

80⁰ U.S.

THE TRS-80 USERS JOURNAL

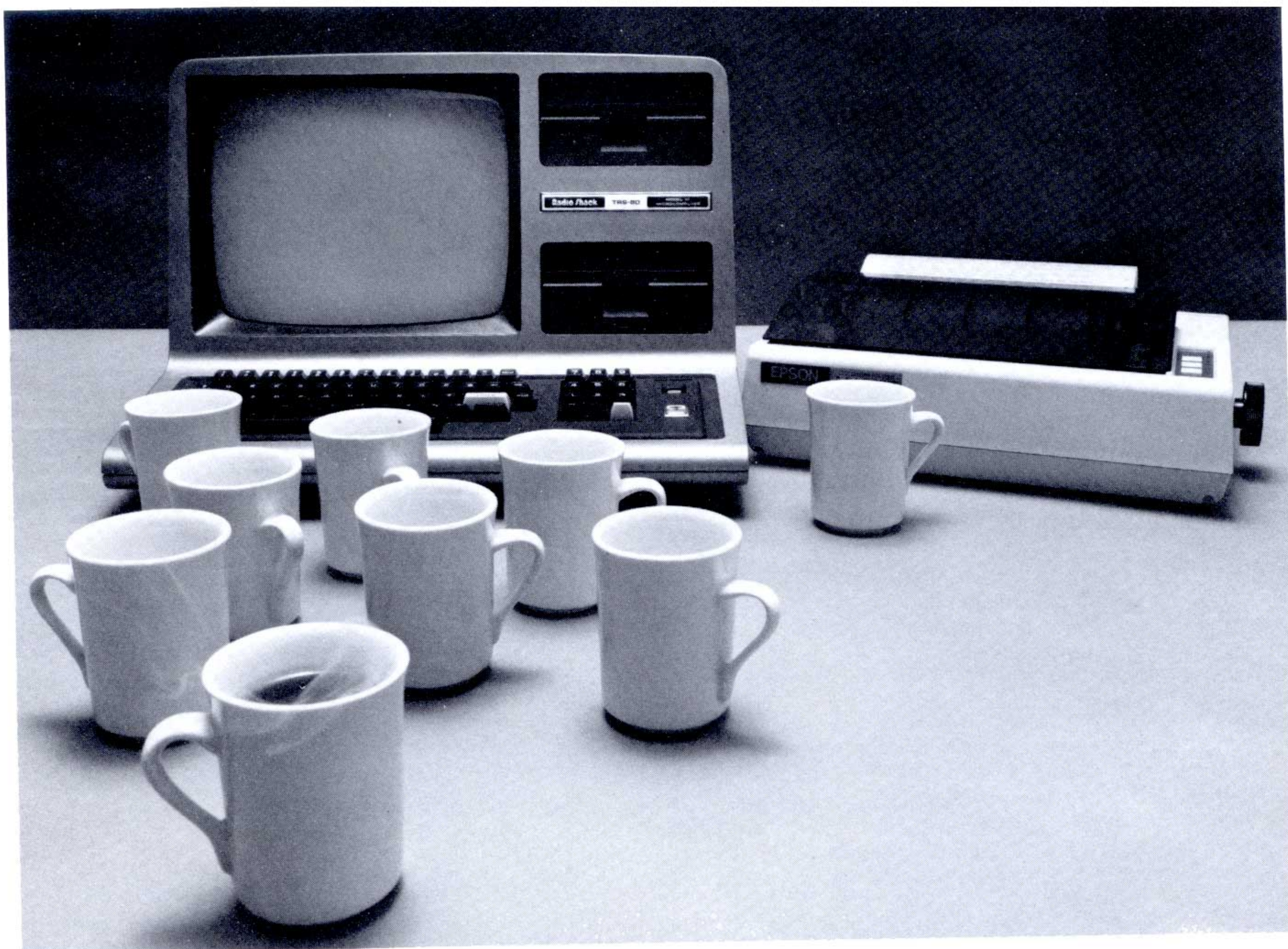
Vol. V, No. 10

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Microcomputing
Tips and Tricks





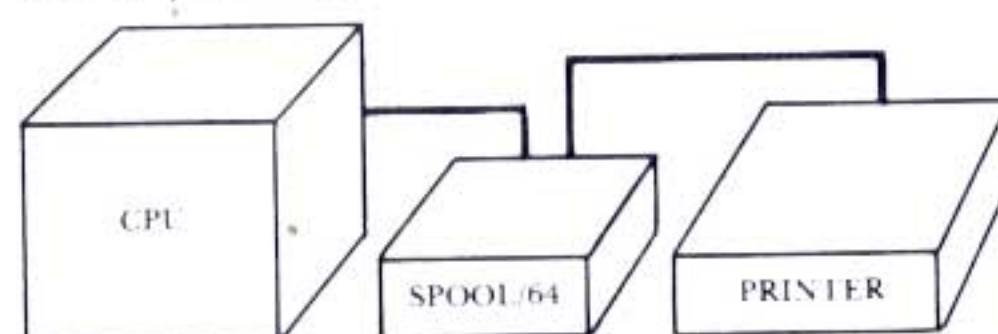
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1



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Important to many users is the fact that Alcor Pascal programs execute between 10-20 times faster than interpreted Basic programs.

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48 K memory One disk drive Single or Double Density (two recommended)

TRS80 Model I

Trsdos 2.3, Ldos 5.1, Newdos 2.0, Dosplus 3.3, 3.4

TRS80 Model III

Trsdos 1.3, Ldos 5.1, Newdos 2.0, Dosplus 3.3, 3.4

Osborne - 1 CP/M

Apple II CP/M (Z-80 softcard)

Other Z-80 CP/M based systems (8 inch drives)

Pascal Features

A complete Jensen and Wirth Standard Pascal
Produces compact efficient code that executes 10-20 times faster than interpreted BASIC
Can compile large programs (4000 lines +)
Fast one pass compiler
Simple commands for compiling and running programs
Supports separate compilation of procedures and functions
Compiler switch options, including conditional compilation
Full heap support including NEW and DISPOSE procedures that perform true heap allocation
Complete implementation of sets with up to 256 members.
Variant records are fully supported
Supports single and double precision REAL
Files are compatible with TRSDOS

Extensions

OTHERWISE clause on case statements
Identifiers may contain '\$' and '-' characters
Automatic type conversion in arithmetic expressions and assignment statements
Constants may be expressed in decimal or hexadecimal
Characters within strings may be specified by ascii code.
Allows non-printable characters in strings.
Type transfer operator to override type matching
ESCAPE allows exit from anywhere in a procedure
LOCATION function returns the address of a variable
SIZE function returns the amount of memory for a variable

Full Screen Text Editor

Included with Pascal
No limit on file size (except disk capacity)

The Best of Both Worlds

Pseudocode (Pcode) for compactness
Allows large programs in small memory space (8500 line + programs can execute in 48k)
Native code for speed
Optional code generator produces Z80 instructions
Z80 code can be mixed with Pcode

250 Page Documentation Pkg.

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Pascal Tutorial with 500 line Data Base program.
(source supplied on diskette)
Pascal Reference Manual
System Implementation Manual
Text Editor Manual
Handy System Reference Card
Cross reference index for documentation package

Linking Loader

Links separately compiled routines
Supports procedure and function libraries
Can create command files

trademark

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CP/M Digital Research, Inc.
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APPLE II Apple Computer, Inc.
OSBORNE I Osborne Computer Corp.

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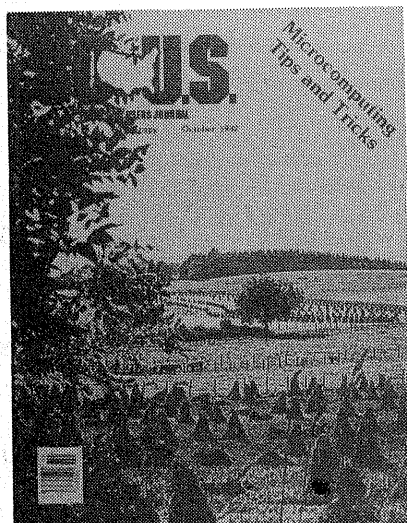
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Our cover for the October issue is seasonal. It shows the midwest countryside in the fall. The photo is from the personal collection of the publisher. It has nothing to do with computers—just thought it would be a nice change.

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80-U.S.

THE TRS-80 USERS JOURNAL

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80-U.S. Journal

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Editorial

By Cameron C. Brown

A number of people are looking for the complete turnkey system—one that has no drawbacks or need for operator intelligence. Such a package is impossible. There will always be bugs or sequences that will cause problems.

I have a vision of a new product called MEGADOS[®], the complete operating system. It is still under development, but the results that are coming back from the alpha test sites are phenomenal.

The complete package comes on 13 diskettes, and can run in either single or double density, 5.25 or 8 inch, floppy or hard. Every possible disk drive configuration is supported. Included is a diamond-tipped razor for shredding the diskettes into stringy floppy format.

Languages are easy to access and a complete translation package is included. If you program in BASIC and your friends are using FORTH, the MEGADOS translator will effortlessly take your code, convert it to machine language, retranslate it into COBOL pseudo-ops, and use a look-up table to make the final translation into FORTH. It includes complete PATCH instructions to upgrade to FIFTH when needed.

Documentation has not been overlooked. Complete descriptions of all library commands are included on microdot, all coded according to Library of Congress standards. Hard copy is available in nine volumes, but this only includes the discussion of the MEGAMICRODOS[®] minimal system. Technical writers with extensive training at IBM and Digital Research led the team which developed this easy-to-use manual. All copy is printed on a special 1×1 dot matrix printer, giving the added advantage of direct use by programmers who know Braille.

All peripherals, including the exotic serial printer with 15-color plotter and joystick, are easily called when needed by invoking the CHAUFFEUR command—no need for single-use drivers. Memory size requests on power-up are no longer needed. MEGADOS will convert un-

MEGADOS[®]

The ULTIMATE user-friendly, human engineered, fully compatible operating system . . . patched and configured to your specifications. Package includes upgrades to FIFTH. Specialized commands are AUTO HELP, SEANCE and CHAUFFEUR. The complete package, on 13 diskettes, features 9 volumes of documentation.

used ROM to RAM as needed and (through its unique modem) access memory from outside computer systems if its internal memory requirements are exceeded. All this without the aid of phone lines!

Recovery of dead programs is possible using the command SEANCE. A specialized HELP command has been included with MEGADOS. Not only do you obtain syntax requirements, but also dialects. If you are still not able to give the correct commands, AUTO HELP will have the machine automatically begin execution by reading your brain waves.

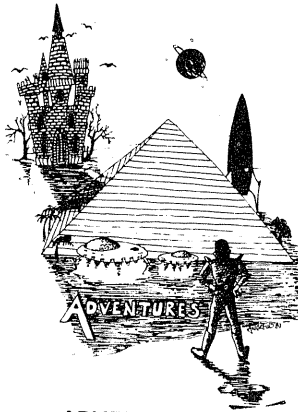
As with any advancement in technology, there are some slight drawbacks. Once MEGADOS has been loaded into your system, it leaves you with zero free space in which to write or store programs. Due to the extensive set of commands, there should be no need for any programming. All possible application packages are already included, but there is no space in which to access the exceptional utilities that you have.

Even though the package will run on all models, including those from various vendors, the system is not yet available. I am not sure that I would like it even if it were.

Solving problems is exciting and fulfilling. Creating a new procedure or application is rewarding and reassuring. If people hadn't reinvented the wheel, we would never have had the rotary engine, or drills that could cut square holes. The home computerist is reinventing the computer. I like that. ■

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Adventures require 16k on TRS80, TRS80 color, and Sinclair. They require 8k on OSI and 13k on Vic-20. Derelict takes 12k on OSI. \$14.95 each.

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BASIC THAT ZOOMS!!

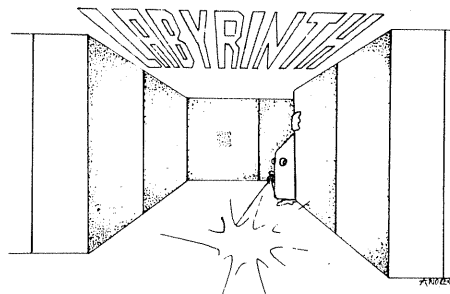
AT LAST AN AFFORDABLE COMPILER FOR OSI AND TRS-80 COLOR MACHINES!!!

The compiler allows you to write your programs in easy BASIC and then automatically generates a machine code equivalent that runs 50 to 150 times faster.

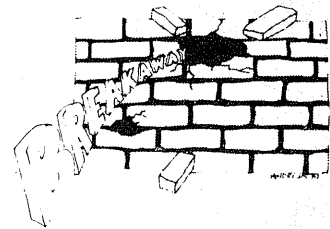
It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and INTEGER NUMBERS FORM 0-64K.

TINY COMPILER is written in BASIC. It generates native, relocatable 6502 or 6809 code. It comes with a 20 page manual and can be modified or augmented by the user. \$24.95 on tape or disk for OSI or TRS-80 Color.

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TRS-80 COLOR

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OSI

VIC-20

Letters to the editor

I take issue with the Westlaw article (July, 1982) written by Mr. Amundson, on two points.

First, I find it very strange that there is no William M. Amundson listed with St. Paul telephone information as an attorney. I find it doubly strange that a William M. Amundson is employed by West Publishing Company as a Westlaw marketing representative. If the author of your article is the Westlaw marketing representative, it should have been mentioned in the article or magazine.

As a practicing attorney, I can attest that computerized legal data bases are not all they are cracked up to be. While I have no experience with Westlaw, I have experience with their competitor, Lexis. From Mr. Amundson's description of Westlaw, they operate in similar matters.

Mr. Amundson talks about the 40,000 new cases added each year. This does not make the task of finding relevant cases any more difficult. There are a variety of reporting "services" that just follow one specific area of law. For example, the Uniform Commercial Code Reporting Service (a multi-volume set) reprints any new important UCC decision along with commentary in its yearly updates. They even examine cases that West Publishing Company does not report. When necessary, new volumes are issued and the old ones are updated yearly. The same type of reporting service exists for medical malpractice, automobile accidents, antitrust, Iranian Hostage litigation, admiralty, and every type of legal specialty I can think of.

Using Lexis, I quickly discovered that if you did not adequately limit your description, you would find yourself swamped with a list of two thousand cases that mention your keywords. In addition, it is very possible for a case to have the keywords Mr. Amundson mentioned and discover it deals with an automobile accident. On the other hand, if you limited your description too severely, relevant cases would be missed.

The only area where computerized legal data bases shine is in finding the brand new supporting cases. The law rarely changes overnight. If there is an important change in some current aspect of case law, the legal magazines will mention it. What they do not mention, are the new supporting cases on a point. As a practicing Missouri lawyer, I find out these new cases only by reading the monthly update of Missouri cases that West Publishing Company (the owners of Westlaw) publishes.

I am sure Westlaw and Lexis are valuable to certain lawyers, but I found it far cheaper and easier to open the relevant text and case books.

**L. J. Kuttan, Attorney
St. Louis, MO**

Failure to mention Mr. Amundson's connection to Westlaw was our fault, not his. Our apologies for this oversight. —Ed.

The program Diskmap in the July, 1982, issue was a good idea toward a much-needed utility. However, the mention that it would work with TRSDOS-compatible disks is not true.

TRSDOS won't open the DIR/SYS file as it is READ protected. I've enclosed a modification to Diskmap that will allow you to use the program with TRSDOS. Just add the lines shown and follow the directions.

When you run a program that requires a special DOS, such as NEWDOS, please give us a fighting chance and show the system required at the start of the article. Now the utility provides the user a chance to go with any DOS he has set up as his standard.

**Robert K. Fink
Dayton, OH**

```
Ø REM DISKMAP/BAS FROM 8Ø-US JULY 82. R
.K. FINK
```

```
1 REM HERE ARE ADDITIONS TO USE DISKMAP
FROM TRSDOS
```

```
2 REM YOU MUST ANSWER NO. OF FILES WITH
3 INSTEAD OF A <ENTER> DEFAULT WHEN EN
TERING BASIC.
```

```
3 REM A NEW FILE CALLED DUMMY WILL APPE
AR ON YOUR DISK AFTER USE
```

```
5 REM SIMPLY KILL IT FROM DOS AFTERWARD
```

```
.....
```

```
555 ONERRORGOTO192Ø: 'THIS WAS AT START
OF PROGRAM. MOVE IT TO HERE
```

```
56Ø DS$="DUMMY"
```

```
565 OPEN"R",1,DS$
```

```
57Ø ST=&H66BF:NL=&HDF:NH=&H66:GOSUB3ØØØ
```

```
575 OPEN"R",2,DS$
```

```
58Ø ST=&H67E1:NL=&HØ1:NH=&H68:GOSUB3ØØØ
```

```
585 OPEN"R",3,DS$
```

```
59Ø ST=&H69Ø3:NL=&H23:NH=&H69:GOSUB3ØØØ
```

```
3ØØØ POKEST,128:POKEST+1,96:POKEST+2,Ø
```

```
3Ø1Ø POKEST+3,NL:POKEST+4,NH
```

```
3Ø2Ø FOR II=ST+5 TO ST+31:READND:POKEII
,ND:NEXT
```

```
3Ø3Ø DATA Ø,Ø,192,255,Ø,Ø,Ø,11,Ø,17,1
```

```
3Ø4Ø DATA 255,255,255,255,255,255,255,2
55
```

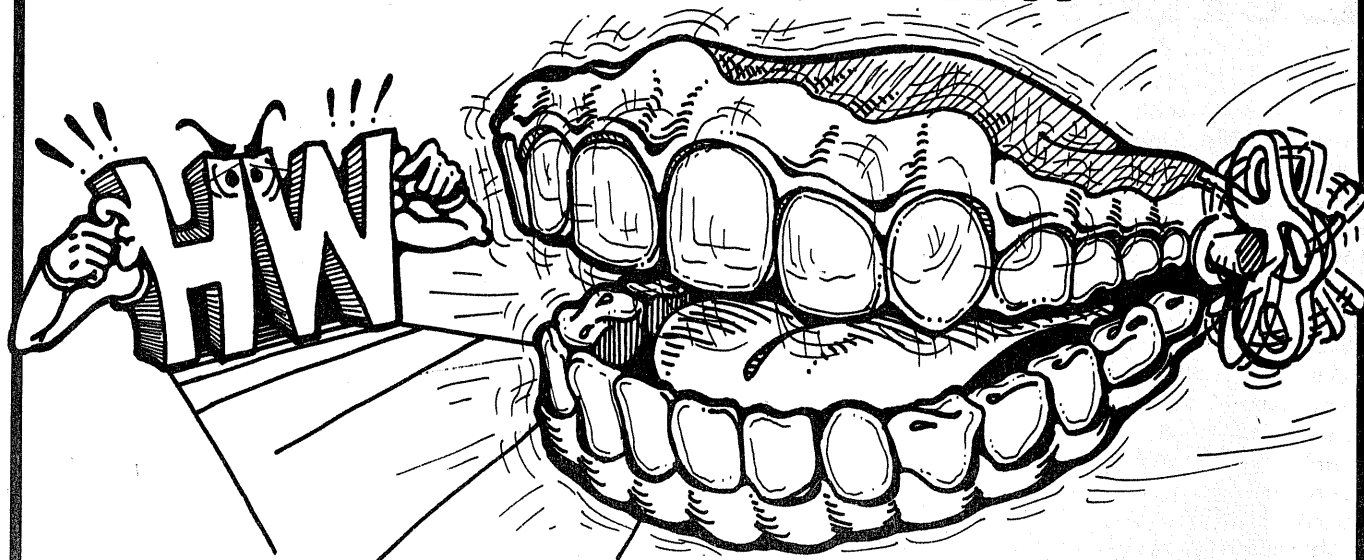
```
3Ø5Ø DATA 255,255,255,255,255,255,255,2
55
```

```
3Ø55 RESTORE
```

```
3Ø6Ø RETURN
```

The incompatibility slipped by us. It read TRSDOS disks, but we forgot that we were using LDOS at the time. Oops! —Ed.

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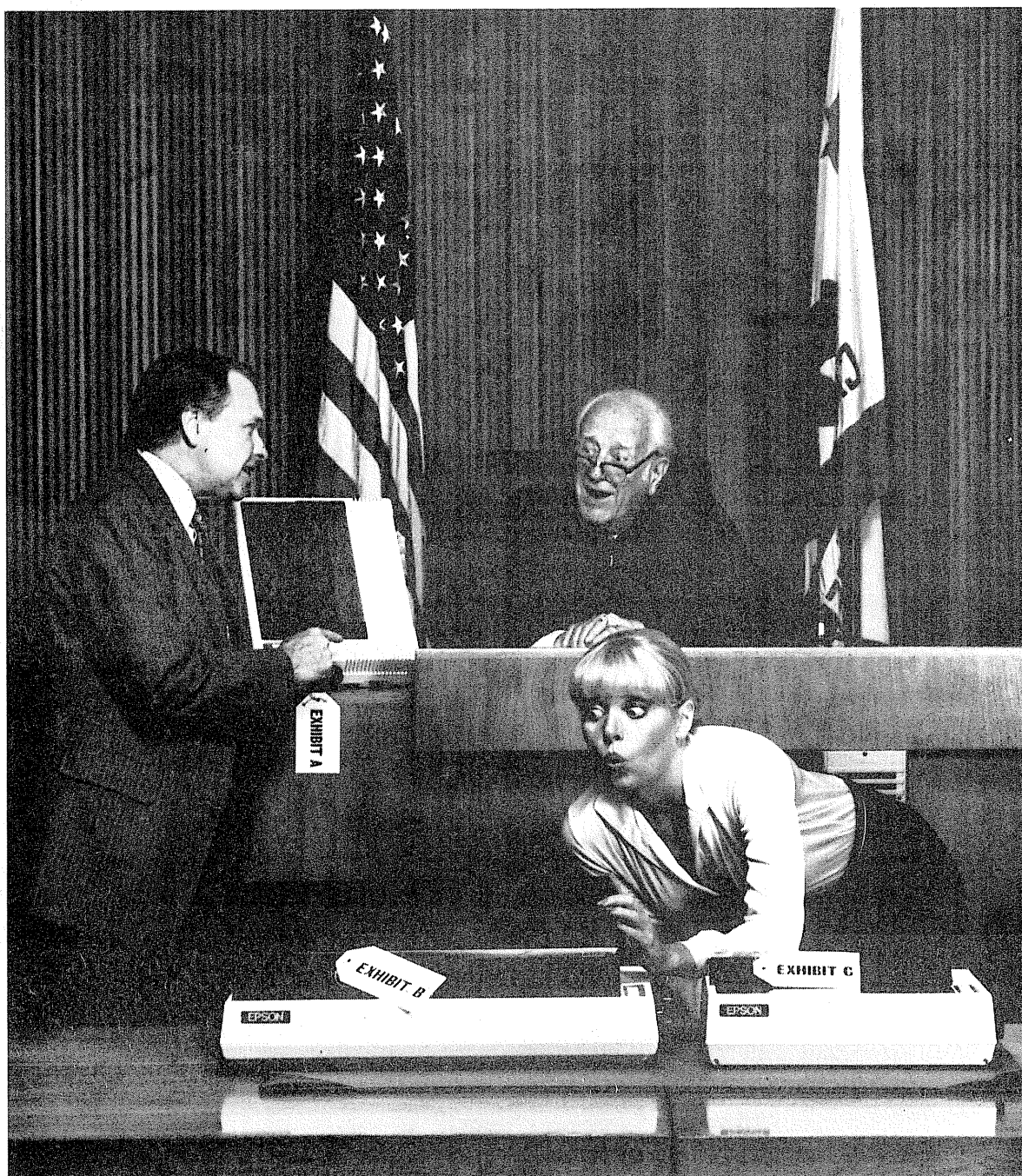
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Items at random

With the warmth of summer behind us, and the crispness of autumn upon us, it is time to prepare some good fall and winter projects. This issue is devoted to a plethora of programs covering many applications. Most are short and (we hope) sweet. The theme is "Tips and Tricks" for your microcomputer. Our lineup of programs and articles through January and February, next year, is shaping up nicely and yes, we have a few rabbits to pull out of our hat.

On the subject of old business, Jerry Latham's programs in past issues have been very well received. Not only are readers sending in improvements and suggestions, but Jerry has found a few bugs which need to be fixed. Here is a list of known errors in the listings published June through August, 1982. The title of his series of articles was "Checkbook: Space saving with NEWDOS/80".

In the first installment (June, 1982):

Listing 1, line 600, should have a comma following the quote mark after "BUILLDALL" and before the V.

Listing 3, line 10190, the variable AC should be ZD.

Listing 4, line 10, needs a Y after the FOR statement.

In the third installment (August, 1982):

Listing 1, line 4010, insert X=0: at the start of the line.

Listing 1, line 4120, near the end, the IF...THEN statement should be IF A="Y" and not IF A="N" as printed.

Listing 1, line 4050, needs a colon (:) before the GOTO 4100.

Listing 1, line 4430, insert USR(0) (just before VARPTR(A)).

Listing 2, add line 5031 as follows: 5031 PRINT "MERGING FILES": MERGE"FILES"

Listing 2, line 5910, delete the
12 80-U.S. Journal

right (closing) parenthesis just before THEN CLS.

Listing 2, line 5950, put the word AND between F1 and CSNG.

Listing 2, line 6380, reverse the positions of the quote mark and the semicolon following the variable name AF.

Any other errors found, or suspected, should be reported directly to Jerry Latham at 1409 Evergreen Circle, Midwest City, OK 73110. Support is given only for NEWDOS/80 2.0 or NEWDOS+ using TASORT for sorting.

In This Issue

This is a "how to" issue, full of tips and tricks. Thomas L. Quindry tells how to restore your data pointer. Larry Krengel tells how to fix a dead ESF floppy wafer. Ron Goodman tells how to recover dead programs. Ray Bennett tells how to take photographs of your video screen. Larry Krengel tells how to make a single sheet feeder for your MX-80. Tim Bowman tells how to automatically get a date on your program listings. David Carman tells how to figure when the sun will rise and set. Roy B. Harrill tells how to change PRINT to LPRINT, the easy way. Whew! How's that for "how to's"? There are more!

Spencer Hall has come up with another "sleeper". You have to see it in action to really appreciate it, and is it nice! I'm speaking of his program in this issue called "DECI-POKE: Taming the Wild USR(0)". This little jewel almost writes a BASIC program for you when you input the hexadecimal values in an assembly language listing. If you have a natural fear of machine or assembly language, this program is for you.

William Fink, the man who wrote the chess program, SFINKS, describes what goes into the making of a chess program on a

microcomputer.

For Color Computerists, we have a word processor program written by Steve Den Beste, and Dale H. Fawcett tells how to interface a serial printer to your Color Computer.

T. G. Melatis does an in-depth evaluation of IJG's Electric Pencil version 2.0z for Models I and III.

Paul M. Hine takes a good look at the Accel 3 BASIC compiler from Algorix.

Two new columns appear in this issue. BASIC Bits, by Thomas L. Quindry, is a column devoted to BASIC manipulation, with questions and answers from readers. Exploring VisiCalc, by Tim Bowman, is intended to inform users of the many interesting ways to use it. He assumes the reader is already familiar with VisiCalc.

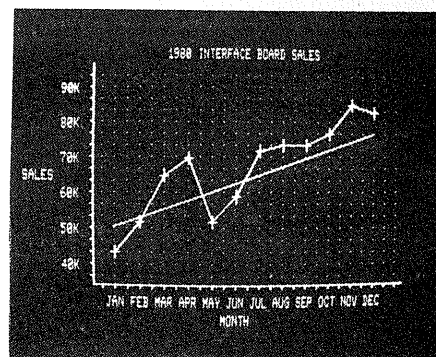
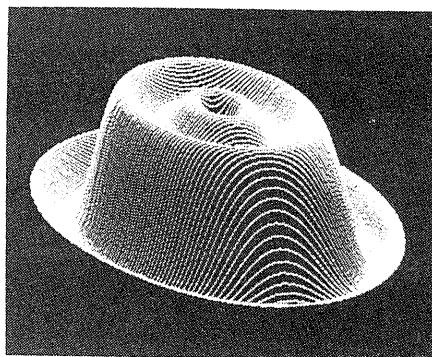
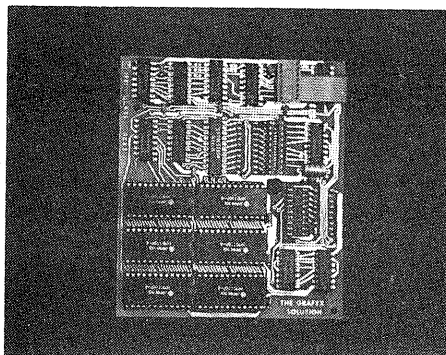
Tandy Topics, by Ed Juge, speaks of a radical departure for Radio Shack. In an unprecedented step, Radio Shack will now be carrying the LDOS operating system as an optional DOS for Models I and III. It appears that LDOS will be the only operating system for Radio Shack Model III hard drives. Congratulations to Tandy Corporation and to Bill Schroeder, of Logical Systems, Inc., for this innovative move!

Elsewhere, Captain 80 (Bob Liddil) is off on another of his escapades. This time, though, he sounds a little like a preacher eulogizing a dead adventure. I hope he's wrong!

Terry Dettmann continues Files and Foibles, and Spencer Hall reports @ News. There are plenty of interesting reviews that should keep you informed until next month, when we will do a communications issue.

Enjoy your Indian summer, wherever you are, and remember that you can control what kind of day you have!

Mike

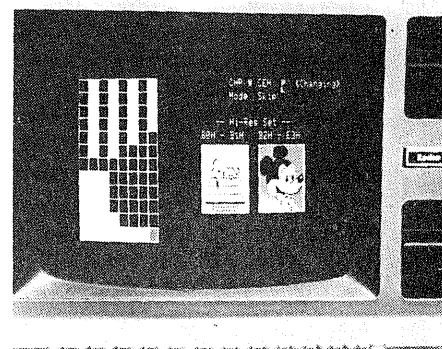
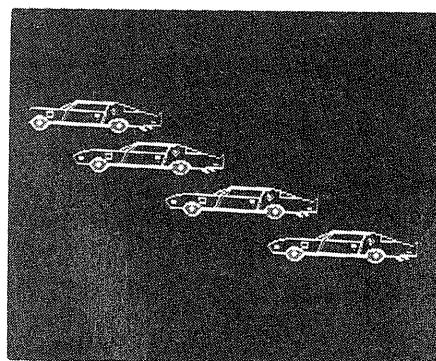
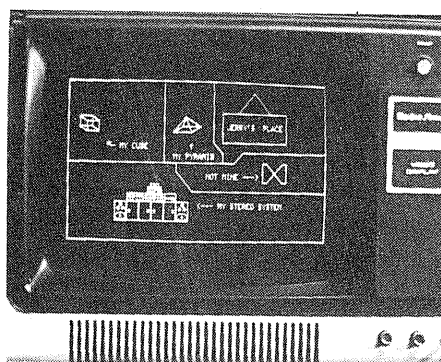


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By Steven Kearns from Acorn

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!

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PENETRATOR

By Philip Mitchell from Beam

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.

16K Tape or 32K Disk, \$24.95



FLIGHT SIMULATION

By Bruce Artwick from Sub-Logic

A graphic tour de force that will truly captivate you. If you haven't seen this brilliant program, you haven't fully utilized the capabilities of your computer! During FLIGHT SIMULATION, you instantly select instrument flight, radar, or a breathtaking pilot's-eye-view. But be sure to strap yourself in—you're liable to get dizzy!

Once you put in some air time learning to fly your computer head for enemy territory and try to bomb the fuel depot while fighting off five enemy warplanes. Good Luck! Please specify Model I or III.

16K Tape, \$25.00

32K Disk, \$33.50

Programmers' Corner

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By Southern Systems from Algorix

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In our opinion ACCEL 3 is the best compiler for the TRS-80. It's flexible: works with tape or disk, Model I or III, and requires as little as 16K of memory. It's fast: only a few seconds to compile. It's a memory miser: only a 15-35% increase in program size in most cases.

ACCEL 3 will work under TRSDOS, NEWDOS or LDOS, and there are very few programming restrictions. To save ACCEL-compiled programs on tape you will need TSAVE (sold separately, \$9.95)

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By Dan & Kathe Spraklen from Hayden

Acclaimed the best of the microcomputer chess programs. SARGON II came in third in the 9th North American Computer Chess Championship, playing against much bigger machines! You haven't really played chess against your computer until you've tried this brilliant program.

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Don't let the Centipede get you!! Each time you hit it, only **one** segment disappears. You must keep firing until the **whole thing** is gone—or, when you have been hit 4 times. And whatever you do, avoid the Giant Spider! Joystick compatible.

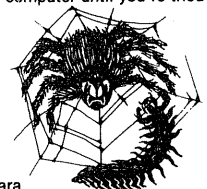
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This new arcade game from Big Five continues their tradition of bringing you the most exciting action in innovative space games. Your fighting spacecraft must run the gauntlet of the attacking alien's weaponry in order to accomplish your defense mission.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

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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 game.

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VOYAGE OF THE VALKYRIE



By Leo Christopherson from AOS

Combine the animation and music techniques pioneered by Christopherson with the challenge of his first fast-moving arcade game and you have VOYAGE OF THE VALKYRIE! You speed through a magical maze guarded by ferocious birds that swoop down to attack if you don't get them first. To list all the play and options of this exciting game would take the 16 pages of instruction included.

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METEOR MISSION 2

By Hogue & Konyu from Big-Five

Six astronauts are stranded on a desolate planet. You must undock from your command module and maneuver your rescue shuttle through the asteroid field to save them. You can only save one at a time, and each landing burns away parts of your landing sites. Order this realtime action game now or live with the astronauts' pitiful screams forever. Joystick Compatible.

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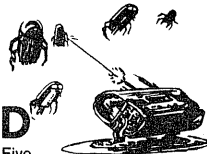
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From Soft Sector Marketing

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!

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DEFENSE COMMAND

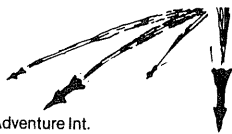


By Hogue & Konyu from Big Five

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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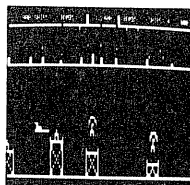
MISSILE ATTACK



By Philip Oliver from Adventure Int.

You must use your twin silos of ABMs to fend off barrage after barrage of enemy missiles that rain down toward your cities. As your skill increases so does the difficulty and speed of this machine language arcade game. Watch the skies and may your aim be true! MISSILE ATTACK has sound and fast-moving graphics galore.

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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.

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



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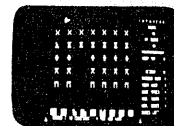
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By Larry Ashmun from Soft Sector

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By Carl Miller from Acorn

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ALIEN ARMADA

By Waldron Hodsdon from Liberty

Hmmm. Looks like another "Space Invaders" type game. Nice neat racks of aliens poised over your defensive base... but WATCH OUT! Here they come, swooping down with their bombs and Kamakazi-like dives. There are individual attackers plus group flights—all intent on destroying your three bases before you destroy them. ALIEN ARMADA allows up to two players and has three levels of difficulty from beginner to expert.

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Notes

This month's set of notes is in response to a few letters and phone calls that recently came in.

INSTR Command

Mr. Ray Vermont called from California with a request that we not sneak things into a program without warning. It turns out that he was trying to run our July Files and Foibles program on his Level II machine and it refused to get past the INSTR command. Since we did not label the article as requiring disks, he was rightfully upset. Most disk users appreciate this command and Terry Dettmann (the author) has been on disks ever since he was weaned. The code had little to do with the ideas in the article and it just got by all of us. Anyway, here is a short routine that will replace the INSTR command if you don't have DOS. The routine will give X equal to the position at which B\$ begins in A\$. If B\$ is not present in A\$, then X=0. N is the place in A\$ to begin the search.

```
10 J=LEN(A$) - LEN(B$) : X=0
20 IF J<0 THEN GOTO 60
30 FOR K=N TO N+J
40 IF B$=MID$(A$,K,LEN(B$)) THEN X=K:GOTO 60
50 NEXT K
60 PRINT X
```

Video Interference

Mr. Tim Fox, Gig Harbor, WA has informed us that he was having severe video interference on his Model III. After moving his LP I from the left hand to right hand side of the computer, all distortion was gone. Be sure to check out the placement of your peripherals and the

tangled web of cables before going off to the service center—it may save you a trip.

Model I Linecounts

Mr. Hal Broenkow, Edmonds, WA noticed that his Model I would not handle line counts on the printer as he had hoped. The reference manual says that the count of lines sent to the printer is kept in location 16425 and that a formfeed, CHR\$(12), resets that value to 1. On two Model I's, the value was found to vary from zero to 66. This means that under some circumstances, the machine will try to put an extra line on the page. On the Model III, the value varies from 1 to 66, so the problem was corrected. In some programs that generate multiple page printouts, you will need to force formfeed on the Model I at the right time and make the computer count properly. Instead of imbedding a CHR\$(12), use a subroutine:

```
LPRINT CHR$(12):: POKE 16425,1: RETURN
```

The semicolon after the formfeed is necessary with most printers to avoid another extra linefeed. Somewhere in the first part of your program, the command POKE 16425,1 should be used to get off on the right foot. The subroutine has no effect on the Model III because the correct value is already in location 16425. Form feeds can be done on the Model III by using CHR\$(140).

Long DATA Lists

Mr. Joseph P. Laronda, Cheshire, CT passed along a tip for keeping count of long data lists that have to be entered into a program. You write a FOR...NEXT loop with an arbitrarily high ending, such as FOR I=1 TO 1000. Change the READ statement to include PRINT, such as READ B becomes READ B: PRINT I;B: NEXT I. When you run the program, it will result in a continuous stream of counting numbers with the DATA numbers next to them. Since 1000 is too high, you will stop with an Out of Data error, but you will have a count of exactly how many entries are present in the program. All you have to do is change the FOR...NEXT loop to your new ending and your program is ready to go. No more having to count the number of data lines. ■

Puzzler

If crossword puzzles, anagrams and enigmas have your interest, then the 80-U.S. Journal puzzle is for you. Periodically, we will supply a problem for solution. We are looking for an ingenious answer and many times it will be a problem that we have not yet solved. Answers are to be in BASIC—no need to submit on

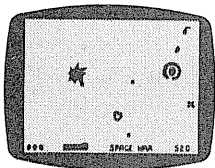
any special media. All answers are due by the first day of the second month following the cover date. Winning solutions will be selected by our editorial staff and winners will receive \$10, notoriety and a free tour of 80-U.S. Journal facilities (you pay transportation). Address all answers to: Puzzler, c/o 80-U.S. Journal, 3838 South Warner, Tacoma, WA 98409.

Puzzle #1: How can you have the computer print out all the possible combinations of "words" using the word Halloween? All combinations up to nine letters should be shown. By the way, there are over 986,000 possibilities, so don't bother sending a complete printout.

Note: This featurette replaces and supersedes our offering in April, 1982, for tips.



Color Computer Collection For Your TRS-80



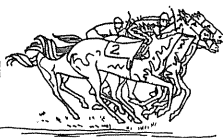
Color Space War

From Spectral Associates

You command the last combat Viper, and must break through the defenses of the Death Star while avoiding the pull of gravity of the Black Hole. Watch out for space mines and enemy ships. Extended BASIC not required. Joysticks.

16K Tape, \$21.95

Galloping Gamblers



By Fred Scerbo

From Illustrated Memory Banks

Exciting racetrack game for 1 to 4 players. Each player gets \$100 to bet. There are 4 horses in each of 12 races; odds are posted at the bottom of the screen for each. The outcome of the race **cannot** be predicted. At the end of the race, the computer awards wins or losses. No joystick required; one player must enter information at the keyboard. Extended BASIC required.

16K Tape, \$18.95

Cocobug

Debugging Monitor for TRS-80 Color Computers

By Allen Gelder From Allen Gelder Software

COCOBUG is a compact monitor program. "With COCOBUG you may examine RAM and ROM in hexadecimal, ASC II or mixed hex and ASC II form. In addition, the powerful MC6809E CPU is made available in a pair of 6809 Programming Models that depict the CPU features at entry and exit (via a restorable Breakpoint) of your machine code string. Byte entry and Breakpointing, plus the ability to direct real-time program flow, are made easy and natural through a line-entry of addresses, bytes and certain control characters."

4K

Tape, \$19.95

16K Extended Color BASIC.

Co-Resident Editor/Assembler (CO-RES9)

From Cer-Comp

CO-RES9 is a M6809 processor machine language program for the color computer. You can enter the text of your article, letters, or a chapter of your newest book; then go back and revise. The tape contains two copies of a demonstration program that you can use to familiarize yourself with the Editor and Assembler entry format.

Tape, \$29.95



Cosmic Super Bowl

From Spectral Associates

An excellent simulation of the popular handheld football games, but with a **cosmic** flavor. You must maneuver your player through a field of defenders. 5 action skill levels. Extended BASIC not required.

16K Tape, \$14.95

Kosmic Kamikaze

By Fred Scerbo

From Illustrated Memory Banks

Test your reflexes in this arcade-type space game. Your fighter craft is armed with automatic laser cannons and rechargeable shields to blast the enemy pirate saucers which pop in and out of hyperspace. Comets can destroy you and end game unless you hit them **dead center**. 3 levels of difficulty; challenging. Extended BASIC, joysticks required.

16K Tape, \$18.95

6809

Assembly Language Programming

By Lance Leventhal from McGraw Hill

This comprehensive book covers 6809 assembly language programming in detail. The entire instruction set is presented and fully explained. The book contains many fully debugged, practical programming examples with solutions in both object code and source code. Discussion of assembler conventions, I/O devices, and interfacing methods is also included. If you've never before programmed in assembly language, this book will teach you how. If you're an experienced programmer, you'll find this book an invaluable reference to the 6809 instruction set and programming techniques.

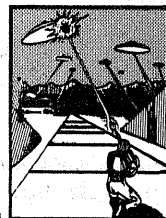
Softcover, \$16.95

6809 Microcomputer Programming and Interfacing with Experiments

Ed. by Staugaard from Howard W. Sams

This book offers a complete description of how to program and interface the 6809 microprocessor. Topics include: chip structure and basic 6809 concepts; addressing modes; registers and data movement instructions; arithmetic, logic and test instructions; branching; input and output signals; interfacing and applications. Review questions and answers for each chapter, plus 4 appendices.

