

Your **Tandy** MS-DOS Advisor

# 80 micro

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## T1000 ADD-ON MANIA

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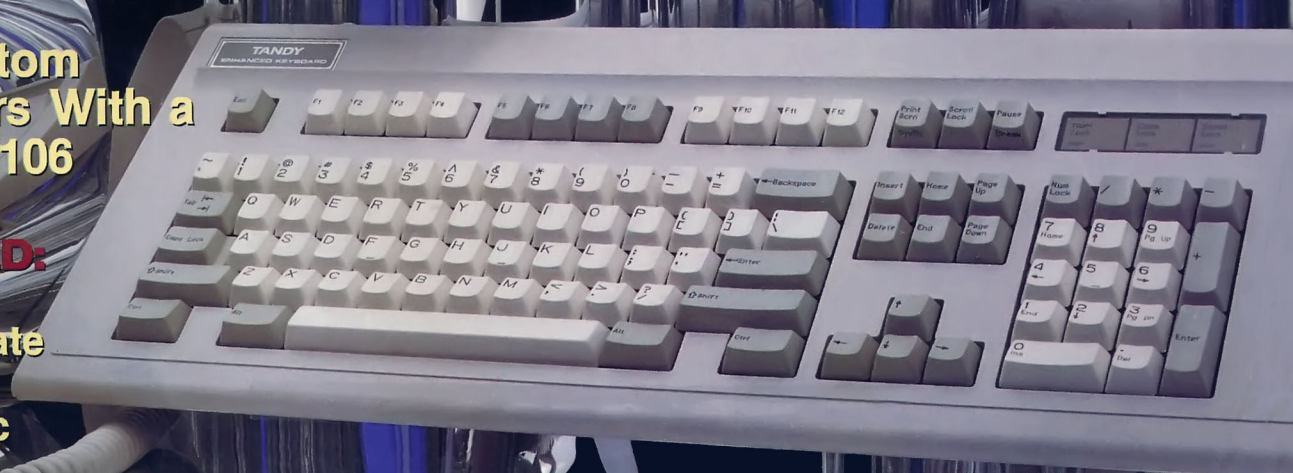
Harry Bee on the  
Good, Bad, and Ugly  
Of Tandy Computing

Making Non-Tandy  
Hard Drives Work  
On Your 1000

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**REVIEWED:**

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A



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**640K**



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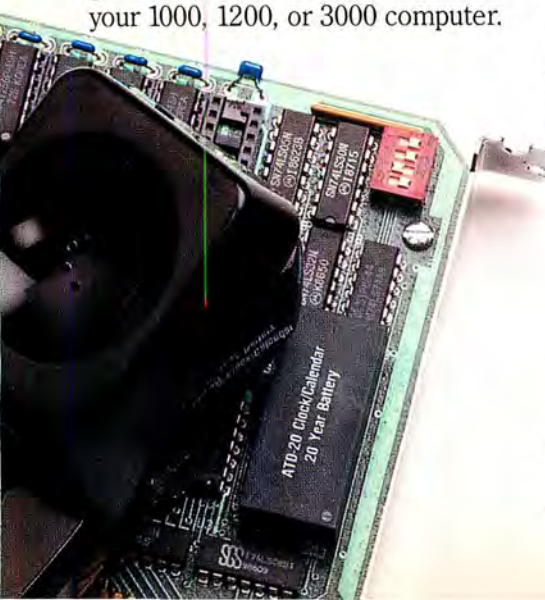
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Photography by Larry Dunn

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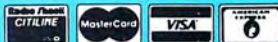
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## Deskmate for the Masses?

■ by Michael E. Nadeau ■

**T**andy has finally decided that being the low-end market leader means more than selling the most computers. To truly lead, Tandy must also work to expand the market. The March 28 announcement that Tandy intends to make Deskmate the standard home and small-business operating environment threatens to do just that.

Tandy is licensing Deskmate to software vendors free. In return, Fort Worth hopes to create a standard user interface, or shell, for software aimed at the home and small-business market. If accepted, the standard would mean that no matter what software you buy, the basic command structure would be the same for all.

This ease of use will, in theory, make computers less intimidating and increase demand. Everyone wins because the market expands at an accelerated pace. Can Tandy convince vendors and users to adopt Deskmate as a universal standard? I think so.

### Precedent Set

The high-end market already has a standard operating system: Microsoft's Windows. Its advantages are obvious. Imagine a company that has just installed, say, 100 PCs. Now imagine having to train 100 computer-illiterate employees not only how to operate the computer, but also how to run several complicated programs. Using Windows with its common command syntax greatly simplifies the task.

Tandy is saying that what's good for the big corporation is good for the small business and home. Why should you have to learn a new command set with each piece of software you buy? After all, your time is just as important as anyone else's.

### The Right Product

Anyone who has used the various Deskmate applications modules knows that better can be found through third-party vendors. What makes them valuable to Tandy users is the Deskmate shell. When third-party products written under Deskmate appear sometime this summer, they will come only with this shell and the specific program.

If you already use Deskmate, you can just incorporate the program into the main menu or replace one of the original Deskmate modules with it. If you own a non-Tandy PC and don't use Deskmate, you'll have a shell to which you can add applications as you buy

software, providing that it uses the Deskmate shell, of course.

### The Big Mo

With the possible exception of Microsoft, Tandy is the only company in a position to propose a standard shell and have any chance of success. Why? Tandy sells more computers in the low-end markets than anyone else—all of them with Deskmate. A large installed base already exists.

Many major software vendors in the low-end markets already have business dealings with Tandy. Software Publishing, Electronic Arts, Sierra On-Line, and Microsoft all sell products through Radio Shack outlets. These companies, except for Microsoft, have already agreed to develop software under the Deskmate shell. So have Intuit, Activision, and Symantec. Others are rumored to soon follow suit.

Tandy has the momentum. Its profile since last August's big product announcements has never been higher. The computer trade press and financial community are finally taking Fort Worth seriously. Tandy is using this momentum wisely.

### The Time Is Right

Once dismissed as a myth, the home market has returned. Vendors and consumers both seem to have a better handle on the advantages and limitations of a PC in the home environment than they did a few years ago.

Ease of use is still elusive, though. Few salespeople have mastered more than a few software packages; many can't even find their way around DOS. A sales pitch must make the potential customer feel comfortable with the computer—not easy when the person making it lacks basic skills.

A common shell greatly simplifies the salesperson's job. No matter what software the customer wanted to see, the salesperson can feel confident that he or she can operate it.

### Remaining Hurdles

The battle is far from won, however. So far Tandy has lined up impressive support, but

the Deskmate shell won't be offered to all vendors until sometime this summer. The vendors already committed were hand-picked by Tandy as guinea pigs. Others are sure to follow, but will they include major players such as Microsoft? Spinnaker? Timeworks? Mindscape?

It is also unclear whether every vendor will convert existing software to the Deskmate shell. If they opt to use it only on new software, acceptance will be slowed.

Finally, current users of PCs will have some natural resistance to a standard shell. Some, like myself, are quite comfortable working from the DOS prompt. Others have settled into habit with the software they use. I don't think Tandy expects to convert existing users, however. If the Deskmate shell sells more computers, Fort Worth will consider the move a success.

### An Unexpected Good-bye

After my May editorial, I feel like a damn fool writing this. You are reading the last issue of *80 Micro*. We will cease publication after 101 issues.

The reasons are simple. We could not generate the circulation or advertising needed to survive, although we tried to the end. Subscribers will be offered another, yet to be determined, magazine in place of owed issues of *80 Micro*.

Speaking for the staff, it has been a pleasure serving you. If magazines lived or died according to the enthusiasm of its readers alone, *80 Micro* would still have a long life ahead. I'm sorry to see it all end.

*80 Micro* has much to be proud of. We preferred to challenge Tandy to provide better service and support, rather than pander to it like some of our competitors. We used the top writers, hired good editors, and carefully groomed the magazine's appearance so that the articles were both informative and easy to read.

Most importantly, *80 Micro* was Everyman's computer magazine—designed for the user rather than a perceived advertising market. I find it both ironic and amusing that some new computer publications are claiming to have discovered the audience *80* has nurtured for eight years.

Fare thee well, readers. I hope our paths will cross again. ■

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## When the Chips Go Down

### FIXING CHIP PROBLEMS

**Q.** I installed 16 chips (8K, 150-nanosecond) on my 128K memory board (Radio Shack catalog no. 25-1004) in an attempt to boost its memory to 384K. I changed the jumper pin from E1 to E2. When I boot my Tandy 1000 under DOS 3.20, the power-on self test (POST) indicates that the board has 384K. Because I've run a memory map program, which indicates that 384K is active, and a program that requires more than 256K, I know that the chips are functioning.

However, when I attempt to enter commands, the cursor freezes after I've typed 10-50 characters. My only recourse in this situation is to reset and try again. When I enter the entire command, the program usually runs successfully, although the screen occasionally fills with character gibberish, followed by another crash.

Before a lockup, DOS 3.20 sometimes displays a "Fatal: internal stack failure, system halted" or a "Divide overflow" error message; usually, it freezes without displaying any message.

Basic A doesn't run properly. I get syntax error messages that aren't correct, and the computer jumbles the program listing lines, dropping part of a line and adding it elsewhere in the program. I can run regular Basic.EXE without problems, and so far, DOS 2.11 seems to run properly.

I was advised at a Radio Shack Computer Center to put STACK = 32,256 in my Config.SYS file. This worked, but the fix was short-lived. My computer seems to have built up a tolerance to it and no longer keeps the memory from locking; the Config.SYS modification didn't help with Basic A at all. I tried changing the Stack command to STACK = 32,384, but it didn't work. I plugged my expansion board into another 1000 and got the same result, which would suggest that the fault isn't in the computer. I'm reluctant to make another investment in expanded memory until I solve my current problems.—*Matt Engler, San Diego, CA*

*Send your questions or problems dealing with any area of Tandy/Radio Shack MS-DOS microcomputing to Feedback Loop, 80 Micro, 80 Elm St., Peterborough, NH 03458. Please include a self-addressed, stamped envelope and daytime phone number.*

**A.** I appreciate the detail with which you describe your problem. Outlining everything you know about your problem makes my job much easier and increases the likelihood of finding a solution.

Your problems probably began when you installed the 8K chips on the upgrade card. When using a 16-chip configuration, you should use 64K chips to add the 128K. Sixteen 8K chips will increase memory by only 16K. If you use 8K chips in a socket with address lines that are configured for 64K chips, a write to one address location will actually write not only to that location, but to seven others, for a total of eight.

The 8K chips don't produce 128K of memory; the address lines on the board address each byte in the 16K bank a total of eight times. The POSTs work because they check only 1 byte at a time. If they tested at least 16K at a time, writing a different value to each individual location and then checking for changes in any of the other ones, the test would fail.

This is why your programs crash; when the computer writes to one location in the added memory, it also writes to seven others and can overwrite previously written data or program code. This results in improper program execution and the subsequent system crash or freeze-up.

To correct your problem, remove the 8K chips and replace them with 16 of the 64K chips. Perhaps you can get 64K chips from someone who upgraded a 1000 SX or a newer Tandy 1200—both upgrades required replacement of the original 64K chips with 256K chips.

**Q.** I bought a 1000 that my Radio Shack dealer had used for three years. It's equipped with dual drives, 640K RAM, a Zuckerboard (Advanced Transducer Devices) memory upgrade, and basic input/output system (BIOS) ROM 1.00.00. My problem is with the sound. Spinnaker's Kindercomp works fine, which tells me the hardware isn't at fault. However, none of my other software produces sound on my system. When I run the software on other Tandy systems and the IBM systems at work, I get sound, so I know the software is OK. I took the CPU to the Radio Shack Repair Center, but the technician found nothing wrong.

I've booted my system with Microsoft's MS-DOS 2.11 and 3.20, Tandy's 2.11.00,

2.11.22, 2.11.24, and PC-DOS 3.21. If my hardware and software are OK, where do I go from here? I may have hacked my way into eternal silence between loading my SYS on the Kindercomp program and buying the other software. Is it possible I could have turned off my sound using an unknown keystroke? I copied the SYS.COM file to the Kindercomp program disk and then transferred that SYS to another program disk with the Command.COM.—*Dana Danna, Douglas, GA*

**A.** Your hardware and DOS seem to have strong alibis; I suggest looking at your BIOS. Tandy upgraded the BIOS for your machine in 1986 to version 1.01, which helped fix some of the early 1000's quirks. You can order the BIOS chips from Tandy National Parts for \$35 and do the upgrade yourself or take your computer into a Radio Shack Repair Center. The replacement chips don't come with instructions, but if you have a one-chip BIOS, all you have to do is locate the BIOS (look under the disk drives), remove the old chip, and replace it with the new one. Replacing the two-chip BIOS is a more complex job; if you have this BIOS, I recommend taking your 1000 to Radio Shack for the installation.

### PARALLEL SWITCHING

**Q.** My printer, a Tandy DMP 110, doesn't work with my Tandy 1000 EX. I connected it to a parallel interface. Is it not compatible?—*John Carson, Burlington, IA*

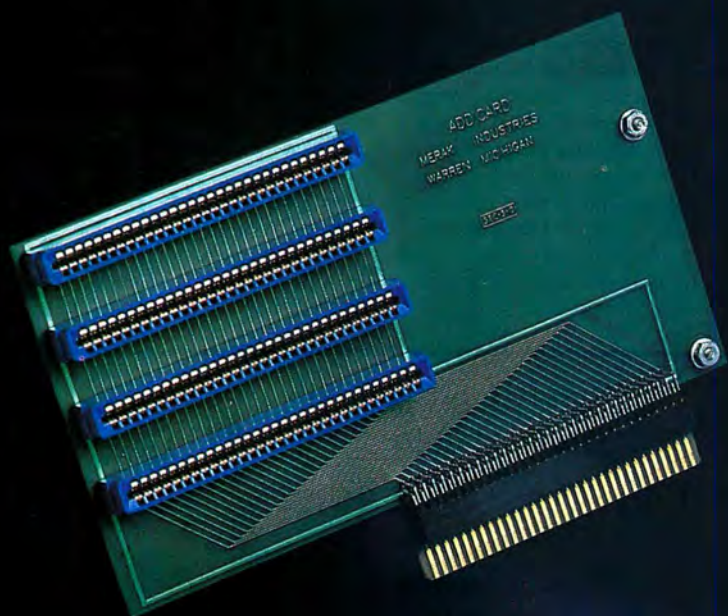
**A.** I tried the TX with a DMP 105 with no problem. I don't know what you were using your printer with before, but connecting it to a parallel interface indicates to me that you were using it with a serial interface. When you switch to a parallel interface, you must also change the input-select switch on the back of the printer. Switch it to parallel (PAR). Make sure the power is off when you change the position of the switch.

### PREFLIGHT CHECKOUT

**Q.** I'm having trouble running Basic graphics programs and Microsoft's Flight Simulator on my Tandy 1200 HD with floppy drive, 10MB hard drive, and Tandy CM-1 video display monitor with graphics display adapter. The programs run with vertical lines through the graphics, making them

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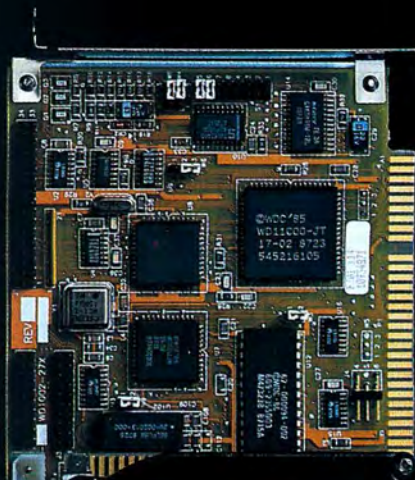
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difficult to read and understand. I can run QDOS and Dac Accounting software in color without a hitch. Could something wrong be in the switch setting on the display card?—James O. Cooper Jr., Colorado Springs, CO

**A.** I tried the demo program you included with your letter, and it ran perfectly on a 1200 with the graphics display adapter and a CM-1 monitor. The graphics display on my monitor was crisp and clear and didn't show vertical lines in the display. Microsoft's Flight Simulator also ran without problems.

The only thing I can do is run through a checklist with you. If everything checks out, you may need to take the graphics adapter and/or the computer in for repair.

- When in the non-graphics text mode, are the characters crystal clear? Most 1000 monitors will have vertical lines through them, but not the CM-1 monitor.

- Type the following program into Basic:

```
10 CLS:DEFINT A-Z
20 DEF SEG=&HB800
30 FOR X=0 TO 101
40 FOR Y=0 TO 1
50 FOR Z=0 TO 79
60 POKE X*80+Y*&H2000+Z,255
```

70 NEXT Z,Y,X

After you type it in, type SCREEN 2:RUN, and press the enter key. The program should slowly "white out" the screen and should *not* have vertical lines through it. If it does, your adapter may have a problem. Press control-break if the program isn't done running and enter SCREEN 1:RUN. This should do the same as the first Screen command in the medium-resolution mode. You can change the 255 value at the end of line 60 to either &H55 or &HAA to examine color in the Screen 1 mode. Again, if vertical lines appear, your problem may be in the adapter.

- Remove the four large silver screws on the back of the computer and remove its cover. Remove all option boards except the graphics adapter card, and try your graphics demo or another graphics program. If the graphics clear up, you'll know that one of your option boards is interfering with your video display. Reinstall them one at a time, running the graphics program after each reinstallation to see which board is causing the problem. This is time consuming, but it may be worth it if you identify the problem.

- If that fails, check on the computer's main

circuit board, which is directly behind the floppy disk drive. Look for a small switch box with eight sliding switches, numbered 1-8. When a switch points to the right of the computer, it's on. Switch #5 should be on, and #6 should be off.

If that's OK, examine the deluxe graphics display adapter. It shouldn't matter which slot it's in. (Mine is in the first one at the far left.) I tried installing it in other slots, but still couldn't emulate your problem. At the top in the front of the card you'll see another switch box with eight slide switches, again numbered 1-8. Make sure that switches 1-5 are pointing down and 6-8 are pointing up. Immediately in front of the card, you should see two pins sticking out. They shouldn't be connected by a jumper; if they are, remove it. Still along the top but closer to the middle are four more pins. The top two shouldn't be connected, and the bottom two should be connected by a jumper.

If everything checks out and you still have a problem, take the card to your local Radio Shack Computer Center (take the monitor too, if the store doesn't have a CM-1) and have its technicians install it on a 3000 or 4000. If the programs work,

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## FEEDBACK LOOP

the computer may be at fault; you may have a glitch in the video driver portion of your system ROM or another problem. If the card worked fine on Radio Shack's computer, bring yours in for repair. If the problem was evident on their computer, have your card repaired.

### FOUR ON DESKMATE

**Q.** I have several questions about Deskmate, which came with my 1000 (MS-DOS 2.11.24).

I often want to print portions of the Worksheet chart on separate sheets. Because the CPU tallies the number of lines it has printed, it often thinks the middle of the second sheet is the end of the page and adds extra lines. Is there any easier way to "re-zero" the line counter when I want to print a second sheet than aborting the second sheet's printout at the end-of-page notice and starting again?

Can I access the data in a Worksheet table to use in a separate graphics program? If not, is there a graphics program that will work from the Worksheet data directly?

How can I store Deskmate data on a separate data disk instead of on the program disk? The available space on the com-

plete program disk is limited. I'm currently working it the opposite way, storing on the program disk only those parts of the Deskmate programs that I use.—*E.H. Paufve, Windsor, NY*

**A.** One way to get around the page break problem is to modify your print sheet parameters. Before you select your text in the worksheet, press alternate-F6 to display your printout parameters. Move the cursor with your arrow keys to the parameter lines that you want to modify. By default, a page's length is set to 66 lines and the number of printed lines on a page is set to 60. After 60 lines have been printed, six blank lines will be sent to the printer to create a top and bottom margin (three lines for each). If you don't want the page to break, change the parameter for printed lines to 66.

Gerry Lennox's Paragraph program (see "To Graph Where None Have Graphed Before," May 1988, p. 41) will work directly from Deskmate.

Saving Deskmate data on another disk requires that you have at least two disk drives or a disk drive and a hard disk. If you have two disks, you can run Deskmate from drive A, and then select F10 (Swap

from the Deskmate main memory, which lets you designate a new path or drive for data. In answer to the prompt, you would enter B, which would allow you to store data on drive B.

### CAN'T GET THERE FROM HERE

**Q.** I have a 1000 SX with a CGA (color-graphics adapter), but I get only four colors when I run Quick Basic 2.0. I've tried all of the screens. How can I get 16 colors without buying an EGA (enhanced-graphics adapter)?—*Larry Zitnick, York, PA*

**A.** Even the newer versions of Quick Basic don't support Tandy's enhanced CGA modes. When Quick Basic checks your hardware, it interprets it as a standard IBM CGA. Therefore, you can't access the non-IBM screen modes directly from Quick Basic.

### INCOMPATIBILITY FIX

Many 1000 TX owners who bought Software Publishing Company's PFS:First Choice 2.00 were taken aback to discover the integrated software package didn't run on their machines. Version 2.01, which is compatible with the TX, is available to registered First Choice owners. Call 415-962-9002 for a free replacement program disk.—*Eds.*

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AD 54



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- 720K 3.5" 80tk TEAC bare drive ..... 109 †
- 720K 3.5" TEAC but in 5.25" bracket ..... 129 †
- 1.44M 3.5" 80tk 2-speed TEAC bare ..... 139 ††
- Dual 5.25" drive case/power supply ..... 59
- Dual 3.5" drive case/power supply ..... 89
- External drive cable for use with 37-pin external floppy controller port ..... 39
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† Requires DOS 3.2 or later.

‡ Requires a compatible BIOS.

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† Takes the place of floppy drive "B".

‡ For XT/AT with external 37 pin floppy controller port.

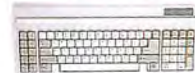
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- 10' Tandy 1000 printer cable (26-1401) ..... 9
- 6' coiled keyboard extender cable ..... 9
- 6' DB9 M/F video extender cable ..... 9
- 6' special IBM hooded power/IEC cable ..... 9
- Centronics M/M gender changer ..... 9
- DB25 gender changer specify M/M or F/F ..... 9

Cables are fully shielded with molded connectors and thumb screws (except Tandy).

**ACCESSORIES**

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Circle 87 on Reader Service card.

by Ron White

# Grid Locked

Everyone was grinning at the press conference at Dallas's Infomart when Tandy announced its purchase of Grid Systems, the company responsible for one of the first laptops and the first 80386 laptop.

Tandy CEO John Roach joked with reporters despite their persistent questioning about the release date for Tandy's rumored PS/2 clone. Grid CEO Samuel J. Wiegand was all smiles as he showed off a couple of his sleek computers. Only soft drinks and coffee were served at the refreshment table, but there wasn't a sober face in the room.

Judging by the preliminary figures, Tandy's acquisition of Grid is a good deal. By trading \$55 million in Tandy common stock (the value could really amount to \$90 million depending on its performance), Tandy gets a division that expects to bring in more than \$100 million in revenue the first year.

The benefits go beyond the bottom line for Tandy, Grid, and their customers. Grid will benefit from Tandy's sheer size. At one point, when sales of Grid's original laptop were beginning to suffer from its lack of IBM compatibility (Grid has since become one of the compatibility faithful) Grid had to seek refinancing just to stay in business. Being part of the Tandy organization gives Grid a \$3.7 billion security blanket and should help the company in other ways: Tandy's buying power should make it cheaper and easier for Grid to obtain components, and although Grid will initially maintain its current customer support organization, the ubiquitous Radio Shack chain could eventually be an ideal support system for Grid.

Tandy will gain access to markets it hasn't yet successfully penetrated—the federal government and Fortune 500 companies, which comprise Grid's primary customer base. Through Grid, which will retain its name, Tandy will sell desktop computers that Grid, strictly a laptop manufacturer, hasn't yet offered. Grid prides itself in customizing its computers for specific clients. Now this customization can include complete systems that incorporate laptop and desktop models.

Although Grid will sell Tandy desktops, Roach cautioned that you shouldn't expect to see Grid laptops for sale at your local Radio Shack Computer Center. Grid laptops are too expensive to fit comfortably into Tandy's computer line (a Grid 8086 computer sells for about \$2,000–\$3,000,



**Photo.** Grid laptop computers, like the Grid Lite shown here, have a reputation for excellence in the industry.

compared with a Tandy 1400 LT, which costs about \$1,500). Grid's 80286 and 80386 machines have price tags up to about \$6,500. One factor that makes its laptops so expensive is Grid's refusal to cut corners in the manufacturing process. Its high-end laptop has a gas plasma screen that's the most readable of any. The case that encloses all Grid models is magnesium, an ideal—if costly—combination of ruggedness and light weight. Grid's legendary quality has caused reviewers to refer to them as the Porsches of laptops. (Wiegand hates that comparison. He prefers to think of Grid computers as Jeeps because they are built to withstand the rough treatment of customers more accustomed to handling oil-well drill bits than delicate electronics.)

Although the typical Tandy customer probably won't need or be willing to pay for the extra durability of a Grid computer, it's possible that Grid laptops may appear in Tandy stores under another guise. Roach noted that buying Grid gives Tandy a state-side manufacturing capability for its laptops, which are now built overseas—no longer an attractive arrangement considering the U.S. dollar's uncertain status. It would be surprising if Tandy doesn't expand on Grid's California-based manufacturing and its excellent engineering staff to create new Tandy laptops. The success of Tandy's 1400 LT surprised everyone at the company. The demand has been so great that until recently, store managers were ordering the laptops under phony customer names just to have some in stock when real customers asked for them. Tandy hasn't made an AT-compatible laptop or one based on 80386 technology, and Grid was the first to come up with an 80386

laptop. The Grid deal puts Tandy in an excellent position to offer new AT-compatible laptops without creating them from scratch. Of course, the laptops would have to be modified to be more consistent with the prices that Tandy customers expect. Put a high-impact plastic case around the Grid works and combine it with the 1400's excellent back-lit screen, and you'd have a Tandy 80286 or 80386 laptop that won't compete for Grid's already established customer base.

It all adds up to an impressive, win-win proposition. But there's one more plus for Tandy. In addition to the financial, engineering, manufacturing, and marketing advantages, Tandy gains prestige. Grid's failure to penetrate the Fortune 500 crowd is due to the persistence, however ill-deserved it may be, of Radio Shack's image as a haven for electronic hobbyists. In buying the computer company that, along with Compaq, has the best reputation for engineering among personal computer makers, Tandy acquires instant status, which may eventually be more important than any immediate figures on the ledger.

## TANDYLAND

Unlike most of the computer industry, which views the cloning of IBM's PS/2 line much as a pilot would a kamikaze mission, Tandy is taking the position that legal agreements can be made easily if they aren't already covered by previous contracts between IBM and its competitors. But in last month's column, Ed Juge, Tandy's director of market planning, said that customers haven't been clamoring for PS/2 technology (see "Testing Big Blue Waters," May 1988, p. 16).

However, Tandy is reportedly hand-tooling 100 PS/2 clones to distribute to computer centers—for demonstration purposes only—to prove that Tandy is capable of cloning the PS/2. According to the *Wall Street Journal*, Tandy can be expected to introduce PS/2-compatibles by April 1988.

Asked about PS/2 clone rumors at the Grid Systems press conference, Roach gave the standard answer: Tandy will introduce a PS/2 clone when the market demands it. Curiously, Roach was grinning when he said that, but somehow the grin didn't seem to stem from his pleasure over the Grid acquisition only. Grins like that are

(continued on page 69)

# Attention: Tandy 1000 Fans!

## 80 Micro's Starter Pack 1000

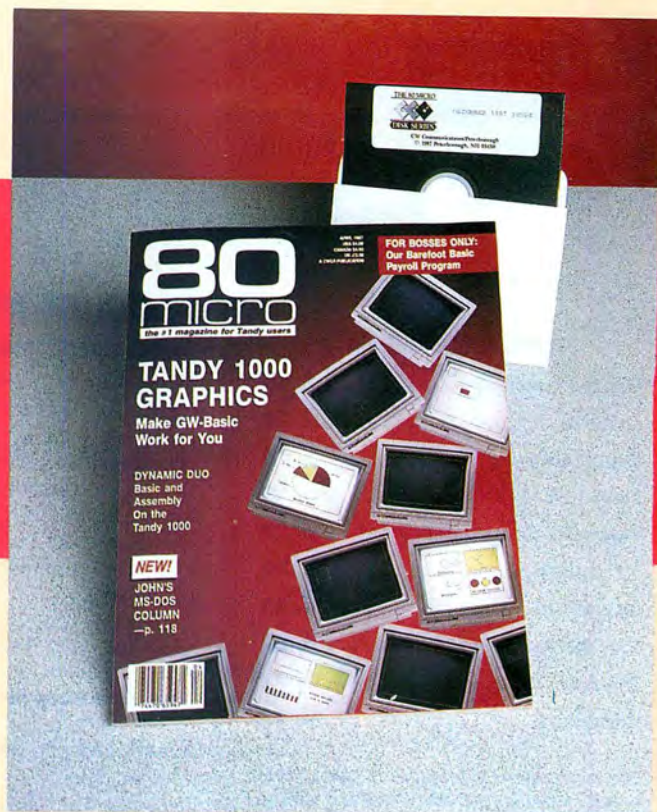
A computer as powerful and versatile as the Tandy 1000 calls for software to match. That's why you and your computer need 80 Micro's Starter Pack 1000. Designed exclusively for Tandy 1000 users, the Starter Pack disk contains 12 essential, educational, and entertaining programs, selected for you by the editors of 80 Micro.

