volt dc to 120-volt ac solid-state converter. Make sure the unit you buy is rated for the current drain that the computer and printer impose.

Q: I have a Model I with 16K and an interface. I'd like some guidelines for installing more memory (16-32K) myself. I've noticed 16 empty integrated circuit (IC) sockets under the interface and assume they're for 32K of extra RAM. If I'm right, what type of RAM should I use? (Chris Miller, Larchwood, IA)

A: Adding memory to the expansion interface is easy. First, clear a work area on a table, with a sheet or newspaper on top to protect the table's finish. Make sure you disconnect the expansion interface from power supplies and from the computer keyboard.

Turn the computer over and remove its bottom case. This exposes the interface's circuitry and chips. Notice that the 16 empty sockets are in two rows, with a notch at one end of each socket. A silk-screened outline of an IC appears below each socket, and a silk-screened notch appears below each socket's notch.

Use 4116 RAM chips with a speed rating of 200-350 nanoseconds. (Radio Shack sells 4116s with a speed of 350 ns.) Carefully pick up each chip by the ends; don't touch the legs, since the static in your hands could damage them. Place the chip in an empty RAM socket, aligning the chip's notch with the socket notch and the silk-screened outline.

If the legs stick out too far, push them in by pressing the chip sideways against the table top. Once the legs are in place, press firmly against the top of the chip until the chip snaps down into the socket. Inspect the chip to make sure its legs are all in the socket and are undamaged. Repeat this procedure with the other chips.

It's a good idea to ask a friend to check your work. Then reassemble the interface, reconnect the power sup-

plies and keyboard, and turn everything on. To test the chips, type in PRINTMEM from Basic—the answer should be about 48,340. If it's 15,572 or 31,956, then one or more chips is defective or improperly positioned, and you'll have to disassemble the interface and inspect the chips again.

If everything looks fine, reassemble the system and use a memory test program to find the bad chips. If you don't have a memory test program, you can use this Basic program to find the bad addresses:

```
10 FOR I = -32767 TO -1:REM Use the MEM
prompt to protect the memory above 15572
```

```
20 POKE I,0: IF PEEK(I) <> 0 THEN PRINT
I "Bad address"; PEEK(I) "number found"
30 NEXT
```

Since each chip is 1 bit of every 8-bit RAM byte, a number other than zero tells you which chip is bad. Chips Z1-Z8 are addresses 49,152-63,535. Remember, you can't POKE and PEEK over 32,767, so you must use negative numbers to access RAM above 32,767; in this case those addresses are -16,384 to -1. Chips Z9-Z16 are addresses 32,768-49,151 (POKE and PEEK addresses -32,768 to -16,383). Z1 and Z9 are bits 7; Z2 and Z10 are bits 6; Z8 and Z16 are bits zero. Therefore, if you get a 3 in the address range -32,767 to -16,384, you need to replace chips Z15 and Z16.

If you don't have the expansion interface's technical manual, you should order one from Radio Shack National Parts (900 E. Northside Drive, Fort Worth, TX 76102).

Don't let all this scare you—I've installed RAM chips many times and only once did I have trouble.

Q: I have a Model II with CP/M 2.2. What programs are available, and where do I find them? (Rafael Salgado, Los Angeles, CA)

A: Thousands of programs will operate on your computer with CP/M 2.2. For commercial programs, the primary source is mail order. Lifeboat Associates (1651 Third Avenue, New York, NY 10128) has been in the mail-order software business the longest. Another good source is Montezuma Micro (P.O. Box 32027, Dallas, TX 75232). Montezuma Micro specializes in support-

ing Radio Shack computers with CP/M software, while Lifeboat serves a more general market.

If you're interested in free software, check out the SIG/M and CP/MUG libraries. The SIG/M library of public domain programs has over 200 disks, each containing an average of about 15 programs. Programs in most languages are available. The CP/MUG library has 92 disks.

A good reference on both libraries is *The Free Software Catalog and Directory* by Robert Froehlich. It's available from Crown Publishers (One Park Avenue, New York, NY 10016) and costs \$9.95. It isn't as well organized as I'd like, but it's by far the best source currently available.

I can supply readers with a catalog disk that lists and describes the SIG/M library's programs. To cover my costs, I'm charging \$6 for a single-sided 8-inch disk in standard IBM format, \$12 for four 5¼-inch disks in Osborne, Omikron, or Xerox format. If enough people are interested, I'll see about supplying the catalog disk in Radio Shack CP/M+ format, too.

To order the catalog, send a check or money order to Terry Kepner, P.O. Box 481, Peterborough, NH 03458. Be sure to specify your format.

I'd like to correct an error that appeared in the December 1984 Feedback Loop. In response to a question from Steve Weeber (p. 18), I said LeScript wasn't designed to operate in the Model 4 TRSDOS 6.X.X environment. That's not true; LeScript has always worked under Model 4 TRSDOS and, in fact, takes advantage of the 4's 80-column by 24-line display.

Steve wanted to know why his computer acted up when he ran LeScript in Model 4 mode. Because he'd just upgraded from a Model III, I assumed his version didn't run under Model 4 TRSDOS. However, LeScript works on the Model III and the 4; Steve should have had no trouble running LeScript under TRSDOS 6.X.X. ■

Terry Kepner is a freelance writer and programmer, and an associate editor of 80 Micro. He writes monthly columns for Portable 100 Magazine, Hot CoCo, and Under Color. He's been writing about microcomputers since 1979.



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How Does The Producer Work?

The Producer itself is a sophisticated program based on years of research and development. But The Producer was written with the end user in mind and the program generation process is quite simple.

You can begin by using a planning form designed to help you organize your program ideas. The Producer then asks you a series of simple English questions to enable those ideas to be translated into a program format. You use the computer's arrow keys and graphic characters to draw the data entry screen just the way you want it.

Then with the press of a button, the program generator takes over and does all that complex coding for you in a matter of minutes. The result is a complete program, capable of running by itself. That means your customized programs may be used independently of The Producer. (A feature not possible with Data Base creations.) You may duplicate your Producer generated programs and even sell them for others to use, without paying royalties.

How Difficult Is The Producer Process to Learn?

The Producer software package makes learning simple. An easy to follow tutorial takes you through each step of The Producer process as you sit at the computer. (This includes audio cassette tapes with the Model I/III versions.) This hands-on experience not only teaches you the process but allows you to create a program of your own design while you learn. The tutorial is all you need to get started.

Later, if you have need for more specific information, you can turn to the fully indexed Producer Reference Manual. The 200 pages of documentation cover virtually any question you may have so you will never be left guessing what to do next. The Producer package also includes a quick reference card to streamline your program operation and, should you ever need technical assistance, you may call a Producer Software technician for free counsel and trouble shooting.

Is It True That I Can Both Create and Edit At Will With The Producer?

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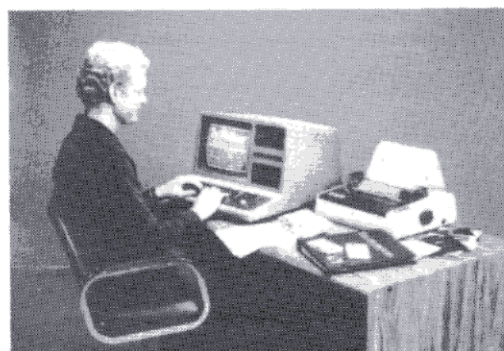
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Getting Fiscal: Old Trends, New Trends

Tandyland

As you might expect, Tandy does a booming business every Christmas, but in recent years its sales curve has flattened out in the December quarter (see the Figure). This year, Tandy has an explanation for the trend: the addition of computers and telephones to its product lines. These products, often aimed at the business or institutional buyer, tend to sell more steadily year-round, as they're usually not bought as gifts.

Overall, average monthly sales for Radio Shack stores at least a year old increased 6 percent during fiscal 1984, compared to increases of 12 percent in fiscal 1983, 10 percent in 1982, 11 percent in 1981 and 6 percent in 1980.

Tandy's slackening sales continued into fiscal 1985: Radio Shack's first quarter sales were down. The company's computer division is looking to the Color Computer and Tandy's new PC-compatible micros to buoy sales, but it will take more sustained growth to get Radio Shack back into its familiar profit profile.

Tandy doesn't expect strong earnings and sales growth until fiscal 1986, according to a story in the Nov. 9, 1984, *Wall Street Journal*. Tandy's president and chief executive officer John Roach said earnings per share could easily grow during fiscal 1985, but that wouldn't necessarily mean an increase in earnings. That's because Tandy has bought about 12.8 million of its own shares since fiscal 1984.

Tandy blamed price-cutting and competition for its earnings slump in two consecutive quarters; the com-

edited by Bradford N. Dixon

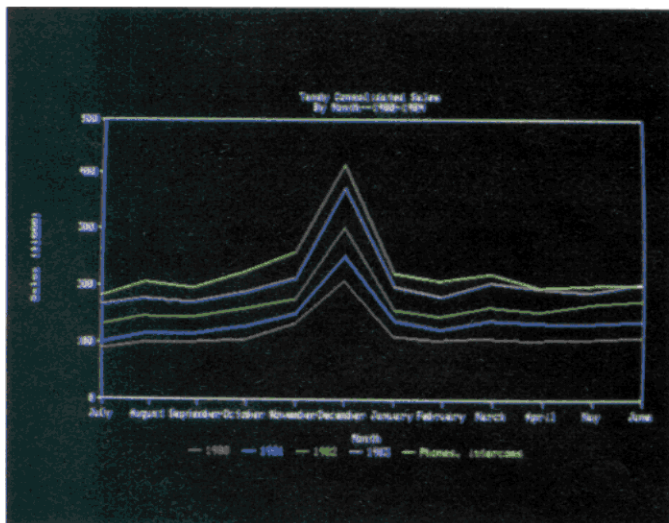


Figure. Tandy's monthly sales since 1980.

pany sold more computers, but the increase in volume didn't offset earnings lost through lower prices.

The Model 100 is the latest target of Tandy price-slashing. Tandy's advertised Christmas sale prices of \$399 (8K) and \$599 (24K) are now the 100's regular prices. The arrival of Tandy's new briefcase computer, the Tandy 200, on the scene puts the Model 100's future in doubt.

Tandy's director of market planning, Ed Juge, told *80 Micro* consumer acceptance of the 100 didn't live up to expectations. Juge said the Christmas price cut was a planned promotion that had been in the works since January 1984.

Tandy's first portable computer is still an appealing buy. The newer Model 200 has a larger screen and Multiplan as firmware, but the 24K Model 100 has the same amount of memory and costs \$400 less.

Tandy's setting up a training ground in New York for users of its 1200 HD

IBM-compatible computer. Digital Controls Inc. of Norcross, GA, has the job of establishing the experimental learning center.

Dick Cain, Tandy's director of computer training, told *ComputerWorld*, "We have trained 200,000 consumers in the last year. We're not fooling ourselves that standup training is the only way to do it. Digital Controls is an enhancement of our programs."

Digital Controls uses a training system that interfaces a laser disk system with a video monitor hooked into the Tandy 1200. Initially, the course costs \$50.

The Tandy 1200 program will use Digital Controls' already developed IBM PC courseware, supplemented with training in seven business programs, including Lotus 1-2-3, MultiMate, Multiplan, Wordstar, and dBase II. Now that Tandy sells Framework and Symphony through Radio Shack Computer Centers, Digital Controls will develop programs for those products as well. Training time for the packages varies from two to twelve hours.

MicroTrends

Backers of micro networking continue to battle it out with multiuser system advocates for the hearts and minds of the business computer buyer. At the Data Processing Management Association's annual meeting last November, Tandy's John Roach helped make the case for networking.

Roach, quoted in *ComputerWorld*, said that although multiuser systems have their advantages, microcomputer

makers are adding features such as graphics that make micro networks more appealing. "Dumb terminals don't support graphics," said Roach, "and users are beginning to expect graphics oriented systems."

According to Roach, price is becoming less of a factor in the choice between networks and multiuser systems. "The cost of microcomputers is approaching the cost of dumb terminals. That will reduce the multiuser advantage."

Tandy, of course, has a stake in the acceptance of micros as an alternative to dumb terminals. Roach advised data processing managers not to wait for the perfect system, but to look for a system that can be expanded to integrate new technologies as they emerge.

What are business users running on their multiuser systems? Data bases, according to Van Chandler, Tandy's director of computer and software merchandising.

Chandler, in an article in November's *Software News*, said, "Few people have recognized how fast the Unix and multiuser marketplace is growing... We sell well over 75 percent of Xenix systems [Model 16B] with data bases. Less than half of these also purchase word processing."

According to Chandler, data base sales have increased five times over what they were a year ago, and multiuser systems account for most of these sales at Radio Shack Computer Centers.

Chandler sees "not much awareness" by software developers of the growing demand for multiuser micro data base management systems. He says easy access and easy screen modification are more important in this market than special program features.

The computer magazine market isn't exactly robust just now, but that's not stopping Lotus Development Corp. from launching a new kind of computer journal: a monthly software magazine for Lotus 1-2-3 and Symphony users.

The magazine, called *Lotus*, is scheduled to debut this May. For six months, Lotus will offer the magazine free to 300,000 Lotus customers; after that, the annual subscription rate is \$18.

Although Tandy has already indicated it will support MS-Windows, it might also support Gem.

Tandy computer owners who use Lotus software won't find *Lotus* at their local Radio Shack Computer Center because Tandy doesn't distribute other companies' products without sales agreements. The magazine will be distributed through other computer retailers and by subscription.

The number of computer specialty stores could double by the end of the decade, according to Future Computing. Right now, about 3,700 U.S. retailers, including 475 Radio Shack Computer Centers, specialize in computers. In a report titled "Computer Stores, USA," Future Computing predicts that number will rise to 7,200 by 1989.

Almost half of the nation's computer stores are located in the 21 largest metropolitan areas. In those 21 markets, 41 percent of the stores are independents, 23 percent are franchises, 21 percent are manufacturer-owned chains, and 14 percent company-owned.

Radio Shack Computer Centers rank second in number of outlets, behind Computerland's 509 stores. But the report notes that Tandy's 675 Radio Shack electronics stores also carry Radio Shack computers. The Table lists the top 10 computer store chains.

Chain	Number of Outlets
Computerland	509
Radio Shack Computer Center	475*
Entre Computer Center	151
Valcom Computer Center	108
Team Electronics	84
IBM Product Center	83
Heathkit Electronic Center	65
Sears Business Systems Center	60
Control Data Business Center	60
MicroAge Computer Store	53

* Radio Shack also has 675 electronics stores that carry its computer line.

Table. Top 10 computer store chains.

Way back in June 1984, Microsoft Corp. said its MS-Windows program would be released by the end of August. August came and went, and Microsoft moved the release date back to mid-November. In mid-October, 80 *Micro* got word that MS-Windows would once again miss its target date and that the product may not be on the shelves or in applications from other vendors until June 1985.

Granted, MS-Windows is an ambitious project, originally described as a graphics-rich universal operating environment using pull-down menus, rubberbanding, and animation. But it's hard to keep up high expectations about a product whose release is delayed time and time again, even after promised introduction dates.

Update

Microsoft and Digital Research, old rivals in the operating system game, are eyeball-to-eyeball once again. Digital's new Gem environment could pose a direct challenge to Microsoft's long-time-no-see Windows program. Gem (graphics environment manager) is a Macintosh-like windowing program due for release in the first quarter of 1985.

Although Tandy has already indicated it will support MS-Windows, it might also support Gem for its MS-DOS computers, according to Ed Juge.

Digital Research says Gem software will run on any MS-DOS based machine equipped with 256K of RAM, two disk drives, a bit-mapped display, a mouse, and MS-DOS 2.0 or a later version. Digital expects all existing MS-DOS software to run under the Gem operating system.

Just what we all need: more software. According to a survey of exhibitors planning to attend the March Info/Software 85 show in Chicago, more software will be introduced in 1985 than in 1983 or 1984.

Thirteen percent of the companies responding to the survey said they'll release substantially more software in 1985 than in the previous two years. Fifty-three percent said they'll introduce "somewhat more" software. Twenty-eight percent plan no increase, while six percent said they'll introduce fewer programs this year. ■

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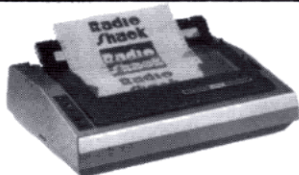
Model 100 8K \$339
Model 100 24K \$510



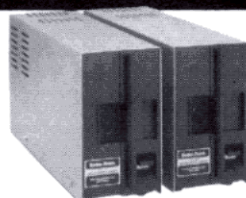
Color Computer II
w/16K Ext. Basic \$135
w/64K Ext. Basic \$179



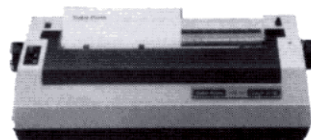
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Radio Shack DC Modem 2212	315

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Wanted: Model 1000 Patches and Tips

In our June 1985 issue, we will publish a feature article detailing patches and hints for the Model 1000. If you have an idea you'd like to submit for possible publication, put it on the Tandy 1000 SIG of 80 Micro's bulletin board (603-924-6985). The UART parameters are 300 baud, 7-bit words, 1 stop bit, and even parity. Alternatively, you can send your ideas to Dave Rowell, 80 Micro, 80 Pine St., Peterborough, NH 03458. We will pay \$25 for each one published.

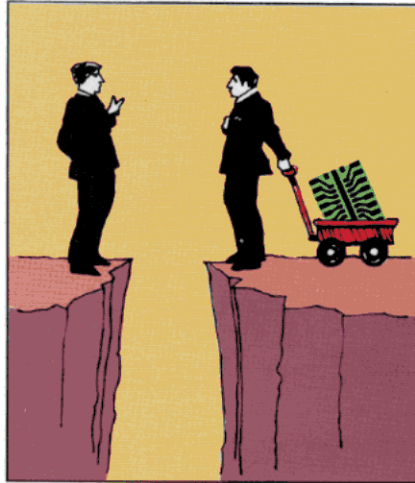
Project 80

Roger C. Alford's hardware column, Project 80, does not appear in this issue. We will publish his two-part CMOS single-board computer project in its entirety next month.

Color Coordination

I have a Model 2000 with the high-resolution color monitor and graphics chip kit. I've read that the Model 2000 screen display is slow when using Basic. One solution is to hit the F12 key during the keyboard scan when you boot up your system. This method, however, inhibits your graphics capabilities. Here's an alternate that gives you both the fast screen display and graphics: First, boot up your system, call Basic, and then hit the F10 key (screen 0,0,0). This puts the computer in the text mode with color disabled. If you want graphics capabilities, use the correct screen command and then return to your text with the F10 key.

Richard R. Hensel
542 Adams Lane
Delaware, OH 43015



Easy Conversion

Alan Cirkovic's "Little Wonder" (December 1984, p. 72) works on the Models 1000, 1200, and 2000 when you incorporate the changes shown in the Program Listing. Also, to scan through the file one record at a time on the 1000, 1200, or 2000 use the plus (+) and minus (-) keys instead of the arrow keys.

—Eds.

More Dumping

These alterations adapt Skip Murrow's DMP 400 screen dump (Tidbit #7, June 1984, p. 143) and Mark Rife's modifications (Reader Exchange, October 1984, p. 129) to run on the Gemini-10X printer. First, change lines 6020 and 6260 to read:

```
6020 LPRINT CHR$(27)CHR$(65)CHR$(6)
      'Adjusts line feed spacing
6260 LPRINT CHR$(12) 'Form feed
```

Now add the following lines:

```
6022 LPRINT CHR$(27)CHR$(71) 'Double
      strike
6024 LPRINT CHR$(27)CHR$(85)CHR$(1)
      'Uni-direction
6262 LPRINT CHR$(27)CHR$(64) 'Re-
      initialize printer to original setting.
```

I chose the double strike and unidirectional codes because they give you a sharper printout.

Dan E. Stich
R.F.D. 1 Box 445
Pittsburg, NH 03592

Reader Assistance

Does anyone have a patch for Model III SuperScript that will let me use the full 80 tracks on drive zero? I converted SuperScript to an 80-track drive and put all of the Electric Webster dictionaries on the same disk. Although everything fits onto the disk, I get the message "No room left on diskette" when I try to open the document.

Jerel Peterson
Box 182
Cando, ND 58324

Error Trap

The Program Listing in the final Pascalcutions column (December 1984, p. 148) is incomplete as published. For a copy of this missing section (EVAL), write to Reader Exchange, c/o 80 Micro, 80 Pine St., Peterborough, NH 03458.

—Eds.

Program Listing. To make "Little Wonder" run on the Models 1000, 1200, and 2000, modify it as shown here.

```
10 KEY OFF: CLEAR 200:CLS:PRINT STRING$(63,""):PRINT:PRINT
80 MD$="B" ' highest drive number
85 DF$="B" ' default drive for files
380 IF YC=3 THEN CLS:INPUT "WHICH DRIVE";D$:IF D$>MD$ THEN 210 ELSE Q$=D$+":":PI
LES Q$:FOR X=1 TO 15000:NEXT:GOTO 210
520 IF INSTR(FL$,":")>0 THEN DNS=LEFT$(FL$,1): FL$=RIGHT$(FL$,LEN(FL$)-2):ELSE
      DNS=DFS
530 IF INSTR(FL$,".")=0 THEN FL$=FL$+".DTA"
540 FL$=DNS+":"+FL$
2020 OPEN FL$ FOR INPUT AS #1
3140 IF I$=CHR$(45) OR I$=CHR$(95) THEN Y=Y-1:IF Y<1 THEN Y=1
3150 IF I$=CHR$(43) OR I$=CHR$(61) THEN Y=Y+1
6050 OPEN FL$ FOR OUTPUT AS #1
```

End



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To properly install the 13 patches in Andy Levinson's "Patch Work" (January 1985, p. 112), insert one space before the asterisk and one space after the number following the asterisk.

—Eds.

Errors in J. C. Sprott's utility, "The Missing Disassembler" (October 1984, p. 108) generate incorrect Z80 mnemonic code. First, to correctly decode the two byte instructions, change line 360 to read:

```
360 IF J=203 AND J1>63 THEN A(J)=
    A3(INT(J1/64)):
    B=RIGHT$(STR$(J1 AND 56/8),1)+ ","
    + B1(J1 AND 7)
```

Second, the operand, "A," for the SBC opcodes is missing and the memory refresh register instructions (LD R,A and LD A,R) aren't included. I added the following lines:

```
145 FOR I=152 TO 159: B(I)= "A, "B1 (I
    AND 7): NEXT
935 IF J1=79 THEN A(J)= "LD": B(J)=
    "R,A"
1005 IF J1=95 THEN A(J)= "LD": B(J)=
    "A,R"
```

Also, change the first 30H in line 490 to 20H and OURIR in line 510 to OTIR. I added the statement ELSE F=F+ "." to line 330 to show the conventional format for nondisplayable ASCII characters.

Ken Wodtke
1913 Cervato Dr.
Camarillo, CA 93010

Here are our solutions to the problems you might encounter with "Scripts Extras" (August 1984, p. 68). First, if you get the response "File access denied due to password protection" when you try to use Debug, use a general file program that unprotects the Scripts file. We use NEWDOS80 to avoid password restriction problems.

In addition, the problem with printing occurs because the area chosen for storing the translation table isn't an unused memory area in your Scriptsit. Instead, the print function uses this area. The solution to this problem is to change the table's location; the first 2 bytes in the program are an ideal place. First, relocate the table to the

new address (hex 5202 or 5303 depending on your version) and make the following substitutions:

Replace

```
434F 5059 5249 4748 5420 3139 3739 20425920
5241 4449 4F20
```

```
5348 4143
```

with

```
9B1B 9C1C 9D1F 315B 325C 335C 345E 355F
3660 387C 397D
307E 3A7F
```

Finally, replace the old table address of 7AD8 with either 5202 or 5203. Newcode 1 should read: E5 06 0E 21 02 52 (or 53). Good luck with your updates.

Richard W. Harrison and
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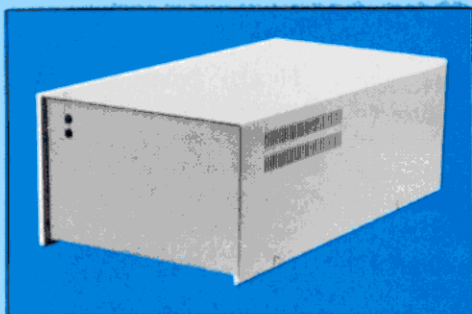


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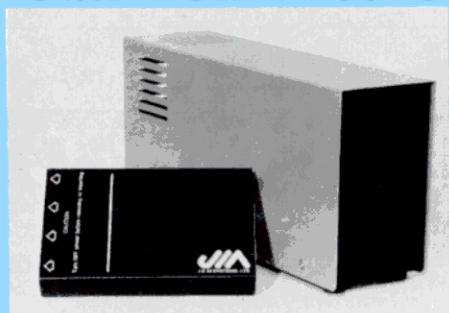
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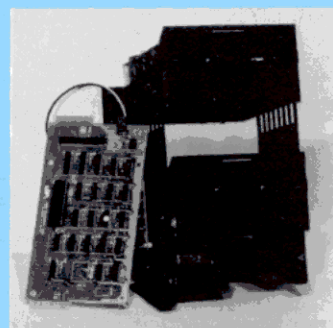


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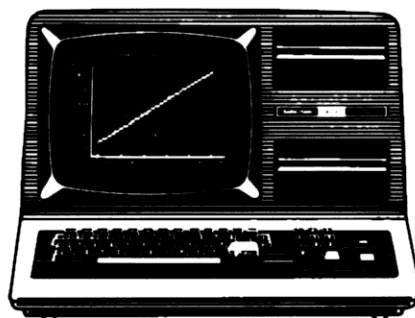
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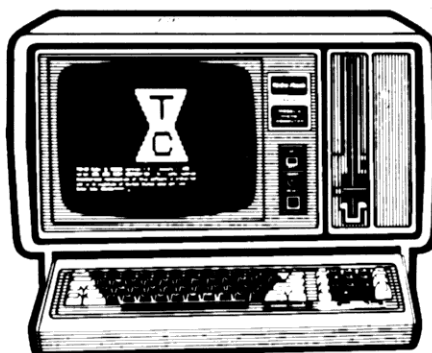
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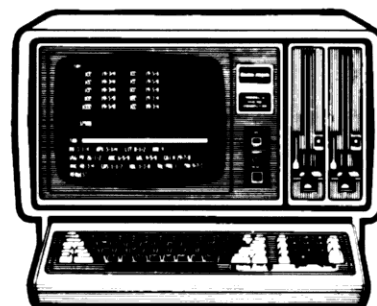
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Through the Looking Glass: The Tandy 1200 HD

by Bradford N. Dixon

Tandy's newest effort in the MS-DOS world is, in their words, a "mirror image" of IBM's hard-disk PC/XT. But the Tandy 1200 HD offers one big advantage: a \$2,999 price tag, compared with \$4,395 for the IBM. Functionally, the 1200 is as compatible with the PC/XT as you can get. And with the money you save from the lower price, you can afford some of the software you'll want to run on the machine.

Product Specifications

Like the PC/XT, the Tandy 1200 is built around Intel's 16-/8-bit 8088 microprocessor (see Photo 1). The detachable keyboard is lighter than the PC/XT's and it's approximately 17¼ inches wide, 7¾ inches deep, and 1½ inches high. The system unit itself measures about 19 by 15½ by 5¾ inches.

The Tandy 1200 comes with 256K RAM standard, expandable to 640K with additional memory boards. One 5¼-inch floppy drive acts as drive A on the machine, while the 10-megabyte, 5¼-inch fixed disk is configured as drive C. The 84-key keyboard is in the familiar PC/XT style and its softer feel reminds me of the Tandy 2000 keyboard.

A parallel printer port comes standard, as do the plug-in disk controllers for the floppy and hard disk drives. While the 1200 provides five expansion slots, only three accommodate add-on cards; Tandy uses the other two for the disk controllers and the optional (but necessary) monochrome or color graphics card with a video

edited by Ryan Davis-Wright



Photo 1. The Tandy 1200 HD.

port. The color graphics card (catalog number 25-3043, \$299) supports both the monochrome and color graphics capabilities of the machine, while the monochrome board (catalog number 25-3040, \$219) supports only a monochrome monitor.

Unlike Tandy's other computers, the 1200 comes with no operating system or Basic. You have to buy MS-DOS and GW-Basic as a separate package (catalog number 25-3130, \$89.95). This seems to underscore Tandy's philosophy that the 1200 isn't aimed at the diehard programmer; rather, Tandy targeted the 1200 for a business environment where the user has little need to learn MS-DOS or Basic.

Setting Up the Machine

The 1200's inside and outside appearance is similar to the PC/XT's, the

Tandy logo being the most noticeable difference. The front of the machine features the 10-megabyte hard drive on the right, with the floppy drive to its left.

The on/off switch is on the right side of the rear panel. The back of the system also holds the power connector, power supply fan, speaker vent, keyboard connector, and five expansion slots.

When you begin configuring the 1200, you may have to open the machine to set the DIP switches for the amount of RAM and the color monitor. All you have to do is remove four screws on the back to slide off the cover.

Since the unit doesn't come with a monochrome or color card, you have to install one. The layout inside the machine is uncluttered and there's ample

room to get at the DIP switches (see Photo 2).

After inserting a color or monochrome graphics card and connecting the 1200 to a monitor, you're ready to set up the system. The Tandy 1200 MS-DOS disk you buy to use the machine contains the LLDFFMT (low-level, fixed-disk formatting) utility, the first step in formatting the hard disk to run as a system and data disk. While the entire process of formatting the fixed disk takes an hour, you only have to do it once.

After formatting the hard drive, move the MS-DOS operating system and system files to it and configure the machine to boot directly from the drive when you turn the power on. All the instructions for formatting and configuring the hard drive are listed in an easy-to-follow form in the com-

puter's instruction booklet.

The booklet is easy to understand, and it gives you the information you need to get the system up and running. It also gives you an overview of the MS-DOS commands you'll use most often. The booklet contains only four chapters: Turning It On, Telling The DOS What To Do, Turning It Off, and Options. The appendixes at the end of the booklet augment the information in each chapter.

Compatibility and Things to Watch

Tandy claims that all PC/XT add-on cards fit and function in the 1200. During the review of the 1200, I used an IBM color graphics card and an IBM RS-232 card without a hitch.

Tandy also promised software compatibility and I found only a few programs that didn't work on the 1200: Prosoft's Dotwriter and Muse Software's Castle Wolfenstein.

All in all, the 1200 performed just as expected from both a hardware and software standpoint. However, you'll want to be aware of a few quirks in using the system. If it doesn't respond to your color or monochrome monitor, make sure the internal DIP switches are firmly set. When I got my 1200, it was supposed to be configured for a color monitor. But the system didn't work until I put the DIP switches in the proper positions.

Tandy's version of MS-DOS takes 10K more RAM than the PC/XT op-

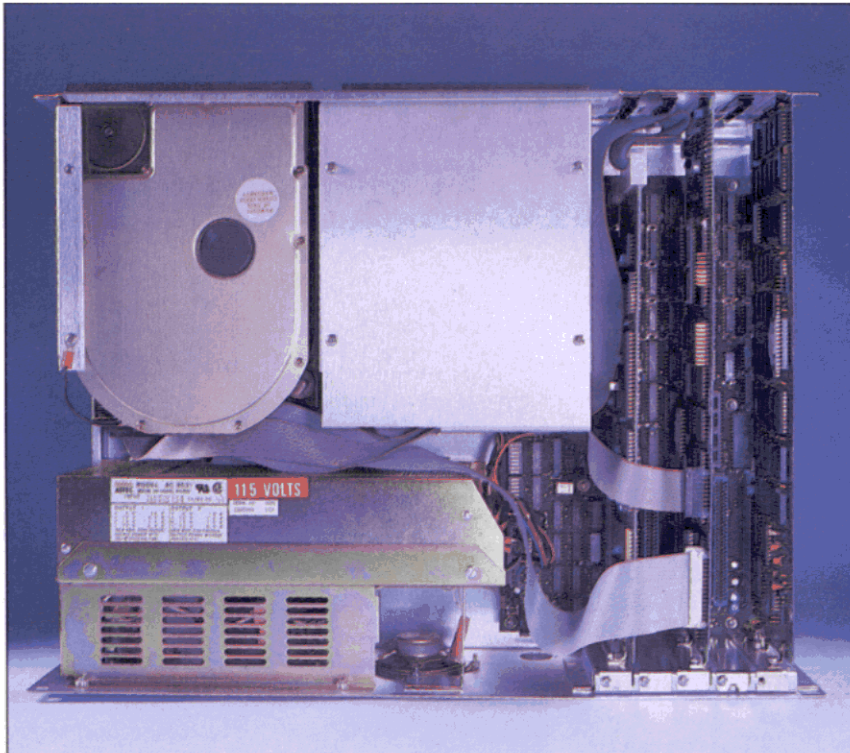


Photo 2. A look inside the Tandy 1200.

erating system, so you have less memory available to store and manipulate data in spreadsheet programs.

Some DOS commands familiar to XT users may not work on the 1200 until you install ANSI.SYS with the operating system. ANSI.SYS is already incorporated onto the IBM system, but you have to activate it on the Tandy 1200 before you can call commands like CLS from the DOS prompt. Another idiosyncrasy that both PC-DOS and Tandy's MS-DOS exhibit is an inability to call MODE from a subdirectory unless you first invoke the Path command.

The Norton Utilities disk diagnostic package (a Super Utility program for the PC family) didn't come up in color as it does on the XT, but the program worked properly except when examining the hard disk. Since the 1200's hard disk is configured differently from the PC/XT's, version 2.0 of the Norton Utilities won't check it, but 3.0 will.

I also noted some color incompatibility when I ran Infocom's interactive fiction games. While the games functioned properly, they apparently didn't recognize the 1200's color graphics board. As a result, the programs didn't ask if you're using a color or monochrome monitor.

Conclusion

The 1200 is an affordable alternative to the IBM PC/XT. Tandy promises that it runs almost all PC/XT ware and accepts IBM option cards. All this for \$1,400 less than the Big Blue machine.

The Tandy 1200 may not make a big dent in the corporate market, which IBM dominates, but it's a quality choice that will help Tandy reposition itself near the front of the business micro market. ■

The 1200 HD: Notes from a Model 4 User

by David A. Williams

Why did this dedicated Model 4 user buy an IBM clone? For one reason only: To enter the mainstream of the computer field.

I really like the Model 4 and think it one of the most underrated computers around. But Big Blue has spoken and you'd have to be deaf not to hear the message. In fact, the company I work for has a variety of computers (including Model 4's) but, by company policy, any new computer must be IBM-compatible. So, I'm trying to learn a new system and it's not easy.

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As I write this, little technical information is available on the 1200. Radio Shack store and Computer Center employees don't know much about it, at least in my area. And Tandy has yet to publish any specifications on it.

The 1200 is certainly a more difficult system to buy than the Model 4, where all you have to do is take it home, plug it in, and you're off. With the 1200, you have to make all these decisions: Monochrome or color monitor? How much memory? RS-232 port? Expansion boards?

As if the initial decision-making weren't enough, a huge aftermarket of IBM-compatible hardware accessories exists. You don't even have to buy Tandy. You can choose from dozens of display adaptors, memory expansion cards, multipurpose expansion boards, graphics cards, and other add-ons available from many different suppliers, including mail-order discount houses.

Tandy says it will stock third-party accessories, but apparently will charge list price for what is heavily discounted elsewhere. One Computer Center was pushing the Tecmar Captain, a multipurpose memory expansion board with 384K of RAM, serial and parallel interfaces, a real-time clock, and utility software for \$795. I've seen it advertised for under \$600 at mail-order houses.

The Machine

The first thing I noticed about the 1200 was the statement on the carton: "Custom-made in the USA for Tandy." Reportedly, Tandon, the company famous for its floppy and hard disk drives, makes the system unit. The machine looks good even though it's pretty heavy. And its thick-painted steel cabinet appears to be durable.

The mirror image falls a bit short when it comes to the expansion slots, however: The 1200 has only five compared to the XT's eight. Three of these are reserved for the disk controllers and the monitor adapter card, which you have to install before you turn on the machine. Consequently, you may need multifunction expansion boards if you want to add many features. (The processor board has a socket for an 8087 math coprocessor chip.)

The 1200's start-up is a little difficult because of the hard disk initialization, but the manual explains

COUNTERPOINT

There's a fine line between inexpensive and cheap. At first glance, I thought the 1200 overstepped that line. My test model had gobs of epoxy holding the hard disk cables to the controller board, awkward DIP switches (I tried one setting that made everything work fine, except that I couldn't format floppy disks), and a case screwed shut so tightly that I needed the Jaws of Life to put in the display adapter.

Since then, however, I've fallen in love with the 1200. It works like a charm, running every piece of non-graphics software I've tried (I use the basic monochrome adapter and monitor). It has such swift and spacious Winchester storage that I'll hate to give it up and go back to floppies.

The keyboard is responsive and an excellent improvement on the IBM standard. I would gladly pick the economical VM-3 monitor over the CM-2 color display, since it has much sharper text.

Most of all, Tandy's price sweeps away objections as it sweeps away competitors. While it's a crime to charge extra for DOS and it's sad that Tandy has signed a death warrant on the Model 2000, the 1200 is simply too good a deal to pass up.

—Eric Grevstad

I use an IBM PC more than any other computer. Except for the 10 megabyte hard drive, I don't see that much difference between the PC and the 1200. The styling and colors are similar, and both machines have five 13-inch expansion slots. Since they're so alike, any comparison comes down to picking nits.

Like most PC clones, the 1200 has an improved keyboard layout. You can reach the shift and return keys, and red LEDs indicate when you've engaged the Caps and Num Lock keys. The keyboard doesn't clack annoyingly like the PC's but it's mushier and slower.

Mass storage is always impressive. The hard drive is quick and quiet once you format it. But formatting takes an hour and the instructions don't always follow the actual screen

displays. The hard drive utilities, specific for the non-IBM format, work just fine.

Judging from a few sessions, the 1200 is highly PC compatible. Most of my regular programs worked normally: WordStar, VisiCalc, Think-tank, Gato. The Norton Utilities (highly regarded MS-DOS utilities) generally worked fine, except the hard drive utilities in version 2.0 didn't recognize Tandy's hard disk format. Then new version (3.0) had no problems. But Sorcerer didn't come up in color and Castle Wolfenstein quickly bombed.

The 1200 is nice, especially considering its price. While I don't trust it yet (I want to look at it some more and try other PC software), I think the 1200 will eventually prove its worth.

—Dave Rowell

My first impressions of the Tandy 1200 were mixed. I've been using a Model 2000 for a year, so it seemed as if the 1200 were a step backward. But I was intrigued with its low cost.

I found the Tandy 1200 mostly identical with the IBM PC/XT. The degree of compatibility Tandy incorporated into the machine is impressive. In terms of software, the 1200 ran as an IBM PC/XT, quite a feat when you consider that the IBM PC/XT depends heavily on its ROM code.

Setting up 1200's hard disk is more complex than on the Tandy 2000. The hard disk formatting and initialization routines require about an hour to run and you must run the low-level format routine twice. Then you have to format and partition the disk as the final step.

In conclusion, I saw little difference between the Tandy 1200 and the IBM PC/XT in hardware, firmware, or software. The most startling differences are those perceived by a regular Tandy 2000 user. The difference in performance between the two machines is overwhelming. While the 2000 is in another league, Tandy will probably sell a lot more 1200s.

—John B. Harrell III

everything clearly. Even first-time computer users should have little trouble. Don't ignore the errata sheets because they contain information on the start-up.

A diagnostic program that checks the processor and memory runs every time you turn on the computer. A message on the display tells you how much memory you've installed. If the hard disk contains the DOS, it will boot automatically and prompt you for the date and time.

The keyboard has a metal base with a plastic cover, and follows the general layout used in other PC compatibles. Model 4 owners may be overwhelmed just by the number of keys. Many of the symbols are in different positions and the Model 4 lacks several of them. If a PC industry standard exists, the 1200's keyboard comes close to it.

