

# 80 U.S.

THE TRS-80 USERS JOURNAL

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December, 1982

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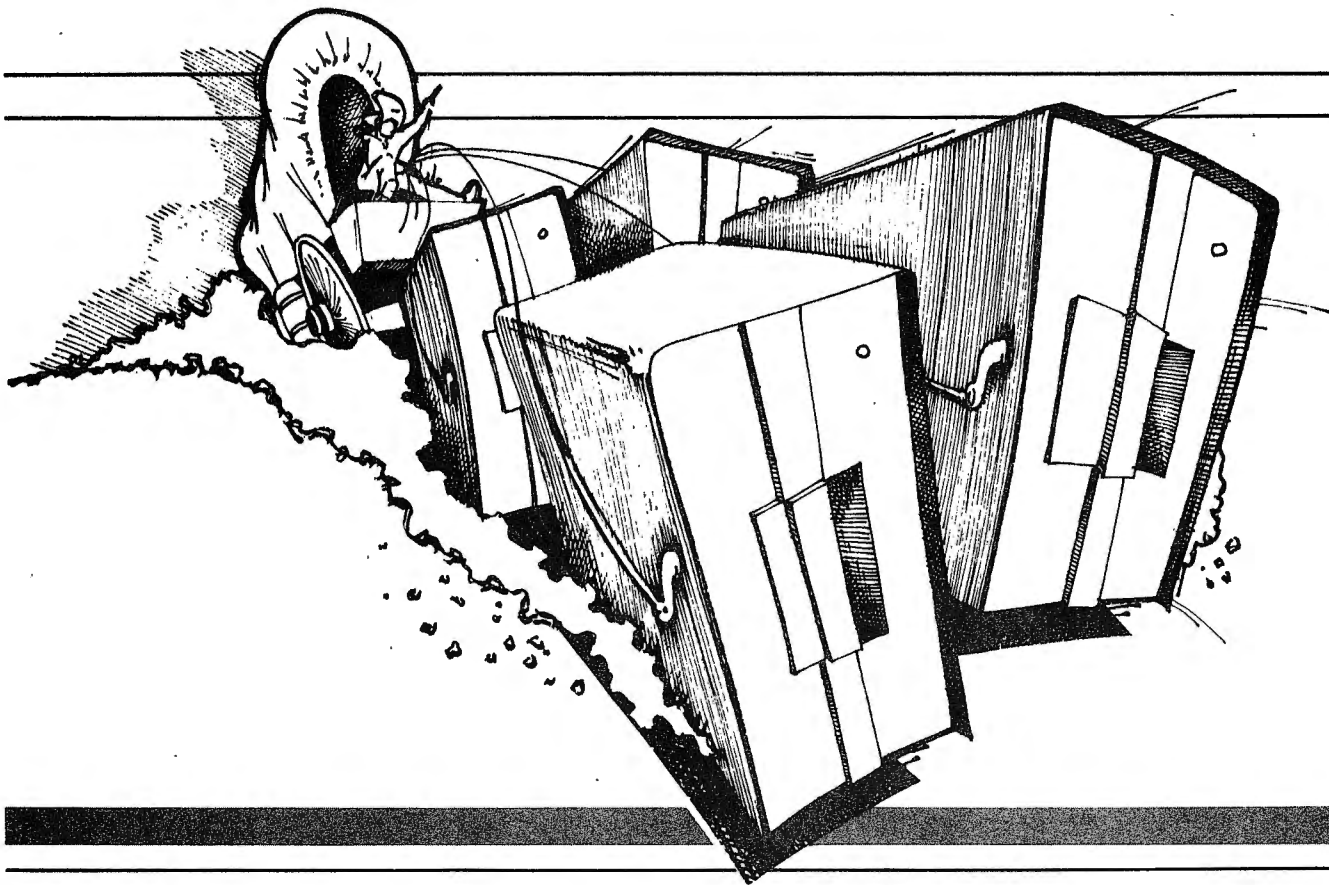
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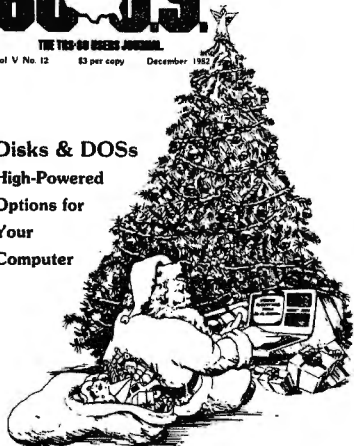
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**Options for**  
**Your**  
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Our cover was designed by Don Snowden of Gig Harbor, WA. He also provided the excellent drawings throughout the magazine.

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## 80-U.S. Journal

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# Editorial

**By Lawrence I. Charters**

I used to think of Radio Shack as nothing more than a somewhat dingy little chain store that gave away free batteries. It seemed that all they sold were CB radios and Made In Hong Kong battery-operated plastic toys that broke after you got them home. In retrospect, it is hard to say if this image ever was true — I never bought a CB or plastic toy — but one thing is certain: Radio Shack is not a dingy little chain store. It is a corporate colossus.

Tandy Corporation (Radio Shack) is now the 20th largest computer firm in the United States, and the top microcomputer company. According to *Computer Decisions* (June 1982), Tandy's computer revenue for 1981 totalled \$460 million, and its revenue growth rate ranked fourth in the computer field. Compared to IBM's \$25 billion in computer revenues, Tandy's performance seems modest, but, compared to IBM, no one is very impressive. More recent figures (*Computer Decision's* ranking was based on Tandy revenues ending June 30, 1981) suggest Radio Shack has climbed even higher. Other microcomputer firms in the top 100 included Apple (23rd), Commodore (49th), Warner (Atari; 71st) and Zenith (89th).

Since your average Radio Shack computer is not very expensive, this performance is remarkable. Another industry magazine, *ICP Software Business Review* (Autumn 1982), reports that Radio Shack is just as potent as a software firm. With revenues of \$38 million in 1981, Tandy was the top microcomputer software supplier in the United States, and ranked 54th when compared with all software firms. The only other microcomputer software companies to hit the top 100 were Vector Graphic (75th), Apple (77th), Commodore (92nd) and Microsoft (93rd).

There are several conclusions you can draw from these figures, but probably the most important one is

this: Radio Shack is not a joke. The microcomputer community long made fun of the "Trash-80," and suggested that Tandy get out of electronics and go back to selling leather goods. Computer magazines and newspapers used to pay so little attention to the TRS-80 that a whole new publishing industry grew up to support it. Independent retailers, often refused to carry any hardware or software for Radio Shack machines. After a time they forgot why they didn't carry such goods, and were able to delude themselves into believing nothing was available. If you go into such a store today and ask for TRS-80 merchandise, you will often be met with a sad look and a suggestion that you junk your machine and buy a *real* computer.

Computer snobbery is nothing new, nor is the sales tactic of selling one item by slandering another. What is odd is the lack of loyalty by Radio Shack computer owners and the TRS-80 press. You will rarely find an Apple owner who will admit to any problems with Apple equipment, and Apple magazines are either enthusiastic promoters of Apple, Inc., or carefully neutral. In contrast, one large TRS-80 magazine has made something of a career of criticizing Radio Shack in general and TRS-80s in particular, and TRS-80 owners have never shown any hesitancy when it comes to gripes. There is nothing wrong with healthy criticism, but is this healthy?

One commonly heard complaint is Radio Shack's lack of software support. Looking through their latest computer catalog (which, by the way, is free — some companies make you buy their catalog), it is hard to take this charge seriously. Even the newest member of the Radio Shack stable, the Model 16, has more manufacturer supported software than most microcomputer firms offer for their entire line. Radio Shack's customer service lines, and its company sponsored newsletter,



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TRS-80 Microcomputer News (free for a year with every computer purchased), are unique — no other microcomputer firm offers such services.

Radio Shack does have an annoying habit of ignoring the outside world (a typical problem in the computer field), but even this is changing. Their newsletter has recently referred to 80-U.S. articles, explained how to connect various gadgets to TRS-80s, and even detailed how different versions of CP/M might work on the Model II. The NIH (Not Invented Here) syndrome is still stronger than most of us might like, but it is not as severe or as important as some contend.

Radio Shack's repair policies — particularly concerning modified machines — have received the most interesting complaints. Almost all computer firms will repair their own machines — provided those machines show no sign of modification or tampering. Considering the complexity of computer machinery, repair technicians are understandably reluctant to risk their equipment — and lives — poking around with some unidentified and undocumented modification. If a computer has been modified you are usually invited to look elsewhere for help. (Some companies will even seize your computer — permanently — claiming such tampering is equivalent to theft of proprietary material.) Such repair policies are not limited to the computer field, either; try taking a Ford in for repair to a Ford dealer — after you have installed a Chrysler engine. All things considered, Radio Shack's policies are both flexible and reasonable.

Radio Shack has grown from an uncertain, pioneering microcomputer infant into a solid, adult giant. With over a million Radio Shack computers of various types installed worldwide, it is time for the TRS-80 community of owners and users to make a similar transition. Show some loyalty, camaraderie and understanding. Add some well-considered praise as well as constructive criticism. It's more fun, and more productive, than ignorant, lonely, peevish grousing. ■

# Letters to the editor

\* I was very pleased to find an article, by Kenneth Smith, in the September issue of your magazine on using the high-resolution graphics available in my Epson MX-100 printer.

My MX-100 is attached to a Model II. That made using the programs, as published, impossible.

Just type the following from TRSDOS READY:

```
DEBUG ON <ENTER>
```

```
DEBUG <ENTER>
```

```
M
```

```
F000
```

```
<F1> (the 'F1' key)
```

```
DB E0 B7 20 FB 7E D3 E1 C9 (spaces added for clarity)
```

```
<F2> (the 'F2' key)
```

```
S
```

```
DUMP PRINTCHR (START=F000 END=F008  
RORT=R) <ENTER>
```

```
DEBUG OFF <ENTER>
```

Then make these changes to Mr. Smith's programs:

```
DELETE 280-300
```

```
ADD:
```

```
50 CLEAR 100,&HEFFF 'protect memory
```

```
60 SYSTEM"PRINTCHR" 'loads the routine
```

```
70.DEFUSR>&HF000 'set the entry point
```

```
280 A=USR(A(I)) 'call the routine
```

**Lowell Johnson**  
Thief River Falls, MN

*Thanks for the conversion. —Ed.*

Through an article in your magazine, and due to a very positive letter from one of your subscribers, I ordered GEAP (Graphics Editor And Programmer) program from Mr. Joe Fettig of J.F. Consulting, Palm Desert, CA.

The service was fast and I received the GEAP program within a short time. Due to some incompatibility problems with the diskette format I had to return the program. Mr. Fettig sent me the previous GEAP cassette version while he was working on how to get me the latest (and improved) diskette version.

The cassette version of GEAP impressed me and I was, as you can imagine, eagerly looking forward to receiving the GEAP disk version. I have this version working on my Model III and there is good reason to be impressed.

8 80-U.S. Journal

But, the service of Mr. Fettig has impressed me even more... you will not experience better service anywhere.

I've subscribed to *80-U.S. Journal* for a year now and my verdict of the magazine is: High-standard articles. Continuously improving and loaded with useful material for us TRS-80 owners. The tutorials almost couldn't be better. My wish for the future: more business application programs and not too much space devoted to reviews of games.

**Arnt Kr. Sviland**  
Stavanger, Norway

*Excellent service is worthy of note, thanks for letting us know. —Ed.*

Let me thank *80-U.S.* for reviewing our program SUPER UTILITY PLUS. Mr. Klaproth did a very fair review and we have no problems with his reporting of our features. We appreciate it when others realize the full power of this utility. SU+ is a very comprehensive product, and he highlighted it nicely.

The "source" of the program mentioned in the review was incorrectly listed as Soft Sector Marketing. That may be where Mr. Klaproth purchased his copy, but the real source is PowerSOFT — a division of Breeze/QSD, Inc., 11500 Stemmons Expressway, Suite 125, Dallas, TX 75229.

Soft Sector Marketing is one of our dealers (and a very fine one), but is not the original source.

Let me also add one other minor correction. The price listed in the review was \$49.95. That was a "summer special" that SSM was selling. The retail price of SU+ is \$74.95, and that now includes two diskettes in the package, the MASTER, and a BACKUP copy. A revised manual completes the package. We started including the BACKUP copy as of 9/1/82.

**Dennis A. Brent, President**  
Breeze/QSD, Inc.  
Dallas, TX

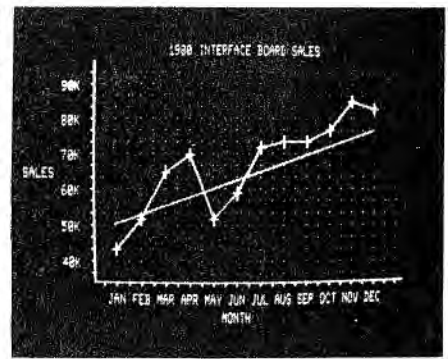
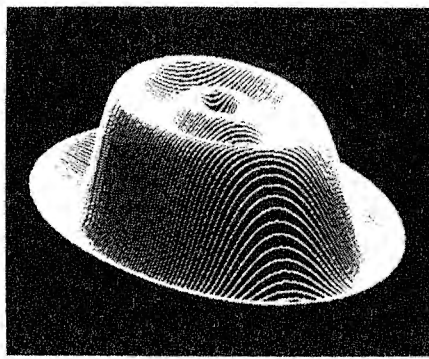
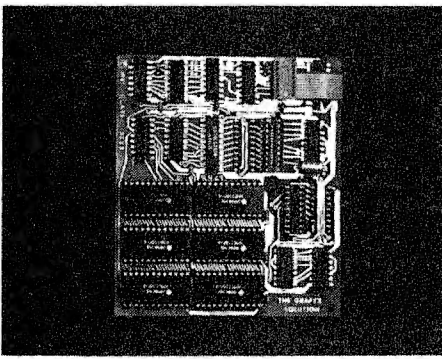
*Our apologies for any inconvenience we may have caused. At \$74.95 it is still a bargain. —Ed.*

I recently purchased your *The Captain 80 Book of BASIC Adventures* and I am quite pleased with it. However, I do have one question that you might be able to help me with.

The process of program entry is quite tiring and prone to error on my Osborne I computer. Do you know anyone who might have the programs available in Osborne I disk format?

**Terry A. Ward**  
Cedar Falls, IA

*Perhaps a reader can help. We have no Osborne's at 80-U.S., just good ole Tandy's. —Ed.*

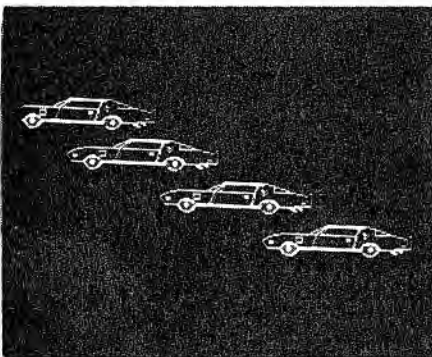


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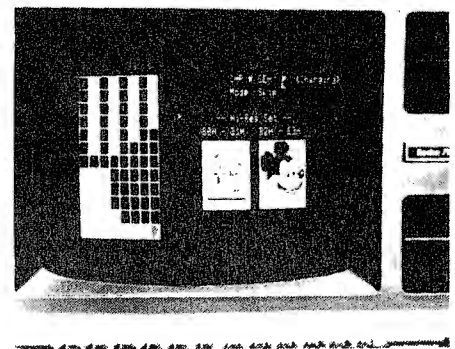
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# Directions

By I. Mike Schmidt, Publisher

Long-time readers may remember when the publisher had a page or so in which to ramble on about everything and anything. Now that we have editors to write editorials, I find myself without a platform, so we created "Directions." There may be times when this page sounds editorial in nature or, it may sound like industry news. Who knows — I may even wax philosophical at times when the spirit strikes. One thing I will not do is pontificate — only pontiffs are allowed to do that, and I don't even qualify as a minor saint — much less a pope!

## What's New at 80-U.S. Journal

The big news at *80-U.S. Journal* is that, starting in January, we will be printed entirely on slick, publication enamel paper. Since we are virtually the only TRS-80-exclusive publication left which actually supports the TRS-80 line of computers, we think it's time to enhance our image. It is also the next logical move for our publication to take, especially since our newsstand distribution has increased drastically. (Did you know that we are now available in most B. Dalton stores?)

The slick format will give us more flexibility in the placement of four-color advertising and editorial material. It's part of the growing up process. Some time during 1983, we will probably be perfect bound, which will give further flexibility and the ability to bind in special sections.

Of course, it costs more to do these things, but we take pride in the fact that issue number one had a cover price of \$3, and a subscription price of \$16, and those figures have not changed in four years! I am sure that everyone expected a price increase in January, 1982, when we went to monthly publication, but we held the price then, and will hold it now. The economic situation we live in demands that we hold it. By the way, our 1983 advertising rates will be released shortly, but you may as well look at last year's card, because the

rates remain unchanged. We are committed to making it, in spite of the times, but not at your expense!

All of this is due to your tremendous support. It is numbers that count, and as the numbers go up, the price per each copy goes down, and we intend to pass that right back to those of you who made it possible. Thank you.

## Mequon Meeting

A two-day conference was held on September 23 and 24, 1982, near Milwaukee, Wisconsin. It was hosted by Logical Systems, Inc., and was attended by about a dozen industry leaders. Most of the attendees have been engaged in TRS-80 hardware and software support almost since the TRS-80 became a reality back in '77 and '78.

The conference was a chance to get together and examine the present state of the industry and its future. The mixture of ideas and methods which resulted was astounding. I found the conference exciting and all participants believed firmly in the continued well-being of the Radio Shack computer.

Several of the companies showed off new products and handed out samples. Hard disks, new operating systems and the Model 16 were discussed at length. The consensus of the attendees was that, in spite of current economic conditions, the micro industry will continue its healthy growth.

The meeting concluded with a farewell banquet and a thoroughly fine time was had by all. We extend our thanks to Bill Schroeder, of Logical Systems, Inc., for being such a gracious host.

Those in attendance were Roger Billings of LOBO Drives International, John Lancione of Aerocomp, John Harding of Molimerx, Ltd., Dennis Brent and Kim Watt of Breeze/QSD, Inc., Earle Robinson of SoftERware, Roy Soltoff of MISOSYS, Bob Snapp of Snapp-

ware, Inc., Renato Reyes of Powersoft, Kirk Hobart of LOBO Drives, Harvard Pennington of IJG and Cam Brown and myself.

## Raburn Leaves Microsoft

Vern Raburn, who was vice president of Microsoft Consumer Products Division, has left for personal reasons. Vern, who was with Microsoft since July, 1979, was the first person to open a Byte Shop and helped organize the Byte Shop chain in California prior to coming to Microsoft.

## New BASF Service Center

In Seattle, a company which sold BASF disk drives recently went out of business and about 3000 BASF drives were sold at ridiculously low prices. Data Tech/Reliance, Inc., a local company which does drive repair, was being called upon to put many of these drives into working order. Unable to find parts for the drives, Jan Nelson, of Data Tech/Reliance, bought the entire repair stock as well as the rights to distribute and deal for BASF. He is now the only service center for BASF in the United States. If you bought one of the drives and have a problem, Jan's number is (206) 941-3296.

## It Works!

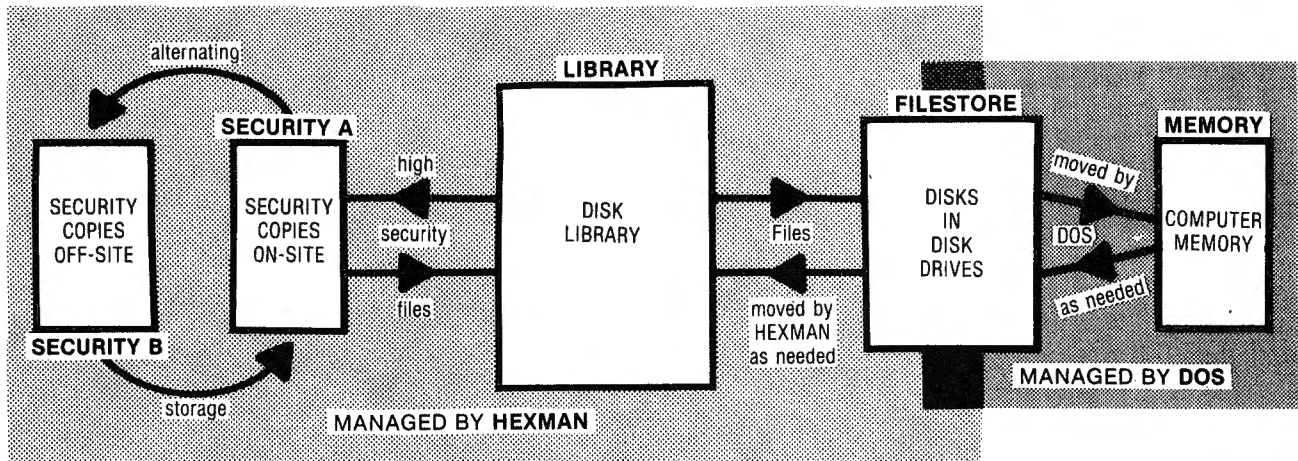
Cam Brown, our editor, recently was asked to help out a local school in selecting some computers for their classrooms. They chose the TRS-80 Color Computer and asked Cam to help them get into operation. As it turns out, the instructors (who had no previous computer experience), followed the "Getting Started" manuals supplied with the computers, and have them running without help. Aside from that, they are enjoying their new computers. Things are definitely looking up when hardware, software and documentation work so well.

Enjoy the upcoming holidays, and remember that good days are made, not had. ■

# HEXMAN D.M.S.

## DISK MANAGEMENT SYSTEM

Computerized file storage and retrieval for your whole disk library.



Your Disk Operating System makes a fine job of managing the files that are in your disk drives. No need to worry about where your old files are kept or where to store new files,

your DOS takes care of it. Now HEXMAN takes over where your DOS leaves off, and extends worry free file storage and retrieval to your whole disk library.

### Storage Management

Only a small portion of your disks can be in your disk drives at any one time. These disks form the "Filestore" to which your computer has immediate access, and the remaining disks form your disk "Library". Ideally the "Filestore" should contain the most active files, while inactive files are kept on "Library" disks stored near the computer.

HEXMAN comes as close to this ideal as it can by monitoring file activity and keeping the most frequently used files in the Filestore. If previously inactive files are needed, they are moved in from the Library. If the Filestore becomes full, the least active files are moved out to the Library. The net result is the files you are most likely to use are ready and waiting.

HEXMAN also performs other storage management chores such as daily backups of modified files, on-site and off-site storage of security copies, and file growth monitoring.

### File Retrieval

HEXMAN manages up to 8000 files (2000 originals with up to 4 copies of each). If remembering that many eight letter file names gives you a headache — don't worry. HEXMAN gives you two easy ways to find the files you need. With HEXMAN you find files by function e.g. "Get all the files I need for the end of month Sales Reports" or by description e.g. "Find the letter I sent to Radio Shack about my disk drives". HEXMAN finds your files in seconds. Once you have found them you may Review them, Load them or Delete them as needed.

### Requirements

Model III — 48K, 2 drives.

Model I — 48K, 2 drives. Double Density adaptor. Lower case modification.

LDOS operating System. If you do not have LDOS, please add \$35 for a copy of the small-LDOS operating system.

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90-day trial - just \$20.

We are sure HEXMAN will become a "must have" program for all serious TRS-80 users. But check it out for yourself. Purchase HEXMAN now and try it out. If you feel you can live without it (unlikely!), return it for a prompt refund less a \$20 evaluation charge.

Offer valid for direct sales only - dealer terms may vary.



**WARNING —**  
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This product is timelocked. Unregistered copies will expire at a future date. Registered owners will receive an extension patch when needed.

A NOTE ON CANADIAN MAIL — please allow 5 to 10 days in each direction for mail delivery. For faster service leave your orders or enquiries on our 24-hour answering machine.

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# TAKE A GIANT STEP BEYOND DOS

## with the HEXMAN Disk Management System

Imagine loading a file whose name you don't know from a disk you can't specify. Imagine creating a file without having to find a disk to store it on. Imagine your computer automatically making those backup copies you know you should have but never get around to. Imagine taking a giant step forward — to the HEXMAN Disk Management System.

The HEXMAN system introduces a new approach to disk management. HEXMAN uses the computer's ability to manipulate large quantities of information to monitor the location and status of all your computer files. All of your files are treated as if they were stored in one huge storage space, called the "Library". Only a portion of this storage space is immediately accessible to your computer, and this portion is called the "Filestore"

### Filestore and Library

The "Filestore" is kept on disks permanently in the disk drives. Your computer has immediate access to these files. The "Library" is kept on disks stored close to your computer. Rather than swap disks in and out of the disk drives as has been done previously, HEXMAN swaps files on and off the diskettes. HEXMAN monitors file activity to ensure that the files in the Filestore are the ones with the highest usage, and are thus the ones most likely to be needed. When you have a large number of files per disk, this method is much more efficient than swapping a whole disk full of files at a time. Remember that while you are swapping in 30 files to get the one file you need, you are also swapping out 25 files, one of which you may need again later. Just check the files in your disk drives now. How many of those files have you used today? With HEXMAN the files you would see on your drives would be the ones you use the most.

For an example of HEXMAN in action, suppose we wish to review a letter we wrote some months ago, type up some new letters using Scripsit, and continue writing an article we have been working on for some time. We request HEXMAN to load Scripsit, the article, and the old letter into the Filestore. HEXMAN finds that Scripsit and the article are in the Filestore as they have been used recently. The letter is in the Library however, and HEXMAN tells us which Library disk to load while the needed file is moved into Filestore.



### Backing Up

HEXMAN does more than ensure that the right files are in the right place. It also takes over the tiresome job of making file backups a needed, and retrieving them when we have a problem. After we finish work, the next time HEXMAN analyzes the filestore it will note that some new files have been created. These new files, our freshly written letters, will be added to the Library. The article that has been changed will be updated in the Library by the daily backup routines. Scripsit and the old letter have not been changed, so no backup is made. Over a period of time the letters will be removed from the Filestore, to make room for more active files. If we continue to work on our article it will remain in the Filestore, and be backed-up each day as it changes.

Some files are more important than others, and for these files you may specify that an extra copy called the "Security File" is to be made. You may even have two Security files. "A" and "B", one of which is kept in a safe place such as a bank vault. Security File A is updated while B is in the bank vault, then A is moved to the bank vault while B is updated. Doing this at regular intervals ensures that vital files are saved even in the event of a fire or other disaster. This level of security is not likely to appeal to the average home computerist, but if you are using your computer for vital business files you should consider it

### Finding your files

HEXMAN can track up to 2000 original files with up to 4 copies of each, for a total of 8000 files. Making up and remembering 8 letter filenames

becomes quite impractical when dealing with hundreds or thousands of files. In the HEXMAN system you retrieve files by designating the function you wish to perform, or by describing a particular file that you wish to find.

In most practical computer applications, more than a single file is needed. For example, an accounting system may use several programs linked by menus, and a number of data and transaction files. For word processing you need not only a word processor program, but also some document files to work on, and maybe a Spelling Checker and its associated dictionary files. For this reason, HEXMAN is designed to work with groups of files, rather than a single file at a time. The group of files HEXMAN is currently working with is called the "Active List". This "Active List" may be as large as your whole library or as small as a single file (Sorry to keep introducing buzz words, but there are a number of novel ideas in HEXMAN and we have to call them something!).

Suppose we wish to do an end of the month sales analysis. We ask HEXMAN to find all the files for the function "Monthly Sales". The monthly sales analysis requires a data file plus four print programs. HEXMAN therefore makes up an Active List consisting of 5 files. Now we ask HEXMAN to load the Active List into the Filestore. HEXMAN will match the Active List to its list of files in the Filestore. It will report which files are already in the Filestore, then move any missing files in from the Library disks

### Searching by description

The Active List is also used when searching for a file by description. In the HEXMAN system, files are cataloged when they are created, under a variety of headings called "Categories". Categories are defined by the user, and you may have over 500 of them. To make this number of Categories manageable, they are divided into 24 groups called pages, with 24 categories to a page. Pages are labeled "A" thru "X", and categories within a page are "a" thru "x".

We track down an unknown file by describing the Categories it may or may not belong to. While searching for the file, a page full of Categories for us to choose from is shown in the upper half of the screen. An example of the search display is shown in Figure 1. To switch to a different page, we simply

press the appropriate upper case letter. Once we are on the correct page, we select the category we want by pressing a lower case letter. The category selected is highlighted, and we press the enter key to confirm our choice

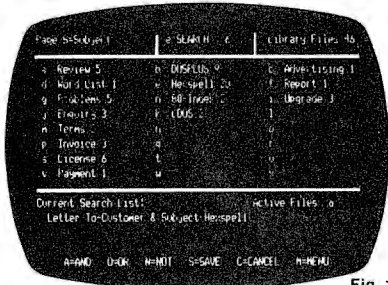


Fig. 1

Suppose we are looking for a letter we sent to Radio Shack about our disk drives. When we cataloged our letters, we filed them under several categories. On page D we specified the date of creation, on page S the subject of the letter, on N the name of the person or company it went to. To find our letter we turn to page N and specify that the name of the recipient must begin with "R", then on page S we specify that the subject is "Disks" HEXMAN replies that there are 3 letters that fit in both categories This is a small enough number to call in the Review program

The Review program gives us a screen full of information on each file in the Active List (See Figure 2). This includes Storage and Activity information, and a file description HEXMAN allows up to three lines of description for each file, enough to clearly identify the exact letter we want We "deactivate" the remaining files on the Active List, and ask HEXMAN to load in the chosen file

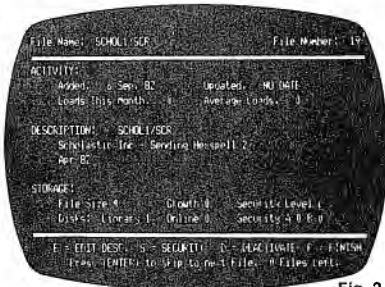


Fig. 2

### The Electronic Filing cabinet

We hope the above description will give you some idea of the power of the HEXMAN system. The effectiveness of HEXMAN depends on the number of diskettes you have in your library, how much disk storage you have (your Filestore) and your pattern of file usage. If you have a standard Model III with two 40-track disk drives, a large mailing list that takes up an entire disk would not be a suitable file to include in your HEXMAN library. On the other hand, if you have a large file of

correspondence, HEXMAN can make an effective electronic filing cabinet out of such a system

Suppose you can get eighty or a hundred letters on a diskette. Twenty or twenty-five diskettes can hold 2000 letters HEXMAN can ensure that the hundred most frequently accessed letters are on the computer, and can retrieve any of the other 2000 letters from the disk library using its advanced search functions. Buying twenty diskettes is probably cheaper than a filing cabinet to hold 2000 pieces of paper, and a lot smaller too. With HEXMAN the electronic filing cabinet becomes a practical reality.

### Hard Disk

So far we have been discussing HEXMAN in the context of a floppy disk system. We believe however that most serious TRS-80 users will move to hard disks in the next few years. HEXMAN has been designed with this move in mind.

On a hard disk system it is likely that most of your files will be in the Filestore, i.e. the hard disk. The Library becomes less an overflow for the Filestore, and more a backup for the Filestore. HEXMAN's automatic daily backup routines ensure that all your file backups are never more than a day out of date, yet only the few files that have changed are backed up each day. No need to worry about where a backup will be stored, HEXMAN takes care of it. If a file needs recovery, HEXMAN quickly selects the correct Library disk. If your hard disk crashes completely, no need to reload all the files. HEXMAN will detect that the filestore is empty and begin reloading files from the Library as they are needed. And when it comes to finding the file you want, HEXMAN's search routines are ready and waiting.

### Try it — you'll like it

We aren't claiming that HEXMAN is perfect for everyone. We have all seen programs that work well for someone else, but don't work out for us. The only way to see if HEXMAN is the program you need is to use it. We are making a unprecedented 90-day trial offer to give you the chance to do just that. When you purchase HEXMAN you have up to 90 days to use the program as much as you wish. If you return the program within 90 days of shipping we will promptly refund your money, less a \$20 charge. The charge covers the cost of the manual and diskettes, which we don't expect to be in a resaleable condition after 90 days of use! We should point out here that HEXMAN is a TIMELOCKED program, in case someone should think of returning the program and keeping a copy. At a certain date in the future the program will cease to function correctly. Long

before this happens registered owners will receive an upgrade patch to the timelock, but anyone with an unregistered copy could run into trouble.

HEXMAN works closely with the Disk Operating System. Because of this, we are releasing HEXMAN under just one operating system, LDOS. LDOS has the selection of features most useful to HEXMAN, and we believe Radio Shack's recent decision to sell LDOS will make it the most widely available of the advanced TRS-80 Operating Systems. If you do not have LDOS we have arranged with Logical Systems Inc. to distribute smal-LDOS, a mini version of LDOS, with the HEXMAN system. If you need it, smal-LDOS must be ordered at the same time as your HEXMAN system, and costs an additional \$35. Please note if you have a Model I that you need a double-density adapter to run HEXMAN, without it you are unlikely to have enough disk storage.

### Updates, and HEXMAN +

While we won't guarantee HEXMAN to be perfect, we do intend to support our product HEXMAN is a complex system, dealing with the real world. The real world is a dynamic place, always producing novel situations and unexpected events. To meet this challenge, we expect HEXMAN to grow and change over time, and will be offering occasional updates at a nominal cost. Because this growth is likely to be greatest early in the life of the program, we will guarantee at least one FREE upgrade to purchasers of Version 1

During the development of HEXMAN we tried out many nice features that didn't make it into the standard package. Only features that are essential to an effective system have been included. Too many fancy features, no matter how nice, confuse the novice user and in the end are counter productive. Once we develop a base of experienced HEXMAN users we will be releasing an extension package called "HEXMAN +". This package, for which there will be an additional charge, will add many powerful features to the standard HEXMAN package. When you are ready to trade the simplicity and ease of use of the standard system for the power and flexibility of an advanced system, HEXMAN + will be there.

### Finally

Order HEXMAN today, direct from Hexagon Systems or from your nearest Hexagon Systems dealer. And take a giant step forward into computerized disk file management.



# Notes, etc.

There has been talk in other journals that Radio Shack service is not as good as it should be. Our experience has been to the contrary. A letter was sent to us from a reader regarding the problem with a single drive copy from single density to double density when the Model I double density disk kit had been installed.

Within eleven days, we had a response from Tandy that the problem was valid and that a new diskette is in production and should be available by the time you read this. The Model I double density disk kit will now be sold with version 2.8, which corrects the single drive copy problem. Owners of version 2.7 can return their diskette for the new release under Radio Shack's standard exchange procedures. I call that quick, excellent response. Who said they don't care?

## Things we would like to see

Every month we are sent a number of articles and programs for possible publication. I would like to give you some hints if you are considering sending material to us. First, keep it brief. A twenty-seven-page submission on using NEWDOS/80 igel files may be important, but it takes up too much editorial space. Short and useful utilities, patches and subroutines are always popular. Second, try not to be too dependent on a specific operating system or peripheral. The wider the audience, the greater your chances of being accepted.

How about an article on simulations, art, music, health? A tutorial on using DEBUG, Model II graphics, a complete Color Computer function grapher, networking within an office environment, etc., would be useful.

As Mike points out in his Directions column, we will be printing on publication enamel in January. Besides giving four-color

capability to our advertisers, it also gives editorial the same ability. So, for our writers out there, feel free to submit color photos or slides with your articles. We would love to run them.

Mr. William H. Moore of Milwaukee, Wisconsin, wrote to see if any of our readers are aware of the TRS-80 being used in any political campaigns. He points out that the politician's need for word processing, fund raising, voter analysis and voter targeting, are perfect for a computer. If any of you have such information, forward an article or report to *80-U.S. Journal*. It strikes us as a subject worth reading about. We can see it now... "TRS-80 leads way to White House."

## Simple Joe—September, 1982

Mr. Dan Sitch of Pittsburg, New Hampshire, dropped us a note that converts the Simple Joe program by Mr. Ron Goodman to work on the Model III. Only three lines have to be changed. The last part of line 110 should read: IF A=109 THEN M=1 ELSE M=0. Change the beginning of line 130 to read: IF A=109, and the beginning of line 140 to read: IF A=237. When you run the program, the numbers that Mr. Goodman refers to in paragraph four will show up as 104 and 232. A good mix of these numbers will have Joe working just fine on the Model III.