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- **Letter Perfect** -- spelling checker program for ASCII files that works with Deskmate.
- **To Each His Own** -- an all purpose customizable data base management system that features sorting and report printing.
- **Custom Character Generator** -- design graphics screens and develop custom text fonts.
- **In The Marketplace** -- commodities futures trading simulator.
- **Time Keeper** -- manages several projects simultaneously, and calculates time spent on each project.
- **Clear-Cut Trends** -- draws, displays, and prints hi-res line and bar graphs.
- **Don't Be Late** -- critical path scheduling brings your projects in on time.
- **Savings and Loan** -- compares payment schedules calculated by simple interest and by the Rule of 78's.
- **Screen Save** -- memory-resident program that blanks out your screen to avoid unnecessary wear and tear.
- **Brain Breakers** -- solve challenging long-division puzzles and rediscover the rudiments of arithmetic.
- **Print No Evil** -- prevent accidental screen-print commands from hanging up your Tandy 1000.
- **MicroTab** -- tabulates the results of opinion polls.

Tandy 1000 is a registered trademark of Tandy Corporation



### Docs on Disk

The Starter Pack is an easy and cost-effective way to build your library of Tandy 1000 software. Documentation? No problem! Full instructions for running the programs are contained on each Starter Pack disk. Read the docs right on the screen or print them out for reference.

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The information in Info Line is taken from press releases. *80 Micro* has not tested the products or services described here and therefore cannot assume responsibility for any claims.

## PRODUCT NEWS

### WORD PROCESSING

#### Nota Bene

Version 3.0 of the Nota Bene word processor features a 100,000-word spelling checker with a 15,000-word exceptions dictionary, a thesaurus, and a laser-printer font editor. You can also mark your changes when you edit your documents and then confirm the changes selectively or globally.

*Dragonfly Software, 285 W. Broadway, Suite 500, New York, NY 10013-2204, 212-334-0445. \$495.*

Circle 350 on Reader Service card.

#### Word Perfect Menus

Menu Perfect 1.4 is a pop-up menu system for Word Perfect 4.x that gives you single-key or scroll-bar selection of Word Perfect commands.

*The Human Interface, 902 94th St. S.E., Everett, WA 98028, 206-348-9043. \$39.95.*

Circle 351 on Reader Service card.

#### Gem 1st Word Plus

Gem 1st Word Plus uses pull-down menus and icons and includes a spelling checker, mail-merge, pagination, search and replace, hyphenation, footnote management, decimal tabulation, and block operations.

*Digital Research, Box DRI, Monterey, CA 93942, 408-649-3896. \$199.*

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#### Document Conversion

Word-Link can perform 56 different conversions between Multimate, Microsoft's Word, Displaywrite I/II/III/IV, Word Perfect, Office Writer, PFS:Professional Write, Wordstar, and ASCII word-processing for-

cats. Text formatting is preserved after the conversion.

*M/H Group, 222 West Adams St., Chicago, IL 60606, 312-443-1222. \$149.*

Circle 353 on Reader Service card.

### UTILITIES

#### Virus Protection

Disk Watcher 2.0, a RAM-resident utility that automatically pops up when common disasters (i.e., disk full, accidental hard disk format, accidental print screen) are about to occur, now prevents the spread of virus code. Current users can upgrade free of charge.

*RG Software Systems Inc., 2300 Computer Ave., Suite 1-51, Willow Grove, PA 19090.*

Circle 354 on Reader Service card.

### ENTERTAINMENT

#### Space Quest II

The 3-D animated adventure, Space Quest II—Vohaul's Revenge, puts klutzy janitor Roger Wilco into action again as he attempts to thwart the efforts of the demented evil scientist, Sludge Vohaul.

*Sierra On-Line Inc., P.O. Box 485, Coarsegold, CA 93614, 209-683-4468. \$49.95 (includes three 5 1/4-inch and two 3 1/2-inch disks).*

Circle 357 on Reader Service card.

#### From Sir-Tech

Sir-Tech has released five of its games for the MS-DOS market. The Proving Grounds of the Mad Overlord (\$59.95), Knight of Diamonds (\$49.95), and Legacy of Llylgamyn (\$49.95) are the first three scenarios in the fantasy/role-playing Wizardry series. The characters used in each new scenario are developed in the previous one.

Deep Space: Operation Copernicus (\$39.95) is an action/strategy space-flight simulator, and The Seven Spirits of Ra (\$49.95) sends you into the Land of the Dead to find the seven souls of Osiris.

*Sir-Tech Software Inc., P.O. Box 245, Charlestown Mall, Ogdensburg, NY 13669, 315-393-6633.*

Circle 358 on Reader Service card.

#### Serious Wargaming

The Universal Military Simulator lets you re-enact and re-create the battles of Gettysburg, Arbella, Hastings, Marston Moor, and Waterloo. Each battle's locale, geographical features, combat troops, and armaments are accurate. Or you can bring armies together from any time period and redefine the battlefield.



Can sanitation engineer Roger Wilco defeat Sludge Vohaul's evil schemes?

*Rainbird*, distributed by Activision Inc., 2350 Bayshore Parkway, Mountain View, CA 94043, 415-960-0518. \$49.95.  
**Circle 359 on Reader Service card.**

## Monopoly

Monopoly is the official and approved version of Parker Brothers' classic real-estate game and includes all the familiar features: tokens, houses, hotels, go to jail, and so on.

Virgin Games, distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404, 800-245-4525. \$39.99.

**Circle 360 on Reader Service card.**

## GRAPHICS

### Deluxe Paint for Tandy

Electronic Arts designed its Deluxe Paint 1.0 specifically to take advantage of the Tandy's 16-color graphics capability. The program lets you pick up any image on the screen and paint with it (or use one of the 10 built-in brushes); flip, rotate, bend, stretch, or shear any image or text to any degree; fill any area with gradient blends or any on-screen pattern, create a dithered blend of colors and use up to four gradient blends; use 21 levels of zoom (all tools work in magnify mode); simulate animation; and use mirror or radial symmetry.

Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404, 800-245-4525. \$49.95

**Circle 334 on Reader Service card.**

### Presentation Graphics

VCN Concorde 3.0 includes a database of hi-res EGA images, animations, fonts, and maps. It supports desktop-publishing formats, VGA standard, drawing tablets, and other peripherals.

Visual Communications Network Inc., 238 Main St., Cambridge, MA 02142, 617-497-4000. \$695.

**Circle 335 on Reader Service card.**

## BUSINESS AND PROFESSIONAL

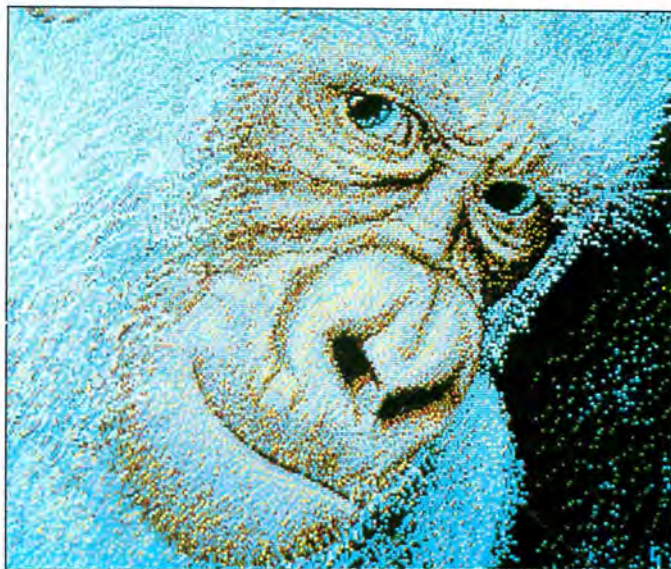
### Order Entry in EOS

Radio Shack's EOS is now offering Micro Associates' Order Entry with Invoicing. Order Entry works with MICA's accounting series or with its Accounts Receivable program to handle normal, blanket, quotation, standing, and drop-ship orders; returns; credit memos; and back-order processing. The program can format invoices, order acknowledgements, and work orders.

Micro Associates Inc., 2349 Memorial Blvd., Port Arthur, TX 77640, 409-983-2051. \$795 (EOS no. 90-3273).

**Circle 343 on Reader Service card.**

**Deluxe Paint 1.0 takes advantage of Tandy's 16-color graphics capability.**



### Clan Practical Accountant

The Clan Practical Accountant double-entry bookkeeping package can produce spreadsheet-style reports for income and expenses. It can export data to use in a spreadsheet and includes an on-screen calculator.

Sir-Tech Software Inc., P.O. Box 245, Charlestown Mall, Ogdensburg, NY 13669, 315-393-6633. \$79.95.

**Circle 344 on Reader Service card.**

### Accounting Modules

The Champion III 1.08 real-time accounting system processes and posts information as soon as you enter it and includes an automatic recovery function that restores and balances your books should your computer go down. The Champion III modules (\$395 each) include GL with Financial

Statements, AP with Purchase Order, AR with Order Entry, Inventory, Payroll, Job Costing, and Job Estimating. Freeway (\$249) creates custom reports.

Champion Business Systems Inc., 17301 W. Colfax Ave., Suite 250, P.O. Box 4008, Golden, CO 80401, 303-278-8666.

**Circle 345 on Reader Service card.**

### Your First Module for \$10

Hooper International is selling trial evaluation copies of General Ledger, one of the five modules that make up Finance Manager II, for \$10. The evaluation disk lets you monitor assets, liabilities, net worth, income, expenses, and budget while you record transactions into the appropriate accounts.

All Finance Manager II modules can run independently except Account Reconcilia-

**VCN Concorde 3.0 includes a database of hi-res images.**



## INFO LINE

tion, which requires General Ledger, and are priced as follows: General Ledger, \$40; Account Reconciliation, \$15; Financial Utilities, \$20; Accounts Receivable, \$30; and Accounts Payable, \$30.

Hooper International, P.O. Box 62219, Colorado Springs, CO 80962, 719-528-8989. **Circle 346 on Reader Service card.**

### Real Estate Projections

Real Estate Investment Analysis 6.0 produces 10-year projections about ownership and resale of any income-producing real

**Circle 19 on Reader Service card.**

estate. It performs the essential tax reform, financing, cash flow, and rate-of-return calculations.

Realdata Inc., 78 N. Main St., S. Norwalk, CT 06854, 203-255-2732. \$250. **Circle 347 on Reader Service card.**

### Info on CD-ROM

The Microsoft Small-Business Consultant (\$149) is a collection of publications on how to start and run a small business. The Microsoft Stat Pack (\$125) is a compilation of U.S. government facts and figures on the economy, politics, demographics, manufacturing, industry, trade, agriculture, and business. Both titles are additions to Microsoft's CD-ROM Reference Library series.

Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206-882-8080.

**Circle 349 on Reader Service card.**

### Manage Your Professional Contacts

Act 1.1 keeps track of your professional contact information and activities. It organizes and keeps files on your schedule and phone conversations, prints reports, maintains to-do files, and prepares letters.

Conductor Software Inc., 9208 West Royal Lane, Irving, TX 75039, 214-929-4749. \$395. **Circle 348 on Reader Service card.**

## HARDWARE

### 40MB Hard Card

The 40MB Amigocard 40F hard disk card works in the Tandy 1000, 1000 SX, and 1000 TX. The drive comes with hard disk utilities and format and partition software.

Origo International, 20675 Bahama St., Chatsworth, CA 91311, 818-340-7552. \$769. **Circle 326 on Reader Service card.**



The 40MB Amigocard 40F hard disk card works with the 1000, 1000 SX, and 1000 TX.

### Two Accelerator Boards

Advanced Transducer Devices has released both an 8MHz (\$445) and a 12MHz (\$599) 286 half-card accelerator board. A switch lets you select either 8088 or 80286 operation, and each board features function-key control of its 8K of zero-wait cache memory.

Advanced Transducer Devices Inc., 235 Santa Ana Court, Sunnyvale, CA 94086, 408-720-1938.

**Circle 327 on Reader Service card.**

### Video Digitizer

The Computer Eyes video digitizer lets you capture real-world images and supports Hercules, CGA, EGA, and VGA graphics and desktop publishing applications. You can store the captured images in a number of formats on disk.

Digital Vision Inc., 66 Eastern Ave., Dedham, MA 02026, 617-329-5400. \$249.95.

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Microcomputer Accessories Inc., 5405 Jandy Place, P.O. Box 66911, Los Angeles, CA 90066-0911, 213-301-9400. \$24.95.

Circle 333 on Reader Service card.

## Removable Hard Disks

The 20 and 32MB Dynex Datamodules plug into a receiver kit that you mount in your computer to provide hard disk storage that you can share with other machines.

Western Dynex Corp., 3536 W. Osborn Road, Phoenix, AZ 85019, 602-269-6401. \$595 (20MB), \$695 (32MB).

Circle 328 on Reader Service card.

## Telex and Fax Terminals

The ATC Proto.FAX Plus package turns your computer into a telex and facsimile terminal and lets you compose, store, send, and receive text messages via Telex, Fax, or DDD.

American Teleprocessing Corp., 10681 Had-dington, Houston, TX 77043, 713-973-1616. \$1,595 (\$975 Telex or Fax only).

Circle 330 on Reader Service card.

## Trackball

The stationary Fulcrum Trackball Plus can emulate any of 10 different pointing devices, such as the Microsoft Mouse, the Mouse Systems Mouse, the Summagraphics Bit Pad One, or the arrow keys for programs that are not mouse driven.

Fulcrum Computer Products, 459 Allan Court, Healdsburg, CA 95448, 707-433-0202. \$95.

Circle 331 on Reader Service card.

## Laptop Modem

The battery-operated Hayes-compatible Tote-A-Modem is designed to travel with most asynchronous laptop computers with an RS-232 serial port. The package includes an RJ-11 modular jack and an acoustic adapter.

Black Box Corp., P.O. Box 12800, Pitts-burgh, PA 15241, 412-746-5530 (orders). \$199 (1200 baud), \$359 (2400 baud).

Circle 332 on Reader Service card.

## LITERATURE

### Word Processor Enhancements

*Word Perfect: Advanced Applications Hand-book* (\$24.95), by Dr. Forest Lin, includes ready-to-use applications programs that use Word Perfect's macro, math, sort, and merge features. Macros aimed at various office and business situations serve as models to simplify office tasks.

*The New Wordstar Customizing Guide* (\$24.95), by Stuart E. Bonney, teaches you how to alter and expand function keys, commands, and defaults to personalize all versions of Wordstar to meet your needs.

Wordware Publishing Inc., 1506 Capital Ave., Plano, TX 75074, 214-423-0090 or 800-231-7467. Circle 355 on Reader Service card.

## INFO LINE

### PFS: First Choice Help

*PFS: First Choice—Applications Made Easy*, by Paul Dlug, demonstrates how to use First Choice's features. The book includes instructions for creating home and business applications.

Tab Books Inc., P.O. Box 40, Blue Ridge Summit, PA 17214, 717-794-2191. \$14.60. Circle 356 on Reader Service card.

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Unlike other advanced software packages, LeScript is one of the easiest you'll ever use. One reason is, LeScript displays your text on the screen the way it is going to look printed - with headers, footers, indents, columns, footnotes, page numbers, line spacing, the works. LeScript even has the incredible ability to show you right on the screen the words that are italic, boldface, underlined, subscripted. A feature that is so necessary, yet unheard of among the competition.

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TRS-80 Model 1/3/4/4D/4P: One disk drive and 48K memory.

## INFO LINE

### FOR THE HOME

#### Nutrition Analyzer in EOS

Nutri-Fit, now available in Radio Shack's Express Order Service (EOS), analyzes your daily food consumption to provide a comparison between what you eat and RDA, National Cancer Institute, and American Heart Association guidelines. The program includes a routine that helps you plan nutritionally balanced meals from a list of over 1,000 commonly eaten foods, including snacks and fast food.

Circle 133 on Reader Service card.

Nutrisoft Inc., 2349 Memorial Blvd., Port Arthur, TX 77640, 409-983-4064. \$49.95 (EOS no. 90-3301).

Circle 337 on Reader Service card.

#### Text-file Database

The Autotrieve 16 formatted-field indexing system lets you use 16 formatted fields to retrieve long-text files of any information, in any length, and in any format.

RHM & Associates, 913 Helen St., Midland, MI 48640, 517-631-9334. \$39.95.

Circle 340 on Reader Service card.

#### DOS Tutor

The DOS *Workbook and Disk* includes a series of lessons and exercises with sample

data that lets you practice on your computer.

Que Corp., 11711 N. College Ave., Carmel, IN 46032. 800-428-5331, ext. 899. \$29.95.

Circle 341 on Reader Service card.

#### New Tornado Version

Version 1.80 of Tornado, the pop-up, random-information processor, is now easier to learn, better organized and documented, and includes more pre-formatted reference information.

Micro Logic Corp., P.O. Box 70, 100 Second St., Hackensack, NJ 07602, 800-342-5930 or 201-342-6518. \$99.95.

Circle 338 on Reader Service card.

#### Weekly Reader Software

Two new entries into the Weekly Reader Software line include Vocabulary Development (\$39.95), which helps children ages 8 and up increase vocabulary and reading skills, and Reading Comprehension (\$39.95), which includes 29 high-interest stories to help children learn such skills as recognizing the main idea, predicting outcomes, and recognizing cause and effect.

Optimum Resource Inc., 10 Station Place, Norfolk, CT 06058, 800-327-1473 or 203-542-5553.

Circle 339 on Reader Service card.

#### Household Inventory

The Tinbox2.EXE 2.11 database for household inventory lets you create a list, organized by room and area, of your home's contents and their value.

Derrell Hooper, P.O. Box 1461, Keene, NH 03431-1461, 603-239-4528. \$20.

Circle 342 on Reader Service card.

### ON-LINE

#### Intuitive Communications Software

Procomm Plus includes 12 error-correcting file-transfer protocols with two to accommodate high-speed error-correcting modems, 16 popular asynchronous terminal emulations, a fully automated dialing directory, and Aspect, a script command language.

Datastorm Technologies Inc., 1621 Towne Drive, Suite G, Columbia, MO 65202, 314-474-8461 or 800-626-2723 (credit-card orders). \$75.

Circle 361 on Reader Service card.

### CLUBHOUSE

#### Florida TMUG

TMUG, the Tandy MS-DOS users' group based in the St. Petersburg, Clearwater, and Largo area, can help novices and intermediate users learn more about their machines. Dues are \$15 per year (you get a monthly newsletter), and meetings are held in the Largo Public Library on the first Wednesday of each month. (You don't need to be a member to attend).

Paul T. Schoenberger, Membership Chairman, 2101 Sunset Point Road #1104, Clearwater, FL 34625.

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## Memory Mate



**Photo. Memory Mate stores almost anything so it's easy to find.**

by **David A. Williams**

**A**re you the type that writes yourself notes that you can never find? Did you flip over the little yellow Post-it pads when they first came out? If so, you'll love Memory Mate.

A free-form, text-oriented filing program, Memory Mate stores almost anything so it's easy to find. Unlike many similar programs that use key words or fixed indices, Memory Mate indexes every word in every record. If you have any idea what you put into a record, you'll be able to find it.

You can use Memory Mate as a memory-resident program, which makes it a convenient way to record your thoughts as they occur. You'll pay for this convenience though; Memory Mate uses an astounding 82K.

The program limits a database to 2MB, but there's no practical limit to the number of records in the database. A single record is limited to 60 lines of text. You don't have to have a hard disk, but using Memory Mate on a floppy-disk system would be cumbersome at best.

Installing and learning Memory Mate is easy. The command menu is nearly always in view (see Photo), the 50-page manual is clear and concise, and context-sensitive help screens provide hints when needed.

Entering data is also easy. You can insert and delete individual characters and even make block moves. The cut-and-paste function, normally used to move data between records, also moves data within the same record. Word-wrap takes care of line end-

ings. When you save a record, Memory Mate asks if you want to enter a reminder date. If you do, the program will display that record the first time you enter the program on the selected day.

With the setup program, you can change the hot key, change the display colors, and compact the database (unnecessary unless you delete a large number of records).

### Retrieving the Data

The Find command is the heart of Memory Mate. After all, anyone can file things; retrieving them is the hard part. Usually, you'll search for words or combinations of words, but you can also search for the date the record was created or modified or the reminder date.

The operators "and" and "or" can restrict your search to records containing certain combinations of words. When searching by date, the mathematical operators less than (<), greater than (>), and equals (=) will request a specific date or range of dates.

Memory Mate is fast! It requires less than a second to identify any combination of records from a total of more than 400. As you page through the selected records, they appear almost instantaneously, provided you're using a hard disk. If you find you've selected too many records, the program lets you thin them out. You can also delete and print records.

### In and Out

Memory Mate can cut and move data from one record to another, as you might expect. It can also move data to and from application programs, which is handy when you've got notes you want to add to a spreadsheet or document. Memory Mate uses the control-P combination to paste data into another program, which will cause a problem if that program happens to use control-P as one of its own commands. Unfortunately, you can't reassign Memory Mate's command keys.

You can transfer large amounts of data between Memory Mate and other programs by using an ASCII file as a go-between. When you input an ASCII file, you can tell Memory Mate to separate the data into records according to a set number of lines, or, if the records don't all contain the same numbers of lines, you can have Memory Mate look for a special termination character at the end of each record.

The Out command transfers the selected records to an ASCII file. Memory Mate places a tilde (~) at the end of each record for easy identification. If you need some

other identifying mark, you can use a word processor's search and replace function to change the termination mark.

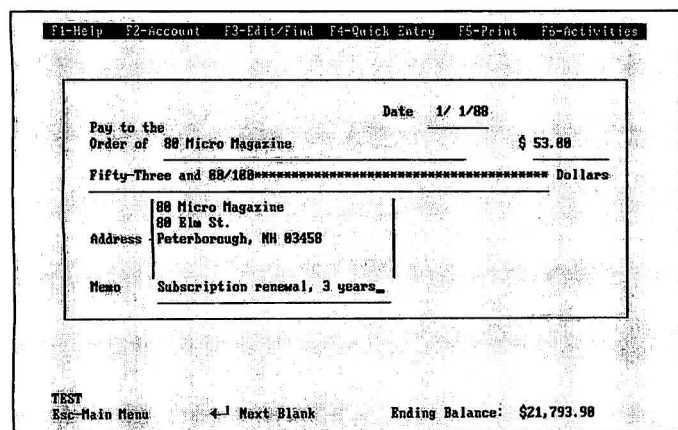
### The Bottom Line

It's too bad Memory Mate is such a memory hog. With it in memory, you might not have room to run a large program. Of course you can use Memory Mate in the non-resident mode, but that limits its usefulness.

The fact that you can't reassign its command keys will also cause some clashes. Still, pasting into other programs is not Memory Mate's primary function; on most counts it's a great program. It's fast, easy to learn and use, and very good at what it does. ■

**Memory Mate requires 256K and MS-DOS 2.x. Broderbund Software Inc., 17 Paul Drive, San Rafael, CA 94903, 415-492-3500. \$69.**

## Financial Management for Peanuts: Quicken



**Photo. The six pull-down menus on Quicken's check-writing screen give you access to the check-writing or the check-register features.**

by John M. Allswang

Your choice of a home or small-business money-management program will depend on its features, ease of use, and price. At just under \$50, Quicken is more than just attractively priced; it ranks high on the other measures as well. It handles a number of basic home and home office bookkeeping tasks quickly and easily, and may well be the only financial-management software many home or small-business users will ever need.

Quicken isn't copy-protected. It works well with even minimally configured computer systems, and doesn't demand that users have previous experience with computers or financial programs. It features an extensive on-line help system, an unusually clear and complete manual, and excellent free (though you pay for the call) telephone support from Intuit.

### Checkbook Accounting

Using Quicken is similar to using a checkbook. You do all your data entry either on the screen image of a blank check (see Photo) or the screen image of the check register, which keeps a record of checks written, deposits made, and so on. Thus, using the program is similar to using your

checkbook, but Quicken can use that data in a number of creative ways, building a basic accounting system from your checks, deposits, and other transactions.

This is essentially the "one-write" system of accounting that many small businesses use. Quicken's way of doing it is elegant, however, and simple. It works from a system of menus and submenus, with short-cut keystroke alternatives available to experienced users.

From the main menu, for example, you can choose the check-writing screen, the check-register screen, or submodules for printing reports or reconciling an account. Each of the major screens, moreover, provides a series of pull-down menus for selecting additional features or on-line help.

You begin Quicken by setting up one or more accounts (checking, savings, and money-market, for example), and you can add additional accounts at any time. Once you've named an account and entered an opening balance, you're ready to write checks or make entries in the check register.

You can review, change, or delete the checks you've written on screen and print them out when you need them.

You use the check-register screen to enter deposits made, interest paid, and other adjustments to the account or to record

checks you wrote outside of Quicken. This power lets you use Quicken for other kinds of bank accounts, including credit card or cash records.

The actual printing process is simple. Intuit can supply you with standard checks that come in one- or two-part formats and in either regular or voucher sizes (prices range from 5 to 14 cents per check). Voucher checks have an additional stub on the bottom (e.g., for payroll information).

Since the check has room for the payee's address, you can use window envelopes to send them. The program has a virtually foolproof way by which you can line the checks up in most printers. Quicken lets you assign output to two different printers; you can select either one each time you print anything.

### Beyond the Checkbook

But Quicken does much more than just balance your checkbook. For example, the check register allows you modest database-management control of account information. You can search for a record on full or partial information in any field of the register or do a search by date of transaction. And you can print out part or all of the register at any time.

Quicken can memorize transactions, such as payments or deposits you make regularly; then, when it's time to write that check to the telephone company, a keystroke or two do the job.

The program also recognizes what it calls transaction groups, which you set up in the check register. You can group together any set of transactions that takes place at the same given time (weekly, monthly, etc.), and Quicken reminds you when it's time to send out the checks.

Quicken comes with a companion program, called Billminder, that you can run from your Autoexec.BAT file; each time you turn on your computer, it tells you if any checks are due to be printed on that day.

Perhaps most powerful, from a bookkeeping standpoint, is the @category feature. This lets you set up categories for some or all of your transactions, thereby grouping them together for reporting purposes, such as a category for tax-deductible expenses.

It is easy to tag a payment or receipt in the check-writing or check-register screen by entering the @ sign followed by the name of the category. Equally important, you can always split transactions while writing checks or entering transactions in the register, so you can divide the amount of a single check or deposit among various categories. (If you use voucher checks, you can use Quicken to manage a small business's payroll).

It's the way Quicken's advanced features relate to its report features that makes the program useful for tax-record keeping, fi-

(continued on page 60)



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32.7 Meg kit \$299      65.5 Meg kit \$569

Don't spend more than necessary to add an internal hard drive to your Tandy 1000/ASX/3000. Aerocomp provides the best low-cost, high quality, fast access hard drives for your Tandy 1000 or other IBM compatible. These kits come complete with the drive, controller, cables and installation instructions. Our systems allow you to boot directly from the hard drive. We use brand new genuine Seagate drives, not some obscure reject off-brand, so you can be assured of long, trouble-free, drive life. Our 20 and 30 megabyte drives have an average access time of 65ms and the 40 megabyte drive is a mere 28ms. Not a slow-stepping dog in the bunch. We provide software to park the heads for maximum protection (automatic on 42-65MB model). All connectors and card edges are gold plated to insure flawless service. SX owners can save hundreds by simply removing one floppy and installing our low-power 20,30 or 40MB hard drive in its place. The sizes listed are after formatting. DOS 2.1 or later is required (42-65MB requires 3.2 or later). Tandy 1000 requires DMA and ROM 1.01.00 or later. Not for Tandy 1000EX/HX. 30 day satisfaction guarantee. If, for any reason, you don't like your hard drive, we'll refund the entire purchase price, less shipping. Order yours today!

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360K 3 1/2" TEAC 35B bare drive 40K	89
720K 3 1/2" TEAC 35F bare drive 80K	129
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2-TEAC 35F's in a dual enclosure	299
2-TEAC 35H's in a dual enclosure	328
1-TEAC 55B 360K in a dual enclosure	139
1-TEAC 55F 720K in a dual enclosure	146
2-TEAC 55B's in a dual enclosure	239
2-TEAC 55F's in a dual enclosure	251

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TRS-80 4-drive floppy cable	34
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5 1/4" case and power supply w/o extender	59
1-TEAC Model 1 TRSDOS 2.3 with manual	25
TRS-80 Model 3 TRSDOS 1.3 disk only	15
TRS-80 Model 4 TRSDOS 6.x with manual	25
TRS-80 Model 4 CP/M (Montezuma version)	129

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## ZUCKERBOARDS



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ØK \$42

Clk/Cal \$28

Tandy 1000/A Multi-Function board. Includes DMA chip, serial port and clock/calendar. Five year warranty plus our 30 day satisfaction guarantee. **RAM Available**

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Model 1000/A/SX \$44      2nd Serial Port \$26

Model 3000 \$74      2nd Serial Port \$43

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Zucker 300/1200 baud modem w/software \$72

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# User's Guide To Tandy 1000 Add-Ons

*Boost memory, storage capacity, power, and versatility with Tandy and third-party hardware.*

by David S. Veale  
**80 Micro Staff**

Since our last roundup of add-on boards (see "The Wonderful World of Tandy 1000 Add-Ons," September 1986, p. 35), the Tandy 1000 has come a long way. Today's 1000s are faster, more powerful, more expandable—and much more compatible.

