

# 80 micro

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NOVEMBER 1987  
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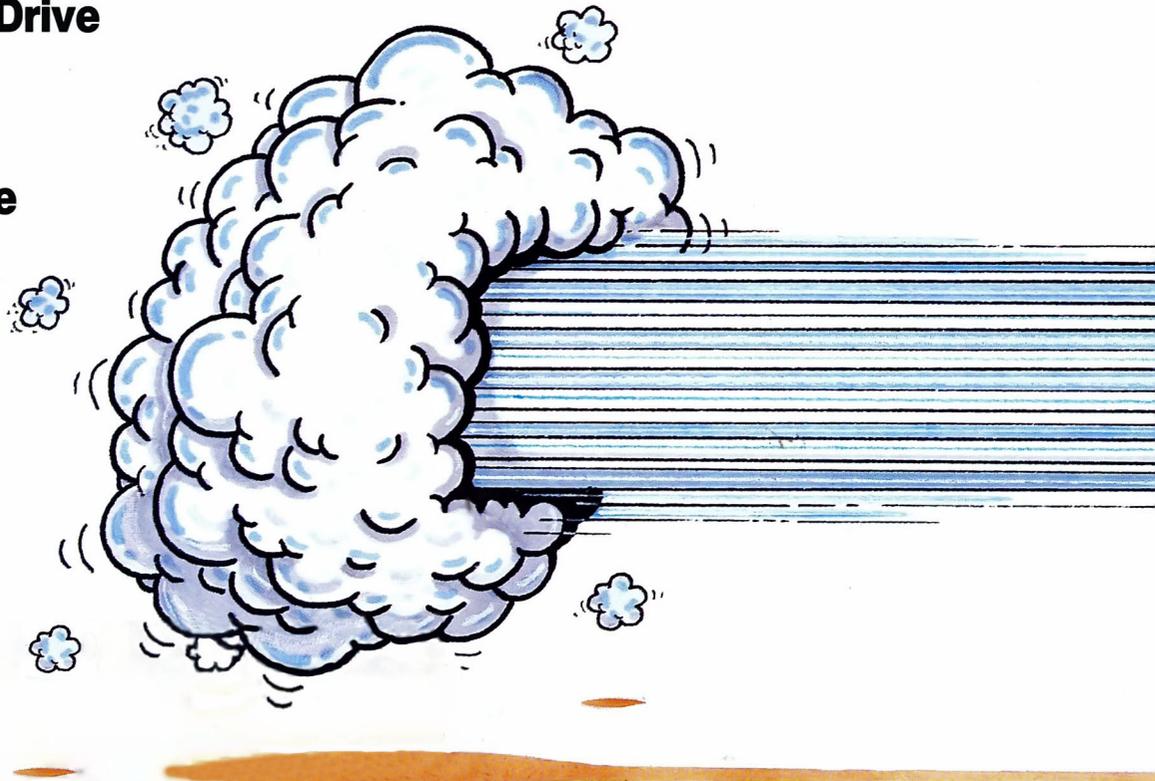
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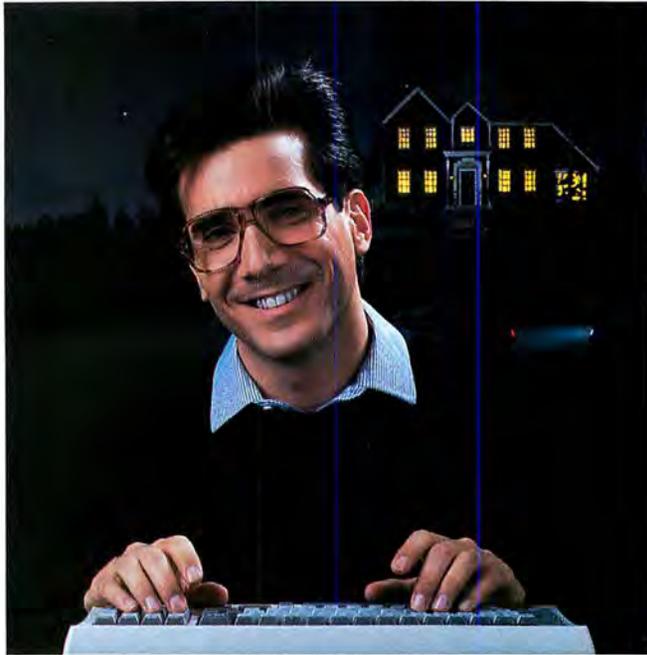
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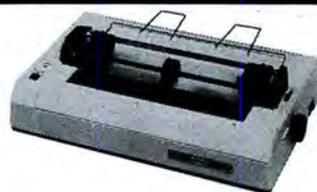
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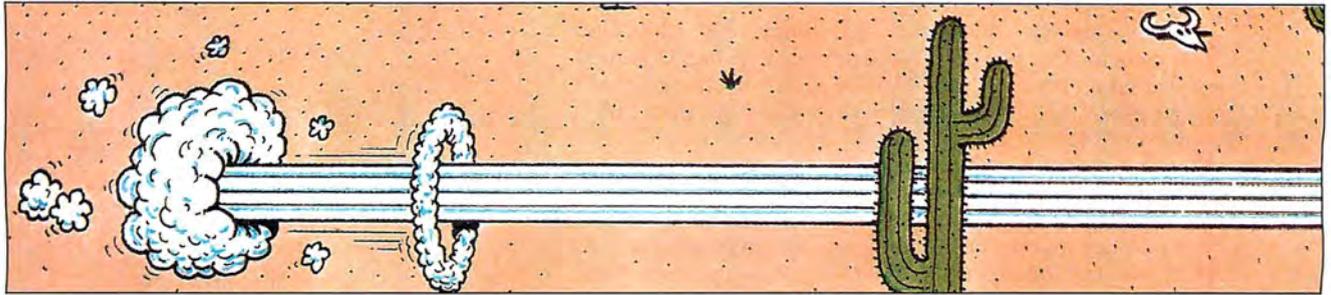
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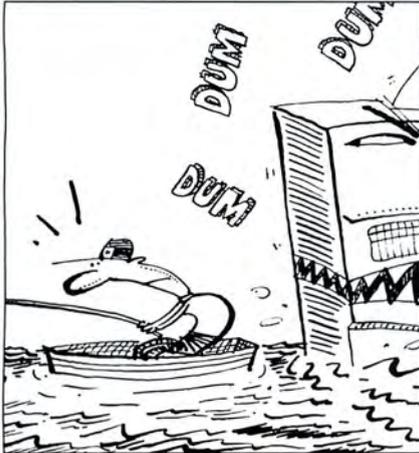
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## Features

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52. **Teach Deskmate New Tricks** by William C. McComas  
Dress up Deskmate II output in ways you thought weren't possible. (1000)
57. **No More Pencils, No More Rulers** by John Collicott  
Create customized graph paper on your Tandy 1000 or Model 4 and dot-matrix printer. (Disk Series)
71. **Functions Defined** edited by David Andrews  
DEF FN routines from our readers that you can use in your Tandy 1000 or Model 4 programs.
79. **The Business of Life** by Thomas L. Quindry  
These shareware and public-domain programs are suitable for the home and office.

## Departments

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| 6. <b>The 80 Micro Disk Series: 1000/1200/3000</b>   | 56. <b>The 80 Micro Disk Series</b>   |
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# LeScript Named No.1 Choice in Word Processors!

80 MICRO Review, November 1985

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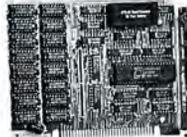
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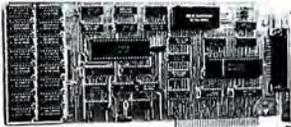
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OK. \$52 256K. \$76 512K. \$99 Clock/Cal. \$28

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OK. \$99 256K. \$123 512K. \$146

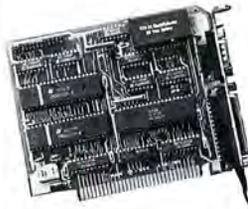
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Mod 1000. \$489 Mod 3000. \$489

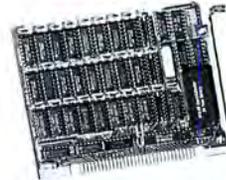
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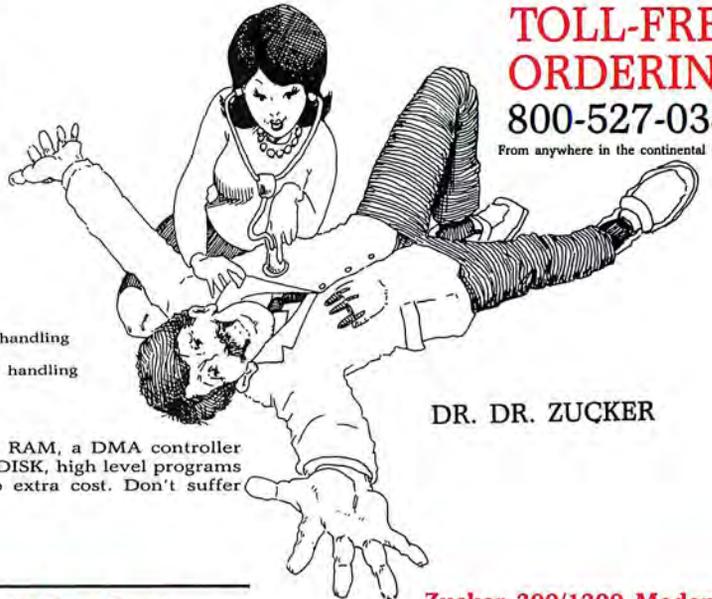
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DR. DR. ZUCKER

# Hard Decision, New Direction

**80** *Micro* has gone through more changes than I sometimes like to think about. But that's life for a magazine in a market as fluid as Tandy's. Today's hot computer becomes a nostalgia item almost before tomorrow's hits the stores.

Balancing coverage between old and new systems has become an obsession for us. We did it when the Model III replaced the Model I, when the Model 4 replaced the Model III, and when the Tandy 1000 replaced the Model 4. Along the way we picked up and discarded the Color Computer, Model 100, Model II, Model 16/6000, and Model 2000. At each transition we gained and lost some readers. That's the price we pay for trying to serve the majority of our readers and ensure the survival of the magazine.

For the most part we've adjusted to changes in system ownership fairly well. But the current split between TRSDOS and MS-DOS has turned us positively schizophrenic. While we've tried to integrate MS-DOS material into what has remained essentially a TRSDOS-based magazine, MS-DOS use has overwhelmed TRSDOS use. The proportion of *80 Micro* readers owning an MS-DOS computer is approaching 60 percent. Model 4 ownership, meanwhile, has dropped to below 40 percent. (The numbers for the I and III are under 20 percent.)

Obviously, the demise of the Model 4 will only cause this trend to continue. A recent survey shows that only about 8 percent of *80 Micro*'s readers have no interest in buying an MS-DOS machine.

Our surveys show emotions to be running high in both the TRSDOS and MS-DOS camps. "I don't like the MS-DOS coverage crowding out the TRSDOS coverage," wrote one reader, while another commented more bluntly, "I despise MS-DOS coverage. . . . Others already provide enough PC garbage."

Disagreeing was a reader who commented, "Too much of the magazine is devoted to TRSDOS machines." Said another, "Your attempts to be the representative for the toy-store systems is admirable but does make the mag a mish-mash of information. *80 Micro* is the only incompatible mag on the mar-



ket. . . . Make the mag strictly an MS-DOS periodical."

After several years of agonizing soul-searching, we at *80 Micro* have concluded that we can no longer straddle the fence. Starting with the January issue, the magazine will devote its entire coverage to the Tandy MS-DOS systems.

Our decision is based on two facts. First, as I mention above, our readers have swung and will continue to swing toward the Tandy MS-DOS systems. We must commit ourselves to providing those people with the best coverage possible.

Second, the third-party support market for TRSDOS is rapidly declining. Vendors report disappointing sales of TRSDOS products. Since a goodly portion of *80 Micro*'s revenues come from advertising, a decline in the fortunes of our advertisers will obviously cause a corresponding decline in the fortunes of the magazine. As much as the more idealistic of our editors (including me) would like to believe that *80 Micro* exists solely to serve its readers, we also recognize the need to pay our bills. We won't find financial stability in the TRSDOS market.

*80 Micro*'s refocus will result in the following specific changes:

Hardin Brother's The Next Step will continue in its present format but for 8088 programmers.

Harry Bee will devote his Fine Lines column to GW-Basic programming.

John's MS-DOS Column will be dis-

continued, although John Harrell will continue to write features and reviews.

All programs appearing in the magazine will be written for MS-DOS systems.

Material in Feedback Loop and Reader Forum will be for Tandy MS-DOS systems.

Several other changes unrelated to the refocus will also take place in January. Most noticeable will be a complete redesign of the magazine. A new section called Info Line will provide information on new products, user groups, newsletters, BBSes, and product updates in the Tandy market. And Public Works will be dropped, with an increased coverage of shareware products in the review and Info Line sections.

Finally, Executive Editor Michael Na-deau will be replacing me as editor in chief. I will be taking over as editor of *80 Micro*'s sister publication, *PC Resource* (more on this in my next, and final, Side Tracks).

While the systems *80 Micro* covers will be different, the type of coverage we provide will go unchanged. You can still expect a mix of applications programs, assembly-language and Basic programming tutorials, reviews of Tandy and third-party products, utilities, and the like. Some of our cover features for 1988 include a beginner's guide to DOS, an introduction to Turbo Pascal, a roundup of add-on boards, and a survey of speedup techniques for the Tandy 1000. We're excited about the coming year and hope you Tandy MS-DOS owners share our enthusiasm.

A final word to you TRS-80 owners. We do not intend to abandon the TRS-80 market entirely. We recognize the need for a source of information on the Models I/III/4 and related products. We're currently considering several options for a newsletter or small magazine exclusively for users of the older TRS-80s. We don't know yet whether a publication is viable, but if it is you'll hear about it soon.

I know this is one time I won't have to ask for reader reaction; I can hear the I/III/4 users loading their word processors already. But just in case, here's an invitation to let us know what you think. We'll devote space in a future issue to your letters. ■

Send your problems and solutions to Feedback Loop, 80 Micro, 80 Elm St., Peterborough, NH 03458. Where applicable, include the proper program name and version, the computer you're using (including any non-standard system configuration), the DOS version you're using, your phone number (not for publication unless you request it), and a self-addressed, stamped envelope.

**Hard Drivin' Man**

**Q:** I want to buy a hard drive for my Tandy 1000A. I considered buying a Seagate ST225 or ST238, but I heard differing opinions about whether or not they work. Can a Seagate drive work in the Tandy 1000A? I was told that I need a special version of ROM installed on the controller card for the computer to recognize that the drive exists. Where can I obtain the ROM if the drive dealer does not have it? (Dennis Skrzyzkowski, Plover, WI)

**A:** Both Seagate drives work with the Tandy 1000 but the hard-drive controller must be specifically configured for the 1000 and 1000A. The special ROM is the hard-drive controller BIOS. You can get a controller board from Hard Drive Specialist, 16208 Hickory Knoll, Houston, TX 77059, 713-480-6001. The Seagate controller board is too long for the 1000, but if you have a Western Digital Controller Card, Hard Drive Specialist will install the 1000A ROM for you, since the installation requires modifications and jumper cutting. I think you would be better off purchasing an entire hard-drive system as a unit configured for your 1000A.

**No Problem**

**Q:** Can Lotus's 1-2-3 2.0 run on the Tandy 1000 SX? If it can, what special procedures do you use to install the Lotus drivers to make the program run on the 1000 SX? (Eugene Becker, Flint, MI)

**A:** We run version 2.01 on the Tandy 1000 SX without any special procedures or problems.

**Free but Fuzzy**

**Q:** I have a Tandy 1000A with a CM-4 monitor—it was offered free during a Christmas sale. I am trying to upgrade the video to something that is easier on my eyes. The local Radio Shack convinced me to purchase a CM-11, but when I tried it, it was the same as the one I have. Could you tell me if the CM-



4 and the CM-11 are the same? (Jeffrey T. Schock, Posen, IL)

**A:** Some early 1000A/RGB monitor combinations displayed fuzzy video images. You might need to replace a resistor pack on the motherboard. The CM-11 should give you a better display than the CM-4. The CM-4 displays 320 by 200 text and graphics, but the CM-11 displays 640 by 200 text and graphics.

**Fast Eddie 87**

**Q:** I won a Tandy 1000, and I am interested in the viability of attaching an 8087 math coprocessor to it. My computer doesn't have a socket for the 8087, so I must use a special adapter. I am aware of the Trionix 8087 adapter in the Radio Shack catalog and the Speed Ticket offered by PG Design Electronics. If I attach an 8087 with the adapter to a Tandy 1000, will it operate as quickly as an 8087 attached to an IBM PC operating at 4.77 megahertz? (Jeffrey Lee, Cleveland, OH)

**A:** It should run as fast on the Tandy 1000 as it does on the IBM PC, providing you have installed the DMA chip (which comes with the first memory upgrade).

**Fishing for Chips**

**Q:** I have a Tandy 1000 with a memory expansion board to bring it up to 256K. I want to fill the board to upgrade my memory to 384K. The chips on the board have a Tandy number, and I cannot determine precisely the type of memory chips. Could you tell me which chips I can use in my system? I assume they are the 64K type, but the advertised chips have speeds of 120, 150, or 200 nanoseconds (ns), and I can't determine which to use. (James McLean, Milford, CT)

**A:** The 120-, 150-, or 200-ns chips will work. The 200-ns chips are probably less expensive, assuming that they are fast enough for you. Otherwise it doesn't matter.

**Playing the Percentages**

**Q:** I am interested in a simple, possibly one-line, MS-DOS batch file that, when invoked, checks the destination drive to see if any files on it match those on the source disk. If any do, only these files would be copied from source to destination. The purpose of this is to update a disk where you maintain a backup, but do not care to copy all files onto the backup—such as when you have software programming and data files on a source disk but only want to copy the data files to the backup disk. I've seen many utilities that copy updated files by date or time, but none that make evaluations according to what already exists on the destination disk. (R.T. Davis, Birmingham, AL)

**A:** The following command updates your backups in the manner you describe: A>FOR %P IN (\*.\*) DO IF EXIST B:%P COPY %P B:

In this example, the source drive is the A drive and the destination drive is the B drive. DOS takes each file entry from the root directory of the default drive and searches for a file of that name on the B drive. If the file exists in the B drive, the file is copied from the default drive to the B drive. To include this command in a batch file, you should use double percentage signs, like this:

```
FOR %P IN (*.*) DO IF EXIST B:%P COPY %P B:
```

You can also substitute other sets in place of the (\*.\*). For example, if you only want to back up DAT files, use (\*.DAT) instead.

**Wasn't in the Cards**

**Q:** I have a 128K Tandy 1000A. I tried to upgrade the memory using multifunction boards to bring it up to 640K. First I tried the PBJ board. When I turned on the computer, it read 640K, but during the memory check, I got the following memory error:

Written	Read	Base	Offset
056A	856A	8000	DF30

Since I've never had any problem with the computer, I sent the card back and got a new PBJ board. I got the same results with the second one. I switched to the Zuckerboard multifunction board and got the same error. I took the com-

puter to Radio Shack, and after they checked it over completely, they said nothing was wrong with it. The computer works fine at 128K. There is a jumper on the Zuckerboard for 384K or 640K. If I put the jumper on 384K, the computer works fine, but I get the error every time I try 640K. I tried swapping all the memory chips on the board between bank 1 and bank 2 with the same results.

Has anyone run into this problem before? Radio Shack says the problem is with the boards, and the technicians for the boards say the problem is in the computer. (John R. Henrie, Shalimar, FL)

**A:** It is rare to purchase three different memory expansion cards from two different manufacturers and find the same problem occurring in each of them. I tend to think the fault is with the computer. Any memory added to the Tandy 1000 is pushed under the 128K of system memory on the motherboard. If you add 512K of memory on the board, as you have, the additional memory is addressed starting at paragraph 0000H. The RAM on the motherboard is addressed starting at the end of the added memory, at paragraph 8000H.

This happens because the Tandy uses the last 16K of the system RAM for video memory. There is no physical memory in the B800H segment where the IBM video normally resides. Instead, all reads or writes to the B800H segment are routed to the segment starting at address 9000:C000 (for a 640K system) by the hardware. It is necessary to keep the memory on the motherboard at the top of the addressable memory space so that the rest of the system memory is contiguous. The error message indicates that your problem occurs at address DF30H in the 64K memory segment starting at address 8000H. This implicates a chip on the motherboard, specifically the U68, rather than one on the multifunction board. I recommend that you try replacing the U68 chip.

## Looking for Reliable Reviews

**Q:** I need information on where I can obtain reliable educational software reviews. The software review organization should be nationally recognized and affiliated with professional teachers or a university. They should have a journal, periodical, or other publication available to individuals, teachers, and school districts. My personal experience has taught me that there is a lot of bad software out there! Because it is not always possible to "try before you buy," the next best thing is to rely on professionals who can test the software. (James L. Negrone, Tampa, FL)

**A:** The following magazines should

give you some help: *The Computing Teacher* (University of Oregon, 1787 Agate St., Eugene, OR 97403) and *Classroom Computer Learning* (Peter Li Inc., 2451 E. River Road, Dayton, OH 45439).

## It Just Said No

**Q:** I've been an addicted Model I user from its inception and use it mostly for programming in Basic using Newdos. A year ago I bought a Tandy 1000 and discovered many subroutines that work on the Model I do not apply to the 1000. Two subroutines that I particularly miss are the Newdos CMD"O", which sorts my address lists, and the subroutine that changes LPrint to Print for video viewing.

On the Model I, to change LPrint to Print, all I do is insert Poke 16422,88 and Poke 16423,4 in place of Poke 16423,141 and Poke 16423,5 for the LPrint. Is there a similar subroutine that I can use on the Tandy 1000? (John R. Schmidt, Gibbstown, NJ)

**A:** If you want to sort a list of items in a file, the Sort command can do it for you. If you have an unsorted file named Unsort.TXT and want to sort it into a file called Sorted.TXT, use this command at the DOS prompt:

```
Sort <UNSORT.TXT>SORTED.TXT
```

To sort in reverse order, add the /R switch onto the sort command:

```
Sort/R <UNSORT.TXT>SORTED.TXT
```

Routing the printer output to the screen is a different story. DOS doesn't offer an easy way to do it. However, since the Basic interpreter appears to use the standard DOS printer-control interrupt for all printed output, it is possible to write a simple resident program that traps the printer interrupt and redirects it to the video interrupt for display on the screen. You could almost do this by poking new values into the interrupt table, as you might be hinting, but the DOS printer service and video service each look for different values in the AL register to tell them what to do. Redirecting the interrupt should allow you to send your printed output to the screen not only with Basic but with any other software that uses the DOS printer interrupt for printer control. Unfortunately, explaining how to create this utility is a subject more involved than I can cover in Feedback Loop.

## Those Bleeping Bugs

**Q:** I use Visicalc 2.9.2 with LS-DOS 6.3.0 on a 128K Model 4 and have a problem using the spool utility. Regardless of whether I reserve bank 1 or bank 2, I get screen garbage, or the spooler refuses to work if the length of the spreadsheet is close to filling the remaining RAM. In ad-

dition, I cannot release the bank afterward without an error message that says no RAM was reserved, yet the bank remains reserved. All I can do is reboot to get all the available RAM back.

I wrote Logical Systems Inc. (LSI) about this. LSI responded that the problem is in Visicalc, which has no mechanism to recognize RAM that has been reserved for spooling; it just writes over it. Radio Shack advised that 2.9.2 was the last version of Visicalc made for the Model 4 before its production was discontinued.

A second bug in Visicalc is that it refuses to let me insert a column (using the /IC command) in a large spreadsheet; it just beeps. Inserting a row (with /IR) is never a problem. Do you know of patches for these problems? (Henry A. Blumenthal, Jacksonville, FL)

**A:** Fixing the bank overwrite problem requires a major patch that I don't have. Visicalc does not respect the TRS/LS-DOS 6 banking scheme, because it requires the extra 64K of memory space for operation. Its approach also allows it to speed up bank switching without going through the slightly slower SVC selection techniques.

Have you considered using a disk buffer instead of RAM? (See the explanation of the Spool command in your TRS/LS-DOS manual.) Though a disk buffer is slower, it is still faster than waiting for the printer to finish a job.

Inserting columns on a large spreadsheet can cause problems if there is not enough room to accommodate both the new cells in the new column and the extra memory required to process this work, especially if the template is much taller than it is wide. The row-insertion process is much simpler than adding columns, since the cells below the new row can be moved down as a single block. A column requires each individual row to break up and move for each new columnar cell. If there is not enough room, Visicalc issues a warning beep that indicates a problem in carrying out your command.

## TRSDOS Conversion

**Q:** How do I copy a program or file from TRSDOS 6.1 to TRSDOS 1.3? (Jay Cox, Wayne, NJ)

**A:** Using TRSDOS 6.1, format a disk as single density, 35 tracks. You can copy or save to the disk from TRSDOS 6.1. TRSDOS 1.3 can read the disk with its Convert utility.

## Delta Patch

**Q:** In December 1985, you published patches to eliminate the delta marks in Model 4 Superscriptit that indicate a double horizontal space (see Reader Forum, p. 27).

I use Superscript to teach word processing and found that students have difficulty using the delta mark. I upgraded to version 1.02.00 and the patches don't work. Can you give me new patches for 1.02.00? (P. Martin Erlengaugh, Fremont, IN)

**A:** The delta symbol offers a good space-saving capability, but it also has many foes. The following patches remove the delta on Superscript 1.02.00:

```
PATCH SCRIPSIT/CTL (D05,3F=18:F05,
3F=20)
PATCH SCRIPSIT/CTL (D15,E5=18:F15,
E5=28)
PATCH SCR35/CTL (D01,30=18:F01,
30=20)
```

You can also eliminate them by holding the shift key down when you make multiple, consecutive spaces.

Another patch that has been provided for every other version of Scripsit, Superscript, and Scripsit Pro makes a solid, non-blinking cursor. The patch for Superscript 1.02.00 is:

```
PATCH SCRIPSIT/CTL (D1A,EC=28 FB 00
00 00 00:F1A,EC=20 04 1B BA 20 F7)
```

## Mismatch Message

**Q:** I tried to put in the patch that boots my computer into uppercase, but I got a "Find line mismatch" error message. I have a Model III upgraded to a Model 4 with two disk drives and TRSDOS 6.1.2. What's wrong? (W. Daskam, Sorrento, FL)

**A:** TRSDOS 6.1.x stores the uppercase-mode byte within SYS0/SYS at a different location than in 6.2 and LS-DOS 6.3. This 6.1 patch lets you boot in uppercase mode:

```
PATCH SYS0/SYS.LSIDOS (D00,93=20:F00,
93=00)
```

## French Brackets

**Q:** I use a Model 4 with Superscript 01.01.00. Since I am a professional writer, I bought a Tandy Modemfone 100 and Omniterm Plus software to communicate with a newspaper.

The newspaper's computer uses a French bracket (curly brace, {, decimal 123, hex 7B) in its log-on filing codes.

There isn't a symbol for this on my keyboard, and it's not available in Superscript. I think you can get it in TRSDOS by pressing the clear-shift-comma (,) key combination. I need to send the bracket in my opening and closing sequences. An additional complication is that I must change the dateline in the opening sequence each week to keep it current.

How can I easily send a symbol to another computer that's not available in Superscript? (Tim Jones, Sharon, NH)

**A:** The Program Listing does the job in Basic for you. It asks you to insert the variable data and then writes a beginning file (line 80) that contains the initialization codes you need (line 70). It also writes a file containing the required closing codes (line 50). Finally, it appends the files to each other, stripping the end-of-file byte (lines 100,110), and copies the new file over the original file (line 120). The article file is ready to send. Insert the particular codes that you need for your communications. Line 50 contains the ending characters. The beginning characters' data is in A\$ in line 70.

## READERS RESPOND

### Printing Illustrations

Hal Songer of Birmingham, AL, responded to Peter Dutcher ("Help Wanted," August 1987, p. 14), who wants to print graphics on a DMP 100 using Micro Illustrator.

He suggests Mr. Dutcher run Graphics.COM from MS-DOS 2.11.22 or later before running Micro Illustrator, and that he select the Tandy DMP Standard choice printer. Then run Micro Illustrator. Call the picture you want to print and press shift-print to dump the picture.

### Beautiful Colors

Dexter Walker of Birmingham, AL, responds to Donal B. Marcus's search for color ribbons ("Help Wanted," August 1987, p. 14) to fit the Tandy DMP 130 printer. He recommends you get Macinker (about \$60) from Computer Friends, 14250 N.W. Science Park Drive, Portland, OR 97229 (800-547-3303). Normally, you use Macinker to re-ink printer ribbons with black ink.

They also sell ink in nine other colors and sell un-inked ribbon cartridges as well. A complete cartridge including un-inked ribbon lists at \$9.00, and the ribbon that you load into an empty cartridge costs \$4.50. For each color ink you want to use, you have to buy an inking roller, which puts the ink on a ribbon and sells for \$5.00. The Macinker machine supports the cartridge and has an electric drive that uses a gear train to provide both clockwise and counter-clockwise ribbon feeds. Dexter has re-inked cartridges 15-18 times before the fabric wears through.

## The Word on Printers

James Petrou of Wichita, KS, tells us that the Citizen Premiere 35 daisy-wheel printer is compatible with the protocols for the Diablo 630 and the NEC 3550, for which drivers appear in the Microsoft Word 3.x package.

## HELP WANTED

► Robert J. Perry, CCCE, 6 S. 561 Naper Blvd., Naperville, IL 60540, wants a design-your-own-function-key template to fit the Tandy 1000 keyboard.

► C.S. Tegge, P.O. Box 517, Laurel Springs, NJ 08021, has a Star Micronics Radix-10 printer and a Tandy 1000 SX with MS-DOS 3.2 and GW-Basic 3.2. He is having a problem printing graphics.

He said when he enters Graphics.COM and uses the C option (PC-compatible printer), he can create graphics on the screen using a Basic program and send this to the printer by pressing shift-print or using the Call routine in the July 1987 issue ("Untended Screen Dumps," p. 11).

"The printed image is off because of incorrect line feeds. The line feed is 1/6 inch and it appears that a 1/10-inch line feed would be correct. These line feeds for the graphics are 1/6 inch regardless of the setting of the DIP switches or previous commands to the printer for a different line feed. If I select the D (graphic printer) option the line feeds are 1/3 inch," he said.

The 1984 Radix User's Manual (p. 183) describes a fix for graphics using Debug for PC-DOS 2.0. This fix does not correct the problem for him.

► John L. Anderson, 10423 Sandpiper Road W., Bradenton, FL 33529, wants to know why his Tandy 1000 doesn't recognize the existence of his 10-megabyte hard drive during periods of high humidity. When he tries a cold boot with the drive A door open and the hard drive powered on, he gets a "Non-system disk" message. When he boots with the system disk in drive A and tries to log onto drive C, he gets an "Invalid drive" message. His system went to repair facilities twice, but there the problem wasn't duplicated. ■

### Program Listing. Model 4 Basic routine to send symbols.

```
10 PRINT:PRINT "Prepare article for sending":PRINT:PRINT
20 PRINT "FILES WILL BE PLACED ON DRIVE 1":PRINT:PRINT
30 INPUT "Press ENTER to continue...",I$
40 CLS:PRINT:PRINT:INPUT "Enter variable data: ",C$
50 OPEN "O",1,"E/SND:1":PRINT#1,CHR$(123):CLOSE
60 OPEN "O",1,"B/SND:1"
70 A$=CHR$(123)+"ET"+CHR$(123)+"SL"+C$+"QUNHWEK-USR"+CHR$(123)+"BYTJONES"+CHR$(123)+"BT"
80 PRINT A$:PRINT#1, A$:CLOSE
90 PRINT:PRINT:INPUT "Enter Name of Superscript file: ",NM$
100 P$="APPEND "+NM$+" B/SND (STRIP)":SYSTEM P$
110 P$="APPEND E/SND B/SND (STRIP)":SYSTEM P$
120 P$="COPY B/SND "+NM$+"1":SYSTEM P$
130 PRINT:PRINT:PRINT "DONE":END
```

End

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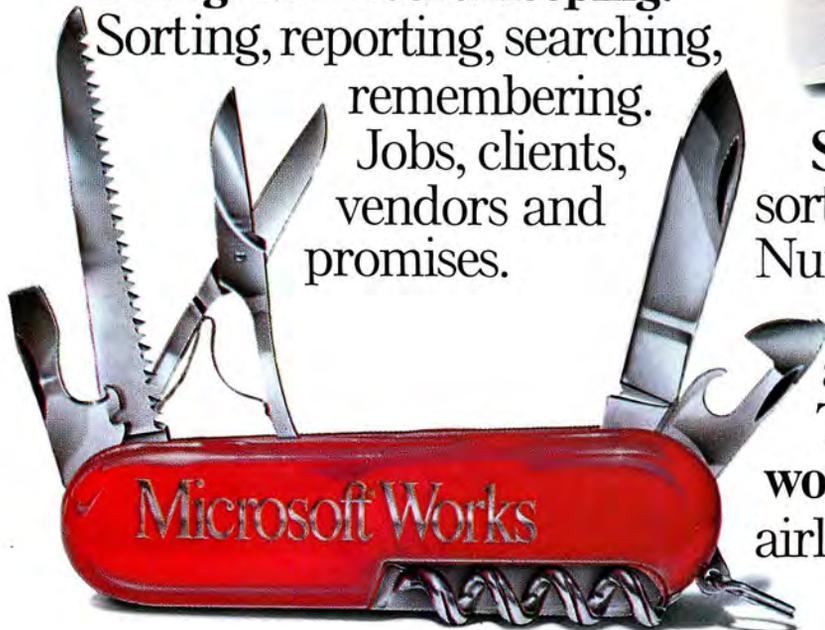
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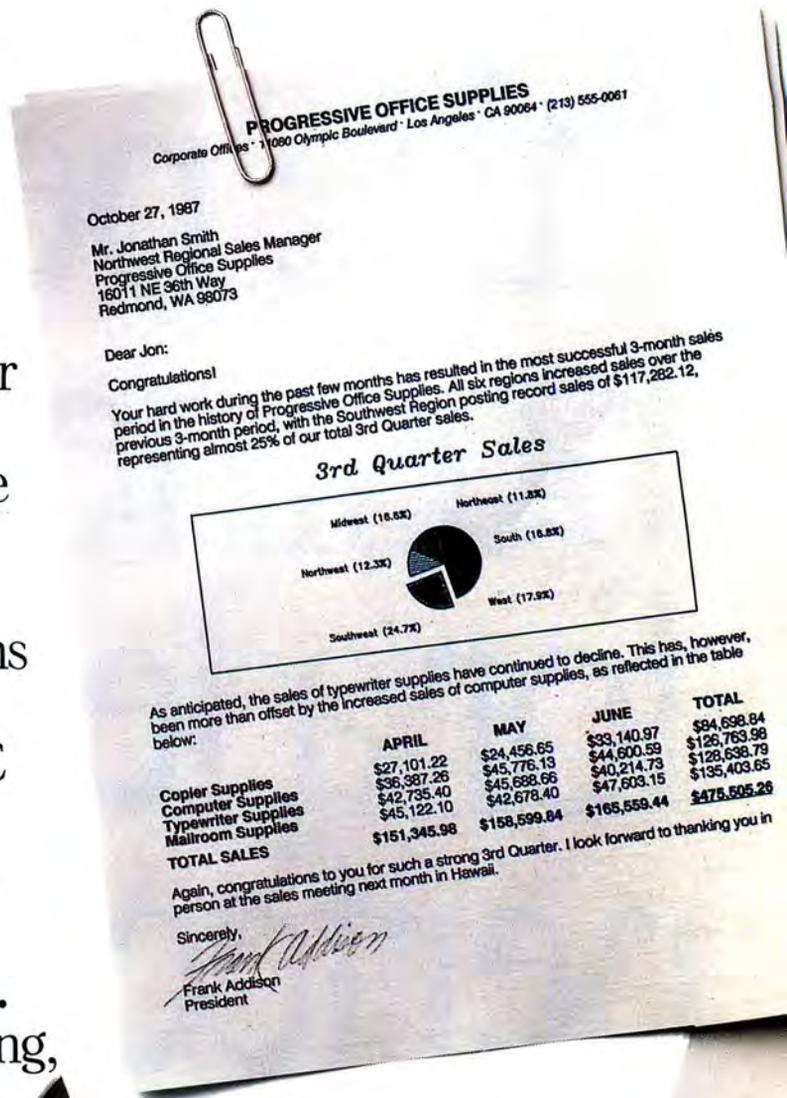
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**3rd Quarter Sales**



As anticipated, the sales of typewriter supplies have continued to decline. This has, however, been more than offset by the increased sales of computer supplies, as reflected in the table below:

	APRIL	MAY	JUNE	TOTAL
Copier Supplies	\$27,101.22	\$24,456.65	\$33,140.97	\$84,698.84
Computer Supplies	\$36,987.26	\$45,776.13	\$44,600.59	\$126,763.98
Typewriter Supplies	\$42,735.40	\$45,688.66	\$40,214.73	\$128,638.79
Mailroom Supplies	\$45,122.10	\$42,678.40	\$47,503.15	\$135,403.65
<b>TOTAL SALES</b>	<b>\$151,345.98</b>	<b>\$158,599.84</b>	<b>\$165,559.44</b>	<b>\$475,505.26</b>

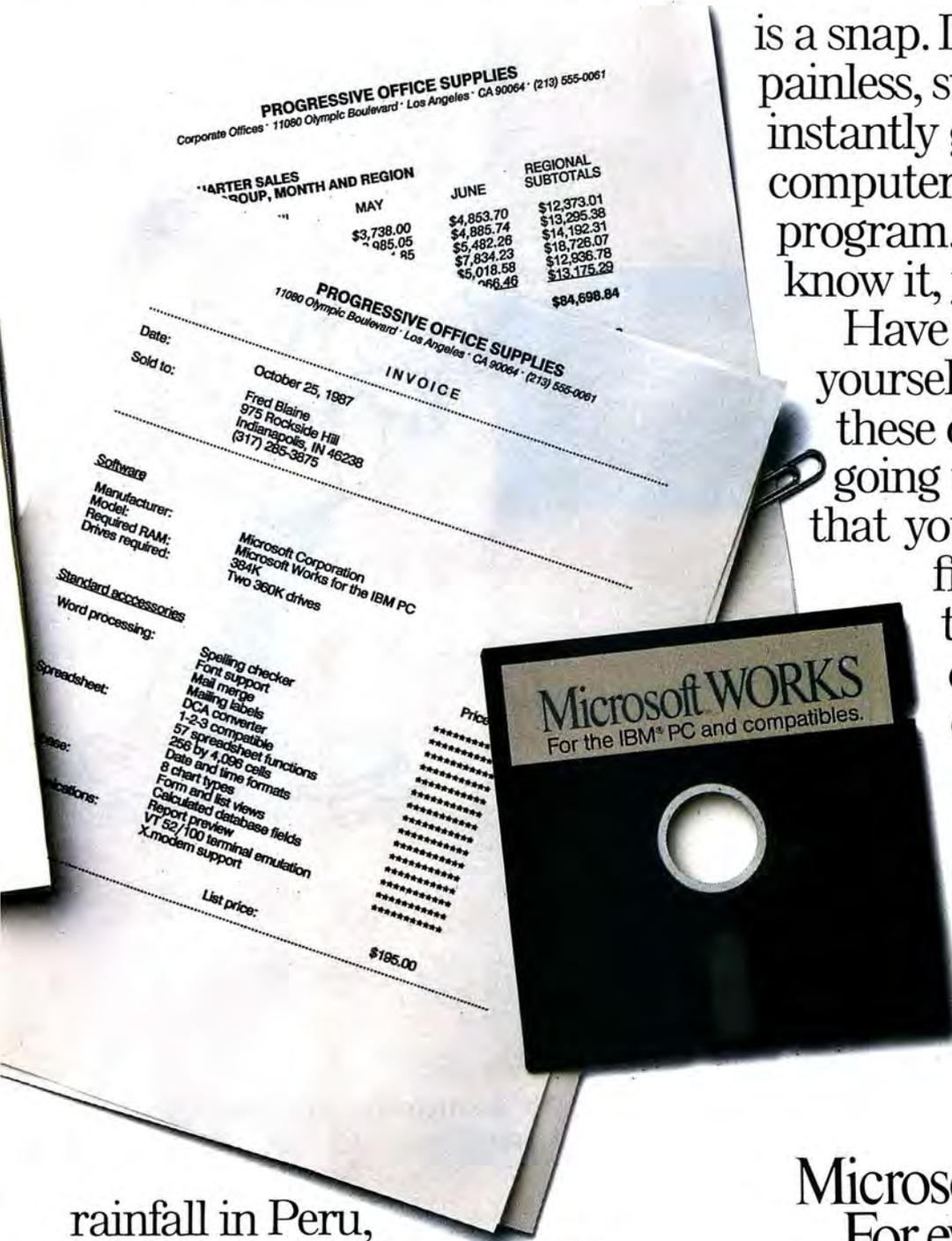
Again, congratulations to you for such a strong 3rd Quarter. I look forward to thanking you in person at the sales meeting next month in Hawaii.