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Cosmic Invaders

From Spectral Associates

Fast-action invaders-type game, complete with 16 skill levels, dynamite sound and 4-color hi-res graphics. Use the special mobile defense shield to help you dodge the invaders' bombs. With Mystery Invader who zooms in and out of hyperspace. Extended BASIC not required.

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Starbase Attack

By Fred Scerbo

From Illustrated Memory Banks

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By Commander from Interpro

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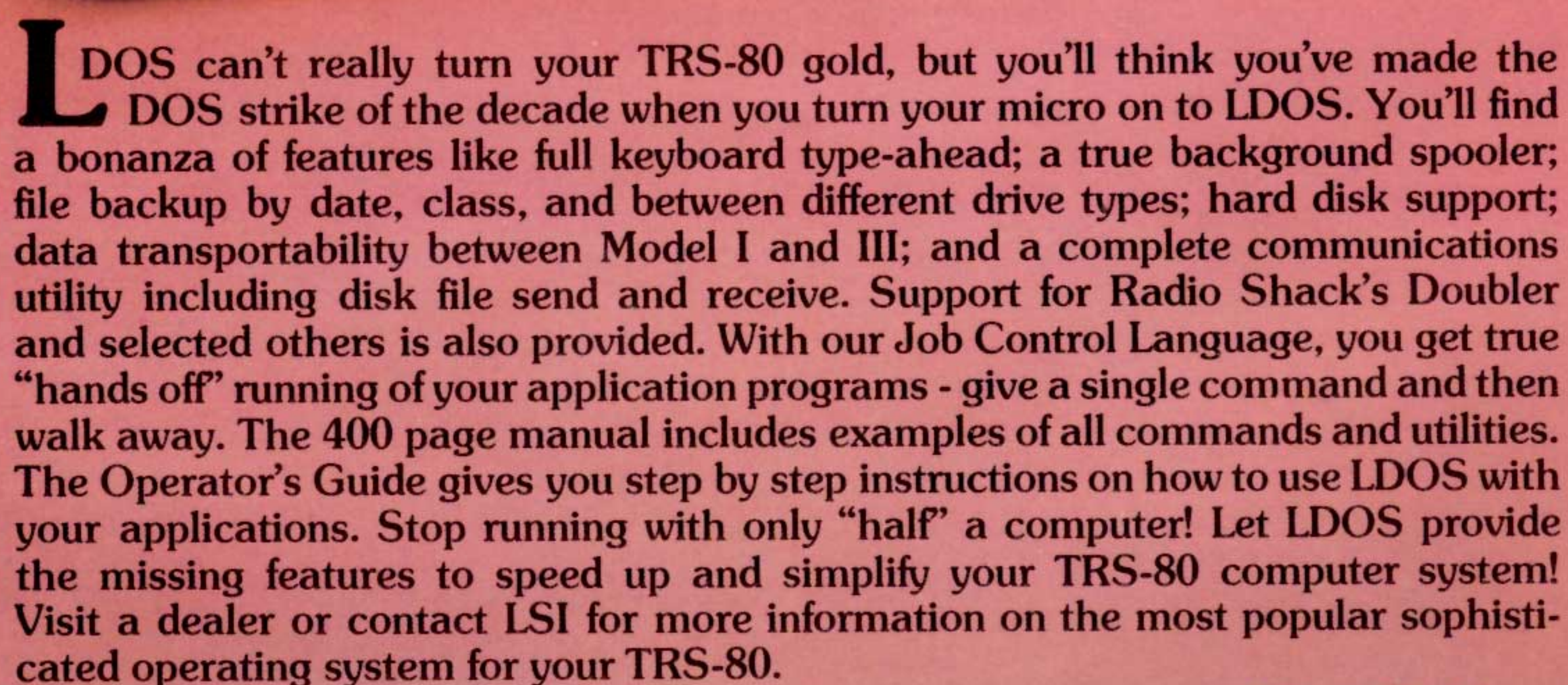
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Tips and tricks



Ingenuity is deserving of special comment. Many times, it is the short, simple approach that is easily overlooked. We have had a number of short articles, or insights, that deserved publication, yet were too small to be presented as single articles.

This special Halloween section is our treat, made up of your tricks. It is our hope that what you will find is useful and can be incorporated into your own efforts. Enjoy the articles which follow — they help to prove that programming is truly a creative endeavor. — *Ed.*





Restore your data pointer

Model I/III, PMC-80, LNW80

Thomas L. Quindry,
Burke, VA

One of the most perplexing problems, when merging two or more programs for menu selection, is what to do about all of those data statements. Everything is fine for the first program and its data statements, but what about the second, third, and other programs that have been merged with data statements? Ordinarily, if the programs aren't run in order, dummy statements must be read to point or "restore" the data pointer to the right location.

The Data Pointer can be selectably restored with an embedded machine language code.

Dummy reads, as a means of "restoring" or pointing the data pointer, can be time consuming and an otherwise enjoyable program becomes inelegant, to say the least. An alternative is to use a short machine

language subroutine. The data pointer can be selectably restored with an embedded machine language code which is also merged with the program. Listing 1 gives you a small, four-line, BASIC program which you can merge to the beginning of other BASIC programs that must have selectable restoration of the data pointer. This program uses the USR function and passes a selected line number to a 14-byte embedded machine code subroutine using the form, `X=USR(line)`, where "line" specifies the line number that you wish to point to. The line number can point to the data statement line or any line number that precedes it. The first data line after the line pointed to is the next one read. The subroutine determines the memory location of the line number specified and then enters this location in the RESTORE pointer location in memory.

Following is an assembly listing of the program that is embedded into the remark statement by a string packing technique:

| | | |
|------|------------|-----------------------------------|
| CALL | 0A7FH | ;PASS LINE NUMBER TO HL |
| PUSH | HL | |
| POP | DE | |
| CALL | 1B2CH | ;FIND LOCATION OF LINE NUMBER |
| DEC | BC | |
| LD | (40FFH),BC | ;PUT BC INTO RE- STORE POINTER |

The string packing technique given in Listing 1 does the following: Line 1 contains the remark statement with 14 bytes reserved. Since the remark statement is a necessary part of your program, the total length of the string must be reserved by dummy bytes (in this case, 12345678901234) so that you will have a place to insert the bytes. Line 4 contains the DATA statement which has the decimal values of the 14 bytes that comprise the machine code to be packed into the remark statement. The address location of the string to be embedded is determined using the start of BASIC pointer at 16548 and 16549 in line 2. This address, plus 7 bytes, is defined for the USR function in line 2 also. In line 2, DEFUSR is used for disk BASIC programs. If you do not have a disk, you must define the location for the USR function in line 2, by `POKE 16526, Z1: POKE 16527, Z2` instead of `DEFUSR= Z3`.

To use the program, simply merge all of your programs, make up a menu to select each one and, at the beginning of each section, place the code `X=USR(line)` where "line" is the line number where the code is placed. Also, if any subprogram has a RESTORE command, replace it with `X=USR(line)`. If you need a USR function in other parts of your program, use USR1 through USR9 for disk-based system, or in Level II BASIC, save the POKE variables Z1 and Z2 or repeat line 2 as necessary





to redefine the USR function to the data restore routine for the next program. Line 3 POKES the data into the remark statement and then deletes the unneeded lines 3 and 4. You are left with lines 1 and 2, which are merged at the beginning of your other programs.

Listing 2 gives an example of how to use the selectable restore program. In this example, line 5 asks for an input. Any number between zero and the program line of the highest data statement, 100 in this example, is valid. The next data line equal to, or higher than, the number of your input will be the next data statement read. For example, any input between 11 and 20 will cause the restore pointer to read the data statement on line 20 next in the example.

Listing 1 for Restore

```
1 '123456789 1234
2 Z3=PEEK(16548)+7+256*PEEK(16549):DEFU
SR=Z3'FOR NON DISK SYSTEMS Z2=INT(Z3/24
6):Z1=Z3-256*Z2:POKE16526,Z1:POKE16527
3 FORN=1TO14:READA:POKEZ3,A:Z3=Z3+1:NEX
T:DELETE3-4
4 DATA205,127,10,229,209,205,44,27,11,2
37,67,255,64,201
```

Listing 2 for Restore

```
1 '123456789 1234
2 Z3=PEEK(16548)+7+256*PEEK(16549):DEFU
SR=Z3'FOR NON DISK SYSTEMS Z2=INT(Z3/25
6):Z1=Z3-256*Z2:POKE16526,Z1:POKE16527,
Z2
3 FORN=1TO14:READA:POKEZ3,A:Z3=Z3+1:NEX
T:DELETE3-4
4 DATA205,127,10,229,209,205,44,27,11,2
37,67,255,64,201
5 INPUT"ENTER 10,20,30,40,50,60,70,80,9
0,OR 100":A=X=USR(A)
6 READA$:PRINT:PRINTA$:PRINT:RUN
10 DATA LINE 10
20 DATA LINE 20
30 DATA LINE 30
40 DATA LINE 40
50 DATA LINE 50
60 DATA LINE 60
70 DATA LINE 70
80 DATA LINE 80
90 DATA LINE 90
100 DATA LINE 100
```

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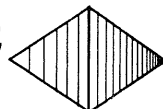
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Does your stringy flop? How to fix a wafer

Models I/III, PMC-80, LNW80

Larry Krengel,
Elmhurst, IL

Sure is a handy little gadget . . . my Exatron Stringy Floppy, that is. After living with a cassette system for two years, I really appreciate the speed and efficiency of the "Stringy."

It has been almost six months since I acquired my Stringy. It tied into my existing system with ease. Learning to use it was amazingly simple. I find some of the features very appealing, such as having the anti-key-bounce as part of the SOS (Stringy Operating

System) and @FREEZE.

There is, however, one problem that has bugged me. Exatron warned in their literature of a problem called "pullout." It was worthy of note.

For those of you who are not familiar with the Stringy Floppy, it operates much like a miniature 8-track tape. It is an endless loop which eliminates the need for rewinding. The tape cassette itself (called a wafer) is about the size of a business card and contains a loop of 1/8-inch tape which can be of various lengths. Pullout occurs when the tape is pulled out of its cartridge.

The pullout problem is real. It has happened to me on several occasions. Exatron has been very cooperative when I have requested them to replace those wafers which pull out. Unfortunately, they cannot help retrieve the programs and data that may be lost on these tapes.

Exatron suggests making a backup copy of all program and data tapes. That sounds like a good idea, but realistically, how often would one be likely to do this with every wafer?

I have gotten into the habit of making a backup copy of my most important programs, especially ones that I have authored myself. There would be no replacing these programs without rekeying them.

But I got burnt . . . it was about a month ago while I was working on a program that my daughter was going to use at her junior high. I had been working on the program for a number of evenings, trying to fine tune it. It had grown to be rather complex.

As with any good educational program, I attempted to predict all of the ways a student might blow up the program. Each one required a short subroutine to thwart disaster.

Then it happened. I went to load it . . . I'm not even sure just what happened . . . but I had a pullout. A pullout on a wafer that I had been working on, and for which I had no backup.

I attempted to stuff the tape back in. No luck. I quickly dialed Exatron's 800 number to ask for help. The first voice couldn't help. I was passed to a second voice. For a second time I explained my plight. A voice that sounded very authoritative asked, "Did you make a backup?" In the best tradition of the Watergate era, I pleaded "nolo contendere." I was guilty and had no excuse, but I needed *help!*

There was no help to be had. It was, they said, hopeless. "Couldn't I take it apart and fix it?" I asked naively. The question brought a chuckle at the other end of the conversation. Even Jimmy the Greek would not give odds on doing that successfully. However, I could send them the wafer and they would replace it. The program? Gone forever.

Well, at that point I had nothing to lose. I prepared the operating arena. I was going to fix the wafer! Pocket knife. Tweezers. High intensity desk lamp. The tears were carefully wiped from the desk. I peeled the label off the front of the wafer. I could then see through the clear plastic case.

The problem was very apparent. The tape which had been feeding from the center of the roll was now wrapped flatly around the center spindle. It was pressing against the top of the case. I needed to get the case open without



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| SPEED/SPACE Performance Table. | | | | | | | | | | | | |
|--------------------------------|------|------|-----|-------------------------|--|---------------------------|-----|-----|-----|--|--|--|
| Speed Improvement (Ratio) | | | | Operation | | Space Degradation (Bytes) | | | | | | |
| INT | SNG | DBL | STR | | | INT | SNG | DBL | STR | | | |
| 178 | 28 | 20 | 7.3 | Assignment (LET) | | -4 | 0 | 0 | 0 | | | |
| 3.5 | 3.6 | 3.6 | 3.5 | Array Reference (1-dim) | | 13 | 13 | 13 | 13 | | | |
| 3.0 | 3.0 | 3.0 | 3.0 | Array Reference (2-dim) | | 12 | 12 | 12 | 12 | | | |
| 35 | 1.8 | 1.6 | | AND, OR | | 4 | 7 | 7 | | | | |
| 23 | 2.0 | 1.6 | 6.6 | Compare (=, >, <, etc.) | | 3 | 10 | 10 | 3 | | | |
| 57 | 1.8 | 1.4 | 3.6 | Add, Concatenate (+) | | 1 | 6 | 6 | 2 | | | |
| 48 | 1.8 | 1.3 | | Subtract (-) | | 4 | 6 | 6 | | | | |
| 1.5 | 1.5 | 1.1 | | Multiply (*) | | 6 | 6 | 6 | | | | |
| 1.08 | 1.17 | 1.02 | | Divide (/) | | 6 | 6 | 6 | | | | |
| 77 | 70 | 84 | 9.3 | Constant Reference | | 6 | 6 | 6 | | | | |
| 7.1 | 1.9 | | | FOR-NEXT | | 0 | 6 | 4 | 4 | | | |
| 111 | 6.8 | 4.8 | | POKE | | 6 | 23 | | | | | |
| 10 | 4.5 | 3.6 | | SET, RESET | | -1 | 5 | 5 | | | | |
| 47 | 4.6 | 3.0 | 8.1 | IF THEN ELSE | | -1 | 5 | 5 | | | | |
| 33 | 4.3 | 3.5 | | ON expression GOTO | | 3 | 9 | 9 | 3 | | | |
| 50 | 6.8 | 5.1 | | ON expression GOSUB | | -2 | 0 | 0 | | | | |
| 1.2 | 1.01 | 1.03 | 1.2 | PRINT simple-variable | | 0 | 3 | 3 | | | | |
| 61 | 5.0 | 3.7 | | OUT | | -1 | -1 | -1 | -1 | | | |
| | | | | Flow of Control | | 5 | 11 | 11 | | | | |
| | 216 | | | GOTO | | | | | | | | |
| | 74 | | | GOSUB/RETURN | | | -7 | | | | | |
| | | | | Functions | | | -10 | | | | | |
| inf | inf | inf | inf | VARPTR | | -3 | -3 | -3 | -3 | | | |
| 5.2 | 1.9 | 1.7 | | POINT | | 3 | 9 | 9 | | | | |
| 38 | 2.3 | 1.7 | | INP | | 5 | 8 | 8 | | | | |
| 149 | 2.3 | 2.0 | | PEEK | | 0 | 3 | 3 | | | | |
| | | | | String Functions | | | | | | | | |
| | 53 | | | ASC | | | | | 5 | | | |
| | 258 | | | LEN | | | | | 0 | | | |
| | 4.8 | | | LEFT\$ | | | | | 1 | | | |
| | 4.7 | | | RIGHT\$ | | | | | 1 | | | |
| | 6.4 | | | MID\$ | | | | | 1 | | | |
| | 25 | | | CHR\$ | | | | | 2 | | | |
| | 36 | | | CVI | | | | | 0 | | | |
| | 16 | | | MKI\$ | | | | | 0 | | | |
| | 7.1 | | | CVS | | | | | 0 | | | |
| | 25 | | | MK\$ | | | | | 0 | | | |
| | 5.4 | | | CVD | | | | | 0 | | | |
| | 16 | | | MKD\$ | | | | | 0 | | | |

- ④ Correct BASIC programs (no dynamic renaming, no out-of-range arguments) compile without modification.

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Tips and tricks

smashing it and then rewrap the tape on the inside of the roll.

The first part was amazingly easy. Gently, using a razor knife, I cracked the seal holding the top on the case. The top lifted easily. There were plastic pegs that held it in proper position, but were not themselves glued. Exatron has done a nice job of engineering a tight-fitting case.

Rewrapping the tape was another story. A number of very gentle attempts failed. But then, just as in the cartoons, the light bulb appeared over my head. Instead of trying to shorten the loop by redoing the winding, why not just take the problematic longer loop a greater distance inside the case. This would take up the excess tape without having to play with the roll itself.

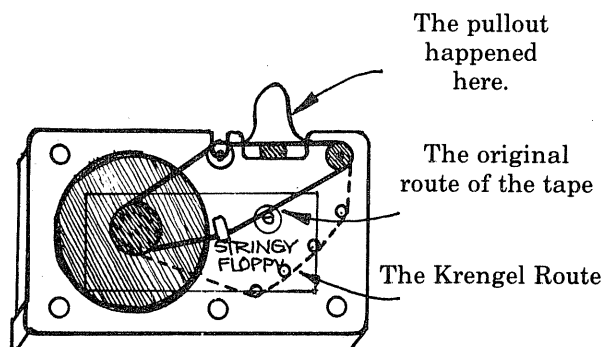
Inside the case, there is a series of small plastic posts that are intended to prevent the case from being squashed. They give the top a way of leaning on the bottom of the case. I simply took the tape and threaded a longer route through the case. My loop was now the right size!

I carefully placed the top back on the case. Using a doubled up piece of paper as a shim, I placed the wafer in the drive. The shim ensured a snug fit on the top that I had surgically removed.

With my fingers crossed, I typed in @LOAD1. The familiar hum of the drive filled the air. Seconds later, DONE appeared on the screen. WOW! Not quite believing it, I quickly listed the program. It was there. My hours of sweat were not in vain. After @SAVEing the program on *two* other wafers, I packed up the offending wafer and sent it back to Exatron.

I think I have always been one to try, even when the "experts" have said it could not be done. Most often they are right, but luckily, this time they weren't. ■

Figure 1
Fixing a Pullout





Recover dead programs

Model I, PMC-80, LNW80



Ron Goodman,
No. Hollywood, CA

It's all too easy to lose a BASIC program. A `USR (X)` call can send you to the memory-size question. My lowercase driver locks up or goes to memory size if I press certain keys. There are even BASIC lines that can cause the unfriendly question to appear at the top of the screen. A short power failure, or turning on a major power appliance, can also cause the fatal blow. But, when you accidentally type `NEW`, or when you get sent to memory size, is your program destroyed? To a small degree, yes, but only fifty or so bytes near the beginning of your program are actually gone.

Well, I spent six hours writing a program. All of a sudden, my lowercase driver said "Bye-bye," and memory size appeared a couple of seconds later. I hadn't made a copy of the program. After I finished yelling and shouting that I should have made a copy, I began to

think about the big job ahead. Suddenly, I said, "I'll get this program back without rewriting it, if it's the last thing I do."

Well, I succeeded, and here's how it's done. This method of recovering lost programs cannot be used on programs that are less than a couple of hundred bytes. Actually, it can be used, it just won't be worth your while.

The first thing to do is get to BASIC. If you are at memory size, just press `<ENTER>` as usual. If you are in BASIC, just to be safe (in case some pointers are messed up), type `SYSTEM <ENTER> /0 <ENTER>`. That will put you in memory size, which you should answer with `<ENTER>`.

It is very important not to use any variables in this process of recovering your program unless it is absolutely necessary. Also, try to avoid typing in errors at all cost. If you type in `POOK` instead of `POKE`, you will get an `?SN ERROR`, and the computer will create a `PO` variable right over your old program, destroying it further.

You need to reset the end-of-program pointer. This means that we must find out where our program ended before we can tell the computer. If you know how to do that, go ahead. If not, this one liner will do it very slowly, but it will do it.

```
FOR X=17229 TO 32767: IF PEEK (X) + PEEK (X+1)
+PEEK (X+2) <> 0 THEN NEXT X: PRINT "ERROR"
ELSE PRINT X+3
```

The use of the variable `X` is harmful, but necessary. The number that was printed is the first free memory address after the end of your program. It needs to be `POKEd` into locations 16633-16634. This can be done easily by typing:

```
POKE 16634, aaaaa/256: POKE 16633, aaaaa - PEEK
(16634) *256
```

The `aaaaa` should be replaced by the number that the first one-liner displayed. At all cost, you must not replace the `aaaaa` by `X`, or the computer will lock up. The next thing is to replace a few scattered bytes that have been destroyed. There is no way to recall those values, so they are being replaced by `CHR$(65)s` (the letter "A"). Once the program is recovered, you will have to restore these few bytes (and others) manually.

```
POKE 17134,65: POKE 17198,65: POKE 17225,65:
POKE 17226,65: POKE 17227,65: POKE 17131,0: POKE
17132,0: CLEAR
```

The last two `POKEs` in this one-liner make the first line number equal to zero. This line (and possibly the next line) will probably be mostly garbage, and you will have to rewrite the line entirely. Yes, this means the first line or two will be destroyed—a small price to pay for recovering an entire 16K program. The `CLEAR` statement gets rid of some of the garbage in the computer. The next thing that must be done is to replace the first

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Tips and tricks

line pointer:

```
FOR X=17135 TO 17372: IF PEEK (X) < >0 THEN
NEXT X: PRINT "ERROR" ELSE X=X+1: POKE
17130, X/256: POKE 17129, X-PEEK (17130) *256
```

Your program is back now. A LIST may not reveal this right off, but it really is. It is possible, when you type LIST, that only one or two lines of garbage will be printed. Delete these lines. This should allow the rest of your program to be LISTed (if they couldn't be LISTed already). Now, find the first line that is good or almost entirely good. Type:

Delete -aaa

... where aaa is the first good line, *minus one*. In other words, if the first good line was 40, you would type:

DELETE -39

Your program is now as recovered as it is going to be. If, in any of these one-liners, you are unfortunate enough to get the "ERROR" message, you have a serious problem. In fact, this recovery method is not a guarantee of recovery. More than 95% of the time it works for me, but there is a 5% chance it will not work. Why not? Because this method has no provision for replacing the line pointer for your second line. If it



happens to get destroyed because some of the messed up bytes were pointers for lines other than the first, you are not so lucky.

For those who understand why this program works, a little experimentation should allow you to quickly learn how to fix any program. Unfortunately, it is far too difficult to explain how to fix these special cases, because their cause is not simple. There are no simple one-liners that can be used, because there are so many possible reasons for the program to fail that 5% of the time.

A very important note is that none of these one-liners can be entered as permanent lines. Only type them in under the command (READY) mode. Otherwise, you will cause irreparable damage to your destroyed program. Also, the order in which the lines are entered is not random and cannot be changed. While I don't completely understand why, some of these lines cannot even be combined as one line with colons. They must be entered separately as four one-liners, or the computer will hang up forever.

While it is true that this method is not foolproof, it is a must if you lose a program. I have saved numerous hours by using this method rather than rewriting the original program.

READY

```
FOR X = 17229 TO 32767: IF PEEK (X) + PEEK (X+1) +
PEEK (X+2) < >0 THEN NEXT X: PRINT "ERROR"
ELSE PRINT X+3
```

29034

```
POKE 16634, 29034/256: POKE 16633, 29034 - PEEK
(16634) *256
```

```
POKE 17134,65: POKE 17198,65: POKE 17225,65:
POKE 17226,65: POKE 17227,65: POKE 17131,0: POKE
17132,0: CLEAR
```

```
FOR X=17135 TO 17372: IF PEEK (X) < >0 THEN
NEXT X: PRINT "ERROR" ELSE X=X+1: POKE
17130, X/256: POKE 17129, X-PEEK (17130) *256
```

LIST

```
6189))))))'&&&&&%%&&&&&GETPRINTENDUSING
```

DELETE 6189

LIST

```
10 FIX (GET MALET = ?? END FOR
```

```
20 FOR X=15360 TO 16383: POKE X,191: NEXT X
```

ETC. . . . (according to your program)

DELETE -19 ■

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WHAT'S STRING COMPRESSION?

When a BASIC program changes a string (words, names, descriptions), it moves it to a new place in memory, and leaves a hole in the old place. Eventually, all available memory gets used up and BASIC has to push the strings together to free up some space. This takes time. Lots of time. The computer stops running for seconds or minutes, and you may even think it's "crashed". The keyboard won't work, and until all the strings have been collected, you just have to sit and wait. Then things run for a while, until string compression is needed again. And again.

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WHAT'S THE SOLUTION?

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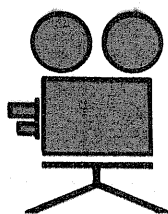
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Photographs



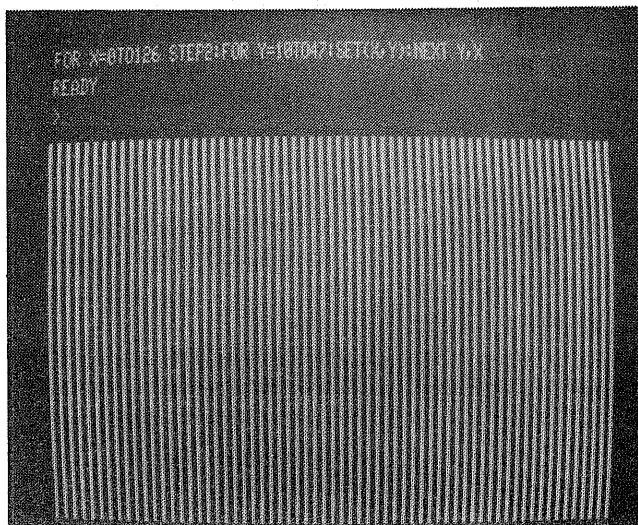
Models I/II/III, PMC-80, LNW80

Ray Bennett, Seattle, WA

Having had several opportunities to photograph the data on the screen of my TRS-80, I decided to come up with a way to set the exposure more accurately.

Since the exposure meter on an adjustable camera is calibrated to a neutral grey average, it makes it difficult to make an accurate reading of the light level from the screen. You don't know which side of 'average grey' the CRT light output is set at.

The solution is shown in the photograph. The screen is nearly filled with alternating lines and blanks. The one-line direct program which generated it is shown above the pattern. Start with a clear screen. After the pattern



has formed and the READY prompt appears, set the screen brightness to a comfortable viewing level in a lighted room. The contrast control should be fairly high.

If you want the screen itself to show (as it does in the photo), leave the room lights on for the next part; otherwise, darken the room. Set up your camera about where you intend to take the picture, preferably on a tripod with a cable release.

Now, fill the screen with whatever you want and snap away.

Make sure no bright objects in the room are reflected in the screen. If the room lights aren't too bright, the reflection of the camera shouldn't show. If it does, cover the camera with a large piece of flat black paper or cloth and cut out a peep hole for the lens. I didn't have that problem. Take the light meter reading, making sure the screen pretty well fills the view finder. Set the exposure and lens opening and don't change them for the rest of the picture taking. Also, don't change the brightness or contrast control on the CRT.

Now, fill the screen with whatever you want a picture of and snap away. Until you get used to the technique, bracket your pictures — that is, shoot one — two F stops higher, and another two F stops lower. After you shoot one roll, you should be able to obtain photographs without the bracketing. The picture shown was the one my light meter told me to take. I used Panatomic-X®, but Plus-X®, or even Tri-X® would be fine.

One word of caution. Don't run the shutter faster than 1/30 second, or you will be dismayed to find that the screen in the photo will be only partially filled. That is due to the faster scan, in which light retention of our eyes makes the screen appear filled when it isn't. I prefer to shoot at 1/15 second or slower. Make sure the information on the screen is stable for the entire exposure. ■

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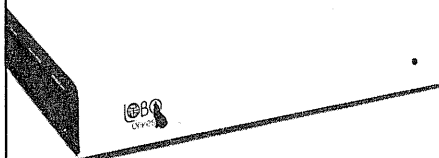
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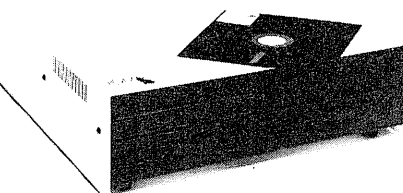
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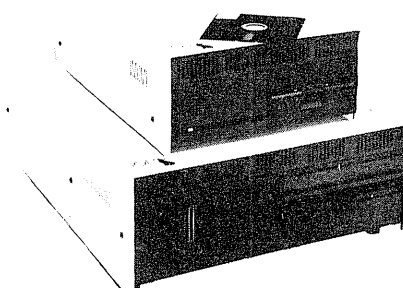
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Baltimore, MD

With computer crime an ever-increasing phenomenon, many computer users, especially those in businesses, are demanding software and hardware to protect their data from the eyes of unauthorized people. While much has been done to fulfill this demand on large computers, the personal computer user is left out in the cold. The routines presented herein should prove invaluable to the security-conscious TRS-80 owner. Two routines, Encrypt and Decrypt, begin at lines 1000 and 2000 respectively in the listing.

To use Encrypt, set A\$ equal to the string that you wish to be encrypted, and C\$ equal to the password which must be used to decrypt the string. Now GOSUB 1000. Upon return, B\$ will be the encrypted version of A\$.

To use Decrypt, set B\$ equal to the encrypted string and C\$ equal to the password used in Encrypt. GOSUB 2000. A\$ is now the decrypted string (if the proper password was used, of course).

The principle used in Encrypt is best described by the figure. First, "TRS-80 microcomputer" and "the password" are converted to their ASCII codes. Then, each character (code) of TRS-80 microcomputer is aligned with a character (code) of the password, with the password being repeated as many times as necessary to make it as long as TRS-80 microcomputer. Next, each pair of ASCII codes is added together and put into the encrypted string. Thus, only a person or program possessing the proper password can decrypt the data properly!

Decrypt works just the other way around. The encrypted string is aligned with the password in the same way the decrypted one was earlier, and the ASCII codes of the password are subtracted from the encrypted

string, giving the decrypted version.

I have presented a very simplistic approach to data security in this article. There are other, more reliable, methods which can (and are) used. Any large library will have books and other material on this topic.

Data Encryption and Decryption Table

| String to be Encrypted: A\$ | | The Password C\$ | | Encrypted String B\$ | |
|--------------------------------|-------|---------------------|-------|-------------------------|-------|
| CHAR | ASCII | CHAR | ASCII | CHAR | ASCII |
| T | 84 | + | T | 84 | = 168 |
| R | 82 | + | H | 72 | = 154 |
| S | 83 | + | E | 69 | = 152 |
| - | 45 | + | | 32 | = 77 |
| 8 | 56 | + | P | 80 | = 136 |
| 0 | 48 | + | A | 65 | = 113 |
| | 32 | + | S | 83 | = 115 |
| M | 77 | + | S | 83 | = 160 |
| I | 73 | + | W | 87 | = 160 |
| C | 67 | + | O | 79 | = 146 |
| R | 82 | + | R | 82 | = 164 |
| O | 79 | + | D | 68 | = 147 |
| C | 67 | + | T | 84 | = 151 |
| O | 79 | + | H | 72 | = 151 |
| M | 77 | + | E | 69 | = 146 |
| P | 80 | + | | 32 | = 112 |
| U | 85 | + | P | 80 | = 165 |
| T | 84 | + | A | 65 | = 149 |
| E | 69 | + | S | 83 | = 152 |
| R | 82 | + | S | 83 | = 165 |

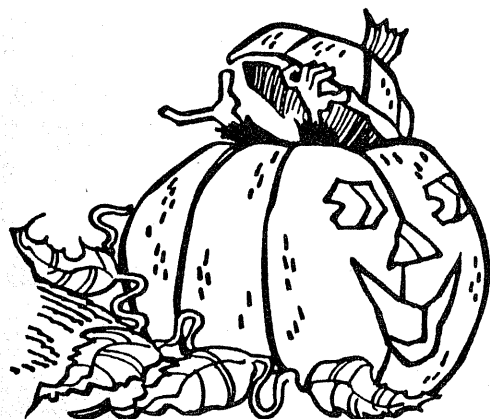
Program Listing for

Encrypt/Decrypt

```

10 CLS: CLEAR 5000: GOTO 100
20 INPUT "DO YOU WISH TO ENCRYPT OR DEC
RYPT (1 OR 2) ";A
25 C$=""
30 IF A<>1 AND A<>2 THEN PRINT CHR$(27)
;: GOTO 20
40 IF A=2 THEN 200
100 INPUT "STRING TO BE ENCRYPTED ";A$
110 INPUT "PASSWORD ";C$
120 GOSUB 1000
125 PRINT "THE ENCRYPTED VERSION: "
130 PRINT
135 PRINT B$: PRINT
140 INPUT "PRESS <ENTER> TO CONTINUE ";
IN$
150 CLS: GOTO 20
200 PRINT "THE STRING TO BE DECRYPTED I
S "
205 PRINT: PRINT B$: PRINT
210 INPUT "WHAT IS THE PASSWORD ";C$
220 GOSUB 2000
230 PRINT "IF YOU USED THE PROPER PASSW
ORD, THEN "

```





```

240 PRINT A$
250 PRINT "IS THE MESSAGE YOU TYPED EAR
LIER (DECRYPTED)!"
260 INPUT "PRESS <ENTER> TO CONTINUE ";
IN$
270 CLS: GOTO 20
1000 ' STRING ENCRYPTION ROUTINE
      VERSION 810825.1 BAS TRS
      BY ARTHUR A GLECKLER
1010 'A$=STRING TO BE ENCODED
1020 'B$=ENCODED STRING
1030 'C$=PASSWORD
1040 A1=LEN(A$): C1=LEN(C$): B$=""
1050 A2=0: C2=0
1060 A2=A2+1: C2=C2+1
1070 IF A2=A1+1 THEN RETURN
1080 IF C2=C1+1 THEN C2=1
1090 A3=ASC(MID$(A$,A2,1)): C3=ASC(MID$
(C$,C2,1))

```

```

1100 S1=A3+C3
1120 B$=B$+CHR$(S1)
1130 GOTO 1060
2000 ' STRING DECRYPTING ROUTINE
      VERSION 810825.1 BAS TRS
      BY ARTHUR A GLECKLER
2010 'A$=DECRYPTED CODE
2020 'B$=CODE TO BE DECRYPTED
2030 'C$=PASSWORD
2040 B1=LEN(B$): C1=LEN(C$): A$=""
2050 B2=0: C2=0
2060 B2=B2+1: C2=C2+1
2063 IF B2=B1+1 THEN RETURN
2065 IF C2=C1+1 THEN C2=1
2070 B3=ASC(MID$(B$,B2,1)): C3=ASC(MID$
(C$,C2,1))
2080 A3=B3-C3
2090 A$=A$+CHR$(A3)
2100 GOTO 2060

```

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MX-80 and a little ingenuity

All Models

Larry Krengel,
Elmhurst, IL

About two years ago, I was happily computing . . . no fancy gadgets tied into the system . . . I was happy.

I had long indulged in pricing peripherals such as printers, disk drives and speech synthesizers. While visiting my friendly (and at that time only) local computer store, I happened to meet a man who was a representative of the Epson Company. He first surprised me with the quality of print of his new MX-80, then amazed me with the price. More than that, he explained how simple it was to tie it into my computer.

Suddenly, I knew my time had come . . . a printer for my system. I was going to go big time. Within a week, I had an MX-80 sitting next to my TRS-80.

I ran the MX-80 through all of its tricks: different widths of print, different densities . . . it was fun just listing my programs on the printer. I found how easy it was to revise the programs I was working on when I could LLIST a portion of the program and sit in my easy chair contemplating it. I had discovered hard copy.

It wasn't long before I indulged myself in a Scripsit program. I continued to impress myself. When I began writing letters, I had the desire to use my letterhead. So I ran back to the computer store and asked their assistance. "Sorry," was the response, "it can't be done. The new MX-80 F/T will be out in a couple of months, but there will be no way to upgrade your machine. You'll need a new one."

I'm sure the thought of selling me another printer broke his heart! The F/T (short for friction/tractor feed) would be able to do what I wanted, but I was not ready to foot the bill for another printer.

I have never been one to easily accept the thought of not being able to do something. So when he told me it could not be done, I went into problem-solving gear. How could I get my letterhead to feed through the printer? The solution seemed simple, and, to my amazement, my first attempt was successful. It provided me with a system that I use to this day.

Since that time, at least two companies have developed modifications that allow the computerist to friction-feed single sheets into the MX-80 printer without the F/T option. I have never felt the need to invest \$40 or more for the modification.

If, by chance, you are in the same situation I was, you might find my letterhead carrier a simple solution. I

don't know why this solution would not work for any tractor feed printer.

Here is how I did it:

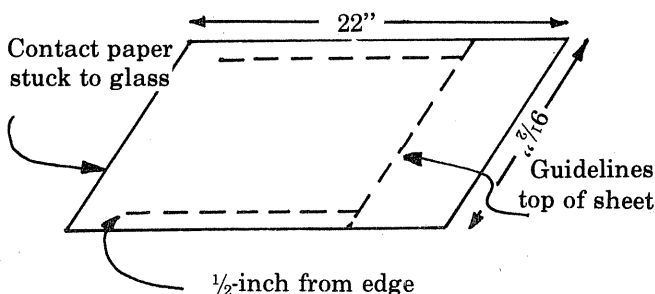
Materials:

- Two continuous sheets of tractor feed paper.
- About two square feet of clear contact paper.
- One 8½" by 11" sheet of paper.
- The proper size hole punch.
- A razor knife.

The reason for using two sheets of the tractor feed paper is to provide enough paper for a leading edge of sufficient length to engage the sprockets. In addition, I needed a long enough tail to avoid having the printer give an out-of-paper warning.

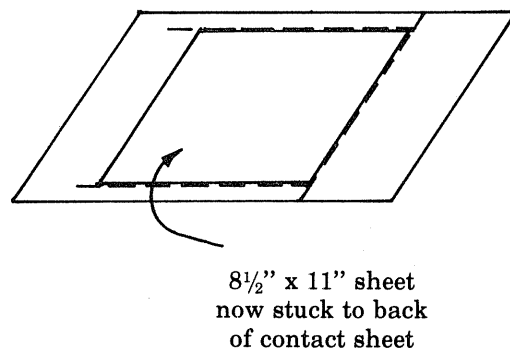
First I cut a piece from the contact paper to fit the two sheets of tractor paper — 9½ by 22 inches. I peeled the backing off and stuck it temporarily to a sheet of old glass (I could have used any shiny hard surface from which I could again peel the sheet). I drew a line across the sheet about ¼ of the way down, and two lines perpendicular to the first, ½-inch in from each side, (see Figure 1). This outlined the position in which the 8½ by 11-inch sheet of paper would be applied.

Figure 1



Peeling the contact sheet only as far as needed, I stuck the paper to the back of the contact sheet and aligned it with my guide lines. I reapplied the contact paper to the

Figure 2



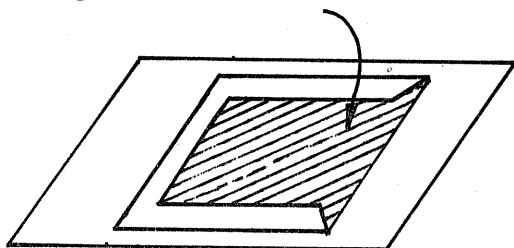


window. I now had the 8½ by 11 sheet stuck under the contact sheet.

Using the razor, I made a cut starting at the lower left corner of the paper (see Figure 2). I cut a giant upside down "U," leaving only a ¼-inch border on both sides and the top of the 8½ by 11 sheet. I now had a hole in the contact paper.

Figure 3

Shaded portion was removed by cutting with a razor knife.



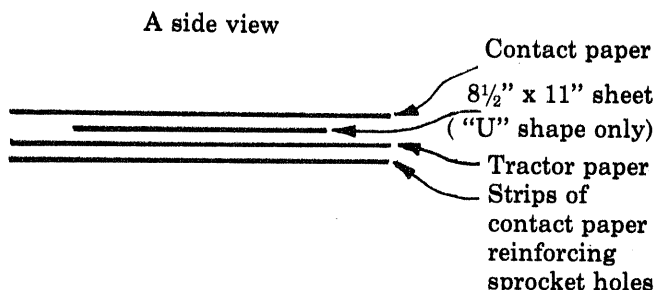
Then came the tough part. I peeled the contact paper back off the glass and stuck it very carefully to the two sheets of tractor paper.

Turning the "sandwich" over, I used the little strips I had left over to reinforce the sprocket holes on the reverse side.

Using a ⅜-inch hole punch, I punched the contact paper which was on both sides of the sprocket holes.

Done! I now had a carrier that allowed me to print on any standard size piece of paper . . . like my letterhead. All except, that is, for the ¾ of an inch at the top and sides of the sheet. (Who prints there anyway?)

Figure 4



I slipped my paper into the carrier and placed it in the printer as I would any other piece of tractor paper.

Is it durable? I have two years of almost daily use on it. It still works like the day I made it. I suppose that if I were a businessman, I would market this gadget for five or ten dollars . . . a nice return on the eighty cents the materials cost! ■

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Automatic program dating

Models I/III, PMC-80, LNW80

Tim Bowman, Spokane, WA



While programming have you ever been frustrated because you couldn't remember which program listing (saved either on magnetic or paper media) was the most current version? If so, there's help. Let's use a simple technique to produce an automatic record of when the program was last run.

Type in Program Listing 1. If your computer has a real time clock, do not type in line 35. If your computer does not have a real time clock, type in the alternate line 35 (without the REM), in place of line 30. This revised line will prompt you for time and date and will only accept a seventeen-character input. In line 20, be sure to insert 21 spaces after "T\$=". The reason will become obvious when we are through. Line 40 obtains the address of T\$, which will have the last 17 characters changed by the POKE in line 70.

The last runtime is automatically inserted and becomes a permanent part of the program.

LIST the program and verify that it is correct. If you have a printer, LLIST it. Type RUN, then LIST and LLIST the program. The string (T\$) has been changed to reflect the time the program was just run. Try running it again and again. Time and date are updated each time the program is run. With this simple technique, each time the program is listed or saved on your favorite storage media, the last run time is automatically inserted as shown in Figure 1 and becomes a permanent part of the program.

