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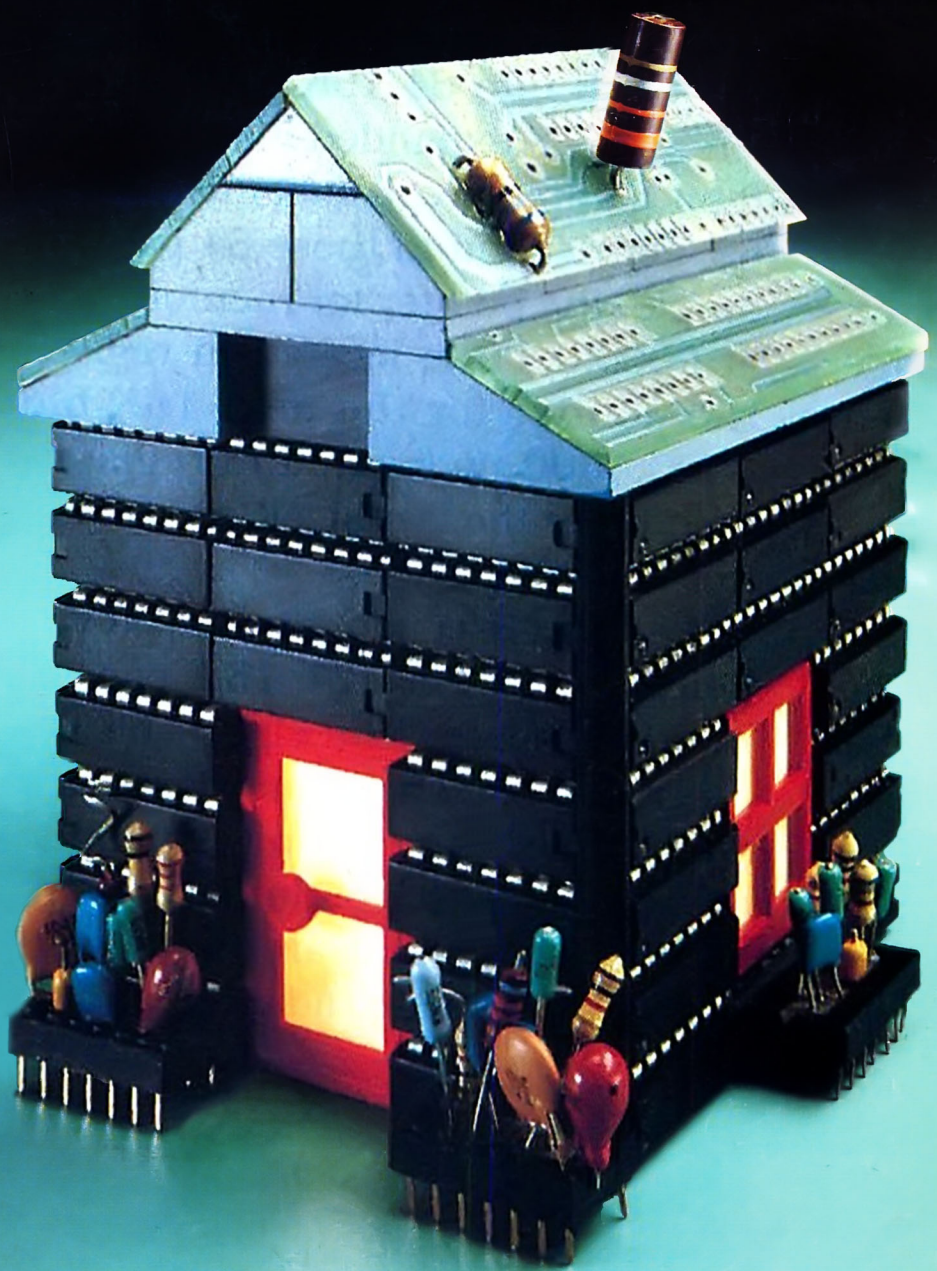

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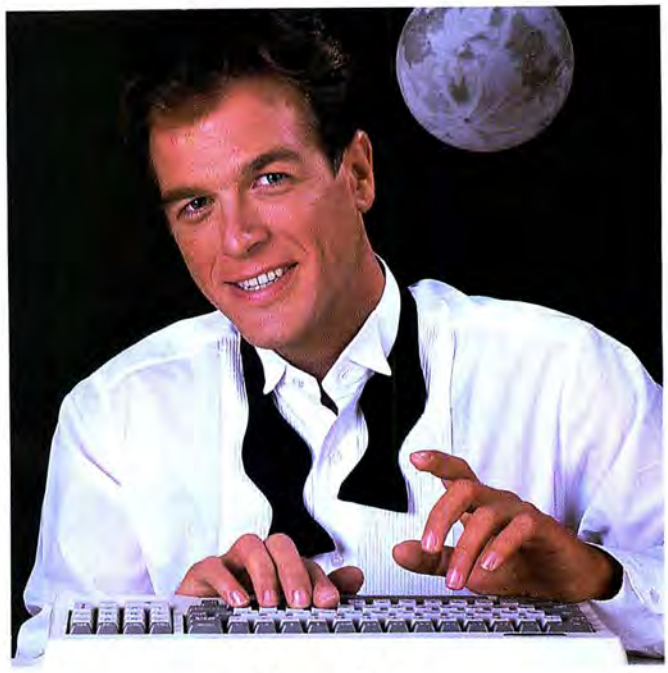

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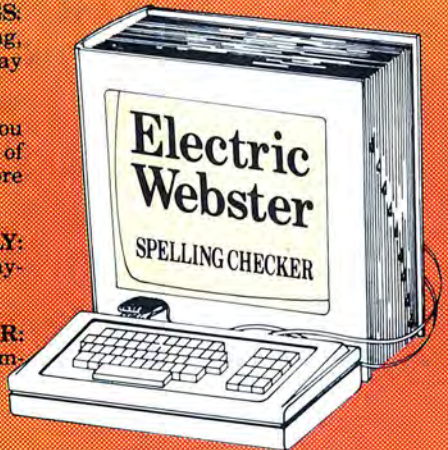

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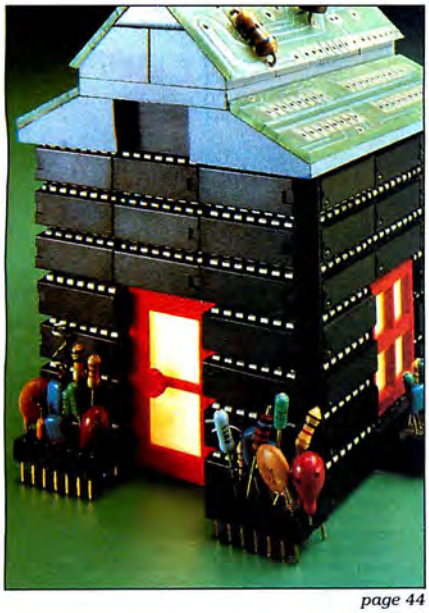

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56. Land of the Bulging Files *by William Barton*
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60. All the Way to 320K *by David H. Collins and Roger C. Alford*
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The shareware field offers good software to cost-conscious business folk.

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The *80 Micro* Disk Series
(formerly Load 80)

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

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

Using the Disk Series is simple. If you own a Model I or III disk system, you boot The *80 Micro* Disk Series disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a Model 4, copy the Model 4 programs from the Series disk to your TRSDOS 6.x disk using the Copy command.

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

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly disk subscriptions to The *80 Micro* Disk Series are $149.95. Individual loaders are available on disk for $17.95, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to The *80 Micro* Disk Series, 80 Elm St., Peterborough, NH 03458.

Directory

Save Your Screen
Article: CRT Saver (p. 75).
System: Model 4, 64K RAM.
Protect your video screen from phosphor burn-in.
Language: Assembly.
Filespecs: CRTSAV/ASM, CRTSAV/FLT.

Upgrade Model 4 Past 128K "Limit".
Article: All the Way to 320K (p. 60).
System: Model 4/4P, 64K RAM.
Gain four 64K memory banks with this do-it-yourself modification.
Language: Assembly.
Filespecs: 256KDISK/SRC, 256KDISK/CMD.

Model 4 Window Programs
Article: The Next Step (p. 91).
System: Model 4/4P/4D, ProCreate 4.3a, 64K RAM.
Use "pop-up" windows with your Model 4.
Language: Assembly.
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Bonus Program
System: Printer Control, Model 4, 64K RAM.
Send decimal control codes to your printer from TRSDOS 6.
Language: Assembly.
Filespecs: PRINT/CMD, BONUS/TXT.

FLT, CMD = object code; SRC, ASM = source code.

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80 MICRO Review, November 1985

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System requirements - IBM-PC Compatible: One disk drive, 128K memory, color or monochrome monitor, and DOS 2.0 or higher.
TRS-80 Model 1/3/4/4D/4P: One disk drive and 48K memory.

Laptop Luck

When you're hot, you're hot. Tandy dodged bullets with IBM's PS/2 introduction, which apparently will have little impact on Tandy's sales this year. Now comes Congress's attempts to ban Toshiba from selling products in the United States for two years as punishment for Toshiba's sales of high-tech equipment to the Soviets. That would include the T3100, which, with 20 percent of the market, is one of the hottest MS-DOS laptops around.

Who would benefit most from the proposed ban? Why, Tandy, of course, which just happened to have announced its MS-DOS laptop, the 1400 LT, at its big Aug. 3 introduction. Tandy's track record with the Model 100 and its growing reputation as number 1 compatibles manufacturer put it in a perfect position to pick up the slack.

This is assuming that the 1400 LT is a quality machine. Stay tuned for an upcoming *80 Micro* evaluation.

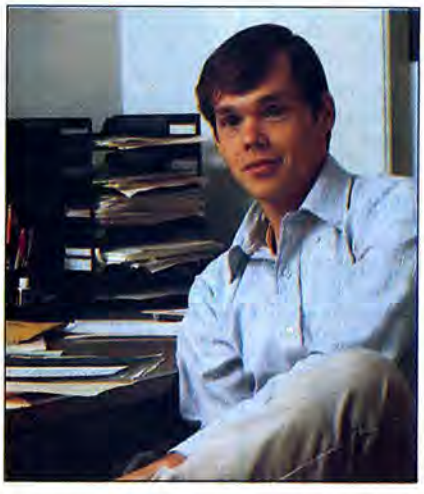
Remember the PCjr

At press time, rumors abounded of a low-end IBM PC for home and school use. The system would be a stripped-down Model 30 that one source said would cost less than $1,200, $900 in volume. Your $1,200 would get you limited expansion capabilities, one 3.5-inch floppy drive, and a 12-inch color monitor.

Comparing this rumored system with Tandy's 1000 family is at this point absurd. However, even assuming that the new IBM compares favorably with the 1000s, IBM is going to have a rough time in the home and education markets. Apple and Commodore own the former, while Apple and Tandy control some 75 percent of the latter.

IBM's one foray into low-end territory was, of course, with the spectacularly unsuccessful PCjr. Looking back on events, the PCjr's failure was not so much due to the technology as it was to poor marketing. After all, the Tandy 1000 was designed as a clone of the PCjr, not of the PC, and the machine is one of the big success stories of the microcomputer industry.

I don't see that much has changed to improve IBM's position since the jr dropped dead. On the contrary, Tandy, Commodore, and Apple have locked up the low-end market more tightly than IBM has the corporate market. The leverage IBM has in the MIS (manager of information services) department—connectivity to mainframes and long-established accounts—doesn't exist in homes and schools.



IBM is certainly big enough to make its presence felt if it so desires. But at this point, Apple and Commodore are still the outfits Tandy must worry about the most as it devises its marketing strategy for the 1000 line.

The Gender Agenda

If you're a feminist and own a Tandy computer, you might want to evaluate whether you're supporting the right company. Here's a run-down of the number of women in executive positions:

- Board of directors—12 men, no women.
- Tandy Corp. officers—9 men, no women.
- Major division and subsidiary management—13 men, one woman.

That adds up to one woman out of 35 executives, or 2.8 percent.

Then there's the comment CEO John Roach made last spring that an upcoming Tandy home system (presumably the 1000 HX) would be so simple "my wife could use it without reading the manual." One wonders whether women are genetically incapable of reading manuals or Tandy's manuals are genetically incapable of being read.

On one of my trips to Fort Worth I talked a while with a Tandy secretary about her career. She was smart, ambitious, and looking to get out of Tandy as soon as she could. Why stick around where you're not wanted?

Tandy Who?

If a survey by *Advertising Age* is any indication, Tandy's success in the PC market bears little relationship to its presence as an advertiser. Shortly after IBM's PS/2 introduction, AA asked 1,000 respondents to name the first computer advertising that came to mind. 23.7 percent said IBM and 21.1 percent picked Apple. Tandy came in third—with a roaring 2.3 percent.

(That 2.3 percent must have been Tandy employees. I swear I can't remember the details of a Tandy commercial since Bill Bixby took his styrofoam smile back to Hollywood.)

How do these guys do it, anyway? Despite continued poor visibility in the market, Tandy continues to sell computers. It makes me wonder as much about the effectiveness of IBM's and Apple's marketing strategies as it does about the inadequacies of Tandy's. If either got as much proportionately for its advertising dollar, it would probably have 80 percent of the market.

Good Computer Cheap

I was at a July 4 flea market when I spotted a two-drive, 48K TRS-80 Model III with a $50 price tag. "Doesn't work," read a piece of tape. "We don't know why!" The owner told me that the computer turned on, but "it's supposed to have Basic in ROM, and we can't get a prompt." With no outlets near, I couldn't tell how serious the damage was, so I made a counter offer of $30 and walked home with my prize.

I turned the machine on and put a DOS disk in drive zero. The disk booted without difficulty. I got a directory from drive 1 with no problem. I reset the computer while holding the break key and was soon writing test programs in Level II Basic. A few diagnostics showed the machine to be in fine working order.

The more I played around with the computer, the more I realized that it had never been used. The keyboard was in perfect shape, the disk drives were like new, and the hand rests showed no signs of wear. I had bought a brand-new Model III for about 2 percent of the original list price.

Oh, yes. The serial number is 8344, making the machine one of the first out of the factory. Do I use it or donate it to a museum?■

Photograph by Frank Cordelle

Circle 534 on Reader Service card.

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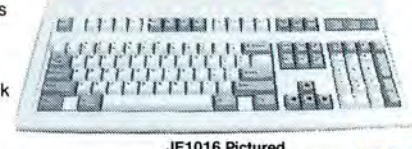

JE1016 Pictured

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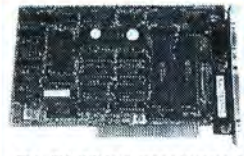

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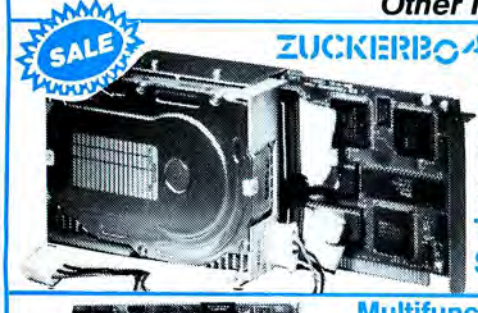

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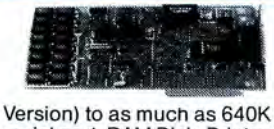

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Hashing Out Those Files

Q. I use Memdisk on my Model 4 as much as possible. I install it with an auto command at bootup. When running Profile 4+, it requires low memory for its forms filter, which is occupied by Memdisk. Without the forms filter, I run into a problem when printing labels. It cannot set up the required lines per page, resulting in a 66-lines-per-page form feed. When I run off a record printout by pressing the H key, it goes into a hash screen and hangs up. How can I solve my problems? (Klaus Meinssen, Verona, NJ)

A. On a floppy-disk system, the forms filter of TRSDOS/LS-DOS 6 resides in low memory even after you install Memdisk. The only time it does not is when other filters or drivers are also located in low memory. If this is the case, install Memdisk, then Forms/Flt, then any other drivers. A hard-disk system such as yours doesn't allow this, as the hard-disk driver occupies all the lower free memory and forces the forms filter into high memory. If you want to use the forms filter with Profile 4 and the hard disk, you have to forgo using Memdisk.

Conversion Breakdown

Q. I use PFS: File and Superscripsit with my Model 4 to keep client files and write letters. Presently I have to print a letter and then run it through the printer again to print clients' names and addresses on the letters with PFS. If I could convert the PFS files to a Superscripsit file, I could use the Superscripsit merge capability, but I have been unsuccessful at this.

I converted a PFS file to ASCII by printing the file to a file name on disk, instead of to the printer. I then attempted to convert the ASCII file to a Superscripsit file. When I try this, Superscripsit displays a "Logical record length open fault" message, and its manual does not list this error. I know that the PFS-to-ASCII conversion is working because I can list the ASCII file from DOS. Please tell me how I can accomplish this conversion so I can avoid this double printing of letters. (Russell J. Liebler, Hopewell Junction, NY)

A. Superscripsit expects the ASCII file to have a logical record length (LRL) of 256. PFS: File writes the file with an LRL of 1. You can fix this by writing a program in Basic to read the file and write a new file that has an LRL of 256 or patch Superscripsit so it accepts variable LRLs. The following patches work with Model 4 Superscripsit version 1.1.x:

PATCH SCRIPSIT/CTL (X'6F31' = E5 21 7C 00 CB C6 E1)
PATCH SCRIPSIT/CTL (X'6F38' = C3 8F 54)
PATCH SCRIPSIT/CTL (X'5450' = 31 6F)

Shelled Roommates

Q. I recently found a glitch in Basic with my Tandy 1000 SX with 640K. When I execute Clear,,,32768 (to allocate 32K of video RAM needed for graphics, mode 6) and then execute Shell (in my application, I do this to use MS-DOS to sort a file created in Basic), I get an "Internal error" message. This happens even if you execute only those two commands in command mode, and in a program as well. When I return to MS-DOS after this error, I occasionally get the message "Memory allocation error; cannot load command, system halted." A Tandy representative said this problem occurs because video RAM is reserved at the top of memory and conflicts with the memory needed when Shell executes. The rep said there is no work-around. Can you help? (Howard D. Nott, Midland, MI)

A. I'm sorry I can't have a good answer for you. Unfortunately Shell and video RAM require the same memory area. One possible, but inconvenient, work-around is demonstrated in Program Listing 1. This program saves the video screen to disk, uses Shell, then reads the video screen back in. One of the biggest problems with this method is that you must use the Clear statement again for video memory—which also clears all your variables. If you use variables, they must also be written to disk before the clear, then read back after the clear.

Sneak Preview

Q. I have a Radio Shack Line Printer VIII. If I buy a Tandy IBM-compatible system, can I use the printer and connect my Model 4 and Tandy IBM-compatible to the same printer with a switcher? Can I at least use the printer with the Tandy IBM-compatible? I noticed it is not the same type of cable for the parallel port on the Tandy IBM-compatible.

Also, I am working on a program that I want to market, and I want to know if it is possible to run the program and record it on a video cassette from the computer without using the camera, but directly to the VCR. I would then overdub the voice. I want to send a video cassette to some customers so I can give them a glimpse of the program before they purchase it. (Andre Campeau, Blainville, Quebec)

Program Listing 1. This program saves the video screen to disk, uses Shell, then reads the video screen back in.

```
10 CLEAR,,,32768
20 SCREEN 6
30 CLS:COLOR 2,1:LINE(20,20)-(160,160),1,BF
40 DEF SEG=&HB800
50 BSAVE "c:bigscrn.pic",0,32768
60 SHELL"debug"
80 DEF SEG=&HB800
90 CLS:CLEAR,,,32768:SCREEN 6:COLOR 2,1
100 BLOAD "c:bigscrn.pic",0
```

End

Illustration by Maris Bishofs

A. You can use Radio Shack's printer selector (catalog no. 26-2820, $99.95) to switch between the two computers. Tandy 1000s use the same type of cable as the Model 4. You need to use LF and Mode LFOFF (perhaps in your Autoexec file) on the IBM compatible to prevent the extra line-feed problem.

You can connect directly to a VCR with a computer that has a round composite-video output connector. The 1000 has one, but the Model 4 does not. Connect a double male RCA-type cable between the connector and the VCR's video-in connector.

Has Anyone Seen the Bridge?

Q. Do you know of any bridge programs for the Models III and 4? (Barbara A. Houston, Durango, CO)

A. Bridge Master from Dynacomp Inc. (1064 Gravel Road, Webster, NY 14580, 716-671-6160), requires 24K and is available on disk for $29.95. Bridge 80 from Recreational Mathematical Software (129 Carol Drive, Clarks Summit, PA 18411, 717-586-2784) requires 16K and comes on cassette or disk for $18.95.

Do Not Pass Go

Q: I have a 64K Model 4 with two disk drives. I purchased Monopoly and Scrabble from Radio Shack. Both games are for the Model III. I can boot the disks in Model III mode, but when I try to run the startup Build program to initialize the programs (which run in Basic with machine-language calls) the initialization screen appears, and the computer locks up.

Also, I purchased a copy of LDOS 5.01.03 at Radio Shack before I learned of the 5.04 conversion. Can you tell me about the changes and how I could get a copy without throwing away the 500-page manual I got with 5.01.03? (Martin Fette, Gainesville, GA)

A: The games don't work because of a compatibility problem between the Model 4's Model III mode and a Model III when using port 224 (E0 hexadecimal [hex]). The problem occurs when a value above 31 is sent to the port, as is the case in lines 19 and 193 of Monty Plays Monopoly. This causes a Model 4 to lock up. I have the Monopoly program, but not Scrabble. Reliable sources say the Scrabble problem is the same as the Monopoly problem.

To correct the problem, first disable password checking by applying the following patch to the disk. Boot the program disk and answer the date prompt. When the time prompt appears, hold the enter key down until the TRSDOS Ready prompt appears. If the "Auto function engaged" message appears, reboot the disk and hold the enter key down. This should get you to the TRSDOS Ready prompt. Enter the following patch:

```
PATCH *2 (ADD=4ED4,FIND=20,CHG=18)
```

The following procedures apply to the Monopoly program. The Scrabble program is different and will probably have different file names. You need to search through the Basic file and find the ASCII byte sequences of 244,239 and change the 239 to 015.

Use Debug to alter the program because the machine-language support routines are loaded on top of the Basic programs. If you go into Basic to edit the programs, a subsequent Save will not include the machine-language routines and could incorrectly offset the support program.

Type DEBUG from the TRSDOS Ready prompt. Press "F" to select the File Modify mode. Answer the filespec prompt with M2 for the Monty Plays Monopoly program. Press the semicolon key (;) until the top left row of numbers is 000300. Press "M" to enter the Modify mode. Press the down arrow key (↓) to move the cursor to the 0003A0 row, and then press the right arrow key (→) seven times to place the modify cursor over the value 32 (actual location 0003A7), which is followed by the values 33 and 39. Replace the 32 33 39 sequence by typing 20 31 35. If you make a mistake, press the break key, the semicolon, then the hyphen key to reset the display. Now try the modification again.

After you make the changes, press enter to lock the changes in. Press the semicolon key until the top left row of numbers reads 002C00. Press the M key, and use the down arrow to get you to the 002C60 row. You should be over a 32 value. Replace the 32 33 39 values with 20 31 35 and press enter. Press the break key twice and reboot the disk to play.

I assume that by LDOS version 5.04, you mean 5.01.04. This is the hard-disk version of LDOS. This version includes hard-disk drive support and archiving utilities, which is about the only major advantage over 5.01.03. This package includes its own manual.

Or, you might be referring to the LDOS 5.03 conversion, which makes LDOS 5.01.03/04 compatible with LS-DOS 6.3. It includes enhancements to many of its utilities, such as LCOMM, and enhancements which were added to the LS-DOS 6 versions. It also includes date stamping up to December 31, 1999, a new Forms filter, a new and more flexible Setcom, Basic and DOS help screens, and expanded patch support. This package is meant for owners of LDOS 5.01.03/04 who already have the manual, as documentation is only supplied for the enhancements. Both versions are available from Misosys, Inc., P.O. Box 239, Sterling, VA 22170-0239, 703-450-4181.

Mouse Matchmaker

Q: I want to add a mouse to my Tandy 3000. I'm interested in Logitech's C7 Logimouse. The package comes with mouse, Quadram Inkjet printer, and software. I noticed the mouse has a DB-25 serial connector and my 3000 has a DB-9 serial connector. Can I match these up? (Gary Hinds, Redmond, WA)

A: You can purchase a DB-9 to DB-25 serial cable adapter from an electronics supply store. The older Logimouse came with either a 9- or 25-pin serial connector. Choose the one you need. The newer ones come with a DB-9 and include a DB-9 to DB-25 adapter.

Bigger Buffer

Q: When I type in commands on my Tandy 1000 keyboard, a buffer holds about 15 keystrokes so that you can type ahead while you wait for a command to finish. Can I increase the size of this buffer to 30 or 45 keystrokes? (David Larson, Cambridge, MN)

A: Yes, you can increase the buffer size. Absolute memory locations 480 and 482 hex store the pointers to the start and end of the buffer, offset from address 400 hex. They contain the values 1E and 3D hex, respectively, allowing for 15 keystrokes (a keystroke uses 2 bytes: one for the ASCII code; the other for the scan code). If you change these two values to 90 and EE hex, you create a buffer that can hold 47 keystrokes. You also need to set the buffer pointers (41A hex for head of buffer and 41C for tail of buffer) within this area. You can do this with the Program Listing 2.

Program Listing 2. Create a 47-keystroke buffer.

```
10 DEF SEG=0
20 POKE &H480,&H90   'Start of buffer
30 POKE &H482,&HEE   'End of buffer
40 POKE &H41A,&H90   'Head of buffer
50 POKE &H41C,&H90   'Tail of buffer
```

End

Function Compunction

Q: I own a Tandy 1000. I write software in Basic and encountered a situation that causes me endless problems. The problem is the type-ahead function that retains multiple keystrokes and then processes all of them. I want to eliminate this annoying function so that I can avoid operator error in some types of operation. Impatience is the problem. Most users try to expedite the machine by pressing enter several times when they are in a hurry, thus compounding the problem. If there are many prompts, each with a default value, the result is

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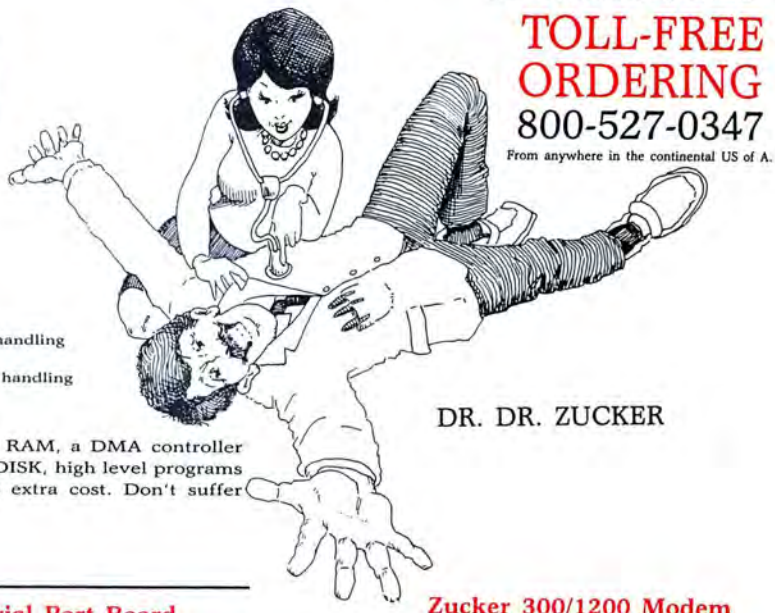

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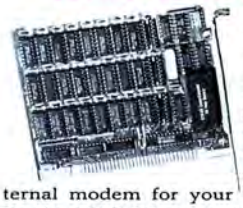

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catastrophic! Surely someone has devised a patch to let you toggle this function. (Robert C. Leaf, Dayton, OH)

A: One solution is to purge the keyboard buffer before displaying an input prompt. For example:

```
200 WHILE INKEY$<>" ":WEND:INPUT A$
```

The While. . .Wend loop executes as long as pending characters are in the keyboard buffer. When the buffer is empty, the Input statement will be executed.

In a later exchange, Mr. Leaf responded that Radio Shack gave him the following program line to fill the buffer before input:

```
200 CLR = 1 to 40:BUF$ = INKEY$:NEXT CLR:INPUT A$
```

The Right Profile

Q: I use LS-DOS 6.3 on the Model 4D and Profile 4+. When I invoke Profile 4+ directly from LS-DOS, everything runs perfectly. However, when I enter Profile via a Job Control Language (JCL) file to set up Memdisk and run the program, this is what happens. The Runtime menu appears on the screen, and all data-base processing portions of the program run well. But pressing "M" for the Creation menu throws control back to the JCL, and this blanks the screen. Pressing enter brings up the LS-DOS Ready prompt. Is there a patch to reconcile this apparent incompatibility between Profile 4+ and the LS-DOS JCL features? (Robert W. Brown, New Albany, PA)

A: Your problem will also crop up with other programs, such as ALEDIT/CMD. The problem is that the prompt in question uses the @KEYIN SVC (supervisory call), which gets its input from the standard input device; the device is usually the keyboard but is now the JCL file. The SVC checks the JCL file, finds the end of file, and, assuming that all JCL processing is done, exits to DOS. The easiest solution is to execute the Runtime menu manually, after the JCL file has initialized Memdisk.

READERS RESPOND

Model 4 Upgrade Arrives

In response to Gene McCormack's request (see April 1987, p. 12) for a Model 4 emulator board for the Tandy 1000, we discovered that Hypersoft (P.O. Box 51155, Raleigh, NC 27609) released a program that emulates the Model 4 on a Tandy 1000 or PC compatible.

Let LP4 Do the Driving

Gerard C. O'Connell of Phoenix, AZ, responds to Albert Spatches' problem ("Who's Driving?" July 1987, p. 12) of using a Model III and an Epson MX-80 with Superscripsit. He suggests Albert use the LP4 driver. He can then initialize the Epson by entering Basic and using the following program:

```
10 LPRINT CHR$(27) CHR$(18)"A" CHR$(140);
20 CMD "S"
```

Now he should be able to use Superscripsit normally.

Mercedes Loses Queendom (Three Times)

Joseph J. Janus of New Castle, PA, sends a possible solution to the printer driver problem ("My Kingdom [Queendom] for a Driver," July 1987, p. 14) for Microsoft Windows and the C. Itoh 8510AP printer. C. Itoh Digital Products Inc. (19750 S. Vermont St., Suite 220, Torrance, CA 90502) has a utility package for the 8510AP called "PC Itoh Utilities" that emulates Epson and IBM printers. The package contains utilities for screen dumps and can print all the ASCII characters generated on an IBM screen. The package cannot be obtained directly from C. Itoh, but by calling their sales department at 800-423-0300, you can obtain information on your nearest distributor. List price is $55.

Ted M. Hopes of Greenlawn, NY, writes that he has Wordperfect 4.2, a Tandy 1000 and a DMP 430. He states that printer driver 25 on the Wordperfect disk is the printer driver for the DMP 430, but, unfortunately, you must use the DMP 430 with DIP switch no. 1 turned off for the Tandy character set. This set does not include graphic characters used by Wordperfect in the Linedraw feature. Also, the superscript and subscript feature does not use microfont characters. It uses the same font as the rest of the text. The Tandy setting does, however, permit underlining, boldface, and double underlining.

Ted found that the best driver to use for the DMP 430 is printer driver no. 76, for the IBM Proprinter. Although this driver does not provide double underlining, it does underlining and boldface, microfont sub- and superscripts, and graphics characters. It can do these when the DMP 430 DIP switch no. 1 is in the on position, which activates IBM characters. The only disadvantage I find with the use of the IBM characters is that I cannot use italics. Apparently the printer won't provide italics unless it is set for the Tandy character set mode.

Martin Pollard of St. Clair Shores, MI, wrote a printer driver for Scripsit Pro and an Epson RX-80 printer. He believes it works fine with the MX and FX, too. Supported features include underlining, italics (which uses the double-underlining print code), boldface, strike-through, superscript, subscript, insert text during printing, insert current date, and pause the printout. Available pitches are 5, 6, 8, 10, 12, and 17. Unsupported features are top of form and proportional spacing. You can obtain the driver by sending a 5¼-inch floppy disk and a self-addressed disk mailer with postage to Martin at 21116 Erben, St. Clair Shores, MI 48041. You can also download it from the Good News BBS at 313-459-8375. It is in the Model 4 download section under the name Epson/PRO (rename the file Epson/CTL or FX80/CTL to use it).

Reach Out and Shadow Someone

Robert B. Boyd of Calgary, Alberta, responds to Mike Cannon's problem (see June 1987, p. 12) of experiencing color distortion on his RGB monitor after having a telephone on top of it. He says it is possible that the shadow mask in the picture tube could have been magnetized from the powerful magnetic field generated by the ringer in the telephone set, unless the phone is an electronic type. If it's not an electronic type, using a degaussing coil might correct the problem. Since most modern color monitors and television sets contain a degaussing circuit that is activated for a few seconds each time the set is turned on, degaussing coils are becoming a scarce piece of service equipment and are difficult to find. The telephone could also alter the strength of some of the several magnets located on or near the yoke assembly for convergence and pincushion adjustments. Any magnets so altered must be replaced and a complete convergence performed to restore normal operation. These parts should be available from Radio Shack.

If you use a standard telephone near a computer or any magnetic medium, you should disconnect the ringer to prevent loss of valuable data or possible interference with other components.

HELP WANTED

►David J. Anna (P.O. Box 226, Loveville, MD 20656) is looking for a DIN connector converter so he can use non-Radio Shack joysticks on his Tandy 1000, which requires a 6-pin DIN connector.

►E.W. Gladstone (The Mansion House Hotel, Duddingston, Edinburgh, Scotland EH15 3QF) is looking for the Speech Synthesizer and Talker 4.0 software from Alpha Products for his Model 4.

►David Ayre (Annadale, Harray, Orkney Isles, Scotland KW17 2LQ) is looking for a copy of APL80 by Phelps Gates and published by Ramware for his Model I.■

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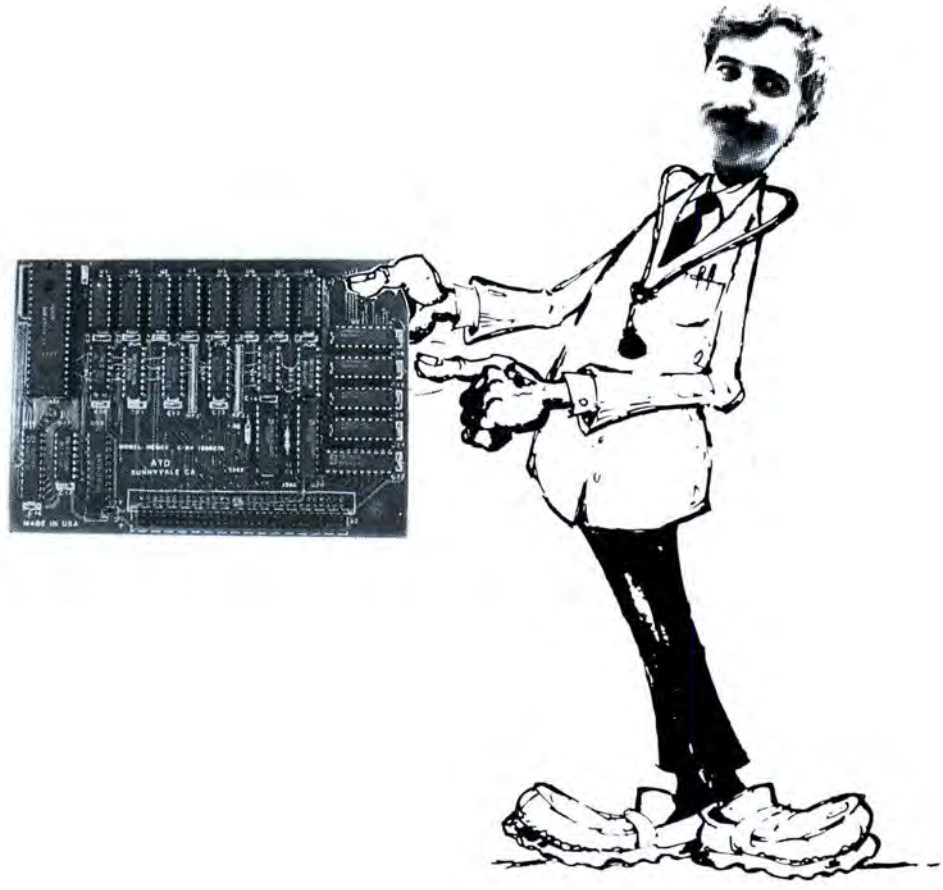

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2009	_____	279	_____
2016	_____	599	_____
TANDY 1000SX			
2006	_____	109	_____
2027	_____	199	_____
2016	_____	599	_____
TANDY 3000			
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Beachum Resigns, Tandy Rethinks Direct-Sales Plans

Tandyland

Call it a fundamental law of business and of government. Whenever changes are made in top management, the seriousness of the changes are in direct proportion to how much everyone involved praises everyone else and insists everything's hunky-dory.

If you apply that law to recent changes in Tandy Corp.'s computer sales, the resignation of Graham C. Beachum Jr. as head of marketing in the Business Products Division seems like big stuff.

Beachum, 39, whom Tandy had hired away from IBM two years ago, left Tandy on a week's notice to become senior vice president of marketing for Dell Computer Corp. in Austin, TX. Dell, the company behind the mail-order PC's Limited MS-DOS computers, is one of those fortune-that-began-in-a-garage success stories the computer industry has seen less of lately. To hear Beachum tell it, his move to the three-year-old Dell was the opportunity of a lifetime.

"I was lucky," he said. "Dell made me an offer I couldn't refuse. There's all kinds of neat stuff happening." He downplays any hint that his resignation from Tandy, despite his short notice, was less than friendly. "Everybody's trying to make something of that. But we left on good terms. There's no drama involved," he said.

Back at Tandy, spokesman Ed Juge also said Beachum's resignation was amiable and said he assumed Beachum left because Dell offered him something very lucrative, such as stock options. Beachum said that wasn't the case.

It might not be fair to say that Tandy wasn't happy with Beachum. But it's a good bet that the company is disappointed with the results from his old department, Tandy's outbound sales force.

The Tandy force was formed last year to help muscle in on IBM's share of the business PC market. About the same time, Tandy issued orders that had turned its sales personnel into IBM clones—at least as far as dress and grooming were concerned. The outbound sales force was to be the answer to IBM's direct sales. Tandy's new crew of pin-striped sales reps made calls on potential business customers. Some were executives who don't shop for computers at the local mall. Others were so

Tandy Vice President Bob Myers

ingrained in the IBM mystique that they wouldn't consider a Tandy product, due to the company's reputation, however ill-deserved, of being a hobbyist's shop.

The Dallas Morning News reported that outside sales didn't fulfill Tandy's expectations, possibly due to the inexperience of the sales force. In a recent research report, First Boston Corp. wrote, "Since this [corporate sales] is an area that is somewhat foreign to Tandy, it is not surprising that the company has encountered difficulties in the early stages of this program."

Juge is quick to point to the successes that the Business Products Division achieved. "We're in large corporations now," he said. "We're on the preferred vendor list for General Electric and Michelin Tire. We're in companies now that by all rights we shouldn't be."

At the same time, Juge said of outbound sales, "We had visions of it moving along faster than it really has."

Tandy sales reps are more blunt. "We spend more time doing bullshit than we do sales," said a Tandy sales representative who did not want his name used. "We're all dressed up as IBMers, but the sales haven't shown any real increase."

The sales rep said outbound sales were poorly implemented from the beginning. "They were trying to implement a lot of policies too slowly," he said.

Another sales representative, who also wished to remain anonymous, faulted the week-long training program for outside sales. "As best they could, they showed us what they wanted us to do, but not how to do it. They had people teaching outside [sales] who didn't know how themselves, even though they had been successful doing inside sales.

"I think some of the IBM image hurt," he added. "When we went out into the business world in dark suits and white shirts, we were seen as fledglings. Part of the success we've had in the past was that we'd roll up our shirt sleeves and say, 'I can show you how to use this computer better than the manual can.' Now when there's a problem, we say, 'Let me call my training and support people.' "

The same salesperson said that the corporate sales program was never well received by some of the old-line Tandy personnel who were "successfully raised, reared, and weaned on retail sales." He hypothesized that the hardline retail personnel "set up" Beachum.

While the changes made soon after Beachum's departure indicate that Tandy has no intention of continuing its outside sales program as Beachum had set it up, the changes are a move further away from its ties to retail stores.

Leadership of the Business Products Division returned to Tandy Vice President Bob Myers, who had relinquished some of his duties over quantity sales to Beachum when the outbound sales program was created. Tandy also created two new classes of outside salespeople: the Retail Account Marketing Manager and the District Government Education Marketing Manager. (Juge said the acronym RAM manager for the first position is a coincidental pun. Rank-and-file Radio Shack employees have already abbreviated the second title to "Digum," which is probably a less-than-coincidental pun on the name of a video game.)

The main difference between RAM managers, Digums, and the old outbound reps is that the new personnel is truly direct sales without any ties to retail outlets. Tandy continues the outbound sales program in which all sales are credited to a local retail outlet.

With direct sales, Juge said, "We'll be able to go directly to Ford or Exxon without going through retail channels and provide a level of service and support we haven't been able to provide."

Photo courtesy of Radio Shack, a division of Tandy Corp.

Some of the new recruits are from outside the ranks of current Tandy salespeople, he said. "We want some high-power people with a lot of experience and training in direct sales."

This means Tandy won't have to depend on retraining its inside salespeople to think like outside reps. It's likely that the old outbound sale personnel will continue to call on smaller local businesses, where the link to a local retail store still makes sense, while the RAMs and Digums form an elite commando squad to storm the Fortune 1000 beachheads already occupied by IBM.

There are two ironies in the saga of Tandy attempts to emulate IBM's success in the business market. One is that Tandy is ordinarily a conservative company that sticks with products and methods it knows best. And if Tandy knows anything, it knows retail storefront sales. If indeed the outbound program has been as disappointing as the signs indicate, it could be because Tandy dared to venture into new territory. The other irony is that despite some softness in computer sales a few years ago while Tandy dragged its feet producing an IBM-compatible personal computer, its retail computer operations generally served the company well. Tandy, by various estimates, has one-third of the PC market and is tied with Apple behind IBM. The abrupt changes in the sales structure, no matter what anyone says, amount to a major shake-up. These changes indicate Tandy doesn't think it gained ground on IBM fast enough. But while all this was happening, IBM reported declining profits and Tandy's overall sales went up 10 percent. Perhaps IBM could learn something from Tandy rather than the other way around.

Update

A danger in downloading public-domain software from bulletin boards is that occasionally you encounter a "Trojan horse," a program some demented practical joker wrote that plays havoc with your disks when you run it. Sometimes it erases data or reformats your hard disk.

One Trojan horse that appeared on BBSes in the last few months has a double-edged fiendishness. The program has appeared under at least one name, SUG.COM, and it's billed as a way to unprotect disks copy-protected by a system used by Softguard Systems Inc.

Instead, it erases everything on a hard disk and the floppy that you're trying to unprotect. Actually, it does more than erase them. It destroys the file-allocation table (FAT) that keeps track of what data is stored in which files and where the files are; it is impossible to restore the files using ordinary unerase programs.

SUG is not a quick-and-dirty hack job. It lulls you into a false sense of security with some fancy screens while it works on a low hardware level so that the drives' lights don't turn on to indicate something is being done to them. As with most Trojan horses, SUG contains messages that tell you how you've been had after it's too late to do anything about it. But the messages in the program are encrypted so that they cannot be detected by utilities such as CHEK4bomb, which looks for the practical joker's "Gotcha!" text.

SUG's message distinguishes it from the average dirty trick. After it trashes your disks, it displays a screen that says SUG is actually a product of Softguard, and it is exacting vengeance on people who try to break its copy protection.

"This destruction constitutes a prima facie evidence of your criminal violation. If you attempt to challenge Softguard Systems, Inc. . . ., you will be vigorously counter-sued for copyright infringement and theft of services," the message says.

It then invites anyone whose disk got zapped to call Softguard's lawyers.