This article provides a comprehensive overview of products available for Tandy 1000s. Though this list is by no means complete, we've tried to include all the major vendors who market their products specifically for the Tandy market.

If you're a regular reader, you may recall that we've reviewed many of those products listed here. We'll be reviewing some of the others later. So for more details, check your back issues (see *80 Micro's* annual index on page 72 of the January 1988 issue) and watch these pages over the coming months.

One theme we want to stress at the outset is the importance of prudent shopping. Don't base your decision on price alone; a higher price doesn't guarantee higher quality, and a low price may or may not be a bargain. Consider all the factors—warranty, technical support, service, compatibility, return and refund policy—and ask plenty of questions. If you don't get a straight answer—or if you don't like the answers you get—shop elsewhere! (For a list of manufacturers' names, addresses, and telephone numbers, see page 40.)

As Tandy's engineers solve hardware quirks and a greater variety of expansion cards becomes available on 10-inch or shorter boards, SX and TX owners are finding that their machines are not only software-compatible with IBM, but hardware-compatible as well. Owners of original 1000s and 1000As can also take comfort, as more 1000-specific hardware is being produced to support the million or so machines in use. Some manufacturers have even begun to make Plus-style cards for the 1000 EX and HX.

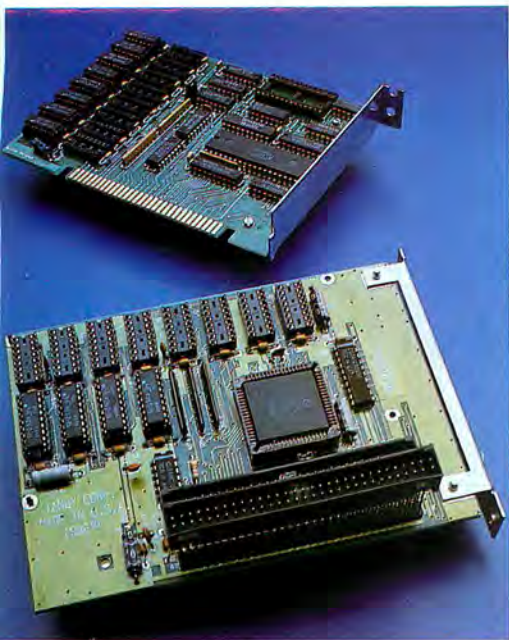
## Memory Boards

For the SX and the TX, memory boards aren't necessary; the TX comes equipped with 640K, which is as much as DOS can address, plus sockets to accommodate an additional 128K for video RAM. The SX comes with 384K and sockets on the system board for another 256K worth of RAM chips to give you the full 640K. Although a couple of manufacturers produce memory boards for the SX to give you 640K, it's an awful waste of a slot and more expensive than just plugging in eight chips.

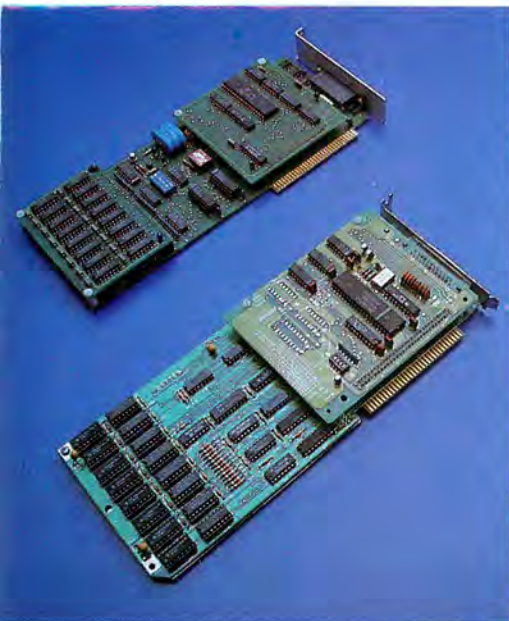
If you have an original 1000 or 1000A, you've probably realized by now that the 128K it came with isn't sufficient; modern application programs generally require 384K or more just to run. If you want to add memory, you'll have to use an expansion slot, because there's no way to add RAM to the 1000's system board.

You'll have to keep two things in mind when you choose your 1000 or 1000A's memory expansion board: first, the 1000 and 1000A weren't sold with a direct memory access (DMA) chip on the system board. This chip allows programs to access memory without having to go through the CPU. Hard disk drives and several applications programs require DMA, so whatever board you select must include not only memory, but a DMA chip as well. Second, because the early 1000s had only three expansion slots, you'll have to conserve space; make sure that the board you buy will hold all the memory you'll ever need. By choosing a board that holds at least 512K, you'll have the DOS-addressable maximum of 640K and never have to tie up two slots just for memory.

One manufacturer producing straight memory boards for the 1000 is Advanced Transducer Devices, makers of the famous Zuckerboard line of 1000 add-ons. Advanced Transducer Devices sells its **Zuckerboard Memory Expansion Board** with 512K of RAM and a DMA chip for \$149. This board also accepts an optional clock/calendar (\$49).



**Zuckerboard Memory Expansion Board** (above) holds 512K, DMA chip, optional clock/calendar. **Tandy's Memory Plus Expansion Adapter** (below) holds 128K RAM, expandable to 384K.



**Matthew Electronics' Master/One EMS multifunction board** (above) provides 1MB memory. **Hard Drive Specialist's clone of Tandy's Memory Expansion Plus card** (below), features a Plus piggyback option port.

Another source of memory boards is Hard Drive Specialist, whose **Memory Plus Expansion Card** sells for \$99. Shipped without memory—but with the required DMA chip and a Tandy Plus-style connector for piggybacking additional function cards—the Memory Plus card lets you add up to 512K.

Southwestern Digital markets a Tandy Memory Plus Expansion board clone that comes with 512K, a DMA chip, and one Plus-style expansion port for \$135.

Tandy doesn't offer memory boards for the original 1000 in its catalog anymore; perhaps they assumed that buyers who purchased an original 1000 or 1000A (discontinued in September 1986) must have upgraded by now. You can still get a Tandy solution, however, by purchasing Tandy's **Memory Plus Expansion Adapter** (\$129.95) and a **Plus Upgrade Adapter Board** (\$14.95), which allows the use of Plus cards in a PC-style expansion slot. This combination gives you an additional 128K of RAM (expandable to a total of 384K on the board), a DMA chip, and two Plus expansion ports for additional options. Note that on the 1000 and 1000A, adding this option lets you expand memory to only 512K, not 640K.

If you have a 1000 EX or HX, the Plus Expansion Adapter is also the Tandy way of expanding the memory of those machines. Adding this board, plus upgrading the memory on the board, gives the EX and HX 640K and the needed DMA chip. *This board, or a third-party clone, is required for any further expansion of the EX and HX.* Other makers of memory boards for the EX and HX include Advanced Transducer Devices, whose **Zuckerboard EX Memory Board** comes with 384K already on it for \$149, and Micro Mainframe, which sells a **Plus Memory Upgrade Board** with 384K and two Plus expansion ports for \$139.

### EMS Memory Boards

For users who want more than 640K, several vendors now offer expanded memory specification (EMS) memory boards. Working together, Lotus, Intel, and Microsoft designed EMS as a way to allow programs more memory than the 640K DOS would allow. It requires special hardware and software, and most commercial programs currently on the market don't take advantage of it. EMS is becoming increasingly important, however, as a DOS-based alternative to OS/2 (IBM's new operating system, which directly supports 16MB of RAM). Look for more programs to support EMS in the near future.

Hard Drive Specialist produces a **Mem-**

**ory Plus Card** that supports up to 4MB of expanded RAM. The board includes RAM disk and print spooler software and has a Tandy Plus-style expansion port. It's shipped with zero K for \$199; you expand it by adding 1MB chips.

Micro Mainframe's **EMS Board** supports up to 2MB of expanded RAM and also has a Plus-style expansion port. It sells for \$229.95, with 256K already installed.

A newcomer to EMS is Advanced Transducer Devices, whose **Zuckerboard 2MB EMS Board** holds 2MB of RAM and supports the latest version of the LIM (Lotus-Intel-Microsoft) EMS specs. As we went to press, prices were not established.

You can usually save money by buying the memory chips separately and installing them yourself. Retail stores take huge mark-ups on memory chips, so you'd probably be better off ordering them by mail from an electronics supplier. For example, 256K RAM chips priced at \$3.50 each via mail-order sold for \$6 to \$7 each in retail stores. Unfortunately, a severe shortage of RAM chips has developed in the United States and prices have risen rapidly. Until the shortage clears up, expect them to be selling at 50 to 100 percent over their traditional street prices.

### Multifunction Boards

With the somewhat limited expandability of the 1000 (i.e., only three or five short expansion slots), users are looking to multifunction cards as a way to get maximum expansion while using as little space as possible. Multifunction cards provide several features—almost always including memory—on one board.

Advanced Transducer Devices's **Zuckerboard Multifunction Board** for the 1000/A/SX features memory expansion up to a total of 640K—with DMA if required. The board has a serial port and clock/calendar and comes with RAM disk and print spooler software. The Zuckerboard sells for \$279 for the 1000/A or \$199 for the 1000 SX/TX. The SX/TX version has a port for an additional optional serial port (\$49).

Hard Drive Specialist makes two versions of its multifunction board, the **TanPak**. Shipped with zero K, the 1000/A's TanPak supports up to 512K of RAM with DMA and includes a serial port, clock/calendar, Tandy Plus-style expansion port, and RAM disk and print spooler software. The board sells for \$179. The TanPak for the SX and TX sells for \$119, but lacks capacity for memory or DMA, which are not needed.

Southwestern Digital markets a card with up to 512K RAM, a serial port, a clock/

## ADD-ONS

calendar, and a Plus expansion slot for \$239. This card also includes RAM disk and print spooler software.

One of the original 1000 boards that's still going strong is the **4N1 Multifunction Board** from Micro Mainframe. This board supports up to 512K of RAM with DMA and has an RS-232 port and clock/calendar. It sells for \$149 with zero K.

Matthew Electronics sells two EMS multifunction boards for the 1000; the **Master/One**, with 1MB of memory installed, for \$455, and the **Master/Four**, which supports up to 4MB, but is shipped with zero K for \$275. Both include a serial port and a clock/calendar, as well as RAM disk and print spooler software.

### Math Coprocessor Support

One of the add-ons for a 1000 that's quickly becoming a necessity is a math coprocessor. The math chip enables you to speed up the large and complex programs that are written to take advantage of it. Spreadsheets, graphics, and other math-intensive programs can run from 10 to 30 percent faster with the chip installed. The latest versions of Quick Basic, Microsoft C, Turbo C, Turbo Pascal, and several other major compilers all produce code that will take advantage of a math coprocessor for maximum speed and numerical accuracy.

The 1000A, SX, and TX all come equipped with a socket that will accommodate a math coprocessor. The EX, HX, and the original 1000 don't. But if you own one of the latter, you can add an **8087 Adapter Card** from Trionix. Priced at \$240, this board plugs into an expansion slot and contains the required socket; it doesn't contain the math chip.

If you decide to add a math coprocessor to your 1000, be sure to purchase the correct one. All coprocessors are made by Intel. For the 1000 with the Trionix board or the 1000A, get an 8087 chip (\$175) with a speed rating of 5MHz. For the 1000 SX and 1400 LT portable, get an 8087-2 (\$250), which has a speed rating of 8MHz. If you have a 1000 TX, which has an Intel 80286 processor, you'll need to get an 80287 chip (\$399.95) with a rated speed of 8MHz.

All math coprocessors are created equal! The 8087 that you buy at your local Radio Shack Computer Center for \$175 is *exactly* the same chip you can get from a mail-order house for about \$99. Most mail-order computer firms and electronic supply houses sell math coprocessors for up to 50 percent less than you'd pay for the same thing in a "name-brand" box.

For maximum benefit, if you've modified your 1000 with a "speed up" option, get a

coprocessor that either matches or slightly exceeds the speed of your CPU.

### Hard Disk Drives

Owners of 1000s need to be careful when selecting hard drives for their systems—not all of them work. Consequently, it's best to review the three options before you choose and install a drive.

The first approach consists of inserting a half-height hard drive in one of the drive bays and installing the controller card in one of the expansion slots. This way is usually the least expensive and can give the best overall hard drive performance, but it also means that you can have only one floppy drive installed in the system. At a time when many users are opting to have a 3½- and a 5¼-inch drive in their system, this could be a limiting factor.

In the second method, the hard drive remains outside the system unit, encased in its own cabinet, with its own power supply and ac outlet. You install the controller card in an internal expansion slot and run cables from the controller to the hard disk. This method offers significant advantages: you can keep your two internal floppy drives, and the hard disk won't put a drain on the 1000's already underpowered power supply. But external hard disks take up space and are more expensive than internal drives.

The third way to add the convenience of a hard disk is to install a hard card, which consists of a controller for your expansion slot and the hard disk itself mounted sideways on the same card. This way, both the hard disk and the controller are mounted in the expansion slot and powered either by the bus or by splicing into the leads coming from the power supply. The advantage of this system is that the hard drive, as well as two floppy drives, can be contained internally. Generally, though, hard cards don't provide the same performance (i.e., speed) as regular hard drives—although that's rapidly changing as storage technology continues to advance.

Of course, the safest way to get a hard drive is to get one directly from Tandy. While this approach is the safest, it's also the most expensive and doesn't necessarily yield the best performance. Tandy has two hard disk solutions for the 1000/A/SX/TX. The most popular is the **20MB Hard Disk Card**. One unique feature of the card is that it's bus-powered; most other hard cards require that they be connected directly to the power supply of the 1000. Unfortunately, Tandy's Hard Card is one of the slowest hard drives available. It has an average access time of 85 microseconds



**Big numbers to crunch?** Add a math coprocessor for speedy handling of complex programs.



**Not all hard disks will work** in a 1000. These will. Left, 64MB drive from Megahaus; center, Tandy's 20MB drive; upper right, Hard Drive Specialist's 45MB drive (right).



For maximum versatility, add a 3 1/2-inch drive such as Tandy's (left) or Manzana's (upper right). Shown center, Tandy 5 1/4-inch drive.



CD-ROM players like this unit from Phillips offer state-of-the-art access to reference materials stored on compact disks

(ms) and scores a mere 0.7 on the Norton Disk index, which indicates that it's only 70 percent as fast as the hard drive in a standard IBM PC/XT. While this card is reliable and gets the job done, its price of \$599 is, to say the least, excessive. With faster 20MB cards selling between \$300 and \$400, you pay quite a premium for the Tandy name on the box.

Tandy also sells an **External 20MB Hard Disk**. This disk, which includes the case and power supply, is certainly one of the more stylish hard drives around, in its small off-white case that matches the case of the 1000. The disk has an average access time of 65ms and scores a 1.2 on the Norton Disk Index. You can attach a secondary hard drive and have two stacked 20MB disks for a total of 40MB of storage.

But again, Tandy's pricing is prohibitive. The hard disk retails for \$599, at least \$200 more than the cost of comparable disks from other vendors. And to add insult to injury, Tandy doesn't include the essential controller card for that price. You'll have to buy that card for an additional \$299.95—three to five times the price that other vendors charge for the same card!

If you own a 1000 EX or HX, you can still use a hard disk despite the machines' lack of standard expansion slots. Western Digital offers a **Hard Disk Controller Board** especially for the EX/HX that fits into one of the Plus-style expansion slots. To use this board, you must have already installed Tandy's **Memory Plus Expansion Adapter** (\$229) or its equivalent, since hard disk operations require DMA circuitry. The board will let you connect any external hard disk that would normally work with the Western Digital WX2 controller. You can buy the board at any Radio Shack store via their Express Order Hardware program.

If you're willing to look beyond Tandy as a supplier, you can save money and gain performance. Several suppliers market hard drive solutions specifically for the Tandy systems.

Hard Drive Specialist sells a full line of internal and external hard drives and hard disk cards for the 1000. Hard Drive Specialist's internal hard drives mount in the 1000's disk drive bay and include the controller card. The drives range in capacity from 20MB for \$479 to 60MB for \$1,199. The same drives are also available in external versions with a case and power supply for \$629 for the 20MB and \$1,349 for the 60MB. Hard Drive Specialist sells other drives with capacities and prices between the 20 and 60MB drives. All the Hard Drive Specialist external drives are also

available for the 1000 EX/HX, although the special controller card costs extra. A 20MB external drive with the special controller card for the EX/HX costs \$729 (\$1,645 for 60MB).

Hard Drive Specialist also sells hard cards with capacities of 20, 30, and 45MB for \$499, \$699, and \$899, respectively.

These hard cards perform admirably. The 45MB version has an average access time of only 41ms and scores a 1.7 on the Norton Disk Index. All Hard Drive Specialist's drives feature buffered seek logic controllers and plated media to enhance performance.

Advanced Transducer Devices markets the **Zuckerboard 30MB RLL Hard Disk Card**. This card offers higher speed than standard hard cards for \$659. RLL (run length-limited) controllers generally speed disk access. While we didn't receive one of these drives for testing in time for this article, we expect that performance should be well above average.

Aerocomp, a longtime supplier for the Tandy market, sells a 65ms, 20MB internal hard drive for \$339 and a 32MB drive for \$399. A 28ms, 40MB drive sells for \$469. These drives include the controller card and mount in the 1000's second drive bay.

Micro Systems is yet another supplier of hard disks. It sells internal hard disks with 20, 30, and 40MB capacity at prices of \$425, \$489, and \$649, respectively. It also sells 20 and 30MB hard cards for \$459 and \$519, respectively.

Origo International markets the IB40F 40MB hard card, which uses an MFM controller for added speed and is priced at \$769. The Origo card is new, and we weren't able to obtain a sample for testing before press-time.

Two more vendors of low-cost hard cards are Southwestern Digital and Discount Computer Supplies. Southwestern Digital markets hard cards ranging from \$479 for 20MB to \$799 for 45MB. Discount Computer sells a 30MB hard card for just \$395.

Another major vendor is Megahaas, which sells a full range of internal and external disks and hard cards. Hard cards range from 21 to 64MB, at prices from \$379 to \$749. Internal hard disks are priced at \$299 to \$559 for the same capacities. For 1000 EX/HX owners, Megahaas offers external hard disks with Plus controllers for \$549 for 21MB all the way to \$849 for 64MB.

We tested a Megahaas 64MB RLL-controlled hard card but found that it was incompatible with our benchmark programs. Although the manufacturer claims an average access time of 28ms which would be considered very fast; however, we found a 41ms



Hard Drive Specialist hard card to be faster than the Megahaus.

If none of these appeals to you, it's possible to adapt a half-height hard disk originally intended for an IBM PC/XT to work in a 1000. See "Adding an XT-type Hard Disk to the 1000" (p. 36) for details.

**Disk Drives**

With the vastly superior 3½-inch drives rapidly replacing 5¼-inch drives, all models of the 1000 are now sold with only one disk drive installed. But because the 5¼-inch drive has been around for the past seven years, and the 3½-inch drive became the standard only a year ago, most users have the bulk of their information stored on 5¼-inch media. For the next few years, it seems that the best route for manufacturers to take is to have both drives available; hence, Tandy lets you choose the size of the drive you want installed as your second floppy drive.

All models of the 1000 except the EX and HX will accommodate a second 3½- or 5¼-inch drive internally; the HX will accept a 3½-inch drive internally, but not a 5¼-inch drive. For the EX and HX, Tandy sells an external 360K 5¼-inch drive for \$249.95 and an external 720K 3½-inch drive for \$279.95. For the HX, there's also an internal 3½-inch drive for \$169.95. Tandy also offers 3½-inch internal drives, with adapters, for the 1000 SX and TX for \$199.90 and a 5¼-inch drive for \$169.95.

If you want to save money, the 5¼-inch internal drives used in the 1000 models are standard Teac 55B drives, which are available from mail-order suppliers such as Aerocomp and Clone Computers for \$90-\$110. Internal 3½-inch drives are available from the same sources for about \$130.

If your 1000 already has two 5¼-inch disk drives or a hard disk in the second drive bay, but you really need a 3½-inch drive, you might consider Manzana's MDQT External 720K 3½-inch Disk Drive. Made for all 1000s with PC-compatible expansion slots, this drive uses a special controller card and software to allow up to three floppy drives on your system. The drive sells for \$410.

One more note about drives: the disk controller in the 1000 won't support 1.2MB 5¼-inch drives designed for the 3000 or the 1.44MB 3½-inch drives designed for the 4000. Do not attempt to use these drives in the 1000.

**Alternative Storage Devices**

Hard disks are no longer the only way to facilitate mass storage on the 1000/A/SX/TX. Though not intended for casual

users, the Disk Cartridge System (DCS) or Bernoulli Box offers massive storage, transportability, and security. The DCS consists of an external cartridge reader and data cartridges; Tandy's current model has two 20MB cartridge slots and works like a hard disk—you can even use it to boot the computer. If you fill the two cartridges to capacity, you can remove one and replace it with another, for virtually unlimited storage capacity. Because a 20MB cartridge fits easily into a briefcase, your data is easily transportable; you can also protect sensitive information by removing cartridges and storing them under lock and key. Tandy's DCS is priced at \$3,648.95, including the interface card.

Two other mass storage technologies that are quickly emerging are CD-ROM players and WORM (write once, read many) drives. While CD-ROM players are similar to compact disk players, CD-ROM disks contain hundreds of megabytes of data, not music. Because of their huge capacity (often exceeding 500MB), whole books—in fact, entire encyclopedias—can be stored on a single disk. For example, Microsoft Bookshelf, the most popular CD-ROM disk at the moment, contains the following in their entirety: *The American Heritage Dictionary*, *The World Almanac*, *The U.S. Zip Code Directory*, *The Chicago Manual of Style*, *Roget's Thesaurus*, *Bartlett's Familiar Quotations*, *The Houghton Mifflin Usage Alert*, a spelling verifier and corrector, as well as letters, outlines, forms, and a listing of business information sources.

CD-ROM is becoming big business and a major technology. Since it's a read-only system, it's perfect for storing large databases. Tandy now offers a Hitachi CD-ROM player through its Express Order Hardware program for \$995. CD-ROM players are available from Amdek, Sony, Phillips, and several other vendors. Check with the manufacturer to confirm compatibility before you buy one. For more information about progress in CD-ROM technology and applications, see *80 Micro's* sister publication, *CD-ROM Review* (IDG/Peterborough, 80 Elm Street, Peterborough, NH 03458); for information on adding a CD-ROM to your 1000, see "The All-Important ROM BIOS" (page 38).

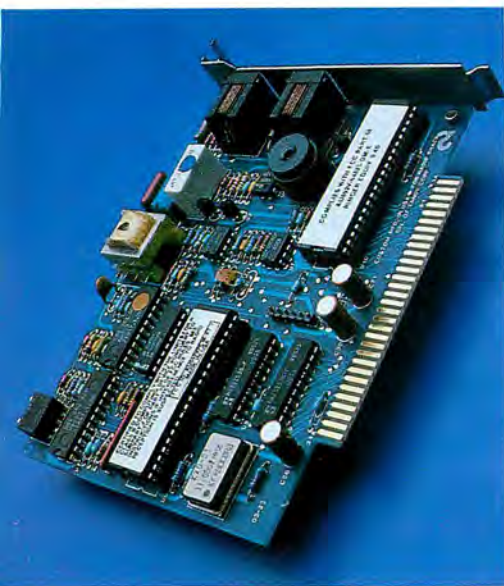
Though you can't write to CD-ROMs, you can write to WORM disks, which are similar to CD-ROMs. This makes them ideal for storing huge company databases and backing up vast amounts of data. Once you write to a WORM, however, you can't erase—hence its name. Of course, with a capacity of 800MB per disk, you can work for a long time before you reach full capacity.



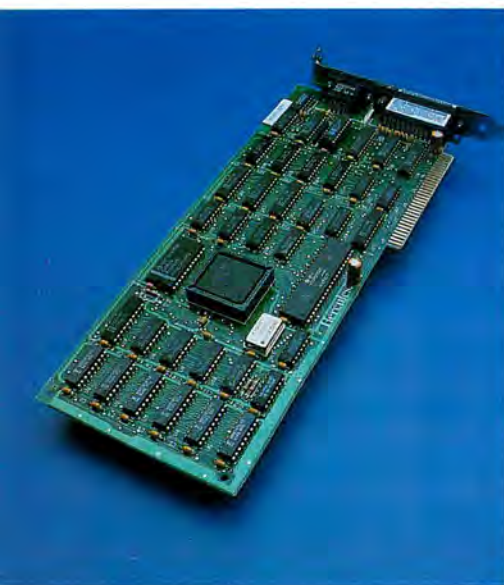
Tandy's Deluxe Joystick (\$29.95) is sufficient for most games people play. But the Color Mouse (\$49.95) won't do Windows—or Microsoft's Word.



Are all your files dated 01/01/80? Add a clock calendar like Tandy's SmartWatch or a Zuckerboard.



You'll wonder how you ever got along without a modem. This one's from Tandy.



Hercules Graphics Card Plus fits the 1000's 10-inch slot.

The biggest name in WORM systems now is IBM, which makes an external unit for \$2,950. We weren't able to test IBM's system on the 1000, so the usual cautions apply. Look to producers of CD-ROM systems for WORM drives also.

Of course, if you already have a hard disk, you needn't invest in a DCS or WORM if all you need to do is make backups. If backing up to floppies is too slow and inconvenient for you, you may want to consider a tape backup system. Tandy offers the TCS-100 Tape Cartridge System for \$2,148.95. This system will back up 48MB of data onto a cassette-sized tape cartridge at a rate of about 1.5MB per minute. The unit works with the 1000/A/SX/TX; though it's external, you'll need to use an expansion slot for the controller card.

If you don't need much speed and capacity, look for something like Irwin's 420XT Tape System, which backs up 20MB onto a tape for \$750. Again, the unit is external and requires an expansion slot.

If you're looking for a tape or DCS system for your 1000, here's a guideline to follow: choose an external unit with its own controller and power supply. Most internal units are going to be made for AT-class drive bays and thus won't fit inside the 1000. Also, the 1000's power supply isn't sufficient to handle both a hard drive and a tape system. There are also incompatibilities between the 1000's drive controller circuitry and IBM's. Therefore, tape systems that claim to use your computer's floppy drive controller to function will rarely work in a 1000—they must use their own controller.

### Pointing Devices

The past 12 months have seen a significant increase in the number of applications that utilize a pointing device, primarily a mouse. The acceptance of Microsoft's Windows as a major operating environment has given the mouse legitimacy in a world once dominated by the Apple Macintosh. Even Tandy has gotten into the act by providing mouse support for Personal Deskmate 2 and Professional Deskmate. In fact, these and many other mouse-compatible programs can be awkward to use if you don't have a mouse.

After Tandy's disastrous Digimouse went out of production last year, Tandy realized that any new mouse would have to be compatible with Microsoft's mouse driver software, the industry standard. Both of Tandy's mice, the Serial Mouse (\$49.95),

a simple two-button mouse, and the Logimouse C7 (\$99.95), a more sophisticated three-button mouse, use the standard drivers. Both connect to a standard serial port, so unless you have a 1000 TX, you'll need to add an RS-232 serial port to your computer to use them. You must also be sure that you're using Tandy's version of MS-DOS 3.2 or 3.3, since the software that drives the mice is included with Tandy's DOS, not with the mice themselves.

The big cheese, however, is still the Microsoft Mouse. Looking more like a bar of Ivory soap, the two-button mouse is as much a work of art as it is a great piece of hardware. It's perfectly sized, and the roller ball is mounted in the front, so that you point with a flick of the wrist, rather than rolling the mouse all over your desktop. The left button is also larger than the right, so it's easy to find your way in the dark.

This mouse is available in six versions, depending on your needs. You can buy it in either serial or bus versions: the serial version connects to a standard RS-232 serial port, and the bus version comes with a controller card that plugs into one of your computer's expansion slots. Each of these is available with three different software configurations. First, you can buy the mouse with PC Paintbrush, a decent entry-level painting and drawing program somewhat like Macintosh's MacPaint program and with Mouse Menu, a series of software drivers that let you use a mouse with programs like Lotus's 1-2-3 and Displaywrite. This software combination sells for \$150 for either the bus or serial mouse. Second, you can get the mouse with EasyCAD, an entry-level computer-aided design program for \$175. Third, you can get it with PC Paintbrush and Windows 2.03 for \$200. If you have the required hard disk and at least 640K of memory, I recommend that you get the mouse with Windows, which sells separately for \$99. Windows is becoming an increasingly important operating environment, and it looks great on a 1000! It will also give you an idea of what OS/2 looks like, since Windows and the OS/2 Presentation Manager look identical.

If you're more adventurous, you might want to consider Mouse System's PC Mouse, which lets you build your own mouse menus and use them with almost any software package. This mouse is available in either serial or bus versions for \$159 and \$179, respectively.