Tandy integrated the arrow keys on the keypad with the number keys in a diamond arrangement. You use the "Num Lock" key to toggle between the keypad's numbers or arrows. This key and the Caps Lock key have an illuminated indicator to tell you what mode they're in.

Tandy offers both monochrome (\$219) and color monitors (\$549.95), with the necessary adapter cards (\$219 and \$299, respectively). The color adapter provides high-resolution graphics when used with the monochrome monitor and adapter.

If you do a lot of word processing or spreadsheet work, you'll want the monochrome monitor. From my own experience, the color monitor/adaptor doesn't have sufficient resolution for long-term use for those types of applications.

If you do buy the Tandy monochrome monitor, make sure it's the VM-3 (catalog number 25-3010). It's the only one compatible with the adapter card. It features green letters on a black background and a non-glare screen. The contrast and brightness controls are on the front panel. While the VM-3 can display dual intensities, it's difficult to distinguish between them if you set the contrast control too high.

Nothing in the literature indicates the 1200's pixel resolution. The display is sharper than the Model 4's, with the characters more delicately formed and the individual dots less noticeable. This makes for a flicker-

free display, but data tends to smear when you scroll it.

MS-DOS vs. TRSDOS

For an extra \$89.95, you get the MS-DOS 2.11 operating system and GW-Basic. My first impression is that MS-DOS will be easier to learn than TRSDOS 6.X. Redirecting the input and output seems more simple. For example, "Copy CON file name" directs output from the keyboard (console) to a disk file while simultaneously displaying it on the screen. Batch processing, which corresponds to the Model 4's job control language, is also easier. The DOS Print command automatically invokes a spooler without the process TRSDOS involves.

On the other hand, there is no Forms/FLT, KSM/FLT, or Memdisk. But with a hard disk, you don't really need the last.

MS-DOS includes a line editor, but it seems a little awkward to use. Perhaps this will change with experience. I have yet to find one I like as well as the one that comes with the Model 4 Assembly Language Development System. There is a Debug utility that has some pluses and minuses compared to the one with TRSDOS. The Debug includes a disassembler that can be run from within.

While GW-Basic has more statements and functions than Model 4 Basic, many of these have to do with graphics. And, of course, you have to have a graphics card to use them. Both a line and screen editor are provided within Basic for program generation and editing.

Documentation

At this point, I can only rate the documentation as fair. The DOS and Basic manuals are supplied in 9-inch, three-ring binders, but neither has an index. This is especially difficult to understand, since other MS-DOS manuals nearly identical in content and organization have them. I've already wasted a lot of time looking around for things.

The overall DOS description is better than TRSDOS, but with fewer examples illustrating the commands. There is no data that would be needed by Assembly-language programmers, but perhaps this will come. Something similar to the Model 4 Technical Reference Manual is needed.

The Bottom Line

I like this machine and I'm looking forward to using it. I finally feel like I'm part of the real world of computers. It's nice to read software and hardware reviews without feeling left out. While I wish I had the performance of the Tandy 2000, the Tandy 1200 has the degree of compatibility I need. ■

CP/M 2.2 Revisited

by John B. Harrell III

Montezuma Micro has significantly improved its version of CP/M since I last reviewed it (March 1984, p. 94), particularly in terms of hard disk support. The new version is available as a \$15 upgrade to previous Montezuma Micro CP/M owners. You receive Montezuma's revamped documentation, a disk with the upgraded CP/M system on it, and a second disk with the hard disk drivers.

New System Features

The first surprise you notice when you boot up the disk is the banner. Jesse Bob Overholt (of The Alternate Source fame) has overhauled CP/M's Basic input/output system (BIOS), the operating system's nucleus. In addition,

Continued on p. 113

CP/M 2.2 version 2.2



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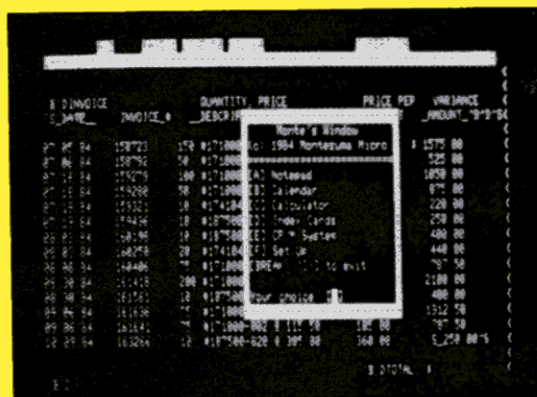
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That Sinking Feeling

Few things bring out a computer user's latent hostility like a disk error message. It's irritating enough that you can't complete your operation, but to add insult to injury, you'll often find the message incomprehensible; you're still left wondering what went wrong.

This article will help you make sense out of cryptic error messages like "GAT read error" and "CRC error during disk I/O." It'll also outline ways to repair disks and prevent disk errors. First, however, you need to know something about a floppy disk's structure.

The Disk Dissected

While it might appear that the only thing recorded on a floppy disk is the data you write to it, your disk operating system (DOS) formats disks with a boot sector, a directory of your files, and other information to guide the disk's controller hardware.

Most TRS-80 operating systems format disks with 40 tracks of data, each track consisting of 18 256-byte sectors.

The boot sector is the disk's first sector; the computer reads this sector first when you boot up the disk. On a system disk, the program contained in this sector bootstraps, that is, it loads the remainder of the DOS into RAM. On a nonsystem disk, the boot program displays an error message, indicating that the disk lacks a DOS bootstrap.

Usually, the DOS devotes an entire track to the disk's directory, which tells the DOS where to locate your files.

But each track on a disk contains more than just data. Your disk controller hardware requires additional information so that it can locate each sector on a track and verify that the DOS has read the data contents of that sector correctly.

The small hole near the disk's center is called the index marker. It enables the disk controller to find the beginning of each track. From there, the controller uses data stored on the track to locate each of the track's 18 sectors. Your DOS writes this data to a disk during formatting.

Each disk sector has four parts: a type III gap, an identification (ID) field, a type II gap, and a data field (see the Fig.). The type III gap separates the ID field from the previous sector's data field, and the type II gap separates the ID field from the next data field.

The ID field contains all the identifying data for the sector. Its first byte, called the ID address mark, tells the disk controller that an ID follows. The second, third, and fourth bytes contain the disk track number, side number (for double-sided disks), and sector number. The fifth byte contains a code that determines the sector's length.

The ID field's sixth and seventh bytes contain its CRC, or cyclic redundancy check, characters (I'll explain CRCs a little later).

The data field is the part of the sector you're most familiar with. Its first byte, called the data address mark, tells the controller that data follows. The next

256 bytes contain data, and two CRC characters follow the data.

TRSDOS 1.3 numbers sectors from 1-18, but it increments the numbers by 3. Therefore, consecutive sectors are numbered 1, 4, 7, and so on up to 18. Sector 2 follows sector 16; sector 3 follows sector 17. This gives the software enough time to access the next-higher-numbered sector before the disk has revolved past it.

TRSDOS 6.1 carries this further by numbering sectors in increments of 6, starting with zero and ending at 17 on track zero. For each successive track, the starting sector's number changes, so that identically numbered sectors aren't adjacent. This provides better performance, but it means that TRSDOS 1.3-formatted disks aren't compatible with TRSDOS 6.1 disks.

Seeing for Yourself

To see exactly what TRSDOS 1.3 writes to a track during the formatting process, try the following patch:

```
PATCH *7 (ADD = 5CF3, FIND = 3E, CHG = F7)
```

Then format a blank disk in drive 1. After you enter the disk's name and password, the patch puts you in Debug. The DOS will write the contents of memory locations 6200-7D61 hexadecimal (hex) to the disk's first track. Locations 6100-61FF hex contain the granule allocation table (GAT) sector, and locations 5F00-5FFF hex contain the hash index table (HIT) sector.

DOS linguist Douglas Payne translates disk error messages and tells you how to correct and prevent them.



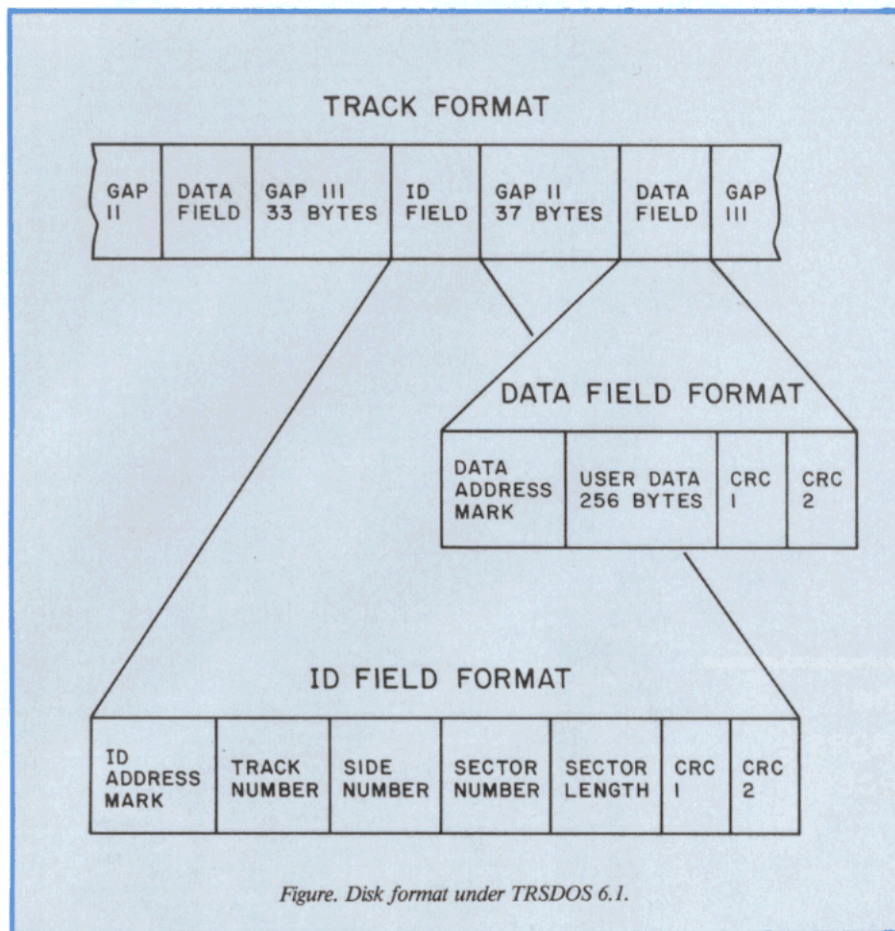


Figure. Disk format under TRSDOS 6.1.

Once you've displayed these locations, make sure you use the Q command to exit Debug without continuing the format. Reverse the patch to restore the format command:

PATCH *7 (ADD = 5CF3, FIND = F7, CHG = 3E)

To do the same thing under TRSDOS 6.1, format a blank disk, and when formatting is complete, enter Debug with the Debug (EXT) command. You can use the D command to display memory. Memory locations 2F00-4745 hex hold the contents of the last track written.

The CRC Factor

A cyclic redundancy check verifies that the data the DOS reads from a disk is the same as the data recorded in the first place. Each time the computer writes an ID field or sector of data, the disk controller computes a CRC using a complex algorithm. The CRC calculation includes every byte of data from the address mark up to, but not including, the CRC itself.

When the DOS reads a sector of data, the controller again computes the CRC and compares it to the CRC stored on the disk. If the two values don't match, the controller sets an error bit in its status register, which the disk in-

put/output (I/O) software checks. The algorithm is accurate enough to detect almost all errors.

Error Messages Decoded

Since TRSDOS 1.3 and 6.1 have different error messages, I'll deal with TRSDOS 6.1's messages and describe the corresponding messages for TRSDOS 1.3. Other standard DOS messages might differ slightly, but they will essentially mean the same thing.

- **Seek error during read.** The disk controller seeks a track by positioning the read/write head at that track. The controller reads the first ID field it finds on the track. If the ID field's track number isn't that of the track the controller is seeking, and the ID field's CRC is correct, the controller sets a status bit indicating a seek error. If the CRC is bad, the controller keeps trying to find an ID field with a good CRC. If it finds none within four drive revolutions, it sets a CRC error status.

Seek errors usually mean that the disk drive hardware has malfunctioned. However, if the disk has a bad track with no valid ID fields, a seek error can also occur. To determine which problem is causing the error, try another disk. If the seek error persists, your drive needs re-alignment or other repairs.

TRSDOS 1.3 has no specific seek error. Under the circumstances described above, it would probably display the message "Disk drive hardware fault."

- **Lost data during read.** TRS-80 hardware and software use what's called programmed data transfer; the CPU must perform an I/O instruction to read or write each byte of data from disk. Since the disk revolves at a constant speed, the CPU must read or write each byte as soon as the controller requests it. If the byte isn't transferred before the next one becomes available, the controller sets a lost data status bit and terminates the I/O operation.

Lost data errors probably mean the disk is defective or the drive isn't turning at the right speed. If the error persists when you try another disk, it's time for drive maintenance.

TRSDOS 1.3 doesn't differentiate between lost data errors on reads and writes. In both cases its message is "Lost data during disk I/O."

- **Parity error during read** means a CRC error occurred while the DOS was reading a sector. The CRC error is in the data field, not the ID field.

CRC errors usually occur because data was read or written incorrectly. Occasionally, the CRC characters themselves can be incorrectly stored, also causing a CRC error.

TRSDOS 1.3 doesn't distinguish between CRC errors during data reads and writes; its corresponding error message is "CRC error during disk I/O."

- **Parity error during header read** indicates that a CRC error occurred while the controller was reading an ID field, trying to find the correct sector, rather than while it was reading a data field.

TRSDOS 1.3 displays the same error message it does for data field CRC errors, but uses a different error number.

- **Data record not found during write.** Before the DOS can read a specific sector of data from disk, it must inform the controller. The controller tries to locate the correct sector by reading the next ID field and comparing its track and sector numbers with those that the DOS requested. If it doesn't find a sector with the correct numbers within four disk revolutions, the controller sets the record-not-found status and terminates the operation.

System Requirements

**Model III or 4
One disk drive**

These errors usually mean the disk's ID field is bad.

The equivalent TRSDOS 1.3 message is "Disk sector not found."

- *Seek error during write* is the same as "Seek error during read," except that the error occurred before a write operation.

- *Lost data during write* corresponds to "Lost data during read," but for a write.

- *Parity error during write* means a CRC error occurred while the DOS was writing a sector to disk.

- *Data record not found during read.* Since the DOS writes the ID fields when it formats a disk, this error can occur for the same reasons as during a read.

- *Write fault on disk drive* tells you the controller has detected some kind of error while writing to disk. This indicates a hardware malfunction in the drive or the controller.

The corresponding TRSDOS 1.3 message is, "Write fault on disk I/O."

- *Directory read error, Directory write error.* These messages indicate that an error has occurred during I/O to the directory track. Try another disk to determine if the problem is in your hardware or the disk.

TRSDOS 1.3 uses the same messages.

- *GAT read error, GAT write error* mean an error has occurred during I/O to the granule allocation table, a special sector on the directory track containing information about the disk's sector allocation. The DOS uses the GAT to determine which sectors are available for a new disk file or for an extension to an existing file.

Both DOSes use the same messages.

- *HIT read error, HIT write error* indicate the disk controller detected an I/O error while reading or writing to the hash index table. This is another special sector on the directory track containing a 1-byte hash code representing each disk file's name. The DOS uses the HIT to locate a file's directory record, which is on another sector of the directory track.

Again, both DOSes use the same message for this error.

Other Error Messages

You've probably encountered other error messages during disk I/O. Most of them, such as "Illegal logical file number" or "Attempt to read past EOF" result from bugs in your program.

In a few cases, hardware may be at fault. For example, if you get an illegal drive number message when you try to access a disk under TRSDOS 6.1 and you're certain the drive contains a valid disk, something's wrong with your con-



troller or the drive. If TRSDOS 1.3 displays a "Disk drive not ready" message for no obvious reason, you probably have hardware problems.

Now What?

Once you know how to interpret your DOS's disk error messages, you can start troubleshooting. The first thing to do is determine whether the disk or your hardware is faulty.

Retry the operation on another disk—I always keep a couple of blank formatted disks on hand for such occasions. If the problem recurs, it's time to take your system to the repair shop. If the operation works without error, you have a bad disk.

Don't think you have to junk a disk because it's generating error messages. If you haven't already done so, buy a good disk utility program. Powersoft's Super Utility is one of the best; I'll go into its capabilities in some detail to demonstrate what you can do to repair a disk.

I'll discuss Super Utility 4/4P, which runs only on the Model 4/4P but can access most Model I or Model III disks. All the utilities I'll mention are also available in Super Utility Plus 3.2, which runs on the Models I and III, and on the Model 4 in Model III mode.

Repairing the Damage

Although Super Utility comprises dozens of utilities, I'll concentrate on those that help you diagnose and repair disk problems. The utilities are divided into seven groups: zap, purge, disk format, back-up, repair, memory, and file utilities.

- *Zap utilities* let you examine and alter a disk's contents by directly addressing the disk by track and sector. The Verify Sectors and Display Sectors options validate and display the data on any number of sectors. They're useful for finding exactly which sectors will cause errors, and identifying those errors.

The Copy Sectors option lets you copy a sector from one disk to another, meaning you can replace a bad sector with good data from another disk. The Read ID Address Marks option lets you quickly find errors in sector headers.

- *Purge utilities* are mainly for cleaning up disks, letting you remove files in a variety of ways and remove file passwords or system files.

- *Disk format utilities* include the Format Without Erase option, which lets you format a disk without losing data. Super Utility does this by reading the sectors on each track into memory before formatting them, then writing the sectors once it has formatted the track.



With this option you can sometimes recover data on a disk that gives periodic errors.

- **Back-up utilities** include a standard back-up function similar to the DOS's, and a special backup for disks with damaged formatting information.

- **Repair utilities** help you restore damaged disks. Since the Boot, GAT, and HIT sectors are accessed more than other sectors, they're the most susceptible to damage. As they're also the most important sectors, along with the directory, Super Utility provides utilities to repair each of these sectors.

The GAT repair option lets you repair the granule allocation table itself or the whole sector, which also contains the disk's name, password, creation date, and Auto command. Super Utility repairs the GAT by going through the directory to determine which granules are really in use.

The HIT repair option lets you reconstruct the entire HIT table. You can verify the GAT and HIT with the Check Directory option, which does a complete check of the disk's directory and lets you automatically correct any errors or inconsistencies it finds.

The Boot Sector option replaces the Boot sector on TRSDOS 2.3, 1.3, and 2.7 double density system disks only. For other DOSes, you have to use the Copy Sectors option in the zap package.

- **Memory utilities** let you examine and alter your system's memory; you can also search for a specific string of bytes

or characters in memory, read or write a byte to any I/O port, and read an entire track from disk into memory in order to examine it.

This last option lets you see exactly what's recorded on a disk. It reads and displays all the information on the track, including index fields, CRC characters, gaps, and address marks. If you don't change any of the track's formatting information you can even write the track back to disk using the format utilities' Write Format Track option.

- **File Utilities** are similar to zap utilities, except they're for files rather than disk sectors. Super Utility uses the directory information to find files, so you don't have to locate files yourself. You can display file sectors, copy files, display free space, and display file locations, among other things. The Sector Allocation option determines which file a particular sector belongs to.

The Disk Allocation option displays a map of the disk with information about each sector, whether or not it's in use, and whether or not it's locked out due to errors. This option corresponds to the standard DOS Free command. One option lets you compute any file name's hash code, another encodes and decodes passwords.

An Ounce of Prevention

Disk errors are no fun. They can cost you hours or even days of hard work. You can save yourself trouble by treating your disks with tender care. Don't

bend, staple, or paper-clip them; keep drinks away from them; don't expose them to electromagnetic fields (such as electric motors), and don't touch the exposed parts. Disks are extremely vulnerable to smoke and dust contamination—if they weren't, they probably wouldn't need CRC's.

Invest in some hard plastic disk cases. And above all, buy high-quality disks. If your system has double-density drives, don't buy single-density disks, even if your best friend does it all the time. The same holds true for double-sided drives: Buy disks rated for double-sided operation. Often, manufacturers test only one side of a single-sided disk for errors.

Give your drives the same consideration as your disks. If you don't have a disk drive cleaning kit, get one. Clean your drives once every month or two; cleaning too frequently can result in premature head wear.

If you want to know exactly how your drives are performing, buy a disk drive diagnostic utility. Simpler programs measure only your drive's rotational speed, while the really sophisticated ones can also check head alignment and index hole detector adjustment.

Further Reading

If you're interested in how your system's disk hardware works, see Radio Shack's Model III or Model 4 technical reference manual. Both models use Western Digital's WD1793-01 floppy disk controller chip. Western Digital's "WD179X-01 Floppy Disk Formatter/Controller Family" specification sheet contains more specific information on the controller's function than the technical manuals. *Inside Super Utility Plus 3.0/3.2* by Paul Wiener and Gary Camp, and *Super Utility+ Tech Manual* by Kim Watt, both available from Powersoft, are also excellent sources of information. ■

Douglas Payne works in the computing services department of the University of Waterloo. You can contact him at 58 Brendawood Crescent, Waterloo, Ontario N2J 4J5, Canada.

Related Articles

Hart, W.D. "Does FORMAT Get Your BACKUP?," January 1982, p. 217. Patch the Model I back-up utility so you can use glitched disks.

Meyer, Vincent E. "Drive Ways," September 1984, p. 43. Disk drive repair and preventive maintenance.

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Program Notes

The machine-language program Graph performs most of the graphics functions (see Program Listing 1, p. 50). Three Basic programs handle special functions: UTIL1/BAS (Program Listing 2, p. 83) draws circles, UTIL2/BAS (Program Listing 3, p. 83) displays a list of commands, and UTIL 3/BAS (Program Listing 4, p. 84) handles rotation and explosion effects. The machine-language programs Load/UTL (Program Listing 5, p. 85) and Save/UTL (Program Listing 6, p. 85) provide the interface between Graph and the Basic programs. A separate machine-language program, Display (Program Listing 7, p. 85), lets you view graphics from DOS level.

Once you assemble the programs and save them to disk, all you have to do is run Graph/CMD; this controls the whole package, calling the other routines or utilities as needed. When you run Graph, it displays a logo, then a clear white screen.

Image-Building

The arrow keys control drawing direction; the cursor, like a pencil point, marks your position on the screen. To move diagonally, combine two keys; for example, pressing the up- and the right-arrow keys moves the cursor northeast. To speed up the cursor, press the 1 key repeatedly until the cursor attains the speed you want. Pressing the 2 key slows down cursor movement. The cursor wraps around the screen; if

you move off the screen to the left, it reappears on the extreme right.

The M key selects a drawing mode, toggling between black and white pixels. For nondestructive cursor movement, press K. If you press K a second time, the cursor reverses each pixel it moves over; black pixels become white and vice versa.

To clear a screen to black, press C. Pressing W clears a screen to all-white. Pressing N reverses all video on the screen—Fig. 1 shows the Graph logo, Fig. 2 shows the same screen in reverse.

With the K option invoked for non-destructive cursor movement, you can make precise corrections. Place the cursor over the pixel you want to change and press the space bar; Graph reverses the pixel from white to black or from black to white.

For a gray or checkerboard background, press Q; doing so lights every other pixel on the screen. Pressing H or V creates a background of horizontal or vertical lines. H and V disrupt the display considerably; if you've put much work into a screen, it's best to save it before invoking them. While Q, H, and V don't erase the display, the random background command, R, does. It fills the screen with random graphics blocks.

To turn a screen display upside-down, press U. Press B for a backward or mirror-image display (see Fig. 3).

Graph draws lines automatically if you want it to. Position the cursor where you want the line to begin and press the comma key. Then move the cursor to the line's end point and press the period key, followed by B for a black line or W for white.

When you lose the cursor or want to abort a function, press the break key and Graph will return the previous screen. If the program isn't handling a function when you press the break key, the display starts to disintegrate; to restore it, press break again. Otherwise, Graph returns to DOS.

Michael Leibow's graphics program won grand prize in *80 Micro's* 1984 Young Programmer's contest (see February 1984, p. 48)



Figure 1. Graph logo.



Figure 2. Reverse-video version of Graph logo.



Figure 3. Mirror-image of Fig. 2.



Figure 4. Display options of shift key function.



Figure 5. Explosion effect.



Figure 6. Medium-sized printout.



Figure 7. Printout using pixel size 3,6.

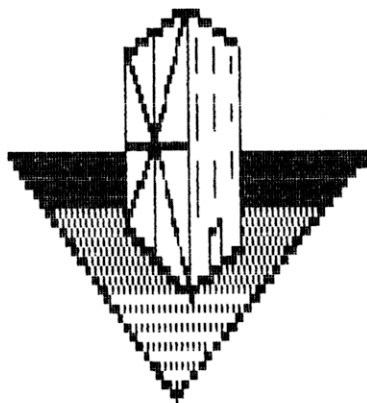


Figure 8. Printout using pixel size 1,4.

Saving Your Screens

Graph's file-handling features let you work on several screens at a time, or use parts of one screen in another display. In addition to files saved on disk, Graph maintains two files in memory, in what I call temporary and permanent files. The temporary file stores your display before you call an ancillary program function; Graph updates this file frequently, so you can restore a screen lost through a mistake. To load the temporary file, type in LT.

To save a screen to the permanent file, press S. Each time you type in S, Graph stores the new screen in its permanent file without the possibility of data loss. You can load the permanent file by typing in LP; you can move back and forth between a screen and the permanent file by pressing E.

If you make a mistake and want to recover the original screen by typing in LT, it's a good idea to save your current screen first. That way, if the temporary file doesn't have your screen, you won't lose everything.

Graph also supports four disk functions. To save a file to disk, type in DS; to load a file from disk, type in DL. The cursor will flash until you type in a file name of eight or fewer characters with no extension. When you press the enter key, Graph reads from or writes to disk.

Typing in DC displays a catalogue of Graph-created files saved to disk. You can use the arrow keys to position the flashing cursor over a file name, then press the enter key to display that file. To return to the drawing mode, press the break key. To recall the previous display, type in LT.

Once you've executed DC, you can recall the catalog without accessing the disk by typing in DO.

You can also load from or save to tape. Have the tape running and type in TS or TL. Don't press the break key during tape operation; the program will bomb.

The Display program lets you view graphics without invoking the main Graph program; from DOS level, type in DISPLAY FILE NAME.

Continued on p. 50

System Requirements

Model III

48K RAM

Disk Basic

TRSDOS 1.3



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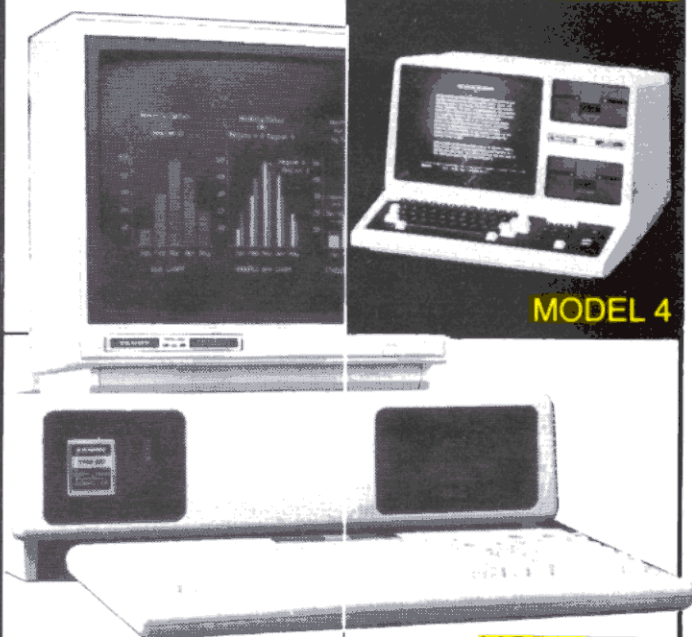
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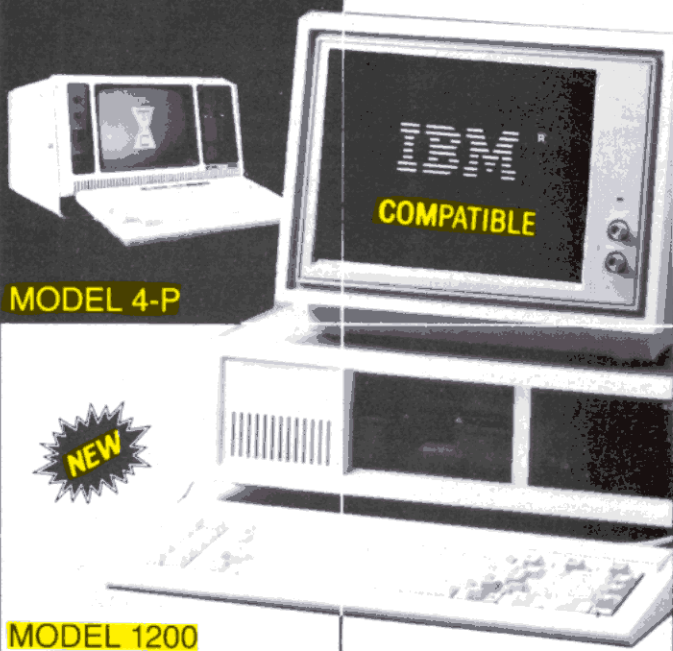
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Moving Parts

Graph lets you store portions of a screen display and reproduce them anywhere you want. To do so, you must outline what you want to save, so position the cursor next to that part of the screen. Press either shift key, followed by a number key from 1-5 to assign the illustration a number. Then draw your outline; a flashing line marks the boundaries of the image you want saved. Unless you're extremely nimble with the arrow keys, slow down the cursor for this operation.

When you've completed your outline, press the enter key. Within a few seconds, Graph stores all pixels within the outlines to the number key you specified.

You can display the stored image as-is, or you can reproduce it with different black/white configurations. Start with the cursor above the spot where you want to reproduce the image. Then press a shift key, followed by one of these letter combinations: PW to display all white pixels stored, PB to display all black pixels stored, NW for a white negative version of PW, NB for a black negative version of PB, B for an all-black image, W for all-white.

After you type in the appropriate letter or letters, press the number key cor-

responding to the stored image (1-5). For example, to display all the black pixels saved to the 1 key, press the shift key, then type in PB1.

Figure 4 illustrates the shift key function. The letter G in the Graph logo (see Fig. 1) was outlined and saved to the 1 key, then reproduced in each of Graph's black/white configurations. The key combinations for displaying each of the figures, from upper left to bottom right, are the shift key and PW1, PB1, NW1, NB1, B1, and W1.

The shift key function saves you the trouble of redrawing a repeated image. For example, to incorporate numbers and letters into your graphics, you could create a character set and save it in a disk file; when you need a particular character, you can store it using the shift key and display it in your new design.

Graph Extras

Three of Graph's routines are Basic programs that you invoke by pressing X followed by a number. X1 transfers control to a menu-driven routine that draws circles; you can set the circle's diameter and position on the screen. Pressing X2 displays a help screen listing Graph's commands. X3 calls a program that rotates a display or creates an explosion effect. It takes several minutes to perform rotation or explosion and the

screen may go black before Graph begins drawing the new display. Figure 5 shows the Graph logo after suffering an explosion with a diameter of 6.

Printed Matter

You can print screen displays in 28 sizes. When you press P, Graph prompts you for the type of printer, Radio Shack (press R) or Epson (press E). Radio Shack printers must have dot-addressable graphics; Epsoms or Epson-compatibles should have the Graftrax feature.

Now you can select the printout's size. Press S for a small picture followed by 1, 2, or 3 depending on the number of identical pictures you want to print. For a medium-sized picture press M; press L for a large one.

If you press D, you can define your own pixel size. Type in a number from 1-4 to define width and a number from 1-7 for length. Figure 6 shows a medium-sized printout of a picture; in Fig. 7, pixels are defined as 3,6; in Fig. 8 as 1,4. ■

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Program Listing 1. Graph/SRC.

00100	ORG	7000H	00490	LD	BC,1024	00880	SUB	128	
00110	CPYWTE	DEFM	'(c) 1984'	00500	INT1 LD	A,(DE)	00890	JP	M,MAIN
00120	START	DI		00510	CP	(HL)	00900	REPIX	LD
00130	CALL	INITIAL		00520	JP	Z,INT2	00910	LD	A,(14400)
00140	LD	A,(HL)		00530	INC	A	00920	JP	NZ,REPIX
00150	CP	13		00540	LD	(DE),A	00930	LD	A,(YY)
00160	JP	Z,BFRE		00550	INT2 INC	DE	00940	LD	D,A
00170	PUSH	HL		00560	DEC	BC	00950	LD	A,(XX)
00180	ADDEXT	INC	HL	00570	INC	HL	00960	LD	E,A
00190	LD	A,(HL)		00580	LD	A,B	00970	PUSH	DE
00200	CP	13		00590	OR	C	00980	CALL	TEST
00210	JP	NZ,ADDEXT		00600	JP	NZ,INT1	00990	POP	DE
00220	CALL	EXTENS		00610	LD	BC,1024	01000	JP	Z,REPIX1
00230	POP	HL		00620	LD	HL,BUFFS	01010	CALL	RESET
00240	CALL	LDPRST		00630	LD	DE,3C00H	01020	JP	LOOP1
00250	LD	HL,BUFFS		00640	INT3 LD	A,(DE)	01030	REPIX1	CALL
00260	LD	DE,TEMPSC		00650	CP	(HL)	01040	JP	LOOP1
00270	LD	BC,1024		00660	JP	NZ,INTRO	01050	MAIN	ADD
00280	LDIR			00670	INC	HL	01060	CP	A,128
00290	CALL	INTRO		00680	INC	DE	01070	CALL	Z,ADVAN
00300	CALL	LOAD		00690	DEC	BC	01080	CALL	ROUTNS
00310	JP	LOOP		00700	LD	A,B	01090	JP	LOOP1
00320	BFRE	CALL	PRPARE	00710	OR	C	01100	ROUTNS	CP
00330	CALL	INTRO		00720	JP	NZ,INT3	01110	CALL	Z,UP
00340	CALL	WHITE		00730	INT4	CALL	NEGATI	CP	16
00350	JP	LOOP		00740	LD	HL,AUTH	01120	CALL	Z,DOWN
00360	PRPARE	LD	HL,BUFFS	00750	LD	DE,16321	01130	CALL	Z,DOWN
00370	LD	DE,1024		00760	LD	BC,61	01140	CP	32
00380	PRP1	LD	A,(HL)	00770	LDIR		01150	CALL	Z,LEFT
00390	ADD	A,70		00780	LD	BC,10000	01160	CP	40
00400	LD	(HL),A		00790	CALL	WASTE	01170	CALL	Z,NW
00410	INC	HL		00800	CALL	ENTER	01180	CP	48
00420	DEC	DE		00810	JP	Z,INT4	01190	CALL	Z,SW
00430	LD	A,D		00820	RET		01200	CP	64
00440	OR	E		00830	LOOP	DI	01210	CALL	Z,RIGHT
00450	JP	NZ,PRP1		00840	LD	A,(3880H)	01220	CP	72
00460	RET			00850	OR	A	01230	CALL	Z,NE
00470	INTRO	LD	HL,BUFFS	00860	CALL	NZ,NEWKEY	01240	CP	80
00480	LD	DE,3C00H		00870	LD	A,(14400)	01250	CALL	Z,SE

Listing 1 continued

01260	RET		02240	TLOAD	LD	HL,4211H
01270	LOOP1	CALL	02250		LD	(HL),1
01280		CALL	02260		CALL	0296H
01290		OR	02270		LD	HL,3C00H
01300	JP	Z,LOOP	02280		LD	BC,1024
01310	CP	87	02290	TLOOP1	CALL	0235H
01320	CALL	Z,WHITE	02300		LD	(HL),A
01330	CP	67	02310		LD	A,(14400)
01340	CALL	Z,CLS	02320		CP	4
01350	CP	82	02330		JP	Z,BREAK
01360	CALL	Z,RND	02340		INC	HL
01370	CP	31H	02350		DEC	BC
01380	CALL	Z,SLOWER	02360		LD	A,B
01390	CP	32H	02370		OR	C
01400	CALL	Z,FASTER	02380		JP	NZ,TLOOP1
01410	CP	84	02390		CALL	01F8H
01420	CALL	Z,TAPE	02400		JP	CLRRET
01430	CP	83	02410	INITIAL	PUSH	HL
01440	CALL	Z,SAVEP	02420		LD	IX,KEY1
01450	CP	78	02430		CALL	INIT1
01460	CALL	Z,NEGATI	02440		LD	IX,KEY2
01470	CP	68	02450		CALL	INIT1
01480	CALL	Z,DISK	02460		LD	IX,KEY3
01490	CP	76	02470		CALL	INIT1
01500	CALL	Z,LDTORP	02480		LD	IX,KEY4
01510	CP	45H	02490		CALL	INIT1
01520	CALL	Z,EXCHA	02500		LD	IX,KEY5
01530	CP	48H	02510		CALL	INIT1
01540	CALL	Z,HORIZ	02520		LD	HL,BUFLAS
01550	CP	56H	02530		LD	(HL),255
01560	CALL	Z,VERT	02540		LD	DE,BUFLAS+1
01570	CP	50H	02550		LD	BC,1152
01580	CALL	Z,LPRINT	02560		LDIR	
01590	CP	4BH	02570		LD	HL,NEWBUF
01600	CALL	Z,KEEP	02580		LD	DE,NEWBUF+1
01610	CP	4DH	02590		LD	BC,999
01620	CALL	Z,MODE	02600		LD	(HL),255
01630	CP	51H	02610		LDIR	
01640	CALL	Z,PLAID	02620		JP	POPHRT
01650	CP	42H	02630	INIT1	LD	(IX),0
01660	CALL	Z,BKWRD	02640		LD	(IX+1),128
01670	CP	55H	02650		LD	(IX+2),6
01680	CALL	Z,UPDOWN	02660		PUSH	IX
01690	CP	49H	02670		POP	HL
01700	CALL	Z,INITIAL	02680		LD	DE,3
01710	CP	88	02690		ADD	HL,DE
01720	CALL	Z,UTIL	02700		LD	(HL),255
01730	CP	'/'	02710		PUSH	HL
01740	CALL	Z,UTIL2	02720		POP	DE
01750	CP	44	02730		INC	DE
01760	CALL	Z,ORIGIN	02740		LD	BC,1149
01770	CP	46	02750		LDIR	
01780	CALL	Z,LINE	02760		RET	
01810	JP	LOOP	02770	WHITE	LD	HL,3C00H
01820	SLOWER	LD	02780		LD	(HL),191
01830		LD	02790		LD	DE,3C01H
01840		XOR	02800		LD	BC,1023
01850		SBC	02810		LDIR	
01860		RET	02820		RET	
01870		LD	02830	ENTER	LD	A,(14400)
01880		RET	02840		BIT	0,A
01890	FASTER	LD	02850		RET	Z
01900		LD	02860	ENT1	LD	A,(14400)
01910		ADD	02870		BIT	0,A
01920		RET	02880		JP	NZ,ENT1
01930		LD	02890		INC	A
01940		RET	02900		RET	
01950	TAPE	CALL	02910	BLINK	LD	A,(YY)
01960		OR	02920		LD	D,A
01970		JP	02930		LD	A,(XX)
01980		CALL	02940		LD	E,A
01990		CP	02950		CALL	TEST
02000		JP	02960		JP	Z,OPFF
02010		CP	02970	ONN	LD	A,(YY)
02020		JP	02980		LD	D,A
02030		LD	02990		LD	A,(XX)
02040		CP	03000		LD	E,A
02050		JP	03010		CALL	RESET
02060		JP	03020		LD	BC,500H
02070	TSAVE	LD	03030		CALL	WASTE
02080		LD	03040		LD	A,(YY)
02090		CALL	03050		LD	D,A
02100		LD	03060		LD	A,(XX)
02110		LD	03070		LD	E,A
02120	TLOOP	LD	03080		CALL	SET
02130		CALL	03090		RET	
02140		LD	03100	OFFF	LD	A,(YY)
02150		CP	03110		LD	D,A
02160		JP	03120		LD	A,(XX)
02170		INC	03130		LD	E,A
02180		DEC	03140		CALL	SET
02190		LD	03150		LD	BC,500H
02200		OR	03160		CALL	WASTE
02210		JP	03170		LD	A,(YY)
02220		CALL	03180		LD	D,A
02230		JP	03190		LD	A,(XX)