Softguard's director of marketing, Joe Diodati, said he had never heard of the program and vigorously denied that Softguard had anything to do with it. He pointed out one place the program's author made a mistake while trying to pin the rap on Softguard. The program includes Softguard's address correct down to the suite number and zip code, but refers to Softguard's protection scheme by the wrong name. SUG refers to the "SOFTLoK-protected disk." The trademark Softguard actually uses is "SUPER-Lok." SUG comes close with Softguard's irregular use of capital and lowercase letters, but Diodati said his company hasn't used the term SOFTLoK in any upper- and lowercase combination.

The chances are that nobody will ever find out who's responsible, just as chances are that SUG will ruin the disks of many honest computer users who may own copies of protected software that they were trying to back up for their own peace of mind.

The moral is: Be careful with BBS software (although in the instance of SUG, none of the usual precautions would have helped much). But you always keep a current backup of your hard disk, don't you?

Micro Trends

There is a maxim that movies are made in the editing room and not in the studio. Now an ingenious board for Tandy and other MS-DOS computers equipped with an enhanced graphics adapter (EGA) allows video hobbyists and businesses to do their own editing by adding special effects including graphics, titles, and even animation to their own video tapes.

The 4- by 4-inch device is the Video Charlie. It attaches to the features connector on an EGA card and has its own connections to receive a signal from one video tape recorder, match it to the scan synchronization of the computer, and resync and refeed the signal to a second recorder after it has been altered by a computer graphics program.

With the hardware in place, you load the memory-resident software that comes with Video Charlie and any graphics program. Then Video Charlie will overlay images or text created with the graphics software on top of whatever video image is on the tape.

One company uses Video Charlie to enhance a tape that shows work going on at its plant. As the tape shows various parts of the factory, a graph created with Lotus's 1-2-3 is overlaid on the scene to show that division's contribution to productivity. A football coach could use the board to highlight game tapes.

It performs limited production techniques such as the fading in or out of the scene you have on tape or the graphics that you want to superimpose. You can stop the fade at any point to create a ghost effect. With some effort and ingenuity, you could create split-screen effects. If your program can create real-time animation, that animation can be transferred to tape as its own creation or as an overlay.

You can also use Video Charlie to create training tapes that show real-time displays of software as it goes through its paces without the flicker that normally occurs when a video camera films a computer screen. You could then run a tape of software in action as it executes a second time to add explanatory captions and arrows. If you feel that you're going to set a record playing your favorite video game, you can record the game to show your friends when they don't believe your score.

Video Charlie is one of the latest products in a field that's likely to become the PC industry's next buzz word—desktop video. At $749.95, Video Charlie is expensive for a home system unless you're a dedicated video enthusiast, but it's cheap compared to the $9,000–$10,000 that a stand-alone video character generator costs. If you are a pro, or you must have the latest in home video equipment, you can get a booklet describing the attachment from Micro Mainframe, 322 E. Bidwell St. Folsom, CA 95630, 916-985-7501.■

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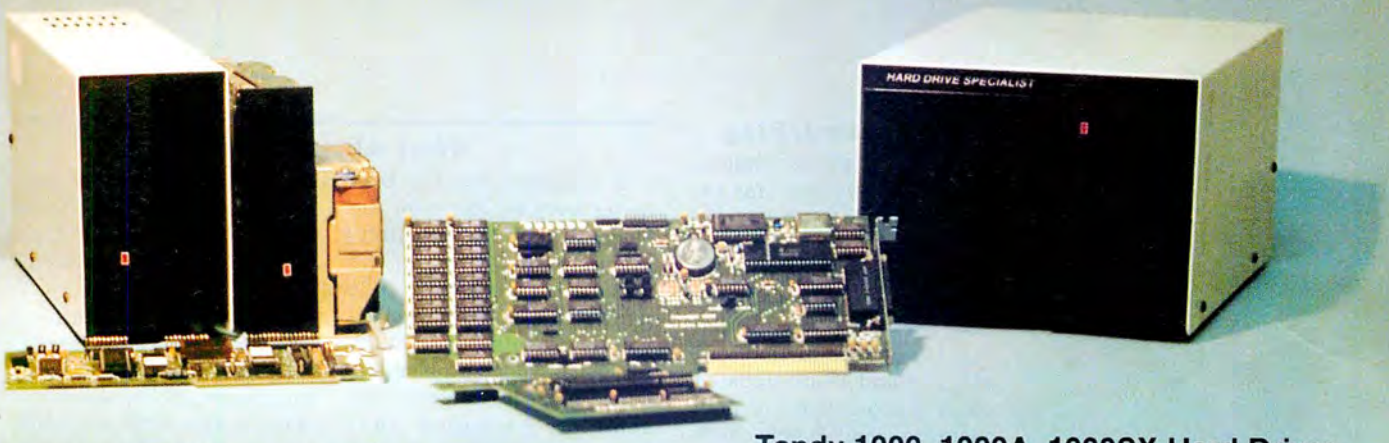

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Hoist the L Flag

Robert M. Doerr's "Bidirectional Ripple Sort" for the Model 4 (Reader Forum, March 1987, p. 25) fails to take full advantage of the L flag in lines 120, 140, and 160. My sort (Program Listing 1) is faster in that variables M and K are updated, often by more than one increment, to avoid double-checking the already sorted portions of the array. Also, the L flag is checked for a zero before entering the reverse sort.

Eric Husted
Napa, CA

Program Listing 1. A ripple sort.

```
99 'Update Bi-Dir Ripple Sort, Eric Husted
100 M=1 : K=NRECORDS
110 L=0: FOR J=M TO K-1
120 IF TABLE$(J)<=TABLE$ (J+1) THEN 130
121 L=J:SWAP TABLE$(J),TABLE$(J+1)
130 NEXT J:IF L=0 THEN 170 ELSE K=L
140 L=0:FOR J=K TO M+1 STEP-1
150 IF TABLE$(J)>=TABLE$(J-1) THEN 160
151 L=J:SWAP TABLE$(J),TABLE$(J-1)
160 NEXT J:IF L=0 THEN 170 ELSE M=L:GOTO 110
170 RETURN
```

End

What About ALDS?

If you purchase The Disk Series from *80 Micro* for the Model III or 4, the assembly-language programs on the disk have their source code written in EDTASM format. If you have another assembler, it is usually not a problem because most other editor/assembler packages that followed EDTASM can read EDTASM files, and you can convert them to their own format by loading the files and saving them back to disk.

But ALDS does not seem to do this. The following four steps accomplish the conversion:

- Load the EDTASM source file into ALEDIT. When the editor display appears, you see the listing with line numbers at the left of each line. (If text or blank spaces appear at the start of the first line before the line number, this indicates an Apparat EDTASM format. You need to edit these 7 bytes out for the conversion to take effect.)
- Use the W command to save the file back to disk.
- Reload the file. The line numbers will be missing.
- Again, use the W command to save the file back to disk. The file is now in ALDS source file format.

The EDTASM line numbers are saved to disk in ASCII with bit 7 of each number set. When loading a file, ALEDIT drops the 7th bit of all incoming bytes, so the number is now stored as normal ASCII data. Saving the file back to the disk this time sends the data in purely ASCII format.

When loading a source file into ALEDIT, if the editor finds a stream of ASCII characters preceding a line, it ignores these characters (and the tab following them). Thus, when you reload the ASCII-saved file, the line numbers are no longer present. Saving the new data to disk a second time causes the data to be stored without line numbers in the desired ALDS format.

David Goben
Mansfield Center, CT

Pay Attention

I wrote a program (see Program Listing 2) that makes it more difficult to overwrite an existing file. It searches all existing files on all disks in the system, even if they are invisible.

OPEN"I",1,"FILENAME/XXX" produces an error message if the file name you request, visible or invisible, cannot be found on any disk in the system. I coupled this with an ON ERROR GOTO statement to prevent inadvertent overwriting.

If placed at the beginning of a program under development, this routine can be skipped over by a GOTO in line 1. You can save at any time by typing RUN3. Line 3 has a remark because any error in typing also jumps it down to line 10. When you run the program and it shows "Saving as filename," and then either "File not found" or "Error #24," you can assume you entered the program correctly and you can delete the REM from line 3.

Do not delete line 11 until you have experimented with the operation and are satisfied with the action. This prevents you from recording anything.

The program is written so that it is hard to overwrite by mistake. You are required to verify by typing YES.

To save the program in ASCII, type SAVE"SAFE SAVE",A. It can be merged with any program that has these lines clear or loaded before starting any new program. It is saved when the program is saved and then can be deleted from the finished product.

Bill Pottberg
Burlingame, CA

Program Listing 2. A program to avoid inadvertent overwriting of files on the Model III or 4.

```
1 GOTO 100 ' jump to program
2 '-------------- save function -----------------
3 REM ON ERROR GOTO 10 ' see notes about this line.
4 CLS: PRINT"SAVE to what FILENAME.... ";: INPUT FL$
5 OPEN"I",1,FL$: CLOSE
6 CLS:PRINT:PRINT CHR$(23) FL$ "   is in USE !!":PRINT
7 PRINT" TYPE 'YES' to OVERWRITE it":PRINT
8 PRINT" or <ENTER> for a new name.": PRINT: INPUT Y$
9 IF Y$="YES" OR Y$="yes" THEN 10 ELSE 3
10 CLS: PRINT:PRINT "   SAVING as -- < "FL$" >"
11 END:'CAUTION!! see notes about this line.
12 SAVE FL$: PRINT:PRINT: END
13 '==============PROGRAM STARTS==================
100 '
```

End

Reader Forum is looking for your words of wisdom. Send your patches, solutions, or advice in regard to Tandy microcomputing to Reader Forum, c/o 80 Micro, 80 Elm St., Peterborough, NH 03458. We pay $10 for each item that we use. All Reader Forum submissions should be no more than one typed, double-spaced page in length.

Option B

If you do a lot of routing, linking, and filtering with TRSDOS 6.x, you have to type the B option each time you use Device to check the current input/output (I/O) settings.

The following patch modifies the Device command so that it defaults to byte I/O display, just as the one in LDOS 5.x does. (Be sure to make a backup copy of DOS first.)

For LS-DOS 6.3:

PATCH SYS6/SYS.LSIDOS (D1E, 90 = FF,FF:F1E,90 = 00,00)

For TRSDOS 6.2.x:

PATCH SYS6/SYS.LSIDOS (D1D, 47 = FF,FF:F1D,47 = 00,00)

Marc A. Barrot
Boulogne, France

A Faster Memdisk

I am using a JCL file similar to, but faster than, Don O. Coffins' "Set Drive Zero Free" (January 1987, p. 69). You build a Memdisk as he suggests, then copy the Memdisk as it is to a disk in drive 1, forcing a mirror-image backup.

To put the Memdisk back in place, whenever you want, use the JCL file in Program Listing 4. With this JCL file, you copy the Memdisk you have already created from the drive 1 disk. The "Y" in the seventh line forces a mirror-image backup from disk to Memdisk. With this method, you need a disk for each Memdisk you build.

A. Jorge Vismara
Rio de Janeiro, Brazil

Program Listing 4. A JCL file for creating and copying Memdisks.

```
. RAM SYSTEM DISK
SYSTEM (DRIVE=2,DRIVER="MEMDISK")
D
D
Y
BACKUP :1 :2
Y
SYSTEM (DRIVE=2,WP)
SYSTEM (SYSTEM=2)
//EXIT
```

End

Diverting the Default

When you do a great deal of assembly-language programming to create COM files, the last stage of operation is to convert the EXE file to COM file format. You do this with the program EXE2BIN, using the format EXE2BIN PGMFILE PGMFILE.COM (if PGMFILE is the file you are working on). This process converts PGMFILE, which has a default EXE extension, into a program called PGMFILE.COM. If you leave off the second file name, a file called PGMFILE.BIN is created by default, and you must rename it with a COM extension to make it executable.

I thought it would be handy if a program like EXE2BIN created a COM file by default, so you don't have to worry about adding a second file name or renaming the default BIN file name.

You can use Program Listing 3 with a backup copy of EXE2BIN.EXE. It converts EXE2BIN.EXE into a program called EXE2COM.EXE, where COM is the output file's default extension. After running this program, you can use EXE2COM in the format EXE2COM PGMFILE, and it automatically creates a file named PGMFILE.COM on the same drive as PGMFILE.EXE.

David Goben
Mansfield Center, CT

Program Listing 3. A program that uses COM as a default extension on the Tandy 1000.

```
10 'CONVERT DEFAULT '.BIN' EXTENSION IN EXE2BIN.EXE TO '.COM'
20 OPEN"R",1,"EXE2BIN.EXE":FIELD 1,128 AS A$:X=1
30 GET 1,X:Y=INSTR(A$,".BIN"):IF Y=0 THEN X=X+1:GOTO 30
40 B$=A$:MID$(B$,Y)=".COM":LSET A$=B$:PUT 1,X:CLOSE 1
50 NAME"EXE2BIN.EXE"AS"EXE2COM.EXE":END
```

End

Instant Allwrite

I adapted an *80 Micro* JCL program for the Model 4 to work with Allwrite that I call ALDOSMEM (see Program Listing 5). With it I can make Memdisk a system and Allwrite editor disk. You can use the other drives for data disks. It takes about two minutes to install because of the writing and purging process, but once installed, ALDOSMEM almost instantly brings up the Allwrite program. A small file appears on the screen in 1 or 2 seconds.

Bill P. Hall
Nashville, TN

Program Listing 5. A program to bring up Allwrite instantly.

```
.*** Aldosmem/jcl installs ALLWRITE and minimum system
     in MEMDISK
.*** makes MEMDISK the system disk and write protects it.
..
System (Drive=3,Driver="Memdisk")
D
D
Y
BACKUP/SYS:0 :3 (S)
PURGE SYS0:3 (S,Q=N)
PURGE SYS5:3 (S,Q=N)
PURGE SYS7:3 (S,Q=N)
PURGE SYS8:3 (S,Q=N)
PURGE SYS9:3 (S,Q=N)
PURGE SYS13:3 (S,Q=N)
COPY AL/CMD:0 :3
COPY AL/DEF:0 :3
COPY CI8510/DEF:0 :3
COPY CI8510/TAB:0 :3
COPY ALF/DEF:0 :3
COPY DIABLO/TAB:0 :3
COPY DIABLO/DEF:0 :3
SYSTEM (DRIVE=3,WP)
DIR :3 (S,I,A=N)
.*** TRSDOS 6 is now installed in MEMDISK
.***    along with disk ALLWRITE COMMAND & DEFAULTS
.*** All drives can now be used for data disks.
.*** Memdisk is now system disk.
.*** ONE DISK MUST CONTAIN ALF/CMD--Leave boot disk
.***    in lower right drive (now drive 3)
.*** Ignore "Job Aborted"
SYSTEM (SYSTEM=3)
```

End

Illustrations by Eric Fowler

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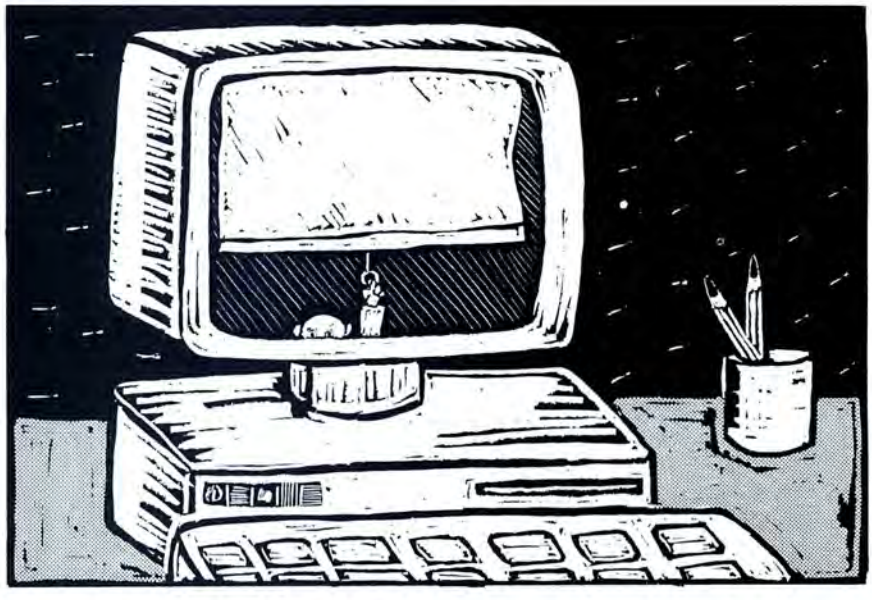
Drawing a Blank



Now I've got it. Whenever I want a full mailbox, I need only present a problem and say, "This is impossible." I said this in July about a screen-blanking routine in Basic for the Model 4. (Actually I said "nigh impossible," but that was close enough.)

It was no surprise that Model 4 partisans rose to the challenge. I'm anxious to show our readers how clever these Model 4 folks are, but first you'll want to see how easy the solution is in GW-Basic.

Blankety-Blank

The problem is screen blanking, once necessary to protect video monitors. In the old days, images left for too long on the screen became permanent. My Model I monitor retains ghosts of programs past. A screen-blanking routine watches the keyboard or another device. If the program detects inactivity for a set period of time, it saves the current video image, clears the screen, and waits. When activity resumes, it restores the image, intact. The fancier ones somehow let you know your computer hasn't gone south.

All the solutions in the program listings follow a scheme I outlined and consist of two subroutines. The one at line 1000 starts the timer if it's off, checks it, and if it runs out, saves the current screen and blanks it. The one at 2000 stops, resets the timer when the awaited signal arrives, and restores the screen if it's blank. Some include a line to initialize variables. This line helps test them:

```
100 I$=INKEY$:IF I$=" " THEN GOSUB
    1000:GOTO 100 ELSE GOSUB
    2000:PRINT I$;:GOTO 100
```

Charles Hucks (Myrtle Beach, SC) uses the system variable, Timer, in his GW-Basic solution (Program Listing 1). Timer counts seconds. If you add 60, this sets the routine's timer for one minute. When it expires, Charles takes advantage of GW-Basic's multiple video pages and the Screen command to swap the current page for a blank one. On signal, line 2000 puts the original page back. I want to thank Charles for adding the nerve-wracking buzzer.

The Screen statement, as you see it in the listing, works for the defective version of Basic that came with most of the Tandy 1000s. If you have a corrected version of Basic (and this method doesn't work), add a third comma before the number.

Moving Video

Eight-bit TRS-80s don't have room for luxuries like more than one page of video. In early models, before the Model 4, video memory is at least in standard RAM where you can get at it. To save the screen before you blank it, you only have to find a place to store it and a way to move it. Some of you peeked video memory 1 byte at a time into an array. This method has two drawbacks: It's slow, and a 1,024-element integer array uses 2K to hold 1K of video. Even slower, though more economical, is first peeking, then poking 1,024 bytes into a 512-element integer array, a string array, or a few remark lines. Some of you wrote video to disk, but without a RAM disk, that's very slow.

Some used a machine-language routine to move the video image quickly, but several of you discovered a solution nearly as fast that doesn't need machine language and a USR call, but relies on Basic alone. Harold Putman's (Pittsburgh, PA) example of the Basic-only solution is a paradigm of Model I/III programming. Look at the way the For. . .Next loop and the If. . .Then . . .Else logic are woven together at the end of line 1000 in Program Listing 2! That's the stuff that gives programming purists apoplexy.

Harold locates a dummy string, A$, with VARPTR, changes the string's length, and points it at video memory in 128-byte segments. Then he lets

Program Listing 1. Charles Hucks's GW-Basic page turner.

```
 8884 | 1000 IF A=0 THEN A=TIMER+60:RETURN ELSE IF B=1 THEN RETURN ELSE IF TIMER
         >A THEN B=1:SOUND ON:NOISE 2,15,1000:SCREEN ,,1:RETURN ELSE RETURN
 4106 | 2000 A=0:IF B=1 THEN SCREEN ,,0:SOUND OFF:B=0:RETURN ELSE RETURN
```

End

Program Listing 2. Harold Putman's Model III classic.

```
 1548 | 10 CLEAR 2000:DIM B$(7):A$=""
15736 | 1000 IF(NOTF)T=1000:F=-1:RETURNELSET=T-1:IFTRETURNELSEC=PEEK(16416):K=P
         EEK(16417):A=VARPTR(A$):POKEA,128:FORP=120TO127:POKEA+1,(PAND1)*12
         8:POKEA+2,P/2:B$(P-120)=A$:NEXT:FORF=0TO1:IFINKEY$=""F=0:CLS:PRINT
         @PEEK(16918)+14,"Hit a Key":NEXTELSERETURN
 7897 | 2000 F=0:IFTTHENRETURNELSEFORP=120TO127:POKEA+1,(PAND1)*128:POKEA+2,P/2
         :LSETA$=B$(P-120):NEXT:POKE16416,C:POKE16417,K:RETURN
```

End

Illustration by Nelle Davis

B$(x) = A$ do the moving. His unorthodox construction at the end of the line runs a message across the screen. He peeks addresses 16416 and 16417 to save the cursor's position.

Having put the screen in a string array, several of you wanted to print the array to restore it, but you had to use strings of odd lengths and avoid printing the last byte of video memory. To keep the display stable, you poked the last character into 16383. Instead, Harold and others put A$ to work and used LSet to do the moving. LSet copies the string to the new location but doesn't trigger scrolling.

Harold's timer counts loops, but so many factors affect them that loops are unreliable timekeepers. Better to use your computer's clock. On the Model III, you peek 16919 for seconds and 16920 for minutes. (That's 16384 and 16385 on the Model I.) Kevin Butler (Rexburg, ID) has an easy way to use the clock (not shown) without constantly peeking it, repeating arithmetic, or manhandling Time$. He pokes the clock to zero it, then watches the clock's minute hand with Mid$(Time$,13,1). Slick.

Mission Impossible

The trouble with the Model 4 is that its designers shoved video memory down a deep, dark hole. The entrance to this video Hades is guarded by the terrible System monster, and you have to know something about the beast to get by it.

Dan Nugent (Sterling Heights, MI) found a way to peek video memory a character at a time (not shown), useful in many situations. He moves the cursor through the screen with successive "Print@(Row,Column),;" statements. After each print, he peeks the video driver (*DO address + 15) to get the character at the cursor position. It's slow but effective. You'll find the video driver address with Device (B = Y) from the TRSDOS prompt.

Daniel Davis (Rome, NY) solved the problem by rescuing the video display from its hidey-hole. Poke &H78, &H86 (see Program Listing 3) switches both video and keyboard memory into accessible high memory. You have to protect high memory with a Clear statement, as Daniel does in line 10. Then you can manipulate string pointers to save and restore the screen. Nifty.

Other Model 4 solutions descended into machine language to use supervisory call (SVC) 15, the video control function. Subfunction 6 of SVC 15 copies the current screen to a buffer in RAM. (This is not the same as Poke &H78, which bank-switches video memory into standard memory where it is continually updated.) Subfunction 5 copies 1,920 bytes onto the video display.

LS-DOS 6.3, with its enhanced Basic, adds a new wrinkle. Its USR11 needs no DEF USR statement, and you don't need to know machine language to use the SVCs. You do have to know which SVC to call and what values it requires. If you have that information (which you can find in the *Model 4/4P Technical Reference Manual*), you plug the values into an integer array and point USR11 at the array with the VARPTR function.

SR11 made most of the solutions in LS-DOS-enhanced Basic look alike. Michael Vernier (Farmington Hills, MI) distinguished his routine in several ways (Program Listing 4): He shows us where to peek the real-time clock—45 for seconds, 46 for minutes. He uses SVC 15 not only to copy the video, but also to save and restore the cursor. Since the two pairs of USR11 calls are the same except for subfunction numbers, he puts one pair of them in a subroutine, at line 2010, and uses a toggle, C, to vary its function. He adds a warning bell, and he uses a double-precision array as his buffer. Nice job. And *bravo* to the Model 4 folks for doing the "nigh impossible."

Program Listing 3. Daniel Davis's Model 4 blank switcher.

```
 3415 | 10 CLEAR ,61400!:DEFINT A-Z:DIM S$(15),T$(15):POKE &H78,&H86
13829 | 1000 W=VAL(RIGHT$(TIME$,2)):IF S=1 THEN RETURN ELSE IF Y=0 THEN T=(W+5)
          MOD 60:Y=1 ELSE IF T=W THEN FOR X=0 TO 15:A=VARPTR(S$(X)):POKE A,
        128:POKE A+2,248+X\2:POKE A+1,(X AND 1)*128:T$(X)=S$(X):NEXT X:S=1
        :R=ROW(0):C=POS(0):CLS
  707 | 1020 RETURN
 4815 | 2000 Y=0:IF S=1 THEN PRINT @(R,C-1),;:FOR X=0 TO 15:LSET S$(X)=T$(X):NE
        XT X:S=0
  707 | 2010 RETURN
```

End

Program Listing 4. Michael Vernier's LS-DOS-enhanced blank.

```
 3644 | 10 DEFINT A-Z:DIM A#(242),B(6):DEF FNTIME=PEEK(46)*60+PEEK(45)
 8933 | 1000 IF A=0 THEN A=FNTIME+60:A=A+((A>3599)*3599):RETURN ELSE IF A=FNTIM
        E THEN C=1:A=-1:SOUND 5,1:GOSUB 2010:CLS:PRINT@920,;:RETURN ELSE R
        ETURN
 3676 | 2000 IF A=-1 THEN A=0:C=0:GOSUB 2010:RETURN ELSE A=0:RETURN
 8529 | 2010 B(0)=15:B(1)=CURSOR:B(3)=(3+C)*256:X=USR11(VARPTR(B(0))):CURSOR=B(
        1):B(0)=15:B(3)=(5+C)*256:B(1)=VARPTR(A#(0)):X=USR11(VARPTR(B(0)))
        :RETURN
```

End

Short Stories

I used a lot of space to talk about making nothing out of something, as it were. Well, it's an important subject. And though it isn't necessary with today's monitors, it's still guaranteed to impress Mom. Now let's take a break from serious topics. This month's puzzles are more for fun than for utility.

Puzzle 1. There are two sets of two or more consecutive positive integers the sum of which is exactly 100. Find them. The *short* Basic routine, which proves your solution, also ought to find any definable series of integers that add up to any other integer. I wonder how many sets of consecutive even numbers total 100?

Puzzle 2. Wouldn't you know it? When the king's daughter, Gwendolyn, fell off the drawbridge into the moat, the squire, Waldo, was the only one around to save her. Well, the king would sooner be devoured by mealybugs than let the grubby groom near his precious Gwen a second time—never mind marry her, as the court's rumor mill had it. Still, he had to do something. So, he gave Waldo a golden rope 500 yards long, and pointing toward the setting sun, he said, "The kingdom's newest landholdings are a week's race by a relay of fast mounts. You may have as much of that fertile land for your barony as you can enclose with this rope. Welcome to the peerage, son. And don't forget to write."

No dolt, Waldo got the most possible within his 500 yards of rope. Assuming ideal conditions—perfectly flat land and rope that lost no length taking corners—how much land did Waldo obtain? (Your programs should find the areas of a variety of figures, given only the perimeter, to prove your solution.)

The Rules:

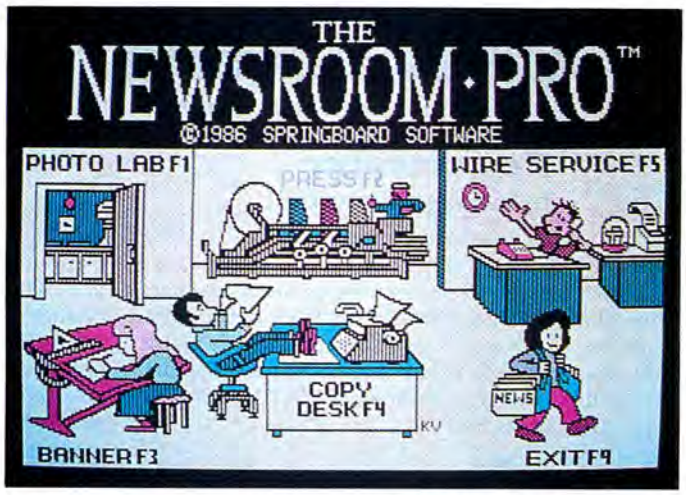
1. Write your program(s) or routine(s) in any TRS or Tandy Basic, except Pocket Computer Basic.
2. Your solution(s) to this month's poser(s) must reach us by October 15, 1987, to be considered for the January 1988 issue and a T-shirt if we use it.
3. Employees of CW Communications already have T-shirts and are not eligible.
4. Send your solutions, comments, criticism, suggestions, and T-shirt size to: *80 Micro*, Fine Lines, 80 Elm St., Peterborough, NH 03458. We cannot return entries.■

Harry Bee is a freelance writer, programmer, puzzle creator, and dreamer. You can contact him at P.O. Box 567, Cornish, ME 04020, or on Compuserve (74076, 3461).

The Newsroom Pro

by George R. Beinhorn

The Newsroom Pro runs on the Tandy 1000/1200/3000 (512K) and requires a color graphics adapter and DOS 2.1 or higher. Springboard Software Inc., 7808 Creekridge Circle, Minneapolis, MN 55435, 612-944-3915. $129.95.



The opening screen displays icons of publishing functions.

When you go shopping for desktop publishing software, you'll save a lot of money if you decide in advance just how much sophistication you need. If you only intend to produce informal newsletters, flyers, and brochures, you'll do well with a low-priced, easy-to-use package like The Newsroom Pro, the more business-oriented offspring of Springboard's The Newsroom, which has enjoyed much success in schools.

The Newsroom Pro requires a color graphics card and monitor—it does not work with monochrome or EGA cards. The program drives virtually any dot-matrix or laser printer, and runs acceptably fast even at 4.77MHz.

The Newsroom Pro doesn't require a mouse, though it responds to mouse-selected commands, and a mouse is essential for freehand drawing.

A Vertical-Market Product

Who should consider The Newsroom Pro? It depends on the quality you need in the work you intend to produce. Other, more sophisticated programs contain smoothing algorithms that eliminate the jagged edges from their bit-mapped dot-matrix or laser-printed results. The Newsroom Pro doesn't, which means that the business newsletters it produces can be pleasant and inviting, but they'll look informal. If your objective is a relaxed-looking company or club newsletter, this may be an asset, but if you're after a high-gloss, formal image, you'll need to look elsewhere.

Two catch-phrases accurately describe The Newsroom Pro: "easy to learn" and "fun to use." In these respects, the program reflects its schoolroom ancestry—as does the excellent manual, which is well organized and thorough and includes a quick-start guided tour and a tutorial.

The impressive clip-art library of 2,000 drawings, supplied at no extra cost, likewise reflects school-newspaper origins: Most of the images are naively simple, if not actually cutesy. Again, depending on the nature of your work, that could be a plus—it makes The Newsroom Pro a wonderful tool for family-created greeting cards and holiday newsletters. Roughly 600 of the clip-art images are suitable for serious business use.

Although it's not limited to them, The Newsroom Pro is primarily intended to create newsletters, as the rigid selections of page formats suggest. You're only allowed two columns with or without a space at the top of the page for a banner. You can't alter the shape of banners and columns. You can't, for example, choose a narrower headline space or create a three-column newsletter.

The fact that The Newsroom Pro limits your options could be a blessing—as witness the unsightly pages produced by people who have the tools of Ventura Publisher and Pagemaker but lack design savvy. The essence of style is simplicity.

The Newsroom Pro at Work

For newcomers to desktop publishing, the most baffling obstacle is knowing where to begin. Do you create a headline first, or write your text, or select pictures? The Newsroom Pro's tutorials go all out to give first-timers a grasp of efficient production flow. What you learn here will serve you well when you move up to a more complex system.

Finding your way around in The Newsroom Pro couldn't be simpler. The opening screen (see the Photo) displays icons representing traditional publishing functions: Photo Lab, Banner, Copy Desk, Press, Wire Service, and Exit.

The Newsroom Pro's manual recommends that you select clip-art graphics first. You can then customize these images—add text to them; give them borders; enlarge or reduce them; flip them right, left, up, or down; and alter them with shading patterns and a full set of line, circle, box, and freehand drawing tools. An Oops icon lets you undo your last action, and a Trash Can icon lets you clear the screen and start over.

You can also do pixel-level editing of your pictures with a Magnifying Glass tool that enlarges a section of the graphic. A scaled-down, continuously updated image of the entire picture reflects your changes. In graphics mode, five text fonts are available: large and small serif and sans serif, and Old English.

Creating a banner is similar to creating artwork, except that you get three additional banner-size fonts, and the work area scrolls across two columns.

The Copy Desk lets you enter text and graphics in the columns. Text automatically flows around the artwork, and when you reposition the art, the text adjusts automatically. From the Copy Desk you can also link a banner to the current page. The banner doesn't appear on screen but will be printed with that page.

While working in the Copy Desk, you see only about a quarter of a column's contents, but a miniature image of the column keeps you abreast of the position of text and graphics.

The Newsroom Pro's text editor is primitive, allowing only basic cursor movements; character deletions; and block copy, delete, and move. It's much easier to create your text with a word processor, save it to an ASCII file, and import it into the publishing program.

To print a page, you select the Press icon. The Newsroom Pro supports 58 models of dot-matrix and laser printers. Laser printers work only in the bit-mapped graphics mode, though, which means you won't be able to print a full page at highest resolution unless your laser machine has sufficient memory.

The Wire Service icon lets you transfer pages by modem to other Newsroom Pro users. The program supports 28 popular modems at 300 and 1,200 baud.

How Good Is The Newsroom Pro?

The Newsroom Pro shows the polish of a program with a past—it pleasantly anticipates your next actions and provides good insulation against input errors. There are rough spots, though. The lack of a way to overflow text onto subsequent pages, or at least to write the overflow buffer to a disk file, is unreasonable. Hassling first-timers with such copy-fitting worries seems inconsistent with The Newsroom Pro's otherwise easy-to-use design.

The Newsroom Pro does a fine job within its own narrow niche, which can be defined as fast, trouble-free production of informal newsletters and brochures.■

Newsmaster's unique menu system.

Newsmaster
by George Campbell

Newsmaster runs on the Tandy 1000/1200/3000 (256K) and requires two floppy drives (or a floppy disk and a hard drive); a color adapter, EGA, or Hercules-compatible graphics card; and DOS 2.x. Unison World, 2150 Shattuck Avenue, Suite 902, Berkeley, CA 94704, 415-848-6666. $99.

Newsmaster is a low-cost, easy-to-use entrant into the heretofore expensive and complicated realm of desktop publishing software. It offers many of the features of the expensive packages, and you'll only need a little practice before you're creating nice-looking documents. Newsmaster isn't Pagemaker or Ventura Publisher, but it can produce small newsletters, flyers, restaurant menus, and eye-catching correspondence, complete with artwork from its art library.

The package includes two floppy disks and a 70-page manual, part of which is a tutorial that takes you through disk files to create a sample newsletter.

Using Newsmaster

Before using Newsmaster for the first time, follow the prompts through its configuration program to set it up for the graphics card and printer you're using (Newsmaster supports over 120 printers). That information is set until you change it.

The upper part of the Newsmaster screen displays the newsletter on which you're working, while the lower third shows Newsmaster's unique icon menu system and the function keys that correspond to each choice (see the Photo). Make a selection, and new icons appear for the next series of program functions. With a little practice, the icon system becomes fairly easy to use.

At all stages of newsletter design, you have four options for displaying your work on screen. You can get a full-page view, in which the text is too small to read; a full-width view of one quarter of the page; a normal view, showing 11 lines of the column on which you're working; and a zoom view that lets you magnify part of your work up to eight times. You can edit text or art from any of the display modes. Text is readable in all but the full-page mode, even when using the smallest font.

Page Layout

Newsmaster makes it easy to lay out the pages of your newsletter, but the program has limitations. You can use up to 10 columns on each page, but the program sets the margins and column placement. I found the margins somewhat narrow for good page design and was frustrated when I could not change them.

Only one headline block is available for each page, and its size is fixed, which prevents you from changing the layout of the top of the first page. The program can handle multiple-page newsletters, but additional pages do not appear until you need them. These additional pages contain a headline block as a default—not the usual format for a newsletter. Because of this, you have to eliminate the headline block and reconfigure the page after you've put text on it. It would be much easier to design the page layout in advance.

Text Handling

Newsmaster offers 30 type fonts: Most can be from 8–60 points in size, but some are only appropriate for headlines and subheads and, therefore, come in only one size. Italic and boldface fonts add variety. As you browse through the fonts, a sample of the typeface the cursor is on appears in a box.

You can enter text directly from the keyboard or import it from your word-processing program. Imported text must be in ASCII format. Once text is in place, you can edit it within the program. Newsmaster supports most word-processing features, such as cut and paste and block moves, but cannot search for text or make replacements. Text automatically snakes from one column to the next and from page to page.

Art Features

Select the art icon from the opening menu and you move into Newsmaster's art editing mode. The program includes over 250 pieces of artwork. You can place any of these anywhere on the page for designing.

The art selection system is similar to that used for type fonts. As you move through the menu, the highlighted artwork appears in a box. Once you find the art you want to use, pressing the enter key loads that picture into the art cursor. Place the cursor anywhere on the page, and press F4 to stamp it on your newsletter.

Once the art is in place, you can change its size, crop it, and manipulate it. A picture can cross column boundaries, and text automatically wraps around it. However, Newsmaster doesn't let you change the actual picture, nor can you create original artwork. Additional art libraries are available from Unison World, and art from their Printmaster program also works.

The art selections that come with the program should handle most of your needs, but the program doesn't offer any computer-related art, which I find puzzling. In smaller sizes, Newsmaster's artwork is clear, but as you enlarge a picture, it becomes blocky and loses definition.

Horizontal and vertical lines are easy to include in your newsletter, as are boxes. Line widths change with the touch of a function key. You can also choose from a number of fill patterns and from a selection of rather flowery decorative letters.

Printing a Newsletter

Newsmaster supports most popular dot-matrix printers and Hewlett-Packard and Kyocera laser printers. On an Epson FX-286 printer with a new ribbon, print quality had a definite dot-matrix appearance: The dot patterns were clearly visible on all text fonts, producing medium-quality results. The output photocopied well.

Text is readable, even in 8-point type, but I wish Unison World used a higher-density printout, as do several other similar programs. Multiple printing passes would produce cleaner type.

If you have access to one of the laser printers Newsmaster supports, you can expect higher print quality.

Summary

Newsmaster is easy to use and offers many of the features of full-scale desktop publishing programs. Its medium-density output and formatting restrictions, however, limit its usefulness. I used Newsmaster to produce a two-page newsletter, with illustrations and text. From start to finish, working with already written text, the process took about three hours.

For producing casual material, complete with art, Newsmaster is a good choice. However, the program will not produce the professional-looking documents for more serious presentations. ■

Tandy's DMP 2110 Printer

by Eric Grevstad

DMP 2110 Printer. Tandy Corp., 1700 One Tandy Center, Fort Worth, TX 76102, 817-390-3300. $1,295.

For some time now, Tandy has been trying to pitch its printers to a larger audience, outgrowing the old image of printers designed only for TRS-80 computers or Radio Shack software. The wide-carriage DMP 2110 has two credentials that deserve dot-matrix buyers' attention—competitive speed and excellent 24-pin print quality—but lacks some features offered by other MS-DOS office printers. It's the ultimate Superscripsit printer, but it may not steal customers from Toshiba, NEC, or Fujitsu.

The DMP 2110 measures a hefty 22 by 15 by 6 inches, growing in height to 11 inches with its convenient snap-on tractor feed. It feels solid and holds paper without slipping, whether using the tractor or single-sheet friction feed; its noise level is average, though my test unit had a slight rattle in its cooling fan.

Like other 24-pin printers, the DMP 2110's thinner wires and smaller dots actually produce a slightly worse or more trembly-looking draft text than do 9-pin models. It's not exceptionally quick, either; my tests on 8½-inch-wide paper at 10, 12, and 16.7 characters per inch (cpi) yielded speeds of 79, 83, and 80 characters per second (cps), respectively. With its default settings for TRS-80 systems, the printer put an extra carriage return between each line; I had to flip a dual in-line package (DIP) switch to get single spacing with my 1200 HD.

While you can get faster draft printing elsewhere, the Tandy keeps up with other deluxe dot-slingers when printing correspondence-quality Courier (47 cps at 10 cpi, 50 cps proportional spacing) or Elite (54 cps at 12 cpi, 57 cps proportional). More important, the output is enough to make you skip the "near" in "near-letter-quality." The Tandy's underlining is a little weak, but its dark, crisp text is terrific. Letters snap off the page; dots don't appear unless you press your nose to the paper; and I never fell in love with a printer's fractions, copyright, and trademark symbols until I saw the 2110's Elite.

The manual is mediocre, appealing to programmers while slighting applications users with vague talk of "data processing" versus "word processing" mode—nothing to do with print quality, but with delayed versus immediate response to line-feed commands for super- or subscripts. All the codes and characters are clearly listed, however.

If you're using Tandy software, a word processor that lets you specify your own codes, or a third-party program that lists the DMP 2110 among its printer drivers, the Tandy is a pleasure. (Some products list the older DMP-2100 as an option; PFS: First Choice, for example, supported justified, bold, underlined, and super- and subscript text on the 2110, but not italics.)

Tandy's DMP 2110 Printer.

For other software, a DIP switch shifts the printer to IBM mode, emulating the old IBM Graphics Printer or early Epson standard. My Epson screen dump program crashed spectacularly, but Graphics Printer drivers for things like Framework II pie charts worked properly.

So what am I complaining about? Other printers in this price range—some in one-third this price range—have convenient top- or front-mounted controls for selecting print quality. The DMP 2110 doesn't even have the familiar form-feed and line-feed buttons; the only front-panel controls are on-line and restart switches and a feed button that advances paper $^{1}/_{24}$ inch or, if held down, continuously. The manual's only words concerning "form feed" are advice not to use the command except for graphics applications, as Radio Shack programs have "top of form" built in.

Some printers that lack handy buttons at least have accessible DIP switches; the Tandy has plenty of room under its hinged lid, but its 18 switches are hidden at the back, making you wrestle the 33-pound unit around, tangling the parallel and power cables and your paper stack, to change from draft to correspondence or Courier to Elite. Some 24-pin printers have plug-in font cartridges; the DMP 2110 uses the effective but clumsier method of downloading fonts from an optional disk kit.

Overall, the 2110 is a good printer with a couple of drawbacks—speed and quality to rival Toshiba or Epson, chained to less convenient design and less support from MS-DOS software packages. Tandy deserves praise for its continued support of its old customers, but the DMP-2110 is surely the only deluxe 24-pin printer whose manual gives detailed advice for use with Model II TRSDOS.■

Better off DED

by John B. Harrell III

DED86 runs on the Tandy 1000/1200/2000/3000 (256K). Misosys Inc., P.O. Box 239, Sterling, VA 22170, 703-450-4181. $59.95.

DED86 is a standout among disk and memory editors. It does everything you'd expect from such a program: You can recover lost files, update data, change file attributes, and so forth. What distinguishes DED from the pack are its special features and commands, exceptional speed, and solid reliability.

Out of the Box

The package consists of a disk containing the program files and an installation utility, along with a 100-plus-page reference manual. Installation is a snap—you just select the correct file and copy it to your working disk. The installation utility is used only for color selection on systems that support colors.

The manual amply documents DED's commands and features. It also provides good background information about disk organization, explains disk structures like the boot record, and describes a typical memory map. Appendixes explain DED's error messages and screen displays.

DED contains a full DOS shell for executing commands. A key toggle switches you between the memory-editor and disk-editor modes. The commands are easy to use without insulting your intelligence—mercifully, the program doesn't go overboard on menus.

The Figure shows a typical screen display in the disk-editor mode.

The Disk Editor

Unlike many other disk editors, DED lets you position a sector for editing using physical addressing, logical addressing, or clusters. Physical addressing specifies the head, cylinder, and sector number. DOS maps each of these physical sectors into a logical sector number from zero to the maximum value allowed. Clusters are groupings of sectors into the smallest packets of information DOS will allocate on a disk.

You can also select sectors while editing a file, but then you're limited to relative sector addressing within the file's structure on the disk. DED handles the mapping for you. You can even position DED to a specific byte within a file—just type in the byte number relative to the start of the file and DED automatically converts it to the correct sector and offset.

You can use either hexadecimal values or ASCII character sequences when editing a file. You simply press the appropriate command key and type your changes directly into the sector locations. You see your changes right on the screen as you make them. DED maintains a complete copy of the sector as it stood before editing, so you can quickly undo mistakes.