In case you are wondering, we just used a simple variation of a string packing technique which is usually used in strings with graphics or machine language code. In everyday programming, I combine the entire program from Listing 1 into two lines near the beginning of the program I am working on. I type line 20

following the heading and combine lines 30-80 into one long line. If the program is not sufficiently debugged to run, I insert a STOP line after the date routine and RUN the program. This updates the time before a listing is made or the program is saved.

This technique can be so helpful that you might want to add it to Spencer Hall's Z-Language (80-U.S., Jan. 82), and call it up by means of a simple GOSUB.

Listing 1 Auto Dating

```
10 CLS

20 T$=                                     "Last Update =
12345678901234567"

30 A$=TIME$

35 REM CLS: PRINT@512, "TIME AND DATE —
FORMAT = 06/24/82 21:42:45": INPUT
A$:IFLENA$<>17 THEN PRINT "LENGTH MUST
BE 17 CHARACTERS!": FORX=1TO500: NEXTX:
GOTO30

40 L=PEEK(VARPTR(T$)+1) + 256*PEEK(VARPTR
(T$)+2)

50 FORZ=1TO17

60 Q=ASC(MID$(A$,Z,1))

70 POKE L+(Z+13),Q

80 NEXTZ
```

Figure 1

Ed. note: Figure 1 shows the effect of running Listing 1. This is not to be entered into your computer.

```
10 CLS

20 T$=                                     "Last Update = 06/28/82
16:26:54"

30 A$=TIME$

35 REM CLS: PRINT@512, "TIME AND DATE —
FORMAT = 06/24/82 21:42:45": INPUT A$:
IFLENA$<>17 THEN PRINT "LENGTH MUST BE 17
CHARACTERS!": FORX=1TO500: NEXTX: GOTO30

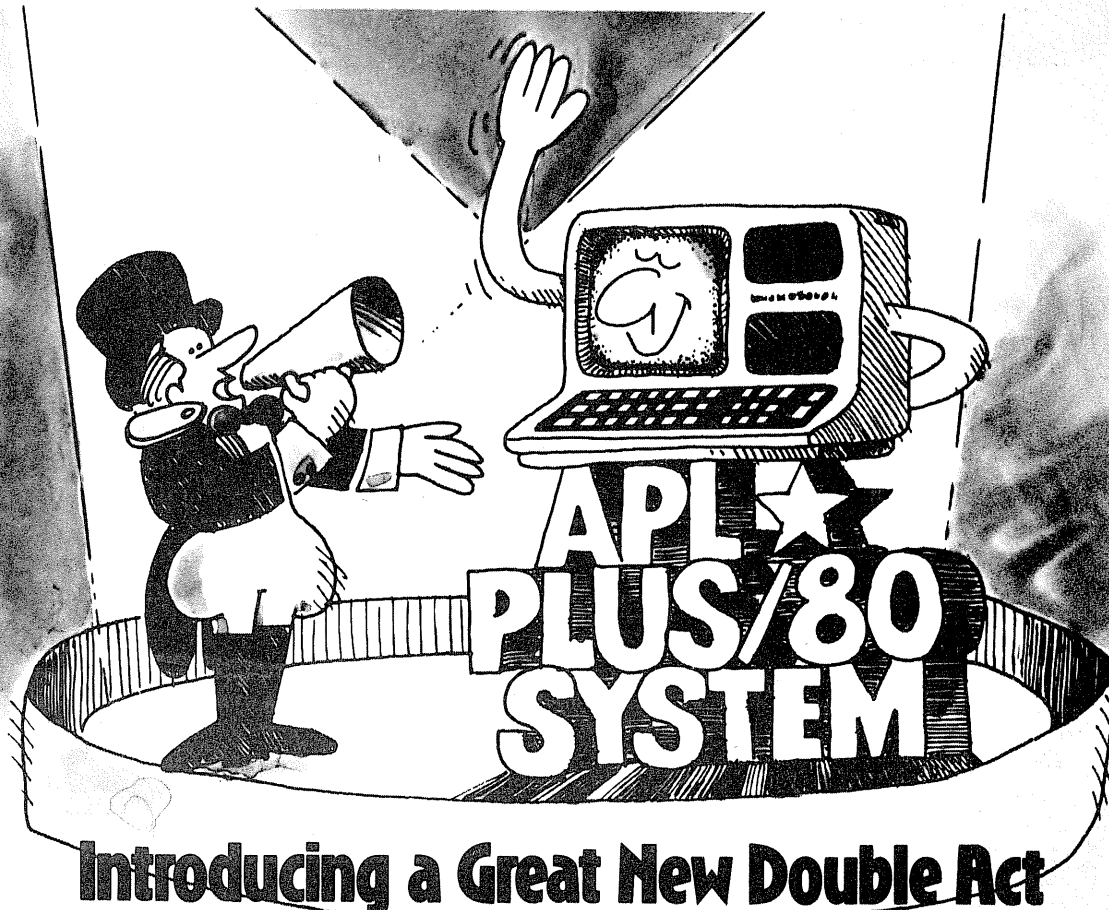
40 L=PEEK(VARPTR(T$)+1) + 256*PEEK(VARPTR
(T$)+2)

50 FORZ=1TO17

60 Q=ASC(MID$(A$,A,1))

70 POKE L+(Z+13),Q

80 NEXTZ
```

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Using APL:

```

▽ BARGRAPH;I;N
[1] 'ENTER UP TO 13 HEIGHTS (FROM 0 TO 48 EACH):'
[2] I←0N*,□◇TCFF A INPUT, CLEAR. PLOT, LOOP:
[3] LP:(I←N[I])°.□SPOT(10×I-1)+15 ◇ + (0<I-1)°LP
▽

```

This APL program with this numeric input

32 6 41 25 48 2 19 0 36 48 45 12 9

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October, 1982 37



PRINT to LPRINT

Models I/III

Ray B. Harrill,
Chicago, IL

How many times have those of you with printers developed a lengthy program using PRINT for output and then wished you'd used LPRINT instead? Being the poor planner that I am (what's a flowchart?), this has happened to me more than once. Believe me, nothing is more boring than editing in an "L" prefix to all those PRINTs.

Out of desperation one night, I sought an easier way. I decided to let the computer do all this — after all, didn't I buy it to *save* work? In a nutshell, my approach was to write a routine to scan an entire program in search of all the PRINTs (including PRINTTABS and PRINTUSINGs, but *not* PRINT@ or PRINT#) and convert them to LPRINTs.

To do this, I had to go through the following steps:

1. Find the beginning memory address for the program text. This is available by PEEKing addresses 16548(LSB) and 16549(MSB) for Model I, Level II. I understand this is the same for Model III, and for both models regardless of whether they have disk. Thus, the subroutine starts out with:

```
5000 B=PEEK(16548)+256*PEEK(16549)
```

For Model I (without disk), this produces an address of 17129. With DISK BASIC (TRSDOS 2.3) on the same machine, it's 26302 (with zero files).

2. Find the end of the program text. This address is obtained by PEEKing addresses 16633(LSB) and 16634(MSB). Thus,

```
5010 E=PEEK(16633)+256*PEEK(16634)-1
```

3. Do the actual program search and change to LPRINT. Now that we know where in memory the program text begins and ends, we can search within these parameters for the PRINT commands. But first we should review how BASIC keywords (such as GOTO, PRINT, FOR, etc.) are stored in memory. To conserve memory, BASIC assigns a numeric "token" designation to each of these keywords. The token designations range from 129 to 255 (decimal — no HEX on these). For example, the token for PRINT is 178, and for LPRINT it's 175. For a complete listing of the BASIC token designations, see Appendix E/1 of Radio Shack's Level II Manual and D/1 for Model III Manual. In this manner, BASIC keywords are stored in only one memory byte. To illustrate, let's look at how a short sample program is stored in memory. Type in the program shown in Figure 1, using the same spacing as shown. Applying steps 1 and 2, we find that the program begins at address 17129 and ends at 17156. Now, carefully enter this in the *command* mode:

```
FOR X=17129 TO 17156: LPRINT X; PEEK(X);  
CHR$(PEEK(X)): NEXT X
```

This memory dump of the program should be the same as the printout shown in Figure 2. (If it's not, check to be sure you entered the program in Figure 1 *exactly* as it is shown; then try again. Let's briefly examine what we've got. This should give you a basic idea of how your silly machine remembers what we've told it.

Point 1: The entire program text is stored sequentially in memory, beginning at location 17129 (model without disk) and ending at location 17156, as we determined earlier.

Point 2: The contents of each program line are preceded by a two-byte (LSB/MSB) pointer to the memory address for the beginning of the next program line. In our example, therefore, bytes 17129 and 17130 point to address 17135 ($239+66*256=17135$). Locations 17135 and 17136 point to address 17149, and so on.

Point 3: The next two bytes comprise the two-byte (LSB/MSB) notation of the program line number. Lines

Out of desperation,
one night
I sought an
easier way.



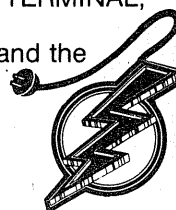
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17131 and 17132, therefore, indicate line 10 ($10 + 0 * 256 = 10$).

Point 4: The actual text of the program line then follows. In this case, the entire text of line 10 ("CLS") is stored in just one token byte (132 at location 17133), as noted earlier.

Point 5: The text of each BASIC program line is concluded with a zero, denoting the end of the line. Thus, the zero delimiters at locations 17134, 17148 and 17154.

Point 6: The zero at the end of the very last line in the program is followed by two more zeroes, such as at locations 17155 and 17156. This is where a two-byte pointer to the next line would be. In effect, these last two zeros tell the CPU, "That's all folks," stop operations and get READY for the user's next action.

Note: Some of the CHR\$ items in the memory dump are not used and are meaningless to the program (i.e., CHR\$ items for locations 17129-17139 and 17148-17156). In these cases, only the numeric item is used by the program — call the garbage collector for the rest.

Now that we've got an overall picture of how the program text is stored, let's look at its contents, remembering that our ultimate goal is to change all PRINTs to LPRINTs. The key here is the keywords. The sample program (Figure 1) contains three such words — CLS, PRINT and END — which we can see are stored in token form at locations 17133, 17139 and 17153, respectively. Token 132 is for CLS; 178 for PRINT; and

128 for END.

If you're still with it, the light should now be shining through on how we can easily change the PRINTs in the program to LPRINTs. We simply search the program for the 178s (the PRINT token) and change them to 175s (the LPRINT token). We make these changes by POKEing (discriminating, of course) a 175 into every location that contains a 178. Our subroutine thus continues as follows:

```
5020 FOR X=B TO E
```

```
5030 IF PEEK(X)=178 AND PEEK(X+1)<>64 AND  
PEEK(X+1)<>35 THEN POKE X,175
```

```
5040 NEXT X
```

```
5050 RETURN
```

This should do the job nicely. Try it out using the program shown in Figure 3. Does it change the PRINT in line 20 to LPRINT? Congratulations.

To change LPRINTs back to PRINTs, simply reverse the 178 with the 175 in line 5030. Note that the subroutine avoids changing PRINTs that are part of PRINT@ or PRINT#, as LPRINT@ (@=CHR\$(64)) and LPRINT# (#=CHR\$(35)) are not valid commands. It does, however, make the change for PRINTTABs and

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PRINTUSINGS.

Also, if your program is lengthy, you'll have to be patient while this routine is operating. It takes time to search the entire text of a long program.

The above approach can be used to change anything in a program to anything else. For instance, if you wanted to change all the shift@ signs in a program to @ (since shift@ is taboo), you would simply search the program for all the 96 "tokens" and change them to 64s.

The more you can learn about how BASIC's ROM and RAM work, the easier it will be for you to make it useful for your own needs. Besides that, it's fun learning them.

Figure 1

```
10 CLS
20 PRINT"SAMPLE"
30 END
```

Figure 2

| | | | | | |
|-------|-----|---|-------|----|---|
| 17129 | 239 | ↵ | 17143 | 77 | M |
| 17130 | 66 | B | 17144 | 80 | P |
| 17131 | 10 | | 17145 | 76 | L |
| 17132 | 0 | | 17146 | 69 | E |
| 17133 | 132 | | 17147 | 34 | • |

| | | | | | |
|-------|-----|-------|-------|-----|---|
| 17134 | 0 | 17148 | 0 | | |
| 17135 | 253 | ↵ | 17149 | 3 | |
| 17136 | 66 | B | 17150 | 67 | C |
| 17137 | 20 | | 17151 | 30 | |
| 17138 | 0 | | 17152 | 0 | |
| 17139 | 178 | ↵ | 17153 | 128 | |
| 17140 | 34 | • | 17154 | 0 | |
| 17141 | 83 | S | 17155 | 0 | |
| 17142 | 65 | A | 17156 | 0 | |

Figure 3

```
10 CLS
20 PRINT"SAMPLE"
25 GOSUB 5000
30 END
5000 B=PEEK(16548)+256*PEEK(16549)
5010 E=PEEK(16633)+256*PEEK(16634)-1
5020 FOR X=B TO E
5030 IF PEEK(X)=178 AND PEEK(X+1)<>64 AND
PEEK(X+1)<>35 THEN POKE X, 175
5040 NEXT X
5050 RETURN
```

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Sunrise-sunset

Models I/III, PMC-80, LNW80

David Carman,
Lindsay, CA

This program is very short and its operation should be self-explanatory. It asks for a month and then a day of the month. You are asked if you want the answers in standard time or daylight-savings time. After a pause for calculations, the times of sunrise and sunset are given for the selected date.

Line 30 contains the data which specifies the location for which the times are calculated. All that is needed is the longitude, latitude, and time zone for the location. Be sure to convert minutes to tenths of degree, e.g. 30 minutes becomes 0.5 degrees, and rounding to whole

All that is needed is the longitude, latitude and time zone for the location.

numbers for longitude and latitude will give enough accuracy. The time zone is given in terms of hours from Greenwich Mean Time. Use the remark in line 20 to guide you. Latitudes and longitudes are available from numerous sources, including almanacs.

I have used this routine on a number of locations in the United States and it is accurate within one to two minutes, and often right on. The times do not change from year to year, but published times claim a similar accuracy, so this program does work very well. The times are not accurate in extreme northern latitudes due to the long nights and days during winter and summer.

I hope you like it.

Listing 1 Sunrise-Sunset

```

5 REM *****
10 REM      SUNRISE/SUNSET PROGRAM
15 REM *****
20 REM  SUNRISE-SET DATA:  LA = LATITUD
   E  LO = LONGITUDE  TZ IS TIME ZONE IN H
   O  URS FROM GREENWICH MEAN TIME.  EASTERN
   T  IME TZ=-5  CENTRAL TZ=-6  MOUNTAIN TZ=-
   -  7  PACIFIC TZ=-8
30 LA=35.4:LO=119:TZ=-8:REM BAKERSFIELD
   C  ALIF
40 REM CHANGE LINE 30 TO LATITUDE/LONGI
   T  UDE AND TIME ZONE

```




```
50 REM OF THE LOCATION FOR WHICH YOU WI
SH TO COMPUTE
60 REM SUNRISE SUNSET TIMES. CONVERT M
INUTES TO TENTHS OF
70 REM OF DEGREES... SUCH AS 30 MINUTES
BECOMES .5 DEGREES,
80 REM ETC. ROUNDING TO WHOLE DEGREES
OF LATITUDE AND
90 REM LONGITUDE PROVIDES ADEQUATE ACCU
RACY IN THE COMPUTATION
100 REM OF SUNRISE AND SUNSET TIMES.
350 CLS
360 PRINT@384,"";:INPUT"Enter the selec
ted month by number (5=May, 6=June, Etc
.)";SM:T=SM
370 IFSM<1ORSM>12GOTO360
380 GOSUB430:PRINT@384,"";:INPUT"Enter
the selected day (12,24,30, etc.): ";SD
390 IFSD<1ORSD>31GOTO380
420 M1=SM:I1=SD:K1=SY
425 GOTO550
430 PRINT@384,"
```

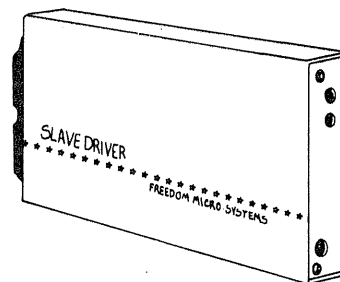
";:

RETURN

```
550 YT=K1/4:IFYT=INT(YT)GOTO630
560 N=((275*M1)/9)-2*((M1+9)/12)+I1-30:
IFM1<=2THENN=N+1
570 P1=0
580 IF M1>2 THEN N=N+1
590 IF M1=1ORM1=2THEN N=N+1
600 IF M1=3ORM1=4ORM1=5ORM1=7THEN N=N-1
610 IF M1=11 THEN N=N+1
620 GOTO650
630 N=((275*M1)/9)-((M1+9)/12)+I1-30:IF
M1=2ORM1=1ORM1=9ORM1=10ORM1=11ORM1=12TH
EN N=N+1
640 P1=1
650 N=INT(N)
790 CLS:PRINT"Do you want to see sunris
e using daylight savings time, or
standard time (D or S) ?";
800 QQ$=INKEY$:IFQQ$=""GOTO800
810 IFQQ$<>"D"ANDQQ$<>"S"GOTO790
815 CLS:PRINT@528,"THE COMPUTER IS COMP
UTING..."
820 QQ$=LEFT$(QQ$,1):IFQQ$="D"ORQQ$="S"
GOTO830ELSE790
830 IFQQ$="D"THENDC=1ELSEDC=0
870 P1=0:LM=LO/15:KD=LA:GOSUB1510:L3=KR
:SI=SIN(L3):CO=COS(L3):TR=N+(6+LM)/24:T
S=N+(18+LM)/24:MR=.9856*TR-3.763:MS=.98
56*TS-3.763:KD=MR:GOSUB1510:M1=KR:KD=MS
:GOSUB1510:M2=KR:LR=MR+1.916*(SIN(M1))+
.02*(SIN(2*M1))+282.605
880 IFABS(LR)>359THENLR=LR-360
```

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Tips and tricks

```

890 LS=MS+1.916*(SIN(M2))+.02*(SIN(2*M2
))+282.605:IFABS(LS)>359THENLS=LS-360
900 KD=LR:GOSUB 1510:LR=KR:KD=LS:GOSUB1
510:LS=KR:RR=.91746*TAN(LR):RS=.91746*T
AN(LS)
910 RR=ATN(RR):KR=RR:GOSUB1500:RR=180+K
D:RS=ATN(RS):KR=RS:GOSUB1500:RS=KD+180:
RR=RR/15:RS=RS/15
920 SR=.39782*SIN(LR):SS=.39782*SIN(LS)
:CR=SQR(1-SR*SR):CS=SQR(1-SS*SS)
930 XR=(-.01454-(SR*SI))/(CO*CR):XS=(-.
01454-(SS*SI))/(CO*CS):GOSUB2360:XR=-AT
N(XR/SQR(-XR*XR+1))+1.5708:XS=-ATN(XS/S
QR(-XS*XS+1))+1.5708:J=XR:KR=XR:GOSUB15
00:XR=KD:KR=XS:GOSUB1500:XS=KD:XR=360-X
R:XR=XR/15:XS=XS/15
940 TR=XR+RR-.06571*TR-6.589:TS=XS+RS-.
06571*TS-6.589
950 IFTR<0THENR=TR+24:GOTO950
960 IFTR>24THENR=TR-24:GOTO960
970 IFTS<0 THENTS=TS+24:GOTO970
980 IFTS>24THENTS=TS-24:GOTO980
990 UR=TR+LM:US=TS+LM:MR=UR-INT(UR):MS=
US-INT(US):UR=UR+TZ:US=US+TZ:MR=60*MR:M
S=60*MS
1000 IF UR>12THENUR=UR-12

```

```

1010 IFUS>12THENUS=US-12
1020 IFMR>59.4ANDMR<60.5THENUR=UR+1:MR=
0
1030 IFMS>59.4ANDMS<60.5THENUS=US+1:MS=
0
1040 UR=UR+DC:US=US+DC:IFDC=1THENDC$="D
T"ELSEDC$="ST"
1050 IFTZ>-5ORTZ<-8THENT$=" ":GOTO1100
1060 IFTZ=-5THENT$="E":GOTO1100
1070 IFTZ=-6THENT$="C":GOTO1100
1080 IFTZ=-7THENT$="M":GOTO1100
1090 IFTZ=-8THENT$="P":GOTO1100
1100 IFJJ=2PRINT@384,"No Sunrise Or Sun
set Today... Must Be Far North Or South
";GOTO1160
1110 AM$=T$+DC$:PRINT@384,"Sunrise Toda
y: ";INT(UR);":":PRINTUSING"###";MR;:PR
INT" AM ";AM$;" Sunset Today: ";INT(
US);":":PRINTUSING"###";MS;:PRINT" PM "
;AM$
1120 IFMR<9.5ORMR>59.4THENPRINT@403,"0"
;
1130 IFMS<9.5ORMS>59.4THENPRINT@434,"0"
;
1140 IFINT(MR)=0THENPRINT@402,":00 ";
1150 IFINT(MS)=0THENPRINT@433,":00 ";
1160 PRINT@512,CHR$(30)
1200 PRINT @838,"DO YOU WANT TO COMPUTE
ANOTHER DATE (Y/N) ?"
1210 QQ$=INKEY$:IF QQ$<>"Y"ANDQQ$<>"N"G
OTO1210
1220 IF QQ$="Y"GOTO350
1230 END
1490 END
1500 KD=KR*57.29578:RETURN
1510 X=INT(KD/360):KR=KD*.01745329-X*6.
2831853:RETURN
2360 IF (-XR*XR+1)<0THEN JJ=2:GOTO950
2370 IF (-XS*XS+1)<0THEN JJ=2:GOTO950
2380 RETURN

```

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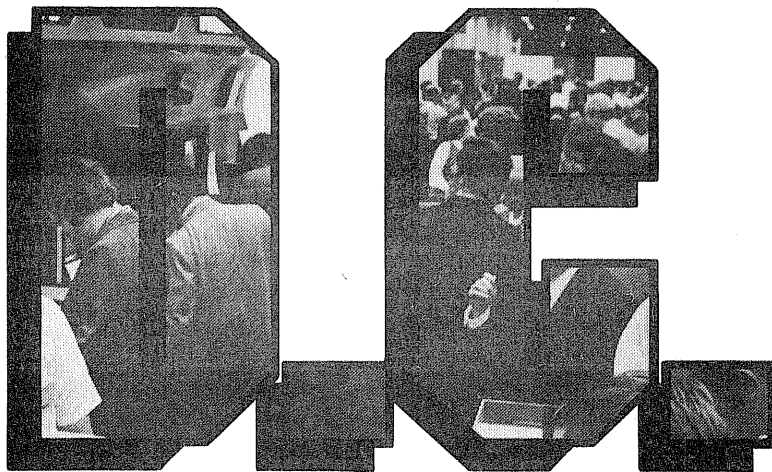
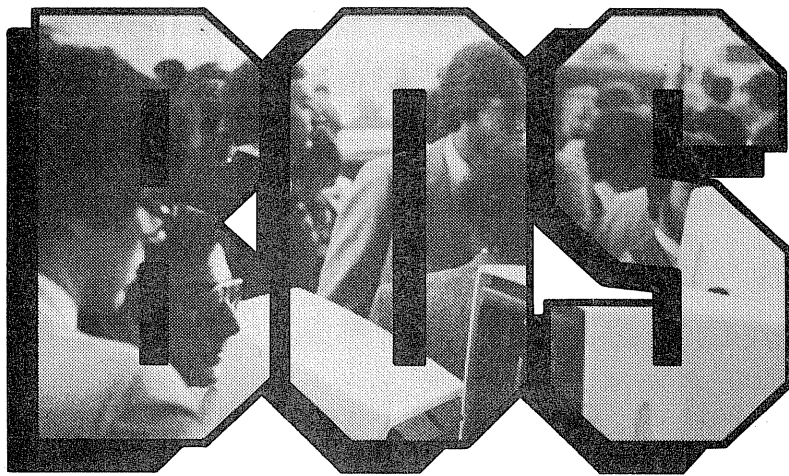
To convert Sunrise-Sunset to run on Color Computer: change all PRINT@ locations in lines 360, 380, 430, 815, 1100, 1120, 1130, 1140, 1150, 1160 and 1200, to one-half the value already included in the listing. For example, in line 360, change the PRINT@384 to PRINT@192. Also change line number 1110 to read:

```

1110 AM$=T$+DC$:PRINT@192,"SUNRISE TODA
Y: ";INT(UR);":":PRINTUSING"###";MR;:PRI
NT" AM ";AM$;" SUNSET TODAY: ";INT(U
S);":":PRINTUSING"###";MS;:PRINT" PM "
;AM$

```

Be sure to include all spaces exactly as shown in the listing. They are crucial for getting the proper print-out on the screen. ■



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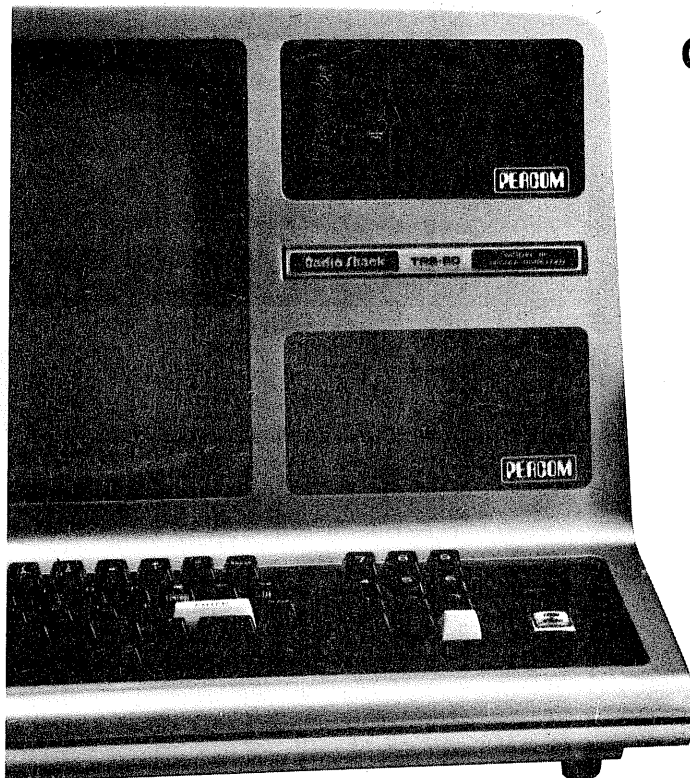
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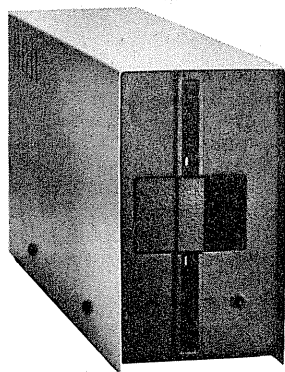
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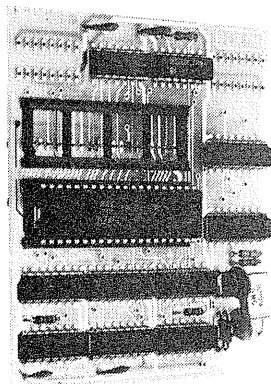
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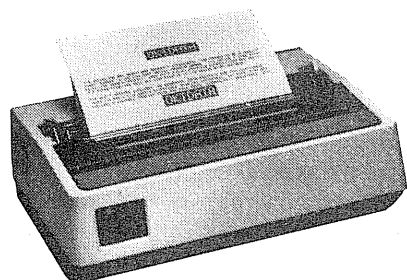
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Electric Pencil 2.0z

An evaluation of IJG's new version of a word processing classic

Model I/III with disk, PMC-80, LNW80

T. G. Melatis, Agoura, CA

The name Michael Shrayor or his word processor "The Electric Pencil" should instill more than nostalgia to the veteran TRS-80 hacker. The Pencil is one of the oldest and most successful word processing packages ever to be written. Now, before you oldtimers out there start to clamor about taking that old dog out and putting it out of our misery, you'd better take a closer look. Electric Pencil 2.0Z is one old dog that has learned a lot of new tricks. While the bulk of this evaluation is directed at the disk system user, the rest of you might want to continue reading. The manual is integrated; one manual that covers cassette, Exatron Stringy Floppy, and disk-based system users. This implies that Electric Pencil 2.0Z is or will be available to each of these potential users.

Under the bright new packaging is a book-sized box that contains two things, a 35-track, single-density, 5¼," write-protected distribution diskette and an operator's manual. The distribution diskette is in Model I format and contains a program that can transfer the programs from the distribution diskette to a disk that has an operating system, either on a single or multiple disk drive Model I system. The Model III user may be at a disadvantage. He must transfer all the programs from the Model I diskette to a Model III double-density diskette using the Convert utility. According to the Electric Pencil Manual, this requires a two-disk system.

The Electric Pencil 2.0Z is compatible with a variety of
48 80-U.S. Journal

system/operating-system combinations. To paraphrase the manual, this software will run on a TRS-80 Model I or LNW80 that is running under TRSDOS 2.3 or Apparat's NEWDOS 2.1, NEWDOS/80 1.0 or NEWDOS/80 2.0. It will also run on a Model III that is running under TRSDOS 1.3 or NEWDOS/80 2.0. The manual does not state what the compatibility is with Model I's that have clock speedups or disk doublers. This is not a complaint. With all of the possible combinations of hardware and DOS systems available, I'm sure that IJG had to draw the line somewhere just so that we could get a release in this lifetime.

Text Entry

The disk Electric Pencil 2.0Z contains three system-level programs. After booting the system, the user types "PENCIL/CMD" (the DOS command "AUTO PENCIL" will take you straight to the Pencil). This program displays the title and copyright banner. Pressing any key loads the text entry program and takes the user to a clear screen and a block-shaped cursor. To enter text, just start typing. At the end of the 64-character line, just keep typing. If the word being typed won't fit on the line, it and the cursor will move to the next line. Thus, the user will always have clearly readable text on the screen. No more wrap around and end of line markers on the display.

Besides the text entry, this program has four basic groups of commands that are either one or

mostly two keystroke commands. The first group is Cursor Control. The arrows move the cursor in the four indicated directions. Additionally, the cursor can be placed at the beginning of the text, first line after the text, the home position, the beginning of the current line, tab eight spaces right, as well as cause the text to scroll up or down past the cursor (with controlled pauses or stops).

The second group is the Editing Command group (all are two keystroke commands). These are insert or delete a character, insert or delete a line, erase from the cursor to the end of the current line, mark a block of text (one to several thousand characters), insert the marked block at the current cursor position, delete the marked block, and a backspace/delete.

The third group is the Utility group. These are: search for a string from 1 to 39 characters long (with optional wild cards for coded searches) that has the option to replace the found string with a new string; a repeat function that repeats any single or double keystroke a specified number of times (as in creating a string of dots). This group also has the keystrokes to exit the text mode to either of the other two system programs, System Menu and Print Menu.

The fourth group includes some special characters and, more important, a couple of special functions. The first is the upper/lower case lock and unlock. The second is a feature I have not seen before, DICT-A-MATIC. The

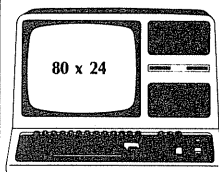
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disk hackers out there will now have an excuse to resurrect those cassette units. First, you take your cassette machine and dictate the text into the microphone. After dictation, you install the cassette as if it were a data machine, but you leave the earphone plug out. Hitting <SHIFT> and <ENTER> at the same time will turn on the cassette (if you left it in the play mode). With the earphone jack removed, the text you dictated will now be audible. Hit <SHIFT> and <ENTER> again and the cassette will stop to allow you to type what you just heard. A professional transcription machine can briefly rewind and playback a part of what was previously played so that the typist can maintain continuity. This function can be done with the play and rewind buttons with a little difficulty. While the DICT-A-MATIC feature is not a professional transcribing machine, it does make clever use of a system resource.

The System Menu

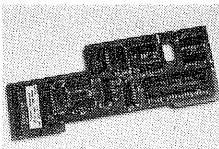
Now that the words are stored in a large memory buffer, what can be done with them? Pressing <CONTROL> and <K> sends the system to the disk to load the second program which is the System Menu. (NOTE: Pencil redefines the <CLEAR> key as a <CONTROL> key.) The text is still in the buffer. The System Menu program takes over the screen and draws a menu. The menu has seven data or command blocks and a command line.

The first of these blocks is the status of the text buffer. Three lines in this block display how many words are in the buffer (a word is all the characters between two spaces, no matter how long), how many text records are in the buffer (not disk records), and how many bytes of memory are left in the text buffer. The word and record calculations are from where you left the cursor through the last text entry. The memory left is the amount left after the last entry. If you want the words and record value to be correct for the whole buffer, you must place the cursor at the home location before entering the System Menu. This



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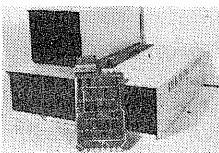
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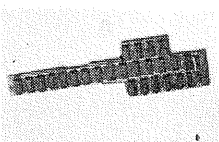
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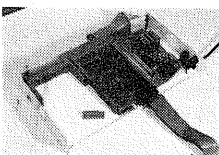
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could be a problem since the menu does not flag the fact that the cursor is not home. However, this will be to the user's advantage when using the other commands discussed below. The manual gives ample and repeated warning of this feature when discussing each system command that may be affected by the cursor placement as well as the advantages of this scheme.

The next three menu blocks are for controlling storage transfer. The first block is for the cassette. The three commands are CSAVE, CLOAD and CLOAD?. These are the same as the Level II BASIC commands. The second block is for the Exatron Stringy Floppy. The commands are @SAVE, @LOAD and @NEW which are the save, load and erase commands. The third block is for the disk commands. There are four commands. The first is DIR, the same as the DOS directory command. It has the

principle function of displaying a directory of all files which have the extension of "/PCL," Pencil text files. The DIR command also has the option to display a directory of all files except "SYSN/SYS" files. The command can specify any disk drive but can display only the filenames and extensions. The second and third commands are the SAVE and LOAD commands. File specifications can include passwords and extensions other than the default "PCL/." The fourth command is the KILL command. Like the DOS command, the full filespec can be used. The three groups of transfer commands can be used to store all or part of the buffer to the specified device (from the cursor through the last text entry), or add one or more files to an existing text buffer or load them into an empty buffer. Thus, the user can create a custom document from several stored standard text

modules. Lawyers, estimators and contract administrators take notice.

The fifth block contains four commands. The first three are used to clear the text buffer, or clear all the text buffer before or after the cursor. The fourth command is the exit to the DOS.

The sixth block has four control commands. The first is the cursor rate control. The Electric Pencil has a built-in repeat function. When a key is pressed and held for more than half a second, the key character or command will begin to repeat. The cursor rate command is a relative repeat speed setting that can be set from 1 to 10 with 10 being the fastest cursor/key repeat speed. Unfortunately, the setting also affects the Pencil's keyboard debounce routine. On a three-year-old Model I, cursor rate values higher than four allowed keybounce. The next command is the tape speed control. For the

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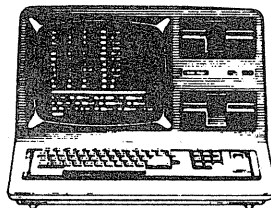
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Model III, it has values of "HI" or "LO." Model I's are restricted to "LO." The next two commands allow the saving or loading of a custom printer driver on a disk system.

The seventh block is a status line that displays the current tape speed setting and cursor rate setting. It also reminds the user to use the BREAK key to get back to the text-entry mode.

The Printer Menu

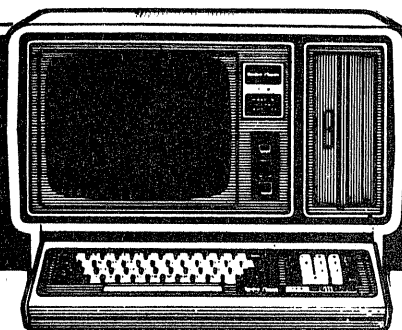
Sooner or later, all word processing packages have to deal with some form of hard copy printer. Here, the Electric Pencil 2.0Z has the most changes and comes up with what I feel are excellent results. Any word processor must ultimately take the text from either memory or storage media and print the text with some desired format. There are basically two ways to do this job. The first is to embed text-formatting

commands in the text buffer. The text with commands passes through a formatting program that executes the commands and prints or stores the text, less commands, in the desired format. The second method is to send commands or format parameters to the format program, then pass the text through the program. It then either prints or stores the formatted text. The Electric Pencil 2.0Z uses the latter.

To print a formatted document, the user places the cursor at the desired place in the text (usually at the start) and then presses <CONTROL> and <P>. The control pair causes the program to load the Print Menu Command program. The first segment of the menu allows the user to specify what the printed format will look like. The user can specify how many lines will be printed per page, how many lines will be blank to skip over fan-fold perforations, set the left

margin and set the number of characters per line. Additionally, the user can set line spacing, the starting page number for numbered pages, and cause the text on each line to be right-justified. Eight commands set up the print format. Once set, they remain until changed or the DOS disk is booted. They are also saved in the disk file and loaded with the text.

The next segment of the Print Menu is the Printer Control commands. The user can set the printing to pause on each form feed. This will allow single sheets to be printed on letter-quality printers that do not use continuous form paper. This group also contains the implied print control command. Most printers will receive characters and store them in their internal buffer until it is full or a character is received that causes the buffer to be printed. Usually this is either a carriage return (most



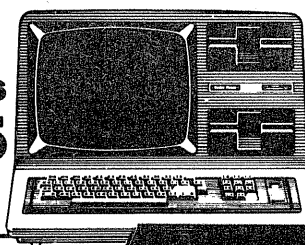
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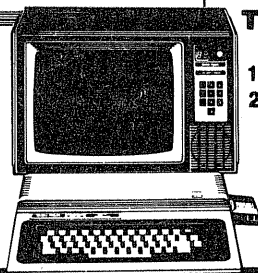
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Centronics or Centronics compatible printers) or a line feed or both. The user may select either or both. Additionally, the user can set the number of nulls that must follow a carriage return (to allow time for the print head to return).

One of the best features of the program is the ability to select one of three different printer drivers. The user can select the standard parallel interface or one of two serial print drivers. The program supports both the standard RS232 interface or the Small Systems Software TRS232 interface (using the cassette output and a level converter that looks like a simple RS232 interface). The Print Menu also controls the parameters for a serial print driver. The user can select baud rate, select either seven or eight bits per character, and select parity, either odd, even, or force it to be a "1." The surplus printer user or RTTY user might complain, "So what? How do I use my hybrid RS232 to 60MA adaptor with my Klineschmidt Baudot TTY?" Easy. The System Menu has two commands that allow the user to save or later load his custom printer driver.

The Text Entry program has one drawback that impacts the ability of the Pencil to live with the more intelligent printers. Many of the newer printers have the ability to alter their print mode by responding to embedded escape sequences. For example, the Epson MX100 will begin printing with emphasized characters when it receives the ASCII sequence, "ESC E." When programming in BASIC, this string can be generated with the statement LPRINT CHR\$(27)+"E". Unfortunately, Electric Pencil does not have a method to embed escape sequences in the text directly from the keyboard. However, Pennington and Shrayner have not left us out in the cold. They have included in the manual a clever scheme for generating an ASCII text file that has a list of escape sequences. The user simply loads this file first, then loads his text file. Using the block-move editing command, a copy of the desired escape sequence can be inserted at the desired text location. Before printing, the user just moves

the cursor to the start of the text. It is very clever, but it takes more effort. Underlining is harder yet. The user must generate two lines for each line that has an underline in it, one with just spaces and underline followed by a carriage return without a line feed and one with the text to be underlined. It may require some trial and error work to get the underlines correct. It would seem that Messrs. Pennington and Shrayner could come up with a utility that uses the block marks to generate the underline text lines. It also requires that a printer with auto line feed after a carriage return have the auto line feed disabled. Potential users who have a printer that does not have the ability to disable the auto or local line feed, will not be able to do any underlining with this or any other word processor unless it has built-in underlining that is turned on and off with escape sequences.

Other Features

What about compatibility with text files created with earlier versions of the Electric Pencil? The manual states that 2.0Z can read text files created by earlier releases. However, 2.0Z files cannot be read by earlier releases unless they have been saved without the print values. The manual clearly documents how to do this with a single System Menu command that is not in the screen menu.

The last command, one that is not on the screen menu, is the Setup command. Using this command creates a file that contains all of the user-selected print and system parameters. If the file is on the disk at boot time, the Electric Pencil will also load these values as default values so the user does not have to go back and set the parameters each time he boots the system. It also makes it possible to have several Electric Pencils in the diskette storage for special jobs. For example, the user can have one Pencil for newsletter column widths, another for form letters, another for generating parts lists, and yet another for invoices and shippers. Just save blank forms on the same disk as the configured

Electric Pencil.

Before leaving the manual, there are other features to be covered. The first is notice of the section on Tricks and Tips. This section covers the use of the Electric Pencil to generate and print BASIC program files. Would you like to have nice, neat listings like the magazines have? With the Electric Pencil it's a snap. So is merging and editing. Also covered is the use of the Electric Pencil with Visicalc™. The manual includes a difficulty report that has detailed instructions for reporting your system configuration and the problem that you are having. IJG recommends that the user send a program and data diskette along with the report for a full analysis of the problem. Be patient. Once they have a chance to review the problem, the user will get a written analysis of the results and any recommendations. To get the diskettes back, enclose \$2.50 for return postage. IJG also has a competitive policy for the replacement of a damaged distribution disk (or cassette or wafer); IJG will replace it for a nominal charge plus shipping and the remains of the original distribution media. Lastly, the final page of the manual is a cutout Quick Reference Guide that also indexes commands to the corresponding manual page numbers.

The Future

Probably the best part of the collaboration of Mr. Shrayner and the IJG team is the future. IJG is planning to release The Electric Pencil Handbook around mid-1982. This will include documentation of the routines, variables, constants and tables, and will also include a full source listing with symbolic labels and comments. The planned price is \$29.95. It will be for the disk version only.