## Corrections

We were getting the impression that you had stopped typing in the programs, and then some letters started arriving. For the article "Restore your data pointer" by Thomas L. Quindry, October 1982, there is a slight error in a remark on line 2 of Listing 1. The variable Z2 should equal INT(Z3/256) not the 246, as was stated.

In the article "High-resolution graphics" by Kenneth R. Smith, September 1982, a small correction

needs to be made for it to work correctly on the Model I. It turns out that Mr. Smith's method for checking printer ready status would only work on the Model III. By changing line 280 to: 280 IF (PEEK(14312) AND 240) <> 48 THEN 280, it should work on both models.

We got a number of letters regarding the program "PRINT to LPRINT," October 1982, by Roy B. Harrill. Mr. Harrill's program is a little too efficient. It will imbed a PRINT or LPRINT code within a line number or BASIC pointer when it does the conversion. We missed this only because we worked the program on a short sample listing and our line numbers did not (luckily?) coincide with codes that were being converted.

Mr. Wilfred O. Duran of Valencia, Venezuela, sent in an easy patch for the program. His letter said: ... In a normal BASIC program, a byte with a zero cannot appear inside a line. It is used as an end-of-line marker and it may also appear in the four bytes preceeding each line. The easiest way to change the routine by Mr. Harrill is to get rid of the unwanted tokens by changing line 5020 to be: 5020 FOR X=B+4 TO E. This will avoid the first four bytes, and then add a line 5025 that will avoid all other unwanted tokens. Insert line 5025 to be: 5025 IF PEEK(X) = 0 THEN X=X+5.

## December Puzzler

Before going into this month's puzzler, here is our winner to Puzzler #1, October 1982. Mr. Ron Goodman of North Hollywood, CA, submitted this following code:

```
5 'OCTOBER PUZZLER ANSWER
6 'BY RON GOODMAN
10 DEFINT A-Z
20 FOR X=1 TO 7
30 AS(X)=MID$( "HALLOWEN",X
,1)
```



```

40 NEXT X
50 FOR X=1 TO 9
60 PRINT A$(A(X));
70 NEXT X
80 PRINT,
90 X=1
100 A(X)=A(X)+1
110 IF A(X)=8 THEN A(X)=1:
X=X+1 ELSE 50
120 IF X=10 THEN END ELSE
100
    
```

According to Mr. Goodman, it works on a base 7 concept. The digits are stored in A(1) thru A(9) and line 10 sets up the characters 'HALOWEN' in the array A\$. The letters L and E don't need to be doubled because all combinations will still result.

The answer does give some extra results, such as HHH, but all possible combinations are given. From the submissions, his was the briefest, most organized in output, and closest to what we were looking for. Congratulations.

**Puzzler #3**

This time, we are looking for the etymology of the word "debug." Who said it first, and in what context? Send your answer to Puzzler, 80-U.S. Journal, 3838 South Warner Street, Tacoma, WA 98409. Winners receive \$10, notoriety, and a free tour of our facilities (you pay transportation).

**In This Issue**


Disks and DOSs is the theme this month, and we have a number of reports for you. Don Scarberry leads off with a discussion of why even bother with another DOS. Contrary to what he says, he is an LDOS lover. Terry Kepner tells us about MULTIDOS, while Cpt. Paul Hine takes a look at DOSPLUS. We have two investigations of hard disk systems, with Terry Dettmann giving a user's view of the Radio Shack Hard Disk for the Model II, and Harry Avant looks at MTY's offering for the Model III.

I had an opportunity to look at

Easylink and thought you might like to know about this new offering, plus this editor wanted to brush up on his reporting skills. If you are a single disk drive owner, be sure to look at the article by Charles Knight and Michael Andreas. It may save you from having to get another drive. Charles Edwards gives Level II users something that even disk owners can't have — unlimited USR calls. Bob Bowker presents an article on drivers that is truly informative. For Color Computerists, we have an excellent sort utility, in BASIC and machine language. Don't forget to use Alan Mandell's party programs. They are for all models and should amuse the kids.

No matter what machine you own, be sure to check out Basically BASIC, BASIC bits, Files and foibles and our other departments. For fun, don't miss Captain 80 or our gift to you entitled Christmas card.


Enjoy your holidays and may your new year be grand. ■



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**SAMPLE CHARACTER FONTS**

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ABCD abcd
MONOCUBES

ABCD abcd
SMALL ENHANCED

ABCDE ABCD abcd MICROPRINT
GEAP

**ADDITIONAL FONT**

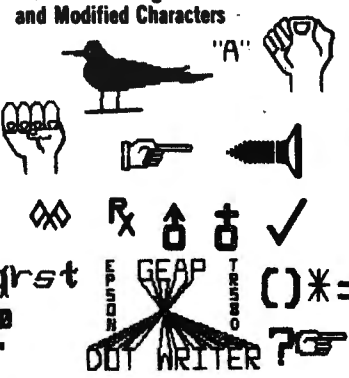
ABCDEFGHIJK

Computer Style ABCD abcd fg hijklmnopqrst

Mesquite x2 ABCD abcd
Mesquite x0

! "\$%&'

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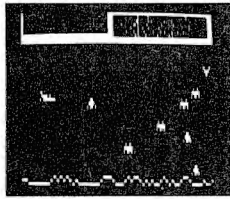
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By Case from Acorn

Shoot down the enemy ships which are coming—and firing—at you. After obliterating them all, you must carefully navigate a tunnel before you are in the clear. You can move your ship left, right, up, down and diagonally; your weapons include a laser cannon and “smart bombs” that render *all* ships on the screen impotent. You start with 5 ships and get another ship and “smart bomb” for each 10,000 points. 3 levels of play; great sound effects.

16K Tape or Disk, \$19.95



## SPACE ROCKS

By Steven Kearns from Acorn

Gigantic antimatter rocks appear on the Tactical Display Screen of your spacecraft. You blast away with lasers and they just explode into smaller chunks. To score in this fast arcade game *with sound*, you must destroy the rocks. To stay in the game at all, you must avoid them!

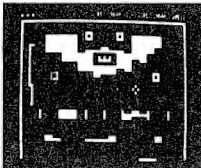
16K Tape or Disk, \$19.95

## KING OF THE JUNGLE

By Vandewalle from Acorn

An unusual combination of fast pinball action plus the challenges and dangers of an arcade game. Keep the ball in play, scoring points as it caroms from obstacle to obstacle, while wandering through the jungle searching for the hidden crown. And try to avoid the deadly Cobra. Lots of action, sound and fun! Choice of 3 screens. Can be used with Trisstick joystick.

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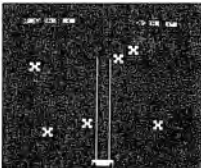


## EVADE

By Knight from Acorn

You're in charge of the USS Krestan, an interstellar tri-ship. If you defeat the enemy aliens you encounter, you get a chance to earn extra points by successfully docking with a larger ship. *Then* come the evil Malicians and dangerous meteor showers. Never a dull moment with this one!

16K Tape or Disk, \$19.95

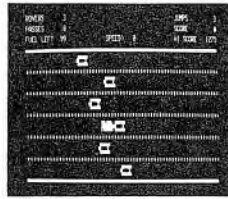


## ENEMY EVASION

By Raul Rivera from Acorn

An original fast-paced arcade style game requiring quick mental and physical reflexes. You must control your Rover to avoid oncoming Rovellan Ramcraft. You gain points for each successful pass through the “death lanes”, but the Ramcraft speed increases as you play. If you reach the double bonus mode, watch out for the land pellets they drop! Joystick compatible.

32K Disk, \$19.95

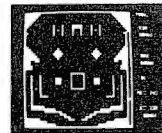


## ASTROBALL

By John Allen from Acorn

Once you load ASTROBALL into your TRS-80, the arrow keys become flipper buttons, the screen becomes the play board, and you become the “Pinball Wizard!” A flying saucer, spaceships, meteors, and black holes add to the fun as your ball realistically zings around the board. Five skill levels.

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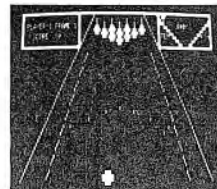


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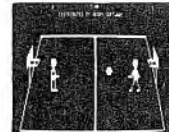
## TENPINS

By John Allen from Acorn

TENPINS brings you all the thrills of championship bowling. Up to 4 players participate, and the program automatically senses the skill of each. Beginners can position the ball and “roll” it, while more skilled players can vary the force, roll a curve and cause the ball to spin as it heads for the pins. PLUS 3-D graphics and sound effects—realistic and challenging!

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**BASKETBALL:** You'll have to be fast!

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## CATERPILLAR

From Soft Sector Marketing

This is the fast-action arcade game you've been waiting to play at home! You must hit mushrooms and caterpillars—segment by segment—moths and tumble bugs. The challenges: they are all moving; when hit they split into additional segments or metamorphose into different shapes; when you destroy a caterpillar, the new one that replaces it is a segment *longer* than the original!

16K Tape, \$15.95

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## OUTHOUSE

From Soft Sector

Isn't there *anywhere* that's safe these days? Now they're invading the OUTHOUSE, trying to steal the paper supply. But watch out... when the paper is gone, *so are you!!!* If that's not enough, they're firing at you from the sky! With sound; disk version “talks”. Joystick compatible.

16K Tape, \$15.95

32K Disk, \$19.95



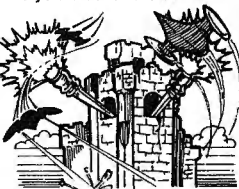
## SKY SWEEP

By Mark Barlow from Soft Sector

You are flying above an ever-changing terrain, with only your skill, speed, and maybe a little luck to help you avoid the missiles and gunfire coming at you. If you succeed, you must enter an ominous cave where *more danger* awaits you. Not for the timid.

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## FORTRESS

By Larry Ashmun from Soft Sector

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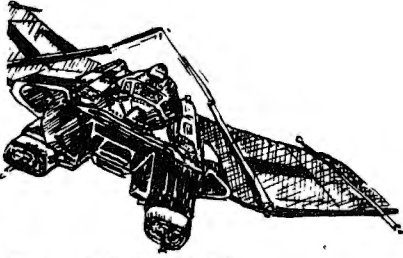


## ARMORED PATROL



By Westmoreland & Gilman from Adventure  
As commander of a lumbering T-36 tank you have the firepower to destroy the enemy—if you can find them. They may be hiding behind the houses scattered about, the bleak terrain and your only view is thru the drivers port (your screen). Impressive animation in this arcade

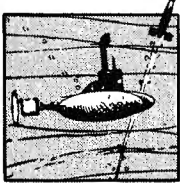
16K Tape, \$19.95      32K Disk, \$24.95



## STARFIGHTER

By Sparky Starks from Adventure Int.  
As mercenary and galactic police officer, you must maintain the condition and control of all parts of your spacecraft. You sit at the controls while peering out of the digital spaceview port. Suddenly something appears on your screen: Is it a Starpirate or a friendly merchant ship? You can't tell yet, and at this speed you may have only a fraction of a second to make an attack/no attack decision.

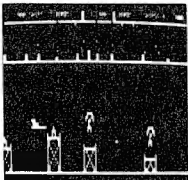
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## SEA DRAGON

By Westmoreland & Gilman from Adventure  
Underwater adventure is yours as you command a nuclear sub armed with deadly missiles and torpedoes. Guide it carefully through sea mines and underwater mountains; watch out for depth charges being fired by overhead ships... and don't run out of air! Scrolling sea bottom for added excitement.

Joystick compatible.  
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32K Disk, \$24.95



## ELIMINATOR

By Westmoreland & Gilman from A.I.  
You'll need all your keyboard manipulative skills to keep up with the action in this arcade game. You travel across the planet's low-altitude airspace in an effort to prevent the marauding enemy from capturing your energizer cells. All manner of alien craft await your arrival with destructive forces. For 1 or 2 players, with sound.

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From Melbourne House  
You are the warrior-savior of cities under relentless alien attack. You're armed with rapid-fire missiles, radar and incendiary star-shells; but you'll need your fastest thinking and instantaneous response to protect yourself and your people. Great real-time graphics!

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## PENETRATOR



From Melbourne House  
Armed with missiles and bombs, you must fly your fighter to the enemy's cache of neutron bombs and destroy them. Your mission is in four stages, involving rugged terrain, caverns and manmade obstacles—not to mention enemy radar, missiles and paratroopers. This new departure in arcade gaming allows you to set up your own terrain and enemy emplacements, then save them for future use. Make your mission as hard or easy as you like. Joystick compatible.

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## PANIK

By Demas from Fantastic  
An arcade style game of a fascinating future world with high-res graphics and voice. Filled with action and excitement; in machine language.

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## VENTURE

By Phillip Case from Horizons  
Set off on a journey into the stronghold of an ancient wizard. Danger is everywhere, and the penalty for a mistake may be complete destruction! The ultimate challenge lies in the forbidden Riddle Room—are you ready for the VENTURE? With sound effects; joystick compatible.

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## DEFENSE COMMAND



By Hogue & Konyu from Big Five  
You are the lone defender of 10 Krotnium fuel cells essential for the survival of the planet. Aliens swoop down from above to steal the fuel; it's your job to destroy them. You can still save the cells after a raid, but you must shoot the alien and simultaneously move under the cell to catch it. If things look bad you can set off one of your 4 antimatter bombs and destroy all enemies on the screen! Arcade fun with action and sound. Joystick compatible.

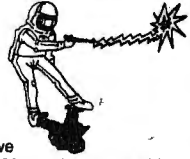
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## STELLAR ESCORT

By Jeff Zinn from Big Five  
This new arcade game from Big Five continues their tradition of bringing you the most exciting action in innovative space games. Your fighting spacecraft must run the gauntlet of the attacking alien's weaponry in order to accomplish your defense mission. You'll use all your skill and dexterity just to survive! Joystick compatible.

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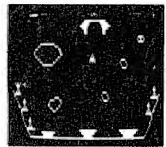
## ROBOT ATTACK

By Hogue & Konyu from Big-Five  
One of the top names in TRS-80 arcade games adds a new dimension: voice sound effects! It's you against the robots in this fast-moving shoot-em-up. Electrified Mazes and the "Flagship" complicate things as you stalk the evil androids.

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# LDOS

## Why bother with another DOS?

Don Scarberry

When a customer goes to a Radio Shack computer center to purchase a microcomputer he is immediately confronted with the problem of selecting one which contains features suitable for his needs. Due to the multitude of options, the customer soon discovers that he must rely heavily on his own instinct. Shopping for a microcomputer is very much like shopping for an automobile. There is a basic, no frills, unit available which sells for a very modest price and contains very limited computing capability. By adding this or that peripheral, a customer can usually obtain a system which will perform as intended — for a price of course.

Because of the large storage capacity and rapid access speed, one of the most needed or desired options is a disk drive (or two). A disk system offers greater speed, reliability, flexibility, substantially more storage capacity than cassette systems and is absolutely necessary for any serious business or educational applications. Usually, purchase of a disk drive option will include a Disk Operating System (DOS). A Radio Shack disk-based system will include an operating system called TRSDOS (pronounced TrissDos), an acronym for Tandy Radio Shack Disk Operating System.

A disk operating system can be viewed as a traffic cop which controls the flow of data between the computer and the disk drives. The computer must be able to manipulate data flow in an organized and useful manner and TRSDOS is provided in order to take care of all the necessary chores. The

computer must be able to tell the disk drives where to store your files and, once stored, where to go to retrieve them. Without an operating system to control the complex activity that takes place between the computer and disk drives, a crash will be inevitable. It is comforting to know that all the complex control functions, provided by the operating system, are virtually invisible to you, thus freeing you for more productive endeavors.

TRSDOS, with all its power and complexity, is what I call a minimal operating system. It gets the job

done but without any frills, bells or whistles. There are many other DOSs available which are more complex and provide much more flexibility than TRSDOS. There is NEWDOS/80, DOSPLUS, MULTIDOS, LDOS and MEGADOS<sup>®</sup> (where have I heard of MEGADOS?) to name a few. All (except MEGADOS<sup>®</sup>) are excellent operating systems in their own right and much more powerful than TRSDOS — but then, they were designed to be. These operating systems will provide the user with much more computing power with



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—BASIC Editor user

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the TRS-80 than is provided by TRSDOS. This is perhaps the reason Radio Shack has decided to offer another, non-Radio Shack, operating system for the TRS-80 Models I and III. They must have realized that there is need for a more powerful disk operating system than the stock version of TRSDOS. Indeed, there is. That is the very reason, other operating systems have been so successful. They fill a very real need.

The Models I and III will still come equipped with TRSDOS as standard equipment. The optional operating system chosen by Radio Shack is LDOS. By optional, I mean that you'll have to pay extra to enjoy the benefits offered by this operating system. The question that will arise immediately in a customer's mind is whether or not LDOS is for him. The answer to that is quite simple if he knows the difference between TRSDOS and LDOS and understands what his needs are. Generally, a customer will have a pretty good idea of what he wants a computer to accomplish for him. He can also experience, first hand, what TRSDOS will or will not do — the operating system comes with the computer. But, how can he justify purchasing a different operating system like LDOS if he doesn't know how it differs from TRSDOS? To cope with this problem I'll single out some of the special features of LDOS and explain how they differ from TRSDOS.

LDOS is considered to be a device-independent system. Each device the system uses has its own control area of memory. This is true for hardware devices actually connected to the system or phantom devices created by the user. Device independence makes it possible to route devices from one to another or to disk files. You may re-direct the input/output of data between the system, its devices, and the disk drives in almost any way imaginable.

Assume you wish hardcopy of a file but someone has borrowed the printer. Further imagine that someone else needs to use the computer that currently contains the file you need printed. What do you do? With LDOS you can simply

tell the computer to treat a disk drive as the printer and print the file. Later, when the printer is available, you can come back and tell the disk to print the file to the printer. It's true that this can be done with TRSDOS and a Model III, but LDOS will let you do it on a Model I also. To further illustrate the power of LDOS let's use another example.

TRSDOS for the Model III contains a FORMS command which enables you to establish the number of columns of print on a line printer before wrap-around occurs. This is a flawed command that Radio Shack claims will go uncorrected. Seems that in order to get a forty-column print-out, you must set the FORMS command to two less characters than what you will need — in this case thirty-eight. This function actually works correctly with LDOS and there is some additional flexibility not found with TRSDOS. Suppose you wish to list a BASIC program, formatted to forty columns, and have each successive line, after the line number, indented. With LDOS you can indent any number of characters you desire. If all this seems too trivial then let's take a few more complex functions and illustrate the differences between TRSDOS and LDOS.

Assume you just saw an extremely hot price on some eight-inch floppy disk drives. The price is so unbelievably low that you can't pass it up. If you stay with TRSDOS you'll have to kiss this deal good-bye. LDOS will allow you to use the eight-inch floppies on your Model I or III with ease. And LDOS will allow you to keep your 5¼-inch floppies on-line simultaneously. That's right! You will be able to intermix 5¼-inch floppies and eight-inch floppies on the same computer. You can use single density single-sided, double density double-sided, 35, 40 or 80-track drives if desired. You can use disk drive configurations I didn't even mention. Here's the sweet meat. Recently those five and ten-megabyte hard disk drives have dropped in price quite dramatically. So what, you say? Your TRSDOS holding you back? With LDOS there's no problem. Buy the hard disk and hook it up. LDOS will

provide you with a seemingly bottomless well for storage of your files. I have even seen hard disks being sold which come equipped with LDOS. Must tell you something, right? Now, that's flexibility!

Virtually every command or function that TRSDOS offers, is found in LDOS. LDOS, however, offers many more. This equates directly to more computing power and flexibility. Practically all the commands contained in TRSDOS are expanded substantially by LDOS. LDOS provides for system growth where TRSDOS does not! Your TRS-80 will not become obsolete as quickly as it would if you confined yourself to TRSDOS. In fact, TRSDOS is dwarfed by all the capabilities of LDOS. You could strip away roughly half of the capabilities of LDOS and still have a system as powerful as TRSDOS in its present state.

Next time you are in a Radio Shack store and see LDOS sitting on the shelf pick up the manual and browse through it. I think you will agree that it is probably the most comprehensive piece of documentation on the market today. If, after looking over the manual, you are still undecided whether LDOS is for you then consider this: if you wish to exploit the power of your TRS-80 to its fullest and allow for future expansion, it's for you. LDOS is a disk-owner's dream come true.

Let me assure you that this is not a biased, paid-for evaluation of LDOS. Radio Shack has realized the need to offer a more sophisticated operating system and their choice was LDOS. I have been using this system for nearly two years and I find the options in a sophisticated operating system well worth the extra money.

There are many other DOSs out there that TRS-80 owners are perfectly satisfied with, and justifiably so. I have used just about every one of them and find they all are excellent in many respects. But for now, my own pride of possession speaks when I say:

I'm not a DOS lover,  
or a DOS lover's son.  
But I'll use LDOS  
'til a better DOS comes. ■

# LDOS

## MICRO REVIEW

Volume 1 No. 1



SPECIAL EDITION



December 1, 1982



LDOS can't really turn your TRS-80 gold, but you'll think you've made the LDOS strike of the decade when you turn your micro on to LDOS. You'll find a bonanza of features like full keyboard type-ahead; a true background spooler; file backup by date, class, and between different drive types; hard disk support; data transportability between Model I and III; and a complete communications utility including disk file send and receive. Support for Radio Shack's Doubler and selected others is also provided. With our Job Control Language, you get true "hands off" running of your application programs — give a single command and then walk away. The 400 page manual includes examples of all commands and utilities. The Operator's Guide gives you step by step instructions on how to use LDOS with your applications. Stop running with only "half" a computer! Let LDOS provide the missing features to speed up and simplify your TRS-80 computer system! Visit a dealer or contact LSI for more information on the most popular sophisticated operating system for your TRS-80.

LDOS is available worldwide through thousands of dealers for just \$129.

## The BASIC Answer

The BASIC Answer is a BASIC text processing utility. It is designed to allow the BASIC programmer to build code in a structured manner. "Source" code is written with a word processor or text editor which allows the user to exploit the powerful editing and movement features characteristic to those types of editors. Source code can even be created by your own BASIC interpreter. The BASIC Answer is then used to process these files into normal interpretive BASIC code.

### Free Yourself from Line Numbers

The BASIC Answer allows substitution of labels for line numbers! This means that your BASIC code now can read like a novel. Instead of the typically un-descriptive "GOSUB 1000", a label such as "GOSUB @Search.Name" is used. Imagine yourself reading code filled with such descriptive branches and understanding it at a glance, even years later. This feature even allows totally relocatable BASIC routines without the renumbering problems.

TRS-80 is a trademark of Tandy Corporation. LDOS is available for the TRS-80 Model-I and Model-III. Prices and specifications subject to change without notice. LDOS and The BASIC ANSWER are products of Logical Systems, Inc.

```
ORLPI:=2TOHA!PRINT#32,"primes found
FHA!/LP:=INT(HA!/LP!)THENGOTO48"CH
EXTLPI:=IFVAL(FAS)=LO!THENFAS=" Pr
RI(CO%)-LO! on this scan"USING"###,
RS(CO%)-FAS LEN(FAS)-1)FORLO!-ST:IT
O%:=CO%-PS%*PS%+1ELSEFAS=LEFTS(FAS,
ORLPI:=#OTO!PRINT#0,"factoring "US
RINT#64*LP!+192,PR!(LO%),PRS(LO%):
O%:=LO%-INPUT"ORIGIN OF SCAN":INS#0
FLO%:=1IFVAL(INS)~2THENING"###,##
EXTLPI ST:=INT(VAL(INS))##;PS%:R
O%:=CO%-INPUT" END OF SCAN":INS#0
FCO%:=1EN!-INT(VAL(INS))IMPR!(10),
FHA!/LP:=INT(HA!/LP!)THENGOTO48"CH
EXTLPI:=IFVAL(FAS)=LO!THENFAS=" Pr
RI(CO%)-LO! on this scan"USING"###,
RS(CO%)-FAS LEN(FAS)-1)FORLO!-ST:IT
O%:=CO%-PS%*PS%+1ELSEFAS=LEFTS(FAS,
ORLPI:=#OTO!PRINT#0,"factoring "US
RINT#64*LP!+192,PR!(LO%),PRS(LO%):
O%:=LO%-INPUT"ORIGIN OF SCAN":INS#0
FLO%:=1IFVAL(INS)~2THENING"###,##
EXTLPI ST:=INT(VAL(INS))##;PS%:R
O%:=CO%-INPUT" END OF SCAN":INS#0
ORLPI:=2TOHA!PRINT#32,"primes found
FHA!/LP:=INT(HA!/LP!)THENGOTO48"CH
```

### A New Concept in Variable Usage

The BASIC Answer allows variable names to be as long as 14 characters and ALL 14 are significant. Imagine reading:

```
"IF ACCNT.OVERDUE #>
0 THEN GOSUB
@PRINT.DUN"
rather than
"IFAO#>0THEN
GOSUB52130"
```

Which would you rather read? It also introduces to BASIC the concept of Global and Local variables. This feature circumvents the tedious problem of variable tracking because a Local variable is only viable in its own subroutine!

NOW AVAILABLE  
LDOS 5.1 Quick  
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### End the Multiple Machine Hassle

The BASIC Answer introduces the concept of "Conditional Translation." This feature allows the programmer to place different "machine dependent" code simultaneously into the same Source Code.

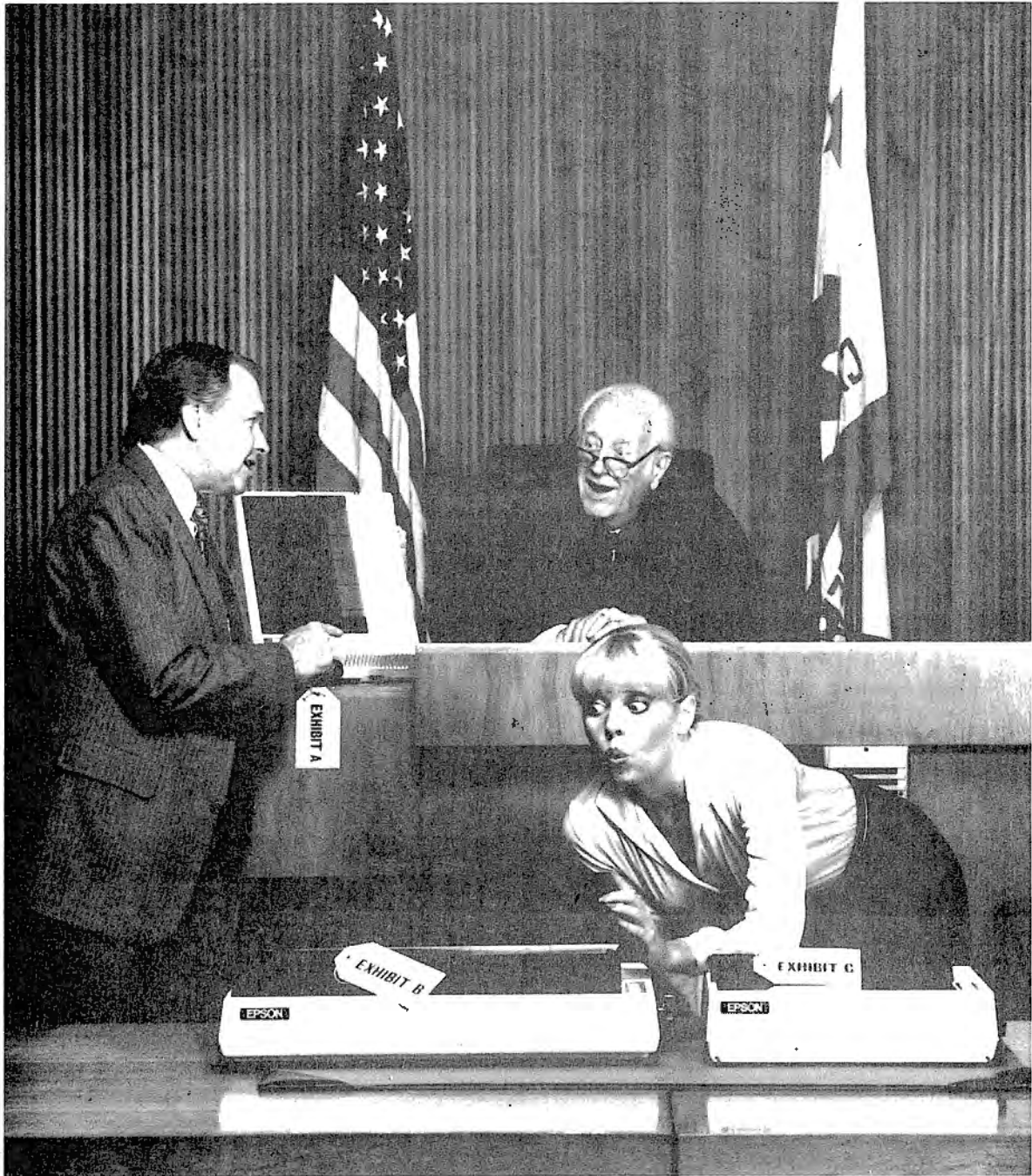
The BASIC Answer can be "switched" when processing to ignore the unwanted or include extra code! No more multiple master programs to confuse maintenance. All the masters could now be rolled into the same program. Modify the one master and you've modified them all. Process the same code with different switches set, and get two or more versions from the same source.

The BASIC Answer combines the self-documenting power of COBOL with the relative ease of BASIC together with the power of a word processor.

The BASIC Answer is available for just \$69.00.

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# Radio Shack hard disk system

## *A user's report*

T. R. Dettmann, Associate editor

The Radio Shack Hard Disk System (RSHDS) is Radio Shack's entry into the hard disk market. With hard disk systems rapidly becoming more affordable, it was inevitable that the Radio Shack line should expand to include hard disk capability. This article discusses how the RSHDS works in an actual, working environment, with real day-to-day problems to solve.

This review is based on experience gained in helping several people install hard disk systems for their businesses. It is a description of how well the RSHDS worked in their situations. Each of the installations was a Model II-based system, officially installed by a Radio Shack Computer Center.

### The Hard Disk

The hard disk itself is an 8.4-megabyte, two-disk, four-platter, eight-inch hard disk system, mounted in a sealed environment. For those who like numbers, the specifications for the system are: Rotation speed, 3125 rpm; latency, 9.6 ms; track access time, 19 ms (track to track); data transfer rate, 4.34 Mb/sec.

Backup is accomplished by the Hard Disk Operating System to eight-inch floppy disks, using a special utility called save. A restore utility is provided to regenerate the hard disk files from the backup copies.

Experienced Model II owners will

find it easy to use, since it appears to the system as disk four. It is normally set up so that the system will start up with the hard disk in operation, taking the place of the drive zero diskette. In this way, your normal use of the diskette system is to transfer programs and do backups.

Once started, the hard disk operating system acts enough like TRSDOS 2.0 to be familiar to anyone who has operated a Model II. The hard disk system is actually TRSDOS 4 (.0 or .1, depending on which release you have).

All of the standard file handling commands are included with the system, as are some new commands. FLOPPY (on/off) turns floppy drives on or off. DRIVE controls drives on or offline (4.1 system). FCOPY is used to up- or download from floppy disks. I haven't personally verified that all commands work, but all that I've tried worked correctly.

One of the problems with TRSDOS 4 is incompatibility with TRSDOS 2.0. You can't just put a TRSDOS 2.0 disk in drive zero and have the hard disk operating system read it. Why, you ask? Well, TRSDOS 4.0 formats its disks differently so that they hold more information. That's great, but why can't the TRSDOS designers get the trick of recognizing a disk in some way (say a standard single density track zero) and make the transition auto-

matic? CP/M systems do it.

To correct the problem, FCOPY is provided. On the 4.0 system, it serves for uploading and downloading of files or whole disks. On the 4.1 system, you get some additional features, such as the ability to get directory listings of floppy disks.

As I noted above, there are two releases of the operating system software. One of the installations, working with a hard disk as of this writing, is still on TRSDOS 4.0. It works fine, but doesn't have some of the things TRSDOS 4.1 has, such as the drive command and the extended FCOPY.

In operation, I've helped to install several databases now using the RSHDS. The advantage of the hard disk is its speed compared to floppy disks. On one database, an increase of five to six times in search speed was noted in going from floppy disk to hard disk.

The RSHDS system is not without its difficulties, though. The FREE command is much harder to understand. It no longer has a picture of the disk layout, but is just a set of numbers. DIR takes a long time since it goes through quite a few files.

My biggest objection to the system is the fact that it allows no internal directory structure within the hard disk system. With as much space as there is, on a single hard disk, placing all of the files in a single directory can sometimes make it im-

possibly large — far too large for most people to really handle effectively.

When we reviewed the CORVUS hard disk, the Model I NEWDOS system for the CORVUS provided a multiple directory structure, allowing the user to effectively attach parts of the disk as logical disks. The CORDOS system provided this same ability on the Model II.

This capability isn't just nice. For some people, it could be essential. One of the installations I've worked on has the complete COBOL accounting system from Radio Shack. Anyone who has seen these packages knows how many files there are in one of the packages — quite a few. Directories go a long time.

There are other problems as well. One of the companies installed the Radio Shack payroll system on the hard disk. After being told it was compatible, they found (or rather, I did) that the payroll program had written over the list command with a BASIC program also called LIST. The hard disk system stores its commands as separate programs. At least, in this case, it could be changed.

One of the companies has had a number of problems with data files being scrambled. So far, no cause has been found and Radio Shack is working on it. I can't say that the problem has anything to do with the hard disk, but to paraphrase an old say: "ya better keep yer backups dry."

So, who is the system really good for? The best applications I've seen on the RSHDS system are those where a few very large files are kept. One of the systems is maintaining a 5000-item Profile database with all of the files on the hard disk. It really works well.

My impression of the RSHDS system is primarily favorable. I would go out and buy one for myself, having seen it in operation. I've heard of some repair problems, but nothing I can verify. Based upon what is admittedly not a rigorous test, I wouldn't hesitate, at this point, to recommend a Radio Shack hard disk. ■

# THE COMPUTING TEACHER

The Journal of  
The International Council for  
Computers in Education

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# Grab TRSDOS by the horns

## Run a data disk in drive zero

Model I, PMC-80, LNW80

Michael D. Andreas and Charles P. Knight, Arlington, TX

TRSDOS and other compatible operating systems consist of huge amounts of code. Hence, they require a large part of the disk in drive zero. To avoid having all of the system in memory at the same time, as is done on the Apple, TRSDOS loads in portions of its code from disk as it needs it. This is why the operating system on the TRS-80 is so much more powerful than that of the Apple — it saves memory space and allows a much more sophisticated operating system to be written, but it does so at the expense of disk space. It also requires that the disk in drive zero contain these overlays at all times, if maximum use is to be made of the system. These portions of code are called “system overlays” and load into the same memory space, but at different times. The memory area used by these overlays is usually 4E00H to 51FFH.

With memory prices dropping, everyone should have 48K of memory. Yet, many applications have been written that only require 32K of memory or less. If you can tie your shoes without help, you can install memory into the TRS-80 expansion interface. So, what are you waiting for?

We propose to put this extra memory to good use by placing system overlay files into the upper 16K of memory. This will speed operations and reduce wear and tear on the disk and drive. You may have noticed that when a new file is being written on a drive other than the system drive, occasional accesses are still done to the system disk. That is because different overlay



files are being loaded.

TRSDOS has five overlays, SYS1/SYS through SYS5/SYS, which use this area, and an additional overlay, SYS6, which uses memory at 5200H. SYS0/SYS is not an overlay — it is the resident system. It is loaded into the area between 4000H and 4E00H by BOOT/SYS each time you boot and is not accessed on the disk again until you reboot.

It is the goal of the boot operation to get SYS0 into memory. Once SYS0 is there, it does not need to be on any disk in the system. It must be present on the disk used for booting, or you'll be greeted with that annoying “NO SYSTEM” message. BOOT/SYS must remain on the disk in order for the system to find the directory track should the system lose it.

SYS1 is loaded on entering DOS

and on returning to DOS READY from any of the other system overlays, or from BASIC, or any other command file. It contains code necessary to accept user input and call the correct overlay from among the other system files. It is also responsible for displaying the DOS READY prompt.