Sincerely,  
*Frank Addison*  
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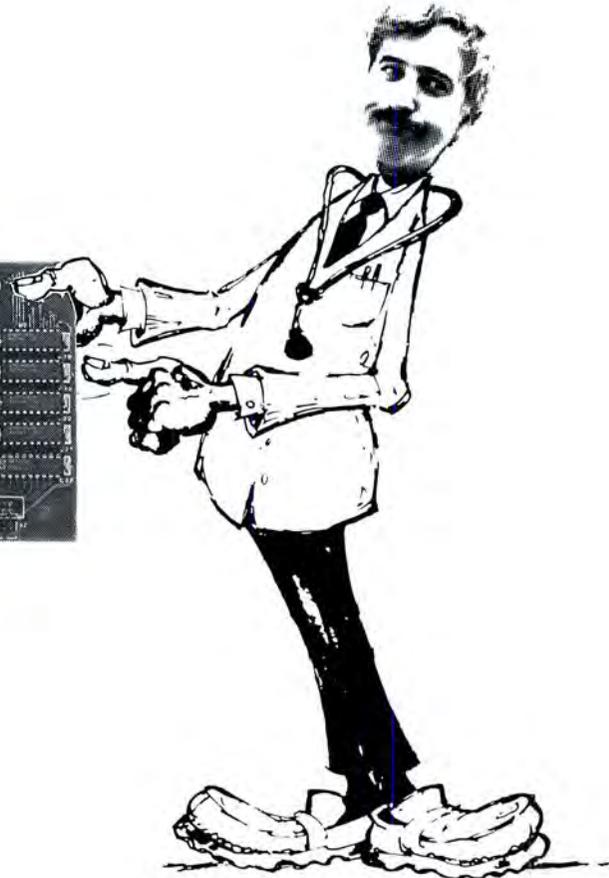
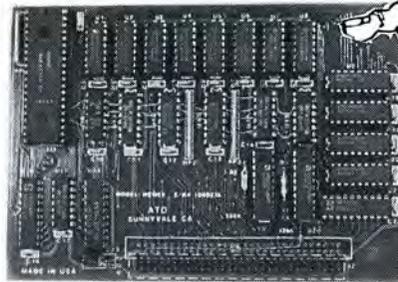
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# 'Hello, Sweetheart, Give Me Rewrite'

## Tandyland

In the days of "Front Page" you could tell a reporter at any public meeting. He was the guy in the wrinkled suit and porkpie hat scribbling furiously in a notebook or sometimes just on scraps of paper. Today he is often a she, and while wrinkled suits are still commonplace, handwritten notes have largely gone the way of porkpie hats. If you want to spot a newspaper reporter today, look for the Model 100.

About the time newspapers traded in clunky manual typewriters for big, dedicated word-processing systems, the reporters in the field started discovering Tandy's original laptop computer. Instead of scrawling notes they often couldn't read a half hour later, they typed quotes from politicians and the powerful on their 100s, fashioned the notes into stories on the same computers, and rushed for the nearest phone to transmit the stories to the mainframe. "Hello, sweetheart, give me rewrite" has been replaced with the whine of a modem.

Journalists are by and large a low-tech bunch. They've accepted laptops as a better and faster way to file stories, but you won't find many of them demanding bigger, faster, better computers.

"Most reporters are not interested in computers generally," says Kenneth Mannings, who's in charge of keeping track of the 145 Model 100s and Tandy 200s used by reporters at the *Washington Post*.

Although Tandy laptops are standard equipment at a number of papers, the introduction of the more powerful MS-DOS Tandy 1400 LT hasn't inspired a great many of them to upgrade en masse. While other computer users might appreciate the ability of the 1400 to run data bases, graphing programs, financial analysis, or most any other MS-DOS software, increased capability doesn't have much meaning for news-



Tandy's 1400 LT is high-tech to the average reporter.

paper staffers.

"Right now the 100s and 200s serve our purposes," Manning says. "The reporters take them out, write their stories, and transmit them in. That's all they want to do."

Because Tandy introduced the 100 at a time when it had no real competition, and it met handily the relatively simple needs of reporters, it quickly became the standard laptop for journalists. Although no hard figures are available, chances are that newspaper staffs constitute Tandy's largest single base of laptop users.

Ed Juge, director of market planning for Tandy, says the company at one time tried to capitalize on this near monopoly by pushing its older laptops as more versatile machines for reporters.

"We used to put out a publication from Tandy on hints every so often about other uses for the 100s," Juge says, "and we asked journalists if they were interested in getting more of that type of information. The answer was 'Hell, no.' It was more than they needed. They didn't want something to schedule their appointments and dial their phones. They just wanted a portable typewriter."

That may be changing. More desktop

computers are turning up in newsrooms. In some cases they supplement mainframe word-processing systems. (An IBM clone can be cheaper than the terminals for some newspaper systems.) In other cases reporters use them as tools for investigative research—searching data bases for property ownership or correlating crime statistics. As reporters in the office discover they can use computers for more than writing, more powerful laptops become attractive as tools to use on the beat.

That's what's happening at a large financial daily (which asked not to be identified). The paper's bureaus are in the process of converting from mainframe

publishing systems to personal computers. At the same time, the publication has been supplementing its Model 100s with Toshiba laptops.

"The initial reaction of everyone," says a staffer in charge of the switch to PCs, "was that they just wanted to learn one program—word processing. But now they're starting to get more adventuresome."

At a few papers contacted at random, some were planning to look at the Tandy 1400s with the idea of upgrading or at least supplementing their 100s and 200s. Another manager of laptops at a newspaper praised the ruggedness of the Tandy machines his paper is already using and said that he would naturally be looking at a brand he knows and is happy with. But at the previously mentioned newspaper that wished to remain anonymous, the 1400s may have already lost out to the Toshibas because of timing.

"We'd rather not have too many different types of computers," says another staffer at the same paper. "You learn one machine, and you tend not to want to have to learn another."

The use of laptops other than Tandys is still rare among newspapers because re-

**A Command to Kill**

LS-DOS 6.3 has no Kill command; you must either use Remove or patch the operating system to use Kill and not to use Remove, which could cause a problem with some software.

To get around this problem, I wrote a program (see Program Listing 1) for creating a Kill command and much more. Your new commands will have the same functions as existing TRS-

DOS commands. For example, to create Kill in LS-DOS 6.3, put the command Remove, followed by a space, in the CMD buffer (see line 240). Then assemble the program and call it Kill/CMD. Now just type KILL file name, and it will be changed to REMOVE file name. You can do this with as many commands as your disk space allows.

Scott McBurney  
Macomb, IL

*Program Listing 1. A program to create a Kill command.*

```
00100      ORG      3000H
00110 START  LD      DE,BUFF ;get buffer address
00120 LP1    LD      A,(HL) ;get a char from DOS buffer
00130      LD      (DE),A ;move it to new buffer
00140      CP      13 ;CR=done with move
00150      JR      Z,EXEC ;if done,execute new cmd
00160      INC     HL ;next buffer location
00170      INC     DE
00180      JR      LP1 ;get next character
00190 ; Move the command line to our buffer
00200 EXEC  LD      A,24 ;CMDI svc
00210      LD      HL,CMD
00220      RST    2BH
00230 ; Pass new command to DOS
00240 CMD   DEFB   'REMOVE '
00250 BUFF  EQU    $
00260      END     START
```

End

**Your Own Set of Tokens**

One problem using Hardin Brothers' Restore patch program ("Restore Patch Revisited," October 1983, p. 24) on the Model III is that the Name command in Basic under TRSDOS 1.3 does not recognize Restore when renumbering the Basic program. Therefore, it ignores any line numbers after the word.

I worked out a patch so that you can select your own set of tokens that the TRSDOS 1.3 Basic Name command will recognize. Name recognizes 12 tokens and correctly changes the line numbers that occur after them. The token numbers and corresponding words

they define are shown in the Table.

I have never needed to use Auto in a Basic program followed by a line number, so I use the following patch to replace Auto with Restore. The token number for Restore is 90 hexadecimal (hex).

```
PATCH *12 (ADD = 4F8B,FIND
          = B7,CHG = 90)
```

Since the tokens beginning at 4F8B hex are B7B69D-9FC28EB4B58DCA9195, you can use this information to change the tokens to recognize whatever command word you choose.

Howard W. Mueller  
Pocahontas, MO

B7 Auto	B6 Delete	9D Edit	9F Resume
C2 ERL	8E Run	B4 List	B5 LList
8D Goto	CA Then	91 Gosub	95 Else

*Table. Token numbers and corresponding words the Name command will recognize.*

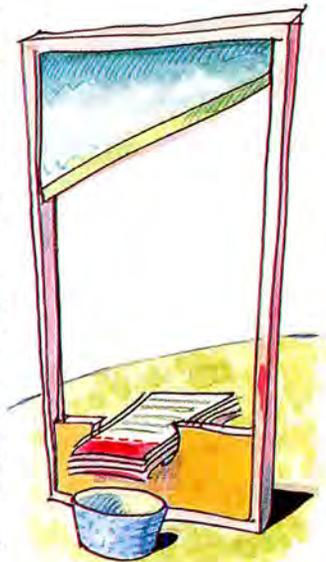
Got a hot tip you would like to share with our readers? Send it to Reader Forum, c/o 80 Micro, 80 Elm St., Peterborough, NH 03458. We pay \$10 for each tip we publish. We regret that we cannot return or acknowledge Reader Forum submissions.

**Beheadings**

The patches in Program Listings 2 and 3 for LDOS 5.1.4 and 5.3.x remove unnecessary headings, line separators, and form feeds from CMD"X" cross-reference utility printouts, making them more readable and compact. (Install the patches on a backup copy of the master disk only.)

Because the standard format prints 50 lines (including the heading) and then 16 blank lines before the next heading—and the printer trundles on regardless—using the patches on continuous paper makes better use of paper by listing the output without interruption.

Bryan Darby  
Tonbridge, Kent, England



*Program Listing 2. A patch to make the LDOS 5.1.4 CMD"X" utility more readable.*

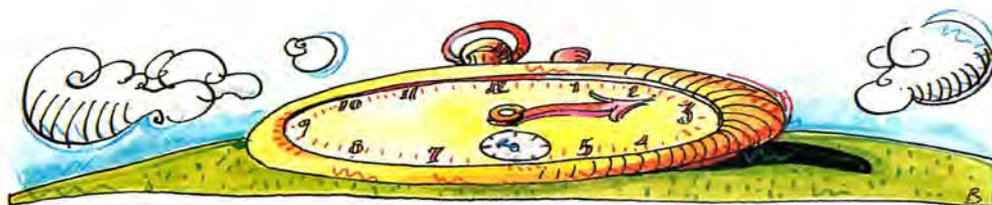
```
.The syntax for installing the patch is:
.PATCH LBASIC/OV2.BASIC USING XREF514/FIX
.
D04,47=00
D05,6A=00 00 00 00 00
D05,70=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,80=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,90=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,A0=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,B0=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,C0=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,D0=00 00 00 00 00 00 00
D05,D9=00 00 00 00 00
.EOP
```

End

*Program Listing 3. A patch to make the LDOS 5.3.x CMD"X" utility more readable.*

```
. The syntax for installing the patch is:
.PATCH BASIC/OV2.BASIC USING XREF53/FIX
.
D04,49=00
D05,6C=00 00 00 00
D05,70=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,80=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,90=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,A0=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,B0=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,C0=00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
D05,D0=00 00 00 00 00 00 00
D05,D9=00 00 00 00 00
.EOP
```

End



**On Your Mark, . . .**

I wrote a two-line time calculator in Model 4 Basic (see Program Listing 4) that I find handy when timing long number-crunching jobs. It would serve equally well for any application for which a resolution of whole seconds is sufficient.

For any Basic that does not handle integer division (as represented by the back-

slash), change the portion of line 10001 that reads:

```
T$ = MID$(STR$(A! - VAL(T$)*3600)\60),2)
```

```
to:
T$ = MID$(STR$(INT((A! - VAL(T$)*3600)/60)),2)
```

To use the routine, set T2\$ = Time\$ just before you begin the application you want to time. When it finishes, set T2\$ = Time\$ and

branch to the subroutine (in this case, Gosub 10000). The routine uses the variables A! and T\$ while it is calculating, so if your program also uses these variables, you must save your values before the Gosub. On return, the variable ET\$ contains the elapsed time in HH:MM:SS format.

Mark J. Gustitis  
Media, PA

*Program Listing 4. A time calculator.*

```
9137 | 10000 A!=VAL(LEFT$(T2$,2))*3600+ VAL(MID$(T2$,4,2))*60+ VAL(RIGHT$(T2$,2))- VAL(LEFT$(T1$,2))*3600- VAL(MID$(T1$,4,2))*60- VAL(RIGHT$(T1$,2)): IF A!<0 THEN A!=A!+86400!
11988 | 10001 ET$="00:00:00": T$=MID$(STR$(INT(A!/3600)),2):MID$(ET$,3-LEN(T$))=T$:T$=MID$(STR$((A!-VAL(T$)*3600)\60),2):MID$(ET$,6-LEN(T$))=T$:T$=MID$(STR$(A!-(VAL(ET$)*3600+VAL(T$)*60)),2):MID$(ET$,9-LEN(T$))=T$:RETURN
```

End

**Missed Target**

I found a bug in Model 4 Scripsit Pro's PROCONV/CMD program, the program that converts Superscripts documents to Scripsit Pro format.

The bug crops up when you choose to convert all files or the System/CTL file. With either of these selections, you are prompted for source and target drives. If by chance you select an illegal target drive, you are prompted again, but afterward the program aborts with an illegal drive error.

The reason for this is an improper program transfer that sets the illegally selected drive number to the source drive before the reprompt. The following patch corrects this transfer problem, setting it to point to the proper address:

```
PATCH PROCONV/CMD(D00,B3 =EA:FOO,B3 =E4)
```

David Goben  
Mansfield Center, CT

**Profile Pitch**

By adding print codes to the report format of Profile 3+ and 4+ on the Models III and 4, you don't need to remember to change the printer pitch before you run a report. This is especially handy if you have many reports of both 10 and 16 pitch.

You need a disk-file editor such as FED, Super Utilities Plus (4/4P), or Diskdump. Using the editor, view sector 00 of your report format. If the first line of your heading is centered, the leading characters will be spaces (20 hexadecimal [hex]). All you have to do is replace the first couple of spaces with the necessary printer codes. For my DMP 200, 1B 14 hex changes print to 16 pitch.

There's one small side effect: Your title is now two spaces to the left of center. To correct this, return to the Define Reports section of the Profile Creation menu, recall the format, and insert the

same number of spaces you used for your print codes, now visible, and your title. It won't look centered on the screen, but it will be centered on paper.

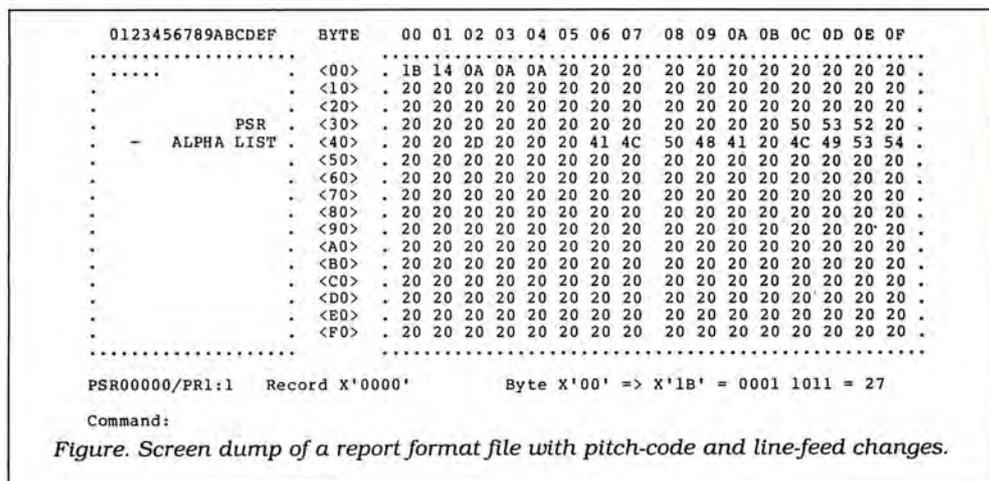
If your title is left-justified on the first line, use Profile's Define Reports *first*, and move the title to the right enough spaces to fit your

print codes. Now that you have room for your print codes, use your disk-file editor to insert them.

The Figure shows a screen dump of the first sector of a report format file to which I've added DMP 200 16-pitch codes (1B 14 hex) and three line feeds (0A hex). The line feeds move the title down the

page to align the paper on the perforation. If you use line feeds, remember to include them as lines when completing the Define Reports section of Profile. That is, if you want 60 lines per page, answer the prompt with 63, 60 plus your three line feeds.

David Krebs  
Amherst, OH



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# Eleventy-Billion

**S**o you *don't* want to talk about searching text files. Fine. Forget I mentioned it.

It wasn't a popular exercise, but Oscar Cottingham (Florence, SC) solved the problem in style—for which I'm a T-shirt's worth of grateful. I was looking through disk-based text files, trying to find all occurrences of a given string. I took the text in record-sized chunks and cut those into two pieces—mostly because TRS-80 default records, at 256 bytes, were too big to fit into strings. With the text sectioned that way, I figured the target string would occasionally lay across the cut, and I'd miss it.

In Oscar's solution (Program Listing 1), he clipped the end off the last piece he looked at and "glued" it onto the front of the next piece he'll search. (That's the subroutine at line 250.) In the bargain, he tested for the expected end-of-file marker, ASCII 26, while he converted to lowercase at line 210.

## Oh, Those Numbers!

Frankly, when I asked you to convert numbers to words, I didn't consider all the implications. It's quite a job, as your heroic efforts demonstrated. You had to answer all kinds of corollary questions such as: How to handle capitalization? Punctuation? How to get the spacing right? What to do with characters that aren't numerals, like commas? What to do with anything to the right of the decimal point? I asked how many numbers you could find words for, without asking myself how large a number you could stuff into one string, W\$. Then, in a fit of unconsciousness, I casually asked you to reverse the process from words to numbers.

Instead of despairing, you answered all the questions and then some. Of course, no one did the job in one line of Basic. You're all fired. Just kidding. A substantial amount of code is required for a job like this.

Michael Guerard (Wenonah, NJ) took a direct approach to the problem and imposed strict limits on what his program would and would not do (see Program Listing 2). He stuck with Input (rather than change to Line Input) to eliminate commas. He accepted no more than nine numbers and no characters that aren't numbers, and that includes the decimal point. He capitalized every word, inserted



the hyphen between decades and units, and put spaces elsewhere. The code is easy to follow—an excellent example of how to catch a Mustang and ride her home. Above all, the program is reliable.

How far can you take these numbers? Barry Mitchel (Reading, MA) named them through undecillions (that's up to 39 digits to you and me), just beyond where Basic breaks down completely. Next come dodecillions, I think, and everything after that is called "many" in my house. Barry also warns that in one string the best you can represent is the equivalent of 19 to 25 non-zero digits, depending on the digits. Even 19 is pushing it.

To print more than the maximum that one string could hold, two of you provided two strings. John Stockwell (Troy, NY), however, dispensed with strings entirely and printed as he went, which is the way I favor. Everyone looked at the digits in triplets. Some added leading zeros to lop them off three at a time, and others picked single numbers in groups of three until they ran out. Edward Meyer (San Antonio, TX) took a different approach and loaded the digits into a three-column matrix.

The enormity of the job and the many possibilities made it perilous to take on too much of it. Among my favorite unexpected results were the program that counted to "twelve three thousand" and the one that invented "thousillions." These breakdowns illustrate two good rules for any programming: First, divide

every project into small, manageable tasks. Second, define your limits clearly.

That's what Greg Wolking (Orlando, FL) did. He also came up with a practical application for the routines. He suggests they'd be at home in a check-writing program and formats numbers to the right of the decimal accordingly. He uses the age-old banker's method of rounding: Banks always round down and keep the fractions of cents (it adds up). Greg's program (Program Listing 3) handles integers 16 digits long, or 14 digits when you add a decimal point. The program simply mutilates numbers it can't handle. Greg's use of functions keeps the code compact.

A couple of you took a shot at reversing the process. Robert McClernan's (Kearney, MO) pretty effort shows how big a job it is to give a program a vocabulary (see Program Listing 4). Like Greg's program, Robert's is faultless with its limits—lowercase, no punctuation, and nothing fancy. When it encounters something beyond its ken, it plays dumb.

## Cubits

Shelly Berryhill (Hawkinsville, GA) suggested an interesting puzzle that originated with H. E. Dudeney, a well-known puzzler. If you want to find the cube root of a number, can you just add its digits? Take 512. The sum of its digits is 8, which is its cube root. Take 4913. Its digits total 17, also its cube root. Is this a law of nature or happenstance? How many of these numbers exist? All it takes to find out is a

## Program Listing 1. Oscar Cottingham searches across the border.

```

4567 | 10 CLS:INPUT"File";F$:INPUT"Find";I$:GOSUB 200:S$:T$:S=LEN(S$):PRINT
2359 | 20 OPEN"R",1,F$,128:FIELD 1,128 AS R$:T$=""
1859 | 30 FOR R=1 TO LOP(1)/128:GET 1,R "TRS-80s: don't divide by 128
1739 | 40 I$=T$+R$:GOSUB 200:M=1:D$=""
2148 | 50 P=INSTR(M,T$,S$):IF P=0 THEN 80
3246 | 60 D$=D$+MID$(I$,M,P-M)+"<"+MID$(I$,P,S)+">":M=P+S:C=C+1
1499 | 70 IF M<LEN(T$) THEN 50
4241 | 80 D$=D$+RIGHT$(I$,LEN(I$)+1)-M):GOSUB 250:IF M>1 THEN PRINT D$:PRINT
2623 | 90 NEXT R:CLOSE 1:PRINT C;"found.":END
1571 | 200 T$="" :FOR I=1 TO LEN(I$)
3078 | 210 AS=MID$(I$,I,1):A=ASC(AS):IF A=26 THEN RETURN
4240 | 220 T$=T$+CHR$(A-32*(INSTR(" ABCDEFGHIJKLMNOPQRSTUVWXYZ",A$)>1))
1143 | 230 NEXT I:RETURN
1772 | 250 FOR J=LEN(I$) TO M STEP -1
3876 | 260 IF MID$(I$,J,1)="" OR MID$(I$,J,1)=CHR$(13) THEN K=J+1:GOTO 280
3571 | 270 NEXT J:IF K>LEN(I$) THEN T$="" ELSE T$=MID$(I$,K,LEN(I$))
666 | 280 RETURN

```

End

## Program Listing 2. Michael Guerard's direct verbal attack.

```

6029 | 1 CLEAR 500:FOR I=0 TO 9:READ D$(I):NEXT:FOR I=0 TO 9:READ T$(I):NEXT:FO
17732 | 2 DATA Zero,One,Two,Three,Four,Five,Six,Seven,Eight,Nine,Ten,Eleven,Twel
ve,Thirteen,Fourteen,Fifteen,Sixteen,Seventeen,Eighteen,Nineteen,Twenty
y,Thirty,Forty,Fifty,Sixty,Seventy,Eighty,Ninety
3611 | 3 INPUT"A number";N$:GOSUB 4 :PRINT W$:PRINT:GOTO 3
5145 | 4 W$="" :L=LEN(N$):IF L>9 THEN W$="Nine digits maximum, please!":RETURN
7380 | 5 FOR I=1 TO L:C=ASC(MID$(N$,I,1)):IF C>47 AND C<58 THEN NEXT ELSE W$="D
ecimal digits only, please!":RETURN
3008 | 6 AS="" :BS="" :CS="" :IF L<9 THEN N$=STRING$(9-L,"0")+N$
4259 | 7 GS=LEFT$(N$,3):NA=VAL(G$):IF NA<>0 THEN GOSUB 11 :AS=X$+" Million "
4392 | 8 GS=MID$(N$,4,3):NB=VAL(G$):IF NB<>0 THEN GOSUB 11 :BS=X$+" Thousand "
6249 | 9 GS=MID$(N$,7,3):NC=VAL(G$):IF NC=0 THEN IF NA=0 AND NB=0 THEN CS="Zero
" ELSE CS="" ELSE GOSUB 11 :CS=X$
1243 | 10 W$=AS+BS+CS:RETURN
2948 | 11 X$="" :FOR I=1 TO 3:D(I)=VAL(MID$(G$,I,1)):NEXT I
3916 | 12 IF D(2)=0 AND D(3)=0 THEN D$=" Hundred" ELSE D$="" Hundred "
1757 | 13 IF D(1)<>0 THEN X$=D$(D(1))+D$
2673 | 14 IF D(2)=0 AND D(1)=0 THEN X$=D$(D(3)):RETURN
3375 | 15 IF D(2)=1 THEN X$=X$+T$(D(3)):RETURN ELSE X$=X$+F$(D(2))
5374 | 16 IF D(3)<>0 AND D(2)<>0 THEN X$=X$+" "+D$(D(3)) ELSE IF D(3)=0 THEN RE
TURN ELSE X$=X$+D$(D(3))
616 | 17 RETURN

```

End

## Program Listing 3. Greg Wolking's big check writer.

```

9819 | 1 DIM W$(3,9):S$="" :FOR I=0 TO 3:FOR J=0 TO 9:READ W$(I,J):NEXT J,I:DEF
FNCS(X,Y)=W$+S$+W$(X,Y):DEF FNL=LEN(N$):DEF FNH=INT(3*(FNL/3-INT(FNL/
3))+.1):DEF FNA=ASC(N$)
17490 | 2 DATA ONE,TWO,THREE,FOUR,FIVE,SIX,SEVEN,EIGHT,NINE,,TEN,ELEVEN,TWELVE,T
HIRTEEN,FOURTEEN,FIFTEEN,SIXTEEN,SEVENTEEN,EIGHTEEN,NINETEEN,TWENTY,TH
IRTY,FORTY,FIFTY,SIXTY,SEVENTY,EIGHTY,NINETY,,,HUNDRED,THOUSAND,MILLIO
N,BILLION,TRILLION,QUADRILLION,,,,
3916 | 3 INPUT"Check Amount";X$:GOSUB 4:PRINT W$:PRINT:GOTO 3
5770 | 4 W$="" :NS=MID$(STR$(X$),2):X=INSTR(NS,".") :IF X THEN N2$=MID$(NS,X+1,2)
:N$=LEFT$(NS,X-1) ELSE N2$=""
3796 | 5 GOSUB 6:W$=W$+" and "+N2$+STRING$(2-LEN(N2$),48)+" /100":RETURN
8522 | 6 IF FNL=0 THEN IF W$="" THEN W$="Zero":RETURN ELSE RETURN ELSE IF FNA=4
8 THEN GOSUB 12:GOTO 6 ELSE IF FNH=0 THEN GOSUB 11:W$=FNCS(3,0)
4117 | 7 IF FNL=0 THEN RETURN ELSE IF FNA=48 THEN GOSUB 12:IF FNH THEN 7
10249 | 8 IF FNL=0 THEN RETURN ELSE IF FNH=0 THEN W$=FNCS(3,FNL/3):GOTO 6 ELSE I
F FNH=2 THEN IF FNA>49 THEN W$=FNCS(2,FNA-50):GOSUB 12 ELSE GOSUB 12:W
$=FNCS(1,FNA-48):GOSUB 12
1365 | 9 IF FNH THEN GOSUB 11
530 | 10 GOTO 8
2030 | 11 IF FNA>48 THEN W$=FNCS(0,FNA-49)
1387 | 12 N$=MID$(NS,2):RETURN

```

End

## Program Listing 4. Robert McClernan speaks numbers.

```

19647 | 1 DEFINT A-Z:DATA zero,ten," ",one,eleven," ",two,twelve,twenty,three,th
irteen,thirty,four,fourteen,forty,five,fifteen,fifty,six,sixteen,sixty
,seven,seventeen,seventy,eight,eighteen,ninety,nineteen,ninety
4566 | 2 DATA trillion,billion,million,thousand,hundred
4412 | 3 FOR I=0 TO 9:READ US(I),TNS(I),TES(I):NEXT:FOR I=1 TO 5:READ BS(I):NEX
T
4419 | 4 INPUT "A number in words ";N$:GOSUB 5:PRINT W$:PRINT:GOTO 4
8493 | 5 FOR I=1 TO 5:V#(I)=0:NEXT:X$=N$:X=LEN(N$):W#=0:U#(1)=1000000000000#U#
(2)=1000000000#U#(3)=10000000#U#(4)=1000#U#(5)=1#X$=N$:J(1)=B:J(2)=
7:J(3)=7:J(4)=8
7900 | 6 FOR K=1 TO 4:U#=#(K):Z=INSTR(X$,BS(K)):IF Z<1 THEN 7 ELSE Y$=MID$(X$,
1,Z-1):X$=MID$(X$,Z+J,X-Z-J+1):X=LEN(X$):GOSUB 8:V#(K)=U#*V#
4122 | 7 NEXT K:Y$=X$:GOSUB 8:V#(5)=X# :W#=V#(1)+V#(2)+V#(3)+V#(4)+V#(5):RETURN
3244 | 8 A=0:B=0:C=0:D=0:V#=0:Z=INSTR(Y$,BS(5)):IF Z<1 THEN 11
7801 | 9 Y=LEN(Y$):ZY$=MID$(Y$,1,Z-1):ZX$=MID$(Y$,Z,Y-Z+1):Y$=ZX$:FOR N=1 TO 9:
Z=INSTR(ZY$,US(N)):IF Z>0 THEN A=N:N=9:V#=100*A:GOTO 11
558 | 10 NEXT N
4754 | 11 FOR N=0 TO 9:Z=INSTR(Y$,TNS(N)):IF Z>0 THEN B=N+1:N=9:V#=#+(10*B-1):
RETURN
560 | 12 NEXT N
8166 | 13 FOR N=2 TO 9:Z=INSTR(Y$,TES(N)):IF Z>0 THEN C=N:N=9:V#=#+(10*C):Y=LE
N(Y$):ZY$=MID$(Y$,1,Z-1):ZX$=MID$(Y$,Z+5,Y-Z-4):Y$=ZX$:GOTO 15
562 | 14 NEXT N
4279 | 15 FOR N=1 TO 9:Z=INSTR(Y$,US(N)):IF Z>0 THEN D=N:N=9:V#=#+D:RETURN
1102 | 16 NEXT N:RETURN

```

End

short Basic program. Choose your own upper limit, but you ought to investigate the numbers up to a million, at least. It's worth an 80 Micro T-shirt for one that's brief and relatively quick.

## Per-functions

Any computer language that you use, no matter how rich it is, always lacks something. Basic has a wealth of useful functions, but I'm constantly encountering situations where one more would make life much easier. For instance, Basic's built-in functions extract the sign of a number (SGN), the integer closest below it (INT), and the integer part of it (FIX), but how do you get the fractional part to the right of the decimal point? You make your own function, that's how.

I'd like you to write the following five useful functions. You'll find three of them in many enhanced versions of Basic. Since you have to use a DEF FN statement to define them, each solution should fit into one line of Basic, but I won't cry foul if you use more than one line.

1. FNFract(N) returns the fractional (decimal) part of the number N. If N is an integer, it returns zero. It keeps the sign.
2. FNGreat(A,B) returns the greater of the two numbers A or B. If A and B are equal, it returns the value of one of them.
3. FNLess(A,B) returns the lesser of A or B. It's the complement of FNGreat. Both are useful tools.
4. If you get by FNGreat and FNLess, here's a logical extension of what they do. FNMost(A,B,C) returns the maximum value of A or B or C. That is if A, B, and C are 62.5, 167, and -4,932, FNMost returns 167, the most positive value.
5. FNLeast(A,B,C), the complement of FNMost, returns the minimum value of A or B or C.

## The Rules

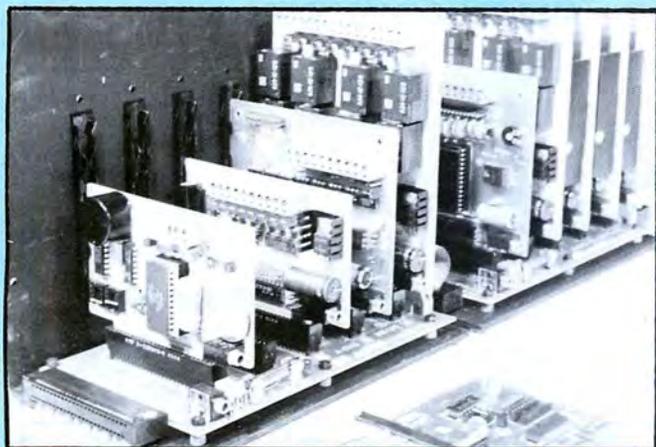
1. Write your program(s) or routine(s) in any TRS or Tandy Basic, except Pocket Computer Basic.
2. Solution(s) to this month's poser(s) must reach us by November 15, 1987, to be considered for the February 1988 issue and a T-shirt if we use it.
3. Employees of CW Communications already have T-shirts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



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

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A-BUS adapter (IBM) in foreground

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The complete set of A-BUS User's Manuals is available for \$10.

### About the A-BUS:

- All the A-BUS cards are very easy to use with any language that can read or write to a Port or Memory. In BASIC, use INP and OUT (or PEEK and POKE with Apples and Tandy Color Computers)
- They are all compatible with each other. You can mix and match up to 25 cards to fit your application. Card addresses are easily set with jumpers.
- A-BUS cards are shipped with power supplies (except PD-123) and detailed manuals (including schematics and programming examples).

#### Relay Card

RE-140: \$129

Includes eight industrial relays, (3 amp contacts, SPST) individually controlled and latched. 8 LED's show status. Easy to use (OUT or POKE in BASIC). Card address is jumper selectable.

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#### Digital Input Card

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#### 24 Line TTL I/O

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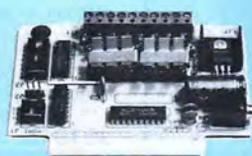
PH-145: \$79

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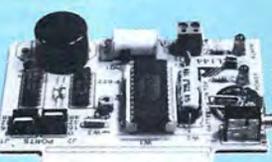
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PR-152: \$15

3/2 by 4 1/2 in. with power and ground bus. Fits up to 10 I.C.s



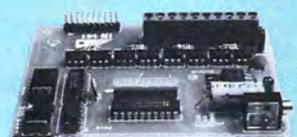
ST-143



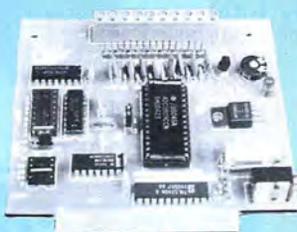
CL-144



RE-140



IN-141



AD-142

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#### Power Driver Board Option PD-123: \$89

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TRS-80 Model 102, 200 Plugs into 40 pin "system bus".	AR-136...\$69
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TTX1410 Pictured

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JE1016 Pictured

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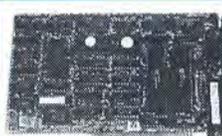


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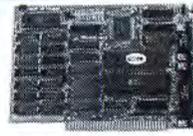
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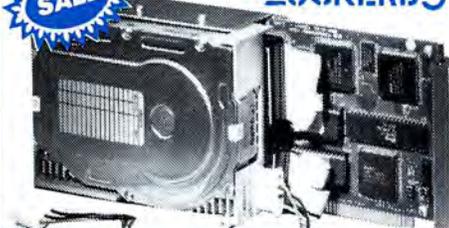
IBM RGB or composite monochrome/color monitors • Parallel printer port • Text modes: 40x25 or 80x25; Graphic modes: 320x200 or 640x200 • Light pen interface • 1 year warranty • Includes composite video monitor adapter • Manual included

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# Imitation of Life

by Harry Bee

**Tornado Notes** runs on the Tandy 1000/1200/3000 (256K). Micro Logic Corp., P.O. Box 174, 100 2nd St., Hackensack, NJ 07602, 201-342-6518. \$49.95.

**T**ornado Notes does a fair impression of the barely manageable collection of notes, lists, reminders, and vague jottings that, strewn from one end of your life to the other, are the inescapable consequence of a busy existence. The significant difference the program makes is that you can find them. That bit of yet-to-be-classified (sometimes unclassifiable), yet-to-be-filed, yet vital information no longer gets thrown out with the envelope you scribbled it on, or falls off the wall to be lost behind the bookcase forever.

Tornado Notes is a memory-resident accessory. Not a data base in any sense, it lets you apply data base-like functions to what would otherwise be scattered scraps. At the least you can gather all your important oddments into one pile. From there, you can search through them, rearrange them, merge them and cut them up, edit them, add to them, and print them out, among other things. As long as your computer is on you have a place to jot, and your notes are always available.

## Making Notes

Making a new note is easy. Whatever application you're running, Tornado Notes stands ready to pop up at the stroke of an alternate-J key combination. (The hot key is reprogrammable.) Press "N" to open a new window and type. The text editor is quick and convenient and gives you a good set of editing tools, including cut and paste. For familiarity's sake it borrows commands from Wordstar, such as control-Y to delete a line.

Most notes tend to be small, but you can expand the note window to the full size of your screen. You can type more than a screen of text, which will scroll as

long as you have something to add. All the characters in your computer's character set are available. When you're through, you can reshape the window to show as much or as little of the note as you like. If the window is too large for the text, the program shrinks it to fit when you leave the editor.

An easier way to make a note is to grab a screen from the program you're running in the foreground. For example, editing records in your data base, you come across one you want to pull out to examine later. Five keystrokes in quick succession (alternate-J, -O, -G, -C, and -L) capture the screen into a Tornado Note, and you continue what you were doing without another thought.

Another kind of note is a form, a prepared note that only needs filling out to be complete. Two things differentiate a form from a regular note: It begins with a special symbol, and it has fields, like a data-entry form. You can make your own electronic version of those pink "While you were out" telephone memos you see everywhere, with places for the date, time, who called, a message, and even two columns of possible dispositions to check off. You create the form once, and it becomes an inexhaustible pad of the things.

Thereafter, when the telephone rings, pop up Tornado Notes and press "F", for form, and the form's identifying letter. A copy of the form appears with your cursor in the first field. Escape-D inserts the

date; escape-T inserts the time. Tab and shift-tab move from one field to another. Fields expand to accept the amount of text you need to put there.

## The Notes Pile Up

Once you have collected a few notes, the screen starts looking more like the careless pile of notes the program simulates. But there is more organization than meets the eye. The arrangement permits you to see pieces of as many as 28 notes, so that you can scan several notes at a glance, at

least one in its entirety.

One note, the so-called current note that's on "top" of the pile at the moment, has a different border and intensity (or color, depending on your monitor) than the others. The current note is the one most commands affect.

You have several ways of looking at your notes. With the up- and down-arrow keys you leaf through the pile a note at a time. The down arrow moves the top note off the pile and highlights the next lower one. The up-arrow reverses the process. An automatic feature walks you through the pile. The end key takes you to the bottom of the pile, and home gets you immediately to the top. The page-up and page-down keys let you browse several notes at a time.

If you want to pick up a group of notes on the same subject or locate a note quickly, type G, for get, and a search term. As you type, the program searches every word of all your notes. If your search term is unique, the note you want often appears before you finish typing. Otherwise, the notes containing the text you typed are gathered into a separate pile.

Either moving a note to the top or bottom of the pile is a one-key operation, but it's not so convenient to rearrange the pile otherwise—one of just two awkward functions I found in the program. You can only move a note down the pile. Often that means first putting it on top of the stack to get it where you want it.



Examples of information you can file with Tornado Notes.

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Maintains DOS performance	YES	NO
Can remove itself	YES	NO
Manages all resident programs without modification	YES	NO
Easy to use	YES	NO
Disk tutorial	YES	NO
Simple documentation	YES	NO
<b>Price</b>	<b>\$39.95</b>	<b>\$69.95</b>

System requirements: IBM PC, XT, AT, 3270 PC, PCjr, or compatible  
Telecommunications require a PC or XT and a Hayes compatible modem  
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The other clumsy function is moving text between notes. (Cut and paste within a note is a snap.) You can join two adjacent notes with two keystrokes. But to move part of one note into another, you have to duplicate the first, join it to the second, then edit out the parts you don't want.

### Versatility

The program's ability to grab a screen of text from the foreground is balanced by a feature that can type text directly into a foreground application, such as a word processor or data base. This gives you a resident clipboard for transferring data among files and programs. Tornado Notes can also write ASCII files to disk, as well as read them, which saves having to load an editor for things like batch files.

The program's printing features not only let you print batches of notes to take with you, but make Tornado Notes a handy, resident editor for writing memos and short letters, too. You can set margins, page breaks, and page length. It keeps track of the line count and advances the page on command. Since you can include the full range of ASCII characters, you can also send codes to your printer for underlining, boldface, or other special features.

You won't use this program long before you find certain notes have become permanent. I keep lists of the macros I write for the various applications I use. Likewise, you can add pop-up help screens to applications that don't have them. Other candidates for permanent notes are all the things you find yourself looking up frequently. The distribution disk comes with a file full of useful reference lists such as metric conversions.

In fact, you can maintain as many files of notes as you like, each for a special purpose, and swap them in and out of memory with a few keystrokes. The program's Save file can be used as a provisional wastebasket for notes you no longer want in your main pile but aren't sure you want to throw away either. And if you get to be fanatical about your Tornado Notes, one feature lets you load multiple copies of the program, each with its own hot key and particular pile of notes.

### Easy Acquaintance

Another file supplied with the distribution disk is an interactive tutorial that takes you through the program's main features with clear examples and hands-on demonstrations. I especially appreciated the tutorial because the manual is wordy, overblown, and, frankly, tiresome.

But as many features as the program offers, Tornado Notes is not difficult to

learn. Its commands are straightforward, easy enough to remember, and its menus remind you of the commands. When the menus aren't enough, you call on help notes to explain the menu choices. And experimentation is safe: The program is one of the best-behaved memory-resident programs I've used, and it handles errors well, too. When you no longer need the menus, you can make them invisible or get rid of them entirely and free up 3K of memory in the bargain.