In addition to standard sector-editing capabilities, the program offers some excellent special features. For example, I have often wanted to insert or delete a byte in a data file. With DED, I can do it at a keystroke—the program automatically adjusts the sector's remaining bytes. Zeroing to the end of a sector is just as easy; one keystroke and the job is done.

In addition to standard sector-editing capabilities, the program offers some excellent special features.

Many editors provide a way to recover deleted files; DED is one of few that let you search for sectors and accumulate them in a file. This is one of DED's greatest strengths. You search through a disk and build a list of sectors that contain your lost data. Using simple commands, you can scan this list of sectors and edit it until you've reconstructed your file. When the list is complete, you then save the sectors as a normal DOS file.

DED also will read specific sectors to verify a disk's integrity. You can dump a sector to the printer on command. If you're editing a directory sector, DED even lets you quickly edit the file on whose name the cursor is positioned.

The Memory Editor

DED's memory-editing capabilities are no less impressive. The display is similar to that of the disk editor—memory is shown in "pages" of 256 bytes each. DED can access the 8086-family processors' entire 1 megabyte of real-mode address space. You specify addresses using segment and offset descriptors, or you can enter full 20-bit absolute notation if you prefer.

The memory-editor commands work like their disk counterparts except that they modify data in the screen-page buffer rather than in the disk-sector buffer. As with the disk editor, changes don't take effect until you execute the Save command.

You can use the memory editor to rescue information in memory lost through a program foul-up; the process is similar to the disk editor's file-recovery method. You piece together pages into a "keep" list, verify that the data is correct, and then write the list to a file.

The Bottom Line

DED is a valued addition to my battery of MS-DOS utilities. Its power, lightning speed, and reasonable price make it an exceptional buy. Owners of a Tandy 2000 will particularly appreciate the performance of a utility tailored to their machines.■

```
0123456789ABCDEF   Byte    00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F

IO      SYS&       <000>   49 4F 20 20 20 20 20 20 53 59 53 26 00 00 00 00
                   <010>   00 00 00 00 00 00 B3 BD C6 0E 02 00 F8 7E 00 00
MSDOS   SYS'       <020>   4D 53 44 4F 53 20 20 20 53 59 53 27 00 00 00 00
      b\           <030>   00 00 00 00 00 00 62 5C B0 08 0A 00 18 43 00 00
A86                <040>   41 3B 36 20 20 20 20 20 20 20 20 10 00 00 00 00
      w            <050>   00 00 00 00 00 00 77 B6 8F 0E 0F 00 00 00 00 00
DOS                <060>   44 4F 53 20 20 20 20 20 20 20 20 10 00 00 00 00
      @ 1          <070>   00 00 00 00 00 00 40 BD 31 0E 10 00 00 00 00 00
FONT               <080>   46 4F 4E 54 20 20 20 20 20 20 20 10 00 00 00 00
      V 1          <090>   00 00 00 00 00 00 56 BD 31 0E 11 00 00 00 00 00
KERMIT             <0A0>   4B 45 52 4D 49 54 20 20 20 20 20 10 00 00 00 00
        U          <0B0>   00 00 00 00 00 00 90 BB 55 0E 12 00 00 00 00 00
MACE               <0C0>   4D 41 43 45 20 20 20 20 20 20 20 10 00 00 00 00
      b 1          <0D0>   00 00 00 00 00 00 62 BD 31 0E 13 00 00 00 00 00
MASM               <0E0>   4D 41 53 4D 20 20 20 20 20 20 20 10 00 00 00 00
      e 1          <0F0>   00 00 00 00 00 00 65 BD 31 0E 14 00 00 00 00 00

Drive: C: Cyl: 0    Head: 1  Sector: 8    Logical sector: 25     Cluster: 0
Byte: X'000' = X'49' = 01001001 = 73   File sector: 0      File byte: 0
File: /
Cwd:  /
Command:          Ignore case: OFF  Entry/display mode: DEC  Write protect: OFF
```

Figure. A typical DED86 screen display in the disk-editor mode.

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The Proteus Factor

by Harry Bee

Proteus runs on the Model III and the Tandy 1000/3000 (256K). Research Design Associates, P.O. Box 848, Stony Brook, NY 11790. 516-928-5700. $59.95. Also, educational site licenses are available from $99.95 for up to two schools, to $429.95 for 20 or more schools. Extra manuals are $9.95 each.

There's something you have to write. What's the hardest part of the job? Structure and organization? Grammar, punctuation, or spelling? Reviewing and rewriting? Depending on the day of the week, they're all tough. But for most of us, worst of all is beginning: the task of getting something, anything, onto a blank page or computer screen. It's what the producers of Proteus call prewriting, and what Proteus attempts to address.

You have your choice of outliners, word processors, and spelling and style checkers galore to help with everything else, but little to help get you started. For students, especially, at whom this educational software aims, getting started is crucial. The people with the idea for Proteus obviously know this. A great deal of experience with teaching young writers shows through both in the methods they chose to include in the program and in the way they wanted to implement them. The manual clearly expresses what the software was supposed to be, and is not.

The Look and Feel Of Things to Come

Proteus is awkward at best. You realize it as early on as the title screen, which types itself one character at a time until you press a key to make it finish quickly. You have to press a key again to go on from there to a prompt that asks you to name the writing session.

That's easy if it's a new session, or if you remember the name of an old one. If you don't remember what you called a previous session that you're now ready to continue, the Model III and Tandy 1000 versions differ in what you do next. The Model III is the worst of the two—one of the few times it is. You have to make up a name to get to the main menu where you select a directory of old sessions. After looking at the directory, you go back to the main menu and select Load, which takes you to another screen where you enter the name of the session you want, which, with luck, you remember from the directory two screens back.

If you're using a Tandy 1000, pressing enter in response to the original prompt gets you the directory of old sessions, from which you can copy the one you want. In either case, having named your session, you're now at the main menu.

Everything in Proteus—every little move you make, it seems—works from a menu, which makes it easy to find your way around the program, but hard to get around. You can't avoid the menus, where you find few direct routes from one program function to another and no shortcuts. To select a function you must highlight the menu item and press enter. You can never simply press a letter or a number. The only way to move the highlight is up and down. When menus span several columns, you have to step to the end of one column to get to the next.

In a program intended to encourage students, and make it easier for them to put their ideas in writing, the inflexible menu system combined with slow response and a generally unappealing design do anything but help. The program is always in the way.

Great Ideas

Proteus, subtitled "The Idea Processor," employs four proven techniques

for encouraging a positive flow of ideas from young writers (from any writer, for that matter), and it attempts to provide a framework on which to organize the ideas around a central topic. The manual provides clear, detailed suggestions and directions for using Proteus in the classroom, and includes several complete lesson plans.

If you've ever been to a writer's seminar, you'll recognize the technique Proteus refers to as freewriting/looping. The idea is to write without stopping, and without regard for correctness of any sort—spelling, punctuation, syntax, and the like. In the pencil-and-paper version of the exercise, you're not supposed to lift your pencil from the paper, or stop to look at what you've written.

Proteus Factor menus are hard to use.

Proteus helps out by giving you nothing to edit with—you can't even backspace—and by prompting you to keep going if you stop for more than 10 seconds. It's an excellent way to warm up and get your creative juices flowing.

Looping is an extension of freewriting. As you freewrite, you're encouraged to take new ideas that occur to you and freewrite about them. Looping focuses your thinking about your subject more sharply and makes you draw details more clearly.

Enforces Brevity

Listing is outlining without a roadmap. The idea is to make a list of your thoughts on a subject as quickly as they come to you. Proteus numbers the list for you, and doesn't let you go back to insert items or rearrange them. It enforces brevity by accepting no more than one line of text per item.

The five W's are the classic questions of journalism, useful in any piece of expository writing: Who? What? Where? When? Why? The software poses each question and leaves you room to freewrite your answer.

Cubing is a way of looking at an idea from six points of view—the six sides of a cube. In turn, Proteus asks you to define your idea, compare it with similar ideas, contrast it with opposing ideas, argue in its favor, argue against it, and analyze it. The exercise takes you step by step through the process of validating and clarifying your thoughts.

It's clear from the way the manual is written that you're supposed to be able to use the four techniques freely and move among them effortlessly; that you're supposed to use an idea to generate new ones, and then expand upon them; that at the end of a session you're supposed to have collected your thoughts into a usable form, a draft you can transfer to a word processor to clean up and arrange into a finished piece of writing. But Proteus doesn't keep the promises the manual proposes. The clumsy, amateurish program is more glue than lubricant.

The concept is. . .spectacular, the programming . . .incompetent.

Great Stumbling Blocks

You begin a session by selecting one of the techniques from the main menu—say, Cubing. That takes you to a prompt below a bordered writing area. You answer the prompt by naming the idea you want to develop. The name becomes the title and directory entry of the writing you're about to do—called a cubing document.

When you're in the writing area, a message reminding you how to stop replaces the prompt. When you stop, what you've written remains on the screen, and across the bottom of the screen is the cubing menu.

In theory what you do using one technique is supposed to lead to ideas you want to develop further, and, in fact, it works that way. There's something in what you just wrote that you knew you wanted to freewrite about as soon as you wrote it. So you step over and select Freewriting/Looping from the cubing menu, and the prompt below the writing area asks you to name the idea you want to freewrite about.

The nature of the exercises dictates that things are generally fuzzy, and you can't remember the idea you had exactly. So you look at what you've just written, still on the screen, but the idea you want came earlier, and it has scrolled off. No problem. You press enter and find yourself in the freewriting menu.

You select View a Document, and the prompt wants the name of a freewriting document. You try the name of the document you just finished, but it's not a freewriting document, the message informs you, so you press enter to get back to the freewriting menu to select Cubing. That gets you the cubing prompt, where pressing enter gets you the cubing menu, whence you can view a cubing document. Select View. Enter the name. Now you can see the beginning of what you just finished writing—well, just finished some minutes before. By now you've forgotten what you were looking for. The heck with it.

Unfortunately, the bizarre scenario I described is not farfetched. Worse, nearly every step of the way there was a disk read. If you were using a Tandy 1000 while you were cubing, the program stopped to write to disk every six lines or so. When you reached the bottom of the writing area, the program took a full three seconds to scroll up a line. If you're a fair typist, you filled the type-ahead buffer before it finished scrolling and lost keystrokes.

Response Is Slow

There's more. Little things. Keyboard response is slow. The Model III graphics are ridiculous. Anyone writing for Model III these days ought to know enough to make the screen clean. All your files are on drive zero on the Model III, or in the currently logged drive and directory on the Tandy 1000. You have no way to choose otherwise.

The program is hardly bulletproof; almost any error is fatal. Everything you type on the Tandy 1000 is uppercase; the Model III version lets you type using the shift key properly. You get CGA video output on the Tandy 1000 whether it looks good on your monitor or not. The program prints single-spaced without margins or page breaks. You can't print part of a session except by printing each document in a session individually, and

that means trekking through the menus again.

You can convert a session into ASCII text files that most word processors can use. The Tandy 1000 version converts its uppercase to lower; the Model III version has a conversion program that's not only unnecessary, it doesn't work. The converted file contains carriage returns after every line, which most word processors do not use, and you will have to remove. Converting or printing, when you ask for the entire session, you get it in the order you wrote it. You cannot rearrange it without taking it a document at a time, and taking it through the menus.

Conclusion

Proteus as a concept is nothing short of spectacular, in my opinion. A decent implementation of it would be valuable beyond the classroom for which it's intended. I'd be eager to use it. But the good sense, experience, and obvious enthusiasm behind the concept go for nothing, ruined by programming that is inexcusably incompetent. More infuriating, however, is that someone looked at this thing and judged it a valuable writing tool for high-school kids.■

The Project Tracker
by Harry Green

Protracs runs on the Tandy 1000/1200/3000 (256K) and requires DOS 2.x. Applied Microsystems Inc., P.O. Box 832, Roswell, GA, 404-475-0832. $59.95.

Project-management programs support the two primary tasks in project management, scheduling and reporting, but there is a vast difference in how well they do it. Protracs includes the basics, but if you frequently manage projects, you'll find that it lacks some essential features.

Protracs is a specialized data-base management system. It accepts a 25-character project description, and priority and responsibility codes. You add scheduled and actual start and complete dates to each activity to complete the record. The program automatically assigns a sequence number to each activity and saves the data for sorting and creating reports.

Figure 1 shows a screen from a sample project that includes more than 40 activities. An on-screen function-key menu provides for adding, deleting, and changing activities.

You can call a series of standard reports from the main menu. Activities are sorted by any of the variables in the input record, such as the responsible person, due date, and priority. You can send reports to the screen, printer, or file by pressing a function key. Protracs displays the project schedule in either a table or a Gantt chart, which is a simple bar chart that shows start and complete dates on a time scale.

Figure 2 shows a Gantt chart from the same sample project. The program displays two months at a time on the screen, and provides for horizontal scrolling to review the entire span of a multi-month project.

Ease of Use

Protracs is an easy program to learn and use. Its menus are clear and logical enough that you should rarely have to refer to the manual or use the on-line help feature. The program's ease of use is the good news, but as you've undoubtedly discovered with other software, programs that are easy to use are frequently lacking in features. Protracs is a case in point; it achieves low cost and simplicity by omitting several features that are essential for anyone with a complex pro-

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(Continued from previous page)

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ject to manage.

Protracs' greatest drawback is that it makes no provision for displaying dependencies among activities. In most projects there is a definite sequence in which work must be done. Some activities can start only after others are completed, some can start independently but can't end until a related activity is complete, and some activities are entirely independent.

It is easy to add projects in Protracs, but impossible to display dependencies.

For example, suppose you are leading a software design team and coordinating the efforts of several different work groups. The project manager's objective is to identify all the activities required to accomplish the project, assign them to someone to complete by a due date, show the relationships between tasks, and monitor progress.

A typical list of major activities might be this: Research users' needs, develop program requirements, construct flow charts, and begin coding. These activities could be considered "level one" tasks, which are the project's primary activities.

It is obvious that a relationship exists between these activities, and that they fall into a natural sequence. Furthermore, these activities are broad. Each one would have several supporting tasks. Not all of the supporting tasks are obvious when the project begins, so a good project-management program must provide for adding activities and showing how they interrelate. It is easy to add projects in Protracs, but impossible to display dependencies.

Project-management software must also be able to calculate the critical path, which is the longest sequence of activities in the project. The critical path shows how long the overall project will take, and this is the first place managers look when they need to compress that time.

Some project-management programs display the critical path directly on the Gantt chart, and others support a network using Program Evaluation and Review Technique (PERT). A PERT chart resembles a program flow chart. Activities are shown in bubbles with arrows connecting them. Protracs supports neither PERT nor critical path. It also does not provide for scheduling scarce resources such as high-priced construction machinery.

Protracs does an acceptable job of producing reports. The menu lists project details by person responsible, lists overdue tasks, lists tasks by priority and due date, shows completed items, and lists all activities in the project. A report-generating utility lets you create or modify reports. The reports are generated with very few keystrokes, and they are almost foolproof in their execution. This is the feature that makes Protracs worthwhile for smaller projects. It is feasible to draw PERT charts by hand, but generating revision upon revision of reports is tedious, so project managers often omit them.

Summary

For managing simple projects, Protracs is an acceptable program. You can, however, use a good data-base management program, a spreadsheet, or a word processor to do everything Protracs can do, except draw a Gantt chart. Whether a specialized tool such as *Protracs* is worth the price is a matter of personal preference, but don't assume that you're getting the features of more expensive project-management programs for a bargain price. Protracs handles only the basics, but what it does, it does well.■

ACT NO.	ACTIVITY DESCRIPTION	PTY CDE	RSP	SCHEDULE START	SCHEDULE END	ACTUAL START	ACTUAL END
17	Order DID numbers	A	BS	06/15/86	06/26/87		
4	Develop LCR plan	A	BS	06/25/87	06/26/87		
2	Resolve LD Carrier Quest.	A	JHG	06/12/87	06/12/87	06/12/87	06/12/87
3	Place order for T1 Line	A	MCI	06/12/87	06/12/87	06/12/87	06/12/87
18	Order trunks from	A	BS	06/15/87	06/26/87		
9	Check out. cable	A	FH	06/15/87	06/26/87		
6	Determine wiring pla	A	FH	06/15/87	06/26/87		
7	Develop FAX routing plan	A	JHG	06/15/87	06/26/87		
20	Review trunk requirements	A	JHG	06/15/87	06/26/87	06/19/87	06/19/87
16	Assign PBX extension numb	A	BS	06/15/87	07/01/87		
5	Review station restrict.	A	BS	06/19/87	06/26/87		
23	Develop final switch conf	A	BS	06/19/87	07/03/87		
1	Develop stn numbering	A	BS	06/26/87	06/26/87		

MAXIMUM TASKS: 2000
CURRENT TASKS: 38

SCHNITZ

F1-SORT F6-07/02/87
F2-SEARCH F7-SAVE FILE
F3-ADD F8-EXIT
F4-DEL/UNDEL F9-UTILITIES
F5-CALENDAR F10-HELP

JULY '87

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Figure 1. A Protracs screen showing a project that includes more than 40 activities.

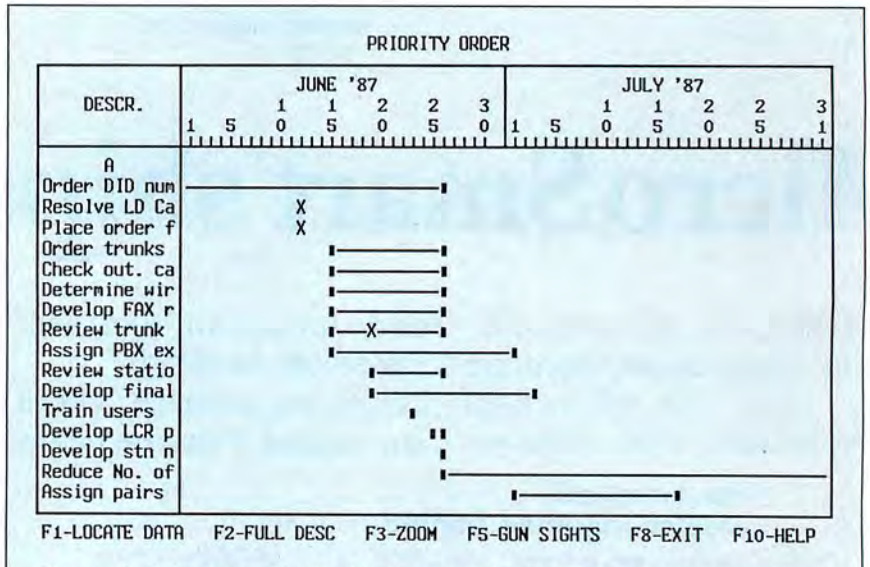

Figure 2. A Protracs Gantt chart—a simple bar chart showing start and completion dates on a time scale.

Takin' Care of Business

by Scott D. Palmer

RAM.B.A. runs on the Tandy 1000/1200/3000 (136K) and requires DOS 2.x. Pitlak Corp., 1639 Valecroft Ave., Westlake Village, CA 91361, 805-495-3158. $149.

RAM.B.A. is a simple RAM-resident pop-up utility that can do 24 different business calculations for you (see the Figure). It goes far beyond the usual calculator functions, offering features to compute effective interest rates, loan payments, commercial paper discounts, and system reliability. Three of its modules even give you advice on how to make business decisions, taking into account human, chance, and intangible factors.

Other RAM.B.A. options offer help with such financial decisions as present and future values of annuities and lump sums, growth rates, markup, break-even points, depreciation, inflation, moving averages, and moving price lists.

Because of its wide array of functions, RAM.B.A. is suitable for use in any business environment from a mom-and-pop grocery store to a multinational corporation. Its ease of use and clear documentation make it accessible to almost anyone, whether you have a business background or not. It lacks on-line help, but it is not really complicated enough to require it.

Although the minimum system requirement for RAM.B.A. is 136K, you're going to need more memory than that if you want to run it within your regular application programs. It doesn't seem to have any problems with other memory-resident programs, such as Sidekick or HQ, and it isn't copy-protected.

Phone support is limited: Pitlak Corp. is a one-man operation, and calls are picked up by an answering machine. At present, RAM.B.A. is only available directly from Pitlak.

Using RAM.B.A.

With most packages like this one, if you push the wrong key or select the wrong option, pressing the appropriate key backs you out of the mistake. Unfortunately, RAM.B.A. doesn't have such a feature. If you choose the wrong menu option or enter the wrong number in a calculation, you just have to follow the process to the end and start all over again—typing more carefully the next time.

The option that helps you calculate loan payments is a good example of RAM.B.A.'s operation. Suppose that you are considering the purchase of a Tandy 3000 HD with a 40-megabyte hard disk. You'll need to borrow $3,000, but you aren't sure how much the monthly payments will be. You're also concerned about how much total interest you will pay if you borrow the money at your bank for two years at 18 percent interest, or if you borrow the same amount at your credit union for three years at 16.5 percent.

RAM.B.A. is suitable for use in businesses from mom-and-pop groceries to multinational corporations.

RAM.B.A.'s loan-payments option offers these three choices: interest-only loan, conventional mortgage, and loan with balloon payment. This is slightly misleading, since the choice you need when figuring for a typical small loan is conventional mortgage, a menu option that doesn't have much to do with purchasing a house.

You are then prompted to enter the amount of the loan, the interest rate, the number of payments per year, and the duration of the loan. For the bank loan, RAM.B.A. calculates that you would pay $149.77 per month, for a total payback of $3,594.53 over two years. For the credit union loan, you would pay $106.21 a month for a total payback of $3,823.67 over three years.

RAM.B.A. also displays a payment schedule that shows, on a month-to-month basis, the part of each payment that goes to pay on the interest and principal, as well as the remaining balance on your loan.

Decision with Human Factors

RAM.B.A.'s human-factors decision-making advice is based on a management-science technique called Vroom's Decision Tree. The underlying idea is that there are only five ways to make a decision, all based on variations of making it yourself or consulting your co-workers. Based on your statements about the situation, RAM.B.A. analyzes the problem and advises you on which method to use.

RAM.B.A. asks a series of questions about the nature of the problem, the available data, and how important it is that co-workers support your decision. Suppose, for example, that you must decide whether or not to build a new plant in Cleveland.

RAM.B.A. asks: "Is the quality of the decision important? That is, is one solution likely to be more rational than another?" If you answer "yes," then the session might continue as follows: "Do you have sufficient data to make a high-quality decision?" (No.) "Is the problem structured? That is, do you know where to find data?" (No.) "Is acceptance of the decision by your subordinates critical to the effectiveness of your solution?" (Yes.) "If you make a unilateral decision, will it be accepted?" (Yes.)

Finally, based on your responses, RAM.B.A. advises: "Share problem with subordinates as a group, getting their ideas and suggestions. Then solve problem yourself."

Summary

RAM.B.A. is an easy-to-use collection of 24 useful business decision-making aids. It has no way to back out of operator errors, and I didn't have much luck with phone support. However, the package is straightforward enough that these are not major problems. ■

1. Effective Interest Rate
2. Compound Interest
3. Present Value of Lump Sum
4. Present Value of Annuity
5. Future Value of Lump Sum
6. Future Value of Annuity
7. Return on Irregular Flow (IRR)
8. Loan Payments
9. Commercial Paper Discounts
10. Economic Order Quantity
11. System Reliability
12. Growth Rates
13. Monte Carlo Simulations
14. Mark Ups
15. Break Even
16. Ratio Analysis
17. Depreciation
18. Inflation
19. Linear Regression
20. Moving Average
21. Alternate Price Lists
22. Decision—Human Factors
23. Decision—Under Chance
24. Decision—Intangibles

0. Put RAM.B.A. away

Figure. The 24 business calculations RAM.B.A. can perform.

Life Is Just A Phantasie

Phantasie runs on the Tandy 1000/1200/3000 (256K) and requires MS-DOS 2.11 or higher. Strategic Simulations Inc., 1046 N. Rengstorff Ave., Mountain View, CA 94043, 415-964-1353. $39.95

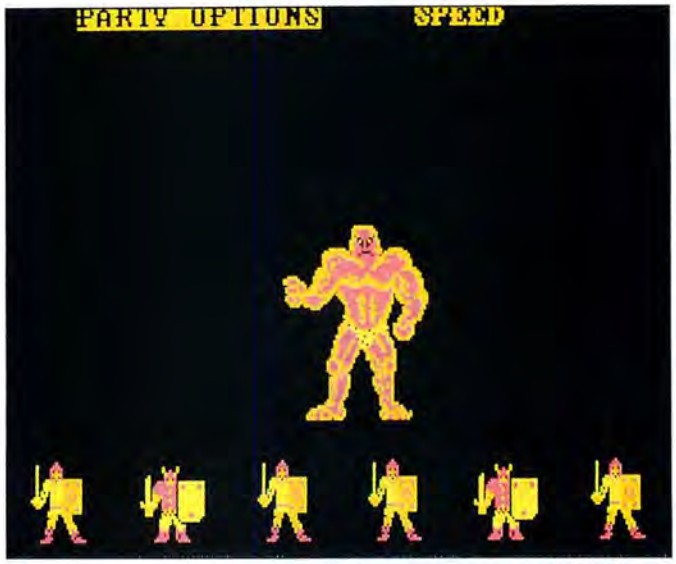

Photo 1. This hearty band of adventurers will make short work of the hill giant.

Every lunch hour for the last week, I've gone on a quest to free the Isle of Gelnor from the clutches of the evil sorcerer Nikademus. So far, my band and I are doing quite well, but 'tis a long quest. I'm not yet ready to face the Black Knights. I've lost many a good elf, gnome, human, dwarf, and halfling along the way.

Phantasie is a role-playing game that takes place in a mythical land of magic and monsters. The object is to gain enough strength, skills, and magic to destroy Nikademus and take his wand.

Putting together the correct six-critter band of adventurers seems to be the key. You need good fighters, spell-casters, and lock-pickers to overcome over 80 types of monsters and numerous dungeons. Once you get the formula, however, the challenge is to keep playing the game until your band has what it takes.

SSI claims the average playing time to be 30–60 hours; I believe it. This game is meant to be played over a period of time, not in one sitting. You travel the island picking up experience points and gold pieces by battling monsters. Once you've amassed a hoard (or are in desperate need of reinforcements), you enter a town where you can train and equip your band, add and drop members, learn new spells, and buy other needed items. A mystic is available to tell you your score.

Good graphics (see Photo 1) and an occasional need for battle strategy held my interest, and I also found the mapping of the Isle of Gelnor and its dungeons interesting. Nonetheless, the game tended to wear on me after a while. I want to know what The Final Battle will be like now. Perhaps I'm just too impatient for this sort of game.

Phantasie has a couple of annoying quirks. While searching each dungeon, the program asks for information from the manual, which you must provide before proceeding. This form of copy protection belongs at the game's startup, not in the midst of play. The enter key brings up the option menus while your band is traveling. Since you use the arrow keys to move your band, I often pressed the enter key by accident on the 1000, forcing me to press escape to get back to play.

All in all, Phantasie is fun. No skill-level rating is given in the package, but I consider the game suitable for beginners to the role-playing genre.

—Michael E. Nadeau

Between Computers And Printers

The Printer Interface Selector 2 (catalog no. 26-2820). Tandy Corp., Fort Worth, TX 76102. $99.95.

I've got a Model 4D and a Tandy 1000, and I use both for word processing. But I've only got one printer, and until I got the Selector 2 (see Photo 2), I either switched cables and considered it a serious inconvenience, or just didn't print from one computer and considered it a serious inconvenience.

Photo 2. Tandy's Printer Interface Selector 2.

The Selector 2, however, lets you connect any two Tandy computers to any two Centronics-compatible parallel printers and send data from either computer to either printer. Your regular printer cables attach your computer(s) to the Selector (its input sockets accept a 36-pin plug), and you'll need 34-pin to 36-pin plug cables (Radio Shack catalog no. 26-4401) from the Selector to your printers.

Six switches on the Selector—five of which are conveniently located on the top front—let you turn it on and configure it for your system. One switch lets you choose the printer you want to use, and one lets you choose the computer, or you can set it to scan the incoming lines to automatically lock onto the machine that is sending data. LED indicators show you which input and output channels are in use.

One switch lets you choose between a Tandy or an IBM-compatible printer, and another lets you decide whether or not you want to append a document separator (a form feed or beep) when you're sending data in the automatic input-scanning mode. The command switch on the rear of the Selector determines whether or not the device will recognize software control codes. Turn this switch off when you're printing graphics.

Software control codes override the switch settings, and the Selector's manual gives the codes you need to select the output channels, to toggle the unit between recognizing and not recognizing other control codes (e.g., to prevent the Selector from interpreting graphics data as control codes), and to toggle between Tandy mode and IBM-emulation mode.

The Selector 2 works just fine, except that every once in a while it sends a form feed to the printer while it's idle. Maybe it's not the Selector 2, but I never had that problem before I added it to my system.

The Selector is only 6 by 7 by 2 inches, but with a power cord and three ribbon cables (it could be four) coming out of its back, it still doesn't fit neatly on a desk crowded with two computers, a printer, and a disk box. But then, I have trouble finding space for my coffee cup, too. I'm thankful for the Selector 2: It's turned my two computer systems into a two-computer system.

—Mark Reynolds

Circle 157 on Reader Service card.

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26-1070	Mod 4D 64K 2DD	1199	838	843	848	26-1280	DMP 130 100cps	359	238	243	248
25-1020	VM-4 Monitor	129	91	96	101	26-1277	DMP 430 180cps	699	479	484	489
25-1023	CM-5 Color Monitor	299	202	207	212	26-2812	DWP 230 200wpm	459	297	302	307
25-1053	100HX 256 IDD	699	489	494	499	26-2800	DWP 520 500wpm	995	681	686	691
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Life Above 640K

The LIM Expanded Memory Specification: what it is and what it can do for you.

by Jeff Holtzman

At one time it seemed that 64K of memory was sufficient for any serious task done on a personal computer. The original IBM PC had on-board capacity for a maximum of 64K of memory, and even with expansion cards you couldn't expand memory beyond about 540K. No one foresaw then that 64K would soon be hardly enough to hold the operating system, much less Dbase II, Wordstar, and other powerful applications programs. However, even at that early stage, 128K was the minimum amount of useful memory.

As for the maximum amount of memory, Microsoft (which didn't actually write the first version of MS-DOS) took a "conservative" approach. Even though it was inconceivable that anyone would ever need so much memory, MS-DOS allowed 10 times the amount everyone was used to—the familiar 640K. And at the time it seemed to be a wise decision. Memory was still fairly expensive at the beginning of the decade; it wasn't until the mid-1980s when memory became so cheap that 640K became a standard of its own.

System Requirements

Tandy 1000/3000
MS-DOS
Turbo Pascal
EMS board (optional)

But a corollary of Murphy's law states that programs expand to fill the amount of memory available to them. Business users were creating spreadsheets so large that 640K simply wasn't enough to hold all their data. RAM-resident programs like Sidekick were also gobbling up RAM so that those spreadsheets had even less memory.

Eventually two of the biggest microcomputer software companies (Lotus and Microsoft) got together with chip manufacturer Intel and figured out a way to cram more RAM in the PC than it was originally designed to hold. The result is called the LIM (Lotus, Intel, and Microsoft) EMS (Expanded Memory Specification).

Segmented Memory

The 8088 has 20 address lines. Therefore, it can access 2^{20} bytes (1 megabyte [MB], or 1,048,576 bytes) of memory. That memory is divided into 16 segments, as shown in Figure 1. Each segment comprises 64K of memory. For the sake of simplicity, I'll assume that segments always start on an even multiple of 64K, although in reality a segment can begin at any multiple of 16.

In general, all the memory in the first 10 segments (00000 to 9FFFF hexadecimal [hex]) is available for user programs; the memory in the top six segments (0A0000 to 0FFFFF hex) is used for system software (BIOS [basic input/output system] and Basic ROMs), video adapters, and so on. The user-program memory is called DOS memory or conventional memory.

Other microprocessors in the 80x8x family have wider data buses (16 bits versus the 8088's 8 bits), extended address buses, and more powerful but DOS-incompatible modes. However, all can operate (and most do, at present) in a simulated 8088 mode in which segmented addressing operates as described above.

For example, the 80286, used in the Tandy 3000, can operate in two modes: real and protected. In real mode, segment addressing works as described above. However, in protected mode, it doesn't. In fact, the segment registers inside the microprocessor function in a much more reasonable manner, allowing programs to address much more memory (16MB) in a linear (non-segmented) mode, much like the 68000.

Memory located above the 1MB limit of the 8088 is called extended memory; it can be accessed only by an 80286 or 80386 running in protected mode. Therefore, a Tandy 1000 cannot have extended memory unless an 80286-based accelerator card is present in the system. Table 1 summarizes how extended memory differs from expanded memory.

Since MS-DOS does not run in protected mode, it can't have *direct* access to extended memory. You can, however, obtain *indirect* access to extended memory, using it as a printer buffer or a RAM disk,

for example. However, using a program such as a virtual disk in extended memory is risky, because the microprocessor must be switched from real to protected mode to access the memory above 1MB, and while switching to protected mode, it won't respond to normal interrupts. Therefore, keystrokes can be lost, as can information from a serial port.

The point here is that, due to shortsightedness in the design of the original MS-DOS, you are now unable to access the power of advanced microprocessor hardware. And that lack is the origin of EMS.

Interrupt Vectors

The 8088 stores a number of pointers in low memory; those pointers tell the microprocessor where to go to perform special functions whenever an interrupt occurs.

An interrupt can be generated in several ways: from an external piece of hardware (e.g., the keyboard, a disk drive, or a memory-parity error), internally by the microprocessor itself (when single-stepping through a program or when attempting to divide by zero), and through software.

The ROM BIOS and MS-DOS each provides a number of software interrupts that allow programmers standard ways of doing common tasks like writing to screen, printer, and disk. In addition, software external to the operating system can either modify the workings of a DOS-supplied interrupt routine or install its own independent interrupt routine that is accessible through otherwise unused interrupt vectors. Most memory-resident programs use the former approach; the EMS memory-control software uses the latter.

Each interrupt vector consists of 4 bytes of memory: one 2-byte segment pointer and one 2-byte offset pointer. There are a total of 256 possible interrupts, and the interrupt vectors begin at location 0000:0000 in memory. Therefore, the first 1K (256 × 4) of memory (through 0000:03FF) stores interrupt vectors.

Memory Mapping

MS-DOS uses a number of locations for storing various sorts of data about the computer; that storage area begins at 0000:0400. For example, the 2 bytes stored beginning at 0000:0413 indicate the amount of conventional memory in the system.

The operating system as a whole comes in several chunks, including the BIOS in ROM (which is located in the highest segment, 0F0000 hex) and several disk files (IBMBIO.COM and IBMDOS.COM). Those disk files are loaded above the data area.

Loaded next are the file buffers and device drivers specified in the Config.SYS file (if any). Last, Command.COM is loaded, Autoexec.BAT is executed, and control reverts to the user. When you boot under MS-DOS 3.2, with no device drivers or file buffers installed, the system takes up 43K of memory—almost the entire memory of the original PC! Figure 2 shows the system memory map up to the point before Autoexec.BAT is executed.

You'll notice back in Figure 1 that several segments (D000:0000 and E000:0000) are undefined. They were originally designed for plug-in ROM cartridges (for the IBM PCjr), but they were never put to any use. Other segments are defined but might not be used on a particular machine. For example, the 0A0000 hex segment is legally used only for the EGA's (Enhanced Graphics Adapter's) memory or for font tables and bit-mapped graphics in the new VGA (Video Graphics

Array) hardware, and the 0C8000/hex segment has the hard-disk controller ROM.

EMS uses one complete 64K segment, usually D000 or E000, to provide a window into as many as 512 pages of memory, each of which contains 16K of memory, for a possible total of 8MB of memory.

EMS memory is implemented using a technique known as bank switching. The technology is not new, only its application to the IBM PC and compatibles.

EMS Hardware

The principle of how EMS works is not difficult. The 8MB EMS space is broken into 512 16K chunks. Those chunks are accessible one at a time—in other words, you can map any 16K chunk of EMS memory into one of the page frames in the selected window. The window's address is usually selected by means of a DIP switch on the EMS board; one of four 16K page frames is selected through a well-defined set of software-interrupt functions (discussed below).

Those functions cause the EMS driver (which is loaded with the Config.SYS file) to alter various hardware registers on the EMS board; those registers map particular pages to the chosen page frame.

Unfortunately, most manufacturers of EMS-compatible equipment consider hardware details proprietary. However, AST Research (in conjunction with Ashton-Tate and Quadram) has developed a totally compatible superset of EMS, and it has published specifications concerning the basics of how its hardware works. So I'll discuss AST's approach, which it calls EEMS, for Enhanced Expanded Memory Specification. The AST boards do not fit in the Tandy 1000, but the principles behind the specifications are similar and will suffice for illustrative purposes.

My approach is not unjustified, because EMS itself deals only with the software at the applications level; it says nothing about the hardware that allows the software to work. And just as the EEMS software has been generalized to make it more flexible, so has the hardware.

AST divides the 1MB address space of the 8088 into 64 16K pages of memory. On an AST expanded-memory board, 64 8-bit mapping registers, numbered zero to 63, correspond to those 64 pages. For example, the pointer for memory beginning at 0000:0000 is located in register zero; the pointer for the next 16K block, at 0000:4000, is located in register 1; the pointer for the last block, at F000:C000, is located in register 63.

Each register contains a 7-bit value that points to one of 127 16K pages on the memory board. The eighth bit serves as an enable bit. The memory-manager software prevents mapping expanded-memory pages into portions of the 8088's address space that are used for conventional RAM, a video adapter, and so on, by setting the eighth bit of appropriate registers to zero.

Other registers would also be disabled, depending on the kind of display adapter (monochrome, color, or EGA) or the presence of a hard disk, for instance. By way of contrast, in an EMS (not an EEMS) system, only four registers are present, and they can be accessed only from the upper unused segments (A000 to F000).

The point is that the mapping registers are what bring the 16K logical pages on the expanded-memory board into the 8088's physical address space. But how do you tell the mapping registers which pages you want access to?

You do so with a map-control register that is present in the 8088's I/O (input/output) space. The map-control register is accessible at an I/O address set by a DIP switch on the board. Actually, it is the third hex digit whose address can be varied; the other three are fixed. The address of the map register is specified as 02x9, where the value of "x" is determined by the DIP switch setting.

The first 6 bits of the map-control register allow access to a group of four registers, the seventh bit controls a dual-page mode I will not discuss here, and the eighth bit provides a global enable function. To avoid potential conflict, the eighth bit is reset at power-up by hardware, so all EEMS memory is disabled until the EEMS driver software (if present) sets that bit.

A group of four page registers is acces-

What Can EMS Memory Do For You?

Since Lotus Development Corp. was one of the designers of the Expanded Memory Specification, 1-2-3 and Symphony use EMS memory and let you build bigger spreadsheets. But you needn't be a spreadsheet user to enjoy the benefits of EMS memory. Below are other applications that benefit from EMS:

- Autocad, a computer-aided drafting program, automatically senses the presence of EMS memory and stores drawing information there after conventional memory is used up.
- Desqview, a multitasking/task-switching operating environment, can swap active and inactive tasks out to EMS memory and can actually use EEMS memory to perform multitasking.
- PCTools, a collection of disk- and file-maintenance utilities, can be configured to run in a RAM-resident mode in which it stores much of its program code in EMS memory. Then you can call up the utilities from within any application program—your word processor, for example.
- The Ready! outline processor can store its program code and your outline data in EMS memory.
- Print buffer and RAM-disk programs are usually included with EMS memory boards. These are the most likely applications of EMS memory for many users.

EMS Boards for the Tandy 1000

The list that follows covers EMS boards that fit in the Tandy 1000. [*Ed. note: Keep in mind that* 80 Micro *has not tested all of these.*] It's possible with the recent surge of products that the list is not comprehensive. If you decide to purchase an EMS board (particularly by mail order; see this month's The Home Computerist, p. 80), be certain to ask if the board will fit in the Tandy 1000; many available for MS-DOS compatibles do not.

Consider your long-term needs when buying an EMS board. You can't mix boards from different manufacturers; so if you think you might want to add a second board at some time in the future, choose one from a manufacturer you'd care to buy from again.

Maxi Magic EMS board (1000 SX only)
$199 (unpopulated), expandable to 2MB
Everex
48431 Milmont Drive
Fremont, CA 94538
415-498-1111

Bocaram/XT (see Express Checkouts, August 1987, p. 44)
$345 (1MB), $575 (2MB), $245 (256K expansion card)
Boca Research Inc.
6401 Congress Ave.
Boca Raton, FL 33431
305-997-6227

EMS5150 2MB board
$229.95 (256K)–$549.95 (2MB)
Includes EMS driver, RAM disk, printer spooler, and memory test
Micro Mainframe
322 East Bidwell
Folsom, CA 95630
916-985-7501

sible at I/O locations 02x8, 42x8, 82x8, and C2x8 hex. Note that each register is separated from its neighbor by 4000 hex (16,384). Which group is accessible depends on the value in the map-control register (at 02x9 hex). For example, if a value of 10000000 (binary) were written to the map-control register, mapping registers zero, 1, 2, and 3 on the EEMS board would be accessible through I/O locations 02x8, 42x8, 82x8, and C2x8 hex. And it is the contents of those registers that map the 16K chunks of memory on the EEMS board into the 8088's address space.

So, the overall process for accessing a specific 16K EMS page would be like this: Write the appropriate value to the map-control register to ensure that the 64K EMS window appears at the desired location. A value of 10110100 (34 hex plus the eighth bit), for example, would enable the four registers corresponding to the 0D000 hex segment to be accessed at four I/O addresses as discussed above. Then by writing the appropriate values to those ports, you could force particular EMS pages to be mapped into the appropriate 16K blocks in the 0D000 hex segment.

That, in a general way, is how the EMS hardware and driver work; I won't discuss the internal workings of the EMS driver. To use EEMS (or EMS) memory, you don't need to worry about the various pointer registers; in fact, you won't need to know anything about logical-to-physical mapping. So let's go on to find out how to use EMS memory.

EMS Software

The basic procedure for using EMS memory is this: First you must ensure that an EMS software driver is present; then you must ensure that its version number is acceptable. If so, next you'll try to allocate the desired number of 16K chunks of memory. If that is successful, your program is assigned a "handle" by which you get access to your pages. You'll have to keep track of the contents of each page yourself, and let the EMS software driver move them in and out of physical memory as necessary.

Interrupts and Functions

You communicate with the EMS memory driver through software interrupt 67 hex. Depending on the state of various CPU registers, the driver executes various functions; Table 2 lists the most commonly used functions, registers, and the actions performed. Other functions are used to control the hardware directly

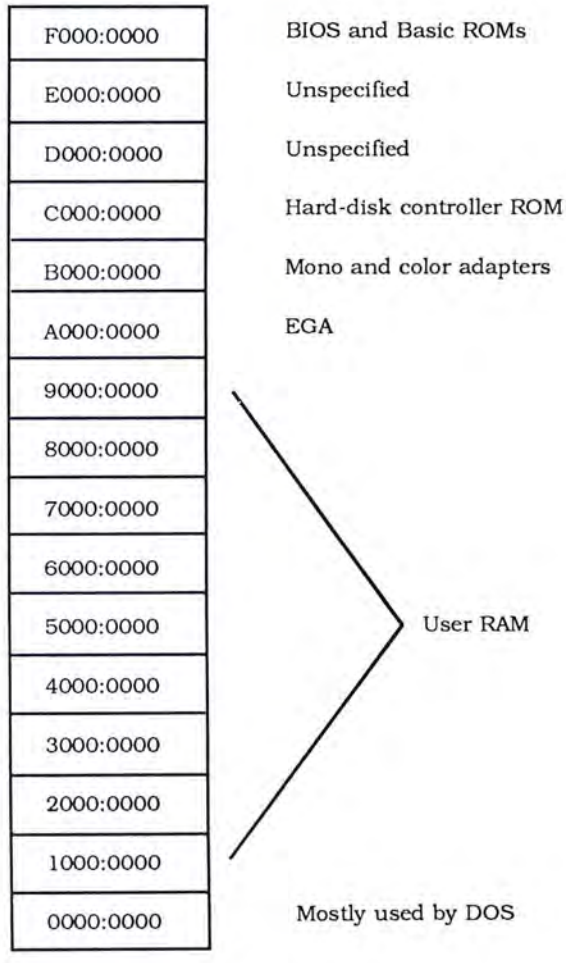

Figure 1. Memory segments of the 8088.