Listing 1 continued

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03200	LD	E,A	04160	LD	(DE),A	05130	CP	4
03210	CALL	RESET	04170	RET		05140	JP	Z,BREAK
03220	RET		04180	DIVIDE	A,L	05150	LD	A,(YYY)
03230	LD	A,(XX)	04190	LD	L,H	05160	LD	D,A
03240	LD	(X1),A	04200	LD	H,0	05170	LD	A,(XXX)
03250	LD	A,(YY)	04210	SLA	L	05180	LD	E,A
03260	LD	(Y1),A	04220	BIT	7,A	05190	CALL	TEST
03270	JP	CLRRET	04230	JP	Z,DIV1	05200	JP	NZ,BKSET
03280	LD	A,(X1)	04240	INC	L	05210	LD	HL,BKBUFF
03290	INC	A	04250	DIV1	A,L	05220	LD	A,(YYY)
03300	RET	Z	04260	BIT	7,A	05230	LD	E,A
03310	LD	A,(14400)	04270	JP	NZ,DIV2	05240	LD	D,0
03320	CP	4	04280	LD	B,0	05250	ADD	HL,DE
03330	JP	Z,BREAK	04290	RET		05260	XOR	A
03340	CALL	2BH	04300	DIV2	B,0FFH	05270	LD	(HL),A
03350	OR	A	04310	RET		05280	JP	BKCON0
03360	JP	Z,LINE1	04320	EXCHA	CALL	05290	BKSET	LD
03370	CALL	SAVE	04330	CALL	LOADP	05300	LD	HL,BKBUFF
03380	CP	'W'	04340	LD	HL,TEMPSC	05310	LD	A,(YYY)
03390	JP	Z,LINEW	04350	LD	DE,SCREEN	05320	LD	E,A
03400	CP	'B'	04360	LD	BC,1024	05330	LD	D,0
03410	JP	Z,LINEB	04370	LDIR		05340	ADD	HL,DE
03420	JP	LINE1	04380	RET		05350	LD	A,1
03430	LD	A,1	04390	CLS	LD	05360	BKCON0	LD
03440	LD	(LMODE),A	04400	LD	HL,3C00H	05370	INC	A
03450	LD	L2	04410	LD	(HL),128	05380	CP	48
03460	LD	A,2	04420	LD	DE,3C01H	05390	JP	Z,BKCON1
03470	LD	L1	04430	LDIR	BC,1023	05400	LD	(YYY),A
03480	LD	A,(X1)	04440	RET		05410	JP	BKCONT
03490	LD	DE,WORD1	04450	MODE	LD	05420	BKCON1	XOR
03500	CALL	MULT	04460	DEC	A	05430	LD	A
03510	LD	A,(Y1)	04470	JP	Z,MODE1	05440	BKCON2	LD
03520	LD	DE,WORD2	04480	DEC	A	05450	LD	(YYY),A
03530	CALL	MULT	04490	JP	Z,MODE2	05460	LD	A,(XXX)
03540	LD	A,(XX)	04500	JP	MODE1	05470	LD	B,A
03550	LD	DE,WORD3	04510	MODE2	LD	05480	SUB	A,127
03560	CALL	MULT	04520	JP	A,1	05490	LD	B
03570	LD	A,(YY)	04530	JP	MODEND	05480	LD	E,A
03580	LD	DE,WORD4	04540	LD	A,2	05490	LD	A,(YYY)
03590	CALL	MULT	04550	MODEND	LD	05500	LD	D,A
03600	LD	HL,(WORD1)	04560	RET	(BB),A	05510	CALL	TEST
03610	LD	DE,(WORD3)	04570	KEEP	LD	05520	PUSH	AF
03620	OR	A	04580	DEC	A	05530	LD	A,(XXX)
03630	SBC	HL,DE	04590	JP	Z,KEEP1	05540	LD	E,A
03640	CALL	DIVIDE	04600	DEC	A	05550	LD	A,(YYY)
03650	LD	L,A	04610	JP	Z,KEEP1	05560	LD	D,A
03660	LD	H,B	04620	DEC	A	05570	POP	AF
03670	LD	(DX),HL	04630	JP	Z,KEEP2	05580	JP	NZ,BKSET1
03680	LD	HL,(WORD2)	04640	KEEP1	LD	05590	CALL	RESET
03690	LD	DE,(WORD4)	04650	JP	A,3	05600	JP	BKCON3
03700	OR	A	04660	KEEP2	LD	05610	BKSET1	CALL
03710	SBC	HL,DE	04670	JP	MODEND	05620	BKCON3	LD
03720	CALL	DIVIDE	04680	LD	MODEND	05630	LD	HL,BKBUFF
03730	LD	L,A	04690	CALL	A,179	05640	LD	A,(YYY)
03740	LD	H,B	04700	CALL	ODDL	05650	LD	C,A
03750	LD	(DY),HL	04710	LD	A,140	05660	LD	B,0
03760	LD	HL,(WORD1)	04720	CALL	EVENL	05670	ADD	HL,BC
03770	LD	DE,(DX)	04730	JP	CLRRET	05680	LD	A,(HL)
03780	OR	A	04740	PLAID	LD	05690	OR	A
03790	SBC	HL,DE	04750	LD	A,153	05700	PUSH	AF
03800	LD	(WORD1),HL	04760	CALL	ODDL	05710	LD	A,(XXX)
03810	CALL	DIVIDE	04770	LD	A,166	05720	LD	B,A
03820	PUSH	AF	04780	CALL	EVENL	05730	LD	A,127
03830	LD	HL,(WORD2)	04790	JP	CLRRET	05740	SUB	B
03840	LD	DE,(DY)	04800	LD	(TEMA),A	05750	LD	E,A
03850	OR	A	04810	LD	HL,15424	05760	LD	A,(YYY)
03860	SBC	HL,DE	04820	LD	DE,64	05770	LD	D,A
03870	LD	(WORD2),HL	04830	PUSH	B,8	05780	POP	AF
03880	CALL	DIVIDE	04840	JP	DE	05790	JP	NZ,BKSET2
03890	LD	D,A	04850	LD	GLINE	05800	CALL	RESET
03900	POP	AF	04860	LD	(TEMA),A	05810	JP	BKCON4
03910	LD	E,A	04870	LD	HL,15360	05820	CALL	SET
03920	LD	A,(LMODE)	04880	PUSH	DE,64	05830	LD	A,(YYY)
03930	DEC	A	04890	LD	B,8	05840	INC	A
03940	JP	Z,L4	04900	OR	A,(TEMA)	05850	CP	48
03950	CALL	RESET	04910	LD	(HL),A	05860	JP	Z,BKCON5
03960	JP	L5	04920	LD	(HL),A	05870	LD	(YYY),A
03970	CALL	SET	04930	INC	HL	05880	JP	BKCON2
03980	LD	HL,(WORD3)	04940	DEC	DE	05890	LD	A,(XXX)
03990	LD	DE,(WORD1)	04950	LD	A,D	05900	CP	64
04000	RST	18H	04960	OR	E	05910	RET	Z
04010	JP	NZ,L3	04970	JP	NZ,GLINE	05920	JP	BKSTT
04020	LD	HL,(WORD4)	04980	POP	DE	05930	CALL	SAVE
04030	LD	DE,(WORD2)	04990	ADD	HL,DE	05940	XOR	A
04040	RST	18H	05000	PUSH	DE	05950	UPSTT	LD
04050	JP	NZ,L3	05010	DJNZ	GLINE	05960	XOR	A
04060	RET		05020	POP	DE	05970	LD	(XXX),A
04070	LD	B,7	05030	RET		05980	UPCONT	LD
04080	LD	L,A	05040	LD	A,149	05990	CP	4
04090	LD	H,0	05050	CALL	ODDL	06000	JP	Z,BREAK
04100	ADD	HL,HL	05060	LD	A,149	06010	LD	A,(YYY)
04110	DJNZ	MULT1	05070	CALL	EVENL	06020	LD	D,A
04120	LD	A,L	05080	JP	CLRRET	06030	LD	A,(XXX)
04130	LD	(DE),A	05090	CALL	SAVE	06040	LD	E,A
04140	LD	A,H	05100	XOR	A	06050	CALL	TEST
04150	INC	DE	05110	LD	(XXX),A	06060	JP	NZ,UPSET
			05120	XOR	A	06070	LD	HL,BKBUFF
				LD	(YYY),A	06080	LD	A,(XXX)
				LD	A,(14400)			

Listing 1 continued

06090	LD	E,A
06100	LD	D,0
06110	ADD	HL,DE
06120	XOR	A
06130	LD	(HL),A
06140	JP	UPCON0
06150	LD	HL,BKBUF
06160	LD	A,(XXX)
06170	LD	E,A
06180	LD	D,0
06190	ADD	HL,DE
06200	LD	A,1
06210	LD	(HL),A
06220	LD	A,(XXX)
06230	INC	A
06240	CP	128
06250	JP	Z,UPCON1
06260	LD	(XXX),A
06270	JP	UPCON2
06280	UPCON1	XOR
06290	LD	(XXX),A
06300	UPCON2	LD
06310	LD	A,(YYY)
06320	LD	B,A
06330	LD	A,47
06340	SUB	B
06350	LD	D,A
06360	LD	A,(XXX)
06370	LD	E,A
06380	CALL	TEST
06390	PUSH	AF
06400	LD	A,(XXX)
06410	LD	E,A
06420	LD	A,(YYY)
06430	LD	D,A
06440	POP	AF
06450	JP	NZ,UPSET1
06460	CALL	RESET
06470	JP	UPCON3
06480	UPSET1	CALL
06490	UPCON3	LD
06500	LD	HL,BKBUF
06510	LD	A,(XXX)
06520	LD	C,A
06530	LD	B,0
06540	ADD	HL,BC
06550	LD	A,(HL)
06560	OR	A
06570	PUSH	AF
06580	LD	A,(YYY)
06590	LD	B,A
06600	LD	A,47
06610	SUB	B
06620	LD	D,A
06630	LD	A,(XXX)
06640	LD	E,A
06650	POP	AF
06660	JP	NZ,UPSET2
06670	CALL	RESET
06680	JP	UPCON4
06690	UPSET2	CALL
06700	UPCON4	LD
06710	LD	A,(XXX)
06720	INC	A
06730	CP	128
06740	JP	Z,UPCON5
06750	LD	(XXX),A
06760	JP	UPCON2
06770	LD	A,(YYY)
06780	INC	A
06790	CP	24
06800	RET	Z
06810	JP	UPSTT
06820	JP	2BH
06830	CALL	A
06840	LD	Z,UTIL
06850	CALL	SAVE
06860	CP	31H
06870	JP	Z,UTIL1
06880	CP	32H
06890	JP	Z,UTIL2
06900	CP	33H
06910	JP	Z,UTIL3
06920	LD	A,(14400)
06930	CP	4
06940	JP	Z,BREAK
06950	JP	UTIL
06960	LD	HL,AUTIL1
06970	LD	HL,AUTIL2
06980	LD	HL,AUTIL3
06990	LD	HL,TEMPIC
07000	LD	HL,TEMPIC
07010	LD	HL,TEMPIC
07020	LD	HL,TEMPIC
07030	LD	HL,TEMPIC

Listing 1 continued

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Model 3 = From 4K-48K Requires (3) Three Kits
Color = From 4K-16K Requires (1) Kit

**Model 1 equipped with Expansion Board up to 48K Two Kits Required
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TRS-64K2. \$38.95

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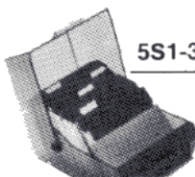
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Listing 1 continued

07040	LD	DE,DCB
07050	LD	BC,9
07060	LDIR	
07070	CALL	DSAVE
07080	RET	
07090	AUTIL1	'BASIC UTIL1/BAS -F:0 -M:61439'
07100	DEFB	0DH
07110	AUTIL2	'BASIC UTIL2/BAS -F:0 -M:61439'
07120	DEFB	0DH
07130	AUTIL3	'BASIC UTIL3/BAS'
07140	DEFB	0DH
07150	SAVE	LD HL,3C00H
07160	LD	DE,TEMPSC
07170	LD	BC,1024
07180	LDIR	
07190	RET	
07200	SAVEP	LD HL,3C00H
07210	LD	DE,SCREEN
07220	LD	BC,1024
07230	LDIR	
07240	RET	
07250	NEGATI	LD HL,3C00H
07260	LD	BC,1024
07270	AGAIN	LD A,(HL)
07280	CPL	
07290	SET	7,A
07300	RES	6,A
07310	LD	(HL),A
07320	INC	HL
07330	DEC	BC
07340	LD	A,B
07350	OR	C
07360	JP	NZ,AGAIN
07370	RET	
07380	RIGHT1	LD A,127
07390	LD	(XX),A
07400	JP	ALMOST
07410	LEFT1	XOR A
07420	LD	(XX),A
07430	JP	ALMOST
07440	DOWN1	LD A,47
07450	LD	(YY),A
07460	JP	ALMOST
07470	UP1	XOR A
07480	LD	(YY),A
07490	JP	ALMOST
07500	DISK	CALL 002BH
07510	OR	A
07520	JP	Z,DISK
07530	CALL	SAVE
07540	CP	'S'
07550	JP	Z,UHOH
07560	CP	'L'
07570	JP	Z,UHOH
07580	CP	'C'
07590	JP	Z,DDIREC
07600	CP	'O'
07610	JP	Z,DD1
07620	LD	A,(14400)
07630	CP	4
07640	JP	Z,BREAK
07650	JP	DISK
07660	UHOH	LD (TEMA),A
07670	LD	B,23
07680	LD	HL,DCB
07690	CALL	0040H
07700	JP	C,BREAK
07710	PUSH	BC
07720	CALL	LOAD
07730	POP	BC
07740	LD	HL,DCB
07750	LD	C,B
07760	LD	B,0
07770	ADD	HL,BC
07780	CALL	EXTENS
07790	LD	HL,3C00H
07800	LD	A,(TEMA)
07810	CP	83
07820	JP	Z,DSAVE
07830	CP	76
07840	JP	Z,DLOAD
07850	RET	
07860	LOAD	LD HL,TEMPSC
07870	LD	DE,3C00H
07880	LD	BC,1024
07890	LDIR	
07900	RET	
07910	LDTORP	CALL 2BH
07920	OR	A
07930	JP	Z,LDTORP
07940	CP	'T'
07950	JP	Z,LOAD
07960	CP	'P'
07970	JP	Z,LOADP
07980	LD	A,(14400)
07990	CP	4

Listing 1 continued

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MOD III

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08010	CALL	SAVE	08960	LD	HL,CBUFF	09910	LDIR	
08020	JP	BREAK	08970	LD	BC,0	09920	LD	BC,9500
08030	LOADP	LD	08980	CALL	4290H	09930	CALL	WASTE
08040	LD	HL,SCREEN	08990	PUSH	HL	09940	JP	POPHRT
08050	LD	DE,3C00H	09000	CALL	CLS	09950	DDUP	PUSH
08060	LD	BC,1024	09010	POP	HL	09960	LD	DE,64
08070	LDIR		09020	PUSH	HL	09970	OR	A
08080	JP	CLRRET	09030	POP	IX	09980	SBC	HL,DE
08090	RND	LD	09040	LD	BC,0FFFFH	09990	DDUP2	LD
08100	LD	BC,1024	09050	CALL	SEARCH	10000	CP	3CH
08110	HELLO	LD	09060	LD	A,(HL)	10010	JP	C,DDUP1
08120	LD	D,127	09070	CP	'G'	10020	DDUP3	LD
08130	MIKE	INC	09080	JP	NZ,DDNEXT	10030	CP	80H
08140	SUB	4	09090	INC	HL	10040	JP	Z,DDUP1
08150	JP	P,MIKE	09100	LD	A,(HL)	10050	POP	DE
08160	LD	(HL),D	09110	CP	'R'	10060	RET	
08170	INC	HL	09120	JP	NZ,DDNEXT	10070	DDUP1	JP
08180	DEC	BC	09130	INC	HL	10080	DDDOWN	PUSH
08190	LD	A,B	09140	LD	A,(HL)	10090	LD	DE,64
08200	OR	C	09150	CP	'A'	10100	ADD	HL,DE
08210	JR	NZ,HELLO	09160	JP	NZ,DDNEXT	10110	DDOWN1	LD
08220	RET		09170	PUSH	IX	10120	CP	40H
08230	LDFRST	LD	09180	POP	HL	10130	JP	NC,DDUP1
08240	LD	DE,DCB	09190	LD	A,(DDSCRE)	10140	JP	DDUP3
08250	CALL	BC,24	09200	LD	E,A	10150	DDLEFT	PUSH
08260	LD	SAVE	09210	LD	A,(DDSCRE+1)	10160	LD	DE,16
08270	LD	HL,BUFFS	09220	LD	D,A	10170	OR	A
08280	CALL	DLOAD	09230	LDIR		10180	SBC	HL,DE
08290	OR	A	09240	LD	HL,(DDSCRE)	10190	JP	DDUP2
08300	JP	NZ,LDFR1	09250	LD	DE,16	10200	DDRITE	PUSH
08310	RET		09260	ADD	HL,DE	10210	LD	DE,16
08320	LDFR1	POP	09270	LD	(DDSCRE),HL	10220	ADD	HL,DE
08330	JP	BFRE	09280	LD	A,(DDCOUN)	10230	JP	DDOWN1
08340	LD	DE,DCB	09290	INC	A	10240	DDFOUN	LD
08350	LD	HL,BUFFER	09300	LD	(DDCOUN),A	10250	LD	DE,DCB
08360	LD	BC,0	09310	LD	A,(IX+22)	10260	LDIR	BC,10
08370	CALL	4420H	09320	CP	'+'	10270	LD	HL,DCB
08380	OR	A	09330	JP	Z,DDEND	10280	DDFLOP	LD
08390	JP	NZ,DERR1	09340	CP	'A'	10290	INC	HL
08400	LD	HL,3C00H	09350	JP	C,DDEND	10300	CP	80H
08410	CALL	DSAVE1	09360	JP	'Z'+1	10310	JP	NZ,DDFLOP
08420	LD	HL,15616	09370	JP	NC,DDEND	10320	DEC	HL
08430	CALL	DSAVE1	09380	PUSH	IX	10330	CALL	EXTENS
08440	LD	HL,15872	09390	POP	HL	10340	LD	HL,3C00H
08450	CALL	DSAVE1	09400	LD	DE,21	10350	LD	(DDSCRE),HL
08460	LD	HL,16128	09410	ADD	HL,DE	10360	XOR	A
08470	CALL	DSAVE1	09420	LD	D,0	10370	LD	(DDCOUN),A
08480	LD	DE,DCB	09430	LD	A,(TEMA)	10380	JP	DLOAD
08490	CALL	4428H	09440	LD	E,A	10390	EXTENS	LD
08500	JP	CLRRET	09450	ADD	HL,DE	10400	INC	HL
08510	LD	DE,BUFFER	09460	XOR	A	10410	LD	(HL),'G'
08520	LD	BC,256	09470	LD	(TEMA),A	10420	INC	HL
08530	LDIR		09480	JP	DDLOOP	10430	LD	(HL),'R'
08540	LD	DE,DCB	09490	LD	HL,3C00H	10440	INC	HL
08550	CALL	4439H	09500	LD	(DDSCRE),HL	10450	LD	(HL),'A'
08560	OR	A	09510	LD	A,(DDCOUN)	10460	INC	HL
08570	JP	NZ,DERR	09520	OR	A	10470	LD	(HL),0DH
08580	RET		09530	JP	Z,LOAD	10480	RET	
08590	DERR	POP	09540	CALL	FLASH	10490	DDEND1	POP
08600	DERR1	PUSH	09550	LD	A,(14400)	10500	SEARCH	JP
08610	CALL	LOAD	09560	OR	A	10510	LD	BREAK
08620	JP	POPART	09570	JP	Z,DDFIND	10520	INC	A,(HL)
08630	LD	(WORD1),HL	09580	CP	4	10530	INC	HL
08640	LD	HL,BUFFER	09590	CALL	Z,DDEND1	10540	CP	BC
08650	LD	DE,DCB	09600	CP	8	10550	JP	'Z'
08660	LD	BC,0	09610	CALL	Z,DDUP	10560	LD	NZ,SEARCH
08670	CALL	4424H	09620	CP	16	10570	LD	DE,4
08680	OR	A	09630	CALL	Z,DDDOWN	10580	OR	A
08690	JP	NZ,DERR1	09640	CP	32	10590	SBC	HL,DE
08700	LD	HL,(WORD1)	09650	CALL	Z,DDLEFT	10600	PUSH	HL
08710	DEC	H	09660	CP	64	10610	POP	BC
08720	LD	(WORD1),HL	09670	CALL	Z,DDRITE	10620	OR	HL
08730	LD	B,4	09680	CP	1	10630	SBC	A
08740	PUSH	BC	09690	JP	Z,DDFOUN	10640	PUSH	HL,DE
08750	LD	DE,DCB	09700	JP	DDFIND	10650	PUSH	HL
08760	CALL	4436H	09710	DEFM	'Please wait	10660	POP	BC
08770	OR	A	09720	ADCAT	a moment'	10670	POP	HL
08780	JP	NZ,DERR	09730	ADCAT1	DEFW	10680	DEC	HL
08790	LD	HL,BUFFER	09740	FLASH	PUSH	10690	LD	A,(HL)
08800	LD	DE,(WORD1)	09750	PUSH	HL	10700	CP	'/'
08810	INC	D	09760	LD	DE,CBUFF	10710	CALL	Z,DDFSET
08820	LD	(WORD1),DE	09770	LD	BC,8	10720	INC	HL
08830	LDIR		09780	LDIR		10730	RET	
08840	POP	BC	09790	POP	HL	10740	DDFSET	LD
08850	DJNZ	DL1	09800	PUSH	HL	10750	LD	A,1
08860	LD	DE,DCB	09810	POP	DE	10760	RET	(TEMA),A
08870	CALL	4428H	09820	INC	DE	10770	UP	LD
08880	JP	CLRRET	09830	LD	(HL),80H	10780	DEC	A,(YY)
08890	LD	HL,CBUFF	09840	LD	BC,7	10790	LD	A
08900	DD1	LD	09850	LDIR		10800	CP	(YY),A
08910	JP	DD2	09860	LD	BC,10000	10810	JP	-1
08920	CALL	CLS	09870	CALL	WASTE	10820	DD1	Z,LEFT
08930	LD	HL,ADCAT	09880	POP	DE	10830	JP	ALMOST
08940	LD	DE,15880	09890	PUSH	DE	10840	LD	A,(YY)
		BC,(ADCAT1)		LD	HL,CBUFF		LD	(YY),A

10850	CP	48	11800	LD	D,0
10860	JP	Z,RIGHT	11810	SRL	E
10870	JP	ALMOST	11820	JP	NC,THORT
10880	LEFT	A,(XX)	11830	INC	C
10890	DEC	A	11840	ADD	HL,DE
10900	LD	(XX),A	11850	LD	DE,3C00H
10910	CP	-1	11860	ADD	HL,DE
10920	JP	Z,UP	11870	SLA	C
10930	JP	ALMOST	11880	SLA	C
10940	RIGHT	A,(XX)	11890	SLA	C
10950	INC	A	11900	LD	A,(BYTE+1)
10960	LD	(XX),A	11910	ADD	A,C
10970	CP	128	11920	LD	(BYTE+1),A
10980	JP	Z,DOWN	11930	BIT	7,(HL)
10990	JP	ALMOST	11940	JP	Z,CHANGE
11000	NW	HL,XX	11950	DEFB	0CBH
11010	DEC	(HL)	11960	DEFB	0
11020	LD	HL,YY	11970	RET	
11030	DEC	(HL)	11980	WAIT	LD
11040	JP	ALMOST	11990	CALL	BC,(HOWFAS)
11050	SW	HL,XX	12000	RET	WASTE
11060	DEC	(HL)	12010	DEC	BC
11070	LD	HL,YY	12020	LD	A,B
11080	INC	(HL)	12030	OR	C
11090	JP	ALMOST	12040	JP	NZ,WASTE
11100	NE	HL,XX	12050	RET	
11110	INC	(HL)	12060	DEFS	256
11120	LD	HL,YY	12070	DEFS	51
11130	DEC	(HL)	12080	DEFS	1024
11140	JP	ALMOST	12090	DEFS	1024
11150	SE	HL,XX	12100	DEFB	61
11160	INC	(HL)	12110	DEFB	21
11170	LD	HL,YY	12120	DEFB	2
11180	INC	(HL)	12130	DEFB	255
11190	ALMOST	A,(XX)	12140	DEFB	255
11200	CP	254	12150	DEFW	0
11210	JP	NC,RIGHT1	12160	DEFW	0
11220	CP	128	12170	DEFW	0
11230	JP	NC,LEFT1	12180	DEFW	0
11240	LD	A,(YY)	12190	DEFW	0
11250	CP	254	12200	DEFW	0
11260	JP	NC,DOWN1	12210	DEFB	0
11270	CP	48	12220	DEFS	128
11280	JP	NC,UP1	12230	DEFS	1761
11290	LD	A,(YY)	12240	DEFW	3C00H
11300	LD	D,A	12250	DEFW	0
11310	LD	A,(XX)	12260	DEFW	'TEMP/GRA'
11320	LD	E,A	12270	DEFB	0DH
11330	LD	A,(BB)	12280	DEFW	1001
11340	DEC	A	12290	DEFW	1001
11350	JP	Z,SETRE	12300	DEFW	1001
11360	DEC	A	12310	DEFW	1001
11370	JP	Z,RESER	12320	DEFW	1001
11380	PUSH	AF	12330	DEFW	1001
11390	CALL	TEST	12340	DEFW	1001
11400	PUSH	AF	12350	DEFW	1001
11410	LD	A,(XX)	12360	DEFW	1001
11420	LD	E,A	12370	DEFW	1001
11430	LD	A,(YY)	12380	DEFW	1001
11440	LD	D,A	12390	DEFW	1001
11450	POP	BC	12400	DEFW	1001
11460	POP	AF	12410	DEFW	1001
11470	DEC	A	12420	DEFW	1001
11480	JP	NZ,KEEP3	12430	DEFW	1001
11490	PUSH	BC	12440	DEFW	1001
11500	POP	AF	12450	DEFW	1001
11510	JP	Z,RESER	12460	DEFW	1001
11520	JP	SETRE	12470	DEFW	1001
11530	KEEP3	PUSH	12480	DEFW	1001
11540	POP	AF	12490	DEFW	1001
11550	JP	Z,SETRE	12500	DEFW	1001
11560	JP	RERES	12510	DEFW	1001
11570	SETRE	CALL	12520	DEFW	1001
11580	JP	WAIT	12530	DEFW	1001
11590	RERES	CALL	12540	DEFW	1001
11600	JP	RESET	12550	DEFW	1001
11610	RESET	LD	12560	DEFW	1001
11620	LD	A,86H	12570	DEFW	1001
11630	SET	JP	12580	DEFW	1001
11640	LD	A,0C6H	12590	DEFW	1001
11650	TEST	JP	12600	DEFW	1001
11660	STORE	LD	12610	DEFW	1001
11670	LD	(BYTE+1),A	12620	DEFW	1001
11680	LD	A,D	12630	DEFW	1001
11690	LOOP5	B,-1	12640	DEFW	1001
11700	INC	B	12650	DEFW	1001
11710	SUB	3	12660	DEFW	1001
11720	JP	NC,LOOP5	12670	DEFW	1001
11730	ADD	A,3	12680	DEFW	1001
11740	SLA	A	12690	DEFW	1001
11750	LD	C,A	12700	DEFW	1001
11760	LD	L,B	12710	DEFW	1001
11770	LD	H,0	12720	DEFW	1001
11780	LOOP6	B,6	12730	DEFW	1001
11790	DJNZ	HL,HL	12740	DEFW	1001
		LOOP6			

Listing 1 continued on p. 80

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Operator Input

Figure 1 shows a sample menu from my program. I reserve the top line of the CRT screen for communications, which includes the operator's menu selection as well as prompt and error messages (see Fig. 1a). Program Listing 1 accepts all data from the operator, and it has multiple entry points. The program receives keyboard input as an INKEY\$ command, and it checks to make sure the entered character is one of the menu options.

The subroutine performs three main tasks. First, line 20440 prints the prompt message WHICH? on the communications line and waits for a single-character response. (This prompt message is in variable W\$.) If you want a different prompt, initialize W\$ with the desired prompt and enter the subroutine at 20450. By merging Listing 1 with Program Listing 2, you can see how the subroutine works with a new prompt.

The subroutine's second function is to accept the operator's menu choice. The value of variable L% determines the maximum number of characters the routine accepts. Whenever you enter the maximum number of characters, an exit

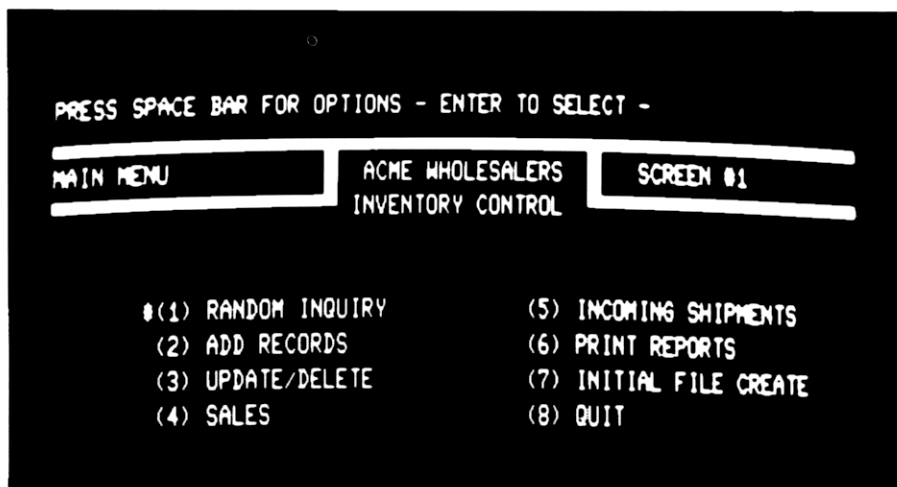


Photo 1. Screen photo of a menu with numeric options.

from the subroutine occurs automatically. The Input subroutine returns the expected response in variable Z\$.

My subroutine has a standard maximum length of one character. However, you can use L% to create an INKEY\$ routine loop that accepts more than one character. Initialize W\$ with the prompt message and L% with the maximum length of the response, then enter the subroutine at line 20460.

Listing 1's third function is to check

input for valid numeric data. If your response is to be numeric, initialize NU\$ with N. This prohibits you from entering any character other than 0-9 or a period. Merge Program Listing 3 with Listing 1 to see the subroutine work with a number-only response.

The program also lets you use the backspace key for data entry, but it doesn't let you use keys not normally used in data entry, such as cursor controls or the clear key.

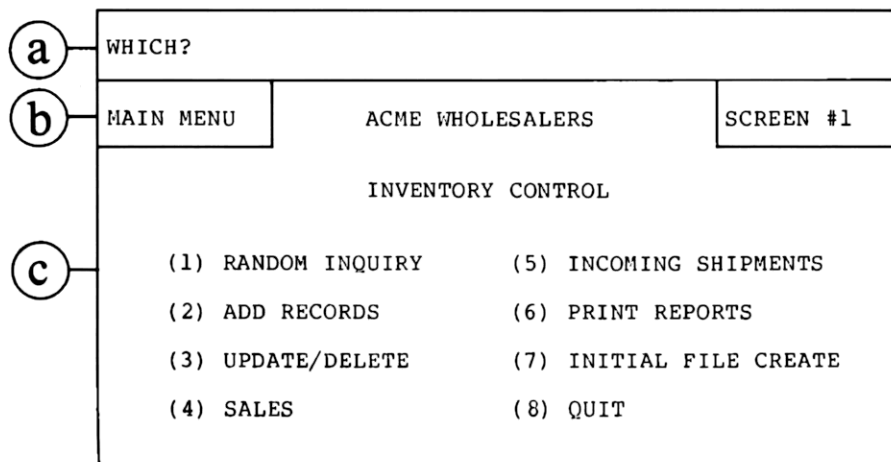


Figure 1. Sample menu. (a) The communications area. (b) Messages appear here; they seem to be outside the main screen. (c) The main body of the screen.

System Requirements

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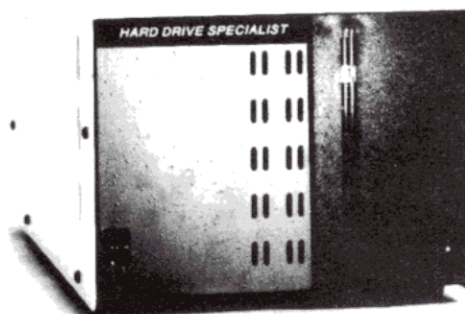
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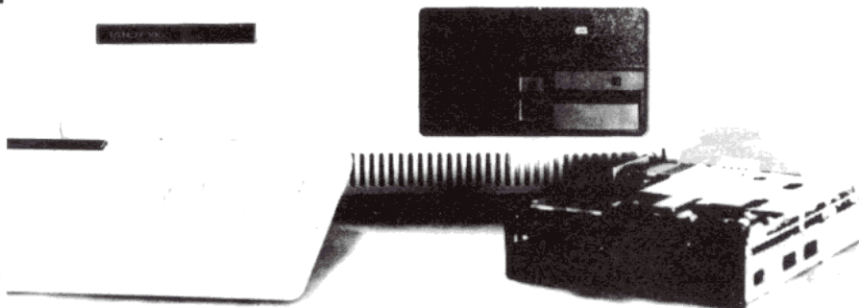
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Error Messages

Program Listing 4 uses the communications area of the screen to flash error messages of your choice. Variable E\$ defines the message, and the subroutine flashes it five times. To use Listing 4, initialize E\$ with the desired message and a GOSUB 20840 command. By merging Program Listing 5 with Listing 4, you can see the technique in action.

Screen Framing

To make messages more visible, the program prints them on top of a frame, which makes them appear outside the normal screen area (see Fig. 1b). Program Listing 6 creates this frame; you can change the frame's layout as you wish. To use the Frame subroutine, ini-

tions line take up the top four lines of the screen, leaving 12 lines for the main body. The main body usually starts with a main menu, as in Fig. 1c.

Menu Selection Techniques

The selection process usually determines the physical layout of a menu screen. The menu in Photo 1 is probably the most common type. One of the Selection routine's primary concerns is ease of operation. Program Listing 8 is a composite program incorporating the subroutines I've already described; it produces the screen shown in Photo 1.

In Listing 8, you select an option with one keystroke. (Remember the Input subroutine uses the INKEY\$ option; you don't need to press the enter key for

You might prefer to have the alphabetic character represent the actual first character of the entry, as in Photo 3. This requires a minor addition to the selection process as listed in Program Listing 10. Note statements 4200-4400. Be careful not to duplicate the first characters in the menu.

The last selection method is selection by cursor movement (see Program Listing 11); you press the space bar to move the cursor from entry to entry.

The key to this routine is loading the screen address into an array and using the array subscript as the entry point. This menu selection technique requires more keystrokes; however, its advantages include ease of training and increased accuracy in entry selection.



Photo 2. Screen photo of a menu with alphabetic options.

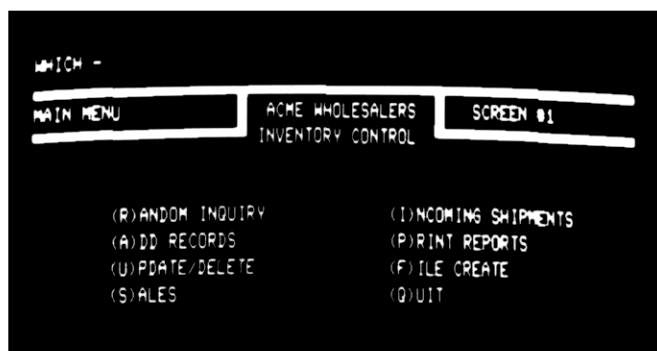


Photo 3. Screen photo of a menu with first-character options.

tialize the variables in Table 1 and execute a GOSUB 20130 command. Merge Program Listing 7 with Listing 6 to see my sample layout.

Listing 6 combines standard code and graphics required to produce a standard frame at the top of each screen. In the upper left box, the current function is identified (F\$). In the upper right box, the screen number is identified (S%). The screen number provides a clear reference point for written documentation. The business name (B\$) appears between the boxes. The program name (P\$) appears directly beneath the business name.

You only have to initialize the business and program names at the start of the program; their values won't change. The framing area and the communica-

single-character entries.) This, however, presents a problem if you have more than nine options. You'd have to enter two digits, which is unacceptable to the standard INKEY\$.

I've told you how to use loops to get around INKEY\$'s preference for single-character input. Another alternative is to construct a menu with alphabetic options. The screen in Photo 2 is an example; notice that it has more entries than the screen in Photo 1. To use the alphabetic option, you can convert the alphabetic characters to numeric equivalents.

Each alphabetic character has an ASCII value equal to its numeric position in the alphabet, plus 64. Therefore, by subtracting 64 from the ASCII value of the alphabetic character, you'll have A = 1, B = 2, C = 3, and so on. The following instruction accomplishes this:

```
4200 ON ASC(Z$) - 64 GOTO  
5000,6000,7000...
```

Program Listing 9 shows a complete menu preparation using the single alphabetic character for selection. This lets you select one of 26 options with a single keystroke.

To make the most efficient use of the three subroutines (Listings 1, 4, and 6), I've stored them in a program called Skeleton (Program Listing 12). Whenever I write a menu-driven program, I merely load Skeleton into memory. Then I can devote more time to building the unique part of the application around the subroutines.

Conversion

All listings run without modification on the Models I and III. Listings 1-5 and 7 run on the Model 4. With the modifications shown in Fig. 2, the remaining listings also run on the Model 4. ■

Write to Ken Schweim at 436 Mound Ave., Mankato, MN 56001.

Variable	Definition
F\$	Function name
B\$	Business name
S%	Screen number
P\$	Program name

Table. Variables used in Program Listing 6.

Related Articles

Miller, Doug. "The Screen Writer," November 1984, p. 98. Creates Model I/III data input screens.
Wilde, Tim. "Versatile Input," September 1980, p. 98. Input Model I data with ease.
Shuken, Bob. "Dexterous Data Entry," December 1981, p. 280. Menu-generated Model I data entry routine.