**. . .you  
don't always  
have to be  
the one  
to adjust.**

Because the current pile of notes is resident, and the program doesn't need continual access to its files, it's as well suited to floppy-disk systems as hard disks. In memory, the program uses 50K. 3K more if you're using the menus, plus the note buffer. The default size of the note buffer, 20K, holds about 100 of the kind of notes I tend to make—about a quarter screen on the average. You can shrink the buffer down to 1K or expand it to as much as 54K.

Micro Logic has gone out of its way, I think, to let you tailor as many program parameters as possible to the way you work. You can set Tornado Notes on the fly to work with different sorts of foreground conditions—Hercules graphics, for instance. You can change the color scheme and the kinds of frames around your notes. You can display notes side by side instead of overlapping. Change the standard size of a new note window, the pitch of its beep, the way it writes the date. This program will meet you more than half way toward establishing a comfortable working relationship; you don't *always* have to be the one to adjust.

### Conclusion

For the way I live and work, I found Tornado Notes perfectly suited. If you tend to accumulate odd scraps of paper and occasionally make a list to keep track of your lists, there's something in this program to interest you. It's not just useful in its concept, it's also useful in practice. It looks good and operates smoothly and, most importantly, safely among your other utilities and applications. I consider Tornado Notes a worthwhile addition to anyone's kit of productivity tools. ■

## Finally!

by David A. Williams

**Finally!** runs on the Tandy 1000/1200/3000 and requires two floppy drives. The **Finally!** Subroutines come in Quick Basic and Turbo Basic versions. The **Finally!** Modules are available only for Quick Basic. Komputerwerk, 831 Parkview Blvd., Pittsburgh, PA 15215, 412-782-0384. **Finally!** Subroutines, \$99; **Finally!** Modules, \$99.

**M**odern compilers have breathed new life into Basic programming, as shown by the growing number of programmer's tool kits supporting Microsoft's Quick Basic and Borland's Turbo Basic. **Finally!**, one of the biggest and most expensive of these tool kits, consists of over 150 Basic subprograms, defined functions, and assembly-language routines. A companion package, **Finally!** Modules, contains five program modules that integrate with many of the subroutines to perform more complex functions.

### The Subroutines

The subroutines package includes source code for everything, a library file for linking to programs compiled with the BRUN option, and object files for the assembly routines. The object files, when put into a user library with Quick Basic's Buildlib program, let you use the routines in Quick Basic's interactive mode.

The manual contains a brief overview, lists the routines by name and by function, and describes each routine. These descriptions, averaging a half page or less, include the calling sequence, the inputs, the outputs, and any special instructions needed. Barely adequate even for experienced programmers, the manual leaves much to the beginner's imagination and is flawed by many errors.

Two disks contain the files, conveniently grouped in directories. A sample program illustrates the application of a few of the routines, but you have to buy another \$19.95 disk from the company for more complete application examples.

The source code for each routine contains introductory comments describing its function and the calling sequence. Other comments document what the code is doing well enough so you can modify it.

A few of the routines are trivial. Converting Celsius to Fahrenheit, degrees to radians, or uppercase to lowercase probably won't tax your programming skills. All but seven of the 42 defined functions are duplicated in subprogram form. Even so, the package contains many useful routines—functions include date manipulation, math, graphics, hard-

ware interface, sorting, keyboard control, and string handling.

Among the math routines are trigonometric functions not found in Basic; number base conversions; and programs to calculate the average, minimum, and maximum values of an array. One of the more complex ones calculates a least squares fit to an array of data.

The graphics routines can create line, bar, and pie charts. Another routine generates Gantt charts (the manual incorrectly calls them Pert charts) by weeks or months. Routines to dump your graphics to disk or printer are included. All the graphics and other screen-handling routines use DOS and BIOS calls rather than direct screen access.

The hardware routines provide several ways to identify the kind of hardware in use, vital information for some programs. One of the assembly routines serves as a generalized interface to DOS-interrupt routines. Others access drive and directory information.

Although you can only link the library file with programs compiled with the BRUN option, there is a way to use the BCOM option to generate stand-alone programs: Include the source code for the subprograms in your program files, then link the resulting object files with the necessary assembly object files. Alternatively, if you have the Microsoft Library Utility included with the macro-assembler, you can build another library file containing object files compiled with the BCOM option.

This procedure has one flaw, however. One of the assembly routines, which several of the subprograms call, locks up the computer if linked to a program compiled with the BCOM option. The developer has a fix for this problem, but it will cost you \$39.95 to get it.

The Turbo Basic version of **Finally!** has in-line code in \$Include files instead of assembly object files. Assembly source code is not included, but as compensation you get test programs.

### The Modules

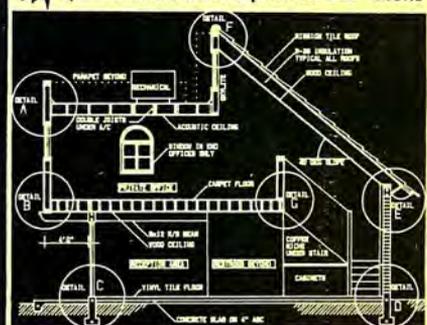
**Finally!** Modules is a collection of five program modules that you can incorporate in your Basic programs compiled with Bascom or Quick Basic. You get two modules for creating menus, one for pop-up screens, plus an input-screen manager and a directory manager. All require the **Finally!** Subroutines package described above. Unlike that package, this provides no source code for the modules.

The program disks contain two library files for each module: one each for programs compiled under the BRUN and BCOM options.

The manual briefly describes each module, gives its calling sequence, and

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offers some theory on how it works. This manual also has its share of errors.

Although each module is accompanied by a compiled, stand-alone *sample program* demonstrating its application, the documentation, with one exception, offers no help in using the programs. Also, some of the screens don't match the manual's illustrations. Source code for the examples is included.

This problem was compounded by the considerable difficulty I had getting the programs to run at all on my computer. I use an Everex display adapter that drives both monochrome and color graphics adapter (CGA) monitors. None of the programs would run on the monochrome monitor and one would not run on either. All worked as advertised, however, on an IBM PC/AT equipped with an enhanced graphics adapter (EGA) monitor. I'm willing to give the programs the benefit of the doubt and lay the blame on my setup, but I've never had a problem like this before.

The first menu program creates Micro-soft-style, pull-down menus and supports both the keyboard and a mouse. The system supports as many menus as you can fit names across the screen; if any space is left over, you can insert a title.

Designing a menu is easy. You simply put the main-menu and submenu labels in a two-dimensional array. The program adjusts the width of the pull-down boxes automatically. You can preselect a menu choice in the calling sequence to prompt the user. The output to the calling program is the number of the main menu and submenu selected.

The program has a few peculiarities. One command to pull down the menus doesn't work, but it is hardly needed. Pressing the first letter of the menu label or the enter key displays the pull-down menu. The arrow keys move the light bar across the main-menu names, but pressing any other key moves the light bar as well. Movement of the light bar under mouse control is a little erratic if you move the mouse rapidly, but this is a minor fault.

The second menu program produces menus similar to those of Lotus's 1-2-3 at the top of the screen. Otherwise, this module shares the features (and faults) of the one just described.

The third program module is a screen generator that you can use to design pop-up screens. It is accompanied by a program, misnamed in the manual, that combines the screens into libraries. You use the screen generator as a stand-alone program or call it from within your application to develop your pop-ups over the actual program screen.

Once you've designed your pop-ups

and stored them in a library, your programs can call them by number. You can store up to 99 pop-ups in memory and display up to five at a time. Your calling program can position a pop-up wherever you want it on the screen.

The operation of the screen generator is far from intuitive and only partly described in the manual. Once you break the code, however, it's easy to use. You can select the colors of the border separately from the text, and you have a choice of several border styles.

The input-screen manager, the fourth program module, is a system for generating and displaying data-input screens. The program supports several data-field types and checks inputs against a pre-determined selection of legal entries.

You have to do your initial screen design with a word processor or text editor. Then you use a stand-alone program, called a scanner, to preview the screens, make minor editing changes, and save the screens in compressed format. Lastly, the screen manager displays the screens and processes the input data.

This is good for simple, monochrome screens only. To get color you have to use a separate screen-generating program from other developers.

I found the scanner awkward to use, considering the moderate editing capability it provides. You can change field types and swap field positions, but you can't change the text or colors.

The last program module, a directory manager, provides a directory display and some file-handling capability that you can call from within a program. File-handling functions include copy, rename, delete, and view (first page only). You can also change directories or make a new directory.

The directory manager has a stand-alone macro editor that configures the module with the features you want. I'd rather that Komputerwerk had given me the directory manager's source code.

### The Bottom Line

Although overpriced, these packages contain some innovative and useful programs. The developer, however, has a severe quality-control problem. Besides the goofs I've mentioned, two function files have glaring errors and obviously were not tested in their delivered form. Since I didn't test all 150 subroutines, I have to wonder how many more errors lie hidden in these programs.

The manual should be expanded and made easier to understand. Programming experience will help to fathom its mysteries, but you'll also need some clairvoyance. Until the developer cleans up his act, I would look elsewhere for a Basic tool kit. ■

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## Balancing Act by Wynne Keller

**Checkmaster 1.02** runs on the Tandy 1000/1200/3000 (128K) and requires DOS 2.1 or higher. Microcomputer Specialists Inc., 18 Lyman St., Westboro, MA 01581, 802-457-4600. \$395.

Assume you own a very small business—say a computer consulting outfit with corporate headquarters in your basement. You're not an accountant; you just hand your financial records over to a C.P.A. every quarter. Your job is to keep track of transactions and expenses, and keep your business checking accounts in order.

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The program has its drawbacks, however. Operation is slow, editing is cumbersome, and payables and receivables are difficult to handle.

### Setup

Checkmaster comes with a set of demonstration disks packaged so that you can try out the program before breaking the seal on the software itself. If you decide the program doesn't meet your needs, you can return it within 30 days for a refund. This excellent arrangement means that you take very little risk when you buy the product.

Printer setup can be a problem. Some of the reports are 132 characters wide, requiring compressed print on an 80-column printer. The manual suggests using the standard printer driver provided and refers you to the appendix if the driver doesn't work. The standard driver would not put my IBM-graphics-compatible printer in compressed mode, and the appendix contained no further information on printer drivers.

Two other drivers supplied with Checkmaster, one of them supposedly for IBM graphics printers, also failed to produce compressed print. Customizing one of the printer drivers to your printer is an option, but it's not a simple matter. Since the manual offered no help, I decided not to tackle the job, which meant I had to put up with truncated reports.

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Checkmaster manages two basic types of accounts: balance and income/expense. A checking account is a bal-

ance account; you can enter a previous balance when you set up this type of account. Income and expense accounts, which help you categorize expenses and deposits, have a zero balance when you open them. Because you can't enter a previous balance, you must start using the program at the beginning of a fiscal year, or else manually combine Checkmaster's totals at the end of the year with any previous balance you might have had.

When you establish account names and numbers, you can also assign each account a six-character code. This is

helpful later when entering transactions, especially if you make the code easy to remember, such as TEL for the telephone account. The program has a handy search function that lets you enter a partial account code, from which it looks for the nearest match. You never need use the account number for a transaction—the code is enough.

You can save time by entering the names and addresses of frequent payees and assigning them a code. Thereafter, you can write a check simply by typing the payee's code. The program prints the payee's full name and address; you

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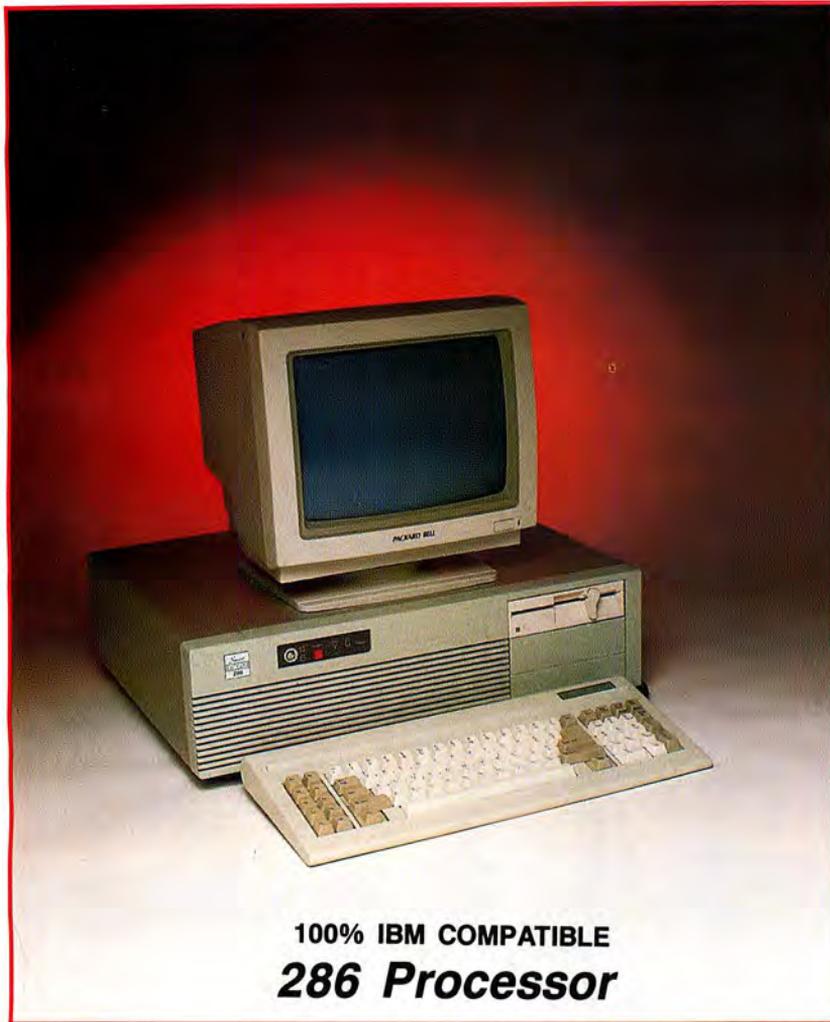
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have the option of correcting the information if necessary.

Entering checks and deposits is the most common activity under Checkmaster. The process is streamlined to some extent: The date defaults to the system date, the checking account to the most recently used account. However, I found some irritating problems. The worst is that you're unable to edit within a line of text. Pressing the delete key does nothing; instead, you have to erase by pressing the spacebar, or make corrections by typing over. You can't even move to the end of the line to add text, because touching the arrow keys jumps the cursor out of the line entirely.

Another problem is slow operation. I ran Checkmaster from a hard disk drive and found it annoyingly slow. With a floppy-disk-based system, the waiting could get very tedious.

Entering a check involves using two screens: one for the amount, payee, memo, and so on; and one to allocate the money to various accounts. You can disable the allocation portion of the program, but if you do so, you've spent \$395 to do nothing but balance your checkbook. The allocation screen is easy but time-consuming to use; you wait for the screen to be drawn, type in the ac-

count code to allocate the funds, then verify that your entry is correct before the program records it.

You can't add an account while entering a transaction. If you find no account appropriate for the transaction, you have to exit and go to another section to add the account.

There's no on-screen help, so you must depend entirely on the manual, which ranges from silent to cryptic on a number of important topics. It does not address accounts payable and receivable at all, yet the sample chart of accounts shows several examples of payables and one receivable as balance-type accounts.

Checkmaster doesn't permit any allocations to balance-type accounts when you write a check. Using these accounts, therefore, requires an extra step, a dummy income/expense account to record a transfer between the checking account and the payable or receivable account. This is more trouble than it's worth, so if you want to keep active accounts payable and receivable, Checkmaster is not for you.

Checkbook reconciliation requires typing in the check number (or pressing return to get the oldest number in the file) followed by the amount of the check or deposit. This is no doubt considered a safeguard against error, but it would be more convenient if the program displayed the amount, so you had only to press return to accept it.

Optional setup of recurring transactions is a real convenience. When you enter the check-writing section of the program, Checkmaster automatically reminds you if a recurring transaction is due and displays the transaction for your approval. This feature can save a lot of time and prevents forgetting periodic obligations.

Checkmaster can send accounting data to Easybusiness Systems' General Ledger program or to the Checkmaster/CPA Client Accounting System. You can also create a standard ASCII file from program data for transfer to a spreadsheet or database.

## Reports

You can design and store up to ten pre-printed check formats, a definite plus

THE UNIVERSAL CORPORATION				Date: Aug 18 87
CheckMaster 1.0.2				
Review Check Register				
Disbursement	Date: 09/11/86	Number: 10111	Amount:	14.50
Bank: USB	Williamsport Savings Bank		Balances	
Payee Name:	American Telephone & Telegraph		Running:	24,985.50
Memo:	Long Distance August		Current:	24,867.04
Category:			Cleared:	25,000.00
Status:	Manual			
Account	Category	Remark	Amount	Distr Total
10000000		American Telephone & Telegraph	14.50	14.50
		←-Previous	PopUp-Previous 4	Home-First
		↓-Next Line	PopDown-Next 4	End-Last
Select: <input type="checkbox"/> Quit				
Return to Review Register.				

Checkmaster allows you to sort through your checks, find the one you are looking for, then pull it up for close inspection.

over similar programs. If you want a predesigned check, the sample file contains the NEBS 9024 multipurpose form for convenience.

You can send check register reports to the screen or printer and select data for reports by specifying a category of transaction, a range of dates or amounts, cancelled checks only, and so forth. If the report goes to the printer, you can opt for a detailed or a summary report; the detailed one includes all information about the transaction—even remarks, memos, and the bank name.

You can also generate financial reports using options similar to those for check registers. The financial report shows credits and debits in more typical accounting style, and can give subtotals. Financial reports vary depending on the options you select, and you have many options. However, you can't actually design your own reports as you can design printed check formats.

## Final Balance

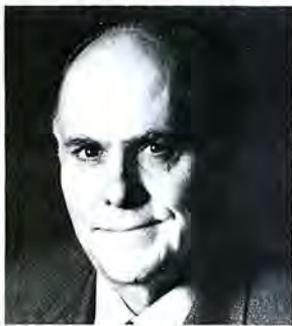
On the plus side are Checkmaster's excellent search facility for account and payee codes, the ability to design check formats, and easy handling of recurring transactions. For businesses that need to send data to an accountant, Checkmaster also provides a link to specialized accountant's software. In the minus column, however, are poor payables and receivables capability, clumsy editing, lack of a custom report generator, and no provision for storing report formats.

Andrew Tobias's *Managing Your Money* (MECA Inc.) costs about half as much, runs faster, has full editing, lets you add accounts while entering transactions, and lets you design your own reports (but not your own checks).

Checkmaster has the link to specific accountant's software and a better recurring-transaction function, but I'd still expect more for \$395. ■

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## Wall Street Weak by Wynne Keller

**The Investor's Management System** runs on the Tandy 1000/1200/3000 (256K) and requires DOS 2.x. Main Line Software Inc., 550 Julie Rivers Drive, Suite 110, Sugar Land, TX 77478, 713-240-5815. \$88.

**T**he Investor's Management System (TIMS) comprises a group of Basic programs that record stock purchases, sales, and price fluctuations; calculate the value of your holdings; and print reports of transactions and price changes. Although the programs are easy to understand, certain design flaws make them tedious to use, and the package doesn't do enough work to justify its \$88 price tag.

TIMS is attractively packaged and takes a unique approach to manuals. Perhaps operating on the assumption that most people don't or won't read a manual, Main Line provides documentation on cassette as well as in printed form. Thus, you can learn how to use the program by reading, or you can sit back and listen to the cassette.

The documentation is thorough. However, one error could cause a problem for

novices—the manual instructs hard-disk users to transfer the programs to their hard drives with the command Copy A:\*.\* B: (the B should be a C).

### The Programs

To use TIMS, you must specify four open files when you load Basic. The manual tells you how, but it would have been nice if the company had included a batch file to load Basic and TIMS properly. TIMS is operated from a menu that loads separate Basic programs depending on your selection. The major functions are adding a company, working with stock (buy/sell/analyze), updating stock prices, entering dividends, printing reports, and calculating the value of your holdings.

The first step involves adding the name of each company whose stock you wish to own or already own. You can access a company's record by its full name, exchange name, or ticker-tape symbol. You can also include its stock rating. You then enter transactions for the company: the date, price per share, number of shares bought or sold, and commission.

You can analyze your holdings and play "what if" games. With your present holdings of a stock displayed in one column on the screen, you enter possible

buy or sell orders and prices. A second column of data appears, revealing the new average price per share, total shares held, net profit per share, and other data. This feature is good for making educated guesses because it all remains hypothetical until you give the command to add the transaction to your holdings.

TIMS conveniently lets you specify which block of a company's shares you are selling. For example, if you own two blocks of ABC stock, one bought at \$10 a share and one at \$20 a share, you can opt to sell the \$10 stock only, or even to sell 50 shares of the \$10 stock and 50 of the \$20 stock.

Other parts of the program let you update stock prices by entering the high, low, closing price, and volume for a given date. You can record stock dividends (date and amount) and stock splits.

### The Down Side

This all sounds pretty useful, but I don't care for the mechanics of data entry. First, editing isn't handled at the same time as data entry, so you must go back to the menu and select another program to correct mistakes.

Second, you must unlearn your habit of pressing the enter key to move to the

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next line after each entry. TIMS expects you to move down with the down-arrow or F10 key.

You press enter only when a page is complete and you're ready to record the data. If you press enter at the wrong time (and you will), you end up recording partial data for a company or transaction, which means you must go back to the menu and select the edit option to correct the error.

Third, recording stock data could be easier. To enter prices, you must select the stock by name or abbreviation. The first line calls for the full name, so to save typing time you move down two lines to enter the ticker-tape symbol instead. But because you can't use the enter key, you have to hunt for the down-arrow or F10 key, move the cursor down, and type in the abbreviation.

This isn't too bad if you have only a few stocks. But it's not unreasonable to suppose that you'd want to track 20 or so stocks, whether you own them or not. Consider how much faster it would be if the program displayed your stocks on screen, and all you had to do was enter prices. This type of streamlining would also help prevent skipping over stocks while updating prices.

Not skipping stocks is important when

you want to find out your holdings' net worth. TIMS omits any stock without a current price from the valuation of your worth, but its original cost shows up in the cost total. This invalidates the calculation without your knowing it. The program for calculating net worth sometimes locked up my computer, and I had to restart from scratch.

**Mutual Funds Forgotten**

You can't use the program to track mutual funds, which is a shame since mutual funds are so popular. One problem is commissions. The program automatically assigns a commission on a sale, based on a discount schedule, if you don't enter one. Many mutual funds are sold without a "load," meaning no commission is taken. You could get around this by assigning a token commission of 10 cents or so, but there are other problems.

One example is mutual fund dividends. Many mutual fund investors have their dividends reinvested in the fund, so they receive fractional shares of the fund instead of money. However, the purchasing section accepts only whole shares, while the money section accepts only dollar amounts. Also, the program can't handle a capital gain distribution from a fund.

TIMS produces two types of reports: stock analysis and stock indicators. The reports are helpful, but you must go through a difficult procedure to obtain them in quantity. You have to choose each stock and each report individually; you cannot ask for either type of report on a range of stocks or for all stocks.

The program doesn't warn you to turn on your printer, and if it isn't on line, the program aborts and returns you to the main menu.

The manual warns you not to store too many stock prices in the program at a time, due to disk space limitations. It suggests that you periodically print reports of accumulated stock indicators, then delete the old indicators. According to the manual, this might be necessary as often as once a week if you have a lot of stock.

**The Bottom Line**

The Investor's Management System offers some nice features, including hypothetical investment display and flexibility in specifying which block of stock to sell. However, it is clumsy to use and leaves too much work for the operator. Other investment software on the market gives much better value for the money. ■

*Reviews Continued on p. 107*

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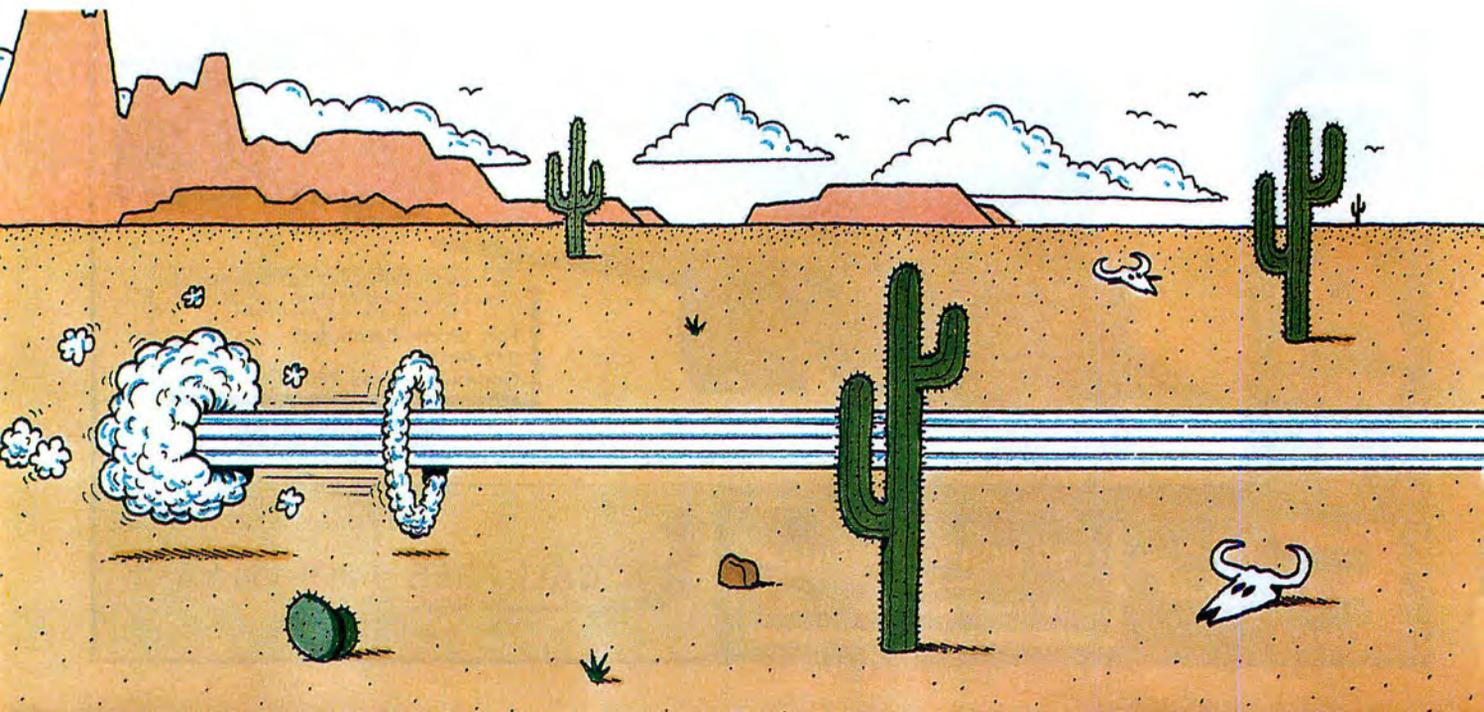
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# *Make It Snappy*

**This Basic compiler offers advantages over larger, commercial packages.**

by Bruce Tonkin



People interested in computing generally start learning in one of two ways. Sometimes, they run an applications program (a word processor or a spreadsheet, for example) and then proceed to other applications or even computer languages. Alternatively, they might study a computer language and then build on that knowledge by writing programs themselves or running programs others have written. In either case, a good way to learn anything is to study working examples.

In this article, I'll give you the means to generate your own working examples of assembly-language code. As a bonus, you'll get a Basic compiler I call BBC (Bruce's Basic Compiler) that generates assembly as output. BBC is written modularly, so it should be easy to alter or extend for particular purposes. You'll find the output fast and efficient, especially for small utility programs and simple tasks.

## Bruce's Basic Compiler

BBC is a subset compiler written in Mi-

---

### System Requirements

Tandy 1000/1200/3000

256K RAM

MS-DOS 2.1 or higher

360K disk drive

Quick Basic or Turbo Basic

Editor/assembler

---

crosoft's Quick Basic. You can buy Quick Basic for about \$60, and Borland's Turbo Basic costs about the same. So why would you want to use a subset compiler such as this one? Both of those compilers are full (not subset) compilers and have far more features than BBC has.

First, BBC is more educational: You can get complete assembly output for any legal BBC Basic program, as an aid to learning assembly programming techniques. Second, the size of the programs BBC generates is much smaller than those produced by almost any other compiler for any other language under MS-DOS.

Most language compilers include a "run-time system" with every program they produce. This run-time system can be very large indeed. For example, if you were to compile a trivial program like:

```
PRINT"HELLO":END
```

with Quick Basic, you'd get at least a 25K stand-alone executable file! Turbo Basic has a similar overhead.

BBC would produce a far smaller EXE file than that. If you wanted to write a small program to print something on the screen and return to DOS, using BBC could save you at least 24K. BBC only uses the routines your program needs. It does not include all the routines from its library each time it compiles a program. For many users, this is an important advantage. Not only is the code small, but the run-time overhead is nearly non-existent.

Since the biggest disadvantage of writ-

ing in assembly is that it is tedious to do simple things, BBC can get you right through most of the drudgery to the interesting things you'd planned to use assembly for in the first place!

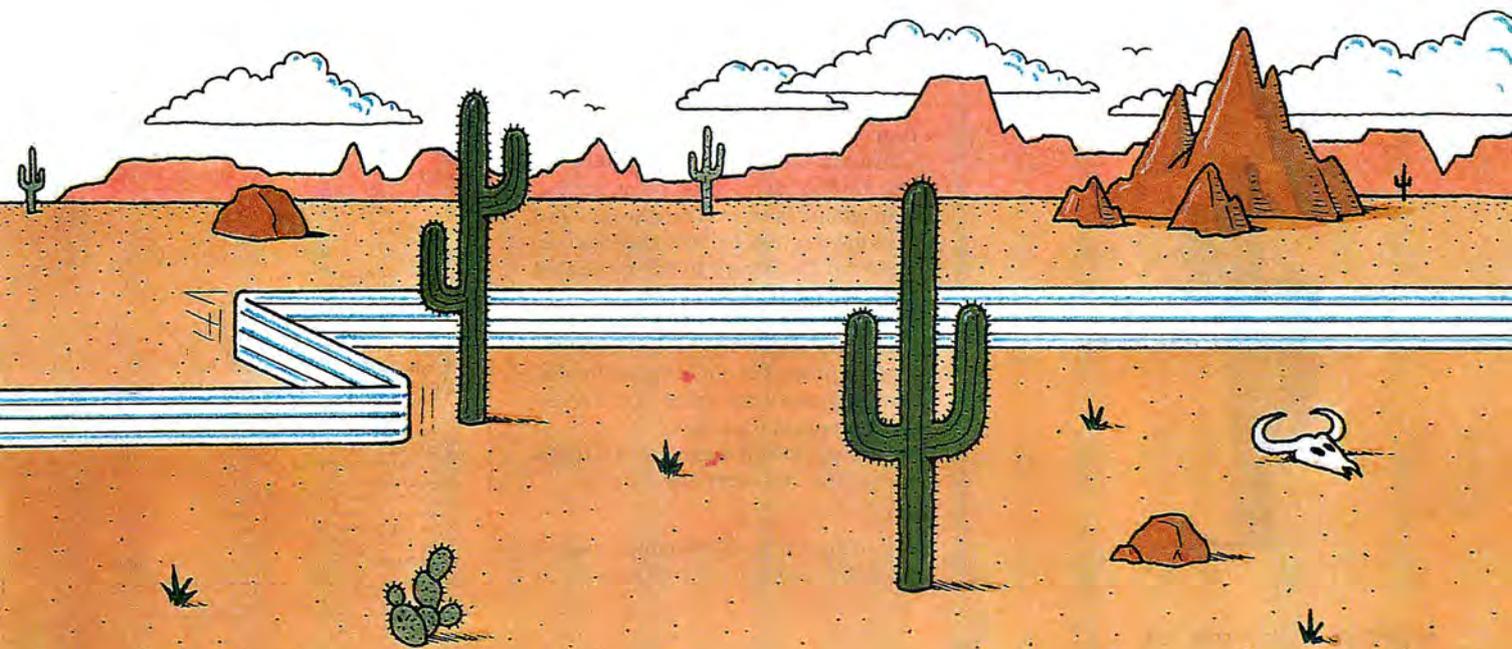
BBC lets you use assembly code anywhere you want to in your program. (See "Using Assembly with BBC" on p. 46.) You can use a Gosub to an assembly routine and even have access to any of the variables in the Basic program once you're there. You can put assembly right in the middle of your program at places you want to optimize for speed. It's easier to use assembly in BBC programs than in Quick Basic or Turbo Basic.

## What You Need

BBC is a good-sized program. You'll need at least 256K of RAM, MS-DOS 2.1 or higher, and at least one 360K disk drive. To convert the assembly code to an EXE file, you need an assembler. Since I've avoided using macros, some of the public-domain assemblers (such as CHASM) should work well. Among professional assembler packages, either the IBM macroassembler (version 1.0 and later) or Microsoft's assembler for the IBM PC or compatibles should be acceptable.

If you want to type in or modify BBC, you'll need either Quick Basic or Turbo Basic. With a little effort, you could also convert the code to run under the GW-Basic interpreter; you would need to change the multiline If statements and add line numbers.

Illustration by Chris Reed



## How to Run BBC

BBC reads a Basic program as input and outputs assembly source code. Each line of the Basic program is translated into one or more assembly commands. If you ask BBC to include documentation, it gives you the original Basic program as comments within the assembly listing. This lets you see the assembly equivalents for each line of Basic code.

You can modify the resulting assembly source code or convert it immediately into a runnable COM file with the assembler.

To run BBC, enter the program BBC.BAS (see Program Listing 1) with the Quick Basic or Turbo Basic editor and compile it. Then enter BBC.LIB (Program Listing 2) with any text editor capable of producing plain ASCII files. If you do not have a word processor or text editor with this capability, you can use Edlin (provided with all versions of MS-DOS).

Save the compiled form of BBC.BAS (BBC.EXE) to disk. You don't need to change BBC.LIB in any way. BBC.EXE can now be run.

If you don't have Quick Basic or Turbo Basic, you can buy a disk containing BBC from me for \$11 or get one from *80 Micro* (which will contain other programs from this issue). My disk will have the complete source code for BBC.BAS, BBC.LIB, and BBC.EXE and documentation for running the programs. (The *80 Micro* Disk Series 1000/1200/3000 version, available in December, will not contain documentation.)

Once you have produced BBC.EXE and BBC.LIB, you're ready to compile your first program. Enter and save the following program in Basic:

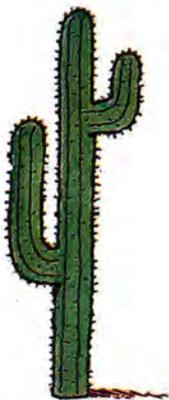
```
10 PRINT "HELLO!"
20 END
```

At the DOS prompt type BBC.

In a few seconds, you'll see a message:

Name of program to compile (default type is .BAS):

Answer with the name you used for your



sample program. The default extension for the Basic program is BAS. You can omit it if that's the extension you used.

The next question is:

Name of desired output file (type will be .ASM):

If you press enter, the output file will have the same name as the input file but with an ASM extension. Regardless of the name you choose for the output file, the extension will always be ASM. This helps avoid problems later.

The next question asks if you want documentation for your program. If you answer "Y," the lines from your original Basic program will be included as comments in the code generated by the compiler. That way, you can see just how each line has been converted. The default is "No."

The final question asks for the drive specification for BBC.LIB. This is important: BBC.LIB contains routines that your programs will almost certainly use. Enter the complete drive and path specification, remembering to include a colon after the drive letter and a backslash after the subdirectory name (if any).

If BBC can't find the library after it has finished writing the code for your program, it will tell you so and ask you for the name of the library drive specification once more. You can re-enter the drive specification at this time.

For example, if the library were on drive C in the subdirectory called Compiler, you would enter C:\COMPILER\ as the full drive and path specification. If you omit

the final backslash, BBC will not find the library. The default for the library drive specification is the current default drive and subdirectory.

You can also run BBC by including the name of the file you want to compile after BBC. To compile MYPROG, for example, you could type BBC MYPROG. That would tell BBC to use MYPROG.BAS as the input file, MYPROG.ASM as the output file, to include no documentation, and to look for the library file on the current drive and subdirectory.

The assembly source code can now be submitted to the assembler you normally use; see the assembler user's manual for the correct syntax. If you use either the Microsoft or the IBM macroassemblers, the output of the assembly file will be an OBJ file that can then be linked using the MS-DOS linker to produce an EXE file. The EXE file can be run directly from the DOS prompt.

Assuming you have Microsoft's macroassembler, you could use Program Listing 3 to assemble, link, and convert MYPROG.ASM to a COM file. The Link and EXE2BIN programs are on your master system DOS disk. You can simplify this whole procedure with a batch file like the one in Program Listing 4 (Compile.BAT). To compile MYPROG.BAS, type COMPILER MYPROG, and everything is taken care of automatically.

## BBC Syntax and Features

Because BBC is a subset compiler, it lacks some of the features found in a com-

### Using Assembly with BBC

Because BBC generates assembly language code, it is easy to add in-line assembly to a BBC program. The compiler uses three commands (more properly called "directives"): #asm, #endasm, and #all.

The directive #asm should appear by itself on a line in your program. Everything following that directive will be printed to the output assembly file without translation until the compiler encounters #endasm. At this point, normal compilation resumes. The directive #all forces the compiler to include all the routines from the library in the generated program.

The sample Program Listing that follows illustrates the technique. The program prints the contents of the registers and stores the value of the registers in program variables.

The loop does not execute 10 times because the assembly line:

```
inc zi
```

increments the loop variable i before the end of each loop increments it

again. Note that the loop index value is being carried in the AX register. The segment registers are all equal because the compiled program is a COM file.

Subroutines such as this one can be of great help when debugging programs, especially assembly programs. ■

#### Program Listing. A sample to test in-line assembly.

```
ax=0:bx=0:cx=0:dx=0:cs=0:ds=0:es=0:ss=0
for i=1 to 10
    gosub 100
next
end
100 #asm
    mov zax,ax
    mov zbx,bx
    mov zcx,cx
    mov zdx,dx
    mov zcs,cs
    mov zds,ds
    mov zes,es
    mov zss,ss
    inc zi
#endasm
print "AX=":print ax;
print "BX=":print bx;
print "CX=":print cx;
print "DX=":print dx;
print "CS=":print cs;
print "DS=":print ds;
print "ES=":print es;
print "SS=":print ss
return
```

End

plete implementation of Basic, such as GW-Basic. The Table lists BBC's features as well as the ones it does not implement.

BBC supports some extensions to standard Basic: IPoke, IPeek, Size, ++, and --. IPoke and IPeek are much like Poke and Peek, except that they deal with integers and not bytes. Size declares the maximum size of a string variable (with a default of 255 bytes). To increment or decrement a variable, use ++ and --, respectively.

Variable names are slightly different than in GW-Basic. You cannot use two variables of the same name but different types. As far as the compiler is concerned, A\$ and A are the same variable.

In addition, file I/O is different in BBC than in GW-Basic. First, you can have no more than three files open at any one time. Second, the Open syntax is OPEN,1,F\$,344, where 1 is the file number (the number can be either 1, 2, or 3, but not a variable), F\$ is a file name and can be a variable or quoted string, and 344 can be any desired record length from 1 to 32,768 (this parameter can be a variable).

When a record is read from disk, the syntax of the Get command is GET 1,23,A\$, where 1 is the file number (not a variable), 23 is the record number to get (can be a variable), and A\$ is the string variable in which the record should be placed. The syntax for Put is similar.

The other big difference between BBC and GW-Basic is in BBC's handling of math. BBC does not allow parentheses (see the section of code in Listing 1 starting with NUMEXPRESSION and ending just before ISKEYWORD). There is a reason for this, however; BBC does all computations in registers and does not use the stack. Stack operations are time-consuming and less efficient than register operations.

In fact, BBC only uses the stack when it absolutely must or when DOS itself uses the stack. If not for DOS, most BBC programs could run nicely with 10 bytes or less of stack space.

As a result, you can't write expressions like:

```
X=(23+Y)*(42-(Z/W))
```

Instead, you would write:

```
A=23+Y:B=Z/W:B=42-B:X=A*B
```

Nor can you write:

```
A$=MID$(X$,4+Y,Y)
```

Instead, use:

```
Z=4+Y:A$=MID$(X$,Z,Y)
```

## Customizing BBC

Customizing BBC is easy. There is enough room for you to add a number of key words to the program without difficulty. You need only remember that in typical assembly source code produced by

a BBC program the names of all variables begin with Z, followed by the name you gave to that variable in Basic.

If you want to add commands, operators, or functions, first look over the listing of BBC. Commands (e.g., Locate, CLS, and Goto) may or may not use variables, but they do not return values. Operators determine which operations to perform, such as addition, subtraction, division, and logical Not. Functions (e.g., VAL, ASC, and LEN) act on one or more values or variables and return a result that alters one or more variables. Commands are translated in one part of the program, functions in another, and operators in still another. If you want to add a new one of

any of them, you should include it with others of the same kind.

Valid key words and operators are determined by comparing them against a list contained in Data statements at the beginning of the program. If you want to add a command or function, you should include its name (in uppercase) within the area used by other commands or functions. Be sure to insert it before the last command (END), which marks the end of that block. To add an operator, include it after the end of the space reserved for operators, and change the value in the loop that reads the operators.