	Maximum	Address Space	Processor Type	Processor Mode
Conventional	640K	Physical	All	Real
Extended	16MB	Physical	80286, 80386	Protected
Expanded	8MB	Bank-switched	All	Real

Table 1. Types of memory and their differences.

XRAM
$259.95, expandable to 2MB ($422.95)
PBJ Inc.
503 East 40th St.
Paterson, NJ 07504
201-523-8663

Maxit
$195 for 256K
Osborne/McGraw-Hill
2600 Tenth St.
Berkeley, CA 94710
415-548-2805

Master/Card (1000A, 1000 SX)
$455, includes EMS emulation software, print spooler, clock, RAM-disk software
Automation Facilities Corp.
6383 Rose Lane
Carpinteria, CA 93013
800-543-2233; in CA, 805-684-5464

Turner Hall Card
$99.95 for 256K
Turner Hall Publishing
10201 Torre Ave.
Cupertino, CA 95014
800-556-1234; in CA 800-441-2345

(which Intel specifically cautions against) and to write RAM-resident programs, RAM-disk drivers, multitasking programs, and other advanced applications that do not concern us.

In any given program, several functions would be called only once, at the beginning. Function 7, for example, returns the EMS software-driver version number; function 1 invokes a hardware/software status-check routine; and function 2 returns the segment address of the EMS page frame.

Functions 3–6 constitute the core of the EMS memory-manipulation procedures. Function 3 returns the number of unallocated 16K pages, allowing you to find out whether your application can run with that amount of memory.

Function 4 lets you allocate a number of 16K pages and returns a handle by which you can refer to those pages. A given program can request more than one group of pages; the EMS driver assigns a unique handle for each group.

Function 5 allows you to map specific EMS pages into the physical address space; in most applications, that function call is made most often.

Last, function 6 is the complement to function 4; it lets you deallocate the pages associated with a specific handle. The deallocated pages are returned to the EMS "pool" and can be reused as necessary.

It's important to understand that if a program does not deallocate the pages it no longer needs before exiting to DOS, those pages will be unavailable subsequently (until the machine is reset). This might sound like a disadvantage, but it's not. For example, you want a RAM-disk driver or a print spooler to maintain ownership of a group of pages after the driver itself loads and control of the machine reverts to DOS (i.e., you get the familiar A> prompt).

What you do with the allocated pages is up to you. You can store data or code there. You could even use an EMS page for the stack, although you shouldn't, because if your stack page were inadvertently mapped out of the physical address space, you could count on pressing the big red reset button to restore operation.

You must know one other thing to use EMS memory in your own programs: how to determine whether EMS RAM and an EMS driver are present in the target system. Intel shows two methods of making that determination; in my example program, I'll use the more general of the two.

Function	Call Values	Return Values*	Description
1	AH = 40 hex	none	Get status
2	AH = 41 hex	BX = address	Get window address
3	AH = 42 hex	BX = unallocated DX = total	Get page count
4	AH = 43 hex, BX = no. of pages	DX = handle	Allocate pages
5	AH = 44 hex, BX = logical page, AL = physical page, DX = handle	none	Map pages
	CX = handle	none	
7	AH = 46 hex	AL = version	Get version number

* For all functions, AH = 0, if no error; consult the official literature for other error codes.

Table 2. EMS functions.

```
Conversion and display routines
    function MakeHexStr (num : real) : HexStr;
    procedure WriteDecHex (Num : real);
    procedure WriteDecHexB (Num : real);
BIOS/DOS routines
    function GetBIOSSize : integer;
    procedure GetDOSValues;
    procedure WriteDOSValues;                          {Display DOS parms}
Low-level EMS routines
    function IsEMS : boolean;                          {Is EMS present?}
    procedure EMSFunction (FuncNum : integer);
    procedure GetStatus;                               {Set status variable}
    function GetVersion : real;                        {Get EMM* version}
    function GetAddress : real;                        {Get EMS page-frame address}
    function GetPageTotal : integer;                   {Get no. of EMM pages}
    function GetPageUnused : integer;                  {Get no. of unused EMM pages}
    function AllocPages (NoToAlloc : integer) : integer;
    procedure MapPages (Logical, Physical, Handle : integer);
    procedure DeAllocPages (Handle : integer);
High-level EMS routines
    procedure FillEMSScreen (Screen : integer; c : char);
    procedure ShowScreen (ScreenNo : integer);
    procedure TestEMS;
    procedure DoEMS;                                   {Get/display EMS stats}
    procedure ScreenTest;

* Expanded Memory Manager
```

Table 3. Memstat program summary.

A Practical Example

You might think that working with EMS RAM is best done in assembly language, but this is not the case. In fact, I developed a set of routines in Turbo Pascal that insulate you completely from the problems of assembly. You can use those routines as the basis for your own programs.

Those routines are included in the program Memstat (see the Program Listing). As its name suggests, the program provides a status report on the memory in your system. Memstat reports on both conventional memory (that beneath 0A0000 hex) and EMS memory, if present. A sample output screen is shown in Figure 3.

To use the program, type MEMSTAT at the DOS prompt. If you want to see a demonstration of how EMS memory can be used as a display buffer, add the /T switch. To run the demo on a color monitor, add both /T and /C.

You'll notice that your system reports three values for the amount of DOS memory. The first two values should always agree, since the amount stored in the system area of low RAM (RAM size), which is usually read from motherboard switches, should be the same as that reported by the BIOS (BIOS size). The amount stored in a program's PSP (program segment prefix) usually equals the previous two values, but might not when you run programs that use high memory—some RAM disks and programs like Dosamatic, Doubledos,

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and Software Carousel, which let you switch among several not usually resident programs.

The next three values tell you how much memory has been used, how much is still free, and the address where programs will load. Those values can be useful for program debugging.

If an EMS software driver (and EMS memory) is present, the program also reports several values of interest, including the software version, the segment location of the software driver, the page frame into which EMS pages are mapped, the total number of EMS pages, and the number that are free. Note that the reported total may not equal the total amount of RAM on your EMS board if you use some of it to backfill DOS memory.

If you specified the /T switch (or both /T and /C), you are placed into a test mode in which a single EMS page has been broken into four chunks. The contents of each chunk are filled with an ASCII character corresponding to the chunk (zero, 1, 2, or 3). When you enter the test mode, pressing the zero, 1, 2, or 3 key causes the appropriate EMS page to be written directly to the video buffer; you can switch among pages by pressing the appropriate key. Pressing "Q" or escape returns you to DOS.

To see how the program works, refer to Table 3, which lists all functions and procedures used. All but one of the reported DOS values are obtained by peeking (to borrow a term from Basic) at various locations in memory. The procedure GetDOSValues obtains those values. The program obtains the amount of memory the BIOS reports by performing a BIOS interrupt in the GetBIOSSize function.

Dealing with EMS is slightly more complicated. I've categorized the EMS routines in two ways: low-level and high-level routines. You can use the low-level routines in just about any Turbo program that uses EMS RAM; the high-level routines are specific to the demo program.

Low-Level EMS Routines

The first thing you must determine is whether any EMS RAM is present. The function IsEMS does this, returning a value of true or false accordingly. That function works by using BIOS interrupt 21 hex to find where the interrupt 67 hex vector points. If an EMS driver is present, offset location 0A hex in the segment returned by interrupt 21 hex should point to the string EMMXXXX0. IsEMS tests for the presence of that string and returns a value of true if it is present or false otherwise. After reporting the DOS memory values, the main program loop calls IsEMS and then executes the appropriate routines if it detects the EMS driver.

The remaining EMS routines rely on the procedure EMSFunction, which calls the appropriate interrupt 67 hex function and sets the global variable EMSStatus true or false, depending on whether the operation was successful.

The other procedures and functions work as you might expect. GetStatus checks EMS hardware and software integrity and sets EMSStatus true or false accordingly. GetVersion and GetAddress return the EMS software-driver version number and the page-frame address, respectively; GetPageTotal returns the total number of EMS pages; GetPageUnused returns the number of unallocated pages.

Memstat only uses the remaining low-level EMS routines when you call it with the /T switch (or /T and /C); they allow you to allocate and deallocate EMS pages and to map them to your page-frame address.

The AllocPages function is simple; just call it with the number of 16K chunks you want to obtain and check EMSStatus afterward. It will be true if your request was granted. The value that AllocPages returns is the handle by which you must henceforth refer to that group of pages. You need the handle to map and to deallocate pages.

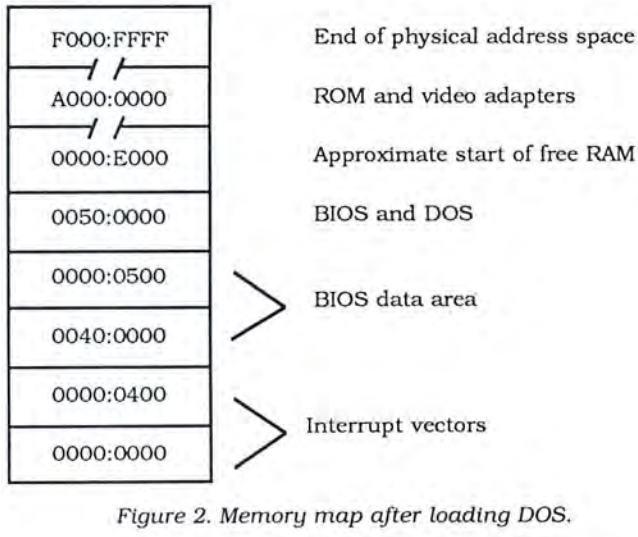

Figure 2. Memory map after loading DOS.

```
C>memstat/t
Usage: A>memstat [/c] [/t]
                    /t  for EMS test
                  /c  for CGA EMS test
          DOS VALUES
      RAM Size:  655360   A0000
     BIOS Size:  655360   A0000
      PSP Size:  655360   A0000
   Used Memory:  297136   488B0
   Free Memory:  358224   57750
Loading Address:  18571   0488B
          EMS VALUES
   EMS Version:     3.2
     Driver at:    2389   00955
  Page frame at:  917504   E0000
   Unused Pages:     64   00040 ( 1048576 bytes )
    Total Pages:     64   00040 ( 1048576 bytes )
 Press 0, 1, 2, 3, or Q to continue
```

Figure 3. Printout of sample Memstat display.

Program Listing. Memstat, a program that provides a status report on system and EMS memory.

```
program memstat;
     {
      jkh  04-25-87
      display status of all DOS and EMS memory
      mod 05-10-87: allow for color display
     }

const HexChr : array[0..15] of Char = '0123456789ABCDEF';
      EMSdevice = 'EMMXXXX0';
      EMSDriverOfs = $0A;    {location of EMS
```

Listing continued

DeAllocPages is even simpler; just call it with the appropriate handle, and then check EMSStatus afterward to ensure a successful operation. Remember that if you don't deallocate a handle's pages, you can't recover them until you reset the machine.

The MapPages procedure is slightly more complex; you must call it with three values: the logical (EMS) page you want to map, the 16K physical page (zero, 1, 2, or 3) into which you want to map it, and the handle that "owns" that page. You have no restrictions on which logical pages you map into which physical pages; you could map the same page four times, or you could map four different pages. You must exercise great caution if you map program code into the window or use it for a stack, because if that window is deallocated while you are using it, havoc results.

High-Level EMS Routines

FillEMSScreen fills a 4,000-byte chunk of EMS RAM with alternating character and attribute bytes. Both the page (zero, 1, 2, or 3) and the character are passed as parameters to the routine.

The procedure ShowScreen simply performs a block move of the desired screen (which is contained in EMS RAM) to the actual screen buffer (0B0000 or 0B8000 hex for monochrome or color, respectively).

The TestEMS procedure allocates a single EMS page and stores the handle assigned to it. Next it fills each 4,000-byte chunk with the appropriate ASCII character. Then it goes into a loop in which it reads the keyboard, displays the appropriate screen for keys zero, 1, 2, or 3, and exits when you press "Q" or escape.

TestEMS is called by ScreenTest, which itself is called from the main program loop, which simplifies the main loop's logic. The remaining high-level EMS routine (DoEMS) simply displays the page-frame address, allocated and free pages, and other information.

Main Loop

The main program loop first reads any parameters passed to the program from the command line and builds up one big string containing all of them. It then forces all characters in the line to uppercase and sets the video-segment pointer (VideoSeg) to either the color or the monochrome buffer, depending on whether you specified the /C switch on the command line. Because the program writes character and attribute directly to the screen buffer, you'll get garbage on the screen if you try to run Memstat on a color system running in a graphics mode.

The program then displays a short help message, followed by the DOS memory values. Next it checks for the existence of the EMS driver software. If none is present, the program states so and terminates. Otherwise, it displays the EMS memory characteristics and executes the ScreenTest routine if you specified the /T switch on the command line. After you press "Q" or escape, the program terminates.

Writing a string of zeros to the video buffer might seem pointless. However, you can put the illustrated principles to serious use. Suppose, for example, that you were writing a word-processing program and wanted to display pages of text or help files quickly. Rather than using FillEMSScreen to load the EMS buffers, you could locate your screen buffers in EMS RAM, or you could load the help files there as part of the program's initialization procedure. Then ShowScreen or a similar routine could provide the kind of snappy response you expect from quality programs.

Conclusions

EMS RAM arose from the need for more memory and from shortsightedness in the original design of MS-DOS. However, EMS memory is here to stay and can be a valuable resource to systems and applications programmers, computer hobbyists, and just plain users. This information will help you understand how it works, what its limitations are, and how to put it to use in your own programs. ■

Jeff Holtzman is a free-lance writer and computer consultant. You can write to him at 30-59 43rd St., Astoria, NY 11103.

Listing continued

```
                                  device name string}
        NoDigits = 5;             {number of hex digits
                                   in conversion routine}
        NumWidth = 8;             {for numeric
                                   formatting}
        MonoSeg = $B000;          {Mono display buffer}
        ColorSeg = $B800;         {Color display buffer}
        EMSScreen = $1000;        {EMS display screen size}
        VIDScreen = 4000;         {Video screen buffer size}
        ContMsg = ' Press 0, 1, 2, 3, or Q to continue ';

type    AllRegs = record case integer of
          1 : (AX,BX,CX,DX,BP,SI,DI,DS,ES,FLAGS : integer);
          2 : (AL,AH,BL,BH,CL,CH,DL,DH          : byte);
              end;
        HexStr = string[NoDigits];

var     TotalSize     : integer absolute $0000:$0413;
        RAMSize,
        BIOSSize,
        PSPSize,                        {DOS RAM variables}
        UsedRAM,
        FreeRAM       : real;

        VidSeg        : integer;        {for video write}

        Registers     : AllRegs;
        EMSDriverSeg  : integer;        {where EMS driver is}
        EMSPageAddr   : integer;        {where EMS frame is}
        EMSStatus     : boolean;        {All EMS routines set this}

        ParmString    : string[80];
        i             : integer;
        c             : char;

function MakeHexStr (num : real) : HexStr;
  {Convert dec number to hex string}
  var i, j, x : integer;
      y       : real;
      s       : HexStr;
begin
  s := '';
  for i := NoDigits-1 downto 0 do begin
    y := 1;
    for j := i-1 downto 0 do y := y * 16;
    x := trunc(num/y);
    s := s + HexChr[x];
    num := num - (x * y);
  end;
  MakeHexStr := s;
end;

procedure WriteDecHex (Num : real);
  {Write decimal and hex version of Num}
begin
  writeln (Num:NumWidth:0,MakeHexStr(Num):NumWidth);
end;

procedure WriteDecHexB (Num : real);
  {Write dec and hex version of Num with dec bytes}
begin
  write   (Num:NumWidth:0,MakeHexStr(Num):NumWidth);
  num := num * 1024 * 16;
  writeln (' (',Num:NumWidth:0,' bytes )');
end;
```

Listing continued

Listing continued

```
function GetBIOSSize : integer;
  {Get BIOS Size in K}
begin
  intr($12,Registers);
  GetBIOSSize := Registers.AX;
end;

procedure GetDOSValues;
begin
  RAMSize := TotalSize;              {Size in system RAM}
  RAMSize := RAMSize * 1024;
  BIOSSize := GetBIOSSize;           {Size from BIOS}
  BIOSSize := BIOSSize * 1024;
  PSPSize := mem[cseg:2]             {Size in PSP}
           + mem[cseg:3] * 16;
  PSPSize := PSPSize * 256;
  UsedRAM := CSeg;                   {Get load address}
  UsedRAM := UsedRAM * 16;
  FreeRAM := PSPSize-UsedRAM;        {Calculate free space}
end;

procedure WriteDOSValues;            {Display DOS parms}
begin
  writeln;
  writeln ('            DOS VALUES');
  write   ('       RAM Size:');
  WriteDecHex (RAMSize);
  write   ('      BIOS Size:');
  WriteDecHex (BIOSSize);
  write   ('       PSP Size:');
  WriteDecHex (PSPSize);
  write   ('    Used Memory:');
  WriteDecHex (UsedRAM);
  write   ('    Free Memory:');
  WriteDecHex (FreeRAM);
  write   ('Loading Address:');
  writeln (CSeg:NumWidth,MakeHexStr(CSeg):NumWidth);
  writeln;
end;

function IsEMS : boolean;            {Is EMS present?}
  var i : integer;
      s : string[8];
begin
  Registers.AX := $3567;
  intr($21,Registers);
  EMSDriverSeg := Registers.ES;
  for i := 0 to 7 do
     s[i+1] :=
       chr(mem[EMSDriverSeg:EMSDriverOfs + i]);
  s[0] := chr(8);
  if pos (s,EMSdevice) > 0
    then IsEMS := TRUE else IsEMS := FALSE;
end;

procedure EMSFunction (FuncNum : integer);
  {Do function, set status}
begin
  with Registers do begin
    AH := FuncNum;
    intr ($67,Registers);
    if AH = 0 then EMSStatus := TRUE else EMSStatus := FALSE;
    if not EMSStatus then writeln
       ('HARDWARE/SOFTWARE ERROR, FUNCTION=',FuncNum);
  end;
end;

procedure GetStatus;                 {Set status variable}
begin
  EMSFunction($40);
end;

function GetVersion : real;          {Get EMM version}
  var major, minor : integer;
begin
  EMSFunction($46);
  with Registers do begin
    Major := (AL shr 4) and $0F;
    Minor := (AL and $0F)
  end;
  GetVersion := Major + (Minor/10);
end;

function GetAddress : real;
begin                    {Get EMS page frame address}
  EMSFunction($41);
  EMSPageAddr := Registers.BX;
  GetAddress := (Registers.BX + 65536.0) * 16;
end;

function GetPageUnused : integer;
begin                     {Get unallocated EMM page no}
  EMSFunction($42);
  GetPageUnused := Registers.BX;
end;

function GetPageTotal : integer;
begin                     {Get total EMM page no}
```

Listing continued

Listing continued

```
    EMSFunction($42);
    GetPageTotal := Registers.DX;
  end;

  function AllocPages (NoToAlloc : integer) : integer;
  begin
    with Registers do begin
      BX := NoToAlloc;
      EMSFunction ($43);
      if EMSStatus then AllocPages := DX
        else AllocPages := 0;
    end;
  end;

  procedure MapPages
            (Logical, Physical, Handle : integer);
  begin
    with Registers do begin
      BX := Logical;
      AL := Physical;
      DX := Handle;
      EMSFunction ($44);
    end;
  end;

  procedure DeAllocPages (Handle : integer);
  begin
    Registers.DX := Handle;
    EMSFunction($45);
  end;

  procedure FillEMSScreen (Screen : integer; c : char);
    {fill Screen in EMS RAM with char}
    var ScrnOffs : Integer;    {Offset in EMS RAM}
        i        : integer;
        CharAttr : integer;    {Attribute * 256 + char}
  begin
    ScrnOffs := Screen * EMSScreen;
    i := 0;
    CharAttr := $0700+ord(c);
    while i < VidScreen do begin
      memW [EMSPageAddr:ScrnOffs+i] := CharAttr;
      i := i + 2;
    end;
  end;

  procedure ShowScreen (ScreenNo : integer);
    {move ScreenNo in EMS RAM to Video buffer}
    var i, ScrnOffs : integer;
  begin
    ScrnOffs := ScreenNo * EMSScreen;
    i := 0;
    while i < VidScreen do begin
      memW[VidSeg:i] := memW[EMSPageAddr:ScrnOffs+i];
      i := i + 2;
    end;
  end;

  procedure TestEMS;
    var
    i, Handle : integer;
  begin
    Handle := AllocPages (4);
    If not EMSstatus then write ('EMS ERROR--ABORTING')
      else begin
        for i :=0 to 3 do MapPages (i,i,Handle);
        FillEMSScreen (0,'0');
        FillEMSScreen (1,'1');
```

Listing continued

Listing continued

```
        FillEMSScreen (2,'2');
        FillEMSScreen (3,'3');
        while pos (c,'qQ'+chr(27)) = 0 do begin
          case c of
            '0' : ShowScreen(0);
            '1' : ShowScreen(1);
            '2' : ShowScreen(2);
            '3' : ShowScreen(3);
          end;
          gotoxy(25,12);
          Write(ContMsg);
          read (kbd,c);
        end;
        DeAllocPages (Handle);
        clrscr;
    end;
  end;

  procedure DoEMS;              {Get/display EMS stats}
    var i : integer;
  begin
    GetStatus;
    if EMSStatus then begin
        writeln ('              EMS VALUES');
        writeln ('    EMS Version:',GetVersion:NumWidth:1);
        write   ('      Driver at:');
        WriteDecHex  (EMSDriverSeg);
        write   ('  Page frame at:');
        WriteDecHex  (GetAddress);
        write   ('   Unused Pages:');
        WriteDecHexB (GetPageUnused);
        write   ('    Total Pages:');
        WriteDecHexB (GetPageTotal);
    end;
  end;

  procedure ScreenTest;
  begin
      writeln;
      write (ContMsg);
      c := 'x';
      while pos(c,'0123qQ'+chr(27)) = 0 do read (kbd,c);
      TestEMS
    end;


    begin                               {Main program}

      ParmString := '';
      for i := 1 to ParamCount do
        ParmString := ParmString + ParamStr(i);
      for i := 1 to length(ParmString) do
        ParmString[i] := UpCase(ParmString[i]);
      if pos ('/C',ParmString) > 0 then
         VidSeg := ColorSeg else VidSeg := MonoSeg;

      writeln;
      writeln('Usage: A>memstat [/c] [/t]');
      writeln('                        /t  for EMS test');
      writeln('                  /c  for CGA EMS test');

      GetDOSValues;                     {Get DOS parameters}
      WriteDOSValues;                   {Display 'em}
      if not IsEMS then write ('No EMS Driver Present')
         else begin
           DoEMS;
           if pos ('/T',ParmString) > 0 then ScreenTest;
      end;
    end.
```

End

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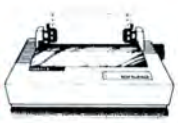

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The Land of the Bulging Files

Put some order to all those small files on your floppies.

by William Barton

Electronic files are compact, but when you're looking for something, you can't paw through them as you would the folders of a file cabinet. If you have more than 100 floppy disks, it can get messy if you don't keep them in order.

Most of my correspondence consists of single-page letters, and most of those letters contain fewer than 1,000 characters.

I needed a correspondence controller to bring order to the chaos of my letters. Since I have more than 112 letters, I must put them in subdirectories, so it seemed reasonable for them to reside in alphabetized directories where I could easily find them. I could have had 26 directories, one for each letter of the alphabet, but that would have been almost as aggravating as having all the files loose on the disk again. Instead, I used a three-letter spread for the directories.

At first, keeping the letters in the directories was a novelty, but the new system soon required much electronic housekeeping, and this aggravated me. I started automating the tasks as I discovered what they were, and from that point the system grew in an organic fashion.

The job breaks down into four distinct areas:

- I had to format the disks and fill them with the appropriate directories.
- For the system to be useful, I had to learn a method of pouring hundreds of old files stored randomly on disks into the directories of the new disks and sorting them properly in the process.
- I needed the program to find a file when I asked for it, and when it found the correct subdirectory, it had to switch to the subdirectory before booting up Wordstar.
- With everything else working properly, I needed to groom the disks to avoid drowning in a sea of old BAK files.

I wrote four DOS batch programs that do exactly these things with the help of two internal utilities that the programs use on their own.

System Requirements

Tandy 1000/1200/3000
Two floppy drives

Start Your Engines

Setup.BAT (see Program Listing 1) is a four-line program, and of those four, only one does anything that relates to the task at hand. The first two lines prevent the program from telling you every move it makes, and the last one verifies that it did what it's supposed to do. The program could consist of the third line only, and it would still work. It creates the eight subdirectories that you need for the alphabetized correspondence files.

I like formatting my new disks in a separate operation, but I could have typed another line into the program, perhaps FORMAT B:/V, after the cls in the second line of the program.

Load 'Em Up

Load is the utility that moves the contents of old "no-directory" disks into the new correspondence system. It sorts them according to the first letter of the file name. I start all of my file names with letters, but if you want to use file names with numbers or symbols, you can modify the program to sort on a broader basis by changing the directory names and passing different parameters through the load-file utilities.

Load.BAT (see Program Listing 2) copies the working program BLOAD.BAT to the disk that will contain the files. Load.BAT gives BLOAD.BAT a set of 26 parameters that represent the letters of the alphabet. BLOAD.BAT uses these parameters to sort files.

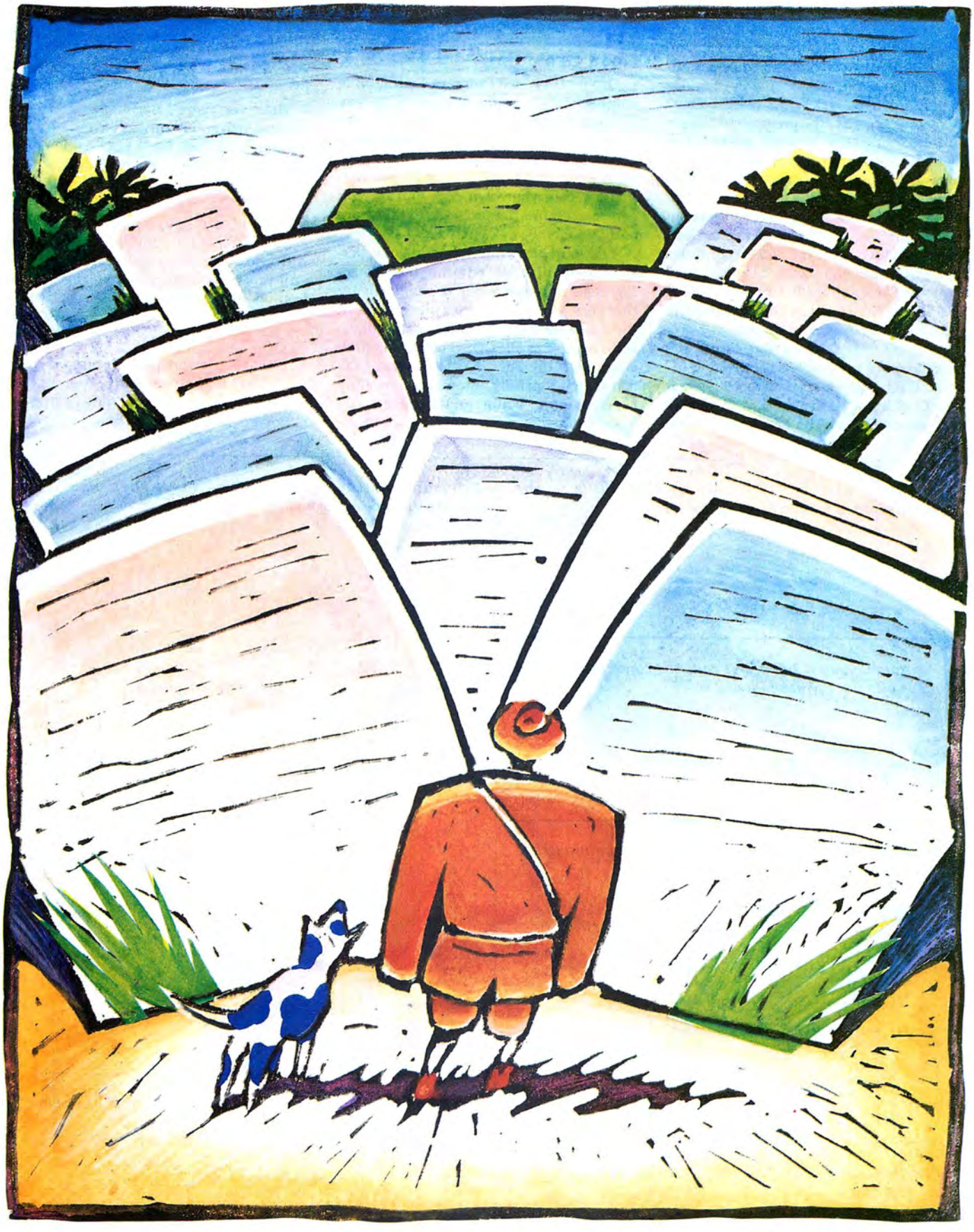
BLOAD.BAT (see Program Listing 3) prompts you to put the source disk in drive A. Then it transfers the files to the proper directories by using the letter parameters it received from Load.BAT. Since no more than 10 parameters can be passed into a For. . .Do loop at one time, this program uses them in groups of three (making one pass for each directory) and then shifts three times to get to the next set. When BLOAD finishes transferring the files, it transfers control to a housekeeping utility called BLOAK.BAT (see Program Listing 4). The name BLOAK.BAT is pointless, but it sounded funny at the time.

Heart of the System

CC.BAT (see Program Listing 5) is the heart of the correspondence-control system. It finds the file you want when you ask for it (provided that you ask for it more or less correctly) and delivers you to your word processor with the appropriate subdirectory in place. I use Wordstar, but you can adapt the program to your own word processor by substituting the WS nearthe end of the program with your owncode.

You can pass two parameters to the program. If you call CC.BAT alone (the fifth line checks for a null parameter in position 1), the word processor starts with the contents of the root directory on the screen. If the program is called with the first parameter as a letter, the word processor boots up tuned to a directory that contains files starting with that letter. For example, if you enter CC N you get the MNO subdirectory. The

Illustration by Mark Matcho



second parameter passes the name of a file to Wordstar's start-up parameter. Entering CC T TEST.DOC logs you into subdirectory STU and then makes Wordstar open the Test.DOC file. If you forget to enter parameter 1 when you enter parameter 2, entering something like CC TEST.DOC momentarily causes the program to "giggle and scream." Then you are delivered to Wordstar's opening menu with the contents of the root directory visible. If this happens, assume you made a mistake. But if you enter CC ! TEST.DOC the correspondence controller directs Wordstar to open your Test.DOC file in the disk's root directory, where you might want it to go.

A word of caution: If you enter CC R TEST.DOC (which is not an unreasonable typo, given the keyboard layout), the program opens Test.DOC for you, but in the PQR directory instead of STU where it belongs. If this happens, you should move it with DOS when you're done, and you realize your mistake. The appropriate commands are:

```
COPY B:\PQR\EST.DOC B:\STU
DEL B:\PQR\TEST.DOC
```

Good Grooming

Groom.BAT (see Program Listing 6) is another simple utility. It iterates its way through the various directories that the system keeps on the disk and does away with all the BAK files that Wordstar and other programs tend to leave. If you normally create your own disk clutter, you can reconfigure the program to take care of that, too.

The four programs automatically perform many of those irritating housekeeping tasks and ease some of the drudgery that goes with using a word processor. But they also do something else. They illustrate the use of MS-DOS's powerful batch command, the For. . .Do loop. This DOS feature lets you fully automate almost any repetitive job. Unfortunately, For. . .Do loops cannot be nested like the comparable commands in Basic and Pascal. DOS forbids the explicit nesting of loops and usually displays an error message on anything like this:

```
FOR %%A IN (1 2 3) DO FOR %%B IN (4 5 6) DO. . .
```

However, there's nothing to stop a programmer from creating a virtual nest like the one in BLOAD.BAT. I used that one to avoid the 10-parameter limit and to build subdirectory names from single-letter parameters. You can use this type of nest to serve almost any function.

MS-DOS is sometimes irritating to deal with. However, it is functional enough for any reasonable purpose. If you're confronted by an unreasonable task, that's why they make programming languages. ■

William Barton is a computer assistance instructor for Health Sciences Consortium. You can reach him at 105 W. Longview St., Chapel Hill, NC 27514.

Program Listing 1. Setup.BAT creates eight subdirectories for correspondence files.

```
echo off
cls
for %%p in (abc def ghi jkl mno pqr stu vwxyz) do md b:\%%p
dir b:
```

End

Program Listing 2. Load.BAT puts the contents of the old disks into the correspondence system.

```
echo off
cls
copy a:bload.bat b:
b:bload a b c d e f g h i j k l m n o p q r s t u v w x y z
```

End

Program Listing 3. BLOAD.BAT uses letter parameters to transfer files to directories.

```
cls
echo Put the source disk in A and
echo off
pause
:top
if %1==v goto mid
for %%p in (%1 %2 %3) do copy a:%%p*.* b:\%1%2%3
dir b:\%1%2%3
for %%p in (1 2 3) do shift
goto top
:mid
for %%p in (v w x y z) do copy a:%%p*.* b:\vwxyz
dir b:\vwxyz
cls
echo Put the Batch/Program Disk back in A and
echo off
pause
a:bloak
```

End

Program Listing 4. BLOAK.BAT is a housekeeping utility.

```
cls
del b:bload.bat
cls
```

End

Program Listing 5. CC.BAT is the heart of the correspondence-control system.

```
echo off
cls
b:
cd\
if .%1==. goto aa
for %%f in (a b c) do if %1==%%f goto abc
for %%f in (d e f) do if %1==%%f goto def
for %%f in (g h i) do if %1==%%f goto ghi
for %%f in (j k l) do if %1==%%f goto jkl
for %%f in (j k l) do if %1==%%f goto jkl
for %%f in (m n o) do if %1==%%f goto mno
for %%f in (p q r) do if %1==%%f goto pqr
for %%f in (s t u) do if %1==%%f goto stu
for %%f in (v w x y z) do if %1==%%f goto vwxyz
goto aa
:abc
cd\abc
goto aa
:def
cd\def
goto aa
:ghi
cd\ghi
goto aa
:jkl
cd\jkl
goto aa
:mno
cd\mno
goto aa
:pqr
cd\pqr
goto aa
:stu
cd\stu
goto aa
:vwxyz
cd\vwxyz
:aa
a:ws b:%2
a:
cls
dir b:
```

End

Program Listing 6. Groom.BAT removes clutter from your files.

```
echo off
cls
cd b:\
del b:*.bak
dir b:
for %%d in (abc def ghi jkl mno pqr stu vwxyz) do del b:\%%d\*.bak
for %%d in (abc def ghi jkl mno pqr stu vwxyz) do dir b:\%%d
cd b:\
cls
echo *DONE*
```

End

by David H. Collins
and Roger C. Alford

All the Way to 320K

Gain four 64K memory banks with this do-it-yourself mod.

You can upgrade your Model 4 or 4P past its 128K memory "limit." By replacing the upper bank of 64K chips with 256K chips, you can have 320K of memory. You must change the circuitry to accommodate a 256-cycle refresh (a 128-cycle is normal) and to use the 256K chips as four switchable 64K banks. This article shows you how to do this and provides you with software to use the extra memory.

Ed. note: This project requires soldering skills and knowledge of the Model 4's circuitry. If you don't feel confident about performing the modification yourself, find someone who can do it for you.

Circuit Theory

The project requires two circuits, which you can most easily build on two separate boards. The first circuit is the refresh counter (see Figure 1), which is responsible for converting the Model 4's 128-cycle refresh circuit to generate the required 256-cycle refresh. Input pin 1 of U1 (74LS393) on the refresh-counter board connects to the active-high refresh signal generated by pin 6 of U87 (74F04) on the Model 4P's board, or pin 16 of U60 (74LS240) on the Model 4's board. This signal also connects to pin 1 of U2 (74LS157) on the refresh-counter board. U1, a dual 4-bit counter, is wired to act as a single 8-bit counter, toggling its 2QD output every 128 refresh cycles. U2 is a quad two-to-one multiplexor.

On the refresh-counter board, the 2QD (pin 8) output of U1 connects to the 1B input of U2 (pin 3). The corresponding 1A input of U2 (pin 2) connects to the computer's dynamic RAM A7 line: it is pin 4 of U110 (74LS157) on the 4P, while on the Model 4 it is pin 9 of U63 (74157). The 1Y output of the refresh-counter multiplexor, pin 4 of U2, must connect back to where the computer's A7 line was going. On the 4P, the 1Y signal should connect to pin 8 of resistor pack RP1; on the Model 4, 1Y should connect to pin 8 of resistor pack RP4.

System Requirements

Model 4/4P
64K RAM
Editor/assembler
Available on The Disk Series

The printed circuit board trace between the computer's A7 line and the respective resistor pack must also be cut. On the 4P, the trace connects pin 4 of U110 (74LS157) to pin 8 of RP1. On the Model 4, the trace connects pin 9 of U63 (74157) to pin 8 of RP4. The new refresh-counter circuit now takes the place of this trace, providing the desired 256-cycle refresh for supporting 256K DRAMs.

Second Circuit

The second circuit, the bank-select circuit (see Figure 2), switches among the four 64K banks. As I will detail later, during an Out instruction to input/output (I/O) port zero, D0 and D1, the two low-order bits of the byte being output, are latched by U5, a 74LS75 latch. The latched bits are then applied to the 1A (pin 2) and 1B (pin 3) inputs of U6, a 74LS157 multiplexor. The output, 1Y (pin 4), is connected (via a 27-ohm resistor) to pin 1 of the 256K DRAMs. This pin, which is unused in 64K DRAMs, is used for address bits 9 and 18 in 256K DRAMs. Four unique values can be applied to address lines 9 and 18 by writing values whose two low-order bits range from zero to 3 to

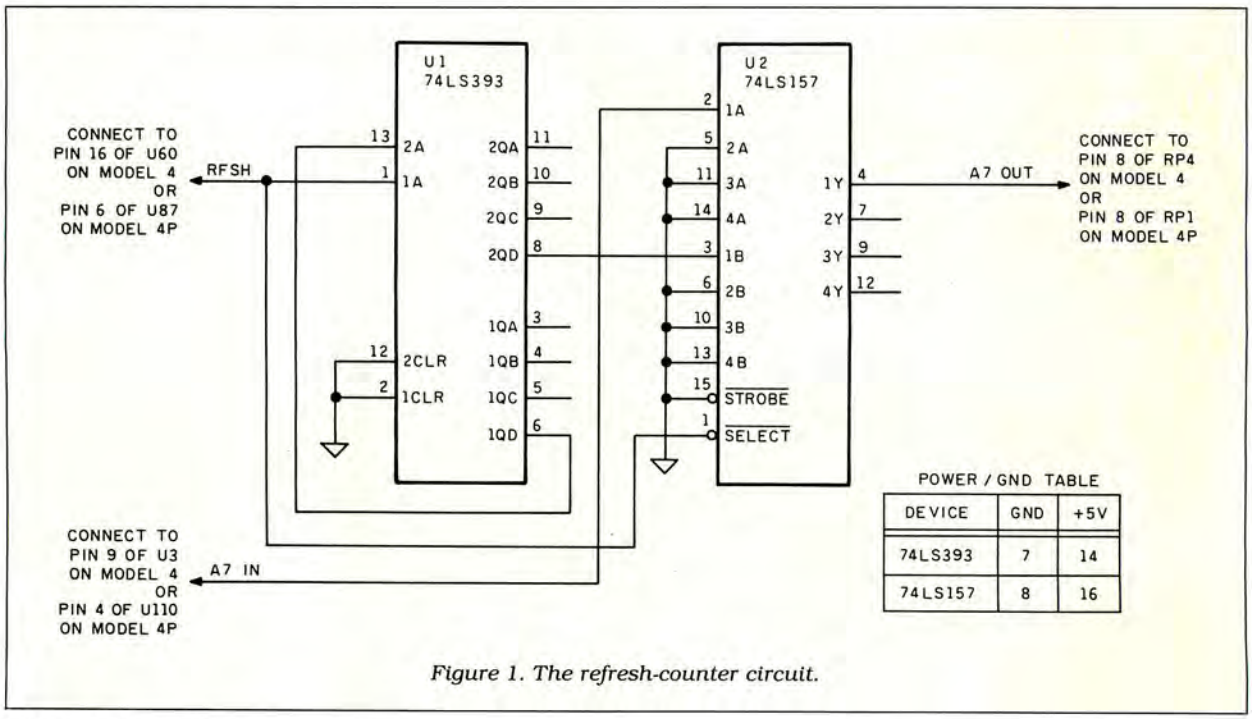


Figure 1. The refresh-counter circuit.

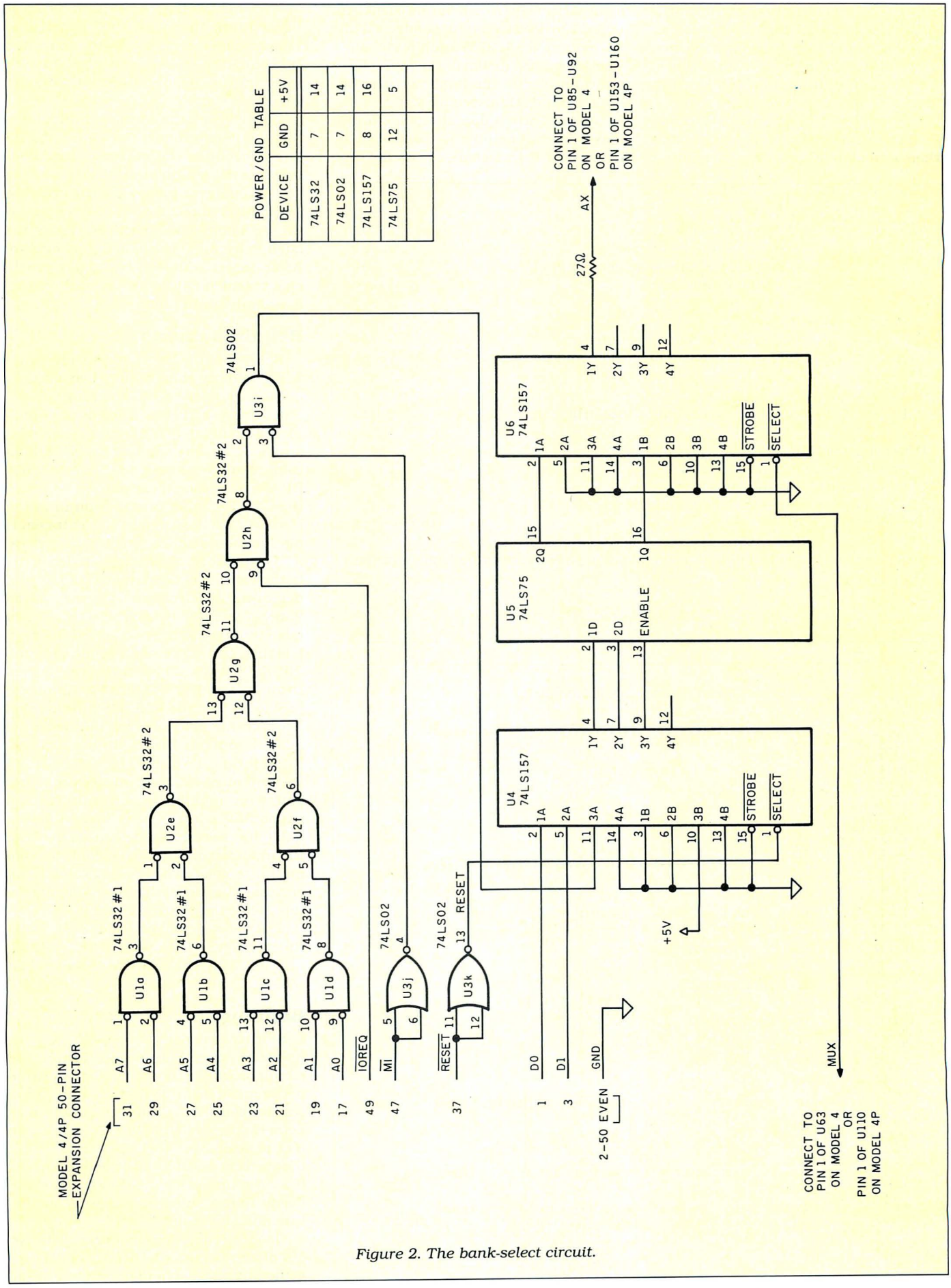


Figure 2. The bank-select circuit.