LISTING 6

```

20140 PRINT @80, STRING$(80,140);
20150 PRINT @186, CHR$(191);
20160 PRINT @212, CHR$(191);
20170 PRINT @266, CHR$(191);
20180 PRINT @292, CHR$(191);
20190 PRINT @320, STRING$(27,131);
20200 PRINT @372, STRING$(28,131);
20220 PRINT @168, FS;
20230 PRINT @215, "SCREEN "; S%;
20240 PRINT @222, "#";
20260 PRINT @189+((20-LEN(B$))/2), B$;
20280 PRINT @269+((20-LEN(P$))/2), P$;

```

LISTING 8

```

2000 PRINT @416,"(1) RANDOM INQUIRY";
2020 PRINT @447,"(5) INCOMING SHIPMENTS";
2040 PRINT @496,"(2) ADD RECORDS";
2060 PRINT @527,"(6) PRINT REPORTS";
2080 PRINT @576,"(3) UPDATE/DELETE";
2100 PRINT @607,"(7) INITIAL FILE CREATE";
2120 PRINT @656,"(4) SALES";
2140 PRINT @687,"(8) QUIT";

```

LISTING 9

```

2000 PRINT @416,"(A) RANDOM INQUIRY";
2020 PRINT @447,"(F) PRINT REPORTS";
2040 PRINT @496,"(B) ADD RECORDS";
2060 PRINT @527,"(G) RETURNED GOODS";
2080 PRINT @576,"(C) UPDATE/DELETE";
2100 PRINT @607,"(H) PRINT CATALOG";
2120 PRINT @656,"(D) SALES";
2140 PRINT @687,"(I) INITIAL FILE CREATE";
2160 PRINT @736,"(E) RECEIPTS";
2180 PRINT @767,"(J) QUIT";

```

LISTING 10

```

2000 PRINT @416,"(R)RANDOM INQUIRY";
2020 PRINT @447,"(I)NCOMING SHIPMENTS";
2040 PRINT @496,"(A)DD RECORDS";
2060 PRINT @527,"(P)RINT REPORTS";
2080 PRINT @576,"(U)PDATE/DELETE";
2100 PRINT @607,"(F)ILE CREATE";
2110 PRINT @656,"(S)ALES";
2120 PRINT @687,"(Q)UIT";

```

LISTING 11

```

2000 PRINT @416,"(1) RANDOM INQUIRY";
2020 PRINT @447,"(5) INCOMING SHIPMENTS";
2040 PRINT @496,"(2) ADD RECORDS";
2060 PRINT @527,"(6) PRINT REPORTS";
2080 PRINT @576,"(3) UPDATE/DELETE";
2100 PRINT @607,"(7) INITIAL FILE CREATE";
2120 PRINT @656,"(4) SALES";
2140 PRINT @687,"(8) QUIT";

```

LISTING 12

```

20140 PRINT @80, STRING$(80,140);
20150 PRINT @186, CHR$(191);
20160 PRINT @212, CHR$(191);
20170 PRINT @266, CHR$(191);
20180 PRINT @292, CHR$(191);
20190 PRINT @320, STRING$(27,131);
20200 PRINT @372, STRING$(28,131);
20220 PRINT @168, FS;
20230 PRINT @215, "SCREEN "; S%;
20240 PRINT @222, "#";
20260 PRINT @189+((20-LEN(B$))/2), B$;
20280 PRINT @269+((20-LEN(P$))/2), P$;

```

Figure 2. Model 4 conversions for Program Listings 6 and 8-12.

Program Listing 1. Common input subroutine.

```

20350 REM -----
20355 REM COMMON INPUT SUBROUTINE
20360 REM -----
20440 W$="WHICH"
20450 L%=1
20460 PRINT @0,STRING$(60," ");
20480 PRINT @0,W$;
20500 PRINT @0+LEN(W$)+1,STRING$(L%,"-");
20520 PRINT @0+LEN(W$)+1,"";
20540 Z$="":Y$=""
20560 FOR I%=1 TO L%
20580 Y$=INKEY$:IF Y$=""GOTO 20580
20584 IF Y$=CHR$(13)GOTO 20770
20588 IF Y$=CHR$(8)GOTO 20610
20592 IF NU$ <> "N" GOTO 20605
20596 IF Y$=CHR$(46)GOTO 20605
20600 IF Y$<CHR$(48) OR Y$>CHR$(57)GOTO 20580
20605 IF Y$<CHR$(32) OR Y$>CHR$(122) Y$="":GOTO
20580
20610 Z$=Z$+Y$
20620 PRINT @0+LEN(W$)+1,Z$;
20640 IF Y$ <> CHR$(8) GOTO 20760
20660 Z$=LEFT$(Z$,LEN(Z$)-2)
20680 PRINT @0+LEN(W$)+1,STRING$(63-LEN(W$)," ");
20690 PRINT @0+LEN(W$)+1,STRING$(L%,"-");
20700 PRINT @0+LEN(W$)+1,Z$;
20720 IF I%=1 GOTO 20580
20740 I%=I%-1
20750 GOTO 20580
20760 NEXT I%
20770 NU$=""
20780 RETURN

```

End

Program Listing 2. Test program for Program Listing 1.

```

25 CLS
50 CLEAR 1000
1000 W$="ENTER TODAYS DATE MM/DD/YY"
1020 L%=8
1040 GOSUB 20460
1999 END

```

End

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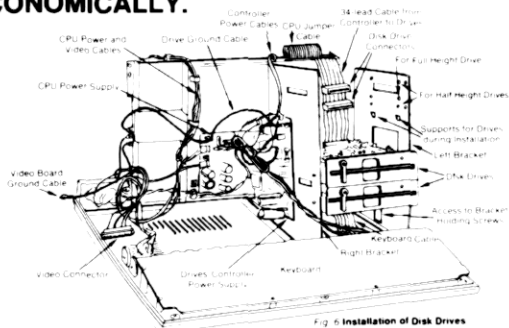


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```

25 CLS
50 CLEAR 1000
1000 W$="ENTER SALES AMOUNT"
1020 L$=9
1040 NU$="N"
1060 GOSUB 20460
1999 END

```

End

Program Listing 4. Error flash subroutine.

```

20800 REM -----
20805 REM ERROR 'FLASH' SUBROUTINE
20810 REM -----
20840 FOR J%=1 TO 5
20845 PRINT @0,E$;
20850 FOR I%=1 TO 250:NEXT I%
20860 PRINT @0,STRING$(63," ");
20880 FOR I%=1 TO 150: NEXT I%
20890 NEXT J%
20920 RETURN

```

End

Program Listing 5. Test program for Program Listing 4.

```

25 CLS
50 CLEAR 1000
1000 E$="RESPONSE MUST BE 1 - 8"
1020 GOSUB 20840
1999 END

```

End

Program Listing 6. Screen framing subroutine.

```

20100 REM -----
20105 REM SCREEN 'FRAMING' SUBROUTINE
20110 REM -----
20130 CLS
20140 PRINT @64, STRING$(64,140);
20150 PRINT @85, CHR$(188);
20160 PRINT @106, CHR$(188);
20170 PRINT @149, CHR$(191);
20180 PRINT @170, CHR$(191);
20190 PRINT @192, STRING$(22,131);
20200 PRINT @234, STRING$(22,131);
20220 PRINT @128, P$;
20230 PRINT @174, "SCREEN "; S%;
20240 PRINT @181, "#";
20260 PRINT @150+((20-LEN(B$))/2), B$;
20280 PRINT @214+((20-LEN(P$))/2), P$;
20300 RETURN

```

End

Program Listing 7. Test program for Program Listing 6.

```

25 CLS
50 CLEAR 1000
1000 B$="ACME WHOLESALERS"
1020 P$="INVENTORY CONTROL"
1040 F$="INITIAL CREATE"
1060 S%=13
1080 GOSUB 20130
1999 END

```

End

Program Listing 8. Composite menu print routine.

```

100 CLS
500 CLEAR 1000
1000 B$="ACME WHOLESALERS"
1020 P$="INVENTORY CONTROL"
1040 F$="MAIN MENU"
1060 S%=1
1080 GOSUB 20130
2000 PRINT @392,"(1) RANDOM INQUIRY";
2020 PRINT @421,"(5) INCOMING SHIPMENTS";
2040 PRINT @456,"(2) ADD RECORDS";
2060 PRINT @485,"(6) PRINT REPORTS";
2080 PRINT @520,"(3) UPDATE/DELETE";
2100 PRINT @549,"(7) INITIAL FILE CREATE";

```

Listing 8 continued

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DESCRIPTION

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 BREAKVEN 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 ANNUEDEF Present value of deferred annuities
27 MARKUP % Markup analysis for items
28 SINKFUND Sinking fund amortization program
29 BONDDVAL 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 BONDDVAL2 Value of a bond
35 EPSEST Estimate of future earnings per share for company
36 BETAALPH Computes alpha and beta variables for stock
37 SHARPE1 Portfolio selection model i.e. what stocks to hold
38 OPTWRITE Option writing computations
39 RTVAL Value of a right
40 EXPVAL Expected value analysis
41 BAYES Bayesian decisions
42 VALPRINF Value of perfect information
43 VALADINF Value of additional information
44 UTILITY Derives utility function
45 SIMPLEX Linear programming solution by simplex method
46 TRANS Transportation method for linear programming
47 EOQ Economic order quantity inventory model
48 QUEUE1 Single server queueing (waiting line) model
49 CVP Cost-volume-profit analysis
50 CONDPFOT Conditional profit tables
51 OPTLOSS Opportunity loss tables
52 FQOQOQ Fixed quantity economic order quantity model
53 FQOQWSH As above but with shortages permitted
54 FQOQWPB As above but with quantity price breaks
55 QUEUECB Cost-benefit waiting line analysis
56 NCFANAL Net cash-flow analysis for simple investment
57 PROFIND Profitability index of a project
58 CAPI Cap. Asset Pr. Model analysis of project

59 WACC Weighted average cost of capital
60 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 Laspeyres price index
66 PRINDPA Paasche price index
67 SEASIND Constructs seasonal quantity indices for company
68 TIMETR Time series analysis linear trend
69 TIMEMOV Time series analysis moving average trend
70 FUPRINF Future price estimation with inflation
71 MAILPAC Mailing list system
72 LETWRT Letter writing system-links with MAILPAC
73 SORT3 Sorts list of names
74 LABEL1 Shipping label maker
75 LABEL2 Name label maker
76 BUSBUD DOME business bookkeeping system
77 TIMECLCK Computes weeks total hours from timeclock info.
78 ACCTPAY In memory accounts payable system-storage permitted
79 INVOICE Generate invoice on screen and print on printer
80 INVENT2 In memory inventory control system
81 TELDIR Computerized telephone directory
82 TIMUSAN Time use analysis
83 ASSIGN Use of assignment algorithm for optimal job assign.
84 ACCTREC In memory accounts receivable system-storage ok
85 TERMSPAY Compares 3 methods of repayment of loans
86 PAYNET Computes gross pay required for given net
87 SELLPR Computes selling price for given after tax amount
88 ARBCOMP Arbitrage computations
89 DEPRSF Sinking fund depreciation
90 UPSZONE Finds UPS zones from zip code
91 ENVELOPE Types envelope including return address
92 AUTOEXP Automobile expense analysis
93 INSFILE Insurance policy file
94 PAYROLL2 In memory payroll system
95 DILANAL Dilution analysis
96 LOANAFDD Loan amount a borrower can afford
97 RENTPRCH Purchase price for rental property
98 SALELEAS Sale-leaseback analysis
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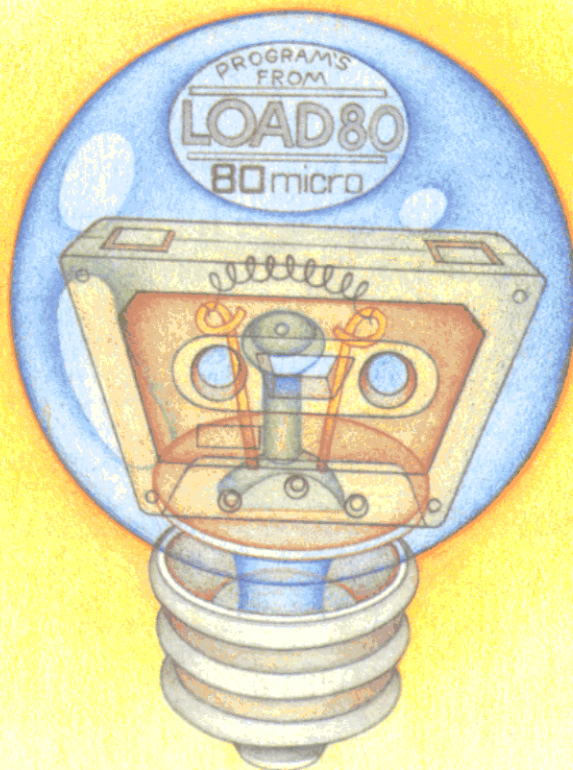
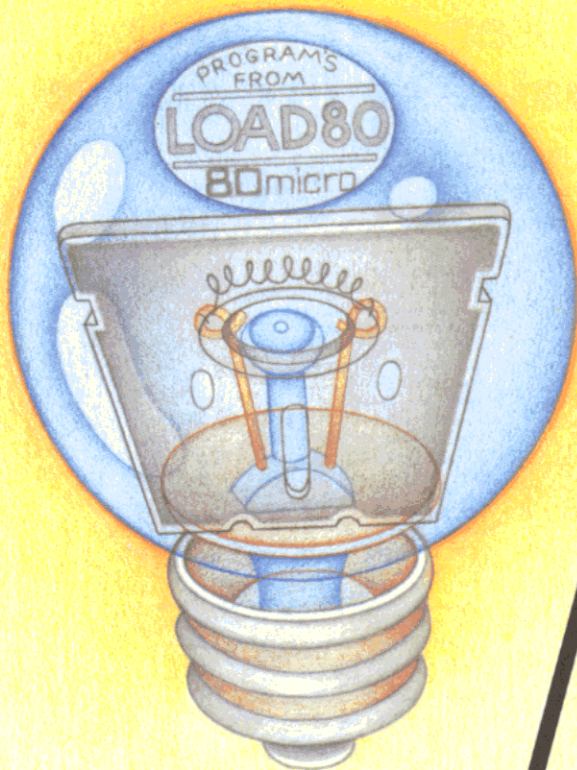


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Listing 8 continued

```

2120 PRINT @584,"(4) SALES";
2140 PRINT @613,"(8) QUIT";
2160 NUS="N"
3000 GOSUB 20440
4100 IF VAL(Z$)<1 GOTO 4500
4200 ON VAL(Z$) GOTO 5000,6000,7000,8000,9000,10000,11000,12000
4500 ES="RESPONSE MUST BE NUMBER 1-8"
4520 GOSUB 20840
4540 GOTO 3000
5000 STOP:REM (RANDOM INQUIRY ROUTINE)
6000 STOP:REM (ADD RECORDS ROUTINE)
7000 STOP:REM (UPDATE/DELETE ROUTINE)
8000 STOP:REM (SALES ROUTINE)
9000 STOP:REM (INCOMING SHIPMENTS ROUTINE)
10000 STOP:REM (PRINT REPORTS ROUTINE)
11000 STOP:REM (INITIAL FILE CREATE ROUTINE)
12000 STOP:REM (QUIT ROUTINE)
19999 END

```

End

Program Listing 9. Composite menu print routine using alphabets.

```

100 CLS
500 CLEAR 1000
1000 B$="ACME WHOLESALERS"
1020 P$="INVENTORY CONTROL"
1040 F$="MAIN MENU"
1060 S$=1
1080 GOSUB 20130
2000 PRINT @392,"(A) RANDOM INQUIRY";
2020 PRINT @421,"(F) PRINT REPORTS";
2040 PRINT @456,"(B) ADD RECORDS";
2060 PRINT @485,"(G) RETURNED GOODS";
2080 PRINT @520,"(C) UPDATE/DELETE";
2100 PRINT @549,"(H) PRINT CATALOG";
2120 PRINT @584,"(D) SALES";
2140 PRINT @613,"(I) INITIAL FILE CREATE";
2160 PRINT @648,"(E) RECEIPTS";
2180 PRINT @677,"(J) QUIT";
3000 GOSUB 20440
4100 IF Z$<"A" GOTO 4500
4200 ON ASC(Z$)-64 GOTO 5000,6000,7000,8000,9000,10000,11000,12000,13000,14000
4500 ES="RESPONSE MUST BE A-J"
4520 GOSUB 20840
4540 GOTO 3000
5000 STOP:REM (RANDOM INQUIRY ROUTINE)
6000 STOP:REM (ADD RECORDS ROUTINE)
7000 STOP:REM (UPDATE/DELETE ROUTINE)
8000 STOP:REM (SALES ROUTINE)
9000 STOP:REM (RECEIPTS ROUTINE)
10000 STOP:REM (PRINT REPORTS ROUTINE)
11000 STOP:REM (RETURNED GOODS ROUTINE)
12000 STOP:REM (PRINT CATALOG ROUTINE)
13000 STOP:REM (INITIAL FILE CREATE ROUTINE)
14000 STOP:REM (QUIT ROUTINE)
19999 END

```

End

Program Listing 10. Composite menu print routine using first characters.

```

100 CLS
500 CLEAR 1000
1000 B$="ACME WHOLESALERS"
1020 P$="INVENTORY CONTROL"
1040 F$="MAIN MENU"
1060 S$=1
1080 GOSUB 20130
2000 PRINT @392,"(R)ANDOM INQUIRY";
2020 PRINT @421,"(I)NCOMING SHIPMENTS";
2040 PRINT @456,"(A)DD RECORDS";
2060 PRINT @485,"(P)RINT REPORTS";
2080 PRINT @520,"(U)PDATE/DELETE";
2100 PRINT @549,"(F)ILE CREATE";
2110 PRINT @584,"(S)ALES";
2120 PRINT @613,"(Q)UIT";
3000 GOSUB 20440
4200 S$ = "RAUSIPFQ"
4220 FOR I%=1 TO LEN(S$)
4240 IF MID$(S$,I%,1)=Z$ GOTO 4400
4260 NEXT I%
4280 ES="INVALID RESPONSE"
4300 GOSUB 20840
4320 GOTO 3000
4400 ON I% GOTO 5000,6000,7000,8000,9000,10000,11000,12000
4500 ES="RESPONSE MUST BE A - J"
4520 GOSUB 20840
4540 GOTO 3000

```

Listing 10 continued

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Listing 10 continued

```
5000 STOP:REM (RANDOM INQUIRY ROUTINE)
6000 STOP:REM (ADD RECORDS ROUTINE)
7000 STOP:REM (UPDATE/DELETE ROUTINE)
8000 STOP:REM (SALES ROUTINE)
9000 STOP:REM (INCOMING SHIPMENTS ROUTINE)
10000 STOP:REM (PRINT REPORTS ROUTINE)
11000 STOP:REM (INITIAL FILE CREATE ROUTINE)
12000 STOP:REM (QUIT ROUTINE)
19999 END
```

End

Program Listing 11. Composite menu print routine using cursor selection.

```
25 CLS
50 CLEAR 1000
100 DIM P(8)
120 FOR I%=1 TO 8
140 READ P(I%)
160 NEXT I%
180 DATA 392,456,520,584,421,485,549,613
200 W$="PRESS SPACE BAR FOR OPTIONS - ENTER TO SELECT"
1000 B$="ACME WHOLESALERS"
1020 P$="INVENTORY CONTROL"
1040 F$="MAIN MENU"
1060 S%=1
1080 GOSUB 20130
2000 PRINT @392,"(1) RANDOM INQUIRY";
2020 PRINT @421,"(5) INCOMING SHIPMENTS";
2040 PRINT @456,"(2) ADD RECORDS";
2060 PRINT @485,"(6) PRINT REPORTS";
2080 PRINT @520,"(3) UPDATE/DELETE";
2100 PRINT @549,"(7) INITIAL FILE CREATE";
2120 PRINT @584,"(4) SALES";
2140 PRINT @613,"(8) QUIT";
3000 FOR M%=1 TO 8
3020 PRINT @P(M%)-1,"*";
3040 GOSUB 20450
3060 IF Z$="" GOTO 4000
3070 PRINT @P(M%)-1," ";
```

Listing 11 continued

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```

3080 NEXT M%
3100 GOTO 3000
4000 ON M% GOTO 5000,6000,7000,8000,9000,10000,
11000,12000
4200 S$="RAUSIPFQ"
4220 FOR I%=1 TO LEN(S$)
4240 IF MID$(S$,I%,1)=Z$ GOTO 4400
4260 NEXT I%
4280 E$="INVALID RESPONSE"
4300 GOSUB 20840
4320 GOTO 3000
4400 ON I% GOTO 5000,6000,7000,8000,9000,10000,
11000,12000
4500 E$="RESPONSE MUST BE A - J"
4520 GOSUB 20840
4540 GOTO 3000
5000 STOP:REM (RANDOM INQUIRY ROUTINE)
6000 STOP:REM (ADD RECORDS ROUTINE)
7000 STOP:REM (UPDATE/DELETE ROUTINE)
8000 STOP:REM (SALES ROUTINE)
9000 STOP:REM (INCOMING SHIPMENTS ROUTINE)
10000 STOP:REM (PRINT REPORTS ROUTINE)
11000 STOP:REM (INITIAL FILE CREATE ROUTINE)
12000 STOP:REM (QUIT ROUTINE)
19999 END
20100 REM -----
20105 REM SCREEN 'FRAMING' SUBROUTINE
20110 REM -----
20130 CLS
20140 PRINT @64, STRING$(64,140);
20150 PRINT @85, CHR$(188);
20160 PRINT @106, CHR$(188);
20170 PRINT @149, CHR$(191);
20180 PRINT @170, CHR$(191);
20190 PRINT @192, STRING$(22,131);
20200 PRINT @234, STRING$(22,131);
20220 PRINT @128, F$;
20230 PRINT @174, "SCREEN "; S%;
20240 PRINT @181, "#";
20260 PRINT @150+((20-LEN(B$))/2), B$;
20280 PRINT @214+((20-LEN(P$))/2), P$;
20300 RETURN

```

```

20350 REM -----
20355 REM COMMON INPUT SUBROUTINE
20360 REM -----
20440 W$="WHICH"
20450 L%=1
20460 PRINT @0,STRING$(60," ");
20480 PRINT @0,W$;
20500 PRINT @0+LEN(W$)+1,STRING$(L%,"-");
20520 PRINT @0+LEN(W$)+1,"";
20540 Z$="":Y$=""
20560 FOR I%=1 TO L%
20580 Y$=INKEY$:IF Y$="" GOTO 20580
20584 IF Y$=CHR$(13) GOTO 20780
20588 IF Y$=CHR$(8) GOTO 20610
20592 IF NU$ <> "N" GOTO 20605
20596 IF Y$=CHR$(46) GOTO 20605
20600 IF Y$<CHR$(48) OR Y$>CHR$(57) GOTO 20580
20605 IF Y$<CHR$(32) OR Y$>CHR$(122) THEN Y$=""
:GOTO 20580
20610 Z$=Z$+Y$
20620 PRINT @0+LEN(W$)+1,Z$;
20640 IF Y$ <> CHR$(8) GOTO 20760
20660 Z$=LEFT$(Z$,LEN(Z$)-2)
20680 PRINT @0+LEN(W$)+1,STRING$(63-LEN(W$)," ");
20690 PRINT @0+LEN(W$)+1,STRING$(L%,"-");
20700 PRINT @0+LEN(W$)+1,Z$;
20720 IF I%=1 GOTO 20580
20740 I%=I%-1
20750 GOTO 20580
20760 NEXT I%
20770 NU$=""
20780 RETURN
20800 REM -----
20805 REM ERROR 'FLASH' SUBROUTINE
20810 REM -----
20840 FOR J%=1 TO 5
20845 PRINT @0,E$;
20850 FOR I%=1 TO 250:NEXT I%
20860 PRINT @0,STRING$(63," ");
20880 FOR I%=1 TO 150: NEXT I%
20890 NEXT J%
20920 RETURN

```

End

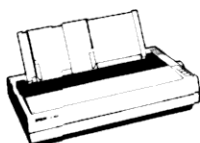
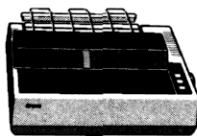
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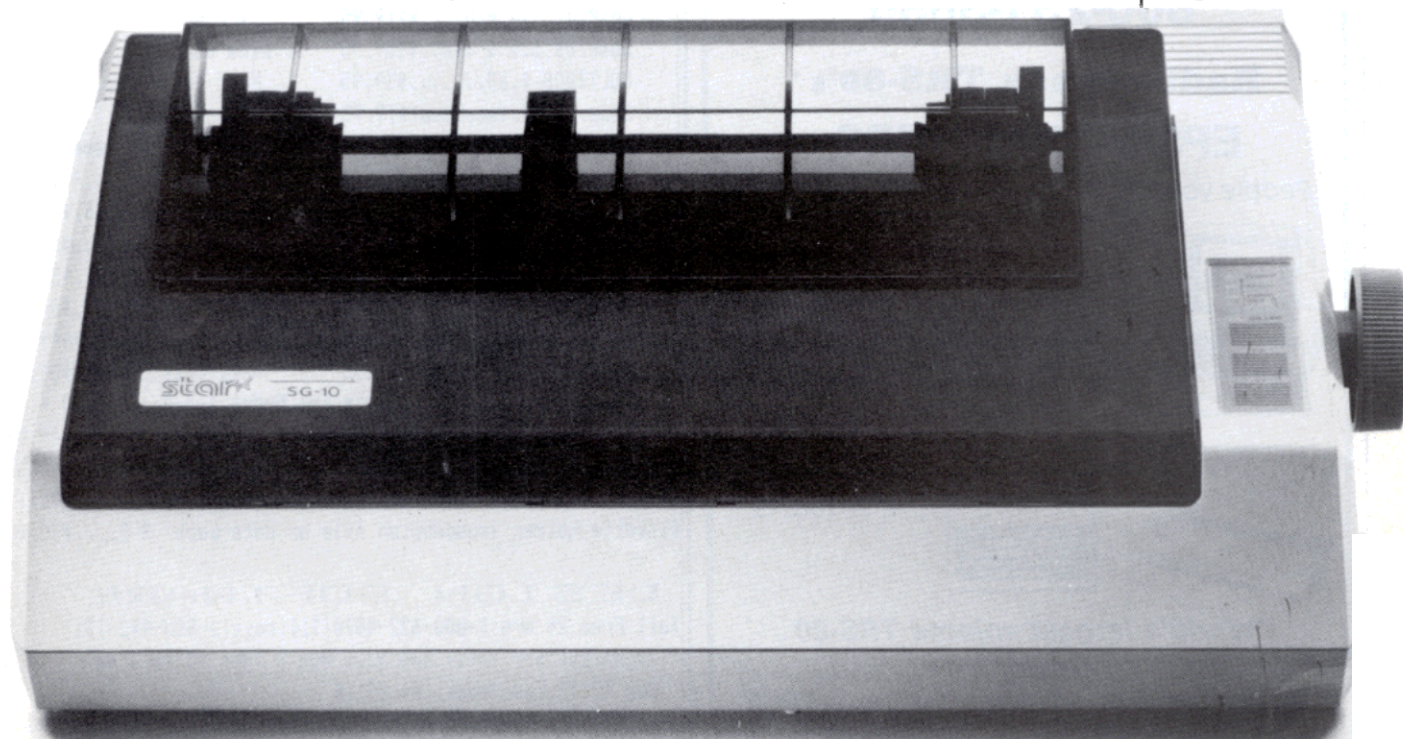
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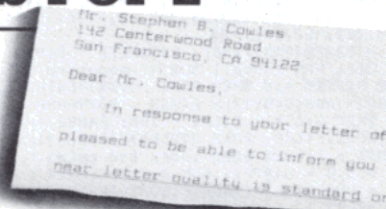
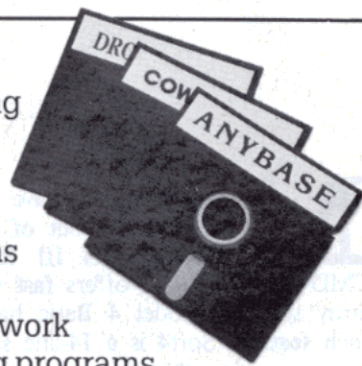
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A Sort Story

Add this lightning-fast string sort
to any Model 4 Basic program.

Model 4 owners have good cause to feel out of sorts. While Model III Basic's CMD"O" statement offers fast string array sorting, Model 4 Basic has no such feature. Sort4 is a 14-line string-sorting routine that restores order to Model 4 Basic. You can incorporate it into any program, and because it includes machine language, it's fast; you can sort 500 randomly sequenced strings, each 10-20 characters long, in about two seconds.

Sorting It Out

To use Sort4, type in Program Listing 1 and save it to disk in ASCII format (SAVE "SORT4",A). Once it's on disk, all you have to do is merge the routine with an existing program or load it before writing a new program.

When you're working with Sort4, you must protect the RAM area above location 65,303, since Sort4 stores machine-language code from locations 65,304-65,535. To do so, load Basic from the DOS level by typing in BASIC (M=65303).

Sort4 requires that you store strings for sorting in a string array named SORT4ARRAY\$ with a subscript between 1 and whatever upper limit you select for the array. Note that the lowest subscript is 1, not zero, to accommodate programs that specify "option base 1" for array subscripts.

A defined function called SORT4\$ controls access to Sort4 from anywhere in your program. You simply specify

Program Listing 1. Sort4 string-sorting routine.

```
1 S4PTR! = 65304! : REM Start of reserved area (232 bytes) for SORT4 code; must
    load BASIC via "BASIC (M=65303)". This is highest possible
    location, but can be lowered, as SORT4 is fully relocatable.
2 DATA 213,221,225,221,102,2,221,110,1,78,35,70,237,67,-229,35,78,35,70,237,67,
    -227,237,67,-217,237,75,-217,203,56,203,25,120,177,200,237,67,-217,33,1,
    0,34,-225,42,-227,183,237,66,34,-223,42,-225,34,-221,237,75,-217,9,34
3 DATA -219,42,-221,205,-184,229,221,225,42,-219,205,-184,229,253,225,221,126,0,
    183,40,98,253,126,0,183,40,40,221,190,0,56,72,221,70,0,175,50,-231,253,
    102,2,253,110,1,221,86,2,221,94,1,26,190,56,64,32,10,19,35,16,246,58
4 DATA -231,183,40,52,221,229,225,253,229,209,6,3,78,26,119,121,18,35,19,16,247,
    42,-221,237,75,-217,183,237,66,250,-194,40,20,34,-221,24,141,71,62,1,24,
    183,229,209,25,25,237,91,-229,25,201,42,-225,35,34,-225,237,75,-223,183
5 DATA 237,66,250,-58,202,-58,195,-28
6 DEFINT S: S4PTRMSB = FIX(S4PTR!/256): S4PTRLSB = S4PTR! - S4PTRMSB*256
7 FOR S4INDEX = 0 TO 216: REM Install SORT4; negative values require relocation
8 READ S4BYTE: IF S4BYTE >= 0 THEN POKE S4PTR!+S4INDEX,S4BYTE: GOTO 13
9 S4LSB = S4PTRLSB + ABS(S4BYTE): S4MSB = S4PTRMSB: REM Do relocation
10 IF S4LSB > 255 THEN S4LSB = S4LSB - 256: S4MSB = S4MSB + 1
11 POKE S4PTR!+S4INDEX,S4LSB: POKE S4PTR!+S4INDEX+1,S4MSB
12 S4INDEX = S4INDEX + 1: REM Step index for extra byte POKE'd
13 NEXT S4INDEX: DEF USR 0 = S4PTR!: REM Define SORT4 code entry point
14 DEF FN SORT4$(X%) = USR 0(MKIS(VALPTR(SORT4ARRAY$(X%)) - X%*3) + MKIS(X%))
```

End

Program Listing 2. Sort4 demonstration.

```
110 CLS: DIM SORT4ARRAY$(200): RESTORE
120 FOR S4WORK = 0 TO 187: REM Hash total DATA statements to check typing
130 READ S4BYTE: S4HASH = S4HASH + S4BYTE
140 NEXT S4WORK
150 IF S4HASH <> 12413 THEN PRINT "Error in DATA statements; please check!": END
160 PRINT "Setting up 200 7-byte alpha strings ....": PRINT
170 FOR S4WORK = 1 TO 200: REM Generate & display 200 random 7-byte strings
180 SORT4ARRAY$(S4WORK) = STRING$(7,RND(26)+96)
190 PRINT SORT4ARRAY$(S4WORK); " ";
200 NEXT S4WORK
210 PRINT 0; "Press <ENTER> when ready to commence sort ...."
220 S4WORK$ = INKEY$: IF S4WORK$ <> CHR$(13) THEN 220
230 CLS: PRINT 0; "Sorting commenced ...."
240 SOUND 0,0: DUMMY$ = FNSORT4$(200): SOUND 0,0: REM Sort SORT4ARRAY$(1)-(200)
250 CLS: PRINT "Sort complete ....": PRINT
260 FOR S4WORK = 1 TO 200: REM Display sorted strings
270 PRINT SORT4ARRAY$(S4WORK); " ";
280 NEXT S4WORK: END
```

End

the number of strings you want sorted.

For example, assume you want to sort 150 strings of varying lengths. You'd dimension SORT4ARRAY\$ (probably early in your program) with the statement DIM SORT4ARRAY\$(150).

Store your 150 strings in the array as SORT4ARRAY\$(1)-SORT4ARRAY\$(150). Each string may contain from zero (a null string) to 255 characters.

When you're ready to sort, you need to write only one statement: DUMMY\$ = FNSORT4\$(150). The variable name dummy is just that, a dummy. You can substitute any string name; Z\$ =

FNSORT4\$(150) works just as well. You can also use an integer variable for the number of strings; for example, if X% = 150, you could type in DUMMY\$ = FNSORT4\$(X%).

A Demonstration

So much for the theory—now you're ready to see the routine in action. Program Listing 2 demonstrates the sorting routine's speed and also checks the accuracy of your typing for Listing 1's data statements.

Assuming you've already saved Listing 1 to disk, load Basic as specified

System Requirements

Model 4
64K RAM
Basic
TRSDOS 6.X.X



above, then type in Listing 2 and merge Sort4 with it (MERGE "SORT4"). Run the merged program. You'll notice a short pause, during which the program sums the data values and checks the total, called a hash total, to make sure it's correct. If not, the program displays an error message.

If the total is correct, the program displays 200 seven-character strings, randomly sequenced, and prompts you to press the enter key to start the sort. In under a second, you'll see the strings re-displayed in sorted alphabetical order.

Routine Matters

Sort4's heart is the machine-language code in data lines 2-5, which is POKED into the high RAM area you protected from Basic. Although I said earlier that this area started at location 65,304 (FF18 hexadecimal), you don't have to use that address. If, for example, you're already using part of that area for a printer driver, change the 65,304 in line 1 to a lower address. The program automatically handles all relocation.

Remember, however, that SORT4 requires a 232-byte protected memory area, so be sure to change your Basic load command accordingly. If you change line 1 to read S4PTR! = 62000, you should load Basic by typing in BASIC (M=61999).

Incidentally, the data statements' negative values indicate that the program calculates relocation parameters before it POKes anything.

Line 14 passes a 4-byte parameter string to the SORT4 machine code. The routine uses the disk-related function MKI\$ to store the two integer values most efficiently: as a pointer to the array and a value indicating the number of strings you'll sort.

The array pointer's code in line 14 may seem strange, but it serves a purpose. If you specify a subscript beyond the dimensioned limit, Basic will return an error message, thereby protecting your data in memory from the machine code. ■

You can write to Alan D. Smith at P.O. Box 119, Mortdale, N.S.W. 2223, Australia.

Related Articles

Allan, Ralph C. "Proper Arrangements," June 1984, p. 96. Sort multidimensional string arrays under Model III TRSDOS.

deZoyza, C.A. "Graphic Sort," August 1980, p. 166. A visual demonstration of the sorting process.

Gorney, Len. "All About Sorts," Parts I and II, August 1981, p. 208 and September 1981, p. 148. A tutorial about sorting techniques.

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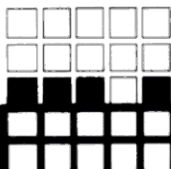
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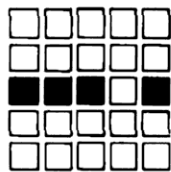
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Reasonable Deductions

Uncle Sam is tightening the reins on home computer tax deductions. Three tax experts explain what's allowed and what isn't.

As you prepare your federal income tax return, you should be aware of some important tax code changes affecting personal computer owners. In an attempt to curb taxpayer abuses, Congress severely limited home computer deductions in the Tax Reform Act of 1984. The new law makes it harder to qualify for a deduction and, in some cases, changes the amount you can deduct.

Many home computer costs are still deductible, however. In this article, we'll review the new deduction criteria and explain the kinds of deductions and tax credits you can claim.

Business Costs

In general, you can deduct computer costs relating to a business or trade, including employee business expenses and certain education expenses. However, the new law strictly limits trade or business deductions if you don't use a computer exclusively at a regular business establishment.

To qualify for a home office deduction, you must use a separate area of your home exclusively for business. The home office must be a principal place of business; for example, if you take work home from the office on weekends, your home study doesn't qualify as a home office.

If you earn secondary income through a home business, such as selling Avon or Amway products, and you use a room at home exclusively for this business, you qualify for a home office deduction.

Trade or business activity could include writing programs for money or computer consulting. The big danger here is that the Internal Revenue Service (IRS) might consider this activity a hobby rather than a business (although hobby costs might also be deductible; see the section below on personal use).

To determine whether an activity is a hobby or a profit-seeking venture, the IRS takes into account your intentions, whether you conduct the activity in a

businesslike way, your expertise, the time and effort you spend, the activity's profitability, and whether the activity is recreational. The tax code presumes that an activity is for profit, qualifying as a trade or business, if it's profitable in at least two of the five consecutive years ending with the tax year in question.

Under the new law, an employee may deduct home computer costs only if the computer is for his employer's convenience and is required as a condition of employment.

Income Production Costs

In addition to business costs, you can also deduct the cost of producing or collecting income; managing, conserving, or maintaining income property; or determining any tax. Deductible computer expenses, then, could include using a personal computer to monitor rental property maintenance, analyze an investment portfolio, keep tax records, or do tax planning.

Personal Costs

Personal use of a computer usually doesn't qualify for tax benefits. For example, if you use your computer solely for games, recipe storage, and household budgeting, your costs aren't deductible. However, in some cases you can deduct the cost of using a computer for medical reasons, charitable service, or as a revenue-producing hobby.

Deductible medical uses include treating a child's learning disability or computer-aided physical therapy. Certain computer uses by a handicapped person also qualify. Usually, a physician must prescribe these medical computer uses.

1984 Date	Start Time	Stop Time	Hardware/Software Used	Purpose and Comments
9/17	5:00p	7:30p	Tax Planner, Printer	Calculate third quarter estimate
9/18	11:00a	2:30p	1-2-3 Printer, Modem	Portfolio analysis
9/18	4:00p	5:00p	Space Commander, etc.	Entertainment
9/19	7:00p	9:30p	WordStar	Type bulletin for local professional organization
9/20	7:30p	8:00p	WordStar	Update mailing list for bulletin
9/22	10:00a	1:30p	1-2-3	Design template for possible resale

Figure. Sample log of computer use.

If you provide computer services to a charitable organization you can deduct some out-of-pocket costs. For example, a program for maintaining church pledge records is a deductible expense, and so are supplies like disks and printer paper. You can't deduct the cost of your computer, however, since capital expenditures aren't considered out-of-pocket expenses.

You can deduct hobby expenses if your hobby also produces revenue. If you use your computer to conduct genealogical research as a hobby and you derive some income from your research, you may deduct your costs, including the computer's cost, to offset the income you earn.

Allowable Deductions

If your computer use falls into one of the categories described above, you may claim a deduction for cost recovery or depreciation, Section 179 expensing (see below), and other expenses. Also, you can claim a tax credit equal to a portion of your computer's cost.

If you use your computer for several activities, your deductions or credits apply only to qualified uses. For example, a taxpayer who uses a computer 80 percent for business and 20 percent for personal purposes may deduct only 80 percent of his costs.

Cost Recovery or Depreciation

The cost of a personal computer is usually considered a capital expenditure and you can't fully deduct it in the year of purchase. Instead, you must spread your deduction over a number of years, either five or 12, depending on how you use your computer. The five-year method falls under the accelerated cost recovery system (ACRS) and a 12-year write-off is called a straight-line write-off.

Before the 1984 Tax Reform Act, all qualifying computer owners could use the five-year cost recovery schedule. However, under the new law, if you bought your computer after June 18, 1984, you must use it predominantly (that is, more than half the time) for business in order to qualify for the ACRS deduction. If you use your computer less than half the time for business, you must take your deduction over 12 years.

Under ACRS, the maximum deduction in the purchase year is 15 percent of the cost, no matter when during the year you bought the computer. The second year's maximum deduction is 22 percent; in each of the third, fourth, and fifth years the maximum deduction is 21 percent.

Under ACRS, the maximum deduction in the purchase year is 15 percent, no matter when during the year you bought the computer.

The cost you can recover is the original purchase price, including taxes, freight, and so on, adjusted for any Section 179 expensing or investment credit (see below). This amount is the maximum deduction; your actual deduction must also take into account the proportion of qualifying use. For example, if you use your computer 60 percent for business and 40 percent for personal reasons, you may take only 60 percent of the maximum deduction.

Investment-related activities don't count in determining whether you meet the minimum 50 percent business threshold. However, if you use your personal computer more than half the time for business activities, investment use counts when computing ACRS deductions. A taxpayer who uses a computer 75 percent for his business and 10 percent to monitor rental property maintenance may deduct 85 percent of the maximum.