Also planned is Blue Pencil, a text proofing program that includes a spelling dictionary of 50,000 words. Red Pencil will be an extension of Blue Pencil that will correct the errors found by Blue Pencil and add words to the dictionary. Pencil-Gram will be a program to send files or text buffers via an RS232

interface to another machine or user via modem. Talking Pencil will use a voice synthesizer to read aloud each character as it is typed, a word as completed, or the entire text buffer. A 2.0Z compatible word processor that speaks and prints is clearly an innovative product that will benefit any person with a visual or speech handicap. Electric-Type will interface the Electric Pencil to a Quadritek 1200 or Autologic 600 automatic typesetting machine. The software will allow embedding of typesetting codes. Pencil Tip will allow the use of embedded codes, subscripts, superscripts and chaining of files. Drawing Pencil will allow the printing of TRS-80 graphics. Pencil Kit will be a utility that will allow the user to define single keystroke input or words or phrases including source for BASIC, EDITOR ASSEMBLER, or others. Lastly, IJG will also offer a package of printer drivers for various letter-quality printers (serial and parallel) and teletype (serial) as well as an improved version of the "ROM" driver.

My overall rating of The Electric Pencil 2.0Z is very good to excellent. This is largely based on the ease of learning and simplicity of operation. The ability to select printer drivers and parameters without patching or zapping outweighs the difficulty with underlining. The ability to buy a source listing is definitely a plus. The Radio Shack representatives at the Los Angeles PRODUX 2000 show in February, informed me that their new SuperScripts will not support the Model I, only the Model III. If this is true, The Electric Pencil as a base with one or more of the future utility programs would be a cost-effective alternative to a one-system word processor.

As a final note, IJG realizes that there are many independent and resourceful users out in the real world. If you develop an enhancement or a utility that can be validated as useful and fully compatible with The Electric Pencil 2.0Z, you can obtain a seal of approval by contacting: IJG, Inc., Marketing Department, 1260 West Foothill Blvd., Upland, CA 91768. ■

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The heart of a chess program

By the man who wrote SFINKS

Models I/III, PMC-80, LNW80

William Fink, Lighthouse Point, FL



In some ways, a chess program is like any other program. It is written to accomplish a specific task. It requires weeks of testing, weeks of debugging, and months of rewriting. Unlike many programs, a chess program pushes a computer to its ultimate limits. It takes those small, finite steps of logic and puts them together in a way that gives the user the impression that his computer has a mind of its own. In a sense, a chess program takes that sheer power of idiotic logic, which we as programmers so often see, and synthesizes it into something more intelligent than ourselves.

In chess, a chess master will give you the impression that all of the chessmen are far more than those discrete objects confined to single squares. They appear to be functioning as an army with the coordination of a finely tuned machine. Every movement will only be a part of the greater, overall plan — determined and controlled by what has happened before and

discretely revealing what is about to take place.

What task could be more natural for the computer? Fortunately, or unfortunately, depending on your point of view, there are a couple of fundamental differences between the chess master and the computer chess program. The chess program uses small steps (increments) of logic and is infallible, even at blinding speeds. The human master works with larger, not always discrete, chunks of information.¹ The human master is more adept at formulating long range plans, but is prone to err. So the task of writing a good chess program amounts to copying the human master, where it is not too difficult to do so, and otherwise trying to compensate.

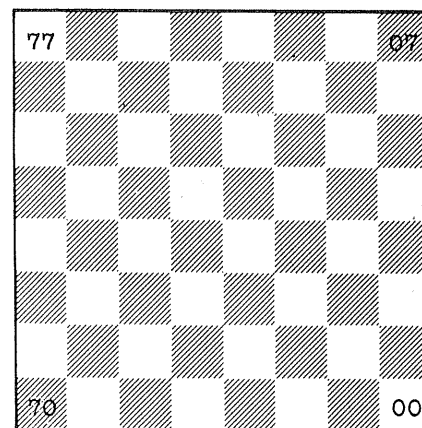
The first thing that a chess program can do is simulate the individual movements of the chess men on a chess board. This is relatively easy for most of the chess pieces (king, queen, rook, bishop and knight). The movement of the pawns

is more difficult.

Sfinks 3.0 uses an octal representation of the chess board similar to that of Microchess.²

Figure 1

BLACK



WHITE

The least significant digit (LSD) specifies the rank (0 to 7). The MSD specifies the file (0 to 7).

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Chess

generate all legal moves on the chess board. At this point in development, the chess program plays like a true beginner, except that it doesn't make any illegal moves. What next? We have a list of all legal moves and we need to find the best move and actually play it.

The human chess master recognizes previously seen patterns or piece formations. He, or she, knows which pieces are subject to capture and the outcome of such captures. He knows the weak and strong points in the position. Most of his knowledge is based on experience and some comes from analysis.¹ After a little reflection, he selects his move.

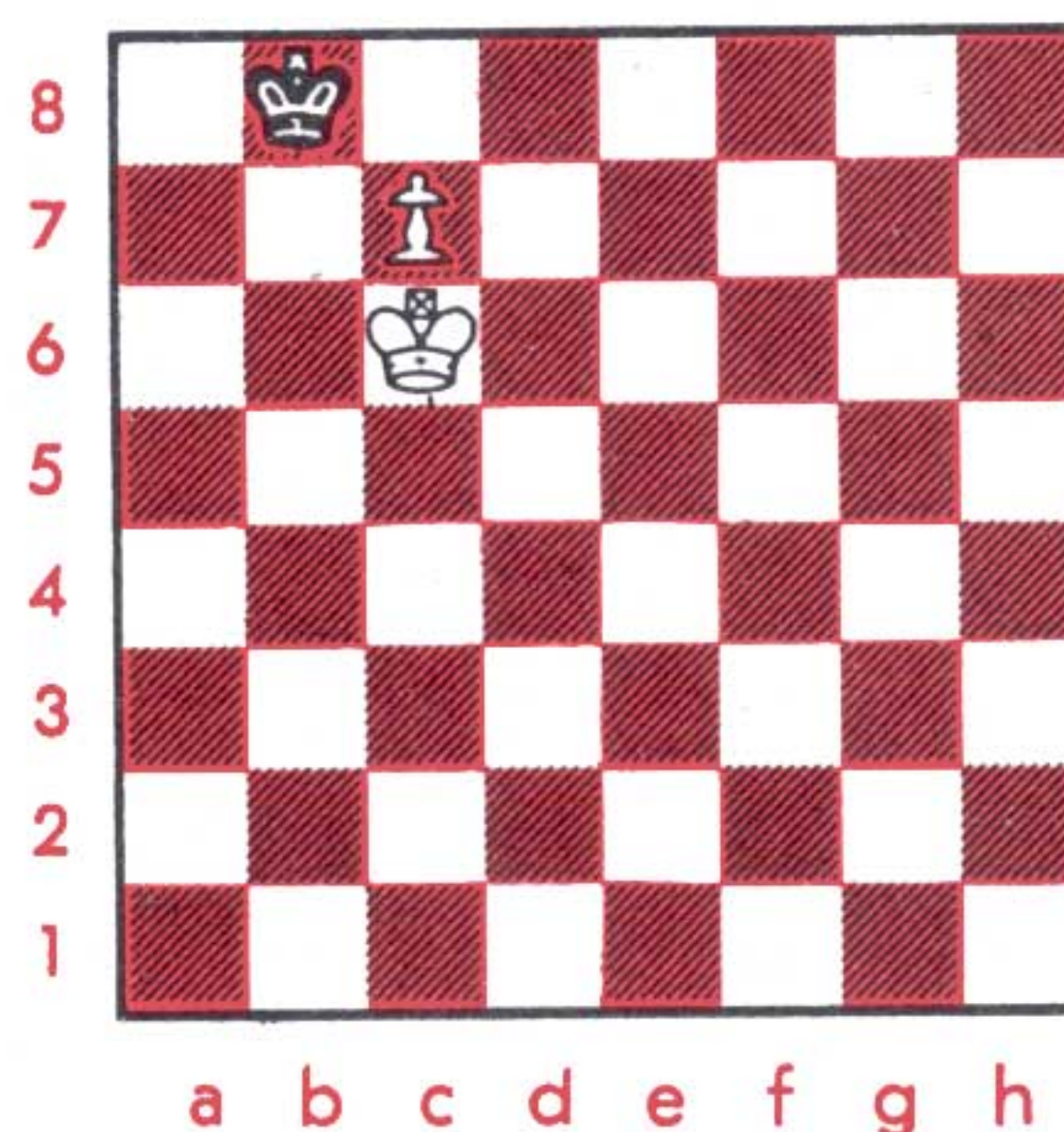
The computer can store tremendous amounts of information, but the information stored is relatively simple. Computers have not been too adept at storing, recognizing and retrieving complex patterns.¹ They can, with modest accuracy, assign a value to a given position. The value is based primarily on the pieces subject to immediate capture. Needless to say, the accuracy is not always dependable. New, improved methods of evaluation had to be found.

The method used by most chess programs (including Sfinks 3.0) is attributed to Claude Shannon.³ Simply stated, the computer chess program generates a tree of moves. The initial board position is the root of the tree. All of the legal moves from the initial board position form branches from the root. Each branch, in turn, gives birth to more branches. As the tree is generated, values are assigned to the terminal nodes. The best line of play is found

by choosing the line of play which maximizes your score or minimizes your opponent's score.

As an example, consider the following position:

Figure 2



The white pawn is checking the black king and threatening to promote to a queen, rook, knight or bishop. Assuming it is black's move, the position might be evaluated like this:

Chess Master's Evaluation

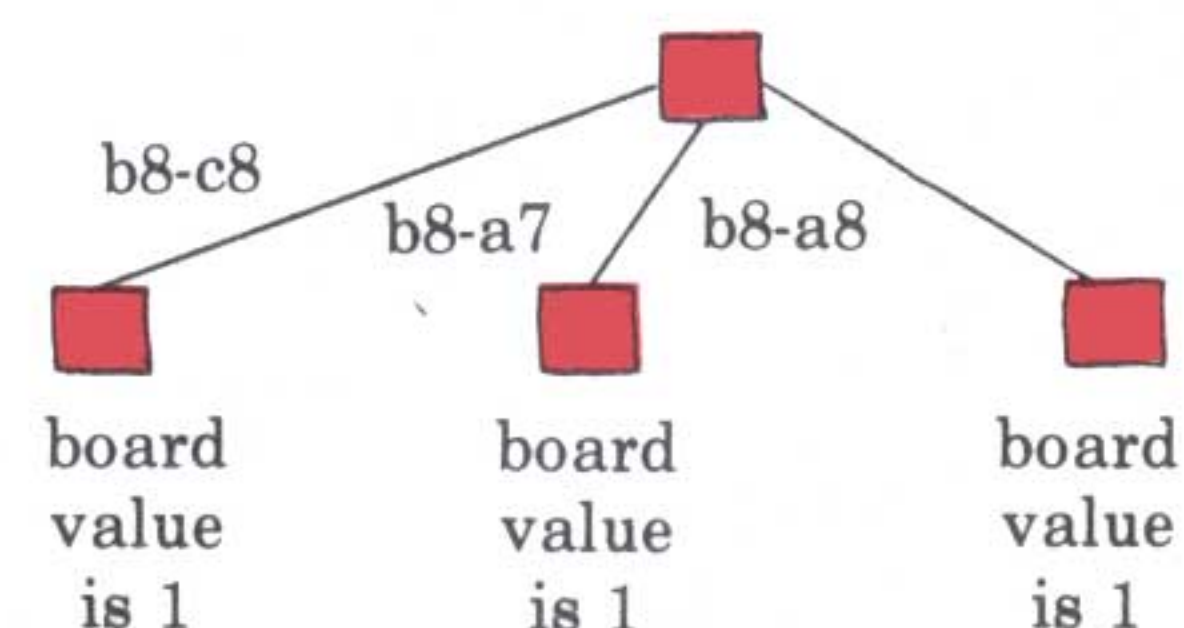
The position is an elementary win for white. Example: b8-c8; c6-d6; c8-b7; d6-d7; b7-b6; c7-c8 Queen, etc.

Computer's Evaluation

1) No tree search, static evaluation — black is attacking white's pawn but the pawn is defended. Since it is black's move and white is ahead by one pawn, the board value is 1.

2) 1-ply tree search — initial position.

Figure 3



All moves are seen as equal so the computer chooses randomly after a 1-ply tree search.

3) 2-ply tree search — initial position.



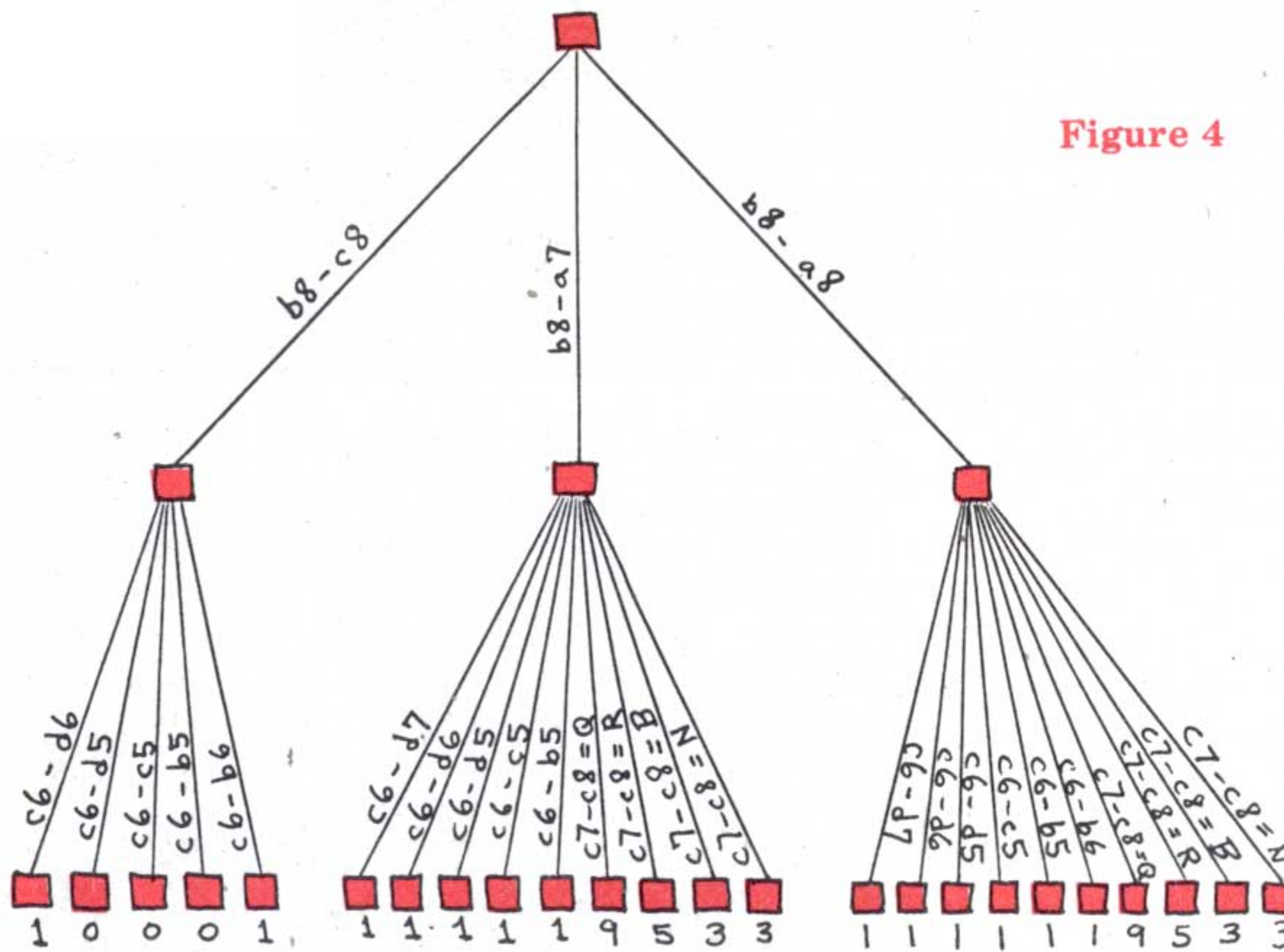
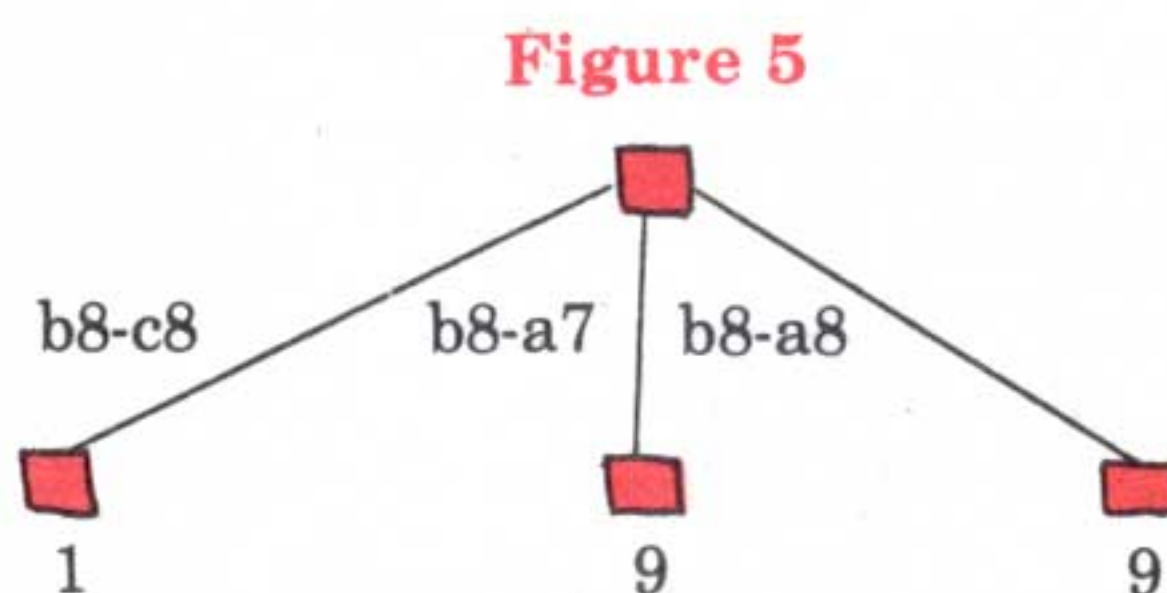


Figure 4

In the two-ply tree search, all terminal nodes are assigned a board value. You may have noticed that the computer assigns the value of 9 to the position after b8-a7, c7-c8 Q, even though the black king is stalemated. The game is drawn, but it would require a three-ply search for the computer to see this.

So, how does the tree work? The computer assumes that its opponent will always play his or her best move. Thus, the values backed up to ply one, from the second ply, will be:



Since the computer tries to minimize its opponent's score, it will choose b8-c8, maintaining the status quo for at least two plys. (It should be stated that some chess programs immediately recognize the position given here as a win for white.) In this way, a computer emulates master play, one move at a time. Its depth of search is limited only by the time allowed for completing such a search and the speed of the computer.

This method of move selection (known as the mini-max search procedure³), is the method most commonly used by computer chess

programs. The method has been refined but it is basically unchanged. The number of terminal nodes to be evaluated grows exponentially as the tree grows in depth. The computer chess programs generally play as well as they do because of the high speed of the hardware. They play no better than they do because of the apparently insurmountable problem with exponential growth in the tree searches. The reader can look forward to improved programs as the hardware improves and more chess knowledge is programmed into the computer. ■

¹ "Chess Skill in Man and Machine," edited by Peter W. Frey, Springer-Verlag, New York, Heidelberg, Berlin 1978, pp. 183-194.

² "Microchess, a Chess Playing Program for the 6502 Microcomputer," by Peter Jennings, Toronto, Ontario, 1976.

³ "Chess Skill in Man and Machine," edited by Peter W. Frey, Springer-Verlag, New York, Heidelberg, Berlin, 1978, pp. 60-64.

Ed. note: Mr. William Fink is the author of SFINKS, a championship chess program for Models I/III which was reviewed in 80-U.S. Journal, June 1982. He has informed us that a minor problem regarding castling status when modifying a board position can be corrected by removing the rooks and then placing them as desired.

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Integrated accounting

Part II: An evaluation of Plus Computer Technology's accounting programs

Models I/III, PMC-80, LNW80

80 U.S. Staff

Based on notes and observations by John Strader, CPA

We have covered the General Ledger program from Plus Computer Technology and have given a brief overview of the integrated system. This evaluation covers Accounts Payable, Accounts Receivable and the Fixed Asset programs. All of these programs can be integrated with the General Ledger and may be used independently.

Accounts Payable program

The Accounts Payable program allows you to manage your business better by projecting your cash requirements. It provides all of the necessary reports to analyze and manage cashflow and payments to vendors. It also aids in tracking payments to individuals which need to be reported on the IRS 1099 form. It is not set up to print the 1099 form. The program is designed to use either the NEBS (New England Business forms) or Wilson-Jones stock check forms.

This evaluation was made on the Model III package. A Model II version is also available. Using the Model III, the program will handle from 350 to 1200 vendors, depending upon the number of disk drives available.

In addition to keeping track of bills and writing checks, this program prepares a schedule of cash requirements. It also tracks discounts and the last date to pay an invoice and still obtain a discount. It helps you to reconcile your check register and prepares an aging schedule of payables by vendor.

The program allows you to prepare a purchase journal and will provide for posting of the various invoices directly to the General

Ledger. A single invoice may be posted to several General Ledger accounts. The program provides for a volume-analysis report, which compares purchases and discounts for this year versus last year. This report is especially useful in comparing prices and discounts so that purchases may be made to your best advantage.

Accounts Receivable

The Accounts Receivable program has several features not usually found in microcomputer accounting systems. It automatically calculates sales tax, salesmen's commissions, service charges and sales discounts. It also handles partial payments on account.

The program maintains prior year and current year-to-date sales information for each customer. It provides managerial information on individual salesperson account activity and sales by territory.

Statements and invoices are printed on standard NEBS or Wilson-Jones forms. The Model III will handle from 300 to 1200 customer accounts, depending upon the number of disk drives available.

Specifically, the Accounts Receivable program performs the following:

- Preparation of invoices, debit memos and credit memos for each of your customers.

- Preparation of receivable reports: aged trial balance, customer statements, cash receipts, sales and Accounts Receivable adjustment journals.

- It keeps track of salesmen's commissions and generates a salesman's account list and commission report. It also creates an

inactive report and new account list, as well as a customer list by territory.

Fixed Assets

This program is intended to handle both book and tax depreciation needs and give all reports necessary for the acquisition, deletion and sale of assets. The reports are:

- Fixed asset register.
- Asset acquisition journal.
- Asset retirements journal.
- Book depreciation journal.
- Tax depreciation journal.
- Projected depreciation journal.
- Year-end asset review.

This program worked fine for book depreciation. However, the tax depreciation portion of the program has not been updated for the 1981 Economic Tax Reform Act and does not work for assets acquired after January 1, 1981. Investment tax credit is figured correctly and can be changed by the user if the rates change. The Model III supports from 800 to 1200 fixed assets, again depending upon the number of drives used.

General comments

The field size in the Accounts Receivable and Payable programs is not always long enough to accommodate names and addresses — some abbreviation may be necessary. These programs have more features than most other systems available for the price. They provide much useful information for the management of small and medium-sized companies.

We will cover the payroll and sales activity programs in another issue. ■

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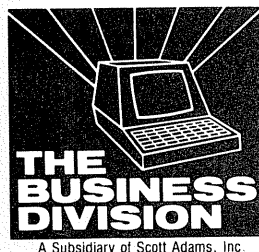
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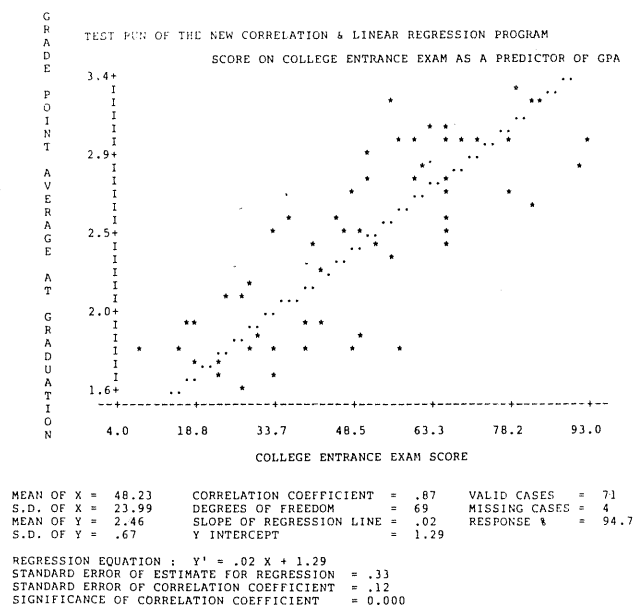
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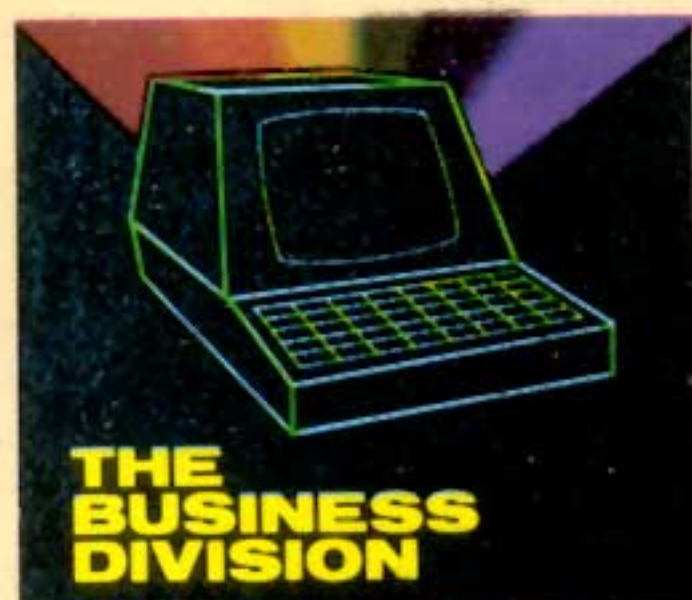
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Word processing on your Color Computer

A line-oriented text editor

Color Computer w/disk

Steve Den Beste, Beaverton, OR

A text editor is a program which allows a user to enter or modify arbitrary text files. With it, you can enter documentation, reports or letters on your computer, and can correct mistakes without retyping the entire file. A BASIC program stored in ASCII can be edited as well. This is useful when you are trying to find all of the places where a given variable is used—a tedious, error-prone process when done by hand.

The editor given in this article provides a foundation for the entry, viewing and modification of text. It requires a 32K Color Computer with Extended BASIC, and at least one disk. It can hold up to 50 lines in memory, with 252 characters, or less, in each line. In general, the editor tries to keep 30 lines free to provide room for insertion.

When you first run the editor, it asks you for the file name you wish to edit, and whether it is new. This allows you to create a new file or edit an existing one. Only one file may be edited per run of the editor.

The editor opens the file being edited for input, and opens a scratch file for output. As text is read from the input and edited, earlier text is written to the output file. Once it is written out, it cannot be accessed for the rest of the editing session. (To get to it, you have to exit and reenter the editor.) This allows the editor to operate on large files (up to half of a disk in size).

Here are the commands that can be used in this editor, along with a brief description of each:

- U— move up toward the beginning of the buffer.
- D— Move down toward the end of the buffer.
- B— Move to the beginning of the buffer.
- I— Insert text.
- S— String search within the current buffer.
- N— String search through the rest of the file.

R— String replace within the current buffer.

K— Kill text lines within the current buffer.

P— (Page) Dump out the current buffer and read in 20 new lines.

A— Dump out all but 10 lines and read in 10 new lines.

Q— Quit the session without changing anything.

E— Exit from the editor, saving all changes.

The editor keeps a pointer to one of the lines in the buffer. I refer to it as the “current line.” It is displayed on the top of the screen. When inserts are done, they are done just before this line. When you search for a string, the search begins with this line.

All of these commands can be preceded by a number, which will cause the command to be executed that many times. (In some cases, however, it makes no sense—for instance, the “E” command.) For the “D”, “U”, “P”, “A” and “K” commands, the number may follow the command as well—whichever you feel is more comfortable. If there is no number, the command will execute once. Since an editor is primarily a vehicle for entering text, and since text is typically lower case, the command characters may be entered in either upper or lower case.

There are three commands to allow you to move around within the buffer: “U”, “D” and “B”. The “U” and “D” commands allow you to move up and down. For instance, “U3” moves to the third line above the current line. Hitting the <ENTER> key alone is the same as “D1”. The “B” command moves you to the beginning of the current buffer.

To insert new text, you use the “I” command. It will insert text just before the current line. It will show you

the two lines just previous, in order to help you remember the context of your new text. Each line entered is terminated with an <ENTER>. When you have entered all you wish to and want to return to command mode, hit <ENTER> with nothing else on a line. (This means the editor will not allow you to actually put an empty line into the buffer. A line with a single <SPACE> on it will serve just as well.)

When there is text in your file that you no longer want, you use the "K" command to delete it. Entering "K<ENTER>" will kill the current line. Entering "K2<ENTER>" will kill the current line and the one below it.

There are three commands to support string searching. The simplest is the "S" command. All characters beginning at the one immediately after the "S", up to the next <ENTER>, are the search string. Thus, SABC<ENTER> will search for ABC, while S<SPACE>ABC<ENTER> will search for <SPACE>ABC. The search begins from the current line and moves to the line containing the next occurrence of the string. If the "S" command is preceded by a number, such as 3SQQQ, it will skip to that occurrence of the string (in this case, the third occurrence of QQQ). If the string cannot be found, or where the numeric parameter requires, the line pointer is left after the last line in the text buffer.

The "N" command is the same as the "S" command,

except that it is not limited to the current buffer. If the string cannot be found in the current buffer, it is written out and a new buffer is read in. This is search, and so on. The "N" command will stop when the string is found, or when the end of the file is reached.

The third of the string commands is the "R" command. It replaces one string with another. Its format is: < optional number > R < terminator > STRING1 < terminator > OPTIONAL STRING2 <ENTER>. This replaces the next occurrence of the first string with the second string. If the second string is absent, the first string is removed, but not replaced. The terminator may be any string that does not appear in either of the strings (even space), but I usually use "/" (thus, R/ABC/DEF replaces ABC with DEF). If there is a numeric parameter, the replace command is executed that number of times. Like the "S" command, the "R" command is limited to the current buffer.

If your file is larger than 20 lines, the editor will initially read the first 20 lines in. You can move through the rest of the file using the "P" and "A" commands. The "P" command writes out all of the text in the current buffer and reads in the next 20 lines from the input file. The "A" command writes all but the last 10 lines in the buffer and reads in 10 new lines.

If, in the course of editing, you decide that you have made a major mistake and wish you had not changed any text, enter the "Q" command. This leaves your input

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file untouched and forgets all of the editing that was done. When you are done with all editing, use the "E" command to save all changes. "E" is the normal way to exit from the editor, while "Q" is a panic stop.

Here is an example of use: I wish to type in "The Walrus and the Carpenter" from "Through the Looking Glass" by Lewis Carroll. Initially, I will make some mistakes, and will go back and change them.

I begin in the Disk Extended BASIC monitor, and type: RUN "EDITOR" <ENTER>. When the editor has loaded and begun running, it prompts me and I respond: Filename to edit? WALRUS / TXT <ENTER>. This is the name of the file I am going to create in this session. Disk Extended BASIC has no easy way to find out if a given file exists, so the editor asks me: Disk assumed. Is this a new file?? Y<ENTER> Are you sure?? Y<ENTER>

Since I did not specify a disk, the editor assumes that I want to operate in a file on disk 0 (zero). It asks twice if the file is new, because if you tell it a file is new when it really exists, the editor will delete it immediately. This cannot be recovered with the "Q" command.

The editor will do some disk file shuffling and will respond with the screen looking like:

Line 1: -----
Line 2:

Line 16: Command?#

In all of these examples, I will give line numbers (omitting blank lines —ed.) to show the relative position of items on the screen. These do not actually show up in real operation. I will also use a pound sign (#) to indicate the position of the blinking cursor. The line of dashes (which *do* appear in real usage) indicates the end of the text buffer. In this case, since the buffer is initially empty, you begin at the end of the buffer.

Now I wish to enter some text. I type: LINE 16: CommandZ? I<ENTER>. This puts me into text insertion mode:

Line 1: <Begin typing>
Line 2: <Enter an empty line when done>
Line 3: #
Line 4:
Line 16:

Here is the text I typed initially:

"The sun was shining on the sea,<ENTER>
Shining with all his might:<ENTER>
He did his very best to make<ENTER>
The billows smooth and bright-<ENTER>
And this was odd, because it was <ENTER>

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The middle of the night.<ENTER>
 <SPACE><ENTER>
 The moon was shinig sulkily,<ENTER>
 Because she thought the sun<ENTER>
 Had got no business to be there<ENTER>
 "It's very rude of him," she said,<ENTER>
 "To come and spoil the fun!"<ENTER>
 ***Oh bother, I forgot a line.<ENTER>
 <ENTER>

The last <ENTER> appears on a line with nothing else. This puts you back in command mode. There are a couple of things wrong with the text I typed. The word "shining" is misspelled on the first line of the second stanza. There is also a line missing from it, and I typed in a line to remind me of that fact when I realized it. Ordinarily, I would just correct those problems immediately. I wish to show how to edit an existing file, so we will exit.

Typing Line 16: Command? E<ENTER> causes the editor to write out all of the text and close all files. At this time, when I do a DIR, I see a file on the disk as follows: WALRUS TXT 1 A 1.

The first "1" indicates that the file is a data file. This is not important. It only indicates that the file was created from a BASIC program. A BASIC file (stored in ASCII) that was edited will also have this "1", but can still be loaded and run. The "A" indicates that the file is in

ASCII.

Now, I want to run the editor again on the existing file and correct the mistakes I made. I run the editor again: RUN <ENTER> Filename to edit? WALRUS/TXT <ENTER> Disk 0 assumed. Is this a new file?? <ENTER>.

When it asks if the file is new, it is looking for a "Y". Anything else makes it assume that the file already exists. Note that it does not ask for it twice. When the disk manipulation is complete, the screen will look like this:

```
Line 1: The sun was shining on the sea,
Line 2:   Shining with all his might:
Line 3: He did his best to make
Line 4:   The billows smooth and bright-
Line 5: -
Line 6: And this was odd, because it was
Line 7:
Line 8: The middle of the night.
Line 9:
Line 10: The moon was shinig sulkily,
Line 11:   Because she thought the sun
Line 12: Had got no business to be there
Line 13: "It's very rude of him," she sai
Line 14: d,
Line 15:
Line 16: Command?#
```

There are several interesting things about this. Some of the text lines exceeded 32 characters. In these cases, the text wrapped around to the next screen line. A good example of this is the text line beginning on screen line 13. Even though some of the text is presented on screen line 14, it is all one text line. A line of text can be presented on up to 8 screen lines.

First, I will correct the misspelling. I type: Line 16: Command? R / shinig / shining <ENTER>. Note that the line where the replacing is done is not the top line of the screen. After this, the screen looks like:

```
Line 1: The moon was shining sulkily,
Line 2:   Because she thought the sun
Line 3: Had got no business to be there
Line 4: "It's very rude of him," she sai
Line 5: d,
Line 6: ***Oh bother, I forgot a line.
Line 7: -----
Line 8:
```

Line 16: Command?#

The replacement text line is shown on the top line of the screen. Now I want to enter the line I forgot. It goes between the lines displayed on screen lines 3 and 4 above. First, I have to find the place I want to insert it at. I have to move the text line I want to insert in front of to the top line of the screen. This is the text on screen line 4.