Not everyone needs a mouse. Some of us (like most of the staff here at 80 Micro) just need something we can use to play a

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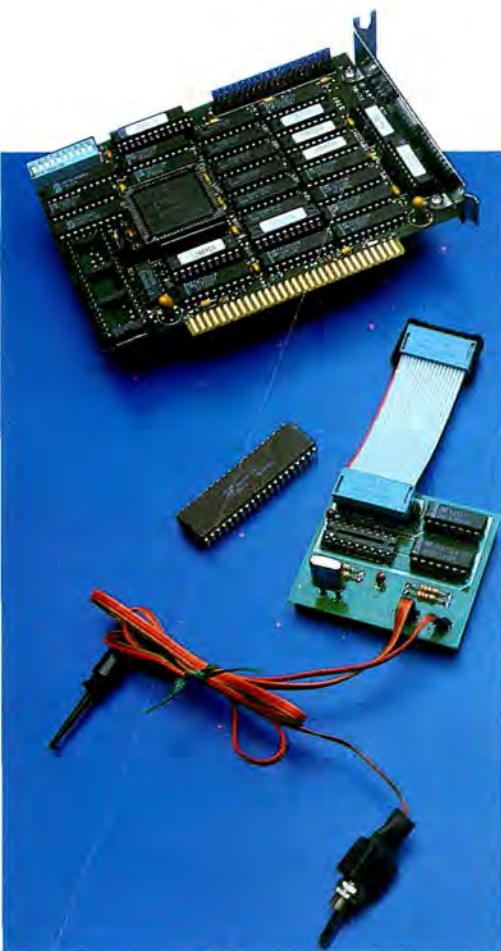
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Tandy's Enhanced Keyboard features 101 keys, full compatibility.



Speed up your 1000 with a 286 Express Card from PC Technologies (above) or DAS Technologies' PC Express (below).

few good video games. In this case, get something that plugs into the joystick port of your computer—something like Tandy's **Deluxe Joystick** (\$29.95). If you really want a mouse just to play games, you can get Tandy's **Deluxe Color Mouse** (\$49.95), a two-button mouse that plugs into the 1000's joystick port. But be forewarned: this mouse won't work with programs (such as Microsoft's Word and Windows) designed to use a standard mouse; it's intended merely as an alternative to a joystick.

### Clock/Calendars

Are you getting sick of typing in the time and date every time you boot your computer? Do you just press enter twice so that all your files are dated 01/01/80? While this method is effective, it is limiting. How can you spot the latest version of your word processing file if all the dates are the same—and *wrong*? You certainly can't make backups of files made before or after a certain date. And some programs, especially accounting programs, are sensitive to the date a file was last modified.

The solution to this problem is a battery-backed clock/calendar that sets the computer's date every time the machine is booted. Your files will be dated accurately and automatically.

Several manufacturers make clock/calendars for the 1000s. Advanced Transducer Devices' **Zuckerboard Clock/Calendar**, priced at \$59.95, is a small circuit board that plugs into an expansion slot that contains the clock circuitry and a 20-year lithium battery. (Imagine still having—and using—your 1000 20 years from now!) The board includes software that tells DOS to check the clock board for the time at boot-up.

Of all the clock schemes around, Zucker's board is unfortunately the worst; I can't imagine wasting an expansion slot for nothing more than a clock. If you really want a Zucker product, buy one of its memory boards or multifunction boards to do the other required upgrades to your machine and add a Zuckerboard Clock/Calendar Option Module to it. This \$49.95 option will add the clock capability to those Zucker cards that don't already include it.

If you have a Tandy Memory Plus Board or compatible, both Southwestern Digital and Hard Drive Specialist sell clock option boards that plug into a Plus expansion port. Both sell the boards for \$59.95. (These boards also work with the 1000 EX/HX.)

By far the best and least expensive solution comes from Tandy, whose **SmartWatch** sells for only \$39.95 and plugs directly into the ROM socket on your

1000's system board. The SmartWatch comes with a 10-year battery, and no expansion slots or special boards are required. The SmartWatch works with all models of the 1000 except the EX. Software is included, but if you have a 1000 TX, you won't need it; the software to use the SmartWatch is already in the computer's ROM.

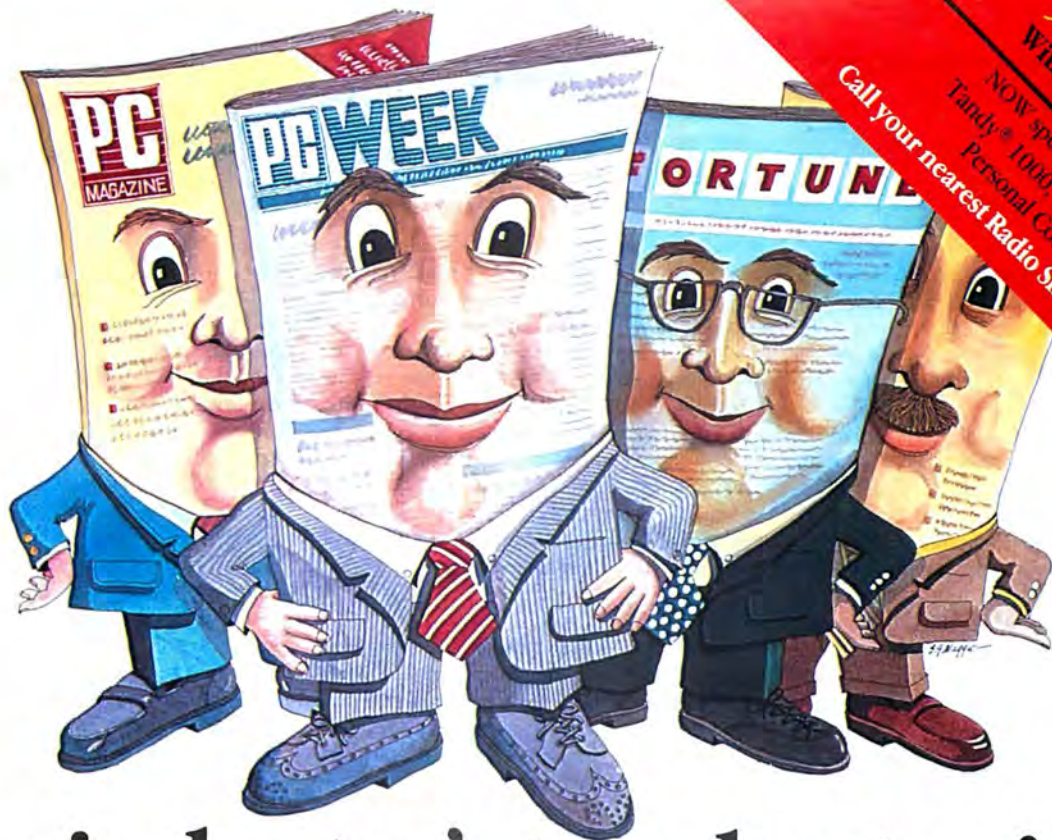
### Modems

A modem is one of those devices that you never think you'll need until you get one; then you wonder how you ever got along without it. A modem is simply a device that allows your computer to communicate with other computers over standard telephone lines. You can communicate with other users directly and take advantage of Bulletin Board Systems (BBSes) and nationwide information services. These sources can provide you with everything from the latest headlines and baseball scores to free software. Telecommunicating can get expensive; long-distance phone charges add up quickly and information services charge you by the minute for using the service. But overall, the benefits of using a modem can far outweigh the cost if used with discretion.

External modems, which are separate from the computer and connect to the serial port via an RS-232 cable, are almost totally system-independent. Because modems are virtually interchangeable (i.e., can be used in any computer that has a serial port), we won't examine modems designed specifically for the Tandy market because they'll virtually all work.

Still, some details are worth noting: First of all, don't buy a modem with a speed less than 1200 baud. The 300-baud modems of yesteryear are all but gone. 1200-baud modems are now considered the "standard", but 2400-baud modems are becoming more prevalent as modems and phone systems continue to improve. If you do a lot of communicating over long distance lines or download programs from information services, you're better off getting the fastest modem you can afford. The extra cost will be more than made up in the long distance and connect-time charges you save.

Another important feature to look for is "Hayes compatibility." Hayes is a manufacturer of modems that use a specific set of commands to accomplish such tasks as dialing a phone number and setting transmission speeds. These commands are often referred to as the "AT" command set. Any modem manufacturer who hopes to stay in business these days makes modems that support the Hayes standard. And especially



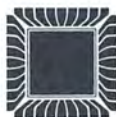
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Jim Seymour, *PC Magazine*

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Dr. Michael Ecker, *Government Computer News*

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Circle 146 on Reader Service card.

in the MS-DOS world, communications software "expects" that your modem will be using this set of commands; many communications programs won't work at all with modems that don't support these commands.

The only recommendation I'll make is this: if you can afford it, buy a genuine Hayes modem. The price can be steep (\$399 list for 1200 baud, \$599 for 2400), but you'll have the best modem you can buy and you'll never have to worry about compatibility. If you opt not to buy a Hayes, you can find literally hundreds of other brands at all levels of price and quality. Before you buy, ask for a demonstration to confirm compatibility and quality. Remember, price isn't everything.

The principles that apply to external modems also apply to internal modems, which fit into one of the computer's expansion slots. They work the same way external modems do, and the same speed and compatibility guidelines apply. If you opt for an internal modem, be sure it's designed for the slots in an IBM PC-compatible.

Even though internal modems are system-dependent, the 1000/A/SX/TX are all sufficiently slot-compatible with the IBM; any modem made for the IBM PC should work as well in one of these. But don't try to install an IBM PC-compatible internal modem into a Tandy EX or HX; these 1000s don't have PC-compatible slots. Tandy's Hayes-compatible **Plus 1200-baud PC Modem** fits the EX and HX's Plus expansion slot. All other models of the 1000 accommodate Tandy's **1200-baud PC Mo-**

**dem** and its **2400-baud Error-Correcting PC Modem**, priced at \$199.95 and \$499.95, respectively.

Once again, the Hayes **1200-baud Internal Modem** (\$349) and the Hayes **2400B (2400-baud) Internal Modem** (\$599) can't be beat for quality. If they're too pricey for your budget, many other manufacturers offer modems said to be compatible. Remember, try before you buy; if you order by mail, make sure the deal includes return privileges.

### Video Cards

When the 1000 first came out, users were pleased that the computer included color graphics capability as a standard feature. But the color standard used was CGA (640 by 200 pixels in four colors), a standard that even at the time of the 1000's introduction was well on its way to obsolescence. Today, EGA adapters (640 by 350 pixels in 16 colors) are the industry standard, and the new VGA adapters (640 by 480 pixels in 256 colors, using analog monitors) will be the standard by the end of 1989. About the only computers that still use CGA are laptops and the 1000, and owners of early 1000s find that their machines can't accommodate any other type of graphics adapter than their own.

Luckily, help is on the way. Matthew Electronics recently released an **EGA Card**, priced at \$295, that works in the 1000 and 1000A. Unfortunately, *80 Micro* didn't receive a sample for testing in time for this article.

Owners of the EX and HX may want to

look into STB's **Chauffeur EX Display Adapter**, which gives the EX and HX 1,056- by 352-pixel resolution with a compatible monitor. The board also emulates the Hercules Graphics Card on monochrome monitors.

If you own an SX or TX, you'll have an easier time upgrading your video because it's not difficult to disable your machine's internal video circuitry and install a video adapter card. But you'll still find compatibility problems with the SX/TX and IBM-compatible video cards. Here are a few things to look for: The video card must fit in the 1000's 10-inch slot. In general, only single-mode cards seem to work in the SX/TX. In our tests, the Hercules **Graphics Card Plus** (\$299) worked fine, as will most straight CGA and EGA cards. (We haven't had the opportunity to test any VGA cards, but don't see any reason why they shouldn't work also.)

By the way, the only cards on the market that are truly IBM VGA-compatible as this issue went to press were IBM's **Display Adapter** (\$595) and Compaq's **VGA Adapter** (\$595). All others had incompatibilities, so be careful.

We ran into serious problems when we tried to use multimode or multiscan cards, which emulate several different types of video adapters. For instance, a card might be able to behave as an EGA or a Hercules card, depending upon the software being run and the hardware to which it was connected. These types of cards generally don't work in the 1000 SX or TX. Because there are exceptions to every rule, we sug-

## Adding an XT-type Hard Disk to Your 1000

So you're looking through your favorite computer magazine and you see that hard disk you've been wanting, at a terrific price. The only problem is that the ad says it's for the IBM PC/PCXT and compatibles. Knowing the idiosyncrasies of your 1000, you question whether it will work on your computer.

The answer is a very definite *maybe*.

In terms of software, the 1000 is almost fully compatible with the IBM PC. But hardware is another story—hard disks are one area where Big Blue and Tandy went separate ways. Luckily, there's a way to rectify the problem.

The hardware compatibility problem stems from the controller card. The most popular hard disk controller card used with XT and 1000-class machines is the **Western Digital WX2**. If the hard disk you're considering comes with or can use this controller card, then you can use it with the 1000—after a little minor surgery.

Before you even think about performing surgery on your controller, try the card as is to make sure it really won't work on your machine; sometimes controllers that won't work on older machines will work on the newer Tandy 1000 SX and TXes without modification.

Once you've decided to proceed, you'll need to order part number WD62000094-XXX, if it isn't already on the board (the "XXX" at the

end of the part number signifies any three numbers), from Western Digital, the maker of the board. Priced at about \$30, this part is a universal ROM chip that replaces the IBM-specific ROM that comes on the board. After you install the chip, locate a group of jumpers on the card marked W7, then locate jumper pins 1 and 2. On the reverse side—the side without the chips—carefully cut the solder trace that connects pins 1 and 2 with a sharp knife to break the connection between the two.

Turn the board over again. On the side with the chips, install a jumper (available at any electronics supply store) over pins 2 and 3 to form a connection between them.

Then locate jumper group SW1 on the board. Place a jumper on the pair of pins marked 7. This operation changes the interrupt the board uses from #5 (IBM's standard) to #2 (Tandy's standard).

This procedure should allow you to use virtually any hard drive that works with the Western Digital controller with your Tandy 1000. If you have difficulty with this procedure, contact Western Digital's technical support department for assistance.

*David S. Veale is a technical writer on the staff of 80 Micro.*

# The Best Keeps Getting Better...



## EXCITING NEW PRODUCTS FROM THE MAKERS OF *filePro*®

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## The All-Important ROM BIOS

by Alan L. Zeichick

**A** funny thing happened when I hooked a CD-ROM player up to my old five-slot Tandy 1200: It didn't work right. Microsoft Bookshelf, the CD-ROM I tried to run, crashed the computer.

The problem wasn't the Tandy 1200, the Amdek Laserdrive, or even Bookshelf—it was the 1200's very old BIOS (basic input/output system) ROM, which wasn't compatible with CD-ROM players.

The BIOS ROM chip, essential to every IBM-compatible computer, contains important low-level programming that MS-DOS depends on. The BIOS is an intermediary between DOS and the computer's hardware. The better the BIOS, in effect, the more efficient—and more IBM compatible—an MS-DOS computer is.

Most major computer vendors, including IBM and Tandy, periodically update their BIOS ROMs. This is usually done with little fanfare, since a new ROM might only make minor improvements to a computer's functioning—speeding up a slow disk operation, for example. Occasionally, a new BIOS ROM will correct a bug or major incompatibility. In those cases, the vendor should notify all registered computer owners and offer an upgrade at a minimal charge.

Tandy offers its new BIOS ROMs for MS-DOS computers at a reasonable cost, usually less than \$20. To order a new BIOS ROM for your computer, give your local Radio Shack store manager the catalog and serial numbers of your computer, and ask him or her to order the BIOS from Radio Shack's National Parts department. If you don't feel comfortable changing chips yourself, ask your nearest Radio Shack

Computer Center to perform the upgrade.

How can you tell if your BIOS is out of date? Unless you own a Tandy 1200, your computer displays its BIOS version when you turn on the power. On a Tandy 1200, you can open the cover and take a look; the BIOS version is written right on the chip.

Next, check the table below for the latest offering for your computer (as of January 28, 1988). If you find that your version is older, I'd recommend purchasing the upgrade. It's the single best method of guaranteeing your computer's present and future compatibility.

Computer	BIOS
1000 (original)	1.1.0
1000A	1.1.0
1000 EX	1.2.0
1000 HX	2.0.0
1000 SX	1.2.0
1000 TX	1.3.0
1200 (5-slot)	3.0
1200A (7-slot)	3.0
3000 (8MHz)	1.3.2
3000 (12MHz)	1.3.2
3000 HL	1.3.2
4000	1.3.2

Alan L. Zeichick is technical director of IDG/Peterborough's CD-ROM Lab and Technical Editor of Portable Computer Review.

gest that you check with the manufacturer of the card you're interested in to confirm that they've certified it to be compatible with the 1000.

### Keyboards

OK, I'll admit it. The standard Tandy 1000 keyboard leaves more than a little to be desired. But so what if half the keys are in the wrong place and using it feels like typing into a wet sponge? IBM did finally have to follow Tandy's lead and put 12 function keys across the top row. Score one for Fort Worth!

The big problem is that some software won't work properly with the 1000's keyboards. People who use standard keyboards at work, then go home to their 1000s, are in serious danger of spraining their fingers in the transition.

Fortunately, the folks in Tandyland finally heard our pleas and released the **Universal Keyboard Adapter** (\$99.95), which installs easily in the keyboard socket on the 1000 and allows the use of virtually any standard PC keyboard.

Tandy, of course, released their own **Enhanced Keyboard** (\$99.95). Manufactured by Keytronic, this keyboard is a clone of the IBM enhanced keyboard included with all models of the Personal System/2 (PS/2), except that it lacks IBM's distinctive

keyclick and has a "mushier" touch.

If you don't want to spring for the Tandy adapter, you may want to consider Data-desk's replacement keyboard for the 1000. It has 101 keys (including 12 function keys), comes with its own adapter and useful utility software, and costs \$169.95. Unfortunately, we weren't able to get a Datadesk keyboard for review in time for this article.

If Tandy's keyboard doesn't do anything for you, you can try other PC keyboards. Genuine IBM XT or AT keyboards will work fine with the keyboard adapter.

### Speedup Boards

Those of you with original 4.77MHz 1000s and 1000As have probably looked at the SX and TX with envy. Certainly there are times when the faster speed of those machines would come in handy. Well it's now possible for 1000 owners to have the speed of an SX in their older machines. PC Technologies' **286 Express card** (\$399), marketed through Radio Shack, adds an 8MHz 80286 processor to the 1000, essentially doubling the processing speed of the 1000. If you need still more speed, the card has a socket for an 8MHz 80287 math coprocessor, to give your math-intensive programs a boost. Be forewarned: Some software is going to choke at the higher speed. You can toggle between 80286 mode

and 8088 mode, however, if your software prefers the slower speed.

If you're short of expansion slots or cash, you'll find another solution to the speed problem in DAS Technologies' **PC-Sprint 1000**. This \$99.95 add-in doesn't require an expansion slot; instead, it works by replacing your 4.77MHz 8088 with either an 8MHz 8088-2 or NEC V20 CPU, and replacing the computer's clock chip with a faster version. In a 1000, PC Sprint increases the speed of the machine to 7.16MHz, like the SX. In a 1000A, PC Sprint can increase the machine's speed to a blazing 9.54MHz. Because of hardware limitations in the 1000, the real-world speed increase is only about 50 percent, but for \$99.95 that speed increase is well worth it.

### Other Neat Stuff

In the "too good to ignore" category, we have the **Complete Answering Machine** (\$349) from Complete PC, which lets your computer answer the phone, give a message, and record an incoming voice message on its hard disk! It also functions as a complete voice mail system.

Another item in this category is Matthew Electronics' **Master/Chassis** (\$575). Though it looks like it might be a PC itself, it's really just a box that contains seven full-size (13-inch) expansion slots and a power



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## ADD-ONS

supply. By connecting this box to your 1000, you can use these slots for additional expansion. Unfortunately, it won't work with the EX or HX.

### In Conclusion...

The Tandy line of computers is really coming into its own. Because so many of you own 1000s, hardware manufacturers

must take your needs into account whenever they design a new PC-compatible product. You can expect to see more boards become available in sizes to fit your machines and more hardware and software to help you maximize your machines' capabilities. Where vendors aren't taking you into account, Tandy is trying to help by making each successive generation of 1000s

increasingly compatible with PC standards. But soon it may not matter at all; we 1000 owners have serious clout now, and the market's offerings are, at last, reflecting that. ■

*David S. Veale is a technical writer on the staff of 80 Micro.*

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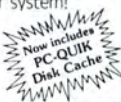
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# The Virtues Of a Virtual Disk

RAM disk cures the red-light blues.



by Jack Alban

**W**hen I first began using computers at work, I was amazed at their raw speed. But once the amazement faded, I sank into the red-light blues, a condition brought on by constant flashes of the disk access light. Every time the red light came on, my program slowed—often, the wait seemed eternal.

Speedy computing with VDisk.SYS, an MS-DOS utility that makes an area of memory behave like a disk drive, cured my red-light blues. Now I can copy my working

files and programs onto a virtual, or RAM disk, as it's more frequently called. Instead of accessing the disk drives, my program accesses memory and runs up to 10 times faster.

## Creating a RAM Disk

To create a RAM disk, you must first redo your Config.SYS file to include the statement:

```
DEVICE = VDISK.SYS [DISK SIZE]
[SECTOR SIZE] [DIRECTORY ENTRIES]
[/E].
```

An example will demonstrate how this works. If you already have a Config.SYS file on your disk, type:

```
COPY CONFIG.SYS + CON
```

If you don't, type:

```
COPY CON CONFIG.SYS
```

Now type:

```
DEVICE = VDISK.SYS 64 512 64
```

Press F6 and then the enter key.

The three parameters you've typed after VDisk.SYS define a RAM disk 64K in size, with 512 bytes in a disk sector, and allowance for 64 directory entries. Typing the /E tells your computer to place the RAM disk in extended memory (if you have it). This leaves room in regular memory to run your applications.

The size of your RAM disk can be anywhere from 2K up to 64K less than the full capacity of your system's memory. You have to be careful not to gobble up too much memory, or you won't have enough to run your program.

You can specify a disk sector size of 128, 256, or 512 bytes; the normal size of a disk sector is 512 bytes.

When deciding how many directory en-

---

*Tandy 1000, 256K, MSDOS 3.2 with VDisk.SYS. Available on the April-June Disk Series, on sale in May.*

---

## VIRTUAL DISK

**Figure 1. Autoexec.BAT makes sure that your files are saved.**

```
AUTOEXEC.BAT FOR START OF WORD PROCESSOR
PATH A:\;B:\;C:\
COPY C:\WORD.EXE
COPY C:\WORD.DOC
C:
COMMAND/C WORD
COPY *.* A:
```

**Figure 2. Rerword.BAT makes it easy to change application programs.**

```
REWORD.BAT FOR RESTART OF WORD PROCESSOR
DEL C:*. *
COPY C:\WORD.EXE
COPY C:\WORD.DOC
C:
COMMAND/C WORD
COPY *.* A:
```

**Figure 3. Frequently used applications can be handled in a separate directory.**

```
ALTERNATE AUTOEXEC.BAT FOR WORD PROCESSOR
CD WORDSDIR
COPY C:*. *
C:
COMMAND/C WORD
A:
COPY C:*. *
CD \
```

tries to allow, remember that some programs make backup copies of each file. In such a case, you'd need to specify double

the number of directory entries you would otherwise specify.

Make sure VDisk.SYS is on the same disk as your new Config.SYS file. Put the disk into drive A, and press control-alternate-delete simultaneously to reboot your system.

Something resembling the following should appear on your screen:

```
Tandy VDISK version 01.00 ram disk drive C
Disk buffer 64KB
Sector size 512
Directory entry 64
```

DOS assigns the next available drive letter to your RAM disk, so the drive letter may differ from the one I've shown here; the selection of the letter will depend on your system.

If you forget to include VDisk.SYS on your boot disk, you'll get the message "Bad or missing VDisk.SYS," and the RAM disk will not be created.

Use the Copy command to copy a medium-sized program to your RAM disk. Now type C: to change to the RAM drive and run your program. You'll be amazed at the speed!

If the red light is still coming on, you've

probably not copied all the necessary program or data files to the RAM disk.

### Caveat!

One caution: When you turn off your computer, the information you've recorded on your RAM disk will disappear. If you're working on something that you want to save, you'll have to remember to stop periodically and copy your files to your floppy or hard disk.

If you're using your word processor, you might think that your file is being saved by the word processor's Save command. But unless you remember to specify the drive letter for your floppy or hard drive in the Save command, your file will be saved to the RAM disk, and you'll lose your data when you turn off your machine.

A simple safeguard is to use a batch file with the DOS Shell command to start your word processor, as in the example shown in Figure 1.

In the example, Word.EXE and Word.DOC represent your word processing program and the files you're working on. By using the DOS Shell command (COMMAND/C), you return control to your

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batch file when you terminate your word processing program. The batch file makes sure that the files you're working on are saved back to disk.

Using a RAM disk can be messy and time-consuming unless you plan your work. If you're *not* careful, you could spend the rest of your life typing and retyping Config.SYS files.

I find the easiest arrangement is to define a single size RAM disk and use it for all applications. Each floppy disk then has two batch files on it, as in Figures 1 and 2.

I use a batch file similar to the one shown in Figure 1, in conjunction with a Config.SYS file, which boots up to a 290K RAM disk. This way, no matter what application I start with, I have an active RAM disk large enough to handle whatever application I want to use. It's a simple matter to use a batch file like the one in Figure 2 to change over to a new application.

Suppose a disk contains many files, some of which you need to run your application and others that you need merely to boot your program or for other limited purposes. Put the frequently used application files in a separate directory, and use a batch file such as the one shown in Figure 3. Though these organizational steps may seem trivial, they can prevent endless hassles with VDisk.SYS.

## Changing Disk Size

If you want to use different size RAM disks, you can write batch files to change the parameters of your RAM disk for each application.

Before you can use these batch files, however, you must create a program called STARTOVR.COM, which will restart your system automatically each time it is called. Use your Debug.COM program to do this. Type DEBUG to enter it, then type e0100 and press enter to begin data entry at

offset 0100.

A segment and offset address will appear on your screen followed by a pair of hexadecimal (hex) digits and a period. Beside the first hex pair, type the hex digits CD and press the space bar. Another hex pair will appear on your screen. Type 19. This time, press enter.

Now type u 0100 and press enter to see what you've done. After the numbers on the first new line, you should see INT 19; this tells you that you've just entered the machine code for Interrupt 19h (hex).

This interrupt is called the Bootstrap Loader. When called, it performs something like a soft restart of your computer, similar to pressing control-alternate-delete, but faster.

Type rcx and press enter to bring up the CX register. On your screen, you'll see:

```
CX 0000
:
```

Type the numeral 2 and press enter to indicate that you want your program to be 2 bytes long. Name your program by typing n STARTOVR.COM and pressing enter. Finally, type w and press enter again to write your program to disk.

To use Oneram.BAT, shown in Figure 4, type ONERAM followed by your three (or four) VDISK parameters and then press enter. The batch file adds a DEVICE = VDISK.SYS line to your existing Config.SYS file and reboots your system by calling STARTOVR.COM. It saves your original Config.SYS file as Config.OLD.

To eliminate any and all RAM disks, type NORAM without parameters. Noram.BAT, shown in Figure 5, uses your Config.OLD file to bring you back to your original situation—i.e., no RAM disk.

Type ADDRAM and your three parameters to add an additional RAM disk. Ad-

dram.BAT (Figure 6), creates a file, Config.NEW, with the parameters to be added to your RAM disk. This file is appended to your Config.SYS file. Your old RAM disks are not eliminated.

However, everything is restarted whenever you use any one of these batch files. So remember to save your important files before you use them.

If you've defined two or more RAM disks, and you want to go back to using only one, use Oneram.BAT again.

The first time you use Oneram.BAT or Addr.am.BAT (you may start with either), you should have a Config.SYS file of some sort already on your disk. That Config.SYS file shouldn't define any RAM disks; if it does, you won't be able to use Noram.BAT to eliminate all RAM disks.

Largely because of the way VDisk.SYS is structured, these batch files are forgiving. You can type any three parameters—even something like ADDRAM FROGS EAT FLIES or ADDRAM a b c, and VDisk.SYS will still create a RAM disk with default parameters.

You must, however, type at least three parameters with the command. Line 3 of Addr.am.BAT and Oneram.BAT uses a logical double negative to make sure three parameters have been added. In effect, it says that if parameters 1, 2, and 3, do not equal nothing (in other words, equal something), you can continue.