If you bought your computer after June 18, 1984, and don't use it predominantly for business, your maximum annual deduction is $\frac{1}{2}$ of its cost. In the first year, however, you may take only a half-year's deduction, or $\frac{1}{4}$ of the cost. You base depreciation on the original price with no reduction for any investment tax credit. Again, though, this is the maximum possible deduction. Your actual deduction depends on the percentage of qualifying use.

In addition to the ACRS deduction, you can claim an investment tax credit of up to 10 percent of the cost of a personal computer used predominantly for business. You must reduce the cost you recover under ACRS by half the amount of your credit. If you use your computer only 60 percent for business, your credit is limited to 60 percent of the maximum.

Under Section 179 of the tax code, an immediate write-off is also available to computer owners who use their system predominantly for a trade or business. This gives you the option of deducting up to \$5,000 of qualifying capital expenditures in the year of purchase, rather than spreading the deduction over a number of years.

Assume you bought a home computer in October 1984 for \$6,000 and used it 80 percent of the time for a consulting business. You may choose to deduct \$4,800 of the cost (\$6,000 times 80 percent) in 1984. You must spread the remaining \$1,200 deduction over five years.

Two examples will illustrate the tax options available to a personal computer buyer. Taxpayer A bought a computer for \$3,500 in October 1984. He uses it 60 percent for business and 10 percent for investment-related activities. The remaining 30 percent is for personal use. He has the following alternatives in 1984:

- Deduct \$2,450 (\$3,500 times 70 percent) under Section 179.
- Claim a \$245 (\$3,500 times 10 percent times 70 percent) investment tax credit and deduct \$349 (((\$3,500 times 70 percent) - $\frac{1}{2}$ of \$245) times (15 percent ACRS allowance)) cost recovery.

Taxpayer B bought a personal computer for \$1,500 in September 1984. She uses her computer 25 percent for investment-related activities, the rest of the time for games and other personal purposes. She's limited to the following deduction in 1984:

- Straight-line depreciation of \$16 (\$1,500 divided by 12 years times $\frac{1}{2}$ first-year limit times 25 percent use). She can't claim an investment tax credit or take advantage of Section 179 expensing.

Other Expenses

Tax rulings for other computer expenses, like software and supplies, depend on how you buy and use the products. Bundled software, that is, software sold along with a computer, is treated as part of the computer cost for tax purposes. The rules for hardware, outlined above, also apply to bundled software.

Programs sold separately are treated as a separate asset. You can deduct their costs only if you use the software in a trade or business, for investment-related activities, for preparing or determining taxes, or for those personal uses specifically allowed as deductions (see above).

You must take your deduction on a straight-line basis over five years or the software's expected useful life, whichever is less. Certain programs, such as tax planning software, often have a useful life of only one year; you can deduct their cost in the year you buy them.

You should allocate the cost of multipurpose software based on use; if you use a spreadsheet program one-half the

time for household budgeting and one-half for investments, you may deduct half its cost.

Supplies like disks, printer ribbons, and paper are usually deductible in the year of purchase, but only to the extent you use them in qualifying activities.

You can deduct other expenses, such as computer books and periodicals, as long as they're necessary to your trade, business, or investment activities.

Changes in Usage

If your ratio of business to personal computer use changes in later years, you may have to compensate for a portion of the deductions or credits you claimed in earlier years. This is called recapturing, and it requires that you report amounts previously deducted as income for the current tax year.

Record-Keeping Requirements

In addition to setting new limits on the amounts of deductions available to personal computer owners, the 1984 tax law also mandates certain record-keeping procedures. In tax years after 1984, you must be able to substantiate by contemporaneous records any deductions or credits relating to computer owner-

ship. The records should accurately indicate the business purpose of computer use, work done, and the date and time. A log like that shown in the Figure should fulfill these requirements.

The law also requires tax preparers to certify that taxpayers claiming personal computer deductions have indicated the existence of adequate documentation.

Failure to comply with the records requirement could lead to penalties for negligence, or even fraud.

Preparing Returns

You should list information about your computer and calculate cost recovery or a depreciation deduction on IRS Form 4562. You can then claim a deduction for cost recovery, depreciation, and Section 179 expensing in one of three places on your tax return.

Use Schedule C (Self-Employment Income) for trade or business claims and Schedule E (Other Income) for deductions relating to rental or royalty income. Claim other deductions on Schedule A (Itemized Deductions). Itemized deductions could include medical use, charitable contributions, investment activities other than those related to real estate or royalty income, and costs in-

curred in determining taxes. You may take Schedule C and Schedule E deductions whether you itemize or not; Schedule A deductions apply only if you itemize.

Summary

To gain the maximum possible tax benefit from computer ownership, you must monitor and document computer use and maintain qualified use. If you do so, your tax savings can be significant, despite the tax code's new restrictions. ■

The authors teach accounting at Auburn University at Montgomery; all are certified public accountants and experienced tax advisors. You can contact them at Auburn University at Montgomery, Montgomery, AL 36193.

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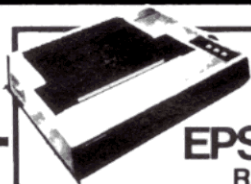
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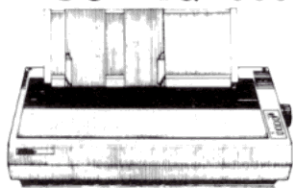
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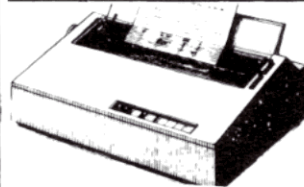
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22295 Euclid Ave.
Euclid, Ohio 44117

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A GOOD NAME!**

12750	DEFM	'FFFFFFFFFFFFFFFF'	13690	DJNZ	LP1D	14650	LD	(HL),A
12760	DEFM	'FFF::O::::::'	13700	LD	(LPMOD),HL	14660	LP7	INC
12770	DEFM	':::GFFFFFFFFFFFF'	13710	RET		14670	LD	A,(XXX)
12780	DEFM	'FFFFFFFFFFFFFFFF'	13720	LP2	LD	A,2	CP	127
12790	DEFM	'FFFFFFFFFFFFFFFF'	13730	LD	(LPA),A	14680	JP	Z,LP8
12800	DEFM	'FFFFFFF:::~:::~'	13740	LD	A,4	14700	INC	A
12810	DEFM	':::~:::~:::~:::~'	13750	LD	(LPB),A	14710	LD	(XXX),A
12820	DEFM	':::~:::~:::~:::~'	13760	CALL	LP1C	14720	JP	LP6
12830	DEFM	':::~:::~:::~:::~'	13770	LP2A	LD	A,1	XOR	A
12840	DEFM	':::~:::~:::~:::~'	13780	LD	(TEMA),A	14730	LD	(XXX),A
12850	DEFM	':::~:::~:::~:::~'	13790	JP	LP5	14740	LD	A,(LPRORE)
12860	DEFM	':::~:::~:::~:::~'	13800	LP3	LD	A,3	CP	'R'
12870	DEFM	':::~:::~:::~:::~'	13810	LD	(LPA),A	14770	JP	Z,LP8
12880	DEFM	':::~:::~:::~:::~'	13820	LD	A,6	14780	LD	A,(LPBIT)
12890	DEFM	':::~:::~:::~:::~'	13830	LD	(LPB),A	14790	SRL	A
12900	DEFM	':::~:::~:::~:::~'	13840	CALL	LP1C	14800	LD	(LPBIT),A
12910	DEFM	':::~:::~:::~:::~'	13850	JP	LP2A	14810	OR	A
12920	DEFM	':::~:::~:::~:::~'	13860	LP4	LD	A,1	JP	LP8A
12930	AUTH	DEFM	13870	LD	(TEMA),A	14830	LD	A,(LPBIT)
start program'			13880	LP4A	LD	A,(14400)	SLA	A
12940	LPRINT	CALL	13890	CP	4	14850	LD	(LPBIT),A
12950	LD	A,(LPRORE)	13900	JP	Z,BREAK	14860	CP	128
12960	CP	'R'	13910	LD	A,(3810H)	14870	LP8A	CALL
12970	JP	Z,LP0	13920	OR	A	14880	LD	HL,LPBUF
12980	CP	'E'	13930	JP	Z,LP4A	14890	LD	A,(LPD)
12990	JP	Z,LP0	13940	AND	30	14900	DEC	A
13000	CALL	CLS	13950	JP	Z,LP4A	14910	LD	(LPD),A
13010	LD	HL,ALPR	13960	CALL	LP4C	14920	JP	NZ,LP6
13020	LD	DE,15880	13970	CALL	LP4G	14930	LD	A,(LPB)
13030	LD	BC,(ALPR1)	13980	LD	(LPA),A	14940	LD	(LPD),A
13040	LDIR		13990	LP4B	LD	A,(14400)	LD	A,(YYY)
13050	LP0A	CALL	14000	CP	4	14960	CP	47
13060	OR	A	14010	JP	Z,BREAK	14970	JP	Z,LPEND
13070	JP	Z,LP0A	14020	LD	A,(3810H)	14980	INC	A
13080	CP	'R'	14030	OR	A	14990	LD	(YYY),A
13090	JP	Z,LP0B	14040	JP	Z,LP4B	15000	JP	LP6
13100	CP	'E'	14050	AND	254	15010	LPEND	LD
13110	JP	Z,LP0B	14060	JP	Z,LP4B	15020	DEC	A
13120	LD	A,(14400)	14070	CALL	LP4C	15030	CALL	NZ,LP6
13130	CP	4	14080	CALL	LP4G	15040	LD	B,3
13140	JP	Z,BREAK	14090	LD	(LPB),A	15050	LPEND1	LD
13150	JP	LP0A	14100	CALL	LP1C	15060	CALL	LPCHAR
13160	LP0B	LD	14110	JP	LP5	15070	DJNZ	LPEND1
13170	CALL	LOAD	14120	PUSH	AF	15080	LD	A,(LPRORE)
13180	LP0	CALL	14130	LD	A,(3810H)	15090	CP	'E'
13190	OR	A	14140	OR	A	15100	JP	Z,LPEND2
13200	JP	Z,LP0	14150	JP	NZ,LP4D	15110	LD	A,30
13210	CP	'S'	14160	JP	POPART	15120	CALL	LPCHAR
13220	JP	Z,LP1	14170	LD	B,-1	15130	LPEND3	JP
13230	CP	'M'	14180	LP4H	INC	15140	LPEND2	LD
13240	JP	Z,LP2	14190	SRL	A	15150	CALL	LPCHAR
13250	CP	'L'	14200	JP	NC,LP4H	15160	LD	A,'@'
13260	JP	Z,LP3	14210	LD	A,B	15170	CALL	LPCHAR
13270	CP	'D'	14220	RET		15180	JP	LPEND3
13280	JP	Z,LP4	14230	LP5	LD	A,(LPA)	LD	A,(LPRORE)
13290	CP	'E'	14240	LD	(LPC),A	15200	CP	'R'
13300	JP	Z,LP0B	14250	LD	A,(LPB)	15210	JP	Z,LPBR
13310	CP	'R'	14260	LD	(LPD),A	15220	LD	A,128
13320	JP	Z,LP0B	14270	CALL	CLPBF	15230	LD	(LPBIT),A
13330	LD	A,(14400)	14280	XOR	A	15240	RET	
13340	CP	4	14290	LD	(XXX),A	15250	LPBR	LD
13350	JP	Z,BREAK	14300	LD	(YYY),A	15260	LD	(LPBIT),A
13360	JP	LP0	14310	LD	A,(LPRORE)	15270	RET	
13370	LP1	LD	14320	CP	'R'	15280	LPLP	CALL
13380	LD	(LPA),A	14330	JP	Z,LP5	15290	LD	A,(TEMA)
13390	LD	A,2	14340	LD	A,128	15300	LD	B,A
13400	LD	(LPB),A	14350	LD	(LPBIT),A	15310	LP9	PUSH
13410	LP1A	CALL	14360	LD	A,27	15320	LD	HL,LPBUF
13420	OR	A	14370	CALL	LPCHAR	15330	LD	B,128
13430	JP	Z,LP1A	14380	LD	A,'@'	15340	LD	A,(LPRORE)
13440	CP	'1'	14390	CALL	LPCHAR	15350	CP	'R'
13450	JP	Z,LP1B	14400	LD	A,27	15360	JP	Z,LP10
13460	CP	'2'	14410	CALL	LPCHAR	15370	LD	A,27
13470	JP	Z,LP1B	14420	LD	A,'A'	15380	CALL	LPCHAR
13480	CP	'3'	14430	CALL	LPCHAR	15390	LD	A,75
13490	JP	Z,LP1B	14440	LD	A,8	15400	CALL	LPCHAR
13500	LD	A,(14400)	14450	CALL	LPCHAR	15410	LD	A,(LPMOD)
13510	CP	4	14460	JP	LP6	15420	CALL	LPCHAR
13520	JP	Z,BREAK	14470	LD	A,18	15430	LD	A,(LPDIV)
13530	JP	LP1A	14480	CALL	LPCHAR	15440	CALL	LPCHAR
13540	LP1B	SUB	14490	LD	A,1	15450	LP10	LD
13550	LD	(TEMA),A	14500	LD	(LPBIT),A	15460	CP	4
13560	LD	A,(LPA)	14510	JP	LP6	15470	JP	Z,LPBRK
13570	LD	B,A	14520	LP6	LD	A,(14400)	LD	A,(HL)
13580	LD	HL,0	14530	CP	4	15480	CALL	LPCHAR
13590	LD	DE,158	14540	JP	Z,LPQUIT	15490	LD	A,(LPC)
13600	CALL	LP1D	14550	LD	A,(YYY)	15500	DEC	A
13610	JP	LP5	14560	LD	D,A	15510	LD	(LPC),A
13620	LP1C	LD	14570	LD	A,(XXX)	15520	JP	NZ,LP10
13630	LD	B,A	14580	LD	E,A	15530	INC	HL
13640	LD	HL,30	14590	PUSH	HL	15540	LD	A,(LPA)
13650	LD	DE,128	14600	CALL	TEST	15550	LD	(LPC),A
13660	CALL	LP1D	14610	POP	HL	15560	DJNZ	LP10
13670	RET		14620	JP	Z,LP7	15570	LD	A,(LPRORE)
13680	LP1D	ADD	14630	LD	A,(LPBIT)	15580	CP	'R'
			14640	OR	(HL)	15590		

15600	JF	Z, LPTAB	17380	OR	C	18340	LD	(WORD1), HL
15610	LD	B, 30	17390	JP	Z, CNTT	18350	JP	NEWPAR
15620	LPTAB1	XOR	17400	LD	CNTY	18360	PARAM3	CALL
15630	CALL	LPCHAR	17410	LD	HL, 3C00H	18370	LD	LOAD
15640	DJNZ	LPTAB1	17420	LD	BC, 1024	18380	LD	HL, (WORD1)
15650	JF	LP10A	17430	NEXTT	A, (HL)	18390	OR	DE, NEWBUF
15660	LPTAB	LD	17440	CP	20H	18400	SBC	HL, DE
15670	LPTAB2	LD	17450	JP	NZ, WAITT	18410	RET	Z
15680	CALL	A, 128	17460	INC	HL	18420	PUSH	HL
15690	DJNZ	LPCHAR	17470	DEC	BC	18430	POP	BC
15700	LP10A	POP	17480	LD	A, B	18440	FIXCOU	DEC
15710	DJNZ	BC	17490	OR	C	18450	DEC	BC
15720	CALL	LP9	17500	JP	Z, 402DH	18460	DEC	BC
15730	LD	CLPBF	17510	JP	NEXTT	18470	LD	A, B
15740	LD	A, 13	17520	WAITT	B, 0	18480	OR	C
15750	CALL	LPCHAR	17530	LOOP	DJNZ	18490	JP	NZ, FIXCOU
15760	LD	A, (YYY)	17540	JP	ADVANI	18500	LD	(NEWCOU), HL
15770	CP	47	17550	BREAK	A, (14400)	18510	PARAM1	LD
15780	JP	Z, LP11	17560	BIT	2, A	18520	PARAM2	LD
15790	XOR	A	17570	JP	NZ, BREAK	18530	LD	IX, BUFLAS
15800	LD	(TEMAL), A	17580	CALL	LOAD	18540	CONPAR	LD
15810	RET		17590	LD	A, 3	18550	LD	A, (HL)
15820	LD	A, 1	17600	LD	(BB), A	18560	CP	0FFH
15830	LD	(TEMAL), A	17610	JP	CLRRET	18570	JP	NZ, NEXPAR
15840	RET		17620	LD	A, 2	18580	INC	HL
15850	LPC1	PUSH	17630	LD	(BB), A	18590	INC	HL
15860	LD	A, (14400)	17640	LD	A, (XX)	18600	DEC	DE
15870	CP	4	17650	LD	(XXX), A	18610	LD	A, D
15880	JP	Z, POPART	17660	LD	A, (YY)	18620	OR	E
15890	IN	A, (0F8H)	17670	LD	(YYY), A	18630	JP	NZ, CONPAR
15900	AND	0F0H	17680	NEWAAA	CALL	18640	JP	ENDPAR
15910	CP	30H	17690	OR	A	18650	CALL	SMALLY
15920	JP	NZ, LPC1	17700	JP	Z, NEWAAA	18660	CALL	SMALLX
15930	POP	AF	17710	CALL	SAVE	18670	CALL	LARGEX
15940	OUT	(0F8H), A	17720	CP	'W'	18680	LD	L, 0
15950	RET		17730	JP	Z, NEWWHI	18690	LD	A, (PARSX)
15960	POP	HL	17740	CP	'B'	18700	LD	(IX), A
15970	LPBRK	HL	17750	JP	Z, NEWCLS	18710	INC	IX
15980	LD	A, 13	17760	CP	'N'	18720	MORPAR	LD
15990	CALL	LPCHAR	17770	JP	Z, NEWNEG	18730	LD	A, (PARY)
16000	LD	A, 30	17780	CP	'P'	18740	LD	D, A
16010	CALL	LPCHAR	17790	JP	Z, NEWQVR	18750	LD	A, (PARSX)
16020	LD	BREAK	17800	CP	31H	18760	LD	E, A
16030	LD	HL, LPBUF	17810	JP	Z, NEWXXX	18770	PUSH	HL
16040	LD	DE, LPBUF+1	17820	CP	32H	18780	CALL	TEST
16050	LD	BC, 127	17830	JP	Z, NEWXXX	18790	POP	HL
16060	LD	A, (LPRORE)	17840	CP	33H	18800	JP	Z, PARRES
16070	CP	'R'	17850	JP	Z, NEWXXX	18810	PARPUS	RR
16080	JP	Z, CLPBF1	17860	CP	34H	18820	RR	H
16090	XOR	A	17870	JP	Z, NEWXXX	18830	PARRES	OR
16100	JP	CLPBF2	17880	CP	35H	18840	JP	A
16110	LD	A, 128	17890	JP	Z, NEWXXX	18850	LD	PARPUS
16120	LD	(HL), A	17900	LD	A, (14400)	18860	LD	A, (PARSX)
16130	LDIR		17910	CP	4	18870	INC	A
16140	LD	HL, LPBUF	17920	JP	Z, BREAK	18880	LD	(PARSX), A
16150	RET		17930	JP	NEWAAA	18890	LD	D, A
16160	ALPR	DEFM	17940	NEWXXX	LD	18900	LD	A, (PARLX)
16170	for Radio Shack or (E) for epson'		17950	PARAM	LD	18910	INC	A
16180	ALPR1	DEFW	17960	ENDPAR	LD	18920	CP	D
16190	CHANGE	LD	17970	LD	A, 0FFH	18930	JP	Z, PARNX
16200	RET	(HL), 80H	17980	INC	(IX), A	18940	INC	L
17030	POPART	POP	17990	LD	IX	18950	LD	A, L
17040	RET	AF	18000	LD	(IX), A	18960	CP	6
17050	POPHRT	POP	18010	LD	A, (TEMAL)	18970	JP	NZ, MORPAR
17060	RET	HL	18020	CP	31H	18980	OR	A
17070	CLRRET	XOR	18030	JP	Z, SPEC1	18990	RR	H
17080	RET	A	18040	CP	32H	19000	SCF	H
17090	POPHDB	POP	18050	JP	Z, SPEC2	19010	LD	A, H
17100	POP	HL	18060	CP	33H	19020	LD	(IX), A
17110	POP	DE	18070	JP	Z, SPEC3	19030	INC	IX
17120	RET	BC	18080	CP	34H	19040	LD	L, 0
17130	KXX	DEFB	18090	JP	Z, SPEC4	19050	JP	MORPAR
17140	YYY	DEFB	18100	JP	SPEC5	19060	LD	L
17150	LPRORE	DEFB	18110	PARAM	CALL	19070	LD	A, L
17160	LPA	DEFB	18120	CALL	KEEP	19080	CP	7
17170	LPA	DEFB	18130	XOR	A	19090	JP	Z, PARMOX
17180	LPC	DEFB	18140	LD	HL, NEWBUF	19100	OR	A
17190	LPD	DEFB	18150	LD	(WORD1), HL	19110	RR	H
17200	LPMOD	DEFB	18160	NEWPAR	CALL	19120	JP	PARNX
17210	LPDIV	DEFB	18170	LD	PFLASH	19130	PARMOX	SCF
17220	LPBUF	DEFS	18180	CALL	WASTE	19140	RR	H
17230	LPBIT	DEFB	18190	LD	PFLASH	19150	LD	A, H
17240	ADVANI	CALL	18200	LD	A, (14400)	19160	LD	(IX), A
17250	CALL	SAVE	18210	AND	125	19170	INC	IX
17260	LD	BREAK	18220	JP	Z, NEWPAR	19180	LD	A, (PARLX)
17270	LD	HL, 3C00H	18230	CP	4	19190	LD	(IX), A
17280	CNTY	LD	18240	JP	Z, PAREND	19200	INC	IX
17290	CP	A, (14400)	18250	CALL	ROUTNS	19210	CALL	PARFIL
17300	JP	Z, BREAK	18260	JP	1	19220	JP	PARAM2
17310	LD	A, (HL)	18270	LD	Z, PARAM3	19230	LD	HL, NEWBUF
17320	CP	20H	18280	LD	HL, (WORD1)	19240	LD	DE, (NEWCOU)
17330	JP	Z, NXTT	18290	LD	A, (YY)	19250	LD	A, (PARY)
17340	INC	(HL)	18300	LD	(HL), A	19260	LD	B, A
17350	NXTT	INC	18310	INC	HL	19270	MORFIL	LD
17360	DEC	BC	18320	LD	A, (XX)	19280	CP	A, (HL)
17370	LD	A, B	18330	INC	(HL), A		JP	B
					HL			Z, KILPAR

19290	NEXFIL	INC	HL	20200	PARSX2	INC	HL	21120	JP	Z,PSPOPR
19300		INC	HL	20210		INC	HL	21130	DEC	A
19310		DEC	DE	20220	PARSX4	DEC	BC	21140	JP	Z,PSNGB
19320		LD	A,D	20230		LD	A,B	21150	DEC	A
19330		OR	E	20240		OR	C	21160	JP	Z,PSOVW
19340		RET	Z	20250		JP	NZ,PARSX0	21170	DEC	A
19350		JP	MORFIL	20260		LD	A,E	21180	JP	Z,PSOVW
19360	KILPAR	LD	A,0FFH	20270		LD	(PARSX),A	21190	JP	PSNGW
19370		LD	(HL),A	20280		JP	POPHDB	21200	PSPOPS	POP
19380		JP	NEXFIL	20290	PARSX1	INC	HL	21210	JP	PSSET
19390	PAREND	CALL	LOAD	20300		LD	A,(HL)	21220	PSPOPR	POP
19400		JP	BREAK	20310		CP	E	21230	JP	PSRES
19410	PFLASH	LD	DE,NEWBUF	20320		JP	C,PARSX3	21240	PSOVW	POP
19420		LD	HL,(WORD1)	20330	PARSX5	INC	HL	21250	JP	C,PSRES
19430		OR	A	20340		LD	PARSX4	21260	PUSH	AF
19440		SBC	HL,DE	20350	PARSX3	LD	E,A	21270	PUSH	BC
19450		LD	A,H	20360		JP	PARSX5	21280	PUSH	HL
19460		OR	L	20370	LARGE	PUSH	BC	21290	JP	PSNEXT
19470		RET	Z	20380		PUSH	DE	21300	PSOVW	POP
19480		PUSH	HL	20390		PUSH	HL	21310	JP	C,PSSET
19490		POP	BC	20400		LD	A,(PARY)	21320	PUSH	AF
19500		LD	HL,NEWBUF	20410		LD	D,A	21330	PUSH	BC
19510	PFORE	LD	A,(HL)	20420		LD	E,0	21340	PUSH	HL
19520		LD	D,A	20430		LD	HL,NEWBUF	21350	JP	PSNEXT
19530		INC	HL	20440		LD	BC,(NEWCOU)	21360	PSNGB	POP
19540		LD	A,(HL)	20450	PARLX0	LD	A,(HL)	21370	JP	NC,PSRES
19550		LD	E,A	20460		CP	D	21380	PUSH	AF
19560		PUSH	BC	20470		JP	Z,PARLX1	21390	PUSH	BC
19570		PUSH	HL	20480	PARLX2	INC	HL	21400	PUSH	HL
19580		CALL	TEST	20490		INC	HL	21410	JP	PSNEXT
19590		POP	HL	20500	PARLX4	DEC	BC	21420	PSNGW	POP
19600		PUSH	HL	20510		LD	A,B	21430	JP	NC,PSSET
19610		JP	Z,PFOFF	20520		OR	C	21440	PUSH	AF
19620	PFOFF	DEC	HL	20530		JP	NZ,PARLX0	21450	PUSH	BC
19630		LD	A,(HL)	20540		LD	A,E	21460	PUSH	HL
19640		LD	D,A	20550		LD	(PARLX),A	21470	JP	PSNEXT
19650		INC	HL	20560		JP	POPHDB	21480	PSRES	PUSH
19660		LD	A,(HL)	20570	PARLX1	INC	HL	21490	PUSH	BC
19670		LD	E,A	20580		LD	A,(HL)	21500	PUSH	HL
19680		CALL	RESET	20590		CP	E	21510	LD	A,(YY)
19690		JP	PFCONT	20600		JP	HC,PARLX3	21520	LD	D,A
19700	PFOFF	DEC	HL	20610	PARLX5	INC	HL	21530	LD	A,(XX)
19710		LD	A,(HL)	20620		JP	PARLX4	21540	LD	E,A
19720		LD	D,A	20630	PARLX3	LD	E,A	21550	CALL	RESET
19730		INC	HL	20640		JP	PARLX5	21560	JP	PSNEXT
19740		LD	A,(HL)	20650	PSPEC0	LD	A,(14400)	21570	PSSET	PUSH
19750		LD	E,A	20660		CP	4	21580	PUSH	BC
19760		CALL	SET	20670		JP	Z,BREAK	21590	PUSH	HL
19770	PFCONT	POP	HL	20680		LD	A,(3810H)	21600	LD	A,(YY)
19780		POP	BC	20690		AND	62	21610	LD	D,A
19790		INC	HL	20700		JP	Z,PSPEC0	21620	LD	A,(XX)
19800		DEC	BC	20710		PUSH	AF	21630	LD	E,A
19810		LD	A,B	20720	PS1	LD	A,(3810H)	21640	CALL	SET
19820		OR	C	20730		OR	A	21650	PSNEXT	LD
19830		RET	Z	20740		JP	NZ,PS1	21660	INC	A
19840		DEC	BC	20750		POP	AF	21670	CP	128
19850		LD	A,B	20760		CP	2	21680	CALL	Z,PSLFX
19860		OR	C	20770		JP	Z,PSPEC1	21690	PSOK	LD
19870		RET	Z	20780		CP	4	21700	POP	HL
19880		JP	PFORE	20790		JP	Z,PSPEC2	21710	POP	BC
19890	SMALLY	PUSH	BC	20800		CP	8	21720	POP	AF
19900		PUSH	DE	20810		JP	Z,PSPEC3	21730	DJNZ	PSDJNZ
19910		PUSH	HL	20820		CP	16	21740	INC	HL
19920		LD	D,0FFH	20830		JP	Z,PSPEC4	21750	JP	PSLOOP
19930		LD	HL,NEWBUF	20840		CP	32	21760	PSNEX	INC
19940		LD	BC,(NEWCOU)	20850		JP	Z,PSPEC5	21770	LD	A,(HL)
19950	PARY0	LD	A,(HL)	20860		JP	PSPEC0	21780	CP	0FFH
19960		CP	D	20870	PSPEC1	LD	HL,KEY1	21790	JP	Z,PSFINI
19970		JP	C,PARY1	20880		JP	PSPEC	21800	LD	C,0
19980	PARY2	INC	HL	20890	PSPEC2	LD	HL,KEY2	21810	LD	A,(TEMA)
19990		INC	HL	20900		JP	PSPEC	21820	LD	B,A
20000		DEC	BC	20910	PSPEC3	LD	HL,KEY3	21830	LD	A,(TEMAL)
20010		LD	A,B	20920		JP	PSPEC	21840	LD	D,A
20020		OR	C	20930	PSPEC4	LD	HL,KEY4	21850	LD	A,(HL)
20030		JP	NZ,PARY0	20940		JP	PSPEC	21860	CP	B
20040		LD	A,D	20950	PSPEC5	LD	HL,KEY5	21870	JP	Z,PSOK2
20050		LD	(PARY),A	20960		JP	PSPEC	21880	JP	NC,PSGREA
20060		JP	POPHDB	20970	PSPEC	LD	A,(HL)	21890	PSLESS	INC
20070	PARY1	LD	D,A	20980		LD	(TEMA),A	21900	INC	C
20080		JP	PARY2	20990		LD	A,(XX)	21910	CP	128
20090	SMALLX	PUSH	BC	21000		LD	(TEMAL),A	21920	CALL	Z,PSLFX
20100		PUSH	DE	21010		INC	HL	21930	PSLES1	CP
20110		PUSH	HL	21020	PSLOOP	LD	A,(HL)	21940	JP	NZ,PSLESS
20120		LD	A,(PARY)	21030		CP	128	21950	LD	B,C
20130		LD	D,A	21040		JP	C,PSNEX	21960	LD	A,D
20140		LD	E,0FFH	21050		LD	B,6	21970	JP	PSMIN
20150		LD	HL,NEWBUF	21060	PSDJNZ	RR	A	21980	PSLFX	JP
20160		LD	BC,(NEWCOU)	21070		PUSH	AF	21990	RET	
20170	PARSX0	LD	A,(HL)	21080		LD	A,(BB)	22000	PSADD	INC
20180		CP	D	21090		DEC	A	22010	CP	128
20190		JP	Z,PARSX1	21100		JP	Z,PSPOPS	22020	CALL	Z,PSLFX
				21110		DEC	A			

```

22030      DJNZ      PSADD
22040 PSOK1      LD      (XX),A
22050      LD      A,(YY)
22060      INC      A
22070      CP      48
22080      CALL     Z,PSLFX
22090      LD      (YY),A
22100      JP      PSPEC
22110 PSOK2      LD      A,D
22120      JP      PSOK1
22130 PSGREA     DEC      A
22140      INC      C
22150      CP      255
22160      CALL     Z,PSGFX
22170 PSGRE1     CP      B
22180      JP      NZ,PSGREA
22190      LD      B,C
22200      LD      A,D
22210      JP      PSADD
22220 PSGFIX     LD      A,127
22230      RET
22240 PSMIN      DEC      A
22250      CP      255
22260      CALL     Z,PSGFX
22270      DJNZ     PSMIN
22280      JP      PSOK1
22290 PSFINI     LD      A,3
22300      LD      (BB),A
22310      LD      A,(XXX)
22320      LD      (XX),A
22330      LD      A,(YYY)
22340      LD      (YY),A
22350      RET
22360 TEMA       DEFB     0
22370 TEMA1      DEFB     0
22380 KEY1       DEFS     1153
22390 KEY2       DEFS     1153
22400 KEY3       DEFS     1153
22410 KEY4       DEFS     1153
22420 KEY5       DEFS     1153
22430 BUFLAS     DEFS     1153
22440 NEWBUF     DEFS     1800H
22450 NEWCOU     DEFW     0000
22460 PARY       DEFB     0
22470 PARSX       DEFB     0
22480 PARLX       DEFB     0
22490 SPEC1      LD      DE,KEY1
22500      JP      SPEC
22510 SPEC2      LD      DE,KEY2
22520      JP      SPEC
22530 SPEC3      LD      DE,KEY3
22540      JP      SPEC
22550 SPEC4      LD      DE,KEY4
22560      JP      SPEC
22570 SPEC5      LD      DE,KEY5
22580      JP      SPEC
22590 SPEC       LD      HL,BUFLAS
22600      LD      BC,1153
22610      LDIR
22620      RET
22630 NEWWHI     LD      A,1
22640 NEWFUN     LD      (BB),A
22650      JP      PSPEC0
22660 NEWCLS     LD      A,2
22670      JP      NEWFUN
22680 NEWNEG     CALL     002BH
22690      CP      'B'
22700      JP      Z,NWNEG1
22710      CP      'W'
22720      JP      Z,NWNEG2
22730      LD      A,(14400)
22740      CP      4
22750      JP      Z,BREAK
22760      JP      NEWNEG
22770 NWNEG1     LD      A,5
22780      JP      NEWFUN
22790 NWNEG2     LD      A,6
22800      JP      NEWFUN
22810 NEWOVR     CALL     002BH
22820      CP      'B'
22830      JP      Z,NWOVR1
22840      CP      'W'
22850      JP      Z,NWOVR2
22860      LD      A,(14400)
22870      CP      4
22880      JP      Z,BREAK
22890      JP      NEWOVR
22900 NWOVR1     LD      A,3
22910      JP      NEWFUN
22920 NWOVR2     LD      A,4
22930      JP      NEWFUN
22940      END      START

```

End

Program Listing 2. UTIL1/BAS.

```

10 DEFUSR0=&HF000:CMD"B","OFF"
20 CLEAR 255
25 CLS
30 PRINT @520,,
40 INPUT "WHAT SHOULD THE DIAMETER OF THE CIRCLE BE";Z
50 IF Z<>INT(Z) OR Z>47 THEN PRINT "INTERGER BETWEEN 1 AND 47 PLEA
SE":FOR X=1 TO 1000:NEXT:GOTO 25
55 CLS:PRINT @128,
60 PRINT "Position cursor where you want circle to be and press (<
d>raw)"
70 PRINT "After Circle is drawn to your satisfaction type (<F>inis
h)"
80 PRINT "Press <Space Bar> to start program"
90 PRINT "Press <Clear> to redefine circle size"
100 PRINT "Press <L> to reload original picture"
110 PRINT "Press <S> to save or <break> to quit and save"
111 PRINT "Press <C> to clear screen"
112 PRINT "Press <W> to White out screen"
120 A=PEEK(14400):IF A<>2 AND A<>128 THEN 120 ELSE GOSUB 470
121 IF A=2 THEN 20
130 X=0:Y=0
140 AS=INKEY$
150 A=PEEK(14400)
160 IF A=4 THEN GOSUB 490 :CMD"I","GRAPH TEMP/GRA"
170 IF A=8 THEN Y=Y-1
180 IF AS="L" THEN GOSUB 470
190 IF A=16 THEN Y=Y+1
200 IF A=2 THEN GOSUB 490 :GOTO 25
210 IF A=32 THEN X=X-1
220 IF A=64 THEN X=X+1
230 IF A=40 THEN Y=Y-1:X=X-1
240 IF A=80 THEN Y=Y+1:X=X+1
250 IF A=72 THEN Y=Y-1:X=X+1
260 IF A=48 THEN Y=Y+1:X=X-1
270 IF AS="C" THEN FOR D=15360 TO 16383:POKE D,128:NEXT
275 IF AS="W" THEN FOR D=15360 TO 16383:POKE D,191:NEXT
280 IF AS="S" THEN GOSUB 490
290 IF Y<0 THEN Y=47
300 IF Y>47 THEN Y=0
310 IF X<0 THEN X=127
320 IF X>127 THEN X=0
330 IF POINT(X,Y) THEN RESET(X,Y) ELSE SET(X,Y)
340 IF POINT(X,Y) THEN RESET(X,Y) ELSE SET(X,Y)
350 IF AS="D" THEN GOSUB 370
360 GOTO 140
370 B=1
380 T=0
390 A=T/3.14159
400 SX=X+Z*SIN(A)
410 SY=Y+(Z/2)*COS(A)
420 T=T+1
425 AS=INKEY$:IF AS="" THEN 430
426 IF AS="F" THEN RETURN
430 IF SX<0 OR SX>127 OR SY<0 OR SY>47 THEN 460
440 SET(SX,SY)
460 GOTO 390
470 CMD"L","LOAD/UTL"
480 A=USR(0):RETURN
490 CMD"L","SAVE/UTL"
500 GOTO 480

```

End

Program Listing 3. UTIL2/BAS.

```

10 CMD"B","OFF":CLS
15 PRINT "Press <P> for printer or <S> for screen"
16 AS=INKEY$:IF AS<>"P" AND AS<>"S" THEN 16
17 IF AS="S" THEN 20
18 READ AS:IF AS="EOF" THEN RESTORE:GOTO 30
19 LPRINT AS:GOTO 18
20 FOR A=1 TO 15:READ AS:IF AS="EOF" THEN A=15:RESTORE:GOTO 26
25 PRINT AS
26 NEXT
30 PRINT "Press <ENTER> to continue or <BREAK> to end";
40 IF PEEK(14400)=1 THEN CLS:GOTO 20
50 IF PEEK(14400)=4 THEN CMD"I","GRAPH TEMP
60 GOTO 40
70 DATA "THIS IS A QUICK REFERENCE PROGR
A M ."
80 DATA " TO LEARN HOW TO USE GRAPH"
90 DATA " CONSULT THE MANUAL"
100 DATA "","LISTING OF KEYS AND THEIR FUNCTIONS"
110 DATA " "
112 DATA "1 -- INCREASE CURSOR SPEED. (MAY BE PRESSED MANY TIMES)"

```

Listing 3 continued

Program Listing 5. Load/SRC.

```

00100  START  ORG  0F000H
00110  LD  HL,NAME
00120  LD  DE,DCB
00130  LD  BC,24
00140  LDIR
00150  CALL  DLOAD
00160  RET
00480  DLOAD  LD  HL,BUFFER
00490  LD  DE,DCB
00500  LD  BC,0
00510  CALL  4424H
00520  RET  NZ
00530  LD  DE,DCB
00540  CALL  4436H
00550  LD  HL,BUFFER
00560  LD  DE,3C00H
00570  LD  BC,256
00580  LDIR
00590  LD  DE,DCB
00600  CALL  4436H
00610  LD  HL,BUFFER
00620  LD  DE,15616
00630  LD  BC,256
00640  LDIR
00650  LD  DE,DCB
00660  CALL  4436H
00670  LD  HL,BUFFER
00680  LD  DE,15872
00690  LD  BC,256
00700  LDIR
00710  LD  DE,DCB
00720  CALL  4436H
00730  LD  HL,BUFFER
00740  LD  DE,16128
00750  LD  BC,256
00760  LDIR
00770  LD  DE,DCB
00780  CALL  4428H
00790  RET
00800  NAME  DEFM  'TEMP/GRA'
00810  DEFB  0DH
00820  DCB  DEFS  100
00830  BUFFER  DEFS  256
00840  END  START
    
```

End

Program Listing 6. Save/SRC.

```

00100  START  ORG  0F000H
00110  LD  HL,NAME
00120  LD  DE,DCB
00130  LD  BC,24
00140  LDIR
00150  CALL  DSAVE
00160  RET
00170  DSAVE  LD  DE,DCB
00180  LD  HL,BUFFER
00190  LD  BC,0
00200  CALL  4420H
00210  LD  HL,3C00H
00220  LD  DE,BUFFER
00230  LD  BC,256
00240  LDIR
00250  LD  DE,DCB
00260  CALL  4439H
00270  LD  HL,15616
00280  LD  DE,BUFFER
00290  LD  BC,256
00300  LDIR
00310  LD  DE,DCB
00320  CALL  4439H
00330  LD  HL,15872
00340  LD  DE,BUFFER
00350  LD  BC,256
00360  LDIR
00370  LD  DE,DCB
00380  CALL  4439H
00390  LD  HL,16128
00400  LD  DE,BUFFER
00410  LD  BC,256
00420  LDIR
00430  LD  DE,DCB
00440  CALL  4439H
00450  LD  DE,DCB
00460  CALL  4428H
00470  RET
00800  NAME  DEFM  'TEMP/GRA'
00810  DEFB  0DH
00820  DCB  DEFS  100
00830  BUFFER  DEFS  256
00840  END  START
    
```

End

Program Listing 7. Display/SRC.

```

00100  START  ORG  7000H
00110  LD  A,(HL)
00120  CP  13
00130  JP  Z,402DH
00140  PUSH  HL
00150  CALL  EXTENS
00160  POP  HL
00170  LD  DE,DCB
00180  LD  BC,23
00190  LDIR
00200  CALL  DLOAD
00210  LD  A,(14400)
00220  CP  1
00230  CALL  Z,NEGATI
00240  CP  4
00250  JP  Z,CLS
00260  JP  LOOP
00270  CLS  CALL  1C9H
00280  JP  402DH
00290  DLOAD  LD  HL,BUFFER
00300  LD  DE,DCB
00310  LD  BC,0
00320  CALL  4424H
00330  JP  NZ,402DH
00340  LD  DE,DCB
00350  CALL  4436H
00360  LD  HL,BUFFER
00370  LD  DE,3C00H
00380  LD  BC,256
00390  LDIR
00400  LD  DE,DCB
00410  CALL  4436H
00420  LD  HL,BUFFER
00430  LD  DE,15616
00440  LD  BC,256
00450  LDIR
00460  LD  DE,DCB
00470  CALL  4436H
00480  LD  HL,BUFFER
00490  LD  DE,15872
00500  LD  BC,256
00510  LDIR
00520  LD  DE,DCB
00530  CALL  4436H
00540  LD  HL,BUFFER
00550  LD  DE,16128
00560  LD  BC,256
00570  LDIR
00580  LD  DE,DCB
00590  CALL  4428H
00600  RET
00610  EXTENS  LD  A,(HL)
00620  INC  HL
00630  CP  13
00640  JP  NZ,EXTENS
00650  DEC  HL
00660  LD  A,'/'
00670  LD  (HL),A
00680  INC  HL
00690  LD  A,'G'
00700  LD  (HL),A
00710  INC  HL
00720  LD  A,'R'
00730  LD  (HL),A
00740  INC  HL
00750  LD  A,'A'
00760  LD  (HL),A
00770  INC  HL
00780  LD  A,0DH
00790  LD  (HL),A
00800  RET
00810  JP  EXTENS
00820  NEGATI  LD  HL,15360
00830  LD  BC,1024
00840  NEG  LD  A,(HL)
00850  CPL
00860  RES  6,A
00870  SET  7,A
00880  LD  (HL),A
00890  INC  HL
00900  DEC  BC
00910  LD  A,B
00920  OR  C
00930  RET  Z
00940  JP  NEG
00950  BUFFER  DEFS  256
00960  DCB  DEFS  100
00970  END  START
    
```

End

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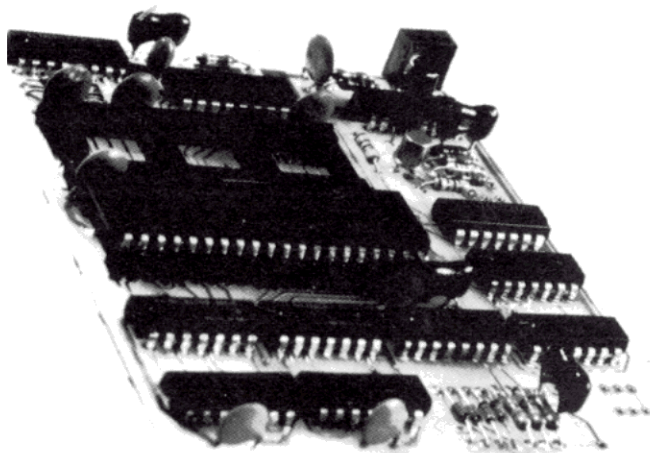
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All Systems Go For the BBS Express

With spring just around the corner, we figured we'd do a little spring cleaning for the BBS Express. This means taking care of some unfinished business.