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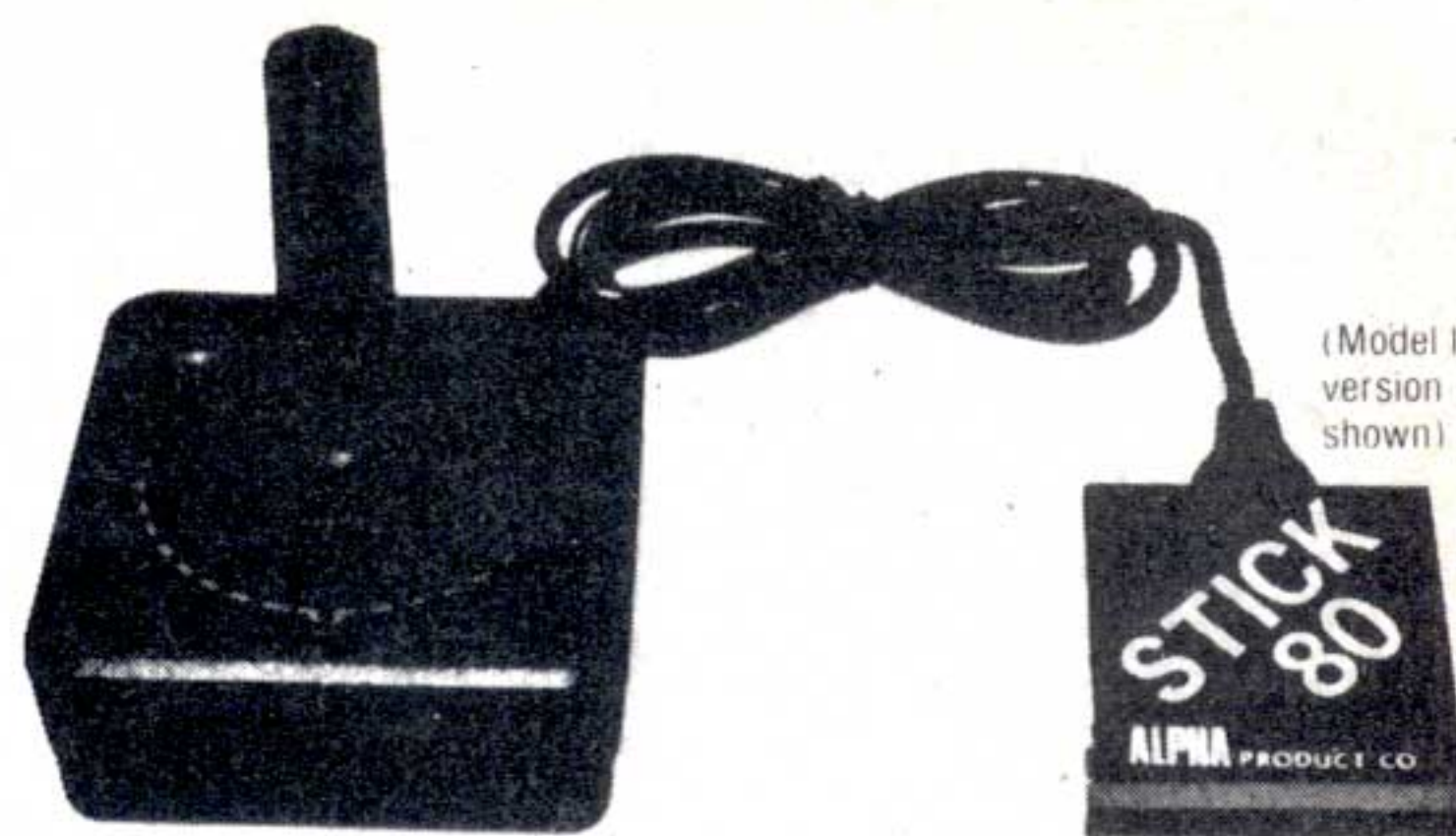
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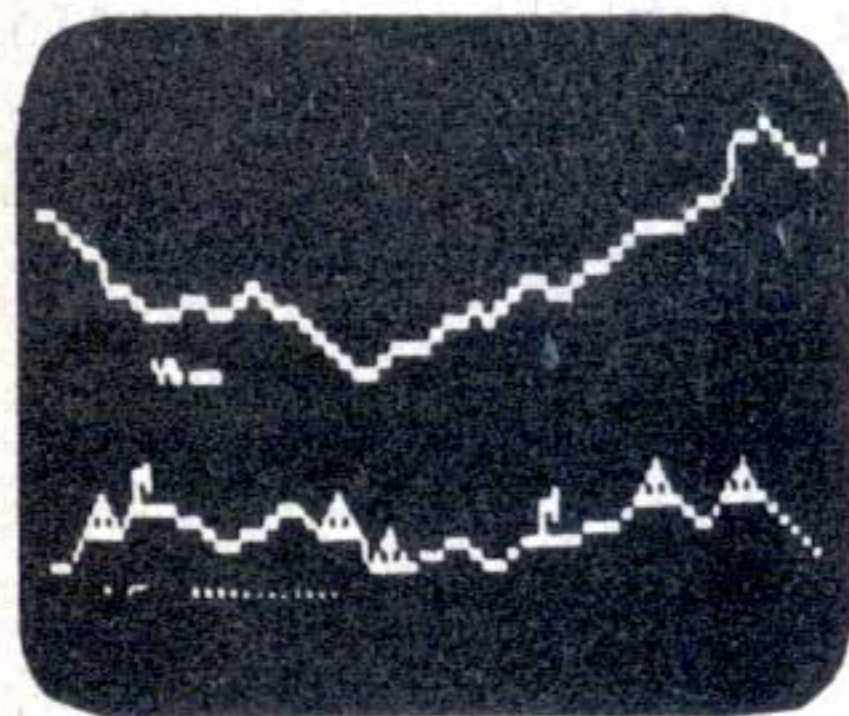
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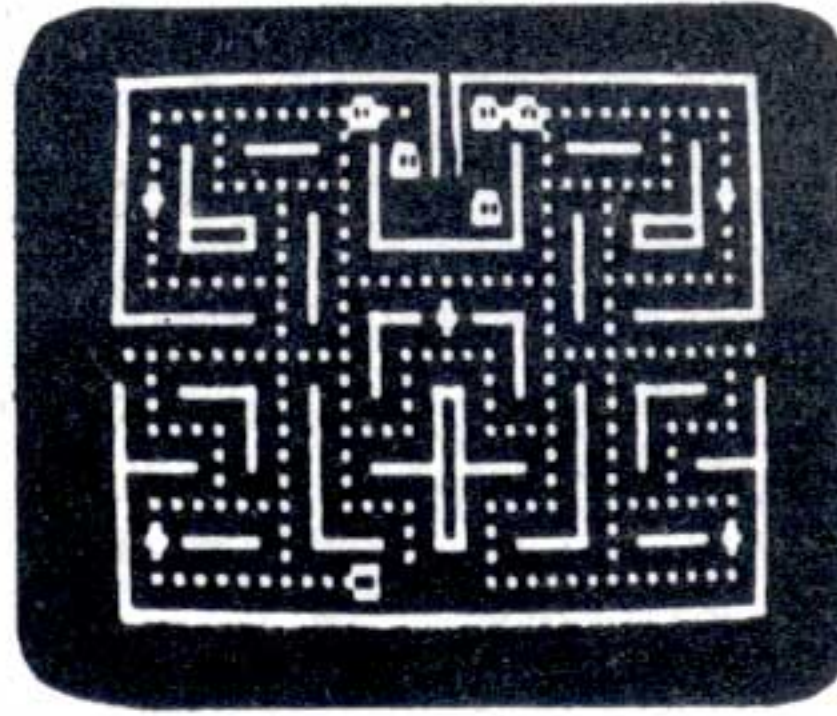
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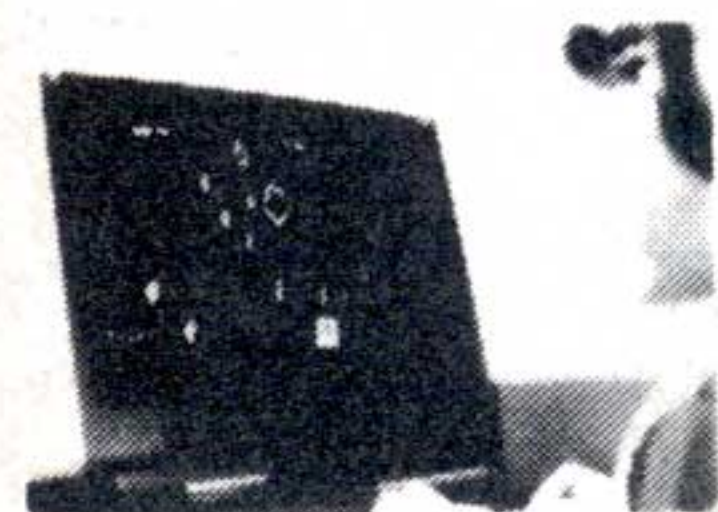
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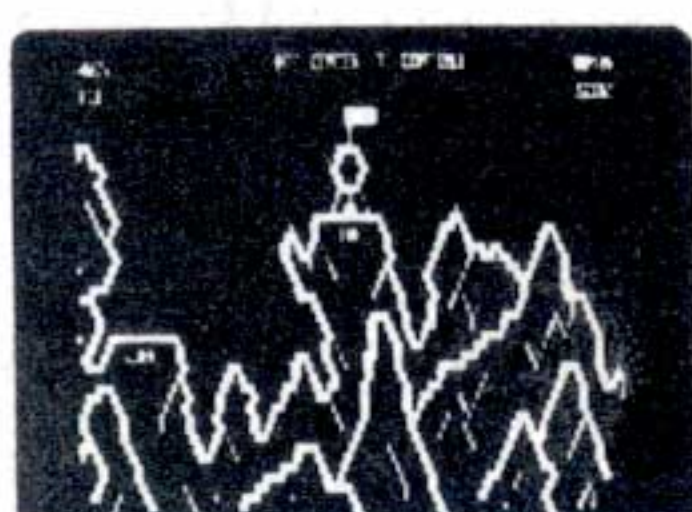
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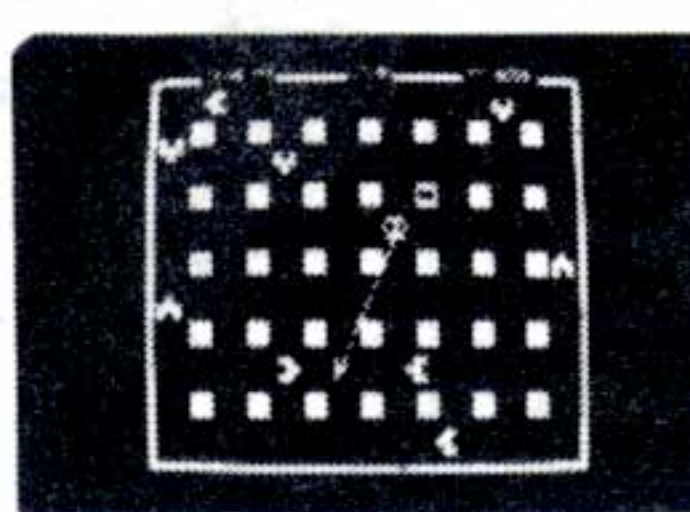
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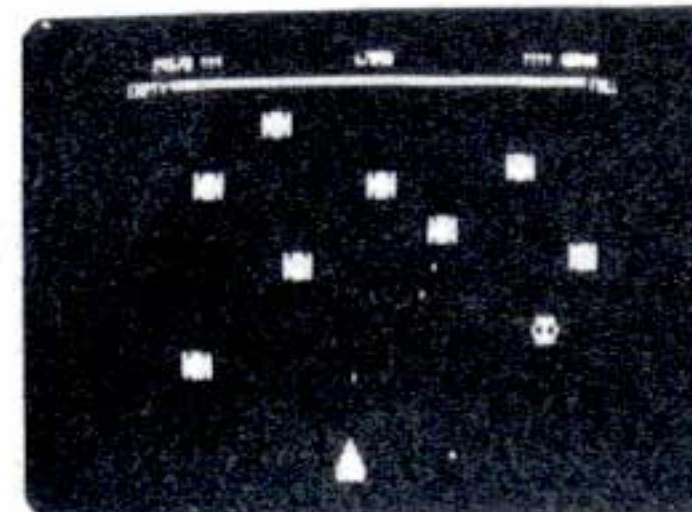
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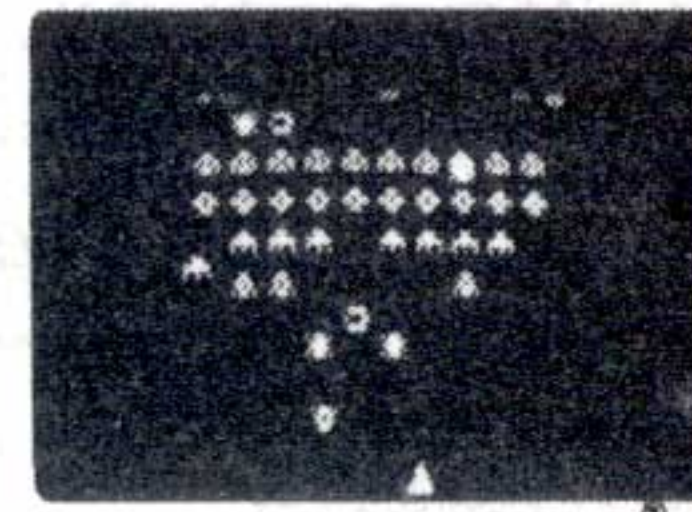
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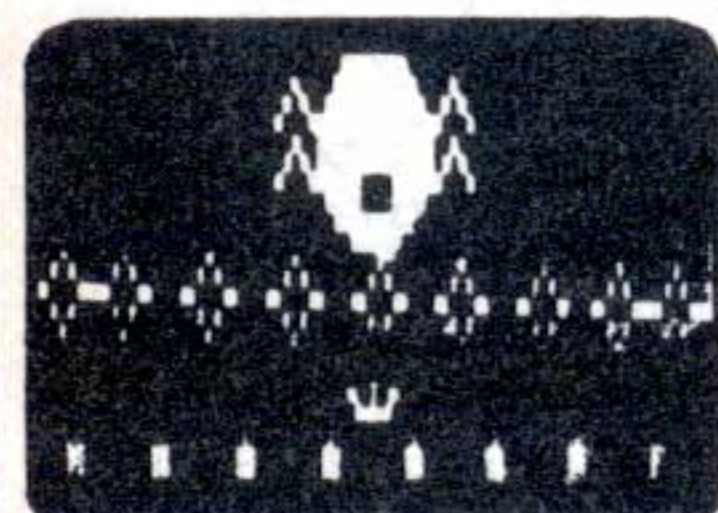
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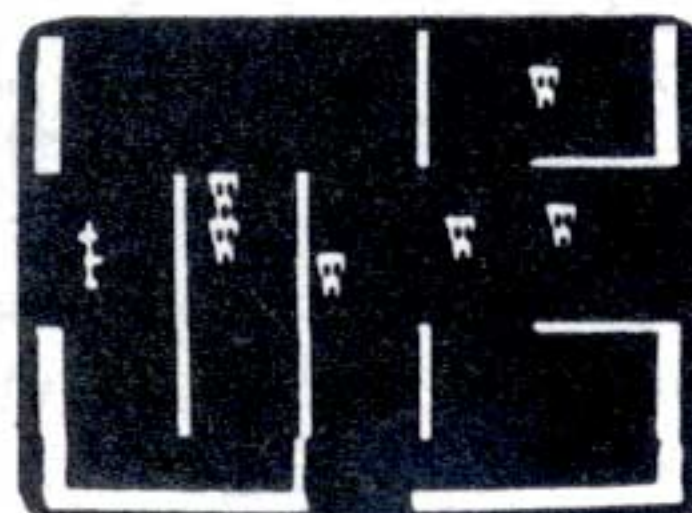
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The sound of the klaxon is calling you! Invaders have been spotted warping toward Earth. You shift right and left as you fire your lasers. A few break formation and fly straight at you! You place your finger on the fire button knowing that this shot must connect! With sound effects!



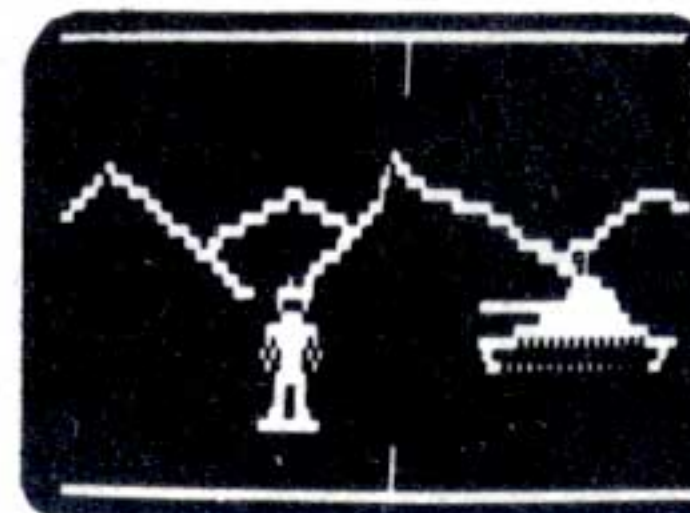
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The invaders are back! Alone, you defend the all important nuclear fuel canisters from thieving aliens who attack repeatedly. An alien passes your guard, snatches up a canister and flies straight off. Quick! You have one last chance to blast him out of the sky! With sound and voice.



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I type: Line 16: Command? D3<ENTER>, which makes the screen look like:

Line 1: "It's very rude of him," she sai
 Line 2: d,
 Line 3: ***Oh bother, I forgot a line.
 Line 4: -----
 Line 5:

Line 16: Command?#

I want to go into insertion mode, so I type: Line 16: Command? I<ENTER>, which makes the screen look like:

Line 1: <Begin typing>
 Line 2: <Enter an empty line when done>
 Line 3: Because she thought the sun
 Line 4: Had got no business to be there
 Line 5: -----
 Line 6: #
 Line 7:

Line 16:

I type in my new line: Line 6: After the day was done--<ENTER>, Line 7: <ENTER>. The second <ENTER>

gets me back into command mode. Because I want to see the new line with the lines both in front of, and behind it, I move up in the buffer: Line 16: Command? U3<ENTER>, leaving the screen looking like:

Line 1: Because she thought the sun
 Line 2: Had got no business to be there
 Line 3: After the day was done--
 Line 4: "It's very rude of him," she sai
 Line 5: d,
 Line 6: "To come and spoil the fun!"
 Line 7: ***Oh bother, I forgot a line.
 Line 8: -----
 Line 9:

Line 16: Command?#

Finally, I want to get rid of the reminder line. I do a succession of "D" commands (or hit <ENTER> in command mode several times) until the line I want to delete is the top line on the screen:

LINE 1: ***Oh bother, I forgot a line.
 LINE 2: - LINE 3:

LINE 16: Command?#

At this point, I type the kill command: LINE 16: Command?K<ENTER>, which leaves the screen looking like this:

LINE 1: -----
 LINE 2:

LINE 16: Command?#

This looks just like the empty buffer did when I first entered the text editor; but the buffer is not empty, it is just that the line pointer is at the end of the buffer.

Having made the changes to the file, I can exit again to BASIC: LINE 16: Command?E<ENTER> to which I am prompted (after a few disk operations) OK #.

If I do a DIR, I will see the following two files: WALRUS TXT 1 A 1, WALRUS BAK 1 A 1. The file with all of my changes in it is "WALRUS/TXT." "WALRUS/BAK" is the version I used as input to the editing session (a backup copy).

There are some strange errors that can be generated using this editor. They are some side effects of how Color BASIC was written. The most annoying one has to do with a bug in the PCLEAR, STRING and FILE commands. When any of these commands appear in a program with a number different from the last program that ran, BASIC has to reorganize its memory while running the program. When it does this, it loses track of things and unusual errors will appear. On my system, when the editor is first run, it goes through the initial sequence, asking for the filename, then generates a "UL 250" error. Because the memory reorganization is now done, the editor will work fine the second and

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subsequent times. I do not know of any way to fix this bug from a BASIC program. I have a very early system and later versions of the hardware may have fixed this problem, or may make it appear in different ways.

Color BASIC has no "ON ERROR GOTO" command. Because of this, there is no easy way to check to see if a file exists. If you tell the editor that the file being edited exists when it doesn't, or if you enter the file specification incorrectly, you will get an error in lines 220 or 230.

Here are the variables used in the editor:

| | |
|---------|------------------------------------------------------------------------------------------|
| D\$ | disk extension |
| F\$ | filename |
| E\$ | file extension |
| I\$ | used for all input |
| S\$ | search string |
| R\$ | replacement string |
| T\$(50) | text buffer |
| L | current line number |
| IT | input iteration count |
| Q9 | utility variable used to cause a command to execute IT times |
| Q | general utility variable |
| C | character position of the last search occurrence (if 0, the search string was not found) |
| E | number of lines in T\$ currently |

File #1 input file
File #2 output file

A file called "EDITTMP/TMP" is opened for output, and is renamed as the very last operation of the editor. This is how the code is laid out internally:

| | |
|-----------|---------------------------------------------------------|
| 150-230 | Enter the filename and open the input-output files |
| 260-470 | Input and decode a command |
| 480-610 | Handler for the "P" command |
| 620-700 | Handler for the "S" command |
| 710-810 | Handler for the "R" command |
| 820-930 | Handler for the "I" command |
| 940-990 | Handler for the "U" command |
| 1000-1050 | Handler for the "D" command |
| 1060-1120 | Handler for the "K" command |
| 1130-1200 | Handler for the "E" command |
| 1210-1310 | Handler for the "A" command |
| 1320 | Subroutine to read in 20 lines when the buffer is empty |
| 1360 | Subroutine to dump the whole buffer to the output file |
| 1380 | Subroutine to paint the screen |
| 1450 | Subroutine to search for a string |

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Listing 1 Color Disk Text Editor

```
100 CLEAR 56*256
110 ! 2,2048
115 REM *****
120 REM EDITOR BY STEVEN DEN BESTE
125 REM 11595 S.W. CENTER #6
130 REM REQUIRES 32K DISK & EXTENDED
135 REM BASIC FOR TRS-80 COLOR COMP.
140 REM NO RIGHTS RESERVED. COPIES
145 REM MAY BE MADE BUT NOT SOLD.
146 REM *****
150 ! ON
160 LINE INPUT "Filename to edit? ";F$
170 Q=INSTR(1,F$,"/")
180 IF Q=0 THEN PRINT"/BAS assumed":E$=
"BAS":ELSE E$=RIGHT$(F$,LEN(F$)-Q):F$=L
EFT$(F$,Q-1)
190 Q=INSTR(1,E$,":"):IF Q=0 THEN D$=":
0":PRINT "Disk 0 assumed": ELSE D$=RIGH
T$(E$,LEN(E$)-Q+1):E$=LEFT$(E$,Q-1)
200 INPUT "Is this a new file?";U$
210 IF LEFT$(U$,1)="Y" OR LEFT$(U$,1)="
y" THEN INPUT "Are you sure?";U$:IF LEF
T$(U$,1)="Y" OR LEFT$(U$,1)="y" THEN OP
EN "O",#1,F$+"/"+E$:CLOSE #1
```

```
220 OPEN "I",#1,F$+"/"+E$+D$
230 OPEN "O",#2,"EDITTMP/TMP"
240 DIM T$(50)
250 GOSUB 1320
260 REM REJOIN POINT FOR ALL COMMAND HA
NDLERS
270 GOSUB 1380
280 LINE INPUT "Command?";I$
290 IT=1
300 IF LEFT$(I$,1)<"0" OR LEFT$(I$,1)>"
9" THEN 340
310 IT=VAL(I$):Q=0
320 Q=Q+1:Q$=MID$(I$,Q,1):IF Q$>="0" AN
D Q$<="9" THEN 320
330 I$=RIGHT$(I$,LEN(I$)-Q+1)
340 U$=LEFT$(I$,1)
350 IF U$="P" OR U$="p"THEN 480 :'NEXT
PAGE
360 IF U$="S" OR U$="s"THEN 530 :'SEARC
H
370 IF U$="N" OR U$="n"THEN 620 :'SEARC
H ACROSS PAGES
380 IF U$="R" OR U$="r"THEN 710 :'REPLA
CE
390 IF U$="I" OR U$="i"THEN 820 :'INSER
T
400 IF U$="U" OR U$="u"THEN 940 :'MOVE
UP
410 IF U$="D" OR U$="d"THEN 1000 :'MOVE
DOWN
420 IF U$="K" OR U$="k"THEN 1060 :' KIL
L LINES
430 IF U$="Q" OR U$="q"THEN CLOSE #1:CL
OSE #2: ! "EDITTMP/TMP":END
440 IF U$="E" OR U$="e"THEN 1130 :'NORM
AL END
```

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```

450 IF U$="B" OR U$="b" THEN L=1:GOTO 26
0
460 IF U$="A" OR U$="a" THEN GOTO 1210
470 GOTO 1000
480 REM PUT OUT A PAGE AND READ ANOTHER
490 FOR Q9=1 TO IT
500 GOSUB 1360:GOSUB 1320
510 NEXT Q9
520 GOTO 260
530 REM SEARCH
540 C=1
550 S$=MID$(I$,2)
560 FOR Q9=1 TO IT
570 GOSUB 1450
580 C=C+1
590 NEXT Q9
600 C=C-1
610 GOTO 260
620 REM SEARCH ACROSS PAGES
630 S$=MID$(I$,2):Q9=1:C=1:N9=0
640 GOSUB 1450
650 IF C>0 THEN 690
660 IF N9=0 THEN PRINT "Searching across
pages":PRINT "***Please wait***":N9=1
670 GOSUB 1360:GOSUB 1320

```

```

680 IF E=0 THEN 260 ELSE C=C+1:GOTO 640
690 C=C+1
700 Q9=Q9+1:IF Q9<=IT THEN 640 ELSE C=C
-1:GOTO 260
710 REM REPLACE
720 U$=MID$(I$,2,1)
730 Q=INSTR(3,I$,U$)
740 IF Q=0 THEN 260
750 S$=MID$(I$,3,Q-3)
760 R$=RIGHT$(I$,LEN(I$)-Q)
770 C=1:Q9=1
780 GOSUB 1450
790 IF C=0 THEN 260
800 T$(L)=LEFT$(T$(L),C-1)+R$+RIGHT$(T$(
L),LEN(T$(L))-C-Q+4)
810 Q9=Q9+1:IF Q9<=IT THEN 780 ELSE 260
820 REM INSERT
830 CLS:PRINT"          <Begin typing>"
840 PRINT"<Enter an empty line when don
e>"
850 IF L>2 THEN PRINT T$(L-2)
860 IF L>1 THEN PRINT T$(L-1)
870 PRINT "-----"
-----";
880 LINE INPUT I$:IF LEN(I$)=0 THEN 260

```



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! "\$ % ' ^ _ `

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```

890 IF E=50 THEN 920
900 E=E+1:FORQ=E TO L+1 STEP -1:T$(Q)=T
$(Q-1):NEXTQ
910 T$(L)=I$:L=L+1:GOTO880
920 PRINT #2,T$(1):FORQ=2TOL-1:T$(Q-1)=
T$(Q):NEXTQ
930 T$(L-1)=I$:GOTO 880
940 REM MOVE UP
950 IF IT>1 THEN Q=IT:GOTO 980
960 IF LEN(I$)=1 THEN Q=1:GOTO 980
970 Q=VAL(RIGHT$(I$,LEN(I$)-1))
980 IF Q<L THEN L=L-Q ELSE L=1
990 GOTO 260
1000 REM MOVE DOWN
1010 IF IT>1 THEN Q=IT:GOTO 1040
1020 IF LEN(I$)<=1 THEN Q=1:GOTO 1040
1030 Q=VAL(RIGHT$(I$,LEN(I$)-1))
1040 IF L+Q>E THEN L=E+1 ELSE L=L+Q
1050 GOTO 260
1060 REM KILL LINES
1070 IF IT>1 THEN Q=IT:GOTO 1100
1080 IF LEN(I$)=1 THEN Q=1:GOTO 1100
1090 Q=VAL(RIGHT$(I$,LEN(I$)-1))
1100 IF L+Q>=E+1 THEN E=L-1:FORQ=L TO E
:T$(Q)="" :NEXT:GOTO260
1110 FOR Q1=L TO E-Q:T$(Q1)=T$(Q1+Q):NE
XTQ1:E=E-Q

```

```

1120 FOR Q1=E+1 TO E+Q:T$(Q1)="" :NEXT:G
OTO 260
1130 REM NORMAL END
1140 GOSUB 1360
1150 IF EOF(1)=0 THEN PRINT"Copying rem
ainder of file":PRINT"***Please wait***
"
1160 IF EOF(1)=0 THEN LINE INPUT #1,I$:
PRINT #2,I$:GOTO 1160
1170 CLOSE #1:CLOSE #2
1180 OPEN "O",#1,F$+"/BAK":CLOSE #1:! F
$+"/BAK"
1190 ! F$+ "/" +E$ TO F$+ "/BAK"
1200 ! "EDITTMP/TMP" TO F$+ "/" +E$:END
1210 REM "A" COMMAND: PUNCH OUT ALL
BUT 10, AND READ IN 10 MORE.
1220 IF E<=10 THEN 1270 : ' NO PUNCHING
NECESSARY
1230 L=10-E+L:IF L<1 THEN L=1
1240 FOR Q=1TOE-10 : PRINT #2,T$(Q):NEX
TQ
1250 FOR Q=1TO 10:T$(Q)=T$(Q+E-10):NEXT
Q
1260 E=10
1270 REM READ IN 10 LINES
1280 Q=0
1290 IF EOF(1) OR Q=10 THEN 260
1300 E=E+1:LINE INPUT #1,T$(E):Q=Q+1
1310 GOTO 1290
1320 REM READ IN 20 LINES OR LESS
1330 E=0:L=1
1340 IF EOF(1)<0 OR L>20 THEN L=1: RETU
RN
1350 LINE INPUT#1, T$(L):E=E+1:L=L+1:GO
TO1340
1360 REM WRITE OUT WHOLE BUFFER
1370 FOR L=1TOE:PRINT #2,T$(L):NEXTL:RE
TURN
1380 REM WRITE 15 SCREEN LINES BEGINNIN
G FROM LINE L
1390 Q=1:CLS
1400 Z=L
1410 IF Z>E THEN PRINT"-----
-----";: PRINT @480,"";:RETU
RN
1420 Q1=INT(LEN(T$(Z))/32)+1
1430 IF Q+Q1>15 THEN Q1=15-Q:PRINT LEFT
$(T$(Z),Q1*32):RETURN
1440 PRINT T$(Z):Z=Z+1:Q=Q+Q1:GOTO 1410
1450 REM SEARCH FOR S$ BEGINNING FROM L
INE L CHARACTER C
1460 IF L>E THEN C=0: RETURN
1470 C9=C
1480 C=INSTR(C9,T$(L),S$)
1490 IF C=0 THEN L=L+1:C9=1:IF L>E THEN
L=E+1:RETURN ELSE GOTO 1480
1500 RETURN

```

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Exploring VisiCalc™

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

Tim Bowman, Spokane, WA

VisiCalc™ is one of the most popular business programs created for a microcomputer. Its popularity has spawned the creation of a number of similar programs. The primary reason for this popularity is that now a person with little or no computer experience can run a computer program that produces quick answers to questions such as, "What if?" It eliminates a great deal of "pencil pushing."

I use VisiCalc on a Model III and will draw upon that perspective for this article. Some of you will be using other versions for the Model I or II. If the ideas I suggest don't work exactly the same on your computer, try doing it in a manner that will run on your machine. After all, it's results we're after.

I'll assume that you have some understanding of how the program works. The VisiCalc instruction manual for the Model III is excellent. You may have heard that your local Radio Shack Computer Center will offer a tutorial class in using VisiCalc. I will not attempt to take the program apart and give you some new "zap." What I will do is show you how VisiCalc can make your job easier and some applications you may not have considered, such as creating a form. Let's consider what happens when the program begins, how we can save memory and easily produce column headings larger than the globally formatted setting.

Program Loading

Load the VisiCalc program by inserting its disk in drive zero and typing "VC" (all commands should

be typed without quotes). After the program loads, you should be able to view a C in the upper right corner. Below this is the number 18, representing 18,000 bytes of remaining memory to fill the electronic spreadsheet.

Incidentally, there is no way that you can fill the entire electronic spreadsheet. You'll run out of memory first. If you ever do, the program does not lock up. It just will not take any more input.

To squeeze the last little bit of usable memory out of the program, type "/SS," the file name and ENTER. When the save is complete, type "/CY," followed by "/SL." When you are prompted for the file name, you can type ":0" or ":1" (depending upon which drive you used to save the program on). Then press the right arrow until the file name you desire appears on the edit line. When it does, press ENTER.

If you are using a single-drive machine, or want to scan all of the files on multiple drives, you can skip typing the ":0" or ":1" and press the right arrow key until you reach the file name you are seeking. Then press ENTER. When the program finishes loading, you should see a memory amount that is slightly larger than before the screen was saved.

Memory Conservation Techniques

In order to conserve memory, keep the following points in mind:

Keep your labels as short as possible, but avoid underlabeling your calculations. There's nothing quite like loading a long VisiCalc

spreadsheet that was created some time ago and having to figure out what each line means. If the printed results are to be distributed to others, use labels that are completely spelled out with upper and lower case letters.

If the spreadsheet is very long and won't fit into the memory available, try splitting it into two or more pieces. Dividing the sheet will require solving your problem in two or more steps. That's a small compromise compared to going back to pencil and paper.

Delete non-essential labels or formulas from the sheet. You will have to scan the sheet for these items. Extra program lines are somewhat harder to find, and learning how to construct compact programs is a skill that comes with practice.

Don't type labels that are longer than the columnar format that you chose on start-up. Even though you will only see the number of characters in the column, the excess characters still take memory space.

Long Column Labels

One of the drawbacks of VisiCalc is the seemingly apparent inability to produce column headings that are larger than the globally formatted size. There is an easy way to produce long column headings. Upon start-up of the program, set the column width by use of the global command to the width that you need for your calculations. This is very important! Let's assume that the column format size was set for nine characters wide. However, you have decided that you need labels that might be up to the

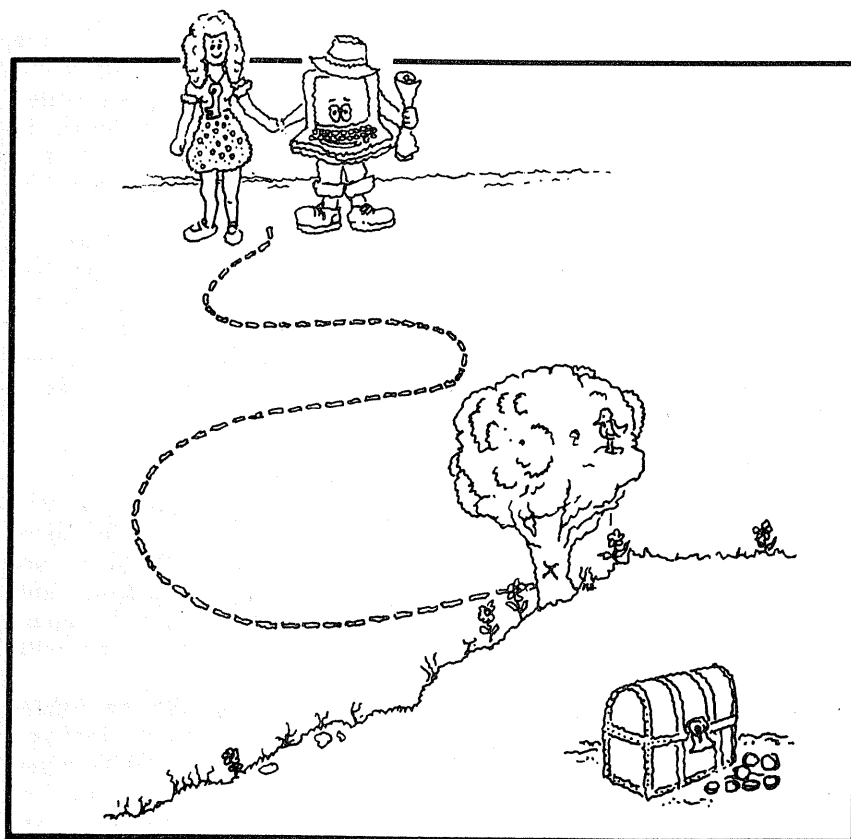
equivalent of three columns wide occupying columns A, B and C starting on line 1. Start typing the label in position A1. Watch the column on the screen. When you have inserted nine characters, press the right arrow key and keep on typing the label. Remember that if your label starts with non-alphabetical characters you must first type a quote sign before typing the label. If the label is still longer

than the second column and after typing nine characters, press the right arrow key and continue typing the label.

If after completing your spreadsheet you want to increase the size of your label, position your cursor in the column to the right of the label and in any row. Type "/IC" and press ENTER. Now you can type your additional amount of label. One caution, however. Do not

decrease the size of your columns after creating labels. You will find that they end up being shortened and look a little strange! ■

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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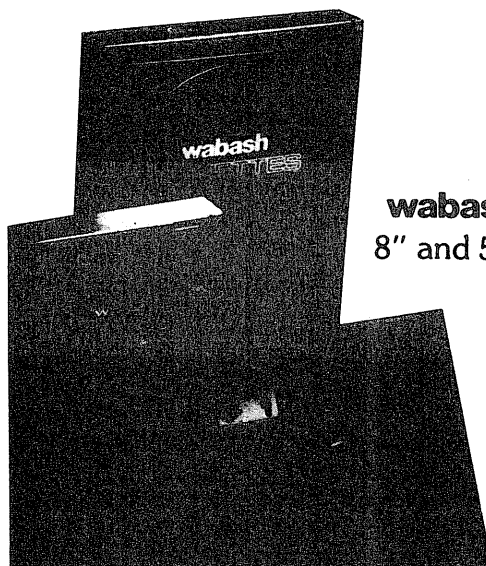
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BASIC Bits

Models I/III, PMC-80, LNW80

Thomas L. Quindry, Burke, VA

This is the first of a series of articles called BASIC Bits. The purpose of this column will be to provide programming tips and tricks for the beginning and advanced BASIC programmer. In order to make this column work, I need you! Your input will determine its worth. Let me know what you want me to discuss. You can be my parachute back to beginning BASIC if I get too technical. The column is written at the layman level. Send in questions for me to answer and offer tips for your fellow computerist.

I will limit my discussions to the Model I and Model III computers and will concentrate on minimal systems — perhaps a 16K Level II with no peripherals as a base system, and no more than a one disk drive 48K system with a printer as an upper limit. Any tips or tricks relating to disk operating systems will be limited to TRSDOS. I will show you how to get the best out of your present system.

Through this column, you will have short utilities that will increase the worth of your programs. Most of the discussion will be in BASIC. Sometimes a short machine language utility will be given. When this happens, it will be given in the form of BASIC POKE statements — a small BASIC subroutine that you can add to your program. No assembly language knowledge will be needed either to use the routine or to add it to an existing BASIC program.

Don Gruenther of Falls Church, VA, gives this tip concerning use of the INPUT statement. Suppose you have to enter numerical data into your program by way of INPUT statements and that data has quite a few digits. Did you know that you can keep track of the number of digits you are entering easier if you split it up with spaces? When entering numeric data, a space is an unrecognized character. Try the following two-line program:

```
10 INPUT A
```

```
20 PRINT "A = ";A
```

RUN the above program. When prompted to enter a value, enter the numbers 12 34 5, complete with spaces, and press ENTER. What do you get for A? You should get A = 12345, with no spaces, displayed on your video screen. For small inputs, the utility of this tip isn't appreciated, but what if you were entering a value such as one billion? You could enter it as 1 000 000 000. This

helps split up the number so you can keep track of the number of zeros.

You can use spaces in place of the commas that you would use if you were writing it down on paper. A comma in your computer input would terminate your input and give you an "?Extra ignored" message. With the one billion example, your answer will be given in exponential notation as A = 1E+09 unless your variable is double precision.

What if you removed the semicolon in line 20? Semicolons and commas are delimiters, or separators, to tell the BASIC interpreter of your computer where you want the information printed. The semicolon tells the computer that no spaces are to be skipped before printing the next value or string. The comma tells the computer to skip to the next column, starting after the last character printed. For this purpose, the computer video screen is divided into four 16-byte columns. In some cases, these delimiters are optional. Take, for example, the following command:

```
PRINT A;CHR$(65);B;
```

```
TAB(29);C;"HOLD";D
```

In this command, each of the semicolons may be omitted and the printed line will be the same. When the semicolon is used as a separator for a PRINT or LPRINT statement, it may be omitted whenever another separator is present. Separators can be any BASIC word such as CHR\$, TAB, ASC, or even the quote mark (").

The following is a perfectly good line:

```
PRINTACHR$(65)B
```

```
TAB(29)C"HOLD"D
```

You have saved seven characters over the previous line and get the same output. Try it! Give A, B, C and D values and enter each line. The value for A, the letter A, the value B, TAB to 29, the value C, the word HOLD, then the value D will be shown in exactly the same format for each of the above examples. If you are trying to conserve space because your program is long, this can help. It will slightly speed up your program.

Question: In experimenting with the STRING\$

command, I entered PRINT STRING\$(64,"I") after CLEARing enough string space. I then entered PRINT "0000000...." with 64 zeros. Why is the CRT display double spaced?

P. P., McLean, VA

Answer: When you enter 64 characters on a line, a linefeed will be entered automatically by your computer. When the PRINT command is completed, another linefeed is entered. To avoid the double spacing, put a semicolon after each of your PRINT statements in the 64-character lines. This suppresses the extra linefeed.

Question: Why is the POS(0) command so special? What is the difference between it and a simple TAB(x) command?

P. P., McLean, VA

Answer: The POS(0) command can be used very much like the TAB command, with one important exception. It can be used to format your display in cases where you aren't quite sure beforehand where you want the TAB to be.

As an example, suppose you want three headings evenly spaced, and suppose these headings are to be obtained from INPUT statements. How are you going to use the TAB function in this example? You don't know the length of each heading or string variable. With the POS(0) (zero is a dummy argument), you can determine the current cursor location on the line and then count from there with your TAB.

Assume that your inputs are A\$(1) thru A\$(3). Your line statement might be:

```
PRINT A$(1);TAB(POS(0)+5;A$(2);TAB(POS(0)+5);A$(3)
```

which would put five spaces between each string function. The semicolons are optional.

Question: Why isn't there an LPRINT command similar to the PRINT @ command for video printing?

Anonymous

Answer: I think you are missing the point of the PRINT @ command. The PRINT @ command is a two-dimensional command. It is used for formatting a screen display with words or, in some cases, with graphic characters. It is used to jump around the CRT (Cathode Ray Tube) screen area regardless of where the cursor is presently located. It relocates the cursor position.

One good use for the PRINT @ command is labeling a chart, or changing a label after the rest of the screen display is complete. The only area of the screen to be overwritten is the area commanded by the PRINT @. It is useful when updated or changing information becomes available further along in your program.

Since a printer operates only in one dimension, it is impossible to have a similar command. Most printers linefeed in only one direction — down. Many printers can't even backspace. There is simply no opportunity to overwrite an area of the printed page.

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Question: How do I keep my printer from going wild when I am accessing a computer bulletin board system? The board is sending out the control characters that cause my printer to shift in and out of different print modes.

E. C., Alexandria, VA

Answer: I've written a short routine which you can put practically anywhere in memory. You might have to save memory in response to the MEMORY SIZE? prompt, depending on where you put it. This routine, given in Listing 1, assumes that your communications program uses the ROM call to the printer when printing. The routine tests for a BELL code (ASCII 7) with the three codes, 254, 7 and 200 in the DATA statement and then tests for codes from ASCII 14 through ASCII 31. If any of these codes are found, the routine returns to the calling program without printing the character.

You can enter any codes that you wish to filter out by using the form 254,?,200; where ? is the ASCII value of the character you wish to filter. In this sequence of code, the 254,? asks to compare the character to be sent to the printer with the value "?." The 200 returns to the calling program without printing the character if there is a match. Place your extra filter codes after the 121 in the

DATA statement. Be sure to leave enough room for all of the data to be POKEd into memory, plus two extra bytes for the printer-routine address from line 70. This will work on both the Model I and Model III.

5 'PRINTER PATCH — BY THOMAS L. QUINDRY —
11/11/81

6 'FILTERS ASCII CODE 7 AND CODES 14 THRU 31.

7 'TO FILTER ADDITIONAL CODES ADD THREE
NUMBERS IN

8 'THE FORM OF 254,7,200 AFTER FIRST DATA
BYTE (121).

9 'IN THIS EXAMPLE, 7 IS THE FILTERED CODE.

10 CLS

20 DATA 121,254,7,200,254,14,56,3,254,32,216,195,0

30 INPUT "MEMORY LOCATION TO START
SUBROUTINE";A

40 N=A-1

50 N=N+1: IFN>32767 THEN N=N-65536

60 READ B: IFB<>0 THEN POKE N,B: GOTO 50

70 POKE N,PEEK(16422): POKE N+1,PEEK(16423)

80 B=INT(A/256): C=A-B*256

90 POKE 16422,C: POKE 16423,B

100 PRINT "PRINTER PATCH HAS BEEN
ENTERED."

110 DELETE 5-110

Line 110 was added so you do not run the program twice. The program reads the printer vector from locations 16422 and 16423 and puts this at the end of the POKEd routine. If you run the program more than once without rebooting, it will read the starting location of the subroutine in line 70 (since this address is now at the printer vector location) and enter it in line 90. You will then be caught in an endless loop and your computer will hang up.

In a future column, I'll be discussing debugging techniques for BASIC programs. If you have questions or tips to contribute on this subject, I'd like to hear from you. ■

Ed. note: Correspondence for Mr. Quindry should be sent to: Mr. Tom Quindry, c/o 80-U.S. Journal, 3838 So. Warner St., Tacoma, WA 98409. Please enclose a SASE for a reply. Problems of general interest may be included in future BASIC Bits.

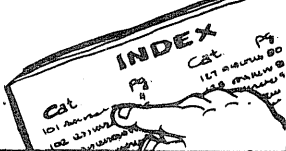
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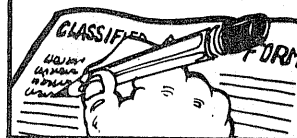
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October, 1982 81

DECIPOKE: Taming the wild $USR(0)$

Convert machine language to BASIC

Models I/III,
PMC-80, LNW80

Spencer Hall,
Associate editor



How can an equation be an instruction? Most of the BASIC vocabulary uses plain English to describe what it is telling your computer to do. If you already understand $X=USR(0)$, please go read something else. This is for the baffled thousands (or is it millions?) who don't.

The idea behind this weird piece of BASIC is very simple and I intend to keep it that way, so don't panic. $X=USR(0)$ is a complete statement which tells the computer to "go and execute that machine language routine." It does precisely what GOSUB or GOTO does, except that the computer must leave BASIC and enter the shady underworld of machine language to find the routine.

Now that you know all of this, we're going to learn how to use $X=USR(0)$ easily and get some spectacular results. First, a word about the mechanics. It may sound just a little heavy, but you are going to use DECIPOKE, which understands the theory so that you don't have to!

How does the computer know where to find that machine language routine? Glad you asked! The start location is stored in RAM addresses 16526 and 16527. Why two addresses? Because one isn't big enough. We're now talking machine language, not BASIC. In machine language, all numbers require two addresses (at least). When it encounters the $X=USR(0)$ statement, your computer reads (and understands!) the number stored in 16526 and 16527. It branches to this location and goes to work. This means that any BASIC program using $X=USR(0)$ must first execute a statement such as: POKE 16526, 150:POKE 16527, 125, to put the start address where it belongs. There must also be machine code in the form of decimal bytes (numbers between zero

and 255) stored in DATA statements. To line these up at the start address, there must be a FOR...NEXT loop to POKE them in place.

Now you're asking, "So what good is it?" Once again, I'm glad you asked. It proves you're still awake! You will often find short, but useful, assembled machine language programs in magazine articles. Armed with DECIPOKE, you can convert one of these to a form usable in BASIC programs without understanding much, if anything, about what is actually going on.

To create a machine program or subroutine in BASIC, you must do four things:

1. POKE the starting address into RAM locations 16526 and 16527.
2. Supply the machine language as decimal bytes in DATA statements.
3. POKE these bytes into their correct location using a FOR...NEXT loop.
4. Write the statement, $X=USR(0)$ at any point in your BASIC program where you want the machine language program to be executed.

Note: You may also want to protect it with a MEMORY SIZE, which uses RAM locations 16561 and 16562.

Listing 1 is DECIPOKE. With it, you can tackle any reasonably short assembled machine language program you find and make yourself a BASIC version. The larger your memory, the larger the program you can create.

You need only the hex addresses and statements at the left of the published code. Publishers who print unassembled code should be defenestrated! DECIPOKE

will ask for the four-digit address on the ORG line, for the address on the END line (at the end of the listing), and for the address of the last line containing two or more hex characters. From then on, it will actually tell you what line needs to be entered next. Proofread each line carefully as you enter it. Also, if your next prompt does not agree with what is printed in the magazine, this means your last hex statement was entered wrong. As the screen tells you, use CLEAR to go back and try again. Repeated CLEAR strokes "walk" you back as far as you want to go.