Once you get used to using VDisk.SYS, you'll be amazed at your Tandy 1000's rapid response—and never again endure the agonies of those red-light blues. ■

*Jack Alban is an insurance agent who has been an avid computer hobbyist since 1984. You can contact him by self-addressed, stamped envelope care of 80 Micro, 80 Elm St., Peterborough, NH 03458.*

**Figure 4. Oneram.BAT adds a Device = VDISK.SYS to Config.SYS file.**

```
ECHO OFF
CLS
IF NOT "%1"==" " IF NOT "%2"==" " IF NOT "%3"==" " GOTO ONERAM
ECHO PROPER FORMAT FOR THE COMMAND IS AS FOLLOWS---
ECHO          ONERAM (DISK SIZE) (SECTOR SIZE) (DIRECTORY ENTRIES) (/E)
ECHO          AT LEAST THE FIRST 3 PARAMETERS MUST BE INCLUDED IN COMMAND
GOTO END
:ONERAM
IF NOT EXIST CONFIG.OLD COPY CONFIG.SYS CONFIG.OLD > NUL
ECHO DEVICE=VDISK.SYS %1 %2 %3 %4 %5 > CONFIG.ONE
COPY CONFIG.ONE + CONFIG.OLD > NUL
DEL CONFIG.SYS
IF EXIST CONFIG.NEW DEL CONFIG.NEW
RENAME CONFIG.ONE CONFIG.SYS
STARTOVR
:END
```

**Figure 5. Noram.BAT uses existing Config.SYS file to return system to original status.**

```
ECHO OFF
CLS
COPY CONFIG.OLD CONFIG.SYS > NUL
DEL CONFIG.OLD
STARTOVR
```

**Figure 6. Addr.am.BAT creates an additional RAM disk.**

```
ECHO OFF
CLS
IF NOT "%1"==" " IF NOT "%2"==" " IF NOT "%3"==" " GOTO ADDRAM
ECHO PROPER FORMAT FOR THE COMMAND IS AS FOLLOWS---
ECHO          ADDRAM (DISK SIZE) (SECTOR SIZE) (DIRECTORY ENTRIES) (/E)
ECHO          AT LEAST THE FIRST 3 PARAMETERS MUST BE INCLUDED IN COMMAND
GOTO END
:ADDRAM
IF NOT EXIST CONFIG.OLD COPY CONFIG.SYS CONFIG.OLD > NUL
ECHO DEVICE=VDISK.SYS %1 %2 %3 %4 %5 > CONFIG.NEW
COPY CONFIG.SYS + CONFIG.NEW > NUL
DEL CONFIG.NEW
STARTOVR
:END
```

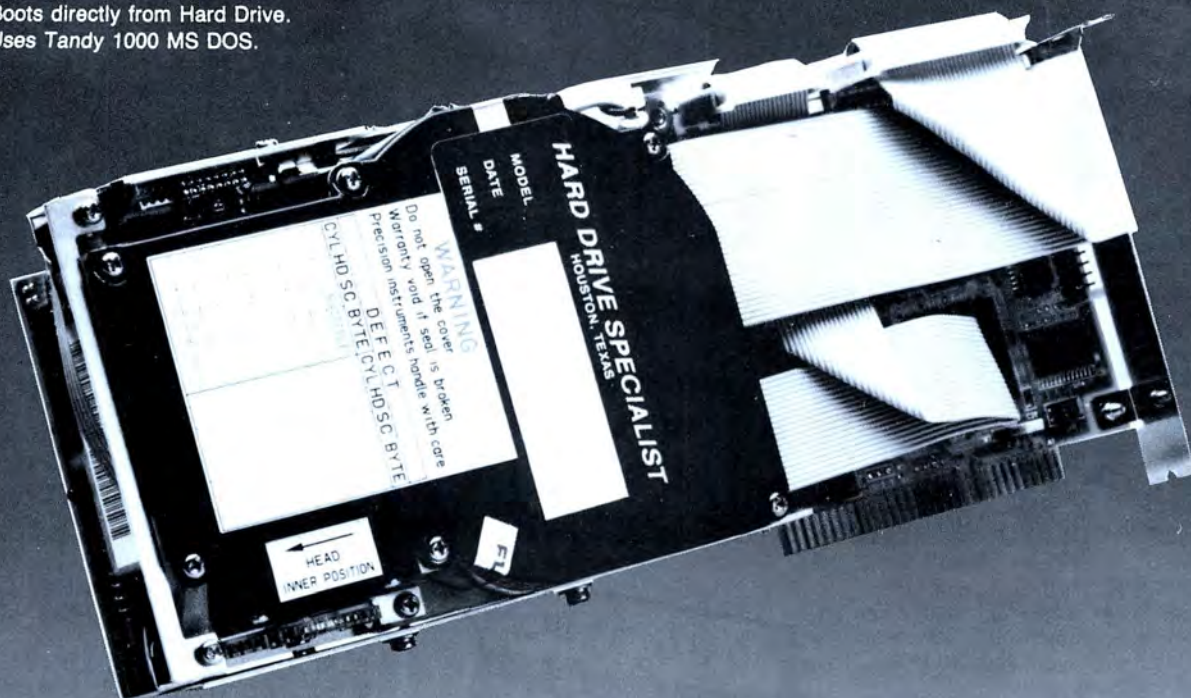


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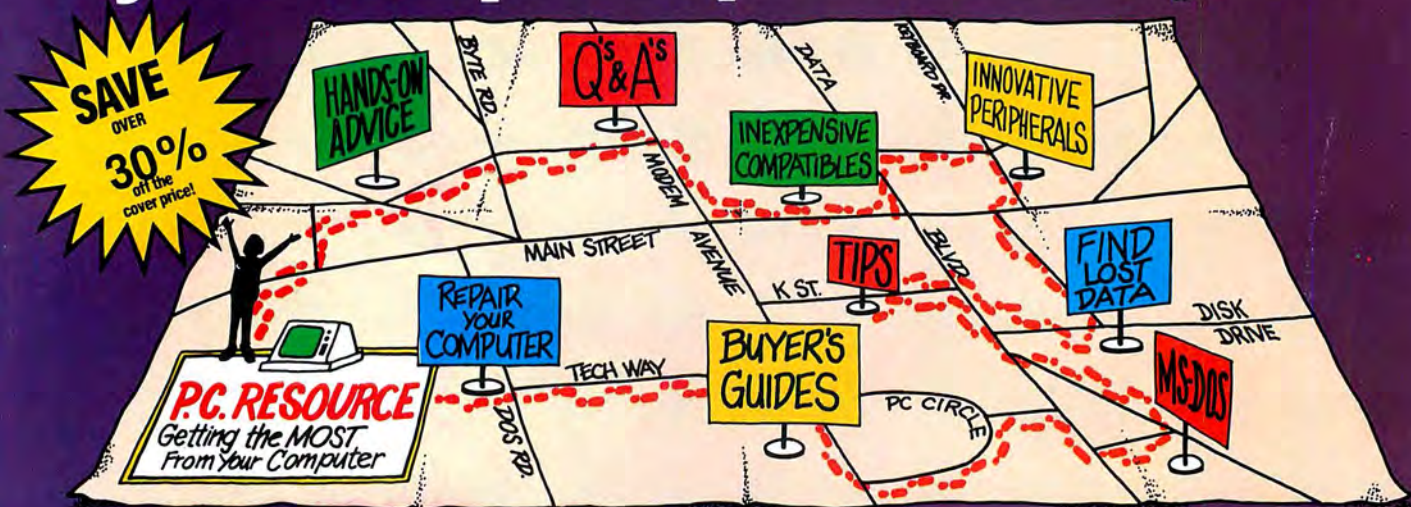
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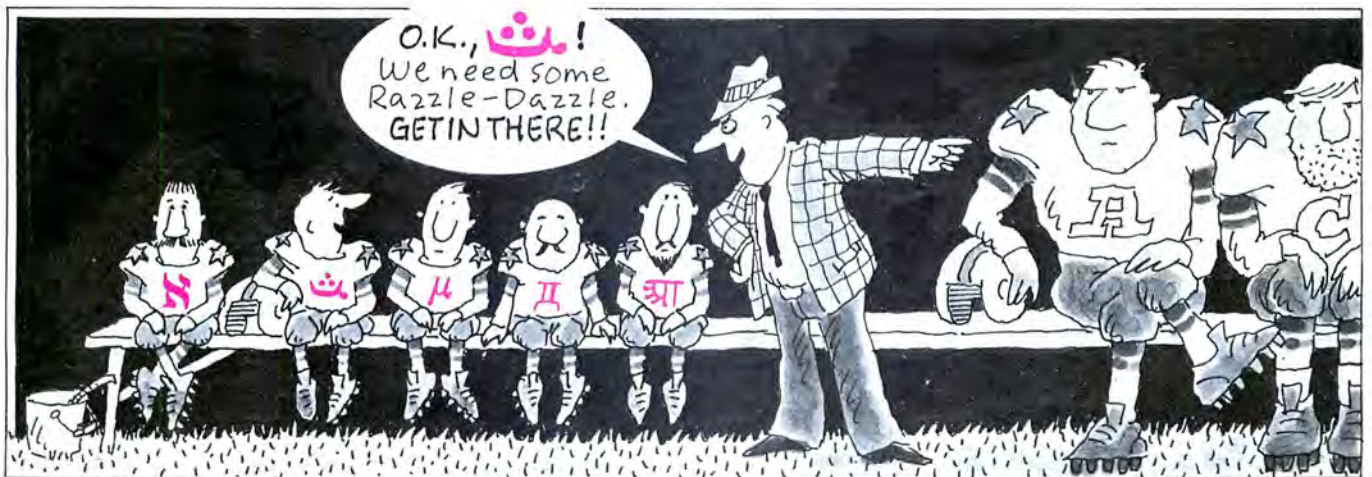
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You can use Custom.BAS, my character-set design utility, to design your own characters and print them in standard, condensed, compressed, or elongated mode. You can also use it to:

- create a set of characters that are different from those in the ASCII table;
- design new fonts;
- make different types of frames for your text;
- devise special characters for personalized letters and documents; and
- add ASCII characters that the DMP 105 and 106 aren't designed to accept.

## Preparing the System

To begin, you'll have to update your Config.SYS file by adding the instruction: `DEVICE = LPDRVR.SYS`.

You can do this with Edlin, the system editor. If you don't have a Config.SYS file, type the following at the DOS prompt:

```
COPY CON CONFIG.SYS  
DEVICE = LPDRVR.SYS
```

Then press control-Z or F6.

Appendix C of Tandy's *MS-DOS Reference Manual* explains Config.SYS in detail; you'll also find helpful information in Lewis Rosenfelder's article, "Demystifying Config.SYS" (February 1988, p. 34).

## Using the Program

Type the Program Listing into Basic (or load it from your 80 Micro Disk Series disk) and save it to disk. If you use a printer

---

*System Requirements: Tandy DMP 105 or 106 printer. Available on the April-June 1988 Disk Series, on sale in May.*

---

# CHARACTERS

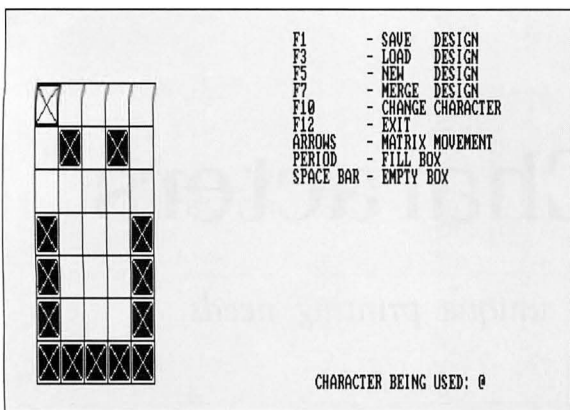


Photo. The main menu for creating custom character sets.

you'll specify the character you want to use. Then you can design a new character in a 7 by 5 matrix, pressing the cursor (arrow) keys to move about in the matrix, the period to fill a box, and the space bar to erase what you've put into a box. When you finish, be sure to save your work. Type your file name without an extension. The program will add an .SET extension for you.

After exiting from Option 1, select Option 2 to install your characters in the printer. Type the name of the file you've already saved and follow the instructions. You can exit the program and use the configuration you've just loaded with your word processor.

other than the DMP 105 or 106, you'll need to change the printer configuration procedure, which starts in line 1550. Check your printer's manual for the appropriate printer control codes. Then select Option

1, for creating the custom character sets (see Photo). Other options, controlled by function keys, let you merge designs, change characters, or begin new designs.

In the lower right corner of the screen,

You can contact Lorenzo Jiménez Briceño through 80 Micro, 80 Elm St., Peterborough, NH 03458.

## Program Listing. Design and print your own characters with Custom.BAS. See page 70 for information on using checksums.

```

10  /*****
20  /*****          RADIO SHACK'S DMP-105  *
30  /*****          CHARACTERS SET DESIGN UTILITY *
40  /*****          BY LORENZO JIMENEZ B.  *
50  /*****
60  /*****          VARIABLES DEFINITION
70  /
1206 80  CLEAR ,,32768!:CLS:KEY OFF:SCREEN 6
6579 90  FOR X = 1 TO 10:KEY X,":NEXT X
1765 100 DIM CHARSET%(255,7,5),CHARCONFIG%(255),CHARPRINT%(5)
110  /*****          ***** MAIN PROCEDURE
674 120 WHILE (CHOICES <> "9")
205 130   GOSUB 1810
108 140   GOSUB 2190
2807 150   IF CHOICES ="1" THEN GOSUB 190
3069 160   IF CHOICES ="2" THEN GOSUB 240
64 170 WEND
1228 180 CLS:SCREEN 0,0,0:SYSTEM
190  /*****          ***** CONFIGURATION PROCEDURE
113 200 GOSUB 2990
193 210 GOSUB 1940
574 220 GOSUB 440
246 230 RETURN
240  /*****          ***** PRINTER PROCEDURE
69 250 GOSUB 2140
187 260 GOSUB 1500
3911 270 LOCATE 1,1:PRINT"DIRECTORY: ";:FILES
116 280 GOSUB 2430
1384 290 IF FILES = ".SET" THEN RETURN
63 300 GOSUB 1270
9597 310 LOCATE 18,5:PRINT"SETTING UP THE DMP-105 WITH THE CHOSEN CHARACTER
SET.."
1560 320 LOCATE 19,5:PRINT"TURN ON YOUR PRINTER, THEN PRESS <ENTER>:"
3083 330 KEYS="":KEYBS=INKEYS:IF KEYS="" THEN 330
5301 340 LOCATE 20,5:PRINT"CONFIGURING THE SET"
5026 350 LOCATE 21,5:PRINT"ONE MOMENT, PLEASE...";
595 360 FOR VALUE% = 33 TO 255
2136 370   IF CHARCONFIG%(VALUE%) = 1 THEN GOSUB 1550
269 380 NEXT VALUE%
362 390 LPRINT
174 400 LOCATE 22,5:PRINT"PRINTER IS NOW CONFIGURED."
2345 410 LOCATE 23,5:PRINT"PRESS <ENTER> TO CONTINUE..."
3177 420 KEYS="":KEYBS=INKEYS:IF KEYS="" THEN 420
248 430 RETURN
440  /*****          ***** CONFIGURATION COMMANDS
327 450 LEAVE% = 0: POSX = 1: POSY = 1
54 460 GOSUB 2260
63 470 GOSUB 2580
701 480 WHILE LEAVE% = 0
734 490   DTS=INKEYS:IF DTS="" THEN 490
1038 500   K=ASC(RIGHT$(DTS,1))
817 510   IF K=72 THEN IF POSX<>1 THEN GOSUB 2630:POSX=POSX-1:GOSUB 258
443 520   IF K=80 THEN IF POSX<>7 THEN GOSUB 2630:POSX=POSX+1:GOSUB 258
8 530   IF K=75 THEN IF POSY<>1 THEN GOSUB 2630:POSY=POSY-1:GOSUB 258
188 540   IF K=77 THEN IF POSY<>5 THEN GOSUB 2630:POSY=POSY+1:GOSUB 258
368 550   IF K=59 THEN GOSUB 1410:GOSUB 650 'F1 SAVE
2802 560   IF K=61 THEN GOSUB 1500:GOSUB 720 'F3 LOAD
1384 570   IF K=63 THEN GOSUB 790 'F5 NEW
1182 580   IF K=65 THEN GOSUB 1410:GOSUB 720 'F7 MERGE
1005 590   IF K=68 THEN GOSUB 1410:GOSUB 860 'F10 CHANGE CHARACTER
1399 600   IF K=153 THEN GOSUB 930 'F12 EXIT CONFIGURATION
68 610   IF DTS = "." THEN GOSUB 1020 'FILL BOX
620   IF DTS = " " THEN GOSUB 1070 'EMPTY BOX
630 WEND
640 RETURN
650  /*****          ***** SAVE PROCEDURE
660 GOSUB 2430
124 670 IF FILES <> ".SET" THEN GOSUB 1120
1287 680 POSX = 1: POSY = 1
1915 690 GOSUB 2580
61 700 GOSUB 2360
82 710 RETURN
255 720  /*****          ***** LOAD PROCEDURE
131 730 GOSUB 2430
4193 740 IF FILES <> ".SET" THEN GOSUB 1270:GOSUB 1410:GOSUB 860
1922 750 POSX = 1: POSY = 1
68 760 GOSUB 2580
68 770 GOSUB 2360
241 780 RETURN
790  /*****          ***** NEW PROCEDURE
205 800 GOSUB 2710
203 810 GOSUB 1500
590 820 GOSUB 860
1927 830 POSX = 1: POSY = 1
73 840 GOSUB 2580
248 850 RETURN
860  /*****          ***** CHANGE CHARACTER
56 870 GOSUB 2260
189 880 GOSUB 2710
89 890 GOSUB 2780
1934 900 POSX = 1: POSY = 1
80 910 GOSUB 2580
255 920 RETURN
930  /*****          ***** EXIT PROCEDURE
940 LOCATE 23,43: PRINT " " '23 SPACES
950 LOCATE 20,43: PRINT "HAVE YOU ALREADY SAVED?:"
960 LOCATE 21,43: INPUT "WANT TO EXIT(Y/N)?:"ANSWS
970 IF ANSW$ = "Y" OR ANSW$ = "y" THEN LEAVE% = 1:RETURN
1060 LOCATE 20,43: PRINT " " '23 SPACES
2251 990 LOCATE 21,43: PRINT " " '23 SPACES
12 1000 GOSUB 2360
190 1010 RETURN
1020  /*****          ***** PROCEDURE FILL BOX
1020 COLR = 1:GOSUB 2680
441 1040 CHARSET%(ASCII%,POSX,POSY) = 1
1975 1050 GOSUB 2580
25 1060 RETURN
205 1070  /*****          ***** PROCEDURE EMPTY BOX
1070 COLR = 0:GOSUB 2680
443 1090 CHARSET%(ASCII%,POSX,POSY) = 0
1955 1100 GOSUB 2580
8 1110 RETURN
188 1120  /*****          ***** SAVE FILE PROCEDURE
368 1130 OPEN FILES FOR OUTPUT AS #1
48 1140 SWITCH% = 1:GOSUB 2860
863 1150 FOR A% = 1 TO 255
2802 1160   IF CHARCONFIG%(A%) = 1 THEN 1170 ELSE 1230

```

Listing continued



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# CHARACTERS

Listing continued

```

250 1170 WRITE #1,A%
2038 1180 FOR X = 1 TO 7
2567 1190 FOR Y = 1 TO 5
2893 1200 WRITE #1,CHARSET%(A%,X,Y)
1750 1210 NEXT Y
1490 1220 NEXT X
119 1230 NEXT A%
207 1240 GOSUB 2900
200 1250 CLOSE #1
201 1260 RETURN
1270 /***** LOAD FILE PROCEDURE
2344 1280 OPEN FILES FOR INPUT AS #1
27 1290 SWITCH% = 0:GOSUB 2860
1684 1300 WHILE NOT EOF(1)
3450 1310 INPUT #1,M%:CHARCONFIG%(M%) = 1
1422 1320 FOR A = 1 TO 7
1862 1330 FOR B = 1 TO 5
145 1340 INPUT #1,CHARSET%(M%,A,B)
1065 1350 NEXT B
899 1360 NEXT A
15 1370 WEND
188 1380 GOSUB 2900
210 1390 CLOSE #1
179 1400 RETURN
1410 /***** REVISING MATRIX PROCEDURE
343 1420 P% = 0
714 1430 FOR A% = 1 TO 7
905 1440 FOR B% = 1 TO 5
801 1450 IF CHARSET%(ASCII%,A%,B%) = 1 THEN P% = P% + 1
104 1460 NEXT B%
96 1470 NEXT A%
1464 1480 IF (P% <> 0) THEN CHARCONFIG%(ASCII%) = 1 ELSE CHARCONFIG%(ASCII%)
= 0
206 1490 RETURN
1500 /***** CLEAN MATRIX PROCEDURE
885 1510 FOR V% = 1 TO 255
2434 1520 CHARCONFIG%(V%) = 0
313 1530 NEXT V%
189 1540 RETURN
1550 /***** CONFIGURE PRINTER PROCEDURE
660 1560 FOR COL% = 1 TO 5
1724 1570 PRINTSTR$ = "":STRG$ = ""
1308 1580 FOR ROW% = 1 TO 7
603 1590 STRG$ = RIGHTS(STR$(CHARSET%(VALUE%,ROW%,COL%)),1)
1968 1600 PRINTSTR$ = PRINTSTR$ + STRG$
466 1610 NEXT ROW%
291 1620 VALPRINT% = VALSTR% = 0:NUMS = ""
775 1630 FOR S% = 7 TO 1 STEP -1
871 1640 NUMS = MIDS(PRINTSTR$,S%,1)
557 1650 IF NUMS = "1" THEN 1660 ELSE 1680
5734 1660 Z% = 1:FOR R = 1 TO S%-1:Z% = Z% * 2:NEXT R
2825 1670 VALSTR% = 1 * Z%
3426 1680 IF NUMS = "0" THEN VALSTR% = 0
3216 1690 VALPRINT% = VALPRINT% + VALSTR%
335 1700 NEXT S%
2878 1710 VALPRINT% = VALPRINT% + 128
2300 1720 CHARPRINT%(COL%) = VALPRINT%
66 1730 NEXT COL%
7027 1740 LPRINT CHR$(27);"W";CHR$(9);CHR$(VALUE%);CHR$(18);
667 1750 FOR COL% = 1 TO 5
2879 1760 LPRINT CHR$(CHARPRINT%(COL%));
78 1770 NEXT COL%
309 1780 LPRINT CHR$(128);CHR$(30)
200 1790 RETURN
1800 /***** SCREENS
1810 /***** MAIN MENU SCREEN
479 1820 CLS
788 1830 LINE(5,5)-(614,194),1,B
9781 1840 LOCATE 2,15:PRINT "DMP 105 FONT DESIGN -- (BY) LORENZO JIMENEZ B.
"
9548 1850 LOCATE 5,15:PRINT " CHARACTER SET GENERATOR FOR THE"
1287 1860 LOCATE 6,15:PRINT " RADIO SHACK'S DMP-105 PRINTER"
1774 1870 LINE(100,20)-(485,60),2,B
2033 1880 LOCATE 14,15:PRINT " 1- CREATE YOUR OWN CHARACTER SETS"
5471 1890 LOCATE 15,15:PRINT " 2- INSTALL YOUR SETS TO THE PRINTER"
1287 1900 LOCATE 16,15:PRINT " 9- EXIT TO DOS"
634 1910 LOCATE 18,15:PRINT " CHOICE SELECTED (1-9):"
1369 1920 LINE(100,90)-(485,160),2,B
178 1930 RETURN
1940 /***** CONFIGURATION SCREEN
472 1950 CLS
781 1960 LINE(5,5)-(614,194),1,B
1362 1970 LINE(40,40)-(165,180),3,B
1602 1980 FOR X = 40 TO 165 STEP 20
1465 1990 LINE(40,X)-(165,X),3
781 2000 NEXT X
1764 2010 FOR Y = 40 TO 165 STEP 25
334 2020 LINE(Y,40)-(Y,180),3
1738 2030 NEXT Y:A = 1
1624 2040 LOCATE 3,40:PRINT"F1 - SAVE DESIGN"
9 2050 LOCATE 4,40:PRINT"F3 - LOAD DESIGN"
2680 2060 LOCATE 5,40:PRINT"F5 - NEW DESIGN"
2342 2070 LOCATE 6,40:PRINT"F7 - MERGE DESIGN"
244 2080 LOCATE 7,40:PRINT"F10 - CHANGE CHARACTER"
1166 2090 LOCATE 8,40:PRINT"F12 - EXIT"
1534 2100 LOCATE 9,40:PRINT"ARROWS - MATRIX MOVEMENT"
447 2110 LOCATE 10,40:PRINT"PERIOD - FILL BOX"
6487 2120 LOCATE 11,40:PRINT"SPACE BAR - EMPTY BOX"
195 2130 RETURN
2140 /***** SETTING UP PRINTER SCREEN
455 2150 CLS
708 2160 LINE(0,125)-(639,199),2,B
207 2170 RETURN
2180 /***** I/O PROCEDURES
2190 /***** REQUEST CHOICE FOR MAIN MENU PROCEDURE
837 2200 GOOD% = 0
1600 2210 WHILE GOOD% = 0
2409 2220 CHOICES="":CHOICES=INKEYS:IF CHOICES = "" THEN 2220
6703 2230 IF CHOICES="1" OR CHOICES="2" OR CHOICES="9" THEN GOOD% = 1
23 2240 WEND
199 2250 RETURN
2260 /***** REQUEST CHARACTER CHANGE PROCEDURE
753 2270 ASCII% = 0
442 2280 LOCATE 23,43:PRINT " " '26 SPACES
273 2290 WHILE (ASCII% < 33) OR (ASCII% > 255)
1849 2300 LOCATE 20,43:PRINT "CHARACTER TO CONFIGURE: ";
583 2310 WORDS="":WORDS=INKEYS:IF WORDS="" THEN 2310
1453 2320 PRINT WORDS
390 2330 ASCII% = ASC(WORDS)
247 2340 LOCATE 20,43:PRINT " " '26 SPACES
24 2350 WEND
3380 2360 LOCATE 23,43:PRINT "CHARACTER BEING USED: ";WORDS
64 2370 GOSUB 2900
206 2380 RETURN
2390 /*****
459 2400 LOCATE 23,43:PRINT " " '34 SPACES
223 2410 LOCATE 23,43:PRINT "FILE NAME: ";FILES = ""
186 2420 RETURN
2430 /***** REQUEST FILE NAME PROCEDURE
114 2440 GOSUB 2400
2375 2450 SW% = 0:WHILE SW% = 0
3169 2460 XS="":XS=INKEYS:IF XS="" THEN 2460
1651 2470 J = ASC(RIGHTS(XS,1))
587 2480 IF J > 32 AND J < 127 THEN FILES=FILES+XS:LOCATE 23,55:PRINT
FILES;
1019 2490 IF J = 75 AND ASC(LEFTS(XS,1)) = 0 THEN GOSUB 2400
142 2500 IF LEN(FILES) > 20 THEN GOSUB 2400
1676 2510 IF J = 13 OR J = 27 THEN 2520 ELSE 2540
408 2520 LOCATE 23,43:PRINT " " '34 SP
ACES
1962 2530 FILES = FILES + ".SET":SW% = 1:GOTO 2550
1483 2540 IF J = 8 THEN GOSUB 2400
20 2550 WEND
196 2560 RETURN
2570 /***** GRAPHIC PROCEDURES
2580 /***** PAINT BOX POSITION PROCEDURE
4178 2590 LINE(41+(POSY-1)*25,41+(POSX-1)*20) - (39+(POSY*25),39+(POSX*2
0)),1,B
2275 2600 LINE(39+(POSY*25),39+(POSX*20) - (41+(POSY-1)*25,41+(POSX-1)*2
0)),1
1560 2610 LINE(39+(POSY*25),41+(POSX-1)*20) - (41+(POSY-1)*25,39+(POSX*2
0)),1
182 2620 RETURN
2630 /***** CLEAN BOX POSITION PROCEDURE
2850 2640 LINE(41+(POSY-1)*25,41+(POSX-1)*20) - (39+(POSY*25),39+(POSX*20)
),0,B
1131 2650 LINE(41+(POSY-1)*25,41+(POSX-1)*20) - (39+(POSY*25),39+(POSX*20)
),0
1469 2660 LINE(39+(POSY*25),41+(POSX-1)*20) - (41+(POSY-1)*25,39+(POSX*2
0)),0
197 2670 RETURN
2680 /***** FILL & EMPTY BOX POSITION PROCEDURE
120 2690 LINE(41+(POSY-1)*25,41+(POSX-1)*20) - (39+(POSY*25),39+(POSX*20)
),COLR,BF
174 2700 RETURN
2710 /***** CLEAN SCREEN MATRIX PROCEDURE
529 2720 FOR A = 1 TO 7
930 2730 FOR B = 1 TO 5
2226 2740 LINE(41+(B-1)*25,41+(A-1)*20) - (39+(B*25),39+(A*20)),0,
BF
688 2750 NEXT B
532 2760 NEXT A
195 2770 RETURN
2780 /***** FILL SCREEN MATRIX PROCEDURE
1570 2790 IF CHARCONFIG%(ASCII%) = 0 THEN RETURN
537 2800 FOR A = 1 TO 7
938 2810 FOR B = 1 TO 5
2820 2820 IF CHARSET%(ASCII%,A,B) = 1 THEN LINE(41+(B-1)*25,41+(A
-1)*20) - (39+(B*25),39+(A*20)),1,BF
680 2830 NEXT B
524 2840 NEXT A
187 2850 RETURN
2860 /***** FILE MESSAGE CONFIGURATIONS
6668 2870 IF SWITCH% = 0 THEN LOCATE 20,43:PRINT "LOADING THE SET..."
6968 2880 IF SWITCH% = 1 THEN LOCATE 20,43:PRINT "SAVING THE SET..."
199 2890 RETURN
2900 /***** MESSAGE PROCESS CONFIGURATED
5198 2910 IF SWITCH% = 0 THEN LOCATE 21,43:PRINT "CHARACTER SET LOADED"
7591 2920 IF SWITCH% = 1 THEN LOCATE 21,43:PRINT "CHARACTER SET SAVED"
30 2930 LOCATE 22,43:PRINT "PRESS <ENTER> TO CONTINUE"
581 2940 KEYBS="":KEYBS=INKEYS:IF KEYBS="" THEN 2940
160 2950 LOCATE 20,43:PRINT " " '20 SPACES
171 2960 LOCATE 21,43:PRINT " " '20 SPACES
1580 2970 LOCATE 22,43:PRINT " " '25 SPACES
194 2980 RETURN
2990 /***** CLEAN MATRIX PROCEDURE
1589 3000 IF CHARCONFIG%(ASCII%) = 1 THEN RETURN
677 3010 FOR Q = 1 TO 7
1212 3020 FOR W = 1 TO 5
601 3030 CHARSET%(ASCII%,Q,W) = 0
1015 3040 NEXT W
720 3050 NEXT Q
207 3060 RETURN