Our first task is to publish the code you need to get your board up and running. The Program Listing gives you this code, while the Table outlines the functions of the individual lines.

Once you type in the listing, your board will be in working order: It welcomes, registers, and updates each user's record. In addition, it will display options in each of its menus that, in turn, direct callers to the proper section of the BBS.

Still missing from the BBS Express is the code for the data base catalog, which we'll include in next month's column. ■

The BBS Express, 80 Micro's bulletin board system, is open 24 hours a day. Call us at 603-924-6985 to see the finished product. UART parameters are 300 baud, 7-bit words, one stop bit, and even parity.

You can reach J. Stewart Schneider and Charles E. Bowen either through their bulletin board at 606-739-6088 or c/o Saturday Software, P.O. Box 404, Catlettsburg, KY 41129.

System Requirements

Model III

48K RAM

Disk Basic

Two disk drives

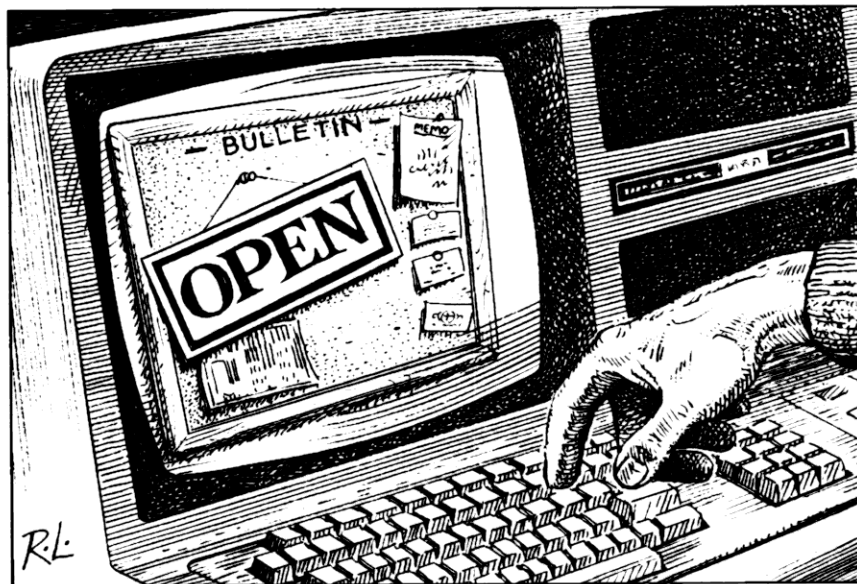


Illustration by Roy Lewando

Program Listing. BBS module.

```

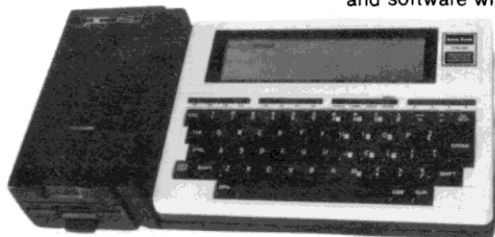
1 REM      Towne Crier v. 2.0
2 REM      version date 5/19/13
3 REM      COPYRIGHT 1984 SCHNEIDER AND BOWEN
10 CLS: CLEAR$000: DEFINT A-Z: IS=STRING$(255,32): SRS=IS: LSETSR$=CH
RS(0): S$=STRING$(62,"-"): CK$=LEFT$(IS,20)
11 CH=(PEEK(-1)=1)
15 DIM IS,CT,CMS,Z,MR,X,AS,PI$,TL,N1$,E,ND,CK$,EN,RN,CS,ER,MN,NM,
F2$,S,SN,SY,A1,LN,LP$,MN$,RD,RP$,S7$,FL$,NA$,SV,AS,C1$,D$,FS
16 DIM NC,PR,B$,HI,M,NV,SF$,SH,A2$,AC,M1$,N,SP,T1$,VW,Y,C2$,CC!,CR
,D1$,DF,F1,L,L1$,N5$,ND$,S1$,S2$,TT$,UA$,V1$,CA,DC$,NM$
17 DIM PF,PW$,S6$,S9$,SA$,SES,SL,SL$,SM$,SP$,SV$,XA$,AD$,CT$,IN$,
K,RE,S8$,SC$,SS$,SN$,SR$,TS,T2$,UH$,WZ,XL$,CA$,CV,M2,MX
18 DIM NW$,OT$,P,P$,PM,RC,SS$,SC,SS$,TN,U1$,U2$,U3$,U4$,UL$,B,C,CL$
,FD,HM,N$,P,TR,TT,U$,ZM$,A,DUS,G,L1,R,X$,Z9,DD$,SD$
20 DIM M(50),MG$(20),MG(20),FS(16),SS(16): DEFUSR0=&HFE00: DEFUSR
1=&HFE6C: DEFUSR2=&HFE7F: DEFUSR3=&HFEF1: TL=-1: NC=0: US=""
% ***** ACCESS: ***%
30 PF=&HFF2A: POKE PF,255'      PRINTER FILTER SWITCH
40 MN=&HFE04: POKE MN,245'      MAX. RECD LINE LENGTH
50 FD=&HFEF5'                  SEARCH TARGET POKE
60 TT=&HFE45: TN=&HFE10: POKE TT,&H20: POKE TT+1,&H14: POKE TN,&H20:
POKETN+1,&H49'                TONE TEST SWITCHES
70 NP=&HFE2E: POKE NP,&H33'      NO PRINT SWITCH
80 RE=&HFEED'                  CHAR. REMAINING ON VID LINE
90 VW=&HFE0F'                  VIDEO WIDTH
100 DEF FN FL$(X)=RIGHT$(STR$(X),LEN(STR$(X))-1): DD$="": 1": SD$="":
0"
110 DEF FN P(R,A$)=CVI(MID$(A$,2*R-1,2))

```

Listing continued

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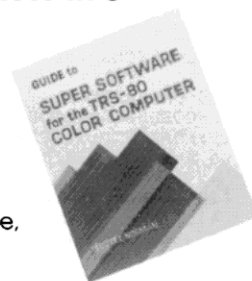
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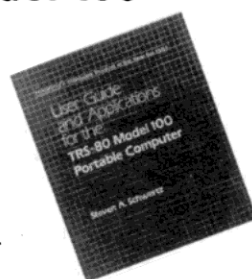
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Lines Description

1-120	Defines variables and POKE locations, and dimensions arrays
130-180	Telecommunications input statement
300-340	Command processor
440-560	Handles message prompts
570-790	Alters user records
800-850	Section prompt and display
860	Creates file name and message number from AS
870-910	Locates records in membership log and data base catalog binary tree
820-930	Writes new users to disk
1090-1170	Collects new user information
1235	Calculates time
1240-1355	Retrieves system information from disk, prints title page, waits for caller or console command
1380-1620	Caller log-in routine
1630-1670	Checks caller's mailbox
1680-1730	Welcomes visitor, prints bulletin and main command prompt
1740-1890	Main command functions
1900-2620	Main SYSOP functions
2630-2720	Sign-off routine
2850-3270	Read and scan routines
5190	Error trap

Table. Line definitions for BBS module.

Listing continued

```

120 GOTO1240
130 LSET IS=" "
140 CT=USR0(VARPTR(IS)):IF CT=-1 THEN 2630
150 CR=INSTR(IS,CHRS(13)):IF CR=0 THEN 170
160 IF NC THEN MID$(IS,CR,1)=CHRS(141) ELSECT=CR-1:MID$(IS,CR,1)
=CHRS(32)
170 IF TL THEN Z=USR1(VARPTR(IS))
180 RETURN
300 IF LEN(CMS)<=1 THEN CS=CMS:CMS="":RETURN
310 CS=LEFT$(CMS,1):CMS=RIGHT$(CMS,LEN(CMS)-1):IF (CS<=CHRS(32))
OR(CS=";") THEN 300
320 IF CMS=" "THEN RETURN
330 IF (ASC(CMS)<=32) OR (ASC(CMS)=59) THENCMS=RIGHT$(CMS,LEN(CM
$)-1):GOTO320
340 RETURN
440 IF (SF) THEN RETURN ELSE RC=0:IF ((LEFT$(T$,5)="SYSOP") AND
SY) OR(LEFT$(T$,LEN(NAS))=NAS) THEN RC=-1
450 K=RC:IF (LEFT$(T$,LEN(NAS))=NAS) OR (SY) THEN K=-1
460 IF RC THEN S7$=CHRS(ASC(S7$) OR 16):LSET S2$=CHRS(ASC(S7$) O
RASC(S9$)):PUT 1,RN
465 IF (BM) OR (PR) THEN RETURN
470 PRINT"(C R E T)";:IF K THEN PRINT"(D = DELETE)";
480 IF SY THEN PRINT"(P = PRINT IT)";
490 GOSUB130:PRINTCHRS(17);
500 IF SY AND ASC(IS)=80 THEN PR=-1:GOSUB4720:PR=0:GOTO470
510 IF LEFT$(IS,1)="T" THEN RN=E:RETURN
520 IF LEFT$(IS,2)="RE" THEN GOTO3380
530 IF NOT((LEFT$(IS,1)="D") AND K) THEN 545
540 PRINT"Please confirm delete (y/n)";:GOSUB130:PRINTCHRS(17):I
F ASC(IS)=89 THEN MID$(MNS,2*RN-1,2)=MKIS(-FNP(RN,MNS)):PRINT"De
leted":MID$(IS,1,1)="C"
545 IF LEFT$(IS,1)="C"THEN RETURN
550 PRINT"C = Continue":PRINT"RE = REply to message":PRINT"T = T
op (ExitRead Function)":IF K THEN PRINT"D = Delete message"
560 GOTO470
570 GET 2,MR:PRINTCHRS(12);
580 PRINT"Name: ";NLS
590 PRINT"1. Street Address: ";ALS
600 PRINT"2. City/State: ";CLS:PRINT"3. Video Width: ";CVI(VIS):
PRINT"4. Line Feeds: ";LIS:PRINT"5. PASSWORD: ";PLS:PRINT"6. ACCE
SS: ";A2$
610 PRINT"Number of calls: ";CVI(C2$):PRINT"Number of messages:"
;CVI(MIS)
620 PRINT:PRINT"Tap ENTER to record":PRINT"Type a number to alte
r";
630 GOSUB130:PRINTCHRS(17):IF CT=0 THEN CLOSE:RETURN
640 IF VAL(IS)>6 OR VAL(IS)<1 THEN 620
650 ONVAL(IS)GOSUB670,690,710,730,760,780
660 PUT 2,MR:GOTO570
670 TL=0:PRINT"Address: ";:GOSUB130:TL=-1:PRINTCHRS(17):IF CT>0
THENLSETAL$=IS
680 RETURN
690 TL=0:PRINT"City/State: ";:GOSUB130:TL=-1:PRINTCHRS(17):IF CT
>0 THENLSETCL$=IS
700 RETURN
710 PRINT"Video Width: ";:GOSUB130:PRINTCHRS(17):IF VAL(IS)>20 A
NDVAL(IS)<255 THEN LSET VIS=MKIS(VAL(IS)):IF M=MR THEN SV=VAL(IS
):POKEVW,SV
720 RETURN
730 IF L1$="Y" THEN LSET L1$="N" ELSE LSET L1$="Y"
740 IF MR=M THENUL$=L1$:IF L1$="Y" THEN POKE PF,255 ELSE POKE PF
,0
750 RETURN
760 PRINT"PASSWORD: ";:GOSUB130:PRINTCHRS(17):IF CT>0 LSETPL$=IS
770 RETURN
780 IF SY THEN PRINT"Access: ";:GOSUB130:PRINTCHRS(17):LSET A2$=
IS
790 RETURN
800 PRINT"Section (Tap ENTER for all, ? forlist)";:GOSUB130:PRIN
TCHRS(17);
810 IF CT=0 THEN SES=UAS:RETURN
820 IFASC(IS)=63THENGOSUB830:GOTO800
821SES=LEFT$(IS,CT):FORZ=1TOCT:IFINSTR(UAS,MID$(SES,Z,1))=0THENP
RINT"Unauthorized to Section ";MID$(SES,Z,1):GOTO800ELSENEXT:RETU
RN
830 FOR Z=1 TO 15:IF (SS(Z)=STRINGS(16,32)) OR(INSTR(UAS,MID$("0
123456789ABCDE",Z,1))=0) THEN 850
840 PRINT MID$("0123456789ABCDE",Z,1); " ";SS(Z)
850 NEXT:RETURN
860 N$=FN FL$(MN):MID$(AS,INSTR(AS,"/")-LEN(N$),LEN(N$))=N$:RETU
RN
870 Y=1:IFEN=1 THEN RETURN
880 GET 2,Y
890 IF CKS>NLS THEN FS=CVI(RP$):IF FS=0 THEN LSET RP$=MKIS(EN-Y)

```

Listing continued

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Listing continued

```

:PUT2,Y:RETURN
900 IF CK$<N1$ THEN FS=CVI(LP$):IF FS=0 THEN LSET LP$=MKI$(EN-Y)
:PUT2,Y:RETURN
910 Y=Y+FS:GOTO880
920 LSET N1$=N5$:LSET A1$=AD$:LSET C1$=CT$:LSET L1$=CL$:LSETA2$=
CA$:LSET M1$=MKI$(0):LSET C2$=MKI$(1):LSET P1$=PW$:LSETUH$=MKI$(
0):LSET V1$=MKI$(CV):LSET LP$=MKI$(0):LSET RP$=MKI$(0)
930 PUT 2,NM:RETURN
1090 N5$="":TL=-1:PRINT"Name: ";:GOSUB130:PRINTCHR$(17):IF CT=0
THENRETURN ELSE N5$=LEFT$(I$,CT)
1100 LSET CK$=N5$:EN=N5$:GOSUB940:IF NOT ER THEN PRINT"Name in use
":PRINT"Please add an initial.":GOTO1090
1110 TL=0:PRINT"Street Address: ";:GOSUB130:PRINTCHR$(17):IF CT>
0 THENAD$=LEFT$(I$,CT) ELSE 1110
1120 PRINT"City/State/Zip: ";:GOSUB130:PRINTCHR$(17):IF CT>0 THE
NCT$=LEFT$(I$,CT) ELSE 1120
1130 CLS:PRINTCHR$(12);N5$:PRINTAD$:PRINTCT$:PRINT"Is this
correct(y/n)?"
1140 TL=-1:GOSUB130:PRINTCHR$(17)
1150 IF ASC(I$)=78 THEN 1090 ' "NO"
1160 IF ASC(I$)>89 THEN 1140 ' INCORRECT RESPONSE
1170 RETURN
1235T1=VAL(MID$(TMS,10))*3600+VAL(MID$(TMS,13))*60+VAL(MID$(TMS,
16)):RETURN
1240 ONERRORGOTO5190
1250 FORX=1TO20:MGS(X)=STRING$(80,32):NEXT
1260 GOSUB190
1270 GET 3,1
1280SL=CVI(SL$):SH=CVI(SH$):CA$=SA$:CV=CVI(SV$):SN=CVI(SN$):PW$=
SP$:CL$=SP$:X=CVI(SM$):SC=CVI(SC$):ND=CVI(ND$):NM=CVI(NM$):DS=CV
I(DS$)
1290 POKE VW,SV:IF UL$="N" THEN POKE PF,0
1300 GOSUB210
1310 GET3,2
1320 FOR X=1TO16:S$(X)=F$(X):NEXT
1330 FIELD 3,255 AS ZM$:GET 3,3:MN$=LEFT$(ZM$,2*SN):CLOSE
1340 CLS:FOR X=0 TO 127:SET(X,0):SET(X,47):IF X<48 THENSET(0,X):
SET(127,X):NEXT ELSE NEXT:PRINT@130,TIMES;
1350 PRINT@334,"The Saturday Software BulletinBoard";:PRINT@410,
"Version 2.0";:PRINT@452,"Copyright (c) 1984 by J.Stewart Schnei
der and C. E. Bowen";:PRINT@178,"Chat Mode";:IFCHTHENPRINT"ON ";
ELSEPRINT"OFF";
1355 PRINT@587,"<S>et Date/Time <C>hat Toggle";:PR
INT@651,"<L>ocal Operation <E>xit Towne Crier";
1360 IF (INP(&HE8)AND32)=0 THEN 1380
1365 AS=INKEY$:N=PEEK(&H387F):IFN=0THEN1360
1375 IFAS<>" "THENAS=CHR$(ASC(AS)AND95):GOTO6500 ELSE1360
1380 CLS:PRINT:PRINTCHR$(12);"Hello, and welcome to":PRINT"the T
he TowneCrier BBS! (Ver. 2.0)":PRINT:PRINT
1390 FOR X=1 TO 5
1400 IFINKEY$<>" "THEN1400
1410 NEXT:IN$=TIMES:TMS=IN$:GOSUB 1235:IN!=T!
1420 CLOSE:PRINT"Are you a first-time visitor?(y/n)":GOSUB130:P
RINTCHR$(17)
1430 IF ASC(I$)=89 THEN 1530 ' YES
1440 IF ASC(I$)<>78 THEN 1420
1450 PRINT"Name: ";:GOSUB130:PRINTCHR$(17):IF CT=0 THEN 1420 ELS
ENAS=LEFT$(I$,CT)
1460 PRINT"Checking Membership Log...":CLOSE:GOSUB240:LSETCK$=NA
$:EN=N5$:GOSUB940
1470 IF ER THEN PRINT"Not recorded":GOTO1420
1480 IF PW$=P1$ THEN 1515
1490 FOR TR=1 TO 3:PRINT"PASSWORD: ";
1500POKENP-1,0:POKENP,0:GOSUB130:PRINTCHR$(17):POKENP-1,&HCD:POK
ENP,&H33
1510 IF LEFT$(I$,16)<>P1$ THEN 1520
1515M=MR:AD$=A1$:CT$=C1$:SV=CVI(V1$):M2=CVI(M1$):UA$=A2$:HI=CVI(
UH$):HM=HI:I L1$="N"THEN POKE PF,0 ELSE POKE PF,255
1516 GOTO1630
1520 NEXT:PRINT"INVALID LOGIN":GOTO1420
1530 IF LEFT$(PW$,8)="PASSWORD" THEN 1600
1540 FOR TR=1 TO 3
1550 PRINT"System password? ";:GOSUB130:PRINTCHR$(17)
1560 IF LEFT$(I$,16)=PW$ THEN 1600
1570 NEXT:PRINT"Invalid login"
1580 PRINT"Board closed to unauthorized persons.":PRINT"Please h
ang up."
1590 GOSUB130:GOTO1590
1600 GOSUB240:GOSUB1090:IF N5$=" " THEN 1420 ELSE NA$=N5$
1610 SV=CV:POKE VW,SV:UA$=CA$:NM=NM+1:GOSUB920:M=NM:IF M>1 THENE
N=M:GOSUB870
1620 MR=M:GOSUB570:CLOSE
1630 IF (WZ) OR (INSTR(UA$,"*")>0) THEN UA$="0123456789ABCDE*":S
Y=-1
1640 SE$=UA$:Q$="ALL"+CHR$(128):PRINT"One momentplease...":PRINT

```

Listing continued

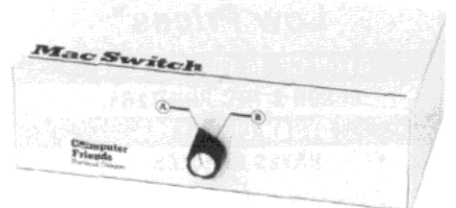
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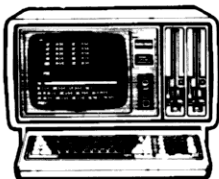
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BBS EXPRESS

Listing continued

```

"Checking your mailbox.":GOSUB220:SF=-1:MN=HI+1:GOSUB430
1650 FOR RN=S TO SN:PRINT".":GET1,RN:L=20:IF (ASC(S2$) AND 16)=
16 THEN1670
1656 IF (L>0) AND (MID$(T1$,L,1)=" ") THEN L=L-1:GOTO 1656
1660 IF (SY AND (LEFT$(T1$,5)="SYSOP")) OR (LEFT$(T1$,L)=NA$) OR
(LEFT$(T1$,LEN(Q$))=Q$) THENGOSUB350:IFRD THEN PRINT:PM=PM+1:M(P
M)=RN:GOSUB4720
1670 NEXT:CLOSE:SF=0:IF PM>0 THEN PRINT"These message(s)":PRINT
havebeen marked for retrieval":PRINT"Using the RM command.":PRIN
T
1680 PRINT"You are caller":SC:PRINT"SYSTEM CONTAINS":SN;"MESSAGE
S FROM"SL"TO"SH
1690 IF M>0 THEN PRINT"HIGH MESSAGE RETRIEVED: ";HI
1700 POKE VW,SV:IF UL$="N" THEN POKE PF,0
1710 F2$="BULLETIN":GOSUB4850
1720 SF=0:TL=-1:NC=0:CLOSE
1730 PRINT:PRINT"Command (? for HELP): ";:GOSUB130:PRINTCHR$(17)
:IF CT=0 THEN 1730
1740 CM$=LEFT$(IS,CT):GOSUB300
1750ONINSTR("$RSLECMUHB",C$)GOTO1900,2865,2850,3280,2630,1790,
3710,1810,180,1780,1774,1777
1760 PRINT"? - Prints this list":PRINT"R - Read Messages":PRINT"
L - Leave a message":PRINT"S - Scan the messages":PRINT"E - Exit
theBBS":PRINT"C - Change Member's Record":PRINT"X - Database"
1770 PRINT"M - Scroll membership log":PRINT"U - Scroll user log"
:PRINT"H - View HELP file":PRINT"B - Set/Reset Brief Mode":PRINT"
(No stopbetween messages)":PRINT"T - Talk to SYSOP":GOTO1720
1774 BM=(BM=0):PRINT"Brief mode ";:IF BM THEN PRINT"ON"ELSEPRINT
"OFF"
1776 GOTO1720
1777 IFNOTCHTHENPRINT"SYSOP not available":GOTO1720
1778 PRINT"PagingSYSOP.":FORX=1TO10:PRINT".":FORT=1TO50:IFPEEK
(&H387F)=0THENNEXTT,X:PRIT:PRINT"SYSOP doesn't answer. Sorry":G
OTO1720ELSEPRINT"Control-P toexit CHAT"
1779 GOSUB130:PRINTCHR$(17):IFINSTR(IS,CHR$(16))=0THEN1779ELSE1
720
1780 F2$="HELP":GOSUB4850:GOTO1720
1790 PRINT"Change Member's Record":GOSUB240
1800 MR=M:GOSUB570:GOTO1720
1810 GOSUB240:PRINT"Control-P to stop"
1820 FOR X=1 TO NM:GET 2,X
1830 PRINTN1$:PRINTC1$:PRINT
1840 IF INKEY$<>CHR$(16) THEN NEXT
1850 PRINT"Job done":CLOSE:GOTO1720
1860 GOSUB280:IF LOF(3)=0 THEN 1720 ELSEPRINT"Control-P to Stop"
:FORX=LOF(3) TO 1 STEP-1:GET 3,X:PRINTU1$:PRINT"IN: ";U2$:PRINT
OUT: ";U3$:PRINT"ELAPSED: ";U4$:PRINT
1870 IF INKEY$=CHR$(16) THEN X=1
1880 NEXT
1890 GOTO1720
1900 IF NOT SY THEN 1720
1910 IFCM$<>" THEN 1930
1920 CLOSE:PRINT"SYSOP Commands (?=HELP): ";:GOSUB130:PRINTCHR$(
17):IFCT=0 THEN 1920 ELSE CM$=LEFT$(IS,CT)
1930 GOSUB300
1940ONINSTR("MACDELPSN$B$FK",C$)GOTO2030,2100,2200,2130,1720,2240
,2570,2310,210,1980,1990,1975,1976
1950 PRINT"? - Prints this list":PRINT"A - Add New Member":PRINT
"C - Change User Record":PRINT"D - Delete User Record":PRINT"K -
Kill ERRORand USER logs"
1960 PRINT"E - Exit Sysop Function":PRINT"L - Print MailingLabel
s":PRINT"N - Set Section Names":PRINT"S - Examine/Change SystemD
efaults"
1970 PRINT"P - Purge Retrieved message":PRINT"M - Membershiplog"
:PRINT"B - Write Bulletin":PRINT"F - Rewrite Membership FilePoin
ters":GOTO1920
1975GOSUB240:E=NM:GOSUB5270:NM=NV:GOSUB190:GET3,1:LSETNMS=MKI$(N
M):PUT3,1:CLSE:GOTO1920
1976 KILL"ERROR/BBS"+SD$:OPEN"O",1,"ERROR/BBS"+SD$:PRINT#1,"ERRO
RLOG":CLOSE:KILL"USER/BBS"+SD$:GOTO1900
1980 STOP:GOTO 1720
1990 B=-1:GOSUB3380:B=0:OPEN"O",3,"BULLETIN/BBS"+DD$
2000 FOR Z=1TOLN
2010 IF MG(Z)>0 THEN PRINT#3,LEFT$(MG$(Z),MG(Z));
2020 NEXT Z:CLOSE 3:GOTO1920
2030 GOSUB1230
2040 GOSUB240
2050 FOR MR=1 TO NM:GET2,MR
2060 PRINTN1$:PRINTA1$:PRINTC1$:PRINT"PASSWORD: ";P1$:PRINT"Acce
ss: ";A2$:PRINT"No. of Calls: ";CVI(C2$):PRINT"Number of Messages
: ";CVI(M1$):PRINT
2070 IF PR THEN LPRINTN1$,"Password: ";P1$:LPRINTA1$,"Access: ";A
2$:LPRINTC1$,"No. of Calls: ";CVI(C2$):LPRINT"Video: ";CVI(V1$),,"
Number of Messages: ";CVI(M1$):LPRINT"line feeds: ";L1$:LPRINT" "
2080 IF INKEY$<>CHR$(16) THEN NEXT

```

Listing continued

BBS EXPRESS

Listing continued

```

2090 PRINT"Job done":CLOSE:GOTO1920
2100 PRINT"Add new member selected":GOSUB240:GOSUB190:IF N5$=""
THEN1900
2110 NM=NM+1:GOSUB920:MR=NM:IF MR>1 THEN EN=MR:GOSUB870
2120 GOSUB570:CLOSE:GOTO1920
2130 CLS:PRINTCHR$(12)"Delete User Record":GOSUB240
2140 PRINT"User Name: ";:GOSUB130:PRINTCHR$(17):IF CT=0 THEN 219
0 ELSELSET CK$=I$
2150 EN=NM:GOSUB940:IF ER THEN PRINT"No such record":GOTO2140
2160 PRINT"Deleting ";N1$:PRINT"Confirm (y/n)? ";:GOSUB130:PRINT
CHR$(17)
2170 IF ASC(I$)=89 THEN DF=-1:LSET P1$=CHR$(0):PUT 2,MR
2180 GOTO2140
2190 IF DF THEN E=NM:GOSUB5270:NM=NV:GOSUB190:GET 3,1:LSETNM$=MK
I$(NM):PUT 3,1:DF=0
2195 GOTO1920
2200 CLS:PRINTCHR$(12)"Change User Record":GOSUB240
2210 PRINT"User Name: ";:GOSUB130:PRINTCHR$(17):IF CT=0 THEN 192
0 ELSELSET CK$=I$
2220 EN=NM:GOSUB940:IF ER THEN PRINT"No such record":GOTO2210
2230 GOSUB570:GOTO1920
2240 CLS:PRINTCHR$(12)"Mailing Labels."
2250 GOSUB1230:IF NOT PR THEN PRINT"PRINTER NOT READY!!":GOTO192
0
2260 GOSUB240
2270 FOR MR=1TONM:GET2,MR
2280 LPRINT N1$:LPRINT A1$:LPRINT C1$:LPRINT " ":LPRINT " ":LPRINT
" "
2290 IF INKEY$<>CHR$(16) THEN NEXT
2300 PRINT"Job done":CLOSE:GOTO1920
2310 CLS:PRINTCHR$(12):GOSUB190
2320 GET 3,1:PRINT"1. Video width: ";CVI(SV$):PRINT"2. Line feed
s: ";SFS:PRINT"3. Default Access: ";SA$:PRINT"4. Maximum messages
: ";CVI(SM$):PRINT"5. System Password: ";SP$
2330 PRINT"6. Hard copy ";:IF PR THEN PRINT"On" ELSE PRINT"Off"
2340 PRINT"Tap ENTER to record":PRINT"TYPE A NUMBER TO ALTER"
2350 GOSUB130:PRINTCHR$(17):IF CT=0 THEN CLOSE:GOTO1910
2360 IF VAL(I$)<1 OR VAL(I$)>6 THEN 2320
2370 ON VAL(I$) GOTO2390,2410,2430,2450,2470,2490
2380 PUT 3,1:GOTO2320
2390 PRINT"VIDEO WIDTH: ";:GOSUB130:PRINTCHR$(17):IF (CT>0) AND(
VAL(I$)>0) AND (VAL(I$)<81) THEN LSET SV$=MKI$(VAL(I$))
2400 GOTO2380
2410 IF PEEK(PF)=255 THEN POKE PF,0:LSET SFS="N" ELSE POKE PF,25
5:LSETSFS="Y"
2420 GOTO2380
2430 PRINT"SYSTEM ACCESS: ";:GOSUB130:PRINTCHR$(17):IF CT>0 THEN
LSETSA$=I$
2440 GOTO2380
2450 PRINT"MAXIMUM MESSAGES: ";:GOSUB130:PRINTCHR$(17):IF (CT>0)
AND(VAL(I$)>10) AND (VAL(I$)<100) THEN LSET SM$=MKI$(VAL(I$)):M
X=VAL(I$)
2460 GOTO2380
2470 PRINT"System password: ";:GOSUB130:PRINTCHR$(17):IF CT>0 TH
EN LSETSP$=I$
2480 GOTO2380
2490 IF PR THEN PR=0 ELSE PR=-1
2500 GOTO2380
2510 PRINT"Tap ENTER to leave unchanged":PRINT"or type new head
er.":TL=0
2520 FOR X=1 TO 15:PRINTMID$("0123456789ABCDE",X,1);" ";S$(X)
2530 GOSUB130:PRINTCHR$(17):IF CT=0 THEN 2560
2540 IF ASC(I$)=16 THEN X=15:GOTO2560
2550 LSET S$(X)=I$
2560 NEXT:GOSUB190:FORX=1 TO 15:LSET F$(X)=S$(X):NEXT:P
UT3,2:CLOSE:TL=-1:GOTO1920
2570 GOSUB220
2580 PRINT"Ready to PURGE recovered messages.":PRINT"Confirm(y/n
)?":GOSUB130:PRINTCHR$(17):IF ASC(I$)<>89 THEN 1900
2590 PRINT"WORKING":FOR RN=1 TO SN:GET 1,RN
2600 IF (ASC(S2$) AND 16) =16 THEN MID$(MN$,2*RN-1,2)=MKI$(-FNP(
RN,MN$))
2610 PRINT". ";
2620 NEXT:PRINT:CLOSE:GOTO1920
2630 CLOSE:PRINTCHR$(17);"Thanks for calling The Towne Crier.":P
RINT"Docal again.":PRINT"Arrival: ";IN$:OTS=TIMES:PRINT"Leaving
: ";OTS:TM$=OTS:GOSUB 1235
2640 E1=TI-IN!:Z=INT(E1/3600):E1=E1-Z*3600:Y=INT(E1/60):X=CINT(E
1-Y*60)
2650 AS=FN FL$(Z):BS=FN FL$(Y):CS=FN FL$(X)
2660 IF LEN(AS)<2 THEN AS="0"+AS:GOTO2660
2670 IF LEN(BS)<2 THEN BS="0"+BS:GOTO2670
2680 IF LEN(CS)<2 THEN CS="0"+CS:GOTO2680
2690 PRINT"Elapsed time
";AS;";";BS;";";CS
2700 PRINT"Please hang up now."
2710 IF M>0 THEN GOSUB240:GET2,M:LSET UH$=MKI$(HI):LSETC2$=MKI$(

```

Listing continued

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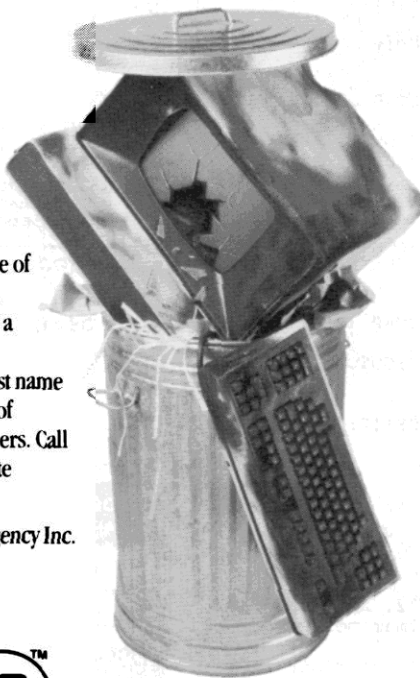
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Listing continued

```

CUI(C2$)+1):LSET M1$=MKIS(M2):PUT 2,M:CLOSE
2720 GOSUB280:LSET U1$=NA$:LSET U2$=IN$:LSET U3$=OTS:LSETU4$=A$+
":B$+":C$:PUT 3,LOF(3)+1:CLOSE
2850 CLS:PRINTCHR$(12);"SCANNING MESSAGE BOARD"
2860 PRINT"Enter a control-C to stop."SF=-1
2865 IF SN=0 THEN PRINT"No messages available":GOTO 1720
2870 IFCM$<>" THEN2890
2880 PRINT"SUBCOMMAND (? for HELP): ";GOSUB130:PRINTCHR$(17):IF
CT=0 THEN 1720 ELSE CM$=LEFT$(IS,CT)
2890 GOSUB300:D$=C$:IF D$="M" THEN 2970
2900 IF INSTR("FRISMN",D$)=0 THEN D$="?"
2910 IF D$="?" THEN PRINT"? - Prints this list":PRINT"F -Forward
":PRINT"R - Reverse"
2920 IF D$="?" THEN PRINT"I - Individual":PRINT"S - Selected":PR
INT"M -Marked":PRINT"N - New Messages":GOTO2880
2930 IF D$="N" THEN MN=HM+1:D$="F":GOTO2970
2940 MN=VAL(CM$):IF MN>0 THEN 2970
2950 PRINT"System contains messages"SL"to"SH:IF D$="I" THEN PRIN
T"Readwhich message?"; ELSE PRINT"Read starting with which messa
ge?"
2960 GOSUB130:PRINTCHR$(17):MN=VAL(IS)
2970 SE$=UA$:GOSUB220:IF D$<>"I" AND D$<>"M" THEN GOSUB800
2980 ON INSTR("FRISM",D$) GOTO2990,3040,3090,3130,3220
2990 E=SN:GOSUB430
3000 FOR RN=S TO E:GET 1,RN:GOSUB350:IF NOT RD THEN PRINT".":GO
TO3020
3010 PRINT:GOSUB4720:GOSUB440:IF N>HI THEN HI=N
3020 IF INKEY$=CHR$(3) THEN RN=E
3030 NEXT:GOTO1720
3040 E=1:GOSUB430
3050 FOR RN=S TO E STEP-1:GET 1,RN:GOSUB350:IF NOT RD THENPRINT"
.":GOTO3070
3060 PRINT:GOSUB4720:GOSUB440:IF N>HI THEN HI=N
3070 IF INKEY$=CHR$(3) THEN RN=E
3080 NEXT:GOTO1720
3090 GOSUB430:IF FN P(S,MN$)<>MN THEN PRINT"NO SUCH MESSAGE":GOT
O1720
3100 RN=S:GET 1,RN:GOSUB350
3110 IF RD THEN GOSUB4720:GOSUB440:IF N>HI THEN HI=N
3120 GOTO1720
3130 PRINT"Search field:(T,F,S)";:GOSUB130:PRINTCHR$(17):IF CT=0
THEN1720 ELSE C$="F"
3140 SF$=LEFT$(IS,1):IF INSTR("TFS",SF$)=0 THEN 3130
3150 PRINT"Search for:":GOSUB130:PRINTCHR$(17):SS$=LEFT$(IS,CT)
:PRINT"Searching";
3160 E=SN:GOSUB430
3170 FOR RN=S TO E:GET 1,RN:GOSUB350:IF NOT RD THEN PRINT".":GO
TO3200
3180 PRINT:GOSUB4720:GOSUB440:IF N>HI THEN HI=N
3190 PRINT".":
3200 IF INKEY$=CHR$(3) THEN RN=E
3210 NEXT:SF$="":SS$="":GOTO1720
3220 E=PM:IF E=0 THEN PRINT"No Marked Messages":GOTO1720
3230 FOR X=1 TO E:RN=M(X):GET 1,RN:GOSUB350
3240 GOSUB4720:GOSUB440:IF N>HI THEN HI=N
3250 IF LEFT$(IS,1)="T" THEN X=E
3260 IF INKEY$=CHR$(3) THEN X=E
3270 NEXT:GOTO1720
3305 IF (TT$="ALL") AND (SY) THEN TT$=TT$+CHR$(128)
5190 IF ERL=4450 THEN PRINT"File not found":CLOSE:RESUME 4430
5200 IF ERL=4450 THEN PRINT"No such file":CLOSE:RESUME 4430

```

End

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Make Your Programs Go in Circles

A Basic loop is a series of program lines that execute in a closed cycle a specified number of times before the program continues. This month I'll demonstrate how to use loops to create a pause in a program; construct a counter; and enter, set, and search for values in your Basic programs.