The program knows when you are finished with the last entry and cues you for what happens next. This will be a presentation of exactly the statements you must write in your BASIC program, except, of course, for X=USR(0). You get a screen display of all but the DATA byte list in one panel. You can copy this at your leisure or call for a line printer version. When the DATA bytes start appearing on the screen, you can stop them with any key in order to copy them. Any key will then restart where the list left off.

The computer has done its work. Now it's time to do yours! Writing the program from DECIPOKE specifications can be a drag but some of the results you get (CLOADable at that) are well worth punching in all of those DATA bytes.

Your mission, if you choose to accept it, is to make a CLOAD version of the machine language program in

Listing 2. It's just a gag, but a neat one, and quite a surprise when you RUN it. Just one hint: Once it runs, your computer locks and must be RESET, so we suggest you CSAVE it for use without your expansion interface.

When you've learned the technique, you'll want something more serious. Listing 3 is the compiled version of Phil Pilgrim's resident utility for chaining BASIC programs (80-U.S. Journal, Sept/Oct 79). Make your CLOAD version and CSAVE it. Then, when you CLOAD and RUN it, you can NEW it out. From command (direct) mode, ENTERing the statement PRINTCHR\$(1) causes a graphics block to appear in the upper right of the screen. This is your signal that any BASIC program loaded will be added (chained) to the program already resident. After this load, ENTERing PRINTCHR\$(0) will restore things to normal. Au Revoir!

Listing 1 for DECIPOKE

```
Ø CLEAR 2000:CLS:DEFINT Z:GOTO 100
1 PRINTTAB((64-LEN(ZT$))/2)ZT$:RETURN
4 PRINTSTRING$(64,ZG);:RETURN
6 PRINT@ 64*(ZP+1),;:FOR Z=1 TO 14-ZP:P
RINTSTRING$(64," ");:NEXT:PRINT@ 64*(ZP
+1),;:RETURN
```

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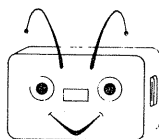
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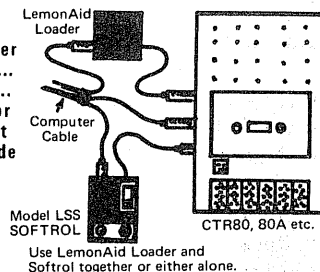
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```

7 FOR ZZ=1 TO 345*Z$:NEXT ZZ:RETURN
8 PRINTTAB(21)"TO PROCEED HIT ANY KEY";
9 Z$=INKEY$:IF Z$=""THEN 9ELSE Z=ASC(Z$)
:RETURN

11 ZO=64+64*ZI-LEN(ZT$)/2-32:PRINT@ ZO,
ZT$;:RETURN
18 PRINT@981,"TO PROCEED HIT ANY KEY";:
GOTO 9
19 ZO=ZI*64+ZT:PRINT@ ZO,ZT$;:RETURN
50 '-----MATHEMATICAL Z-SUBROUTINES-----
----'

51 GOTO 54'----- CONVERT DECIMAL TO HEX
. -----
52 GOTO 63'----- CONVERT HEX. TO DECIMA
L -----
53 GOTO 68'-----CONVERT DECIMAL TO LSB
/MSB-----
54 DEFINT H

55 H1=D/4096:I=D-H1*4096:H2=I/256:I=I-H
2*256:H3=I/16:H4=I-H3*16
56 IF H1>9 H1=H1+55 ELSE H1=H1+48
57 IF H2>9 H2=H2+55 ELSE H2=H2+48
58 IF H3>9 H3=H3+55 ELSE H3=H3+48
59 IF H4>9 H4=H4+55 ELSE H4=H4+48
60 H$=CHR$(H1)+CHR$(H2)+CHR$(H3)+CHR$(H

```

```

4):IF LEFT$(H$,2)="00" H$=RIGHT$(H$,2)
61 IF LEFT$(H$,1)="0" H$=RIGHT$(H$,3)
62 RETURN
63 N=LEN(H$):M=N+1:FOR J=1 TO N:D$(J)=M
ID$(H$, (M-J),1):NEXT
64 FOR J=1 TO N:IF ASC(D$(J))>57 THEN D
(J)=ASC(D$(J))-55:GOTO 66
65 D(J)=VAL(D$(J))
66 NEXT J
67 D=0:F=1:FOR J=1 TO N:D=D+D(J)*F:F=F*
16:NEXT:RETURN
68 MS%=D/256:MS=MS%:LS=D-256*MS:RETURN
69 '--- INKEY$ INPUT (REQUIRES "ZZ" AS
LIMITER) ---
70 ZZ$=""
71 PRINTCHR$(143); '--- GRAPHICS BLOC
K CURSOR
72 Z$=INKEY$:IF Z$="" THEN 72ELSE Z=ASC
(Z$) '--- ACCEPT INPUT
73 IF Z>70 THEN 72'--- SPECIAL: ACCEPT O
NLY <A> THRU <F>
74 IF Z>31 THEN 80'--- IF IT'S A CHARACT
ER, PROCESS IT
75 IF Z=31 THEN 90'--- SPECIAL: CORRECT
PREVIOUS ENTRY
76 IF Z=8 AND ZZ$="" THEN 72'--- NO INPU

```

[illegible]

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```

T YET? - NO BACKSPACE
77 IF Z=8 ZZ$=LEFT$(ZZ$,LEN(ZZ$)-1):PRI
NTCHR$(8);:PRINTCHR$(8);:GOTO 71'--- BA
CKSPACE ---
78 IF Z=13 AND ZZ$="" THEN 72'--- <ENTER
> HIT WITH NO INPUT ---
79 IF Z=13 PRINTCHR$(8);:RETURN '--- <
ENTER> CLOSSES INPUT ---
80 IF LEN(ZZ$)=ZZ THEN 72'---REFUSE INPU
T AFTER ZZ CHARACTERS
81 ZZ$=ZZ$+Z$:PRINTCHR$(8);:PRINT Z$;:
GOTO 71'--- ADD IT!--
82 '--- (SUB) ERASE CURRENT LINE, READY
TO REDO ---
83 PRINTCHR$(29);:PRINTCHR$(250);:PRINT
CHR$(29);:RETURN
84 '--- (SUB) ACCEPT (4) DIGIT HEX. AND
CONVERT---
85 ZZ=4:GOSUB70:H$=ZZ$:GOSUB52:RETURN
88 RETURN
89 ' -- CORRECT PREVIOUS LINE --
90 XK=XK-1:XA=XA-N(XK):N=N-N(XK):CA=CA-
N(XK):D=CA:GOSUB51:CA$=H$:GOSUB83:PRINT
CHR$(27);:GOSUB83:GOTO270
91 '--- ADVANCE LOCATION FOR LINES AFTER
GOSUB 11 --

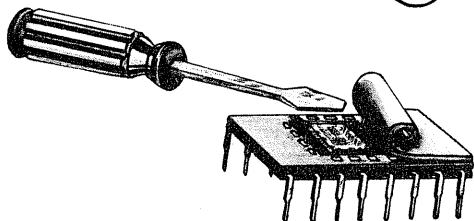
```

```

92 ZO=ZO+64:RETURN
93 '--- PRINT <ZT$) IF HARD COPY WAS REQ
UESTED ---
94 PRINT ZT$:IF P=80 LPRINT ZT$
95 RETURN
96 '--- LEAVE BLANK ON SCREEN AND ON PR
INTER IF SELECTED ---
97 PRINT:ZT$="":GOSUB94:RETURN
98 '***** --- PROGRAM STARTS HERE --
- *****
100 ZT$="POKE PATTERN CONSTRUCTION":ZG=
140:GOSUB1:GOSUB4:F$="####"
110 '--- GET FIRST, LAST AND ENTRY ADDR
ESSES ---
120 PRINT"ENTER <ORG> ADDRESS: ";:GOSUB
85:PRINT
130 IF D<17129 THEN GOSUB83:GOTO 120
140 FA$=ZZ$:FA=D
150 PRINT "ENTER <END> ADDRESS: ";:GOSU
B85:EA=D:PRINT
160 PRINT"ENTER LAST STATEMENT ADDRESS:
";:GOSUB85:LA=D
170 LA$=ZZ$:LA=D:PRINT
180 ' --- ESTIMATE SIZES OF MATRICES --
-
190 A=LA-FA+4:K%=A/1.5:K=K%

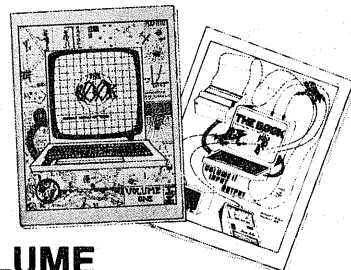
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```

200 ' -- SET UP MATRICES (FILES) ---
210 DIM A$(K),S$(K),N(K),B(A)
220 ' -- INITIALIZE INCREMENTED VARIABLES --
230 CA$=FA$:CA=FA:XA=0:XK=0:N=0
240 '--- ACCEPT EACH HEX STATEMENT ON CUE ---
250 ZP=1:GOSUB6:PRINT:ZT$="USE <CLEAR> TO RE-ENTER PREVIOUS LINE":GOSUB1:ZS=2:GOSUB7
260 PRINT:PRINT "BEGIN CODE ENTRY.....":PRINT
270 PRINTTAB(8) CA$: ";
280 '--- TEST FOR EVEN PAIRS <BS> OF HEX DIGITS IN STATEMENT ---
290 GOSUB70:CS$=ZZ$:BS=LEN(CS$)/2:BS%=BS:IF (BS%-BS)<>0 THEN GOSUB83:GOTO270
300 A$(XK)=CA$:S$(XK)=CS$:N(XK)=BS:XK=XK+1
310 '---DISMEMBER AND CONVERT CURRENT HEX STATEMENT/STORE
320 L=1:PRINTTAB(28);:FOR I=1 TO BS:H$=MID$(CS$,L,2):GOSUB52:PRINTUSINGF$;D;:B(XA)=D:L=L+2:XA=XA+1:NEXT:PRINT
330 '--- TEST FOR COMPLETION OF M/L INPUT ---
340 IF CA$=LA$ THEN 380
350 '--- IF MORE, UPDATE HEX ADDRESS CUE ---
360 CA=CA+BS:D=CA:GOSUB51:CA$=H$:GOTO270
370 '--- FINALIZE MATRIX LENGTHS & CHANCE TO CORRECT LAST
380 CA=CA+BS:SK=XK-1:ZT$="<CLEAR> STILL CORRECTS - ANY OTHER KEY PROCEEDS":PRINTTAB(5)ZT$;:GOSUB9:IF Z=31 THEN 90

```

```

390 ' -- DISPLAY DEVELOPED BASIC SPECIFICATIONS --
400 CLS:ZL=5:ZT$="IF YOU WISH HARD COPY OF":GOSUB11:GOSUB92
410 PRINT@ZO,"THE PROGRAM SPECIFICATIONS":GOSUB92
420 PRINT@ZO,"TURN YOUR PRINTER ON NOW":GOSUB92
430 PRINT@ZO,"AND ANSWER PROMPT WITH <P>":GOSUB18:P=Z
440 CLS:ZT$="YOUR PROGRAM MUST CONTAIN THESE LINES.....":GOSUB94
450 D=EA:GOSUB53
460 ZT$="POKE 16526,"+STR$(LS)+":POKE 16527,"+STR$(MS):GOSUB94
470 D=FA-2:GOSUB53
480 ZT$="POKE 16561,"+STR$(LS)+":POKE 16562,"+STR$(MS):GOSUB94:GOSUB97
490 ZT$="YOUR POKING LOOP MUST READ AS FOLLOWS.....":GOSUB94:GOSUB97
500 ZT$="FOR J="+STR$(FA)+" TO"+STR$(FA+XA-1)+":READ B:POKE J,B:NEXT":GOSUB94:GOSUB97:GOSUB18
510 CLS:ZT$="<DATA> STATEMENTS MUST CONTAIN THE FOLLOWING IN EXACT ORDER.....":GOSUB94:GOSUB97
520 A=0
530 ZT$=STR$(B(A)):PRINT ZT$;:IF P=80 LPRINT ZT$;
540 A=A+1:IF A=XA THEN 570
550 Z$=INKEY$:IF Z$="" THEN 530
560 Z$=INKEY$:IF Z$="" THEN 560ELSE 530
570 GOSUB97:GOSUB8
580 CLS:ZT$="HIT <R> TO REPEAT THESE SPECIFICATIONS":GOSUB11
590 GOSUB9:IF Z=82 THEN 400

```

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**Listing 2 for
X=USR(0)**

| | | | | |
|------|--------|-----|------------|-----------------------|
| 7530 | 00100 | ORG | 7530H | |
| 002A | 00110 | EQU | 2AH | |
| 7530 | 3E40 | LD | A, 0040H | :ASCII FOR "*" |
| 7532 | 21003C | LD | HL, 3C00H | :MSB AFTER SCREEN MAP |
| 7535 | 3E2A | LD | (HL), CHAR | :FIRST SCREEN ADDRESS |
| 7537 | 23 | INC | HL | :PUT IN A "*" |
| 7539 | BC | CP | H | :NEXT SCREEN ADDRESS |
| 7539 | 20FA | JR | NZ, FILL | :IS IT BEYOND SCREEN? |
| 753B | C33B75 | JP | LOOP | :IF NOT, ANOTHER "*" |
| 7530 | 00190 | END | 7530H | :IF YES, FREEZE |

**Listing 3 for
X=USR(0)**

| | | | | |
|------|--------|--------|---------------|---|
| 7F9D | 00100 | ORG | 7F9DH | |
| 7F9D | 2A1E40 | LD | HL, (401EH) | |
| 7FA0 | 22B67F | LD | (SDSPY+1), HL | |
| 7FA3 | 21AC7F | LD | HL, RDSPLY | |
| 7FA6 | 221E40 | LD | (401EH), HL | |
| 7FA9 | C3191A | JP | 1A19H | |
| 7FAC | F5 | RDSPLY | PUSH | |
| 7FAD | 3E01 | LD | AF | |
| 7FAF | B9 | CP | A, 1 | |
| 7FB0 | 2812 | JR | C | |
| 7FB2 | 3030 | JR | Z, CVR | |
| 7FB4 | F1 | JR | NC, UNCVR | |
| 7FB5 | CD0000 | POP | AF | |
| 7FB8 | F5 | SDSPY | CALL | |
| 7FB9 | 3AFD7F | PUSH | \$-# | |
| 7FBC | B7 | LD | AF | |
| 7FBD | 283C | OR | A, (FLAG) | |
| 7FBE | 323F3C | JR | A | |
| 7FC2 | 1837 | JR | Z, RETURN | |
| 7FC4 | 3AFD7F | LD | (3C3FH), A | |
| 7FC7 | B7 | JR | RETURN | |
| 7FC8 | 2031 | LD | A, (FLAG) | |
| 7FCA | E5 | OR | A | |
| 7FCB | 2AA440 | JR | NZ, RETURN | |
| 7FCE | 22FE7F | PUSH | HL | |
| 7FD1 | 2AF940 | LD | HL, (40A4H) | |
| 7FD4 | 2B | LD | (BSAVE), HL | |
| 7FD5 | 2B | LD | HL, (40F9H) | |
| 7FDE | 22A440 | DEC | HL | |
| 7FD9 | E1 | DEC | HL | |
| 7FDA | 3E9B | LD | (40A4H), HL | |
| 7FDC | 32FD7F | LD | A, 155 | |
| 7FDF | 323F3C | LD | (FLAG), A | |
| 7FE2 | 1817 | LD | (3C3FH), A | |
| 7FE4 | 3AFD7F | JR | RETURN | |
| 7FE7 | B7 | LD | A, (FLAG) | |
| 7FE8 | 2811 | OR | A | |
| 7FEA | E5 | JR | Z, RETURN | |
| 7FEB | 2AFE7F | PUSH | HL | |
| 7FEE | 22A440 | LD | HL, (BSAVE) | |
| 7FF1 | E1 | LD | (40A4H), HL | |
| 7FF2 | AF | POP | HL | |
| 7FF3 | 32FD7F | XOR | A | |
| 7FF6 | 3E20 | LD | (FLAG), A | |
| 7FF8 | 323F3C | LD | A, ' ' | |
| 7FFB | F1 | LD | (3C3FH), A | |
| 7FFC | C9 | POP | AF | |
| 7FFD | 00 | RET | | |
| 0002 | 00570 | FLAG | DEFB | 0 |
| 7F9D | 00580 | BSAVE | DEFS | 2 |
| | 00590 | END | START | |

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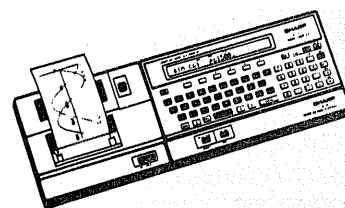
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Tandy topics

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

Have you been to your local Radio Shack outlet for your copy of our 1983 Computer Catalog? Well, it's there, and you should! It's Catalog Number RSC-8. The eleven of you who said in Mike's recent survey that you own Model 16s (hopefully a few more by now) will find 1- and 2-drive slimline double-sided drive expansion units. In the catalog, and expected to be available this year, are (finally) 68,000 versions of our three-disk accounting packages!

Although it isn't in the book, we should be in the testing stages of our multi-user operating system by the time you read this. I can tell you that the system will not be format compatible with the single-user Model 16 TRSDOS or the underlying Model II TRSDOS 4.1. This means that you won't be able to run your existing single programs until specific multi-user products are released. The good news is that they have been in the works, since July. We hope to make multi-user versions of our 3-disk accounting and ICS packages available immediately with the OS. I'll try to keep you informed, but remember I'm writing almost three months before you're reading... and a lot often transpires in three months.

Model II for 1983

Of course Model II continues. Did you hear the rumor that we were

discontinuing it? We did. In truth, we feel the 8-bit Model II and III-type machines have a relatively long life expectancy. Sixteen-bit CPUs really shine for intensive number-crunching, addressing lots of memory, and multi-user applications. But there are still a multitude of single-user tasks for which the Z-80A is very well suited, proven, and for which there is a world of existing, debugged, excellent software. Since the II is upgradable to a 16 when you need those capabilities, it's a safer buy for the businessman who plans to grow, than any other microcomputer I can think of. So don't look for it to disappear. Caveat... We reserve the right to improve, enhance, or modify any of our product line without it being considered discontinuance.

In the catalog for Model II owners, there is a new Enhanced Visicalc that allows much larger spreadsheets (with another 64K RAM board plugged into your II). And the extra RAM board has a reduced price!

For Profile Plus users, we have new utility programs: "Prosort" allows sorting on one primary field with four sub-sorts and selection on up to 16 specific fields.

"Forms" will print one detailed record per page (or sheet) on each item in your file. Each page can contain up to 66 lines of 132

characters, rather than the maximum two lines per item reports available with Profile Plus.

"Archive" lets you purge inactive records based on sort/select criteria. Eliminate them, or spin them off to an archive disk. Have you ever wished you could use Profile Plus's custom menu capability in other places... say to select programs on your hard disk? Well, it's now available separately as a "menu generator," for just thirty-nine bucks. On top of all this, we have some unannounced, really great Profile utilities yet to come! I'll let you look at the other software listings yourself.

An All New (?) Printer Line

You're going to find a completely updated printer line included. Here's that "discontinued" question again... There's a DMP-500, which looks and acts like a Line Printer V, except it's faster (220CPS), cheaper (\$1,795), and conforms to a standardized set of specifications common to all of our dot matrix printers this year. The differences are sufficient to warrant a new name and catalog number. The same is true with almost the whole line. LP-VII becomes DMP-100, faster — same price. LP-VIII is replaced by DMP-200, much faster at 120CPS

and bidirectional, plus removable tractor. LP-VI . . . DMP-400, and so on.

All of the dot matrix printers now have built-in graphics, are bidirectional, have 9-wire heads, and feature three modes: graphics, data processing, and a word processing mode with monospaced and proportionally-spaced characters. In total, I believe that each printer has about seven different character sets.

The Daisy Wheel II stays in our line, unchanged, and with its old name. It's still a winner. It does inherit a little brother, though, the DWP-410. (Did you notice "DMP" for "dot matrix printer" and "DWP" for "daisy wheel printer?" Clever, huh? Also, as price/features increase, the numbers get higher.) Anyway, the DWP-410 has just about all the features of the DW-II, except its 25 characters per second (only about 300 words per minute), and it sells for a low \$1,495. We'll

offer a tractor, but *no sheet or envelope feeders*.

And finally, there's a new printer, or is it a plotter, or . . . Well, we call it the CGP-115 "Color Graphics Printer." And at \$249.95, it's a steal and a perfect companion to the Color Computer. It uses the same four colored pens used by the PC-2 Printer, and prints, plots, or whatever, on 4½-inch wide roll paper. Each line can contain up to 80 characters, with 40 being "standard."

And speaking of plotters, our six-color plotter continues. In addition, there's a new one-pen-at-a-time flatbed plotter which comes with four colored pens, at only \$995.

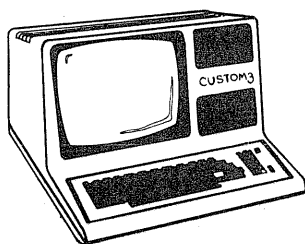
In the big accessory field, there's a new graphics tablet specifically for the Color Computer, called the "X-Pad." It samples 100 points per second, has a number of unique and outstanding features, and plugs into the program pak slot — all for \$349.95, just about half the price of

similar products! There's a lot of small stuff too: new cables, accessories, cleaning kits, software, books, a new low-profile cassette recorder, and other goodies I'll let you find for yourselves.

Color Computer

Well, those nasty rumors from early in the year still haven't come to pass. Color Computer is still alive, well, and kicking even harder than ever. RSC-8 contains our first two-disk programs for the CC. Scripsit for word processing has some nice twists — you can actually display upper and lower case characters on the screen, print one document while working on another, load documents from tape or disk, and of course, you can print elongated and underlined characters on the new Line Printer or LP-VIII. Second is the disk edition of Spectaculator . . . our CC spreadsheet program. There are, of course, a number of new and exciting Program Paks, too.

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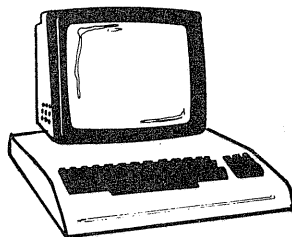


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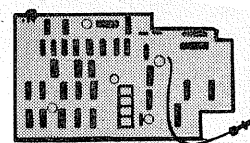
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Pocket Computers

The PC-1 continues with accessories and 20 software packages. PC-2 listings include the new 8K memory module, for even larger (or more) programs in memory. The first four programs for PC-2 are cataloged: Personal Finance, Business Finance, a Games Pack and "Invasion Force," a great space war game. You can expect to see many more PC-2 programs coming out very soon and regularly.

And Finally, Model III

For several years, we've been asked why we didn't "support" NEWDOS, LDOS, DOSPLUS, etc. Well, obviously, we can't "support" many operating systems. Our applications need only one OS on which to run, and our choice was to support our own TRSDOS as a standard. Remember, in the beginning, those guys weren't around as an alternative.

TRSDOS is a user's DOS, not a programmer's DOS. It contains a lot of error-trapping, etc., to try to safeguard the user — which is what our *average* customer needs. But, now we're gonna' do it! We will still produce and support our software on TRSDOS, but we will offer LDOS in both Model III and Model I versions, for those who want a full-feathered programmer's operating system! Radio Shack software will be supported under LDOS on a limited basis.

LDOS will be the operating system for our new . . . Model I and III hard disk! Yep, 5MB for \$2,495. No installation required for Model III. The inexpensive Model I adapter kit may require installation. However, when you hang your first secondary drive (three are allowed), there is an additional installation required.

Get the catalog and read about this one. And it's available right now! There's some new software,

including, of course, the long-promised *and now on the shelf* Super Scribes and Profile III Plus. I'm told by those who converted from Model II Scribes to Super on the III, that it is a superior system. I'm stuck on my II, and haven't had time to try this new one. You should! Of course, the old Scribes remains on our line as a less expensive, and still quite powerful, alternative. Profile III Plus isn't kin to the old Profile. It's like the Model II version, with (I believe) some seven added features.

Special Merchandise

In special editions of RSC-8 carried in our Radio Shack Computer Centers, you'll find four additional inserted pages, containing some items available only in the centers. These include a super 1200-baud modem, a Portable Data Terminal, 400CPS dot matrix printer, copiers, and accessories. So, the message is: get your new computer catalog today. ■

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Files and foibles

A review of random files

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

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After quite a few articles dealing with random access file handling in the Files and Foibles series, it's a good idea to take a little time and go back over some of the principles we started out with in a little more detail. Specifically, we'll go back over the statements we covered in the first of our articles on random files.

What we want to do is expand on the material we've covered and pull together some things we've only covered peripherally in some of the applications.

The OPEN Statement

Random access files use an OPEN statement the same as sequential files do. The purpose of the OPEN statement is to connect a file to a particular memory buffer for use. When we get information from a file, it is first dumped into the memory buffer in sector-size units and then given to our program as needed.

Writing to a file works the same way, only in reverse. We write into the buffer and when it's full, the buffer is dumped to the disk. This procedure matches the characteristics of the disk to those of the computer itself.

The form of the statement (its syntax) looks like this:

OPEN "R", buffer number, filename, record length

The buffer number can be a number or variable that designates which of the possible buffers should be used for the file.

Where do the buffers come from? Well, you actually set aside memory for them. If you are on a Model I or III, the answer to the "Number of Files" question going into BASIC is the number of disk buffers available for use. This can range from zero through 15 and it defaults to 3 if you just hit the ENTER key in response. On a Model II, you must follow the BASIC command with a -F:num, where num is the number of file buffers to create. The Model II defaults to zero buffers allocated.

It's important to realize that the buffers are numbered from 1 through the number specified in going into BASIC. If you specify -F:2 on the Model II, then file buffers number 1 and 2 are available.

If you've never tried it before, try going into BASIC with different numbers of files allocated and jot down the memory size for each case. As you might expect, you're dealing with a trade off. The more files you specify, the more memory you use and the less is available for your program.

A file buffer can be attached to only one file at a time.

There are several strategies that you can use for minimizing the number of file buffers you're using. You can open the file only as needed and share the buffer, or you can open every file needed and keep them that way. The first is slower, the second leaves your files open all of the time.

The filename part of the OPEN statement is used to specify which file the system is to connect through the buffer. This can be a string constant (enclosed in quotes) or a string variable. Obviously, using a string constant makes the file name permanent, short of modifications to the program. Using a variable allows the user to specify the file he wants while running the program.

The final field of the OPEN statement is optional (in fact on some operating systems it isn't allowed). It specifies the "record length" for the file. The default record length is 256 bytes if it isn't specified.

The record length is the number of bytes ('characters,' if you like) that will appear in every record of the file. In a sequential file, the record length varies for each record, but with that kind of organization, you can't just jump straight to a particular record by computing its position in the file unless you know how long each record is.

By making all records the same length, any point in the file can be located by computing its position. This can save time.

How many bytes do you need? Well, it depends on the file. If you're laying out a file, you have to decide how many bytes there will be in each record and provide for that number. Once you've created the file with a particular record length, you can't just change it. It's fixed.

In order to change the record length of a file, you have to write a program to copy the file record by record to a new file with the desired record length.

An example OPEN statement for a random access file named PAY/DAT with a record length of 60 bytes would be:

OPEN "R",1,"PAY/DAT",60

This makes the file available, but now to use it we have to do some more.

Laying out the Buffer

On the Model I, II and III, when we want to get information from the random access file buffer, we

October, 1982 91

assign a string variable to refer to a part of the buffer and get the information from the string variable. This also works on the Color Computer, but there we can also INPUT from a random access file buffer.

To assign a string variable to cover part of the buffer, we use the FIELD statement. All this statement does is specify how many characters are to be assigned to different string variable names starting with the first character in the buffer.

The form of the FIELD statement is:

FIELD buffer number, num bytes AS string variable,...

The buffer number tells BASIC which buffer to assign the variables to; num bytes tells how many bytes to assign to the variable after the AS.

The variable assignments start at the first character of the buffer and proceed through the buffer. For example, the FIELD statement:

```
FIELD 1, 30 AS A$, 5 AS B$, 10 AS C$
```

would result in the buffer layout shown in Figure 1.

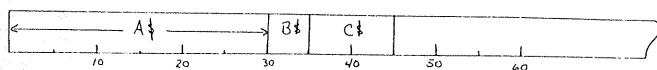


Figure 1

It isn't necessary to have the whole buffer assigned to

variables, and for convenience you can have more than one variable covering the same area by using more than one FIELD statement.

You have to be careful of unrelated problems when dealing with the strings. For example, say you wanted to use the whole 256-byte record length as a single string variable. You can't, because strings are limited to 255 characters in length.

To get the information out of the buffer, we simply set the variable we want the information put in equal to the appropriate string. If we used A\$ to store last names and we wanted to put the information from the buffer into string NM\$, we simply say NM\$=A\$.

You have to be careful going the other way. If you are trying to put information back in the file by setting A\$=NM\$, you'll find that it will never make it. By setting A\$=NM\$, what happens is that you create a new A\$ in string space instead of in the file buffer. A\$ does have the information but it no longer is in the right place in memory.

To overcome the problem with changing the place A\$ refers to, we use one of two statements to store the data. LSET stores the data in the field "Left Justified." That means that the first character of the data will appear to the left side of the field. RSET stores the data "Right Justified" in the file. For example:

```
LSET A$=NM$: RSET C$=NM$
```

will result in the effects as shown in Figure 2.

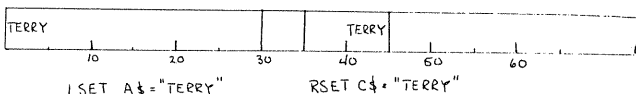


Figure 2

Storing Numbers

Notice that everything in the buffer is fielded with strings. What about numbers? We could use the STR\$ function to convert all numbers to strings and store them that way. BASIC provides us with a better way though.

In memory, numbers are stored as binary patterns. For a given variable type, these patterns are fixed. Since fields must be strings, we can't simply LSET/RSET the numbers into them. What we have to do is fool the system.

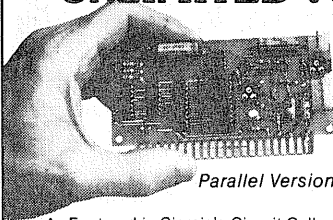
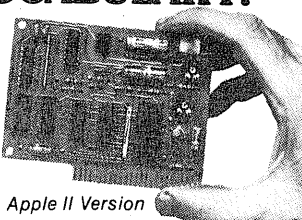
BASIC provides three functions, MKI\$, MKS\$, and MKD\$ to fool BASIC into thinking that integers, single precision, or double precision numbers respectively are strings. This allows us to LSET or RSET the numbers into a field. We have to be careful that we provide a field of the correct length. Integers are 2 bytes long, singles are 4 bytes, and double precision are 8 bytes.

To get back to number form, we have the reverse functions CVI, CVS and CVD. These restore the correct variable form.

Record, Record, Where Is the Record?

When we're creating a record, we first write our information into the buffer fields using LSET and RSET

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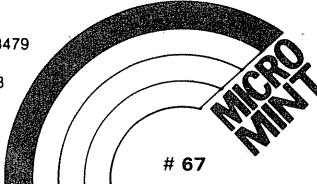
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instructions. When we're ready, we put the record on disk (actually we mark it for dumping to disk) by using the PUT instruction.

The form of the PUT instruction is:

PUT buffer number, record number

The buffer number tells which buffer to mark and record number tells the system where to put the buffer on disk. Each of these can be a variable if we want.

When we want to get information from the file, we execute a GET instruction. Its form is just like the PUT instruction:

GET buffer number, record number

GET brings the record designated from the file into the buffer number specified if it isn't already there. Once it has been placed in the buffer, the information can be taken out of the buffer with the buffer variables.

What Have We Done?

We've gone over the basic random access file statements needed for file handling. Try out the sample program included. As written it should work on Models I, II, III. It simply enters information from the keyboard and stores it into the file by record number.

If you haven't been following the more advanced techniques we've covered, this will be a good chance to start.

Program Listing for Files and Foibles

```

95 REM          MAKE SOME STRING SPACE
AVAILABLE
100 CLEAR5000
105 REM          GET THE FILE, DEFAULT 2
56 BYTE RECORD LENGTH
110 OPEN"R",1,"DATAFILE/DAT"
115 REM          FIELD 4 FIELDS FOR USE
AT 30 CHARACTERS APIECE
120 FIELD #1, 30 AS A$,30 AS B$,30 AS C
$,30 AS D$

125 REM          SET UP ERROR TRAP
130 ON ERROR GOTO 600
185 REM          WELCOME ABOARD
190 CLS:PRINT"RANDOM ACCESS FILE DEMO":
PRINT:PRINT

200 REM - - - - - COMMAND LOOP
- - - - -
205 REM          GET A COMMAND
210 LINE INPUT"COMMAND ==> ";CD$
215 REM          PROCESS THE COMMAND
220 IF CD$="END" THEN 300
230 IF CD$="STORE" THEN GOSUB1000
240 IF CD$="DISPLAY" THEN GOSUB2000

```



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```

250 IF CD$="HELP" THEN GOSUB3000
255 REM          GO GET ANOTHER COMMAND
260 GOTO200
300 REM - - - - - END PROGRAM - -
- - - - -
305 REM          MAKE SURE THE FILES ARE
          PROPERLY CLOSED
310 CLS:CLOSE:PRINT"HAVE A GOOD DAY":EN
D
400 REM - - - - - STORE A R
ECORD - - - - -
405 REM          LSET OR RSET FOR PRACTI
CE
410 LSET A$=W$
420 RSET B$=X$
430 LSET C$=Y$
440 RSET D$=Z$
445 REM          THIS IS WHAT STORES THE
          BUFFER
450 PUT 1,RN
460 RETURN
500 REM - - - - - GET A RECORD
FROM FILE - - - - -
505 REM          GET THE RECORD WE WANT
510 GET#1,RN
515 REM          EXTRACT THE INFORMATION
          FROM THE BUFFER

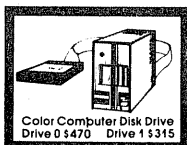
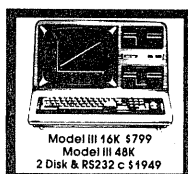
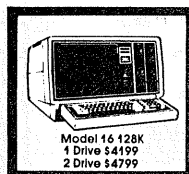
```

```

520 W$=A$
530 X$=B$
540 Y$=C$
550 Z$=D$
560 RETURN
600 REM - - - - - ERROR TRAP -
- - - - -
605 REM          IF THE ERROR IS IN LINE
          510, ASSUME IT'S PAST END OF FILE
610 IF ERL=510 THEN 650
620 PRINT:PRINT"ERROR":RESUME 200
650 PRINT"OOPS - YOU ARE LOOKING FOR A
NON-EXISTENT RECORD":RESUME 560
1000 REM - - - - - ENTER IN
FORMATION AND STORE IT - - - - -
1010 PRINT
1020 LINE INPUT"FIELD A =====> ";W$
1030 LINE INPUT"FIELD B =====> ";X$
1040 LINE INPUT"FIELD C =====> ";Y$
1050 LINE INPUT"FIELD D =====> ";Z$
1060 PRINT
1070 LINE INPUT"RECORD NUMBER: ";RN$:RN
=VAL(RN$):PRINT
1080 GOSUB400
1090 RETURN
2000 REM - - - - - DISPLAY A RE
CORD - - - - -
2010 PRINT
2020 LINE INPUT"RECORD NUMBER: ";RN$:RN
=VAL(RN$)
2030 PRINT
2040 GOSUB500
2050 PRINT"FIELD A =====> ";W$;"<==LSE
T FIELD"
2060 PRINT"FIELD B =====> ";X$;"<==RSE
T FIELD"
2070 PRINT"FIELD C =====> ";Y$;"<==LSE
T FIELD"
2080 PRINT"FIELD D =====> ";Z$;"<==RSE
T FIELD"
2090 PRINT
2100 RETURN
3000 REM - - - - - HELP COMMAND -
- - - - -
3010 PRINT
3020 PRINTTAB(10)"POSSIBLE COMMANDS:";P
RINT
3030 PRINTTAB(20)"END";TAB(40)"CLOSE FI
LES AND END PROGRAM"
3040 PRINTTAB(20)"STORE";TAB(40)"ENTER
DATA AND STORE IT TO THE FILE"
3050 PRINTTAB(20)"DISPLAY";TAB(40)"RETR
IEVE DATA FROM THE FILE"
3060 PRINTTAB(20)"HELP";TAB(40)"DISPLAY
THIS LIST"
3070 PRINT
3080 RETURN

```

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Serial printer interfacing

Connecting to your Color Computer

Color Computer

Dale H. Fawcett, Strongsville, OH

The value of a printer is obvious to anyone who has copied his programs by hand from the screen. I grew tired of this job after the second program. But, like most home computer owners, I can't justify the cost of a printer just to print my listings. I had access to a Texas Instruments Hard Copy Silent 700 Terminal (Model 735), so I decided to use it as a printer. The same basic techniques can be applied to any hard copy terminal or non-standard printer. In interfacing the printer, I also discovered how to interface to certain basic functions through machine language subroutines called by BASIC.

The Color Computer has a printer interface through its serial port. BASIC software treats this interface in a simple fashion. One line signals that the printer is ready. As long as this signal is present, the Color Computer BASIC outputs to the printer. There is no interrupt from the printer signalling that the printer is done printing a character, or line of data, and ready for more. BASIC has an end-of-line delay variable telling it how long to wait before starting the next line. If this variable is too small, data output will be lost because it is sent while the printer carriage is returning to the left side of the page (unless your printer has a buffer in it).

Due to the availability of documentation, the hardware portion of this project was the easy part. The Silent 700 Terminal has a standard RS232 interface and a 25-pin connector with the following signals:

| Pin | Signal |
|---------|-------------------|
| 1 | Protective ground |
| 2 | Transmitted Data |
| 3 | Received Data |
| 4 | Request to send |

| | |
|----------|---------------------|
| 5 | Clear to send |
| 6 | Data set ready |
| 7 | Signal ground |
| 8 | Carrier detect |
| 20 | Data terminal ready |

As a terminal, it expects certain handshake signals from the computer to work. These signals are easily generated by jumping the Silent 700 Data Terminal ready signal (pin 20) to the following signals: clear to send (pin 5), data set ready (pin 6) and carrier detect (pin 8). This turns the terminal ready signal around and tells the terminal that carrier is present and it is connected to a computer.

The terminal is now ready to interface to the Color Computer. This requires use of three of the four pins available in the serial port as shown in Figure 1, with the following signals:

Figure 1
Color Computer Serial Port

| | |
|-------------|---------------------------|
| Pin 1 | not used |
| Pin 2 | ready signal from printer |
| Pin 3 | ground |
| Pin 4 | data output to printer |

To accomplish the hardware connection, I purchased a serial printer cable from Radio Shack (#26-3020) and removed one of the DIN connectors. I also purchased a 25-pin connector to mate with the Silent 700 connector. This 25-pin connector was used for jumping the Silent 700 signals by soldering wires between pins 20, 5, 6 and 8. Then, the printer cable wires were connected to the 25-pin connector as follows:

| Computer Pin | Cable Wire | 25-Pin Connector | Signal |
|--------------|------------|------------------|---------------------|
| 2 | green | 20 | Data terminal ready |
| 3 | red | 7 | Signal ground |
| 4 | white | 3 | Receive data |

Having completed the easy part, I attempted to print. The Color Computer assumes that it has a printer which functions at 600 baud and has .017 milliseconds for a carriage return. These variables are stored in RAM and initialized at start up of the system, as are many other RAM locations. They can be easily changed by use of the POKE command. Locations 149 and 150 contain the baud rate and locations 151 and 152 contain the carriage return delay time. The values to POKE for the baud rate are shown below:

| Baud Rate | Value 149 | Value 150 |
|-----------|-----------|-----------|
| 120 | 1 | 202 |
| 300 | 0 | 180 |
| 600 | 0 | 87 |
| 1200 | 0 | 41 |
| 2400 | 0 | 18 |

I set the baud rate at 300 to match the terminal. The line delay is set from zero to 1.15 seconds, in increments of .017478125 milliseconds. To set the line delay value, determine the time required for the printer, such as .195 seconds. Divide this by 1.75788125E-5. The result, 11093, must be converted into two 8-bit values to POKE into 151 and 152. Divide 11093 by 256, giving 43.3332031. The integer portion 43 is the value for location 151. The fractional part, .3332031, is multiplied by 256, giving 85 for location 152. Therefore, POKE 151,43:POKE 152,85 will set up the proper end-of-line delay for a printer which requires .195 seconds for a carriage return. Location 155 contains the printer width and is set equal to the number of columns on the printing device.

With these changes to the RAM locations, I tested the line printer. This produced very good results when my BASIC program executed a PRINT#-2 command, at least for the first line. The Silent 700 performs a line feed only when given a specific line feed character (10), but the Color Computer BASIC only outputs a carriage return character (13). In a BASIC program, a line feed can be output easily by adding a CHR\$(10) after each print line. Making listings, however, isn't so easy. The BASIC program outputs a carriage return, but no line feed, at the end of a line, resulting in one, unreadable, overprinted line.

Going under the theory that (somewhere) the BASIC program has to allow changes for various devices, I began dumping memory locations. I discovered that locations 350 to 424 are initialized to return from subroutine commands. Various BASIC routines transfer control to these subroutines before, or after, completion of their functions. This allows the user to set in his own routines to perform various functions. The locations occur in triads so that a machine language direct-jump instruction which occupies three bytes can be entered and not disturb the other routines. The locations for which I've discovered functions are:

| | |
|-----|--------------------------------------------------------------------|
| 353 | beginning of line for PRINT#-2 |
| 356 | end of each item in list to be printed |
| 362 | after printing each character keyed in |
| 368 | beginning of line for PRINT#-2 (after jump to 353) |
| 374 | After some BASIC commands entered from keyboard (RUN, PRINT, etc.) |
| 380 | after run command |
| 383 | beginning of each line when executing LIST or LLIST |
| 386 | end of command line from keyboard |
| 389 | after run command |
| 392 | after run command |
| 404 | after run command |
| 419 | after command line from keyboard |
| 422 | after line number is printed for LIST or LLIST |

I have not found when other locations are called, but some experimenting could reveal this. The above list show that location 383 is the one needed for producing listings. Locations 353 or 368 can be used for printing with PRINT#-2 to eliminate the need for a CHR\$(10) at the end of each line.

The next step is to write a line feed processing routine and use the appropriate subroutine locations to jump to it. The following routine will work to output a line feed.

| | | | | | |
|----|----|-----|-----|------------------------------------------|-------------------------------|
| 86 | OA | LDA | 10 | Load A register with line feed character | |
| BD | A2 | 82 | JSR | CHROUT | Call character output routine |
| 39 | | | RTS | | Ret. from subroutine |

This routine loads the A register with a line feed character, which is 10, and calls the BASIC subroutine CHROUT to send it to the current device. The use of CHROUT is described in the Color BASIC manual on page 270. Other functions can be performed in a similar fashion, but require a knowledge of 6809 machine codes to program.

The call to subroutine CHROUT may not work for all versions of BASIC. This is because the actual address of the CHROUT routine may change. An indirect subroutine jump AD 9F, instead of direct JSR BD to A002, will work in all versions. Location A002 and A003 contain the location of the CHROUT routine for all versions.

To get to the line feed routine for listings, one needs to set locations 383, 384 and 385 to a jump to 180, where I located my line feed routine. This is 7E 00 64. For the print lines, set locations 353, 354 and 355 to the same values. All of this machine language code can be set up by using POKE commands from the keyboard or by a simple BASIC program (see Figure 2). The hexadecimal machine code above has been converted to decimal for the data statements in the program. This program needs to only be loaded and run once. Then, other programs can be loaded and listings made.

The end-of-line routine can be modified to suit your own purpose. Other uses would be to count the lines printed and at some fixed number, issue a series of line

feeds to start a new page, add a header or page number, or a page eject command, if your device recognizes one. A larger set of codes will require a different location for your routine. I selected lower memory locations 180 to 185 for my routine.

This may not always work because some BASIC functions may also use this area. Loading programs from cassette and running them has not overwritten locations 180-185 in my programs. Upper memory, starting at 4089 on a 4K machine, can also be used for the routine. If so, it should be protected by use of a CLEAR N,4088 where N is your program's required string storage. This prevents BASIC from using the last six locations of memory where you stored the routine. Placing the line feed routine in upper memory requires changing the jump address in locations 354-355 and 384-385 to decimal values 15 and 159 instead of 0 and 180. The execution of another CLEAR instruction, however, can unprotect the upper memory and overwrite the line feed routine. Therefore, any program used while you desire to preserve this routine should also protect upper memory if it has a CLEAR instruction.

I hope this information is helpful to others who may be interfacing printers to their Color Computer or are interested in how to interface special routines to normal BASIC functions. I'm sure other readers will be interested in finding out what some of the other subroutine locations between 350 and 424 are used for, such as end-of-cassette read or write. This can be done by using a routine similar to the line feed one, which outputs a character such as A to the screen. As a word of caution, some functions may require that registers be preserved. If your routine doesn't save and restore them, the BASIC monitor becomes very confused and the only recovery is to turn the computer off and back on again. It is, therefore, wise to save your setup program on tape before running it, to save time in having to key it in again.

Listing 1 for Printer Interfacing

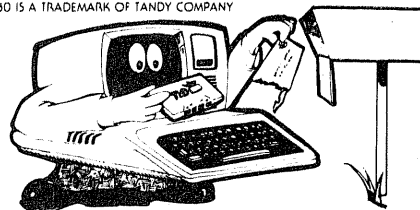
```