```

End

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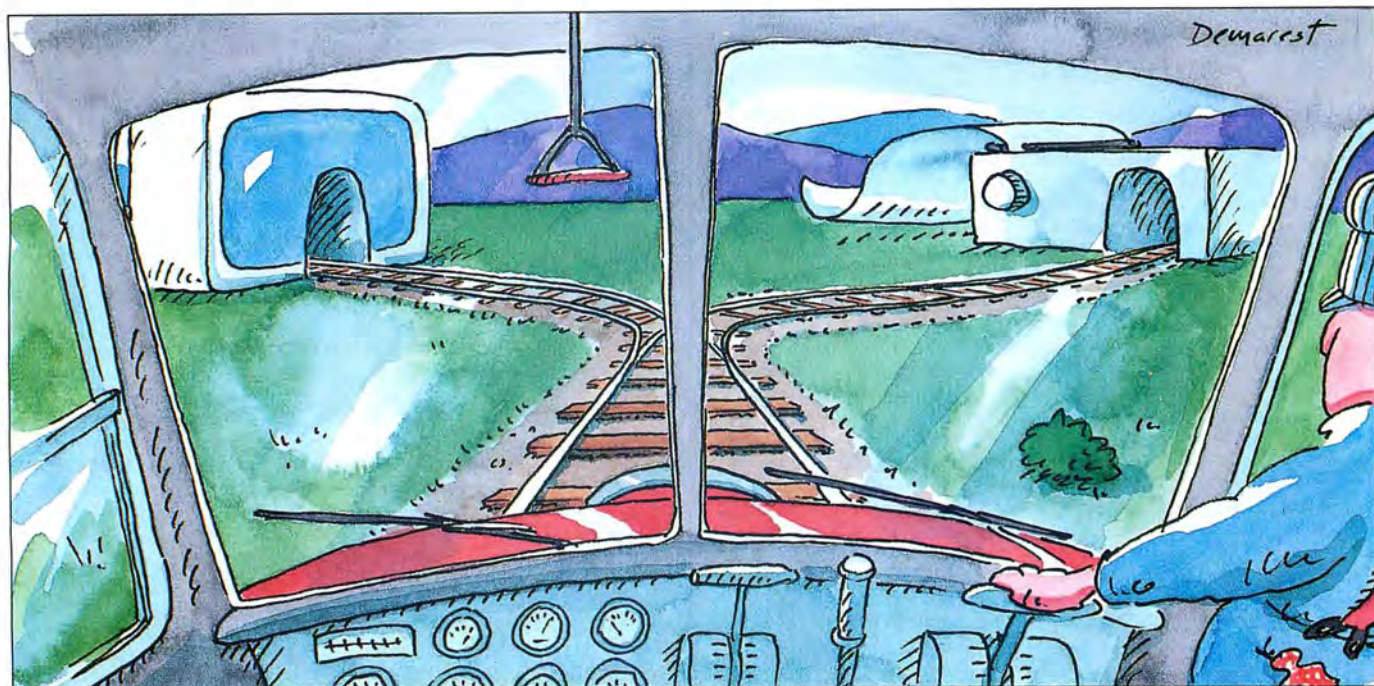
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# Video Hardcopy

*PRED: The utility that isn't afraid to tell your hardcopy where to go.*



## by Ed Clinton

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To run the program, enter PRED at the DOS prompt. Every press of the alternate-P key combination will toggle the printer redirection on and off until you reboot the machine. If you prefer, you can enter the

PRED command into the Autoexec.BAT file so that the utility runs automatically every time you boot your machine.

## Loose Ends

Be careful not to call the program twice in succession, or you'll waste memory. To remove the program from memory, warm boot the computer with a control-alternate-delete key combination or with the reset button (assuming, of course, that you have a Tandy 1000).

You might notice that the video service treats some characters differently than you might expect. Tabs, for instance, don't

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*System Requirements: Macroassembler and printer. Available on the April-June Disk Series, on sale in May 1988.*

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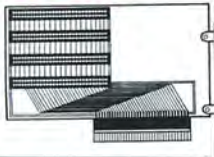
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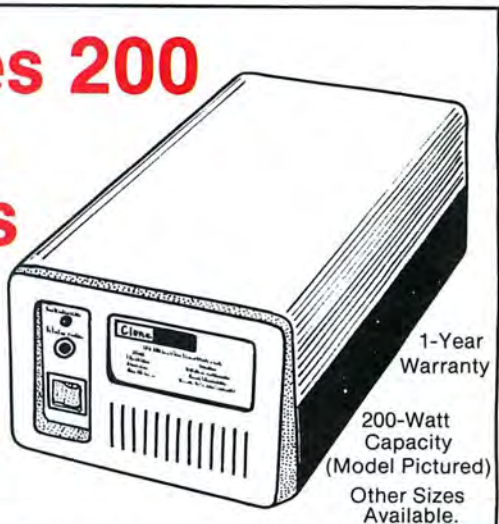
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(continued from page 25)

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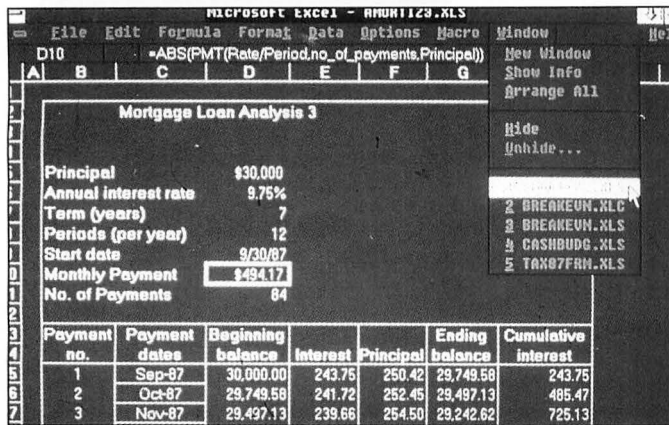
Intuit also sells the Quicken Transfer util-

ity (not tested) for \$19.95, which integrates Quicken data into Lotus's 1-2-3 or compatible spreadsheets and prepares reports using the spreadsheet program's abilities. It has a number of other features, including consolidating several Quicken accounts into one spreadsheet.

All told, Quicken is an impressive package and would be so at several times its modest price. By following the manual and using your imagination, you should be able to manage most small-business bookkeeping. The program is easy, fast, and apparently bug free. ■

**Quicken 2.0 requires MS-DOS 2.x, 256K, and two floppy-disk drives. Intuit, 540 University Ave., Palo Alto, CA 94301, 415-322-0590. \$49.95.**

## Excel: High-Powered Spreadsheet



**Photo. Excel uses Windows-type pull-down menus.**

### by David A. Williams

The first thing that impresses you about Excel is its size. From the packing box to the hardware required to the worksheet (256 columns by 16,384 rows), Excel is *big*. It's also big on performance: 131 worksheet functions, a rich programming language with 224 macro functions, superb charts, and the ability to generate attractive screen displays and printed output. Excel will run as a stand-alone program or under Windows 2.0 or Windows 386.

Aside from requiring a lot of memory, Excel's size also exacts a performance penalty. While recalc times are fast, Excel takes much longer to load and get started. It took 53 seconds to load the program and a small worksheet compared with seven seconds for Multiplan on an 8MHz AT.

It's a good idea to have some expanded or extended memory, since the program requires about 400K. With DOS 3.x and

the usual collection of memory-resident programs, you'll be lucky to have 100K left for your worksheet. Excel demands that the entire worksheet fit into memory. Though the program won't run on a Tandy 1000, you could use it on the TX with a hard drive, an EMS board, and an EGA card.

Besides letting you build larger worksheets, additional memory will make room for the included disk-cache program. This improves performance significantly, especially with slow hard disks. You'll also want a mouse. While not a requirement, using one will improve your efficiency.

You can easily make the switch from another spreadsheet. Excel can read Multiplan and 1-2-3 worksheets and chart files directly, and a separate utility helps translate 1-2-3 macros. I converted several Multiplan and 1-2-3 files, including one with a chart, and they all worked perfectly the first time.

### Learning Excel

The documentation consists of an 800-page, encyclopedia-style command reference manual and a 400-page manual covering functions and macros. While the encyclopedia format tends to fragment the information, the documentation treats several core topics in some depth and offers many examples. You also get a quick-reference booklet and a sampler describing many Excel applications.

While the documentation is imposing, Excel is not difficult to learn. If you have experience on other spreadsheets, you can quickly get up to speed on the basics and learn the more advanced features as you need them.

There is no printed tutorial, but there are two on-line learning aids that you can select from the Help menu. The first is a tutorial designed for first-time spreadsheet users. It's agonizingly slow—avoid it if you know anything about spreadsheets.

The second, called the Feature Guide, is an overview of Excel features that includes several exercises. I recommend this one, even if you're a spreadsheet expert. Strangely, both tutorials ignore the mouse, and the Feature Guide doesn't cover the database functions.

You can get other on-line help when you're building a worksheet. Pressing F1 pops up a help window with information on the current context. You can move and size this window so that you can view part of the underlying screen.

If you forget a function syntax, the Formula Paste Function command displays a list of functions, including any you've designed with macros. Pick one and Excel pastes it into your formula, complete with dummy arguments that you then replace with the real thing.

### The Windows Environment

Excel's most unusual feature is the graphics-mode screen display. It offers more attractive, easier-to-read worksheets and makes more data visible at one time. You can construct borders around cells or groups of cells, use different font styles and sizes, and use shading and color to create custom effects. Row heights vary automatically to accommodate larger font sizes, but you can also vary them manually to create special effects. It's possible, for example, to create realistic looking tax forms.

The other side of the coin, and the reason you need a fast processor, is that graphics displays eat up processing time. Excel's screen handling is sluggish on a Tandy 3000 HL at 8MHz, but not objectionably so. On a 4000, the display action is satisfactory.

You select commands from a Microsoft-style menu bar with pull-down menus. The menu bar is always visible, and if you're using a mouse, you can pull menus down directly. If you're using the keyboard, the alternate key (or the slash for 1-2-3 fans)

activates the menu bar. There are many keyboard shortcut keys if you care to remember them, but using a mouse is much easier. Commands requiring additional information display a pop-up dialog box.

You can load several files at once, depending on available memory, and view them in overlapping or tiled windows that you can move and size. If you usually have a certain collection of files open, you can save the combination as a "workspace" to simplify the loading process.

**Worksheet Features**

Excel has 21 number and date formats, but you can design more, including complex ones that combine numbers with text. If you enter a date in any generally accepted format, Excel recognizes it and converts it to the cell format. You can select non-contiguous blocks of cells and give them a common name or format.

Array formulas, which you only have to enter and store once, operate on blocks of data and return multiple values. If you forget a cell name, the Formula Paste Name command will display a list from which you can select one to paste into a formula.

You can link two or more Excel worksheets or, if you're running under Windows, link a worksheet to a document in another application. This lets you decompose a large, complex model into several compact worksheets. You don't need any special commands to create links; simply enter the name of the linked worksheet in your formula. Nor is it necessary to load all linked worksheets. If you know that a particular worksheet hasn't changed, you can tell Excel to use the last value imported from that sheet.

When you enter or change data on a worksheet, Excel recalculates only the affected cells. You can also switch to a manual mode that recalculates only on command.

Auditing is an important part of worksheet construction, especially if you're building large, complex models. With Excel, you can attach explanatory notes to any cell. Excel displays cells related to the current cell; that is, cells that feed values to it or accept values from it. Finally, you can easily review cells or ranges to discover blank cells, cells that differ from their neighbors, or cells that contain a particular formula.

When you're ready to print a worksheet, you can preview it to see exactly what you'll get. You need a graphics printer if you want the printed form to match the screen display, but a draft mode using the printer's native character font produces a quick hard copy. Excel will add headers and footers, and you can print in landscape mode, but this results in a lower resolution on some printers.

**Charting**

Drawing a chart is as easy as selecting a

range or ranges and pressing F11. Excel provides seven chart types and a total of 44 variations on those types. The default is a bar chart, but you can change that if you have another preference. You can plot data from more than one worksheet on a single chart, overlay one chart type on another, and print them without leaving Excel. Excel will produce some titles and legends automatically, but it is also easy to manually add titles, arrows, or other text.

**Excel as a Database**

Select a range, execute the Set Database command, and you have a database. Field names go in the top row and the records

in the rows under that. There are two ways you can work with a database. The easiest is with Excel's pop-up form. Field names and blanks to enter data are arrayed vertically next to a scroll bar. You can enter or delete records and search for records based on defined criteria. You can design your own custom forms that include explanatory text or labels or that only display certain fields.

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## REVIEWS

The other method is to use the several database commands provided. These generally duplicate the functions of the form, but you can extract records from the database that meet a specified criteria and place them in another range. There is also a collection of database functions that calculate statistics on the database, but they are slow compared with the equivalent standard functions.

I can hardly do justice to Excel's macro capability. This is a full-blown programming language that goes far beyond what you can do with the Excel keyboard commands. An application developer's dream, this language can modify menus and dialog boxes, create new ones, add powerful new commands, call external programs written in other languages, and create training aids or demos.

There are two basic types of macros. Command macros execute a series of commands much as you would do from the keyboard, but they can also include macro commands not available from the keyboard. Macro commands include many of

the constructs found in other programming languages: jumps, branches, loops, and sub-routines. You can execute command macros with the Macro Run command or you can assign control-key combinations to them.

Function macros, the second type, compute and return a value. You use them in formulas as you would the built-in functions. Both types of macros are stored on special worksheets where they can be used by any regular worksheet.

You can create simple command macros with the Macro Recorder. When you start the recorder, Excel asks for a name and a shortcut key (a control-key combination). At this point you can choose absolute or relative recording. The latter references all actions to the active cell when the macro

is invoked. Succeeding key strokes are recorded until you turn off the recorder. More complex macros have to be written out manually. In either case, you can edit the result.

### The Bottom Line

Excel is not for the casual spreadsheet user, but if you have sophisticated needs and hardware to match, Excel is well worth considering. Its open architecture and flexible programming environment will let it grow with your needs. ■

**Excel runs on a Tandy 3000/4000 and requires 640K, a hard disk with at least 5MB of free space, and a graphics card. Microsoft Corp., 16011 N.E. 36th Way, Redmond, WA 98073, 206-882-8080. \$495.**

## Hardly Hard-Disk Management

by David A. Williams

**W**hich of the following statements about hard disks is true?

- The data density on a hard disk is uniform across all tracks.
- When DOS looks for a place on the disk to store a new file, it starts wherever the heads happen to be positioned.
- You'll never see any files smaller than 4K when you look at an XT directory listing.
- The FAT (file allocation table) contains a series of 2-byte addresses.
- The command SYS C: or FORMAT C: /S will copy all DOS utility files to your hard disk.
- None of the above.

If you chose f, you know more about hard disks than do the authors of *Hard Disk Management*. What could otherwise be a useful book for the novice is marred by these and other errors and misleading statements.

Under the category of "expert tips you won't find in the DOS manual" is a technique of merging several word-processing files into one with the DOS Copy command. One reason this isn't in the DOS manual is that it doesn't work, except with ASCII files, which today's word processors rarely use.

The book begins with an overview of disk-storage technology and the mechanics of preparing a hard disk for use. Don't expect to find detailed information on how to read FATs, directory formats, or the data contained in the boot sector. What you'll find are some basic definitions and an interesting description of disk-drive mechanics.

Next, the book launches into detailed coverage of DOS file-handling commands, subdirectories, and batch-file programming that fills one third of the book. Like other books of this kind, the descriptions are

more readable than are those in the DOS manual. The authors have oriented most of the material toward the special problems of hard-disk users. Two chapters describe how to construct a batch-file menu system. One chapter describes commercial and shareware DOS-shell programs.

The next section of the book covers hard-disk security. After describing the DOS Backup and XCopy commands, the authors discuss several commercial backup programs, tape drives, and removable disk systems. Then, a chapter on password security describes two largely ineffectual password programs: one a batch file, the other written in Basic. Both are easily circumvented by booting up with a DOS disk in drive A. A discussion of hidden files and data encryption completes this section.

In the final section, devoted to disk optimization, the authors discuss file fragmentation and its effects, but tend to overplay the benefits of defragmenting your disk. Much space is given to describing one of the lesser known disk-utility packages, but other products, including some shareware programs, are mentioned. There is a brief description of RAM disks and disk-cache utilities.

*Hard Disk Management* is well organized and contains much information of value to novice computer users. Unfortunately, the numerous errors will ultimately confuse them. There is little of interest here for those knowledgeable enough to separate the good data from the bad. ■

***Hard Disk Management with MS-DOS and PC-DOS*, by Dan Gookin and Andy Townsend, Tab Books Inc., P.O. Box 40, Blue Ridge Summit, PA 17214, 717-794-2191. \$26.95 hardbound, \$18.95 paperback.**

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# Windows to Information Management

by Harry Green

Info-XL is one of a handful of programs designed to bring order from the often chaotic task of information management. It has some of the characteristics of a word processor, a database manager, and an electronic calendar. The program is divided into six windows, five of which are displayed simultaneously (see the Photo).

The first window, Manager, at the top half of the screen, functions as an outline processor. You store information under headings and subheadings, which can shrink and expand according to the amount of detail displayed. A few keystrokes let you link information in the Manager window to information in the other windows.

The Records window, just below Manager, is analogous to a more conventional database manager. It stores information in forms and links it to the third window, Comments. This window, to the right of Records, is essentially a word processor and can store up to 10,000 characters of free-form information.

Comments provides conventional word processing features such as word wrap and cut and paste. Although the window is tiny, you can expand each of the windows to full-screen size or hide them from view.

The bottom third of the screen contains two specialized windows, Daily Schedule and Monthly Calendar. If you don't need these, just crowd them off the display. The Manager's date-stamp feature automatically updates Daily Schedule.

Paging through the Calendar automatically displays the events scheduled for the day, which makes Info-XL a reasonably flexible project-management tool, lacking only some of the charting and reporting details of specialized project-management programs.

The sixth window is Search, which resides in the background until you call it up. It lets you search for any character string in the Manager, Records, and Comment windows. "And" and "or" operators can limit the scope of the search. When the search is executed the window disappears.

You could use Info-XL to store abstracts of technical articles, for example. The Manager window could store the major topics, Records could contain such details as the publication name, date, page, and article title, and the Comments window could contain a synopsis of the article. Then you could use Search to look for key words, titles, and journal names, to name a few.

## Specialized Applications

The applications for which Info-XL is suited are somewhat specialized. Visualize an application that requires collecting information, different elements of which are in outline, free-text, and database form. For this application, Info-XL works nicely. If you also need a running diary or list of things to do on future dates, those func-

tions are a bonus, but Info-XL is not a universal information manager. I tried using it to organize information I was collecting for a seminar and found that the outline option in my word processor was easier to use.

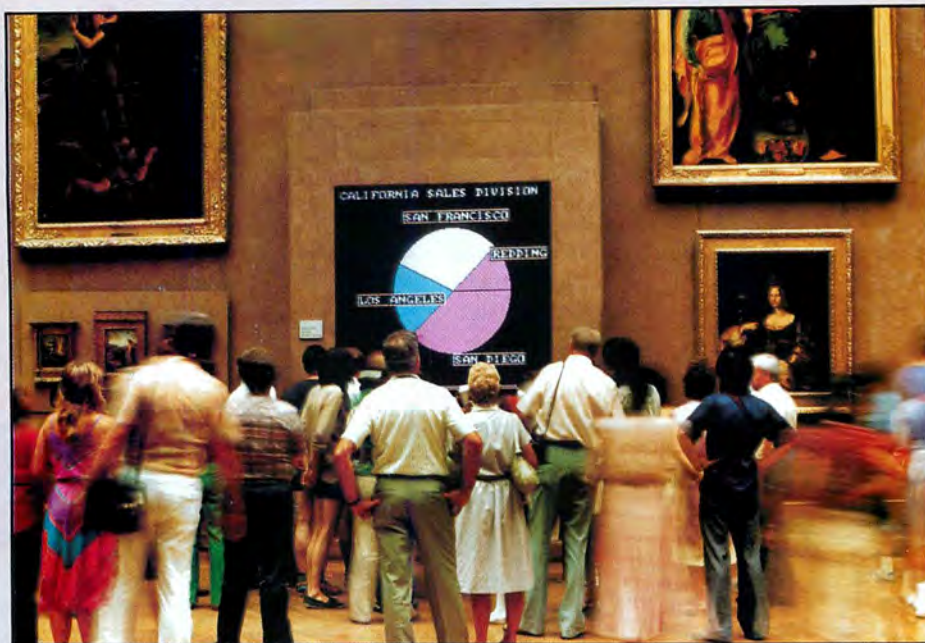
If your information can be arranged in database form, you'll find that Info-XL

(continued on page 66)

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**A. Which Tandy MS-DOS computer(s) do you use most? Check all that apply.**

1.  4000      4.  1200      7.  1000 TX  
 2.  3000 HD/HL      5.  1000 EX/SX      8.  1000  
 3.  1400 LT      6.  1000 HX      9.  Other MS-DOS

**B. Where do you use your Tandy MS-DOS computer? Check all that apply.**

1.  At home for business      4.  At work for business  
 2.  At home for recreation      5.  At school  
 3.  At home for education

**C. How many MS-DOS computers do you plan to buy in the next 12 months?**

1.  One      3.  5-10      5.  21-50  
 2.  2-4      4.  11-20      6.  more than 50

**D. Which types of MS-DOS products are you considering purchasing during the next 12 months? Check all that apply.**

1.  Entertainment software      5.  Printers  
 2.  Word processing software      6.  Monitors  
 3.  Data-base/business software      7.  Modems  
 4.  Graphics or speed-up boards      8.  Other peripherals

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1.  Up to \$500      4.  \$2500-\$5000  
 2.  \$500-999      5.  More than \$5000  
 3.  \$1000-\$2499

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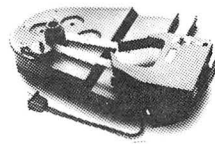
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## REVIEWS

(continued from page 63)

lacks the selection and arithmetic features that such applications usually require. But a lot of other information doesn't lend itself to the rigid structure of a database. Info-XL's outstanding feature is its ability to simultaneously display all the parts of the primary information, which can include more structured data and free-form text.

You can easily adapt Info-XL to maintain a disparate collection of records. The tutorial application shows the records of a vineyard owner and contains records of his customers, suppliers, competitors, family, equipment inventory, and business plans. The tutorial does an excellent job of demonstrating Info-XL's flexibility. You could easily adapt the program to records of projects, inventories, clients, and other such collections of information that clutter the desk and defy easy retrieval.

### Summary

With a few hours of practice, you'll master the program's concepts and learn its function-key operations. Pull-down menus help when you can't remember the key-

board command. The manual is short but includes plenty of illustrations, an effective index, and a useful glossary.

Info-XL isn't suited for all information-management tasks, but if you have the right application, you'll find it an easy and

effective way to organize and retrieve information. ■

**Info-XL 1.0 requires 384K and two floppy-disk drives, and DOS 2.x. Valor Software Corp., 1700 Don Ave., San Jose, CA 95124, 408-978-3044. \$295.**

## Super Modem

by David S. Veale

**T**he Supramodem 2400 external, auto-answer, auto-dial modem looks a lot like a Hayes 2400. Its 1- by 4 $\frac{1}{8}$ - by 6 $\frac{1}{2}$ -inch size tempts me to call it cute. The rear panel contains the ac adapter connector, a female DB-25/RS-232C, and two phone jacks. The speaker is on the bottom of the unit; you control its volume via software commands.

The push-button on/off switch and status-indicator lights are on the front panel. The on/off switch seems a little flimsy for day-to-day use, but it held up fine for the review.

The letters of Supramodem's high-speed, auto-answer, carrier-detect, off-hook, receive-data, send-data, terminal-ready, and

modem-ready indicators light to show that a mode is active. A translucent plastic strip covers the lights, and the one on my review unit was placed off center. It doesn't affect the modem's operation, but it doesn't look good.

Installation is simple. The Supramodem comes with the phone cord you plug into a modular wall jack and a power adapter. You supply the serial cable that connects the modem's RS-232 port to the serial port on your computer.

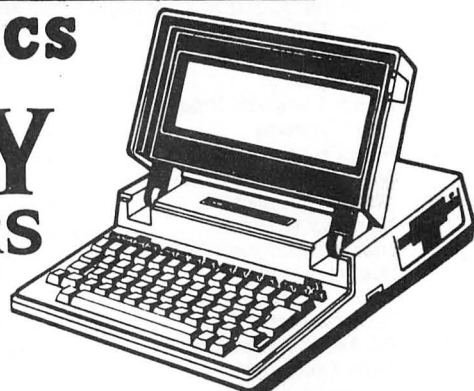
The Hayes AT-compatible Supramodem worked well with the Host, Qmodem, One to One, and Hayes Smartcom II communications software. At 2400 baud, the modem was more sensitive to phone-line noise. There were no problems when the connection was good, but I got some garbage in messages from distant boards when the



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**The Supramodem 300/1200/2400-baud Hayes-compatible modem.**

connection was less than crystal clear.

Once the modem thought the host had disconnected me while downloading a file; however, the line was noisy and the BBS was 3,000 miles away. I never had a problem communicating with CompuServe at 2400 baud.

An EPROM (erasable, programmable,

read-only memory) in the Supramodem stores the configuration you use and a phone number, so they're automatically set when you turn the modem on.

**Summary**

If you need to transmit important information over long distances, and the phone

lines in your area are especially noisy, the Supramodem probably isn't for you. Its noise control just doesn't measure up to more expensive modems like the Hayes and Universal Data Systems.

For the money, however, the Supramodem performed well at all speeds and is a good buy for the home or small-business user who needs to connect with BBSes, local offices, and data services. Its compatibility with Bell 103/212A standards, as well as CCITT V.22 and CCITT V.22 bis protocols make its performance more than satisfactory. ■

**Supramodem 2400.** Supra Corp., 1133 Commercial Way, Albany, OR 97321, 503-967-9075. \$179.95

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TARGET SELLING PRICE =	4.875	
LOWER LIMIT =	3.500	
PRICE CHANGE REQD =	0.875	
NET PROFIT AT TARGET =	328.50	<b>NIBBLE</b>
COMMISSION =	109.00	
TOTAL INVESTMENT =	2109.00	
% ROI =	15.6%	
LOSS AT LOW LIMIT =	-348.00	
<p>&lt;M&gt;ORE    &lt;X&gt;IT    &lt;C&gt;HANGE TYPE</p>		

Photo. The Nibble Theory program tells you how many shares of a stock to buy, calculates the high and low selling limits, and estimates the brokerage fee.

**by Harry Green**

The Nibble Theory isn't one of those get-rich-quick schemes. On the contrary, it's a make-money-slowly method designed to help investors turn a few thousand dollars into steady, if unspectacular, earnings. All it takes—in addition to the initial investment and the price of the program—is a few hours of your time once or twice a week . . . assuming, of course, that the system works as well as the author says it does.

**The Theory**

The Nibble Theory is disarmingly simple.

It's based on the hypothesis that when low-priced stocks take an unexplainable drop of 15 percent or more in a trading day, they normally recover more than 80 percent of the drop in the next few days.

To play, you need a newspaper that reports the largest percentage losers on the New York and American stock exchanges. Then you pick the stocks that sell for \$5 or less that have dropped 15 percent or more. The theory might work on the over-the-counter market, but program author Bob Zeiss says he hasn't tested that.

After you've picked stocks, you must move quickly to learn whether there is some underlying weakness that caused the

drop. If so, avoid the stock, because it might not rebound. If the company looks healthy, you can use the Nibble Theory software to calculate the number of shares to purchase and the recommended high and low selling prices.