I/O port zero. This divides the 256K DRAMs into four 64K banks, one for each value. Each bank is accessed in the usual way by the Z80 using its 16 address lines.

Bank zero is automatically placed in context on reset or power-up.

Referring to Figure 2, gates A–J form a decoder to select the bank-select latch when writing to I/O port zero; the output of the decoder goes high during a port zero write. The decoder output connects to the 3A input of a 74LS157 multiplexor (U4). The 1A and 2A inputs of the multiplexor are connected to the low-order data bus lines, D0 and D1, respectively.

During normal operation, the multiplexor select line (pin 1)—controlled by the system reset signal—causes the multiplexor to pass the 1A, 2A, and 3A input signals through to the 74LS75 latch (U5). Thus, when a port zero write occurs, the D0 and D1 bit values are latched into U5, selecting the desired 64K bank (one of four).

During reset, the alternate multiplexor "B" inputs are routed through to the U5 latch, because the active reset signal switches the multiplexor select input. The "B" multiplexor inputs are hardwired to ground (1B and 2B) and +5V written to the U5 latch. This effectively clears the latch, selecting the default 64K bank zero. After reset, software can again freely choose which 64K bank it wants to be active at any given time.

Bank-Select Board		
U1, U2	74LS32 quad 2 input Or gate	25¢
U3	74LS02 quad 2 input Nor gate	19¢
U4, U6	74LS157 quad two-line to one-line multiplexor	35¢
U5	74LS75 4-bit bistable latch	29¢
Refresh-Counter Board		
U1	74LS393 dual 4-bit binary counter	79¢
U2	74LS157 quad two-line to one-line multiplexor	35¢
RAM		
U1–U8	50256P-15 150-ns dynamic RAM (Hitachi)	$3.29
Miscellaneous Parts		
Refresh-counter board (Radio Shack)		$1
Bank-select board (Radio Shack)		$2
Connector for external I/O bus (Radio Shack)		$3*
Sockets (if desired)		10–30¢ each

*Type will vary. The Model 4P has a 50-pin edge connector; the Model 4 has a 50-pin plug.

Table. The chips used for Model 4/4P RAM expansion.

Program Listing. 256K Memdisk.

```
00100          TITLE   '256K MEMDISK'
00110 ;*****************************************************************
00120 CR       EQU     0DH
00130 LF       EQU     0AH
00140 @BANK    EQU     66H
00150 @GTMOD   EQU     53H
00160 @GTDCT   EQU     51H
00170 @DSPLY   EQU     0AH
00180 @KEY     EQU     1
00190 @EXIT    EQU     16H
00200 @HIGH$   EQU     64H
00210 @GTDCB   EQU     52H
00220 ;*****************************************************************
00230          ORG     3000H
00240 ;
00250 START:
00260          LD      HL,OPMSG        ;OPENING MESSAGE
00270          LD      A,@DSPLY        ;SHOW IT
00280          RST     28H
00290          LD      HL,OPMSG1
00300          LD      A,@DSPLY
00310          RST     28H
00320          LD      HL,OPMSG2
00330          LD      A,@DSPLY
00340          RST     28H
00350          LD      HL,OPMSG3
00360          LD      A,@DSPLY
00370          RST     28H
00380          LD      HL,OPMSG4
00390          LD      A,@DSPLY
00400          RST     28H
00410 KEY:
00420          LD      A,@KEY          ;GET ANSWER TO MESSAGE
00430          JP      NZ,KEY
00440          RES     5,A             ;U/C
00450          CP      'N'             ;ABORT ?
00460          JP      Z,EXIT          ;IF SO, THEN GO
00470          CP      'Y'             ;FORMAT?
00480          JP      NZ,DRIVEALT     ;NO- THEN JUST ALTER THE DRIVER
00490 ;
00500 FORMAT:
00510          CALL    FILLZ           ;FILL UPPER BANKS WITH ZEROES
00520          CALL    TABLES          ;ALTER DCT AND GAT FOR LARGER DRIVE
00530          JP      DRIVEALT        ;AND THEN ALTER THE DRIVE
```

Listing continued

Requires Inputs

Because of the larger addressing space, 256K memory chips require two more address inputs than 64K memory chips. Since address lines on DRAMs are multiplexed—half latched during row-address-strobe (RAS) time and half latched during column-address-strobe (CAS) time—256K DRAMs need one more address pin than the 64K DRAMs normally found in the Model 4 and 4P systems. This extra pin is pin 1, which is unused on the 64K devices.

As described above, the 74LS75 latch in the bank-select circuit holds 2 bits that determine which of four 64K banks in the 256K of memory is to be selected. This is done by making the two 74LS75 latched bits the extra address bits required by the 256K DRAMs. These bits are passed through another 74LS157 multiplexor (U6) to provide the RAS/CAS multiplexing necessary to place the bits on the DRAM address pins at the appropriate times. Thus, the pin 1's on the Model 4/4P DRAM sockets must all be connected together and to the output of the U6 multiplexor to support the extra address line. As shown, a 27-ohm series resistor is used between the multiplexor and DRAM connection to minimize noise. The resistor value is not critical. The Model 4 uses 56-ohm resistors, while the 4P uses 27 ohms.

The select signal (pin 1) for the U6 multiplexor comes from pin 1 of U63 (74157) on the Model 4, and pin 1 of U110 (74LS157) on the 4P.

Building the Circuits

Start your construction by making the necessary trace cut on your computer's circuit board. On the Model 4, cut the trace between pin 9 of U63 (74157) and pin 8 of resistor pack RP4. On the 4P, cut the trace between pin 4 of U110 (74LS157) and pin 8 of resistor pack RP1. Be careful to cut the correct trace. It is also good practice to use an ohmmeter when you're done, to verify that a short no longer exists between the two points.

Once the cut is done, connect all the pin 1's of the pertinent DRAM sockets together, by wiring pin to pin. On the Model

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4, the pertinent sockets are U85–U92. On the 4P, the sockets of interest are U153–U160.

Now construct the refresh circuit board, determining ahead of time where you will mount it. With the refresh circuit board in position, connect power and ground lines from your computer's board to the refresh board, to provide power for the chips.

Once you have connected the power lines, connect the three signal wires that interface to the computer board. On the Model 4, the connections are to pin 16 of U60 (74LS240), pin 9 of U63 (74157), and pin 8 of RP4. On the 4P, the connections are to pin 6 of U87 (74F04), pin 4 of U110, and pin 8 of RP1. Once you make these connections, the refresh circuit installation is complete.

Your computer should be ready to accept 256K DRAMs, and kick you off to greater memories.

Finally, construct the bank-select circuit board, again predetermining where it will be mounted in your computer's cabinet. It is best to mount this board near the 50-pin expansion connector. With the board at or near its final installation site, connect power and ground to the bank-select board from a convenient location on your computer's circuit board.

Connect all signals that attach to the 50-pin expansion port; this should leave only two signals yet to be attached. Now connect pin 1 of U6 (74LS157) to the appropriate multiplexor signal connection on your computer's circuit board. This is to pin 1 of U63 (74157) on the Model 4, and pin 1 of U110 (74LS157) on the 4P.

At Last!

Finally, connect the open end of the 27-ohm resistor on the bank-select board to pin 1 of one of your computer's DRAM sockets that you wired earlier. The bank-select circuit board installation is now complete. Your computer should be ready to accept 256K DRAMs, and kick you off to greater memories!

The refresh counter was built on the Radio Shack board (catalog no. 276-159), a two-chip board perfect for the purpose. The bank-select board was built on a 4-inch-wide board (approximately), to fit in an internal slot above the main printed circuit board on the Model 4P. You might want to measure your machine to make

Listing continued

```
00540 ;
00550 FILLZ:
00560         LD      A,(BUSE)        ;PUT NEW XTENDED BANK IN CONTEXT
00570         OUT     (0),A
00580         INC     A               ;LAST ONE DONE
00590         CP      5
00600         JP      NC,BACK         ;GO IF SO
00610 ;
00620         LD      (BUSE),A        ;NO, STORE NEXT BANK
00630         DI                      ;DISABLE INTERRUPTS
00640         LD      BC,1            ;LOWER 1/2
00650         LD      A,@BANK         ;IN CONTEXT
00660         RST     28H
00670         PUSH    BC              ;SAVE OLD BANK
00680         CALL    FILLER          ;AND FILL WITH ZEROES
00690         LD      BC,2            ;UPPER 1/2
00700         LD      A,@BANK         ;IN CONTEXT
00710         RST     28H
00720         CALL    FILLER          ;AND FILL WITH ZEROES
00730         POP     BC              ;GET BACK ORIGINAL BANK
00740         LD      B,0
00750         LD      A,@BANK
00760         RST     28H
00770         EI                      ;ENABLE INTERRUPTS
00780         JP      FILLZ           ;ROUND AGAIN
00790 ;
00800 BACK:
00810         LD      A,0
00820         OUT     (0),A           ;ORIGINAL XTENDED BANK
00830         RET                     ;BACK
00840 ;
00850 FILLER:
00860         LD      HL,8000H        ;FILL UPPER 32K OF MEMORY WITH 0s
00870 LP1:
00880         LD      A,0
00890         LD      (HL),A
00900         INC     HL
00910         LD      A,H
00920         OR      L
00930         JR      NZ,LP1
00940         RET
00950 ;
00960 TABLES:
00970         LD      A,0             ;XTENDED BANK 0
00980         OUT     (0),A           ;IN CONTEXT
00990         DI                      ;DISABLE INTERRUPTS
01000         LD      C,1             ;LOWER 1/2
01010         LD      A,@BANK         ;IN CONTEXT
01020         RST     28H
01030         PUSH    BC              ;SAVE ORIGINAL BANK
01040         LD      C,03H           ;LOGICAL DRIVE #3
01050         LD      A,@GTDCT        ;CHANGE MAX#CYL IN DCT
01060         RST     28H
01070         LD      (IY+6),037H     ;55 CYLINDERS RELATIVE TO 0
01080 ;
01090         LD      HL,92CCH        ;CYLINDERS OVER 35 BYTE OF GAT
01100         LD      A,015H          ;CYLINDERS OVER 35
01110         LD      (HL),A          ;PUT IN
01120 ;
01130         LD      HL,9202H        ;FREE/ASSIGNED TABLE, LESS 1ST 2 BYTES
01140         LD      A,0F8H          ;ALL 3 GRANS FREE
01150         LD      B,36H           ;54 CYLS EXCEPTING BOOT AND DIR
01160 F1:
01170         LD      (HL),A          ;FILL
01180         INC     HL
01190         DJNZ    F1              ;54 BYTES WITH F8H
01200 ;
01210         LD      HL,9202H        ;AND COPY TO AVAIL/LOCKED OUT TABLE
01220         LD      DE,9062H        ;TO ADDRESS
01230         LD      BC,05EH         ;BYTES TO COPY
01240         LDIR                    ;DO IT
01250 ;
01260         POP     BC              ;GET BACK ORIGINAL BANK
01270         LD      B,0
01280         LD      A,@BANK
01290         RST     28H
01300         EI
01310         RET
01320 ;
01330 ;DRIVEALT:  THIS SECTION INSTALLS THE MODIFICATIONS TO THE DRIVER, AND
01340 ;MODIFIES THE POINTER THAT KEEPS TRACK OF FREE SPACE IN THE DRIVER AREA
01350 DRIVEALT:
01360         LD      DE,MODNAME      ;GET POINTER TO MODULE HEADER (HL)
01370         LD      A,@GTMOD        ;AND DCB (DE)
01380         RST     28H
01390         JR      NZ,NIST ;NO MODULE - GO
01400         LD      (HDRBL),HL      ;SAVE MOD HDR ADDRESS
01410         INC     HL              ;HL=> ADDRESS OF LAST BYTE OF MODULE
01420         INC     HL
01430         LD      E,(HL)          ;GET ADDRESS IN DE
01440         INC     HL
01450         LD      D,(HL)
01460         DEC     HL              ;RESTORE HL
01470 ;
01480         LD      B,40H           ;ADD 40H TO THE ADDRESS
01490 LOOPX:
01500         INC     DE
01510         DJNZ    LOOPX
01520 ;
01530         LD      (HL),E          ;PUT NEW END INTO MODULE
01540         INC     HL
```

Listing continued

Listing continued

```
01550           LD      (HL),D
01560 ;
01570 ;THE FOLLOWING SECTION UPDATES THE SYSTEM POINTER THAT KEEPS TRACK
01580 ;OF THE NEXT FREE LOCATION IN THE DRIVER AREA (STORED AT KIDCB-2).
01590 ;
01600           PUSH    DE              ;SAVE ADDRESS OF LAST BYTE OF MODULE
01610           LD      D,'I'
01620           LD      E,'K'
01630           LD      A,@GTDCB
01640           RST     28H
01650           DEC     HL
01660           DEC     HL              ;HL=>KIDCB-2 = POINTER TO
01670                                   ;FIRST BYTE OF FREE MEMORY
01680           PUSH    HL
01690           POP     IX              ;PUT IN IX
01700           POP     DE              ;GET BACK NEW LAST BYTE ADDRESS
01710           INC     DE              ;FIRST FREE BYTE
01720           LD      (IX+0),E        ;AND STUFF IN KIDCB-2
01730           LD      (IX+1),D
01740 ;
01750 LOADER:
01760           LD      HL,LOADPOINT    ;INSTALL CODE AT END
01770           LD      DE,(HDRBL)
01780           PUSH    HL              ;GET (HDRBL)+0DCH IN DE
01790           LD      HL,0DCH
01800           ADD     HL,DE
01810           PUSH    HL
01820           PUSH    DE
01830           POP     HL
01840           POP     DE
01850           POP     HL              ;HL= LOADPOINT
01860           LD      BC,27H
01870           LDIR
01880 ;
01890           LD      HL,LOADPOINT1   ;INSTALL 1ST JR INSTR
01900           LD      DE,(HDRBL)
01910           PUSH    HL
01920           LD      HL,09FH
01930           ADD     HL,DE
01940           PUSH    HL
01950           PUSH    DE
01960           POP     HL
01970           POP     DE
01980           POP     HL
01990           LD      BC,2
02000           LDIR
02010 ;
02020           LD      HL,LOADPOINT2   ;INSTALL 2ND JR INSTR
02030           LD      DE,(HDRBL)
02040           PUSH    HL
02050           LD      HL,0FCH
02060           ADD     HL,DE
02070           PUSH    HL
02080           PUSH    DE
02090           POP     HL
02100           POP     DE
02110           POP     HL
02120           LD      BC,2
02130           LDIR
02140 ;
02150           JP      EXIT            ;AND GO
02160 ;
02170 NIST:
02180           LD      HL,NISTMSG      ;DISPLAY MSG
02190           LD      A,@DSPLY        ;AND EXIT
02200           RST     28H
02210 ;
02220 EXIT:
02230           LD      HL,0            ;NO ERROR
02240           LD      A,@EXIT         ;RETURN TO DOS
02250           RST     28H
02260 ;
02270 ;---------------------------------------------------------------
02280 ;
02290 OPMSG:
02300           DEFM    'DO YOU WANT TO FORMAT?   ENTER SAME ANSWER AS ENTERED '
02310           DEFM    'TO TRSDOS MEMDISK.'
02320           DB      0DH
02330 OPMSG1:
02340           DEFM    'THIS PROGRAM ALSO ASSUMES THAT A SSDD TYPE D MEMDISK WAS'
02350           DEFM    ' CHOSEN AS DRIVE #3.'
02360           DB      0DH
02370 OPMSG2:
02380           DEFM    'IT SHOULD ONLY BE RUN IMMEDIATELY AFTER THE INSTALLATION'
02390           DEFM    ' OF THE MEMDISK.'
02400           DB      0DH
02410 OPMSG3:
02420           DEFM    'IF ANY OF THE ABOVE CONDITIONS ARE NOT MET, CHOOSE ABORT!!'
02430           DB      0DH
02440 OPMSG4:
02450           DEFM    'PRESS Y TO FORMAT, N TO ABORT, OR ANY OTHER KEY TO INSTALL'
02460           DEFM    ' W/O FORMATTING.'
02470           DB      0DH
02480 BUSE:
02490           DB      1
02500 MODNAME:
02510           DEFM    '$MD'
02520           DB      0
02530 HDRBL:
02540           DW      0
02550 NISTMSG:
```

Listing continued

sure of the size. See the Table for the chips used in this project.

You might want to socket the chips to minimize the possibility of heat or static damage. You can do all the wiring on empty sockets and place the chips in them afterward. The actual placement on the boards is a matter of choice. Just make sure that you connect the correct pins to the +5V and ground, and that connections between the chips are as shown on the schematics. You can leave unused pins unconnected. You must connect together pin 1 of each of the 256K RAM chips. This requires soldering a wire from socket to socket. You then connect the output of the bank-select board to this wire.

Installation of a connector of this type frees the edge connector for adding equipment.

Final Hardware Notes

The signals for the bank-select circuit can be taken off the exterior 50-pin I/O connector. TRSDOS 6.02 leaves the I/O connector enabled. CP/M+ and possibly other operating systems disable this port. If the port is disabled, precede any routine that uses the port with a routine that activates the port. The routine must read MODIN (port 0FF hexadecimal [hex]), set bit 4, and output the result to MODOUT (port 0FF hex). When you are finished using the port, use the same procedure, but reset bit 4, to restore the port to its original condition.

One more comment regarding this connector: If you do not want to use the edge connector, the board has solder holes for a 50-pin internal connector on the same bus. Installation of a connector of this type frees the edge connector for adding other equipment.

Using the Extra Memory

256K Memdisk (see the Program Listing) is a program that patches the TRSDOS Memdisk program to allow it to use the 256K bank of extra RAM as a RAM disk. No other drivers and filters can be in memory when you install the patches, although you can add the drivers and filters after modifying the Memdisk. The reason is that the program takes the first 40 bytes (hex) after the Memdisk and adds them to

Memdisk to hold the patch code.

256K Memdisk alters the TRSDOS tables so that filters, drivers, and other programs that you add later will load correctly, but anything already loaded is overwritten, with interesting results. Therefore, first load the standard Memdisk and then 256K Memdisk at the beginning of your computing session to avoid the chance of a crash.

This program has one deficiency compared to the standard Memdisk: On making a DIR request, the display shows a standard 63K RAM disk, although the free space is shown correctly as 246K (252K minus 6K of system files). The disk correctly adjusts the free space, and other than the directory display, this makes no functional difference.

Guidelines

If you follow the guidelines below, 256K Memdisk should give a reliable performance.

- Always load 256K Memdisk at initial startup, immediately after the standard Memdisk installation and before any other drivers or filters.
- When installing the standard Memdisk, choose a single-sided, double-density, type D (banks 1 and 2) RAM disk as logical drive 3. Any other choices will result in unpredictable results.
- Answer "Y" (do format) to the question the modification program (256K Memdisk) asks.

You should now have a 246/252K Memdisk up and running. You can remove the drive unchanged via the regular Memdisk command.

Reclaiming Data

If for some reason you remove the Memdisk drive and want to reclaim the data on it, you can restore the data, provided you have not turned the power off or run any programs that modify the upper banks of memory.

First, run the regular Memdisk program with the "No format" option. Next, run the 256K Memdisk with the "No format" option (enter any key except "N" or "Y"). You should now be able to access the data.

However, if the original Memdisk was a 64K Memdisk, do not try to use the 256K Memdisk program to reclaim data. If any filters are loaded on top of the standard driver, 256K Memdisk overwrites them, resulting in a crash. Only try to reclaim the upper banks if the original Memdisk was a 246/252K Memdisk.

Inside the Patch

To understand the patch, first consider the 256K of RAM in the upper bank. It is divided into four banks numbered zero to 3 (which I will call XBanks to distinguish them from the standard TRSDOS banks zero to 2). You can map each bank into the space originally occupied by the upper 64K bank of the standard machine. To do the mapping, output the XBanks zero–3 to I/O port zero. Select XBank zero at startup and reset it; it is the default bank addressed by the standard Memdisk.

The patch works by taking track requests over 14 (the highest cylinder of the standard Memdisk) and subtracting 14 from them until a number less than 14 is obtained. The number of times 14 was subtracted to obtain the number less than 14 is output to port zero, thus selecting that XBank. Therefore, a request for track 7 brings in XBank zero, the standard bank. A request for track 15 brings in XBank 1, and so on.

Once the correct XBank has been selected, the remainder less than 14 is passed to the standard Memdisk program, which addresses the correct position within the bank. If a cylinder over 56 is selected, a jump is made to the device unavailable exit of the main driver (line 8660 in the code in the The Source [Logical Systems Inc., P.O. Box 55235, Grand Junction, CO 81505]). This, however, is unlikely except in custom software, as the GAT (granule-allocation table) and DCT (device-control table) are set for 56 tracks and the only way to make such a request is via machine code. At the end of the standard driver, a section of code brings XBank zero back into context before returning to the calling program.

Listing continued

```
02560          DEFM    'NO DRIVE INSTALLED, EXTENDED INSTALLATION ABORTED.'
02570          DB      0DH
02580 ;
02590 ;-----------------------------------------------------------------
02600 ;
02610 LOADPOINT:
02620          LD      A,D             ;GET CYL REQUEST IN A
02630          PUSH    BC              ;SAVE BC
02640          LD      BC,0            ;ZERO C(COUNTER FOR NEXT SEC)
02650 ;
02660 LPZ:
02670          SUB     0EH             ;REDUCE TRACK REQUEST MOD 14
02680          INC     C
02690          JR      NC,LPZ
02700          ADD     A,0EH           ;RESTORE A (=CYL COUNT MOD 14)
02710          DEC     C               ;ADJUST BANK COUNT
02720          PUSH    AF              ;SAVE AF
02730          LD      A,C             ;PUT IN A
02740          CP      4               ;CYL REQUEST > 56?
02750          JR      NC,$-85D        ;EXIT WITH ERROR IF SO
02760          NOP                     ;THE 2 NOPS ARE JUST SPACERS
02770          OUT     (0),A           ;BRING UP CORRECT XBANK
02780          POP     AF              ;RESTORE AF
02790          POP     BC              ;RESTORE BC
02800          ADD     A,A             ;BEGINNING OF STD CODE (IT AND
02810                                  ;THE LD A,D WERE REPLACED BY
02820                                  ;THE JP INSERTED IN THE STD
02830                                  ;CODE
02840          NOP
02850          JR      $-85D           ;RETURN TO STANDARD CODE
02860          NOP
02870          PUSH    AF              ;SAVE AF
02880          LD      A,0             ;SELECT XBANK 0
02890          OUT     (0),A
02900          POP     AF              ;RESTORE AF
02910          LD      A,102           ;CODE REPLACED BY THE JP
02920          JR      $-55D           ;RETURN TO STD ROUTINE
02930 ;
02940 LOADPOINT1:
02950          JR      $+3DH           ;JP TO PATCH PART 1
02960 ;
02970 LOADPOINT2:
02980          JR      $+31H           ;JP TO PATCH PART2
02990          END     START
```

End

The setup section alters the DCT and other TRSDOS tables to reflect the Memdisk's new capacity.

The patch code consists of two jumps, which are installed in the driver, and a two-part main patch, which is placed at the end of the driver in the 40 bytes (hex) added by 256K Memdisk. The first jump, line 2940, goes at the beginning of the driver subroutine, which turns a cylinder/sector request into a bank/address request. The code from lines 2610 to 2850 reduces the cylinder-request modulo 14 and translates the deleted cylinders to a request for one of the four 64K XBanks formed from the 256K chips. It also maps in the requested bank. It then returns to the standard Memdisk routine, which chooses the correct part of the selected bank. At the end of the standard routine, before restoring the standard memory mapping, another jump is installed (line 2970) going to the second part of the main patch at line 2870. This code simply returns the standard XBank (XBank zero) into context and jumps back to the standard routine.■

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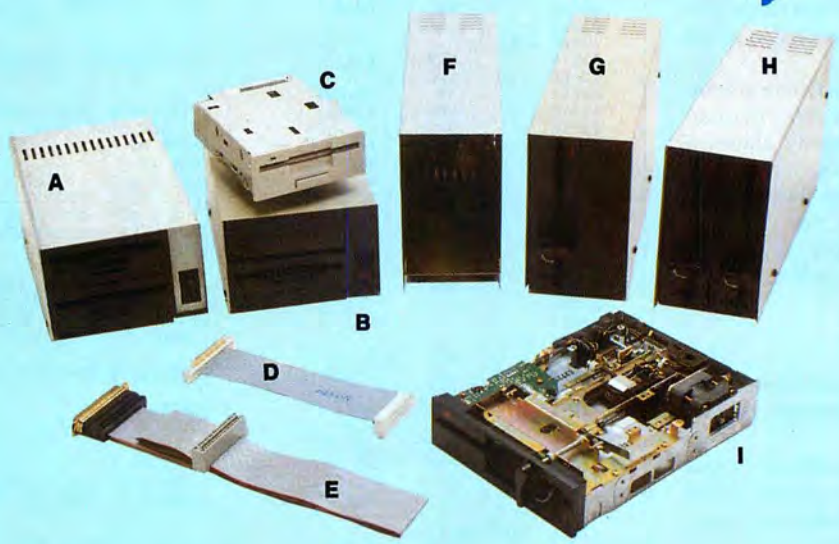

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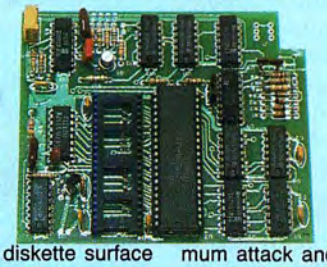

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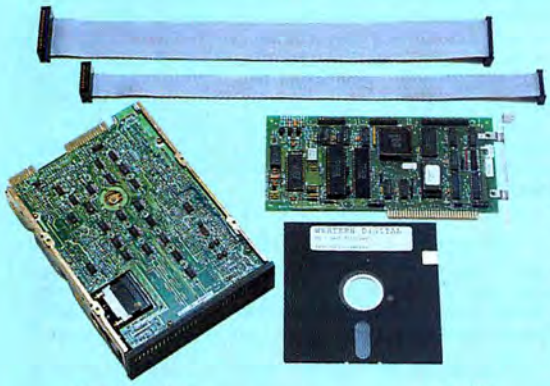

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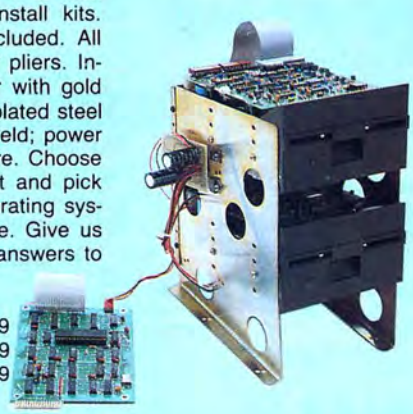

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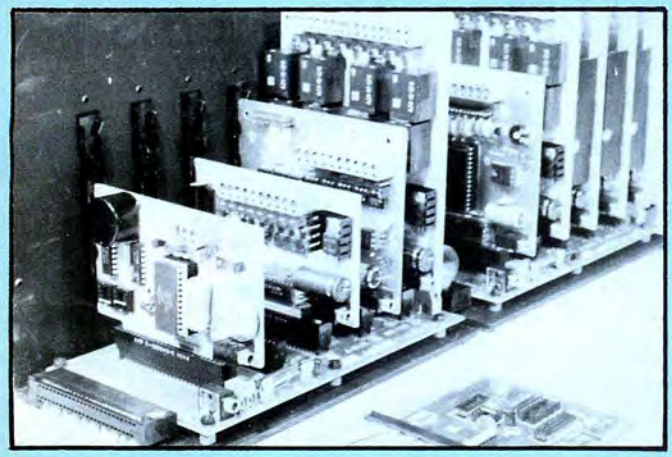

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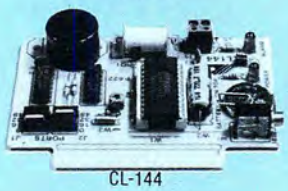

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by Jon Scheer

CRT Saver

Protect your video screen from burn-in.

If you leave a static image on your screen for a long period of time, it can burn into the phosphor and leave a permanent shadow. If you must abandon the computer for any length of time, it is desirable to turn the screen off.

My CRT Saver (see the Program Listing) automatically clears the Model 4's screen if you don't display a character for three minutes. The next character you send to the display restores the screen contents. The program has three parts: a low-priority background task, a video filter, and a routine to install the task and filter.

The task uses a counter (DELAY) to clear the screen. Every time the task is called, the counter is decremented. Once the counter reaches zero, the contents of the screen are copied to a buffer in memory. The filter restores the contents of the screen and is attached to the output device *DO. The filter is called whenever you send a character to the screen. Each time the filter is called, it restores the screen, if necessary, and it resets the tasks counter.

The initialization routine installs the task and filter after copying them into high memory. (This routine is based on several Hardin Brothers' filter-installation routines.) This routine also sets up a short routine to display a message when you reboot the system. This second routine is used only if you sysgened your boot disk after installing the task.

The Task

To determine the value the counter starts with, calculate the number of times it will be called in three minutes. The task is installed in slot 2, which is called every 266.67 milliseconds. Therefore, the routine is called 255 times a minute, or 765 times every three minutes.

When the filter is called, it resets the tasks counter to 765. The filter should execute quickly, and it is faster for the filter to set a flag (OUTFLG) that tells the task to reset the counter. Now when the task is called, it first checks if the counter should be reset. After the counter is decremented, if it is zero, the task copies the screen contents to a buffer (SCRBUF), clears the screen, and turns off the cursor. A problem occurs when the task tries to accomplish these last two things. Both of these operations require special characters to be sent to the screen, thus calling the filter. To overcome this problem, a flag, IGNOR, tells the filter to ignore these characters and not to reset OUTFLG. Once you save the screen, the task resets IGNOR. Another flag, SCROFF, tells the filter that the screen was saved. This way the filter knows if it should restore the screen before displaying the next character to the screen.

The Filter

When the filter is called, it checks IGNOR to see if it should ignore setting OUTFLG. If IGNOR is not set, the filter looks at SCROFF to determine if the screen was saved. If it was, it copies the buffer to the screen, turns on the cursor, and resets SCROFF. Next, the filter sets OUTFLG, and the current character appears on the screen.

For the task and the filter routines to synchronize with each other, they must share the following variables: SCRBUF, the buffer to store the screen contents in, and three flags; OUTFLG, the counter-re-

System Requirements

Model 4
64K RAM
Assembly language
Editor/assembler
Available on The Disk Series

Program Listing. A filter that clears CRT screen to avoid phosphor burns.

```
00100 ;
00110 ;       CRTSAV -- CRT Saver.  This filter will 'save'
00120 ;       the CRT screen by turning it off (copying it
00130 ;       to a buffer, erasing the screen, and turning
00140 ;       off the cursor) if a character is not received
00150 ;       after 3 minutes.  Once a character is sent, the
00160 ;       filter will turn back on the screen (copy from
00170 ;       the buffer, and turn on the cursor).
00180 ;
00190 ;       By Jon Scheer  (C) 1986,
00200 ;       Version 1.6
00210 ;
00220 VERNUM  EQU     16H             ; Version 1.6.
00230 ;
00240 ;       System calls:
00250 ;
00260 ADTSK   EQU     1DH             ; Add task.
00270 CHNIO   EQU     14H             ; Chain I/O routine.
00280 CKTSK   EQU     1CH             ; Check slot for task.
00290 DSP     EQU     02H             ; Display a character.
00300 DSPLY   EQU     0AH             ; Display a line.
00310 EXIT    EQU     16H             ; Exit program.
00320 FLAGS   EQU     65H             ; Get system flags.
00330 GTMOD   EQU     53H             ; Get module address.
00340 HIGH    EQU     64H             ; Get/Alter HIGH$.
00350 VDCTL   EQU     0FH             ; Video control.
00360 ;
00370 ;       ASCII equates:
00380 ;
00390 LF      EQU     0AH             ; Line feed.
00400 CR      EQU     0DH             ; Carriage return.
00410 SO      EQU     0EH             ; Turn on cursor.
00420 SI      EQU     0FH             ; Turn off cursor.
00430 FS      EQU     1CH             ; Home cursor.
00440 US      EQU     1FH             ; Clear to End-Of-Screen.
00450 ;
00460 ;       Misc equates:
00470 ;
00480 DELVAL  EQU     02A3H           ; 3 minutes (3 * 225).
00490 SLOT    EQU     2               ; Task goes in slot # 2.
00500 TRUE    EQU     01H
00510 FALSE   EQU     00H
00520 ;
00530 ;       Start of program:
00540 ;
00550 ;       Filter header:
00560 ;
00570         ORG     3000H
00580 FLTBEG: JR      START           ; Branch to start of flt.
00590 OLDHI:  DEFW    $-$             ; Used for old HIGH$.
00600         DEFB    6               ; Length of module name.
00610         DEFM    'CRTSAV'        ; Module name.
00620 MODDCB: DEFW    $-$             ; Used for DCB address.
00630         DEFW    $-$             ; Reserved by TRSDOS.
00640 ;
00650 ;       Start of filter code:
00660 ;
00670 START:  JR      NZ,FLT01        ; Jump if not PUT.
00680         DI                      ; Disable interupts.
```

Listing continued

Listing continued

```
00690           PUSH    AF              ; Save A & flags.
00700           LD      A,(IGNOR)       ; Load ignor flag.
00710 REL00     EQU     $-2
00720           CP      TRUE            ; Flag set?
00730           JR      Z,FLT00         ; Jump if ignor true.
00740           LD      A,TRUE          ; Load value.
00750           LD      (OUTFLG),A      ; Set output flag.
00760 REL01     EQU     $-2
00770           LD      A,(SCROFF)      ; Get screen status.
00780 REL02     EQU     $-2
00790           CP      TRUE            ; Set flags.
00800           JR      NZ,FLT00        ; Jump if not off.
00810           CALL    RESSCR          ; Restore screen.
00820 REL03     EQU     $-2
00830           PUSH    IX              ; Save IX.
00840           LD      IX,(MODDCB)     ; Get DCB vector.
00850 REL04     EQU     $-2
00860           LD      A,CHNIO         ; Set up call.
00870           PUSH    BC              ; Save BC.
00880           LD      C,SO            ; Turn on cursor char.
00890           RST     28H             ; Output char.
00900           POP     BC              ; Restore BC.
00910           POP     IX              ; Restore IX.
00920           LD      A,FALSE         ; Load value.
00930           LD      (SCROFF),A      ; Save new status.
00940 REL05     EQU     $-2
00950 FLT00:    POP     AF              ; Restore A & flags.
00960           EI                      ; Enable interupts.
00970 FLT01:    PUSH    IX              ; Save IX.
00980           LD      IX,(MODDCB)     ; Get DCB vector.
00990 REL06     EQU     $-2
01000           LD      A,CHNIO         ; Set up call.
01010           RST     28H             ; Chain to DCB.
01020           POP     IX              ; Restore IX.
01030           RET                     ; Return.
01040 ;
01050 ;         Interupt routine (task):
01060 ;
01070 TCB:      DEFW    INTBEG          ; Point to start of task.
01080 RELTCB    EQU     $-2
01090 REL10     EQU     $-2
01100 INTBEG:   LD      A,(OUTFLG)      ; Get output flag.
01110 REL11     EQU     $-2
```

Listing continued

set flag, SCROFF, the CRT-saved flag, and IGNOR, the ignore-character flag.

Installation

The program installs easily. After compiling the program to CRTSAV/FLT, issue the following TRSDOS commands:

```
SET *CS CRTSAV/FLT
FILTER *DO *CS.
```

Once the filter is installed initially, if you issue the TRSDOS command Sysgen, it automatically installs when you boot your system. When the disk boots, you receive a short message informing you that the filter is installed.

I have been using the filter for several months and have only encountered one problem. When using Scripsit, the screen is saved once after three minutes, regardless of whether I type anything. (Apparently, Scripsit uses its own routines to access the screen memory.) Pressing any key restores the screen. I don't know if the same problem occurs with Superscripsit. Except for that one problem, the filter works well. I've left my machine on for weeks at a time. ■

John Scheer is a computer programmer for Science Applications International Corp. You can write him at 822 Lincoln Rd., Apt. 201, Bellevue, NE 68005.

Listing continued

```
01120           CP      TRUE            ; Was char displayed?
01130           JR      NZ,INT00        ; Jump if not.
01140           LD      HL,DELVAL       ; Load delay value.
01150           LD      (DELAY),HL      ; Save new delay.
01160 REL12     EQU     $-2
01170           LD      A,FALSE         ; Load value.
01180           LD      (OUTFLG),A      ; Reset output flag.
01190 REL13     EQU     $-2
01200 INT00:    LD      HL,(DELAY)      ; Get delay.
01210 REL14     EQU     $-2
01220           LD      A,H             ; Get high byte.
01230           OR      A               ; Set flags.
01240           JR      NZ,INT01        ; Jump if not 0.
01250           LD      A,L             ; Get low byte.
01260           OR      A               ; Set flags.
01270           JR      Z,INTEXI        ; Jump if 0.
01280 INT01:    DEC     HL              ; HL = HL - 1.
01290           LD      (DELAY),HL      ; Save new value.
01300 REL15     EQU     $-2
01310           LD      A,H             ; Get high byte.
01320           OR      A               ; Set flags.
01330           JR      NZ,INTEXI       ; Jump if not 0.
01340           LD      A,L             ; Get low byte.
01350           OR      A               ; Set flags.
01360           JR      NZ,INTEXI       ; Jump if not 0.
01370           CALL    SAVSCR          ; Save screen.
01380 REL16     EQU     $-2
01390           LD      A,TRUE          ; Load value.
01400           LD      (SCROFF),A      ; Set screen-off flag.
01410 REL17     EQU     $-2
01420 INTEXI:   RET                     ; Return.
01430 ;
01440 ;         SAVSCR -- Save screen.  This routine saves the
01450 ;         current screen into buffer SCRBUF, clears the
01460 ;         screen, and turns off the cursor.
01470 ;
01480 SAVSCR:   PUSH    AF              ; Save A & flags.
01490           PUSH    BC              ; Save BC.
01500           PUSH    DE              ; Save DE.
01510           PUSH    HL              ; Save HL.
01520           LD      A,TRUE          ; Load value.
01530           LD      (IGNOR),A       ; Set flag.
01540 REL20     EQU     $-2
01550           LD      A,DSP           ; Set up call.
01560           LD      C,SI            ; Turn off cursor char
01570           RST     28H             ; Output char.
01580           LD      A,VDCTL         ; Set up call.
01590           LD      B,06            ; Copy to buffer.
01600           LD      HL,SCRBUF       ; Point to buffer.
01610 REL21     EQU     $-2
01620           RST     28H             ; Copy screen > buffer
01630           LD      A,VDCTL         ; Set up call.
01640           LD      B,04            ; Want cursor position
01650           RST     28H             ; Get position.
01660           LD      A,DSP           ; Set up call.
01670           LD      C,FS            ; Home cursor char.
01680           RST     28H             ; Output char.
01690           LD      A,DSP           ; Set up call.
01700           LD      C,US            ; Clear to EOS char.
01710           RST     28H             ; Output char.
01720           LD      A,VDCTL         ; Set up call.
01730           LD      B,03            ; Want to move cursor.
01740           RST     28H             ; Move cursor.
01750           LD      A,FALSE         ; Load value.
01760           LD      (IGNOR),A       ; Reset flag.
01770 REL22     EQU     $-2
01780           POP     HL              ; Restore HL.
01790           POP     DE              ; Restore DE.
01800           POP     BC              ; Restore BC.
01810           POP     AF              ; Restore A & flags.
01820           RET                     ; Return.
01830 ;
01840 ;         RESSCR -- Restore screen. This routine restores
01850 ;         the screen by copying the buffer (SCRBUF) back
01860 ;         to the screen.  NOTE: The calling routine must
01870 ;         turn the cursor on (it's easier that way :-).
01880 ;
01890 RESSCR:   PUSH    AF              ; Save A & flags.
01900           PUSH    BC              ; Save BC.
01910           PUSH    DE              ; Save DE.
01920           PUSH    HL              ; Save HL.
01930           LD      A,VDCTL         ; Set up call.
01940           LD      B,05            ; Want  copy to screen
01950           LD      HL,SCRBUF       ; Point to buffer.
01960 REL30     EQU     $-2
01970           RST     28H             ; Copy buffer > screen
01980 ;         LD      A,DSP           ; Set up call.
01990 ;         LD      C,SO            ; Turn on cursor char.
02000 ;         RST     28H             ; Output char.
02010           POP     HL              ; Restore HL.
02020           POP     DE              ; Restore DE.
02030           POP     BC              ; Restore BC.
02040           POP     AF              ; Restore A & flags.
02050           RET                     ; Return.
02060 ;
02070 ; This routine will be activated upon booting the disk
02080 ; if the filter has been installed and the SYSGEN command
02090 ; has been issued.
02100 ;
02110 BOOT:     PUSH    AF              ; Save A & flags.
02120           PUSH    BC              ; Save BC.
02130           PUSH    DE              ; Save DE.
02140           PUSH    HL              ; Save HL.
02150           LD      A,DSPLY         ; Set up call.
02160           LD      HL,BOTMSG       ; Point to text.
02170 REL40     EQU     $-2
02180           RST     28H             ; Print text.
02190           POP     HL              ; Restore HL.
02200           POP     DE              ; Restore DE.
02210           POP     BC              ; Restore BC.
02220           POP     AF              ; Restore A & flags.
02230 LINK:     DEFS    3               ; 3 bytes(Opcode+Addr)
02240 ;
02250 ;         Data storage area:
02260 ;
02270 DELAY     DEFW    DELVAL          ; Delay left.
02280 IGNOR     DEFB    FALSE           ; Ignor char flag.
02290 OUTFLG    DEFB    TRUE            ; Output-a-char flag.
02300 SCROFF    DEFB    FALSE           ; Scrn-turned-off flag
02310 SCRBUF    DEFS    2048            ; Screen buffer.
02320 ;
02330 ;         Messages:
02340 ;
02350 BOTMSG    DEFB    LF
02360           DEFB    LF
02370           DEFM    'Model IV CRT Saver.  Version '
02380 BOTLOC    DEFM    'x.x  By Jon Scheer (C) 1986'
02390           DEFB    LF
02400           DEFM    '   Filter installed and active.'
02410           DEFM    '  Timeout occurs after 3 minutes.'
02420           DEFB    LF
02430           DEFB    LF
02440           DEFB    CR
02450 ;
02460 FLTEND    EQU     $-1             ; End of filter.
02470 FLTLEN    EQU     $-FLTBEG        ; Length of filter.
02480 ;
02490 ;         Filter Installation Routine.
02500 ;
02510 INIT      EQU     $               ; Start  init routine
02520           PUSH    DE              ; Save DCP pointer.
02530           LD      (MODDCB),DE     ; Put into header.
02540           LD      A,VERNUM        ; Get version number.
02550           RLCA                    ; Swap the high bits
02560           RLCA                    ;   with the low bits.
02570           RLCA                    ;   (Rotate left.)
02580           RLCA                    ;
02590           AND     0FH             ; Clear high bits.
02600           ADD     A,'0'           ; Convert to ASCII.
02610           LD      (VERLOC),A      ; Put into string.
02620           LD      (BOTLOC),A      ; Put into boot string
02630           LD      A,VERNUM        ; Get version number.
02640           AND     0FH             ; Clear high bits.
02650           ADD     A,'0'           ; Convert to ASCII.
02660           LD      (VERLOC+2),A    ; Put into string.
02670           LD      (BOTLOC+2),A    ; Put into boot string
02680           LD      A,DSPLY         ; Set up call.
02690           LD      HL,SIGNON       ; Point to text.
02700           RST     28H             ; Print text.
02710 ;
02720 ;         Check to see if slot is available.
02730 ;
02740           LD      A,CKTSK         ; Set up call.
02750           LD      C,SLOT          ; Use slot # 2.
02760           RST     28H             ; Is slot in use?
02770           JR      Z,CANUSE        ; Jump if not in use.
02780           LD      HL,SLTBSY       ; Point to text.
02790           JP      ERROUT          ; Print error & quit.
02800 ;
02810  CANUSE: EQU     $
02820 ;
02830 ;         Activate task AFTER filter has been installed.
02840 ;         So install filter.
02850 ;
02860           LD      A,GTMOD         ; Set up call.
02870           LD      DE,MODNAM       ; Get module name.
02880           RST     28H             ; Already installed?
02890           JR      NZ,VIASET       ; Jump if not.
02900           LD      HL,INSTLD       ; Point to text.
02910           JP      ERROUT          ; Print error & exit.
02920 ;
02930 VIASET:   LD      A,FLAGS         ; Set up call.
02940           RST     28H             ; Get system flags.
02950           BIT     3,(IY+2)        ; Used SET?
02960           JR      NZ,SETHI        ; Jump if yes.
02970           LD      HL,NOSET        ; Point to text.
02980           JP      ERROUT          ; Print error & exit.
02990 ;
03000 SETHI:    LD      A,HIGH          ; Set up call.
03010           LD      B,0             ; Want to use HIGH$.
03020           LD      HL,0            ; Want to return value.
03030           RST     28H             ; Get HIGH$.
03040           JR      Z,CHKHIG        ; Jump if no error.
03050           LD      HL,MEMERR       ; Point to text.
03060           JP      ERROUT          ; Print error & exit.
03070 ;
03080 ;         Must not use memory above F400, so move down
03090 ;         memory if too high.
03100 ;
03110 CHKHIG:   PUSH    HL              ; Save HL (HIGH$).
03120           PUSH    HL              ; Copy HL into BC.
03130           POP     BC              ;   (BC = HL)
03140           LD      HL,0F3FFH       ; Load value.
03150           SBC     HL,BC           ; HL = HL - BC.
```

Listing continued

Circle 46 on Reader Service card.