Creating Loops

To write a Basic loop, you can use *For...Next*, *GOTO*, and *If...Then* statements. Here's an example:

```
100 PRINT "Why are you looking at this?"
110 GOTO 100
```

This program creates an endless loop; that is, the *GOTO* statement makes the program repeat endlessly. People sometimes create endless loops as practical jokes, to vex users who don't know how to exit a program.

If...Then loops let you bail out of a loop and continue the program once the program meets the conditions of the *If...Then* test. More on these later.

For...Next loops make a program segment repeat a set number of times. Two common applications of *For...Next* loops are timing and counting functions.

Timing Loops

The simplest kind of loop is a timer:

```
100 FOR X=1 TO 500: NEXT X
```

The Model III executes this timer loop in about one second. Timer loops give a program rhythm, make a program wait for user response, or display material for a set amount of time before continuing.

Loops can count things other than time. For example:

```
100 CLS:FOR X=1 TO 20: PRINTX:: NEXTX:
END
```

This line counts to 20. A loop can count almost indefinitely:

```
100 CLS: FOR X=1 TO 4.25353E+37:
PRINTX: NEXTX
```

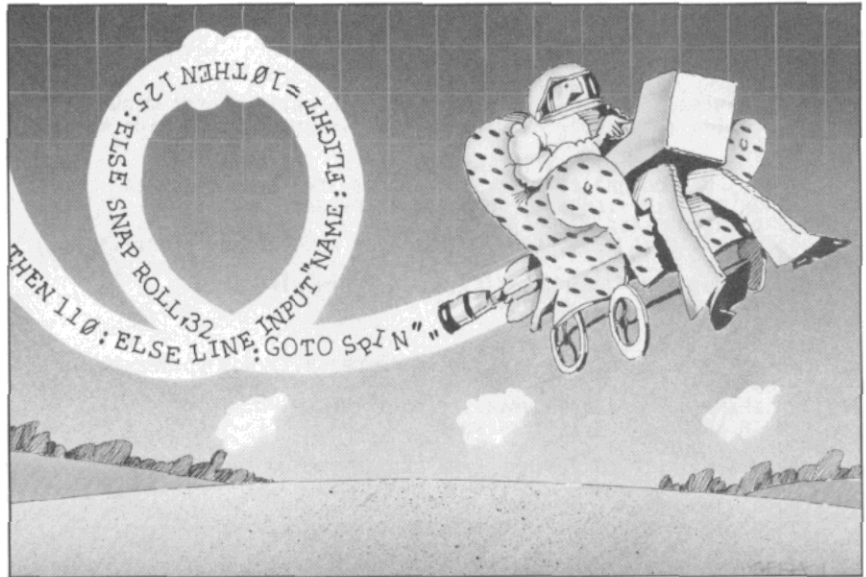


Illustration by Phil Geraci

If you run the listing above, you'll wait to the crack of doom (figuratively speaking) for it to finish. Press the break key to stop it.

Counting in Step

Basic counts a loop by increments, or steps, greater than or less than 1. Programs can count by whole numbers:

```
100 FOR X=1 TO 1000 STEP 10: PRINTX::
NEXTX
```

or by fractions:

```
100 CLS: FOR X=1 TO 10 STEP .5: PRINTX::
NEXTX
```

Loops can also count backward by whole or fractional steps:

```
100 CLS: FOR X=100 TO 1 STEP -1:
PRINTX:: NEXTX
```

Here are a few rules to remember: Loops counting forward can do so in increments of 1 without using the *Step* command. *Step* is necessary when counting forward by fractions or by increments greater than 1. Counting backwards requires using *Step* with subtraction, even if you're decrementing only by 1.

You can use variables within loops, but you must define the variables before the loop:

```
100 CLS: INPUT "Start number";A
110 INPUT "Finish number";B
120 INPUT "Step number";C
130 FOR X=A TO B STEP C: PRINT X::
NEXT X
```

In this program, you enter a starting number, ending number, and a step number; the program counts according to your input.

Try running this program several times, using different numbers. If you enter 100, 200 and 3, the loop counts to 199. Basic counts as close to the ending number as possible, given the step number.

Input 200, 100, and -2 to count backward by twos from 200 to 100. Enter 200, 100, and 2 and the program won't go far. Can you see why?

Reading Arrays

For...Next loops are also useful for reading array values:

```
100 REM * My Grades
110 DATA 79,64,81,72,51
120 CLS: DIM G(5): FOR X=1 TO 5:
READ G(X): NEXT X
```

BASIC TAKES

```
130 PRINT "I had five calculus tests."
140 INPUT "For which do you wish to
    see my grade";X
150 X=INT(X): IF X<1 OR X>5
    THEN CLS: GOTO 130
160 PRINT "I GOT A SCORE OF "G(X)"
    on test "X: GOTO 130: END
```

The loop in My Grades reads the data values in line 120 and displays them in response to your input.

Without using data lines, you can set sequential and random values with a loop. Here's an example of setting values sequentially:

```
100 CLS: DIM A(200): FOR X=23TO69*2
    STEP 69*2/3: A(X)=X: PRINT A(X);:
    NEXT
```

This line sets random values:

```
100 DIM A(20): FOR X=1TO20:A(X)=
    RND(0): PRINT A(X);:NEXTX
```

Nested Loops

In all the above examples, the loops end with a Next X statement. In single loops, you can end loops with Next alone; Basic knows which loop variable is at work.

In some programs, however, hundreds of lines can separate For and Next statements. I suggest including a variable with Next to keep program flow clear. The following program, Nested Loops, shows how confusion can occur.

```
100 REM *Nested Loop
110 CLS
120 FOR A=1 TO 3
130 FOR B=1 TO 3
140 PRINT A;B "/";
150 NEXT B
160 NEXT A
```

Loop A (lines 120-160) repeats three times; loop B (lines 130-150) is inside loop A and repeats three times for every execution of loop A. The resulting number sequence should make this clear.

Change the last two lines to read:

```
150 NEXT A
160 NEXT B
```

and you'll get a next-without-a-for error (NF). You must include the B loop within the A loop for the program to run properly.

Here's a legal change: Delete line 160 and type in 150 NEXT B,A. This saves a line. You can create numerous nested loops, and if program logic calls for it, you can end them all at once in one statement: NEXT X,H,J,L,Z.

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BASIC TAKES

The listing below uses nested loops to produce a running clock. Variable HR represents hours, MN is minutes, SC is seconds, and T represents a timer of 1 to 300 for each second.

```
100 REM * CLOCK
110 CLS: FOR HR = 0 TO 23
120 FOR MN = 0 TO 59
130 FOR SC = 0 TO 59
140 PRINT@40,HR": "MN": "SC";
    STRING$(5,32);
150 FOR T = 1 TO 300
160 NEXT T,SC,MN,HR: END
```

To make the clock more accurate for your computer, experiment with line 150's For...Next time loop value, comparing the result against an actual timepiece. Note that Basic material interleaved in the program can slow such timer routines.

Use nested loops to read or otherwise set values in a multidimensional array:

```
100 REM * Array Setter
110 DATA 3,6,7,1,3,6,9,9
120 DIM A(2,2,2)
130 FOR X = 1 TO 2: FOR Y = 1 TO 2:
    FOR Z = 1 TO 2
140 READ A(X,Y,Z): NEXT Z,Y,X: END
```

Run this listing, then try different values in line 120. For example, try A(2,1,2) or A(1,1,1). The results appear in line 110. Variables X, Y, and Z keep track of the variables. Using loops to read data values is a useful shortcut, especially when the program must read thousands of related array numbers.

If...Then Loops

Loops are of greatest value when used in an If...Then test. Insert the following line into the Clock listing:

```
145 IF H>7 THEN PRINT "Time to wake up!": END
```

The program might be more realistic if you rig a buzzer to sound when variable H attains a value of 8.

The following program is a pseudo-game that demonstrates how you can use a loop to determine an event.

```
100 REM * Whose Turn?
110 CLS: DIM A$(2)
120 A$(1) = "Sam": A$(2) = "Bob"
130 FOR X = 1 TO 2
140 PRINT A$(X), "It's your turn."
150 INPUT "Type a guess and press enter":G
160 NEXT X: GOTO 130: END
```

Imaginatively using If...Then tests within loops will occur to you as you blend other Basic instructions into the concept. Here are some examples:

```
IF Z = 12 THEN GOSUB 1000
IF MID$(A$,X,3) = "MIN" THEN PRINT
    "You guessed": END
IF C<100 THEN C = 100
IF G/2 = INT(G/2) THEN PRINT
    "Overload in sector ZED!"
```

Summing Up

A good working knowledge of loops can help you shorten your programs. Loops provide a convenient way to pause, count, set values, or search for values. They also test true/false situations and provide a handy tool for working with other Basic statements, commands, and functions.

Next month I'll discuss input/output functions and how information gets where it's going. ■

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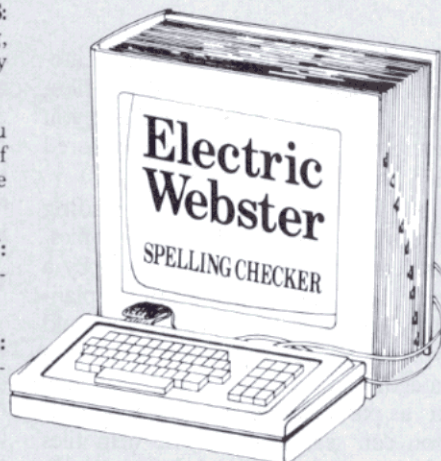
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Model 4 Owners Get Help

I think TRSDOS 6.2 is one of the best operating systems available for any personal computer. I've been using it for several months and have found little to complain about and much to praise.

TRSDOS 6.2's most powerful utility is Help/CMD. Unlike the Model III help function, the Model 4's version is completely expandable: You can add as many help files as you like to any disk you want. If you're developing a program for others to use, or if you'd like on-line lists of commands for your favorite utilities and applications programs, all you need do is write new help files. Help files all have the extension /HLP, but you don't have to type in the /HLP extension when entering the help file name.

Of course, there's a catch. Neither Radio Shack nor Logical Systems Inc. (the authors of TRSDOS 6.X) have supplied any information about writing help files. To get you started, I'll describe the inner workings of Help, the format of a help file, and give you a Basic program that lets you write your own help files.

Help has several functions. If you type in HELP from TRSDOS Ready, you'll see a full screen listing the help files available. On a distribution disk, DOS is the only category that appears.

You have to follow a specific format in setting up a help file so the help utility can move through a set of disk files quickly.

If you type in the name of a help file, a list of topics appears that are actually subsections of the complete help file (records in the file). To see information about a topic, type in its name and press the enter key. For instance, say you've developed a help file for Scripsit. If you type in Scripsit/HLP, you'll see a list of topics for Deleting, Inserting, Block Moves, and so on.

Once you've looked over the help file, you can either press the enter key to return to the list of topics or type in

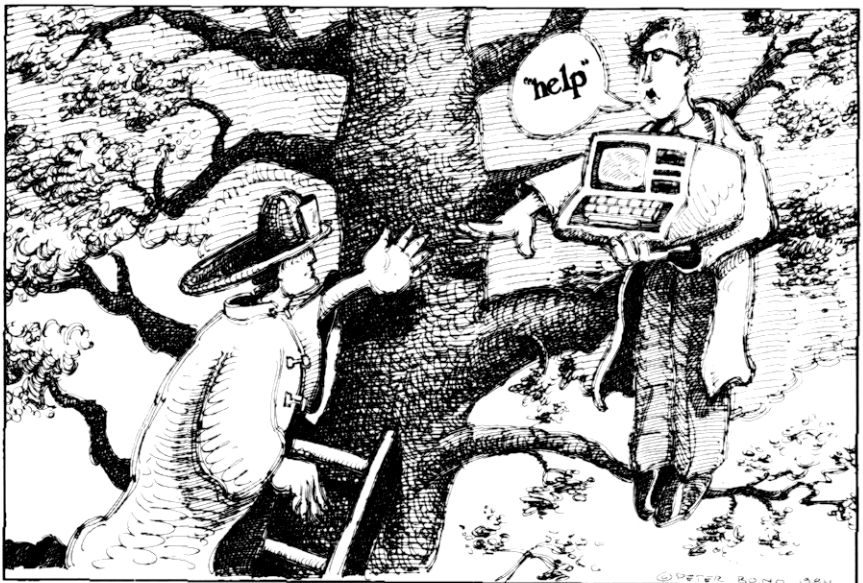


Illustration by Peter Bono

the name of another topic in that category. When you're done with the files, press the break key to leave Help; you return to DOS with the screen restored as if you'd never used Help.

If you don't feel like wading through the list of help files or topics, you can type in HELP followed by a help file name to bypass the explanatory screen. Alternatively, you could type in HELP followed by both a category and a topic to move directly to a particular information screen. You can search all on-line help files for a particular topic key word with the command HELP *Topic, and you can also set parameters for printout and video display (explained in Help's main menu).

When you type in HELP from TRSDOS Ready, the program displays its opening page and searches all disks for files with the extension /HLP. Help removes the extension and drive number from the file name and displays the rest as a category title. Since DOS/HLP is the only help file on the distribution disk, it's the only category that Help normally lists.

If you have help files with the same name on different disks, Help displays each as a separate category. Add a drive suffix after a category name to tell Help to work with a file on a particular disk; otherwise, it picks the first it comes to in the same way Basic does.

Help File Structure

The directory entry for DOS/HLP is the first clue to the file structure of all help files. DOS/HLP has a logical record length of 1 (instead of the more common record length of 256). It treats a help file as a string of bytes instead of a series of records, and it finds its way through the file by knowing the address of the individual bytes it wants to read.

System Requirements

Model 4
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TRSDOS 6.2



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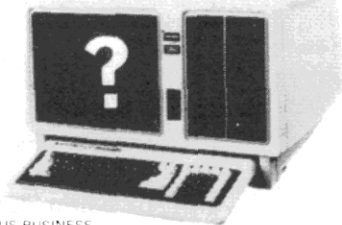
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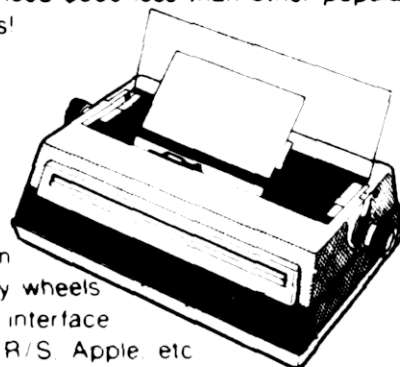
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Program Listing. Help file generator.

```

100 '      HELP File Generator
101 '      for TRSDOS 6.2
102 '      Written by Hardin Brothers
103 '
104 CLS
105 DEFINT A - Z
106 MAX.LINES = 100
107 MAX.TOPICS = 100
108 DIM AS(MAX.LINES), BS(MAX.TOPICS), CS(MAX.TOPICS)
109 BCOUNT = 0: PLACE = 0
110 '
111 '      Get a file name, massage it, and open file
112 '
113 INPUT "Name of Category (File Name)"; FS
114 '      Strip extension and drive #
115 IF INSTR(FS, "/") THEN FS = LEFT$(FS, INSTR(FS, "/")-1)
116 IF INSTR(FS, ":") THEN FS = LEFT$(FS, INSTR(FS, ":")-1)
117 '      Cut down to 8 characters
118 FS = LEFT$(FS, 8)
119 '
120 INPUT "Drive Number"; DS
121 '      Is it legal?
122 IF LEN(DS) > 1 OR DS > "7" OR DS < "0" THEN GOTO 120
123 '      Put together the file name
124 FILE.NAMES = FS + "/HLP:" + DS
125 '      Open the file and erase old copy if there is one
126 OPEN "R", 1, FILE.NAMES, 1
127 IF LOF(1) = 0 THEN GOTO 132
128 CLOSE 1
129 KILL FILE.NAMES
130 GOTO 126
131 '      Field the file
132 FIELD 1, 1 AS DS
133 '
134 '      Get a Topic Name and turn it into upper-case
135 '
136 CLS
137 BCOUNT = BCOUNT + 1
138 PRINT "Category ==> "; FS
139 PRINT "Topic #"; BCOUNT; " ==> ";
140 LINE INPUT BS(BCOUNT)
141 IF LEN(BS(BCOUNT)) > 32 THEN GOTO 139
142 IF LEN(BS(BCOUNT)) < 2 THEN GOTO 139
143 FOR I = 1 TO LEN(BS(BCOUNT))
144   B.CHARS = MID$(BS(BCOUNT), I, 1)
145   IF B.CHARS < "a" AND B.CHARS > "z"
146     THEN MID$(BS(BCOUNT), I, 1) = CHR$(ASC(B.CHARS)-32)
147 '      Put current file location into CS(BCOUNT)
148 CS(BCOUNT) = MKI$(PLACE)
149 ACOUNT = 0
150 INV.OFF = -1
151 '      Line counter
152 '      Flag for inverse print
153 '
154 '      Now get the lines of text for this topic
155 CLS
156 PRINT "Category ==> "; FS
157 PRINT "Topic ==> "; BS(BCOUNT)
158 PRINT: PRINT "Embed <\> to toggle inverse print"
159 PRINT "Enter line of <X> to end"
160 '
161 '      Enter one line
162 ACOUNT = ACOUNT + 1
163 '      Increase line counter
164 AS(ACOUNT) = "": PRINT "Line"; ACOUNT; " ==> ";
165 LINE INPUT AS(ACOUNT)
166 IF AS(ACOUNT) = "X" THEN GOTO 170
167 '      Leave when done
168 '      Change <\> characters to inverse toggles
169 IF INSTR(AS(ACOUNT), "\") THEN
170   MID$(AS(ACOUNT), INSTR(AS(ACOUNT), "\"), 1) = CHR$(127):
171   INV.OFF = NOT INV.OFF:
172   GOTO 166
173 '      Put a CR at the end of each line
174 AS(ACOUNT) = AS(ACOUNT) + CHR$(13): GOTO 161
175 '      If inverse print is still on, place toggle before CR
176 IF NOT INV.OFF THEN
177   AS(ACOUNT-1) = LEFT$(AS(ACOUNT-1), LEN(AS(ACOUNT-1))-1) + CHR$(127) + CHR$(13)
178 AS(ACOUNT) = CHR$(12)
179 '      Mark end of Topic
180 '
181 '      Put the text into the file
182 '
183 FOR I = 1 TO ACOUNT
184   FOR J = 1 TO LEN(AS(I))
185     LSET DS = MID$(AS(I), J, 1)
186     PUT 1, PLACE + 1
187     PLACE = PLACE + 1
188   NEXT J
189 NEXT I
190 '
191 '      Another topic?
192 '
193 CLS
194 PRINT "Another Topic?";
195 YN$ = INPUT$(1)
196 IF YN$ = "Y" OR YN$ = "y" THEN GOTO 136
197 IF YN$ <> "N" AND YN$ <> "n" THEN GOTO 187
198 '
199 '      No more Topics, so sort the list using a selection sort
200 '
201 CLS: PRINT "Sorting Topic Names"
202 IF BCOUNT < 2 THEN GOTO 207
203 '      Skip sort if less than 2 topics

```

Listing continued

*Store your
topic titles in
uppercase
and in alphabetical
order.*

Each help file has three sections: the text of all topics, a list of topic titles, and a pointer to the beginning of the title list. The order of the first two sections may be reversible, but building a file that way would be more difficult.

The file's final 2 bytes hold a pointer to the beginning of the topic title list. The file stores this pointer in binary form, in least significant byte/most significant byte (LSB/MSB) order. Help starts reading a help file by opening the file with a logical record length of 1 and then moving to the end of the file to read those 2 bytes. It then uses those bytes to position the file to the beginning of the topic list. Because of the structure of the final pointer as well as the other pointers in the file, the maximum length of any help file is 64K, including topic titles and address pointers.

The list of topic titles has several peculiarities. Each topic title must be at least 2 bytes long, though I know of no upper limit. However, Help only accepts 32 characters of input when it asks for a topic title, so use that as a practical limit.

Store the titles in uppercase, because Help translates your requested topic to uppercase before searching the list. Also, be sure to store the topic titles alphabetically. Help must use something akin to a binary search to find topic titles quickly; I know from experience that it can't find topics that aren't in alphabetical order, though it does include them in the topics list.

Each topic title must end with a byte that has the high bit set. For example, if the help file contains a topic named Test, you must store the final 'T' as D4 hexadecimal (hex) instead of the normal ASCII value of 54 hex. Help follows each topic name with a 2-byte pointer to the position of the beginning of its text section in the file.

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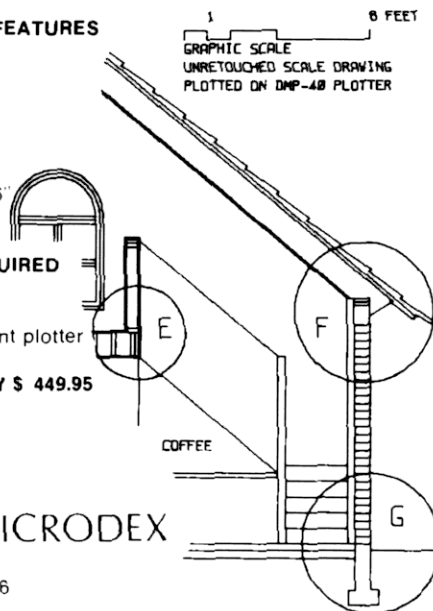
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THE NEXT STEP

Listing continued

```

195 FOR I = 1 TO BCOUNT
196   MINS = BS(I)
197   MIN.PTR = I
198   FOR J = 1 TO BCOUNT
199     IF BS(J) => MINS THEN GOTO 202
200     MINS = BS(J)
201     MIN.PTR = J
202   NEXT J
203   IF MIN.PTR = I THEN GOTO 206
204   SWAP BS(I), BS(MIN.PTR)
205   SWAP CS(I), CS(MIN.PTR)
206 NEXT I
207 '
208 '   Now load the topic names and addresses
209 '
210 CS = MKIS(PLACE) 'Save current file location
211 PRINT "Saving Topic Names to Disk:"
212 PRINT
213 FOR I = 1 TO BCOUNT
214   PRINT BS(I)
215   B.CHARS = RIGHTS(BS(I),1)
216   ' Set high bit of last character
217   MIDS(BS(I),LEN(BS(I)),1) = CHR$(ASC(B.CHARS) OR 128)
218   FOR J = 1 TO LEN(BS(I))
219     LSET DS = MIDS(BS(I),J,1)
220     PUT 1, PLACE + 1
221     PLACE = PLACE + 1
222   NEXT J
223   ' Save address of Topic's text
224   FOR J = 1 TO 2
225     LSET DS = MIDS(CS(I),J,1)
226     PUT 1, PLACE + 1
227     PLACE = PLACE + 1
228   NEXT J
229 NEXT I
230 '
231 '   Save address of Topic list
232 '
233 FOR I = 1 TO 2
234   LSET DS = MIDS(CS,I,1)
235   PUT 1, PLACE + 1
236   PLACE = PLACE + 1
237 NEXT I
238 '
239 '   Close file and leave
240 '
241 CLOSE 1
242 END

```

End

The computer stores text for each topic in modified ASCII form. To keep the disk file as short as possible, you can omit spaces from the text. If the computer stores any character with the high bit set, Help will print the character normally and follow it with a space. However, it will also print normal ASCII spaces, so you don't need to use this trick to condense the file.

The character 7F hex tells Help to turn inverse printing either on or off. Inverse printing is automatically turned off when Help starts printing a section of text; the first 7F hex character turns it on, the next turns it off again.

Help stores carriage returns in the text portion as normal 0D hex bytes (the ASCII code for a carriage return). Each text section ends with a 0C hex byte, which is a signal to Help to stop printing the text and display its own prompt message.

When Help prints out the text for a topic, it follows specific formatting rules. First, it always puts the topic title at the top of the screen; you don't need to store the title again in the body of the text. Also, Help keeps track of the cursor position on the screen, and

waits for your keystroke when the screen is full. The text does not need to have embedded marks for the end of each screen. The first screen holds the topic title plus 23 lines of text; each following screen holds 24.

Creating Help Files

After I deciphered the structure of a help file, writing a program to create new files was easy. I thought first of writing a program that would take an ASCII file from a word processor as input, but decided that it was easier in most applications to simply type the text directly into a Basic program.

The Program Listing shows one way you can write such a utility. With the information above and the comments in the program, you should have little trouble understanding what happens in the program. It uses a simple block structure for clarity, and demonstrates how to generate a help file. The only unusual part of the program is the way that you calculate positions in the file. Basic numbers the bytes in the file starting at 1, but Help starts counting at zero.

Though help files must have a cer-

THE NEXT STEP

*You can create
some unusual
effects within the
Help file format.*

tain format, you can still create some unusual effects with them. For example, you may want to display a single page of information instead of a list of topics with several pages of text. You can create such a file by removing lines 141-181 and 193-205 from the Listing. Treat each topic as a screen line (make sure you enter a full line of information) and Help will think you've created a file with many topics and no text. When you type in HELP and a category from TRSDOS Ready, the single page of information appears on the screen.

Also, you could create a file in which several topics share the same text. You do so by altering the Listing; even easier would be to use a file editor (such as Super Utility Plus or the LDOS file editor, FEDII) to alter the pointers following topic names so that they point to the same sections of text in the disk file.

The power and flexibility of Help is only one example of the general excellence of TRSDOS 6.2. If you use a Model 4 or 4P and have not yet upgraded to TRSDOS 6.2, I urge you to do so. This new version of TRSDOS adds enough features to be well worth the upgrade price, and Radio Shack has removed most of the bugs of the earlier Model 4 TRSDOS. Help is the only new utility included with TRSDOS 6.2, but it alone is worth at least half the purchase price. ■

You can contact Hardin Brothers through CompuServe. Go PCS-117 to the Writers' and Editors' SIG (WESIG) and leave your message addressed to him. Feel free to join in discussions started by others.

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Basic Bonus: Redefined Function Keys

Last month's column focused on commercial software; this time around, I'll get into some Basic programming techniques. My program, KEYMOD.BAS, redefines the Tandy 2000's 12 function keys; you can use the program as written or substitute any Basic commands you choose.

Some Key Changes

Why redefine the function keys? First, Microsoft chose to assign the most useless Basic commands to them. You really don't have much need for the TRON (trace on) or TROFF (trace off) commands.

Also, the F1 key invokes the List command. This is fine if you want to list an entire program. However, when you want to list only a small segment of a program, you must remember to add a space between the key word and the part of the command specifying the program segment. Most of the time, I wind up with a syntax error because I forget the space.

Finally, the F11 and F12 keys aren't even assigned a command, so they're being wasted.

The Program Listing permanently assigns new definitions to the programmable function keys. Table 1 shows the Listing's new commands; you can choose any commands you want. I'll explain some of the code segments so you can apply the same techniques to other programs.

Lines 10-130 initialize the program and assign key definitions to the elements of array K\$(). Lines 140-250 prompt you to press the enter key after you insert a disk containing Basic.EXE in drive A.

Lines 260-310 perform the file-open operation. This seems more complex than usual, but the additional code is necessary. I want only Basic.EXE's last two records, so I must access the file using direct (random) access methods. However, if you attempt to open a file using the



Illustration by Charlie Wilton

Program Listing. KEYMOD.BAS.

```

10 DEFINT A-Z: DIM K$(12)
20 K$(1) = "LIST"
30 K$(2) = "RUN"+CHR$(13)
40 K$(3) = "LOAD"+CHR$(34)
50 K$(4) = "SAVE"+CHR$(34)
60 K$(5) = "LLIST"
70 K$(6) = "SYSTEM"+CHR$(13)
80 K$(7) = "FILES"+CHR$(34)+"*.BAS"
90 K$(8) = "EDIT"
100 K$(9) = "CLS"+CHR$(13)
110 K$(10) = "SCREEN 0,0,0"+CHR$(13)
120 K$(11) = "WIDTH 40"+CHR$(13)
130 K$(12) = "WIDTH 80"+CHR$(13)
140 CLS
150 PRINT "BASIC Function Key Modification"
160 PRINT "Written by: John B. Harrell, III"
170 PRINT
180 PRINT:BEEP
190 PRINT "Make sure the disk in drive A has the BASIC.EXE file"
200 PRINT "to be modified and then press <ENTER> when ready."
210 AS=""
220 WHILE AS=""
230 AS=INKEY$
240 WEND
250 IF ASC(AS)<>13 THEN 210
260 ON ERROR GOTO 700
270 OPEN "I",1,"A:BASIC.EXE"
280 CLOSE
290 ON ERROR GOTO 0
300 OPEN "R",1,"A:BASIC.EXE",256
310 FIELD 1,128 AS R1$,128 AS R2$
320 GET 1,202
330 R202.1$=R1$: R202.2$=R2$
340 ZA$=R202.1$: GOSUB 750: ZA$=R202.2$: GOSUB 750
350 GET 1
360 R203.1$=R1$: R203.2$=R2$
370 ZA$=R203.1$: GOSUB 750: ZA$=R203.2$: GOSUB 750
380 MID$(R202.2$,117,11)=STRING$(11,0)
390 MID$(R202.2$,117,11)=K$(1)
400 MID$(R203.1$,1,128)=STRING$(128,0)
410 FOR I=0 TO 7
420 MID$(R203.1$,5+I*16,16)=K$(I+2)
430 NEXT
440 MID$(R203.2$,1,48)=STRING$(48,0)
450 FOR I=0 TO 2
460 MID$(R203.2$,5+I*16,16)=K$(I+10)

```

Listing continued

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Listing continued

```

470 NEXT
480 PRINT
490 PRINT "Record modification is complete - the modified records are:"
500 PRINT
510 ZAS=R202.1$: GOSUB 750: ZAS=R202.2$: GOSUB 750
520 ZAS=R203.1$: GOSUB 750: ZAS=R203.2$: GOSUB 750
530 PRINT
540 PRINT "Ready to permanently modify file BASIC.EXE with these
550 PRINT "new key definitions."
560 PRINT
570 PRINT "Is it 'OK' to update BASIC.EXE? ";
580 AS=""
590 WHILE AS=""
600 AS=INKEY$
610 WEND
620 IF AS<>"Y" AND AS<>"y" AND AS<>"N" AND AS<>"n" THEN 580
630 IF AS="N" OR AS="n" THEN STOP
640 LSET R1$=R202.1$: LSET R2$=R202.2$
650 PUT 1,202
660 LSET R1$=R203.1$: LSET R2$=R203.2$
670 PUT 1
680 CLOSE 1
690 END
700 PRINT
710 BEEP: BEEP: BEEP
720 PRINT "A:BASIC.EXE cannot be found on the current disk in drive A"
730 ON ERROR GOTO 0
740 RESUME 180
750 PRINT:FOR I=0 TO 7
760 AS=HEX$(I*16): IF LEN(AS)=2 THEN PRINT AS;" "; ELSE PRINT "0";AS;" ";
770 FOR J=0 TO 15
775 IF J=7 THEN PRINT " ";
780 AS=MID$(ZAS,I*16+J+1,1)
790 AS=HEX$(ASC(AS)): IF LEN(AS)=1 THEN AS="0"+AS
800 PRINT AS;" ";
810 NEXT
820 PRINT CHR$(179);
830 FOR J=0 TO 15
840 AS=MID$(ZAS,I*16+J+1,1)
850 IF ASC(AS) < 31 OR ASC(AS) > 127 THEN PRINT "."; ELSE PRINT AS;
860 NEXT
870 PRINT CHR$(179)
880 NEXT
890 RETURN

```

End

*It's imperative to
verify that the file
exists before writing to it.*

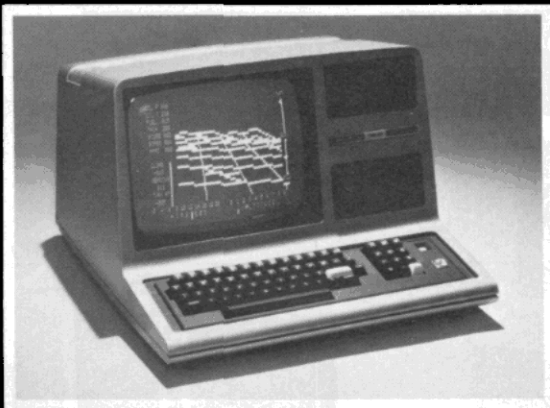
"R" option and the file doesn't exist, Basic creates a new file without indicating the previous file-open failure.

Any subsequent write operation extends this file. Therefore, it's imperative to verify that the file exists before writing to it. If you attempt to open the file using the I option and it's not there, Basic flags the failure as a file open error and lets you know.

Lines 320-370 retrieve records 202 and 203 from the file Basic.EXE and display their contents. These records contain the key definition table that you're modifying. The program stores these two records in the program as 128-byte segments even though I set the record length to 256 bytes. That's because Basic's ability to manipulate character strings is limited to 255 bytes. The subroutine that this segment calls (line 750) displays

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records in hexadecimal (hex) and ASCII format.

Program lines 380-470 modify the key assignments using the key strings assigned to the K\$(array. When the modification is complete, the program

prompts you to initiate writing the modified records to the Basic. EXE file.

To use the program under the new Basic 1.03.00, load Basic and the Listing, then make the changes shown in Table 2. ■

Function Key	Original Assignment*	KEYMOD.BAS Assignment*
F1	[List]	[List]
F2	[Run<]	[Run<]
F3	[Load"]	[Load"]
F4	[Save"]	[Save"]
F5	[CONT<]	[LLIST]
F6	[,"LPT:"<]	[System<]
F7	[TRON<]	[Files"*BAS]
F8	[TROFF<]	[Edit]
F9	[Key]	[CLS<]
F10	[Screen 0,0,0<]	[Screen 0,0,0<]
F11	[]	[Width 40<]
F12	[]	[Width 80<]

*Character strings are enclosed in [] symbols to allow including blanks and the " character in the assigned key text. The < character designates a carriage return.

Table 1. Standard and reassigned function key commands.

1. Delete lines 320-340
2. 350 GET 1,203
3. Delete 380-390
4. 420 MID\$(R203.1\$,5+I*16,16)=K\$(I+1)
5. 440 MID\$(R203.2\$,1,64)=STRING\$(64,0)
6. 450 FOR I=0 TO 3
7. 460 MID\$(R203.2\$,5+I*16,16)=K\$(I+9)
8. Delete 510
9. Delete 640-650
10. 670 PUT 1,203

Table 2. Changes to the Listing for Basic 1.03.00. Boldface type indicates a change from the original listing.

John B. Harrell III is an associate editor of 80 Micro. You can reach him at 1519-A Carswell Circle, Bolling Air Force Base, Washington, DC 20366.

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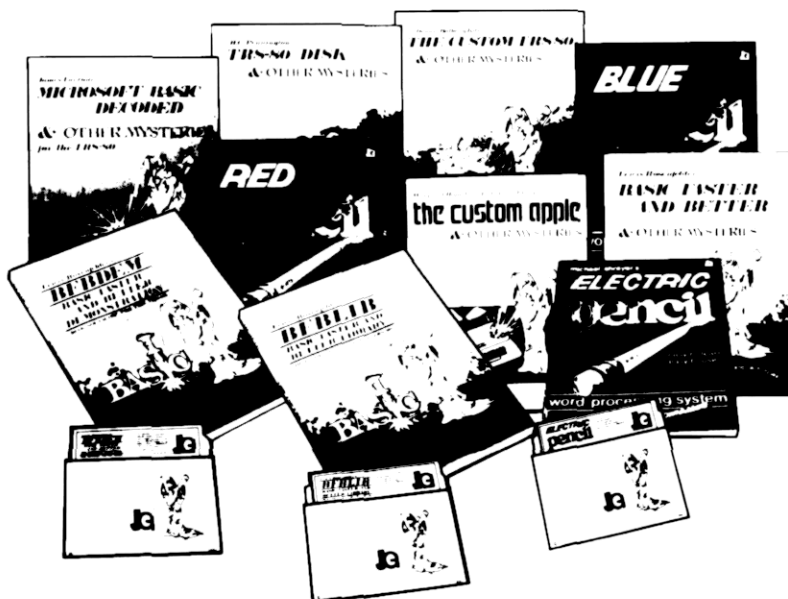
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tion, the new documentation is written clearly and succinctly.

Aside from the much-improved BIOS, the first major change you'll note is the absence of the now-famous interchange utility (INTERCHG). As good as INTERCHG was, it had serious limitations (stepping your disk drives at 30 milliseconds, among other things). Montezuma replaced INTERCHG with a disk format definition file. You can use this custom disk formatter with either the configuration (CONFIG) or disk back-up (DUP) utilities to easily format disks.

CONFIG and DUP can access format definitions from the default disk or from any other drive or file you specify. With CONFIG, you can assign any of the four logical floppy disk drives to any of the formats defined in the definition file. You can make these changes (as all others) a temporary or permanent part of your system.

You write the disk formats in ASCII notation (using any text processor) so that they conform to the parameters prescribed in the CP/M disk parameter header and disk parameter blocks.

Montezuma Micro's CP/M now supports over 40 disk formats, including both 40- and 80-track drives, single and double density, and single and double sided, and, as the documentation says, you can "roll your own" formats. Montezuma also offers a formats-to-go service: If you send Montezuma a disk and the required format information, they'll return your disk with the updated disk definition on it.

The CONFIG utility provides the routine options that let you select various parameters for the keyboard, printer, serial port, and input/output device assignments. It also lets you assign any single byte value to the arrow, clear, and break keys in either unshifted, shifted, or control modes. And you can assign a string of up to eight characters to the three function keys in each of the same three modes.

In addition to the normal video control codes used in Montezuma's terminal emulation, CP/M provides 16 control codes not assigned a particular function. CONFIG lets you redefine these codes as duplicate functions of the 15 codes already provided. You don't have to change programs de-

Montezuma's CP/M now supports over 40 disk formats, including 40- and 80-track drives and single- and double-density.

signed to work with another terminal emulation, all you do is redefine the control codes.

Another useful utility provided is KEYDEF. If you don't want to redefine keys with CONFIG, you can use KEYDEF. For example, WordStar requires several special control keys. With KEYDEF, you can reassign the arrow, clear, break, F1, F2, and F3 keys. These assignments remain in effect until you next cold-boot the system or until you run KEYDEF to return them to the default values. The input to KEYDEF is a simple ASCII text file you can develop with any text processor.

Hard Disk Drive Support

This is the first version of Montezuma Micro's CP/M that supports hard disk drives. It supports Radio Shack's 5-megabyte drive (catalog number 26-1130), Radio Shack's 15-megabyte drive (catalog number 26-4155), and Percom's 5-megabyte drive (part number PHD5C3). In addition to the drivers, you also get a patch to CP/M and a hard disk back-up utility.