SYS2 and SYS3 are used in opening and closing files. Each time a request is made of the operating system that involves opening or closing a file, or saving or loading a BASIC or machine language program, these two files are called, one at a time, to provide the code to do this. Even a BASIC program is a file, and before that file can be loaded, it must be opened. After loading, it must be properly closed.

Since these files must be read in from disk each time they are used, a great savings in time can be

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Tony Bove & LeRoy Finkel

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Source: TCAR16 - CompuServe: 70310.267 TRS-80 is a <sup>TM</sup> of Tandy Corp.

## Grab TRSDOS

realized, in a program which repeatedly opens and closes files, by having these two modules already resident in memory. Instead of reading the disk, a simple block move is done to relocate the code to the proper place in RAM. It is possible to speed things up by as much as one thousand percent this way, but it will cost you some of your high memory.

SYS4 displays DOS error messages. Actually, SYS4 isn't really an executable code. It's just a table of error messages that is accessed by SYS0 each time an error has occurred. The entire file is read into the overlay area and the proper error message is displayed. If you never make errors (you are perfect, aren't you?), then SYS4 is never used.

SYS5 is the system debugger. If you never program in machine language, then you don't need this overlay and can gain an extra gran of disk space by killing it. Many new TRS-80 users have been surprised to see the screen fill with baffling numbers when the computer should have been doing something else. This is the debug screen. To a programmer, it is very useful, but to a non-programmer, it can be quite a surprise. This program requires it to be on the disk and it will be placed in high memory with the rest of the system overlays. A flag is maintained, in the system communications area, to tell the system whether debug is active or not. If debug is active and the break key is pressed, or a /CMD file is executed, it is loaded from disk and executed. SYS1 is reloaded whenever debug is exited via the normal G402D command.

SYS6/SYS occupies an area above 5200H and is used to execute DOS library functions. Any time you enter a command which is in the TRSDOS command library, code in SYS6 is executed to perform the function requested. To get a look at the commands that use the SYS6 overlay, type "LIB" in response to DOS READY. The command "LIB", itself, is also executed by this overlay.

Since a directory access is required to load the overlays, the

files are physically located next to the directory track on the disk to minimize access time. You can see that, by placing them in unused memory, even more time would be saved by not having to access the disk at all.

DOS loads the system files, as needed, by an unusual (but logical) process. When you call a vector (documented in the DOS manual) that is in one of the overlays, the A register is loaded with a value that corresponds to the desired function. The lower four bits specify the desired overlay file. The most significant bit must be set to signify that this is a call for an overlay, and the remaining three bits specify the subfunction in the overlay.

Next, an RST 28H instruction is executed. This is the same as CALL 28H, except it is only a one-byte instruction whereas, a call would be a three-byte instruction. The ROM code at 28H vectors to 400CH, which vectors to the system overlay loader. This routine kills the return address, so that control will pass back to the program which called the documented vector. Then, it ensures that bit 7, in the A register, is set. Next, it looks at the lower four bits and compares that value with a variable that specifies which overlay is already in memory. If it's already there, control is passed directly to it, otherwise it is loaded first.

The value of the lower four bits is the directory entry code (DEC) and corresponds to the location of the entry for the /SYS file in the directory. This explains why you can't directly copy a /SYS file to a disk that doesn't already have it in the directory. If you try, the directory entry will be randomly placed in the directory and will most likely be put in a different directory slot. The system overlay loader would go crazy trying to find it.

Our program, which we call MEMSYS/CMD, copies each SYS file into memory, then modifies the system overlay loader to look first in memory for the file before going to disk. Files are stored in memory (in the load module format) as on disk, which means that any patches you have applied will be loaded



automatically with the /SYS file.

Type in the accompanying program under EDTASM. If you desire a different set of files in memory, delete the code that points to the filename, calls the loader and checks for an error. The last error check done must be the same as the one after the code that loads SYS6.

We also strongly recommend that you make a special disk to transfer your object code to while testing the program. Since we're playing around with the system, a simple typographical error could cause portions of the disk to be overwritten with garbage. This happened during the development of this program, exercising our vocabulary considerably! Previous tangles with machine language program bugs have taught us to be careful.

One note about the password, "LOY4". This seems to be a master password that allows access to any protected file under TRSDOS 2.3. Now that you know this password, you can enjoy looking at files Tandy thought you shouldn't see.

This program is compatible with any application that recognizes and respects the top of memory value which DOS stores at 4049 and 404AH (also referred to as HIGH\$). BASIC uses this value as the default answer to the "MEMORY SIZE?" initialization question. (NEWDOS 2.1 BASIC does not honor HIGH\$.) All of the TRSDOS 2.3 overlays will fit into less than 11K of memory, so any BASIC program that works in a 32K machine will certainly work with MEMSYS active in a 48K machine.

With MEMSYS active, you should notice a vast improvement in operating speed involving opens, closes and file writes, which extend the length of the file. Saving a file from BASIC will only access the drive that the file is being saved to. Typing CMD"S" will reenter DOS without reading SYS1/SYS from the disk. Entering debug is done without starting the disk. Exiting debug via G402D does not activate them either. The clock will lose less time because fewer sectors are being read from disk.

Perhaps the largest advantage of

MEMSYS is the ability to use a data disk in drive zero. This amounts to an extra eleven granules of storage space. Simply boot up with a system disk, activate MEMSYS, load BASIC and your program, and swap in a data disk. Of course, you will have to reinsert the system disk if you want to reboot. This will be a definite advantage for short programs that handle a large amount of data. Two-drive owners will find that they can copy files from one data disk to another without copying them to a system disk first.

The program listing shown is for

TRSDOS. Modifications for NEWDOS 2.1, and another for DBLDOS, are shown as additional lines of code to be added after the TRSDOS code has been entered. Use the same line numbers we have, and you can add the code for the operating system of your choice later with minimum difficulty. Where a line number exists that is not in the TRSDOS version, add that line. Where a line number is the same as in the TRSDOS version, substitute that line for the one in the TRSDOS version.

When MEMSYS is first executed, it must create an area in memory to

Listing 1

```

00100 ;*****
00110 ;**** MEMSYS 1.0 *****
00120 ;**** FOR TRSDOS 2.3 *****
00130 ;**** COPYRIGHT 1981 *****
00140 ;**** BY MICHAEL D. ANDREAS *****
00145 ;**** AND CHARLES P. KNIGHT *****
00150 ;*****
00160 ; MEMSYS WILL PLACE SYSTEM OVERLAYS
00170 ; SYS1/SYS THRU SYS6/SYS INTO THE UPPER
00180 ; MEMORY OF A 48K MACHINE AND THEN MODIFY
00190 ; THE SYSTEM OVERLAY LOADER TO LOAD OVERLAYS
00200 ; AS NEEDED FROM MEMORY INSTEAD OF WEARING
00210 ; OUT THE DISK AND DRIVE. (IT'S A LOT
00220 ; FASTER TOO!!!!)
00230
5200 00240 ORG 5200H
5200 110072 00250 INITSY LD DE,SGNMSG
5203 CD6053 00260 CALL DISPLA
5206 2180FF 00262 LD HL,SYLVAR
5209 0680 00264 LD E,128
520B 3600 00266 L3 LD (HL),0
520D 23 00268 INC HL
520E 10FB 00269 DJNZ L3
5210 11BD52 00270 LD DE,SY1 ;POINT TO FILENAME
5213 CDED52 00280 CALL TUKSYS ;PUT IT IN MEMORY
5216 2028 00290 JR NZ,ERREXT
5218 11AD52 00300 LD DE,SY2 ;SAME-O SAME-O
521B CDED52 00310 CALL TUKSYS
521E 2020 00320 JR NZ,ERREXT
5220 119D52 00330 LD DE,SY3
5223 CDED52 00340 CALL TUKSYS
5226 2018 00350 JR NZ,ERREXT
5228 118D52 00360 LD DE,SY4
522B CDED52 00370 CALL TUKSYS
522E 2010 00380 JR NZ,ERREXT
5230 117D52 00390 LD DE,SY5
5233 CDED52 00400 CALL TUKSYS
5236 2008 00410 JR NZ,ERREXT
5238 116D52 00420 LD DE,SY6
523B CDED52 00430 CALL TUKSYS
523E 2803 00440 JR Z,NEREXT
5240 C30944 00450 ERREXT JP 4409H
00460 ;THE NEXT SECTION OF CODE WILL BE EXECUTED
00470 ;ONCE THE ENTIRE SYSTEM HAS BEEN SUCCESSFULLY
00480 ;PLACED IN MEMORY. IT WILL MODIFY THE SYSTEM
00490 ;OVERLAY LOADER TO LOOK INTO RAM FOR THE DESIRED
00500 ;SYSTEM. THE ORIGINAL CODE IS MOVED INTO HIGH
00510 ;RAM FOR USE IF THE REQUIRED SYS OVERLAY IS
00520 ;NOT IN MEMORY (IT WILL LOOK ON THE DISK).
5243 215DFF 00530 NEREXT LD HL,PATCH ;POINT TO NEW CODE.
5246 11CE4B 00540 LD DE,OLDSYS ;POINT TO WHERE ORIGINAL CODE GOES
5249 061D 00550 LD B,PEND-PATCH+1 ;NUMBER OF BYTES TO MOVE
524B 4E 00560 SWAP LD C,(HL)
524C 1A 00570 LD A,(DE)
524D 77 00580 LD (HL),A
524E 79 00590 LD A,C
524F 12 00600 LD (DE),A

```

# Grab TRSDOS

be used as a mini-directory which MEMSYS will use to find the overlay when it is placed in memory. It proceeds to load each system overlay, in turn into memory, by pointing to a file control block (FCB), then calling the subroutine TUKSYS, which reads the file in and places it in high memory. If all designated system overlays are successfully loaded, it modifies the system loader and the top of available memory pointer, and returns to DOS. If it encounters an error at any point, it will abort and not modify the system.

The subroutine TUKSYS (which loads the /SYS file specified by the DE register pair) displays the filename, for the user's edification, then finds the mini-directory location specified by the byte pair following the terminating 00 byte after the filename in the FCB. In the NEWDOS 2.1 version, this must be two bytes of zeroes, for /SYS files with numbers less than ten, to keep the offset consistent. Throughout the loading of the /SYS file, the IX register pair will point to the beginning of the DOS FCB, and the IY register pair will point to the mini-directory entry. The /SYS file is opened, and the DEC is read from the eighth byte of the DOS FCB. This DEC is placed in the mini-directory entry for use when loading system overlays from high memory. Next, the ending record number (ERN) is obtained from the thirteenth byte of the FCB and placed in the second byte of the mini-directory. We can take this shortcut because /SYS files are never longer than 256 sectors long, so only one byte will be needed to store the ERN.

The value at memory location HLDARE specifies the top of available memory and the beginning of the memory location of this /SYS file. This value is placed in the mini-directory and will be used by the modified system overlay loader to find the file. The FCB is positioned to the first sector which is read into memory. A period is displayed if it is successfully read. If the last sector has not yet been read, the routine loops back for the next sector. When the last sector has been read, it returns to the routine which

```

5250 23      00610      INC      HL
5251 13      00620      INC      DE
5252 10F7    00630      DJNZ     SWAP
5254 3EC9    00640      LD       A,0C9H      ;CODE FOR 'RET'
5256 77      00650      LD       (HL),A      ;PUT ON END OF OLDSYS
5257 2160FF  00660      LD       HL,PATCH+3  ;ONE OF THE ORGSYS
525A 36C0    00670      LD       (HL),0C0H   ;INSTRUCTIONS HAS TO BE
525C 23      00680      INC      HL          ;MODIFIED
525D 3600    00690      LD       (HL),0      ;CODE FOR 'NOP'
525F 23      00700      INC      HL
5260 3600    00710      LD       (HL),0
5262 2A7EFF  00720      LD       HL,(HLDARE) ;PROTECT MEMORY
5265 2B      00730      DEC      HL
5266 224940  00740      LD       (4049H),HL  ;FROM SYSTEM.
5269 AF      00750      XOR      A
526A C32D40  00760      JP       402DH      ;BACK TO DOS.
00770      ;THE NEXT SECTION OF CODE DESCRIBES THE FILES TO
00780      ;BE PLACED IN MEMORY AND WHERE A MINI MEMSYS
00790      ;DIRECTORY ENTRY WILL BE PLACED.
00800
526D 53      00810      SYS6    DEFM   'SYS6/SYS.L0Y4' ;FILENAME
527A 00      00820      DEFB   0        ;TERMINATOR BYTE FOR PRINTOUT
527B 94FF    00830      DEFW   0FF94H   ;MEMSYS DIR ADDRESS
527D 53      00840      SYS5    DEFM   'SYS5/SYS.L0Y4'
528A 00      00850      DEFB   0
528B 90FF    00860      DEFW   0FF90H
528D 53      00870      SYS4    DEFM   'SYS4/SYS.L0Y4'
529A 00      00880      DEFB   0
529B 8CFF    00890      DEFW   0FF8CH
529D 53      00900      SYS3    DEFM   'SYS3/SYS.L0Y4'
52AA 00      00910      DEFB   0
52AB 88FF    00920      DEFW   0FF88H
52AD 53      00930      SYS2    DEFM   'SYS2/SYS.L0Y4'
52BA 00      00940      DEFB   0
52BB 84FF    00950      DEFW   0FF84H
52BD 53      00960      SYS1    DEFM   'SYS1/SYS.L0Y4'
52CA 00      00970      DEFB   0
52CB 80FF    00980      DEFW   0FF80H
00990      DEFS   32
01000
01010      ;THE NEXT SECTION OF CODE TAKES THE FILE POINTED TO
01020      ;BY THE DE REGISTER AND PLACES IT IN MEMORY.
01030
52ED D5      01040      TUKSYS  PUSH   DE
52EE DDE1    01050      POP     IX
52F0 D5      01060      PUSH   DE
52F1 114772  01070      LD      DE,LINE1
52F4 CD6053  01080      CALL   DISPLA
52F7 D1      01090      POP     DE          ;RESTORE FILENAME
52F8 CD6053  01100      CALL   DISPLA
52FB 210E00  01110      LD      HL,OFFSET   ;FIND DIR POS
52FE 19      01120      ADD     HL,DE
52FF 7E      01130      LD      A,(HL)
5300 23      01140      INC     HL
5301 66      01150      LD      H,(HL)
5302 6F      01160      LD      L,A
5303 E5      01170      PUSH   HL          ;HL POINTS TO DIR POS
5304 FDE1    01180      POP     IY
5306 210070  01190      LD      HL,BUFFER
5309 0600    01200      LD      B,0
530B CD2444  01210      CALL   OPENEX     ;SEE TRSDOS MANUAL PG. 6-9
530E C0      01220      RET
530F DD7E07  01230      LD      A,(IX+7)   ;IF ERROR
5312 FD7700  01240      LD      (IY+0),A  ;GET DEC
5315 DD7E0C  01250      LD      A,(IX+12) ;LOAD MINIDIR WITH DEC
5318 FD7701  01260      LD      (IY+1),A  ;GET ERN
531B 2A7EFF  01270      LD      HL,(HLDARE);PUT IN MINIDIR
531E FD7502  01280      LD      (IY+2),L  ;BEGINNING OF STORAGE POINTER.
5321 FD7403  01290      LD      (IY+3),H  ;INTO MINIDIR.
5324 010000  01300      LD      BC,0      ;POINT TO FIRST RECORD
5327 CD4244  01310      NXTREC CALL   POSN     ;GET RECORD FROM DISK,
532A C0      01320      RET      NZ       ;IF ERROR
532B CD3644  01330      CALL   READ
532E C0      01340      RET      NZ
532F D5      01350      PUSH   DE
5330 FDE5    01360      PUSH   IY
5332 3E2E    01370      LD      A,'.'      ;DISPLAY FOR EACH SECTOR
5334 CD3300  01380      CALL   33H
5337 FDE1    01390      POP     IY
5339 D1      01400      POP     DE
533A E5      01410      PUSH   HL
533B D5      01420      PUSH   DE
533C C5      01430      PUSH   BC
533D 21FF70  01440      LD      HL,BUFFER+255 ;POINT TO END OF DISK BUFFER.
5340 ED5B7EFF 01450      LD      DE,(HLDARE) ;POINT TO BEGINNING OF FREE STORAGE
5344 010001  01460      LD      BC,256     ;NO. OF BYTES IN A RECORD.
5347 EDB8    01470      LDDR
5349 ED537EFF 01480      LD      (HLDARE),DE ;TRANSFER IT

```

specifies the /SYS files to be loaded.

When a new system overlay is requested by the system, the modified system overlay loader calls TSYS. TSYS hunts through the mini-directory and looks for an entry that has the correct DEC. If that is not found, it executes the code which reads the /SYS file from disk. If found, HLDARE is modified to point to the first sector of the file in memory. The resident system has a routine which reads in a machine language object file, places it in the proper memory locations, and finds the execution address. The portion of the code which reads the next sector is modified to get it from memory via TREAD, by changing the code specified by VECTOR to point to TREAD instead of the disk read routine in the resident system. TSYS calls the machine language file loader, which reads in the file. Once accomplished, control is returned to the system overlay loader, which executes the code.

TREAD simply transfers the /SYS sector pointed to by HLDARE, to the system buffer, the location of which varies between operating systems. Then, it adjusts the HLDARE pointer to the next sector and returns to the calling routine.

After you have MEMSYS up and running on your favorite operating system, try putting a data disk in drive one, a data disk in drive zero, and copying files, one at a time, between disks. Who says you need three drives? Sure it's nice to have that many drives, but we don't all need this much storage. If you're running NEWDOS, there will still be a short delay before any CMD function is executed. NEWDOS still must move BASIC and its pointers up against the bottom of the MEMSYS system before it can execute the DOS command. Try running some of the Radio Shack accounting software and see how much faster it runs. We haven't done any benchmark tests, but we noticed that disk accesses seem to be almost instantaneous. In many cases where disk accesses were formerly required, they now operate without any delay. A new freedom from the confines of DOS are now available to you.

```

534D C1      01490      POP      BC
534E D1      01500      POP      DE
534F E1      01510      POP      HL
5350 03      01520      INC      BC          ;COUNT UP TO NEXT RECORD
5351 79      01530      LD       A,C        ;MAKE SURE WE'RE NOT
5352 FD8E01  01540      CP       (IX+1)     ;READING PAST END
5355 20D0    01550      JR      NZ,NXTREC   ;NOT THERE YET, SO READ ANOTHER.
5357 D5      01570      PUSH    DE
5358 115472  01580      LD      DE,LINE2
535B CD6053  01590      CALL   DISPLA
535E D1      01600      POP     DE
535F C9      01610      RET     ;GOBACK AND READ ANOTHER FILE
          01620
          01630 ;THE NEXT SECTION OF CODE WILL DISPLAY THE STRING
          01640 ;POINTED TO BY REGISTER DE AND TERMINATED BY
          01650 ;A ZERO BYTE.
          01660
5360 D5      01670 DISPLA  PUSH  DE
5361 1A      01680 L2     LD    A,(DE)
5362 B7      01690      OR     A          ;IS IT A ZERO?
5363 280C    01700      JR     Z,ENDMSG   ;IF SO THEN QUIT WRITING.
5365 D5      01710      PUSH  DE
5366 FDE5    01720      PUSH  IY
5368 CD3300  01730      CALL  33H
536B FDE1    01740      POP   IY
536D D1      01750      POP   DE
536E 13      01760      INC   DE          ;POINT TO NEXT BYTE.
536F 18F0    01770      JR    L2          ;PRINT IT.
5371 D1      01780 ENDMG   POP   DE
5372 C9      01790      RET
          01800
          01810 ;THE NEXT SECTION OF CODE IS THAT WHICH "OPENS" THE
          01820 ;SYSTEM ENTRY IN THE MINI DIRECTORY.
          01830
          01840
FF00      01840      ORG   0FF00H
FF00 DDE5    01850 TSYS   PUSH  IX
FF02 E5      01860      PUSH  HL
FF03 D5      01870      PUSH  DE
FF04 C5      01880      PUSH  BC
FF05 2A964C  01882      LD    HL,(VECTOR)
FF08 227CFE  01884      LD    (STRVEC),HL
FF0B 2142FF  01890      LD    HL,TREAD    ;MODIFY ORG SYS OBJECT
FF0E 22964C  01900      LD    (VECTOR),HL ;FILE LOADER TO GET SECTORS FROM MEMO
FF11 78      01910      LD    A,B          ;B HAS DEC
FF12 2180FF  01920      LD    HL,SY1VAR   ;HUNT THRU MINIDIR ENTRIES FOR FILE
FF15 110400  01930      LD    DE,4
FF18 0620    01940      LD    B,32
FF1A BE      01950 L1     CP    (HL)
FF1B 2805    01960      JR    Z,TOPEX     ;LOOK THRU ALL OF THEM.
FF1D 19      01970      ADD   HL,DE       ;NOT FOUND, SO WE'LL GET IT FROM DISK
FF1E 10FA    01980      DJNZ  L1
FF20 1830    01990      JR    RDISK
FF22 EB      02000 TOPEN  EX   DE,HL
FF23 D5      02010      PUSH  DE
FF24 DDE1    02020      POP   IX
FF26 DD6E02  02030      LD    L,(IX+2)    ;FIND FILE IN MEMORY
FF29 DD6603  02040      LD    H,(IX+3)
FF2C 227EFF  02050      LD    (HLDARE),HL
FF2F CD394C  02060      CALL  4C39H      ;CALL ORG SYS OBJECT FILE LOADER
FF32 22FC4B  02070      LD    (4BFCH),HL ;EXECUTION ADDRESS.
FF35 2A7CFE  02080      LD    (STRVEC),HL ;RESTORE DISK VECTOR TO LOADER.
FF38 22964C  02090      LD    (VECTOR),HL
FF3B AF      02100      XOR   A
FF3C C1      02110      POP   BC
FF3D D1      02120      POP   DE
FF3E E1      02130      POP   HL
FF3F DDE1    02140      POP   IX
FF41 C9      02150      RET
          02160
          02170 ;THE NEXT SECTION OF CODE IS CALLED BY THE ORIGINAL
          02180 ;SYSTEM'S OBJECT FILE LOADER WHEN IT NEEDS THE NEXT
          02190 ;SECTOR OF THE OVERLAY.
          02200
FF42 2A7EFF  02210 TREAD  LD    HL,(HLDARE)
FF45 11FF4D  02220      LD    DE,4DFEH
FF48 010001  02230      LD    BC,256
FF4B EDBB    02240      LDDR
FF4D 227EFF  02250      LD    (HLDARE),HL
FF50 AF      02260      XOR   A          ;SET NO ERROR
FF51 C9      02270      RET
          02280
          02290 ;THE NEXT SECTION OF CODE IS EXECUTED IF THE
          02300 ;OVERLAY HAS NOT BEEN PLACED IN MEMORY.
          02310
FF52 2A7CFE  02320 RDISK  LD    HL,(STRVEC)
FF55 22964C  02330      LD    (VECTOR),HL
FF58 C1      02340      POP   BC
FF59 D1      02350      POP   DE

```



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```

FF5A E1      02360      POP      HL
FF5B DDEL    02370      POP      LX
              02380
              02390 ;THE NEXT SECTION OF CODE IS THAT WHICH MODIFIES THE
              02400 ;SYSTEM OVERLAY LOADER
              02410

4BCE        02420      OLDSYS  EQU      4BCEH
FF5D FDES   02430      PATCH  PUSH    IY
FF5F CD00FF 02440      CALL    TSYS
FF62 FDEL   02450      POP     IY
FF64 C20944 02460      JP      NZ,4409H
FF67 00     02470      NOP
FF68 00     02480      NOP
FF69 00     02490      NOP
FF6A 00     02500      NOP
FF6B 00     02510      NOP
FF6C 00     02520      NOP
FF6D 00     02530      NOP
FF6E 00     02540      NOP
FF6F 00     02550      NOP
FF70 00     02560      NOP
FF71 00     02570      NOP
FF72 00     02580      NOP
FF73 00     02590      NOP
FF74 00     02600      NOP
FF75 00     02610      NOP
FF76 00     02620      NOP
FF77 00     02630      NOP
FF78 00     02640      NOP
FF79 00     02650      PEND   NOP
FF7C        02660      ORG
FF7C 0000   02665      STRVEC DEFM   TSYS+7CH
FF7E FF7E   02670      HLDARE DEFM   TSYS-1
0080        02680      SYLVAR DEFS   128 ;MINIDIR AREA
4424        02690      OPENEX EQU    4424H
4442        02700      POSN   EQU    4442H
4436        02710      READ  EQU    4436H
4428        02720      CLOSE EQU    4428H
4409        02730      DERREX EQU    4409H
7000        02740      BUFFER EQU    7000H
7200        02750      ORG
7200 1C     02760      SGNMSG DEFB   28 ;HOME CURSOR
7201 1F     02770      DEFB   31 ;CLS
7202 4D     02780      DEFM   'MEMSYS FOR TRSDOS 2.3 VER 1.0'
7220 0D     02790      DEFB   0DH
7221 43     02800      DEFM   'COPYRIGHT 1981 BY MICHAEL D. ANDREAS'
7245 0D     02810      DEFB   0DH
7246 00     02820      DEFB   0
7247 52     02830      LINE1 DEFM   'READING —
7253 00     02840      DEFB   0
7254 20     02850      LINE2 DEFM   ' — NOW IN MEMORY'
7265 0D     02860      DEFB   0DH
7266 00     02870      DEFB   0
000E        02880      OFFSET EQU    14
4C96        02885      VECTOR EQU    4C96H
5200        02890      END     INITSY

000000 TOTAL ERRORS
27897 'TEXT' AREA BYTES LEFT

```

Listing 3

NEWDOS 2.1 PATCHES-- ALL THE DBLDOS  
PATCHES EXCEPT LINES 432-806  
CHANGE 'DEFB' TO 'DEFM' IN LINES  
820,850,880,910,940,970.

ADD THESE LINES

```

431 JR      NZ,ERREXT
432 LD      DE,SYS11
433 CALL   TUKSYS
434 JR      NZ,ERREXT
435 LDa    DE,SYS12
436 CALL   TUKSYS
437 JR      NZ,ERREXT
438 LD      DE,SYS13
439 CALL   TUKSYS

```

```

801 SYS13 DEFM 'SYS13/SYS.L0Y4'
802 DEFB 0
803 DEFW 0FFA0H
804 SYS12 DEFM 'SYS12/SYS.L0Y4'
805 DEFB 0
806 DEFW 0FF9CH
807 SYS11 DEFM 'SYS11/SYS.L0Y4'
808 DEFB 0
809 DEFW 0FF98H
2780 DEFM 'MEMSYS FOR NEWDOS 2.1V1.0'
2880 OFFSET EQU 15

```

Listing 2