Listing continued

```
03160           POP     HL              ; Restore HL (HIGH$).
03170           JR      NC,HIGHOK       ; Jump if memory ok.
03180           LD      HL,0F3FFH       ; Load value.
03190 HIGHOK:   LD      (OLDHI),HL      ; Save top mem location
03200 ;
03210 ;         Parse the relocation table.
03220 ;
03230           LD      IY,RELTAB       ; Point to reloc table.
03240           LD      DE,FLTEND       ; Point to end of filter.
03250           XOR     A               ; Clear A.
03260           SBC     HL,DE           ; HL = HL - DE.
03270           PUSH    HL              ; Copy HL...
03280           POP     BC              ;   into BC.
03290 ;
03300 RELOC1:   LD      L,(IY+0)        ; Get LSB of tbl value.
03310           LD      H,(IY+1)        ; Get MSB of tbl value.
03320           LD      A,H             ; A = H.
03330           OR      A               ; Set flags.
03340           JR      Z,PWRUP         ; Jump if done (0000).
03350           LD      E,(HL)          ; Get LSB of address.
03360           INC     HL              ; HL = HL + 1.
03370           LD      D,(HL)          ; Get MSB of address.
03380           EX      DE,HL           ; Swap DE & HL.
03390           ADD     HL,BC           ; HL = HL + offset.
03400           EX      DE,HL           ; Swap DE & HL.
03410           LD      (HL),D          ; Save MSB of new addr.
03420           DEC     HL              ; HL = HL - 1.
03430           LD      (HL),E          ; Save LSB of new addr.
03440           INC     IY              ; IY = IY + 1.
03450           INC     IY              ; IY = IY + 1.
03460           JR      RELOC1          ; Loop back.
03470 ;
03480 ; Before moving code, set up power-up initialization
03490 ; routine:
03500 ;
03510 PWRUP:    LD      A,FLAGS         ; Set up call.
03520           RST     28H             ; Get flags.
03530           LD      A,(IY+28)       ; Get opcode.
03540           LD      (LINK),A        ; Save into code.
03550           LD      L,(IY+29)       ; Low byte of address
03560           LD      H,(IY+30)       ; High byte of address
03570           LD      (LINK+1),HL     ; Save into code.
03580           LD      A,0C3H          ; Opcode (CALL).
03590           LD      (IY+28),A       ; Save to init routine
03600           LD      HL,BOOT         ; Get address.
03610 REL50     EQU     $-2             ; Calculate new address.
03620           LD      (IY+29),L       ; Save to init routine
03630           LD      (IY+30),H       ; Save to init routine
03640 ;
03650 ;         Now, move code:
03660 ;
03670 MOVE:     LD      DE,(OLDHI)      ; Point to destination.
03680           LD      HL,FLTEND       ; Point to filter end
03690           LD      BC,FLTLEN       ; Get length of filter.
03700           LDDR                    ; Move filter.
03710           LD      A,HIGH          ; Set up call.
03720           LD      B,0             ; Want to use HIGH$.
03730           EX      DE,HL           ; HL = New HIGH$.
03740           RST     28H             ; Set new HIGH$.
03750           INC     HL              ; Point to flt start
03760           POP     IX              ; Get DCB off stack.
03770           LD      (IX),47H        ; Allow GET, PUT, CTL.
03780           LD      (IX+1),L        ; Save LSB of address.
03790           LD      (IX+2),H        ; Save MSB of address.
03800           LD      A,DSPLY         ; Set up call.
03810 ;
03820 ;         Now activate task.
03830 ;
03840           LD      A,ADTSK         ; Set up call.
03850           LD      C,SLOT          ; Use slot # 2.
03860           LD      HL,(RELTCB)     ; Point to new INTBEG.
03870           DEC     HL              ; HL = HL - 1.
03880           DEC     HL              ; Now HL -> TCB.
03890           EX      DE,HL           ; Swap DE and HL.
03900           RST     28H             ; Add task.
03910 ;
03920           LD      A,DSPLY         ; Set up call.
03930           LD      HL,SUCCES       ; Point to text.
03940           RST     28H             ; Print text.
03950           LD      A,EXIT          ; Set up call.
03960           LD      HL,0            ; Clear HL.
03970           RST     28H             ; Exit program.
03980 ;
03990 ERROUT:   LD      A,DSPLY         ; Set up call.
04000           RST     28H             ; Print text.
04010           LD      A,EXIT          ; Set up call.
04020           LD      HL,-1           ; Want to error out.
04030           RST     28H             ; Exit program.
04040 ;
04050 ;         Initialization data area:
04060 ;
04070 ;         Relocation table:
04080 ;
04090 RELTAB:   DEFW    REL00
04100           DEFW    REL01
04110           DEFW    REL02
04120           DEFW    REL03
04130           DEFW    REL04
04140           DEFW    REL05
04150           DEFW    REL06
04160           DEFW    REL10
04170           DEFW    REL11
04180           DEFW    REL12
04190           DEFW    REL13
```

Listing continued

Listing continued

```
04200           DEFW    REL14
04210           DEFW    REL15
04220           DEFW    REL16
04230           DEFW    REL17
04240           DEFW    REL20
04250           DEFW    REL21
04260           DEFW    REL22
04270           DEFW    REL30
04280           DEFW    REL40
04290           DEFW    REL50
04300           DEFW    0
04310 ;
04320 ;         Messages:
04330 ;
04340 SIGNON    DEFB    LF
04350           DEFM    'Model IV CRT Saver.  Version '
04360 VERLOC    DEFM    'x.x  By Jon Scheer (C) 1986'
04370           DEFB    LF
04380           DEFB    CR
04390 MODNAM    DEFM    'CRTSAV'
04400           DEFB    0
04410 SLTBSY    DEFM    'Slot #2 already running a task --'
04420           DEFM    ' process aborted.'
04430           DEFB    CR
04440 INSTLD    DEFM    'Filter already installed --'
04450           DEFM    ' process aborted.'
04460           DEFB    CR
04470 NOSET     DEFM    'Filter must be installed via SET.'
04480           DEFB    CR
04490 MEMERR    DEFM    'High memory not available --'
04500           DEFM    ' process aborted.'
04510           DEFB    CR
04520 SUCCES    DEFM    '   CRT Saver now installed.  Screen will'
04530           DEFM    ' clear after 3 minutes of inactivity.'
04540           DEFB    LF
04550           DEFM    '   Displaying another character will restore'
04560           DEFM    ' the screen.'
04570           DEFB    LF
04580           DEFB    LF
04590           DEFM    '*** Remember to FILTER the driver to *DO ***'
04600           DEFB    LF
04610           DEFB    CR
04620 ;
04660           END     INIT
```

End

Mastering Mail Order

Ordering hardware by phone seems like one of the simpler tasks in the life of a computer owner. And it is, if you do your homework first. You should know what to ask a vendor and how to answer the questions he or she might ask you.

Magazine ads don't always have all the information you need. For instance, some companies don't advertise their return policies, what kind of customer support they provide, or warranty information. On the other hand, a vendor might need to know details about your system to set up a product to work with it.

I've put together two checklists: The first is a list of items to have on hand or things to know before making the call, and the second is a list of questions to ask the vendor. Most are common sense, but the obvious questions are often the ones overlooked.

Prep Work

I'll assume that you've decided on which type or brand of product you want to buy and that you are now shopping for price and service. Here's the first list:

- Have the magazine ad to which you will refer open in front of you.
- Highlight or write down the pertinent information from that ad—price, product number, shipping information, and so on. If anything is unclear in the ad, note it and make a reference to it on your second checklist.
- Know how you want to pay. If you want to use a credit card, have it in front of you.
- Be ready to give your street address, not a post office box number. UPS and other shipping companies will deliver only to a street address.
- Know your DOS version, amount of RAM, printer brand and model, and any other unusual facts about your system.
- Get a pencil and the second checklist.

The Order

Your next step is to make a list of questions to ask the vendor. The reason for asking these questions is, of course, to verify that you are getting what you expect, when you expect it. Don't be shy about changing your mind and placing the order with another vendor if you don't like the answers you get. You have a lot of mail-order vendors to choose from.

In fact, it's a good idea to call several vendors. You will notice differences in not only their policies and procedures, but also in how they respond to you.

When you place the call, you will most likely speak to an operator whose job is solely to take orders. Nonetheless, this person should know the company's policies, warranty information, method of shipping, and type of customer support. He or she should also be able to tell you whether or not the product is in stock and if it will work on your computer.

If the operator cannot answer your questions or gives vague answers ("Well, I *think* this modem works on a Tandy 1000"), ask to speak to someone who can tell you what you need to know. If your questions continue to go unanswered, find another vendor.

I don't like this kind of runaround. When I place an order, I expect to speak with trained personnel. Using inexperienced help doesn't speak well for the company's commitment to the customer. Fortunately, my experiences have been good. I've called several mail-order houses whose operators were well-versed in the companies' ways. I assume that you can expect the same most of the time.

Before actually placing the order, ask these questions:

- *What is the warranty?* Warranties vary; all Tandy products come with a 90-day warranty, and I've seen other brands offer as much as a two-year warranty. To me, six months is adequate, a year is good. Sometimes you'll come across the term "limited" warranty. Find out exactly what the company means by this; it usually means that abused equipment won't be covered.
- *Do you offer a money-back guarantee?* Some mail-order houses will let you return merchandise within a specified length of time if you are not satisfied for any reason. Thirty days seems to be the standard period used.
- *Do you service what you sell?* This question is moot if you buy Tandy equipment mail-order through a Radio Shack franchise dealer; you can get it serviced at any Radio Shack store. Some vendors leave servicing to the manufacturers. A number of hard-drive, memory-board, and multifunction-board vendors in the Tandy 1000 market do sell these products under their own names, and they do service their own products.

If the vendor does no servicing, find out who can repair the item. You must ship some products back to the manufacturer for repair—often a long, drawn-out process. Ask about repair turnaround time if this is the case.

- *What kind of customer support do*

Illustration by Mary Ann Smith

you offer? The better-established mail-order houses offer technical hot-line service. With others, the quality of technical assistance depends on who answers the phone. And a few offer no customer support at all, referring you to the manufacturer. The hot-line service is great, if you can get through. I know of one vendor whose hot line is open only a couple of hours each weekday. I've yet to get through to it.

- *How well do you know the Tandy 1000?* Some order-takers won't be able to answer this question. Beware that not all add-on boards work with the 1000. Some are too long, and others just can't swallow some of the 1000's hardware idiosyncrasies. Remember, this is a silly question to ask mail-order houses that are also Radio Shack franchisees. Generally speaking, advertisers in *80 Micro* will be more sensitive to 1000 users.
- *Is the item in stock? If not, when can you ship it?* Some smaller operations will wait until they have enough orders before stocking an item. But even the best vendors run out of stock. If you can't get a definite shipping date that you are comfortable with, find another place to buy the item.
- *What is the total cost, including shipping?* Some vendors include shipping in the advertised price. Some charge, but don't advertise how much.
- *Do you honor credit cards?* Ask this question even if you intend to pay for your purchase by other means. Be wary of any mail-order business that doesn't take a major credit card. If you use a credit card, you can cancel the order through the credit-card company within 60 days—useful if you don't receive the ordered merchandise.

You should have a gut feeling one way or the other once you've asked the questions above. If in doubt, thank the person for the information and call other vendors. Speaking to several companies will help you narrow your choice of from whom to buy.

Suppose that you like the vendor you've just called and you place an order. Follow these steps, and write down what the order-taker tells you:

- Make a note of the date of the order. If it is late, you'll have a record.
- Get an order number from the vendor and the name of the order-taker. Most assign a code of some kind to each order and often give it to you unasked. Later, this information will come in handy if there is a problem.
- Ask for a shipping date. The better mail-order houses boast same-day shipping. I once ordered a printer from a Radio Shack franchisee in a neighboring state late one afternoon and received it by noon the next day. If the item is in stock, but the vendor can't promise a definite shipping date, something is wrong. Perhaps the item isn't really in stock, or the vendor isn't well organized.
- Find out how the company ships. UPS seems to be the courier of choice. Knowing the method of delivery might be helpful if you don't receive the item.
- If you aren't asked, give the order-taker your phone number. You can ask to be called if a problem arises.

Mail order is my shopping method of choice. I don't live near a computer store, and I hate paying list price for anything. Risks are involved, but with diligence and caution you'll avoid the less respectable vendor. Ask questions, take notes, use a credit card to pay for merchandise, and go with your gut feelings.

Third-Party Memory For the EX

Tandy rarely has the best deals on add-on boards for its computers. Unfortunately for EX owners, Tandy has been the only game in town—until Advanced Transducer Devices (ATD) introduced its Zuckerboard memory upgrade. I recently installed the 384K version in my 1000 EX, bringing it up to the full 640K.

The board slid into its slot easily, and it works. It uses 25 chips, including the 12 memory chips, whereas the Tandy Plus memory board uses only 15 chips including memory. The Tandy board also has two slots for other add-on boards and is shielded on the bottom for RFI; the Zuckerboard has one slot and is not shielded.

Two software utilities come with the Zuckerboard: Z Disk and Z Spool. Z Disk lets you use part of the computer's memory as a RAM disk. It is easy to set up and comes with brief, clear instructions. The utility tells the EX to treat part of RAM as another disk drive. The benefits include faster running software and quicker copying of files. You can use up to 500K as a RAM disk.

Z Spool sets up part of the computer's RAM as a printer buffer, allowing you to use your EX while it simultaneously prints out a file. It is also easy to set up, and the buffer's maximum size is 64K, enough for most word-processing files.

I'm confused about ATD's warranty. The cover of the board's manual says, "User's Manual and 5-Year Warranty." However, the page showing the warranty information mentions only a two-year warranty. Whichever is correct, ATD's warranty beats the heck out of Tandy's 90-day deal.

The Zuckerboard's main selling points are the utilities, which Tandy does not offer, its warranty, and its price: $149 versus $209.90 for a Tandy Plus memory board with 384K. The Tandy board's best features are fewer chips, RFI shielding, and two expansion slots. It looks like the Tandy board has a slight edge in construction quality, as well.

My choice would be to go with the Zuckerboard, mainly because of its price. I have about a dozen hours on the one in my EX, and so far I've had no problems. ATD's address is 235 Santa Ana Court, Sunnyvale, CA 94086, 800-222-4920 (800-233-6874 in California).

Next Month

I promised to talk about Tandy's new computers this month, but I must put it off until November. By then, I hope to have one or more on hand. I'll also discuss a software package appropriate for the election year. ■

Michael E. Nadeau is 80 Micro's executive editor. He has been editing computer magazines for six years, using Tandy equipment all the while. Write to him c/o 80 Micro, 80 Elm St., Peterborough, NH 03458.

Can we talk? CP/M vs TRSDOS

By moving to CP/M on your Model 4 you achieve two things. First you open the door to a wealth of existing software. More 8-bit software runs under CP/M than any other operating system. This includes virtually all of the "big name" programs which have set the standards by which all others are measured. Programs like **WordStar, dBASE II, and Turbo Pascal** are available for CP/M, but not TRSDOS. Public domain software, almost unknown under TRSDOS, fills hundreds of megabytes of disk space. Valuable public domain programs like the **Small C Compiler** are just a toll-free phone call away. Most importantly, hundreds of applications programs are available from a multitude of vendors. Many include the source code. Wouldn't you like to be able to choose from scores of Accounts Receivable or General Ledger programs, instead of the meager selection you now have? Circle our special Reader Service number 600 on the Reader Service Card to receive our comprehensive **free listing of suppliers of application programs that run under CP/M.**

What about the future?

When the time comes to move up to another computer it will almost certainly use MS-DOS. That's when CP/M users get a pleasant surprise. Since MS-DOS was a derivative of CP/M it operates in almost the same manner. Even better, most of the same software packages are available in 16-bit form and they operate in virtually the same way that they did under CP/M.

Is it easy to use?

Montezuma Micro's CP/M has been carefully crafted to present a maximum of features while taking a minimum of memory. It supports all of the standard features of the Model 4/4P/4D computers, as well as most of the optional ones. Our CP/M has been consistently been awarded the highest ratings in industry magazines. It is version 2.2, the most popular and reliable of all the versions of CP/M produced. Our CP/M has been made as easy to use as possible. All customer-selected features are chosen from simple menus in our CONFIG utility. This includes the ability to configure a disk drive to run like that of scores of other CP/M computers for maximum ease of software portability. Using the unique DBLCROSS program in our Monte's Toolkit utility package you can move files back and forth between CP/M, TRSDOS (1.3 and 6.x), and MS-DOS.

Why use Montezuma CP/M?

We have already told you why our CP/M is the best for the Radio Shack Model 4 computer. The only question left to answer is "Why buy CP/M at all?" Radio Shack has abandoned TRSDOS — all of their new machines use MS-DOS. Most of the software producers have followed, leaving no new software development and saddling the TRSDOS user with whatever software "leftovers" he can find. Which DOS do you want to head into the future with: the one originally written for the Model I or the one that served as the basis for MS-DOS? Make the right choice right now for just $169.

If I need support?

We don't forget you after the sale. If you have a problem you will find our phones are answered by people, not answering machines or hold buttons. Our philosophy is very simple — we want you to be happy and satisfied with your purchase. If you have a problem then we have a problem, and we'll do whatever we can to resolve it.

Cost to update?

Our owners are protected against instant obsolescence by our lifetime upgrade policy. At any time you can return your original CP/M disk to be upgraded to the latest version free of charge, except for a small shipping and handling fee. Periodically we publish NEW STUFF, a newsletter for registered users of Montezuma Micro CP/M. This publication carries news about new products, tips for getting more out of CP/M, and other valuable information for our users. It is sent free of charge to registered owners.

Can I use a hard disk drive?

CP/M hard disk drivers are available for Radio Shack, Aerocomp, and most other popular brands of hard disk drives. These drivers allow the hard drive to be partitioned into one to four logical drives of varying sizes. These drives may all be used by CP/M, or may be divided between CP/M and TRSDOS. A head-parking utility is included on the driver disk to minimize the risk of damage when the hard disk drive is not in use. Also included at no charge is a utility which will copy, compress, list, print, and delete files with ease. There isn't much you can say about a driver. It either works or it doesn't. Ours works supremely and it only costs $30.

Hard disk backup?

Unlike the high-priced, underpowered backup utilities available for backup of TRSDOS hard drives, our CP/M **HARDBACK** utility makes the backup of a hard disk to floppies quick and painless. Only **HARDBACK** gives you the choice of backing up the entire drive or only those files which it knows have been changed since the last backup. Daily backup is no longer a chore, since only new data must be copied. With **HARDBACK** you can quickly restore an entire drive, or only a single file if necessary. Only **HARDBACK** will perform a complete check of the hard disk drive and lock out tracks which have become flawed to prevent the use of those tracks for later data storage. Add this supreme program to your hard disk for just $49. Isn't your time and data worth it?

Specs?

Size of Transient Program Area (TPA): 56,070 bytes in a 64k system. 55,046 bytes in a 63k system (with optional hard disk driver). **CP/M IOBYTE:** Fully implemented. **Device Drivers:** Disk (35, 40, 77, & 80 track, single/double density single/double sided, 3, 5, or 8 inch. (More than 85 disk formats supported) **Maximum Disk Capacity:** 40T SS=220k, 40T DS=440k, 80T DS=880k **RS-232:** All word lengths, parity, & baud rates. **Parallel Printer:** With or without linefeed and/or formfeed. **Video:** 24 by 80 with reverse video. **Keyboard:** Full ASCII with 9 function keys. **RAM Disk:** 64k, automatic on 128k systems. **Hard Disk:** Optional drivers available at extra cost for most popular models. Standard CP/M programs included: **ASM, DDT, DUMP, ED, LOAD, MOVCPM, PIP, STAT, SUBMIT, SYSGEN, and XSUB.**

Order Information

Give us a call now with your order and we will ship immediately. Prices include delivery to your door in the lower 48 States including APO/FPO. All others please add an amount commensurate to shipping requested. Any excess will be refunded. Credit cards will not be charged before we ship your order. The suitability of software selected is the responsibility of the purchaser as there are **NO REFUNDS ON SOFTWARE.** Defective software will be replaced upon it's return, postpaid. Now available at Radio Shack Stores as Express Order Software—Cat. No. 900-0600.

The toll-free lines are for orders only.
Specifications/prices are subject to change without notice.

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Montezuma CP/M: Model 4 version 2.32	$ 169
Hard Disk Driver: Specify exact hard drive	30
Hardback: Hard disk backup utility	49
Monte's BASIC: Converts TRSDOS BASIC to run under CP/M	49
Monte's Toolkit: Doublecross; Freeform; WSPR; Filefix; SYS2M; Auto	49
Monte's Window: Note pad, appointment calendar, calculator, data base	49

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Shaping Up Your Hard Disk

I devoted last month's column to initially organizing your hard disk. This included establishing directories for each application and the necessary links to connect all the applications for ready use. This month's column will explore some tools you can use to maintain your hard-disk structure in optimal condition once you have established it.

Many public-domain and shareware utilities can ease your burden; you can find them in the download areas of information services. Too many exist for me to discuss them reasonably in this forum, so I will devote this column to describing some of the more popular commercial alternatives.

Accessing Your Applications

I have shown you how to organize your files by application, and I have described simple batch-file structures that let you readily access these applications from the DOS command prompt. This method has several drawbacks.

First, the batch files are generally short, and each requires much less space than is allocated on your hard disk for the file. For example, a 48-byte batch file will be stored in 2,048 bytes (2 megabytes [MB]) on my hard disk. Second, batch-file execution is slow. Last, you have to carefully plan modifications to environment variables such as the DOS Path, as the residue from these batch files can adversely affect other applications.

I use a menu program to rapidly access applications on my hard disk. Several commercial systems are available, such as The Norton Commander and Bourbaki Inc.'s 1Dir. My favorite is the menu shell contained in Wordperfect Corp.'s Library, particularly since I use Wordperfect's word processor extensively.

Library contains several useful desktop programs in addition to the shell. It is exceptionally easy to install and virtually eliminates the need for batch files except for complex applications, such as setting up the proper environment for Microsoft's C compiler.

The most important feature of these shells is that they allow extensive modification to the application's environment without affecting later operation of your other applications. When I establish conditions for the C compiler, the many environment changes made are performed on a copy of the environment created when the batch file executes (see the Figure).

The last batch command loads the DOS command interpreter using this new environment and leaves me at the DOS command prompt ready to use the C compiler. When I exit this process back to the shell by typing the DOS command EXIT, the modified environment copy is purged as I return to the shell menu. I return to my initial starting conditions.

Disk-Maintenance Tools

Anyone who owns a hard disk must have a set of tools such as The Norton Utilities or PCTools. The greatest feature of these tools is the ability to reclaim deleted files; this overcomes one of the hard disk's most serious limitations. You can inadvertently destroy great quantities of information with a simple command, such as Del *.*. If your disk is in good shape (more on this in a moment), you can recover all the deleted information.

The Norton Utilities provide several other features useful in manipulating hard-disk directories. I use the directory-sorting utility to keep the file list in each subdirectory organized. Normally, I keep files sorted by extension and name so I can quickly locate items. But Dirsort (DS) has other useful features, such as sorting the directory into descending date order to locate the newest files near the top of the list.

I use the file-attribute utility (FA) to mark selected files for backup by setting the "archive" attribute. Combine this

```
ECHO OFF
CLS
SET DUMMY =
SET DUMMY1 =
SET PROMPT = MICROSOFT C V4.0 $_%PROMPT%
SET INCLUDE = C:\LANGUAGE\MSC\INCLUDE
SET LIB = C:\LANGUAGE\MSC\LIB
SET TMP = C:\LANGUAGE\MSC\MSRC
SET COMPOPTS = /G2/GS/OAT
SET LINKOPTS = /EXEPACK
PATH C:\LANGUAGE\MSC;%PATH%
CD MSRC
COMMAND
```

Figure. Example batch file for Microsoft C compiler.

Illustration by Fred Schrier

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Why give a present that will be opened just once when you can give one that will be opened year-round? You'll be remembered this season, and every season, when you send the perfect gift for Tandy users—an **80 Micro** subscription.

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with DS to sort the directory into decreasing size order, and you can use XCopy to perform a well-controlled selective file backup of your directory onto the minimum number of disks. For example, I can use the command sequence below to perform a file backup of my data files using XCopy:

```
FA \DATAFILE\*.* /A+
DS S- \DATAFILE
XCOPY \DATAFILE\*.* A:\ /M
```

where the last command is repeated until I no longer get an "Insufficient disk space" message and the directory has been copied to the floppy disks.

The Norton Utilities also provide several tools for restoring deleted files. Quick unerase (QU) will attempt to restore files that are not fragmented. When you first load the disk, DOS writes files to the disk beginning with the first available data cluster and allocates space in contiguous blocks. As you update files, the application might extend the file or write a new file prior to deleting the old file. DOS then uses any free cluster to write the new file, and the space allocation might not be in contiguous blocks.

QU depends on being able to locate all the file's clusters sequentially. It will fail if it cannot. Then you must use the main Norton utility program (NU) to piece the file's clusters together into the file chain.

PCTools provides many of the same features contained in The Norton Utilities. However, it is organized around a full-screen display, and its functions are all contained in one program. While The Norton Utilities contain many other useful programs to enhance DOS operation, PCTools is primarily a disk utility.

PCTools provides file-copy and move utilities, file compare, disk copy, formatting, and directory-maintenance tools. If you can spare at least 64K of memory, you can load PCTools as a resident utility available at the touch of a key. This is handy if you need to format a disk for storing a data file and cannot exit your application without losing your file. PCTools has a powerful disk-copy function that automatically duplicates nonprotected software disks even if the target drive is not formatted.

One feature that I have found useful lets you "prune and graft" your directory tree. I have placed files in a subdirectory and almost immediately wished that I had located the directory in another branch of the tree structure. To correct this, you would normally have to create a new directory and copy all the files, then delete the old list and directory.

With PCTools, you simply select the disk-services directory-maintenance function. Position the cursor on the directory you want to move and press the key for "prune." The limb is marked and you next select the directory to contain the amputated limb and press "graft." In one clean operation, the directory moves, including any subordinate directories, to the new location without you ever moving a file.

Redeeming Your Hard Disk

As you use the applications on your hard disk, the application files tend to become fragmented as I mentioned above. This can significantly affect your computer's performance because DOS has to continually move the read/write heads to access the file. In the worst case, you can slow the computer down to almost the speed of a floppy disk.

You can see a similar degradation in performance in heavily used directories containing many files. As DOS uses the directories, gaps develop in the directory entries where you have deleted files. DOS locates files by searching a directory from the beginning each time it accesses a new file. Many deleted entries can slow your file-access times as DOS skips over them.

Several utilities are available that let you restore your hard disk's optimal performance. Mace+ Utilities perform a directory sort and compression and optimize the disk by compacting the files into contiguous storage blocks. Mace+ also moves all directories next to the root directory for more rapid access. The Advanced Norton Utilities and the newest version of PCTools also provide this service.

These newer programs take advantage of a feature in DOS to provide an even greater service—restoring your files after you accidentally format your hard disk. PC-DOS and some MS-DOS versions do not write on the hard-disk data area during a format operation. They read the entire disk looking for bad sector areas and then zero out the file-allocation table (FAT) and the root directory. Then they mark the FAT, showing the location of bad clusters. Your data area is intact, and you can recover it.

These utilities save the vital FAT and root-directory information in a protected file area in the hard-disk data area. When you need to recover the disk, the utility program restores these areas from the protected file, and your disk returns to its status at the time of your last file update. Mace+ attempts to restore files contained in subdirectories even if you did not have the program installed before the accident.

I have also been able to recover from serious FAT errors by using Mace+ to restore the information. I consider these features so important that I am never without them. No hard-disk user should miss this opportunity to protect his or her data.

Library
Wordperfect Corp.
288 West Center St.
Orem, UT 84057
801-225-5000
$129

The Norton Utilities
The Norton Utilities, Advanced Edition
Peter Norton Utilities
2210 Wilshire Blvd. #186
Santa Monica, CA 90403
213-453-2361
$150 each

PCTools
Central Point Software Inc.
9700 S.W. Capital Highway #100
Portland, OR 97219
503-244-5782
$39.95

Mace+ Utilities
Paul Mace Software
123 N. First St.
Ashland, OR 97520
503-488-0224
$99

Table. Addresses for companies mentioned in this column.

Conclusion

Is this an all-inclusive list? Not by a long shot—look at the advertisements in this magazine alone for some indication of other programs. I have explained the salient features of some industry leaders to provide you with a basis for comparison (see the Table for addresses).

Many of these programs are under $100. The cost is minimal when you consider the amount of time they will save, especially if you have to restore a full 30MB hard disk after someone formats it for you.

I have not touched upon another area: disk-backup features. These are complicated and expensive. I devoted this column to low-cost alternatives to optimize your disk's performance.

By using the techniques I outlined in these last two articles, you are well on your way to becoming a hard-disk expert. ■

John B. Harrell III is a naval electronic warfare systems analyst. He programs in Pascal, C, and assembly language. Write to him c/o 80 Micro, 80 Elm St., Peterborough, NH 03458.

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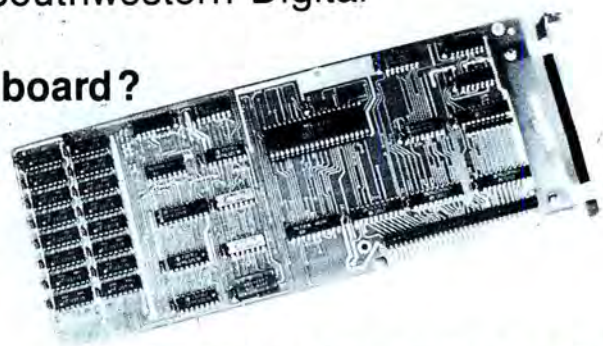
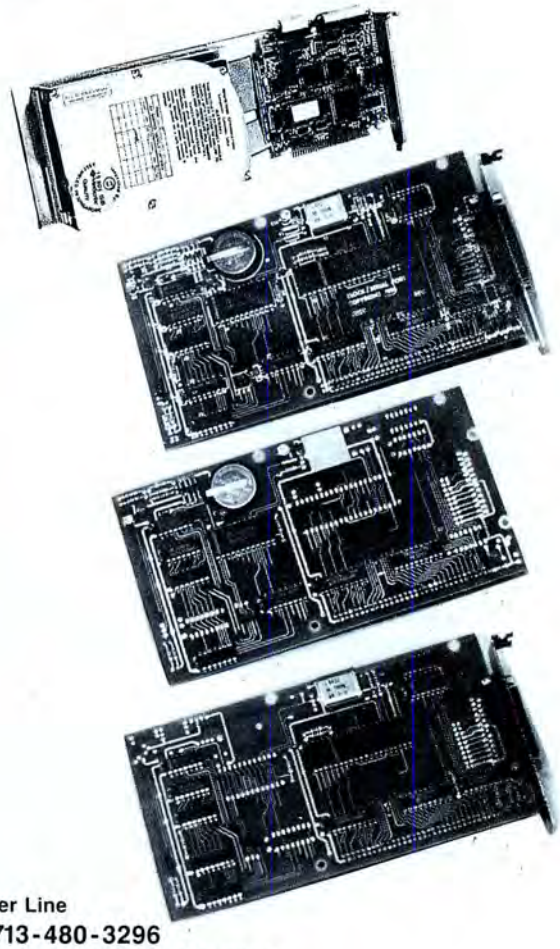


The Southwestern Digital Memory Expansion Plus Card has all the features of the Radio Shack Board but the price; you save almost $400. Features include 512K installed, burned in, and tested to give you a total of 640K, a DMA circut that is fully tested for hard drive operation, and an expansion port that will work with any of the Radio Shack Memory Plus Expansion Card options. High quality manufacturing, and features such as gold plated card edges make this the logical choice in upgrading your memory.

Multifunction Card for 1000, 1000A
Includes 512K, RS232C Serial Port, Clock/Calendar, Plus Expansion Port, RAM Disk, And Printer Spooler ..... $239.

Hard Cards for the 1000, 1000SX, 3000HL
20 Meg ..... $479.
30 Meg ..... $629.
45 Meg ..... $799.



Tandy 1000 Add on Boards
Serial, Clock, or Both
Tandy 1000, 1000SX, 1000EX

The Southwestern Digital new Add-On boards were developed for use with the Plus Card Port, (a piggy-back type, add on port established by Tandy to eliminate the need for an additional card slot). These cards are fully compatible with the Memory Expansion Plus Card from Southwestern Digital and the Memory Expansion Plus Board from Tandy.

RS232C PLUS Option Board

Mounts on a PLUS expansion board, and features selectivity between COM Port 1 and COM Port 2. The RS232C output connector is the standard Tandy female DB25, and is fully compatible with the Tandy output. **$59.**

Clock/Calendar PLUS Option Board

Mounts on a Plus expansion board, and features selectivity between two ports so that you can run two clocks at one time. The Clock Calendar Board gives you perpetual time/date so that you don't have to re-input time and date into your application programs as part of your power up routine. **$59.**

RS232C-Clock/Calendar PLUS Option Board

Features options of both of the above boards on just one board. **$129.**

Tandy 1000SX Computer System
with 640K, RS232C Serial Port, 20 Meg Hard Drive, (1) 360K Disk Drive, Clock/Calender ..... $1399.
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Business Bargains

You don't need expensive programs like Framework II to have business software for your personal computer. PC-Write, Wordplan, As-Easy-As, File Express, and PC-File + are shareware programs that have many of Framework's functions but are not fully integrated packages.

Word Processing

I discussed PC-Write and Wordplan in May (see "User-Supported Word Processors," p. 98). Only PC-Write has a spelling dictionary, but you can interface both with Borland's Lightning, a commercial spelling checker. Wordplan is more a report generator than a word processor and can also integrate Lotus-style spreadsheet files. You can also integrate As-Easy-As, which I discuss later in this column, with Wordplan. As-Easy-As formats its spreadsheet files the same way as Lotus's 1-2-3.

I prefer PC-Write for word processing. Its dictionary isn't the best, but the manual's instructions tell you how to integrate the Lightning program. For report generation, Wordplan provides its own mathematical functions and commands that act on data that you enter manually or extract from a spreadsheet file. To update data, you can change your spreadsheet file instead of editing your report. Wordplan reads the data in and performs the calculations for printing the report. PC-Write requires 256K (320K with the dictionary). Wordplan requires one disk drive and 128K of memory, though 256K is recommended.

As-Easy-As

As-Easy-As, by Trius Inc., is a shareware clone of Lotus's 1-2-3 spreadsheet program. Although As-Easy-As can read 1-2-3 spreadsheets and perform math operations, it might not operate macros or run the graphics utilities of 1-2-3. As-Easy-As features its own modest macro-command structure and graphics commands. You can configure this easy-to-use program to work with either a color or monochrome monitor, Hercules or enhanced graphics adapters, and the display colors of your choice. You can choose Lotus-style menus or pull-down menus on the left side of the screen. Menu selections are fully commented, and you get a second chance if you accidentally leave As-Easy-As without saving your file.

The graphics abilities of As-Easy-As don't require you to load in another program when you want to display data in a graph. Four types of graphs are available: x-y, bar, pie, and line graphs. An Epson-compatible printer can make an image of your plot.

The program has an on-line help function, and the 60-page manual, which is sent to supporting users, explains the program's functions. The manual is supplied on disk, but those familiar with other spreadsheets won't need one.

As-Easy-As includes trigonometric, logical, financial, statistical, and date functions. Because As-Easy-As isn't protected software, you can put it on your hard drive. As-Easy-As works best with a minimum of 256K memory.

Data Bases

PC-File +, an updated version of PC-File III from Buttonware Inc., is a powerful, easy-to-use relational data-base program. It requires 384K and two double-sided floppy drives (or one double-sided floppy and a hard drive).

Documentation comes on disk. A compressed text version, which requires PKXARC.COM to unarchive the file and print it, is also in the shareware file. The documentation file is so large that it won't fit on a 360K floppy if it's not compressed; all 250 pages of it must print directly to printer using PKXARC. This is not an easy chore. If you get a paper jam when printing, you can't recover without restarting. Use the on-line help files to evaluate PC-File +. If you like what you see, you can send in the user-support fee and get a printed manual from Buttonware.

PC-File + can open up to 71 data bases simultaneously. Per data base, the maximum field length is 1,665, the maximum number of fields is 70, the maximum number of records is 65,533, and the maximum number of sort fields is 10.

You have free-form control to put your data and fields on the computer screen. This is called screen painting. You can also call in the format of a similar data base and modify it to create your new data base. A report writer gives you an advanced report-command language. You can save several formats for writing many types of reports from the same data base. You can also use the data base to print labels and to mail-merge form letters.

You can do searches using wild-card characters or partial words. You can even search for like-sounding words. For example, you can ask for "?Qwendri?" and the program finds "Quindry." And/or combinations are possible, too. You

Illustration by Paul Fisch

can search for combinations of different fields of the data bases, such as all people with the same last name that live in a given state.

PC-File+ can exchange data with Dbase, Wordperfect, Wordstar, Lotus, Word, Peachtext, Leading Edge, and others. This means that As-Easy-As, which writes Lotus-like files, can transfer its data files to and from PC-File+. Nothing's perfect, though. I exported a PC-File+ file to a word-processor file and back. It wasn't in the same place in the data base, but it's possible to reformat it.

File Express is good, but not as versatile as PC-File+. Expressware Inc., distributor of File Express, calls it an information-management program. It lets you manipulate small- and medium-sized data bases by using menu-driven commands. With File Express you can create and maintain files of facts, figures, names, mailing lists, or patient records. You can add, delete, edit, and display information from your data base. You can generate reports with mathematical operations included. You can perform the same types of operations with File Express as with PC-File+ but probably not on as large a scale or with as much flexibility. One thing you can't do with version 3.83 is correct a field length in a data base that you already have.

It is easier to set up your data base with File Express than with PC-File+. File Express doesn't have an on-line help file like PC-File+, but you can probably do what you want without reading the manual. Printing labels seems to be simpler. You can also merge mail and generate reports.

Memory requirements are 256K with at least one disk drive, but two are recommended. File Express supports both color and monochrome monitors. The maximum number of records is 32,767 with 2,400 characters per record. The maximum number of fields per record is 40 with a maximum length of 60 characters. Ascending or descending sorts can be a maximum of 10 fields deep. All this will change with version 4.0: The maximum records will be 16 million, the maximum fields per record will increase to 120, and the maximum field length will be 250 characters. Version 4.0 will sport a new report editor and allow screen painting. By this month version 4.0 should be in my hands, and I will post it on the *80 Micro* Bulletin Board System (BBS).

Tandy Bulletin Boards

I've located some bulletin boards around the country that have Tandy-related topics. These boards run at 300/1,200 baud and possibly 2,400 baud; use 8 bits, no parity, and 1 stop bit.

The Byteline BBS in Indianapolis, IN, is run in part by the Tandy Users Group. This board supports MS-DOS, Models I/III/4 and 100/200, CP/M, and the Color Computer. The main system operator (sysop) is Chuck Ober, and each different conference has its own sysop. A recent addition to the Byteline BBS is an on-line CD ROM with the optical disk of all offerings from PC-SIG for MS-DOS. (I thank Brian Murray for telling me about the Byteline.) The phone number is 317-782-3220.

The Chicago Syslink, run by George Matyaszek, is part of a national network of bulletin boards around the U.S. and Canada (one in West Germany is planned). About 17 bulletin boards call each other daily and transfer electronic mail and public-domain programs among themselves. Users in one area can request programs from another location, and they are transferred to their local board for downloading. About 3,000 files of MS-DOS, Model III/4, and CP/M software are available. Access to chat is free, but the downloading fee is $20 a year. Don Lambert, author of Syslink, has a BBS in Providence, RI, at 401-272-1138. Each Syslink runs off a Model III or 4. (An MS-DOS version is available.)

In Great Falls, VA, one of the better Washington, DC, area boards supports MS-DOS, Models I/III/4, and CP/M. Tiff Reardon, the sysop of the Tech Connect, started his BBS with a Model III 4½ years ago. He now runs the BBS with an MS-DOS clone and 70-megabyte hard disk. Tiff has a tremendous amount of public-domain and shareware software on his BBS. His board is one of the major sources of material for my columns. Tiff provides user-supported special access for a lifetime $25 fee, which helps him upgrade his equipment. You can share your public-domain and shareware programs with his board for free access. His BBS number is 703-430-0091. Leave me a message if you call there.

In March I told you about the Handy Tandy BBS. Mike Shoupe, the sysop, moved, and his new BBS number is 703-534-8911.

Next Month

Next month I'll talk about more business software. Most fall in the home-use category. For a limited time, all the software discussed this month will be on the *80 Micro* BBS for downloading. By special arrangement, you can order PC-Write, PC-File+, and File Express from me by sending $10 per program ($6 for As-Easy-As). Each program takes two disks, except for As-Easy-As (I'll add some appropriate public-domain programs).

PC-Write
Quicksoft Inc.
219 First North #224
Seattle, WA 98109
$89 asked for user support

As-Easy-As
Trius Inc.
15 Atkinson St.
Lynn, MA 01905
No phone number available
$30 asked for user support

File Express
Expressware Inc.
P.O. Box 230
Redmond, WA 98073
206-481-3040
$49 asked for user support

PC-File+
Buttonware Inc.
P.O. Box 5786
Bellevue, WA 98006
800-J-Button (orders)
206-454-0479 (technical support)
$69.95 plus $5 shipping asked for user support

Wordplan
DEA Software
P.O. Box 968
Fremont, CA 94537
$49.95 asked for user support

Table. User-supported software discussed this month.

I'm still waiting to hear from Wordplan regarding my late request. If you want Wordplan, send a self-addressed stamped envelope and a separate check for $6. If I don't get the required permission for Wordplan, I'll return your check and send you any information I find on how you can get the program. (See the Table for a full listing of shareware programs discussed this month.)

When you order programs from me, you don't pay for the programs, but for the method of distribution. The authors don't benefit financially when I offer programs to you unless you send them money. My charges are minimal. Please support the authors of the programs that you like. This way everybody wins.■

Photo by Richard Quindry

Thomas Quindry has written for 80 Micro since 1980. Write Tom at 6237 Windward Drive, Burke, VA 22015. Enclose a stamped, self-addressed envelope for a reply.