If you want to add anything that requires the use of a library routine, you

Commands	Functions	Operators	Comparisons
Print	Input	=	>
LPrint	VAL	+	<
multiline If...Then	STR\$	++	=
Goto	LEN	-	=>
Gosub	Poke	--	<=
Return	Peek	*	<>
Stop	IPoke	/	
Open	IPeek	And	
Close	VARPTR	Or	
CLS	CHR\$	Not	
Color	ASC	Xor	
Locate	Inkey\$	Mod	
Size	Mid\$		
Call	Left\$		
Get	Right\$		
Put	String\$		
For...Next			
DEF SEG			
End			

**Features not implemented in BBC:**

- Arrays\*
- Mid\$ on left of = sign
- Floating-point math
- Bounds checking
- While...Wend
- Sound
- Parentthesized expressions
- Sequential files\*
- Event handling
- Graphics
- Else clause for If...Then
- Communications ports

\*You can implement these without altering BBC.

**Features in program Data statements but not implemented:**

- Run
- DIM
- LSet
- Structure
- MEM
- RSet

Table. BBC features.

```

Program Listing 1. Bruce's Basic Compiler (BBC).
770 | DEFINT A-Z
1669 | DEF FN$(A)=MID$(STR$(A),2)
2371 | DEF FNP$(A$,B$)=LEFT$(A$,INSTR(A$,B$)-1)
4782 | PRINT"BBC: A BASIC compiler. Copyright 1987, Bruce Tonkin."
3895 | PRINT"34069 Hainesville Road, Round Lake IL 60073"
4454 | PRINT"Portions copyright 1982-1987, Microsoft Corp."
4522 | PRINT"All rights reserved, foreign and domestic."
2969 | DIM RS(50),LS(10),F(100),VS(500),LN(500),NXT$(9),S(500)
2820 | MAX=1000:TS=CHR$(9):FIL=0:CRS=CHR$(13)+CHR$(10)
5038 | DATA PRINT,LPRINT,IF,THEN,GOTO,GOSUB,RETURN,INPUT,RUN,STOP,OPEN,CLOSE
4614 | DATA VAL(,STR$(,INKEY$,LEN(,POKE,PEEK(,IPOKE,IPEEK(,VARPTR(,CHR$(,ASC
2053 | DATA CLS,COLOR,LOCATE,DEF SEG
4545 | DATA STRUCTURE(,DIM,SIZE(,MID$(,LEFT$(,RIGHT$(,STRING$(,CALL,MEM,GET
Listing 1 continued

```

## Listing 1 continued

```

2274 | DATA PUT,LSET,RSET,FOR,NEXT,END
2961 | I=1:WHILE (R$(I-1)<>"END"):READ R$(I):I=I+1:WEND
950 | TOKENS=I:U=0
1672 | DATA AND,OR,NOT,XOR,MOD
1839 | FOR I=1 TO 5:READ L$(I):NEXT
3169 | SKIPFLAG=0:F$=COMMAND$:IF F$<>" THEN SKIPFLAG=1
2338 | IF SKIPFLAG THEN GOTO SKIPENTRY1
5485 | LINE INPUT"Name of program to compile (default type is .BAS) :";F$
5356 | LINE INPUT"Name of desired output file (type will be .ASM) : ";O$
820 | SKIPENTRY1:
2136 | IF INSTR(F$,".")<1 THEN F$=F$+".BAS"
1195 | IF O$<" " THEN O$=F$
2186 | IF INSTR(O$,".") THEN O$=FNPN$(O$,".")
2826 | O$=O$+".ASM".CALL UPPER(C$):CALL UPPER(O$)
2707 | IF SKIPFLAG THEN C$="N":GOTO SKIPENTRY2
328 | C$=" "
1533 | WHILE C$<>"N" AND C$<>"Y"
6027 | PRINT"Do you want documentation in your assembler output (Y/N)?"
3218 | LINE INPUT C$:CALL UPPER(C$):IF C$=" " THEN C$="N"
398 | WEND
647 | GETLIBDR:
5670 | LINE INPUT"Please enter the drive spec for BBC.LIB ";LD$:CALL UPPER(C$)
821 | SKIPENTRY2:
1026 | OPEN"1",1,F$:I=0
668 | LINELOOP:
1757 | IF EOF(1) THEN GOTO FIXED:
3262 | LINE INPUT #1,L$:IF VAL(L$) THEN LN(I)=VAL(L$):I=I+1
1051 | GOTO LINELOOP
426 | FIXED:
1243 | CLOSE 1:LN(I)=32767
1550 | OPEN"1",1,F$:OPEN"0",2,O$
1526 | PRINT #2,T$"title "F$
1724 | PRINT #2,"CODE"TS"SEGMENT"
1323 | PRINT #2,T$"ORG 100H"
2363 | PRINT #2,T$"ASSUME CS:CODE,DS:CODE"
1963 | PRINT #2," START:"T$"PUSH CS"
2543 | PRINT #2,T$"POP CX"CRSTS"MOV Z_ZSG,CX"
1490 | ON ERROR GOTO ABORT:
1019 | GOTO GETLINE:
691 | STRIPPER:
1652 | IF LEN(U$)<1 THEN RETURN
3628 | JX=1:WHILE JX<LEN(U$) AND MID$(U$,JX,1)<=" ":JX=JX+1:WEND
1755 | IF JX>1 THEN U$=MID$(U$,JX)
1653 | IF LEN(U$)<2 THEN RETURN
3632 | JX=LEN(U$):WHILE JX>1 AND MID$(U$,JX,1)<=" ":JX=JX-1:WEND
2210 | IF JX<LEN(U$) THEN U$=LEFT$(U$,JX)
576 | RETURN
578 | GETLINE:
1695 | IF EOF(1) THEN GOTO ATEND
796 | FOR.LOOP=0
3673 | LINE INPUT #1,L$:CALL UPPER(L$):L1$="":OLN=LN:LN=VAL(L$)
2433 | IF LN THEN W=1:PRINT #2,"1"FNPN$(LN)": ";
2889 | IF C$="Y" THEN PRINT #2,T$";L$:ELSE PRINT #2,""
870 | IF LN>0 THEN
3056 | X=INSTR(L$, " ") :IF X<1 THEN X=INSTR(L$,CHR$(9))
1710 | IF X<1 THEN GOTO ABORT:
1487 | L$=MID$(L$,X):LZ=LZ+1
969 | ELSE LN=OLN
582 | END IF
4123 | IF INSTR(L$,"#ALL") THEN FOR PULL%=0 TO 33:F$(PULL%)=1:NEXT PULL%
3066 | IF INSTR(L$,"#ASM")>0 THEN ASM%=1:GOTO GETLINE:
1762 | IF ASM%<1 THEN GOTO GETL2:
3280 | IF INSTR(L$,"#ENDASM")>0 THEN ASM%=0:GOTO GETLINE:
1747 | PRINT #2,L$:GOTO GETLINE:
408 | GETL2:
326 | A$=""
749 | MULTILINE:
2955 | FOR.LOOP=0:L1$="":U$=L$:GOSUB STRIPPER:L$=U$
1894 | IF L$<" " THEN GOTO GETLINE:
3618 | IF LEFT$(L$,1)="" OR INSTR(L$,"REM")=1 THEN GOTO GETLINE:
3561 | I=1:WHILE (INSTR(L$,R$(I))>1 AND I<=TOKENS):I=I+1:WEND
3268 | OK=0:GOSUB GENERATE:IF OK THEN GOTO MULTILINE:
3545 | IF L1$STRING$(LEN(L1$),32) THEN L6=L1$:GOTO MULTILINE:
1019 | GOTO GETLINE:
645 | GENERATE:
623 | K1=1:K3=0
993 | LOOKFORMULTI:
1162 | J=INSTR(K1,L$,":")
3891 | IF J THEN FOR K2=1 TO J:K3=ABS(K3-(MID$(L$,K2,1)=CHR$(34))):NEXT
3080 | IF J>0 AND K3=1 THEN K1=J+1:GOTO LOOKFORMULTI:
2562 | IF J THEN L1$=MID$(L$,J+1):L$=LEFT$(L$,J-1)
4843 | IF INSTR(L$,"PRINT")<1 THEN IF INSTR(L$,"LPRINT")>1 THEN GOTO NOTPR
INT:
1699 | J=6-(INSTR(L$,"LPRINT")=1)
2928 | WHILE MID$(L$,J,1)<=" " AND J<LEN(L$):J=J+1:WEND
2556 | IF MID$(L$,J,1)<=" " THEN K=J+1:GOTO FEED:
3440 | IF MID$(L$,J,1)>CHR$(34) THEN GOTO NOTQUOTEDSTRING:
2791 | J=INSTR(L$,CHR$(34)):K=INSTR(J+1,L$,CHR$(34))
334 | FEED:
4189 | IF K=J+1 THEN PRINT #1,T$"MOV CX,0":IF INSTR(L$,"LPRINT")=1 THEN _
2485 | PRINT #2,T$"MOV AH,5":GOTO SHORTS:_
3560 | ELSE IF K=J+1 THEN PRINT #2,T$"MOV AH,2":GOTO SHORTS:
2340 | PRINT #2,T$"JMP I"FNPN$(LN)"A"FNPN$(W+1)
2789 | PRINT #2,"I"FNPN$(LN)"A"FNPN$(W)":T$"DB ";:W=W+1
3037 | FOR L=J+1 TO K-1:PRINT #2,FNPN$(ASC(MID$(L$,L,1)))
3948 | IF (L-J) MOD 15=14 AND L<K-1 THEN PRINT #2,"":PRINT #2,T$"DB ";:_
3110 | ELSE IF L<K-1 THEN PRINT #2,"";:ELSE PRINT #2,""
415 | NEXT
4375 | PRINT #2,"I"FNPN$(LN)"A"FNPN$(W)":T$"MOV BX,OFFSET I"FNPN$(LN)"A"FNPN$(W

```

Listing 1 continued on p. 93

need to do two things: insert the routine in the library file, and tell BBC to include it. A number precedes each routine in the library.

Let's say your routine is preceded by the number 57. When you know your command, operator, or function has been used, you should set the variable F(56) to a non-zero value; that ensures that BBC will include routine 57 from the library. (Note that F(56) is one less than the number you assigned your routine in the library.) You can use any unassigned number for your routines; there is room for up to 101 assembly routines (1-101) in the library. If you need more routines, change the dimension of the F() array appropriately.

Adding new data types, arrays, rules for parentheses, and operator precedence is considerably more complex and takes a lot more work. There, you're on your own.

## A Test

One of the most famous tests of a compiler is a program called the Sieve of Eratosthenes. Though the program isn't really a good benchmark, it has an honored status in the industry; it has been used as an informal yardstick of compiler performance for years.

The Sieve program (see Program Listing 5) supposedly computes the prime numbers from 1 to 16,384 and repeats the procedure 10 times. It then prints the number of primes it found. I say "supposedly computes" because the program incorrectly skips the number 2 as a prime.

Since BBC doesn't support arrays directly, I used a character string 8,191 bytes long for the purpose. Also, the program uses the ++ increment operator in several places. Other than that, it looks very much like standard Microsoft Basic.

Program Listing 6 shows the assembly source code that BBC outputs for Sieve.BAS.

## Conclusion

BBC is an example of a simple Basic compiler that serves two purposes: to help the beginning or advanced programmer use assembly and to illustrate some simple techniques used in writing a language compiler. The code generated by BBC is smaller than that produced by other language compilers for MS-DOS machines, and you can optimize it further.

I would appreciate hearing from any users who have added features to the language, or who have suggestions for further enhancement. ■

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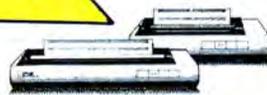
**\$619**

136 col.

- 216 cps draft, 72 cps NLQ
- 24 wire print head
- Friction and push tractor
- 5K buffer, expand to 16K
- Parallel interface



- IBM Graphics
- Single sheet auto-feed
- Epson LQ1500 compatible
- Easy front panel operation



## PREMIERE 35

**\$499**

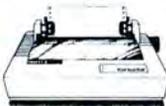
136 col.



### 120D

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80 col.



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- Bottom or back feed
- 4K buffer
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- Epson compatible
- Tractor included

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- Push tractor built-in
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- Epson compatible
- 18 month warranty

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- 8K buffer
- Push tractor built-in
- IBM graphics
- Epson compatible
- 18 month warranty

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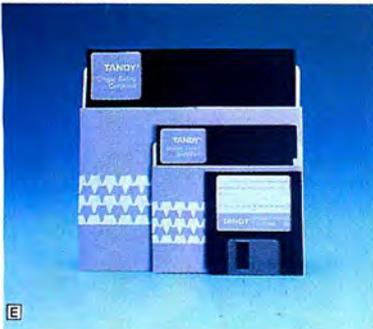
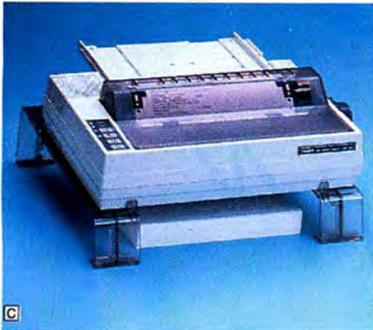
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# TEACH DESKMATE



Illustration by Robert Kopecky

# NEW TRICKS

Make it perform italics,  
and underlining,  
and headers, and. . .

**W**hen I bought my Tandy 1000 SX, I was told that sending printer codes for such essentials as headers and footers, automatic page numbers, italics, and font changes was impossible from Deskmate II. But I've found a way.

You can use LPSetup.COM and LPDRVR.SYS, two programs on your MS-DOS supplement disk, with two programs and a batch file I wrote, to create headers, footers, and other features on any Tandy 1000 and send them to a printer.

Start by booting MS-DOS. Copy LPSetup.COM and LPDRVR.SYS to the

by William C. McComas

---

## System Requirements

Tandy 1000  
GW-Basic  
Deskmate II  
Printer

---

*Program Listing 1. SETPRN1.BAS, a program for italics, underlining, and special characters.*

```

2752 | 5 REM program name = setprn1.bas
4908 | 100 LPRINT CHR$(27);"W";CHR$(4);CHR$(123);CHR$(27);CHR$(66);CHR$(1):REM
      | {on ital
5006 | 200 LPRINT CHR$(27);"W";CHR$(4);CHR$(125);CHR$(27);CHR$(66);CHR$(0):REM
      | }off ital
3892 | 300 LPRINT CHR$(27);"W";CHR$(2);CHR$(91);CHR$(15):REM [on ulin
3990 | 400 LPRINT CHR$(27);"W";CHR$(2);CHR$(93);CHR$(14):REM ]off ulin
2892 | 500 LPRINT CHR$(27);"W";CHR$(2);CHR$(130);CHR$(187)
2890 | 600 LPRINT CHR$(27);"W";CHR$(2);CHR$(131);CHR$(192)
2889 | 700 LPRINT CHR$(27);"W";CHR$(2);CHR$(133);CHR$(161)
2905 | 800 LPRINT CHR$(27);"W";CHR$(2);CHR$(138);CHR$(189)
2713 | 900 LPRINT CHR$(27)+CHR$(18):REM nlq l0cpi
710 | 1000 SYSTEM

```

End

system disk from your MS-DOS supplement disk, and enter the following lines:

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

Or, you can add LPDRVR.SYS to your existing Config.SYS file. It is the driver that permits conversion of a single code to a series of printer codes. Press F6 or control-Z and the enter key to install the printer driver; when you boot with this system disk, the 1000 automatically installs LPDRVR.SYS.

The code for your printer might differ, but that will not matter—use your Tandy-mode printer's code. It is the CHR\$(27); "W";CHR\$(n1);CHR\$(n2) that converts the character whose ASCII code is n2 into the sequence of n1 - 1 codes that your printer understands.

You can turn italics on and off with braces, { and }, by adding the following to the program:

```

30 LPRINT CHR$(27);"W";CHR$(4);"{";CHR$(
27);"B";CHR$(1)
40 LPRINT CHR$(27);"W";CHR$(4);"}";
CHR$(27);"B";CHR$(0)

```

Note that n1 is now 4. If you convert a character to a three-code sequence, n1 is 3 + 1 = 4. You can convert a character to a sequence of as many as eight codes.

## Ready, Set, Underline!

With the following Basic program you can turn underlining on and off using Deskmate and the DMP 130 printer in Tandy mode:

```

10 LPRINT CHR$(27);"W";CHR$(2);CHR$(
91);CHR$(15)
20 LPRINT CHR$(27);"W";CHR$(2);CHR$(
03);CHR$(14)

```

Run this program, and return to DOS. Install Deskmate, choose Text (Deskmate's text capability), and write a sentence. Write the same sentence again but enclose it in brackets, [ and ]. Now print. The second sentence is underlined.

Notice in lines 10 and 20 that CHR\$(91) is the ASCII code for the left bracket and CHR\$(93) is the code for the right bracket. CHR\$(15) is the DMP 130's code for turning on underlining; CHR\$(14) turns it off.

## Converting Character Sets

The same conversion command solves another frustration. The Tandy 1000 uses and displays the IBM character set 2 on the screen. To write the word *ménage*, you would ordinarily use ASCII 130 for the "e" with the acute accent. Turn on the number lock on the keyboard's number pad, hold down the alternate key, type the number, and the accent appears over the letter "e" on the screen. But when you try to print, you discover that the printer is in Tandy mode and doesn't have a character that corresponds to ASCII 130.

You could enter ASCII 187, the DMP 130's code for the "e" with acute accent in Tandy mode. It would print correctly, but the character that displays on the screen resembles somebody's elbow instead. Or, you could set the printer for IBM emulation and IBM character set 2, but IBM mode has no code for italics. Even worse, the conversion command doesn't work in IBM mode. (The DMP 130 manual is incorrect when it states that you can stay in Tandy mode and choose IBM character set 2. You get character set 1, not 2.)

The solution is to leave the printer in Tandy mode and type:

```
50 LPRINT CHR$(27);"W";CHR$(2);CHR$(
130);CHR$(187)
```

Now when you enter alternate-130 on the number pad, the screen shows your "é," and when the printer receives it, it prints the character it knows as ASCII 187, the "e" with acute accent. Your screen and printed characters are finally the same.

*Program Listing 2. SETPRN2.BAS, a program for headers and footers.*

```

2753 | 5 REM program name = setprn2.bas
1877 | 10 LPRINT CHR$(&H1B);CHR$(&H99);'header set
2775 | 20 HEAD$="P+= Line 1 of your header"
2605 | 30 HD2$=" Line 2 of your header"
947 | 40 LPRINT HEAD$
864 | 50 LPRINT HD2$
1786 | 60 LPRINT CHR$(&HD);CHR$(&HA);'lf
1787 | 70 LPRINT CHR$(&HD);CHR$(&HA);
1788 | 80 LPRINT CHR$(&HD);CHR$(&HA);
1087 | 90 LPRINT CHR$(0);
1933 | 100 LPRINT CHR$(&H1B);CHR$(&H9A);'footer set
994 | 110 LPRINT "P+=";'page number
1180 | 120 LPRINT CHR$(12);'form feed
1130 | 130 LPRINT CHR$(0);
2418 | 140 LPRINT CHR$(&H1B);CHR$(&H43);CHR$(34);'lines per page
2385 | 150 LPRINT CHR$(&H1B);CHR$(&H9C);CHR$(0);'lf after cr
668 | 160 SYSTEM

```

End

With Program Listing 1 (SETPRN1.BAS), you can use italics, underlining, and several special characters and print in near letter quality on the DMP 130—all from Deskmate. Line 500 gives you "é"; line 600, "â"; line 700, "à"; and line 800, "è." You can add your own program lines for bold, elongation, pitch changes, or whatever you want to send the Tandy-mode printer from Deskmate—and let no one say it can't be done.



## Headers, Footers, And LPSetup

Program Listing 2 (SETPRN2.BAS) puts a two-line header (followed by three line feeds) and a one-line footer on every page printed from Deskmate's Text. It also numbers the pages automatically; in fact, it puts the page number wherever you place P+ = in the header or footer (see line 20 in Listing 2). Putting D+ = and T+ = in the header or footer inserts the date and time, respectively.

An example of a statement that uses all three delimiters is the following:

```
LPRINT "DATE: D+ = ; TIME: T+ = ; PAGE: P+ ="
```

You need to install LPSetup from MS-DOS before you try to do headers, footers, and pagination with Deskmate. (Make sure LPSetup.COM is on your system disk.) The command is:

```
LPSETUP SWITCH.PTYPE.PORT[,PAGE]
```

Switch might be on or off, PType is Tandy or IBM, Port is the printer port, and Page is the starting page number that defaults to 1 if you don't give it a value. For example, typing LPSETUP ON,TANDY, 1,23 makes resident a portion of LPSetup (on), tells the resident portion that the computer is on line to a printer in Tandy mode on parallel port number 1, and that you want to start pagination at page 23.

The following Basic command gives you your header:

```
LPRINT CHR$(&H1B);CHR$(&H99):"YOUR  
HEADER HERE";[optional carriage return  
and line feed codes here];CHR$(0)
```

This next command puts your footer on every page:

```
LPRINT CHR$(&H1B);CHR$(&H9A):"YOUR  
FOOTER HERE";[code for optional form feed  
here];CHR$(0)
```

Last, set the lines per page and provide

*Program Listing 3. A batch file to run SETPRN1 and SETPRN2 and install Deskmate II.*

```
echo off
cls
echo THIS IS ARTNAM.BAT. It sets up the printer and installs DeskMate II in drive B
echo for writing articles. Call it from MS-DOS with the command artnam [page].
echo --
echo Be sure printer is on and Deskmate II is in Drive B. When DeskMate II
echo appears, replace system disk with data disk in Drive A.
echo on
pause Press CTRL C for termination option or
basic setprn1.bas
lpsetup on,tandy,1
basic setprn2.bas
lpsetup on,tandy,1,%1
b:
dmpplus
```

End

for a line feed after each carriage return with the following:

```
LPRINT CHR$(&H1B);CHR$(&H43);CHR$(  
number of lines per page)  
LPRINT CHR$(&H1B);CHR$(&H9C);CHR$(0)
```

Determining the number of lines per page to specify in the command above gets tricky because you also designate printed lines per page and total lines per page in Deskmate, and you choose double spacing in Deskmate while the screen is single-spaced; the printout, though, will be double-spaced.

For the Deskmate printer setting (alternate-F6), enter 60 for both printed lines per page and total lines per page. This prevents Deskmate from adding its own spaces with a form feed when it thinks it has completed a page. You want to control lines per page with your Basic program. Through trial and error I discovered 34 lines per page worked in Listing 2 (SETPRN2.BAS); with my five-line header (two printed lines and three line feeds), it gives an attractive page layout with 25 lines of text.



## Putting It All Together

You can create a batch file in MS-DOS by typing COPY CON ARTNAM.BAT and pressing enter. Next enter the commands given in Listing 3. Now type F6 or control-Z and press enter to save your batch file.

The batch file in Listing 3 runs SETPRN1.BAS, turns on LPSetup, runs SETPRN2.BAS, and turns on LPSetup

again to let you specify the starting page number. If Deskmate is in, say, drive B, you could have your batch file switch to that drive and give you Deskmate, as in Listing 3.

What does %1 do in the batch file's LPSetup command in Listing 3? It is a replaceable parameter: When you call your batch file from MS-DOS with ARTNAM 23, the 23 replaces the %1 and is the beginning page number.

## A Shift

A slight but noticeable line shift appears when you switch between normal and italics printing with the DMP 130. You can compensate for it by sending the printer a reverse line feed at the same time, but the size of the reverse line feed varies, so you need to experiment.

Otherwise, you are on your way to making Deskmate perform new tricks for you, hardly an impossible task.

You might want to take on two challenges: (1) to make these tricks work with the printer in IBM mode; and (2) to make the conversion codes work with printers that already use CHR\$(27); "W" for other purposes. ■

*William C. McComas is a free-lance writer and amateur programmer. He has a Ph.D. in psychology and specializes in the field of addictions treatment. He also writes novels under a pseudonym. Write to him c/o 80 Micro, 80 Elm St., Peterborough, NH 03458.*



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## Reaching the Back Banks

Article: The Next Step (p. 82).  
System: Model 4/4P/4D, LS-DOS 6.3, 128K RAM.

A new way to access alternate memory banks.  
Language: Basic.  
Filespecs: EXMEM/ASM, EXMEM/BAS, EXMEM/CMD.

CMD = object code; ASM = source code; BAS = Basic  
See page 6 for details on the quarterly disk series for the Tandy 1000/1200/3000.

assembly-language programs if you don't have an editor/assembler. And it helps you build a substantial software library.

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Not all programs will run on your system. Some Model III programs, for instance, will run on the Model 4 in the Model III mode, but not in the Model 4

## Make Graph Paper with Printer

Article: No More Pencils,  
No More Rulers (p. 57).  
System: Model 4, 64K RAM,  
Epson RX-80 printer.

Make graph paper exactly the size you need.  
Language: Basic.  
Filespec: GRAFPAPR/BAS.

mode. You should check the system requirements box that accompanies the article to find out what system configuration individual programs require.

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly disk subscriptions to The 80 Micro Disk Series are \$149.95. Individual loaders are available on disk for \$17.95, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-258-5473 24-hours a day. Or, you can write to The 80 Micro Disk Series, 80 Elm St., Peterborough, NH 03458.

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# No More Pencils, No More Rulers

by John Collicott

UTILITY

Let your printer construct graph paper  
with just the right grid size.

I got tired of using a pencil and ruler to draw grids on paper whenever I needed to make some kind of chart. Various graphing projects require different-sized grids and usually, different pads of graph paper. It seemed that every time I started a project, I had every size of grid on paper, except for the size that I needed. I decided to draw graph paper with my printer instead.

Grafpaper (see Program Listing 1) works with the Epson RX-80 printer, and codes specific to the RX-80 are documented. You can change those character codes to work with other printers by referring to lines 300-340, 980-1010, and 1710-1740 in Program Listing 1, the Tandy 1000 conversion written by 80 Micro technical editor Beve Woodbury. Program Listing 2 is my version for the Model 4. Refer to lines 300-350, 920-930, and 1590-1650 in Listing 2 to make printer-code adjustments.

The opening menu lets you choose between using an existing disk file of an earlier graph or building a new design. The program automatically saves and loads disk files with the extension GRP. When you build a new graph, the top left corner displays special keys that are used in the program. In the middle of the screen, the top of the graph is laid out and divided into eight segments; each segment has 10 spaces. The size of each graph begins at 80 by 100 (or 8 by 10 inches). You are reminded on the bottom of the screen that 1 inch on paper equals 10 spaces (one segment).

Use the left- and right-arrow keys to select a position for a vertical line. Press the L key to mark the line, and if you change your mind, use the B key to erase that mark. When you press the R key, the program asks if you want to repeat lines or blanks (L or B). Choose L to insert lines or B to blank (delete) lines you previously inserted. It then requests the number of spaces you want between lines or blanks. For example, if you want five spaces between each line, the program repeats (inserts) the lines for you. You can shorten the vertical graph to less than 8 inches by using the E key at the desired location.

---

## System Requirements

Tandy 1000/1200/3000

or Model 4

Basic

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Once you mark all the vertical lines, press the C key to move to the next stage, the heading design. A line editor appears directly under the grid layout, and it allows you to type in a header line that appears on the top of the grid when you print the graph. Left- and right-arrow keys allow you to move the cursor and type over characters to make changes in the header. When you are finished with the header, press enter, and the screen is ready for horizontal line selection.

Everything here is the same as with vertical selections, except that with horizontal selections, you cannot adjust the length. Another difference is that when you select horizontal lines, only 20 lines display at a time. To view the remaining lines, use the down arrow key, and the

next 20 lines display. The repeating-patterns feature works the same although you might not see it unless you scroll down the screen.

After you complete the design, the C key presents another menu. Now you can save a graph to a disk file for future use or designate a number of printed copies. If you want to run a test print, select only one copy. When the printer finishes, control is returned to the menu. ■

*John Collicott is a self-taught programmer. He worked for Radio Shack as a computer specialist and is currently involved with the Hutchinson Color Computer Club. You can address questions and comments to him at 201 East Morgan, Inman, KS 67546.*

Program Listing 1. Grafpaper lets you create graphs with your printer on the Tandy 1000. See p. 86 for using checksums in Listings 1 and 2.

```

10 ' GRAFPAPR BY JOHN COLLICOTT FOR THE EPSON RX80
20 ' Model 1000 conversion by Beve Woodbury
30 ' Title Page
40 '*****
1106 | 50 CLS: CLEAR, , 20000
5419 | 60 A1$=STRING$(8,219):A2$=STRING$(7,219):A3$=STRING$(5,219):A4$=STRING$(
2,219): A5$=CHR$(219)
5625 | 70 B1$=STRING$(9,32):B2$=STRING$(6,32):B3$=STRING$(5,32):B4$=STRING$(4,3
2): B5$=STRING$(3,32)
3549 | 80 PRINT " "+A1$+" "+A2$+B2$+A4$+B3$+A1$+" "+A2$+B2$+A4$+B3$+A2$+B5$+A
2$
5905 | 90 PRINT " "+A5$+B1$+A5$+B2$+A5$+B4$+A5$+" "+A5$+B4$+A5$+B1$+A5$+B2$+A5
$+B4$+A5$+" "+A5$+B4$+A5$+B2$+A5$+" "+A5$+B2$+A5$
5993 | 100 PRINT " "+A5$+B1$+A5$+B2$+A5$+B5$+A5$+B4$+A5$+B5$+A5$+B1$+A5$+B2$+A5
$+B5$+A5$+B4$+A5$+B5$+A5$+B2$+A5$+" "+A5$+B2$+A5$
3923 | 110 PRINT " "+A5$+" "+A3$+" "+A2$+B5$+A1$+" "+A1$+" "+A2$+B5$+A1$+"
 "+A2$+B5$+A2$
5552 | 120 PRINT " "+A5$+B2$+A5$+" "+A5$+B4$+A5$+B4$+A5$+B2$+A5$+" "+A5$+B1$+
A5$+B1$+A5$+B2$+A5$+" "+A5$+B1$+A5$+B4$+A5$
5552 | 130 PRINT " "+A5$+B2$+A5$+" "+A5$+B3$+A5$+B5$+A5$+B2$+A5$+" "+A5$+B1$+
A5$+B1$+A5$+B2$+A5$+" "+A5$+B1$+A5$+B3$+A5$
5132 | 140 PRINT " "+A1$+" "+A5$+B2$+A5$+" "+A5$+B2$+A5$+" "+A5$+B1$+A5$+B1$
+A5$+B2$+A5$+" "+A5$+B1$+A5$+B2$+A5$
4000 | 150 LOCATE 20,1,0:PRINT "JOHN COLLICOTT";:FOR T=1 TO 2000:NEXT T
1582 | 160 CLEAR:DIM L$(101),V$(101)
3432 | 170 X=1:D=60:N1=1:N2=20:V$(1)=CHR$(205):V$(100)=CHR$(205):R=80
| 180 '*****
3614 | 190 CLS:LOCATE 1,35:PRINT "GRAFPAPR":PRINT STRING$(80,42)
2508 | 200 LOCATE 5,30:PRINT "1) USE A DISK FILE"
2562 | 210 LOCATE 6,30:PRINT "2) BUILD NEW GRAPH"
2569 | 220 LOCATE 7,30:PRINT "3) END THE PROGRAM"
1774 | 230 QS=INKEY$:IF QS="" THEN 230
2816 | 240 ON INSTR("123",QS) GOTO 1890,250,1950:GOTO 230
2438 | 250 A$(1)=CHR$(135)+STRING$(78,133)+CHR$(136)
2387 | 260 A$(2)=CHR$(134)+STRING$(78,32)+CHR$(134)
2434 | 270 A$(3)=CHR$(132)+STRING$(78,133)+CHR$(131)
2448 | 280 A$(4)=CHR$(137)+STRING$(78,133)+CHR$(138)
| 290 '*****
| 300 ' EPSON RX80 DOCUMENTATION
| 310 ' CODE 135=UPPER LEFT CORNER 133=HORIZONTAL LINE
| 320 ' CODE 136=UPPER RIGHT CORNER 134=VERTICAL LINE
| 330 ' CODE 132=VERTICAL+RIGHT LINE 131=VERTICAL+LEFT LINE
| 340 ' CODE 137=LOWER LEFT CORNER 138=LOWER RIGHT CORNER
| 350 '*****
2237 | 360 CLS:PRINT " < SPECIAL KEYS >"
2427 | 370 PRINT "L...LOCATES LINE LOCATION"
2362 | 380 PRINT "B...REPLACES WITH A BLANK"
2438 | 390 PRINT "C...CONTINUE TO NEXT PART"
2663 | 400 PRINT "R...REPEATING LINE PATTERNS"
2505 | 410 PRINT "USE LEFT & RIGHT ARROW KEYS"
2546 | 420 PRINT "E...SHORTEN THE LINE LENGTH"
4135 | 430 LOCATE 20,1:PRINT "REMEMBER THAT 10 SPACES = 1 INCH ON PAPER.";
2278 | 440 B$=CHR$(219)+STRING$(78, ".")+CHR$(219)
| 450 '*****
3186 | 460 C$=" : : : : : :
| : : : : : :
3272 | 470 D$=" : 10 20 30 40 50 60
| : 70 80"
2148 | 480 SS=15:CR=1:LOCATE 13,1:PRINT D$
2759 | 490 LOCATE 14,1:PRINT C$:LOCATE 15,1:PRINT B$
2823 | 500 QS=INKEY$:IF QS="" THEN GOSUB 2400:GOTO 500
1409 | 510 IF LEN(QS)=1 THEN 550
1330 | 520 Q=ASC(RIGHT$(QS,1))
2104 | 530 IF Q=75 THEN GOSUB 880:GOTO 500
2101 | 540 IF Q=77 THEN GOSUB 910:GOTO 500
2820 | 550 IF QS=CHR$(76) OR QS=CHR$(108) THEN GOSUB 940

```

Listing 1 Continued

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25-1023	CM-5 Color Monitor	299	202	207	212	26-2812	DWP 230 200wpm	459	297	302	307
25-1053	100HX 256 1DD	699	489	494	499	26-2800	DWP 520 500wpm	995	681	686	691
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Listing I Continued

```

1288 IF ASC(QS) < 32 OR ASC(QS) > 122 THEN 1230
1290 TT$=LEFT$(TT$,T1)+Q$:LOCATE 16,T1:PRINT QS;T1=T1+1
1300 GOTO 1230
1310 TT$=CHR$(32)+LEFT$(TT$,T1)
1320 LOCATE 8,1:PRINT STRINGS(70,32)
1330 LOCATE 16,1:PRINT STRINGS(80,32):GOTO 620
1340 *****Up arrow key module
1350 IF SS=<1 THEN 1360 ELSE 1390
1360 IF Z<1 THEN 770
1370 Z=Z-1:N2=Z+1:N1=N2-19:SS=1
1380 GOSUB 700:SS=20:Z=N2:GOTO 1400
1390 SS=SS-1:Z=Z-1
1400 RETURN
1410 *****Down arrow key module
1420 IF SS+1>20 THEN 1430 ELSE 1460
1430 IF Z+1>100 THEN 770 ELSE 1440
1440 Z=Z+1:N1=Z-N2:N1+19:SS=1
1450 GOSUB 700:SS=1:Z=N1:GOTO 1470
1460 SS=SS+1:Z=Z+1
1470 GOSUB 2400:RETURN
1480 *****Insert a horizontal line
1490 IF Z=1 OR Z=100 THEN 1520
1500 L$(Z)=A$(3):V$(Z)=CHR$(205)
1510 LOCATE SS,75:PRINT CHR$(205);
1520 RETURN
1530 *****Replace a blank
1540 IF Z=1 OR Z=100 THEN 1560
1550 L$(Z)=A$(2):V$(Z)=":LOCATE SS,75:PRINT ".
1560 RETURN
1570 *****Choices for finished grafpapr
1580 CLS:LOCATE 1,35:PRINT "GRAFPAPR"
1590 PRINT STRINGS(80,42)
1600 LOCATE 5,30:PRINT "1) SAVE TO DISK"
1610 LOCATE 6,30:PRINT "2) PRINT COPIES"
1620 LOCATE 7,30:PRINT "3) START OVER"
1630 LOCATE 8,30:PRINT "4) END PROGRAM"
1640 Q$=INKEY$:IF Q$=" THEN 1640
1650 ON INSTR("1234567890") Q$ GOTO 1810,1670,160,1950:GOTO 1640
1660 *****Printer routine Epson RX80
1670 CLS:LOCATE 5,1:PRINT "HOW MANY COPIES OF THIS GRAPH ";:INPUT N
1680 LOCATE 10,1:PRINT "PREPARE PRINTER ***";
1690 Q$=INKEY$:IF Q$=" THEN 1690
1700 *****
1710 LPRINT CHR$(27)"@"; ' Reset printer
1720 LPRINT CHR$(27)"m"CHR$(4); ' Select graphics characters
1730 LPRINT CHR$(27)"01"; ' Unidirectional mode (sharper lines)
1740 LPRINT CHR$(27)"1"; ' Line spacing set to 7/72 inch
1750 *****
1760 FOR TT=1 TO N:LPRINT TT$
1770 FOR T=1 TO 100:LPRINT L$(T):NEXT T
1780 FOR G=1 TO 10:LPRINT NEXT G
1790 NEXT TT:GOTO 1580
1800 *****Disk save - adds GRP extension
1810 CLS:LOCATE 5,1:PRINT "ENTER 8 LETTER FILE NAME ";:INPUT F$
1820 IF LEN(F$)>8 THEN 1810
1830 F$=F$+".GRP":OPEN "O",1,F$
1840 CLS:LOCATE 20,1:PRINT "WRITING TO FILE "F$";
1850 WRITE #1,TT$
1860 FOR T=1 TO 100:WRITE #1,L$(T):NEXT T
1870 CLOSE #1:GOTO 1580
1880 *****Disk retrieve - adds GRP extension
1890 CLS:LOCATE 5,1:PRINT "NAME OF FILE TO RETRIEVE ";:INPUT F$
1900 IF LEN(F$)>8 THEN 1890
1910 F$=F$+".GRP":LOCATE 20,1:PRINT "RETRIEVING FILE "F$";
1920 OPEN "I",1,F$:INPUT #1,TT$
1930 FOR T=1 TO 100:INPUT #1, L$(T):NEXT T:CLOSE
1940 GOTO 1580
1950 CLS:LOCATE 8,26:PRINT "Thank you for using GRAFPAPR"
1960 END
1970 *****Repeating vertical lines - screen 1
1980 RX=X
1990 LOCATE 8,1:PRINT "REPEAT LINES OR BLANKS (L/B) ";
3372
    
```

Listing I Continued

Listing I Continued

```

560 IF QS=CHR$(82) OR QS=CHR$(114) THEN GOSUB 1980
570 IF QS=CHR$(66) OR QS=CHR$(98) THEN GOSUB 1960
580 IF QS=CHR$(69) OR QS=CHR$(101) THEN GOSUB 1120
590 IF QS=CHR$(67) OR QS=CHR$(99) THEN GOTO 1210
600 GOTO 500
610 *****Changes for vertical screen
620 SS=0:LOCATE 13,1:PRINT STRINGS(163,32)
630 LOCATE 15,1:PRINT STRINGS(80,32)
640 LOCATE 6,1:PRINT "USE THE UP & DOWN ARROW KEYS";
650 LOCATE 7,1:PRINT "A TOTAL OF 100 LINES AVAILABLE";
660 L$(1)=A$(1):L$(100)=A$(4)
670 FOR T=2 TO 99:L$(T)=A$(2):NEXT T
680 FOR T=2 TO 99:V$(T)="":NEXT T
690 GOSUB 700:GOTO 760
700 IF SS=0 THEN SS=1
710 FOR Z=N1 TO N2
720 IF Z<10 THEN LOCATE SS,72:PRINT Z;V$(Z):GOTO 750
730 IF Z<100 THEN LOCATE SS,71:PRINT Z;V$(Z):GOTO 750
740 LOCATE SS,70:PRINT Z;V$(Z);
750 SS=SS+1:NEXT Z:RETURN
760 SS=1:Z=1:CR=75
770 Q$=INKEY$:IF Q$=" THEN GOSUB 2400:GOTO 770
780 IF LEN(Q$)=1 THEN 820
790 Q=ASC(RIGHT$(Q$,1))
800 IF Q=72 THEN GOSUB 1350:GOTO 770
810 IF Q=80 THEN GOSUB 1420:GOTO 770
820 IF QS=CHR$(76) OR QS=CHR$(108) THEN GOSUB 1490
830 IF QS=CHR$(82) OR QS=CHR$(114) THEN GOSUB 2180
840 IF QS=CHR$(66) OR QS=CHR$(98) THEN GOSUB 1540
850 IF QS=CHR$(67) OR QS=CHR$(99) THEN 1580
860 GOTO 770
870 ***** Left arrow key module
880 X=X-1:IF X<1 THEN X=1
890 CR=X:GOSUB 2400:RETURN
900 ***** Right arrow key module
910 X=X+1:IF X>80 THEN X=80
920 CR=X:GOSUB 2400:RETURN
930 ***** Inset vertical line
940 IF X=R THEN 1040
950 MIDS(A$(1),X,1)=CHR$(130):MIDS(A$(2),X,1)=CHR$(134)
960 MIDS(A$(3),X,1)=CHR$(128):MIDS(A$(4),X,1)=CHR$(129)
970 *****
980 ' Epson documentation
990 ' CODE 130=horizontal + down line
1000 ' 128=crossed lines
1010 ' 129=horizontal + up line
1020 *****
1030 MIDS(B$,X,1)=CHR$(222):LOCATE 15,X:PRINT CHR$(222);
1040 RETURN
1050 ***** replace a blank (.)
1060 IF X=R THEN 1100
1070 MIDS(A$(1),X,1)=CHR$(133):MIDS(A$(2),X,1)=CHR$(32)
1080 MIDS(A$(3),X,1)=CHR$(133):MIDS(A$(4),X,1)=CHR$(133)
1090 MIDS(B$,X,1)="":LOCATE 15,X:PRINT ".
1100 RETURN
1110 *****Shorten horizontal line
1120 RX=X:LOCATE 15,1:PRINT "SWAP ES,AS(1)";
1130 ES=LEFT$(AS(2),X-1)+CHR$(136):SWAP ES,AS(1)
1140 ES=LEFT$(AS(2),X-1)+CHR$(134):SWAP ES,AS(2)
1150 ES=LEFT$(AS(3),X-1)+CHR$(131):SWAP ES,AS(3)
1160 ES=LEFT$(AS(4),X-1)+CHR$(138):SWAP ES,AS(4)
1170 ES=LEFT$(AS,X-1)+CHR$(69):SWAP ES,B$
1180 LOCATE 15,1:PRINT STRINGS(80,"")
1190 LOCATE 15,1:PRINT B$:RETURN
1200 *****Title Headings
1210 LOCATE 8,1:PRINT "TYPE IN A HEADING AND PRESS < ENTER > WHEN DONE"
1220 T1=L:SS=16:TS=STRINGS(78,32):LOCATE 16,1
1230 CR=T1:Q$=INKEY$:IF Q$=" THEN GOSUB 2400:GOTO 1230
1240 O=ASC(RIGHT$(Q$,1))
1250 IF O=75 THEN T1=T1-1:IF T1=0 THEN T1=1
1260 IF O=77 AND T1<78 THEN T1=T1+1:IF T1>LEN(TS) THEN TT$=TT$+Q$":GOTO 1230
1270 IF Q$=CHR$(13) THEN 1310
    
```