```

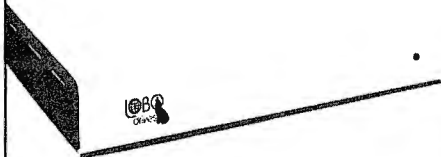
432 JR      NZ,ERREXT
434 LD      DE,SYS7
436 CALL   TUKSYS
802 SYS7  DEFM 'SYS7/SYS.L0Y4'
804 DEFB 0
806 DEFW 0FF98H
1255 INC    A
1840 ORG   0FEFAH
2202 TREAD PUSH  HL
2204 PUSH  DE
2206 PUSH  BC
2210 LD      HL,(HLDARE)
2220 LD      DE,42FFH
2252 POP   BC
2254 POP   DE
2256 POP   HL
2660 ORG   TSYS+82H
2780 DEFM 'MEMSYS FOR DOUBLEDOS
4,23 VER 1.0
2885 VECTOR EQU 4C90H

```

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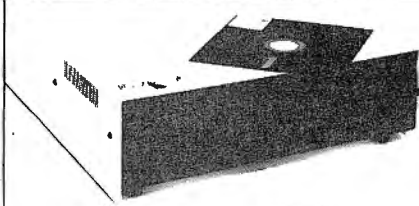
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LDOS includes a powerful extended disk BASIC, smart terminal emulator, and many other useful utilities that make it worth far more than its low price. It runs on any Model I or Model III with at least one disk drive.

**LDOS operating system (specify Model I or Model III) \$129.00**

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### Add-on 8" floppies for Model II

Why pay Radio Shack prices to expand your Model II's disk capacity? The Lobo 8202C2 adds two 8" double-density floppy drives, for a total of 1.1 megabytes of additional storage. Installation and operation are identical, and you get the added benefit of Lobo's 1-year parts and labor warranty.

**8202C2 dual-drive 8" floppy system for Model II \$1269.00**

### Add-on minifloppy drives for Model I

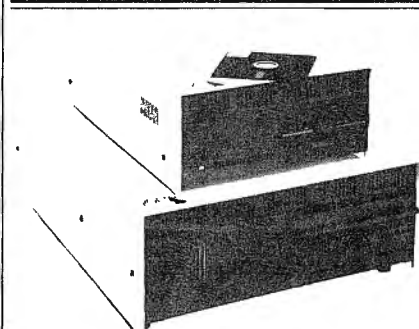
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# 17

### 8" floppy systems for Model I and Model III

These rugged dual-drive systems attach to any Model I with LX-80 expansion interface, or any Model III, and add the mass storage you need for the big jobs. Double density recording stores 535kB on one side of the disk. Using the LDOS operating system (required) you get full compatibility with standard TRSDOS plus greatly increased capabilities.

**8202C3 two single-sided drives (1.1 MB total) for Model III \$1625.00**

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# 18

# EasyLink

## Western Union on your TRS-80

For all models

EasyLink is a new, exciting telecommunications network that Western Union has opened up for the computer owner.

No longer are users restricted to a closed network such as CompuServe or The Source. You now have complete message sending and retrieval to others who are on or off the system.

Anyone who owns a computer, modem, and terminal software can use the system. Western Union is offering a communications service that consists of two major parts, EasyLink and the ACCESS system.

EasyLink began just last spring and now has over 5000 terminals connected. They expect to grow to over 10000 by 1983. Projections show that there are over three million communication terminals in the United States, and Western Union hopes to get at least ten percent of that market.

Through EasyLink, you have a complete store and forward message-switching service. All you need is an ASCII terminal that operates at 300 or 1200 baud. Messages may be addressed to Telex I and II terminals, any other compatible terminal, auto-answer terminals, or (and here is the real advantage) to a mailbox facility or any Western Union InfoMaster service.

For the business with branch outlets, a message can be sent directly through EasyLink to all offices. For those outlets without terminals, messages can be forwarded to the nearest postal outlet for delivery as a Mailgram. If you have an unknown number of customers who wish to contact you, messages can be sent to your

EasyLink mailbox and you can retrieve them as you wish.

### Subscriber Options

EasyLink offers a variety of message types. You can direct messages to another EasyLink subscriber, to a Telex I subscriber in the United States, to a Telex II user in the United States, or to a TWX user in Canada. For subscribers with international needs, you can send via International Telex (ITX) or Cablegram (INT). For sending messages to users who don't have terminals, or those who are not EasyLink subscribers, Western Union has the answer. Messages can be specified to be telegrams (PMS) or Mailgrams (ZIP) which are delivered by the postal service.

Message traffic can be outgoing or incoming. By far the largest use is for outgoing traffic. To access incoming messages, you would need to have an auto-answer modem or call-up messages that are stored in your mailbox.

### How Is It Done?

EasyLink is quite simple to use. Each subscriber is assigned an identification code and password. These are verified by the EasyLink computer prior to accepting your message. All you need to do is power-up your computer and modem, run your terminal program, and call EasyLink. Type the code for your terminal type, I.D. code, name and password. If all is well, you get the response PTS for Proceed to Select.

Identify where and how you wish the message to be sent, and EasyLink responds with the letters GA, for Go Ahead. Then go back to the terminal program, load the ASCII text into your computer's

Cameron C. Brown, Editor

memory (RAM buffer), and send it. Text can be sent directly from keyboard input, but the primary use is to dump prewritten messages.

For TRS-80 owners, text is sent at 300 to 1200-baud (your modem determines this value), in ASCII, with even parity, one stop bit, and either half or full duplex. When receiving incoming text, you can specify that you have an 80- or 132-character printer.

Ease of operation has been a goal in the development of this system. Subscribers can predetermine a set of addresses (up to 99) and dump a message to all of them at once. Operator codes are straightforward and use easy-to-remember mnemonics. The subscriber's manual is concise and clear, but it assumes that you understand your own computer, modem and terminal operation.

### What Are the Fees?

The cost savings can be tremendous. If your business Telex cost is now \$500 per month, EasyLink could possibly lower that by fifty percent. There is a \$25 registration fee. Auto-answer terminal connection is \$15 per month or, with a mailbox to receive messages, it is a total of \$25 per month. The cost per message is based upon connect time and baud rate. At 1200-baud, it is only \$.40 per minute, or \$.20 per minute for 300-baud. Current TLX charges are \$.3745 per sixty characters. For some remote users, the cost of a Telex line is prohibitive. EasyLink may be the answer.

For businesses that require it, message costs can be billed to separate departments or indivi-

duals. This should help to simplify a number of accounting headaches. Nationwide, over thirty businesses are now using the TRS-80 Model II or III in conjunction with EasyLink.

**The ACCESS Connection**

For \$10 per month, you can join the ACCESS system. It gives you a priority mailing system that reaches worldwide. Through ACCESS, you can direct messages for one-day delivery as Mailgrams, two-day delivery via the U.S. Postal Service's electronically computer-originated message system (E-COM), or go for three-day plus delivery via a Computer Letter. With a Computer Letter, you can forward messages as well as enclose brochures and inserts. For international same-day delivery, there is the International Cablegram that goes to 150 countries. A new option is the International Priority Letter, which gives two-day delivery to Europe and the

United Kingdom. You do not have to join EasyLink to take advantage of the ACCESS system.

**Security**

Western Union offers no scrambling or message decoding. All transmissions are in plain text and go through regular communication networks, such as phone, microwave, satellite, etc. If you desire to keep your business information extremely confidential, and have needs beyond the normal password and identification procedures, the encoding and decoding of data is up to you. Western Union sends the ASCII file, it can be as scrambled as you wish to make it.

**New Options and the Future**

User requests have led to some additions and changes in the service. Single messages are restricted to 15000 characters and this was too restrictive for some subscribers.

Now, up to 50000 characters can be sent in a batch mode. If it happens that your branch office is closed when the message is sent, it can now be automatically rerouted to a second number or mailbox. It's nice to see a company that is still developing a system quick to meet user needs.

Western Union's goal is to allow any hardware device to speak to any other piece of hardware. It may not be too long before we see modems attached to all of the IBM Selectric typewriters in the world. It's clear that once a keystroke is captured, Western Union wants to deliver it.

*Ed. Note— This article is based upon interviews with Mr. David W. Hurley, Senior Communications Representative for Western Union. For further information, you may contact him, or Ed Links, at 655 South Orcas, Seattle, WA 98108, (206) 764-4578.*

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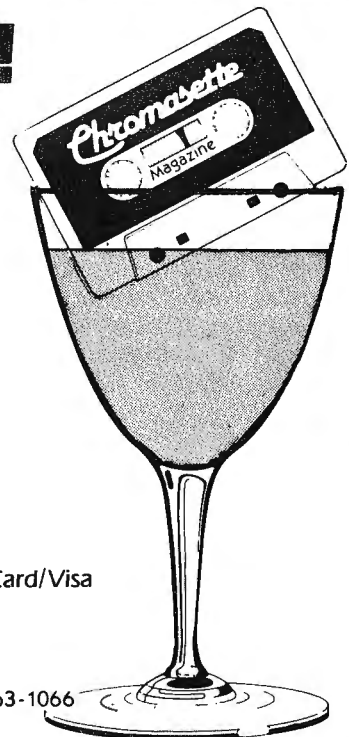
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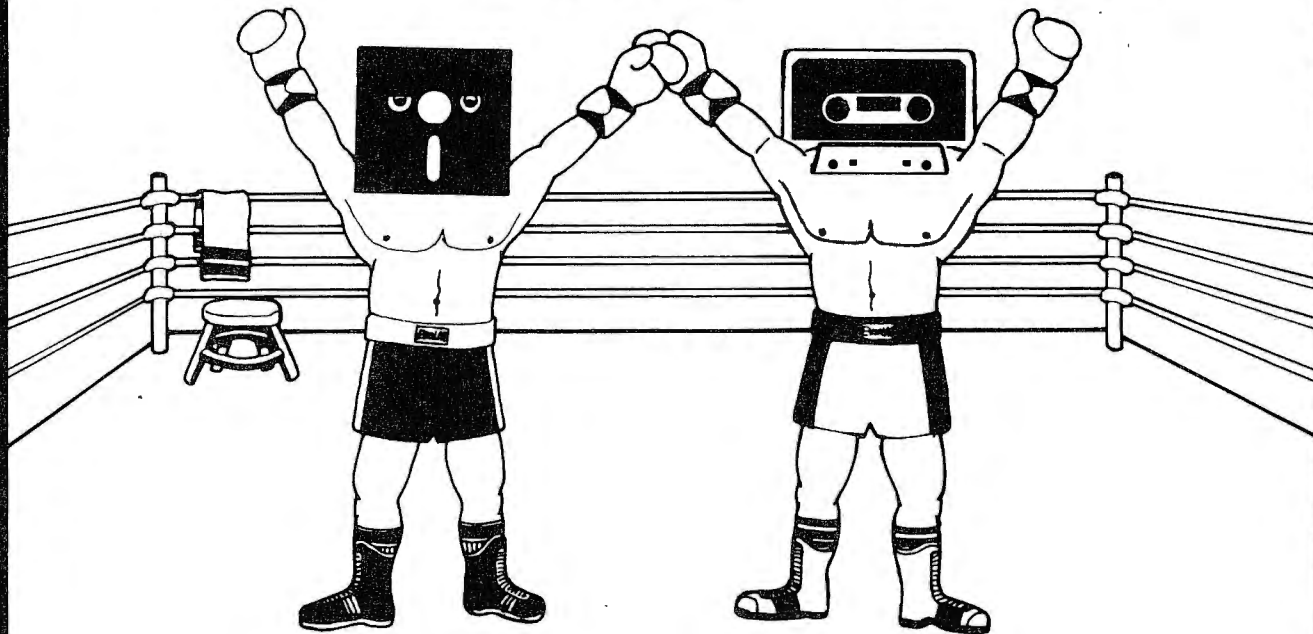


TRS-80  
Model I

And In This Corner,  
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TRS-80  
Model III

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Model III, PMC-80, LNW80

Harry Avant, La Crescenta, CA

The MTI C/140 is described by Microcomputer Technology, Incorporated as "... an exciting new personal and small business computer that is both CP/M and TRSDOS compatible." Features include CP/M 2.2 compatibility, 80 x 24 display, four-megahertz speed up, and full compatibility with TRSDOS software. A built-in diagnostic and monitor are also included. A well documented BASIC program is included with the computer that gives detailed instructions for using 80 x 24 with DOSPLUS.

MTI supplied a system for purposes of evaluation, equipped with two forty-track drives (Tandon), a CP/M board, an 80 x 24 display board, an external 7.5-megabyte hard disk (Tandon), DOSPLUS 3.3 and 4.0, CP/M 2.209, WordStar 3.0, and manuals.

List price for all of the above based on the MTI catalog is:

Model III plus C/140	\$2959
Winchester/E 7.5	2999
DOSPLUS 4.0	299
CP/M hard disk	
Enhancement	149
CP/M 2.2	no charge
DOSPLUS 3.3	no charge
WordStar 3.0	495
Total System Cost	\$6901

### CP/M Compatibility

The thing that sets the C/140 apart from a Model III is the addition of a board that will allow the computer to run under CP/M and an 80 x 24 video display. CP/M is a disk operating system developed by Digital Research Corporation that dates back to 1973. Originally

the operating system was developed for 8080 microcomputer systems. During the past several years CP/M has undergone several revisions and enhancements, and today it is considered to be the "standard" operating system for 8080, 8085 and Z80 based systems.

### CP/M and 80 Column Board

Included with the two boards are very good instructions for installing them. The only thing to watch out for is during removal of the Model III's top cover. Make sure that you have plenty of room on the left side and remember that the video wires are very short.

MTI refers to the CP/M board as the Compactor I. This board plugs into the Z80 socket on the Model III's main board. When installed it allows the computer to either run standard TRSDOS type software or CP/M. In the case of the CP/M the Compactor reconfigures memory by removing the Read Only Memory (ROM) from the addressing of the Z80. Next the top 48K of Random Access Memory (RAM) at addresses 4000-FFFF hex are relocated to 0000-BFFF hex. This provides 49151 bytes of RAM for the basic CP/M system to use. Next the video display RAM and keyboard tables are moved from 3800-3FFF hex to F800-FFFF hex. Then the Compactor ROM is loaded into locations C000-CFFF hex. Locations D000-F7FF hex are not used. It is too bad they aren't, as the extra 10239 bytes would be very useful with WordStar.

When the Compactor has finished the above, which takes about two seconds, a sign-on message appears,

which indicates the CP/M software was implemented by Hurricane Labs.

The sign-on asks you to either insert a CP/M or TRS disk or press one of the following keys:

D for system diagnostics  
M for monitor  
Break to enter TRS non-disk BASIC.

The diagnostics are a nice feature incorporated into the Compactor. Ten different commands are available.

1. An automatic test mode which performs a memory test, video test, checksum test, and a display of characters test. I ran this test for twenty-four hours non-stop and no errors were indicated.

2. A test of the Compactor read only memory by use of checksums.

3. A drive select, used in conjunction with tests for drive speed.

4. Keyboard test to verify that all keys are sending correct values.

5. Display the floppy disk controllers registers. This also includes a test of the floppy disk controller.

6. A random memory test for the system memory.

7. A moving display of the character set across the video.

8. Test of video memory.

9. Drive speed test. When used with number three (above) allows you to verify that the drives are running at correct speed. This is a real nice feature and it sure beats paying \$25 for one of the drive speed test software packages.

10. Video character set display,

shows all of the characters available.

If "M" is entered in response to the sign-on message the monitor mode is entered. "L" is a command in the monitor that gives a six-line by thirty-two-character hex display of memory contents. For example, if CE25L is entered while in monitor mode, the hex display and result ASCII code for the start of the sign-on message will be shown on the screen. A "/" command shows the memory contents of the location specified, i.e., 10/ will display the contents of memory location 10 decimal.

CP/M implementation on the MTI C/140 is excellent, except for the limited memory. (After this review was completed MTI announced a new memory board that has a full 64K of RAM.) All of the standard CP/M utilities are supplied. In addition, version 2.209 has some unique files.

First is 80.COM which is used to switch-in the 80 x 24 display. In order to get back to a 64 x 16 display 64.COM is used. CONFIG.COM is a

menu-driven program to modify the drive configuration, i.e., number of tracks, step rate and number of sides. It also will configure the RS-232 port. HFORMAT.COM and HCONFIG.COM are used to format the hard disk and establish the track count, number of surfaces and other parameters needed for setting up the hard disk.

CP/M requires the use of some keys that are not found on a standard Model III keyboard, such as an escape key, control key, brackets and backslash. Under CP/M the keyboard is remapped to generate these keys. For example, the break key becomes escape, downarrow serves as a control key and shift break becomes a backslash. These changes are documented in the Compactor operating instructions.

Information about the floppies derived from STAT DSK: indicates the following: Each drive has 1520 x 128 bytes or a total of 194560 bytes available to the user. In addition there are two tracks reserved for system use. The minimum block size

is two kilobytes. This means that the smallest allocation of space on the floppy is 2048 bytes.

CP/M programs are noted for using a lot of disk space, but with the MTI configuration this should not present any problem. The version of WordStar supplied with this machine had on one disk: a 64 x 16 version, an 80 x 24 version, the install program, WordStar example program, and still had 30 kilobytes of free space.

### DOSPLUS Hard Disk Operating System

As noted above, a 7.5-megabyte hard disk was supplied as part of the system. As I had requested, this was an external disk, although several different hard disks can be supplied in place of the upper floppy drive.

I first checked out the hard disk using DOSPLUS 4.0. When formatted, the hard disk indicates 7280K bytes of free space. A 5¼-inch floppy formatted under the same DOS indicates 180K free bytes. At first blush, it would appear that the hard disk will hold 7280/180 or the

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equivalent of 40.44 floppy disks! However, there is a "gotcha" in all of this. The hard disk has 910 grans of free space. If bytes are divided by number of grans, we see that each gran is eight kilobytes long. This means that the minimum allocation on the hard disk will be 8192 bytes. A program such as Scrispit, which is about 10.5K bytes long, will occupy 16K bytes of space on the hard disk. This is not a problem with the hard disk but is a problem with the DOSPLUS 4.0 operating system. As noted in the DOSPLUS manual, a five-megabyte disk will have each gran just over 5K bytes long.

Although a great deal of information can be stored on the hard disk, gran size is something that disk manufacturers and disk operating system writers usually don't discuss in their sales literature. When considering purchase of a hard disk, the buyer should look into this to determine if he is really getting the usable space he thinks he is. Another factor is cost per megabyte. The five-megabyte disk by MTI has a list price of \$2499 or \$499 per megabyte. The 7.5-megabyte disk sells for \$2999 list or \$399.86 per megabyte. A ten-megabyte hard disk sold by MTI has a list of \$3499 or \$349.90 per megabyte.

Something that cannot be equated to cost is the incredible speed of a hard disk. A twenty-four-kilobyte program loads instantly. There is no delay. One can really get spoiled with this speed.

A very nice feature of DOSPLUS 4.0 is the ability to place the entire operating system on the hard disk. When this is done, the floppy disk in drive zero is used to boot the computer only. After booting, all commands that normally would be handled by the disk operating system on drive zero are now performed by the system on the hard disk. The difference in speed of the system when it is accessed from the hard disk is awesome.

A problem with DOSPLUS 4.0 is the lack of a wild card for directory or catalog functions. With 200 to 300 programs on a hard disk, locating the name of a particular one from the directory is nearly impossible. (MTI has recently announced a newer version of DOSPLUS (4.0A1)

which does have a wild card feature and a command called ACAT, which gives an alphabetical listing.)

### CP/M Hard Disk Operating System

The HCONFIG program provided with the evaluation machine was evidently preset for a five-megabyte hard disk. At any rate, when I ran it, no prompts appeared and control was returned in a second or two. I formatted the hard disk using HFORMAT.COM, which resulted in an indication that the disk had been formatted so that 4864K of space was available. I do not know if HCONFIG was supposed to ask for hard disk parameters or not.

If this had been a five-megabyte hard disk, the following parameters would apply. The directory would hold 512 entries and minimum disk allocation space would be 8K bytes, the same as for DOSPLUS. In the case of CP/M, this rather large size would not present the same problem as under DOSPLUS, due to the large size of most CP/M application files. For example, WordStar is about 16K bytes long and requires two overlay files, one of 28K, the other of 34K bytes.

It is a joy using WordStar with the C/140 and a hard disk. Due to the limited memory in the C/140, using WordStar with floppy disks is not very effective. A disk I/O will occur after every few lines of text, either during text entry or scrolling. When WordStar is used with the hard disk, there is *no* apparent disk I/O! It happens so fast that it is impossible to tell when a disk access has been done.

### Video Problems

The computer supplied for evaluation suffered from two problems associated with the video display. First, the display was just not sharp, compared to my Model III. Horizontal components of the characters exhibited noticeable blooming and the single-dot components were very fuzzy. Attempting to use the 80 x 24 column display was very hard on the eyes. Similar models in the MTI showroom did not exhibit this problem, so I guess the focus had not been properly set prior to shipment. The second problem was the

noticeable video movement that occurred during floppy disk activity. Either the power supply was marginal in capacity or inadequate filtering had been used. A computer with this much potential deserves a better video. After this article was prepared, MTI announced that a P31 green phosphor tube could be installed for an additional charge.

### Heat Buildup

Something that always concerns me with the addition of internal accessories is a build up of heat due to the extra load. When I first brought the C/140 in for evaluation, I set it up next to a stock Model III equipped with two drives. I inserted matched thermometers into the number one drive of each machine and turned them both on. After a little over an hour, the stock Model III indicated 38 degrees C, and the C/140 was 40 degrees C. Evidently, MTI has done a very good job handling extra heat generated by the two additional boards.

The MTI C/140 is a powerful computer, or perhaps it should be called a powerful pair of computers. It is really two computers in one. CP/M has been implemented quite well in this machine. There is one rather strong drawback. There is just not enough memory (45K) to run many CP/M programs. MTI should have an additional memory board for the C/140 by the time this article is published.

Another thing that is really needed with the C/140 is a terminal program used with the RS-232 port to allow transfer of programs from another computer. The disk format used by the C/140 is not CP/M standard and there is no assurance that all of the software a buyer might want is available in this format. In fairness to MTI, it should be noted that there is *no* standard disk format for the 5¼-inch floppy disk.

DOSPLUS 3.3 is supplied with the C/140 at no charge. I would think that DOSPLUS 3.4 would be a better choice. It has several useful features not included in 3.3. I tried DOSPLUS 3.3 and 3.4, TRSDOS 1.3, NEWDOS/80 and LDOS with the MTI C/140, and all worked fine. However, using the hard disk does require DOSPLUS 4.0 or a driver for

NEWDOS or LDOS.

A very useful addition to the software packaged with the C/140 would be an alteration of DOSPLUS and CP/M to allow them to share a hard disk. For example, DOSPLUS could, perhaps, format one-half of the disk and CP/M the other half. Another useful software package would be a utility that allowed the transfer of TRSDOS files to CP/M and vice versa. Omikron has a very nice utility supplied with their CP/M board to convert TRSDOS files, and Misosys supplies a very versatile utility for converting a CP/M file over to LDOS. Due to different CP/M formats involved, neither of these programs will work with the MTI version of CP/M.

During the testing of the C/140, I plugged it into a wall outlet that is unusable with my own computers because of voltage fluctuations. I did not experience any low voltage problems with the computer or the hard disk. The only time I turned the power off on either device for the first couple of weeks was when it was necessary to move them to

different parts of the room. Turning the hard disk on or off while the computer was running, and turning the computer off while the hard disk was on, did not have any effect. I went to a fair amount of trouble trying to get one or the other to malfunction but without success. I never did have any rebooting or random resets with the C/140 during the month I had it for evaluation. The C/140 and its hard disk are rock solid.

The only real problem I had with the C/140 during evaluation was trying to figure out some way to convince MTI that I should be allowed to keep the hard disk for a couple of years for an extended test. By now, you should be aware that I have flipped over the 7.5-megabyte and the disk I/O speed.

Looking back at the list price of the C/140, in the configuration I tested, raises the question, "Is it worth it?" It is true that \$6901 is a lot of money, but the C/140 and 7.5-megabyte hard disk make for a lot of computing power. A stock Model III with 48K of memory and two disk

drives sells for about \$2200. A bottom-end CP/M system with two drives would cost at least \$3000. Current prices for a 7.5-megabyte hard disk may be as low as \$2600. A two-computer setup similar to the CP/M would sell for about \$7800 plus software — at least \$900 more than the MTI.

*Ed. note: Mr. Avant's article was sent to MTI for comment. Here is their response.*

Dear Mr. Avant:

I appreciate the opportunity to review your evaluation of the system we lent you. I would like to take advantage of this opportunity to address several points in your article. I shall attempt to itemize these by area within your article for reference purposes.

**Overview**

Our instructions give details for using the 80 x 24 board with DOSPLUS only, not with a TRSDOS-type operating system. It is important that the user understand that this board will only operate with CP/M automatically,



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or DOSPLUS if addressed. We do not support *any* other operating system. The system supplied contained DOSPLUS 3.4 and DOSPLUS 4.0A. These distinctions are important, as we will see later in the area of examining the operating system itself.

**CP/M and 80-Col. Board**

The version you would see on the screen at bootup is 2.2, if you insert a CP/M diskette. The version 1.0 visible on the screen refers to the compactor. Perhaps clearer documentation is needed.

**DOSPLUS Hard Disk Operating System**

The version of this system you had was 4.0A. Since the time of this evaluation, a new version has come out known as 4.0A1. This version allows one to partition the disks into pseudo drives. This is a fine feature in several respects. It allows you to backup one-half of the disk to the other half. Secondly (we have not thoroughly tested this), it appears that we can, by partitioning, run both CP/M and DOSPLUS on the same disk. An additional feature is the ACAT command, which gives you an alphabetical listing of the directory (very useful when you have one hundred or more entries). The ACAT command also allows you to use wild cards in sorting.

As far as the allocation of grans and the size of the bytes per gran,

although I do not pretend to be a programmer, I do know that when all else fails... read the instructions. They do contain the necessary elements to change the CONFIG to allocate different bytes per gran and different grans per track. I do know that you cannot allocate a specific number of bytes, but you can limit the problem that you are addressing.

**Video Problems**

The video monitor is a standard Radio Shack monitor and they do have variations inherent in design and manufacture. As I demonstrated to you when you returned the machine, there is a focus control on the video board that simply requires turning a trim pot to sharpen the screen. The 80 x 24 board has no effect on the video, other than a general shrinking of the horizontal format size in order to allow for the number of lines (twenty-four) involved. We do realize that a problem exists with the large power supply we use in this machine, but corrections are on the way. Our engineering department has determined the difficulty and has worked with the manufacturer to correct this problem. Future versions should not show the movement that you refer to.

We do have available catalog #1316 green CRT and catalog #1315 white cabinet as extra cost options for anyone who wishes to dress up his machine.

All of our dealers are required to purchase a service kit. Two of the items in this kit are the CP/M transfer diskettes (Model II and Model III) and the CP/M transfer cable to link the two machines together.

In regard to standard format, the new CX machine, containing 64K RAM, etc., which we just introduced at Comdex Spring, contains the following formats for drive one, all of which are operator selectable: Xerox, Osborn, Cromemco, Omikron, Lifeboat and Eagle.

We are developing other standard formats at present and will also have these available to run on the 48K version. DOSPLUS 3.3 is provided because we have a license agreement to use it and for the average end-user it is a better DOS. We do have an optional upgrade to 3.4 if desired.

I hope that these comments have corrected some of the shortcomings you may have felt were existent in our machine. MTI is proud of its products and values its good name. We will do what is necessary to make our many customers happy. Thank you for the time and effort you put in on this article.

Sincerely,  
Paul S. Gans

Director of Marketing, Microcomputer Technology, Inc., 3304 W. MacArthur, Santa Ana, CA 92704, (714) 979-9923, TWX 910-595-1902  
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```

10 CLS
20 FOR X=0 TO 127
30 SET(X, 0):SET (X,47)
40 NEXT
50 FOR Y=1 TO 46
60 SET(0, Y):SET (127,Y)
70 NEXT
80 FOR X=108 TO 124
90 SET(X, 2):SET (X,11)
100 NEXT
110 FOR Y=3 TO 10
120 SET(108, Y): SET (109,Y)
130 SET(123, Y): SET (124,Y)
140 NEXT
150 FOR X=109 TO 124 STEP 3
160 SET(X-1, 12)
170 NEXT
180 FOR Y=3 TO 11 STEP 2
190 SET(107, Y):SET(125,Y-1)
200 NEXT
210 PRINT @ 122,"15";
220 POKE 15484, 67
230 POKE 15479, 168
240 POKE 15480, 172
250 POKE 15481, 180
260 PRINT @ 184, CHR$(174)CHR$(187)CHR$(
187)CHR$(189);
270 FOR X=113 TO 118
280 SET(X, 9)
290 NEXT
300 FOR X=115 TO 117
310 SET(X, 10)
320 NEXT
330 PRINT @ 68,"THE REINDEER" @ 132,"% 8
0-US JOURNAL";@ 198,"TACOMA, WA";
340 PRINT @ 700,"AIR MAIL";
350 FOR X=24 TO 39
360 SET(X, 39)
370 NEXT
380 FOR X=78 TO 85
390 SET(X, 3)
400 NEXT
410 SET(86, 4): SET (87,4)
420 SET(88, 5): SET (88,6)
430 SET(87, 7)
440 FOR X=86 TO 78 STEP -1
450 SET(X, 8)
460 NEXT
470 SET(77, 7): SET(76,7)
480 SET(76, 6):SET(76,5)
490 SET(77, 4)

```

```

500 FOR X=90 TO 104
510 SET(X, 4): SET(X,7)
520 NEXT
530 PRINT @ 612,"TO:" @ 678,"Y O U";@ 33
7,"H A N D L E W I T H C A R E";@ 401,
"C H R I S T M A S C A R D E N C L O S
E D";:PRINT@862,"PRESS <ENTER> TO OPEN"
;
540 IF INKEY$ ="" THEN 540
550 CLS
560 F=-1
570 L=7
580 PRINT"FROM BOB, CAM, CATHY, DON, EVA
, KRISTI,"
590 PRINT"MIKE, SHERRY, JIM, SPENCER, TE
RRY"
600 READ A
610 IF A=-2 THEN L=L+1: X=18: GOTO 600
620 IF A=-1 THEN 700
630 IF F=-1 THEN X=X+A ELSE FOR X1=X
TO X+A-1: SET(X1, L): NEXT: X=X+A
640 F=-F
650 GOTO 600
660 DATA-2, 23, 1,-2, 22, 2, 1, 1, 10, 1
,-2, 22, 3, 8, 1, 1, 2,-2, 23, 2, 8, 3,-
2, 23, 1, 9, 2, 2, 1,-2, 23, 1, 1, 1, 6,
2, 1, 2,-2, 22, 1, 1, 1, 6, 2,-2, 25, 1
, 1, 2, 1, 2,-2, 22, 13,-2, 23, 11, 50,
1,-2, 26, 5, 22, 2, 28, 2,-2, 26, 5, 21,
2, 27, 5,-2, 27, 3
665 DATA 21,3,28,4,-2,28,3,13,4,2,2,28,8
670 DATA-2, 28, 4, 3, 16, 30, 6,-2, 5, 1
, 22, 24, 26, 8,-2, 4, 4, 19, 24, 3, 2,
21, 12,-2
680 DATA 3, 4, 20, 30, 22, 8,-2, 4, 6, 1
6, 19, 2, 5, 5, 2, 16, 13,-2, 2, 7, 15,
13, 10, 9, 3, 2, 17, 8,-2, 0, 12, 9, 3,
3, 6, 15, 2, 6, 2, 16, 15,-2, 3, 5, 12,
1, 5, 5, 27, 1, 22, 2,-2, 1, 10, 9, 1, 3
, 3, 32, 1, 21, 2,-2, 0, 12, 7, 2, 2, 2,
34, 2, 20, 2, 2, 5
690 DATA 6, 11,-2, 5, 2, 13, 5,-2, 5, 2,
5, 8,-2, 4, 8,-2, 0, 4,-1
700 PRINT @ 913,"M E R R Y C H R I S T
M A S"
710 X=45:Y=17
720 FORB=1TO100:FORC=1TO30:RESET(X,Y):RE
SET(X+2,Y):NEXTC:SET(X,Y):SET(X+2,Y):FOR
D=1TO30:NEXTD:NEXTB
730 GOTO 720

```

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# MULTIDOS

## An extremely versatile operating system

Model I/III, PMC-80, LNWS80

Terry Kepner, Peterborough, NH

Cosmopolitan Electronics Corporation (P.O. Box 234, Plymouth, MI 48170 (313) 397-3126) has recently released MULTIDOS for the Model I and III, retailing for only \$99.95.

MULTIDOS is unique in that it can read and write all density disks, with only one exception. That is, if you have a double-density board, such as Percom's, you can read or write files in double-density mode and make backups of them, no matter whose double-density DOS you originally used. This is also true of single-density disks. The exception is that NEWDOS/80 disks can only be read, and NEWDOS/80, version 1.0, can be backed up only if the directory is exactly two granules in length. NEWDOS/80 version 2.0, for the Model III, cannot be backed up. If you want to use double-density disks on drive zero, you should order MULTIDOS on a double-density disk. MULTIDOS can read, write, or copy to and from, several Model III DOS diskettes (unfortunately, there is a problem in writing to NEWDOS/80 or TRSDOS).

You can control the number of tracks being used on the disk. For example, if your drives are 80-tracks, just backup the MULTIDOS disk from a 35-track drive to an 80-track drive. Voila, you have an 80-track DOS.

Outside of these unusual capabilities, MULTIDOS is quite similar to TRSDOS. Most of the library commands are similar to TRSDOS, but there are some new ones. You can perform a software computer reset, disable the BREAK

key, create and substitute a disk file for keyboard input (commonly called a DO file), set to zero all RAM locations from location 5200H to top of memory, or from 4000H to top of memory. You can customize the power-up stepping speed and density default values for the disk drives, set printer parameters (line width, lines per page, lines printed per page, and line spacing), set default conditions of the keyboard (lowercase and graphics drivers, repeating keyboard, CLEAR key disable, blinking cursor), and the character used for the cursor can be altered. You may link the printer to the video display, or vice versa (anything sent to one goes to both), redirect printer output to the video or vice versa, and reserve high memory in DOS for programs and/or data. (*Whew!*)

MULTIDOS's system utilities include the standard three (backup, copy and format), adapted to multiple track and single or double density operation, plus these other utilities:

1) Radio Shack's tape-based editor/assembler, as adapted by Apparat for disk I/O, and further adapted by CEC to MULTIDOS, adds (among other things) commands to view the directory and to copy or kill files. Because CEC didn't write this utility, documentation is supplied only for the commands that were added.

2) A graphics utility which uses the keyboard to generate graphics characters with single keystrokes.

3) A utility to locate one- or two-byte machine language codes in

memory.

4) A print-spooler which lets the computer operate at full speed without waiting for the printer to finish printing each line of data.

5) A "master" disk file manipulator, that copies files in batches, performs batch file purges, prints the disk directory (just the right size to tape to the diskette's envelope), and executes a program. Protection attributes in the directory are ignored, so you can use VFU to copy *any* file, which provides a handy method of customizing your DOS.

There are actually two versions of BASIC on the MULTIDOS diskette. The first is SUPERBASIC, which gives you "single keystroke commands" and "single letter commands" (a total of fourteen commands).

In addition, via the command CMD" ", you have access to more functions. Obtain automatic program space and linefeed elimination, (if they are not in quoted text), data statements, or REM statements. Redisplay the last disk I/O error code message. Zero arrays or delete them. Duplicate lines and move them. Open an additional disk file buffer from BASIC. You have a built-in machine language sort and a listing of all the scalar variables used by your program. There is the ability to transfer the resident disk BASIC program down to Level II BASIC, execute or edit it, and return to disk BASIC with the program and variables intact. This feature will be indispensable for people who



develop software for Level II machines. You can execute any MULTIDOS function from SUPER-BASIC, including SUPERBASIC, again.

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The other BASIC, called BBASIC, supports all of the features of SUPERBASIC, plus powerful TRACE features. You can single step each instruction, single step each BASIC line, single step with times wait, trace to video, trace to the printer, and review the values of selected variables on demand. These features can be turned on and off from within your programs.

The eighty-five-page manual is not for the beginner. It is thorough, but assumes that the reader is familiar with operating systems and their commands.

MULTIDOS supports data files with logical record lengths other than 1 and 256. This eliminates the need for subrecords, or wasted disk space.

MULTIDOS is a powerful system for developing BASIC programs. To my knowledge, no other DOS supplies a BASIC with so many helpful features for the programmer. ■

*MULTIDOS has just been released in an upgraded version that now includes utilities such as Easy Zap, TAPE/CMD for conversion of machine language to disk, and DDT/CMD for disk drive timing. — Ed.*

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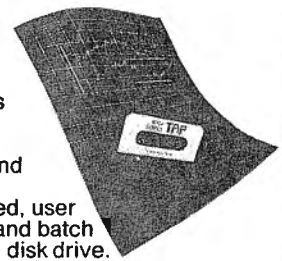
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# USRful patch

## *Have unlimited USR calls*

Model I/III, PMC-80, LNW80, no disks

Charles C. Edwards, Jacksonville, FL

Faster than a speeding GOSUB, more powerful than a Shell sort, able to leap through K of RAM in a single JP. Is it BASIC? Is it TRSDOS? No, it's assembly language. However, those of us who have tried to merge machine code with our BASIC programs have had to face the annoyance of having only one USR call available in Level II BASIC. Have you long envied those disk owners with their ten USR calls? Well, this article will describe an extremely small (twelve bytes) enhancement to Level II which will provide an unlimited number of USR calls. As a bonus, you will no longer have to POKE the address of your subroutine into memory before calling it.

First, let's examine how disk systems manage to implement their ten USR calls, and we will see how we can use the same method to our advantage. When the Level II interpreter encounters the token "USR," it branches to ROM address 27FEH to begin processing the statement. Once there, the first thing it does is call address 41A9H. Under Level II, this location contains a RET instruction, so we simply return to the caller and continue processing. Most DOSs alter this into a jump instruction, which transfers control to a piece of code in the DOS, which implements the multiple USR calls.

For this reason, 41A9H is called a "DOS." That is just a fancy way of saying that this is a point at which ROM processing can be intercepted in order to change the normal flow of logic. Well, if a DOS can intercept the interpreter at this point, so can we! Listing 1 is the complete patch which will implement infinite USR calls.

Listing 1

```
41A9      JP      USR      ;BRANCH TO THE PATCH
          USR      CALL 1E5BH ;GET THE ADDRESS, IF
                                ANY
          DEC     HL      ;BACK UP POINTER
          LD      A,D     ;SEE IF ADDRESS IS ZERO
          OR      E
          RET     Z       ;USR CALL WITH NO
                                ADDRESS
          LD      (408EH),DE ;STORE THE ADDRESS
          RET
```

You will notice that, with the exception of address 41A9, I have not provided any addresses with the listing. I did this to emphasize the fact that this code is completely relocatable. You can put it at the top of memory, or after any other routines (printer driver, etc.)

which you normally load. After loading this, you can invoke a machine language subroutine by entering, in BASIC: X=USRn(Y), where n is the address (in decimal) of the routine. For example, a common BASIC subroutine suspends processing until a key is depressed.

Listing 2 shows two methods of doing this. The first example is the typical BASIC coding. The second uses a ROM routine at decimal 73 (hex 49) to wait for a key to be hit. Of course, we don't know which key was pressed, as we do with INKEY\$. For the purposes of the example, we are assuming that we don't care.

Listing 2

```
1  REM THIS IS HOW WE WOULD NORMALLY
   DELAY IN BASIC

10  PRINT "HIT ANY KEY TO CONTINUE":GOSUB
   200

200 I$=INKEY$:IF I$="" THEN 200 ELSE RETURN

1  REM THIS IS HOW TO DO IT USING A ROM
   ROUTINE

10  PRINT "HIT ANY KEY TO CONTINUE"
   :X=USR73(Y)
```

Let's look at Listing 1 in detail. After intercepting the interpreter at the beginning of USR processing, the HL register points at the byte OC1H, which is the internal representation of the token "USR" in Level II. We call the ROM routine at 1E5BH, which will convert the ASCII number following the USR command into the binary equivalent and return the result in the DE register. If the number is omitted, the DE register will contain zero. A side effect of this routine is that HL will now point to the character following the address, which should be the "(" So, the next thing we must do is back up HL to the preceding character.

We must check if the result in DE is zero. If so, we will return to USR processing and resume the normal program flow. Otherwise, we load 408EH with the address specified and return to the ROM routine. 408EH is the location where the address of the USR routine is normally POKEd. This will cause us to branch to that

## USRful patch

location.

The beauty of this routine is that it retains the ability to pass a parameter to the subroutine. Other published methods to implement multiple USR calls usually use the parameter to pass the address of the routine to be called, whereas, my method is much easier to implement. I am surprised that it is not standard practice in most DOSs. For those of you without assembler, Listing 3 is a short BASIC program which will POKE this routine into memory for you. Simply change the value of "I" in line 10 to point to the address at which you want the code to begin.

### Listing 3

```
10 I=65524:I1%=I/256:I2%=I-I1%*256
20 POKE 16809,195:POKE 16810,I2%:POKE 16811,I1%
30 FOR J=I TO I+11:READ X:POKE J+65536*(J>327
67),X:NEXT
40 DATA 205,91,30,43,122,179,200,237,83,142,64,201
```

The next time your friend with his fancy-schmancy disk drive brags about all of the great features his DOS gives him, you can knock his socks off with more USR calls than he can shake a diskette at! ■

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# Driver education

## Using device control blocks and drivers

Model I/III, PMC-80, LNW80

Bob Bowker, Los Angeles, CA

With the availability of several new DOSs on the market for the TRS-80 Models I and III, the subject of "compatibility" has become an important one: Will my TRSDOS programs run with LDOS, NEWDOS/80 or one of the others?

In the case of most application programs — accounting, database management, etc., whether BASIC or machine language — the answer is *yes*, as the new DOSs have, in general, tried to be upward compatible with TRSDOS.

"Upward compatible" is one of those buzzwords which too often get in the way; it simply means that TRSDOS programs should run on the new DOS, but programs written with the new DOS won't necessarily run on TRSDOS. None of this means that the DOSs are compatible with each other — for example, there's no guarantee that a BASIC program written on NEWDOS/80 will run on LDOS, or vice versa.

The fact that many programs will run with few changes (if any) on another DOS is due in no small part to the willingness of the new system authors to respect Randy Cook's format in the communications region. Starting with TRSDOS 1.0 on the Model I, the RAM from 4000H to 4200H was set aside for pointers, vectors and storage areas, which have been largely maintained in the versions of TRSDOS released since, and in the new DOSs.

The first twenty-one bytes from 4000H to 4014H are vectors for seven RST instructions. For example, when the Z80 encounters an RST 28H, control is transferred first to 0028H in the ROM, where a JUMP 400CH vectors the program into the DOS communications area. There, another JUMP will vector the

program to the DOS code which will execute the RST 40H commands. In the absence of a DOS, there will be a RET instruction at 400CH, sending control back to the ROM to handle things.

The next twenty-four bytes, from 4015H to 402CH, make up the DEVICE CONTROL BLOCKS — in effect, they contain all the information anyone needs to know about the keyboard, display and printer. Each of these devices is assigned an eight-byte block of RAM in which to store various codes, addresses and parameters. All of the DCBs are constructed as follows:

Rel Byte
0 — Device Type
1 — LSB of Driver Address
2 — MSB of Driver Address
3 — Device Parameter Storage byte 1
4 — Device Parameter Storage byte 2
5 — Device Parameter Storage byte 3
6 — Device Name byte #1
7 — Device Name byte #2

This format is followed in TRSDOS 1.0 through 2.3B, NEWDOS+, NEWDOS/80, LDOS, DOSPLUS, and so on: they make a very necessary contribution to compatibility.

The three DCBs for the keyboard, display and printer are maintained in the communications region at these addresses:

Keyboard DCB	... 4015H-401CH
Display DCB	..... 401DH-4024H
Printer DCB	..... 4025H-402CH

### Device Type

The first byte of every DCB is a flag which defines the directions of communication which that device supports. Only three of the eight bits available in this one byte are used consistently by all DOSs: if bit two is set, the device is capable of handling requests containing control codes; if bit one is set, the computer can get information *from* the device; and if bit zero is set, the computer can send data *to* the device.

This is really not as complex as it sounds. For example, the keyboard: the computer can get data *from* it — that happens every time you hit a key — but the computer can't send either control codes or data *to* the keyboard, since that would be fruitless. Thus, the device type for the keyboard is 0000 0001, or 01H.

Similarly, the display can handle control code requests (set bit two), the computer can send data *to* it (set bit one), and can receive data back *from* it (set bit zero). Thus, its type code is 0000 0111, or 07H. A line printer's type code is 06H, since it's capable of two-way communications with the computer but can't handle control code requests.

The rest of the bits in this device type flag are used for other parameters by LDOS, for instance, but there's no standard for them among all systems. Of all the systems on the market today, LDOS seems to be the most advanced; it carries the DCB concept to extremes, assigning one each to any number of devices, all of which are user-definable. In LDOS, we're finally seeing Randy Cook's ideas working properly, and well.

### Driver Address

Relative bytes one and two of

every DCB contain the address of the device's driver, in standard Z80 reverse notation. A driver is really nothing more than the subroutine which controls that device. A driver for each of the three devices is provided in ROM:

Keyboard Driver .... 03E3H-0457H  
 Display Driver ..... 0458H-058CH  
 Printer Driver ..... 058DH-05D8H

Each of the devices is handled by using its driver subroutine. For instance, to send a byte to the printer, load it in the C register and CALL 058DH.

This is the opening we need to customize the TRS-80 — write your own driver, or portions of one, and stuff *that* address in the DCB of the appropriate device. When an operation uses that device, your routine will be in control. This way, you can change all zeroes going to the printer into slash/zeroes, or add a linefeed to every carriage return, or activate the lowercase characters in

the Model I, or convert your "QWERTY" keyboard into a "DVORAK" keyboard, and so on — the possibilities are endless.