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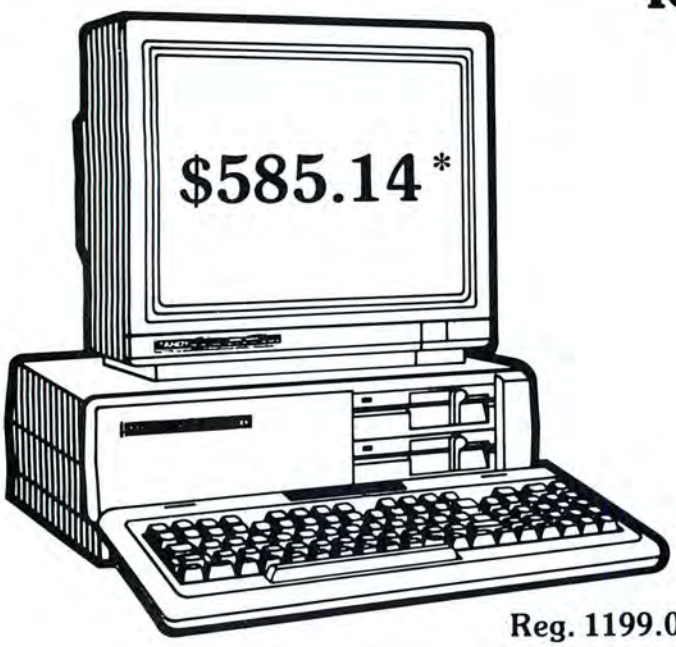

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Look Out of Any Window

It seems like I spent all of last month looking through one window after another. I tested several new application programs that run in windows; I've been writing a program that uses windows for data entry, menus, and help messages; and I've been learning a programming language, Smalltalk/V, that is entirely window-based.

But all of those windows have been on my MS-DOS computers. Each time I move back to my Model 4, I wonder why there aren't more windowing programs that run under TRSDOS/LS-DOS 6. My Model 4P with 256K bytes of memory and an XLR8er card seems to do everything faster than my Tandy 1000. I wondered how fast it could create, scroll, and remove windows. I haven't finished the complete program I have in mind yet, but I convinced myself that the 4P can use windows just as quickly and easily as any MS-DOS computer.

This month's listings are part of a low-level window library I've been creating for the Model 4. I could have simply used the program interface provided by Pro-Wam, but I wanted a set of routines that I could include in programs that might be distributed to people who don't have Pro-Wam. Also, I wanted to stay within the "normal" Model 4 64K limit.

The routines in Program Listing 1 are the basis for a windowing library; Program Listings 2 and 3 are test and demonstration programs for those routines, and Program Listing 4 is the set of macro commands necessary to assemble both demonstration programs. The window routines in Listing 1 make assumptions that you should understand before you modify them or add them to your own programs. I set most of these assumptions because of the application program I'm writing, not because of any inherent limitations in the Model 4.

System Requirements

Model 4/4P/4D
TRSDOS 6.2 or LS-DOS 6.3
Assembly language
Editor/assembler (Pro-Create 4.3a or MRAS)
Available on The Disk Series

Program Listing 1. Low-level windows for TRSDOS 6.2 and LS-DOS 6.3.

```
00100 ;-------------------------------------------------------------
00110 ;  Low-level window routines for TRSDOS 6.2/LS-DOS 6.3
00120 ;
00130 ;  These routines use the memory space from 2400h to 2fffh
00140 ;  as a temporary work area.  This area is always
00150 ;  relinquished when a call to a window routine returns
00160 ;
00170 ;  Save as WINLIB/ASM
00180 ;-------------------------------------------------------------
00190 ;
00200 ;       Assumes that MACLIB/ASM is already loaded
00210 ;
00220 W_START DEFL    $                       ;Save current PC
00230         ORG     2400H                   ;Beginning of work area
00240 W_VBUF  EQU     $
00250         DS      80*24                   ;Screen buffer area
00260 ;-----------
00270 ;  Check memory overrun
00280 ;-----------
00290         IF      $.GT.2FFFH              ;End of reserved area
00300         ERR     'Low memory limit exceeded'
00310         ENDIF
00320 ;
00330         ORG     W_START                 ;Start of window code
00340 ;
00350 ;-------------------------------------------------------------
00360 ;  W_SCGET -- Gets the current screen into the work buffer
00370 ;       No entry parameters
00380 ;       Uses AF
00390 ;-------------------------------------------------------------
00400 W_SCGET:
00410         RPUSH   DE,HL                   ;Save affected registers
00420         LD      HL,W_VBUF               ;HL==> work buffer
00430         @@VDCTL 6                       ;Function: get screen
00440         RPOP    HL,DE
00450         RET
00460 ;-------------------------------------------------------------
00470 ;  W_SCPUT -- Puts the current work buffer onto the screen
00480 ;       No entry parameters
00490 ;       Uses AF
00500 ;-------------------------------------------------------------
00510 W_SCPUT:
00520         RPUSH   DE,HL                   ;Save affected registers
00530         LD      HL,W_VBUF               ;HL==> work buffer
00540         @@VDCTL 5                       ;Function: put screen
00550         RPOP    HL,DE
```

Listing 1 continued

Illustration by Kyle Skrinak

Listing 1 continued

```
00560          RET
00570 ;-----------------------------------------------------------
00580 ;  W_RC2ADR -- Finds buffer address from row/column address
00590 ;        Entry:  H = row (0 - 23)
00600 ;                L = col (0 - 79)
00610 ;        Return: HL = buffer address
00620 ;        Uses AF
00630 ;        Assumes that W_VBUF begins on a page boundary
00640 ;-----------------------------------------------------------
00650 W_RC2ADR:
00660          RPUSH   BC,DE                   ;Save affected registers
00670          LD      B,L                     ;Save column number
00680          LD      C,H                     ;C has row #
00690          LD      HL,80                   ;HL has line size
00700          @@MUL16                         ;Multiply row * line size
00710          LD      H,L                     ;Move result
00720          LD      L,A                     ;  to HL
00730          LD      C,B                     ;Column count to C
00740          LD      B,.HIGH.W_VBUF          ;BC = Video buffer + column addr.
00750          ADD     HL,BC                   ;HL has address
00760          RPOP    DE,BC                   ;Clean up
00770          RET
00780 ;-----------------------------------------------------------
00790 ;  W_SAVE -- Saves a window to program-defined storage
00800 ;        Entry:  H = start row (0 - 23) of new window
00810 ;                L = start col (0 - 79)
00820 ;                B = # of rows (1 - (24-H))
00830 ;                C = # of cols (1 - (80-L))
00840 ;                DE ==> save address
00850 ;        Uses AF, BC, DE, HL
00860 ;  Note: no error checking performed
00870 ;-----------------------------------------------------------
00880 W_SAVE:
00890          RPUSH   BC,HL,DE                ;Save registers
00900          LD      HL,(W_BUFF$)            ;Get current buffer link
00910          LD      A,H                     ;Is it 0?
00920          OR      A                       ;It is if H is 0.
00930          JR      NZ,W_WS1                ;No, go
00940          @@VDCTL 4                       ;Else ask TRSDOS for cursor
00950          LD      (W_CUR$),HL             ;And save it for transfer
00960 W_WS1    POP     DE                      ;Get data save area
00970          LD      HL,W_BUFF$              ;HL ==> beginning of data
00980          LD      BC,9                    ;Bytes to transfer
00990          LDIR                            ;Move the housekeeping bytes
01000          POP     HL                      ;Get row/col of new window
01010          CALL    W_RC2ADR                ;Screen address in HL
01020          POP     BC                      ;BC = row/col count
01030 W_WSLP   RPUSH   BC,HL                   ;Save row/col count and this addr.
01040          LD      B,0                     ;BC = column count
01050          LDIR                            ;Move one row
01060          POP     HL                      ;Get back starting address
01070          LD      BC,80                   ;Get line length
01080          ADD     HL,BC                   ;HL ==> start of next row
01090          POP     BC                      ;Get back counts
01100          DJNZ    W_WSLP                  ;Loop for next row
01110          RET
01120 ;-----------------------------------------------------------
01130 ;  W_RSTOR -- Restore a window from program-defined storage
01140 ;        Note: the storage area is assumed to be the memory
01150 ;          location stored at W_BUFF$.  That is, we can only
01160 ;          pop up one level at a time.
01170 ;        Uses AF, BC, DE, HL
01180 ;-----------------------------------------------------------
01190 W_RSTOR:
01200          LD      HL,(W_START$)           ;HL = row/col of present window
01210          CALL    W_RC2ADR                ;Get buffer address of window
01220          EX      DE,HL                   ;Save in DE
01230          LD      HL,(W_BUFF$)            ;HL==> Saved information
01240          LD      BC,9                    ;Offset to screen data
01250          ADD     HL,BC                   ;HL==> screen data to restore
01260          LD      BC,(W_SIZE$)            ;BC = size of current window
01270 W_WRLP   RPUSH   BC,DE                   ;Save count and address
01280          LD      B,0                     ;BC = column count
01290          LDIR                            ;Move one row
01300          POP     DE                      ;Get back start of row
01310          EX      DE,HL                   ;Address to HL
01320          LD      BC,80                   ;Offset to next row
01330          ADD     HL,BC                   ;HL==> beginning of next row
01340          EX      DE,HL                   ;Address back to DE
01350          POP     BC                      ;Recover counts
01360          DJNZ    W_WRLP                  ;Do next row
01370          LD      HL,(W_BUFF$)            ;HL ==> info about last window
01380          LD      DE,W_BUFF$              ;DE ==> housekeeping area
01390          LD      BC,9                    ;Bytes to move
01400          LDIR                            ;Reclaim housekeeping bytes
01410          LD      HL,(W_CUR$)             ;Get previous cursor
01420          @@VDCTL 3                       ;Restore cursor
01430          RET
01440 ;-----------------------------------------------------------
01450 ;  W_CLS -- Clear the current window
01460 ;        Uses AF
01470 ;-----------------------------------------------------------
01480 W_CLS:
01490          RPUSH   BC,DE,HL                ;Save registers
01500          CALL    W_SCGET                 ;Get the screen to the buffer
01510          LD      HL,(W_START$)           ;Get row/col of screen start
01520          LD      (W_CUR$),HL             ;Record new cursor position
01530          @@VDCTL 3                       ;Set the cursor on screen
```

Listing 1 continued

Terminology for various windows seems to vary from one reference work to another. The routines in Listing 1 support what are usually called "pop-up" windows—sections of the screen that seem to overlay the text behind them. When the window is on the screen, it hides whatever was there before; when the window is removed, the previous text and cursor positions are restored.

The routines in Listing 1 allow only one active window on the screen at a time. Normally, that window is the entire screen, managed by TRSDOS. When a program calls the routine to open a new window, only that new window is active. To make another window active, a program must either ask that the current window be closed or that a new window be created and designated as the active window.

Some windowing programs use "tiled" (or side-by-side) windows instead of pop-up windows. With tiled windows, two or more windows are apparently active at once. With some work, the routines in Listing 1 could be modified to support tiled windows, but they aren't part of my original plan for this project.

Finding Buffers

When you create a pop-up window, it must save at least some of the contents of the video display before overwriting it. This is a two-step process: It must somehow read whatever is currently on the screen, and it must then move that information to some location in memory.

The @VDCTL SVC (supervisory call) provides three methods of reading information from the screen. Function 1 returns the character at a single, specified location. Function 9 returns the contents of a single line, and function 6 reads the entire 1,920 bytes (80 columns by 24 rows) of the screen at once. If a program uses function 6 or function 9, it must set aside a buffer of the appropriate size to receive the video data. Also, the entire buffer must be located below 0F400 hexadecimal (hex).

It is certainly possible to implement the window routines by using single-byte transfers to the screen. But the resulting programs feel sluggish. It is much faster to transfer 1,920 bytes in one SVC call than to make 1,920 calls to transfer 1 byte at a time. The only problem is that doing this requires a buffer that is 1,920 bytes long. Luckily, that screen buffer doesn't need to be allocated permanently. It only needs to be in existence when a window is being manipulated.

The block of memory immediately below 3000 hex is reserved for TRSDOS library routines. If a program loads at 3000 hex or above, it can use the

@CMNDI or @CMNDR SVCs to invoke any of the library routines without damaging itself. When a library routine is not running, and usually it is not, that block of memory sits unused.

Since the Model 4 cannot generally do two things at once, there is no possibility that a program could call both a window routine and a library routine simultaneously. The window routines (and any other program module) can therefore use the low-memory block as a temporary buffer. The only requirement is that the window routines must never expect that memory space to remain unchanged between calls. All the routines in Listing 1 use a temporary full-screen buffer that begins at 2700 hex.

The window routines can . . . use the low-memory block as a temporary buffer.

If a window covers part of the screen, the "hidden" data must also be saved somewhere in memory. The window routines cannot know how many windows will be opened on top of each other, nor can they know how large such windows should be. Therefore, there is no way to set aside a properly sized buffer to hold data that is behind an open window.

The routines in Listing 1 require that the storage buffer be supplied by the calling program, which allocates its memory space as needed. Each time a program asks the low-level routines in Listing 1 to open a window, it must allocate a buffer large enough to hold the screen contents beneath the window plus 9 bytes for some simple housekeeping. To open a window that is 20 columns by five rows on the screen, the calling program allocates 109 bytes ($20 \times 5 + 9$) of storage.

The window routines make one other requirement of the calling program. The storage buffer must not move while a window is on the screen. If you call the window routines from a program written in assembly language or C, this requirement should cause no difficulties at all. If you call the routines from Basic, you have to be careful of how you manipulate variables and memory to sidestep Basic's normal memory manipulations.

Actually, the storage buffer can move

Listing 1 continued

```
01540          CALL    W_RC2ADR                ;Change to buffer address
01550          LD      BC,(W_SIZE$)            ;Get row/col count
01560          DEC     C                       ;One column will be directly filled
01570 W_WCLP   RPUSH   BC,HL,HL                ;Save BC, HL and
01580          POP     DE                      ;  transfer HL to DE
01590          INC     DE                      ;DE = HL + 1
01600          LD      B,0                     ;BC = column count
01610          LD      (HL),' '                ;Clear the first space of row
01620          LDIR                            ;Clear one row
01630          POP     HL                      ;Get starting address
01640          LD      BC,80                   ;Offset to next row
01650          ADD     HL,BC                   ;HL ==> next row
01660          POP     BC                      ;Get back count
01670          DJNZ    W_WCLP                  ;Loop for all rows
01680          CALL    W_SCPUT                 ;Put screen back
01690          RPOP    HL,DE,BC                ;Restore registers
01700          RET
01710 ;---------------------------------------------------------
01720 ;  W_OPEN -- Create and clear a window on the screen
01730 ;        Entry:  H = top row (0 - 23)
01740 ;                L = left col (0 - 79)
01750 ;                B = row count (1 - (24-H))
01760 ;                C = col count (1 - (80-L))
01770 ;                DE ==> save buffer (B * C + 6 bytes long)
01780 ;        Uses AF
01790 ;---------------------------------------------------------
01800 W_OPEN:
01810          CALL    W_SCGET                 ;Get the screen
01820          RPUSH   BC,DE,HL                ;Save entry parameters
01830          CALL    W_SAVE                  ;Save current window
01840          RPOP    HL,DE,BC                ;Get back everything
01850          LD      (W_START$),HL           ;And save it
01860          LD      (W_SIZE$),BC            ;  all to define
01870          LD      (W_BUFF$),DE            ;  a new window
01880          LD      A,H                     ;Get starting row
01890          ADD     A,B                     ;Add # of rows
01900          DEC     A                       ;Offset from 0
01910          LD      (W_LSTRW$),A            ;And save it
01920          CALL    W_CLS                   ;Clear the window & put on screen
01930          RET
01940 ;---------------------------------------------------------
01950 ;  W_CLOSE -- Releases a window and restores previous screen
01960 ;---------------------------------------------------------
01970 W_CLOSE:
01980          RPUSH   BC,DE,HL
01990          CALL    W_SCGET                 ;Get the screen
02000          CALL    W_RSTOR                 ;Restore previous window
02010          CALL    W_SCPUT                 ;Put it back on screen
02020          RPOP    HL,DE,BC
02030          RET
02040 ;---------------------------------------------------------
02050 ;  W_SCRUP -- Scroll the current window up one row and
02060 ;  place cursor at beginning of last window row.
02070 ;        Uses: AF
02080 ;---------------------------------------------------------
02090 W_SCRUP:
02100          RPUSH   BC,DE,HL                ;Save affected registers
02110          CALL    W_SCGET                 ;Get copy of whole screen
02120          LD      HL,(W_START$)           ;Get row/column of top-left
02130          LD      A,(W_LSTRW$)            ;Last row of window
02140          LD      H,A                     ;HL==> beginning of last row
02150          LD      (W_CUR$),HL             ;Save new cursor loc.
02160          @@VDCTL 3                       ;Set cursor there
02170          LD      HL,(W_START$)           ;Get beginning again
02180          CALL    W_RC2ADR                ;Change to buffer address
02190          PUSH    HL                      ;Copy address
02200          POP     DE                      ;  to DE
02210          LD      BC,80                   ;BC = 1 row
02220          ADD     HL,BC                   ;HL==> beginning of row 2
02230          LD      BC,(W_SIZE$)            ;Get row/column count
02240          DEC     B                       ;One row will disappear
02250 W_SCRUPLP:
02260          RPUSH   BC,DE,HL                ;Save registers
02270          LD      B,0                     ;BC = column count
02280          LDIR                            ;Move one row
02290          RPOP    DE,HL                   ;Get back addresses
02300          LD      BC,80                   ;One screen row
02310          ADD     HL,BC                   ;Add one row to orig. DE
02320          EX      DE,HL                   ;Values back to original registers
02330          ADD     HL,BC                   ;DE & HL ==> next row
02340          POP     BC                      ;Get back counter
02350          DJNZ    W_SCRUPLP               ;Repeat for all rows
02360          DEC     C                       ;Columns - 1
02370          LD      B,0                     ;BC = columns - 1
02380          PUSH    DE                      ;Move start of last row
02390          POP     HL                      ; to HL
02400          INC     DE                      ;DE ==> last row, col 2
02410          LD      (HL),' '                ;Space to one position
02420          LDIR                            ;Fill last row with spaces
02430          CALL    W_SCPUT                 ;Put the screen back
02440          RPOP    HL,DE,BC                ;Restore registers
02450          RET
02460 ;---------------------------------------------------------
02470 ;  W_LDSPLY -- Print a line in the current window and return
02480 ;  cursor to the beginning of the line
02490 ;        Entry: HL ==> line, terminated by any byte < ' '
02500 ;        Uses AF,HL
02510 ;---------------------------------------------------------
```

Listing 1 continued

Listing 1 continued

```
02520 W_LDSPLY:
02530         RPUSH   BC,DE,HL                ;Save registers
02540         LD      HL,(W_CUR$)             ;Get current cursor
02550         LD      A,(W_LSTRW$)            ;And get last row
02560         CP      H                       ;At end of window?
02570         JR      NC,$+5                  ;No -- skip call
02580         CALL    W_SCRUP                 ;Else scroll up window
02590         POP     HL                      ;Get pointer to string
02600         PUSH    HL                      ;  and save it again
02610         LD      A,' '-1                 ;Test for control characters
02620 W_LDSPLP:
02630         CP      (HL)                    ;Is it a control char.?
02640         JR      NC,$+5                  ;Yes -- go
02650         INC     HL                      ;Else point to next
02660         JR      W_LDSPLP                ;And loop back
02670         LD      (HL),3                  ;Make terminator an ETX
02680         POP     HL                      ;Get original pointer
02690         @@DSPLY                         ;Let DOS print string
02700         LD      HL,(W_CUR$)             ;Get original cursor again
02710         INC     H                       ;Move to next line
02720         LD      (W_CUR$),HL             ;Save it again
02730         @@VDCTL 3                       ;Move screen cursor there
02740         RPOP    DE,BC                   ;Restore registers
02750         RET
02760 ;-----------
02770 ;  Nonvolatile data
02780 ;  for window routines
02790 ;-----------
02800 W_BUFF$         DW      $-$             ;No previous save buffer defined
02810 W_START$        DW      0<8+0           ;Full screen starts at 0,0
02820 W_SIZE$         DW      24<8+80         ;Full screen is 24 x 80
02830 W_CUR$          DW      $-$             ;Row/col of window cursor
02840 W_LSTRW$        DB      23              ;Full screen ends on row 23
02850 ;
02860         END
```

End

Program Listing 2. First test program for window routines.

```
00100 ;-------------------------------------------------------------
00110 ;  First test program for window routines
00120 ;
00130 ;-------------------------------------------------------------
00140 *LIST OFF
00150 *GET MACLIB/ASM
00160 *LIST ON
00170 ;
00180 TROW    EQU     4                       ;Change these to test
00190 TCOL    EQU     5                       ;  various window sizes
00200 NROW    EQU     6
00210 NCOL    EQU     20
00220 ;
00230         ORG     3000H
00240 ;
00250         DS      100H
00260 STACK   EQU     $
00270 START   LD      SP,STACK
00280         @@DSP   0FH                     ;Turn off the cursor
00290         LD      HL,W_VBUF               ;HL ==> screen buffer
00300         LD      DE,W_VBUF+1             ;DE ==> 2nd location
00310         LD      BC,80*24-1              ;BC = screen bytes - 1
00320         LD      (HL),0AAH               ;Select a graphics character
00330         LDIR                            ;Fill the screen buffer
00340         CALL    W_SCPUT                 ;Put it on the screen
00350         LD      HL,TROW<8+TCOL          ;HL has top row/col
00360         LD      BC,NROW<8+NCOL          ;BC has number of rows/cols
00370         LD      DE,SAVBUF               ;DE ==> save buffer
00380         CALL    W_OPEN                  ;Open a window
00390         CALL    PAUSE                   ;Wait for a keystroke
00400         LD      B,9                     ;Number of rows to print
00410 LOOP    LD      HL,LINE$                ;HL ==> message to print
00420         CALL    W_LDSPLY                ;Put it in the window
00430         CALL    PAUSE                   ;Wait for a keystroke
00440         LD      A,(LIN_NUM)             ;Get the line number
00450         INC     A                       ;Bump it
00460         LD      (LIN_NUM),A             ;Put it back
00470         DJNZ    LOOP                    ;Print another line
00480         CALL    W_CLOSE                 ;Close the window
00490         @@DSP   0EH                     ;Turn cursor on
00500         @@CLS                           ;Clear the screen
00510         @@EXIT                          ;And back to LS-DOS
00520 ;-----------
00530 ;  Simple pause routine
00540 ;-----------
00550 PAUSE   @@KEY
00560         RET
00570 ;-----------
00580 ;  Line to print in window
00590 ;-----------
00600 LINE$   DB      '  This is line '
00610 LIN_NUM DB      '1',0DH
00620 ;-----------
00630 ;  Load window routines
00640 ;-----------
00650 *GET WINLIB/ASM
00660 SAVBUF  EQU     $                       ;Put save buffer at end
00670         END     START
```

End

while a window is open. The window routines simply require that it return to its original location before the window is closed. For example, if you want to move the storage buffer to an alternate bank, your program has to get the buffer back to the correct location before it calls the window-close routine.

The Routines in Detail

Most of the window routines should be easy to understand. In its present form, Listing 1 is meant to be included in a longer assembly program. It begins by saving the current program counter in a temporary variable, W_START, so it can establish a new ORG (origin) at 2700 hex and define the location of the video buffer. Once that is done, Listing 1 resets the program counter back to its original location with another ORG statement.

You might think that it's easier to define the video buffer with a simple EQU (equate) command instead of using two ORG commands. The purpose of the ORGs is to let other temporary storage locations be defined as the library grows and to give the assembler the ability to ensure that the low-memory buffers stay below 3000 hex.

The first two routines in the listing should be self-explanatory. W_SCGET uses the @VDCTL SVC to move a copy of the screen into the video buffer. The second routine, W_SCPUT reverses that process and asks TRSDOS to copy the video buffer back onto the screen. All the Listing 1 routines and labels begin with W_ to show that they are part of the windowing library instead of the overlying application program and to keep naming conflicts at a minimum.

The next routine, W_RC2ADD (row/column to address) expects a screen row number in the H register and a column number in the L register. It uses those two numbers to calculate the address, in the video buffer, of a particular screen location. The only assumption it makes is that the video buffer begins on a memory-page boundary; that is, the buffer's address must be in the form nn00 hex, with "nn" representing any two hexadecimal digits.

The next routine, W_SAVE, is long but not very complicated. It begins by transferring 9 bytes of housekeeping information to a save buffer, followed by the data from the portion of the screen that is about to be overwritten. The housekeeping information it saves is used later to re-establish the location and cursor position of the current window. The housekeeping information is also used as a pointer to the previous save buffer.

Because each buffer contains the address of the previous buffer, the windows

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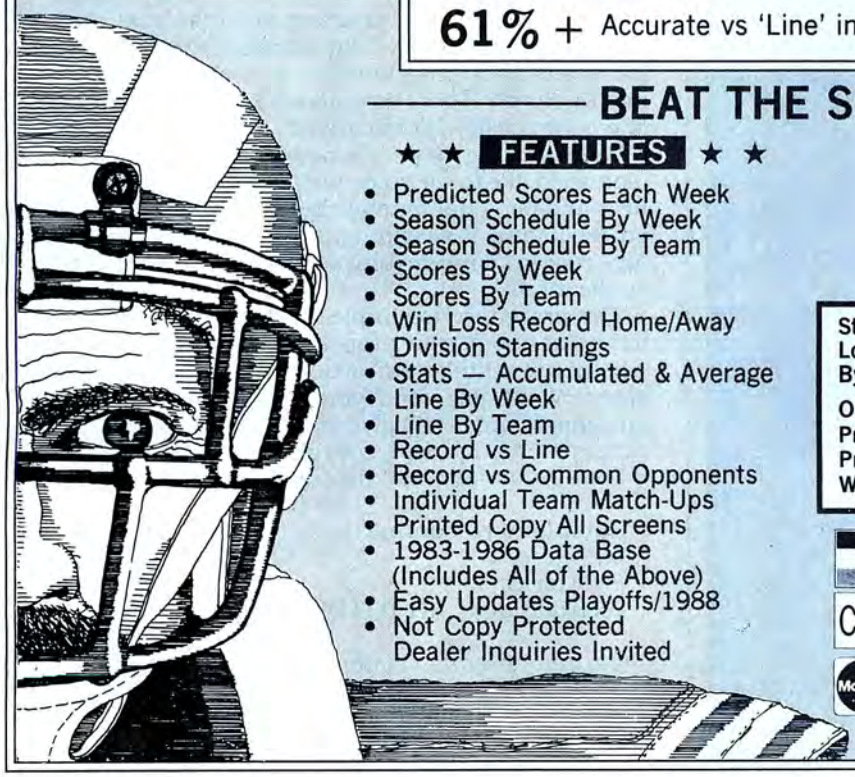

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5 10 15 20 25	155 160 165 170 175	305 310 315 320 325	455 460 465 470 475
26 31 36 41 46	176 181 186 191 196	326 331 336 341 346	476 481 486 491 496
27 32 37 42 47	177 182 187 192 197	327 332 337 342 347	477 482 487 492 497
28 33 38 43 48	178 183 188 193 198	328 333 338 343 348	478 483 488 493 498
29 34 39 44 49	179 184 189 194 199	329 334 339 344 349	479 484 489 494 499
30 35 40 45 50	180 185 190 195 200	330 335 340 345 350	480 485 490 495 500
51 56 61 66 71	201 206 211 216 221	351 356 361 366 371	501 506 511 516 521
52 57 62 67 72	202 207 212 217 222	352 357 362 367 372	502 507 512 517 522
53 58 63 68 73	203 208 213 218 223	353 358 363 368 373	503 508 513 518 523
54 59 64 69 74	204 209 214 219 224	354 359 364 369 374	504 509 514 519 524
55 60 65 70 75	205 210 215 220 225	355 360 365 370 375	505 510 515 520 525
76 81 86 91 96	226 231 236 241 246	376 381 386 391 396	526 531 536 541 546
77 82 87 92 97	227 232 237 242 247	377 382 387 392 397	527 532 537 542 547
78 83 88 93 98	228 233 238 243 248	378 383 388 393 398	528 533 538 543 548
79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
101 106 111 116 121	251 256 261 266 271	401 406 411 416 421	551 556 561 566 571
102 107 112 117 122	252 257 262 267 272	402 407 412 417 422	552 557 562 567 572
103 108 113 118 123	253 258 263 268 273	403 408 413 418 423	553 558 563 568 573
104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
128 133 138 143 148	278 283 288 293 298	428 433 438 443 448	578 583 588 593 598
129 134 139 144 149	279 284 289 294 299	429 434 439 444 449	579 584 589 594 599
130 135 140 145 150	280 285 290 295 300	430 435 440 445 450	580 585 590 595 600

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3 8 13 18 23	153 158 163 168 173	303 308 313 318 323	453 458 463 468 473
4 9 14 19 24	154 159 164 169 174	304 309 314 319 324	454 459 464 469 474
5 10 15 20 25	155 160 165 170 175	305 310 315 320 325	455 460 465 470 475
26 31 36 41 46	176 181 186 191 196	326 331 336 341 346	476 481 486 491 496
27 32 37 42 47	177 182 187 192 197	327 332 337 342 347	477 482 487 492 497
28 33 38 43 48	178 183 188 193 198	328 333 338 343 348	478 483 488 493 498
29 34 39 44 49	179 184 189 194 199	329 334 339 344 349	479 484 489 494 499
30 35 40 45 50	180 185 190 195 200	330 335 340 345 350	480 485 490 495 500
51 56 61 66 71	201 206 211 216 221	351 356 361 366 371	501 506 511 516 521
52 57 62 67 72	202 207 212 217 222	352 357 362 367 372	502 507 512 517 522
53 58 63 68 73	203 208 213 218 223	353 358 363 368 373	503 508 513 518 523
54 59 64 69 74	204 209 214 219 224	354 359 364 369 374	504 509 514 519 524
55 60 65 70 75	205 210 215 220 225	355 360 365 370 375	505 510 515 520 525
76 81 86 91 96	226 231 236 241 246	376 381 386 391 396	526 531 536 541 546
77 82 87 92 97	227 232 237 242 247	377 382 387 392 397	527 532 537 542 547
78 83 88 93 98	228 233 238 243 248	378 383 388 393 398	528 533 538 543 548
79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
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104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
128 133 138 143 148	278 283 288 293 298	428 433 438 443 448	578 583 588 593 598
129 134 139 144 149	279 284 289 294 299	429 434 439 444 449	579 584 589 594 599
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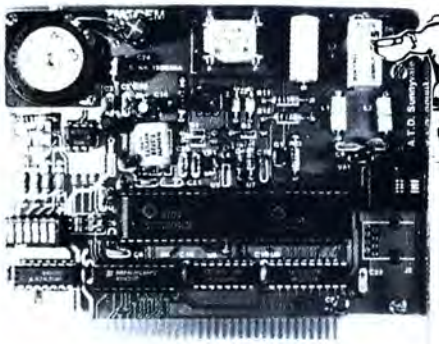

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Program Listing 3. A demonstration program for the routines in Listing 1.

```
00100 ;-------------------------------------------------------
00110 ;  Windowing Demonstration Program
00120 ;       Do not run this program until you are sure that
00130 ;       you have the windowing routines debugged.
00140 ;-------------------------------------------------------
00150 *LIST OFF
00160 *GET MACLIB/ASM
00170 *LIST ON
00180 ;
00190 TROW    EQU     0                       ;Definitions for first
00200 TCOL    EQU     0                       ;  window
00210 NROW    EQU     6
00220 NCOL    EQU     16
00230 ;
00240         ORG     3000H
00250 ;
00260         DS      100H
00270 STACK   EQU     $
00280 START   LD      SP,STACK
00290         @@DSP   0FH                     ;Turn off the cursor
00300         @@DSP   10H                     ;Enable inverse video
00310         LD      A,10H                   ;On/off flag
00320         LD      (VID_TGL),A             ;And save it
00330         LD      HL,TROW<8+TCOL          ;HL has top row/col
00340         LD      (WIN_TOP),HL            ;Save it
00350         LD      B,17                    ;17 windows for demonstration
00360 LOOP1   PUSH    BC                      ;Save loop counter
00370         CALL    FLIP                    ;Flip the video mode
00380         LD      HL,(WIN_TOP)            ;Get top of window
00390         LD      BC,NROW<8+NCOL          ;Get number of rows & columns
00400         LD      DE,(BUF_PTR)            ;Get pointer to save area
00410         CALL    W_OPEN                  ;Open the window
00420         CALL    SCROLL                  ;Print 9 lines
00430         LD      HL,(WIN_TOP)            ;Get beginning of window
00440         LD      BC,1<8+4                ;Offset to next window
00450         ADD     HL,BC                   ;Add the offset
00460         LD      (WIN_TOP),HL            ;Save it again
00470         LD      HL,(BUF_PTR)            ;Pointer to save area
00480         LD      BC,NROW*NCOL+9          ;Bytes per window
00490         ADD     HL,BC                   ;Add to offset
00500         LD      (BUF_PTR),HL            ;Save pointer to next buffer
```

Listing 3 continued

form what is known as a one-way linked list. The calling program must allocate the requisite memory for the save buffers and it needs to know how many windows are opened, but it does not have to worry about the actual location of each save buffer. The windows "know" the order that they are in and the location of each of the save buffers.

If a window is saved, it eventually needs to be restored. The next routine, W_RESTOR, copies information from a save buffer back onto the screen. It also copies back the 9 housekeeping bytes so that the previous window becomes the active window.

Simple Routine

The routine called W_CLS is simple. Its job is to clear the current window by filling it with spaces. It also moves the cursor position to the top left corner of the window. The screen location and size of the window are stored in the housekeeping bytes, which the window routines maintain. W_CLS calls W_SCGET to get a copy of the screen in memory, uses the housekeeping information to reset the cursor, and then writes a space to every location inside the current window before sending the buffer back to the

screen by calling the W_SCPUT routine.

The next two routines coordinate opening and closing windows. W_OPEN receives information about a new window in the BC, DE, and HL registers, calls the W_SAVE routine to save the current window, and then calls W_CLS to clear the new window and send the buffer back to the video screen. The previous routines do all the work; W_OPEN just coordinates the process of opening a new screen.

If a window is saved, it eventually needs to be restored.

W_CLOSE is even simpler. It saves the current state of the registers and then calls three of the previous routines to get a copy of the screen, restore the previous window, and send the buffer back to the video display.

Listing 3 continued

```
00510           LD      A,(WIN_LET)             ;Get window's letter
00520           INC     A                       ;Bump to next
00530           LD      (WIN_LET),A             ;Save it again
00540           POP     BC                      ;Get outer loop counter
00550           DJNZ    LOOP1                   ;Do another window
00560 ;-----------
00570 ;  Now close all the windows
00580 ;-----------
00590           LD      B,17                    ;17 windows to close
00600 LOOP2     PUSH    BC                      ;Save the loop counter
00610           LD      A,(WIN_LET)             ;Get last window's letter
00620           DEC     A                       ;Move down one
00630           LD      (WIN_LET),A             ;Save it again
00640           CALL    FLIP                    ;Flip the string
00650           CALL    SCROLL                  ;Scroll through that window
00660           CALL    W_CLOSE                 ;Close a window
00670           POP     BC                      ;Recover counter
00680           DJNZ    LOOP2                   ;Close them all
00690           @@DSP   11H                     ;Be sure inverse is off
00700           @@EXIT                          ;And leave
00710 ;-----------
00720 ;  Scroll one window
00730 ;-----------
00740 SCROLL    LD      B,9                     ;Rows to print
00750 S_LOOP    LD      HL,LINE$                ;HL ==> message to print
00760           CALL    W_LDSPLY                ;Put it in the window
00770           LD      A,(LIN_NUM)             ;Get the line number
00780           INC     A                       ;Bump it
00790           LD      (LIN_NUM),A             ;Put it back
00800           DJNZ    S_LOOP                  ;Print another line
00810           RET
00820 ;-----------
00830 ;  Flip between normal and
00840 ;  inverse displays
00850 ;-----------
00860 FLIP      LD      A,(VID_TGL)             ;Get previous state
00870           XOR     1                       ;Flip states
00880           LD      (VID_TGL),A             ;Save new state
00890           LD      C,A                     ;Put it in C
00900           @@DSP                           ;And send to video
00910           LD      A,'1'                   ;Reset to "Line 1"
00920           LD      (LIN_NUM),A             ;Save it
```

Listing 3 continued

Listing 3 continued

```
00930          RET
00940 ;--------------
00950 ;  Data area
00960 ;--------------
00970 VID_TGL DB       $-$                    ;Hold current video state
00980 WIN_TOP DW       $-$                    ;Current window top
00990 BUF_PTR DW       BUFFER                 ;Address of save buffer
01000 LINE$   DB       'Window '
01010 WIN_LET DB       'A  Line '
01020 LIN_NUM DB       '1',03H
01030 ;--------------
01040 ;  Get windowing routines
01050 ;--------------
01060 *GET WINLIB/ASM
01070 BUFFER  EQU      $                      ;Beginning of storage
01080          END      START
```

End

Program Listing 4. Macro commands for Listings 1, 2, and 3.

```
00100 ;-------------------------------------------------------------
00110 ;  Macro commands required for Listings 1, 2, and 3
00120 ;  Add the necessary macros to your own library or
00130 ;  save this file as MACLIB/ASM
00140 ;-------------------------------------------------------------
00150 ;
00160 ;---------------------------------------------
00170 ;   @@CLS -- Clears the screen
00180 ;---------------------------------------------
00190 @@CLS    MACRO
00200          DEFINE  @CLS,69H
00210          SVC     @CLS,CHECK
00220          ENDM
00230 ;
00240 ;-------------------------------------------------
00250 ;   DEFINE -- Define a lable unless it
00260 ;         is already defined.
00270 ;-------------------------------------------------
00280 DEFINE   MACRO   #LABEL,#VALUE
00290          IFNDEF  #LABEL
```

Listing 4 continued

Perhaps the most complex routine in Listing 1 is W_SCRUP, which scrolls the data in a window up one line. It also sets the cursor position to the beginning of the last line inside the window. It must get a copy of the video display, copy each window line onto the one above it, and then clear the last line of the window before returning.

The final routine in Listing 1, W_LDSPLY, is responsible for displaying a single line inside a window. It doesn't check to ensure that the line will fit—that job is left to the calling program. Instead, W_LDSPLY is responsible for calling the scrolling routine, if necessary, to make sure the line ends with the ETX character 03 hex. Next W_LDSPLY calls the normal TRSDOS/LS-DOS @DSPLY SVC to display the line. W_DSPLY then resets the cursor to the correct location for the next line.

No Error Checking

It is important to realize that none of these routines provide any error checking. Each one assumes that the calling program is smart enough to set parameters correctly and make the right calls. The advantage of omitting error checking is that the routines can run at full

speed and not spend part of their time examining parameters or returning error codes. It also means that each one can be as short as possible. The disadvantage is that a small bug in a calling program can cascade into a major system crash. When I write both the low- and high-level portions of a program myself, I'm willing to take that chance in return for speed and compact code. It's also kind of fun to watch the crashes that occur during early debugging, as long as all the disk drive doors are open and the hard disk is write-protected.

The difference is one of programming philosophy. If the low-level routines do extensive error checking and correction, a system crash is less likely, but a bug in the calling program could go undetected. If the low-level routines don't check for errors, a bug in the calling program will probably result in erratic behavior of the windowing routines or a system crash, but it's then possible to find and remove that bug.

If you want to add error checking, the W_SAVE routine should make sure that the H and L registers contain possible row and column screen numbers, that H + B and L + C will be on the screen, and that the buffer address in DE is greater than 3000 hex. The W_LDSPLY routine should also check to be sure that the line it is to display will not go past the right edge of the window.

The Test Programs

Listing 2 is a simple test program that exercises most of the window routines and lets you watch what happens. It begins by filling the screen with a graphics character, 0AA hex, so that the window and its borders are clear. It then asks the routines to open a window and print nine lines. Since the window is only six rows high, the text has to be scrolled.

At each step, Listing 2 waits for a keystroke to continue. This way you can determine exactly where any errors are occurring and correct bugs in the window routines fairly easily. There is one feature of both Listings 2 and 3 that deserves special comment. Each starts by setting aside 256 bytes for a program stack. The low-level window routines plus any interrupt calls that occur while they are running require more stack room than TRSDOS/LS-DOS 6 makes available to a running program. Therefore, each must create its own stack to avoid the strange kinds of bugs that happen when a stack overflows into parts of the operating system. It is possible to save the TRSDOS stack on entry and restore it just before a program ends, but the @EXIT and @ABORT SVCs automatically restore the system stack for you at the end of a program.

Listing 4 continued

```
00300 #LABEL  EQU     #VALUE
00310         ENDIF
00320         ENDM
00330 ;
00340 ;-----------------------------------------
00350 ;  @@DSP -- Display one character on the screen
00360 ;      #char defaults to value in C register
00370 ;-----------------------------------------
00380 @@DSP   MACRO   #CHAR
00390         DEFINE  @DSP,02H
00400         PUSH    DE
00410         IFEQ    %%,1
00420           LD      A,#CHAR
00430           LD      C,A
00440         ENDIF
00450         SVC     @DSP,CHECK
00460         POP     DE
00470         ENDM
00480 ;
00490 ;-----------------------------------------
00500 ;   @@DSPLY -- Displays line of text
00510 ;   LINE defaults to value in HL
00520 ;-----------------------------------------
00530 @@DSPLY MACRO   #LINE
00540         DEFINE  @DSPLY,0AH
00550         IFEQ    %%,1
00560           RPUSH   DE,HL
00570           LD      HL,#LINE
00580           SVC     @DSPLY,CHECK
00590           RPOP    HL,DE
00600         ELSE
00610           PUSH    DE
00620           SVC     @DSPLY,CHECK
00630           POP     DE
00640         ENDIF
00650         ENDM
00660 ;
00670 ;-----------------------------------------
00680 ;  @@ERROR -- Reports an error.
00690 ;   Depends on CFLAG$ & SFLAG$ for options
00700 ;   Exits program via ABORT
00710 ;   Requires #ERRNO
00720 ;-----------------------------------------
00730 @@ERROR MACRO   #ERRNO
00740         DEFINE  @ERROR,1AH
00750         LD      C,#ERRNO
00760         SVC     @ERROR
00770         ENDM
00780 ;
00790 ;-----------------------------------------
00800 ;  @@EXIT -- Exits program
00810 ;  #RETCOD defaults to 0 (no error)
00820 ;-----------------------------------------
00830 @@EXIT  MACRO   #RETCOD
00840         DEFINE  @EXIT,16H
00850         IFEQ    %%,1
00860           LD      HL,#RETCOD
00870         ELSE
00880           LD      HL,0
00890         ENDIF
00900         SVC     @EXIT
00910         ENDM
00920 ;
00930 ;-----------------------------------------
00940 ;  @@KEY -- Waits for key at *KI device
00950 ;          keystroke returned in A
00960 ;-----------------------------------------
00970 @@KEY   MACRO
00980         DEFINE  @KEY,01H
00990         PUSH    DE
01000         SVC     @KEY,CHECK
01010         POP     DE
01020         ENDM
01030 ;
01040 ;-----------------------------------------
01050 ;  @@MUL16 -- Multiplies 16-bit by 8-bit value
01060 ;     If values aren't specified, defaults to
01070 ;     values in HL and C
01080 ;     Result in HL and A
01090 ;-----------------------------------------
01100 @@MUL16 MACRO   #VAL16,#VAL8
01110         DEFINE  @MUL16,5BH
01120         PUSH    DE
01130         IFEQ    %%,2
01140           LD      HL,#VAL16
01150           LD      A,#VAL8
01160           LD      C,A
01170         ENDIF
01180         SVC     @MUL16
01190         POP     DE
01200         ENDM
01210 ;
01220 ;-----------------------------------------
01230 ;   RPOP
01240 ;     Pops 0 to 6 registers from the stack
01250 ;     Example:  RPOP   BC,DE,HL,IX
01260 ;-----------------------------------------
01270 RPOP    MACRO   #R1,#R2,#R3,#R4,#R5,#R6
01280         IFGT    %%,0
01290           POP     #R1
```

Listing 4 continued

Listing 4 continued

```
01300          ENDIF
01310          IFGT    %%,1
01320            POP     #R2
01330          ENDIF
01340          IFGT    %%,2
01350            POP     #R3
01360          ENDIF
01370          IFGT    %%,3
01380            POP     #R4
01390          ENDIF
01400          IFGT    %%,4
01410            POP     #R5
01420          ENDIF
01430          IFGT    %%,5
01440            POP     #R6
01450          ENDIF
01460          ENDM
01470 ;
01480 ;-----------------------------------------
01490 ;   RPUSH -- Version 2
01500 ;     Pushes 0 to 6 registers onto the stack
01510 ;     Example:  RPUSH   BC,DE,HL,IX
01520 ;-----------------------------------------
01530 RPUSH    MACRO   #R1,#R2,#R3,#R4,#R5,#R6
01540          IFGT    %%,0
01550            PUSH    #R1
01560          ENDIF
01570          IFGT    %%,1
01580            PUSH    #R2
01590          ENDIF
01600          IFGT    %%,2
01610            PUSH    #R3
01620          ENDIF
01630          IFGT    %%,3
01640            PUSH    #R4
01650          ENDIF
01660          IFGT    %%,4
01670            PUSH    #R5
01680          ENDIF
01690          IFGT    %%,5
01700            PUSH    #R6
01710          ENDIF
01720          ENDM
01730 ;
```

Listing 4 continued

Once you run Listing 2 and make sure that the windowing routines work correctly, Listing 3 demonstrates how fast the window routines can run. This program successively opens 17 windows on the screen and scrolls nine lines of text through each before it opens the next. Then it closes each in turn after it scrolls another nine lines of text. Listing 3 uses the Model 4's inverse text capabilities to provide contrast between one window and the next. To leave the DOS screen unchanged at the end of the program, it must leave the inverse routine on. If that causes a problem with another program (LeScript, for example, doesn't run well when inverse text is enabled), type CLS from the DOS Ready prompt after you run Listing 3.