Listing I Continued



Listing 2 Continued

```
683 | 800 GOTO 730
1810 | ***** LEFT ARROW KEY MODULE
1514 | 820 X=X-1:IF X<2 THEN X=2
1830 | 830 PRINT @ (15,X-1),":":RETURN
840 | ***** RIGHT ARROW KEY MODULE
1581 | 850 X=X+1:IF X>R THEN X=R
1833 | 860 PRINT @ (15,X-1),":":RETURN
870 | ***** INSERT LINE INTO GRAPH MODULE (VERTICAL LINE)
1125 | 880 IF X=R THEN 970
2932 | 890 MIDS(A$(1),X,1)=CHRS(130):MIDS(A$(2),X,1)=CHRS(134)
2939 | 900 MIDS(A$(3),X,1)=CHRS(128):MIDS(A$(4),X,1)=CHRS(129)
910 | *****
920 | ***** EPSON DOCUMENTATION CODE 130=HORIZONTAL+DOWN LINE
930 | 128=CROSSED LINES 129=HORIZONTAL+UP LINE
1409 | *****
1499 | 950 MIDS(B$(X,1)=CHRS(149))
2887 | 960 PRINT @ (15,X-1),CHR$(149):PRINT @ (15,X-1),":":
672 | 970 RETURN
980 | ***** INSERT A BLANK BACK INTO GRAF MODULE
1164 | 990 IF X=R THEN 1040
2916 | 1000 MIDS(A$(1),X,1)=CHRS(133):MIDS(A$(2),X,1)=CHRS(132)
2971 | 1010 MIDS(A$(3),X,1)=CHRS(133):MIDS(A$(4),X,1)=CHRS(133)
1064 | 1020 MIDS(B$(X,1)=":":
2542 | 1030 PRINT @ (15,X-1),":":PRINT @ (15,X-1),":":
709 | 1040 RETURN
1050 | ***** SHORTEN HORIZONTAL LINE MODULE
2879 | 1060 R=X:ES=LEFTS(A$(1),X-1)+CHRS(136):SWAP ES,A$(1)
2623 | 1070 ES=LEFTS(A$(2),X-1)+CHRS(134):SWAP ES,A$(2)
2623 | 1080 ES=LEFTS(A$(3),X-1)+CHRS(131):SWAP ES,A$(3)
2665 | 1090 ES=LEFTS(A$(4),X-1)+CHRS(138):SWAP ES,A$(4)
2284 | 1100 ES=LEFTS(B$(X-1)+CHRS(69):SWAP ES,B$
1966 | 1110 PRINT @ (15,0),SPRINGS(80),":":
2934 | 1120 PRINT @ (15,0),B$:PRINT @ (15,X-1),":":RETURN
1130 | ***** TITLE HEADINGS FOR GRAF MODULE
6577 | 1140 INT @ (16,1),":":T1=1:T$=STRINGS(78,32)
1874 | 1150 QS=INKEY$:IF QS="" THEN 1150
2286 | 1160 IF QS=CHRS(8) AND T1>1 THEN T1=T1-1
2346 | 1170 IF QS=CHRS(9) AND T1<78 THEN T1=T1+1
1589 | 1180 IF QS=CHRS(13) THEN 1220
1292 | 1190 PRINT @ (16,T1),":":
2301 | 1200 IF ASC(QS) < 32 OR ASC(QS)>122 THEN 1150
2873 | 1210 MIDS(T$T1,1)=QS:PRINT QS:T1=T1+1:GOTO 1150
1012 | 1220 T$=CHRS(32)+T$
1891 | 1230 PRINT @ (16,0),STRINGS(70,32);
726 | 1240 GOTO 600
1250 | ***** UP ARROW KEY MODULE
1966 | 1260 IF SS-1 < 0 THEN 1270 ELSE 1300
1255 | 1270 IF Z-1 < 1 THEN 730
2396 | 1280 Z=Z-1:N2=Z-N1:N2-19:SS=0:GOSUB 670
1447 | 1290 SS=0:Z=N1:GOTO 1310
2261 | 1300 SS=SS-1:Z=Z-1:PRINT @ (SS,75),":":
1862 | 1310 PRINT @ (SS,75),":":RETURN
1320 | ***** DOWN ARROW KEY MODULE
1995 | 1330 IF SS+1>19 THEN 1340 ELSE 1370
1317 | 1340 IF Z+1>100 THEN 730
2389 | 1350 Z=Z+1:N1=Z-N2:N1+19:SS=0:GOSUB 670
1422 | 1360 SS=0:Z=N1:GOTO 1380
2264 | 1370 SS=SS+1:Z=Z+1:PRINT @ (SS,75),":":
1869 | 1380 PRINT @ (SS,75),":":RETURN
1390 | ***** INSERT A LINE INTO GRAF MODULE (HORIZONTAL LINE)
1692 | 1400 IF Z=1 OR Z=100 THEN 1430
1786 | 1410 L$(Z)=A$(3)+VS(Z)-CHRS(140)
2898 | 1420 PRINT @ (SS,75),CHR$(140):PRINT @ (SS,75),":":
712 | 1430 RETURN
1440 | ***** INSERT A BLANK BACK INTO GRAF MODULE
1792 | 1450 IF Z=1 OR Z=100 THEN 1480
1337 | 1460 L$(Z)=A$(2)+VS(Z),":":
2530 | 1470 PRINT @ (SS,75),":":PRINT @ (SS,75),":":
717 | 1480 RETURN
1490 | ***** MAKE CHOICES FOR FINISHED GRAFPAPR
3349 | 1500 CLS:PRINT @ (1,35),"GRAFPAPR":PRINT STRINGS(80,42)
2096 | 1510 PRINT @ (5,30),":1) SAVE TO DISK"
```

Listing 2 Continued

```
1520 | PRINT @ (6,30),":2) PRINT COPIES "
2051 | 1530 PRINT @ (7,30),":3) START OVER "
2059 | 1540 PRINT @ (8,30),":4) END PROGRAM"
1211 | 1550 PRINT @ (9,20),":":
1884 | 1560 QS=INKEY$:IF QS="" THEN 1560
3269 | 1570 ON INSTR("12345",QS) GOTO 1710,1590,1500,1830:GOTO 1560
4034 | ***** PRINTER ROUTINE EPSON RX80
2506 | 1580 CLS:PRINT @ (5,0),":HOW MANY COPIES OF THIS GRAPH ";:INPUT N
1876 | 1600 PRINT @ (10,0),":PREPARE PRINTER ...";
1876 | 1610 QS=INKEY$:IF QS="" THEN 1610
1372 | 1620 LPRINT CHR$(27),"0";:RESET PRINTER
1808 | 1630 LPRINT CHR$(27),"C";:SELECT GRAPHICS CHARACTERS
1444 | 1640 LPRINT CHR$(27),"U";:UNIDIRECTIONAL MODE (SHARPER LINES)
1360 | 1650 LPRINT CHR$(27),"1";:LINE SPACING SET TO 7/72 INCH
1767 | *****
1670 | FOR T=1 TO N:LPRINT T$
2401 | 1680 FOR T=1 TO 100:LPRINT L$(T):NEXT T
3199 | 1690 FOR G=1 TO 12:LPRINT:NEXT G:NEXT TT:GOTO 1500
1700 | ***** DISK SAVE - ADDS EXTENSION /GRP:1 TO FILENAME
3078 | 1710 CLS:PRINT @ (5,0),":ENTER 8 LETTER FILE NAME ";
2081 | 1720 INPUT F$:IF LEN(F$)>8 THEN 1710
1792 | 1730 F$=F$+" /GRP:1":OPEN "O",1,F$
2688 | 1740 CLS:PRINT @ (20,0),":WRITING TO FILE ";F$;
912 | 1750 WRITE #1,T$
3599 | 1760 FOR T=1 TO 100:WRITE #1,LS(T):NEXT T:CLOSE #1:GOTO 1500
1770 | ***** DISK RETRIEVE - ADDS EXTENSION /GRP:1 TO FILENAME
2147 | 1780 CLS:PRINT @ (5,0),":NAME OF FILE TO RETRIEVE ";
3254 | 1800 INPUT F$:IF LEN(F$)>8 THEN 1780
1694 | 1810 OPEN "I",1,F$:INPUT #1,F$
3517 | 1820 FOR T=1 TO 100:INPUT #1,LS(T):NEXT T:CLOSE:GOTO 1500
3893 | 1830 CLS:PRINT @ (8,26),":Thank you for using GRAFPAPR"
1482 | 1840 PRINT @ (16,0),":":END
3403 | 1850 ***** REPEATING LINES MODULE FOR VERTICAL LINES (SCREEN 1)
1892 | 1860 RX=X:PRINT @ (8,0),":REPEAT LINES OR BLANKS (L/B) ";
1870 | 1870 QS=INKEY$:IF QS="" THEN 1870
4550 | 1880 IF QS="L" OR QS="1" THEN FL=1 ELSE IF QS="B" OR QS="b" THEN FL=2 E
LSE 1870
4020 | 1890 PRINT @ (8,0),":HOW MANY SPACES BETWEEN EACH LINE OR SPACE....?";
1880 | 1900 QS=INKEY$:IF QS="" THEN 1900
1600 | 1910 IF QS=CHRS(13) THEN 1950
793 | 1920 R$=R$+QS
5455 | 1930 IF VAL(R2$)<0 OR VAL(R2$)>R-X THEN R2$="":PRINT @ (8,47),":":P
1448 | 1940 PRINT @ (8,47),":":GOTO 1900
2463 | 1950 R2=VAL(R2$):FOR X=RX TO R-1 STEP R2
1614 | 1960 IF FL=1 THEN GOSUB 880
1618 | 1970 IF FL=2 THEN GOSUB 990
1058 | 1980 NEXT X:X=RX
3065 | 1990 PRINT @ (8,0),STRINGS(50,32):PRINT @ (15,X-1),":":
1360 | 2000 R2=0:R2$="":RETURN
2010 | ***** REPEATING LINES MODULE - HORIZONTAL LINES (SCREEN 2)
2983 | 2020 PRINT @ (8,0),":REPEAT LINES OR BLANKS (L/B) ";
1870 | 2030 QS=INKEY$:IF QS="" THEN 2030
4528 | 2040 IF QS="L" OR QS="1" THEN FL=1 ELSE IF QS="B" OR QS="b" THEN FL=2 E
LSE 2030
4159 | 2050 PRINT @ (8,0),":HOW MANY SPACES BETWEEN EACH LINE OR SPACE....?";
1876 | 2060 QS=INKEY$:IF QS="" THEN 2060
1587 | 2070 IF QS=CHRS(13) THEN 2110
791 | 2080 R2$=R2$+QS
5421 | 2090 IF VAL(R2$)<0 OR VAL(R2$)>99-Z THEN R2$="":PRINT @ (8,47),":":P
R
1435 | 2100 PRINT QS:GOTO 2060
1276 | 2110 R2=VAL(R2$):RX=Z
1666 | 2120 FOR Z=RX TO 99 STEP R2
1641 | 2130 IF FL=1 THEN GOSUB 1400
1648 | 2140 IF FL=2 THEN GOSUB 1450
3139 | 2150 NEXT Z:SS=0:GOSUB 670:Z=RX:R2=0:R2$="":SS=Z-1
3583 | 2160 PRINT @ (8,0),STRINGS(50,32):PRINT @ (SS,75),":":RETURN
```

End

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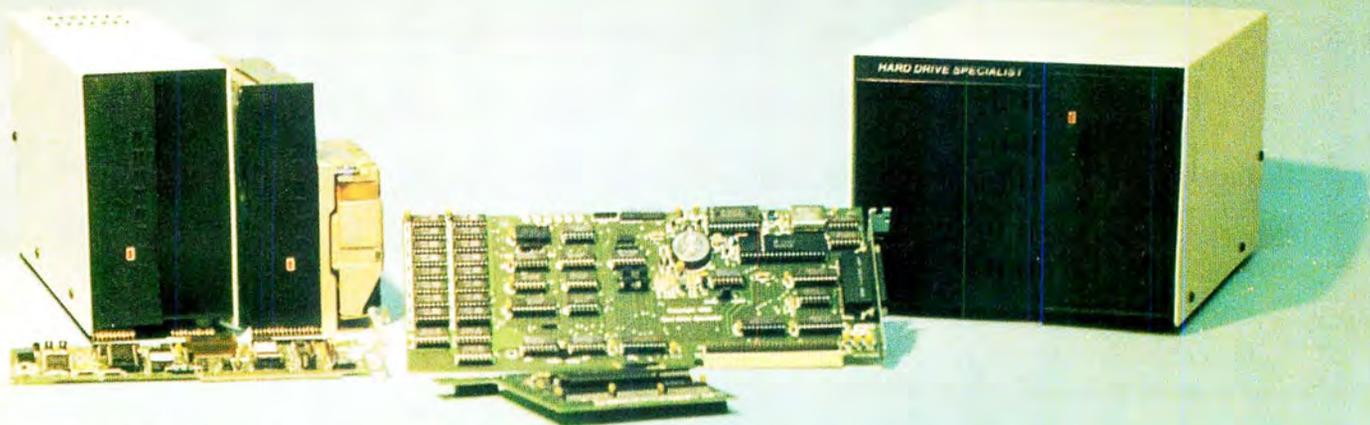
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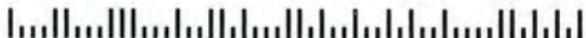
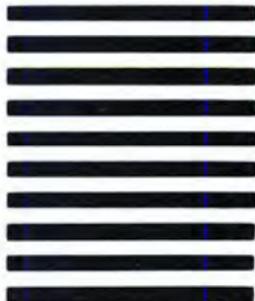
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# Functions Defined

Use these DEF FN routines to create functions for your Tandy 1000 or Model 4.

Last year, *80 Micro* asked its readers to submit interesting applications of the DEF FN (define function) command, which most versions of Basic contain. With this feature you can create your own functions and increase the number of your programming tricks. User-defined functions can reduce listing clutter and debugging time while making the program easier to read.

Time passed, and we received many submissions. What follows are several DEF FN routines that some of you sent and probably forgot about (until now).

For a quick review of user-defined functions and how they work, see "What's Your Function?" by Joel M. Hoffman in the October 1986 issue (p. 124).

## A Flock of DEF FNs

The first submissions came from Frank Yacucci (Austintown, OH). His Military to Civilian Time Changer (see Program Listing 1) has two parts; the first function makes a number two digits long, and the second converts military time to civilian time in the HH/MM/SS \_M. format.

You can use his Phone Number Formatter (Program Listing 2) to print telephone numbers in the (###) ###-#### format from a string of 7 or 10 digits. If you have many numbers from the same area code, replace the first set of "###" in the listing with a default area code, and it is inserted automatically. If you use a 10-character string, the default area code is ignored.

With Program Listing 3, the Special Character Number Cushion, you can create a number of a specific length and pad it with a character that you define. Program Listing 4, the Simple Social Security Separator, prints a social security number in the ###-##-#### format from a string of 10 digits.

The 7-11 Late-Night Counter Helper (Program Listing 5) automatically computes a person's age from the MM/DD/YY format. It does this according to the date that you log in when you initially boot your system. Finally, the No Space, No Muss String Compressor (Program Listing 6) converts a number to a string without a

leading space.

While we're on the subject of compressing, John P. Jones (Fairmont, WV) sent us three functions. He uses the first two extensively for compressing data into character strings for storage in memory or on a machine-read disk file. The third part of his Bonhomme Richard Compressor (see Program Listing 7) justifies the string for easy display.

## A Remainder Returner and a Roman Numeral Translator

Some computers have a built-in modular arithmetic (math that deals with whole numbers where the numbers are re-

placed by their remainders after division by a fixed number). This function is missing on the Model 4, but you can use the Model 4 Remainder Returner that Jack Haren (Strongsville, OH) wrote (see Program Listing 8).

Jamie Reid (Lantzville, British Columbia) wrote a function that converts any number between one and 3,999 to a Roman numeral. The function merges with other programs; the code is compacted and devoid of code that both programs would naturally share, and this lets it run faster. Therefore, make sure you type CLEAR 1000 when using J.R.'s Roman Numeral Translator (see Program Listing 9) on the Model III or 4.

### Program Listing 1. Military to Civilian Time Changer.

```
10 DEF FN2D$(A)=RIGHT$("0"+RIGHT$(STR$(A),LEN(STR$(A))-1),2) 'Function to make a
number two digits long.
20 DEF FNCLOCK$(B$)=FN2D$(VAL(B$)+((VAL(B$)>12)*12))+MID$(B$,3)+" "+MID$("PA",-
VAL(B$)<12)+1,1)+"M."
30 PRINT FNCLOCK$("22:34:24") 'Test line
```

End

### Program Listing 2. Phone Number Formatter.

```
10 DEF FNTELEPHONE$(B$)=" "+MID$(RIGHT$("###"+B$,10),1,3)+" "+MID$(RIGHT$("###"
+B$,10),4,3)+"-"+MID$(RIGHT$("###"+B$,10),7,4)
20 PRINT FNTELEPHONE$("1234567890") 'Test line
```

End

### Program Listing 3. Special Character Number Cushion.

```
10 DEF FNNUMPADS(A,B$,C)=RIGHT$(STRING$(C,B$)+RIGHT$(STR$(A),LEN(STR$(A))-1),C)
20 PRINT FNNUMPADS(5,"*",10) 'Test line
```

End

### Program Listing 4. Simple Social Security Separator.

```
10 DEF FNSNS(B$)=LEFT$(B$,3)+"-"+MID$(B$,4,2)+"-"+RIGHT$(B$,4)
20 PRINT FNSNS("1234567890") 'Test line
```

End

### Program Listing 5. 7-11 Late-Night Counter Helper.

```
10 DEF FNAGE$(B$)=(VAL(RIGHT$(DATE$,2))-VAL(RIGHT$(B$,2)))+(LEFT$(B$,4)>(LEFT$(
DATE$,2)+MID$(DATE$,4,2)))
20 PRINT FNAGE$("02-09-61") 'Test line
```

End

### Program Listing 6. No Space, No Muss String Compressor.

```
10 DEF FNNOSPACESTR$(NUMBER)=RIGHT$(STR$(NUMBER),LEN(STR$(NUMBER))-1)
20 NUMBER=123:PRINT NUMBER:PRINT FNNOSPACESTR$(NUMBER) 'Test line
End
```

### Program Listing 7. Bonhomme Richard Compressor.

```
10 'Compresses 0-255 to one byte
15 DEF FNM1$(M1)=CHR$(M1):DEF FNM1(M1$)=ASC(M1$)
20 'Compress 0-65535 to two bytes
25 DEF FWN2$(W2)=CHR$(INT(W2/256))+CHR$(INT(W2-256*INT(W2/256)))
30 DEF FWN2(W2$)=256*ASC(LEFT$(W2$,1))+ASC(RIGHT$(W2$,1))
35 'Right justifies string to JW spaces for ease of display
40 DEF FNCOS$(C$,JW)=RIGHT$(STRING$(JW,32)+C$,JW)
45 M%=199:M$=FNM1$(M%):W=654321:W$=FWN2$(W):C$="789":C$=FNCOS$(C$,9)
50 M%=0:W=0:M%=FNM1(M$):W=FWN2(W$):PRINT C$,M%,W
End
```

### Program Listing 8. Model 4 Remainder Returner.

```
10 DEF FNM(M1,M2)=M1-(INT(M1/M2)*M2) 'Returns the remainder of M1 divided by M2
20 M1=100:M2=30:PRINT FNM(M1,M2) 'Test line
End
```

### Program Listing 9. J.R.'s Roman Numeral Translator.

```
1 DIM R$(4,9):FOR X=1 TO 4:FOR Y=1 TO 9:READ R$(X,Y):NEXT Y,X:DATA M,MM,MMM,IIII,
,C,CC,CCC,CD,D,DC,DCC,DCCC,CM,X,XX,XXX,XL,L,LX,LXX,LXXX,XC,I,II,III,IV,V,VI,VII,
,VIII,IX:DEF FNN$(N)=STRING$(5-LEN(MID$(STR$(N),2)), "0")+MID$(STR$(N),2)
2 DEF FNR1$(N)=VAL(MID$(FNN$(N),2,1)):DEF FNR2$(N)=VAL(MID$(FNN$(N),3,1)):DEF FNR3$(N)=VAL(MID$(FNN$(N),4,1)):DEF FNR4$(N)=VAL(MID$(FNN$(N),5,1)):DEF FNRM$(N)=R$(1,FNR1$(N))+R$(2,FNR2$(N))+R$(3,FNR3$(N))+R$(4,FNR4$(N))
3 PRINT FNRM$(1987) 'Test line. The result would be MCLXXXVII
End
```

### Program Listing 10. The Accounting Organizer.

```
40 DEFDBL B-D,G,T:DEFINT A,E,I-N,R:DEFSTR P,P,S
70 DEF FNAD(A)=((A=60)+(A=68)*2+(A=71)*3+(A=76)*4+(A=79)*5+(A=80)*6+(A=86)*7+(A=104)*8+(A=123)*9+(A=140)*10+(A=E)*11) 'Flag to print totals
80 DEF FNAE(A)=1-((A>60)+(A>68)+(A>71)+(A>76)+(A>79)+(A>80)+(A>86)+(A>104)+(A>123)+(A>140)) 'Direct amount to total buckets
90 DEF FNAF(A)=((A=41)+(A=47)*2+(A=60)*3) 'Flag to print subtotals
100 '
890 'If the summation has been taken care of in another manner you only need FNA
D(A) and FNAF(A).
895 'Insert line numbers after each GOSUB to start program code for the routine.
900 ON FNAF(RAL) GOSUB ..... 'Subtotal printing routines
910 ON FNAD(RAL) GOSUB ..... 'Total printing routines
920 '
2250 'Below the data stream differs and all three functions are used.
2260 ON FNAE(R1) GOSUB ..... 'Summing routines selector
2270 ON FNAF(R1) GOSUB ..... 'Subtotal printing
2280 ON FNAD(R1) GOSUB ..... 'Total printing
End
```

### Program Listing 11. The Plurality Checker.

```
10 DEF FNPLURAL$(N,N$)=N$+CHR$(-(N>1)*(83-(ASC(RIGHT$(N$,1))>96)*32))+ "
100 M=10:PRINT "You have" M; FNPLURAL$(M,"missile"); "remaining."
End
```

### Program Listing 12. Set and Reset Function.

```
10 DEF FNBITSET(X,B)=X OR 2^B:DEF FNBITRES(X,B)=X AND (32767-2^B)
20 DEF FNBITEST(X,B)=-SGN(X AND 2^B)
100 I=FNBITSET(I,6):I=FNBITRES(I,3):IF FNBITEST(I,1) THEN 200
200 PRINT "It worked!"
End
```

### Program Listing 13. Info into Column-Row.

```
10 DEF FNTABLE(E,R,C,W)=((E-1) MOD R)*80+((E-1)\C)*W
100 FOR I=1 TO 100:PRINT@ FNTABLE(I,20,5,16), N$(I);:NEXT
End
```

### Program Listing 14. Header Plus Column-Row.

```
10 DEF FNTABLE(E,R,C,W)=((E-1) MOD R)*80+((E-1)\C)*W
100 FOR I=1 TO 100:PRINT@ FNTABLE(I,20,5,10)+3*80+15,N$(I);:NEXT
End
```

## Accountable Functions

Robert B. Franke (Reading, PA) sent functions for an accounting program he wrote. His Accounting Organizer (see Program Listing 10) uses FNAD(A) to permit the printing of totals after groups of accounts such as assets, liabilities, and income. FNAE(A) ensures that each account is added to the proper classification as it is handled. FNAF(A) lets you include a subtotal for grouping of assets.

You must include line 40 of the program to cover the lack of type-declaration flags in the other lines. The tag counts as part of the variable name, so omitting it from each name reduces memory usage and increases the running speed of the program.

## Organizing Your Stuff

Steve Troxell (Tampa, FL) sent four functions. The first function, his Plurality Checker (see Program Listing 11), returns N\$ with an "s" attached if the value of N is greater than one. It also checks the last character of N\$ to determine if the "s" should be upper- or lowercase. It adds a space to the end of the string regardless of the value of N so that you can print CHR\$(0) without displaying unwanted characters.

His Set and Reset Function performs the Set and Reset operations on the settings of bit B (zero-7) contained within the integer variable X. Bitest is a logical function that returns -1 (Set) or zero (Reset) if bit B in integer variable X is set. Program Listing 12 sets bit 6 of I and resets bit 3 of I. It then tests bit 1 of I.

You can use the next function, Info into Column-Row (see Program Listing 13) to display a list of information into a row-by-column format on the Model 4. You should use it within a loop to yield the screen position of each element that you want to print. "E" is the specific element you are concerned with (the loop counter), "R" is the number of rows you want in the table, "C" is the number of columns that you want, and "W" is the width in characters of each data column. Remember to allow for separation between columns when you set column width. The function returns the absolute screen position (zero-1919 for an 80 by 24 display) of the start of text for element E. The example in Listing 13 displays a list of 100 topics in five columns of 20 topics each, with each column 16 characters wide.

If you want to add column headers to this row-by-column format, use the Header Plus Column-Row function (see Program Listing 14). This uses an offset value added to the returned function value, which shifts the table in the desired direction. The example in Listing 14 provides for three lines above the table for headers. Each column is reduced to 10 characters, and the table is centered horizontally with 15 characters on each side. ■

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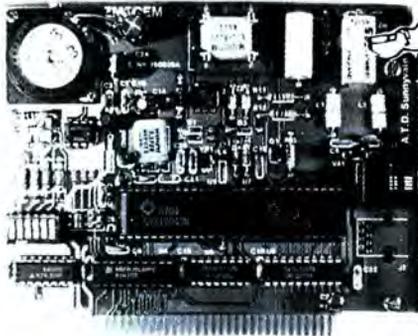
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# I Want to Be Elected

I once considered a career in politics, and I still get excited about a presidential election. I've followed each one since Humphrey versus Nixon in 1968. I remember staying up late, watching the returns come in, and being outraged upon learning that the number of votes a candidate receives isn't as important as the number of electoral votes won. (Humphrey nearly won the popular vote but lost big on electoral votes.) That was my first lesson in politics; I was 11 at the time.

I've found a program that illustrates the basic dynamics of the electoral process. It offers a great way to introduce your own 10-, 11-, 12-, or whatever-year-olds to our political system.

President Elect, from Strategic Simulations Inc. (SSI, 1046 N. Rengstorff Ave., Mountain View, CA 94043-9986, \$24.95), lets you re-create each presidential election from 1960 to 1984, and it lets you simulate the upcoming 1988 election. You can either run a candidate's campaign yourself or leave it to the computer. Over a nine-week period preceding election night, you must decide how much money to spend and where to spend it, which states to visit, and whether or not you should debate your opponent(s). Other factors you control are the candidates themselves, the vice-presidential candidate's home state, and whether or not you travel abroad.

As a predictor of the outcome, President Elect has its problems. To be fair, asking any program to account for the inevitable unpredictable events that affect election campaigns is unreasonable. Who could have foreseen the fallout over Nixon's 5 o'clock shadow, Carter's handling of the Iran crisis, or Donna Rice?

But that doesn't stop SSI from pushing President Elect as soothsaying software. The packaging states in large type, "After Reagan, who'll be next in '88? Find out today with President Elect." The documentation, however, makes no such claims. I credit President Elect's author, Nelson G. Hernandez Sr., with this realistic approach.

To successfully play President Elect, you must learn how the different variables are weighted, and there are a lot of them. For example, where should your candidate concentrate his or her campaign? To answer this, you must consider the states' political leanings, the demographic impact of the candidate and his or her running mate, the strengths and



weaknesses of your opponent, and the time and money limitations.

The program has its set of assumptions, but it's up to you to determine what they are. The documentation is quick to point this out, but the game's educational value would be enhanced with a little more information about those assumptions.

Each week, the candidates can debate one another. The debates seem to affect the election only if one candidate clearly outshines the other. Debates consist of dividing your time among four types of response, which include attacking your opponent's position, killing time, and stating your own position. President Elect then scores the debate according to its preset notions of "ideal" answers.

President Elect is a quality simulation. The expertise of the author is evident in the program and documentation, which includes short, interesting synopses of each election since 1960.

The game is fun, too. I played only against the computer, but competing with a person would be better and, I suspect, easier. The computer creamed me.

Most of my complaints are minor. I hate the tinny-sounding version of "Hail to the Chief" that plays at the beginning. The program has data on most of the Democratic and Republican candidates from each election year since 1960. While I am impressed by the thoroughness of the list, the "ratings" the author assigned to their views and personal qualities can only be subjective.

My biggest complaint is that the program seems to be too heavily weighted

to the candidates' personal qualities: speaking ability, magnetism, and poise. I ran myself against George Bush in a simulated 1988 election. The program rated my views somewhere between Joseph Biden and Bruce Babbitt, whom Bush crushed in earlier simulations.

I was generous about my personal qualities, though. I had the speaking ability of Mario Cuomo, the magnetism of Ronald Reagan, and the poise of Lyndon Johnson. I beat Bush 53 to 47 percent taking 458 of 538 electoral votes. Not bad for an unknown from a small town in New Hampshire.

Nevertheless, I can recommend President Elect; its flaws are easily outweighed by its educational and entertainment value.

## Next Month

I was overly optimistic about having Tandy's new computers on hand in time for this month's column. You have my apologies.

December will be a bit of a mixed bag. I have some new software for the home to discuss, and I'll recommend some reference books to keep by your computer. ■



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

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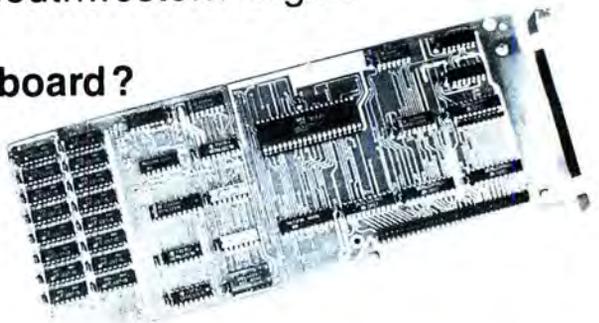
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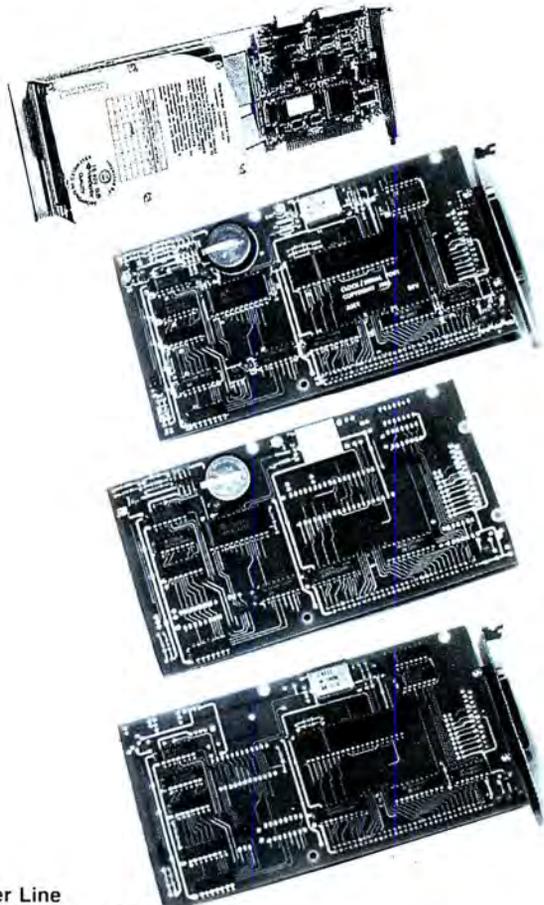
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# Hard Disks III:

This Time It's Personal

I have been discussing organizational tips for disk maintenance and some of the tools that I use to ease my work. Last month, I mentioned several features for maintaining files on your disks and, during the course of this discussion, I alluded to PCTools. Unfortunately, I had not received my upgrade to the latest version yet, so I want to expound on this product's new features and other worthwhile system enhancements.

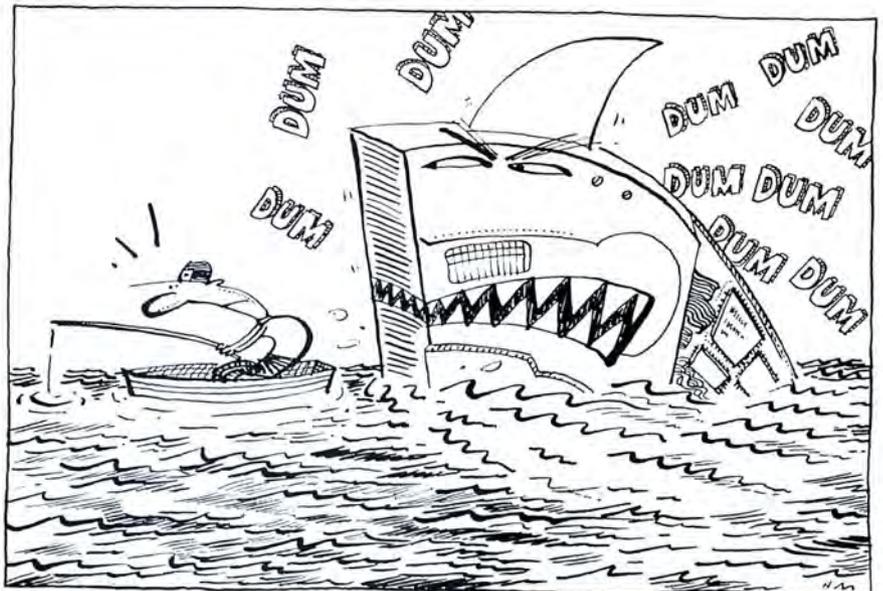
## PCTools 3.23

PCTools is a \$39.95 utility from Central Point Software Inc., which produced the CopyIIPC disk-copying program that duplicates almost any type of special disk. This newest release contains the same PCTools utility for file maintenance as the others, albeit improved. What makes this product great are the other programs shipped as part of the basic tool set.

PCTools now supports recovery of formatted disks, as do several other programs on the market. Mirror writes a copy of the file-allocation table (FAT) and the root directory into a protected, hidden file on your disk. It depends on the DOS feature where the formatting operation does not really write to the data areas of the disk but reads the data area scanning for bad sectors. Recovery is simple—Mirror restores the critical DOS file areas from the "mirrored" file contents and returns the disk to its state when you last executed Mirror.

PCTools also contains a Compress utility that reorganizes the files on your disk into contiguous data areas. This enhances your ability to recover files that you inadvertently delete. Another benefit is the overall increased speed that you will realize by minimizing disk-head travel when accessing a file.

The nicest part of this utility set is the excellent DOS backup and restore programs. The only way to really protect your vital information is to back it up to some medium such as floppies. Using the DOS Backup and Restore commands is painful at best. PCBackup and PCRestore use concurrent disk reads and writes to overlap the I/O processing as much as possible. They also use a special formatting procedure that packs the



information onto your drives, and they are fast.

Best of all, the programs create a backup log for each session and remember what you put on the floppy disks. You can then select all files during a restore or restore files individually. Using PCBackup, I selectively archived files to a standard DOS disk in my high-density disk drive (1.2 megabytes) using the 720K 80-track format. PCBackup put about 800K onto each of these floppies. You should see about the same performance on the smaller 360K 40-track drives. PCTools is a winner in all respects, especially considering its price.

## Other Enhancements

Not all enhancements require a hard disk; two of my favorite productivity tools fall into this class. The first is a keyboard aid called KBFIX2 that adds several significant features to your computer while taking up only about 2.5K of memory. You can get this public-domain program from many information services for the cost of downloading it. (See the Table for the publisher's address.)

I use this small program to rid myself of one of the greatest annoyances on an IBM compatible—the 15-key type-ahead buffer. KBFIX2 provides a 128-key type-ahead buffer that I have successfully used with such nefarious programs as Borland's Sidekick. No fuss—no muss.

KBFIX2 also provides a way for you to adjust your keyboard's "typematic" action. Separate controls adjust the timing from the first press of a key to the initial repeat and the repeat frequency of the keys. I "tweak" up my keyboard for use with GEM Desktop, which is mouse-intensive but tolerates a keyboard. This helped to make the keyboard a bearable substitute during the period that I did not have a mouse.

Another annoying feature of most compatibles is producing lowercase letters when you have selected caps lock and you press the shift key. KBFIX2 corrects this by letting the shift key work only when you have released the caps lock key.

KBFIX2 can also indicate visually and/or audibly the state of the three major shift keys (caps lock, number lock, and scroll lock) if your system does not have indicators for them. One last feature lets you select scroll lock as a "pause control" similar to the hold key currently on the Tandy 1000's keyboard. You do not lose the normal scroll lock functions—you simply have to press the shift key to actuate them.

## CED—DOS Command-Line Editor

CED is the public-domain version of a program that has recently gone commercial. I find this small utility almost invaluable.

able, and it is so innocuous that it does not interfere with anything else. Most important, CED provides a vast improvement in command-line editing and recall of previously issued DOS commands.

CED also lets you build command synonyms, alternative representations for your DOS commands. These synonyms can include chaining of a series of commands, parameters just like a batch file, and parameter recall from similar commands. You can adjust the buffers' sizes on installation for all functions, and a programmer's facility lets you add new "resident" commands to the DOS command shell.

After you've used the DOS function keys for command-line editing, CED's editor is a welcome change. While you are typing in a command, you can use the arrow keys to move left and right in the command line. Simply type over mistakes or press the insert key to insert characters. The delete and backspace keys work as you would expect for removing unwanted characters. Best of all, the command line is entirely visible for you to see the changes as you make them.

Made a mistake on the last command? Press the up-arrow key (or F3 just like DOS) to recall the last command and edit it. Press enter, and it will execute with the new changes you made. This is equally applicable to any other command already saved on the stack. Simply press the up- or down-arrow keys to get to the appropriate command.

CED maintains two different command stacks by being "aware" of DOS; that is, CED knows when the DOS command processor is active. One stack contains all the commands that you enter while at a DOS prompt. The second con-

## ***CED provides a vast improvement in command-line editing and recall of . . . DOS commands.***

tains all parameters that you can enter while running an application that uses the normal DOS "buffered line input" functions. Programs such as Debug and Edlin use this feature, and all of CED's capabilities are available as well.

### **Pcall Option**

CED provides a parameter recall, or pcall, option that lets you specify that you would like to use the parameters from a program's most recent invocation. For example, I invoke my programmer's editor to modify a file with the command EDWIN (file name). To edit the file the next time, all I need is the program's name—CED will remember the parameters and supply them.

Command synonyms are particularly valuable. I use Microsoft's Codeview symbolic debugger on a PC/AT with an enhanced graphics adapter (EGA) monitor. The resident program I use to maintain a special character set in the EGA and Codeview do not get along well. I have to switch off the font controller before running Codeview, then turn it back on when I am done.

This is a perfect application for CED's synonym processing. I define a command called CVF that contains the text "fntoff^cv -f -43 %l^fnton." This tells CED to process the command "fntoff," then call Codeview with command-line switches and a parameter option (the program name), and then turn the font back on when I am done. To debug a program, I now type CVF PROGRAM and press the enter key.

Note that the synonym listed above specified multiple DOS commands. This command-chaining feature is available at the DOS prompt; you can type in multiple commands separated by a character that you can redefine.

CED is tolerant of its environment and takes about 16K to 17K bytes of memory, depending on the buffer sizes. It traps only DOS function interrupt vector \$21 and processes command input from applications that read the keyboard using DOS function \$0A (buffered keyboard input). Other programs that use alternative means to read DOS commands from the keyboard will not have access to CED's features, and CED cannot process commands in batch files.

This program has almost eliminated my need for simple batch files to perform repetitive tasks. The program's author, Chris Dunford, has recently released PCED as a commercial product with significant improvements in all areas.

### **Conclusion**

This completes my series on disk organization, maintenance, and productivity. Many of the tips and pointers I have provided are common sense, and a small amount of planning can greatly increase your productivity. These are not the only means of improvement you can use—you have to find the ones that are right for you. Experimentation with various concepts will help you determine your best system configuration.