Let's take one example, converting all zeroes headed for the printer into slash/zeroes. This one is simple — you don't have to write a complete driver, just intercept all printer commands to check for a zero. Should the character about to be printed not be a zero, send the program on its way to the existing driver and hardly a step has been missed. If it is a zero, however, we'll go to work ourselves. The code in Listing 1 will do just that.

Step 1: The contents of the C register are transferred to the A register to be compared with 30H (hex for 0); if it's anything else, the Z flag will not be set, and a JUMP will take place to the LPRDVR: carry on, folks. However, if it is a zero, the Z flag will be set, and the JP will not take place.

Step 2: Print the zero, but don't give up control yet: make sure the LPRDVR returns things to us and

not to the caller. We can do that by CALLING the LPRDVR ourselves.

Step 3: Once the zero is on paper, we have to move the print head back one space, to "overstrike" the slash. If we were to try to use LPRDVR to do this, we'd be in trouble: the ROM printer routine ignores such control codes by masking them out (remember the printer device type — 06H means no control code requests can be handled). So we'll have to bypass LPRDVR and do the backspace ourselves, by loading the 08H directly into the printer's memory mapped location.

Step 4: All that's left is to print the slash itself, which we load in the C register. Since we're finished now, we'll let LPRDVR take it away this time — we JUMP to it, and when in turn it's done, control will be passed back to the original program.

We now have a "trap," but we need to set it in place, and activate it. Since the system already has a LPRDVR, and not necessarily ROM's driver, we'll need to incorporate the existing address in

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our program. Also, to be really professional about this, we should relocate our subroutine into high memory, and protect it.

The first thing INIT does is get the current LPRDVR address, and load it into our code at the three spots we use it. Next, the address of the first available location in upper memory is loaded into DE (the DEstination). HL is loaded with the address of the last byte in our code, and BC (the ByteCount) is loaded with the length of our code. The command LDDR moves those bytes, one at a time, in reverse order.

The next task is to "protect" our code. The LDDR instruction leaves DE pointing to the location just ahead of our code, so storing that address in 4049H, the high memory pointer, will do the trick. Bump DE to point to the first actual byte of our code, store it in the printer's DCB, and we're done.

### Parameter Storage

The three bytes in the middle of each DCB are available to the driver

to store various parameters, values, counters, etc. In the case of the printer DCB, for instance, parameter byte one contains the number of lines per page, and byte two has the current line number.

In passing: this explains why in many cases the printer, under TRSDOS, will "creep" down the page, starting each page one line lower than the previous page: TRSDOS initializes the printer DCB byte #3 to sixty-seven lines per page, when eleven-inch paper allows only sixty-six lines. There's a practical application: write a program to stuff a 42H there, and you'll get rid of the creep!

In the case of the display DCB, the current screen address of the cursor is stored (in reverse notation) in relative bytes three and four, and the cursor character is stored in byte

five.

### Device Name

The final two bytes of each DCB contain a mnemonic for the device name: KI for keyboard (Keyboard Input), DO for the display (Display Output) and PR for the printer (Print).

This concept is carried several steps further by LDOS, which allows for several DCBs beyond the standard three. In the case of the extra DCBs, the device can be named anything you want: CL for Comm Line, SP for Serial Printer or LP for Light Pencil. In operation, these DCBs can handle any device you assign to it — even fictitious or non-existent devices.

### Filters, etc.

To be precise, the program in

### Listing 1

	00100	DRIVER	LD	A,C	;get character into A register
	00110		CP	30H	;is it a zero?

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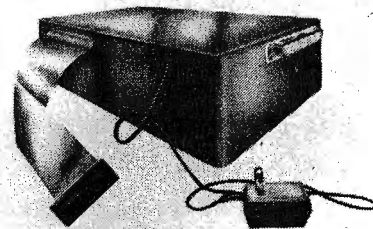
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# 28

Listing 1 should not be called a driver, but a *filter*: it's a subroutine which filters input to or from a device before the driver gets its hands on it. A routine which converts the "QWERTY" keyboard to "DVORAK" is a driver, while the code to add a LF to all CRs is a filter.

Using a filter, it is possible to assign special meanings to certain combinations of keys on the keyboard: that's how the JKL screen-print option was first instituted, and NEWDOS makes entry into MINI-DOS. It's not too difficult, for instance, to use the 4, 5 and 6 keys, when pressed simultaneously, to enter a subroutine which sends special codes to your printer (change type size, skip a line, start underlining, etc.) — just trap the keyboard driver, checking for a 70H in the A register.

One final idea: you could write a filter for the keyboard driver which would send all bytes to the printer first, then to the keyboard. Instant typewriter!

00120	SPOT1	JP	NZ,LPRDVR	; pass if not . . .
00130	SPOT2	CALL	LPRDVR	;print the zero
00140		LD	A,08H	;08H is a "backspace"
00150		LD	(37E8H),A	; and stuff it
00160		LD	A,2FH	;2FH is a "slash"
00170		LD	C,A	;get it into the C register
00180	SPOT3	JP	LPRDVR	; and go back to work.

Listing 2 — INIT to Driver

00190	INIT	LD	HL,(4026H)	;get current LPRDVR
00200		LD	(SPOT1+1),HL	; and stuff that address
00210		LD	(SPOT2+1),HL	; into the 3 places we
00220		LD	(SPOT3+1),HL	; need it ourselves
00230		LD	HL,INIT-1	;point to end-of-code
00240		LD	DE,(4049H)	;point to top-of-memory
00250		LD	BC,INIT-DRIVER	;load up length of DRIVER
00260		LDDR		; and move the code
00270		LD	(4049H),DE	;store new top-of-memory
00280		INC	DE	;point to DRIVER
00290		LD	(4026H),DE	; and store that address
00300		JP	402DH	;all done.
00310		END	INIT ■	

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# Pocket adventure

## *A real-time spoof*

Pocket Computer

Robert D. Miller, Hopewell, VA

"You are in an empty room that will blow up in five minutes unless you can get out!! A window faces east. Open doors face west and north."

Sound familiar? If you've ever played one of the dozens of adventure games on a computer, large or small, then you know that these words announce the challenge of yet another adventure. What's so great about another adventure? Well, this one just happens to be written for the TRS-80 Pocket Computer (PC-1)! So now all of you Pocket Computer owners can get out and rub shoulders with the micro, mini and mainframe computer adventurers!

Actually, with the memory limitations of the PC-1, it is unlikely that a serious challenge for adventurers could be written. This program, which occupies every single byte of program memory, is actually a good natured tongue-in-cheek poke at the adventure programs written for larger computers. Although there is a surprise or two in store for the game player, the primary intent is just to have a little fun. With all due respect (and apologies, as necessary) to Crowther, Woods and Adams, whose ideas I have built upon, I present for your consideration and enjoyment a "Pocket Adventure!"

Key in the program exactly as listed. When you are through, press MEM to ensure that there are zero steps and zero memories remaining. Put the PC-1 in RUN mode and RUN the program. As is traditional with most adventure type programs, only limited instructions are provided. They are as follows:

1. Use only one word to describe the direction you wish to go.
2. You may use the whole word or just the first letter.
3. Quarter points of the compass (NE, NW, SE, SW) are ineffective.
4. There *is* a solution.

The program is written in such a fashion that if you successfully complete the adventure or fail to escape the

room before time expires, you can restart the game by pressing ENTER.

This program utilizes some of the advanced features of the Pocket Computer. Line 10, for example, loads the program's "vocabulary" in variables A\$ through L\$, yet these same values are accessed using a subscript technique in lines 80 and 90. As most PC-1 owners realize, two variable access techniques can be used interchangeably. In other words, A\$(1) refers to the same memory location as A\$, A\$(2) is B\$, A\$(3) is C\$, etc. In line 10, I chose to assign the values using A\$ through L\$ because each assignment takes three less characters of program memory than if subscripts were used. Lines 80 and 90, on the other hand, use subscripts so that a loop procedure can access the vocabulary values.

Also in line 10, the variable N is used to store the number of "minutes" (chances) remaining. M\$ is used to store the letter "S," which is used to make the word "minute" plural in lines 60 and 600 when there is more than one minute remaining. As soon as the minutes (N) reduce to 1, the value of M\$ is made null (line 35).

Another advanced feature of the PC-1 is the ability to GOTO a line number contained in a variable. Lines 80 and 90 use this technique to send the program to a calculated location depending upon a proper match with an entry in the vocabulary list. Line 110 is used if the user enters a word that does not match any in the list.

Lines 200 through 710 contain the various routines used when there is a match between the user's response and an entry in the vocabulary list. All but one of the routines represent incorrect solutions and send the user back to line 30 for another try. The correct solution stops the program with the word "congratulations!!!!" Pressing ENTER at this point will restart the program.

Lines 900 and 910 are used when the "minutes" remaining reduce to zero (see line 30). The last thing displayed in this case are the words "the end." Again,



pressing ENTER at this point will restart the program.

Line 950 is a subroutine called from two locations in the program (lines 450 and 900). Its function is to take a word and have it move across the display in a "Times Square" fashion.

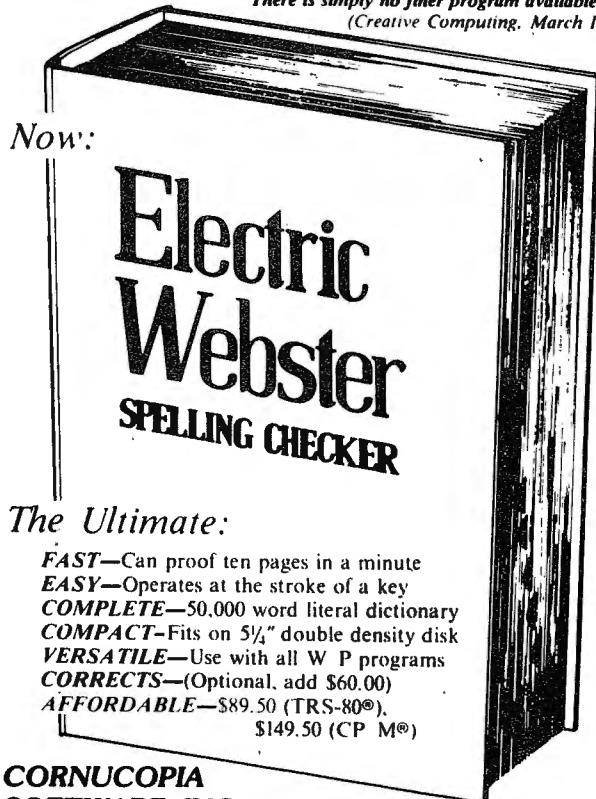
I realize that by entering a program of this type from a listing, one misses a lot of the impact they would normally have had from running the program without having seen it before. Even so, if you enter the program as written, without analyzing its content, I think you will find there are still a few surprises in store. Since the PC-1 is so portable, you can demonstrate the program to others quite easily and have fun observing their reactions. So, enter the program, enjoy it and remember that you've only got five minutes!

**Program Listing for  
Pocket Adventure**

```
10 :N=6:A$="EAST":B$="E":C$="WEST":D$="
W":E$="NORTH":F$="N":G$="SOUTH":H$="S"
20 :I$="UP":J$="U":K$="DOWN":L$="D":M$=
H$
30 :N=N-1:IFN=0THEN900
35 :IFN=1LET M$=""
40 :IF N<5PAUSE "TRY AGAIN!!"
50 :PAUSE"YOU ARE IN AN EMPTY ROOM":PAU
```

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- 6). DO ALL OF THE FOLLOWING ON VARIABLE LENGTH LINES->  
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GRAPHICS-PRINT-JUSTIFY TEXT-BUFFER/RESTORE TO SCREEN.  
UTILITIES INCLUDE-> MASK - AUTOMATIC PRINT# NUMBERS  
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# DOSPLUS 3.4 and 3.4D

*An operating system that makes compatibility easy*

Model I/III

Captain Paul M. Hine, San Diego, CA

The TRS-80 Model I owner can easily lay claim to a wider choice of operating systems and hardware configurations than for any computer system since the IBM System 360. The choices vary from the simple (TRSDOS 2.3 and OS-80) to the very complete (NEWDOS/80 version 2.0 from the folks at Apparat). In between have been the excellent products from LOBO and Microsystems Software, as well as NEWDOS-PLUS.

In their current offering, Microsystems Software has made worthwhile revisions to DOSPLUS 3.3, with enhancements to both the DOS and BASIC language portions of the package. The most marked change has been in documentation, which is now competitive with that offered by the finest software houses in the microcomputer support business. The least apparent change is one of adaptability to other systems designed to support hard disk systems on the TRS-80. Compatibility to eight inch floppy drives is also included if the system is configured with an appropriate drive controller.

I reviewed this new operating system using a Model I TRS-80 with an LNW expansion board, LNDOUBLER (to attain double density operation), and three disk drives. Drive zero was a 40-track (MPI B51), and both of the other drives were 80-track units (also MPI). Although DOSPLUS supports lower case modifications and automatically senses this installation, I didn't have one installed. A speedup installation can also be installed and the DOS will manage it to avoid I/O incompatibility.

All three drives were operated at six millisecond track stepping, and the 80-track drives were operated both as 80-track units and, with novel "track skipping", as 40-track drives.

Three distinct grades of floppys were used and the results were locked out during formatting. On premium floppys, no granule lock-outs occurred, proving that for 80-track, double density operation, you get pretty much what you pay for. During 75 hours of operation, three CRC errors happened, and all of these were on the economy floppys. This was cured by using the verify mode of DOSPLUS, which fought through the lower grade floppys without further lost data.

Earlier versions of DOSPLUS gained a reputation for reliability, ease of use and poor documentation. The whole documentation issue can be put to bed right away. The user's manual provided with DOSPLUS 3.4/4.0 is handsome, well written, well organized and *readable!* Some reference to Radio Shack's TRSDOS manual may be advisable, so don't throw that away if you purchase DOSPLUS. The assembly language buffs will be delighted with documentation for many calls to DOSPLUS routines. Some of these are understandable and handy for us BASIC language types to modify our little machine language modules and monitors. The printer driver is flexible enough to handle just about any ASCII serial or parallel printer, and even does the graphics conversions for EPSON owners. This DOS can do nearly anything

the others can, including:

1) Formatting from 20 to 96 cylinders (new word for track) on any drive in either single or double density.

2) Double stepping an 80-track drive to produce or read a 35- or 40-track floppy (you can change it back and forth by command from a BASIC program if you need to change disks).

3) Using any drive as either a double density or single density drive without making any changes in "system" or configuration files. Just put the disk in the drive and DOSPLUS selects the appropriate controller chip to run the show. Files from single density TRSDOS formatted disks can be "copied" directly to double density disks and vice versa!

Format is one of the long suits offered by DOSPLUS. During the format of cylinders (called that for compatibility of terminology with the dual-headed and hard disk crowd), the head is stepped toward the center as in TRSDOS and NEWDOS/80. When the innermost track is reached, the verification is done from inside-out. Aside from being quicker than TRSDOS or NEWDOS, this technique looks for excessive radial error due to hysteresis in the drive's stepper. (Hysteresis is the slop in a leadscrew or band positioner. *That is bad news*, particularly on 80-track drives.)

If the format operation verifies, and the system is operated in the Verify mode (read and verify after each write), you can be assured of good data reliability. Where

DOSPLUS 3.3 displays the sector being verified, 3.4 displays the process by cylinder and granule. This formatter is improved over 3.3, as it locks out individual granules with flaws instead of locking out a whole track. This can save some previously wasted space on floppies which have several bad spots and multiple track lockouts.

The Format utility (as well as Backup, Copy and Diskzap) is menu driven and straightforward in operation. For the students of Mr. H. C. Pennington, there are two (count 'em—two) ZAP-type utilities. Both are written in machine language and are fast. One, Diskzap, is a very complete track- and sector-oriented display/modify utility, which also includes formatting, copy, verify and print functions (it looks as if it were designed with Harv's book open to a "how to" page).

The other zapper is called Diskdump. While being track and sector oriented, it is entered by using the file specification. This initial time (and patience) saver is only a small taste of what is to follow, because changes can be entered in *either* Hex or ASCII. (It is a quick and painless way to change a couple of bytes in any file or machine language utility without writing a program, or doing a reassembly and dump, to complete the job).

As in DOSPLUS 3.3, the DIR command provides a complete directory sector breakdown including all file attributes. The MAP command is unchanged, still showing the track and sector assignments for each file (the sharp-eyed will note sufficient leading zeroes on track and sector attributes to accommodate the larger hard disks). The FREE command still provides a graphic display of all tracks and granules on the disk. DOSPLUS 3.4 adds a new command—"CAT" (or catalog). This provides a display like DIR in TRSDOS or NEWDOS.

The Model I display cursor is a square block, similar to that used on the Model III. A boot option permits accessing the Level II I/O drivers and the conventional cursor is displayed to remind you that these are in use. The keyboard is

debounced when the block cursor is displayed and the repeating key is featured on the entire keyboard.

The FORCE command from 3.3 is continued so that I/O can be redirected. Version 3.4 also features a new command—JOIN, so that output can be paralleled to two devices simultaneously (display and printer, and in Model III, display and RS-232). The previously supported AUTO, DO and BUILD commands are continued to provide for automatic execution of commands or programs at boot-up time. The only missing command is CLEARFILE, which used to erase file data while leaving the directory entry intact.

All practical commands and utilities are available from BASIC. Rather than having a reduced set of DOS commands during BASIC operation, Microsystems chose to load a larger BASIC for program development and then use most of the DOS for support. Programs can be called for execution under a smaller BASIC called TBASIC. This language module supports all of the microsystems extensions to BASIC, but has no access to the DOS commands (except for those which are supported by BASIC reserved words—TIME\$, etc.). The extensions to BASIC include a single step trace, global editing of text files (SR command), and a memory dump of variables (M command), which, if used with an ONERROR statement, can parallel the finest mainframe debugging systems.

Two extensions which are new to 3.4 include a sort utility for BASIC arrays (O command) and a new reserved word—INPUT@, which eases screen formatting during data entry routines. INPUT@ sets, and clearly indicates, input field length. Interestingly, it can provide elementary input editing to restrict alphabetic characters from numeric fields! Unfortunately, the "O" command, as well as "M" and "SR", aren't available from TBASIC.

The only mild irritation, to date, is the requirement to enter BASIC and execute a CMD"T" to disable interrupts. While the need is seldom, I've added two commands (EI/CMD and DI/CMD) to avoid the problem.

In all other respects, I found DOSPLUS 3.4D to be smooth, fast, powerful, and operator-oriented. Nothing showed up to cast a shadow on the DOSPLUS reputation for rock steady reliability. All of the NEWDOS/80 options aren't included, but the automated features of this DOS do away with the need for many of the NEWDOS switches and SYSGEN-type options. Microsystems does not include an Editor/Assembler or Disassembler with this package. Instead, a separate machine language support package is offered as a distinct product.

DOSPLUS showed strong upward compatibility with all forms of programs and data from TRSDOS 2.3. It operated satisfactorily on single density files and programs from NEWDOS/80 version 2.0 with the exception of marked-item formats. Both NEWDOS/80 and TRSDOS 2.3 had trouble reading DOSPLUS disks, due, most probably, to the extended protocols in granule allocation table codes.

Microsystems Software is offering a newsletter to users and promises both zaps and updates at reasonable prices. Patches are reportedly available for a wide variety of programs including the Microsoft BASIC Compiler. SCRIPSIT patches are available, along with patches to some other commercially available patches for special printer support. The availability of these patches makes DOSPLUS a very attractive upgrade for the established TRSDOS or OS-80 user. For the TRS-80 user upgrading to double density, or one who finds that he or she has a mixed bag of disk drives, DOSPLUS 3.4D is the easy answer. For the user with both Model I and Model III machines, the DOSPLUS system offers a high degree of compatibility. ■

*DOSPLUS 3.4 or 3.4D are available from Microsystems Software, Inc., 4301-18 Oak Circle, Boca Raton, FL 33431, (305) 983-3390. The operating system is also available for Model I or PMC in single density, as well as for the Model III. All versions are the same price, \$149.95.*



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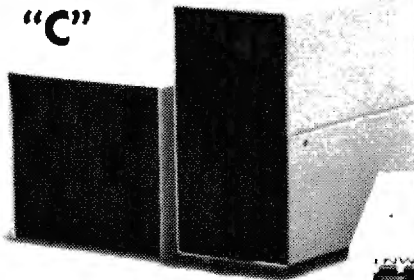
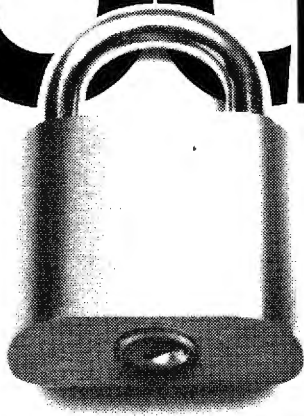
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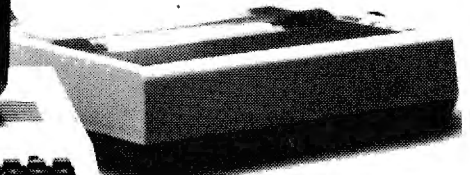
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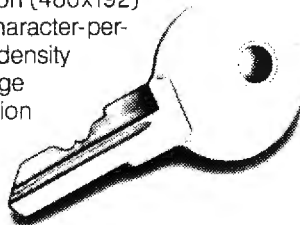
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# Color Computer sorting

## A routine for quick results

Color Computer

Mark D. Goodwin, Orland, ME

Sooner or later you'll probably write a program which requires sorted data. Sorting the elements of an array can be very time consuming, if the sort is done by a BASIC subroutine. A BASIC sort is adequate, when the array is small. But if you should have to sort a large array, say 1000 elements, you could be twiddling your thumbs for quite some time.

Enter machine language. A machine language sort can sort an array in a fraction of the time a BASIC sort routine requires. Listing 1 contains a general purpose sort routine. It can sort both string and numeric data. The size of the array is limited only by the memory size of your computer. A partial sort can also be accomplished.

In order to understand the sort routine, you must first know its requirements. The routine requires a string array, which will be sorted, and a numeric array, which is used for an index. On entry to the routine you must POKE the following values into memory: 3FF1 — VARPTR of the 1st element in the string array. 3FF3 — VARPTR of the 1st element in the numeric array. 3FEF — number of elements to be sorted, minus one.

With the above information, let's tackle the program. In order to speed up program execution, I chose to utilize the 6809's direct page-addressing mode. This of course rules out relocatability, but this isn't a very serious limitation. The program is written for a 16K machine, but can be used on a 32K machine with the following changes:

```
0002      ORG $7FFF-$9C
0003      SETDP $7F
0004 START LDA #$7F
```

The program should contain sufficient comments to understand how it works. The program can be assembled easily with an editor assembler. First enter the program line by line. Be sure to make the appropriate changes if you want to utilize the full memory of a 32K computer. Once the program has been entered, double check the program for errors. Now save a few

copies of the object code on cassette. Follow this by saving a few copies of the source code in case any typos were missed. Remember, an ounce of prevention is worth a pound of cure.

If you don't have an editor assembler, enter the program in Listing 2. This is a BASIC version, which POKES the sort routine into memory. To use the program with a 32K machine, change line 90 to:

```
90 DATA 134, 127, 30, 139, 151, 255,
15, 252
```

For a 32K computer the memory addresses in Listing 2 will have to be changed. Simply change the 3Fs to

### Listing 1

```
0001 0600      NAM SORT
0002 0600      ORG $3FFF-$9C
0003 3F63      SETDP $3F
0004 3F63 863F  START LDA #$3F      NEW DP VALUE
0005 3F65 1E8B  EXG A,DP      A = OLD DP = NEW
0006 3F67 97FF  STA <OLD      SAVE OLD DP
0007 3F69 0FFC  ST1  CLR <NUM      CLEAR SORT FLAG
0008 3F6B DCEF  LDD <V1      D=#ELEMENTS-1
0009 3F6D DDF5  STD <LEN      LOAD VARIABLE
0010 3F6F DCF1  LDD <V2      D=VARPTR(A*(1))
0011 3F71 DDF7  STD <STP      LOAD VARIABLE
0012 3F73 DCF3  LDD <V3      D=VARPTR(A(1))
0013 3F75 DDF9  STD <INT      LOAD VARIABLE
0014 3F77 9EF7  ST2  LDX <STP      X=STRING POINTER
0015 3F79 A684  LDA ,X      A=LEN(STRING1)
0016 3F7B 97FD  STA <LEN1     SAVE IT
0017 3F7D EC02  LDD 2,X      D=STRING1 POS
0018 3F7F 1F02  TFR D,Y      PUT IT IN Y
0019 3F81 A605  LDA 5,X      A=LEN(STRING2)
0020 3F83 97FE  STA <LEN2     SAVE IT
0021 3F85 EC07  LDD 7,X      D=STRING2 POS
0022 3F87 1F01  TFR D,X      PUT IT X
0023 3F89 1E12  EXG X,Y      EXCHANGE X AND Y
0024 3F8B 96FE  LDA <LEN2     A=LEN(STRING2)
0025 3F8D 2706  BEQ ST5      IF A=0 JUMP
0026 3F8F 96FD  LDA <LEN1     A=LEN(STRING1)
0027 3F91 271C  BEQ NOSWAP   IF A=0 JUMP
0028 3F93 2006  BRA ST3      JUMP
0029 3F95 96FD  ST5  LDA <LEN1  A=LEN(STRING1)
0030 3F97 2716  BEQ NOSWAP   IFA=0 JUMP
```

## CC sorting

7Fs. For example:

```
30 CLEAR200,&H7F62
```

Before loading the machine language version, enter CLEAR200, &H3F62 or CLEAR200,&H7F62; depending on the memory size of your computer. This is necessary to reserve the memory for the sort program. In line 30 the BASIC version reserves memory for you.

Listing 3 demonstrates the use of the sort routine. It only sorts an array of ten elements, but should help in understanding how the routine is used. The program uses the TIMER function to time the sort. I won't tell how long the sort takes because I prefer to surprise you.

You may have wondered why the sort routine uses a numeric array at all. This array can be quite useful as an index. If you want to sort a disk mail list file by zip codes; simply set the string array to the zip codes, sort the data and save the index on the disk. Now the mail list can be accessed by using the index. This eliminates the need of rewriting the entire mail list file after the sort. If an index isn't needed, use a dummy numeric array for the sort routine. A numeric array can be sorted by loading its values into a string array with the STR\$ command. Then sort the string array and transfer the data back with the VAL command.

I hope you find this sort routine useful. There are many uses for sorted data and having the ability to sort data quickly can greatly enhance any program.

*Ed. note: The author is making these programs available on cassette (\$9.95) or disk (\$11.95) plus \$2 shipping and handling. Contact: Mr. Goodwin at Star Route 790, Box 103, Orland, ME 04472.*

0031	3F99	2008		BRA	SWAP	JUMP	
0032	3F9B	A680	ST3	LDA	,X+	PUT CHAR IN A	
0033	3F9D	A1A0		CMPA	,Y+	COMPARE STRINGS	
0034	3F9F	272D		BEQ	ST4	IF = JUMP	
0035	3FA1	250C		BCS	NOSWAP	IF > JUMP	
0036	3FA3	9EF7	SWAP	LDX	<STP	X=STRING POINTER	
0037	3FA5	8D37		BSR	MOVE	SWITCH STRINGS	
0038	3FA7	9EF9		LDX	<INT	X=INDEX POINTER	
0039	3FA9	8D33		BSR	MOVE	SWITCH INDEX	
0040	3FAB	8601		LDA	#1	A=1	
0041	3FAD	97FC		STA	<NUM	SET SORT FLAG	
0042	3FAF	CC0005	NOSWAP	LDD	#5	D=5	
0043	3FB2	D3F7		ADDD	<STP	+ STRING POINT	
0044	3FB4	DDF7		STD	<STP	SAVE IT	
0045	3FB6	CC0005		LDD	#5	D=5	
0046	3FB9	D3F9		ADDD	<INT	+ INDEX POINT	
0047	3FBB	DDF9		STD	<INT	SAVE IT	
0048	3FBD	9EF5		LDX	<LEN	X=#ELEMENTS	
0049	3FBF	301F		LEAX	-1,X	DECREMENT IT	
0050	3FC1	9FF5		STX	<LEN	SAVE IT	
0051	3FC3	26B2		BNE	ST2	IF X<>0 JUMP	
0052	3FC5	96FC		LDA	<NUM	A=SORT FLAG	
0053	3FC7	26A0		BNE	ST1	IF A<>0 JUMP	
0054	3FC9	96FF		LDA	<OLD	A=OLD DP	
0055	3FCB	1F8B		TFR	A,DP	SET DP	
0056	3FCD	39		RTS		RETURN TO BASIC	
0057	3FCE	0AFE	ST4	DEC	<LEN2	DEC STRING2 LEN	
0058	3FD0	2706		BEQ	SWS	IF =0 JUMP	
0059	3FD2	0AFD		DEC	<LEN1	DEC STRING1 LEN	
0060	3FD4	27D9		BEQ	NOSWAP	IF =0 JUMP	
0061	3FD6	20C3		BRA	ST3	JUMP	
0062	3FDB	0AFD	SW5	DEC	<LEN1	DEC STRING1 LEN	
0063	3FDA	27D3		BEQ	NOSWAP	IF =0 JUMP	
0064	3FDC	20C5		BRA	SWAP	JUMP	
0065	3FDE	C605	MOVE	LDB	#5	B=COUNT	
0066	3FE0	D7FB		STB	<CNT	SAVE IT	
0067	3FE2	A605	MO1	LDA	5,X	SWITCH	
0068	3FE4	E684		LDB	,X	LOCATIONS	
0069	3FE6	E705		STB	5,X	POINTED	
0070	3FEB	A780		STA	,X+	TO BY X	
0071	3FEA	0AFB		DEC	<CNT	DECREMENT COUNT	
0072	3FEC	26F4		BNE	MO1	IF CNT<>0 JUMP	
0073	3FEE	39		RTS		RETURN	
0074	3FEF	0000	V1	FDB	0		
0075	3FF1	0000	V2	FDB	0		
0076	3FF3	0000	V3	FDB	0		
0077	3FF5	0000	LEN	FDB	0		
0078	3FF7	0000	STP	FDB	0		
0079	3FF9	0000	INT	FDB	0		
0080	3FFB	00	CNT	FCB	0		
0081	3FFC	00	NUM	FCB	0		
0082	3FFD	00	LEN1	FCB	0		
0083	3FFE	00	LEN2	FCB	0		
0084	3FFF	00	OLD	FCB	0		
0085	4000			END	START		
CNT	3FFB	INT	3FF9	LEN	3FF5	LEN1	3FFD
LEN2	3FFE	MO1	3FE2	MOVE	3FDE	NOSWAP	3FAF
NUM	3FFC	OLD	3FFF	ST1	3F69	ST2	3F77
ST3	3F9B	ST4	3FCE	ST5	3F95	START	3F63
STP	3FF7	SW5	3FDB	SWAP	3FA3	V1	3FEF
V2	3FF1	V3	3FF3				

### Listing 2

```
10 REM CLEAR STRING SPACE
20 REM & SET MEMORY SIZE
30 CLEAR200,&H3F62
40 REM POKE SORT ROUTINE
50 FORI=&H3F63 TO&H3FFF
60 READJ
70 POKEI,J
64 80-U.S. Journal
```

```
80 NEXTI
90 DATA134,63,30,139,151,255,15,252
100 DATA220,239,221,245,220,241,221,247
110 DATA220,243,221,249,158,247,166,132
120 DATA151,253,236,2,31,2,166,5
130 DATA151,254,236,7,31,1,30,18
140 DATA150,254,39,6,150,253,39,28
```

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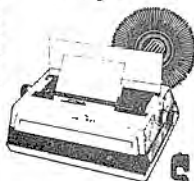


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**CC sorting**

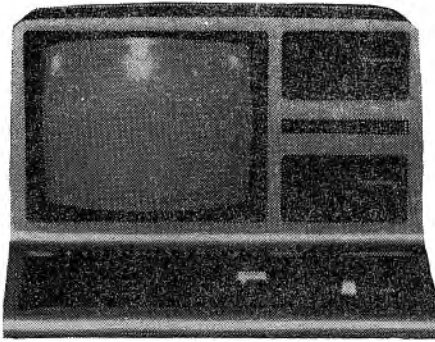
- 150 DATA32,6,150,253,39,22,32,8
- 160 DATA166,128,161,160,39,45,37,12
- 170 DATA158,247,141,55,158,249,141,51
- 180 DATA134,1,151,252,204,0,5,211
- 190 DATA247,221,247,204,0,5,211,249
- 200 DATA221,249,158,245,48,31,159,245
- 210 DATA38,178,150,252,38,160,150,255
- 220 DATA31,139,57,10,254,39,6,10
- 230 DATA253,39,217,32,195,10,253,39
- 240 DATA211,32,197,198,5,215,251,166
- 250 DATA5,230,132,231,5,167,128,10
- 260 DATA251,38,244,57,0,0,0,0
- 270 DATA0,0,0,0,0,0,0,0,0,0,0

Listing 3

- 10 REM CLEAR STRING SPACE,
- 20 REM SET MEMORY SIZE,
- 30 REM SET USR0, &
- 40 REM DIM VARIABLES
- 50 CLEAR300,&H3F62
- 60 DEFUSR0=&H3F63
- 70 DIMI(10),IS(10)
- 80 REM INITIALIZE VARIABLES
- 90 FORI=1TO10
- 100 I(I)=I
- 110 READI\$(I)
- 120 NEXTI
- 130 REM POKE POINTERS
- 140 I=VARPTR(I\$(1))
- 150 POKE&H3FF1,INT(I/256)
- 160 POKE&H3FF2,I-INT(I/256)\*256
- 170 I=VARPTR(I(1))
- 180 POKE&H3FF3,INT(I/256)
- 190 POKE&H3FF4,I-INT(I/256)\*256
- 200 REM POKE LENGTH
- 210 I=9
- 220 POKE&H3FEF,INT(I/256)
- 230 POKE&H3FF0,I-INT(I/256)\*256
- 240 REM SET TIMER
- 250 T=TIMER/60
- 260 REM CALL SORT ROUTINE
- 270 I=USR0(0)
- 280 T=TIMER/60
- 290 REM PRINT RESULTS
- 300 CLS
- 310 PRINT"SORT TIME:"T"SECONDS
- 320 PRINT:PRINT"ORIGINAL","SORTED"
- 330 FORI=1TO10
- 340 FORJ=1TO10
- 350 IFI(J)=I THENPRINTI\$(J),:GOTO370
- 360 NEXTJ
- 370 PRINTI\$(I)
- 380 NEXTI
- 390 DATAMARK, DENISE, RYAN, CANDY, GLENN, ROS  
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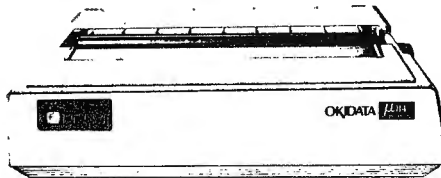
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# Basically BASIC

## String functions and what they can do

For all models

James A. Conrad, Seattle, WA

Most novice, and many not-so-novice programmers don't understand much about string functions. Functions seemed relatively unimportant when they started learning BASIC — something to “get to later.” Well, “later” is now. String functions are easy to understand.

Many programmers tend to confuse *functions* and *statements*. A *statement* is an instruction to the computer, telling it to do something. It contains (or is) a verb such as PRINT or GOTO. Most *functions* calculate or convert. They're like self-contained subroutines; LOG(x), for example, computes the natural logarithm of x.

The major BASIC functions perform arithmetic or string operations. String functions analyze and manipulate strings. They're indispensable in input checking and output formatting routines.

### A Few Words About Functions

A function has two parts — a *title* and an *argument*. The *title* describes, in BASIC, what the function does, e.g., LENgth, VALue. The argument is the input to the function. The function takes this input and *returns* a *result*. The parentheses following the title contain the argument. They are pronounced *of* — the function LEN(A\$), for example, is pronounced “length of A string.”