5 'SET UP PRINTER
10 POKE 150,180:POKE151,43:POKE152,85
11 '
15 ' PUT LINE FEED ROUTINE INTO LOCATIO
NS 180 TO 185
20 DATA 134,10,189,162,130,57
30 FOR I=180 TO 185
40 READA:POKEI,A:NEXT
41 '
45 'SET UP JUMP FOR LISTED LINE
50 DATA 126,0,180
60 FOR I=383 TO 385
70 READA:POKEI,A:NEXT
71 '
75 'SET UP JUMP FOR BASIC PRINT LINE
80 DATA 126,0,180
90 FOR I=353 TO 355
100 READA:POKEI,A:NEXT
110 END

```

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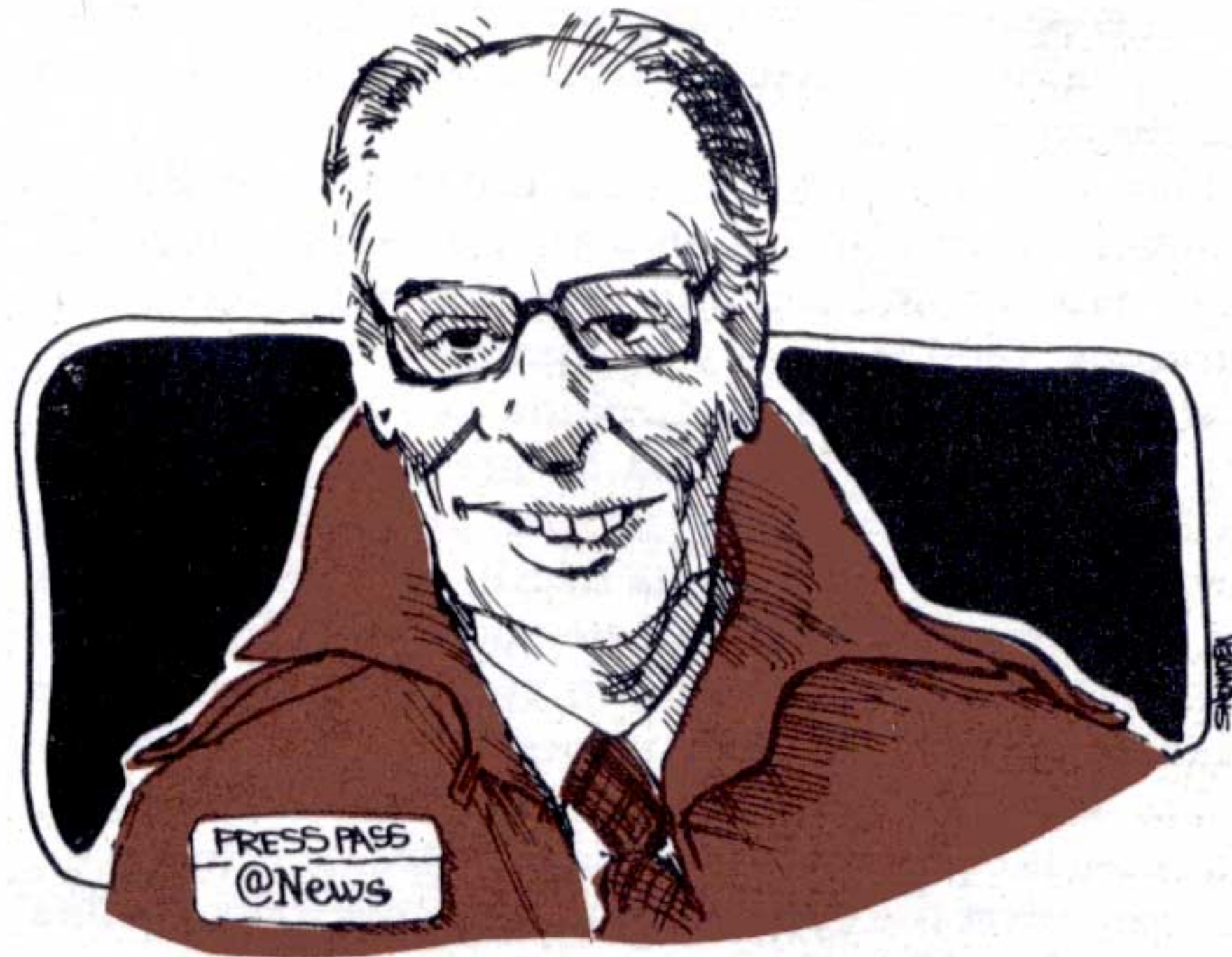
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@ News

Spencer Hall, associate editor



Packed Strings and Other Things

Who introduced graphic characters, and who originated the PEEK and POKE commands which the underprivileged owners of Models II and 16 have to do without? These powerful features of Microsoft BASIC make possible, among other things, the "forcing" of graphics blocks into a string previously defined with just about any old keyboard characters. When such a string is printed, of course, the picture defined by the graphics blocks appears instantaneously on the screen. Do you suppose that the creators of today's BASIC interpreters anticipated that they would be used to "pack" strings?

The delight of millions depends on this phenomenon and the prosperity of a group of highly talented programmers . . . of whom, Leo Christopherson comes most readily to mind. Another byproduct of packable strings is the growing literature of programs designed to perform this rather complex function by, as the saying goes, "letting the computer do the thinking." My wafer collection contains a "Colossal Character Creator" by Paul Gerhardt of CLOAD magazine, 1981. It's very good. Exatron's first @LOAD release, Vol. 0, No. 1, contained another good string packer by Mike Van Pelt. Mike's version is a little

simpler in concept, but useful, especially for making fancy letterheads on a line printer.

Such a letterhead came to @NEWS the other day. Correction, make that two such letterheads, both done with the Van Pelt packer. The author pretends to have a delightfully split personality. One is William Barker Thornton, an ardent personal computer enthusiast. His alter ego is I. T. Phoolsme, a grassroots humorist in the best American tradition of Josh Billings and Bill Nye. His column regularly delights readers in Lexington, Kentucky. The letterheads are reproduced for your admiration. He says that he tried to edit some packed strings and got garbage.

Well, Ole Bill, as your pal I.T. calls you, join the club. We've all done it! That garbage in a Model I packed-string listing is, of course, the interpreter's conversion of your graphics codes as tokens for BASIC reserved words. When you try to edit such a line, you invoke the witch's curse and the prince turns into a toad. It will henceforth print said reserved words instead of your pretty picture.

Mr. Barker (or is it Mr. Phoolsme?) needed sixteen packed strings in his Van Pelt array and wasn't aware that arrays over ten cells long must be DIMed. His fix was to provide A\$(n) and B\$(n) dummies, using n=9 in both cases. Not all that bad for someone who says he doesn't

know BASIC! For use of your name (make that names!), letterheads and thoughts in this column, Bob Howell has offered to send you Bill Burnham's Easy Does It, which brings us to this month's second order of business.

Review: Easy Does It

This is a utility by Exatron's librarian, Bill Burnham, another sharp and sane schizophrenic, whose alter ego is "Wee Willy." Maybe string packing does that to people! Easy Does It is, possibly, the ultimate string packer. It also makes use of an ESF feature that should cause users of disk systems to eat their hearts out.

With your String Floppy, you can dump any portion of RAM to a wafer. By dumping addresses 15360 to 16383 (3C00 to 3FFF HEX if you insist), you place the screen contents on a wafer. @LOAD this file using a trick Bill describes in the documentation and your pretty screen appears like magic. Used to provide instructions to go with a BASIC program, it makes them callable without using any program memory or disturbing the BASIC program or its variables. With the Exatron speed-up kit installed, it's like a packed string. That's a 14,400 baud load you're watching!

As with all of Bill's writing, the 44-page manual is excellent. His program contains many features

(Sketch, Text/Edit, Circle, Rectangle and Diagonal modes, to name a few) as well as commands to switch to large screen characters, panel save, string pack, etc. Each mode has a mnemonic cursor. The circle mode cursor is an "O." These are all explained in great detail, with Bill's folksy, easy-to-follow style.

One is left, as Bill warns in his introduction, with the feeling that the "bells and whistles" are just too complicated to learn. They aren't, however. If you learned BASIC from David Lien, you know that really good stuff is worth the time and study. Not the least valuable is the appendix, which contains an excellent bibliography of string packing and related techniques, referencing several periodicals and books. Bill has used his own program to furnish MX-80 hardcopy of all the program's callable menus and such spectacular graphics feats as a flow chart of Easy Does It.

For a taste of Easy Does It, consider circle mode. Call it with "C" and you're asked, "Fold It?" Answer "Y," (yes) and your requested circle, if it's too large for the screen, will be "folded" back onto itself, making an interesting and conceivably useful pattern. Answer "N" (no) and a too large circle will be chopped off to fit the screen or, as Bill says, drawn in "extended space." Next, you're asked, "Fill It?" Answer "Y" and, you guessed it, all pixels inside the

circle are turned on. Go to Text/Edit mode and your "moon" can be written on. In keeping with the season, go to Graphics mode, add a stem, then use blanks in the Text/Edit mode to cut a grinning face in your jack-o-lantern.

There has been a problem about the price of Easy Does It. Contrary to the ESF annual report and an earlier software bulletin, the price is actually \$24.95. This has caused much embarrassment. If you're serious about programming spectacular graphics, it's well worth the price. It's a program you could write off on your income tax if you program to earn money. If technical matters are a bore, you can still have fun just playing with Easy Does It.

Moths in the Mailbag

John Belham, Jr. of 2302 Middlecoff Drive, Gulfport, MS (isn't that on the shores of Bay St. Louis?) wrote in answer to Jim Perry's request for saving parameters to put Macrotronics programs on wafer. He says:

MBO ver. 2.0: Machine language: @SAVE #,30208,2560,12309. BASIC portion of program is 10197 bytes long. Use two files. First for machine language as above and then @SAVE2 for the BASIC. M800 ver. 1.1: @SAVE #,17392,8803,17583 MBL Baudot: (20-foot wafer): @SAVE#,17129,15572,17153.

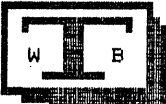
Mr. Belham's list of locations in 16K where MBL Baudot code resides

is shown in Figure 1. I hope this is useful to Macrotronics users. It's Greek to me!

Figure 1
MBL Baudot Machine Code
Block Locations

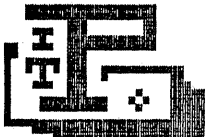
| Number | HEX Address | DEC. Address | Bytes |
|--------|-------------|--------------|-------|
| 1 | 4300H | 17152 | 18 |
| 2 | 49FCH | 18940 | 128 |
| 3 | 4A7CH | 19068 | 128 |
| 4 | 4AFCH | 19196 | 128 |
| 5 | 4B7CH | 19324 | 128 |
| 6 | 4BFCH | 19452 | 128 |
| 7 | 4C7CH | 19580 | 128 |
| 8 | 4CFCH | 19708 | 128 |
| 9 | 4D7CH | 19836 | 128 |
| 10 | 4DFCH | 19964 | 4 |
| 11 | 4E0AH | 19978 | 128 |
| 12 | 4E8AH | 20106 | 128 |
| 13 | 4F0AH | 20234 | 128 |
| 14 | 4F8AH | 20362 | 105 |
| 15 | 7F00H | 32512 | 3 |
| 16 | BF00H | 48896 | 3 |
| 17 | FF00H | 65280 | 3 |

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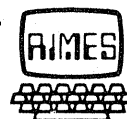
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Reviews

XBASIC
Model II/III
Snapp-Ware, Inc.
3719 Mantell
Cincinnati, OH 45236
1-800-543-4628
\$100 Model II
\$75 Model III

I was definitely falling apart at the seams over my BASIC programming. I had a series of programs that I had developed with common modules. It started out very simply, but eventually it got to the point where it was hard to keep track of the variables.

Oh, I had my lists of variables, but

a single mistake in one list could cause no end of problems. Sure enough, it did. I would have sold my soul for a good cross reference program for my system. In fact, I had already started to write one. Just at that point, Snapp, Inc. came to my rescue with XBASIC.

XBASIC, short for Extended BASIC, is a series of enhancements to Model II BASIC to give it capabilities that are needed but just not there. What's more, the system is fast because it is direct, machine language enhancement to BASIC and not just programs that run under BASIC.

You've probably seen the ads for Snapp-Ware. They're easy to spot with a picture of Scott Adams saying, "My biggest loss of programming time . . . is spent inserting my diskette." I respect Scott, but I've never been impressed by the ads. I was impressed by the packages.

There are six packages. Each adds something useful to your system. XBASIC adds single-character abbreviations for common commands like E for edit. It also adds a way to recover after an accidental NEW or Reboot.

XREF adds the ability to list cross references for variables to the screen or the printer. XDUMP lists the values of variables in a program so you can follow execution easily. XRENUM is an extended renumbering facility that allows block movement of program lines, block copying, and block renumbering.

XFIND is a cross reference facility for strings and commands in a program file. XCOMPRESS compresses your programs to the minimum space possible for efficiency in storage and execution. It can even handle REM statements that are branched to by GOTOs or GOSUBs.

These are all essential tools for the serious programmer. For me, no tool has become more useful than the XREF facility. It makes listing variables quick and easy. The format is easy to read, and it can be done on the screen by direct call-up for a program in memory.

I have been using the complete package on a test for two weeks without an error or trouble. More

than any other Model II utility, this has been a great help to me. I generally program well without all of the aids, but Snapp-Ware's utilities go a long way toward making the system truly functional for program development.

I do have a reservation. You cannot simply BACKUP a disk that has been modified. If you do, BASIC won't work! Each disk with XBASIC has to have a special generation program run on it that transfers some files to a hidden location on the disk from the distribution disk. I don't like that!

I can see that this technique inhibits software piracy since it makes copying difficult (in fact, impossible) for the user who needs to make a new disk since he *must* have the distribution disk. Still, I tend to think that it is almost too high a price to pay for the loss of convenient BACKUP.

I solved the problem for my system by making a modified disk for drive zero to use only during development. No programs are on it. Programs I am working on go on an expansion drive. This isn't feasible for the single drive user, however.

I guess that I have to admit to liking the package, even with the problem I mentioned. I use it all of the time, and I'm sure you would too, if you get it.

T. R. Dettmann

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Color Computer
Eigen Systems
P.O. Box 10234
Austin, TX 78766
(512) 837-4665
\$34.95

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entry of BASIC commands, switching BASIC AID on or off and entering BASIC commands with or without trailing space. The BASIC AID package comes with the ROM pack, a plastic keyboard overlay that shows all of the program's commands, and a user's manual.

You've read about those lucky people with disk drives and fabulous utility program libraries, haven't you? With BASIC AID's merge command, you gain some of the power and convenience of these libraries. The command allows you to merge a BASIC file on cassette with your BASIC program currently in memory. BASIC AID will even renumber the file and change the line increment while the file is loading! You can maintain subroutine files without retyping them each time you need them.

How many times have you entered a program and had to restructure it for neatness or to improve speed? BASIC AID's move command gives you the ability to move any number of BASIC program lines to any point within the program. You can change the line numbers and increment during the move. The program even searches through the balance of the program and updates all references to that block of code.

The automatic line numbering feature takes a great burden off your shoulders. You'll never have to enter line numbers again with BASIC AID installed in your computer. The

program contains two commands that deal with line numbers. One command is used to initialize the desired beginning line-number feature.

All of BASIC AID's commands are entered with a two-key sequence: a control key (the down arrow key) followed by the desired command key. Since the keyboard overlay has all of the program's commands printed on it, you don't have to memorize a list of commands and their options.

The beauty of this feature is that you can redefine any command key (except keys 1 through 7 — these are the program's major command keys) to be anything you specify. You can assign messages for quick entry, debug sequences to automatically display variable contents, or other things. After you have redefined keys, you can save these new definitions on cassette for later use.

During the two-key entry of commands, BASIC AID automatically enters a space following entry of the command. If you're writing a compact program and can't afford extra spaces, you can disable the trailing space. The program then enters commands exactly like you would from the keyboard.

The program even allows you to enable or disable. Thus, when you execute a program that must have total control of system resources, you can disable BASIC AID.

Eigen Systems provides a seven-page manual that describes BASIC AID's commands, prompts, and how the commands are used. It describes the procedure for installing the ROM pack and the keyboard overlay.

I find that BASIC AID dramatically improves my programming ability. Since I don't need to enter line numbers or frequently used subroutines, I have more time to work on my application. If you are tired of doing these things, check out BASIC AID. You'll be pleasantly surprised!

Darrell Wright

**Super Utility Plus
Model I/III
Soft Sector Marketing
6250 Middlebelt
Garden City, MI 48135
1-800-521-6504
\$49.95**

Super Utility Plus is an enhanced version of Super Utility written by Kim Watt. It would be more precise to say that it is a rewritten Super Utility, with many additional utilities, and support for double-density. In any case, it is claimed to be the last word in utilities, and this reviewer must admit that nothing currently available equals it in power and usefulness. It has so many features that describing them in detail would go beyond the scope

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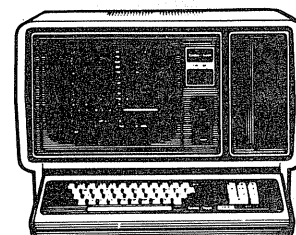
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Model II 64K

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of this article. I shall confine my review to the finer points of this masterpiece.

The hardware requirements are a 48K Model I or III with a minimum of one disk drive, although two drives are required to fully realize some of the potentials of the program. It will also support double density and TRS232 serial line printers. The diskette is claimed to be non-copyable (even using the special disk copy utility on Super Utility Plus), but the author makes a backup copy available to registered owners for only \$5.00. Furthermore, the original disk will be replaced for only \$8.00. However, it is this author's opinion that Kim Watt is not playing cricket. If one is to make available a utility that will copy any "protected" software on the market, that utility should be able to be backed up also, for the same reasons given for the existence of the copy utility.

The entire utility resides in RAM and contains its own I/O routines so

that after loading and initialization, the disk can be removed from the drive. The disk can also be custom-configured for a specific system, either by zapping the disk permanently or by using temporary override commands. The highlights of the disk include a ZAP utility, similar to Apparat's Superzap, that allows zapping in Hex, ASCII, decimal, binary or octal. It has a search routine that will find a byte, a word, a string, or even encrypted code. The ZAP utility also allows reading of the sector-formatting and ID address marks and altering the data address marks. It can also reverse the data in the entire sector, copy sectors, zero sectors, verify sectors, or exchange sectors. It also displays whether the sector is IBM format or not. One really nice feature is dual cursors — one for hex and another for the ASCII side of the sector display.

The disk copy works as advertised, except on itself. However, some hackers have discovered the secret to that already. Format utilities allow the advanced disk wizard to configure anything. One really nice feature is the ability to reformat a disk without destroying the information already on the disk sectors. You can even add additional tracks, to say, upgrade a 35-track disk to 40 tracks. A special tape copy routine copies a tape bit-by-bit using two recorders in order to allow a backup of any protected tape made. There are several disk-repair utilities that allow repair of the GAT and HIT sectors and an automatic fix for a damaged or missing BOOT sector. You can recover files killed by Super Utility or NEWDOS. You can read-protect or un-read-protect directories, move the directory to a different track, clear unused entries from the directory, and find all inactive files on a particular disk.

There are memory utilities to test, inspect, move, compare, zero out, exchange, display, fill, input or output, jump to, reverse, string search, read or write an entire track or sector to or from memory. The memory test utility is especially fast. There are file utilities that allow you to display file sectors, compare files, give file locations,

create or clear files, display disk directory and free space, and disk drive status. With these utilities, you can actually rearrange a disk with all files rewritten in their most contiguous order for faster loading. Lastly, you can configure Super Utility Plus to your particular system, including density of drives, number of drives, type of printer, lower case and high speed mods, and even which operating-system BOOT sector to use when creating or repairing disks.

Super Utility Plus is so comprehensive that I was unable to test every feature of every utility. However, the main features were tested and worked without any bugs. Knowing the quality of Kim Watt's work, I have little doubt about the integrity of the software. Super Utility Plus certainly deserves a place in every serious disk user's library.

Jim Klaproth

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*TM Tandy Corp # 74

Stellar Escort Model I/III

Big Five Software
P.O. Box 9078-185
Van Nuys, CA 91409
(213) 782-6861

16K tape \$15.95
32/48K disk \$19.59

Written by Jeff Zinn, Stellar Escort is one of the latest releases from Big Five Software. The program is available in both tape and disk versions. Big Five has distributed the disk version in a format that can be backed up easily on the Model I and with just a little effort, on the Model III computer.

After booting the disk and going through the options to get to the game, you are presented with a display that shows a triangular shape at the middle of the screen. That's you! The object is an overhead view of an escort craft attached by a shimmering force field to another spacecraft.

Your job is to protect the defenseless craft you are towing from the vile Cretonians who are out to destroy it. It is to your advantage to protect the craft well, because if it is destroyed the disruption of the force field immediately destroys your escort craft also. As in most

arcade style games, the real object is to amass the points that are awarded for killing off the attackers. Your rewards are a high score and an extra escort craft for each 10,000 points won.

In a departure from past game formats, your ship never leaves the center of the display. While you use the four arrow keys, or your joystick, to move left and right and forward and back, your relationship to the enemy ships around is displayed with you remaining in the center of the video. You must maneuver to get the enemy in your sights. Instead of having a forward-firing weapon, you have a new "particle beam weapon" that is focused on a point just ahead of your ship. When the weapon is fired, either by pressing the space bar or the fire button on the joystick, beams will erupt from the four corners of the display and meet just in front of your ship. Any enemy ship that happens to be there will be destroyed.

Generally, I found this to be a challenging game. The graphics and sound effects are well done, especially considering the coarse graphics provided on the Model I. Big Five continues to expand its vocabulary, and now the vocalizations even start taking on an inflection, or perhaps I've just been listening to them too long. As compared to other games on the market in the same price range, you will definitely get your money's worth from this one.

Jerry L. Latham

**Super-Terminal
Model I/III
Instant Software, Inc.
Peterborough, NH 03458
1-800-258-5473
\$95.00 Disk**

Super-Terminal, a new RS232 communications program, is a recent release from Instant Software. Super-Terminal, written by David Lindberg, is a machine language program designed to turn your TRS-80 Model I or III computer (with the help of an RS232 board and a modem) into a telecommunications terminal, offering you the vast databases and resources of the giant macro-computers. Super-Term is a

sophisticated communications program, and comes with a complete 44-page instruction booklet. Unfortunately, it uses small, hard-to-read print.

After loading and starting, Super-Term waits for your instructions, or for data to begin arriving from the RS232. You may switch from data display to command mode at any time by tapping the '@' key twice.

At the bottom of the command display, you are told the baud rate, word length, stop bits, and parity settings of your RS232 board. The length of your text buffer and how much of it has been used are displayed with the number of framing, parity and overrun errors encountered so far.

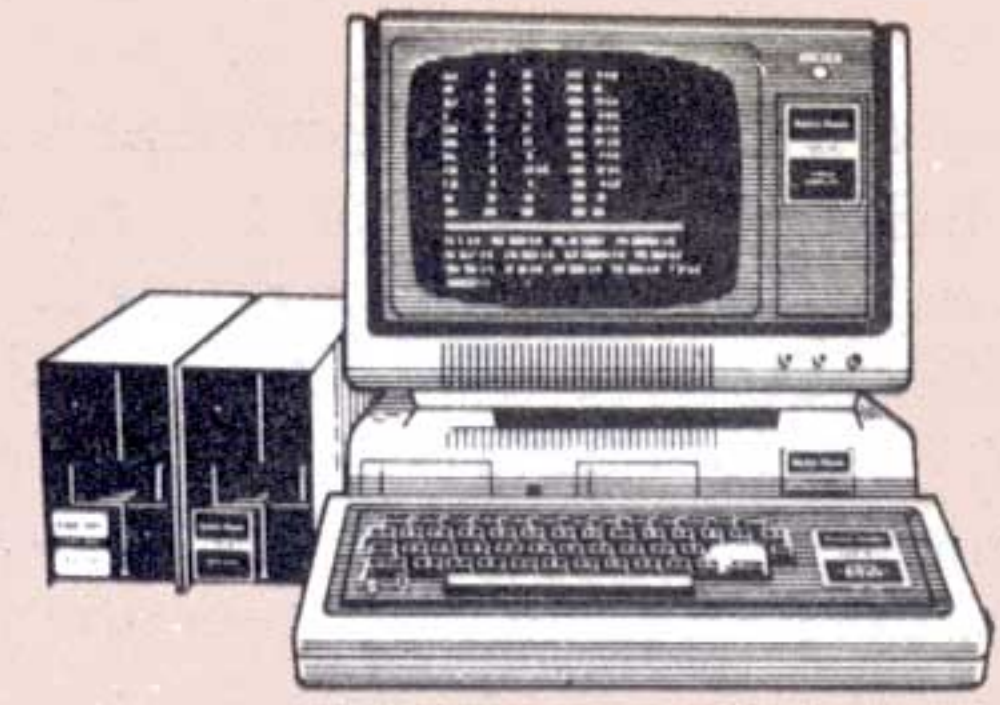
The command display also tells you the system settings, which are turned on and off by pressing the appropriate key. One condition option is the printer-spooler. When Super-Term starts, the spooler is off. By pressing the P key, while in the command display mode, you toggle the option to on. Pressing it a second time turns the spooler off again. The spooler has a maximum capacity of 2048 characters.

Screen reformatting is an important option which allows you to specify how many characters Super-Term will print in one video line before performing a carriage return to the next line. This lets you match your screen size to the screen size of the source computer on the other end of the communications link. The maximum size is 255 characters per line.

You can control the manner in which Super-Term treats incoming carriage returns and linefeeds by toggling CR and LF suppression. "On" means the program ignores the CR or LF sent by the host computer.

Toggle options include: 1) Full duplex (echo back to host computer) or half duplex (no echo) operation, or 2) sending a linefeed character with every carriage return.

You can have incoming information from a host computer stored in a text buffer. You can read a file from the disk into your buffer, and you can save a buffer to the disk. Both of these options ask for a valid disk file name. Another option refers to the system clock. Zeroing the clock, before calling a host-system,



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lets you record how much time you are using.

One interesting option refers to a 2048-character buffer that simply stores the last 2048 characters that came into the system. Both your responses and the host computer's transmissions are saved.

Since Super-Term uses the '@' key to go to the command mode, you have an option that lets you send an '@' to the host computer. Similarly, because the CONTROL-A code is used by the TRS-80 as BREAK, a special option was added to let you send a CONTROL-A to the host computer. The 'U' command lets you change the switch settings of the RS232 without manually changing them.

An important option lets you examine and change the character tables used by Super-Term. These tables allow the program to change any incoming character to any other character, or to change any outgoing character to any other character just before it is sent. These

conversions are usually used when operating specific pieces of hardware or for translating one set of control codes to a second, more convenient, set of control codes.

There are four distinct sets of tables: the first set consists of four tables that change the codes going to the video display, communications line, disk buffer, or to the printer; the second set is for the characters coming from the keyboard, disk buffer, or the communications line; the third is for the control keys; and the last is for the Super-Term special command key table. These tables may be saved to disk for future use.

The last option is used to give you access to special system commands, quitting Super-Term, restarting it with original settings, loading and saving special tables, changing the auto-sign-on message, and resetting the input buffer without losing its former contents.

As you can see, Super-Term is a powerful program. If you are interested in RS232 communications, I recommend that you give this program serious consideration.

Terry Kepner

had eight broken pieces of a golden scepter within it.

Unfortunately, the scepter was imbued with an evil aura. When the townspeople opened the chest, the evil aura escaped and took up residence in the dragon. Fortified with renewed energy, the dragon seized the castle and turned the peaceful kingdom into one of fear and death. Many tried in vain to penetrate the castle, now guarded by the Red Dragon's evil forces, but none were successful. It is at this point that the game starts.

The object of the game is to find the eight pieces of the scepter within the castle occupied by the Red Dragon. Once this is done, the Red Dragon himself must be defeated. Along the way, various obstacles must be overcome and treasure can be accumulated.

At the outset of the game, you are asked what level of difficulty you desire. You can then select how many characters will be participating and will be asked if any of them already exist on file. There are sixteen different character combinations possible, each with its own advantages and disadvantages.

Once the party has been created and outfitted, it finds itself on the first of two castle levels. Those familiar with Hellfire Warrior are in for a pleasant surprise. Though written in BASIC, the room drawing process is almost instantaneous. The party's leader is defined by an asterisk and is moved by using the arrow keys. The rest of the group is assumed to be following at a respectful distance. It is at this point that a game in progress can be saved. Once the group starts moving, things really start to happen.

If you fight often and well, you may meet a wandering C'bot who will sell you knowledge and more weapons. Only the most determined and skillful will be able to find all eight pieces of the scepter and defeat the Red Dragon.

Overall, this is a very good game. The graphics are well done and even though there is no sound, the game is very enjoyable. I would recommend it highly to anyone who enjoys a good adventure.

David Tinis

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Reign of the Red Dragon is a new multicharacter, realtime adventure game in the mold of Hellfire Warrior but with several big differences. The setting for the game is explained via a short story in the rule book. Players will want to refer to this story as there are hints for play within it.

We have the familiar confrontation of good and evil. We learn that an aged dragon was befriended by the inhabitants of a peaceful kingdom. In return for food and shelter, it provided a source of tourist income. Eventually, the dragon sickened to the point of dying and the tourist trade dried up. To make up for the loss of income, the citizens dug up an ancient, forbidden chest hidden in a temple. This box, described by the dragon,

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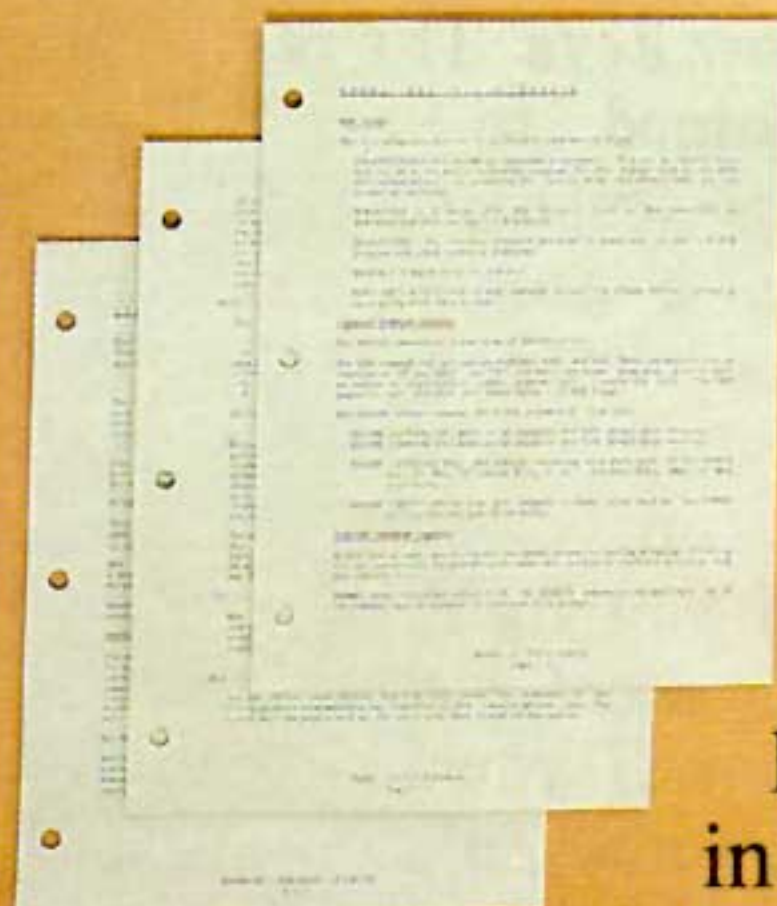
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All Models

James A. Conrad, Seattle, WA

A grizzled old programming pro told me the other day that the input statement is one of the easiest statements in BASIC to understand — why write a silly article about it? I asked if he'd ever used the lineinput statement? "The what input statement?" he replied. "And when was the last time a user called to ask why the output from one of his programs didn't correspond to the input? Stupid user," he mumbled in his beard as he shuffled off.

Assignment statements assign values to variables. In the last issue, we discussed the let statement. The let statement is program-dependent — the data to be assigned are written into the program. To write an interactive program (one which interacts with the user), we need a program-independent assignment statement.

The input statement gives us a way to enter data from the keyboard and assign them to variables. Its simple form is:

Input Variable

When executed, an input statement does three things:

- Halts program execution.
- Prints a question mark prompt (?) on the screen and waits for the user to enter data.
- Assigns the data to the variable which follows the input statement.

Try this quick program with various inputs:

```
10 INPUT R
```

```
20 PRINT R
```

What happens? Line 10 prints a "?" on the screen and the program waits for user input. When numeric information is entered, the input statement assigns it to variable R and line 20 prints it.

Try entering your name in response to the prompt. You might expect a "type mismatch" error since variable R is a numeric variable and you are attempting

to enter string (alphanumeric) information. But if you think about it, a type mismatch error would break the program — not at all "user-friendly." Instead, the computer refuses to accept the string information and responds with "REDO?". The "?" is a new prompt, telling the user to reinput numeric information.

What if we have a value in another variable, B for example, and want to copy it into variable R. Can we do this with an input statement as we can with a let statement? Try it:

```
10 LET B = 17
```

```
20 INPUT R
```

```
30 PRINT R
```

When the ? prompt is printed from line 20, try entering B. The computer won't accept it and responds with REDO?. It has no way of knowing what we are trying to do. It sees the alphanumeric B and asks for numeric input.

Let's try assigning information to a string variable.