The public-domain programs KBFIX2 and CED10D listed in the Table are available from most bulletin-board services (BBSes), CompuServe, Delphi, and other national information services. They are also available on 80 Micro's BBS at 603-924-6985 (300/1,200 baud, 8-bit words, no parity, 1 stop bit) for a limited time. ■

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#### **CED10D—The Command-Line Editor**

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CompuServe: 76703.2002

#### **KBFIX2—Keyboard Fixup Utility**

Skip Gilbrech  
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CompuServe: 71445.534 (leave messages on IBMSW SIG)

#### **PCTools**

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Table. Programs mentioned in this column.



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

# The Business of Life

**B**usiness-type functionality is not just for the office. Managing your home is much easier with the right software. This month's pick of the litter is for public-domain and shareware software for both home and business use. You can use this software to manage your time and your home finances.

## On the Right Track

Column One Inc.'s Cashtrac, by John MacEvoy, is a personal-finance manager that keeps investment and checking records in a familiar checkbook-register format rather than a spreadsheet or ledger format. Cashtrac can keep track of up to 16 different checking accounts. It keeps an accurate record of deposits and withdrawals, including explanations of purchases and expenses for tax purposes.

You can place entries in one of many categories for easy tabulation or create your own categories. You can also use one of the checking account data bases for your credit purchases.

A function that stores one-time, monthly, and yearly unpaid bills reminds you when they are due. You can transfer the information on them directly to the checking account file when you pay those bills. An investment and savings account program shows where you invested money and how your investments are performing.

You can generate several types of reports for tax and budget purposes. Graphing functions can give you a bar chart of your investment and checking accounts. The program supports check printing that uses form-feed check styles.

This version of Cashtrac is a demonstration program, but it handles 200 transactions in each of the 16 data bases (a total of 3,200 transactions) and 200 investments. If you like the program, you can order the commercial version from Column One (see the Table).

Column One's electronic bulletin-board system (BBS) is available to users who provide support. The phone number is 703-941-2386 (300/1,200/2,400 baud, 8-bit words, no parity, 1 stop bit).

## Deskteam

Deskteam, which is similar to Borland International's Sidekick, is a shareware



program from Alternative Decision Software Inc. You can operate it as a stand-alone or an in-resident program that you can call up with a two-key combination while you are running other programs.

Deskteam has utilities usually found with this type of program including a calculator, calendar, notepad, and phone dialer. Other utilities are an alarm clock, DOS commands for file and disk management, printer control, and typewriter emulation. The printer control utilities can select the printer type and enable or disable the print screen function—good for preventing computer lockup when a printer isn't on and you inadvertently

press the print key.

The calendar function highlights dates on its perpetual calendar that correspond to notes you put in a file relating to that date. It displays one month at a time. The current month appears when you first boot Deskteam, but you can cycle the months or the year. You can load other calendar files and highlight calendar dates specific to a user or topic.

The alarm function, which alerts you to impending tasks, can make your computer hang up if it sounds as you download a program from a bulletin board. This happened twice when I used the Procomm communications program. I

PC-Outline (PC0324.ARC)  
Brown Bag Software Inc.  
File 41719  
Box 60000  
San Francisco, CA 94160-1719  
\$89.95  
(\$49.95 for manual and technical support only)

PC-Tickle  
Buttonware Inc.  
P.O. Box 5786  
Bellevue, WA 98006  
\$29.95

Cashtrac (CT604-A.ARC, CT604-B.ARC, CT604-C.ARC)  
Column One Inc.  
P.O. Box 11264  
Alexandria, VA 22312  
\$79.50

Deskteam (Deskteam.ARC)  
Alternative Decision Software Inc.  
P.O. Box 307  
Lancaster, NY 14086  
\$25

Table. Public-domain and shareware programs by authors who request a donation.

keep the alarm disabled without any detrimental effects to Deskteam.

### PC-Tickle

PC-Tickle, a shareware program distributed by Buttonware Inc., keeps track of your important events. It is not a resident program and does not have Deskteam's variety of utilities. One feature lets you display or print a calendar for the day, month, or year. You can print your schedules, too.

This scheduling program can read a file that you created and specially formatted with your word processor or the PC-Tickle editor. The editor is much like a subset of Buttonware's PC-Type + program that I described in the May 1987 column (p. 98).

The required formatting is simple. If you specify a date on a line, the program displays the line only if the date matches the date template. You specify the file and a date template in the same command line that you use when you call the PC-Tickle program. The date template can hold wild-card characters like asterisks (\*) so you can easily specify combinations of month, day, and date to display.

You can write your scheduling file to include codes so that a particular entry only displays if it falls on a certain day of the week. PC-Tickle also provides a file that tells you the holidays of the month.

PC-Tickle and Deskteam operate on different principles; one might be better for you than the other; you might want to use both.

### Off to Work

Brown Bag Software Inc.'s PC-Outline (PCO) is more attuned to the office than the home. I ran out of space last month when I discussed business software, so I'll include it here.

To compose text, you should have a program that outlines. PCO lets you randomly write down your thoughts, plans, and ideas. Then you can organize them by moving text and selectively hiding and unveiling information as you write. Each major and minor heading that you write when you start an outline program is similar to a file within a file. You can open and close several layers of description in a hierarchical structure. Once it's designed, you can use a "hide and unhide" feature to view the level of detail you want. You can look at the most important topics or view all levels of detail.

PCO includes other files not necessarily connected with its outline functions but written by the same people. GOODCLK.COM makes the time display in PCO read the correct time and date with some compatibles. This program verifies that the real time and date are stored in the right place for programs to

read them. I needed this program with my Tandy 1000 and the PBJ multifunction board with real-time clock.

Global.COM performs any DOS function on an entire directory tree at once. You can use CPY.COM to back up a series of files to a floppy. It prompts you when to insert a new disk. DIRS.COM calculates the total disk space occupied by a set of files. It differs from the normal DIR command because it tells the space occupied, not the file size.

### Greynum

Tandy 1000 users can't use PCO without Greynum. PCO makes extensive use of the gray plus (+) and minus (-) keys, which the 1000 doesn't have. Greynum is a short resident program that changes the functions of the F11 and F12 keys on the 1000 to act in place of the gray plus (F12) and gray minus (F11) keys. Other programs that make this key conversion can cause problems when you use Deskmate, which needs the F11 and F12 keys with their normal return codes. Greynum is better because the F11 and F12 keys revert to their normal function-key codes when you press the numbers lock key.

With MS-DOS 2.11 or 3.2 you can also use the KEYCNVRT.SYS driver to make the shift-insert and the shift-delete key combinations act as the gray plus and minus keys, respectively. Just include DEVICE = KEYCNVRT.SYS inside your Config.SYS file.

### Bulletin Boards with Tandy Interests

I saved space this month to tell you about two BBSes that have Tandy-specific or related topics. The Exclusive-80 BBS and the Tandy Hotline (300/1,200 baud and possibly 2,400 baud) use 8-bit words, no parity, and 1 stop bit.

Brian Driscoll and Bob Griggs run the Exclusive-80 BBS in Philadelphia, PA (215-739-9512). Its emphasis is shifting to MS-DOS, but Brian and Bob plan to support Radio Shack computers as needed. This BBS uses the TBBS software and supports the Tandy 1000/1200/3000, Models I/III/4/4P, the Color Computer, Models 100/200, other MS-DOS machines, compatibles, and some CP/M computers. Message conferences and download files are available for all of these computers, plus a gamer's conference with downloads.

Selections for all the Tandy computers are plentiful: general utilities, graphics programs, computer-language programs, games, text and screen editors, and files for data-base and spreadsheet programs. This BBS also has high-resolution graphics programs for the Models III and 4.

For MS-DOS, one program adds line

feeds to TRSDOS-generated ASCII files. MS-DOS programs include enhanced graphics and CAD (computer-aided-design) utilities. One program has an EGA (Enhanced Graphics Adapter) driver for Lotus's 1-2-3 version 1A. You can also download MS-DOS games such as Striker and pinball programs.

### Tandy Hotline

The Tandy Hotline is Collie node no. 2 in net no. 823, which I believe makes it a Fido bulletin board. This system is now acting as the area host for the Northeast region of Collie BBSes. Fido bulletin boards have a tight network across the country and several of them exchange message bases nightly. Getting on a BBS in the Fido network, which includes Fido bulletin boards, Collie, Seadog, Opus, and probably others, usually means that you can access at least one national conference message base and exchange messages across the country. It might take a week or more to get an answer to your message, though. The Tandy Hotline is run by The Tandy Users Group, in Richmond, VA. You can call the Tandy Hotline at 804-358-5824.

The Tandy Hotline supports the Models I/III/4, the Tandy 1000/1200/2000/3000, the II/12/16/6000, the Color Computers, and the MC-10. Among the on-line program selections are a Model III digital clock and disk-drive timer, a Model 4 file generator and word processor, and a tic-tac-toe game for kids.

### Next Month

For December, I'll have some programs with a Christmas theme and other odds and ends. All software discussed here will be placed on the 80 Micro BBS at 603-924-6985 (300/1,200 baud, 8-bit words, no parity, 1 stop bit) for a limited time. You can also order each program from me for \$6 per disk at my home address. Each major program needs one disk except Cashtrac. Send \$10 for Cashtrac because it requires two disks. I'll include Greynum on each disk. The distributors of Deskteam have not yet answered my request for permission to distribute it, so send a self-addressed stamped envelope if you order Deskteam or suggest an alternate program in case I can't honor your request. ■



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

# Looking for a Tax System?

Nail it down!

with **PC-Tax**

for your TRS-80  
and all PC's



when looking over the field  
this little "Help" message may be useful.

## HOW TO READ A TAX SYSTEM AD

### THE MAN SAYS:

We will give you our last year's system free.

We have had our system tested by this giant CPA firm and they just love it.

Our system is 99% pure.

Don't believe what you read in tax system ads.

### TRANSLATION:

We didn't get a system out in time to prepare returns. Now we've had six more months to work on it and though it still isn't complete we hope you won't notice.

It hasn't been in use in the field to any extent yet and we are trying to get around this with double-talk.

(Pure what?)

We have found out that most tax systems advertised go bust in a year or two but we are sure we'll make it.

## Now let's talk PC-Tax —

### LET'S TALK PERFORMANCE:

PC-Tax gives you full screen displays of all forms and schedules. Data-entry is just the same as if you were doing the return with a pencil, only twenty times faster. All calculations are made automatically RIGHT WHILE YOU ARE MAKING ENTRIES! You won't even notice this; it just happens. In fact, once you have turned on your machine and 1040 comes up, you are simply working with a calculator, a master calculator that knows all about tax returns and knows you want one prepared. You enter the figures, PC-Tax prepares the return.

### LET'S TALK FEATURES:

Want a tax-planner? PC-Tax has had one built-in for years; it is called QUIKTAX. With this function you can tax-plan based on a client's full return (or a short version if you wish). No one has tried to decide for you what is important, leaving out just the item the client needs.

PC-Tax totals W-2 forms, computes the S.S. overpayment, and brings total wages and the overpayment to 1040. Client billing becomes available right after you have printed out the return and you can add "See you next year, Joe.", or whatever you like, to the invoice.

These are only a tiny portion of PC-Tax's special functions. If we listed them all here the type would be so small you couldn't read it.

### LET'S TALK TRACK RECORD:

**(Ours is eleven years and 20 million returns)**

No tax preparation system has been in the field as long as PC-Tax and, for each of those years, we have improved, modified, and fine-tuned until our system is absolutely unique. It is flat-out impossible for any organization to even approach the quality and accuracy of PC-Tax in any conceivable time-frame.

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**Demonstration Disk - Specify computer make and model - \$7.50**



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# Reaching the Back Bank

In June I wrote about using alternate memory banks in the Model 4 for data storage. I ended by saying that the only practical method that I knew to access the alternate memory banks from Basic and C programs was to use them as a memory or RAM disk.

Soon after I wrote that column (see "The Rules of Bank Switching," p. 98), a program appeared in the *Misosys Quarterly* that radically changed my mind. That program and how you can use it in Basic is the topic of this month's column. We reprint it with the permission of Roy Soltoff, the program's author.

Before we get down to the technical nitty-gritty, some review might be worthwhile. The Model 4's Z80 microprocessor has 16 address lines, which means it can access up to 64K of memory at one time.

However, with the Model 4/4P/4D's design you can install up to 128K of RAM in the machine. Add-on boards can expand that capability to 1 megabyte (1,024K) of RAM.

All the extra memory (everything above 64K) is normally invisible to the Z80 CPU. By setting some hardware switches electronically, the computer can access the extra memory in banks of 32K each. You can install any 32K block of memory in the upper or lower half of the Z80's memory space by correctly setting the hardware switches.

The TRSDOS/LS-DOS operating system was originally designed for a machine with up to 288K of memory. The lower half of "normal" or boot-up memory is inviolate because it holds the operating system itself. The normal upper half of memory is called bank zero. Together, these two sections of 32K make up the standard 64K Model 4.

Within the confines of an unpatched version of TRSDOS/LS-DOS 6, you can access a maximum of seven alternate



memory banks through the operating system. With patches from Misosys and some of the memory board suppliers, you can increase this number to 31. Combining 32K of permanently resident DOS memory in the lower half of the Z80's memory space, 32K in bank zero in the upper half of memory, and 31 banks of 32K controlled by DOS, your Model 4 can have 1,056K of memory—just over 1 megabyte.

You should realize that memory banks controlled by TRSDOS/LS-DOS are always substituted for the upper half of memory. The bottom 32K is never swapped out because doing so removes TRSDOS and all interrupt and device handling from memory. The actual memory swaps are nearly instantaneous.

A program written in any language that has access to the TRSDOS/LS-DOS supervisory calls (SVCs) can control bank switching if it follows two rules. First, any filter, device driver, or interrupt routine must be resident in low memory or in bank zero because TRSDOS always switches bank zero back into memory during input/output (I/O) and interrupt processing. You could not, for example, tuck a keyboard filter in bank 29 because it would never be in the Z80's memory space when you need it.

The second restriction is more severe. Whenever banks are switched, the stack must be in the lower half of memory. If

the stack were switched out of addressable memory, the system would become completely lost, especially if an interrupt occurred while an alternate bank was in place.

That second restriction essentially eliminates all alternate bank usage from any program except those written in assembly language. Both Basic and C (at least Misosys's MC) have access to SVCs, but both languages keep their stacks near the top of available memory. It might be possible to lower High\$, the top-of-memory pointer, to the boundary between upper and lower memory and run a small C program with access to the back banks. But even that trick won't work for Basic, since the interpreter itself extends past the magic dividing line.

## The Solution

Program Listing 1 cuts through these restrictions completely and gives every Basic and C program the opportunity to use back banks of memory, at least for data storage. It does this by installing itself in low memory as an SVC, using its own stack area when it is called, and handling all the tricky work of moving data between bank zero and any back bank of memory. Now your Basic and C programs can have almost one million bytes of data-storage area, provided you know how to manage that memory.

The Extended Memory Handler, or EXMEM, in Listing 1 installs a new SVC

## System Requirements

Model 4/4P/4D

128K RAM

LS-DOS 6.3

Editor/assembler, MRAS

Basic

Available on The Disk Series

in memory called @EXMEM (by convention, all SVC names begin with "@"). Programs can communicate with this SVC, as they do with all others, by loading information into the CPU registers, loading the SVC number into register A, and using an RST 28 hexadecimal (hex) instruction.

@EXMEM supports four subfunctions. It can move a page of memory (256 bytes) or a single byte from main memory to a bank or vice versa. The function number is placed in the B register, the bank number is put in C, the address in the bank is stored in HL, and the address in main memory is passed to the SVC in DE.

@EXMEM assumes that the program has access to the bank. Its error checking is limited to ensuring that HL, the bank address, is within range, and it uses the @Bank SVC to ensure that the bank exists. There is both a danger and a power here. You can use @EXMEM to access memory in any existing back bank, which means that you could directly manipulate RAM-disk or print-spooler storage from Basic. Obviously, you need to exercise caution in using @EXMEM.

## Understanding the Program

Roy Soltoff's assembly programs are necessarily concise due to years of stuffing as many functions as possible into a limited number of bytes. But this terse programming style makes Listing 1 more difficult to read and understand than the assembly programs usually seen in this column.

I added the comments in square brackets to the original source code in Listing 1 to make the program easier to read. If you type and assemble the code in Listing 1, please follow Roy's wishes and leave all copyright notices unchanged.

The program begins by defining both the SVCs it will call and a name for the low-memory buffer that it uses to transfer data from one bank to another. TRSDOS uses the page of memory from 2300 hex to 23FF hex as a disk-sector buffer when it loads its library routines. Other programs can use the page of memory whenever TRSDOS is not loading or writing to a disk. Therefore, @EXMEM should not be called by an interrupt-handling program.

The program displays a copyright message and then uses the @GTDCB SVC to find the address of the first device-control block (DCB), which is always assigned to the keyboard driver, KI. The 2 bytes preceding the KI DCB contain a pointer to the first unused byte in the low-memory driver area, which is a portion of memory reserved for device drivers such as RAM disks that must be

### Program Listing 1. EXMEM/ASM.

```

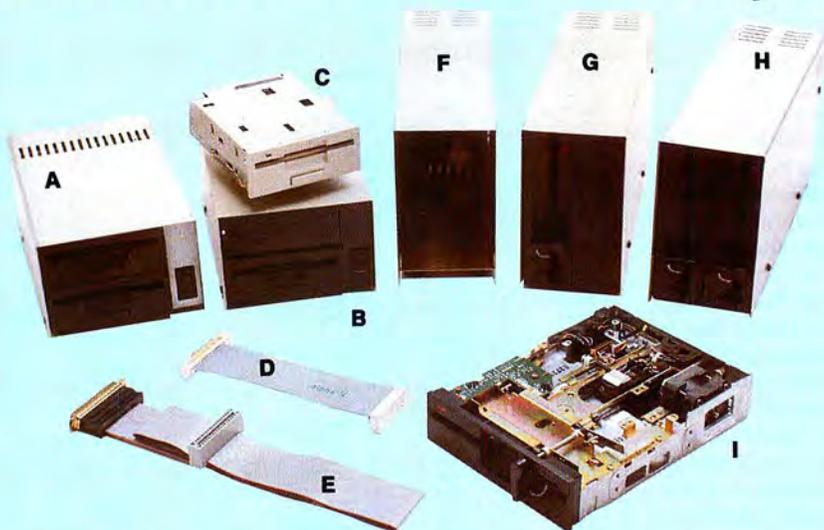
00100 ;EXMEM/ASM - Adds @EXMEM SVC to LS-DOS 6.3 - 03/10/87
00110 ;*==*
00120 ; Copyright 1987 MISOSYS, Inc., All rights reserved
00130 ; [Reprinted here with permission of MISOSYS, Inc.]
00140 ;*==*
00150 @DSPLY EQU 10
00160 @LOGOT EQU 12
00170 @ABORT EQU 21
00180 @GTDCB EQU 82
00190 @FLAG$ EQU 101
00200 BBUF$ EQU 2300H ;Low memory swap buffer
00210 ;*==*
00220 ORG 2600H
00230 BEGIN LD HL,HELLO$ ;Welcome
00240 LD A,@DSPLY ; [Print sign-on message]
00250 RST 40 ; [Invoke SVC]
00260 LD DE,'IK' ; [Keyboard driver signature]
00270 LD A,@GTDCB ;Locate low memory ptr
00280 RST 40
00290 JR NZ,NOTLOW ;Error, can't find *KI
00300 DEC HL ; [HL=> MSB of low-memory ptr]
00310 LD D,(HL) ;P/u pointer to
00320 DEC HL ; start of free
00330 LD E,(HL) ; low core
00340 LD (LCPTR+1),DE ;Save loc for later
00350 PUSH HL ;Save low core ptr
00360 LD HL,MODEND-MODBGN ; [HL = length of @EXMEM]
00370 ADD HL,DE ;Start + driver length
00380 PUSH HL ; [Save end of @EXMEM]
00390 DEC HL ;Point to last byte
00400 LD (SVEND+1),HL ; [Save for relocation]
00410 LD BC,1300H ;Max addr + 1
00420 XOR A ; [Reset carry flag]
00430 SBC HL,BC ; [Will it fit in low memory?]
00440 POP DE ;Rcvr new lc
00450 POP HL ;Rcvr low core ptr
00460 JR NC,NOROOM ;No memory if => 1300h
00470 ;*==*
00480 ; Relocate absolute addresses
00490 ;*==*
00500 LD (HL),E ;Stuff low core ptr
00510 INC L ; with new low
00520 LD (HL),D
00530 CALL RELO ;Relocate vectors
00540 ;*==*
00550 ; Fixup @EXMEM's calls to @Bank
00560 ;*==*
00570 LD A,@FLAG$ ;Get flags pointer into IY
00580 RST 40
00590 LD H,(Y+26) ;Point to SVCTAB
00600 LD L,108*2 ;Point to @BANK entry
00610 LD A,(HL) ;Get @BANK pointer
00620 INC HL ; [HL=> MSB of @BANK pointer]
00630 LD H,(HL) ; [Put pointer in HL]
00640 LD L,A ;Update @BANK calling
00650 LD (SVC102),HL ; for speedier @BANK
00660 LCPTR LD DE,$-$ ;Low core pointer
00670 ;*==*
00680 ; Move module to memory
00690 ;*==*
00700 MOVMOD LD HL,MODBGN ; [HL ==> beginning of @EXMEM]
00710 LD BC,MODEND-MODBGN ; [BC = bytes to move]
00720 LDIR ; [Move it all]
00730 LD H,(Y+26) ;Point to SVCTAB
00740 LD L,108*2 ;Point to SVC_108 slot
00750 LD DE,EXMEM@ ; [DE = new starting address]
00760 RX01 EQU $-2
00770 LD (HL),E ;Update SVCTAB
00780 INC HL ; [HL ==> MSB of SVC slot]
00790 LD (HL),D ; [New SVC installed]
00800 LD HL,INSTLD$ ; [HL ==> success message]
00810 LD A,@DSPLY ; [Put it on the screen]
00820 RST 40
00830 LD HL,0 ;Indicate successful
00840 RET ; to DOS
00850 NOTLOW LD HL,NOTLOW$ ; [HL ==> error message]
00860 DB 0DDH ; [Skip next LD HL instruction]
00870 NOROOM LD HL,NOROOM$ ; [HL ==> error message]
00880 LD A,@LOGOT ; [Send to current log device]
00890 RST 40
00900 LD A,@ABORT ; [Indicate error to DOS]
00910 RST 40
00920 ;*==*
00930 ; Relocate internal references in driver
00940 ;*==*
00950 RELO LD IX,RELTAB ;Point to relocation tbl
00960 SVEND LD HL,$-$ ;Find distance to move
00970 LD (MODBGN+1),HL ;Set last byte used
00980 LD DE,MODEND-1 ; [DE = current module end]
00990 OR A ;Clear carry flag
01000 SBC HL,DE ; [HL = distance to move]
01010 LD B,H ; [Transfer distance]
01020 LD C,L ; [ to BC]
01030 RLOOP LD L,(IX) ;Get address to change

```

Listing 1 continued

# NEW FLOPPY DISK DRIVES For Mod 1-3-4-1000, IBM

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	2-80k DS 3.5" TEAC	.....289
B.	1-40k DS 3.5" TEAC	.....159
	1-80k DS 3.5" TEAC	.....179
C.	Bare 40k DS 3.5" TEAC	.....109
	Bare 80k DS 3.5" TEAC	.....129
D.	Bare 80k TEAC in 5.25" frame	.....149
	Extender cable w/ gold contacts	.....10
E.	IBM external floppy drive cable	.....40
	TRS-80 2-drive floppy cable	.....24
	TRS-80 4-drive floppy cable	.....34
	Disk Operating System Mod 1 TRSDOS 2.3 complete w/man	.....25
	Mod 3 TRSDOS 1.3 complete w/man	.....25
	LDOS (specify Mod 1 or 3)	.....45
	Mod 4 TRSDOS 6.x complete w/man	.....35
	Mod 4 CP/M (Montezuma 2.2)	.....159



F.	5.25" Power supply	..... \$ 59
G.	1-40k SS 5.25" TEAC	.....129
	1-40k DS 5.25" TEAC	.....139
	1-80k DS 5.25" TEAC	.....169
H.	2-40k SS 5.25" TEAC	.....219
	2-40k DS 5.25" TEAC	.....259
	2-80k DS 5.25" TEAC	.....299
	Add \$17 for Stainless Steel	
L.	Bare 40k SS 5.25" TEAC	.....99
	Bare 40k DS 5.25" TEAC	.....109
	Bare 80k DS 5.25" TEAC	.....139
	Bare 40k SS TM100-1	.....109
	TEAC FD55A/B/F Ser. Man	.....20
	TM100-1/2 Service Manual	.....20
	TM848-1/2 Service Manual	.....20

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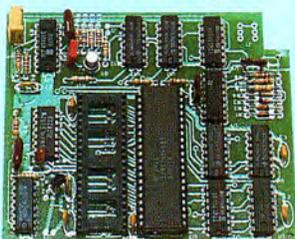
what you need just call our technical assistance number and we'll help you out. All drives are new—not factory blembs, seconds, closeouts or defunct manufacturers surplus (MPI, Qume, Shugart, etc). Instruction manuals are included at no extra cost and service manuals are available. We appreciate your business and will do our very best to support you.

Add \$4 shipping for non-drive items; \$6 for single drives; \$10 for dual drives.

## INCREASED DISK STORAGE FOR YOUR MODEL I Add 80% more capacity to your disk drives with our Double Density Controller (DDC).

Add double density to your TRS-80 Model I by installing our DDC in your expansion interface. Lets talk about density. The Model I was designed to store data on diskettes in single density. Single density refers to the method used to write data to the disk. Your diskette is organized into tracks and sectors. Early Model I's had 35 track drives while later models, and most aftermarket drives, had 40 tracks. In single density the tracks on the diskette surface are divided into 10 sectors. Each sector contains 256 bytes of data for a total of 2,560 bytes or 2.5k per track times the number of tracks your drive is capable of addressing. Double density, on the other hand, allows each track to be divided into 18 sectors. As in single density each sector contains 256 bytes but now there are 18 sectors instead of 10 giving a new storage capacity of 4,608 bytes or 4.5k per track. The result is 80% more data in the same space. You may wonder why Radio Shack did not choose to use double density in the beginning. The reason is simple. It costs more money. Double density disk storage techniques were more expensive to implement back then.

Reliable double density operation required a better disk drive than Radio Shack was furnishing in addition to better quality components and diskettes. Therefore, no double density for the Model I. We went to work and came up with a design that allowed



reliable double density operation on the Model I. In fact, our DDC had a higher probability of data recovery than any other disk controller on the market then or since. Our analog design phase lock loop data separator has a wider capture window than the digital types others use. This allows high resolution data centering. Our "DDC" analog circuit allows infinitely variable tuning with optimum attack and settling times. The oft-stated fears of adjustment problems rumored by digital dilettantes have been proved groundless by thousands of satisfied users the world over. The bottom line is state-of-the-art reliability and performance. TRS-80 Model I disk system owners who are ready for reliable double density operation will get 80% more storage per diskette; single and double density operation with far fewer disk I/O errors; single density compatibility; simple plug-in operation. You will need a disk operating system that has the necessary double density software driver. All the popular DOS's (except TRSDOS) have the software driver. We have a special combination offer that saves you \$10 and includes the LDOS operating system in the event you do not already have a DOS.

DDC by itself	.....	\$ 99
DDC including the latest version LDOS	.....	139

Please add \$5 shipping

# LOW COST HARD DISK DRIVES FOR YOUR TRS-80



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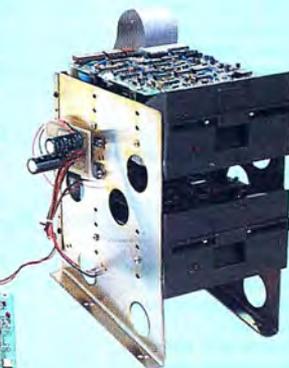
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# How to Use 80 Micro Program Listings

Basic Program Listings in *80 Micro* include a checksum value at the beginning of each line. This value is the sum of the ASCII values of all characters and spaces in the line, excluding remarks. You can use these values to test the accuracy of your typing.

- Type in the program code exactly as listed, omitting the indentations (when program lines continue to a second or third magazine line). Do not type the checksum values at the beginning of each line or the vertical bar (|).

- Save the program in ASCII format with the command SAVE "file name",A.

- Load and run Checksum (see Program Listing; Model 4 changes are below). The program prompts you for the name of the file to be verified and gives you the option of sending the checksum values and program lines to the printer or to the screen.

When printing to the screen, Checksum lists 22 lines and then waits for you to press the enter key. You can change the number of lines displayed in line 190.

- Compare the checksum values with the checksums shown in the listing. Correct errors in lines having checksum values that don't match.

To modify Checksum for the Model 4, make the following changes. Omit line 45. Replace lines 100 and 110 with the lines in the Figure. Replace all occurrences of PRINT#2, with PRINT.

—Beverly Woodbury,  
Technical Editor

## Program Listing. Checksum for MS-DOS.

```

3504 | 10 'CHECKSUM/BAS revised -- 08/87
4218 | 20 CLS:PRINT "PRINT PROGRAM LISTING WITH CHECKSUMS"
4015 | 30 PRINT:PRINT:PRINT "Basic program must be in ASCII."
2273 | 40 PRINT:PRINT:INPUT "Enter name of file to PRINT";F$
3061 | 45 IF INSTR(F$,".")=0 THEN F$=F$+".bas"
3124 | 50 PRINT:PRINT:PRINT "List program to:"
3098 | 60 PRINT TAB(20) "<P>rinter or <S>creen ?";
2441 | 70 K$=INKEY$:IF K$="" OR INSTR("PpSs",K$)=0 THEN 70
3653 | 80 PRINT K$:IF K$="P" OR K$="p" THEN PN=1
5529 | 90 PRINT:BS=CHR$(34):ES=CHR$(32)+CHR$(124)+CHR$(32):OPEN "I",1,F$
3991 | 100 IF PN THEN OPEN "LPT1:" FOR OUTPUT AS 2:GOSUB 480:ELSE OPEN "SCRN:"
693 | FOR OUTPUT AS 2
1304 | 110 IF EOF(1) THEN CLOSE:IF PN THEN LPRINT CHR$(12):END ELSE END
3361 | 120 X=0:CS=0
3110 | 130 LINE INPUT #1, L$: A=VARPTR(L$):GOSUB 310:Q=PEEK(A)
2034 | 140 LS=PEEK(A+1):MS=PEEK(A+2):A=MS*256+LS:GOSUB 310
2944 | 150 IF INSTR(L$,"") THEN GOSUB 330
1619 | 160 FOR K=1 TO Q:P=PEEK(A):A=A+1:CS=CS+P:NEXT K
3301 | 170 N=VAL(LEFT$(L$,5)):L=L+1
1854 | 180 IF PN THEN IF L>58 THEN GOSUB 470:GOTO 200 ELSE 200
1463 | 190 IF L>22 THEN L=0:INPUT XY$
1126 | 200 IF Q>72 THEN GOTO 240
3016 | 210 IF CS=0 THEN 110
3430 | 220 IF X=2 OR X=3 THEN PRINT#2, " ";ES;LS:GOTO 110
2085 | 230 PRINT#2, USING "#####";CS,:PRINT#2, ES;LS:CS=0:GOTO 110
2986 | 240 NL=LEN(STR$(N)):S1=NL+8:S=NL
3507 | 250 L=L+1:IF X=3 THEN PRINT#2, " ";ES;MID$(L$,1,72)
2540 | 260 L=L+1:PRINT#2, USING "#####";CS,:PRINT#2, ES;MID$(L$,1,72)
4046 | 270 PRINT#2, STRING$(S1, " ");MID$(L$,73,72-S)
4393 | 280 IF Q>144-S THEN L=L+1:PRINT#2, STRING$(S1, " ");MID$(L$,145-S,72-S)
987 | 290 IF Q>216-(S*2) THEN L=L+1:PRINT#2, STRING$(S1, " ");MID$(L$,217-(S*2),72-S)
1865 | 300 CS=0:GOTO 110
661 | 310 IF A>32767 THEN A=(65536!-A)*-1
1756 | 320 RETURN
2683 | 330 I=INSTR(L$,""):IQ=I-1:X=1
2716 | 340 IF LEN(L$)=INSTR(L$,"") THEN X=2:RETURN
1813 | 350 N=VAL(LEFT$(L$,4)):N$=STR$(N):LN=LEN(N$)+2
3168 | 360 IF I<LN THEN X=3:RETURN
1392 | 370 Q1=INSTR(L$,B$):IF Q1>I OR Q1=0 THEN 430
2863 | 380 Q2=INSTR(Q1+1,L$,B$):IF Q2 THEN I=INSTR(Q2,L$,"")
3170 | 390 IF I=0 THEN RETURN
1386 | 400 Q3=INSTR(Q2+1,L$,B$):IF Q3>I OR Q3=0 THEN 430
1484 | 410 Q4=INSTR(Q3+1,L$,B$):IF Q4 THEN I=INSTR(Q4,L$,"")
1265 | 420 IF I=0 THEN RETURN
1380 | 430 FOR I=IQ TO 1 STEP -1
2939 | 440 C=ASC(MID$(L$,I,1))
1182 | 450 IF C<33 THEN NEXT I
3389 | 460 QM=Q:X=4:RLS=LEFT$(L$,I):Q=LEN(RL$):RETURN
2610 | 470 PRINT#2, CHR$(12)
490 | 480 PRINT#2, STRING$(10, " ");F$;STRING$(32, " ");"Page ";PN
490 | 490 PRINT#2,:PRINT#2,:PN=PN+1:L=3:RETURN

```

End

## Figure. Replacement lines for the Model 4.

```

2916 | 100 IF PN THEN SYSTEM"ROUTE *DO *PR":GOSUB 480
5242 | 110 IF EOF(1) THEN CLOSE:IF PN THEN SYSTEM "RESET *DO":LPRINT CHR$(12):E
ND ELSE END

```

End

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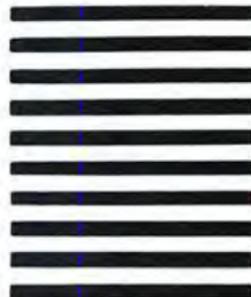
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# THE NEXT STEP

placed in low memory. Several other device drivers, including the TRSDOS COM/DVR and most hard-disk drivers, place themselves in low memory if there is room instead of taking space in high memory.

The program loads the low-memory pointer into the DE register pair and saves it for later use. (In Roy's comments, p/u means "pick up" or retrieve a value from memory.) Next, the program takes the length of the actual @EXMEM routine, adds it to the current low-memory pointer, and compares the result to 1300 hex, the first address above the low-memory area. If there isn't enough room, the program jumps to a routine to print an error message and abort back to LS-DOS.

If there is room for @EXMEM in low memory, the program adds its length to the low-memory pointer and then calls the RELO routine to relocate the jump and call addresses inside @EXMEM.

To ensure the integrity of its small internal stack, @EXMEM operates with interrupts disabled. To keep interrupts turned off for the shortest time possible, it takes a shortcut in the standard program-to-TRSDOS interface. When a program invokes an SVC, DOS must use the value in the A register as an index to a table of addresses, select the correct address, and then jump to that location. If the SVC routine is in one of the system overlays, the SVC handler must also ensure that the overlay code is in memory.

Because TRSDOS switches bank zero back to main memory for every I/O request, the code for the banking routines is in the core of DOS memory, which is always present and never overlaid by other routines. The address of the @Bank SVC never moves while the computer is running, so you can eliminate the time required for the TRSDOS SVC to look up the address of that code if the @EXMEM program looks up that address itself.

The section of the installation routine labeled "Fixup @EXMEM's calls to @Bank" uses the @Flag\$ SVC to find the address of the SVC table and then finds the address of the @Bank SVC within that table. Finally, it puts that address inside the @EXMEM SVC so that calls to @Bank can be made directly instead of through the normal DOS SVC handler.

Although the SVC handler is efficient, each call to @EXMEM must invoke the @Bank SVC twice, and this shortcut saves a small but appreciable amount of time.

You might wonder about the program's use of expressions like "LD DE,\$-\$" at the label LCPTR. The dollar sign (\$) in assembly means "the current

## Listing 1 continued

```

01040 LD H,(IX+1) ; [HL ==> value to change]
01050 LD A,L ; [Get LSB of address]
01060 OR H ; [Is address 0?]
01070 RET Z ; [Yes -- leave]
01080 LD E,(HL) ;P/u address
01090 INC HL ; [HL ==> MSB of value]
01100 LD D,(HL) ; [DE = value to offset]
01110 EX DE,HL ;Offset it
01120 ADD HL,BC ; [Add offset value]
01130 EX DE,HL ; [New value to DE]
01140 LD (HL),D ;And put it back
01150 DEC HL ; [HL ==> LSB of value]
01160 LD (HL),E ; [New value in place]
01170 INC IX ; [Bump IX to next]
01180 INC IX ; [ spot in relocation tbl]
01190 JR RLOOP ;Loop till done
01200 ;
01210 HELLO$ DB 10,'EXMEM 1.0 - Extended memory handler for LS-DOS 6.3'
01220 DB 10,'Copyright 1987 MISOSYS, Inc., All rights reserved',10,13
01230 INSTLD$ DB 'SVC_100 (@EXMEM) is now installed',13
01240 NOTLOW$ DB 'Can't locate low memory pointer!',13
01250 NOROOM$ DB 'No memory space available',13
01260 ;***
01270 ; Extended memory access
01280 ;
01290 ; B =>func [1=getchar, 2=putchar, 3=getpage, 4=putpage]
01300 ; C =>bank
01310 ; HL=>bank offset
01320 ; DE=>UBUFF$
01330 ; E => char
01340 ; Z <= OK
01350 ;***
01360 MODBGN JR EXMEM@ ; [Jump over memory header]
01370 DW $-$ ; [Old low-memory limit]
01380 DB 3,'$XM' ; [Module name]
01390 ;***
01400 ; Get char from bank (C) at (HL)
01410 ;***
01420 GETCHAR CALL MOVSTAK ;Switch to our stack
01430 RX02 EQU $-2
01440 RXB1 CALL @BANK ;Get requested bank
01450 RET NZ ;Back on error
01460 LD A,(HL) ; [Get requested character]
01470 GETEXIT PUSH AF ; [Save it]
01480 RXB2 CALL @BANK ;Restore previous bank
01490 POP AF ; [Recover character returned]
01500 RET
01510 ;***
01520 ; Put char from (E) to bank (C) at (HL)
01530 ;***
01540 PUTCHAR CALL MOVSTAK ;Switch to our stack
01550 RX03 EQU $-2
01560 RXB3 CALL @BANK ; [Get requested bank]
01570 RET NZ ;Back on error
01580 LD (HL),E ;Char to memory
01590 JR GETEXIT ;Reinstall previous bank
01600 ;***
01610 ; Write page from bank(C) at (HL) to (DE)
01620 ;***
01630 GETPAGE CALL MOVSTAK ;Switch to our stack
01640 RX04 EQU $-2
01650 RXB4 CALL @BANK ;Install the bank
01660 RET NZ ;Back on error
01670 CALL MOVMEM ; [Move page to low-mem buffer]
01680 RX10 EQU $-2
01690 PUSH AF ; [Save return code]
01700 LD BC,256 ; [Bytes to move]
01710 LDIR ; [Move page to UBUFF$]
01720 POP AF ; [Get return code]
01730 RET
01740 ;***
01750 ; @EXMEM SVC entry point
01760 ;***
01770 EXMEM@ SET 7,H ;Ensure upper mem address
01780 DEC B ;Check on function 1
01790 JR Z,GETCHAR ;Check on function 2
01800 DEC B ;Check on function 3
01810 JR Z,PUTCHAR ;Check on function 4
01820 DEC B ;SVC parameter error
01830 JR Z,GETPAGE ; [Back on parameter error]
01840 DEC B
01850 PERR LD A,43
01860 RET NZ
01870 ;***
01880 ; Write page from (DE) to bank (C) at (HL)
01890 ;***
01900 LD A,H ;Check for page 255
01910 INC A ; [Error if HL > 0FF00h]
01920 JR NZ,PUTPAGE ; [No error -- go]
01930 OR L ; [HL = 0FFh, check L]
01940 JR NZ,PERR ; [Go if HL > 0FF00h]
01950 PUTPAGE CALL MOVSTAK ;Switch to our stack
01960 RX05 EQU $-2
01970 EX DE,HL ;UBUFF to HL, offset to DE
01980 CALL MOVMEM ;Install the bank, move
01990 RX11 EQU $-2
02000 RET NZ ;Back on error

```

Listing 1 continued

*Listing 1 continued*

```

02010    PUSH    BC          ;Save previous bank #
02020    LD      BC,256     ;Page length
02030    LDIR   BC          ;Move page into bank
02040    POP    BC          ;Recover previous bank #
02050    RXB5   JP      @BANK ;Reinstall previous bank
02060    ;*==*
02070    ; Routine common to page I/O
02080    ;*==*
02090    MOVMEM  PUSH    BC          ;Save previous bank #
02100    PUSH    DE          ;Save UBUFF or offset
02110    LD      DE,BBUFF$   ;Our buffer to DE
02120    PUSH    DE          ; [Save it]
02130    LD      BC,256     ;Move page to our space
02140    LDIR   BC          ;
02150    POP    HL          ;Our buffer to HL
02160    POP    DE          ;UBUFF or offset to DE
02170    POP    BC          ;Recover previous bank #
02180    @BANK  LD      A,C    ;Simulate SVC handling
02190    JP      S-$         ;Reinstall previous bank
02200    SVC102 EQU    S-2     ; [Linkage to @Bank routine]
02210    ;*==*
02220    ; Routine to switch to our stack
02230    ;*==*
02240    MOVSTAK DI          ;Interrupts off
02250    LD      (HLSAV),HL  ;Save reg_HL
02260    RX06   EQU    S-2
02270    POP    HL          ;Get RET address off of stack
02280    LD      (SPSAV),SP  ; [Save current stack addr]
02290    RX07   EQU    S-2
02300    LD      SP,STACK   ;Set to new stack
02310    RX08   EQU    S-2
02320    PUSH   HL          ;Set RET to MOVSTAK caller
02330    LD      HL,S-$     ;Restore reg_HL
02340    HLSAV  EQU    S-2
02350    RET          ;Back to MOVSTAK caller
02360    DC      16,0       ;Stack area
02370    STACK  DW      RESTORE ;Point to restore code
02380    RX09   EQU    S-2
02390    RESTORE LD    SP,S-$ ;Restore old stack
02400    SPSAV  EQU    S-2
02410    EI          ;Interrupts on
02420    RET          ;Return to @EXMEM caller
02430    MODEND EQU    $
02440    ;
02450    RELTAB DW      RX01,RX02,RX03,RX04,RX05,RX06,RX07,RX08,RX09,RX10
02460    DW      RX11,RXB1+1,RXB2+1,RXB3+1,RXB4+1,RXB5+1,0
02470    END

```

End

*Program Listing 2. EXMEM/BAS. See p. 86 for information on using checksums.*

```

1  |-----|
2  | Use of @EXMEM SVC 108 from Basic |
3  | This program requires LS-DOS 6.3 and its |
4  | enhancements to Microsoft Basic |
5  |-----|
6  |
7  |
403 | 100 CLS
852 | 110 DEFINT A-Z
716 | 120 DIM RG(5) 'Registers for USR11 call
2241 | 130 RG.AF=0: RG.BC=3: RG.DE=2: RG.HL=1 'Register assignments in RG()
2037 | 140 TRUE = (1=1): FALSE = NOT TRUE
2406 | 150 DEF FN B2W(A,B) = CVI(CHR$(B) + CHR$(A))
4107 | 160 DEF FN SADDR(X$) = FN B2W(PEEK(VARPTR(X$)+2),PEEK(VARPTR(X$)+1))
1309 | 170 OPEN "R",1,"DUMMYS" 'Use a dummy file as buffer
1387 | 180 FIELD 1, 240 AS BUFF$ 'Set up a string as a buffer
968 | 190 DONE = FALSE
787 | 200 GOSUB 1000 'Set up the system
1155 | 210 WHILE NOT DONE
854 | 220 GOSUB 2000 'Change the message
856 | 230 GOSUB 3000 'Wait for the next clock tick
858 | 240 GOSUB 4000 'Does the user want out?
485 | 250 WEND
797 | 260 GOSUB 5000 'Clean up before ending
411 | 270 CLS
3005 | 280 PRINT "Everything is cleaned up"
402 | 290 END
995 | *****
996 | Setup the system: Is @EXMEM installed? Is there a bank?
997 | If so, create 10 strings and put them into the bank.
998 | *****
1512 | 1000 XMOD$ = "$XM" + CHR$(13) 'XMOD$ contains @EXMEM's module name
1026 | 1010 RG(RG.AF) = 83 'GETMOD SVC
1897 | 1020 RG(RG.DE) = FN SADDR(XMOD$) 'DE ==> module name
2146 | 1030 SVC = USR11(VARPTR(RG(RG.AF))) 'Is @EXMEM in memory?
5384 | 1040 IF (RG(RG.AF) AND 64) <> 64 THEN PRINT "@EXMEM is not installed":C
LOSE: END
1829 | 1050 BANK = 0: GOT.BANK = FALSE
2476 | 1060 WHILE BANK < 32 AND GOT.BANK = FALSE
1177 | 1070 BANK = BANK + 1
1169 | 1080 RG(RG.AF) = 102 '@BANK SVC
1864 | 1090 RG(RG.BC) = FN B2W(3,BANK) 'Try to reserve bank

```

Listing 2 continued

16-bit contents of the assembler's program counter." Therefore, "\$-\$" means "subtract that 16-bit value from itself." It is just another way of writing a zero.