You can do almost anything with a function that you can with a variable. You can print it. You can add or subtract it (if it's numeric). You can even put it in the argument of another function — this is called “nesting” — e.g., LEN(MID\$(A\$,3)). (When you nest functions be sure that you've put in a right parenthesis for every left one.) About the only thing you can't do with a function that you can with a variable is assign a value to it with

an assignment statement.

### The String Functions

Here's a summary of string functions, what they do, and a program line that prints an example. The symbols used in the arguments are:

\$: String being analyzed.

sub\$: Substring.

len: Length of substring to be returned (0 - 255).

pos: Position in string.

x: Any numeric expression or number the computer can handle.

chr: Character (in quotes) or ASCII, control or graphics code.

asc: ASCII, control or graphics code (0 - 255).

Any of these (except *chr*) can be a constant, variable or formula.

We'll use line 10 to make a 9-character string, A\$, to play with:

```
10 A$ = "123456789"
```

LEFT\$(\$,len)

Returns the left *len* characters of string \$.

```
20 PRINT "THE FIRST 4 CHARACTERS OF A$ ARE:  
"; LEFT$(A$,4)
```

It prints 1234.

RIGHT\$(\$,len)

Returns the right *len* characters of string \$.

```
30 PRINT "THE LAST 3 CHARACTERS OF A$ ARE:  
"; RIGHT$(A$,3)
```

This prints 789.

**MIDSTRING(\$,pos,len)**

Returns a substring of string \$, beginning with character number pos and having a length of len characters.

```
40 PRINT "CHARACTERS 2, 3, AND 4 OF A$ ARE:";
MID$(A$,2,3)
```

This time, 234 is printed.

**MIDSTRING(\$,pos) (len omitted)**

Returns the entire substring right of position pos.

```
50 PRINT "RIGHT SIDE OF A$ FROM 5 ON IS:";
MID$(A$,5)
```

Now it prints 56789.

**LEN(\$)**

Returns the number of characters in string \$.

```
60 PRINT "NUMBER OF CHARACTERS IN A$ IS:";
LEN(A$)
```

This shows 9.

**VAL(\$)**

Returns the numeric value of string \$.

```
70 PRINT "THE VALUE OF A$ IS:"; VAL(A$)
```

We get 123456789. (Note that the first position is a space.)

**STR\$(x)**

Converts a number or numeric expression (x) to a string.

```
80 LET A = 333
90 PRINT "THE STRING OF A IS:"; STR$(A)
```

This prints 333. (The first position is a space and the length of the string is 4 characters.)

**STRING\$(len, chr)**

For this the Color Computer requires Extended BASIC. Returns a string of character chr which is len characters long.

```
100 PRINT STRING$(20, "=")
```

Prints a double line 20 characters long:

```
=====
```

```
110 PRINT STRING$(20, 61) : REM 61 is ASCII code
for "="
```

Prints the same double line.

**INSTR(pos, \$, sub\$)**

This command is on Disk Models I and III or the Extended Color Computer. Searches string \$ beginning at position pos for substring sub\$. Returns position number if found, 0 if not found. If pos is omitted, search begins at first character (pos. 1).

```
120 PRINT "POSITION OF 56 IN A$ IS:"; INSTR(1,
A$, "56")
```

This prints 5 — the substring 56 begins at the 5th position in A\$.

**ASC(\$)**

Returns ASCII code number of the first character of string \$.

```
130 PRINT "A$ BEGINS WITH ASCII CHARACTER
# "; ASC(A$)
```

Prints 49 — the ASCII code for 1. Printing ASC("1") will also return 49.

**CHR\$(asc)**

Returns the character, in a one-character string, for ASCII, control or graphics code asc.

```
140 PRINT "THE CHARACTER FOR ASCII CODE 49
IS:" : CHR$(49)
```

This prints 1.

**Workhorses**

The LEFT\$, RIGHT\$ and MID\$ functions are the workhorses of string manipulation. And they're easy to understand. Run this quick FOR...NEXT loop for a display of their operation:

```
10 B$ = "ABCD"
20 FOR X=1 TO 4
30 PRINT LEFT$(B$, X)
40 NEXT X
```

Printing this, we see that as X increases, the printed string changes:

When X is	The screen shows
1	A
2	AB
3	ABC
4	ABCD

Now change line 30 to: 30 PRINT RIGHT\$(B\$, X). We get:

When X is	The screen shows
1	D
2	CD
3	BCD
4	ABCD

Try another change: 30 PRINT MID\$(B\$, X, 2). Now:

When X is	The screen shows
1	AB
2	BC
3	CD
4	D

We've briefly examined the string functions and what they do. Next time we'll use them to manipulate strings.

One of my many idiosyncrasies (some people call them symptoms of my insanity) is having a lot of fun playing with strings and string functions. They're easy to learn. The more you experiment with them, the more innovative you'll make your programs. That's BASIC. ■

# Tandy topics

Ed Juge, Director, Computer Merchandising  
1500 One Tandy Center, Fort Worth, TX 76102

Summer is really over in Texas. This morning, it was 55 degrees. A couple of times each week, we're seeing a hot air balloon drifting across the morning sky. Seems to be the same one each time. I think I need a job like his! I can't help wondering where he finds a chase crew to pick him up when he lands. Oh, well . . .

Since you're reading this in December, I thought I'd "tie up" the year by telling you a little bit about our internal structure, and the folks who have worked all year to bring you TRS-80 products. For those of you who have asked, here's a thumbnail sketch.

The Fort Worth staff people responsible for the TRS-80 product line are broken into three main groups: computer merchandising, hardware engineering, and software development (the latter two being part of our research and development department). Of course, in the support area, we have computer customer services, technical support, and national parts. Many others are involved, so I've named those you're likely to hear a little more of.

We've told you that we buy a lot of software from outside sources. Even so, we have a large software team of

analysts, programmers, testers and writers. There are project managers, who supervise development teams specializing in specific types of software. They also work with outside software vendors on the forty to fifty percent of our software which comes from third parties. There are two major divisions in the group, for systems and applications software. All software goes through extensive testing, and manuals written outside are edited by our internal staff.

Our hardware engineering staff includes groups who specialize in specific areas of hardware. They have their own group of writers for hardware manuals.

Computer merchandising includes our computer buyers (a more common industry title is product managers), software product planners, newsletter staff, the group who writes our computer center training material, and our new third-party software vendor support function. Product planning, direction, promotion and advertising are the primary department functions. Merchandising also includes a sizable software Q/A group.

Customer services is the group you're most likely to come in contact

with. We've recently put about 150 customer service representatives in selected computer centers, to serve you faster and better on a local basis. There is still a very large group here in Fort Worth to answer your (and our field folks') questions and problems. They also keep our stores updated on patches and fixes to all software items. They answer a tremendous number of phone calls, and do an outstanding job! No, they won't always have an instant answer for a just-reported problem, nor can they help you with "custom" programming or hardware questions: "How do I hook a brand xyz printer to my TRS-80?" We just can't know all of the combinations, and this is a type of information we aren't staffed to supply.

In Fort Worth, there are five computer factories, including one exclusively for software. We also have one warehouse here devoted exclusively to computer products. Our computer operation is supported by many other departments, including national quality assurance, advertising, data processing, personnel, and others.

Although in many ways we're highly self-sufficient, make no mistake that we recognize and appreciate all of the non-Radio Shack vendors who support our



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products. We can't do it all, and we couldn't make the TRS-80 nearly as useful to as many people without those fine folks!

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I'd like to tell you about a change we're making, to serve you better than before with products. As any of you know, who have ever been involved in inventory control, a retail business can't stock items which move slowly, and stay in business very long. Every so often, you have to review your sales, and see what is and isn't moving, and drop slow-moving items. Yet, as a computer user, you know you'd always like to see us with even more products to choose from.

Well, we recently reviewed our computer line, and found some likely candidates for discontinuance, yet we know that many of them are darned near indispensable to those of you who do need them. So, we came up with a plan.

We took a number of "slow, but

necessary" items and created a new "fast-order system". We won't carry those items in our stores (any stores) any longer. But your local store can take a deposit and order them for you through their daily computer tie-in with Fort Worth. *Your order will be shipped the following day!* Frankly, these items move slowly enough that most stores wouldn't have stocked them anyway, so a special order would have been necessary. Normal warehouse shipments to stores are done on a cyclical basis, so the new system could literally save weeks, if your order reached our warehouse out of cycle.

Will you notice the lack of those items in the stores? Doubtful! They total less than one percent of our sales. Now, the other good news is that this system will allow us to make available some new items which we couldn't have considered in the past because we knew they would be slow sellers. Fast orders started October 1, and we think

they're going to improve our ability to supply your needs.

**The New Year**

I really wish I could tell you about some of the things we have planned for 1983, but it's a little premature. In lieu of that, how about a prediction? 1983 will be one of the most exciting years we've had for TRS-80s!

I had a visit from Mike Schmidt and Cam Brown yesterday, and they're planning some changes in *80-U.S. Journal* for '83, too — very positive changes. If you have a friend who is a TRS-80 owner and isn't getting *80-U.S.*, tell him (or her) to write to Mike and ask for a free sample copy. Tell Mike it's the free sample he promised Ed Juge he'd supply.

Now that I've done my bit to increase Mike's expenses, I'll get out of here by just wishing everyone a very, very happy holiday season and prosperous new year. See you in 1983. ■

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---

# BASIC bits

## Packing strings efficiently

Model I/III, PMC-80, LNW80

Thomas L. Quindry, Burke, VA

Last month the simplest form of string packing for BASIC programs was illustrated. To recount, the string variables, A\$ and B\$, were packed with graphic values read from data statements and concatenated using the form,  $A\$ = A\$ + \text{CHR}\$(A)$ , where A is the latest value read from the data statements given.

While this method works, it is probably one of the most archaic ways of packing a string. If much string packing takes place, noticeable time will be lost due to the constant redefining of the string A\$ for each successive concatenation of values. As you will remember, the garbage collection routine is the culprit.

There are much easier ways to pack strings. They avoid the garbage collection routine of your computer because the computer has nothing to sort. Many people don't realize that if a string function is defined within a BASIC program, it will not be sorted when the computer goes into its string function garbage collection routine. Let's say our BASIC program defines A\$ to be the word STRING. It can be defined either in a data statement such as DATA STRING, which is later read and interpreted to a string variable (READ A\$), or in the form  $A\$ = \text{"STRING"}$ .

In the above example as long as A\$ is not redefined to another value, the VARPTR for A\$ will help us find the word STRING, which appears in your BASIC program. You don't have to CLEAR string space when defining strings of this type either. Since the operating BASIC program is a permanent fixture in RAM, there is no need to reserve extra space for these string functions, which are currently a part of the program. They already have a place in memory which will not be redefined. BASIC program statements are not redefined while running them.

Well, almost not redefined! The all-powerful POKE function, used with the just as powerful VARPTR function, can redefine strings in your BASIC program without affecting operation (when used carefully). Since repetition is one of the best ways to prove a point, consider last month's program called Animate. That example illustrated the packing of graphic characters in

a string to display men jumping on the video screen. Instead of doing what we did last month, another way to define the strings, A\$ and B\$, is given in Listing 1.

I have rewritten Animate so that it performs the same as last month, but does so in a slightly more efficient manner. Notice that the CLEAR 93 command given last month is omitted. Replacing it are dummy string values of thirty-one characters each for A\$ and B\$. The graphic character values and control codes are still given in data statements, but the CHR\$ function is no longer used. Instead of defining the strings as we did last month, the strings are already defined. Each string is defined as a word of thirty-one bytes. These words are dummy words.

Using this method of string packing, we must reserve space for the final graphic character. Since each graphic character of the jumping man will have thirty-one characters as it did last month, we have to reserve thirty-one spaces. Instead of spacing over thirty-one times between the quote marks, the easiest way to do this is to count with numbers. We could count 12345678901234... or, as I like to do, leave a space in place of each of the zeroes (123456789 1234...). The spaces are easier to see and help in the counting.

Now comes the VARPTR function. The VARPTR function helps to locate the position of variables. With string variables such as A\$,  $\text{VARPTR}(A\$)$  will point to an address which tells the length of the string. That address is followed by two bytes which give the address of the string in memory, whether it be in your BASIC program or reserved string space saved by the CLEAR function. Addresses are saved in the form: Least Significant Byte (LSB) first, then Most Significant Byte (MSB). We use the value  $(\text{VARPTR}(A\$)+1 + (\text{VARPTR}(A\$)+2)*256)$  to calculate the address of our string variable.

Now that we know where the string is, we can use the POKE function to substitute values from our data statements into the reserved area. This is done in lines 80 through 110 and 290 to the end of the program. Just run the program once and the string areas will be redefined.

The beauty of this method of string packing is that once we have run our program, we have redefined our program to include the final graphic strings, A\$ and B\$. We have no use now for the routine and the data statements used in redefining it. We can delete the line numbers stated in the previous paragraph and do anything we want to the remaining part of the program. We can CSAVE it, CLOAD it, SAVE or LOAD it to disk. We can even add BASIC program statements before or after the program lines containing the redefined strings, or merge it with another program.

If you have keyed in the program from Listing 1 and run it once, you will notice something out of the ordinary when you list the program. Those with a Model I will see a series of BASIC words and spaces, within the quote marks of lines 40 and 50, which define A\$ and B\$. Each string takes four lines to be defined. If you command your computer to PRINT A\$,B\$, you will see the two positions of the graphic character (the man) we have defined.

This discrepancy is because of the way the Model I BASIC interpreter works. With both the Model I and III, each BASIC word is tokenized. These tokenized words share the same ASCII character as the graphic blocks. When listing a program line, the Model I tokenizes each word to be displayed, including those graphic characters which have been packed into a string function. The Model III is a little smarter. It only

tokenizes those ASCII characters which fall within the command line of the BASIC statement. On the Model III, you will see the graphic characters when you list lines 40 and 50.

Delete the lines, mentioned before, that are no longer needed. When you run the program, you will notice that there is no longer a pause before the men appear on the screen and start jumping.

Next month, I'll finish up string packing with some hard, fast rules for packing machine code. Also, I'll tell you about one other machine code packing technique and give you an example.

*Question:* Can I reset the memory size on my computer without turning it off?

*Answer:* Assuming that you don't want to save a BASIC program in residence, enter the SYSTEM command and respond to the \*- with "/0." This reinitializes the computer as if you had just turned it on. Then, you can enter the memory size. I have used another way which is convenient if you want to save your BASIC program in memory. POKE the new memory size you wish to save, minus two bytes, into locations 16561 and 16562. This requires a knowledge of hexadecimal addressing and is similar to what we have been doing with LSB and MSB bytes for the VARPTR function in the example of Animate.

Remember to send your questions and tips to me, care of 80-U.S. Journal, 3838 South Warner Street, Tacoma,

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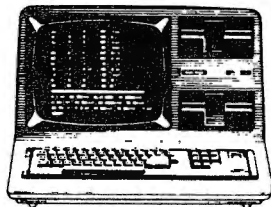
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# 41



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**Program Listing for  
BASIC Bits**

```

1 'BASIC BITS #3 LISTING NO. 1
10 'ANIMATE - BY THOMAS L. QUINDRY
20 'AN EXAMPLE OF AN EFFICIENT STRING PA
CKING
30 'TECHNIQUE FOR ANIMATED GRAPHIC STRIN
G CHARACTERS
40 A$="123456789 123456789 123456789 1"
50 B$="123456789 123456789 123456789 1"
60 CLS
70 PRINT@256,"THIS IS AN ANIMATION OF ME
N JUMPING"
80 X = VARPTR(A$)
90 GOSUB 370
100 X = VARPTR(B$)
110 GOSUB 370
120 PRINT@ 450,A$;
130 PRINT@ 455,A$;
140 PRINT@ 460,A$;
150 PRINT@ 465,B$;
160 PRINT@ 470,A$;
    
```

```

170 PRINT@ 475,A$;
180 FOR N=1 TO 100
190 NEXT
200 PRINT@ 450,B$;
210 PRINT@ 455,B$;
220 PRINT@ 460,B$;
230 PRINT@ 465,A$;
240 PRINT@ 470,B$;
250 PRINT@ 475,B$;
260 FOR N=1 TO 100
270 NEXT
280 GOTO 120
290 DATA 128,176,144,128,26,24,24,24,24
300 DATA 180,187,177,148,26,24,24,24,24
310 DATA 128,159,149,128,26,24,24,24,24
320 DATA 130,129,131,128
330 DATA 128,175,133,128,26,24,24,24,24
340 DATA 135,191,151,133,26,24,24,24,24
350 DATA 128,149,149,128,26,24,24,24,24
360 DATA 128,128,128,128
370 X = PEEK(X+1) + 256*PEEK(X+2)
380 FOR N=X TO X+30
390 READ A
400 POKE N,A
410 NEXT
420 RETURN ■
    
```

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# 42



# Files and foibles

## Sorting large sequential files

Models I/II/III, PMC-80, LNWS80

T. R. Dettmann, Associate editor

This series has been primarily concerned with random access files and techniques. But people with sequential file systems have real concerns as well. The current problem is one that faces many people with mailing lists or other data bases that are maintained as sequential files: How do we sort when there are too many items to sort in memory?

For example, several years ago, a friend was maintaining a 25000-name database on a TRS-80 Model I with five-inch disks! Imagine the problem of combining those files into a mailing list sorted by zip code.

Most people have taken to structuring their data into separate files, each of which can be sorted. However, this means that sorting can't be done on very large combined files in ways other than the original structuring.

How about having a file the size of a single disk and then sorting it? It can be done, if you have disk space for temporary files, by using a "sort/merge" technique. The same technique can also be used (by leaving out the sort) to merge a set of files.

The basic idea of the sort/merge operation is to take small steps and accomplish it little by little. For very large files, you may have to let it run for awhile, but you could restructure a whole database with this technique.

To see how a sort/merge works, let's look at it as a series of simple steps:

1. Open the input file.
2. Split the input file into smaller files by reading as many items as possible, sorting them and writing the sorted items out to one of the smaller files.
3. Merge the files by opening some of the smaller files, reading the first item from each, then writing the smallest to the output file. Read another item from the file where the smallest item was.

The basic operation sounds very easy. For the most part it is, but there are some interesting complexities that one has to deal with to make it work right.

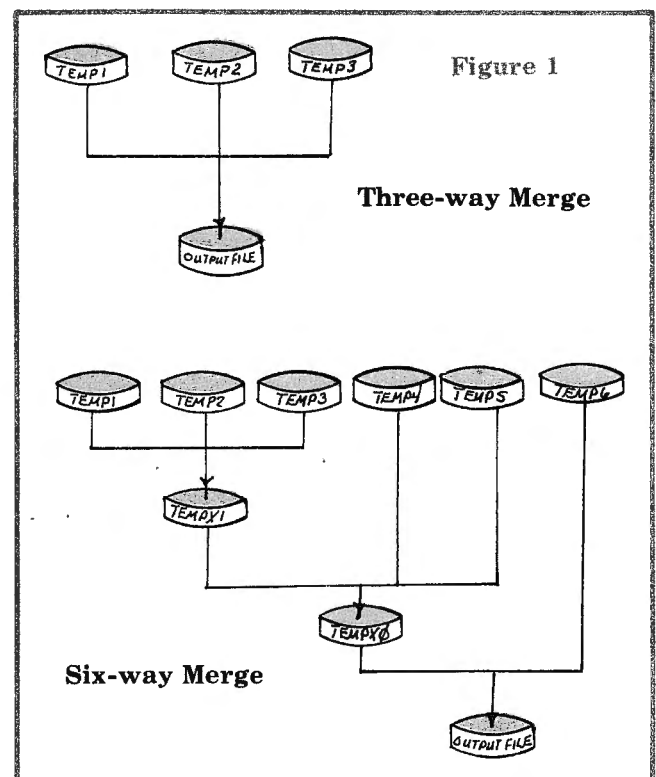
To see how to do a real sort/merge operation, let's look at the sample program. In lines 10-150, we initialize the program. The important part of this is in lines 110-130. In line 110, we set up a set of parameters for the program which make it quite flexible. The first, NL is the number

of lines to read into memory for sorting. The sample program limits it to ten for the demonstration, but you would normally set it to 400-600, depending on your program.

Parameter NFL is the number of files that will be declared in entering BASIC. I used four so that I could merge three files into one. You could use up to sixteen if you wanted.

Parameter NX is the maximum number of temporary files to generate. Since a list of these files is kept in memory (not absolutely necessary), this will serve as the dimension of the array which remembers their names.

Line 120 sets up the line array (LN\$), the temporary filename list (FF\$), and the merge file list (FC\$). The root of the temporary filename is set to TEMP and the number of the current temporary file is set to zero.



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(by Rodger Olsen)

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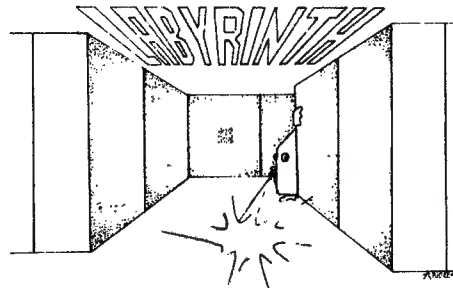
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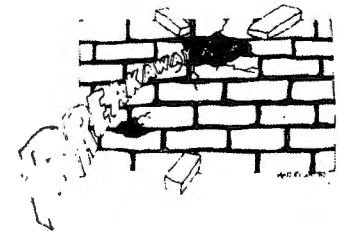
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## Files and foibles

After getting the names of the desired input and output files, lines 250-300 break up the input file into a series of temporary smaller files. Each of these has NL or fewer lines, all in sorted order. Subroutine 1000 first reads in NL or fewer lines. Then, subroutine 2000 sorts them (you could replace this with a call to a fast machine language sort if you like). Finally, subroutine 3000 writes the sorted lines to a temporary file.

Once the input file is completely broken up, it is necessary to recombine the sorted files into a single file with a merge operation. Lines 310-460 are the merge operation.

Subroutine 4000 chooses an output filename for each merge and selects which files to merge. If we have enough file buffers available to merge all of the output files, we just merge directly to the final output file.

Whenever there aren't enough buffers available, we have to go first to an intermediate file (TEMPX0 or TEMPX1). Why two files? If we have to use an intermediate file, it will be merged in the next step. If there are still too many files, we need another intermediate file for the following step. Look at the figure for merges of four or more files to see what happens.

Once the files are selected for the merge and the output filename is assigned, the files are opened and the first line is read from all the input files in lines 320-380. With a line entered from each file, we look to see which line is smallest (or has the smallest key field, or whatever) using subroutine 5000. When the smallest line is selected, subroutine 5000 also reads in a new line from the input file that the smallest line came from. That line is written to the output file in line 410. If there was no line (we're at the EOF on all input files), we check subroutine 6000 to see if we're all done.

This procedure would be like taking a set of cards, breaking it down into smaller stacks, sorting each stack and combining them by taking the smallest visible card from each stack and placing it on the final stack. It can run automatically (which is nice) but requires a large amount of disk space (for temporary files). If it's all you've got though, it's better than nothing.

This same idea could be used to take a group of input files, sort them and during the merge operation have the results written to a series of output files of a standard size, or with a standard grouping. Can you make it do that? Try it and see.

### Program Listing for Files and foibles

```

95 REM          CLEAR SOME STRING SPACE
AND DEFINE ALL VARIABLES
96 REM          TO BE INTEGERS FOR PROCE
SSING
100 CLEAR10000:DEFINTA-Z
105 REM        THESE PARAMETERS CONTROL
THE SIZE OF THE SORT/MERGE
106 REM        OPERATION: NL = MAX NUMB
ER OF LINES IN MEMORY
107 REM        NFL = MAXIMUM NU

```



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## Files and foibles

```

NUMBER OF FILE BUFFERS AVAILABLE
108 REM          NX = MAXIMUM NUMBER OF TEMPORARY FILES TO USE
110 NL=10:NFL=4:NX=10
115 REM          LN$( ) IS THE LINE BUFFER ARRAY
116 REM          FF$( ) IS THE TEMPORARY FILENAME LIST
117 REM          FC$( ) IS THE SET OF FILES TO USE FOR MERGE
120 DIM LN$(NL),FF$(NX),FC$(NFL)
125 REM          FT$ IS THE TEMPORARY FILENAME ROOT
126 REM          FT IS THE NUMBER OF THE CURRENT TEMPORARY FILE
130 FT$="TEMP":FT=0
135 REM          FNCTR$ PRINTS X$ CENTERED ON AN 80 CHARACTER LINE
136 REM          FNHDR$ PRINTS A 3 LINE SCREEN HEADER
140 DEFFNCTR$(X$)=STRING$( (80-LEN(X$))/2," ")+X$
150 DEFFNHDR$(X$)=STRING$(80,"-")+FNCTR$(X$)+CHR$(13)+STRING$(80,"-")
200 REM - - - - - SORT/MERGE DEMO: MAIN PROGRAM - - - - -
210 CLS:PRINTFNHDR$( "SORT/MERGE" ):PRINT:PRINT
215 REM          GET THE INPUT AND OUTPUT FILENAMES
216 REM          THESE COULD BE THE SAME
220 LINEINPUT"INPUT FILE ==>>>" ;FI$
230 LINEINPUT"OUTPUT FILE ==>>>" ;FO$
240 PRINT:PRINT
245 REM          GET THE INPUT FILE
250 OPEN"I",1,FI$
255 REM          READ IN PART OF THE INPUT FILE
260 GOSUB1000
265 REM          SORT IT
270 GOSUB2000
275 REM          WRITE IT TO A TEMPORARY OUTPUT FILE
280 GOSUB3000
285 REM          IF ALL THE DATA FROM THE INPUT FILE HASN'T BEEN READ
286 REM          THEN GO GET SOME MORE
290 IF FLG<>1 THEN 260
295 REM          CLOSE ALL FILES
300 CLOSE
305 REM          START THE MERGE OPERATION
306 REM          FIRST GET THE INPUT & OUTPUT FILE ASSIGNMENTS
310 GOSUB4000
315 REM          OPEN THE FILES - 1 FOR OUTPUT

```

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## Files and foibles

```

316 REM                                     2-NZ FO
R INPUT
320 OPEN"O",1,FC$(1)
330 PRINTFNCTR$( "OUTPUT FILE: "+FC$(1))
340 FOR I=2 TO NZ
350     OPEN"I",I,FC$(I)
360     PRINTFNCTR$( "INPUT FILE: "+FC$(I))
365 REM                                     GET THE FIRST LINE FROM
EACH FILE
370     LINEINPUT#I,LN$(I)
380 NEXTI
385 REM                                     CHOOSE THE SMALLEST LINE
390 GOSUB5000
395 REM                                     IF THERE IS NO SMALLEST
LINE THEN WE'RE DONE WITH THIS
396 REM                                     PASS THROUGH THE FILES
400 IF LN$="" THEN 430
405 REM                                     PUT THE SMALLEST LINE TO
THE OUTPUT FILE
410 PRINT#1,LN$:K=K+1:PRINTUSING"####
>";K;:PRINTLN$
420 GOTO390
430 CLOSE
435 REM                                     CHECK TO SEE IF WE'RE AL
L DONE
440 GOSUB6000
445 REM                                     IF WE'RE NOT DONE, THEN
GO GET THE REST
450 IF EF=1 THEN 310
460 END
999 END
1000 REM ----- READ FROM INPUT
FILE -----
1005 REM                                     FLG IS A FLAG TO
MARK THE END OF THE INPUT FILE
1010 FLG=0
1020 PRINTFNCTR$( "READING FROM: "+FI$)
1025 REM                                     READ IN UP TO NL
LINES
1030 FORI=1TONL
1040     IF EOF(1) THEN FLG=1:GOTO1070
1050     LINEINPUT#1,LN$(I):PRINTUSING
"####>";I;:PRINTLN$(I)
1060 NEXTI
1065 REM                                     NM IS THE NUMBER
OF LINES ACTUALLY READ IN
1070 NM=I-1:RETURN
2000 REM ----- SORT DATA IN ME
MORY -----
2005 REM                                     SHELL SORT
2006 REM                                     SET THE INITIAL
GAP
2010 GAP=NM
2015 REM                                     IF THE GAP GETS
DOWN TO 1 THEN WE'RE DONE
2020 IF GAP<=1 THEN RETURN
2025 REM                                     LOOK AT 1/2 THE

```

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## Files and foibles

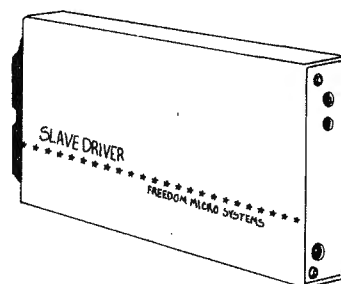
```

PREVIOUS GAP
2030 GAP=INT(GAP/2)
2035 REM SET THE SWAP FLAG TO NO SWAPS
2040 FG=0
2050 FORI=1TONM-GAP
2060 IF LN$(I)>LN$(I+GAP) THEN GOSUB2100:FG=1
2070 NEXTI
2080 IF FG=1 THEN 2040 ELSE 2020
2100 REM ----- SWAP LINES -----
-----
2105 REM MOD I/III OWNERS
REPLACE THIS WITH A SWAPPING
2106 REM PROCEDURE SUCH AS:
2107 REM T$=LN$(I):LN$(I)
=LN$(I+GAP):LN$(I+GAP)=T$
2110 SWAP LN$(I),LN$(I+GAP):RETURN
3000 REM ----- WRITE DATA TO TEMPORARY OUTPUT FILE -----
3005 REM FT IS THE CURRENT TEMPORARY FILE NUMBER
3006 REM MAKE NF$, THE CURRENT TEMPORARY FILE NAME & SAVE IT
3007 REM IF WE'VE USED NX FILES, THEN CUT OFF THE INPUT
3010 FT=FT+1:NF$=FT$+MID$(STR$(FT),2):FF$(FT)=NF$:IF FT>=NX THEN FLG=1
3015 REM WRITE THE LINES TO THE TEMPORARY FILE
3020 OPEN"O",2,NF$
3030 PRINTFNCTR$( "TEMPORARY FILE: "+NF$)
3040 FORI=1TONM:PRINT#2,LN$(I):PRINTUSING"####>";I,:PRINTLN$(I):NEXTI
3050 CLOSE2
3060 RETURN
4000 REM ----- PICK OUTPUT FILE & INPUT OFFSET -----
4005 REM F1 IS THE FIRST FILE TO READ
4006 REM F2 IS THE LAST FILE TO READ
4007 REM FF IS THE NUMBER OF THE INTERMEDIATE MERGE FILE
4008 REM MOD I/III CAN WRITE THIS AS FF=FF-INT(FF/2)*2
4010 F1=F2+1:F2=F2+NFL-1:FF=(FF+1)MOD2
4015 REM MAKE THE INTERMEDIATE MERGE FILE NAME
4020 FF$=FT$+"X"+MID$(STR$(FF),2)
4025 REM TWO CASES:
4026 REM FC$(1)="
" => FIRST TIME THROUGH
4027 REM FC$(2)<<
"" => ALREADY BEEN THROUGH
4030 IF FC$(1)="" THEN 4060

```

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# 49

```

4035 REM           WE HAVE TO MERGE
THE LAST INTERMEDIATE FILE &
4036 REM           1 LESS TEMPORARY
FILE
4040 FC$(2)=FC$(1):F2=F2-1:J=2
4050 GOTO4070
4060 J=1
4065 REM           CHECK FOR LAST F
ILE
4070 IF F2>FT THEN F2=FT
4075 REM           IF THIS IS THE L
AST PASS, THEN WRITE TO
4076 REM           THE DESIRED OUTP
UT FILE, OTHERWISE WE'LL USE AN
4077 REM           INTERMEDIATE
4080 IF F2=FT THEN FC$(1)=FO$ ELSE FC$(1
)=FF$
4085 REM           GET THE TEMPORAR
Y FILENAMES
4090 FORI=F1TOF2:J=J+1
4100 FC$(J)=FF$(I)
4110 NEXTI
4115 REM           NZ IS THE NUMBER
OF FILES THIS GO AROUND

4116 REM           K IS NUMBERING F
OR THE PRINTOUT
4120 NZ=J:K=0
4130 RETURN
5000 REM - - - - - SELECT SMALLEST
INPUT LINE - - - - -
5010 FOR I=2 TO NZ:IF LN$(I)<>"" THEN 50
50
5020 NEXTI
5030 LN$=""
5040 RETURN
5050 FC=I:LN$=LN$(I):J=I+1
5060 IF J>=NZ THEN 5100
5070 FORI=JTONZ:IF LN$(I)="" THEN 5090
5080 IF LN$>LN$(I) THEN LN$=LN$(I):FC
=I
5090 NEXTI
5100 IF NOT EOF(FC) THEN LINEINPUT#FC,LN
$(FC) ELSE LN$(FC)=""
5110 RETURN
6000 REM - - - - - CHECK FOR END O
F PROCESSING - - - - -
6010 IF FC$(1)<>FO$ THEN EF=1 ELSE EF=0
6020 RETURN ■
    
```

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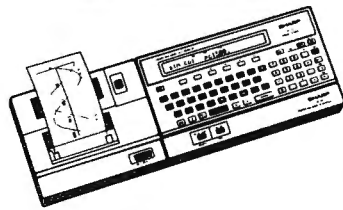
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# @ News

## Wafer management

For ESF owners

Spencer Hall, Associate editor

There's a stereotype, in American folklore of the astute small town businessman who operates from a roll-top desk piled high with papers. Within seconds, he can lay his hands on any document he needs. I don't believe it! Do you? At any rate, serious users of the Stringy Floppy know that this approach to wafer storage is disastrous.

This month, we'll talk a bit about identifying wafers, recording their contents, storing and retrieving them—in short, wafer management. We'll address our remarks to Joe Rolltop, who has one hundred fifty wafers, give or take a few, stashed in envelopes, unmarked wafer organizers, wafer boxes, and one empty coffee can. Some of them (not all) have their contents scrawled on the labels.

First, Joe, you need "What's On It" (Exatron program 142, \$9.95). Boot it up, and you can see exactly what any wafer contains. File numbers are shown. BASIC programs, machine language programs, and data files are each identified by type. The length is given and the first few characters of each are displayed. It's a good idea to rewrite all BASIC programs to put the name in a REMark on the first line so this program will display it. Using "What's On It" is, of course, no substitute for good organization, but it does help bring order out of chaos.

As Joe "reads" his wafers with this program, he should mark them temporarily, pending a permanent label. Sanford's "Vis-a-vis" marking pen makes beautiful black

lines on glass, cellophane, etc. Use it for temporary I.D. on the old-style plastic labels. Newer labels are paper and can't take temporary marking. Get some plastic laminating sheets, such as Dennison's PRES-a-ply Clear Seal. Cut pieces in wafer label size, attach them, and voila, your paper label has turned to plastic. "Scratch" wafers, whose contents change frequently, need this type of identification.

Joe can make permanent labels, if he has a line printer, by using the X-Label program (80-U.S. Journal, July, 1982), or Bill Burnham's Super Label Maker (Exatron 182, \$9.95). If you don't have a printer, get a box of Avery 3/4" by 1" labels (stock S-1216) and a fine point pen such as Sanford's Espresso. (No, I don't own stock in Sanford!)

Now that you have all of your wafers labeled, Joe, where are you going to keep them? That coffee can has got to go! The answer depends on the nature of each program. It helps to classify programs (and wafers) as follows:

Masters— the copies you paid good money for and never touch unless there's a disaster. These need your safest, but not necessarily handiest, storage device.

Major backups— which are treated exactly the same as masters.

Often used— which may include utilities, if you're into programming; favorite games, if they're your bag; and certainly, those applications you can't do without, such as budget analyzers, check registers, data managers, etc.

Other programs— miscellaneous games, programs copied from magazines, code fragments you've written — all of the things you don't use every day but want to keep.

Data files— generated by a text editor, database manager, or special application package, such as an accounting system.

"Masters" and "major backups" are relatively small groups, while "data files" may become large over a period of time. For both of these, Joe can get himself a box of Oxford Pendaflex file guides (stock PN225). These are heavy cardboard panels with tabs from A to Z. He also needs a supply of single-pocket vinyl business card holders, available from several manufacturers.

Staple these, eight to a panel, in two rows of four, on the dividers. You can keep these panels in a letter-size file cabinet, or in a portable file box. If you keep them in Pendaflex hanging files, you can include a log of wafer contents for each panel. Keep the log on a heavy grade of ledger paper to stand repeated handling. Paste your own identification labels over the letter tabs, or use the letters as prefixes in a wafer numbering system.