The Nibble Theory recommends that you purchase about \$2,000 worth of a stock in round lot numbers (multiples of 100 shares). Place an order for the recommended number of shares at the previous

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## REVIEWS

day's closing price when your broker opens for business the next morning. The theory states emphatically that you shouldn't purchase at the market price, because you might catch the stock after it has already rebounded.

If the trade is completed, place sell orders at prices the software recommends. The upper limit is approximately 80 percent of the previous day's drop, and the lower limit is a stop-loss order that automatically sells the stock if it drops an additional 13-15 percent. If the stock behaves according to the theory, you'll make a comfortable but modest gain.

### The Program

The Nibble Theory software is adequate but much less sophisticated than most commercial programs, even those that sell for less than \$50. The program provides four primary functions: testing for potential profit, maintaining portfolio records, and maintaining records of purchases and sales.

To calculate the purchase's potential profit, enter the closing price of the stock

and the amount by which it dropped during the last trading session. The program tells you how many shares to buy, calculates the high and low selling limits, and estimates the brokerage fee. You can adjust the fee to approximate the actual commissions your broker charges.

The Photo shows the screen that makes these calculations. There's no place to enter the name of the stock and no way to print the results. Since this is the heart of the transaction, you must either copy the information by hand or do a print screen.

The purchase-transaction log works reasonably well, but you can't enter your starting cash balance. Therefore, each purchase ends with a warning that you have a negative balance. You can't correct any errors you make in the sales-transaction log, and there's no way to indicate that you've sold other than all the shares in the portfolio.

The software does nothing you couldn't do more elegantly and easily with a spreadsheet, if you know what factors the theory uses. These aren't difficult to deduce from the program, so you might want to convert it to a spreadsheet.

### Does It Work?

But what of the theory itself? Does it really work? The answer is a qualified "yes." I followed the author's suggestion to dry run the program to see how well it per-

formed before committing funds, but I didn't do the research to determine why the stock took its initial drop. If I had, I might not have made some of the purchases.

Several of the stocks dropped sharply on one day but bounced back within a day or two. Two stocks didn't rebound by the end of the trial, and one had dropped enough to trigger the stop-loss order. The remainder made a profit of about \$1,500—not bad, especially since I skimmed on the homework.

According to my tests, the Nibble Theory recommended a sell level that was usually below the day's high for that stock. Therefore, my profits were less than they could have been. But the theory is designed to yield small, consistent gains. Holding out might yield bigger profits, but it would also increase your chances for bigger losses.

### The Bottom Line

If playing the market is your game, the Nibble Theory is worth investigating. It's an interesting hypothesis, and, though it won't make you rich, it should make some improvement in your bank account. ■

**The Nibble Theory 2.1. Z Systems Inc., 3657 Hi Dale, Lake Orion, MI 48035, 313-391-1369. \$59.95 (source code is available for \$195).**

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**MICRO TRENDS**

(continued from page 16)

one reason that no matter how fervently Tandy issues denials, no one seems to believe it doesn't have a PS/2 waiting in the wings. Don't be surprised if by the time you read this, Tandy is offering PS/2 clones.

According to Juge, the idea of Tandy custom-building PS/2 clones just to show them off is silly. The last time Tandy hand-built a cabinet for a computer was for the first Model IIs, and the project cost about \$10,000 for just a couple of them. The company has better ways to spend money than on 100 hand-tooled computers, he said. But Juge wouldn't deny that somewhere in Tandy's Research and Development offices a PS/2 clone might be up and running. Roach has said that anyone who's a serious player in the computer business has to have a PS/2 strategy, and it's hard to have a strategy until you've figured out what's involved in building the machine. The bottom line is this: right now there isn't any software or hardware to take advantage of the features of the PS/2 and its microchannel architecture. When the software finally appears that makes the PS/2 a must buy, Tandy will be ready to roll with its own version of the machine.

**A**nother rumor about a new Tandy computer is nearly as persistent as the one about a PS/2 clone. This rumor has Tandy coming out with a clone of the Apple Macintosh. Tandy executives deny the rumor—only this time, with a straight face. Juge says that for one thing, creating a Macintosh clone would involve Tandy's engineers learning a whole new ball game. Programmers outside Tandy confirm this. One said that engineering and programming for the Macintosh is a nightmare for someone used to MS-DOS standards. (Of course, there *was* that help-wanted ad that Tandy placed for programmer with Apple experience....)

Add the fact that Apple is more protective of its proprietary rights than IBM has ever been, and the idea of anyone coming out with a MacClone is as unlikely as it is intriguing.

**I**f you've been thinking about upgrading the amount of memory in your computer, do it now. Tandy officials say the cost of memory is already going up. Because

Tandy buys so many memory chips, it gets as good a volume discount as there is available, but prices may still go up 40-60 percent. That's still not as bad as the 100-300 percent price hikes the smaller companies face.

In an industry where the price of everything seems to drop weekly, a price increase is a surprise. What's behind it is the classic supply-and-demand cycle you learned about in Economics 101. When the demand is high, everyone starts producing chips until they flood the market; then the price drops as manufacturers scramble to reduce factory inventory. Companies stop making the chips because they aren't profitable, and eventually, the supply dries up, the chips become valuable again, the price increases, making it a hot business again, and the game starts all over again.

The waning strength of the U.S. dollar might have something to do with the higher prices, along with U.S. pressure on Japanese chip manufacturers to cut down on exports to this country. But it comes down to this: if you want to upgrade, do it fast or get ready to pay more. Otherwise, you'll have to wait a few years for the cycle to reverse itself. ■

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TRSCROSS cannot convert machine language programs, (UCMD files) - nor can any other conversion product. Tandy 1000 (all models) requires more than 128K mem. BASIC conversion does not convert PEEKS, POKES or graphics



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# How to Use 80 Micro Program Listings

Most lines in 80 Micro's Basic program listings begin with a checksum value, a number representing the sum of the ASCII values of all characters and spaces in the line. (Lines that begin with apostrophes don't have checksum values. Remarks at the end of a line of code are not included in the checksum values.)

Like the previous Checksum program, the new Checksum program (see Program Listing) lets you confirm the accuracy of your typing line by line. But unlike the earlier program, it uses weighted checksum values to identify transpositions. Example: With the old program, typing 168 would yield the same checksum value for that line as 186, and no error would be evident. With the new program, the error will be obvious.

All programs published in previous issues of 80 Micro use the old Checksum program; all programs published in this and forthcoming issues will appear with weighted values calculated to work with the new Checksum program.

To enter a program, load and run Checksum. Enter the program exactly as listed, omitting the checksum number and bar at the beginning of the line. Omit the indentations when program lines continue to a second or third magazine line. Do not type in comments at the end of a line. When you press enter, the line will be redisplayed with a checksum.

Compare this number with the one found in 80 Micro. If they are not the same, you made a typing error. Use the arrow keys to move the cursor to the first space of the line just typed. Press the delete key seven times to delete the checksum. Move the cursor to the error, and correct it by typing over the error or use the insert and delete keys to add or delete information. Press enter and recheck the checksum number.

After you enter the entire program, save it to disk with the Save command.

Checksum simulates Save, List, LList, Load, Files, and New commands and adds three new commands: Basic, Check, and LCheck. The Basic command exits the Checksum program back to Basic, leaving Checksum in memory. Check and LCheck work like List and LList, except they show the checksums along with the listing.

Checksum saves the new program as an ASCII file. By saving the program again with Basic, you shorten it on disk and make it load faster, but you can no longer edit it with Checksum unless you convert it back to an ASCII file by using the SAVE"file name", A command in Basic.

## Program Listing. Checksum.

```

18 'Checksum by Randall D. Hamilton, enhanced by Donald Williams
20 DIM L$(500),LNUM(500);KEY OFF;CLS:MAX=0:LNUM(0)=65536:CLS
572 25 DEF FNSP(AS)=LEF$(AS,1)+" ":DEF FNRM$(AS)=MID$(AS,2)
773 30 DEF SEG=4840:N=PEEK(484A)
4895 40 PRINT:PRINT"Checksum Program Ready."
11831 50 LINE INPUT L$:Y=CSRLIN-INT(LEN(L$)/M)-1:LOCATE Y,1
12613 60 DEF SEG=0:POKE 1850,30:POKE 1852,34:POKE 1854,0:POKE 1855,79:POKE 18
56,13:POKE 1857,20:LINE INPUT L$:DEF SEG:IF L$="" THEN 50
1861 70 DS=L$:GOSUB 800:LS=DS
2851 80 IF ASC(L$)>57 OR ASC(L$)<48 THEN 210
2298 90 BL=INSTR(L$," ")IF BL=0 THEN BL$=L$:GOTO 180 ELSE BL$=LEF$(L$,BL-1)
1132 100 LNUM=VAL(BL$):TEXTS=MID$(L$,LEN(STR$(LNUM))+1)
2620 110 IF LNUM>655291 THEN PRINT"Line number greater than 65529":GOTO 30
3746 120 IF TEXTS="" THEN GOSUB 540:IF LNUM=LNUM(P) THEN GOSUB 550:GOTO 50 E
LSE 50
216 130 WORKS=TEXTS
365 140 DS=WORKS:GOSUB 800:WORKS=DS
190 150 IF LEF$(WORKS,1)="" THEN AS="" | ":LOCATE Y,1:GOTO 180
1513 160 GOSUB 900:LOCATE Y,1
2022 170 AS=".....":RSET AS=STR$(CKSUM)+" | "
592 180 PRINT AS+LS
2216 190 GOSUB 540:IF LNUM(P)=LNUM THEN L$(P)=TEXTS:GOTO 50
136 200 GOSUB 560:GOTO 50
3369 210 TEXTS="":FOR I=1 TO LEN(L$):A=ASC(MID$(L$,I)):TEXTS=TEXTS+CHR$(A+32)
(A>96 AND A<123):NEXT
3196 220 DELIMIT=INSTR(TEXTS," ") :COMMANDS=TEXTS:ARGS=""
4298 225 IF DELIMIT THEN COMMANDS=LEF$(TEXTS,DELIMIT-1):ARGS=MID$(TEXTS,
DELIMIT+1) ELSE DELIMIT=INSTR(TEXTS,CHR$(34)):IF DELIMIT THEN THE
N COMMANDS=LEF$(TEXTS,DELIMIT-1):ARGS=MID$(TEXTS,DELIMIT)
1736 230 IF COMMANDS="LIST" THEN GOTO 330
1615 240 IF COMMANDS="LLIST" THEN OPEN "lpt1:" FOR OUTPUT AS #1:GOTO 340
3441 250 IF COMMANDS="LCHECK" THEN CFLAG=1:OPEN "lpt1:" FOR OUTPUT AS #1:GO
TO 340
3584 260 IF COMMANDS="CHECK" THEN CFLAG=1:GOTO 330
3183 270 IF COMMANDS="SAVE" THEN GOSUB 570:OPEN ARGS FOR OUTPUT AS #1:ARGS=""
:GOTO 340
1432 280 IF COMMANDS="LOAD" THEN GOTO 490
17896 290 IF COMMANDS="NEW" THEN INPUT "Erase program - Are you sure?":LS:IF L
EFT$(LS,1)="y" OR LEF$(LS,1)="Y" THEN MAX=0:LNUM(0)=65536:GOTO 30
ELSE 30
3987 300 IF COMMANDS="BASIC" THEN COLOR 7,0,0:ON ERROR GOTO 0:CLS:END
126 310 IF COMMANDS="FILES" THEN GOTO 520
2532 320 PRINT"Syntax error":GOTO 30
96 330 OPEN "scr1:" FOR OUTPUT AS #1
179 340 IF ARGS="" THEN FIRST=P:MAX=1:GOTO 380
3535 350 DELIMIT=INSTR(ARGS," ") :IF DELIMIT=0 THEN LNUM=VAL(ARGS):GOSUB
540:FIRST=P:GOTO 380
7295 360 FIRST=VAL(LEF$(ARGS,DELIMIT)):LAST=VAL(MID$(ARGS,DELIMIT+1))
7878 370 LNUM=FIRST:GOSUB 540:FIRST=P:LNUM=LAST:GOSUB 540:IF P=0 THEN P=MAX-
2553 380 FOR X=FIRST TO P:N=MID$(STR$(LNUM(X)),2)+" "
717 390 IF CFLAG=0 THEN AS="" :GOTO 450
374 410 DS=WORKS:GOSUB 800:WORKS=DS
99 420 IF LEF$(WORKS,1)="" THEN AS="" | ":GOTO 442
989 430 LS=N$+L$(X):GOSUB 900
2013 440 AS=".....":RSET AS=STR$(CKSUM)+" | "
4865 442 N=LEN(NS):L=LEN(L$(X)):LL=9+N+L
287 443 IF LL>88 THEN GOTO 1000
395 450 PRINT #1,AS+NS+L$(X)
2838 460 IF INKEY$<>" " THEN X=P
982 470 NEXT :CLOSE #1:CFLAG=0
99 480 GOTO 30
4117 490 GOSUB 570:OPEN ARGS FOR INPUT AS #1:MAX=0:P=0
1549 500 WHILE NOT EOF(1):LINE INPUT #1,L$:BL=INSTR(L$," ") :BL$=LEF$(L$,BL-
1):LNUM(P)=VAL(BL$):L$(P)=MID$(L$,LEN(STR$(VAL(BL$)))+1):P=P+1:WEND
729 510 MAX=P:CLOSE #1:GOTO 30
3772 520 IF ARGS="" THEN ARG$="A":ELSE SEL=1:GOSUB 570
877 530 FILES:GOTO 30
5286 540 P=0:WHILE LNUM<LNUM(P) AND P<MAX:P=P+1:WEND:RETURN
8846 550 MAX=MAX+1:FOR X=P TO MAX:LNUM(X)=LNUM(X+1):L$(X)=L$(X+1):NEXT:RETUR
N
6886 560 MAX=MAX+1:FOR X=MAX TO P+1 STEP -1:LNUM(X)=LNUM(X-1):L$(X)=L$(X-1)
:
955 570 DS=ARGS:GOSUB 800:ARGS=DS
511 580 IF LEF$(ARGS,1)<>CHR$(34) THEN 320 ELSE ARG$=MID$(ARGS,2)
3691 590 IF RIGHT$(ARGS,1)=CHR$(34) THEN ARG$=LEF$(ARGS,LEN(ARGS)-1)
536 600 IF SEL=0 AND INSTR(ARGS,"")=0 THEN ARG$=ARG$+".BAS"
173 610 SEL=0:RETURN
153 620 PRINT "Error #":ERR:RESUME 50
1026 800 WHILE FNSP(DS):DS=FNRM$(DS):WEND:RETURN
1475 900 CKSUM=0:FOR I=1 TO LEN(L$):CKSUM=CKSUM+ASC(MID$(L$,I,1))*I*(I+2*(I
MOD 2+1)):NEXT:CKSUM=ABS(CKSUM):RETURN
1898 ' line too long
149 1010 NL=9+NL:NL=80-NL:PRINT #1,AS+NS+LEF$(L$(X),XL)
3245 1020 PRINT #1, SPACES(NL);MID$(L$(X),XL+1,XL):XL2=XL*2:IF XL2=NL THEN G
OTO 460
2007 1030 PRINT #1, SPACES(NL);MID$(L$(X),XL2+1,XL):XL3=XL*3:IF XL3=NL THEN G
OTO 460
1442 1040 PRINT #1, SPACES(NL);MID$(L$(X),XL3+1,XL):GOTO 460
    
```

# READER FORUM

edited by Mare-Anne Jarvela

## KEYSTROKE SHORTCUT

■ If you find yourself using certain DOS keywords or program names frequently and want to reduce the number of keystrokes needed to execute them, use SHIFTKE.BAT, a batch file that will redefine each shift-function key to a frequently used DOS command or keyword. I chose to use shift with the function keys because function keys already have uses in DOS.

First, you have to ensure that ANSI.SYS loads when

### Program Listing. SHIFTKE.BAT, a utility that lets you substitute lengthy commands with a shift-function key combination.

```
PROMPT $e[0;84;"DIR/P";13p
PROMPT $e[0;85;"DIR "p
PROMPT $e[0;86;"TYPE "p
PROMPT $e[0;87;"PROMPT "p
PROMPT $e[0;88;"ERASE "p
PROMPT $e[0;89;"CLS";13p
PROMPT $e[0;90;"BASIC";13p
PROMPT $e[0;91;"DISKCOPY A: B: ";13p
PROMPT $e[0;92;"COPY "p
PROMPT $e[0;93;"REN "p
PROMPT $e[0;162;"MKDIR "p
PROMPT $e[0;163;"RMDIR "p
```

your computer boots. Your Config.SYS file should include DEVICE = ANSI.SYS. The ANSI.SYS driver monitors all activity between the CPU and screen output or keyboard input. The ASCII codes assigned to the shifted function keys are extended; they consist of 2 bytes, the first of which is a zero. The table below shows the extended ASCII codes for the shifted function keys:

Key	Extended ASCII code
SHIFT-F1	0 84
SHIFT-F2	0 85
SHIFT-F3	0 86
SHIFT-F4	0 87
SHIFT-F5	0 88
SHIFT-F6	0 89
SHIFT-F7	0 90
SHIFT-F8	0 91
SHIFT-F9	0 92
SHIFT-F10	0 93
SHIFT-F11	0 162
SHIFT-F12	0 163

To redefine shift-F1 as the DIR/P command followed by a carriage return (ASCII code 13), type at the DOS prompt

PROMPT \$e[0;84;"DIR/P";13p. Every subsequent press of shift-F1 will issue the command to list the directory of files for your currently logged path.

Note in the Program Listing the placement of the semicolons and the items that aren't enclosed in double quotes. If you place a semicolon immediately to the left of the closing "p," you will lose the first character you type after pressing that shift-function key combination. You may place whatever strings you wish between the quotes.

If you want to redefine more keys, add Prompt statements to the batch file. You could redefine the control or alternate keys with separate function keys to get a total of 36 redefined keys. You can redefine any keys you wish, provided they don't have special uses.

James E. McKenna,  
Fredonia, NY



## TRIPLE PLAY

■ The following line, when typed into your Autoexec.BAT file, will set up the prompt to show the current date, time, and path with each new prompt:

```
PROMPT DATE: $D TIME:
$T$H$M$S$_$P$G
```

This will show the current date and time on the first line. The \$\_ (dollar sign, underscore) will show a new line for the current path ending with a > (greater sign).

The easiest way to get a directory of all my subdirectories is to type DIR \*. ; this will show only the files with no extensions (my program files are seldom without an extension).

I found a way to use the XCopy command to make the chore of backing up my hard disk less tedious. After you make a complete backup, put the following batch file in each directory that you intend to change the files (Root, word processing, ASM, Basic, database, etc.):

```
XCOPY *.* A: /M
```

This will copy all files that you've modified since your last backup or XCopy /M command. Since only the files that have been modified (such as databases or document files) need backing up, this provides a faster and easier way to back up your hard disk.

Ron Hawkins  
Syracuse, NE

## MAKE TIME FOR YOURSELF

■ I bought a 1000 EX and discovered it didn't automatically display the date and time upon bootup. My solution was to purchase the Plus Digi-mouse Controller/Calendar Board from Tandy. After installation, I realized that the date and time still had to be called up via the Date and Time commands from DOS. The time was displayed on a military (24-hour) basis. I wrote Time.BAS (see the Program Listing) to solve my frustration. It is executed through the Autoexec.BAT function at bootup. The Autoexec.BAT consists of the following:

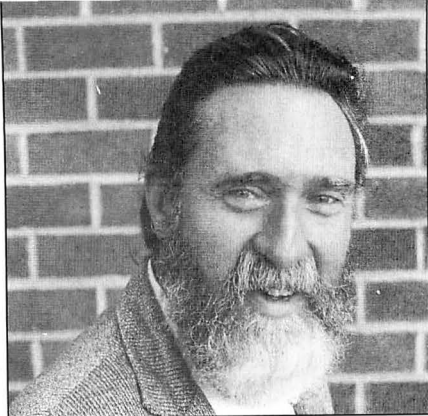
```
ECHO OFF
CLOCKGET
CLS
BASIC TIME
```

Basic.EXE must reside on the same disk as Autoexec.BAT.

John P. Cunningham  
Narragansett, RI

### Program Listing. Time.BAS displays date and time at bootup.

```
1222 10 REM ***TIME.BAS
854 20 REM ***DISPLAYS DATE AND TIME (12 HR. CLOCK)
851 30 REM ***ON SYSTEM BOOTUP
334 40 CLS
98 50 DAYS=MIDS(DATES,4,2)
803 60 MONTHS=LEFTS(DATES,2)
537 70 YRS=RIGHTS(DATES,4)
1125 80 M=VAL(MONTHS)
624 90 HRS=LEFTS(TIMES,2)
101 100 MINS=MIDS(TIMES,4,2)
6 A=VAL(HRS)
515 120 IF A=0 THEN 130 ELSE 150
485 130 A0=12
440 140 GOTO 220
382 150 IF A=12 THEN 160 ELSE 180
377 160 AA=12
446 170 GOTO 220
363 180 IF A>12 AND A<24 THEN 210 ELSE 220
213 190 AB=A
153 200 IF A>12 AND A<24 THEN 210 ELSE 220
263 210 AC=A-12
894 220 FOR I=1 TO 12
215 230 READ MS
916 240 IF I=M THEN 250 ELSE 360
2104 250 PRINT "TODAY IS: ";MS";"DAYS";";YRS
791 260 IF A0=12 THEN 270 ELSE 290
3753 270 PRINT "THE TIME IS: ";A0;"MINS;"AM"
402 280 GOTO 370
716 290 IF AA=12 THEN 300 ELSE 320
805 300 PRINT "THE TIME IS: ";AA;"MINS;"PM"
387 310 GOTO 370
488 320 IF AB<0 THEN 330 ELSE 350
890 330 PRINT "THE TIME IS: ";AB;"MINS;"AM"
393 340 GOTO 370
892 350 PRINT "THE TIME IS: ";AC;"MINS;"PM"
121 360 NEXT
402 370 SYSTEM
6900 380 DATA JANUARY,FEBRUARY,MARCH,APRIL,MAY,JUNE,JULY
4724 390 DATA AUGUST,SEPTEMBER,OCTOBER,NOVEMBER,DECEMBER
```



## Some Respect; Some Don't

■ by Harry Bee ■

**S**everal friends and relatives thought it strange when I got a database for Christmas (here it is approaching the other solstice, and I'm talking about Christmas). A database. A lot of information organized into a few disk files with an engine for sorting, searching, printing, and otherwise playing with it. I thought it was a thoughtful gift.

### Ready-made Reference

The database is a PC-Index from Information Services (949 Villa Gran Way, Fenton, MO 63026, 314-576-9295). It's an index of articles and reviews from 10 computer-specific magazines. A year's subscription with quarterly updates costs \$33 for information you'd sit at your local library and search through *The Reader's Guide to Periodical Literature* to find—or more likely, in my case, what I'd connect to CompuServe to locate.

CompuServe provides access to the on-line version of *The Reader's Guide*. It also has specific references, such as Microsearch, which is an index, including abstracts, of hardware and software reviews from a couple of hundred computer publications. The on-line connection is more likely because, despite the cost of the toll call, connect fees, and database surcharges, a few minutes of telecommunication time is still less expensive than the drive to the library and the time that it takes.

PC-Index has been valuable in the few months I've used it. It's helped me get research for several projects started and saved me on-line costs. Because four of the 10 magazines it covers are in my own collection, it's like the index I'd always meant to put together myself. I might even go ahead and add to it the other publications I compulsively save—sure I will.

Mark Yohman, of Information Services, told me most PC-Index subscribers are small businesses. It makes sense. General Motors can afford a staff of researchers, but when the rest of us need to make a hardware or software purchase, we're on our own. Memory and a casual recommendation are good enough for some, but packaged references like PC-Index are vital

elements in the mix of information resources that can help you make informed judgments.

### Shareware Engine

The database engine you get with PC-Index is PC-File+, a speedy, feature-rich relational database manager from Buttonware Inc. (P.O. Box 5786, Bellevue, WA 98006, 206-454-0479). PC-File+ is a shareware product, and an arrangement with Buttonware allows Information Services to distribute the shareware version of the database manager—sometimes called an evaluation version—with PC-Index.

The shareware version includes the complete PC-File+ program, not a crippled demonstration model, and the utilities that go with it. What you don't get is the complete documentation. A reference guide in a Read.ME disk file and pop-up help give you enough direction to use the program to manipulate, modify, and add to the PC-Index files.

The program is so easy to use for ordinary database functions that, after practicing with PC-Index, it won't tax you much to try it out on your own applications. If you like what you see when you try it, you might be tempted to buy the whole PC-File+ package, which is neither a far-fetched notion nor a bad one.

The 270-page manual you get when you become a registered user gives you complete access to the program's advanced features, which include automatic graphing, relational look-ups and calculations, a powerful database language, macros, and file importing and exporting in about any file format you can name. The list of well-executed features is long. You also get courteous technical support through a toll-free telephone number.

Buttonware charges you \$69.95 to register and sends new program disks with the manual. At that price, PC-File+ is the best value in database management you're likely to run into.

### About Respect

Shareware deserves more respect than it gets. Even a quick look at typical shareware fare—PC-File+, Quicksort's PC-Write, and Brown Bag Software's PC-Outline, to name the best known—shows you well designed, fully functional software with vendor support as good as or better than you get when you shop in more conventional venues.

The difference is that you can get a copy of a shareware program free from your brother-in-law or a local BBS. Shareware vendors encourage you to copy and pass along their products to friends. They want you to try them before you spend your money, and they trust you to pay for them if you use them. When you buy, they typically charge you less than you'd pay for comparable products that use conventional marketing channels.

Now look elsewhere. Though copy protection is going out of fashion, it's still too prevalent. A current trend is to charge you for support and service separately from the purchase price. This comes from companies whose only warranty assures you the disks won't be spindled, folded, or mutilated, but who refuse to guarantee that the product will do anything at all, and who insist, under the shrinkwrap, that they haven't sold you anything; all you have is a license to use the program, thank you.

Yet we cling to the notion that something we can get for nothing and buy for little from people who treat us with trust and respect can't be any good. It's just not true.

Shareware marketing isn't for every product. I don't advocate that. But the underlying concepts of shareware, that you have a right to know what you're getting before you buy and that you have a right to expect performance and service for your money, ought to be fundamental principles for all software publishers.

Most software vendors work hard to deliver good products and service at fair prices. Many succeed. But as long as I see "as is" warranties, I can't be convinced of the vendor's good intentions. As consumers, we need to insist on meaningful warranties, the complete eradication of

copy protection, and the demise of the shrinkwrap license. And, we ought to support the companies who respect us enough to give us those things. We pay the freight; that gives us the power.

### Tourist-class Fare

Nowhere is copy protection more entrenched than in game and educational software. A series of products from Blue Lion Software (90 Sherman St., Cambridge, MA 02140, 617-876-2500) falls into both categories and comes copy protected, too. What irritates me, enough to point out the copy protection even before I name the products, is that nowhere in the packages does Blue Lion bother to bring up the subject. If they're going to treat me like a crook, the least they can do is tell me.

The two in the series I tried were Ticket to London and Ticket to Paris. Copy protection aside, I grade both of them as successful. They're entertaining, if you have a taste for knowledge tests, and you could learn something. If you can get high school kids to sit still for them, they might learn something, too.

In "London" you're on vacation, but you arrive to find your travel agent in a playful mood: you'll get your return ticket when you identify a famous Englishman. You find clues to your quarry's identity under several bowler hats hidden around the city. You find out where a bowler hat is each time you score enough points by answering questions about English history and culture posed by perfect strangers. (No, realism isn't a strong component of the game.)

To find the bowler hats and the clues and to get people to ask you questions, you travel the city by taxi, underground, and on foot. You start with a vacation budget and have to pay for cabs, subways, meals, and souvenirs. So, you need to mind your shillings and pence somewhat.

You must also keep track of time. Shops and museums have their closing times and restaurants their serving times. You have to turn in each night at your hotel, and you have only 10 days to complete your quest.

"Paris," released after "London," benefits from experience. Your budget is tighter. You have to find a hotel you can afford. You can barter in the market, and you have to deal with monetary exchange rates.

Fatigue and hunger play an important role. You have to find the cheap eats and decide when you can indulge yourself on *l'haute cuisine*. Walking is free and pleasant, but it's also slow and tiring. If you don't take care of yourself, you may end up in the hospital, which costs dearly.

Your mission in "Paris" is a family affair. You're to find your long lost cousin and convince him to return home. As in "Lon-

### Program Listing. Square shooter.

```
10 KEY OFF:SCREEN 1,0,0:COLOR 3,0:PRINT TAB(17) "SQUARES"
20 DS = "bm-40,0:m+40,-34:m+40,+34:m-40,+34:m-40,-34"
30 DRAW DS:DS = LEFTS(DS,8)"s8;" +MIDS(DS,9):DRAW DS
40 LINE (120,66)-(200,134),3,B
99 IS=INKEYS:IF IS="" THEN '99 ELSE SCREEN 0,0,0:WIDTH 80:LIST
```

don," you get clues to your cousin's whereabouts by answering questions about things French. When you get a clue, you have to hurry to meet your cousin before he moves on. To be successful, you must talk to him several times before you run out of money and have to go home alone.