However, DE will not be loaded with a value of zero in that instruction. An earlier instruction places the value in the code. Therefore, "\$-\$" now means "a value determined while this program is running." A zero has the same effect as far as the assembler is concerned but is more difficult for humans to understand when they read (and debug) a program.

When the program reaches the next section of the installation routine, all of its checks have been passed and all internal memory references have been adjusted. The portion of code beginning with the label MOVMOD simply moves the @EXMEM SVC into the low-memory driver area, places its address in the SVC table, and returns to TRSDOS with a success message.

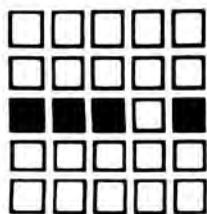
The last section of the installation program is the subroutine that adjusts the absolute addresses inside the @EXMEM SVC. It is similar to the relocation routines I often use in this column and shouldn't require any explanation besides the comments in the code.

## @EXMEM Routines

The @EXMEM SVC is entered with a function number in the B register, a bank number in the C register, and an address in that bank in HL. If you move a full block of 256 bytes, the address of the user's main-memory buffer is in DE. Otherwise, the E register sends a single byte to a bank. If a single byte is read from a bank, it is returned in the A register. This allocation of registers is consistent with the convention established by other SVCs.

The SVC begins with a standard TRSDOS/LS-DOS memory header: a relative jump to the actual routine entry point followed by the previous memory pointer and the module name. If you use a utility that maps modules in high and low protected memory, @EXMEM appears as "\$XM."

To keep relative jumps in the program within the +127 to -128 byte range allowed by the Z80, the actual entry point to @EXMEM is in the middle of the module at the label EXMEM@. There, the high bit of the address in HL is set to ensure that it points to a location in banked memory. Then the function number in B is parsed with a series of DEC (decrement) and JR Z (jump to a relative location if the zero flag is set) instructions. If the value in B was not a valid function number, the routine loads A with the code for an SVC error and returns to the calling program.



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Each of the four function routines begins by calling MOVSTAK, which must be read before the function routines to understand exactly how @EXMEM works. MOVSTAK begins by disabling interrupts and then saves the current value of HL into the program code. Next, the return address (a return to a section of @EXMEM) on the top of the stack is moved into HL and then the stack pointer is saved, again into a later section of code. When the stack pointer is saved, the top address on the stack is the return to the original calling program.

The stack is moved to @EXMEM by loading the stack pointer with the address labeled Stack. The value there is the address of a short routine called Restore, which loads the original address

back into the stack pointer and returns to the calling program. Here, if you execute a Return instruction, control returns to the program that called the @EXMEM SVC.

Finally, the return address to an @EXMEM function, which was in the HL register, is pushed onto the local stack, and HL is again loaded with its original value. Now a Return instruction sends control back to one of the @EXMEM function routines. In 24 bytes plus 8 bytes for a local stack, you accomplished a great deal of work. If you have trouble following the MOVSTAK routine, try drawing a picture of both stacks and the values in HL as you trace through it. You can learn a great deal about programming in these 24 bytes.

After MOVSTAK, the function routines are almost anticlimactic. Except for the fourth routine, Putpage, each begins by calling the @Bank SVC (the previously described shortcut to @Bank). Because the B register is already set to zero after the parsing section of the program, and the C register contains the selected bank, no further register manipulation is needed before @Bank is called. And since @Bank always sets the B and C registers correctly to swap banks back to their previous configuration, B and C won't need changing before @EXMEM finishes.

The GETCHAR and PUTCHAR routines manipulate a single byte, flip the banks back, and are done. The page functions call MOVMEM to move a 256-byte block of code from the user's buffer or banked memory into @EXMEM's low-memory buffer. Like MOVSTAK, MOVMEM is another fine example of tight coding. It falls into the @Bank routine, so the page functions don't need a separate call, and the @Bank routine (like all SVCs) returns to the last address on the stack, which is in the middle of one of the page functions.

## Using @EXMEM

I used much space describing how @EXMEM is written, partly because it is not an easy program to understand (it was written for compactness, not clarity), and partly because so much can be learned about tight programming by studying @EXMEM in detail.

If you have enough free low memory, run EXMEM and it installs itself. If you don't, you must reboot your computer. In my case, rebooting and running EXMEM puts the program nicely into low memory and forces into high memory a device driver that normally installs low from my start-up JCL program.

On your computer, however, low memory might be filled while the system configuration is installed. In that case, you have to reboot again while pressing the clear key to disable automatic configuration, install @EXMEM, and then reinstall all the device drivers that you sysgened. If you want @EXMEM available every time you boot, sysgen your system again once you reinstall everything.

Program Listing 2 is a Basic program that demonstrates how to use @EXMEM for back-bank storage. It scroll-protects the top of the screen and then pauses occasionally to get a string from a storage bank and write that string on the top of the screen. In the demonstration program, the messages change based upon the computer's clock, but you could use the same techniques to display help screens for each subsection of a program

Listing 2 continued

```

2240 | 1100   SVC = USR11(VARPTR(RG(RG.AF))) 'Call @BANK SVC
3135 | 1110   IF (RG(RG.AF) AND 64) = 64 THEN GOT.BANK = TRUE
530  | 1120 WEND
6141 | 1130 IF GOT.BANK = FALSE THEN PRINT "No available back banks of memory"
      | :CLOSE: END
3275 | 1140 PRINT "Using bank";BANK;"for storage"
1024 | 1150 FOR I = 0 TO 9 'Get ready to store 10 messages
2742 | 1160 LSET BUFF$ = STRINGS(240,MID$(STR$(I),2))
1143 | 1170 RG(RG.AF) = 108 '@EXMEM SVC number
1833 | 1180 RG(RG.BC) = FN B2W(4,BANK) 'Func 4: put page in bank
1638 | 1190 RG(RG.DE) = VARPTR(#1) 'The file buffer holds our data
1883 | 1200 RG(RG.HL) = FN B2W(&H80+I,0) 'Store at 8000h, 8100h, 8200h, etc.
2210 | 1210 SVC = USR11(VARPTR(RG(RG.AF))) 'Call @EXMEM
4964 | 1220 IF (RG(RG.AF) AND 64) <> 64 THEN PRINT "@EXMEM ERROR":CLOSE:GOS
      | UB 5000:END
654  | 1230 NEXT I
      | 1240 '*****
      | 1250 ' Now set the screen for scroll-protect and move the
      | 1260 ' cursor to the first line after the protected area
      | 1270 '*****
1030 | 1280 RG(RG.AF) = 15 'VDCTL SVC
1542 | 1290 RG(RG.BC) = FN B2W(7,4) 'Protect 4 lines
2146 | 1300 SVC = USR11(VARPTR(RG(RG.AF))) 'Do it
1050 | 1310 PRINT @(4,0); 'Move cursor out of protected area
4980 | 1320 PRINT "Everything is ready .... press any key to start"
1645 | 1330 WHILE INKEY$ = "" : WEND
712  | 1340 RETURN
      | 1995 '*****
      | 1996 ' Use the last digit of time$ to index a message in our
      | 1997 ' bank, save the cursor, display our message, and restore
      | 1998 ' the cursor.
      | 1999 '*****
902  | 2000 PRINT @ 0;
1073 | 2010 RG(RG.AF) = 108 '@EXMEM SVC
1762 | 2020 RG(RG.BC) = FN B2W(3,BANK) 'Get a page
1568 | 2030 RG(RG.DE) = VARPTR(#1) 'Use disk buffer
2988 | 2040 RG(RG.HL) = FN B2W(&H80+VAL(RIGHT$(TIME$,1)),0)
2149 | 2050 SVC = USR11(VARPTR(RG(RG.AF)))
988  | 2060 PRINT BUFF$ 'Display the message
1054 | 2070 PRINT @(4,0);
1160 | 2080 PRINT CHR$(31); 'Erase to end of the screen
715  | 2090 RETURN
      | 2995 '*****
      | 2996 ' Print the current time until it changes
      | 2997 '*****
1220 | 3000 WHILE T$ = TIME$
2036 | 3010 PRINT "The time is ";T$
531  | 3020 WEND
814  | 3030 T$ = TIME$
711  | 3040 RETURN
      | 3995 '*****
      | 3996 ' Has the user pressed a key? If so, we're done
      | 3997 '*****
2183 | 4000 IF INKEY$ <> "" THEN DONE = TRUE
709  | 4010 RETURN
      | 4995 '*****
      | 4996 ' Clean up -- turn off scroll protection and release
      | 4997 ' our memory bank
      | 4998 '*****
1024 | 5000 RG(RG.AF) = 15 '@VDCTL SVC
1532 | 5010 RG(RG.BC) = FN B2W(7,0) 'Protect 0 lines
2149 | 5020 SVC = USR11(VARPTR(RG(RG.AF))) 'Do it
1072 | 5030 RG(RG.AF) = 102 '@BANK SVC
1765 | 5040 RG(RG.BC) = FN B2W(1,BANK) 'Unreserve bank
2152 | 5050 SVC = USR11(VARPTR(RG(RG.AF))) 'Give it back
609  | 5060 CLOSE
1032 | 5070 KILL "DUMMY"
717  | 5080 RETURN

```

End

# THE NEXT STEP

or pop-down menus.

Listing 2 doesn't do much, but it demonstrates how to use @EXMEM and other SVCs from Basic. It begins by declaring all unmarked variables as integers—if you leave out line 110, be sure that you always refer to the register array as RG%() or else Basic reports an "Illegal function call" error and stops.

The array RG() holds register values for calls to Basic's USR11()/SVC function. As I've said before, a special feature of the LS-DOS enhancements to Basic is that this array must have a two-character name. If you give it a longer name, USR11() always reports an error.

Lines 130 and 140 establish some constants that are used throughout the program. Those in line 130 are the positions in the RG() array that hold values for each of the Z80 registers when USR11() is called. Those in line 140 are Basic's logical true and false values, which I find easier to use than -1 and zero, their numeric equivalents.

The two user functions in lines 150 and 160 help simplify later parts of the program. The first, FN B2W (bytes to word), takes 2-byte values—integers between zero and 255—and combines them into a full 16-bit integer. It does the

## @ EXMEM uses about 250 bytes of precious low-memory space.

same as "A\*256+B" but the function doesn't report an overflow error if A is greater than 127. The second function, FN SADDR (string address), finds the address of a string in memory and returns it as an integer.

You need a 256-byte buffer to perform data swaps with a back bank. You can create such a buffer in at least two ways. The program could define an array of 128 integers with a DIM statement and use it, but an easier method is to open a dummy file and use Basic's file buffer. If a file is opened for random access without a specified length, Basic allocates a 256-byte buffer to that file. By using an appropriate Field statement, it is easy to associate one or more strings with the buffer.

The first subroutine called, in line

1000, sets up the system and stores 10 pages of text in a back bank. It begins by using the @GTMOD SVC to determine if @EXMEM was loaded. The @GTMOD SVC requires DE to point to the module name, which is terminated by any control character. The definition of the string XMOD\$ in line 1000 ends the string with a carriage return, CHR\$(13).

If @GTMOD succeeds, it sets the CPU's Z flag. In Basic, you can test the Z flag after an SVC call by performing a logical And of 64 and the value in the AF register position in the array. If the result is 64, that is, if the Z flag was set, @GTMOD was successful. Otherwise, the result of the And operation will be zero.

Beginning in line 1050, the program uses a While... Wend loop to look for an available memory bank. If it finds one, its number is stored in the variable bank, and the program posts the bank number on the screen.

Once a bank is found, the program creates 10 strings of 240 bytes and saves each of them in that memory bank. Instead of calling @EXMEM 240 times to save each byte individually, the program makes a single call to store the entire file buffer in memory. The extra 16 bytes are ignored.

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DW II, DWP 410-510, RICOH 1200-1300-1600 Black (1449)	Inker Loop	\$18/2	\$ 51/6	\$ 96/12	\$8/1	\$7 ea	2 or more	\$21/3	\$78/12	\$432/72
DMP - 100, LP VII, COMMODORE 1525, GORILLA BANANA (1424)	1/2 x 20	\$20/2	\$ 57/6	\$108/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
DMP - 200, 120, 130 (430 INSERTS & RELOADS) (1483)	5/16 x 14	\$15/2	\$ 42/6	\$ 78/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
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DMP - 2100, TOSHIBA P1340-1350-1351-351 (1442)	1/2 x 52	\$35	GENERIC	\$30	\$18/1	\$16ea	2 or more	\$30/3	\$ 57/6	\$108/12
DMP - 2200, C ITOH 3500 (1233)	1/2 x 15	\$15/2	\$ 42/6	\$ 78/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
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STAR MICRONICS RADIX 10	1/2 x 25	\$19/2	\$ 54/6	\$102/12	\$8/1	\$7 ea	2 or more	\$18/3	\$66/12	\$360/72
STAR MICRONICS RADIX 15	1/2 x 18	\$22/2	\$ 63/6	\$120/12	\$8/1	\$7 ea	2 or more	\$18/3	\$66/12	\$360/72
EPSON LQ 1000	1/2 x 20	\$14/2	\$ 36/6	\$ 66/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
MX-FX-RX 70-80-85, LX 80-90 (5/16 x 7)	1/2 x 30	\$18/2	\$ 51/6	\$ 96/12	\$8/1	\$7 ea	2 or more	\$18/3	\$66/12	\$360/72
MX-FX-RX 100-185-286, LQ 800 (1/2 x 18) LQ 1500 (1/2 x 14)	1/2 x 15	-----		-----	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	-----
EPSON LQ 2500 (INSERTS & RELOADS ONLY)	5/16 x 290	\$21/3	\$72/12	\$414/72	(Call for Correctable Prices)		-----	-----	-----	-----
DX 20-35 Carbon Film (Multistrike), OLIVETTI ET-121-221	5/16 x 145	\$18/3	\$60/12	\$342/72	\$5 ea 3-11	\$4 ea	12 or more	\$24/6	\$42/12	\$234/72
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Pinwriter P1-P2-P6, P-5 (1/2 x 14)	1/2 x 20	\$25/2	\$ 69/6	\$126/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
P3-P7	1/2 x 27	\$30/2	\$ 84/6	\$156/12	\$8/1	\$7 ea	2 or more	\$18/3	\$66/12	\$360/72
COMREX 420 Fabric (INSERTS & RELOADS ONLY)	5/16 x 52	-----		-----	\$10/1	\$9 ea	2 or more	\$30/3	\$57/6	\$108/12
DX-15, II } Fabric	5/16 x 17	\$15/2	\$ 42/6	\$ 78/12	-----	-----	-----	-----	-----	-----
BROTHER HR-15-25-35 } Carbon Film (Multistrike)	5/16 x 82	\$18/3	\$60/12	\$342/72	-----	-----	-----	-----	-----	-----
OKIDATA Pacemark 2350-2410 Black	1/2 x 100	\$20 EACH		-----	\$20/1	\$18ea	2 or more	\$36/3	\$132/12	\$720/72
Microline 293-94	7/8 x 28	\$30/2	\$ 84/6	\$156/12	SEND CHECK, MONEY ORDER, OR C.O.D. TO.					
Microline 182-183-192-193 292 (7/8 x 16)	Inker Loop	\$20/2	\$ 57/6	\$108/12	<b>BCCOMPCO</b>					
ML-80-82-83-92-93 (Call for ML-84 Prices)	1/2 x 16	\$21/6	\$36/12	\$198/72	800 South 17 Box 246					
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One final SVC is used, starting in line 1280, to scroll-protect the top four lines of the screen. Then the subroutine positions the cursor below those lines, prints that it's ready, and waits for you to press a key before it returns.

The second subroutine, beginning in line 2000, positions the cursor to the top of the screen. Then it uses @EXMEM and the last digit of the current Time\$ string to select one of the 10 data pages in the storage bank. With a call to @EXMEM, that block of data moves into the disk buffer. The data prints to the protected area at the top of the screen and then the cursor moves below the protected area and the screen is cleared from that location to the end.

The final three subroutines are simple. The routine at 3000 prints the current time until the last digit changes. The routine following it checks to see if you pressed a key. The final routine calls @VDCTL to turn off scroll-protect, calls @Bank to release the storage bank for the next program that wants to use it, and closes and erases the dummy file.

## Final Thoughts

Listing 2 shows how you can use the @EXMEM from Basic, but perhaps does

not give a clear idea of the uses of this new SVC. A number of ideas come to mind immediately. You could use one or more back banks as room for screen buffers (using the page get and put @EXMEM functions, a bank has room for 16 full screens). Those screens could contain help information, menus, and blank forms.

You could also use a back bank to store program data temporarily. The advantage of managing banks yourself rather than using a RAM disk is that no room is lost to boot or directory sectors, and access is generally faster than with a RAM disk because the system does not have to calculate the sectors to read. I imagine that sorting data-base records in a bank managed with @EXMEM could be much faster than the same sort using records held in a RAM disk.

If you program in C, the advantages of manipulating bank storage directly should be even more apparent since C avoids Basic's system overhead that is involved in interpreting lines of code and watching for the break and pause keys.

About the only thing that you can't do with @EXMEM is keep parts of a program, especially a Basic program, in a memory bank. It might be possible to

use a bank to contain an overlay, but unless you know a great deal about the inner workings of Basic, it is difficult to load the overlay into main memory and make Basic recognize it.

The one drawback that I see with @EXMEM is it uses about 250 bytes of precious low-memory space. Since much of @EXMEM duplicates the bank switching done by Memdisk, it is possible to free some of that space by writing a new RAM disk based on @EXMEM's services. Such a program could be shorter than the present Memdisk driver, reside in high memory instead of the low-memory area, and thus free plenty of low-memory space for other programs. But that is a project for another day. ■



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423 | -1)
3269 | W=W+1
3668 | PRINT #2,TS*MOV CX,"FNSS(K-J-1):PRINT #2,TS*MOV AH,";
1487 | IF INSTR(LS,"PRINT")=1 THEN PRINT #2,"5":ELSE PRINT #2,"2"
541 | PRINT #2,TS*CALL PSTR"
SHORTS:
2995 | IF INSTR(K,LS,")<1 THEN PRINT #2,TS*CALL PLNE"
943 | F(0)=1:RETURN
1236 | NOTQUOTEDSTRING:
3732 | PRINT #2,TS: IF INSTR(J,LS,"$")<1 THEN GOTO NUMERICPRINT:
2732 | K3=INSTR(J,LS,"$"):L2$=MIDS(LS,J,K3-J+1):F(0)=1
1447 | PRINT #2,TS*MOV CX,2*L2$
2053 | PRINT #2,TS*MOV BX,OFFSET 2*L2$
2023 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1652 | PRINT #2,TS*MOV BX,[BX]"
1356 | PRINT #2,TS*MOV AH,";
3668 | IF INSTR(LS,"LPRINT")=1 THEN PRINT #2,"5":ELSE PRINT #2,"2"
3449 | PRINT #2,TS*CALL PSTR:IF INSTR(J,LS,") THEN RETURN
1999 | PRINT #2,TS*CALL PLNE:RETURN
986 | NUMERICPRINT:
786 | L2$="":K3=J
2943 | WHILE (MIDS(LS,K3,1)>="A" AND MIDS(LS,K3,1)<="Z") _
2799 | OR (MIDS(LS,K3,1)>="0" AND MIDS(LS,K3,1)<="9"):_
2153 | L2$=L2$+MIDS(LS,K3,1):K3=K3+1:WEND
486 | F(1)=1
3595 | IF VAL(L2$) OR LEFTS(L2$,1)=0 THEN PRINT #2,"MOV CX,"L2$:
1872 | ELSE PRINT #2,"MOV CX,2*L2$
1356 | PRINT #2,TS*MOV AH,";
3668 | IF INSTR(LS,"LPRINT")=1 THEN PRINT #2,"5":ELSE PRINT #2,"2"
1846 | F(1)=1:PRINT #2,TS*CALL PNUM"
2994 | IF INSTR(J,LS,")<1 THEN PRINT #2,TS*CALL PLNE"
576 | RETURN
696 | NOTPRINT:
2398 | IF I<>TOKENS THEN GOTO NOTASSIGN:
3785 | IF INSTR(LS,"*")=1 THEN PRINT #2,TS*INC 2*MIDS(LS,3):RETURN
3695 | IF INSTR(LS,"-")=1 THEN PRINT #2,TS*DEC 2*MIDS(LS,3):RETURN
2618 | US=FNPS(LS,""):GOSUB STRIPPER:V2$=US:J=0
3207 | WHILE (V$(J)<>" " AND V$(J)<>"+")>0 AND V$(J)=J+1:WEND
1504 | IF V$(J)=" " THEN V$(J)=V$
2892 | IF INSTR(VS,"$") THEN GOTO STRASSIGNMENT:
3412 | J=INSTR(VS,"$")+1:US=FNPS(LS,J):GOSUB STRIPPER:V1$=US
3177 | IF V1$="A" AND V1$<="Z" THEN GOTO NUMEXPRESSION:
1682 | IF INSTR(V1$,"*")>1 OR INSTR(V1$,"-")>1 OR INSTR(V1$,"")>0 _
3180 | OR INSTR(V1$,"/")>0 THEN GOTO NUMEXPRESSION:
2617 | IF FOR.LOOP THEN PRINT #2,TS*MOV AX,"V1$
2149 | PRINT #2,TS*MOV 2*V2$,"V1$:RETURN
1082 | NUMEXPRESSION:
2946 | YES=0:GOSUB ISKEYWORD:IF YES THEN RETURN
1232 | EX=0:NUMPASSES=0
585 | NUMEXP2:
281 | K=1
2959 | WHILE (MIDS(V1$,K,1)>="A" AND MIDS(V1$,K,1)<="Z") _
3383 | OR (MIDS(V1$,K,1)>="0" AND MIDS(V1$,K,1)<="9"):_K=K+1:WEND
594 | NUMEVAL:
661 | K1=K:V4=0
350 | HERE:
1655 | NUMPASSES=NUMPASSES+1
4842 | IF K1<LEN(V1$) THEN IF MIDS(V1$,K1,1)<=" " THEN K1=K1+1:GOTO HERE:
3291 | V3=LEFTS(V1$,1):OF=0:IF V3$>="0" AND V3$<="9" THEN OF=1
865 | IF OF=1 THEN
3399 | IF NUMPASSES>1 THEN PRINT #2,TS*MOV CX,VAL(V1$)
2281 | ELSE PRINT #2,TS*MOV AX,VAL(V1$)
582 | END IF
3853 | V3=0:IF OF=0 AND EX MOD 2=0 AND (MIDS(V1$,1,1)="-") THEN V3=1:V2=2
3722 | IF OF=0 AND EX MOD 2=0 AND INSTR(V1$,"NOT")=1 THEN V3=1:V2=7
2691 | IF EX=0 AND V3=1 THEN PRINT #2,TS*MOV AX,0"
415 | CONT1:
1447 | IF OF=0 AND V3<>1 THEN
3810 | IF NUMPASSES>1 THEN PRINT #2,TS*MOV CX,2*LEFTS(V1$,K-1) _
2692 | ELSE PRINT #2,TS*MOV AX,2*LEFTS(V1$,K-1)
582 | END IF
3147 | IF V3=1 THEN V3=0:V4=1:K=K1+V2\2:K1=K:GOTO HERE:
2677 | EX=EX+V4:IF EX MOD 2<>1 THEN GOTO CONT0:
3832 | IF V2=1 THEN PRINT #2,TS*ADD AX,CX":GOTO CONT0:
3811 | IF V2=2 THEN PRINT #2,TS*NEG CX*CRSTS*ADD AX,CX":GOTO CONT0:
2947 | IF V2=3 THEN PRINT #2,TS*IMUL CX":GOTO CONT0:
3532 | IF V2=4 THEN PRINT #2,TS*CWD*CRSTS*IDIV CX":GOTO CONT0:
3046 | IF V2=5 THEN PRINT #2,TS*AND AX,CX":GOTO CONT0:
2997 | IF V2=6 THEN PRINT #2,TS*OR AX,CX":GOTO CONT0:
3086 | IF V2=7 THEN PRINT #2,TS*XOR AX,CX":GOTO CONT0:
3719 | IF V2=8 THEN PRINT #2,TS*CWD*CRSTS*IDIV CX*CRSTS*MOV AX,DX"
414 | CONT0:
3283 | V2=0:US=MIDS(V1$,K1):GOSUB STRIPPER:V2$=LEFTS(US,1)
2111 | IF V2$="" THEN V2=INSTR("+-*/",V2$)
1222 | IF V2<1 THEN L=1:
4278 | WHILE L<6 AND V2(L)=V2:INSTR(US,LS(L)):V2=-L+4:V2=1:L=L+1:WEND:
3367 | IF V2<1 AND V2$="" THEN GOTO ABORT:
2918 | IF V2<1 THEN V1$=MIDS(V1$,K1):GOTO MAYBEDONE:
3448 | IF V2>4 THEN K=K1+LEN(LS(V2-4)):ELSE IF V2>0 THEN K=K1+1
1488 | V1$=MIDS(V1$,K):K=K1+1
416 | CONT2:
1709 | IF EX MOD 2=0 THEN EX=EX+1
1191 | IF LEN(V1$)>0 THEN
3288 | WHILE (MIDS(V1$,K,1)<=" " AND K<LEN(V1$)):K=K+1:WEND
1292 | V1$=MIDS(V1$,K):K=1
582 | END IF
1901 | IF V1$="" THEN GOTO NUMEXP2:
718 | MAYBEDONE:
2857 | IF V1$>STRINGS(LEN(V1$),") THEN GOTO ABORT:
2758 | PRINT #2,TS*MOV 2*LEFTS(LS,J-2),AX":RETURN
763 | ISKEYWORD:
3549 | K=1:WHILE INSTR(V1$,RS(K))>1 AND K<>TOKENS:K=K+1:WEND
1723 | IF K>TOKENS THEN
447 | YES:
2094 | IF RS(K)="VAL(" THEN GOTO ISVAL:
2396 | IF RS(K)="STRS(" THEN GOTO ISSTRING:
2086 | IF RS(K)="LEN(" THEN GOTO ISLEN:
2226 | IF RS(K)="PEEK(" THEN GOTO ISPEEK:
2372 | IF RS(K)="IPEEK(" THEN GOTO ISIPEEK:
2598 | IF RS(K)="VARPTR(" THEN GOTO ISVARPTR:
2118 | IF RS(K)="CHR$(" THEN GOTO ISCHR:
2078 | IF RS(K)="ASC(" THEN GOTO ISASC:
2274 | IF RS(K)="LEFTS(" THEN GOTO ISLEFT:
2440 | IF RS(K)="RIGHTS(" THEN GOTO ISRIGHT:
2112 | IF RS(K)="MIDS(" THEN GOTO ISMID:
2781 | IF RS(K)="STRINGS(" THEN GOTO ISSTRINGS:
2484 | IF RS(K)="INKEY$(" THEN GOTO ISINKEY:
984 | YES=0:RETURN
598 | ISINKEY:
3257 | PRINT #2,TS*MOV DL,0FFH*CRSTS*MOV AH,6*CRSTS*INT 21H"
1488 | PRINT #2,TS*MOV 2*V2$,0"

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2891 | INTERNALJUMP=INTERNALJUMP+1
2454 | PRINT #2,TS*JZ IJ*FNSS(INTERNALJUMP)
1489 | PRINT #2,TS*MOV 2*V2$,1"
2813 | PRINT #2,TS*MOV BX,OFFSET 2*V2$
2823 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1653 | PRINT #2,TS*MOV CX,[BX]"
1648 | PRINT #2,TS*MOV [CX],AL"
2264 | PRINT #2,"IJ*FNSS(INTERNALJUMP)",
576 | RETURN
441 | ISVAL:
3779 | F(30)=1:V2$=MIDS(V1$,5):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
1577 | PRINT #2,TS*MOV CX,2*V2$
2863 | PRINT #2,TS*MOV BX,OFFSET 2*V2$
2823 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1652 | PRINT #2,TS*MOV BX,[BX]"
1590 | PRINT #2,TS*CALL ASCBIN"
2131 | PRINT #2,TS*MOV 2*V2$,AX":RETURN
685 | ISSTRING:
3781 | F(31)=1:V2$=MIDS(V1$,6):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
2813 | PRINT #2,TS*MOV BX,OFFSET 2*V2$
1575 | PRINT #2,TS*MOV AX,2*V2$
1945 | PRINT #2,TS*CALL STR":RETURN
437 | ISLEN:
3361 | V2$=MIDS(V1$,5):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
1575 | PRINT #2,TS*MOV AX,2*V2$
2131 | PRINT #2,TS*MOV 2*V2$,AX":RETURN
507 | ISPEEK:
3362 | V2$=MIDS(V1$,6):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
1744 | PRINT #2,TS*MOV CX,2*25G"
1467 | PRINT #2,TS*MOV ES,CX"
2546 | IF V2$<"A" THEN PRINT #2,TS*MOV BX,"V2$:
1969 | ELSE PRINT #2,TS*MOV BX,2*V2$
2741 | PRINT #2,TS*MOV AX,0*CRSTS*MOV AL,[ES:BX]"
2131 | PRINT #2,TS*MOV 2*V2$,AX":RETURN
580 | ISIPEEK:
3363 | V2$=MIDS(V1$,7):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
1744 | PRINT #2,TS*MOV CX,2*25G"
1467 | PRINT #2,TS*MOV ES,CX"
2546 | IF V2$<"A" THEN PRINT #2,TS*MOV BX,"V2$:
1969 | ELSE PRINT #2,TS*MOV BX,2*V2$
1861 | PRINT #2,TS*MOV AX,[ES:BX]"
2131 | PRINT #2,TS*MOV 2*V2$,AX":RETURN
693 | ISVARPTR:
3364 | V2$=MIDS(V1$,8):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
2865 | PRINT #2,TS*MOV DX,OFFSET 2*V2$
2134 | PRINT #2,TS*MOV 2*V2$,DX":RETURN
435 | ISCHR:
3362 | V2$=MIDS(V1$,6):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
2752 | IF MIDS(V2$,1,1)<="9" AND MIDS(V2$,1,1)>="0" THEN
1569 | PRINT #2,TS*MOV AL,"V2$
1822 | GOTO ISCHR2:
582 | END IF
1575 | PRINT #2,TS*MOV AX,2*V2$
485 | ISCHR2:
2813 | PRINT #2,TS*MOV BX,OFFSET 2*V2$
1489 | PRINT #2,TS*MOV 2*V2$,1"
2023 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1652 | PRINT #2,TS*MOV BX,[BX]"
1639 | PRINT #2,TS*MOV [BX],AL"
576 | RETURN
429 | ISASC:
3361 | V2$=MIDS(V1$,5):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
2863 | PRINT #2,TS*MOV BX,OFFSET 2*V2$
2823 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1652 | PRINT #2,TS*MOV BX,[BX]"
2515 | PRINT #2,TS*MOV AH,0*CRSTS*MOV AL,[BX]"
2131 | PRINT #2,TS*MOV 2*V2$,AX":RETURN
513 | ISLEFT:
3363 | V2$=MIDS(V1$,7):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
2748 | V3$=FNPS(V2$,""):V4$=MIDS(V2$,INSTR(V2$,"")+1)
3996 | US=V4$:GOSUB STRIPPER:V4$=US:US=V3$:GOSUB STRIPPER:V3$=US
2610 | IF V4$<"A" THEN PRINT #2,TS*MOV CX,"V4$:
3482 | ELSE PRINT #2,TS*MOV BX,2*V4$:PRINT #2,TS*MOV CX,BX"
1595 | PRINT #2,TS*MOV 2*V2$,CX"
1474 | IF V3$>0 THEN RETURN
2813 | PRINT #2,TS*MOV BX,OFFSET 2*V2$
2823 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1639 | PRINT #2,TS*MOV DI,[BX]"
2064 | PRINT #2,TS*MOV BX,OFFSET 2*V3$
2023 | PRINT #2,TS*INC BX*CRSTS*INC BX"
3326 | PRINT #2,TS*MOV SI,[BX]*CRSTS*PUSH DS*CRSTS*POP ES"
2088 | PRINT #2,TS*CLD*CRSTS*REP MOVSB"
576 | RETURN
596 | ISRIGHT:
3364 | V2$=MIDS(V1$,8):US=FNPS(V2$,""):GOSUB STRIPPER:V2$=US
2748 | V3$=FNPS(V2$,""):V4$=MIDS(V2$,INSTR(V2$,"")+1)
3996 | US=V4$:GOSUB STRIPPER:V4$=US:US=V3$:GOSUB STRIPPER:V3$=US
2610 | IF V4$<"A" THEN PRINT #2,TS*MOV CX,"V4$:
3482 | ELSE PRINT #2,TS*MOV BX,2*V4$:PRINT #2,TS*MOV CX,BX"
1595 | PRINT #2,TS*MOV 2*V2$,CX"
1576 | PRINT #2,TS*MOV AX,2*V3$
2864 | PRINT #2,TS*MOV BX,OFFSET 2*V3$
2823 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1654 | PRINT #2,TS*MOV SI,[BX]"
1428 | PRINT #2,TS*ADD SI,AX"
1463 | PRINT #2,TS*SUB SI,CX"
3998 | PRINT #2,TS*MOV BX,OFFSET 2*V3$:PRINT #2,TS*INC BX*CRSTS*INC BX"
3311 | PRINT #2,TS*MOV DI,[BX]*CRSTS*PUSH DS*CRSTS*POP ES"
2618 | PRINT #2,TS*CLD*CRSTS*REP MOVSB":RETURN
432 | ISMID:
1894 | V2$=MIDS(V1$,6):V2$=FNPS(V2$,"")
2442 | V3=INSTR(V2$,""):V4=INSTR(V3+1,V2$,"")
1712 | IF V4=0 THEN GOTO ISMID2:
2724 | V3$=LEFTS(V2$,V3-1):V4$=MIDS(V2$,V3+1,V4-V3-1)
2633 | V5$=MIDS(V2$,V4+1):US=V3$:GOSUB STRIPPER:V5$=US
4323 | V3$=US:US=V4$:GOSUB STRIPPER:V4$=US:US=V5$:GOSUB STRIPPER:V5$=US
2633 | PRINT #2,TS*MOV DI,[BX]"
1639 | PRINT #2,TS*MOV BX,OFFSET 2*V3$:PRINT #2,TS*INC BX*CRSTS*INC BX"
4849 | PRINT #2,TS*MOV SI,[BX]"
1654 | PRINT #2,TS*MOV SI,[BX]"
2549 | IF V4$<"A" THEN PRINT #2,TS*MOV AX,"V4$:
1578 | ELSE PRINT #2,TS*MOV AX,2*V4$
1428 | IF V5$<"A" THEN PRINT #2,TS*MOV CX,"V5$:
1973 | ELSE PRINT #2,TS*MOV CX,2*V5$
1595 | PRINT #2,TS*MOV 2*V2$,CX"
2725 | PRINT #2,TS*PUSH DS*CRSTS*POP ES*CRSTS*CLD"
1496 | PRINT #2,TS*REP MOVSB"
576 | RETURN
482 | ISMID2:
3396 | V3$=LEFTS(V2$,V3-1):V4$=MIDS(V2$,V3+1):US=V3$:GOSUB STRIPPER
2386 | V3$=US:US=V4$:GOSUB STRIPPER:V4$=US
3998 | PRINT #2,TS*MOV BX,OFFSET 2*V3$:PRINT #2,TS*INC BX*CRSTS*INC BX"
1639 | PRINT #2,TS*MOV DI,[BX]"
4849 | PRINT #2,TS*MOV BX,OFFSET 2*V3$:PRINT #2,TS*INC BX*CRSTS*INC BX"