If Joe has a radial arm saw (or knows someone who does) he could make himself a tray for "often used" wafers. Use a scrap of 2" by 10" lumber, cut across the grain to a width of 2 3/4", which is slightly larger than the width of a wafer. With a dado head set for a one-quarter inch slot, make uniformly spaced cuts (about one-quarter inch apart) across this piece, at an angle of about sixty degrees from horizon-

tal. Cut to a depth of one-half inch from the opposite side. Cutting with the grain avoids the problem of cross-grain in the ridges between slots, which causes them to crumble as they are cut. Close the sides by nailing on side panels. I used scrap pieces of 1½" decorative trim which were just right, if a bit ornate.

Joe could also order the Wafer Wheel from Exatron, which we mentioned in July. Either device sits handily at the left of your keyboard with its contents instantly available.

For what will ultimately be the largest part of any wafer collection, the category I called "other programs", ring binders are the most elegant. They don't have to be expensive. They won't get heavy use. Three-hole punch 8½" x 11" card stock, or hack up file folders. Tape vinyl business card pockets to these pages, two rows of three each, with the panel in the normal (vertical) position. An index on ledger paper can be placed in each

volume.

Of course, there are endless other ways to store wafers, many of them better, I'm sure, than those I've described. An element of personal preference goes into the choice. If you have a unique storage system, let's hear about it. The rest of us will be interested.

### "No Win" Department

A few months ago, I wrote about the EOT/BOT beeper which could be installed in your Stringy. I mistakenly said Exatron would retrofit it. The following month, I apologized for the error and described how even a beginner could install it. There was a major error in my instruction! With this track record, I'm afraid to even attempt a correction, but here it is, in case anyone still cares! The condenser is actually near IC 6 (it's identified on page F-2 of the manual as C21). It is mounted above, or sometimes below, the board. The trace, at the end of which the red beeper lead is to be

soldered, actually extends out from under IC 5, and not IC 11. I've answered several inquiries already and still have more to go.

### Scriptit Note

Several people have written about Scriptit for ESF. Here are some summary notes. You can put your tape version on wafer by using the ESF Monitor (Exatron 192, \$9.95 — most valuable of all ESF software). This needs a twenty-foot wafer because it's just a wee bit too long for ten feet. This version loads rapidly, but saves and loads text only via tape. Get the ESF patch from Exatron (133, \$9.95), load your tape version, then load the patch.

The patch overlays the tape version, converting it to accept commands to save by file number, load by file number, certify (@NEW) by file number and even choose the drive. Standard ESF responses, e.g., error messages, bytes certified, etc., appear in the special command line as needed. Saves are continuous and

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are verified. The patched (revised) version can be backed up ad infinitum and you never need the tape version, or the patch you bought (darn it) again.

There's also a program called Crossword, which converts Scripsit tape files to ESF files. At this writing, I don't know what it costs, or anything else about it. If you're interested, call the hot line.

Mr. Paul Secord of Houston, Texas, reports several interesting things about Scripsit, to wit:

"If you're like me, you have entered substantial text into memory and then, instead of entering S F1 for save, you (inadvertently) enter L F1 for load. Your text disappears from the screen and the Scripsit buffer appears empty. But, it isn't! Use any monitor available to print the text, which begins at (RAM) address 6ED1H. In that way, at least you don't have to recompose your deathless prose.

"Or, once again, you have substantial text entered, but you forgot

to set your printer to the kind of typeface that you want. If you reset, give your printer the appropriate BASIC command, and return to Scripsit via 4300H, you will wipe out your text. But there is another reentry which will save your text and let you continue from where you left off. After reset, and after giving your printer the appropriate commands, do the following: 1) Type SYSTEM, 2) press ENTER, 3) type /21510, 4) press ENTER, 5) press CLEAR, and you will be back in Scripsit, with text preserved.

"Finally . . . I become impatient with the slow cursor movement during . . . editing. You can set the speed of the cursor . . . with a simple POKE command. The byte at 20785 controls cursor speed, both vertically and horizontally. The default value is decimal 13. This can be done by resetting to BASIC after loading Scripsit and POKEing (a smaller number into address 20785). Then, do SYSTEM and /21490 to return to initialized Scripsit. I prefer an

accelerated speed achieved by the command POKE 20875,4. Apparently, this value, with some kinds of touch, may cause key repeats, so if 20875,4 is too fast, try some value between four and thirteen. It will really speed up your editing!"

Your @NEWS editor has a big problem with all of this. When I reset out of Scripsit, my operating system is a mess, and I can't do anything, let alone what Mr. Secord suggests. I can change cursor speed by holding shift when I load Scripsit from wafer, thus defeating the autostart. Now, I execute the POKE 20875,6 and do a SYSTEM /17152 to get into Scripsit. As for the rest, it sounds great, so I've printed it here. If anyone knows how to take advantage of it, please write to me at 80-U.S. Journal!

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In case your January issue doesn't arrive before the holidays, have a very Merry Christmas and, in all ways, a Happy 1983. ■

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# Data Ace

## *A powerful database manager for the Model II*

Model II

T. R. Dettmann, Associate editor

Anyone working with business software is associated with database management. After all, what is a general ledger, if not a database? The same goes for inventory, accounts receivable, accounts payable and so forth.

Data Ace is a standalone database management system which provides the user with a simple, flexible, yet incredibly powerful, relational database management system. Using simple commands such as LIST, ADD, CHANGE and DELETE, you can do a major part of the normal data management tasks necessary in most systems.

If you wanted to list an account number 156, you would simply say: LIST ACCOUNT 156, if you had previously defined the account relation. In order to list all accounts in the account relation, you make the request plural: LIST ACCOUNTS. The whole system is this easy to use.

If that were all the system provided, it just wouldn't be enough. You should also be able to search through the database and look at records selected according to specified criteria. What if you wanted a list of all accounts that have balances over \$1000 and are greater than ninety days overdue? Could your accounts receivable provide such a list? Probably not.

Data Ace makes questions like that easy to answer, even if you didn't think of them when you

started. What's even better is that you can automate such requests as new commands in the system.

Flexible report processing is a much harder requirement to meet. If you buy an accounting program off the shelf, you're stuck with its reporting formats unless you change them yourself. With Data Ace, it's so simple to define a new report format, you just define special reports as needed.

Let's assume you have a customer file which records all orders for each customer. As a salesman, you might want to make a report which lists all customers who have large amounts of credit available and a history of buying but who haven't bought recently. The Data Ace manual shows you how to make such a report.

Do you want totals? Data Ace can handle them. Special heading on your reports? Data Ace has that too! I was most impressed with its ability to combine relations.

Let's say that we define an inventory relation (think of it as an inventory file if you wish). If we want to scan an order-entry relation for information and at the same time pull out amplifying information from the inventory, Data Ace can do that with the JOIN command. During a join operation, two normally distinct relations are treated as one. Try that with Profile or Profile Plus!

So even with all that, you still

want to make more of it. Well, that is possible too. Data Ace has a built-in fully-structured programming language modeled on Forth. Using volume two of their manual, you get a beginner's introduction that gives you enough practice in their Data Manipulation Language (DML) to be able to add your own customizing to the system.

DML is a derivative of polyForth and was developed by Computer Software Design, Inc. to provide the programming ability they needed. It comes as part of the Data Ace system. You don't have to know, or love, Forth to like DML (but it does help). Learning DML makes it possible for you to tailor a system the way you want it.

The system comes with three disks. The first disk is the Data Ace system disk. This is *not* a TRSDOS system. In fact, it is a complete system all by itself. The Data Ace system disk goes in Drive 0 when you boot-up and it starts up in the Data Ace system, ready for use. No Disk Operating System to worry about, just Data Ace.

The second disk is a demonstration data disk. The whole manual for Data Ace is keyed to playing games with the demonstration disk. Relations have been defined, data entered, and enough special work has been done so that you can play with all of the capabilities of Data Ace just on the demo disk.

The manual takes you through a series of examples and tells you what to try and what you should get. This makes the manual easy to follow. Less advanced users can stop with the simple data manipulation and definition facilities. More advanced programmers can learn to do anything they want.

It sounds like this package is too good to be true. Well, it almost is. It is remarkably flexible. It is amazing that it's here on so small a computer as the Model II. I have seen data management systems with this much power on large computers, but never on anything as small as a Model II. It gives you large machine power on a small machine.

I have had about two months to play with the system and try my hand at building databases and tearing them down. I have had numerous successes, primarily due to the ease with which I could follow the manual. By playing with their data disk, trying their examples, and working through their problems, I was able to get to the

point where I could create useful databases in only a few hours. I can safely say that I wouldn't hesitate to use this for a complete accounting system wherever it fit the task.

### Backup

There is a normal backup procedure clearly explained in the manual for the data disks. But there is no way to do it for the master disk. That seems a little excessive to me. One problem and sorry, no system! It is especially bad if you have a great deal of custom programming on that disk. What do you do? The Data Ace people will replace your system, but they can't replace your customizing.

Data Ace also suffers from its own isolation. Since it is a standalone system, it can't read TRSDOS disks without special programming. You couldn't use it to share information with existing systems. Not unless you wanted to write your own disk access routines.

By isolating itself so much, Data Ace must function for now as a

standalone system. That's not bad, it's not good, it's just the way it is. For many applications, that's just what's called for; for others, it isn't enough.

At \$850 for the Model II version, Data Ace is not the kind of thing you just pick up for fun. That kind of price is only justified by serious use. You have just got to generate some income from such a purchase.

Its advantages make Data Ace a major package to consider for the development of new software. The disadvantages of Data Ace are outweighed by the advantages. I certainly recommend Data Ace to anyone looking for the most powerful database management ability possible. ■

---

*Ed. note: Data Ace is available from Computer Software Design, Inc., 1911 Wright Circle, Anaheim, CA 92806, (714) 634-9012. The company reports that a Model III, hard disk version will be available in the near future for \$375.*

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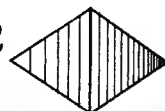
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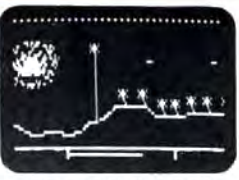
### STRIKE FORCE

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### PANIK

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### SEA DRAGON

Your submarine, the U.S.S. Sea Dragon, penetrates a mined enemy channel. Armed with missiles and torpedoes, you engage the enemy while navigating unknown waters. Succeed or come to a salty end in this game. 29 screens of horizontally scrolling sea-scape and sound from Adventure International. Price: B

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# 10, 15, 20%



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Huge boulders careen off the walls. You're in the middle in danger of being flattened. Keep your wits about you as you blast these "bounceboids" from the screen. Large ones break into many small ones. Clear a screen, and enter a fast-paced challenge stage with a chance for big bonus points from the Corsoft Group. Price: A



### CATERPILLAR

An arcade favorite! Stop these multi-sectioned crawlers before they creep down through the mushrooms. Zap one and it splits into two smaller bugs, each with its own sense of direction. There are moths and tumble bugs too. It all adds up to lots of fun for kids and adults alike. From Soft Sector Marketing. With sound. Price: A



### DEFENSE COMMAND

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### OUTHOUSE

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### GALAXY INVASION

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In this game of ICBM's, high-energy lasers and particle beams, you control the U.S. strategic defense satellite system. From your viewpoint high above the globe, you intercept Soviet nuclear missiles in flight and attempt to destroy their scattered missile silos. With sound from MED Systems. Price: B



### CHICKEN

Will the chicken cross the road? That's up to you. Can you guide these helpless little chicks across the perilous "to lane" super highway to safety? Or will you bump, hitting the backstop with a storm of chicken feathers? A humorous yet challenging game of nerves from SSM with sound. Price: A



### PENETRATOR

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C: TAPE: \$24.95 + DISK: \$24.95

ALPHA Products

# 58

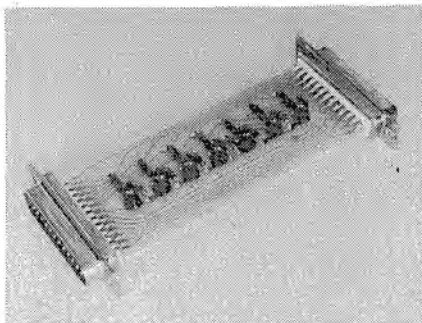
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All photos are actual TRS-80 screens.

December, 1982 \$9

# New products



## RS232 Tester

B & B Electronics offers an RS232 Tester which monitors and displays the status of the seven most important RS232 lines. LEDs clearly display the status of Transmit Data, Receive Data, Request To Send, Clear To Send, Data Set Ready, Carrier Detect and Data Terminal Ready. The unit has one male and one female 25-pin connector for easy (no adaptor required) insertion into any RS232 interface. The tester requires no power, and is designed to be left in the line permanently. It does not affect data-transfer ability.

Available directly from the manufacturer, B & B Electronics, Box 475, Mendota, IL 61342 or Phone: (815) 539-5827, at \$39.95 postpaid.

#200

## New 3" Micro-Floppydisk Drive and Cartridge

Just introduced by Amdek Corporation, the Micro-Floppydisk offers one-megabyte capacity and is plug compatible with standard five-inch floppydisk drives. The new drive has a built-in power supply and accommodates two three-inch Micro-Floppydisk cartridges.

Only .179" x 3.15" x 3.94," the new Micro-Floppydisk cartridge features a flip-type, hinged head cover that protects the three-inch disk from dust, scratches or fingerprints.

Single-side recording capacity is 125K bytes or 250K bytes for both sides with double density (500K byte) capability. A "write protect" mechanism is available to assure "read only" status.

Micro-Floppydisk cartridges are low-priced and the new drive unit is only \$899.

For further information, write or phone: Amdek Corporation, Marketing Dept., 2201 Lively Blvd., Elk Grove Village, IL 60007, (312) 364-1180. Tlx 25-4786.

#201

## COPY-TAPE

COPY-TAPE is a utility program used to duplicate BASIC or system

tapes. Make back-up copies of your software on both the TRS-80 Model I and Model III. On the Model III, COPY-TAPE converts 500 to 1500-baud and vice versa. It is menu-driven and extremely easy to use. Options include load original tape, record new tape, verify tape and advance tape. COPY-TAPE presents the ASCII code of the program on the screen during loading and recording. Available for the TRS-80 computers Model I Level II and Model III, requires 16K minimum. The guaranteed cassette tape sells for \$11.95 and is available from Modtec, Software Division, 4144 N. Via Villas, Tucson, AZ 85719.

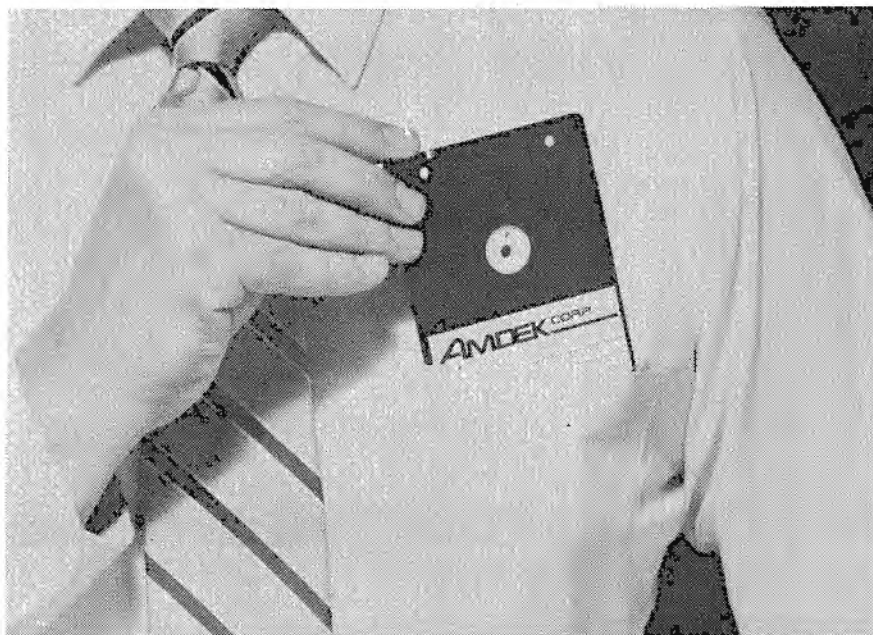
#202

## COLOR-FORTH

COLOR-FORTH for the TRS-80 Color Computer (6809) is now available. Prices are \$58.95 for the RAM version and \$123 for the ROM plus RAM version. Included with the ROM are instructions for installing it in the disk controller, or it will work in a ROM cartridge.

COLOR-FORTH works with both disk and tape. The ROM version will work with 4K of RAM. The RAM-based version requires 16K.

COLOR-FORTH comes with a powerful Semigraphic-8 editor and a set of utilities. It has a unique trace feature, and handles interrupts cleanly in high-level Forth. COLOR-FORTH maintains the CPU carry



flag, for easy implementation of extended math, and has words for bit manipulation, graphics, sound, task multiplexing, fast math, auto-repeat keys, control keys, disk and tape control and linkage to BASIC routines.

COLOR-FORTH was written largely in assembly language, and it takes advantage of the unique features of the Color Computer. COLOR-FORTH does not affect normal operation of the Color Computer.

For more information contact: Hoyt Stearns Electronics, 4131 E. Cannon Dr., Phoenix, AZ 85028, (602) 996-1717.

**#203**

---

**Low priced  
212A-compatible modem  
from Radio Shack**

Radio Shack now offers a high-speed direct-connect modem that operates at either 0-300 or 1200 baud. The new TRS-80 DC-1200 High Speed Direct Connect Modem (76-1005) is available for \$699; an optional add-on auto-dialer accessory module (76-1009) is also available for \$149.95.

With high speed operation, time charges (and in some cases, affiliated long distance charges) may be greatly reduced.

The DC-1200 Modem can operate asynchronously at 0-300 baud (Bell 103/113 compatible). Both full- and half-duplex operation are supported at both speeds. The unit features manual originate (plus auto-dialer option available), automatic answer operation, and is self-adjusting to the incoming baud rate. A self-test mode has also been incorporated, as well as eight LED status indicator lights. Connection to TRS-80 computers is made to its DB25 connector with standard RS232C cables.

For further information contact your local Radio Shack Computer Center.

**#204**

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**COLORTEXT**

MICRO SCHOOL PROGRAMS announces COLORTEXT, for use on TRS-80, 32K Color Computers, with one disk drive. COLORTEXT is an easy-to-use, high-resolution text driver which displays a variety of

character fonts and graphics on the screen simultaneously, including the use of all features of Extended BASIC. It permits the intermixing of upper-lowercase text and graphics in various sizes and colors.

Other features include non-destructive overwrite for animation, variable screen scrolling speed, a BREAK key lock-up option, and ADDCHR — a program for creating and editing all characters, (including graphics, alphanumeric, etc.). ADDCHR can be used to create character sets of up to 200 characters. The defined character sets may be for foreign languages such as Greek, Hebrew, Russian, or various other print types. Special characters may also be defined and displayed within standard print statements.

The TRS-80 Model III graphics character set is included in COLORTEXT. This permits the user to enter and use programs written for Models I and III very quickly, using the same graphics character set numbers used in the other programs. This character set may be changed by the user if desired.

COLORTEXT comes on disk with a fifty-plus-page manual priced at \$79.80. For further information contact: BERTAMAX, Inc., 101 Nickerson, Suite 202, Seattle, WA 98109, (206) 282-6249.

**#205**

**Double Density Adapter**

The Holmes DX-1D Double Density Adapter adds double density and eight-inch drive capacity to the TRS-80 Model I for only \$129.50. Double density, eight-inch drives for the Model I require faster system speed and it can be achieved using the Holmes Sprinter II.

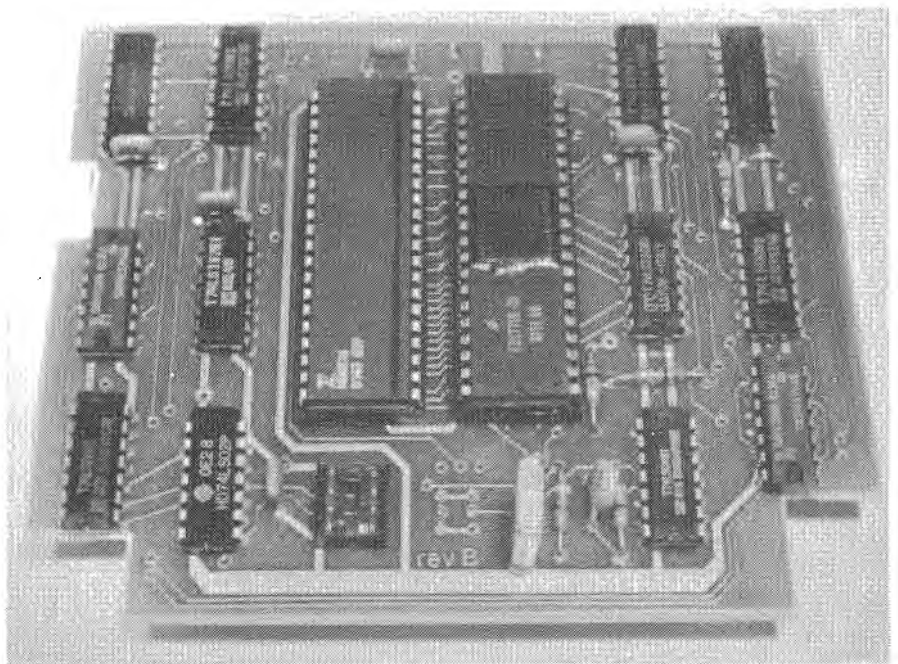
Designed for use in the TRS-80 Model I, the DX-1D can be used with the Radio Shack Expansion Interface, Holmes DX-1S single density disk controller, and other single density Model I compatible disk controllers.

Complete with a "state-of-the-art" LSI Data Separator, this new product offers greater disk storage, fewer read errors, and greater long-term performance than other controllers.

This product with the Holmes Expansion Mainframe and DX-1S Single Density disk controller provides a complete double density disk controller for \$319.

The Double Density Adapter is available through Holmes Engineering, Inc. or any of its authorized dealers. For more information call or write: Holmes Engineering, Inc., Dept. #20, 3555 South 3200 West, Salt Lake City, Utah 84119. (801) 967-2324.

**#206**



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# Exploring VisiCalc

Models I/II/III/16, PMC-80, LNW80

Tim Bowman, Spokane, WA

The VisiCalc program is best known for its ability to perform calculations and allow the user to consider questions like, "What if..." This month, let's use VisiCalc to do some things that you may not have considered using it for: text processing and forms creation.

## Text Processing

Believe it or not, VisiCalc can be used as a very adequate text processor and it is very easy to use. All that you need to do after loading the program is to set the column width equal to fifty-five by typing /GC55 ENTER. Then, begin typing. It is important to remember that the regular VisiCalc commands govern the input of text material. For example, if you wish to begin a sentence with a non-alphabetic character, you must type a quote sign (shifted 2) before typing the text material. It is also important to note that while typing in text on the edit line, you can type many more characters on the edit line than will actually print on the screen or a lineprinter.

The power of VisiCalc comes into play when you want to enter additional lines of text in the middle of existing text. This is done by typing /IR and typing the text to be inserted. Similarly, you can delete lines of text by typing /DR. For those of you with the older version of VisiCalc, you do not have a line edit

capability, so if you wish to edit a line, you must type the whole line over again.

In order to properly position the output on a lineprinter, so that it does not print the left margin on the left edge of the paper, you will have to either shift the paper in the printer to the left, or start typing the text after ten or twelve presses of the spacebar.

In any event, VisiCalc can serve as an emergency word processor, or, for the budget-conscious person, an inexpensive text processor.

## Forms Creation

In my occupation, I have discovered that we use a number of forms and that VisiCalc can be used to easily create forms. The reason VisiCalc can create forms so easily is due to its replicate command. Before you try what I suggest next, I would encourage you to refresh your memory and review your VisiCalc documentation of the replicate command.

If you wish to save any text that you created using the preceding tip, now is the time to save it. Type in /CY and /GC5 to set the column width at five spaces. We'll create a simple form to keep track of time by job. Type in the information shown in Figure 1. Be sure to provide the spaces after any quotes in order to get the proper character alignment.

After Figure 1 has been typed in,

the real power of the replicate feature can now be used. With the cursor at position B6, type /R.K6 DOWNARROW ENTER B18 ENTER. After the enter key is pressed, you should see the screen fill the cell positions with the replicated material. I've found that it is faster than any word processor at duplicating repetitive material, such as lines or boxes, or any other characters. The reader who is familiar with the replicate command will also see other uses of that command while typing in the detail in Figures 1 and 2.

To finish out the form, type in the additional information as shown in Figure 2, with your cursor beginning at position C19.

After you have typed in Figure 2, your final product should look like Figure 3. I have found that I like more space between the empty lines, so I use the insert command (/I) before any line that I wish to have more space. The example in Figure 3 is relatively simple, but by using a little imagination, I am confident that you can create useful forms for your own use.

---

*Ed. note: Correspondence for Mr. Bowman should be addressed to Mr. Tim Bowman, c/o 80-U.S. Journal, 3838 S. Warner St., Tacoma, WA 98409. Be sure to include a SASE if you desire written response.*

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# Captain 80

*The adventures of a software secret agent*

© 1982, Bob Liddil, Contributing editor

Here's the Software Secret Agent, off on another deadly mission into the hinterlands of TRS-80 software-dom. My top-secret equipment includes some of the old standards: a combination belt buckle telephone/modem and laser blaster in case of aliens, a ballpoint pen watch/micro-cassette recorder and standard top-secret, all-purpose, milk of human kindness gumdrop popper.

This mission was commissioned by none other than the CIA, (better known as Citizens against Interaction in Arcadia), committee on plots to reinstate adventure as the number one genre in microcomputer gamedom. The nature of the assignment was so secret that the guy who briefed me wasn't allowed to listen.

It was simple. All I had to do was investigate rumors that Scott Adams, who had launched a fully-computerized submarine, had been kidnapped by Blowhard, notorious international criminal, oil baron, shipping tycoon and litterbug.

It was true. Investigation revealed Adventure International's new Sea Dragon. The latest twitch by arcade geniuses Wayne Westmoreland and Terry Gilman created a great sigh of

acceptance from video game aficionados. I must confess that I am among those who embraced this game enthusiastically.

Sea Dragon succeeds where Sky Warrior failed, as far as combining elements of different popular arcade games into a coherent, new activity. By going underwater with their scenario, the dynamic duo of diverse compuanimation freed this offering of all but the most oblique similarities, to Defender and other coin-op twitches.

Here's how Sea Dragon works. The submarine is launched from shallow water into a sea of floating mines which (most inconveniently) float up to blow her to smithereens. Ah, but she is not without defenses. The forward tubes spit out an endless stream of deadly torpedos which are quite capable of destroying these mines. Chained, or unchained, they are worth points to the player.

As the cleverly-executed sea floor scrolls under her keel, Sea Dragon makes the briny deep safer for mankind. If this were all there were to the game, the terrific twosome would have scored a fair hit with me. But, not content to simply be good,

they added other elements.

First of all, air is not unlimited, so frequent surfacing is required. Also, the aforementioned scrolling seabed, which makes up the one-way course Sea Dragon must follow, is fraught with caves containing killer stalagmites which fall, and can do in undersea travelers. And, what submarine game would be worth its salt without battleships to blow up?

There are EATS (Enemy Attack Stations), which fire at random as you pass. Not an altogether safe way to travel, Sea Dragon, if you ask me. There is also a reactor (possibly owned by Blowhard, remember him?), that spews radioactive chunks and is protected by a large neutronium shield fabricated by a work force recruited from pro-nuclear plaque carriers at airports in seventy cities.

Sea Dragon's ability to blow things up extends to both the horizontal and vertical plane, and allows a lot of room for growth in skill level. Resident arcade munchkins have to be dragged away from the computer that contains this program. It is a winner, a challenge, an amusement, an achievement and a fair buy for the money, all rolled up into one neatly-



illustrated package, onto which the Adventure International nameless artist lovingly airbrushed a fine poster-quality submarine scene fit for hanging on a computer room wall.

All this was useful information as I set out to rescue Scott from the clutches of the guest Evil Villain of the Month—namely Blowhard. I would use my patented electromagnetic, microprocessor-equipped, infrared adventure grandmaster detector, and a cleverly-designed Bad Guy Buster, guaranteed to foil any evil plot.

When I arrived at Blowhard's mansion, I noticed that the lights were dimming. Was I too late? I raced through the corridors to Blowhard's laboratory. The fiend! He was torturing the Phooba of

Puzzles by making him read old two-color documentation covers from Mad Hatter, Ramware and The Programmer's Guild.

I aimed my Bad Guy Buster squarely at the skulking torturer and fired, but the rays bounced off and melted my gun. Then, he ordered me to drop the BGB, or he'd turn up the power and torture poor Scott to death. I hesitated. He reached for a copy of Ting-Tong. I knew I was beaten. I capitulated. I dropped the BGB and surrendered.

"Ah, ha! I've *beaten you, Captain.*" Blowhard cried triumphantly. As he opened his mouth and let out a squeal of pure joy, I let him have both barrels of my milk of human kindness gumdrop popper.

"Oh, no!" he yelped.

"Oh, yes, Blowhard!" says I. "From now on, you will have to be kind to everyone you meet. No nasty letters, no dastardly deeds, no littering. The milk of human kindness gumdrops have no antidote."

He left the lab a confirmed do-gooder, and the last I saw of him, he was heading for the coast in his Jaguar, ready to perform massive good deeds in the Orient. Another threat to humanity foiled.

I turned Scott over to the crew of the Sea Dragon for the long voyage back to Orlando. "Who *was* that caped crusader?" I heard him mutter, obviously still dazed from re-reading the instructions to Journey to the Center of the Earth.

I chuckled to myself. A good day's work, well done, thought I . . . and wait until the CIA gets my bill. ■



# Reviews

## Speak

Model I/III  
48K with disk  
Model I version

Order direct from author:

Mr. Bill Neville, III  
P.O. Box 2581

Houston, TX 77001

\$39.95

Model III version:

The Alternate Source

704 No. Pennsylvania Ave.

Lansing, MI 48906

(800) 248-0284

\$39.95

Speak is a program which will "add lips to your TRS-80" computer. I have always wanted to have a program which could produce voices on my computer, but I have never been able to find such a program, until now.

The program itself will work only

on disk systems, and recording can only be accomplished using a Model III computer. Model I users can record voices if they bypass the Radio Shack tape recorder modification — this process is described in the Speak documentation. There are several programs on the disk, including Record, which allows me to talk to the computer to record my voice, Pack which lets me pack my voice into BASIC programs, and several demonstration game programs such as talking Hangman. Note that any voice can be recorded, since Speak can recognize and record any word.

### How it works

After typing in Record from my DOS READY prompt, I may record in either the word or phrase mode. The word mode is used most often,

since it is the only type that can be packed into my own programs. The only difference between these two modes is that in word mode, each word is packed into a string. Phrases are packed continuously into memory. Words in phrase mode are, in effect, "strung together" so that a sentence is stored, rather than a word. Usually, about eight words can be packed into any one phrase.

Recording is very simple since all I have to do is talk into the small microphone on my tape recorder. The computer will acknowledge each time a word is spoken by saying "word 1 recorded," "word 2 recorded" and so on. The buffer will be full after about eight or ten words. At this point, I save my words onto disk in a data file.

After saving I can pack my words into BASIC programs by using the

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# 62

Pack/Bas program. I can listen to each word and then decide if I want it packed or not. I am amazed at the clarity of the voices, they sound almost exactly as if I were talking. Once all the strings are packed into BASIC (an amount limited only by your memory — usually about fifteen words), the process of putting voices into my program is finished.

**Using the words**

Although only disk systems can use Speak, the voices may be reproduced on any TRS-80 Model I or Model III. Due to the limited number of words that can be packed into one program, games will probably make the best use of speak for saying things like "game over" and "you're dead." However, other applications can be practical. On a disk system many files can be saved and accessed quickly for teaching the alphabet and numbers or any other thing which is re-enforced by using real voices. Hundreds of words can be saved to disk ready to be used

later.

Although the voice sounds very much like my own, the speed may be changed so that I can sound like Mickey Mouse or a very old man. Every word is produced through the cassette AUX plug connected to an amplifier.

Speak is an excellent program with many applications. I have never seen a program of this type before, and I believe that programmers would find this especially helpful. Speak's clarity is excellent, and I highly recommend it to anyone wanting a way to put voices in their programs.

Tim Knight

**Crayon  
Model I/III,  
PMC-80, LNW80  
Pioneer Software  
1746 NW 55th Ave. #204  
Lauderhill, FL 33313  
\$35 tape  
\$45 disk  
Pioneer Software, the maker of the**

excellent "Scriptr" program, has come out with another impressive program. It is a program for the TRS-80 Model I/III owners with either disk or cassette and it is appropriately named Crayon.

It is named Crayon because it literally turns your screen and keyboard into just that. With the Crayon program, it is possible to draw and modify graphics on your TRS-80 screen. But that is only the tip of the iceberg, as far as Crayon's power goes.

In brief, here are some of the fine features of this program that took one and a half years to write. Crayon will allow you to typeset logos. For instance, if you are part of a company, say, "Acme Green Beans," you can use a simple command to get "Acme Green Beans" printed in bold graphics letters on your paper. Doing this is much less expensive than having the same job done at a printing shop. You don't even have to be part of a company — maybe you'd like your

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name printed in huge letters on your paper! Crayon allows you to create and run real-time cartoons. These are not shoddy, flicker-filled creations, either. Crayon has the power to run the cartoons you make at thirty-five screens (or frames, if you wish) every second!

In addition, this program will maintain a full disk directory for you, along with commenting and searches for your directory.

One of Crayon's main functions allows you to draw anything on the screen you would like, and then save it to either tape or disk.

Also available with Crayon is the ability to keep an appointment schedule. Using the thirty-frame storage area, you may keep a full month's appointments on your system! I think this is an especially creative idea of Pioneer.

Crayon allows you to do virtually anything you would do with a video worksheet, but much more efficiently and effectively.

You use the screen as a drawing board, then send that drawing to

your printer, tape or disk file. This is much easier to do than drawing out your picture on a graphics worksheet, then trying to transfer your picture from paper to computer.

Of course, using a cursor to form these pictures might get a little difficult, since the cursor is the same as the graphics. Pioneer has planned ahead for that. Crayon has a nine-character cursor that surrounds the character but never covers it and is always clearly visible in any display. Along with that, there are sixteen different commands for efficient graphics entry, for things like title pages and bar graphs.

Crayon can work in conjunction with another fine program from Pioneer Software called Scriptr. Using the two together, you can load in a picture from Crayon, temporarily halt the printing of Scripsit, then send the picture directly to your printer!

The thirty-screen buffer is another handy item to have, especially considering the imaginative

possibilities. Lists and records can be kept within the thirty-screen buffer, which may also be used to print mailing labels! Crayon certainly is a number of great individual programs rolled up into one package.

Using Crayon as a text or graphics processor is well supported by many sub-commands. These are all covered in the easy to understand forty-page documentation. These commands include functions for deleting, inserting, exchanging and inverting graphics. One might think that with all of those graphics within a print-out, that print justification (the alignment along the side of the paper) would be lost. Not so! Crayon makes sure that no matter how many graphics you create, the print-out will remain justified.

Crayon is a professionally done program. It has fine documentation, excellent versatility and great features. If you work with graphics, either on the video screen or paper, I recommend that you buy Crayon. It

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is very reasonably priced, and certainly well worth it. In my experience with Pioneer Software, they are courteous and willing to answer any questions you might have about their software. These things — good software, good documentation and good software support — are what make purchasing and using software enjoyable. Crayon is a superb program. If you think you might need anything like it, buy it.

Tim Knight

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microcomputer users run into is how the heck he or she is going to store programs and data. The ubiquitous tape recorder is slow, error prone, generally cumbersome to operate, has limited storage and retrieval capabilities, and is quite inexpensive. One the other hand, floppy disk systems are very fast, much less error prone, computer operated, have excellent storage and retrieval qualities (90K to multi-megabytes), and are very expensive!

These alternatives are also true for TRS-80 owners. To make the leap from cassette to disk involves the purchase of an interface (\$299 without memory), one or more disk drives (\$495 from Radio Shack, as low as \$300 from some sources) and disks (about \$5-8 per disk usually). That's over \$800 for 90-120K bytes of storage! When my time of truth arrived, I was bound and determined to find effective mass storage at low cost.