You can play in English or *en français*. You don't need much fluency to play in French. Repetition helps, and you get clues from a dictionary and the context of the questions and dialogue. I was able to recall enough high school French, even after mumbledy-mum years, to get by, and I enjoyed the game more for the extra challenge.

On another level, anyone who's never traveled can get a hint, albeit a small one, of what it's like to deal with an unfamiliar language (or idiom), strange coinage, and a new set of customs. If you're not up on French or English history and culture, you can pick it up in the course of play. The program asks for the the same information in different ways until you get it, adds new questions as you master early ones, and adds still more as you complete one game and try another.

Other games in the series are Ticket to Spain, which you can play in English or Spanish, and the recently released Ticket to Washington, D.C. All tickets are \$39.95, tips not included, except for "Washington, D.C.," which, as you'd expect, costs 12.5 percent more. Personally, I can't wait for One-way Ticket to Bulgaria, which the folks at Blue Lion coyly insist is not in their plans. Sure. And I suppose Sophia's not one of the top 10 vacation capitals of the world?

### Fine Lines Reprise

There were several responses to the menu challenge from the March Fine Lines. All of them were too long to reproduce here, but Isaac Brumley (Windsor, CA) and Jim Pierce (Hubert, NC) get T-shirts for their good efforts.

Meanwhile, Patrick Gainer (Tanner, WV) wrote to take exception to my narrowly defining, in April, science as rules. He's right. The rules are but a by-product of science and a means of applying it. As Pat says, "Science is knowledge," whatever its current state or expression.

Also in the April column, I asked, not at all seriously, if anyone knew of a practical application for the string reversal routines printed the month before—routines that turned "doctor" into "rotcod."

Wouldn't you know it? Longtime Fine Liner D. A. Wood (Ottawa, OH) wrote to say that he had used the technique, but not for strings. His application in a graphics program took bit-image codes intended for an Epson printer and turn them upside down for use on a Tandy DMP 200. Which proves that no matter what you know, it's probably better to know it.

Solutions to April's connect-the-dots puzzle are coming in at a healthy clip. I'll have good ones to show off next month. And it looks like you'll see some lavalampalia programs, too.

### The Lower Right Corner

By now you have an idea of what this new column is about, some of the products that pique my curiosity, and the kind of notions that catch my attention. I'll look beyond software to the books, accessories, and services I come across that may be helpful, interesting, amusing, or dangerous to you and your computer. The ones I'll talk about here, for the most part, are those you may see in catalogs and new product announcements, but which may not warrant the attention of a proper review. Others are ideas that are brand new, particularly praiseworthy, or especially vile.

While I wander extensively through the computer jungle, I can't possibly run across every beast there is. So I don't mind asking for your help. If you know of a product or service that helps or hurts your computing enough that you want others to know about it, point me in its direction. If you're curious about a product, and you haven't seen it written about, name it. I'll see what I can find out.

While you're at it, if you have an opinion about things computerish, express it. As I can, I'm reserving this space in the lower right corner to pass on your most compelling, thought-provoking comments, and, as I said in May's Fine Lines, to occasionally toss out a Fine Line-ish challenge.

For instance, the Program Listing draws three nested squares, one at a time. Can you plot the same figure with a single Draw statement that makes one continuous line without backtracking? ■

Harry Bee gets his curious notions while wandering the computer jungles of Cornish, ME 04020. You can write to him at P.O. Box 567 or Easyplex to Compuserve address 74076,3461.



## The Game of Life

■ by Hardin Brothers ■

Last month I explored the Tandy 1000's video capabilities. I'll continue that exploration this month by discussing a unique graphics capability of the 1000 and how you can use it with "The Game of Life," a program I've discussed in past columns.

Medium resolution, on the 1000 and other MS-DOS color computers, is generally defined as graphics with 320 dot or pixel positions across the screen and 200 pixel rows. Because of their limited video RAM, most MS-DOS color computers allow only four colors in medium resolution. Since four colors can be specified with 2 bits (00, 01, 10, and 11 in binary notation), such computers use 128,000 bits (320 x 200 x 2) or 16,000 bytes of RAM for medium resolution, the maximum amount of memory most color graphics cards have available.

Because of its flexible method of allocating video memory, which I discussed last month, the 1000 can display medium-resolution graphics in either a four-color mode, compatible with other computers, or in a 16-color mode. Since a 16-color mode requires 4 bits of information, this mode requires 256,000 bits (320 x 200 x 4), or 32,000 bytes of memory for one screen. If you use the video paging techniques I discussed last month and are willing to dedicate 128K of the 1000's memory to video processing, you can have up to four separate pages of 16-color medium resolution graphics.

Unfortunately, hardware requirements make accessing the video graphics memory somewhat complicated. A programmer, however, can only complain about hardware limitations and then work within whatever restrictions the hardware places on a program. If graphics speed isn't a prime consideration for a project, working with the unusual memory mappings of medium-resolution graphics isn't difficult.

Using 16-color medium-resolution graphics is a multistep process. First, the video system must be put into the correct mode. The easiest way to do so is to make a call to the video's ROM basic input/output system (BIOS) at interrupt 10 hex, with register AX containing 9, the number for this video mode. The mode change will

automatically clear the graphics screen. In assembly, the appropriate call is:

```
MOV AX,9
INT 10h
```

To return to 80-column text mode, use the following call:

```
MOV AX,3
INT 10h
```

Once the computer is in 16-color graphics mode, screen memory consists of a 32K block, which you can address at B800:0 hexadecimal (hex). Each row of the screen (320 pixels) is contained in 160 bytes (see Figure 1). Inside each byte, the 4 high-order bits determine the color (zero-15) of the left pixel of the pair, and the 4 low-order bits determine the color of the pixel on the right (see Figure 2). Therefore, to store yellow (14) in pixel zero and blue (1) in pixel 1, the first byte of the row would be loaded with the binary value 11100001 (0E1 hex). The difficulty is in finding the address of the beginning of each row; the easiest way to do this is to create an array of the starting address of each row and then use those addresses plus the byte number in the row to find the address to poke. Program Listings 1 and 2 demonstrate how to do this.

```
B800:0000—Row 0
B800:00A0—Row 4
B800:0140—Row 8
```

```
B800:2000—Row 1
B800:20A0—Row 5
B800:2140—Row 9
```

```
B800:4000—Row 2
B800:40A0—Row 6
B800:4140—Row 10
```

```
B800:6000—Row 3
B800:60A0—Row 7
B800:6140—Row 11
```

To determine the offset address of a row, you can use this algorithm:

$$\text{Offset} = ((\text{ROW} \text{ MOD } 4) * 2000 \text{ hex}) + ((\text{ROW} \setminus 4) * 0A0 \text{ hex})$$

It is generally fastest, as Program Listing 1 shows, to calculate all row addresses at the beginning of a program and store them in a look-up table for later use.

In text modes, the video screen can be accessed as a single contiguous block of memory. In most graphics modes, however, a program must do calculations to find the address of each screen row. The calculations aren't difficult, but they're time consuming and tend to make graphics effects such as smooth animation difficult to achieve, especially in a high-level language.

### The Game of Life

In *Scientific American's* October 1970 issue, Martin Gardner introduced John Conway's "The Game of Life" (see "Mathematical Games," p. 120). This isn't a competitive game, but a simulation of a small universe with rigorous rules about birth, life, and death.

In the August 1981 *80 Micro*, Dennis Kitz presented a new and faster algorithm for generating Life's "universe" on a Model I. In my February 1986 column, I adopted his algorithm and added features to create a Model 4 version of Life (see "Life with the Model 4," p. 100).

The rules of Life are simple. The computer's screen represents the universe, and each pixel location on the screen represents one cell. Each cell may be occupied by a single "individual" in the Life universe. Each cell has eight neighbors, just as the center box of a tic-tac-toe board has eight neighboring boxes.

During each generation of this universe, individuals are born and live, or die, according to the number of neighboring cells that have living occupants.

---

*System Requirements: Quick Basic 4.0 or Microsoft's C. Available on the April-June 1988 Disk Series, on sale in May.*

---

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## THE NEXT STEP

•The status of every generation of the universe is based upon the distribution of living individuals (occupied cells) during the previous generation.

•If an individual has fewer than two living neighbors, it dies of "loneliness." If it has more than three neighbors, it dies of "overcrowding."

•If an individual has two living neighbors, it will continue to live for the next generation.

•If any cell has three living neighbors, a new individual will be born in that cell.

Collections of living individuals, or colonies, can grow, move across the screen, send satellite colonies across the screen, fight with each other, or vanish.

A number of articles and books have been written about The Game of Life, several mathematical theories about the universe have been formulated, and Life has been translated to three- and four-dimensional universes.

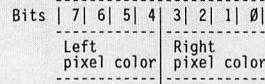
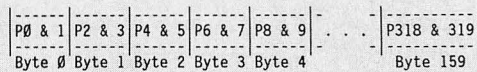
Listings 1 and 2 demonstrate one way you can implement Life in the 1000's 16-color medium-resolution mode. They both add one extra rule to the Life universe: an individual who continues to live will change color with each generation. Both programs are short and reasonably simple. They begin by creating a buffer that is slightly larger than the screen. It has the same logical width as the screen (160 bytes) but an extra row at the top and the bottom.

Each program then switches the 1000 into graphics mode 9, puts a starting configuration on the screen, waits for a key-stroke, and then begins to run the Life universe. During each generation, the buffer is cleared and the screen is scanned for living individuals. Each time an individual is found, its corresponding neighbor cells in the buffer are incremented.

The buffer contains information about which cells should live, reproduce, or die. After the entire screen is scanned, the buffer is scanned a cell at a time, and the screen is updated. The program then pauses, checking the keyboard to see if you've pressed any key to tell the program you want to stop. If not, the Life universe cycles through another generation. Letting the universe wrap around from left to right, but not from top to bottom, simplifies these versions of the program. Also, each has only one starting configuration, an "R" colony, which will continue to grow and develop indefinitely. However, each program includes instructions about creating a random universe, and you might want to expand either one to allow for a larger number of possible starting configurations.

Listing 1 is written in Quick Basic 4.0. Before you run it, you'll need to protect the graphics memory in your 1000 by running the Save128 program from last

**Figure 1. Each row of the screen (320 pixels) is contained in 160 bytes.**



**Figure 2. The 4 high-order bits determine the color of the left pixel of the pair, and the 4 low-order bits determine the color of the pixel on the right.**

**Program Listing 1. The Game of Life, written for the 1000 in 16-color medium-resolution graphics.**

```
' John Conway's GAME OF LIFE written for the Tandy 1000 in
' 16-color, medium resolution graphics
' This version is written for QuickBasic 4.0

DEFINT A-Z
DECLARE SUB Setmode (mode%)
DECLARE SUB Setscreen ()
DECLARE SUB OneGeneration ()

'$INCLUDE: 'QB.BI'
Note: QB.BI is included with QuickBasic 4.0
DIM SHARED inregs AS RegType, outregs AS RegType

DIM SHARED scrnrow(1 TO 200) AS INTEGER 'Address of each screen row
DIM SHARED buffer(-1 TO 202 * 160 + 1) 'Buffer for generation calculations

CLS
FOR lp = 1 TO 200
    scrnrow(lp) = ((lp MOD 4) * &H2000) + ((lp \ 4) * 160) 'Calculate each
NEXT lp 'screen row address

CALL Setmode(9) 'Put video system in graphics mode
DEF SEG = &H8000 'Segment of video memory
CALL Setscreen 'Initial configuration on screen
DO WHILE INKEY$ = "" 'User presses key to stop
    REDIM buffer(-1 TO 202 * 160 + 1) 'Fast way to empty the buffer
    CALL OneGeneration 'Update the LIFE universe
LOOP
CALL Setmode(3) 'Screen back to text
CLS
END

SUB OneGeneration
'Begin a generation by scanning the screen and marking the neighbors of
'each living cell in the buffer

FOR row = 1 TO 200
    FOR col = 0 TO 159
        IF PEEK(scrnrow(row) + col) THEN
            buffer((row - 1) * 160 + col - 1) = buffer((row - 1) * 160 + col - 1) + 1
            buffer((row - 1) * 160 + col) = buffer((row - 1) * 160 + col) + 1
            buffer((row - 1) * 160 + col + 1) = buffer((row - 1) * 160 + col + 1) + 1
            buffer((row) * 160 + col - 1) = buffer((row) * 160 + col - 1) + 1
            buffer((row) * 160 + col + 1) = buffer((row) * 160 + col + 1) + 1
            buffer((row + 1) * 160 + col - 1) = buffer((row + 1) * 160 + col - 1) + 1
            buffer((row + 1) * 160 + col) = buffer((row + 1) * 160 + col) + 1
            buffer((row + 1) * 160 + col + 1) = buffer((row + 1) * 160 + col + 1) + 1
        END IF
    NEXT col
NEXT row

'Now scan the buffer and update every position on the screen

FOR row = 1 TO 200
    FOR col = 0 TO 159
        dot = buffer(row * 160 + col)
        IF dot < 2 OR dot > 3 THEN
            POKE scrnrow(row) + col, 0
        ELSEIF dot = 2 THEN
            thisdot = PEEK(scrnrow(row) + col)
            IF thisdot THEN
                thisdot = thisdot - 1
                IF thisdot = 0 THEN thisdot = 15
                POKE scrnrow(row) + col, thisdot
            END IF
        ELSEIF dot = 3 THEN
            POKE scrnrow(row) + col, 15
        END IF
    NEXT col
NEXT row
END SUB

SUB Setmode (mode)
'Set the video mode according to the number received.
'This procedure requires use of QB.QLB or QB.LIB on the
'QuickBasic 4 distribution disk

inregs.ax = mode 'Mode number in register AX
CALL INTERRUPT(&H10, inregs, outregs) 'Use the VIDEO BIOS to set the mode
END SUB

SUB Setscreen
```

Listing 1 continued



month's column (see Program Listing 1, p. 72). You can, if you wish, modify that program to protect 32K of RAM from application use instead of a full 128K. You'll also have to compile this month's Listing 1 using the QB library (either QB.QLB or QB.LIB) provided with Quick Basic 4.0.

Because the 16-color graphics screen is so large—it contains 32,000 bytes, which Listing 1 interprets as 32,000 possible cells—Listing 1 runs slowly. On my computer, the first eight generations take almost 53 seconds to appear, or approximately seven seconds per generation.

Because of this slowness, I rewrote Listing 1 in C, using Microsoft's C compiler, version 5.0 (Quick C or any other C would work just as well). The result is Listing 2. Because C has better facilities for direct memory access and Listing 1 must use Basic's inherently slow Peek and Poke commands to access the screen, Listing 2 runs much faster than Listing 1, requiring just two seconds per generation. The general program structure is the same; you might

```
'Set the starting configuration of the LIFE universe. Comment out the
'first five POKE statements below and erase the apostrophes in front of the
'other lines if you want a random starting configuration

POKE scrnrow(99) + 80, 15
POKE scrnrow(99) + 81, 15
POKE scrnrow(100) + 79, 15
POKE scrnrow(100) + 80, 15
POKE scrnrow(101) + 80, 15

'Use the following for a random universe (remove the apostrophes)
/
RANDOMIZE TIMER
FOR ip = 1 TO 2000
  i = INT(RND(1) * 200) + 1
  j = INT(RND(1) * 160) + 1
  POKE scrnrow(i) + j, 15
NEXT ip

a$ = INPUT$(1)          'Pause after screen is set
END SUB
```

like to compare Listings 1 and 2 to see how a program can be translated from Basic to C.

I still wasn't happy with the speed of Listing 2, so I rewrote the one-generation procedure in assembly. That version, which is on the 80 *Micro* April-June Disk Series disk as an EXE file but isn't printed here, speeds up the program sufficiently to produce one new generation per second.

These programs demonstrate how Life can be written for the 16-color medium-resolution mode, but none are a complete implementation of Life. You will probably

want to add other starting configurations, an opportunity to define (and perhaps save on disk) new configurations, and perhaps a facility to increase the programs' speed.

However, the programs demonstrate that the 1000's 16-color graphics are relatively easy to use. You can also save and load screens of 16-color graphics with Basic's BLoad and BSave commands for your programs. ■

Contact Hardin Brothers at 280 N. Campus Ave., Upland, CA 91786 (enclose an SASE) or on Compuserve's WESIG (PCS-117).

### Program Listing 2. The Game of Life, written in C.

```
/* Implementation of The Game of LIFE in Microsoft C */
/* Written for the Tandy 1000, 16-color medium resolution */

#include <stdio.h>
#include <stdlib.h> /* Prototypes for srand() and exit() */
#include <memory.h> /* Function prototype for memset() */
#include <conio.h> /* Function prototype for kbhit() */
#include <malloc.h> /* Function prototype for malloc() */
#include <dos.h> /* Function & union decl. for int86() */

char far *scrn[201]; /* Screen addresses are outside the data segment */
char *buf[202]; /* The buffer has 202 lines
char *buff;

/* Prototypes for my functions: */

void main(void);
void set_mode(unsigned);
void set_screen(void);
void one_generation(void);

/* Program starts here: */

void main(void)
{
  int i;

  if ((buff = (char *)malloc(202 * 162 + 2)) == NULL) {
    puts("Insufficient memory available");
    exit(-1);
  }

  for (i = 0; i < 200; i++) { /* Set address of each screen row */
    FP_SEG(scrn[i+1]) = 0xb800; /* All have the same segment addr.*/
    FP_OFF(scrn[i+1]) = ((i % 4) * 0x2000) + ((i / 4) * 160);
  }

  for (i = 0; i < 202; i++) /* Make buffer addressable as row, col */
    buf[i] = buff + (i * 160) + 1;

  set_mode(9); /* Set graphics screen mode */
  set_screen(); /* Starting configuration on screen */
  while (!kbhit()) /* Until user presses a key ... */
    one_generation(); /* Do one generation */
  getch(); /* Clear the keystroke */
  set_mode(3); /* Back to text mode */
  exit(0); /* Return to MS-DOS */
}

/* Use the video BIOS to set a new screen mode */
void set_mode(unsigned m)
{
  union REGS regs;
  regs.x.ax = m;
  int86(0x10, &regs, &regs);
}

/* Set the initial screen. For a random screen, comment out the first*/
/* five assignments and remove the comments from the random number block*/

void set_screen(void)
{
  int i, j, k;

  scrn[99][80] = 15;
  scrn[99][81] = 15;
  scrn[100][79] = 15;
  scrn[100][80] = 15;
  scrn[101][80] = 15;

  /* Random screen generator: */
  /* srand((int) time(NULL)); */
  for (i = 0; i < 2000; i++) {
    j = (rand() % 200) + 1;
    k = (rand() % 160) + 1;
    scrn[j][k] = 15;
  }

  getch(); /* Wait for user to press a key */
}

/* One generation in the LIFE universe: */
void one_generation(void)
{
  register int row, col;
  unsigned char i;

  memset(buff, 0xfe, (162 * 202 + 2)); /* Clear the buffer */
  /* Each cell contains -2 */

  /* Scan the screen to update the buffer: */

  for (row = 1; row < 201; row++)
    for (col = 0; col < 160; col++)
      if (scrn[row][col]) {
        buf[row-1][col-1]++; /* If we found a living indiv.*/
        buf[row-1][col]++; /* Update neighbors in buffer */
        buf[row-1][col+1]++;
        buf[row][col-1]++;
        buf[row][col+1]++;
        buf[row+1][col-1]++;
        buf[row+1][col]++;
        buf[row+1][col+1]++;
      }

  /* Scan the buffer to update the screen: */

  for (row = 1; row < 201; row++)
    for (col = 0; col < 160; col++) {
      i = buf[row][col]; /* Will be true if <2 or >3 neighbors */
      if (i > 1)
        scrn[row][col] = 0;
      else if (i == 1) /* If exactly 3 neighbors... */
        scrn[row][col] = 15;
      else if (scrn[row][col]) { /* If exactly 2 neighbors... */
        scrn[row][col]--;
        if (!scrn[row][col]) /* don't let cell become blank */
          scrn[row][col] = 15;
      }
    }
}
```

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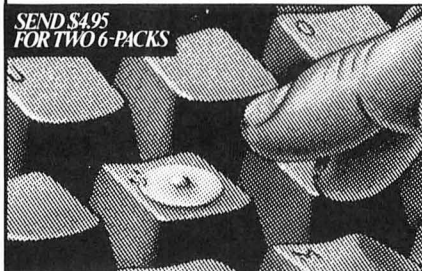
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# Let the Buyer Beware

## Credit Card Scam?

■ I'd like to alert *80 Micro* and its readers to a possible scam involving a national computer mail-order house, PC Network in Chicago, IL.

On Feb. 13, 1988, I noticed that my Visa credit card bill listed an unauthorized charge to PC Network. A year before, I had ordered three input/output (I/O) cards for XT-type computers. At the time, I was required to purchase a membership to buy the cards. This was no surprise, since the ad had mentioned the required membership.

When PC Network declared bankruptcy, it listed not only its suppliers as creditors, but also its customers who had paid for products but hadn't yet received them. I vowed never to buy from the company, since I consider taking bankruptcy against customers unforgivable. When my Visa statement arrived, I was outraged to discover that PC Network decided to raise funds by running old credit card numbers through the bank again under the guise of "membership fees." The charge was dated Jan. 20, 1988. I didn't authorize a perpetual membership with that single telephone order for the I/O cards. Other readers may want to see if such a billing slipped by on their credit cards.—Lynn L. Martin, Alva, OK

## Too Many Inches

■ Several readers have told us they bought a Tandy 1000 TX, which uses the 3½-inch disk, and Tandy's user-installable 20MB hard card (catalog no. 25-1029). Unfortunately, the hard card's installation software is on a 5¼-inch disk. If you buy the TX and a hard card, check the size of the hard card's utilities disk with the store manager; if the software is on a 5¼-inch disk, have the manager copy it onto 3½-inch media.—Eds.

## Indispensable, But...

■ As an enthusiastic subscriber of your magazine for the past two years, I've found your columns and articles extremely helpful and informative. However, you've been running an ad for Gray Fox Enterprises that I consider extremely offensive.

I currently run a construction company, but my original field was in psychology,

**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 300/1200 baud, 8-bit words, 1 stop bit, no parity.**

specializing in family and youth counseling and correctional institutions. I have yet to find anyone positively influenced by "one sexual fantasy after another." I have seen firsthand the destructive influence of products such as "Wild Adventure."

This advertisement has no place in a magazine of your caliber. Although I consider *80 Micro* almost indispensable, if you continue to run advertising of this type, I will not renew my subscription under any circumstances.—Brett J. Dickinson, Brownsville, TX

## Who's Driving?

■ In my article "Smaller is Bigger" (April 1988, p. 28), important instructions were omitted. You must include the statement `DRIVPARM = /d:1/f:2` in your `Config.SYS` file.—John M. Gregg, Florence, SC

## T/Master—Yes or No?

■ It is true that T/Master is an unconventional and powerful integrated software product (see "Far Out," February 1988, p. 82); however, for Harry Bee to say it's so far out to be considered irrelevant is far from the truth.

I can use T/Master on my HP Portable Plus and my HP Vectra ES. Everything—including the communications, desktop publishing, and graphics—works! I don't know of another integrated software product that can rival this feat. What other product do you know of that can run in less than 640K of Edisc on a Portable Plus?

The system is fluid and dynamic, and the program seamlessly integrates word processing, database, macros, spreadsheet, file management, graphics, communications, and desktop publishing into a single productive work environment. With a little imagination, you can combine spreadsheet, database, word processing text, macros, and several graphics all in the same file.

T/Master is the only program I've seen that can produce beautiful publications with multiple print densities on the same page. Most desktop publishers work best on expensive laser printers with special fonts and maintain only one print density; T/Master works wonders on dot matrix, ink jet, and laser printers alike. The publisher commands are practical and easy to use. Producing documents with text and graphics is a snap.

It's true that T/Master is an unconventional product. That's what makes it so exceptional and dynamic. It's refreshing to know that someone writes "real-world" software to help the productive person get the

job done without all the klutzy glitter. It's like driving a BMW when all your friends have Lincolns. It's the performance that counts.

It takes time to appreciate and understand a new product; I wish that Harry Bee had the opportunity to fully experience T/Master, especially with the enhancements in the latest version (the communications module has been a part of T/Master for nearly two years).—David Hughes, Middletown, NY

*I can appreciate that T/Master has fans as loyal as Mr. Hughes and others who've written in its defense. The Chicago Cubs have loyal fans, too. However, the version of the product I reviewed could only be called "fluid and dynamic" in comparison to a yak with heartburn. If there was another version, why was I told, nine months ago, that the version I had was current, "except we've just added communications and some graphics features," which I agreed to mention without comment? Two years? Duck pockey! And in the month since T/Master called to complain about the review, why haven't they sent the up-to-date version they swear exists? Enough already!—Harry Bee*

## Shift

■ The thousands of people buying MS-DOS computers are not programmers. They don't know Basic or Cobol or any other language. These people are software users. They use Word, Word Perfect, Dbase III, and 1-2-3 at work and need to use these programs at home. They also like to play games. They wonder what brands of hardware to buy to make their programs run more efficiently.

Tandy MS-DOS users need a magazine that presents comparative reviews of hardware and software products based upon performance, ease of installation and use, price, and value. They also want to know how to overcome glitches and make their software run better on Tandy machines—solutions that don't require degrees in computer science.

How nice it would be to see a comprehensive review of hard disks that fit my old Tandy 1000.—Ronald Sarti, Centerville, OH

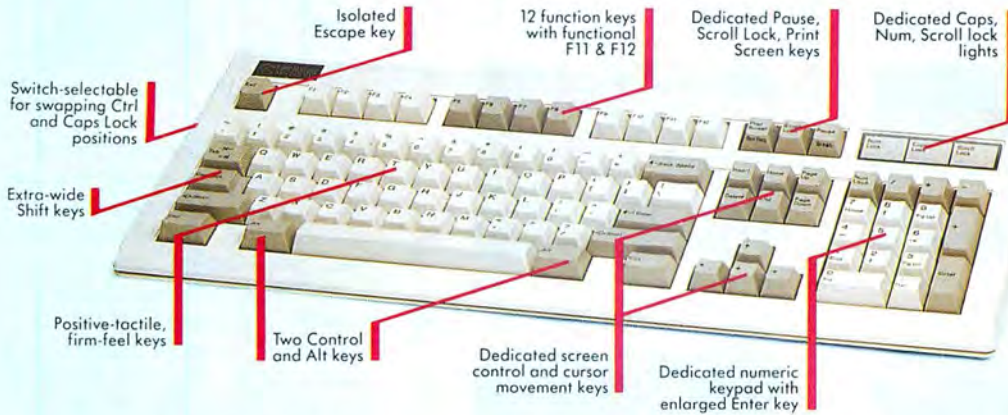
You'll find what you're looking for on page 27 of this issue.—Eds. ■

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ThinkTank is the world's most powerful outliner and idea processor. It will introduce you step-by-step to a fascinating new way of organizing and managing your ideas, your time, your business, and even your thinking. And to get you up and running quickly and easily we even include 30 predefined ThinkTank Productivity Templates with the *Cerebral Power-Pak*. ThinkTank is considered by many to be one of the most important productivity enhancers on a microcomputer. It turns thoughts into reality and ideas into results!

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Both the Turbo-101 and ThinkTank are designed to immediately streamline and improve your computing performance regardless of which model Tandy, IBM XT, AT, AT&T or compatible you use. With our *Cerebral Power-Pak* you'll feel the difference from the tip-of-your fingers to the center of your brain!

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ThinkTank is already a best seller at \$195. So it's easy to figure out that getting both the critically-acclaimed Turbo-101 keyboard and the ThinkTank software for the price of the keyboard alone—\$169.95—is a deal that turbocharges your PC without flattening your wallet. And that's not all, our USA-made Turbo-101 keyboard is so well built it carries a full 2-year warranty—which is probably a lot longer than your PC's warranty! But just in case you're not completely satisfied, you can always change your mind, with our no-questions-asked 30-day money-back guarantee.

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“I really prefer the feel of the DataDesk Turbo-101. The keys have tactile feedback. No mush at all.

*Jerry Pournelle  
 Byte Magazine, August 1987*”

“Don't plopp down your simoleons for a Keytronic or others... for ingenuity of design and sheer dollar-value those from DataDesk can't be beat.

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 Washington Post, May 1987*”

Models also available for all Tandy models, IBM XT, AT and compatibles, Macintosh and AT&T.

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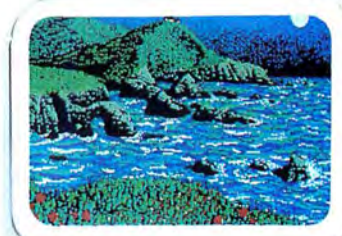
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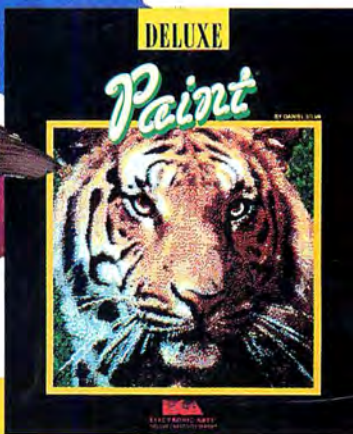


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