The documentation first describes the organization of a hard disk drive. This section provides a lot of information, especially concerning one important feature of the system: Montezuma Micro's CP/M supports sharing the hard drive between CP/M and TRSDOS/LDOS. In fact, if you're creative, you can format a hard disk with all three operating systems co-resident.

The step-by-step instructions are easy to follow and use two of the other utilities Montezuma supplies, MOVCPM and SYSGEN. These programs create a larger resident area for CP/M to hold the hard disk driver, which needs an additional 1K of memory.

The hard disk driver contains the code necessary to format, partition, and assign the drives their proper logi-

cal names. If you set aside the first head of the hard disk as drive A, the Model 4/4P can boot directly from the hard disk once you finish the configuration process. The driver will format only the particular areas of the hard drive assigned to CP/M after positive confirmation of the order.

You use the HARDBACK utility to back up and restore hard disk drives from the floppy drives. The options available include backing up the hard disk, restoring the hard disk, or checking the hard disk for errors.

During a full back-up operation, HARDBACK compares the parameters for the hard drive and floppy disk you specify and tells you how many floppy disks you need to format. This is a nice touch. It's a real pain to be almost through backing up one of these drives only to find out you've depleted your supply of previously formatted disks.

HARDBACK also supports an archival back-up feature using the archive (or modified) attribute bit CP/M maintains. This saves you time when you've modified only a few files.

The last part of the hard disk support is CPMFIX. If you've never seen a 5 megabyte disk directory, imagine 792 files scrolling across your screen, four per line. This will rapidly try your patience.

CPMFIX implements standard features in the CP/M system used to solve this (and other) problems. To effectively use a hard disk drive, you must segment the logical drive into various user areas (numbered zero through 15).

This, however, creates a problem in determining the current user area, since CP/M normally doesn't display this information. And you can't easily access files in other user areas. Every user area would need its own copy of a utility.

CPMFIX patches the console command processor to allow a visual display of the user number with each command prompt. It also adds code to the system to allow those programs in user area zero to become available to all other areas. The last modification alters CP/M to honor the archive attribute bit.

Conclusion

I was pleased with this implementation of the CP/M system; it offers

some handy improvements over Montezuma Micro's previous version of CP/M. If you want to open your world to the vast software base available for CP/M, I think this version of CP/M is a fine way to do so. ■

Let There Be Music

by Gary A. Ludwick

Radio Shack has good news for all you closet Van Halens, Bachs, or Coplands: You can turn your Model III or 4 into a music synthesizer to create, load, play, edit, and save your own compositions. Orchestra-90 provides a complete hardware and software system that, when connected with your home stereo, turns your computer into an electronic orchestra.

If writing or transcribing music isn't your forte, there is a Special Interest Group (SIG) on CompuServ, Orch-90, that has hundreds of songs you can store and play back. All you have to do is download them. Whichever way you use it, Orchestra-90 is an excellent value at its price.

Overview

Orchestra-90's hardware comprises a two-channel stereo pre-amplifier that attaches to your computer's 50-pin input/output bus. The leads from the pre-amp go directly to the tape or

auxiliary inputs of your stereo. The package includes the patch cords as well as a set of torroid coils to eliminate radio frequency interference. Installation is a snap, taking only about 10 minutes.

Orchestra-90 comes in two versions, one for straight cassette use and one for transferring the cassette programs to disk. I would rather that Radio Shack charge an extra \$5 for a disk version, to avoid the hassle of wiring up a cassette to make the transfer.

The Orchestra-90 package includes a 74-page manual that is refreshingly well done. It makes the assumption that you know nothing about music or musical notation, and then leads you through song creation step by step.

Musical Basic

Remember your first attempt at Basic programming, how you sat there with the manual in your lap, trying to memorize syntax, functions, and error messages? If you recall that experience, creating and transcribing music on Orchestra-90 will seem familiar.

Using Orchestra-90 is really like learning a new programming language: It has its own syntax, symbols, and error codes (see Figs. 1 and 2). The program designers have created a new computer language that translates every aspect of musical notation into a form you can enter from your keyboard, without learning any music theory.

In Fig. 2, for example, you can see how every note on the bass and treble staves has been assigned a number or letter code. If you were transcribing an existing piece of sheet music, all you'd have to know is the note's position on the staff and the Orchestra-90 code assigned to that position.

In addition, Orchestra-90's coding system accommodates other musical symbols: sharps, flats, syncopation, meter, articulation, measures, and repeats are all predefined. For further flexibility, you can produce harmonies in up to five voices (five notes played simultaneously) and you can assign one of five instrument sounds (trumpet, oboe, clarinet, organ, or violin) to the notes.

Making Orchestra-90 Work

It would be easy for you to be intimidated by this program. But the truth is that those who have no musical

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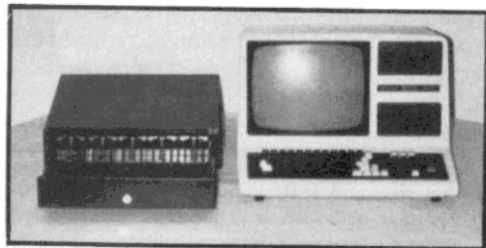
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+F	D
+E	C
+D	B
+C	A
+B	G
+A	F
+9	E
+8	D
+7	C
+6	B
+5	A
+4	G
+3	F
+2	E
+1	D
0	C (Middle C)
-1	B
-2	A
-3	G
-4	F
-5	E
-6	D
-7	C
-8	B
-9	A
-A	G
-B	F
-C	E
-D	D
-E	C
-F	B
S	REST

Figure 1. Orchestra-90 note conversion chart.

training often learn Orchestra-90 easier than people with a musical background. The reason is simple: All you have to remember is that a note at a particular place on the staff is zero. To me, that note is middle C, which I then have to translate to a programmed zero. Orchestra-90 codes all other notes relative to middle C's zero.

Programming in Orchestra-90 is just like programming in Basic: You have to follow certain rules. With a couple of weeks of practice, Orchestra-90 will become as second nature to you as Basic is to many people.

Unusual Program Support

Although Orchestra-90 is relatively new to Radio Shack, the program was previously available from Software Affairs (under the name Orchestra-80 and -85). For the beginner, this is good news, because on-line help is available through the Orch-90 Special Interest Group on CompuServe.

I mentioned earlier that Orchestra-90 could store and play songs. The Orch-90 SIG offers nearly 400 already programmed titles ready for downloading. Also, a number of other boards around the country feature music downloads for the program.

Best of all, you'll have access to experts who have been working with this system for some time, including the program's author. My inquiries on the

SIG always resulted in quick and knowledgeable replies, and the download menu has an incredible variety.

Conclusion

Orchestra-90 is an intriguing piece of work.

Compared to other music systems on the market, Orchestra-90 stands out with its capabilities and the quality of its output. It does require you to do some work and to practice to become truly proficient with it, but so does Basic or learning the guitar. If you have a yen to try your hand at playing or composing music, Orchestra-90 is a good introduction. ■

Spell Bound

by Terry Kepner

Model 4 owners plagued by typos and neologisms, take heart. Cornucopia Software has introduced Electric Webster, their well-known spelling checker program, for the Model 4 under TRSDOS 6.1 or Model 4 DOSPLUS. Electric Webster provides a fast, efficient way to check and correct spelling errors in text files.

This new version of Electric Webster features special modules that customize its operation for use with the Allwrite, Lazy Writer, LeScript, and Scripsit word processors. These modules let you invoke the spelling checker from within your word processor and then return to the text after Electric Webster checks the document. The modules also make allowances for the special formatting commands in each of the word processors so that these commands aren't included in the word counts given during the checking process.

Unfortunately, these special modules don't allow Electric Webster to check the word processor's formatting commands for errors. For example, Allwrite uses a semicolon at the beginning of a line to indicate a formatting control command. When Electric Webster encounters the semicolon, it skips the rest of the line. Any spelling errors in the commands remain undetected. Since Cornucopia programmed the modules so they don't count format commands as words, the manufacturer could additionally have had

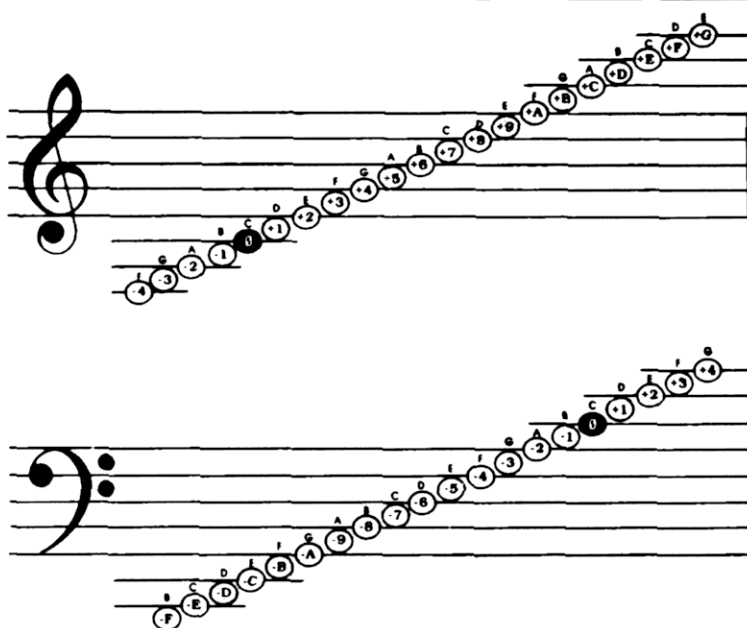


Figure 2. Orchestra-90 music language scale. The small letters above the notes represent the musical scale.

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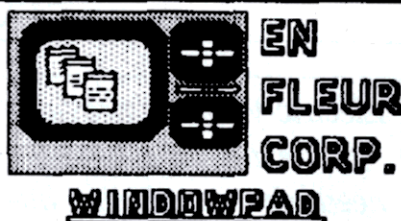
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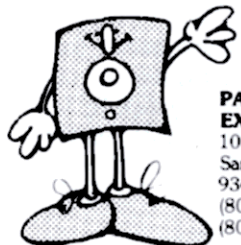
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REVIEWS

Electric Webster provides that extra security you need when producing important documents, and it does so with a minimum of hassle.

the modules check command syntax and point out errors.

All Together Now

When you get Electric Webster, you should make a back-up copy using either TRSDOS or DOSPLUS. Cornucopia includes a special utility with Electric Webster, Test/EW, to detect file errors on the disk. If any files are bad, you should return the master disk to Cornucopia for replacement.

You need two disks to use Electric Webster: one for your word processor and Electric Webster's control files, and the other for the dictionary files.

With the back-up disk in your computer, transfer the six main sections of Electric Webster (using the appropriate word processor linking module) to your word processing disk. This requires about 70K of free space before you start. If you don't have that much room available, you can put two of the files on the dictionary disk instead (reducing available room for your expansion dictionary).

Now, format a new disk and put the dictionary files on it. That's all there is to it.

Working from Within and Without

You can invoke Electric Webster either from within your word processor or independently. If you call it from within, Electric Webster loads your document in memory, discards duplicate words, sorts the remainder, and compares them with the entries in its dictionary files. It eliminates matches and lists the other words to the screen in a group. Pressing the enter key starts the correction mode, where you can correct the word, leave it unchanged, display the word in context, display the appropriate section of the dictionary, add the word to the dictionary, or exit the program.

Selecting the in-context option reserves the word for later, when Electric Webster reloads the text file and dis-

plays the word in context. When you're done, Electric Webster updates the dictionary if necessary and returns you to the word processor with the corrected text in memory. (Allwrite and LeScript also put corrected copies on disk, Lazy Writer and Scripsit don't.)

Using Electric Webster by itself is quite different. It loads the document you specify in memory, discards duplicate words, and sorts and compares the remainder with the dictionary lists. Electric Webster displays words missing from the dictionaries on the screen, or sends them to your printer, and the program terminates operation.

The amount of memory available on your data disk is the only limit to the number of words you can add to Electric Webster's dictionary. On the dictionary disk, you have about 70K (after removing unnecessary Electric Webster files) if you're using standard 40-track, 18-sector Radio Shack drives.

Famous Last Words

Electric Webster provides that extra security you need when producing important documents, and it does so with a minimum of hassle. Its best features are available only if you integrate it with one of the word processors it supports.

The only serious drawback I found with Electric Webster is that it ignores the text formatting commands, forcing you to manually check them for spelling problems. ■

Electric Webster



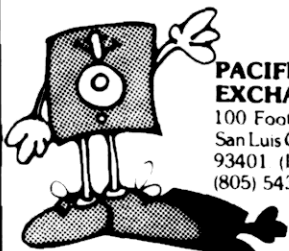
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1138.6948
1129.7858
1120.8758
1111.9658
1103.0578
1094.1488
1085.2388
1076.3288
1067.4188
1058.5088
1049.5988
1040.6888
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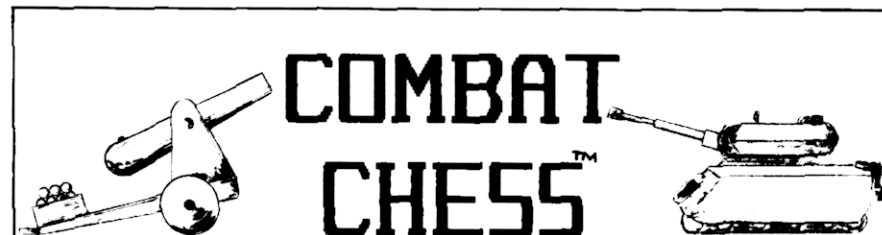
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"Take a Byte" is a Modular BASIC Program

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- (3) 28 Nutritional MEAL LIST Data File Examples
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At Home or Offix

Offix is an integrated software package for the Model 2000 that combines filing, word processing, forms design, and report generation in an easy-to-understand format.

Created by Emerging Technology Consultants Inc., Offix (\$149) does away with user's manuals, featuring instead pop-up menus, help screens, and on-line tutorials.

Offix simulates the steps involved in gathering and filing information by displaying a file cabinet on screen. To open a file, you position the cursor over the appropriate drawer. Each drawer holds up to 100 file folders, and each folder can contain an unlimited number of documents.

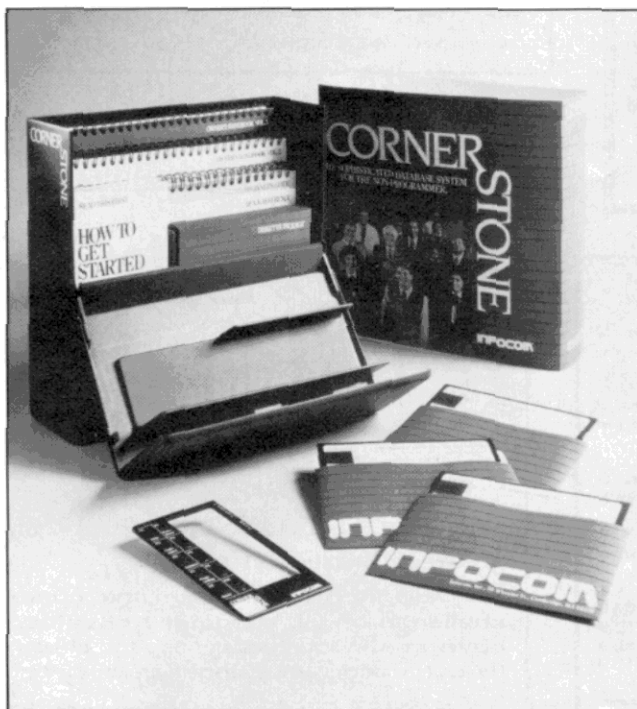
More information is available from your local Radio Shack store, or by contacting Emerging Technology at 1877 Broadway, Boulder, CO 80302, 800-782-4896.

Reader Service ✓ 552

Data Adventures

Infocom, maker of popular adventure games such as Zork and Deadline, is entering the business software market with Cornerstone (\$495), a relational data base system for non-technical users.

Program features include context-sensitive on-line help messages, menu-driven command structures, text editing capabilities, and a report writing module that



The latest product from Infocom isn't a game—it's a data base manager for computer novices.

draws information from any combination of files.

A conversion utility lets you transfer files from dBase II and III and PFS: file. Cornerstone includes an on-line tutorial, beginner's guide, owner's handbook, and sample data base application. The program is available for the Models 1000, 1200, and 2000.

Contact Infocom Inc. (55 Wheeler St., Cambridge, MA 02138, 617-492-1031) for more information.

Reader Service ✓ 574

Diet Software

Soft Byte Inc. (Box 1484, E. Lansing, MI 48823, 517-337-1253) offers three nutri-

tion software packages for the Models III and 4.

Heartware (\$50) aids family cooks in making recipe changes for low-sodium, low-cholesterol, and low-fat diets. The program translates diet restrictions into healthy, appetizing meals by checking recipes for unacceptable ingredients. It then suggests substitute ingredients and calculates the necessary amounts.

The Balancing Act (\$65) is an interactive dietary program for creating a weight loss plan. The program applies the basic concepts of weight control by balancing diet and exercise. Diet ratings let you balance or rebalance your diet.

A professional version of the program, The Balancing Act I (\$299), is a multiuser, modifiable data base program for educating patients in weight control. It's designed for health professionals in private practice, outpatient clinics, and fitness programs.

Reader Service ✓ 557.

Tandem Tandy

Double Duty lets you run two programs simultaneously on a 128K Model 4. You can move between any two programs and execute library commands from within them.

The program partitions Model 4 memory into two 64K sections and a library command section, letting you concurrently run two programs that use less than 64K of memory each.

Created by Software Concepts Inc., Double Duty is available at Radio Shack stores (catalog number 26-2231) for \$69.95.

For more details, contact Tandy Corp./Radio Shack at 1800 One Tandy Center, Fort Worth, TX 76102.

Reader Service ✓ 551

Thinking to the Max

MaxThink (\$59.95) is a thought processor for Xenix, CP/M, and MS-DOS computers that helps you create outlines and organize ideas.

MaxThink helps you transform information into ideas by using commands for organizing, analyzing,

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evaluating, planning, and thinking.

Commands gather, classify, divide, join, and sort words and ideas. MaxThink runs on the Models II, 4, 12, 16, 1000, and 1200, and includes a manual.

For more information, contact MaxThink Inc., 230 Crocker Ave., Piedmont, CA 94610, 415-428-0104.

Reader Service ✓ 568

More CP/M

The PICDisk micro disk (\$799) puts CP/M 2.2 on the Model 100, letting you run thousands of CP/M applications programs on your laptop (and your desktop) computer.

The system includes T/Maker, the integrated software package that incorporates spreadsheet, data base, word processing, list processing, and graphics functions.



The PICDisk micro disk system includes CP/M 2.2 and T/Maker integrated software.

PICDisk uses 3½-inch disks and provides an additional 32K of RAM. It attaches directly to the Model 100, requiring only a screwdriver for installation. A built-in battery pack and charger provide 2½ hours of disk access time.

A dual drive option is also available. For more information, contact Personal Integrated Computers at 18013 SkyPark Circle,

Suite D, Irvine, CA 92714, 714-261-0503.

Reader Service ✓ 559

Connect the D.O.T.S.

The D.O.T.S. utility package (\$29.95) lets you create, edit, and print designs on a dot-matrix printer using the Model I or III.

The programs, from MicroSmith Computer Technology (Box 1472, Elkhart, IN 46515, 219-293-8339)

use an overlay that you put over the design you're digitizing. The enlarged grid on the overlay is proportional to the dot spacing on Epson and compatible printers. You can then modify any graphics block of 8 by 8 dots with the video graphics editor.

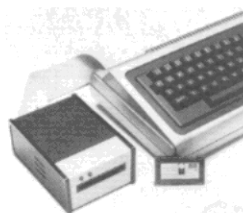
D.O.T.S. creates a data file for use with the print routines and includes routines to print designs on labels or as a logo on standard printer paper.

Two other Model I/III programs, Screen-It (\$24.95) and Microcomm (\$24.95), are available from MicroSmith. Screen-It saves print-out paper by letting you display Scripsit files as they will print out.

The Microcomm communications program transfers CMD files, up- and downloads programs, and saves information to a buff-

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If you own a Model 4, and use a Model 3 DOS,
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SUPERMOD4 BRINGS YOU THE POWER OF SPEED. Using the 4 MHz CPU clock, all your software runs twice as fast — but not out of control; SUPERMOD4 makes the realtime clock and similar operations work correctly.
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SUPERMOD4 HAS THE POWER OF INTELLIGENCE. It knows how to do its job. It doesn't need any software or hardware patches. All SUPERMOD4 needs is a Model 4 (4P owners, please inquire) running most Model 3 DOS's. It works with all software that use the normal I/O drivers.

You control the POWER: select the ones you want, and have them work your way.

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- SUPERDISK is compatible with Alpha Technology's memory boards. With them, create even larger RAMDISKS.

Also available: Hardware by Alpha Technology - 5 MHz CPU speed-up kits and memory expansion boards (up to 512K). Both are compatible with SUPERMOD4 and SUPERDISK. Send for details.

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NEW PRODUCTS

er. It requires 48K RAM and a printer.

Reader Service ✓ 561

Pick a Daisy

Xerox Corp.'s Diablo Advantage D25 25 cps heavy-duty daisy-wheel printer (\$745) uses an all-purpose interface to connect to serial or parallel interfaces.

The D25 features automatic proportional spacing, automatic carriage return, bidirectional printing, variable line and column spacing, and automatic paper loading.

Options include a bidirectional tractor and a single-bin sheet feeder. Hardware and software for these accessories is built into the printer.

For more information, contact Xerox Corp., Xe-



The Diablo Advantage D25 printer features an all-purpose interface that connects via a parallel or serial port.

rox Square 006, Rochester, NY 14644, 716-423-5078.

Reader Service ✓ 567

Beeping in Basic

Logical Systems Inc. (8970 N. 55th St., Box 23956, Milwaukee, WI 53223, 414-355-5454) offers

the BEEP enhancement package (\$49) for TRSDOS 6.2 Basic.

BEEP provides one-key-stroke abbreviations for the Auto, Edit, Delete, and List commands. The Immediate command key feature lets you use combinations of the arrow, period, and comma

keys to edit the current line or to list the current line, the next program line, the previous line, the first program line, or the last program line.

Other features include moving a program line, duplicating a program line, and high-speed loading and saving. BEEP loads a 26K program in fewer than six seconds, compared to 26 seconds for TRSDOS 6.2 Basic.

Reader Service ✓ 554

Express Impressions

The TTXpress 1280 40-character-per-second (cps) compact thermal printer (\$229) runs on batteries or ac current and fits into a briefcase.

The unit measures 11¼ by 4½ by 1¾ inches, weighs 2.2 lbs., and runs for up to two hours on three C

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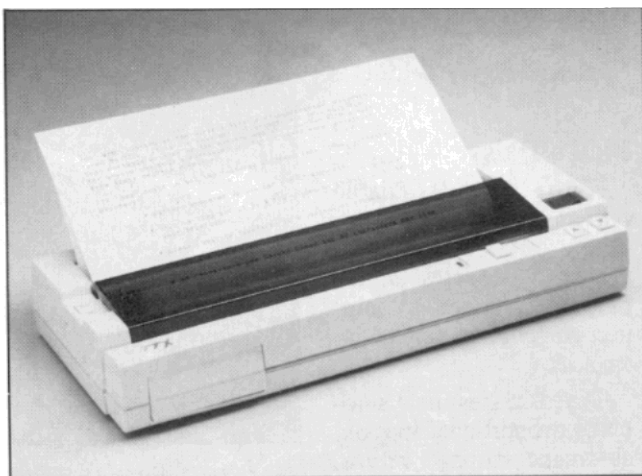
• Outputs:

"H1929	DEFM	'READY'
	DEFB	ODH

instead of the meaningless "equivalent":

"AB25	LD	D,D
	LD	B,L
	LD	B,C
	LD	B,H
	LD	E,H
	DEC	C

", etc

NEW PRODUCTS

The TTXpress 40 cps battery-powered thermal printer fits into a briefcase.

batteries. Using an ac adapter (not included) increases print speed to 50 cps. TTXpress prints up to 160 columns on roll paper or 8 1/2- by 11-inch sheets.

Other features include an internal buffer, bit-map graphics capability, and condensed, emphasized, and enlarged character modes. A parallel interface is included.

Contact TTX Inc., 3420 E. Third Ave., Foster City, CA 94404, 415-341-1300 for more information.

Reader Service ✓ 573

drives. A manual with examples and an overview of survey research is included.

Reader Service ✓ 570

Quick Switch

The Scooter Multi-Buffer (\$389) automatically accepts data from up to three computers for output to one printer. Data from the computers waits in turn in Multi-Buffer's 64K memory before printing out.

An LED bar graph indicates the amount of buffer memory in use. Multi-Buffer also features LED lights that indicate which computers are inputting data, a print light, a pause switch, a copy switch for reprinting a data segment, and a reset switch. The unit works with any parallel printer.

For more information, contact Ohm Electronics, 746 Vermont, Palatine, IL 60067, 312-359-6040.

Reader Service ✓ 569

Ahead in the Polls

Survey Analyst, from The Alternate Source (704 N. Pennsylvania, Lansing, MI 48906, 517-482-8270) calculates results for your survey, questionnaire, or poll.

The program lets you create a survey of up to 510 questions with yes/no, multiple-choice, and numerical answers. The data entry mode screens entries for accuracy, and edits, displays, prints, and saves files to disk. Output is in table format for presentation in reports.

Survey Analyst also profiles and compares selected respondent groups. The program is \$195 and requires a Model I, III, or 4 with 48K RAM and two

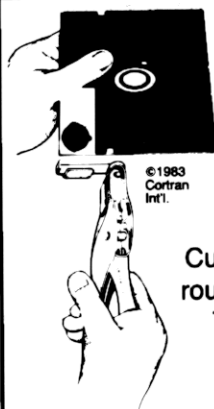
Slim Screen

The Thinview LCD screen (\$699) from Axonix Corp. is a self-contained 80-column by 25-line display system for the Model 100.

The expanded screen lets you edit full text pages, interpret spreadsheet data, and create high density

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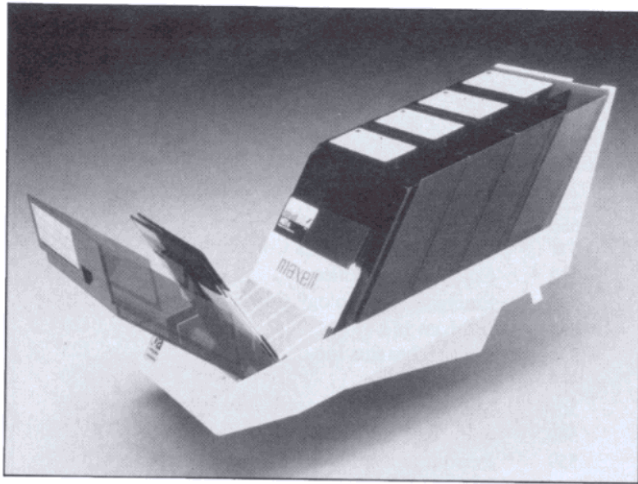
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Disk Filer holds up to 50 disks in five transparent compartments.

graphics for output to a printer.

Thinview features an on-board microprocessor, a 16K RAM input buffer, a printer port, and a macro library of screen commands. The unit weighs 3 pounds and measures 11 by 6 by 1 inches. It includes a rechargeable power supply.

An optional operating system-based program lets you display Model 100 ROM-based programs on Thinview.

For more details, contact Axonix Corp. at 417 Wa-

kara Way, Salt Lake City, UT 84108, 801-582-9271.

Reader Service ✓ 553

Introducing Disk Windows

Disk Filer (\$34.95) organizes and protects up to 50 disks in five transparent, flip-down compartments. Color-coded labels identify each ten-disk compartment. A side lock secures compartments when closed.

Disk Filer includes a handle and measures 14 by 6 1/4 by 8 inches.



Thinview adds a 25-line LCD screen to the Model 100.

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d-den. 23 ⁹⁵	d-den. 30 ⁵⁰	d-den. 25 ⁹⁵	d-den. 24 ⁹⁵
d-side 27 ⁵⁰	d-side 34 ⁵⁰	d-side 28 ⁹⁵	d-side 30 ⁹⁵
s-side quad 33 ⁹⁵	s-side quad 45 ⁵⁰	s-side quad 36 ⁹⁵	s-side quad 39 ⁹⁵
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s-den. 26 ⁰⁰	s-den. 30 ⁹⁵	s-den. 34 ⁹⁵	s-den. 26 ⁹⁵
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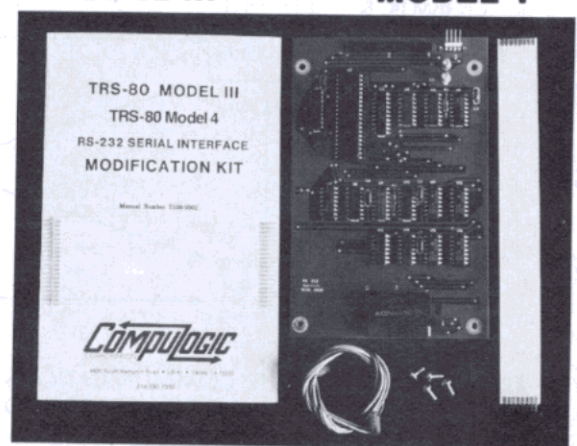
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For more information, contact Computer Accessories Corp. at 7696 Formula Place, San Diego, CA 92121, 619-695-3773.

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Programs Plus

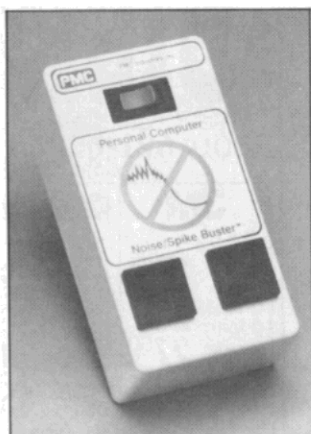
In *60 Business Applications Programs for the TRS-80 Model 100 Computer*, Terry Kepner and Mark Robinson offer a range of useful business programs for the Model 100.

A full explanation accompanies each program, and a glossary of commonly used business terms is included. The book is \$17.95 from Scott, Foresman and Co., 1900 E. Lake Ave., Glenview, IL 60025.

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Spike Busters

The Model 062 two-outlet Noise/Surge Buster



The Surge Buster comes in two- and four-outlet models.

(\$79.95) for personal computers protects data from line noise, transients, and high-voltage surges.

A four-outlet model is also available. Contact PMC Industries Inc. (9353 Activity Road, San Diego, CA 92126, 619-695-3520) for more details.

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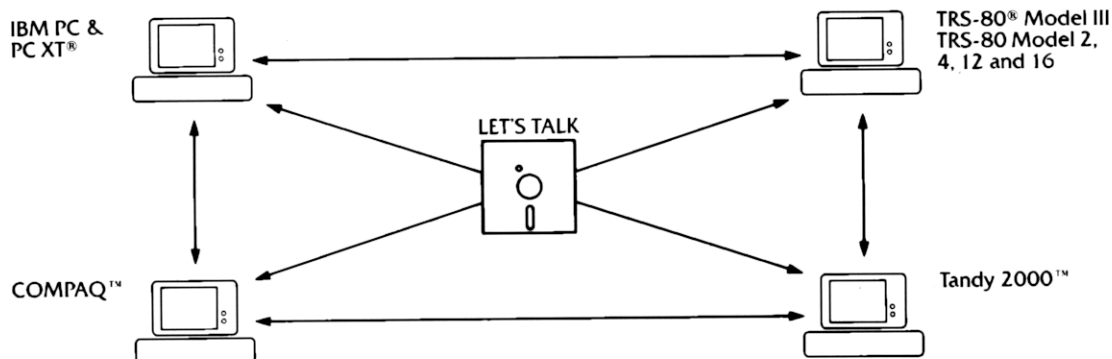
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The computer includes a complete operations manual, "disk drives," plus a sample stick-on upgrade kit that lets you install up to 640 "K." Options include a foam antenna (for pulling in hard-to-get programs), a memory upgrade kit, and a repair tool (for hardware and software).

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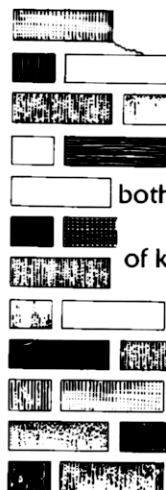
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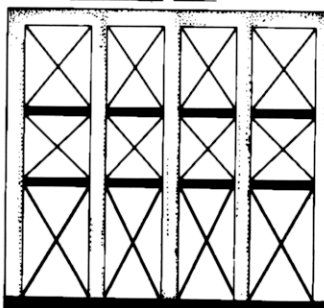
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Tandy: MS-DOS Means More Than "Me Too"

Send your questions about Tandy products and services to Ask Tandy, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Q: Does Tandy's introduction of a family of MS-DOS computers mean you'll be cloning IBM's every move?

A: No. When we introduced our first MS-DOS computer, the Tandy 2000, it was the highest performance MS-DOS machine available (IBM finally has a Tandy 2000 competitor, the PC AT). The Tandy 1000 has a high level of software compatibility with the IBM PC, but it's not a clone. It couples PC functionality with enhanced graphics and sound at an unheard-of price. Our goal is products that take advantage of the huge MS-DOS software base, yet that go beyond a "me too" approach.

Q: Despite references in the Model 4 owner's manual to TRSDOS support of double-sided drives, I was unable to get any answers from Fort Worth about how to use them. Why?

A: LDOS has support built in for double-sided drives, even drives of different sizes, as we recall. Radio Shack has never intended to support those capabilities, but neither did we remove them. Logical Systems, authors of LDOS, can supply information on some of those features we don't support.

Q: I work in a school system, teaching computer education on a limited budget. I've read that you give 100 hours of training to your sales people. Could I get or use some of that material for my classroom work?

A: The training material we use is sales-oriented, and wouldn't be of much use in a classroom environment. Our training isn't all classroom work either; part of it is on-the-job

training administered by field management people. Sorry, but we don't think it would fit your needs.

Q: I hear that a company other than Tandy manufactures the new Tandy 1200 HD. Does the same company make the Tandy 1000?

A: The Tandy 1000 is a new design by Tandy engineers, and is built at a Tandy factory in Fort Worth, TX.

Q: Now that Tandy's line of business computers includes the 1000 and 1200 HD, do you plan to continue fully supporting the Model II/12/16 line?

A: The II/12/16 family provides a great expansion path from a highly functional 8-bit computer to a multi-user 16-bit system. We don't plan to support multiuser operation of the 1000 or 1200 HD, nor will we abandon the II/12/16 family.

Q: So far, Tandy has introduced high-end, mid-range, and consumer-priced MS-DOS computers. Any plans for a fourth MS-DOS computer priced under \$1,000?

A: No.

Q: Will Tandy offer any trade-in arrangements to Model I/III/4 owners who want to buy a Tandy 1000?

A: Radio Shack stores aren't prepared to handle used hardware, and have never offered trade-ins. We have no plans to change that policy.

Q: I'm considering replacing my Model III with a Tandy 1000. Can I access some of my Model III ASCII files with the Tandy 1000, maybe via cassette?

A: The Tandy 1000 has no cassette facility. However, ASCII files are ASCII files. You could transfer them via the RS-232 port with communica-

tions software. You could probably use text files, but data files would be of questionable value, unless the same program is available under MS-DOS. But it's not guaranteed they'll work. Commercial programs to convert from TRSDOS to MS-DOS format are available; look for ads in 80 Micro.

Q: Does Tandy really answer the Ask Tandy questions? Are Tandy/80 Micro relations that good? If so, why isn't Ed Juge writing his Inside 80 column again?

A: Yep, it's really Tandy. Relations between Tandy and all of our support publications are excellent. Relations with 80 Micro have never been better. Ed would probably do Inside 80 again, but the editors apparently feel Ask Tandy is more useful to readers.

Q: I have a new 128K Model 4. Why does the PRINTMEM command produce a figure of 29,924 (or less) instead of a number nearer 128,000?

A: An 8-bit computer can count only as high as 64K, so the use of more than 64K of RAM requires switching between banks of memory. The memory management needed to bank switch from Basic would cut your computer's operating speed by at least half, and would add substantially to Basic's size and complexity. I'm not aware of a Z80 bank switching Basic version. The only way to access the extra 64K is through the use of Memdisk or by machine language.

Q: I have a Model 4P. Can I hook it up to my Model I monitor?

A: Anything is possible if you know how. But you'd have to attack your computer with a soldering iron, a practice we discourage. You could cause damage, and you'd stand a good chance of raising the RFI (radio frequency interference) radiation beyond the limits the FCC allows. ■

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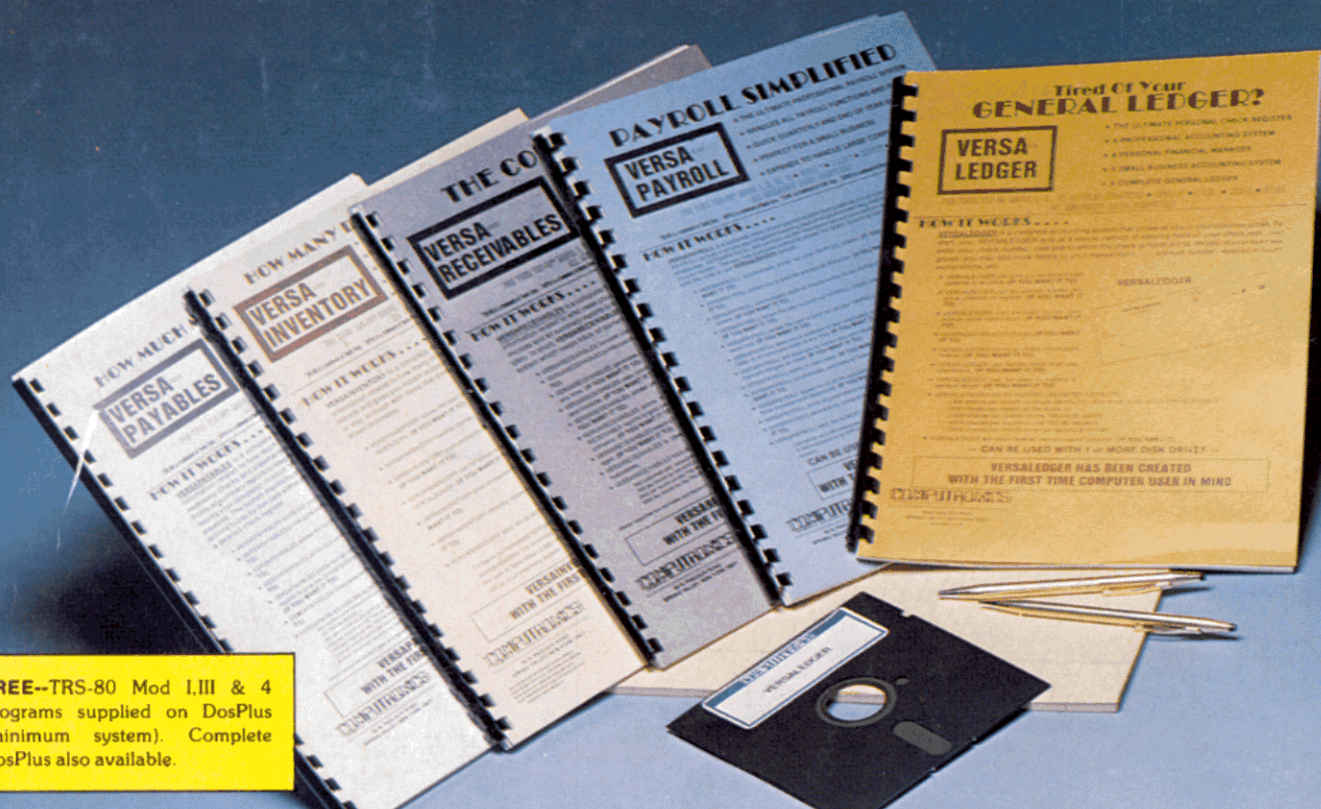
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