To verify that the windowing routines restore the text underneath a window, you might want to fill the screen with something before you run Listing 3. The easiest way to do this is to ask TRSDOS for a directory, leave the directory on the screen, and then run Listing 3. On my machine, Listing 3 runs so fast that it is difficult to see the lines of text scroll up in each window. You might want to add a timing loop to Listing 3's Scroll routine to make the scrolling clearer.

Enhancements

You can enhance the window routines in many ways, and you'll probably want to if you use them within your own programs. You can write additional low-level routines to scroll a window down, to the left, or to the right. You can also add borders to the windows so they appear more clearly on the screen.

Such extras are important to the look of a final program. Ten years ago, almost all programs handled the screen as if it was a teletype machine; graphics and cursor manipulation were almost unheard of; the most common method of clearing the screen was to print 24 carriage returns. Today, most programs know the difference between a printer and the screen, and most reflect the idea that anything except for a simple utility must run well and present an attractive user interface.

The windowing routines in Listing 1 demonstrate that programs for the Model 4 can handle the screen display just as efficiently as more modern computers. It is simply a matter of whether a programmer is willing to do the work to make a program look modern.■

Listing 4 continued

```
01740 ;-----------------------------------------
01750 ;     Invoke a TRSDOS 6 SVC
01760 ;     If "check" is specified, exit
01770 ;     through @ERROR if NZ flag is returned
01780 ;     from TRSDOS.
01790 ;-----------------------------------------
01800 SVC     MACRO   #NUM,#CHECK
01810         LD      A,#NUM          ;;A = SVC number
01820         RST     28H             ;;Perform SVC
01830         IFGT    %%,1            ;;More than one argument?
01840           JR      Z,$1?         ;;Go if no error
01850           LD      C,A           ;;Put error code in C
01860           LD      A,1AH         ;;@ERROR SVC number
01870           RST     28H           ;;Exit through @ERROR
01880 $1?       EQU     $             ;;Here if no error
01890         ENDIF
01900         ENDM
01910 ;
01920 ;-----------------------------------------
01930 ;  @@VDCTL -- Calls one of the @VDCTL functions
01940 ;       #FNC is required
01950 ;-----------------------------------------
01960 @@VDCTL MACRO   #FNC
01970         DEFINE  @VDCTL,@FH
01980         IFEQ    %%,0
01990           ERR     "MISSING PARAMETER"
02000         ENDIF
02010         PUSH    BC
02020         LD      B,#FNC
02030         SVC     @VDCTL
02040         POP     BC
02050         ENDM
02060 ;
```

End

Write Hardin Brothers at 280 N. Campus Ave., Upland, CA 91786. Enclose a stamped, self-addressed envelope for a reply. You can also contact Hardin on Compuserve's WE-SIG (PCS-117).

MS-DOS

Dbase Interface

Ellie, a memory-resident natural language interface for Dbase III and Dbase III Plus, features synonyms, antonyms, phrase definition, and an expandable dictionary. Its logical interpreter generates PRG code from simple lookup queries to range searches, minima/maxima, simultaneous totaling on multiple fields, and data-correlation tasks.

Ellie requires 512K RAM and is available for $189 from Elf Software Co., 210 W. 101 St., Suite 14B, New York, NY 10025, 212-316-9078.

Circle 560 on Reader Service card.

Ellie features synonyms, antonyms, and phrase definition.

Nightmare in Academia

Ever since you arrived at George Underwood Edwards Institute of Technology, you've heard stories about the tunnels, basements, and storage rooms beneath the campus. One night, though you intended to work on your term paper, something draws you down into the mysterious world under campus. Unfortunately, you're not prepared for the horrifying sights you find.

Thus begins Infocom's newest in interactive fiction, The Lurking Horror. It sells for $39.95 from Infocom Inc., 125 Cambridgepark Drive, Cambridge, MA 02140, 617-492-6000.

Circle 550 on Reader Service card.

Accounts Payable

The Accounts Payable System (APS) tracks invoices to be paid, monitors a business's cash requirements and available discounts, ages invoices, and generates a vendor analysis showing month-, year-, and total-to-date information. The system prints the necessary vendor information on an IRS Form 1099.

APS can generate checks from up to nine different checking accounts, and you can designate those entries that recur so you won't have to enter them each month.

APS requires a hard drive and sells for $500. A networking version, APS-M, is available for $700. For more information, contact Software Technology Inc., 620 N. 48th St., Suite 120, Lincoln, NE 68504, 402-466-1997.

Circle 553 on Reader Service card.

PC-Type +

PC-Type + offers the usual word-processing features, like full-screen editing and complete cursor control, and advanced features, too, like a 100,000-word spelling dictionary, mail-merge and label-processing programs, and a whoops key to recover up to 10 accidentally deleted lines.

The word processor works with PC-File data bases and comma-delimited (Wordstar) formatted files (up to 10 files simultaneously). It can move and copy blocks and columns (within a file or from one file to another); draw boxes and lines and fill in the intersections; sort up to eight columns or rows; and accept ascending, descending, case-sensitive, and case-insensitive requests.

PC-Type + lets you save up to 10 macro keys; search and replace (with optional case sensitivity); add, align, and sort columns of numbers; use up to 12 printer escape-code sequences; format and reformat columns so you can have two or more columns per page; and customize the program.

PC-Type + requires DOS 2.x and 256K and sells for $69.95 from Buttonware Inc., P.O. Box 5786, Bellevue, WA 98006, 800-528-8866.

Circle 554 on Reader Service card.

Two from Gazelle

Back-It lets you make high-speed backups in a DOS-compatible format. Its data-recovery routines can recover and restore files from damaged disks, so your data is protected before and after you write it to disk. Instead of writing to bad or marginal sectors and then using special routines to resurrect them, Back-It blocks out the questionable sectors, so there's no chance of losing data there.

Back-It 3.0 requires MS-DOS 2.x, 256K, and a hard disk and is available for $129.95.

Q-DOS II, a hard-disk file-management utility, adds functions to MS-DOS and provides a means to perform DOS-related commands faster and more efficiently. You can find files regardless of the directory they are in, display file contents in hexadecimal, ASCII, or special Wordstar format, and edit files with one keystroke.

Q-DOS II can print files, sorted file listings, and the directory structure and display or change file or directory attributes. The program is not copy-protected and requires MS-DOS 2.x and 256K and sells for $69.95.

For information on either product, contact Gazelle Systems, 42 N. University Ave., Suite 10, Provo, UT 84601, 800-233-0383 or 801-377-1288.

Circle 556 on Reader Service card.

Best of Both Worlds

Donetwothree lets you access Lotus's 1-2-3 data directly from Dbase without having to use translate utilities. It combines Dbase's error-handling and relational data base capabilities with 1-2-3's spreadsheet characteristics and can generate Dbase reports from 1-2-3 data, then put the results back into a 1-2-3 worksheet. Donetwothree sells for $99 from Communication Horizons, 701 7th Ave., Suite 900, New York, NY 10036, 212-724-0150.

Circle 551 on Reader Service card.

C-Worthy

The C-Worthy Interface Library contains a set of portable, integrated subroutines and development utilities to enhance programs written with the leading C compilers.

It includes more than 350 functions that make your programs easy for others to use.

C-Worthy has tested routines for windowing, keyboard handling, full function procedures (e.g., menus, scrollable choice list, word-wrapping text editor), over 15 data-input field types (security, data validation, field movement), full error support, and an MS-DOS interface. C-Worthy applications run on any PC compatible.

The C-Worthy Interface Library sells for $295, or $495 with source code. Contact Solution Systems, 541 Main St., Suite 410, S. Weymouth, MA 02190, 800-821-2492 or 617-337-6963.

Circle 552 on Reader Service card.

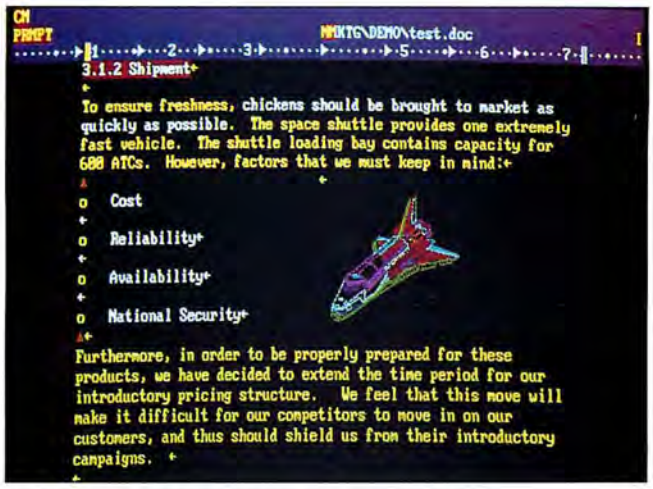
Graphics + Text

Inset 2 is a memory-resident graphics and text integrator. While using any program, you can pop up Inset 2 to edit and save the current screen. Then use your word processor to place the name of the saved image into the body of your report and print it out normally. Inset 2 automatically merges the captured image into the printed text.

The program lets you alter the size of the image and includes a graphics editor so you can draw lines, circles, and boxes; enter text in several different fonts; import symbols or other images; and zoom in on a portion of the image.

Inset 2 is available for $99 from the American Programmers Guild, 12 Mill Plain Rd., Danbury, CT 06811, 203-794-0396.

Circle 563 on Reader Service card.



Inset 2 lets you draw lines, circles, and boxes.

Four from MVP

Battle Ground, a World War II two-player action/strategy game with graphics and sound effects, pits a German and an American platoon against each other in one of nine levels of competition and 25 different battlefields, including city, town, and forest terrain. It requires MS-DOS 2.x and 256K and costs $29.95.

Facing the Empire takes you far away to the stellar periphery of Lyra, where you must build a battle fleet and develop attack and defense strategies to protect the peaceful Lyrans from the evil Morte Star empire. The Lyran technology is sophisticated, but watch your defenses—the Morte will attack wherever they see a weakness. Facing the Empire sells for $29.95.

Time Traveler takes you on an educational adventure through American history as you try to locate the Key of Time to return to the present.

Along the way you'll meet friendly and unfriendly people and learn some secrets of time travel. At several stops you must answer questions about American history to accumulate gold pieces. Time Traveler requires MS-DOS 1.x and 128K and sells for $34.95.

Scripture Memory 2.01 helps you memorize Bible verses by associating them with a topic and reference. The program keeps track of your progress and can perform word searches and produce printouts. Scripture Memory requires 128K and a printer and sells for $34.95.

Contact MVP Software, 1035 Dallas S.E., Grand Rapids, MI 49507, 616-245-8376.
Circle 559 on Reader Service card.

Bibliography Data Base

Pro-Cite 1.3 is a data-base and text-management system that helps you create bibliographies. It is designed especially for the scientific community and lets you decide how many author names to print, whether to reverse the first and last names, and whether to truncate an author's first name to initials.

Pro-Cite supports authority lists, by which you can standardize author names, journal titles, and index terms. The program includes global search and replace, user-definable workforms, and in-text reference handling.

The program requires 256K and at least DOS 2.1. It is available for $395 from Personal Bibliographic Software Inc., P.O Box 4250, Ann Arbor, MI 48106, 313-996-1580.
Circle 561 on Reader Service card.

Simple Weibull Analysis

Weibullsmith simplifies Weibull analysis, a technique of evaluating probability based on a sample of values. It automatically finds the appropriate distribution from an infinite range of possibilities. The program doesn't require you to understand probability or Weibull analysis; you enter data from the keyboard or a disk file and Weibullsmith plots the results on the display screen.

You can plot up to three different sets of data and their associated confidence limits on the same graph with up to 250 points in each data set. Weibullsmith stores files in ASCII format and includes a conversion program to change Lotus's 1-2-3 PRN data files to a format Weibullsmith can use.

Weibullsmith sells for $59 from Fulton Findings, 1251 W. Sepulveda Blvd., Suite 800, Torrance, CA 90502, 213-518-5045.
Circle 557 on Reader Service card.

Desktop Publishing Primer

Desktop Publishing Skills: A Primer for Typesetting with Computers and Laser Printers, by James Felici and Ted Nace, introduces the principles, processes, and techniques of publishing to help you use desktop publishing software and hardware more effectively. It discusses publishing fundamentals like typesetting, design, and page makeup, principles that apply to any desktop-publishing system. To produce the book, the authors use the technologies and methods they discuss, so the format itself provides examples of their ideas.

This 180-page book sells for $19.95 from Addison-Wesley Publishing Co., Reading, MA 01867, 617-944-3700.
Circle 562 on Reader Service card.

MS-DOS Guide

The *MS-DOS User's Guide*, by Chris DeVoney, offers instructions that range from such beginning topics as preparing disks, managing DOS

directories, printing, and avoiding disastrous errors to more advanced procedures like mastering path names, customizing DOS, and using RAM disks.

The guide references 69 of the most frequently used DOS commands and helps you cope with DOS error messages. Now in its second edition, the 580-page book is available for $21.95 from Que Corp., 7999 Knue Road, Suite 202, Indianapolis, IN 46250, 800-428-5331 or 317-842-7162.

Circle 555 on Reader Service card.

Turn Basic Into Pascal

P-tral translates GW-Basic into Turbo Pascal and can handle commercial applications including business graphics, scientific, and games software. The program is interactive and, when necessary, lets you pick out or name subroutines and rename variables that don't fit Pascal criteria.

P-tral works best on systems equipped with a hard disk, requires DOS 2.x with ANSI.SYS, and sells for $179. Contact Woodchuck Industries Inc., 340 W. 17th St., #2B, New York, NY 10011, 212-924-0576 or 212-206-6490.

Circle 558 on Reader Service card.

TRSDOS

Art & Design

Pro-Draw is a graphics editing package for the Models III/4/4P/4D equipped with the Grafyx Solution or Radio Shack hi-res board. This machine-language program is fast and flexible enough to create everything from casual drawings to complex schematics.

Pro-Draw can set, clear, or complement points, lines, circles, arcs, ellipses, or boxes. It lets you tilt, reverse, and mirror drawings; save portions of the screen; zoom in for detail; and put text with your work.

Pro-Draw includes sample block files, hi-res pictures, and a manual for $59.95 from Micro-Labs Inc., 7309 Campbell Road, Dallas, TX 75248, 214-702-8654.

Circle 564 on Reader Service card.

With Pro-Draw and a hi-res board, you can create sophisticated graphics on your Model III/4.

Etc.

If You've Got the Money, Honey, I've Got the Time

Two new programs, Telling Time and Money, combine guided learning drills, an arcade-style reward game, and a program- and student-management system. Telling Time contains lessons that work with digital and analog time recognition at four difficulty levels: hour, half-hour, quarter-hour, and five-minute intervals.

Money trains students to count money, determine whether or not they have enough to buy particular items, and count change. When a student has correctly answered a set number of problems, he or she can play the arcade game as a reward.

Teachers can use the system to hold up to 200 names and view, print, or delete all or individual files. The Model III/4 and MS-DOS versions of each program cost $44.95 ($54.95 with backup disk, and $164.95 for the class pack). Contact Gamco Industries Inc., Box 1911, Big Spring, TX 79721, 800-351-1404 (in Texas call collect, 915-267-6327).

Circle 565 on Reader Sevice card.

The Match Game

The Computer Match Program helps you set up a compatibility-dating service. Designed primarily as a fund-raising activity for junior and senior high schools, the program includes a sample questionnaire, or you can design your own. It permits up to 30 multiple choice questions, each with one to nine responses.

You enter the students' names and responses into the program, and it gives each student a list of 10 members of the opposite sex whose responses most closely match his or hers. The data disk can hold information for 1,000 to 4,000 students, depending on the computer system used.

The Computer Match Program runs on the Model III/4 (48K) or the Tandy 1000/1200/3000 (256K) and sells for $49.95. Contact Big G Software, Rt. 2, Box 111, Alleyton, TX 78935, 409-732-3904.

Circle 566 on Reader Service card.

Three Computer Friends

MacMaster is a universal printer controller and buffer with versions that support all major serial or parallel printers. As a buffer, MacMaster stores files and sends them to the printer while you use your computer to work on something else. The unit's digital display tells you how much memory is left in the buffer, and the copy button and number pad let you make as many copies of the printout as you wish.

As a printer controller, MacMaster gives you access to all your printer commands via the MacMaster keyboard. You can define and store up to 99 commands and then select such things as your printer's fonts, line spacings, and form settings at the touch of a button.

As a printer memory, MacMaster lets you store recurrent phrases, logos, and graphics commands. By combining the buffer and printer-control functions, you can change the print style or add phrases at the touch of a button.

MacMaster comes in a serial or a parallel version. Either costs $350 for a 256K or $550 for a 1MB unit.

Proteus is a double buffer and data switch that lets you connect two parallel peripherals to your computer and send different data to each peripheral at the same time. For example, one printer can print your letters while the other prints a mailing list.

Proteus features a multiple copier on each port and a software-controlled data switch, so you can automatically merge data from your mailing list into your form letters and then have one printer print the letters while the other prints the envelopes. A 64K Proteus sells for $199; a 256K version sells for $299.

The Mercury Modem is a 300/1,200-baud Hayes-compatible modem with front-panel lights, auto dial and answer, a built-in speaker, and call-progress monitoring. It sells for $149.

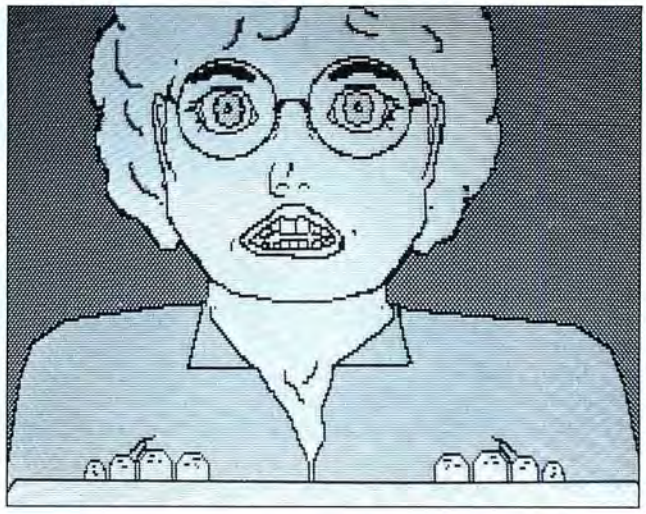
For more information on these products, contact Computer Friends Inc., 14250 N.W. Science Park Drive, Portland, OR 97229, 503-626-2291.

Circle 567 on Reader Service card.

New Products listings are based on information supplied in manufacturers' press releases. 80 Micro *has not tested or reviewed these products and cannot guarantee any claims.*

Circle 357 on Reader Service card.

DIFFERENT TRACK



Imagine the yucks at the office when something like this pops up on an unsuspecting co-worker's screen.

Hi-Tech Jests

When things get just too boring at the office, sneak over to a colleague's terminal and put PC-Prankster onto his or her boot disk or hard disk. Then sit back and watch the fun as the poor sucker begins typing, only to see a surprising picture pop onto the screen.

These animated figures include a flasher (wearing a fig leaf), a cyclops that blinks, an ugly face that blows a kiss, a strange creature that wags its tongue, and a person at a computer staring back at you. After the prank, the program the victim was using resumes where it left off.

PC-Prankster requires DOS 2.x, 256K, and a color card. It sells for $19.95 from Mainland Machine, 2930 McMillan Road, Unit E, San Luis Obispo, CA 93401, 805-543-7149.
Circle 568 on Reader Service card.

Fixes and Updates

Words Galore

I increased the size of J. C. Sprott's Word Checker dictionary program and modified it for the Model 4. The original program (see "Letter Perfect," February 1984, p. 96) used hashing to define words. It translated words into one of 256 files but limited file length to 62 characters. This resulted in a dictionary of about 3,174 (256 × 62/5) words. The program was memory resident and read the file to be checked one line at a time.

In my variation (see the Program Listing), I changed the file capacity to about 11,468 (256 × 224/5) words. Line 420 controls the record length (originally 62, now 224). Instead of loading the entire dictionary into memory, my program loads each record into memory as it is needed and writes the updated record back to disk when finished. When you use the program with Memdisk, it is almost like having the dictionary in memory.

To install the program, initialize Memdisk to drive 2 with the command:

SYSTEM (DRIVE = 2,DRIVER = "MEMDISK")

Format a disk on drive 1. The first time you use the program you need to create an initial Words/TXT file on drive 1 with the command:

CREATE WORDS/TXT:1 (LRL = 224,REC = 256)

You execute the above commands at the DOS Ready prompt.

When you run the program, it first copies the dictionary (Words/TXT) onto drive 2 (Memdisk). When it is through running, it copies the new updated dictionary back onto drive 1.

I eliminated the original sound subroutine and used the Model 4's sound command to alert you to each new word. However, the program runs much faster if you eliminate the sound command on line 390.

To use the program, answer the prompt "File name to read" with the name of the document you want to check. When the program finds a word that is not in its dictionary, it prints a question mark (?) after the word, beeps, and waits for you to press either the enter key to add the word to your dictionary or the spacebar to skip over the word. (Note: You have to jot the incorrect words down, because there is no provision for on-the-spot editing.) The original program checked for a printer and printed the line in which new words were found. I have not found a way to do this properly.

William H. Rogers
La Grange, CA

Ed. note: A Tandy 1000 version of the program is available on the "Starter Pack 1000" disk under the file name Diction.BAS. To order the disk call 800-258-5473.

Program Listing. Word Checker

```
10 CLS:PRINT TAB(26) "WORD CHECKER":PRINT
20 PRINT TAB(22) "by Prof. J.C. Sprott"
30 PRINT TAB(13) "5002 Sheboygan #207, Madison, WI 53705":PRINT
40 PRINT TAB(14) "with Model 4 mods by William H. Rogers"
50 PRINT TAB(15) "9185 El Encanto, La Grange, CA 95329"
60 DEFINT A-Y:DIM B$(128)
70 SYSTEM"COPY WORDS/TXT:1 :2"
80 OPEN"R",2,"WORDS/TXT:2",224
90 FIELD 2,224 AS D$
100 CLS:INPUT"FILE NAME TO READ";NF$
110 I=1:OPEN"I",1,NF$
120 IM=I-128*INT((I-1)/128):LINE INPUT#1,B$(IM)
130 IF I<=128*M THEN 160
140 IF EOF(1) THEN CLOSE 1:E=0:GOTO 170
150 E=1:IF IM=128 THEN CLOSE:GOTO 170
160 I=I+1:GOTO 120
170 B$=STRING$(255,32):PRINT CHR$(15);:IF M=0 THEN CLS
180 IF M=0 THEN CLS:PRINT"--> Press <ENTER> to enter word in dictionary
    .":PRINT"--> Press <SPACE BAR> to bypass word.":PRINT
190 FOR J=1 TO IM
200 LB=LEN(B$(J)):IF LB=0 THEN 310
210 C=0:L1=1:FOR K=1 TO LB:A=ASC(MID$(B$(J),K,1))
220 IF A>127 OR A<32 THEN A=32
230 PRINT CHR$(A);:IF A>90 THEN A=A-32
240 MID$(B$,K,1)=CHR$(A)
250 IF A<65 THEN IF K>L1+1 THEN C=K-L1:C$=MID$(B$,L1,C)
260 IF A>64 AND A<97 AND K=LB THEN C=K-L1+1:C$=MID$(B$,L1,C)
270 IF A<65 OR K=LB THEN L1=K+1
280 IF C<2 THEN 300
290 WC=WC+1:GOSUB 350:C=0
300 NEXT
310 PRINT:NEXT:IF E THEN M=M+1:GOTO 110
320 PRINT:PRINT"Word count =";WC
330 CLOSE 1,2
340 SYSTEM"COPY WORDS/TXT:2 :1":END
350 H=0:FOR JH=1 TO C:H=H+ASC(MID$(C$,JH)):NEXT
360 H=H-256*INT(H/256)+1
370 GET 2,H:A$=D$
380 L=LEN(A$):IN=INSTR(A$,C$):IF IN THEN 440
390 PRINT"<?>";:SOUND 1,1:
400 E$=INKEY$:IF E$="" THEN 400 ELSE IF E$=CHR$(32) THEN 430
410 IF E$<>CHR$(13) THEN 400
420 IF L+C<224 THEN A$=C$+" "+A$ ELSE MID$(A$,C+2,222-C)=MID$(A$,1,222-
    C):GOSUB 470
430 FOR JH=1 TO 3:PRINT CHR$(8);:NEXT:GOTO 480
440 IF IN<2 OR IN+C>L THEN 480
450 IF MID$(A$,IN+C,1)<>CHR$(32) THEN 480
460 MID$(A$,C+2,IN-1)=MID$(A$,1,IN-1)
470 MID$(A$,1,C)=C$:MID$(A$,C+1,1)=CHR$(32):GOTO 480
480 LSET D$=A$:PUT 2,H:RETURN
490 OPEN"R";1,"WORDS/TXT:2",224:FIELD 1, 224 AS A$:FOR I=1 TO 256:GET 1
    ,I:PRINT I;A$;"*":NEXT:CLOSE
```

End

THE CLASSIFIED 80micro

SOFTWARE

TRS-80 SOFTWARE, Models 1/3/4/4P/4D, Send $2 for listing: Practical Programs, 1104 Aspen Drive, TomsRiver, NJ 08753.

Media Conversion for Tandy Models to over 800 systems including Magtape, Micro Computers, Mini Computers, Word Processors and Typesetters. Pivar Computing Services, Inc., 165 Arlington Hgts. Rd., Number 80, Buffalo Grove, IL 60089. 312-459-6010.

BUDGET/PLUS HIGH-SPEED BUDGET MANAGEMENT SYSTEM. Friendly program brings you one step closer to a balanced budget. Free user support. For free information write: Elran Software Systems, PO Box 201166, San Antonio, TX 78220

$$$WIN with Thoroughbred, Harness, Greyhound Handicapping Software. . .$29.95, enhanced . . .$49.95. Professional Football Handicapping System. . .$39.95. Free information. Software Exchange, PO Box 5382M, W. Bloomfield, MI 48033. (313) 626-7208.

RENT Software $3/disk! Domain/commercial for T-1000-3000. CCS 728 Muskogee, Norfolk VA 23509. (804) 853-3441.

BOWLING LEAGUE SECRETARY — MS-DOS — Model III/4—0-K Audio—543 Cedarwood Middletown, OH 45042—513-423-0321.

Physicians! Patient Care programs. Exercise perscriptions, PFT, TPN, Others. Medaide, 815 S. Quebec, Tulsa OK 74137.

TANDY 1000, 2000, 3000 Owners—We support you with RAMDISK, Backup, HELPERS Utilities, printer utilities. Call or write for catalog. ALPS, 1502 County Road 25, Box 6100, Woodland Park, CO 80866. 800-232-ALPS

COMMUNICATIONS

NATIONSERV. Online information Network, 3960 Covert Ave., Evansville, IN 47715, (812) 477-5343.

BUSINESS OPPORTUNITIES

PERSONAL COMPUTER OWNERS CAN EARN $1000 to $5000 monthly selling simple services performed by their computer. Work at home in spare time. Get free list of 100 best services to offer, Write: A.I.M.E.D., P.O. Box 60369, San Diego, CA 92106-8369.

HARDWARE

RADIO SHACK, TANDY OWNERS find the computer equipment you need that Tandy no longer sells. Pacific Computer Exchange buys and sells used TRSDOS MSDOS computers and peripherals. 503-236-2949. Pacific Computer Exchange, 1031 S.E. Mill Suite B, Portland, OR 97214

TANDY 1000/SX/EX/3000/3000 HL. Discount Software/Hardware. Micro 1000. P.O. Box 1192 Orange, TX. 77631. (409) 886-3808.

GET THE ATTENTION YOU DESERVE

Tell more than 200,000 dedicated, interested TRS-80 users about your product or service with an efficient and economical ***80 Micro*** classified ad.

You'll reach the most people in the market for the least amount of money!

With ***80 Micro***'s well-established audience of involved buyers, sellers, and swappers, your ad is bound to get fast results!

Get the attention you deserve. For only $5 per word, your ad will be seen by over 100,000 dedicated TRS-80/Tandy users. Ads must be received by the 20th of the month 3 months prior to publication date. **Send yours today. Consecutive 3 month pre-pay special $3 per word.**

Name _____

Address _____

City _____ State _____ Zip _____

Telephone _____

CATEGORY _____

_____ _____ _____ (3 words)
_____ _____ _____ (6)
_____ _____ _____ (9)
_____ _____ _____ (12)
_____ _____ _____ (15)
_____ _____ _____ (18)
_____ _____ _____ (21)
_____ _____ _____ (24)

Total Number of Words × $5/issue = _____

For _____ issue

Make Checks Payable to 80 Micro
NO AD ACCEPTED WITHOUT PAYMENT
Classifieds, c/o MCSS
11 Northeastern Blvd., Suite 210
Nashua, NH 03062

Continued from p. 112

ago Tandy would have sent the magazine letter bombs and put out a contract on the author." My recollection of their actions is that they pulled ads from your magazine. If you have evidence to the contrary that supports your statement, please make it known.

The column went so far that I queried the users of my Compuserve forum about it. I am hoping that other readers share my opinions. In any event, here's one reader taken aback by your offhand comments with a request that you spend more time in retrospect of that column.

Roy Soltoff
Misosys Inc.
Sterling, VA

Correction

In the August 1987 issue (see "The Tandy Story," p. 59) the author of Newdos was incorrectly identified. Newdos was actually written by Cliff Ide in 1976, according to sources at Apparat Inc., Denver, CO.

Those MS-DOS Blues

I have been a "Trash-80" fan and user for eight years. I watched the changes in both the TRS-80 product line and the magazine that covered it, *80 Micro*. Along with my fellow computer owners, I have felt the twinges of pain as I watched my system(s) become obsolete. My desire to leap into the "now" of computer technology is curtailed only by the thinness of my wallet.

I sympathize with those who see "their" magazine overrun with MS-DOS jargon. I know that someday we will all have to move into the future. But as much as my appetite is teased by the new Tandy products, I realize that my TRS-80 meets my needs and that even if I were to purchase the most advanced desktop machine available today, I would be purchasing yesterday's technology.

There is one way to jump into the future. That is to envision the day when *80 Micro* changes its name to *The Tandy User*.

Herman A. Winters Jr.
Willingboro, NJ

No Respect

Tandy 1000 owners get no respect from anyone; that is, they don't get respect from anyone except *80 Micro*. I address Mark Zimmerman's letter in the July Input column (see "Of Edsels and Ferraris," p. 116). He complains that your magazine abandoned TRS-80 loyalists, and it is no longer useful to him. I understand his frustration, but reject his premise. I am a new subscriber with a new computer, and I need all the help I can get. I own a Tandy 1000 SX, and *80 Micro* is the only magazine that comes close to fulfilling my needs.

80 Micro's BBS is open 24 hours a day. It offers programs you can download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

Certainly, I don't read the articles on other Tandy equipment with the same interest as those specifically related to the 1000 SX, but I read them nevertheless, because I might find something that I can apply. I can also learn what other people are saying about their machines and software.

Rather than rejecting *80 Micro* for publishing articles on older models and the newer lines, I believe we subscribers and readers will remain in debt to the many talented staffers on the magazine for bringing us information about the equipment we have.

It would be fantastic if there was enough advertising revenue to generate a zippy magazine for each of us, but until that day comes, I'll continue to read cover to cover the magazine I have and just say keep up the great work.

David E. Smith
Omaha, NE

Last Issue

I still own and use my Models I and 4P, and I bet there are programmers out there writing marketable programs, even in areas like artificial intelligence, and even for 48K and 64K machines. Since you no longer cover these machines, *80 Micro* is no longer of use to me.

I echo the sentiments of Mark Zimmerman. This is my last issue. I'm letting my subscription run out.

Robert Cogan
Erie, PA

Made Out of Clay?

I purchased a Tandy 1000 SX and started computing with it last December. I paid strict attention to your articles and took every word as gospel. No more! In your June issue, Harry Bee reviewed a product I know something about (see "What a Difference a Blink Makes," p. 27) and revealed his feet are made of clay.

How he can call Electric Pencil a "treasure," "outstanding," and "serious, feature-rich word processing" while giving it only three-and-a-half stars is beyond me. How would he describe a five-star program?

Mr. Bee claims to have read the manual completely without finding any reference to the program's Blink feature. My manual references Blink on pages 6-1, 6-6, 6-29, and 6-61. Page III of the table of contents also lists Blink by name, and it has its own on-screen tutorial in the Pencil Tutor. It is also listed by name on the quick-reference card.

For Mr. Bee to grudgingly admit that he found "two unremarked sentences two-thirds of the way through the manual" that referred to Blink, leaves much to be desired.

I am over 40 years old, and despite my eyeglasses, I had no problem with the manual's type size. I don't know which machine Mr. Bee used Electric Pencil with, but on my 1000 SX, the proofreader *does* highlight the "not found" word, in context.

If I had read the review before purchasing the product, I might have passed up this great program.

David R. Craig
El Paso, TX

I applaud Mr. Craig's enthusiasm for an obviously good program. That's what three-and-a-half stars means. Good. Better than good, in fact. A five-star program would have to be perfect, which Electric Pencil is not.

He is correct that the Blink command, necessary to get a proper video display with some hardware configurations, is listed in all the places he names, and in the index as well. Listed. The explanation of the command, such as it is, appears in the manual only on page 6-29. That's page 29 of chapter six. There are seven chapters in the manual.

Two-thirds of the way back is actually being kind. It's more than three-fourths of the way through the book, even allowing for the appendixes.

The point is that neither the command nor the need for it shows up in the program's installation instructions where it ought to be prominent. My attitude toward finally finding it was far from grudging. I was angry that I had to hunt for something that important. When I want a puzzle, I open Games *magazine; when I install a word processor, I don't expect to have to play hide and seek with vital information. (Besides, I don't call a screen going blank for a second or two a blink.)*

Finally, I envy Mr. Craig his eyesight.

—Harry Bee

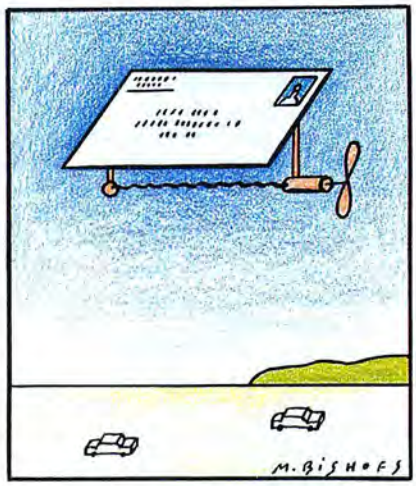
Send your correspondence to Input, 80 Micro, 80 Elm St., Peterborough, NH 03458. We reserve the right to edit letters.

Rocky Mountain Low

David Williams' review of our products, ASE and ASP (see "Subroutines to Go," May 1987, p. 32), correctly concludes that they are aimed toward the professional programmer. However, the review completely missed the main point and purpose of ASP. ASP has a large number of subroutines that afford easy transition to additional languages and computers for programs and programmers. It might increase speed and decrease the size of EXE programs, but its main purpose is to provide common subroutines for many languages and computers. ASP does not write directly to video memory to increase console speed, or do anything else to inhibit portability. ASP is not limited to IBM clones, but it can be easily adapted to non-clones that run MS-DOS. ASP makes ASE transportable, despite the complexity of ASE.

The reviewer only used Basic for his article and did not mention that ASP and ASE can run with Quick Basic, Turbo Pascal, and Toolworks' C compilers without modification. ASP and ASE are easily adapted to other compilers. Each supported language has features that duplicate some subroutines of ASP, but in any language there are a number of ASP subroutines that provide convenient language extensions. The review neglected to show the strength of ASP in other languages, particularly in Pascal and Fortran. Even features helpful to Basic programs such as 4-byte integer arithmetic, strings longer than 255 bytes, and increased available memory for interpreter uses were ignored.

A user requires some time to absorb the complete package, and this is understandable, given its almost 300 subroutines. The ASP manual explicitly states that the user should be familiar with the language used, but the reviewer expects more detail about using the language itself. All program sequences in the manual were tested. I assume that the "numerous errors and program sequences that don't work" occurred because Aspen Systems used a later version of Bascom than the reviewer when checking the manual. Unlike most releases of Bascom, our version allows constants as subroutine arguments. Our



current software releases note this discrepancy.

The ASP manual was originally printed under CP/M on a dot-matrix printer when NLQ printers were just becoming available. The MS-DOS updates to ASP (which comprise one-third of the manual) and the ASE manual are printed on a daisy-wheel printer, but the rest of the manual was not reprinted because we wanted to keep prices reasonable. We haven't had any customer complaints about illegibility. The comment that the manual is "of little practical help in the application of the subroutines" seems strange alongside the mention of the sample programs since similar comments apply to Basic manuals; they are of little practical help in writing Basic programs, but the Basic sample programs provide the necessary illustrations.

The configuration instructions in the ASP manual are confusing for a novice, but we corrected this problem with the January addition of an easy-to-use configuration program for both programs.

The increase in EXE file size experienced by the reviewer is due to the use of the Basrun library. Exclusive use of ASP subroutines for input/output (I/O) decreases the size of EXE files in other languages and in Basic when the Bascom library is used (as it would be when a program is distributed to others). However, when the Basrun library is used, all Basic I/O is included in the loaded program whether it is needed or not.

The limited review doesn't begin to convey the capability of ASP or ASE. If your readers use only Basic programs, the review likely suits their purposes. However, I invite others to look more carefully at the advantages of ASE/ASP for their applications, especially if they desire portable software.

William B. Stelwagon
President, Aspen Systems
Grand Junction, CO

Mr. Stelwagon says that I missed the main point and purpose of ASP, but after reading his letter twice, I still don't know what he considers that point to be. My contention, with which he agrees, is that the Aspen packages have little appeal to the casual programmer or even the serious programmer writing in a single language.

As I noted, the ASP subroutines offer little or no performance improvement over the Basic compiler. I did not detail advantages to the users of the Basic interpreter, since, as I mentioned, such users would be better advised to invest in Quick Basic or another low-cost compiler.

Speaking of Quick Basic, the ASP package sent to me for review did not work with Quick Basic, and the developer was unaware of this until I discussed the problem with him. An updated version arrived too late for review. As for the other compilers, my review mentioned all the ones listed in the ASP manual.

Not all the problems I found can be attributed to the version I used in the review; in any case, the manual does not state that the package only works with certain versions.

—David A. Williams

Are the Times A-Changin'?

Eric Maloney's June editorial (see "Tandy Feels Its Oats," Side Tracks, p. 8) contained statements that I feel are out of place in a national publication.

You close the fourth paragraph with the remark, "Hey, Ed—what kind of drug are you on and where can I get some?" I don't think that remark has any place in *80 Micro*. Comments alluding to drugs belong back in the 1960s, not in the 1980s.

The editorial also states, "Three years

Continued on p. 111

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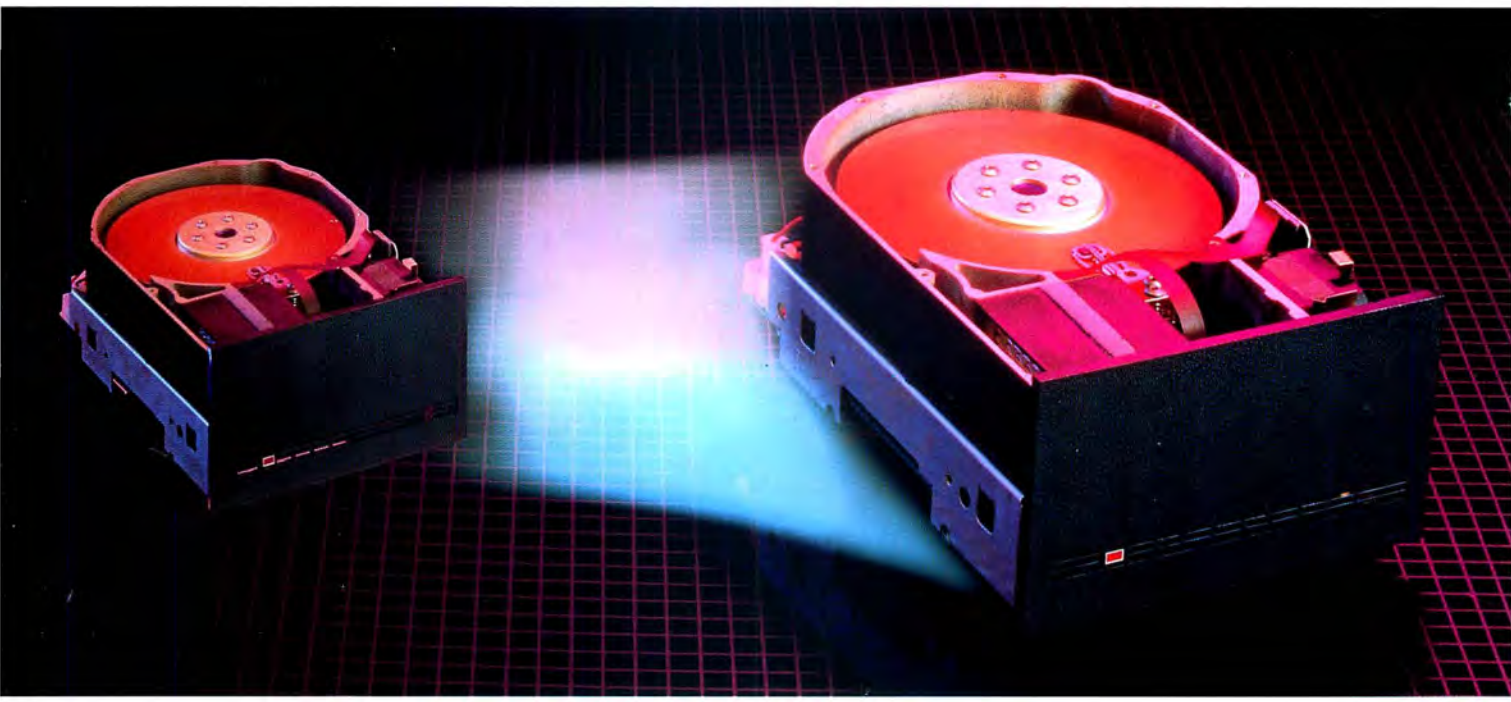

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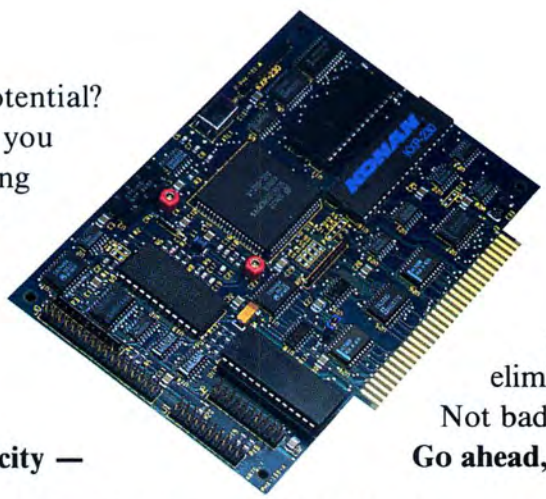

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