```
10 INPUT R$
```

```
20 PRINT R$
```

When we use a let statement, we enclose string information in quotes. Try entering your name enclosed in quotes. It works. The computer accepts and assigns the string (but not the quotation marks) to the string variable R\$. Try it again without the quotes. Again it works. The quotation marks are optional.

What happens if we try to input numeric information into a string variable? Try it. No error message. The numbers are alphanumeric information (characters) and the computer accepts them — but it accepts them as strings, not as numbers.

Prompt Messages

An innocent user, confronted with a ? on the screen, probably won't understand that he's expected to enter something. To make our programs user-friendly, we include messages telling the user what to enter:

```
10 PRINT "ENTER YOUR NAME"
20 INPUT NA$
30 PRINT "ENTER A NUMBER"; NA$
40 INPUT R
```

Lines 10 and 30 are *PROMPT MESSAGES*, requesting the user to enter the desired information. Every input statement should have a prompt message.

TRS-80 BASIC allows a simple prompt message to be included in the INPUT statement. The form is:

```
INPUT "PROMPT MESSAGE"; VARIABLE
```

Using this, lines 10 and 20 in the last example can be combined into a single line:

```
10 INPUT "ENTER YOUR NAME"; NA$
```

This combination form can't be used, however, to combine lines 30 and 40, because line 30 prints the contents of variable NA\$ before input is requested in line 40. A variable can't be included in an input statement's prompt message.

Multiple Inputs

It is possible to include several input variables in a single input statement. The full form of the input statement is:

```
INPUT "PROMPT MESSAGE"; VARIABLE,
VARIABLE, ..., VARIABLE
```

The information to be input must be separated by commas or entered separately. Try this:

```
10 INPUT "ENTER 3 NUMBERS, SEPARATED BY
COMMAS";A,B,C
20 PRINT A, B, C
```

First, type three numbers, separated by commas, and press the ENTER key. If you did it correctly, line 20 should print the numbers.

Run it again, entering just one number. The screen shows a double question mark (??) prompt. Enter the second number — the screen shows another double prompt. Enter the third number — the program progresses to line 20 and prints all three numbers.

Let's experiment to see what results various inputs produce. We'll add a new line — 30 GOTO 10 — to loop the program back to its beginning so that we can try some different inputs:

1. Input four numbers, separated by commas. The

screen shows "EXTRA IGNORED." The program continues and prints the first three numbers entered.

2. Press the enter key without first typing a number. The program jumps to line 20 and prints the old values, which were already in variables.

3. Enter only the first number, followed by a comma. The double prompt appears. Enter another number. Line 20 prints the contents of the variables. The first number was assigned to variable A, the value 0 (zero) was assigned to B and the second number was assigned to C.

4. Change the variables to string variables and enter (in quotes, separated by commas): "LASTNAME, FIRSTNAME", "CITY, STATE", "PHONE : NUMBER". Try it again without the quotation marks. Experiment — try to confuse the computer. Easy, isn't it?

In commercial programming, this exercise would be called an *alpha test* — a determined effort to derange a program. Flunks, doesn't it?

The point of this little test is to suggest subtly that you use only one variable per input statement.

LINEINPUT

If you have disk BASIC, you can use the lineinput statement to prevent the kinds of errors which come from entering punctuation marks. Its form is:

```
LINEINPUT "PROMPT MESSAGE"; $VARIABLE
```

This handy statement accepts everything entered and assigns it to a single string variable. The string can include commas, colons, quotation marks, leading and trailing blanks.

Unlike a regular input statement, lineinput doesn't print a question mark prompt. If you want one, you have to include it in the prompt message.

To get used to the lineinput statement, try running this little program with several different inputs:

```
10 LINEINPUT "ENTER ANYTHING ?"; R$
20 PRINT R$
30 GOTO 10
```

Input Checking

Well-written programs are user-proof as well as user-friendly. Experienced programmers include input checking routines with virtually all of their input statements. Here are two of the most useful.

The first checks numeric input and, if it's incorrect, prints an error message and returns to the input statement for the proper value:

```
10 INPUT "ENTER A NUMBER BETWEEN 5 AND
9"; R
20 IF R<5 THEN PRINT "NUMBER TOO LOW —
REINPUT" : GOTO 10
30 IF R>9 THEN PRINT "NUMBER TOO HIGH —
REINPUT" : GOTO 10
```


40 ... (PROGRAM CONTINUES HERE) ...

This routine checks strings:

10 INPUT "ENTER YES OR NO"; R\$

20 IF R\$ <> "YES" AND R\$ <> "NO" THEN PRINT
"INCORRECT ENTRY — REINPUT" : GOTO 10

30 ...(PROGRAM CONTINUES HERE) ...

Programming Tips

1. The input statement provides a handy way to stop a print routine from scrolling off the screen. Here's a quick example:

10 CLS

20 LC = 0 : REM SET LINE COUNTER

30 FOR N = 1 TO 100

40 PRINT "THIS IS LINE"; N

50 LC = LC + 1

60 IF LC=13 THEN GOSUB 1000

70 NEXT N

80 END

1000 REM SUBROUTINE TO STOP PRINTING

1010 INPUT "PRESS ENTER TO CONTINUE"; R

1020 LC = 0 : REM RESET LINE COUNTER

1030 CLS

1040 RETURN

In this example, variable LC counts the number of lines printed. A more sophisticated program would delete lines 20, 50 and 1020 and change line 60 to:

60 IF N/13 = INT (N/13) THEN GOSUB 1000

2. Use the same variables in all your programs for temporary responses to input statements (such as R in the previous example).

3. If you're going to be using a prompt message (such as "PRESS ENTER TO RETURN TO MENU") more than once, assign it early in the program to a string variable (such as M1\$, M2\$, etc., for message strings). You can then print it when you need it without including the entire message in every input statement.

4. The input-statement prompt message can't include a variable. To print a variable, use a print statement followed by an input statement. When using this format, a trailing semicolon following the print statement will print the question mark prompt on the same line, for example:

1010 PRINT M1\$; : INPUT R

5. Use a multiple input statement only when there is no chance for operator input error (which is almost never). Use individual input statements and prompt messages instead.

6. If you don't have the lineinput statement (it's available only in disk BASIC) and have to input leading or trailing blanks, enclose them in quotation marks.

7. If you have disk BASIC, use the lineinput statement for string input.

8. To get a "?" prompt when using a lineinput statement, include it in the prompt message, such as:

LINEINPUT "MESSAGE ?"; R\$

9. Alpha-test your input routines and use input checking routines to prevent improper input.

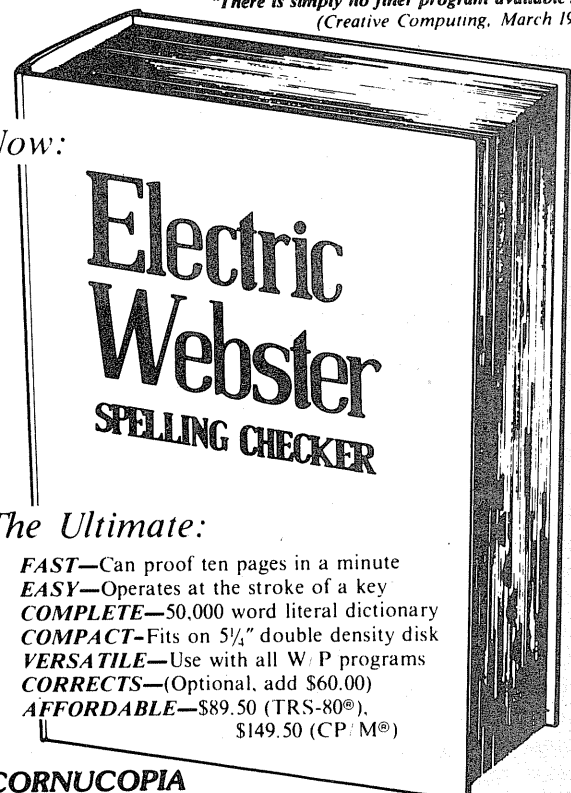
10. Consider inputting everything (even numeric data) into string variables and writing input-checking routines using string functions (e.g., MID\$) to analyze the strings.

I know very few programmers who couldn't improve their programs by writing tighter input-checking routines. Even if you're a grizzled old pro at programming, a few minutes spent reviewing and experimenting with input statements might improve your programming. That's BASIC. ■

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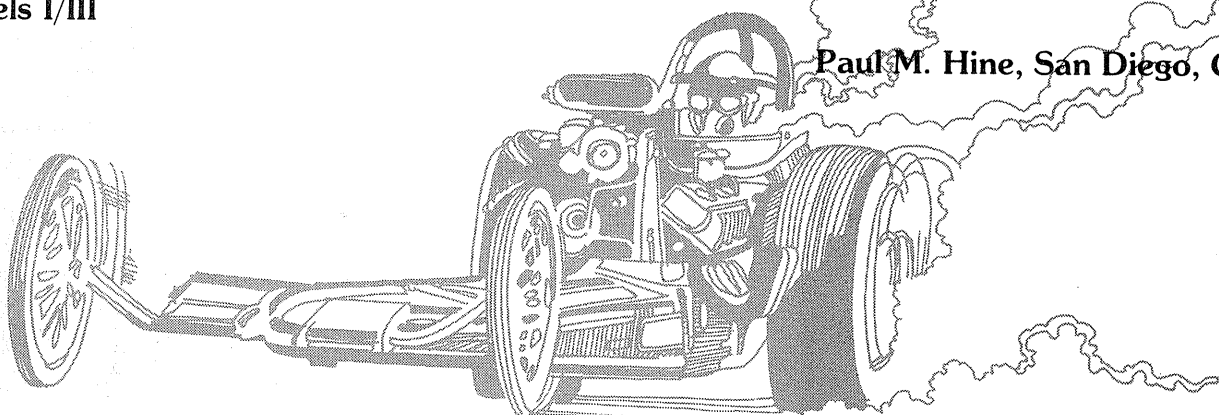
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ACCEL 3

An evaluation of Algorix's BASIC Compiler

Models I/III

Paul M. Hine, San Diego, CA



The modern microcomputer is fitted with an excellent BASIC language interpreter (normally located in ROM). Microsoft has pioneered the use of language tokens (single byte codes) to store programs in compact form and these tokens also speed up interpreter operation. High-speed clocks and faster microprocessors have further increased execution speeds. In view of these factors, why own a BASIC compiler? Since four major software houses have introduced BASIC compilers for the TRS-80 within the last eighteen months, there must be some customer demand. Two of these products carry claims of compatibility with Level II BASIC-in-ROM, while the others advertise a different subset of BASIC with differences tailored to special needs.

ACCEL3 is a third-generation product from Southern Software in England. The earlier ancestor started as an integer-only product and over the past year and a half has evolved through ACCEL2 into the current offering. Upgrades from ACCEL2 are offered by Allen Gelder of Algorix. In exchange for some loss of capability with Stringy

Floppy systems, ACCEL3 claims improved speed and better processing of several structures, particularly the FOR...NEXT loop.

The software is supplied on an expertly recorded, serially numbered cassette with a registration card and 20 pages of documentation. The focus of the instruction manual is on backup, initial loading, transfer to disk or tape, and operation of the compiler. A short sample program is listed and the compiled program provides a quick learning experience. There are no language rules and no list of reserved words. The documentation is best described as non-definitive and generally descriptive. The writing style is British in organization and American in grammatical construction and vocabulary — a very pleasant package. The approach to documentation appears completely adequate as operation of the product is quite simple once it is loaded into the computer.

While most compilers are very "tight" in syntax (very rigid concerning rules for word usage and delimiting of statements), ACCEL3

qualifies as the most "loose" product in the field. Whatever runs with the interpreter seems to be compatible with ACCEL3. There are some taboos: no line feeds following a colon, don't end a statement with a colon, and it's a good idea to write your source code with one statement per line number.

One needn't worry about the extra line numbers and spaces. On the compiler's first pass, these extras are eliminated and all of the variables are identified and mapped. The second pass does the actual conversion into a compiled form. ACCEL3 performance and convenience seemed worth more than just a casual review, so I devised an evaluation, working with the TRS-80 Model I using TRSDOS 2.3, DOSPLUS 3.4D, Level II and an Exatron Stringy Floppy (Version 4.1). I decided to evaluate ACCEL3 with respect to the qualities one would normally look for in a compiler.

Reasons for compilation include faster execution, reduced memory requirements for overhead, prevention of unauthorized program modification and security for

proprietary source listings. A complete system of compilers (FORTRAN, COBOL, BASIC, RPGII, etc.) for a given computer will produce load modules which can be linked together and these modules will normally be fully compatible with respect to memory-storage formats. A compiler should be versatile, with a wide range of reserved words and logic constructs. The compiler should also produce diagnostics pointing to syntax errors. It should check types and sizes of variables and string receivers and provide warnings and error messages which may identify potential run-time problems. Many of the better compilers can insert special code in the object program to facilitate debugging during run-time processing. While all of these features are seldom found in minicomputer or microcomputer compilers, they are desirable and make compilation a breeze. Within this framework for evaluation, I'll try to provide a snapshot view of ACCEL3.

The first characteristic we'll examine is speed. I chose two benchmarks to measure speed of execution before and after compilation. The first program was "Visisort" by Jeffrey C. Ruble, 80-U.S. Journal, March '82. This program is unique in its extensive array-accessing, frequent loads to video memory and various logic constructs. For those not familiar with Visisort, it's a 90-line program which graphically illustrates the bubble, delayed-replacement and Shell-Metzner sort routines. Twelve runs of this program were accomplished as follows:

- The program was run as written and total execution time recorded. Each of the three sort routines was exercised.

- The above exercise was repeated following compilation.

- The source program was modified from single-precision processing to integer operation by adding an initial line "100 DEFINT A-Z." All three sorts were exercised.

- This integer version was compiled and run again for time.

Figure 1 shows the before-and-after results for the single-precision version of the program. The speed improvement is something slightly

better than 50 per cent and the growth of the program code in memory was just over 45 per cent. Compiling time is quite fast, running something less than five seconds.

In the second example, shown in Figure 2, things change markedly. Not only has program performance improved, but compiler performance has gone up as well. If you interpolate between these two examples (one all single-precision, the other all integer) you'll find a representative speed increase of about 2.35 and a program growth of about 40 per cent. These figures should hold true for the broad range of TRS-80 applications in personal computing. If, however, your program is laden with looping constructs or PEEKs and POKEs, then my other benchmark may turn you on.

The graphics benchmark consisted of a simple white-out/black-out of the video display and was designed to look at the speed of the POKE operation while exploring two different loop structures. This benchmark produced paydirt. The first coding of the program used three FOR...NEXT loops. One loop "whited out" the screen, the second loop blacked it out and third caused the first two to repeat ten times to get some accurate time measurements.

The second coding of the program replaced the FOR...NEXT structure with an assignment statement ($J = 15360$), an increment ($J = J + 1$) and then, following the POKE, a test ($IF J < etc.$) to make the loop work. Again this was repeated ten times. Operation of the programs in ROM BASIC was really ho-hum, as the numbers in Figure 3 show. The compiled versions are lightning quick. I can say that the ACCEL3 met its claims.

Having nailed down the speed of execution question, I pressed on to look at compatibility with "non-Tandy" language extensions. A short program was written to create a string array and sort it using a DOS utility. The non-standard extensions included loading the array from the keyboard using the "INPUT@" command from DOSPLUS 3.4. This command was compiled, or more correctly, ignored

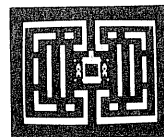
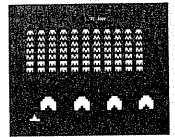
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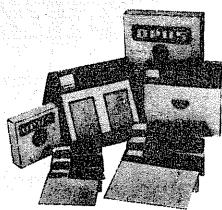
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ACCEL 3

by the compiler, passed back to DOSPLUS BASIC, and run correctly. The screen showed the input pseudo-blanks, properly limited the length of the string and the input-editing feature worked properly.

The sort was called using the CMD"O" feature of DOSPLUS, which is similar to the TRSDOS command, but provides for multiple sort keys and either ascending or descending operations. The sort was exercised on two descending keys. This command also executed properly and, following disk operation, the control returned to the compiled program.

Several other programs have been compiled and run. Speed improvement has always accompanied compilation. String packing and DEFUSR calls to Z80 code have compiled and functioned properly. When compiler or run-time crashes have occurred, I've been able to clear the problem by recoding multiple statements into separate lines. Programs are loaded and saved using standard BASIC load and save procedures.

The compiled version of the program is a mixture of Microsoft tokens, compiled machine code and ASCII statements for literals and commands which are extensions to Level II. In all, about 80 per cent of the Level II and disk BASIC (L3) language tokens are compiled or "optimized" by ACCEL3. The rest are sent to the interpreters for execution. I was unable to make the system work with EXATRON Stringy Floppy I/O and data file commands (@OPEN, @CLOSE, etc.), but in all honesty, I didn't put any real effort into mapping all of the hooks and pointers between the compiler, the I/O module and the keyscan routines. Programs can be saved using @SAVEN and, of course, the compiler loads nicely using @LOAD. When the compiler is loaded, either regular BASIC programs or compiled programs can be loaded and run. The distributor included a note (dated April 4, 1982) which indicated run-time problems with NEWDOS/80 and promised a patch.

Operation with DOSPLUS at first appeared difficult, since the ACCEL3 compilation command is

"/FIX." DOSPLUS uses a slash to cause the last line of the program to be printed on the display. If the user will strike the clear key and then enter the /FIX command, it will work properly. There are only two other ACCEL3 commands and these can be inserted into a program to cause the compiler to skip around a troublesome section of code.

With all of its language versatility, ease of program loading and good speed in execution, ACCEL3 looks almost perfect. Unfortunately, there are some drawbacks which accompany the product. Potential run-time errors are not flagged with warnings and error diagnostics. Routing of error handling using the ONERROR and RESUME statements cannot be assured. This means that fatal errors may exist in complex code which, without extensive testing after compilation, may remain hidden, to emerge much later. While no obvious math errors appeared, I did not test the math routines sufficiently to have confidence in their performance for critical applications. For business financial applications or programs which operate on critical data (blood-sample analysis for instance), I would prefer a tighter compiler with stringent language specifications and very predictable results.

The compiler does not output relocatable load modules which are 100 per cent machine code. Linkage to other modules or subroutines generated from utilities, FORTRAN or COBOL isn't possible. (Chaining of ACCEL3 programs is a feature of this system.) Remember, too, that the code is not compatible with current disassemblers and machine monitors. The use of patches, breakpoints and monitor analysis will not be easy.

The third disadvantage is the large total overhead. I located the compiler in high memory (at location E808H) with about 500 bytes above it for "DO" operations, a small monitor and telecommunications driver. After my DOS and BASIC were loaded, with space for three file buffers, only 29220 bytes of program and variable storage remained in a 48K RAM. While this may seem like plenty, remember that a program will expand or grow

in length about 25 to 50 per cent during compilation. (Again, chaining is available.) The large business application with big tables or large sorts just won't fit!

To close on a very positive note, consider one of the very important "sweeteners" to buying ACCEL3 — there are no royalties. Further, the run-time module which must accompany the program is public domain when provided by a registered purchaser of ACCEL3. Happiness is being able to compile, give, or sell, without keeping royalty records or buying licensed, copyrighted disks to deliver the programs on.

I recommend ACCEL3 for general use by the hobbyist as well as the

professional who is looking for versatility and speed. Research applications, personal computing and game programs which have extensive graphics will benefit. ACCEL3 compilation (or optimization) provides sufficient security and immunity from tampering for most applications. Since INP and OUT as well as PEEK and POKE have impressive performance gains when optimized by this compiler, the product appears to have dynamite potential in data collection, control and robotics applications.

ACCEL3 is available from Algorix,
P.O. Box 11721, San Francisco, CA
94101, for \$99.95.

Figure 1

VISISORT (SINGLE-PRECISION) BEFORE AND AFTER COMPILATION.
CLOCK - 1.7 MHZ SYSTEM - DOSPLUS 3.40

INPUT ARRAY: "Q-M-A-S-Z-N-B-V-G-X"
SOURCE LENGTH: 2329 BYTES
OBJECT LENGTH: 3397 BYTES
GROWTH: 45.9%
COMPILATION TIME: LESS THAN 5 SEC.

RUN TIMES

| MODE | SOURCE (SEC) | OBJECT (SEC) | IMPROVEMENT |
|---------------------|--------------|--------------|-------------|
| BUBBLE | 86.30 | 53.89 | 1.6 x |
| DELAYED-REPLACEMENT | 66.53 | 38.69 | 1.71 x |
| SHELL-METZNER | 49.49 | 29.99 | 1.65 x |

Figure 2

VISISORT (INTEGER) BEFORE AND AFTER COMPILATION
CLOCK - 1.7 MHZ SYSTEM - DOSPLUS 3.40

INPUT ARRAY: (SAME AS FIGURE 1)
SOURCE LENGTH: 2339 BYTES
OBJECT LENGTH: 2929 BYTES
GROWTH: 25.2 %
COMPILATION TIME: LESS THAN 4 SEC.

RUN TIMES

| MODE | SOURCE (SEC) | OBJECT (SEC) | IMPROVEMENT |
|---------------------|--------------|--------------|-------------|
| BUBBLE | 59.23 | 22.48 | 2.6 x |
| DELAYED-REPLACEMENT | 44.42 | 13.42 | 3.3 x |
| SHELL-METZNER | 34.50 | 12.46 | 2.76 x |

Figure 3

SCREEN WHITE-OUT/BLACK-OUT CLOCK - 1.7 MHZ
RUN TIME FOR 10 CYCLES SYSTEM EXATRON S-F 4.1

| | | |
|---------------------|------------|----------------------|
| FOR-NEXT SOURCE | 136.52 SEC | |
| FOR-NEXT OBJECT | 6.45 SEC | 21.17 TIMES IMPROVED |
| COUNTER-TEST SOURCE | 326.33 SEC | |
| COUNTER-TEST OBJECT | 3.93 SEC | 83.03 TIMES IMPROVED |

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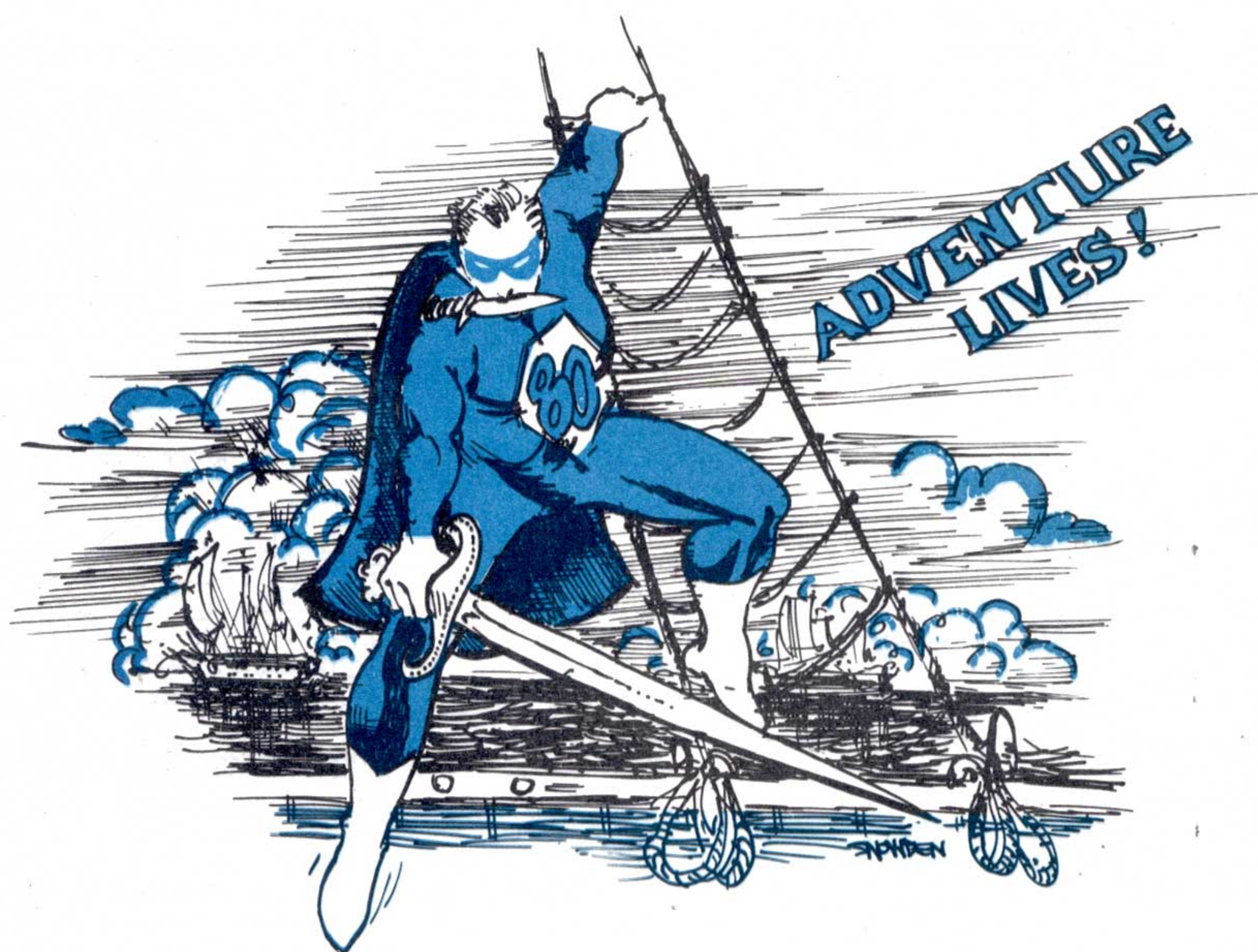
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Max was kind enough to have my Electric Pencil loaded and waiting when I arrived on the third floor for work this morning. It sits there blinking at me, as if to say, "Go ahead, write. You're sitting on deadline and Mike Schmidt doesn't pay you for blank paper."

It's tough to be coherent on a Sunday morning at 5:00 a.m., let

alone witty, clever, or profound. But there's something sad in the air and I've been hearing it everywhere I go, from each industry person I speak to. They're saying adventure is dead.

You remember adventure, don't you? You know — those impossible mind puzzles that used to drive you insane trying to get just the right combination of words so that you

could get through the door and into the room with the treasure. They were authored and produced by Scott Adams, alone at first. Later came Lance Miklus, Greg Hassett, Charles Forsythe, Teri Li and others. Success came to those with the cleverest plotlines and toughest puzzles.

Remember Pirate's Cove and that Clark Kent Mongoose? How about

Strange Odyssey, Mission Impossible, or The Count? Without a doubt, Scott Adams, grandmaster and father of the genre, contributed as much to the growth of TRS-80 microcomputing as those who designed the machine. It was his games that elevated the little plastic computer to the semi-intelligence of adventure. Each of his microworlds reflected the planning and purity of logic that only a true professional could give to his work.

As with all good things, imitation was inevitable. A major hit was Dragonquest, written by a young Cambridge student by the name of Charles Forsythe. Charlie was consumed by the desire to write adventures . . . and write he did. At the age of fifteen, he saw his creation scrambling heel-to-toe in the marketplace with programs of Scott Adams, the programmer he most admired.

Partially as a result of the success of his new release, Charlie got a chance to fly to Florida to meet Scott. I've known the man for a long time and I know how crushingly busy he is. Scott took an entire day out of his schedule and took Charlie to Disney World, treated him to a catfish dinner and, in general, let him know that he was a mighty important young fellow. When Charlie got home, he wrote and wrote. He has many commercial programs out and I credit Scott Adams' sensitivity for the extra polish this youngster adds to his programs.

While adventure was in its prime, there were many titles to choose from. The Adams series always led the charts. After that, successes and failures were blurred together. Death Dreadnaught was a modest success, for example, and so was Dragonquest. But each of those had its own separate advertisements. The Hassett adventures, which had massive direct mail campaigns, enjoyed a brief fling, earning young Greg many thousands of dollars. If bootleg copies of a program are a mirror of its success, then the Hassett adventures were very popular.

Technical competence did not necessarily hallmark success. Automated Simulations' Dunjon-

quest series featured little more than primitive graphics, a slickly packaged booklet and a requirement of high manual dexterity. It sold like a bandit. The handwriting was beginning to appear on the wall. The age of slick commercialism was dawning, threatening to spell the end to adventure as we loved it.

Along came Med Systems. They took the maze, so carefully marketed by Automated Simulations, and the adventure, so zealously played by the masses, and combined them into one awesome, aggravating, impossible, terrific, frustrating smash hit called Deathmaze 5000. Followed by Asylum and Labrynth, in quick succession, this new generation of adventure complemented our old friends. Now we had someplace to go to when Charlie, Scott and Greg's universes were conquered.

But the age of pictures was upon us so quickly that we didn't see it coming. Terry Kepner's Atlantean Odyssey went perpendicular to Med Systems. His program illustrated the adventure with static displays where Med Systems drove you relentlessly through rat's-eye views of endless corridors and traps. Bill Demas' Forbidden Planet and Forbidden City added talkies. The structure of adventure was intact, but it was plain to see that survival in the marketplace was going to be more and more tentative.

Enter the Twitches. (I capitalize the word because it describes a genre, even as adventure used to be capitalized). It was inevitable, with the overwhelming publicity given to arcade games across the country, that twitches would invade the micro-software industry. Graphics presentations had improved geometrically with Leo Christopher-son leading the way. But Leo never programmed twitches. All of his graphics characters had lives of their own. Andy the Android, the snakes from Snake Eggs, the little ETs from Life Two all had personalities — extensions of Leo's gentle hand.

The emergence of Big Five software as a driving force in the marketplace was the result of genius. The kids at Big Five are intelligent, articulate, top-notch

programmers. They knew where the market was heading and they were there with the best. Super Nova rocketed into first place almost without warning. Scarfman, produced by Cornsoft after being rejected by Advanced Operating Systems in a rare blunder, put the nation's top twitch within easy grasp of everyone with a TRS-80.

The spectre of Atari, and the awesome power wielded by Warner Communications, overshadowed this new class of gaming. Atari took out full-page ads warning programmers not to release TRS-80 versions of their games. (And what twitch on the market is not an imitation of some coin-op?) Flight of the Valkyrie, though not technically a twitch, is scratchbuilt. Olympic Decathlon from Microsoft (rejected by the once-mighty Softside/TSE publishing team), is still available. Frogs, from Adventure International, is still with us. Instant Software continues to market Swamp Wars. None of these are in any particular danger of extinction.

Look at the top twitches and you will see variations of your arcade favorites: Defender, Battle Zone, Asteroids, Missile Command, Pacman, Alien Invaders, Berzerk — everything you ever dropped a quarter into is available for the TRS-80, or is on the drawing board of some hopeful kid dreaming of success.

Are we becoming a nation of videots? Will we forsake adventure and the simulations? Will Santa Paravia, Taipan and games that require judgment and interpretation of things read from the screen, be replaced by mindless twitches that merely demand hand-eye coordination?

It is the consumer who must ultimately make such a decision. The consumer seems to be moving inexorably in the direction of jiggly aliens shooting endless laser beams. We are moving down the pathway formerly tread by television, when it was still able to judge between pap and substance. There is a place for both in the world of computer games, but let's keep intelligent, playable simulations alive and healthy lest microdom become the next wasteland. ■

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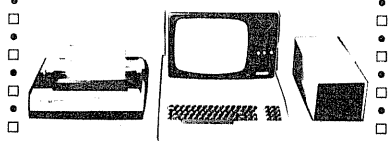
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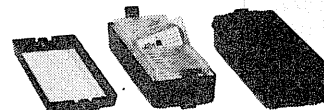
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Coco Drawer comes with two complete character sets for typing messages on pictures. Also included are outlines of Texas and Australia digitized with this program.

Coco Drawer is available for \$19.95 from Greathouse and Company, P.O. Box 27051, Rancho Bernardo, CA 92127. Extended Color BASIC and 32K are required.

Circle #200

DOSPLUS II

DOSPLUS II is the first TRSDOS-compatible alternative operating system for the TRS-80 Model II. Suggested retail price is \$249.95. There will be a standard floppy disk version and versions for most of the popular Model II hard disk subsystems including Radio Shack, VR Data, Corvus, Micro-Mainframe and QuCeS.

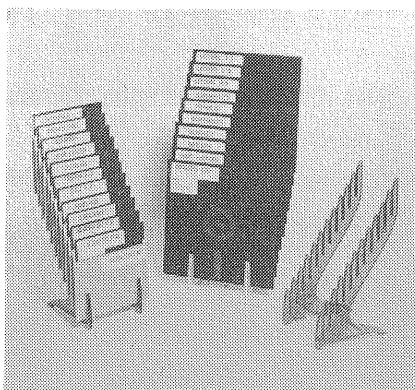
The operating system features complete device independence while still giving a speed increase of 5-10 times over TRSDOS. More reliable disk I/O is present even though the system stores more data on each disk than TRSDOS. Support software includes a terminal/host package and full disk editing-repair programs. The system uses Microsoft BASIC.

A version for the TRS-80 Model 16 is scheduled. For further information, contact Micro-Systems Software, Inc., 4301-18 Oak Circle, Boca Raton, FL 33431, (305) 983-3390, or PowerSOFT, 11500

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Disk-o-Tier, an extremely useful desktop holder for computer diskettes, has been introduced by ETS Center, Willoughby, Ohio. Each stand will hold eleven floppy diskettes conveniently close to the operator and in minimum space. Safe, upright storage prevents "wipe-outs" caused by scratches, coffee spills, etc.

Disk-o-Tier stores either 5 $\frac{1}{4}$ " or 8" diskettes and is priced at \$9.50 each, plus \$2.00 postage, or two for \$19.00, shipped postpaid. Available from ETS Center, Dept. 61, P.O. Box 651, Willoughby, Ohio 44094, (216) 946-8479.

Circle # 202

Three C.C. Plug-ins

The Programmable Sound Module plug-in cartridge gives the Color Computer the ability to generate a new array of sound effects. Three tone channels and three noise channels are added by the device. The cartridge contains PSM/OS, an operating system for the sound module, which adds new words to the vocabularies of BASIC or Extended BASIC. The Programma-

ble Sound Module cartridge comes complete with PSM/OS in ROM and full instructions. It sells in single quantities for \$139.95.

Versaclock is a new plug-in cartridge for the Color Computer which enables it to tell time. The clock gives seconds, minutes, hours, day, date, month and year, and has both 12- and 24-hour modes. It can also handle daylight savings time and provide a time-of-day alarm. The computer can be interrupted via many different programmable schedules. Versaclock comes fully assembled and tested, with complete instructions.

The Colorport plug-in cartridge adds I/O capability to the Color Computer, resulting in a cost-effective 6809-based control system. This unit adds two fully programmable 8-bit bidirectional parallel ports with full handshaking, which may be configured for interfacing to peripherals. Interrupts are supported, and important computer voltage and logic lines are brought out to the standard 44-pin edge connector. The Colorport cartridge comes with full instructions, and sells without any memory for \$129.95. 2K RAM chips are available for \$19.95 each and 2K EPROMs are available for \$12.95 each from Maple Leaf Systems, P.O. Box 2190, Station C, Downsview, Ontario, Canada M2N-2S9.

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The system is available on a single 8" diskette for the TRS-80 Model II 64K in TRSDOS 2.0a or CP/M. The manual has extensive documentation and excellent exam-

ples. The price of the system is \$225 from Century Software Systems, 1875 Century Park East, Suite 1730, Los Angeles, CA 90067, (213) 879-5911, Telex 18-1380.

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Hard Disk for Model III

The JHD-III is a hard disk system for use with the TRS-80 Model III. It utilizes a 5 $\frac{1}{4}$ " Winchester drive with either 5 or 10 megabytes of storage. An LDOS driver is used that allows the storage to be divided into individual logical units. The system comes with the controller, host adapter, hard disk drive, all cables, adapter software diskette, and an operator's manual. The price is \$1895 for the 5 megabyte system and \$2095 for the 10 megabyte system. Contact J&M Systems, Ltd., 137 Utah NE, Albuquerque, NM 87108, (505) 265-5072.

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BASIC Conversions Handbook

The BASIC Conversions Handbook for Apple, TRS-80 and PET Users is a book that simplifies the method used to convert a BASIC program into the form of BASIC used by another one of those machines.

Written by David A. Brain, Philip R. Oviatt, Paul J. A. Paquin and Chandler D. Stone, Jr., and published by the Hayden Book Co., Inc., the book is a complete guide to converting programs.

Contact local book stores or Hayden Book Co., Inc., 50 Essex Street, Rochelle Park, NJ 07662, (800) 631-0856 or (201) 843-0550.

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School Attendance System

Micro School Programs has announced the release of its School Attendance System for TRS-80 Model II and III microcomputers. The Model II version requires 64K of memory with two disk drives and a printer. It will handle daily attendance accounting and reporting for up to 2600 students, 8 periods per day, absences, tardies, excuses and early dismissals. Reports can be displayed on screen or printer for individuals, classes, activity ranges or a number of other options.

The system has been successfully pilot tested in high schools in cities in two different states. The Model III version of the program will handle 1000 students on a 48K two disk

system. The features are the same as those listed for the Model II version.

The program package consists of a program disk, demonstration disk, data disks for autumn and spring quarters, and a detailed, illustrated user's manual. The Model II version is \$995.00 and the Model III version is \$650.00 from Bertamax, Inc., 101 Nickerson, Suite 202, Seattle, WA 98109, (206) 282-6249.

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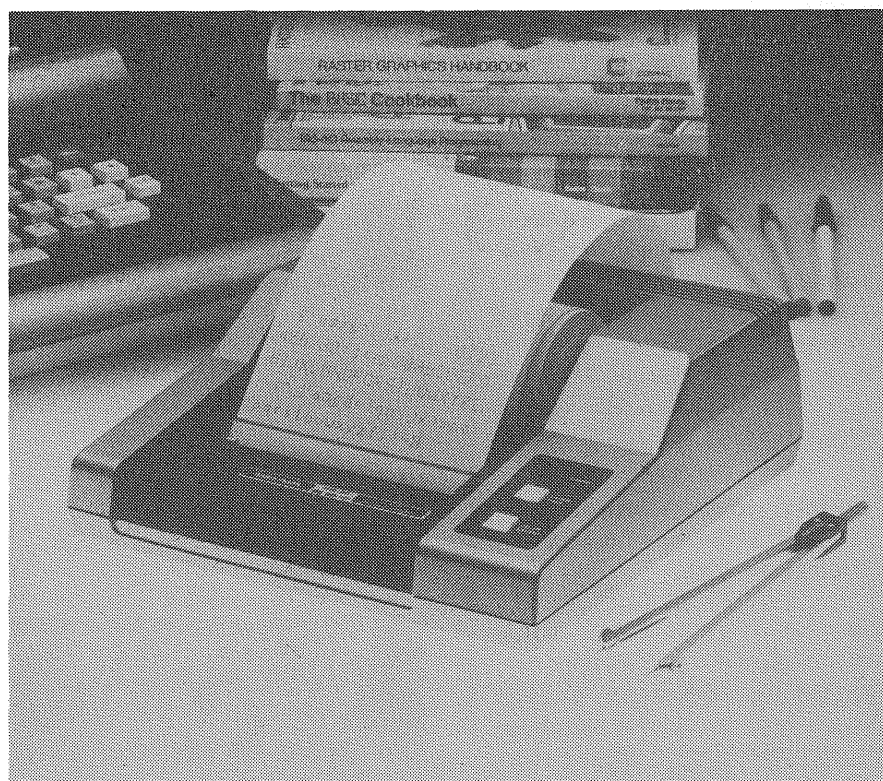
Color Graphic Printer

The TRS-80 Color Graphic Printer can create anything from "doodles" to four-color pie charts, as well as more standard text and graphics. Ninety-six ASCII characters are available in red, blue, green, and black, as well as image plotting using several commands.

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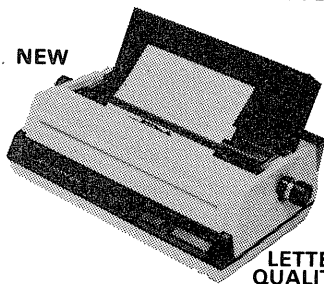
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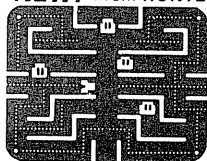
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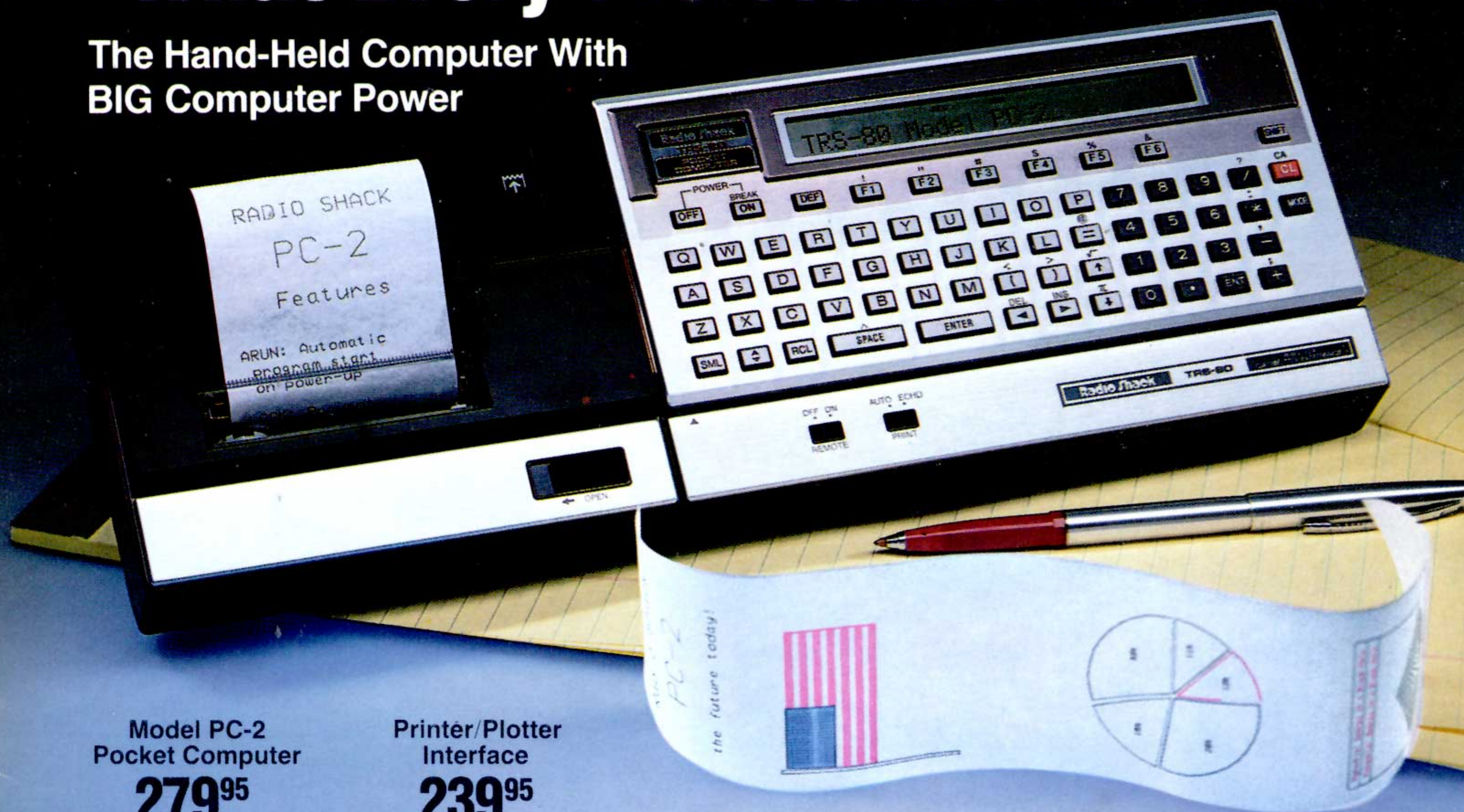


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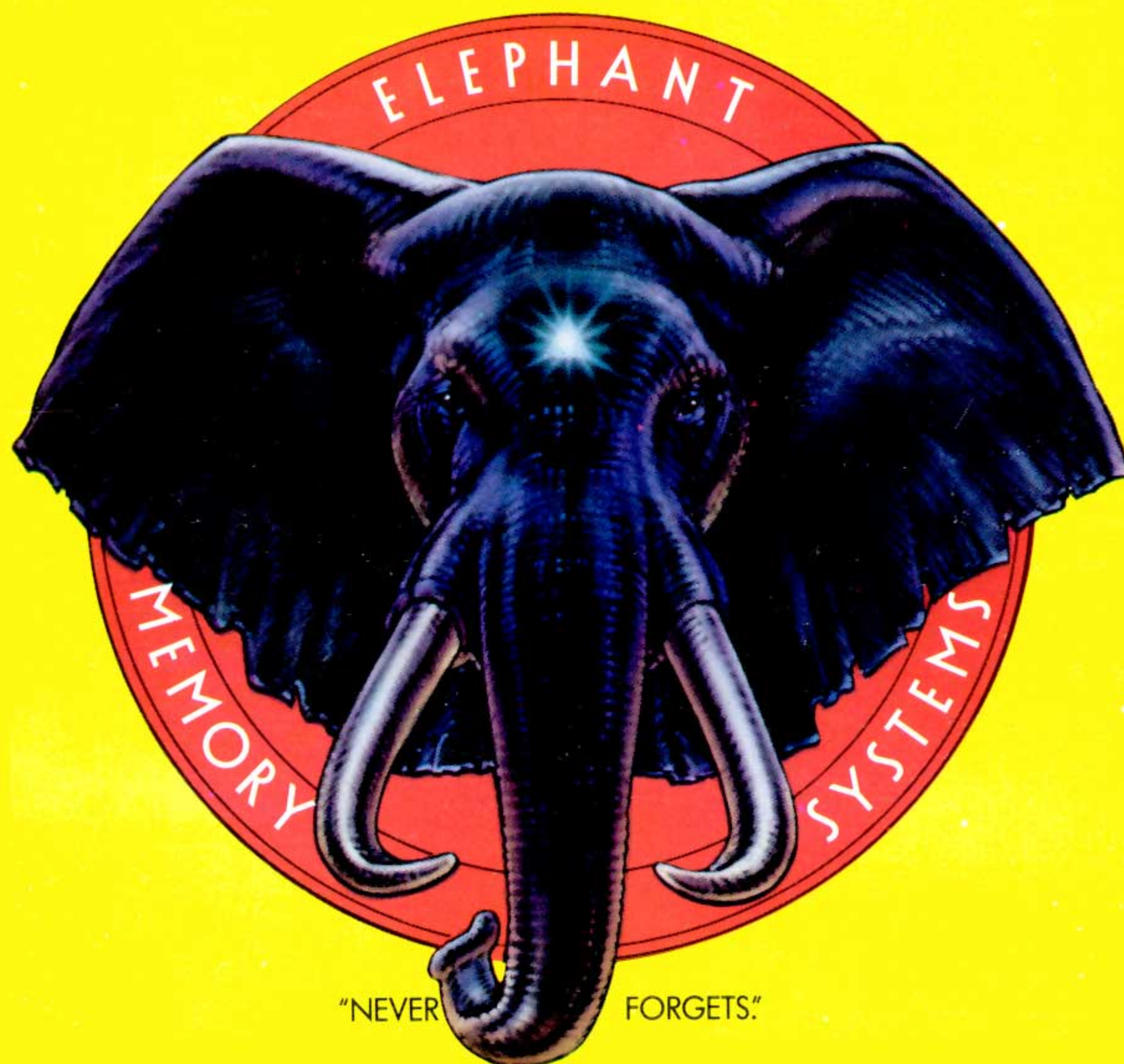
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