I pored over computer journals and searched computer stores for months before I learned about a small company in California called MECA. They had just begun production of a digital cassette storage device called the BETA-80 which was designed to interface directly with the TRS-80 Level II. The promotion literature promised 512K bytes of formatted storage on two tracks per drive (256K per track in 1000, 256-byte blocks) and up to four drives on-line at once. Each track could hold up to sixty-four file names, which could be used to access any combination of BASIC, machine language program or data. The BETA-80 has its own microprocessor and runs asynchronously. This means that it runs independently of the main computer and communicates with it in much the same way that a terminal might, a very nice feature. Access time to any point on any track is thirty-six

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# 67

seconds maximum and usually much less. This combined with the fact that the computer does the searching for files by name or location (provided in the directory) made this very attractive in a cassette-based system. Then came the clincher; no interface is necessary and \$699 for the first drive! Drive two costs \$499. (Ed. note: A new double density version is available for \$849 for drive 1 and \$649 for a second drive — capable of over one megabyte of storage.)

This sounded like the answer to my prayers. The operating system allowed all cassette commands to be programmed into BASIC programs as well as by machine language and direct BASIC commands. I sent off my money and waited for it to arrive by UPS. I scanned the manual for any obvious no-nos and plugged the unit into my keyboard. The machine is self-booting just like disk and worked perfectly the first time! The instruction manual, when you get around to reading it, is complete with very good hardware and

software sections. There are numerous examples to try and directions for approved modifications to suit special needs. This is one company that is not afraid to have their equipment looked at and altered. They have sent me annotated source listings for the O.S. and complete schematics. They even have an open royalty proposition for modifications and programs sent for appraisal.

Within a few hours, I had loaded all my programs from the ridiculous pile of tapes on my desk onto two tapes (one working, one backup) with two-thirds of both tapes still empty.

I have owned my BETA-80 for well over a year now, with no more than a handful of lost bytes, usually my fault. In that time, I have acquired a second drive and modified my tape version of Scipsit to run on the BETA-80. This is available to owners of Scipsit for \$20 plus shipping (\$25 for a version that allows selection of typing mode for printers such as the MX-80). MECA

also makes available to registered owners of G2L3 Level III BASIC (Ed. note: from Microsoft, Inc. Bellevue, WA), a self-booting version that gives BETA-80 owners all the power of Disk BASIC at half the cost. Incidentally, I never bothered to get an expansion interface.

Mark A. Schimelman

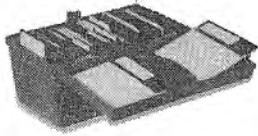
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When the Motorola 6809 chip was first introduced, I was chomping at the bit to find out more about it. I questioned engineers about it and was impressed by what I heard. When I heard the Color Computer was going to use it, it became imperative for me to learn more.

I collected all the technical information I could, but nothing I collected came close to comparing with the completeness and usefulness of Leventhal's 6809

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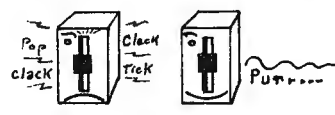
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**Assembly Language Programming.**

It's a hefty book, filled with a large amount of information about the 6809 and various peripheral chips that the programmer has to know about. There's also a large amount of information on general assembly language programming which is useful even to the professional programmer. If you already have some of the Osborne/McGraw-Hill books on various microprocessors, you're already familiar with some of the information.

I've been using the book as a general reference for programming the 6809 and I've never had a real problem with it. It did take me awhile to figure out some of the intricacies of the processor such as the post byte, when to expect it and when not. Here, I got more from the programmer's card for the 6809 than from Leventhal's book.

I can't claim comprehensive application of everything in the 528 pages, but of those instructions I have used, it hasn't lead me wrong.

T.R. Dettmann

**Outhouse**

By J. Weaver, Jr.

Soft Sector Marketing

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Model I/III, \$15.95 cassette

\$19.95 disk

An arcade game about an outhouse? You've gotta be kidding!

Nope — this is Outhouse, Soft Sector M's hilarious new entry into the "original arcade game" category of TRS-80 software.

Actually, the game itself is not hilarious — just the concept of protecting an outhouse and its contents from thieves and aliens bent on destroying your ship and the outhouse below. The outhouse begins with 200 feet of paper. The enemy attacks you in waves, and after each wave that you survive, you are awarded bonus points based on how many feet of paper remain. After every fourth wave, you are also rewarded with a fifty foot roll of paper, although your total cannot exceed 250 feet.

By now, you are surely wondering what types of villainous vandals are attacking the outhouse, and what you, as a concerned citizen, can do to save the paper and the outhouse from certain destruction. First of all, there are seven different types of enemy creatures. Fireballs and rotors will try to destroy you by colliding with you. Anglers and crunchers will try to obliterate the outhouse by crashing into it. Zappers will try to destroy you by firing a laser at you. Thieves will run toward the outhouse and run out of it with the loose end of the paper, unrolling it until they leave the screen. Squatters will run toward the outhouse, enter it, use up about five feet of paper and leave.

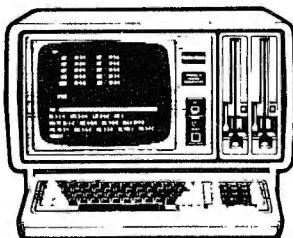
In order to protect yourself and the outhouse from these vicious varmints, you ship is armed with a laser which never runs out, and three smart bombs, which destroy all aliens on the screen.

The game starts out fairly slow, but gets progressively faster and harder. After about wave eleven, it gets so fast that it is almost physically impossible to destroy everything without using a smart bomb. I honestly cannot remember the last computer game that I have played that was so fast moving. It really tests your skill and coordination.

So, what we have here is a game that is fast and funny. But is it a good game? I have played a few fast-action games that just did not appeal to me. Fortunately, Outhouse is not one of these. There are enough different types of aliens to give the game variety and hold your interest. There is enough variance in speed to provide a seemingly endless challenge.

The controls for Outhouse are rather difficult to master. They are similar to those of Big Five's Robot Attack, and consist of using the arrow keys for movement, any number key for a smart bomb, and the space bar and arrows for firing. The way the firing works is that you simultaneously press the space bar and the direction that you want your laser to go. It is not that hard once

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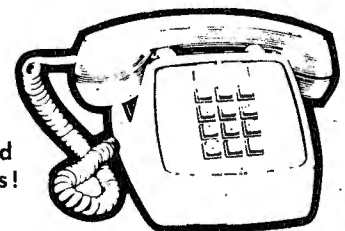
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## Reviews

you get used to it, but it can take a while to get used to it. Outhouse is joystick compatible, although you must go back to the keyboard to press a number for a smart bomb.

The sound and graphics are good (although there is no crescent moon on the outhouse). The disk version has a very high quality voice and saves the eight highest scores to disk.

Outhouse — it is fun, fast and funny. It is, perhaps, Soft Sector Marketing's best game yet. After a day, you will like it. After a week, you will love it. Call SSM sick. Call them disgusting. Call them today and order Outhouse.

**Matt Friedenber**

challenges the player by putting him or her in a complex situation and saying, "Now what are you going to do!?" This is fine until one finally decides to do something, — no list of the available commands is included. It's save game feature allows you to save the game's present condition out to tape (takes about five seconds) and then continue from that point sometime later.

Black Sanctum combines complex situations, fast machine language, and a helpful save game feature to make one of the most fun times one can have on the TRS-80 Color Computer.

**Roy Seney**

**Black Sanctum**

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If you think that creating a text adventure for the TRS-80 Color Computer is a waste of the many graphic features available then you've made a very grave mistake. Black Sanctum has none of that, but what it lacks in graphics is made up for in complexity and difficulty.

Black Sanctum is the thinking man's adventure. It has even stumped this author as of this writing (maybe I'll complete it by publication time). When I first heard about Black Sanctum I thought, "What a welcome relief a nice quiet adventure would be from battling space rocks and U.F.O.s." I should have known that anything Mark Data Products creates could not be taken lightly. Black Sanctum is definitely not for the novice at adventuring. Black Sanctum is puzzling, perplexing, problematic, delicate, ticklish and trying — but, most of all, Black Sanctum is fun.

Without trying to spoil the thrill of discovery, the idea behind Black Sanctum is to destroy the Evil Presence of an ancient, but not yet abandoned, monastery. Black Sanctum is *not* patterned after the popular Dungeon and Dragon type games. There is no fighting or combat in it. Black Sanctum

Electric Webster is a second generation spelling checker, sometimes called Son of Microproof. Although patterned after Microproof, Electric Webster is superior in several areas. There are several possible configurations of the program; however, all testing was conducted on a 48K Model I with two 40-track, single density disk drives using the optional correcting feature integrated into the word processor, Newsprint. It was also tested using an integrated copy for Lazy Writer. Electric Webster can also be incorporated into Electric Pencil version 2.0, Scripsit, and Superscript. It can be used manually from DOS when using the older Electric Pencil, Copyart, Pensadyne and all other word processors. The integration feature is handy because the user never has to leave the word processor to invoke the spelling checker. The corrected text is automatically renamed and Electric Webster returns you to your word processor.

The standard Electric Webster operates by comparing the words in the working document against the words contained in its 50000 word dictionary. All words that are contained in the dictionary are

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listed out on the screen or optionally, on a printer. This list of words becomes a list of "potential errors." I say potential, because a word will appear in the list if it is spelled correctly but not contained in the dictionary. Proper names, plural forms of nouns, and many technical buzzwords are not included in the original dictionary. You then take the list of potential errors and correct the document using the global search and replace features of your word processor. This method is probably sufficient for those who do not have a large amount of material to proof; but, if you do a lot of writing, the optional correction feature would be a wise investment.

Using the optional correction feature is very handy and simple. After the list of potential errors appears, the user hits the ENTER key and is presented with the first word that was identified as an error. The user has six options at this point, each one requiring only one keystroke. The first option is simply to leave the correctly spelled word "as is" without adding to the dictionary. If the word is correctly spelled and will be commonly used in the future, you may decide to add the word to the expansion dictionary. This allows the user to tailor the dictionary to specific needs. If you know the correct spelling, correct it by simply typing in the word and hitting ENTER (option three). The fourth option is to simply exit the correcting feature once all of the necessary corrections were completed.

Options five and six require a bit more explanation and are features that make Electric Webster unique. You may be unsure of the correct spelling and can choose to display the dictionary. After hitting the proper key, you are presented with a list of words in the dictionary, with words above and below where the word in question would appear. Electric Webster actually shows you where that word would appear in relation to several words on either side of it. You can then scroll forward or backward through the dictionary in order to find the correct spelling. This feature is extremely useful if the misspelled word is very close to the correct spelling. Most of the time, the word will appear in the

close proximity on the displayed dictionary. If the correct word is found, another feature allows you to scroll the dictionary until the proper word appears on the bottom line and by hitting a key, will automatically replace the misspelled word.

Another handy feature covers when you know the word is misspelled, and are unsure of the correct spelling. Type the proposed new spelling, preceded by an "@"." If it is already in the dictionary, it will automatically replace the misspelled word. If it is not correct, Electric Webster will take you to the part of its dictionary where the new spelling would have appeared.

The last option is to ask to see the word displayed in context. Here you have the opportunity to see where the word appears in relation to a small portion of the text. However, the only options available while in this mode are to leave the word "as is," type in the correct spelling, or leave it "as is" and skip all subsequent context displays of that particular word.

After all of the words are proofed, the dictionary is automatically expanded and then the corrected text is either written over the original text or a backup copy is made. The entire process is transparent to the user and if disk swapping is necessary, the program prompts you on which disk to insert. On a two-drive, single density computer, four disks are involved: Your normal word processor, the Electric Webster system disk, the dictionary disk and your text disk. On a double density system, disks three and four can be combined. Single-drive owners can also use Electric Webster by swapping disks more often.

The most outstanding feature is its speed. It took a total of seventy-four seconds to produce the list of potential errors for a 2000-word text. Another impressive feature is the compactness of the dictionary. The 50000-word dictionary fits into only 104K of disk space. Electric Webster is truly a state-of-the-art product that performs flawlessly and effortlessly. If you need a spelling checker and have not purchased one as yet, Electric Webster is certainly an outstanding choice.

Jim Klaproth



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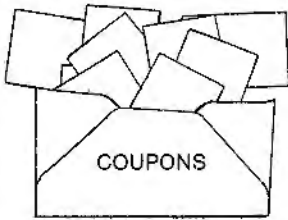
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## Reviews

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Dunzhin is part one of a trilogy of fantasy role-playing adventure games. (Ed. note: *KAIV* and *The WYLDE* are the other two.) Your goal is fame, fortune and retrieval of a precious object buried deep in the Dunzhin. Machine language programming makes this role-playing adventure fast and furious.

You begin as a level one warrior armed with a magic wand, minimum armor, sword and treasure pouch to fill with goodies. Starting at the first level of the Dunzhin, you work your way down to the last level where the mysterious gift is kept. The Dunzhin varies from four to seven levels and contains fifteen rooms on each level. The rooms are arranged randomly in each adventure so there is no way to determine a pattern. Three of the rooms in the Dunzhin contain poisonous gas, three others teleport you to various places in the maze, and three more are regeneration rooms that heal you if you run into some trouble. There are also rooms scattered about to repair armor, weapons and recharge your wand.

Probably the most exciting feature of Dunzhin is its mapping

feature. As you progress the various levels, a map is automatically drawn. This map is never erased. Even if you got to a different level, when you return the map will still be there. The rooms are shown on the map with the letters A through O. You enter the room by placing your warrior directly on the letter. Be careful, Med Systems has thrown in some traps to add to the fun.

Movement is accomplished with a number for steps, and a letter for direction. For example, W9 would move your warrior nine steps to the West. If you have not been through this part of the maze you have no way of knowing where the walls are. Of course, you don't want to go too slow, monsters have a way of popping up.

Monsters have three levels of difficulty and you might be confronted by one or five. Different parts of the body are easier to hit on different monsters. There is also a wandering thief who occasionally takes your treasure pouch. Occasionally, there is a fog which totally obscures the Dunzhin.

In all fantasy games battles are always the best part and that's also true in Dunzhin. When you encounter a monster, or many monsters, you can try to hide or run or fight. Hiding and running are randomly "rolled" or decided. If you're a Storm Bull and decide to fight, you choose a location — head, chest, leg, etc. — and start swinging. Again it's chance and skill that determines if you slay the enemy. Should you be lucky enough to fend off the enemy, you may move up the warrior scale. With each rank comes better armor, greater attack skill, and of course, tougher monsters.

Either Dunzhins or characters may be saved at anytime. A character can gain experience and then be saved to play in a different Dunzhin or the entire Dunzhin can be saved. You may save up to five of each. Saves are done at high speed and do not disrupt the play of the game.

The game is a must for fantasy role-playing adventurers. If you RuneQuest or Dungeons and Dragons, you should enjoy Dunzhin. It's fast, exciting and features most of the ideas of role-playing games.

Mark E. Renne

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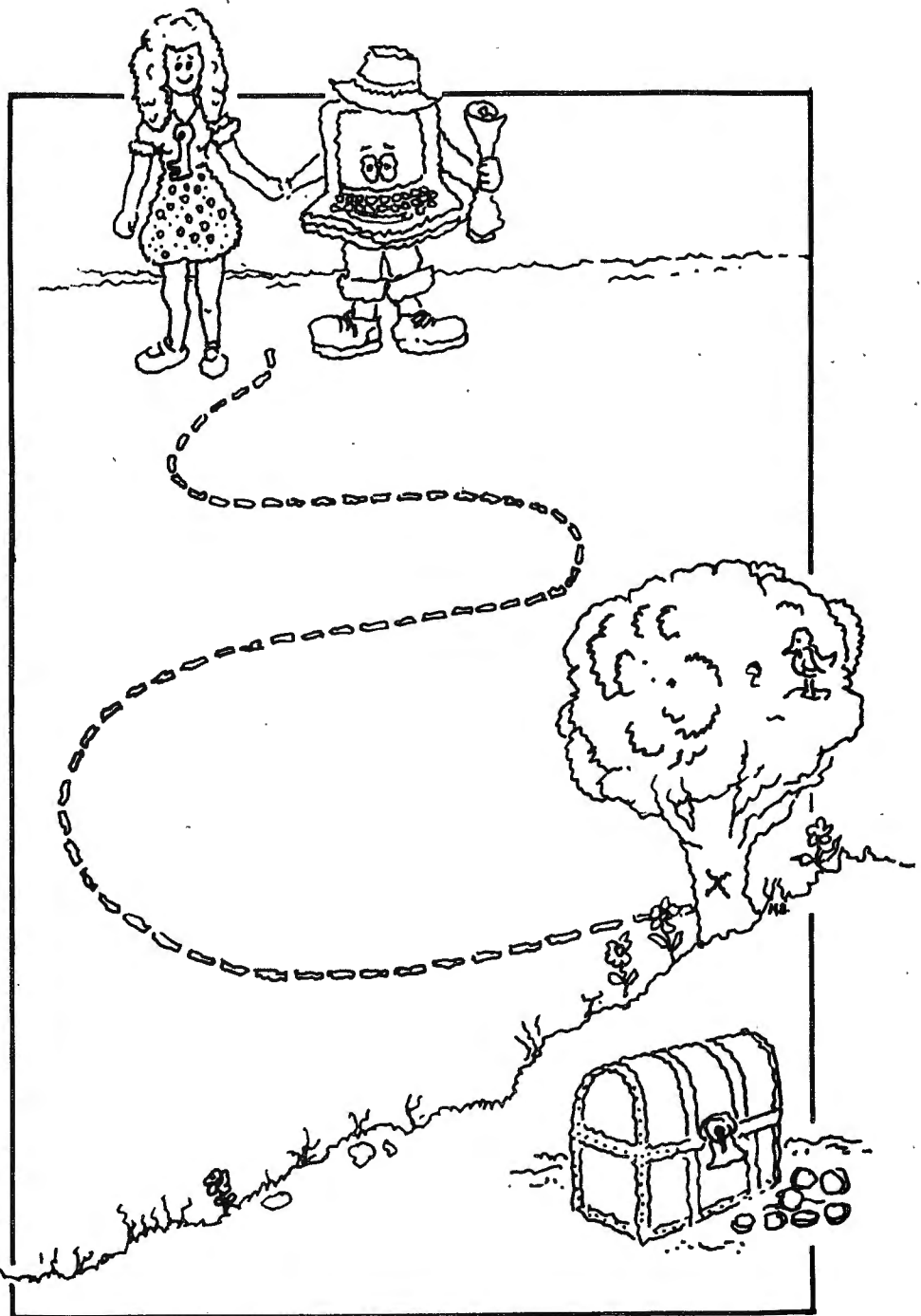
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# Screen dump utility

## A tiny word processor

Model I/III, PMC-80, LNW80

Alfred L. Brophy, III, West Chester, PA

A number of programs have been published that dump the contents of the TRS-80 screen to a printer. Some of them delete spaces, and others store the text to be printed in a buffer before printing it. Although these features can have some advantages, I wanted a screen-dump utility that dumps directly from the screen to the printer and provides an exact copy of the screen contents without changing the text in any way. I was also dissatisfied with the inefficiency of the programs that store every line in a string before printing it. I would rather have the text printed immediately, thus avoiding the use of any extra variables.

I decided to write my own screen-dump routine and, wanting to make it really concise, set out to write a one-line program. Here is the program:

```
20 FOR A=15360 TO 16320 STEP 64:FOR B=A TO A+63: LPRINT CHR$(PEEK(B)); :NEXT B:LPRINT: NEXT A
```

The program works by PEEKing into screen memory, and then LPRINTing the CHR\$ value of the memory location just PEEKed. After printing 64 characters, the printer advances a line and begins printing again. In this way the screen is dumped to the printer exactly as it appears.

If you are dealing with graphics, you might like to maintain about the same height-to-width ratio on the printer as on the video screen. To accomplish this, change the screen dump routine to:

```
20 FOR A=15360 TO 16320 STEP 64: FOR B=A TO A+63: LPRINT CHR$(PEEK(B)); :NEXT B:LPRINT:LPRINT: NEXT A
```

This adds an extra linefeed between each line so the printout will be double spaced. The printout of a full screen will now be 6.4" wide by 5.3" high, about the same height-to-width ratio as the screen. This assumes that your printer is set to print ten characters per inch.

This routine has a number of uses. It can be called as a subroutine in programs that require minimal printer output. It can easily be expanded into the following word processor:

```
10 A$=INKEY$:IF A$=CHR$(13) THEN PRINT CHR$(15);: GOTO 20 ELSE PRINT CHR$(14);A$;:
```

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GOTO 10

20 (same as line 20 above)

The word processor works by using INKEY\$ to get keyboard input. It checks to see if ENTER, CHR\$(13), has been pressed. If ENTER has been pressed, the program turns off the cursor, CHR\$(15), in order to omit the cursor from the printout. It then proceeds to the screen-dump routine at line 20. If, on the other hand, ENTER has not been pressed, the cursor is turned on, CHR\$(14), and the INKEY\$ character is displayed. The GOTO statement at the end of line 10 repeats this process.

Now RUN the program. Type anything you want, up to one full screen. You can use the arrow keys to position the cursor to the spot where you want to type. See Table 1 for a description of the uses of the arrow keys and other control keys in this program. If you make a mistake, use the arrow keys to position the cursor over the character you mistyped, and type over it. When you want to dump the contents of the screen to the printer, press ENTER, which transfers control to the screen-dump routine. If you have a lowercase modification installed in your computer be sure to use your lowercase driver with this program, otherwise the PEEK values will not be correct.

Table 1

Tiny Word Processor Commands

Command	Use
Backarrow	Backspaces cursor and erases character.
Shift backarrow	Backspaces cursor; does not affect any character.
Forwardarrow	Has no function.
Shift forwardarrow	Advances cursor one position;
Uparrow	Prints up arrow.
Shift uparrow	Upward linefeed; does not affect any character.
Downarrow	Places cursor at start of next line and erases that line.
Shift downarrow	Has no function.
CLEAR	Clears screen from cursor's position to end of screen.
ENTER	Dumps screen to printer. ■

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# Let's have a party

*For children of all ages*

For all models

Alan Mandell, Portsmouth, VA

So, you are going to host a birthday party for your child. Do you anticipate, with trepidation, several hours of high noise levels and chaotic destruction of your furniture? Perhaps there is a way for your child to have a successful party and for you to retain your sanity while protecting your property.

This article offers some ideas and programs for a different type of preteen party. By mixing computer-centered activities with other birthday festivities, you may be able to survive an indoor celebration with this age group.

The listings provide some program outlines which are built around children's party games. They provide opportunity for interaction with the computer. The listings are outlines of possible procedures. You will want to use them as models, and insert your own "forfeits" and "treasure hunt" clues. You can also add animation and sound to the programs, if you desire.

Listing 1 provides a program for Forfeits. Lines 1000-1010 grab the attention of the party goers. The OUT 255,4 and OUT 255,0 make it possible for taped music to be played while the graphics are displayed. You will have to change the length of the time loop T to fit the amount of music you wish to play. After the players enter their names (lines 20-25), the computer randomly picks a name and a forfeit to be performed.

Lines 100 and 110 are sample forfeits; you may want to change them after consultation with the party person about the nature of the intended guests. In any event, you should add more forfeits at lines 120 to 190.

The subroutine in lines 200 - 215 erases each player's name after it has been called for a forfeit. If you want to play the game again, the names of the players will have to be reentered. Incidentally, this game (appropriately modified) might add life to some of the parties you host for your own friends.

Listing 2 provides an outline of a "Treasure Hunt" game involving teams of guests. This can be another time consuming game if you have 10 clues that lead to 10 secret words. You enter the clues in lines 30, 35, 40, etc., and the checks for the correct secret words in line 100 to 900. Use the pattern of GOTOs shown in the model for the ones that you add. Be sure to have a prize for winning team. Between you and your spouse, you should be able to develop some tricky and clever clues and

secret words.

Listing 3 will randomly assign players to a team. This could be added to Listing 2 as a subroutine to pick the team members and perhaps protect everybody's feelings.

If the crowd isn't too large, you can load up some individual games and let each guest try to score the highest number of points. A possible disadvantage of computer games played by one person at a time is that the rest of the guests are not involved, except as spectators, and may invent things to do on their own.

Listing 4 offers a short program which will solve the problem of "who gets the first turn" in the individual games.

Don't overlook the fine opportunity for exercising your genius to create a computer birthday card (with several pages) which can be run at cake cutting time, perhaps accompanied by a taped version of the Happy Birthday song.

## Some General Suggestions

For certain age groups, insist that you have lent all your space invasion type games to a friend or the party may be a failure in the opinion of your child. "All the boys wanted to do was zap aliens."

Keep the computer keyboard away from the food and drink area. Melted ice cream will really give you a key-bounce problem that even KBFIX can't fix. Make sure your programs have long delay loops for reading directions, or use INKEY\$. Not everyone reads and comprehends at the same rate.

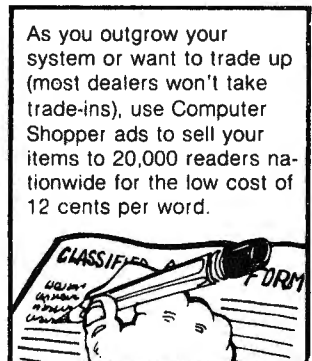
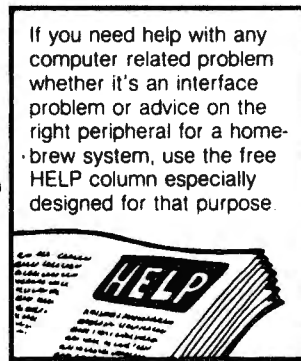
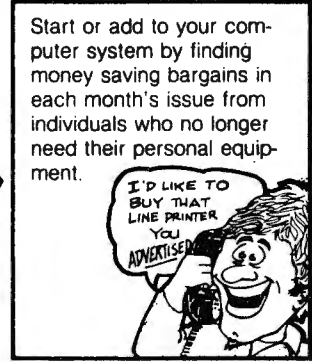
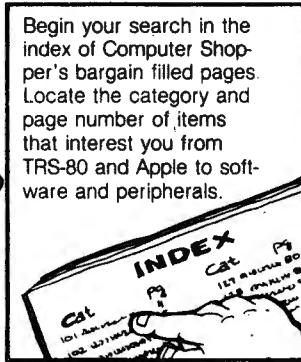
Mix up a computer activity with other non-computer activities to give yourself time to load the next program, while the crowd is busy elsewhere.

Plan to give prizes to the winners. This may add motivation to participate among the guests who would rather wrestle near your china cabinet.

Know the nature and interests of your child and the expected guests. If your child doesn't seem too enthused about computer games at the party, don't push it. After all, it's his, or her, birthday.

I hope that the programs and suggestions will make the party a success, both for the parents and the children. In any event, my best wishes for the party person: Happy Birthday.

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*Ed. note: Model II owners are not to attempt the OUT procedure that is remarked in Listing 1. Model I/III owners may use the audio feature by changing line 1110 to:*

```
1110 FOR T=1 TO 50:PRINT#-1,A:OUT255,4:NEXT:
CLS:OUT255,4:RETURN
```

*You can change the amount of time the recorder remains on by changing T to be higher or lower than 50. Experimentation is encouraged.*


### Program Listing 1

```
1 'LISTING 1 FOR FORFEITS GAME
5 CLS:RANDOM:GOSUB1000
10 PRINT"HI GANG. I'LL HELP YOU DECIDE
WHO IS GOING TO DO WHAT FORFEIT."
15 PRINT:PRINT"LET'S SEE WHO WILL BE FI
RST":PRINT
20 INPUT"ENTER THE NUMBER OF PEOPLE PLA
YING";N:DIMP$(N)
25 FOR I=1TON:INPUT"ENTER NAME OF PLAY
ER ";P$(I):NEXTI
30 GOSUB200
35 PRINT"YOUR FORFEIT IS - ":GOSUB500:P
RINT
40 Y=RND(10):ON Y GOTO 100,110,120,130,
140,150,160,170,180,190
50 PRINT@832,"WHEN YOU ARE READY FOR ME
TO CHOOSE THE NEXT PERSON, PRESS ANY
KEY"
55 KY$=INKEY$:IFKY$="" GOTO 55 ELSE CLS
:GOTO30
100 PRINT"YOU MUST IMITATE A MONKEY WIT
H FLEAS":GOSUB500:GOTO50
110 PRINT"YOU MUST KISS EVERY PERSON OF
THE OPPOSITE SEX":GOSUB500:GOTO50
111 ' YOU MUST ENTER FORFEITS FOR LINES
120,130,... 190 USING THE FORMAT IN LI
NES 100 AND 110
200 X=RND(N):CLS
205 IFP$(X)=" "GOTO200
210 PRINT@256,"OK ";P$(X);" IT'S YOUR T
URN . . ."
215 P$(X)=" ":RETURN
500 FORT=1TO8000:NEXT:RETURN
1000 PRINTCHR$(23):PRINT"* * * ARE YOU
READY FOR * * *":PRINT:PRINT
1005 PRINT:PRINT"! ! ! F O R F E I T S
! ! !"
1110 FOR T = 1TO1000:NEXT:CLS:RETURN
1111 ' YOU CAN ADD SOUND FROM YOUR TAPE
RECORDER IF YOU DESIRE BY USING 'OUT 2
55,1' AND OUT 255,0 AROUND LINE 1110 AN
D INCREASING THE TIME DELAY TO FIT YOUR
MUSIC'S LENGTH
```

### Program Listing 2

```
3 ! LISTING 2 - TREASURE HUNT GAME
5 CLS:CLEAR100
10 PRINTCHR$(23):PRINTTAB(8)"IT'S TIME
FOR":PRINT
11 PRINTTAB(15)"A":PRINT
12 PRINTTAB(8)"TREASURE HUNT"
13 FORT=1TO2000:NEXT:CLS
15 PRINT"IN A MINUTE I WILL GIVE YOU TH
E FIRST CLUE TO START THE TREASURE HUNT
.":PRINT
16 PRINT"WHEN YOU FIGURE OUT THE FIRST
CLUE GO TO THAT PLACE AND YOU WILL FIND
SECRET-WORD #1.":PRINT
17 PRINT"LEAVE THE SECRET WORD THERE AN
D COME BACK TO ME.":PRINT
18 PRINT"I WILL TELL YOU TO ENTER THE S
ECRET WORD TO FIND THE NEXT CLUE.":PRIN
T
19 PRINT"THE TEAM THAT FINDS ALL THE SE
CRET WORDS FIRST, WINS THE PRIZE.":PRIN
T
20 PRINT"WHEN YOU ALL UNDERSTAND THE RU
LES OF THE HUNT, PRESS ANY KEY."
25 KY$=INKEY$:IFKY$="" GOTO 25 ELSE 30
30 CLS:PRINT"CLUE #1 - A PLACE WHERE FO
OD IS KEPT"
31 ' MAKE THIS CLUE GENERAL ENOUGH SO T
HAT THE TEAMS HAVE SEVERAL DIFFERENT PL
ACES THAT MIGHT FIT THE CLUE
32 GOSUB500:GOTO95
35 CLS:PRINT"HERE IS CLUE #2 -"
36 GOSUB500:GOTO95
40 CLS:PRINT"HERE IS CLUE #3 - "
90 CLS:PRINT"HERE IS CLUE #9 -"
92 GOSUB500:GOTO95
95 GOTO1000
100 CLS:INPUT"TYPE IN AND ENTER SECRET
WORD #1";W1$
105 IF W1$="BREADBOX" GOTO 115 ELSE 110
110 PRINT:PRINT"SORRY, THAT'S THE WRONG
SECRET WORD":GOSUB500:GOTO30
115 PRINT:PRINT"YOU'RE ON YOUR WAY. HER
E IS CLUE #2":GOSUB500:GOTO35
200 CLS:INPUT"TYPE IN AND ENTER SECRET
WORD #2";W2$
205 IF W2$ = "WHATEVER" GOTO215 ELSE 21
0
210 PRINT:PRINT"SORRY THAT'S THE WRONG
SECRET WORD":GOSUB500:GOTO35
215 PRINT:PRINT"YOU'RE GETTING HOT. HER
E IS CLUE #3":GOSUB500:GOTO40
500 FORT=1TO2500:NEXT:RETURN
1000 CLS:INPUT"WHICH NUMBER SECRET WORD
DO YOU WISH TO ENTER";N
1005 ON N GOTO 100,200,300
```



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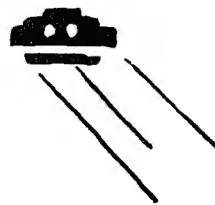
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1006 ' YOU WOULD NEED AN ADDITIONAL 'GO  
TO' LINE FOR EACH SECRET WORD

**Program Listing 3**

```

3 ' LISTING 3 - PROGRAM FOR PICKING TEA
MS
5 CLS: CLEAR100
7 PRINT "I'M GOING TO HELP YOU CHOOSE TH
E TEAMS FOR THE NEXT GAME": PRINT
8 PRINT "PRESS ANY KEY WHEN YOU WANT ME
TO START"
9 KY$=INKEY$: IFKY$="" GOTO 9 ELSE CLS:G
OTO10
10 INPUT "HOW MANY PEOPLE ARE PLAYING"; P
: DIM P$(P)
11 INPUT "HOW MANY TEAMS DO YOU WANT"; T:
M=P/T
15 CLS: PRINT "ENTER PLAYERS NAMES, ONE A
T A TIME"
20 FOR I=1 TO P: INPUT ""; P$(I): NEXT
25 CLS: FOR K=1 TO T: PRINT "OK, TEAM # "; K; "
WILL BE:"
30 FOR J=1 TO M
31 X=RND(P)
32 IF P$(X)=" " GOTO 31
    
```

```

35 PRINT P$(X); "-"; : P$(X)=" "
45 NEXT J: PRINT
50 FORT=1 TO 500: NEXT T
55 NEXT K
    
```

**Program Listing 4**

```

1 ' LISTING 4 A PROGRAM TO DECIDE WHO GO
ES FIRST
5 CLS: PRINT "HI GANG, I'LL HELP YOU DECI
DE WHO WILL WORK WITH ME FIRST"
10 PRINT: INPUT "WHAT IS THE SIZE OF THE
GROUP"; N: DIM C$(N)
15 FOR I=1 TO N: INPUT "ENTER THE NAMES OF
THE PEOPLE, ONE AT A TIME"; C$(I): NEXT I
20 X=RND(N): I=X
25 CLS: PRINT @256, "AND THE WINNER IS ..
.";
28 IF C$(I)=" " GOTO 20
30 FOR T=1 TO 1000: NEXT: PRINT C$(I): C$(I)=
" "
35 FOR T=1 TO 1000: NEXT: CLS: GOTO 40
40 PRINT "WHEN YOU WANT ME TO TELL YOU W
HO WILL BE NEXT, PRESS ANY KEY"
45 KY$=INKEY$: IFKY$="" GOTO 45 ELSE 20
    
```

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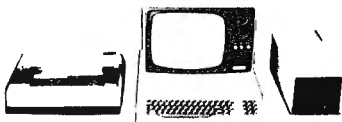
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## MORE THAN JUST ANOTHER PRETTY FACE.

Says who? Says ANSI.

Specifically, subcommittee X3B8 of the American National Standards Institute (ANSI) says so. The fact is all Elephant™ floppies meet or exceed the specs required to meet or exceed all their standards.

But just who is "subcommittee X3B8" to issue such pronouncements?

They're a group of people representing a large, well-balanced cross section of disciplines—from academia, government agencies, and the computer industry. People from places like IBM, Hewlett-Packard, 3M, Lawrence Livermore Labs, The U.S. Department of Defense, Honeywell and The Association of Computer Programmers and Analysts. In short, it's a bunch of high-caliber nitpickers whose mission, it seems, in order to make better disks for consumers, is also to

make life miserable for everyone in the disk-making business.

How? By gathering together periodically (often, one suspects, under the full moon) to concoct more and more rules to increase the quality of flexible disks. Their most recent rule book runs over 20 single-spaced pages—listing, and insisting upon—hundreds upon hundreds of standards a disk must meet in order to be blessed by ANSI. (And thereby be taken seriously by people who take disks seriously.)

In fact, if you'd like a copy of this formidable document, for free, just let us know and we'll send you one. Because once you know what it takes to make an Elephant for ANSI . . .

We think you'll want us to make some Elephants for you.

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