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Listing 1 continued

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1654 PRINT #2,TS"MOV SI,[BX]"
2549 IF V4<"A" THEN PRINT #2,TS"MOV AX,Z"V4S:
1970 ELSE PRINT #2,TS"MOV AX,Z"V4S
1428 PRINT #2,TS"ADD SI,AX"
1578 PRINT #2,TS"MOV CX,Z"V3S
2238 PRINT #2,TS"SUB CX,AX"CRSTS"INC CX"
1595 PRINT #2,TS"MOV Z"V5S,CX"
2725 PRINT #2,TS"SUB DS"CRSTS"POP ES"CRSTS"CLD"
1496 PRINT #2,TS"REP MOVSB"
576 RETURN
768 ISSTRINGS:
3073 V2S=MIDS(V1S,9):V3=INSTR(V2S,"")V3S=MIDS(V2S,V3+1)
3123 V2S=LEFTS(V2S,V3-1):US=V2S:GOSUB STRIPPER:V2S=US
3332 US=LEFTS(V3S,INSTR(V3S,"")-1):GOSUB STRIPPER:V3S=US
2700 IF V2S>"A" THEN PRINT #2,TS"MOV CX,Z"V2S:
1880 ELSE PRINT #2,TS"MOV CX,Z"V2S
1595 PRINT #2,TS"MOV Z"V5S,CX"
2013 PRINT #2,TS"MOV BX,OFFSET Z"V5S
2023 PRINT #2,TS"INC BX"CRSTS"INC BX"
1639 PRINT #2,TS"MOV DI,[BX]"
2700 IF V3S>"A" THEN PRINT #2,TS"MOV AX,Z"V3S:
1879 ELSE PRINT #2,TS"MOV AX,Z"V3S
2141 PRINT #2,TS"SUB DS"CRSTS"POP ES"
1053 PRINT #2,TS"CLD"
2038 PRINT #2,TS"REP STOSB":RETURN
1868 STRASSIGNMENT:
3817 J=INSTR(LS,"")+1:IF J THEN V1S=MIDS(LS,J):ELSE GOTO DETOUR:
4875 US=V1S:GOSUB STRIPPER:V1S=US:YES=0:GOSUB ISKEYWORD:IF YES THEN RETURN
525 DETOUR:
2885 J=INSTR(LS,CHR$(34))+1:K=INSTR(J,LS,CHR$(34))-1
2790 IF J=1 AND K=-1 THEN GOTO STRASSIGNMENT2:
2013 PRINT #2,TS"MOV BX,OFFSET Z"V5S
2777 IF K<J THEN PRINT #2,TS"MOV Z"V5S,"0":RETURN
1785 PRINT #2,TS"MOV Z"V5S,"K-J"
2023 PRINT #2,TS"INC BX"CRSTS"INC BX"
2223 PRINT #2,TS"MOV DI,[BX]"CRSTS"CLD"
3439 FOR L=J TO K:PRINT #2,TS"MOV AL,"FNSS(ASC(MIDS(LS,L,1)))
1237 PRINT #2,TS"STOSB"
953 NEXT:RETURN
1118 STRASSIGNMENT2:
4119 J=INSTR(LS,"")+1:V2S=MIDS(LS,J):K=1:US=V2S:GOSUB STRIPPER:V2S=US
1841 K=INSTR(V2S,"")V3S=LEFTS(V2S,K):V2S=MIDS(V2S,K+1)
3902 US=V3S:GOSUB STRIPPER:V3S=US:US=V2S:GOSUB STRIPPER:V2S=US
2458 IF V3S=V2S THEN GOTO STRASSIGNMENT:
1578 PRINT #2,TS"MOV CX,Z"V3S
2064 PRINT #2,TS"MOV BX,OFFSET Z"V3S
2023 PRINT #2,TS"INC BX"CRSTS"INC BX"
2038 PRINT #2,TS"MOV BX,[BX]"CRSTS"MOV SI,[BX]"
2013 PRINT #2,TS"MOV BX,OFFSET Z"V5S
2023 PRINT #2,TS"INC BX"CRSTS"INC BX"
1639 PRINT #2,TS"MOV DI,[BX]"
1595 PRINT #2,TS"MOV Z"V5S,CX"
3752 PRINT #2,TS"SUB DS"CRSTS"POP ES"CRSTS"CLD"CRSTS"REP MOVSB"
2620 IF V2S<=STRINGS(LEN(V2S),32) THEN RETURN
639 CATENATE:
4262 US=V2S:GOSUB STRIPPER:V2S=US:IF LEFTS(V2S,1)<"0" THEN GOTO ABORT:
3856 V2S=LEFTS(V2S,2):US=V2S:GOSUB STRIPPER:V2S=US:K=INSTR(V2S,"")
3979 V3S=LEFTS(V2S,K):V2S=MIDS(V2S,K+1):US=V3S:GOSUB STRIPPER:V3S=US
1969 US=V2S:GOSUB STRIPPER:V2S=US
2064 PRINT #2,TS"MOV BX,OFFSET Z"V3S
1653 PRINT #2,TS"MOV CX,[BX]"
2023 PRINT #2,TS"INC BX"CRSTS"INC BX"
1654 PRINT #2,TS"MOV SI,[BX]"
1525 PRINT #2,TS"MOV AX,Z"V5S
1347 PRINT #2,TS"SUB DS"CRSTS"POP ES"CRSTS"CLD"
1427 PRINT #2,TS"ADD AX,CX"
1593 PRINT #2,TS"MOV Z"V5S,AX"
2013 PRINT #2,TS"MOV BX,OFFSET Z"V5S
2023 PRINT #2,TS"INC BX"CRSTS"INC BX"
1639 PRINT #2,TS"MOV DI,[BX]"
1266 PRINT #2,TS"POP AX"
1413 PRINT #2,TS"ADD DI,AX"
3752 PRINT #2,TS"SUB DS"CRSTS"POP ES"CRSTS"CLD"CRSTS"REP MOVSB"
1119 STRASSIGNMENT3:
3065 IF V2S=STRINGS(LEN(V2S),32) THEN GOTO CATENATE:
576 RETURN
752 NOTASSIGN:
1776 IF INSTR(LS,"SIZE")=1 THEN
2990 V2S=MIDS(LS,6):US=FNSS(V2S,""):GOSUB STRIPPER
1948 V4S=MIDS(LS,INSTR(V4S,"")+1):J=0
3302 WHILE (VS(J)<"") AND VS(J)>US AND J<MAX:J=J+1:WEND
2201 IF VS(J)=US THEN S(J)=0V:RETURN
2127 IF VS(J)=** THEN VS(J)=US:S(J)=UV
672 RETURN
582 END IF
3874 IF INSTR(LS,"CLS")=1 THEN F(2)=1:PRINT #2,TS"CALL CLS":RETURN
1804 IF INSTR(LS,"COLOR")=1 THEN
V4S=MIDS(LS,6):V5=INSTR(V4S,"")
1788 IF V<1 THEN GOTO ABORT:
2123 V1S=FNSS(V4S,""):V4S=MIDS(V4S,V+1)
2712 V=INSTR(V4S,""):IF V<1 THEN V3S="":V2S=V4S
2890 IF V THEN V2S=MIDS(V4S,V+1):V2S=LEFTS(V4S,V-1)
2063 US=V1S:GOSUB STRIPPER:V1S=US
2865 US=V2S:GOSUB STRIPPER:V2S=US
2067 US=V3S:GOSUB STRIPPER:V3S=US
2639 IF V1S<"A" THEN PRINT #2,TS"MOV AX,Z"V1S
2095 ELSE PRINT #2,TS"MOV AX,Z"V1S
2642 IF V2S<"A" THEN PRINT #2,TS"MOV BX,Z"V2S:
2097 ELSE PRINT #2,TS"MOV BX,Z"V2S
3550 IF V3S<"**" THEN IF V3S<"A" THEN PRINT #2,TS"MOV CX,Z"V3S:
2099 ELSE PRINT #2,TS"MOV CX,Z"V3S
3214 PRINT #2,TS"SHL BX,1"CRSTS"SHL BX,1"CRSTS"SHL BX,1"
2488 PRINT #2,TS"SHL BX,1"CRSTS"AND BL,BF0H"
2362 IF V2S<"**" THEN PRINT #2,TS"OR AL,BL"
2441 IF V3S<"**" THEN PRINT #2,TS"OR AL,CL"
2537 PRINT #2,TS"MOV Z,2"ZATTR,AX":RETURN
582 END IF
654 ISLOCATE:
1861 IF INSTR(LS,"LOCATE")=1 THEN
1987 V4S=MIDS(LS,7):V5=INSTR(V3S,"")
2119 V1S=FNSS(V3S,""):V2S=MIDS(V3S,V+1)
2063 US=V1S:GOSUB STRIPPER:V1S=US
2065 US=V2S:GOSUB STRIPPER:V2S=US
2523 IF V1S<"*" OR V2S<"*" THEN GOTO ABORT:
2823 PRINT #2,TS"MOV AH,BFH":PRINT #2,TS"INT 10H"
IF V1S<"A" THEN PRINT #2,TS"MOV AX,Z"V1S:
2083 ELSE PRINT #2,TS"MOV AX,Z"V1S
2643 IF V2S<"A" THEN PRINT #2,TS"MOV CX,Z"V2S:
2066 ELSE PRINT #2,TS"MOV CX,Z"V2S
2946 PRINT #2,TS"MOV DH,AL":PRINT #2,TS"MOV DL,CL"
2067 PRINT #2,TS"DEC DH"CRSTS"DEC DL"
3221 PRINT #2,TS"MOV AH,2":PRINT #2,TS"INT 10H":RETURN
582 END IF
1773 LS="DEF SEG" THEN
2298 IF INSTR(LS,"")<1 THEN GOTO ABORT
US=MIDS(LS,INSTR(LS,"")+1):GOSUB STRIPPER:V5=US

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985 IF VS<"A" THEN
1563 PRINT #2,TS"MOV AX,Z"V5S
2408 PRINT #2,TS"MOV Z,ZSG,AX":RETURN
614 END IF
1589 PRINT #2,TS"MOV AX,Z"V5S
2344 PRINT #2,TS"MOV Z,ZSG,AX":RETURN
550 END IF
527 ISGOTO:
1734 IF INSTR(LS,"GOTO")=1 THEN
1191 V=VAL(MIDS(LS,5))
2609 VS=FNSS(V):PRINT #2,TS"JMP 1"V$:RETURN
582 END IF
1326 IF INSTR(LS,"GOSUB")=1 THEN
1867 V=VAL(MIDS(LS,6)):V5=FNSS(V)
1987 PRINT #2,TS"CALL 1"V$:RETURN
582 END IF
1901 IF INSTR(LS,"RETURN")=1 THEN
1711 PRINT #2,TS"RET":RETURN
582 END IF
1913 IF INSTR(LS,"END")=1 THEN
1913 PRINT #2,TS"INT 20H":RETURN
582 END IF
1747 IF INSTR(LS,"STOP")=1 THEN
1913 PRINT #2,TS"INT 20H":RETURN
582 END IF
2958 IF INSTR(LS,"INPUT")<1 THEN GOTO NOTINPUT:
2533 US=MIDS(LS,6):GOSUB STRIPPER:V5=US:J=0
1805 WHILE VS(J)<V5 AND VS(J)<"*" AND J<MAX:J=J+1:WEND
1584 IF VS(J)=** THEN VS(J)=V5
2551 IF INSTR(VS,"$")>0 THEN GOTO STRINPUT:
3703 F(13)=1:PRINT #2,TS"CALL GETNUM"CRSTS"MOV Z"V5S,AX":RETURN
578 STRINPUT:
2013 PRINT #2,TS"MOV BX,OFFSET Z"V5S
2589 PRINT #2,TS"CALL GETSTR":F(14)=1:RETURN
699 NOTINPUT:
3121 IF INSTR(LS,"IF")<1 THEN GOTO NOTCONDITIONAL:
622 K1=K2=0
931 NOTINQUOTES:
2971 K=INSTR(K1,LS,"THEN"):IF K<1 THEN GOTO ABORT:
3274 FOR K3=1 TO K:K2=ABS(K2+(MIDS(LS,K3,1)=CHR$(34))):NEXT
2449 IF K2 THEN K1=K+1:GOTO NOTINQUOTES:
1115 V1S="":V2S="":V3S="":
332 K1=3
3932 WHILE MIDS(LS,K1,1)<"*" AND MIDS(LS,K1,1)<">" AND MIDS(LS,K1,1)<"<"
2726 IF MIDS(LS,K1,1)>" " THEN V1S=V1S+MIDS(LS,K1,1)
561 K1=K1+1
398 WEND
3766 WHILE MIDS(LS,K1,1)<"*" AND (MIDS(LS,K1,1)>"9" OR MIDS(LS,K1,1)<"0")
3638 IF MIDS(LS,K1,1)=*" OR MIDS(LS,K1,1)=*" OR MIDS(LS,K1,1)=*"
1748 THEN V2S=V2S+MIDS(LS,K1,1)
593 K1=K1+1
398 WEND
3392 WHILE K1<K:IF MIDS(LS,K1,1)>" " THEN V3S=V3S+MIDS(LS,K1,1)
K1=K1+1:WEND
857
2770 IF V1S="" OR V2S="" OR V3S="" THEN GOTO ABORT:
3898 US=V1S:GOSUB STRIPPER:V1S=US:US=V2S:GOSUB STRIPPER:V2S=US
3308 US=V3S:GOSUB STRIPPER:V3S=US:K3=0:K2=INSTR(V1S,"$")
2782 IF V2S<"*" THEN K3=1:IF K2 THEN US="SC":F(15)=1
IF V2S<"<" OR V2S<">" THEN K3=2:IF K2 THEN US="SC4":F(17)=1
3544 IF V2S<"<" OR V2S<">" THEN K3=3:IF K2 THEN US="SC9":F(20)=1
3556 IF V2S<"=" OR V2S<"=" THEN K3=4:IF K2 THEN US="SC8":F(19)=1
2839 IF V2S<"<" THEN K3=5:IF K2 THEN US="SC5":F(16)=1
2856 IF V2S<"=" THEN K3=6:IF K2 THEN US="SCA":F(18)=1
1652 IF K3=0 THEN GOTO ABORT:
IF K2 THEN
731 PRINT #2,TS"MOV BX,OFFSET Z"V1S
2129 PRINT #2,TS"MOV CX,OFFSET Z"V3S
1343 PRINT #2,TS"CALL "US
1266 GOTO FIRSTPASS:
558 END IF
2543 IF V1S<"A" THEN PRINT #2,TS"MOV AX,Z"V1S:
1967 ELSE PRINT #2,TS"MOV AX,Z"V1S
2548 IF V1S<"A" THEN PRINT #2,TS"MOV BX,Z"V3S:
1978 ELSE PRINT #2,TS"MOV BX,Z"V3S
1288 IF K3=1 THEN US="J2"
1346 IF K3=2 THEN US="J3"
1345 IF K3=3 THEN US="J4"
1335 IF K3=4 THEN US="J5"
1278 IF K3=5 THEN US="J6"
1274 IF K3=6 THEN US="J9"
1449 PRINT #2,TS"CHP AX,BX"
2091 INTERNALJUMP=INTERNALJUMP+1
2411 PRINT #2,TS"J"FNSS(INTERNALJUMP)
1927 PRINT #2,TS"JMP 1"FNSS(LN(L2))
2511 PRINT #2,"1"FNSS(INTERNALJUMP)":TS":
1252 GOTO FIRSTPASS2:
761 FIRSTPASS:
1361 PRINT #2,TS"OR AL,AL"
2091 INTERNALJUMP=INTERNALJUMP+1
2532 PRINT #2,TS"JNZ 1"FNSS(INTERNALJUMP)
1927 PRINT #2,TS"JMP 1"FNSS(LN(L2))
2511 PRINT #2,"1"FNSS(INTERNALJUMP)":TS":
811 FIRSTPASS2:
1890 L1S=MIDS(LS,K+4)*L1S:RETURN
2764 IF INSTR(LS,"POKE")<1 THEN GOTO NOTPOKE:
334 K1=5
595 POKESUB:
2566 V1S="":WHILE MIDS(LS,K1,1)<"0":K1=K1+1:WEND
3134 V1S=MIDS(LS,K1):K1=INSTR(V1S,"")-1:V2S=LEFTS(V1S,K1)
2727 K1=K1+2:WHILE MIDS(V1S,K1,1)<"0":K1=K1+1:WEND
841 IF K1>1 THEN
1390 V1S=MIDS(V1S,K1,1)+K1-1
2364 WHILE MIDS(V2S,K1,1)<"0":K1=K1+1:WEND
1957 IF K1>1 THEN V2S=LEFTS(V1S,K1)
582 END IF
2548 IF V2S<"A" THEN PRINT #2,TS"MOV SI,Z"V2S:
1971 ELSE PRINT #2,TS"MOV SI,Z"V2S
2545 IF V1S<"A" THEN PRINT #2,TS"MOV CX,Z"V1S:
1969 ELSE PRINT #2,TS"MOV CX,Z"V1S
1742 PRINT #2,TS"MOV AX,Z,2SG"
1465 PRINT #2,TS"MOV ES,AX"
2309 IF INSTR(LS,"IPOKE")=1 THEN RETURN
2391 PRINT #2,TS"MOV [ES:SI],CL":RETURN
602 NOTPOKE:
2910 IF INSTR(LS,"IPOKE")<1 THEN GOTO NOTIPOKE:
3711 K1=6:GOSUB POKESUB:PRINT #2,TS"MOV [ES:SI],CX":RETURN
675 NOTIPOKE:
2726 IF INSTR(LS,"CALL")<1 THEN GOTO NOTCALL:
2725 XP=5:WHILE MIDS(LS,XP,1)<"*" :XP=XP+1:WEND
1614 IF MIDS(LS,XP,1)=*" THEN
731 XP2=XP+1
3699 WHILE (XP2<LEN(LS) AND MIDS(LS,XP2,1)=*" :XP2=XP2+1:WEND
2634 PRINT #2,TS"MOV BX,Z"MIDS(LS,XP,XP2-XP)
1592 PRINT #2,TS"CALL [BX]"

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Listing 1 continued

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672 | RETURN
582 | END IF
2663 | PRINT #2,TS*CALL "VAL(MIDS(LS,XP)):RETURN
583 | NOTCALL:
2529 | IF INSTR(LS,"OPEN") <> 1 THEN GOTO RGTE:
803 | F(28)=1:XP=5
3598 | WHILE (MIDS(LS,XP,1)>"9" OR MIDS(LS,XP,1)<"1") AND XP<LEN(LS)
681 | XP=XP+1
398 | WEND
2062 | IF XP=LEN(LS) THEN GOTO ABORT:
2094 | FIL=VAL(MIDS(LS,XP)):FILLS="128"
3324 | XP2=INSTR(LS,"*"):IF XP2 THEN XP2=INSTR(XP2+1,LS,"*")
4532 | IF XP2 THEN FILLS=MIDS(LS,XP2+1):US=FILLS$:GOSUB STRIPPER:FILLS=US
1166 | XP=INSTR(LS,"*")+1
2708 | IF MIDS(LS,XP,1)=CHR$(34) THEN GOTO ROPENS
4311 | FILS=MIDS(LS,XP):XP=INSTR(FILS,"*"):IF XP THEN FILS=LEFTS(FILS,XP-1)
2558 | PRINT #2,TS*MOV DL,OFFSET FCB*FNSS(FIL)
2141 | PRINT #2,TS*PUSH DS*CRSTS*POP ES"
2146 | PRINT #2,TS*MOV BX,OFFSET Z*FILS
2023 | PRINT #2,TS*INC BX*CRSTS*INC BX"
1654 | PRINT #2,TS*MOV SI,[BX]"
3021 | IF FILLS<"A" THEN PRINT #2,TS*MOV CX,"FILLS":_
2239 | ELSE PRINT #2,TS*MOV CX,Z*FILLS
2833 | PRINT #2,TS*MOV AX,2903H:PRINT #2,TS*INT 21H"
2891 | PRINT #2,TS*MOV DX,DI*:PRINT #2,TS*MOV AH,16H"
2084 | PRINT #2,TS*CALL ROPEM*:RETURN
529 | ROPENS:
2726 | PRINT #2,TS*JMP "FNSS(LN)"A*FNSS(W+2):W=W+1
2279 | PRINT #2,"FNSS(LN)"A*FNSS(W):"TS*DB "":XX=XP+1:W=W+1
4186 | WHILE MIDS(LS,XX,1)<>CHR$(34):PRINT #2,MIDS(LS,XX,1):XX=XX+1:WEND
761 | PRINT #2,"*"
2555 | PRINT #2,"FNSS(LN)"A*FNSS(W):"TS":W=W+1
2981 | IF FILLS<"A" THEN PRINT #2,"MOV CX,"FILLS":_
2119 | ELSE PRINT #2,"MOV CX,Z*FILLS
3041 | PRINT #2,TS*MOV SI,OFFSET 1*FNSS(LN)"A*FNSS(W-2)
2558 | PRINT #2,TS*MOV DI,OFFSET FCB*FNSS(FIL)
2833 | PRINT #2,TS*MOV AX,2903H:PRINT #2,TS*INT 21H"
3144 | PRINT #2,TS*PUSH DS*CRSTS*POP ES*CRSTS*MOV AH,16H"
3072 | PRINT #2,TS*MOV DX,DI*CRSTS*CALL ROPEM*:RETURN
364 | RGTE:
3997 | IF INSTR(LS,"GET")<>1 AND INSTR(LS,"PUT")<>1 THEN GOTO XCLOSE:
359 | F(28)=1:FIL=VAL(MIDS(LS,4)):IF FIL=0 THEN GOTO ABORT:
3862 | XP=INSTR(LS,"*"):XP=XP+1:XQ=INSTR(XP,LS,"*"):US=MIDS(LS,XQ,XP)
3058 | GOSUB STRIPPER:BUFS=US*XXS=MIDS(LS,XQ,XP)
4133 | PRINT #2,TS*MOV BX,OFFSET Z*BUFS:PRINT #2,TS*INC BX*CRSTS*INC BX"
1654 | PRINT #2,TS*MOV DX,[BX]"
2294 | PRINT #2,TS*MOV AH,1AH*CRSTS*INT 21H"
2571 | PRINT #2,TS*MOV BX,OFFSET FCB*FNSS(FIL)
1375 | PRINT #2,TS*ADD BX,33"
2627 | IF XXS="A" THEN PRINT #2,TS*MOV CX,"XXS":_
2010 | ELSE PRINT #2,TS*MOV CX,Z*XXS
1233 | PRINT #2,TS*DEC CX"
1653 | PRINT #2,TS*MOV [BX],CX"
4101 | PRINT #2,TS*INC BX*CRSTS*INC BX*CRSTS*MOV CX,0*CRSTS*MOV [BX],CX"
2573 | PRINT #2,TS*MOV DX,OFFSET FCB*FNSS(FIL)
2401 | PRINT #2,TS*CALL R*LEFTS(LS,3):RETURN
514 | RCLOSE:
2036 | IF INSTR(LS,"CLOSE")<>1 THEN GOTO FORLOOP:
463 | F(28)=1
2936 | FIL=VAL(MIDS(LS,6)):IF FIL<1 THEN GOTO ABORT:
2573 | PRINT #2,TS*MOV DX,OFFSET FCB*FNSS(FIL)
2071 | PRINT #2,TS*CALL FCLOS*:RETURN
603 | FORLOOP:
2781 | IF INSTR(LS,"FOR")<>1 THEN GOTO NEXTLOOP:
797 | POP LOOP=1
4827 | U=1:ZS=LS:US=MIDS(LS,4):INSTR(LS,"TO")-4:GOSUB STRIPPER:LS=US
3322 | I=FORENS:GOSUB NOTPRINT:LS=ZS:XP=INSTR(LS,"TO")
1982 | X1=INSTR(LS,"STEP"):NX=U-N-1
2026 | NXS=FNSS(U)+CRS+NX*FNSS(U)+"*"
3832 | XP=XP+2:WHILE MIDS(LS,XP,1)<"*" :XP=XP+1:WEND:US=MIDS(LS,XP)
1511 | GOSUB STRIPPER:ZS=US
652 | FORLOOP1:
3312 | IF ZS>"A" THEN PRINT #2,"FOR*FNSS(U)":TS*MOV BX,Z*ZS
3467 | IF ZS<"A" THEN PRINT #2,"FOR*FNSS(U)":TS*MOV BX,"VAL(ZS)
1854 | THEN GOTO FORLOOP3:
3502 | PRINT #2,TS*CMP AX,BX":INTERNALJUMP=INTERNALJUMP+1
2499 | PRINT #2,TS*JBE IJ*FNSS(INTERNALJUMP)
1788 | PRINT #2,TS*JMP NXT*FNSS(U)
2264 | PRINT #2,"IJ*FNSS(INTERNALJUMP)":*
2943 | NXTS(NX)=TS+MOV AX,Z+VS+CRS+TS+INC AX+CRS+TS
3950 | NXTS(NX)=NXTS(NX)+MOV Z+VS+AX+CRS+TS*JMP FOR+NXS:RETURN
654 | FORLOOP2:
3578 | ZS=MIDS(LS,XP1+5):WHILE LEFTS(ZS,1)<=" ":ZS=MIDS(ZS,2):WEND
2447 | IF LEFTS(ZS,1)=-" THEN GOTO FORLOOP4:
3502 | PRINT #2,TS*CMP AX,BX":INTERNALJUMP=INTERNALJUMP+1
2499 | PRINT #2,TS*JBE IJ*FNSS(INTERNALJUMP)
1788 | PRINT #2,TS*JMP NXT*FNSS(U)
2264 | PRINT #2,"IJ*FNSS(INTERNALJUMP)":*
2038 | NXTS(NX)=TS+MOV AX,Z+VS+CRS+TS
988 | IF ZS>"A" THEN
4556 | $+,"AX"
550 | END IF
925 | IF ZS<"A" THEN
4466 | NXTS(NX)=NXTS(NX)+MOV CX,"ZS+CRS+TS+ADD AX,CX+CRS+TS+MOV Z+VS
+,"AX"
550 | END IF
3002 | NXTS(NX)=NXTS(NX)+CRS+TS+JMP FOR+NXS:RETURN
655 | FORLOOP4:
3502 | PRINT #2,TS*CMP AX,BX":INTERNALJUMP=INTERNALJUMP+1
2499 | PRINT #2,TS*JAE IJ*FNSS(INTERNALJUMP)
1788 | PRINT #2,TS*JMP NXT*FNSS(U)
2264 | PRINT #2,"IJ*FNSS(INTERNALJUMP)":*
2038 | NXTS(NX)=TS+MOV AX,Z+VS+CRS+TS
988 | IF ZS>"A" THEN
3459 | NXTS(NX)=NXTS(NX)+SUB AX,Z+ZS+CRS+TS+MOV Z+VS+,"AX"
550 | END IF
925 | IF ZS<"A" THEN
3369 | NXTS(NX)=NXTS(NX)+SUB AX,"ZS+CRS+TS+MOV Z+VS+,"AX"
550 | END IF
3002 | NXTS(NX)=NXTS(NX)+CRS+TS+JMP FOR+NXS:RETURN
691 | NEXTLOOP:
2922 | IF INSTR(LS,"NEXT")<>1 THEN GOTO TEMPABORT:
2134 | W=X+1:PRINT #2,NXTS(U-N):RETURN
744 | TEMPABORT:
576 | RETURN
434 | ABORT:
3078 | PRINT"SYNTAX ERROR IN LINE":PRINT LN;LS:END
422 | ATEND:
1743 | PRINT #2,"132767:TS*INT 20H"
2078 | GOSUB RESOLVCALLS:TOT=0:J=0
972 | WHILE VS(J)<>"*
3555 | IF INSTR(VS(J),"S") THEN MAX=S(J):IF MAX<1 THEN MAX=255
1608 | IF INSTR(VS(J),"S") THEN
1116 | TOT=TOT+MAX
1469 | JS=FNSS(10+TOT-MAX)
2265 | PRINT #2,"Z*VS(J)TS*DW 0",SAREA+*JS

```

```

2033 | ELSE PRINT #2,"Z*VS(J)TS*DW 0"
678 | END IF
493 | J=J+1
398 | WEND
863 | IF F(28) THEN
917 | FOR J=1 TO 3
2076 | PRINT #2,"FCB*FNSS(J)":TS*DB " "
2731 | FOR TOT=1 TO 36:PRINT #2,"0",:NEXT TOT
962 | PRINT #2,"0"
617 | NEXT J
582 | END IF
1742 | PRINT #2,"Z_ZATTR"TS*DW 7"
1574 | PRINT #2,"Z_ZSG"TS*DW 0"
1509 | PRINT #2,"SAREA"TS*DW 0"
1491 | PRINT #2,"CODE"TS*ENDS"
2207 | PRINT #2,TS*END _START":CLOSE:END
969 | RESOLVCALLS:
839 | CLOSE 1:AS=""
1431 | OPEN"1",LDS+BBC.LIB"
1147 | IF F(1) THEN F(0)=1
1249 | IF F(13) THEN F(30)=1
1256 | IF F(17) THEN F(15)=1
1259 | IF F(19) THEN F(16)=1
1253 | IF F(20) THEN F(18)=1
3334 | FOR I=0 TO 33:IF F(1) THEN A=I+1:GOSUB READLIBRARY:
1058 | NEXT I:RETURN
875 | READLIBRARY:
2446 | WHILE VAL(AS)<A:LINE INPUT #1,AS:WEND
2240 | WHILE VAL(AS)<>A+1:LINE INPUT #1,AS
1998 | IF EOF(1) THEN GOTO LIBERROR:
916 | IF CS="N" THEN
1094 | X=INSTR(AS,"")
1800 | IF X THEN AS=LEFTS(AS,X-1):_
3563 | X=1:WHILE X<LEN(AS) AND MIDS(AS,X,1)<="*" :X=X+1:WEND:_
1676 | IF X>LEN(AS) THEN AS=""
2477 | IF VAL(AS)<1 AND AS<>"* THEN PRINT #2,AS
582 | END IF
2411 | IF CS="Y" AND VAL(AS)<1 THEN PRINT #2,AS
398 | WEND
576 | RETURN
758 | OPENERROR:
2869 | PRINT"ERROR: LIBRARY (BBC.LIB) NOT FOUND!"
5148 | PRINT"Correct your library drive spec (now "LDS"): ",:INPUT LDS
1418 | GOTO RESOLVCALLS:
667 | LIBERROR:
4737 | PRINT"FATAL ERROR: unexpected end of library (BBC.LIB)":END
1422 | SUB UPPER(XS) STATIC
1755 | IF LEN(XS)=0 THEN EXIT SUB
487 | FLAG=0
2369 | FOR I=1 TO LEN(XS):X=ASC(MIDS(XS,I,1))
2000 | IF X=34 THEN FLAG=ABS(FLAG-1)
4365 | IF FLAG=0 THEN IF X>96 THEN IF X<123 THEN X=X-32:MIDS(XS,I,1)=CHR$(X)
520 | NEXT I
481 | END SUB

```

End

Program Listing 2. BBC.LIB.

```

1 | ADD AL,48
PSTR: | MOV [BX],AL
| MOV AX,DX
PNUM6: | MOV CX,10
| CWD
| DIV CX
| MOV CX,OFFSET SAREA
| CMP BX,CX
| JNZ PNUM7
| OR AL,AL
| JZ PNUM8
PNUM7: | INC BX
| ADD AL,48
| MOV [BX],AL
PNUM8: | ADD DL,48
| INC BX
| MOV [BX],DL
| MOV CX,OFFSET SAREA
| SUB CX,BX
| NEG CX
| INC CX
| MOV BX,OFFSET SAREA
| POP AX
| CALL PSTR
| RET
3 | CLS: | MOV BX,Z_ZATTR
| MOV BH,BL
| MOV CX,0
| MOV DL,79
| MOV DH,24
| MOV AL,0
| MOV AH,7
| INT 10H
| MOV DX,0
| MOV BH,0
| MOV AH,2
| INT 10H
| RET
4 |
5 |
6 |
7 |
8 |
9 |
10 | DIV CX
11 | MOV CX,OFFSET SAREA
12 | CMP BX,CX
13 | JNZ PNUM5
14 | OR AL,AL
| JZ PNUM6
PNUM5: | INC BX

```

Listing 2 continued

```

MOV DX,OFFSET SAREA
INT 21H
MOV BX,OFFSET SAREA
MOV CX,[BX]
MOV CL,CH
MOV CH,0
INC BX
INC BX
CALL ASCBIN
PUSH AX
MOV AH,2
MOV DL,13
INT 21H
MOV DL,10
INT 21H
POP AX
RET
15
GETSTR: MOV AX,0
        MOV [BX],AX
        PUSH BX
        INC BX
        INC BX
        MOV DI,[BX]
        MOV CX,DI
GETS1:  MOV AH,7
        INT 21H
        CMP AL,13
        JZ GETSF
        CMP AL,10
        JZ GETSF
        CMP AL,8
        JNZ GETS2
        CMP DI,CX
        JBE GETS1
        DEC DI
        MOV DL,AL
        MOV AH,2
        INT 21H
        MOV DL,32
        INT 21H
        MOV DL,8
        INT 21H
        JMP SHORT GETS1
GETS2:  MOV [DI],AL
        MOV DL,AL
        MOV AH,2
        INT 21H
        INC DI
        JMP SHORT GETS1
GETSF:  SUB DI,CX
        POP BX
        MOV [BX],DI
        MOV AH,2
        MOV DL,13
        INT 21H
        MOV DL,10
        INT 21H
        RET
16
SC:     MOV AX,[BX]
        CMP AX,[CX]
        JNZ SFALSE
        MOV DX,AX
        INC BX
        INC BX
        INC CX
        INC CX
        MOV SI,[BX]
        MOV DI,[CX]
        PUSH DS
        POP ES
        CLD
SC1:    OR DX,DX
        JZ STRUE
        CMPSB
        JNZ SFALSE
        DEC DX
        JMP SHORT SC1
STRUE:  MOV AX,-1
        RET
SFALSE: MOV AX,0
        RET
17
SC5:    MOV AX,[BX]
        MOV DX,[CX]
        INC BX
        INC BX
        INC CX
        INC CX
        MOV SI,[BX]
        MOV DI,[CX]
        PUSH DS
        POP ES
        MOV CX,AX
SC51:   JCXZ SCAT5
        OR DX,DX
        JZ SCAT5
        CMPSB
        JG SCAF5
        JB SCAT5
        DEC CX
        DEC DX
        JMP SHORT SC51
SCAF5:  MOV AX,0
        RET
SCAT5:  MOV AX,-1
        RET
18
SC4:    CALL SC
        XOR AX,-1
        RET
19
SCA:    MOV AX,[BX]
        MOV DX,[CX]
        INC BX
        INC BX
        INC CX
        INC CX
        MOV SI,[BX]
        MOV DI,[CX]
        PUSH DS
        POP ES
        MOV CX,AX
SCA1:   JCXZ SCAF
        OR DX,DX
        JZ SCAT
        CMPSB
        JG SCAT
        JB SCAF
        DEC CX
        DEC DX
        JMP SHORT SCA1
SCAF:   MOV AX,0
        RET
SCAT:   MOV AX,-1
        RET
20
SCB:    CALL SC5
        XOR AX,-1
        RET
21
SC9:    CALL SCA
        XOR AX,-1
        RET
22
ROPE:   PUSH AX
        MOV AH,0FH
        INT 21H
        OR AL,AL
        JZ ROPENG
        POP AX
        INT 21H
        OR AL,AL
        JZ ROPENC
        MOV DX,OFFSET RERR
        MOV AH,9
        INT 21H
        RET
RERR:   DB 'Create file fail
ed! Fatal error!',0dh,0ah,'$'
ROPE:   POP AX
ROPE:   MOV BX,0EH
        ADD BX,DX
        MOV [BX],CX
        MOV BX,32
        ADD BX,DX
        MOV AX,0
        MOV [BX],AX
        MOV BX,33
        ADD BX,DX
        MOV [BX],AX
        ADD BX,2
        MOV [BX],AX
        RET
RGET:   MOV AH,21H
        INT 21H
        OR AL,AL
        JZ RGETG
        CMP AL,2
        JNZ RGETG
        MOV DX,OFFSET GERR
        MOV AH,9
        INT 21H
        RET
GERR:   DB 'Read failed: not
enough room to transfer rec
ord.',0dh,0ah,'$'
RGETG:  RET
RPUT:   MOV AH,22H
        INT 21H
        OR AL,AL
        JZ RPUTG
        CMP AL,1
        JZ RPUTF
        MOV DX,OFFSET PUTTRF
        MOV AH,9
        INT 21H
        RET
RPUTF:  CALL FCLOS
        MOV DX,OFFSET RPUTE
        MOV AH,9
        INT 21H
        RET
RPUTG:  RET
PUTTRF: DB 'Fatal error: not
enough memory to write reco
rd!',0dh,0ah,'$'
RPUTE:  DB 'Fatal error: out
of disk space!',0dh,0ah,'$'
FCLOS:  MOV AH,10H
        INT 21H
        OR AL,AL
        JZ FCLOSG
        MOV DX,OFFSET FCERR

```

```

MOV AH,9
INT 21H
FCLOSG: RET
FCERR:  DB 'Error reported i
n closing file',0dh,0ah,'$'
30
31
ASCBIN: MOV AX,0
        INC CX
        DEC BX
        MOV DX,0
        PUSH DX
        DEC CX
        INC BX
        JCXZ ASCDON
        MOV DL,[BX]
        CMP DL,'-'
        JZ ASCL2
        CMP DL,'+'
        JZ ASCL3
        CMP DL,'0'
        JB ASCL
        CMP DL,'9'
        JG ASCDON
        JMP SHORT ASCL4
ASCL2:  POP DX
        MOV DX,-1
        PUSH DX
        INC BX
        JMP SHORT ASCL4
ASCL3:  INC BX
        DEC CX
        JCXZ ASCDON
        MOV DL,[BX]
        CMP DL,'0'
        JB ASCL3
        CMP DL,'9'
        JA ASCDON
        PUSH CX
        PUSH DX
        MOV CX,10
        CWD
        MUL CX
        POP DX
        POP CX
        MOV DH,0
        SUB DX,48
        ADD AX,DX
        JMP SHORT ASCL3
ASCL4:  POP DX
        OR DX,DX
        JZ ASCFIN
        NEG AX
        ASCFIN: RET
32
STR:    PUSH BX
        INC BX
        INC BX
        MOV DX,[BX]
        MOV BX,DX
        MOV [BX],32
        MOV CX,10000
        CWD
        IDIV CX
        CMP AH,128
        JB STR2
        MOV [BX],'- '
        INC BX
        ADD AL,48
        MOV [BX],AL
        MOV AX,DX
        AND AX,7FFFH
        MOV CX,1000
        CWD
        DIV CX
        ADD AL,48
        MOV [BX],AL
        INC BX
        MOV AX,DX
        MOV CX,100
        CWD
        DIV CX
        ADD AL,48
        MOV [BX],AL
        INC BX
        MOV AX,DX
        MOV CX,10
        CWD
        DIV CX
        ADD AL,48
        MOV [BX],AL
        INC BX
        MOV [BX],DL
        POP CX
        MOV DX,CX
        MOV AX,BX
        MOV BX,CX
        INC BX
        INC BX
        MOV CX,[BX]
        SUB AX,CX
        MOV BX,DX
        MOV [BX],AX
        RET
33
34
        ; EXPANSION AREA
End

```

Program Listing 3. A sample program to assemble, link, and convert an ASM file to a COM file.

```

MASM MYPROG,MYPROG,MYPROG,MYPROG
LINK MYPROG,MYPROG,MYPROG;
EXE2BIN MYPROG.EXE MYPROG.COM
DEL MYPROG.EXE

```

Program Listing 4. Compile.BAT.

```

MASM %1,%1,%1,%1
LINK %1,%1,%1;
EXE2BIN %1.EXE %1.COM
DEL %1.EXE

```

Program Listing 5. The Sieve of Eratosthenes in Basic.

```

391 | 10 A$=" "
    | 'C IS THE LOCATION WHERE A$ STORAGE BEGINS
2067 | B=VARPTR(A$):++B:++B:C=IPEEK(B)
1524 | PRINT"10 ITERATIONS"
934 | FOR M=1 TO 10
662 | COUNT=0
1214 | A$=STRING$(8191,1)
1018 | 80 FOR I=0 TO 8190
2348 | 90 D=C+I:B=PEEK(D):IF B=0 THEN GOTO 170
902 | 100 PRIME=I+1+3
    | PRINT PRIME
793 | K=PRIME+I
1564 | 120 IF K>8190 THEN GOTO 160
1047 | 130 D=C+K:POKE D,0
795 | K=K+PRIME
652 | GOTO 120
662 | 160 ++COUNT
503 | 170 NEXT
504 | 180 NEXT
2132 | 190 PRINT COUNT;:PRINT" PRIMES."
393 | 200 END

```

Program Listing 6. The assembly source code BBC outputs for the Sieve.

```

CODE      title C:SIEVE.BAS
          SEGMENT
          ORG 100H
          ASSUME CS:CODE,DS:CODE
_START:   PUSH CS
          POP CX
110:      MOV Z_ZSG,CX
          ;10 A$=" "
          MOV BX,OFFSET ZA$
          MOV ZA$, 1
          INC BX
          INC BX
          MOV DI,[BX]
          CLD
          MOV AL,32
          STOSB
          ;C IS THE LOCATION WHERE A$ STORAGE BEGINS
          ;      B=VARPTR(A$):++B:++B:C=IPEEK(B)
          MOV DX,OFFSET ZA$
          MOV ZB,DX
          INC ZB
          INC ZB
          MOV CX,Z_ZSG
          MOV ES,CX
          MOV BX,ZB
          MOV AX,[ES:BX]
          MOV ZC,AX
          ;      PRINT"10 ITERATIONS"
          JMP I10A2
110A1:   DB 49,48,32,73,84,69,82,65,84,73,79,78,83
110A2:   MOV BX,OFFSET I10A1
          MOV CX,13
          MOV AH,2
          CALL PSTR
          CALL PLNE
          ;      FOR M=1 TO 10
          MOV AX,1
          MOV ZM,1
FOR1:    MOV BX, 10
          CMP AX,BX
          JBE IJ1
          JMP NXT1
IJ1:    ;      COUNT=0
          MOV ZCOUNT,0
          ;      A$=STRING$(8191,1)
          MOV CX,8191
          MOV ZA$,CX
          MOV BX,OFFSET ZA$
          INC BX
          INC BX
          MOV DI,[BX]
          MOV AX,1
          PUSH DS
          POP ES
          CLD
          REP STOSB
180:    ;80 FOR I=0 TO 8190
          MOV AX,0
          MOV ZI,0
FOR2:    MOV BX, 8190
          CMP AX,BX
          JBE IJ2
          JMP NXT2
IJ2:    ;90 D=C+I:B=PEEK(D):IF B=0 THEN GOTO 170
190:    MOV AX,ZC
          MOV CX,ZI
          ADD AX,CX
          MOV ZD,AX
          MOV CX,Z_ZSG
          MOV ES,CX
          MOV BX,ZD
          MOV AX,0
          MOV AL,[ES:BX]
          MOV ZB,AX
          MOV AX,ZB
          MOV BX,0
          CMP AX,BX
          JZ IJ3
          JMP I100
IJ3:    ;
          JMP I170
1100:   ;100 PRIME=I+I+3
          MOV AX,ZI
          MOV CX,ZI
          ADD AX,CX
          MOV CX, 3
          ADD AX,CX
          MOV ZPRIME,AX
          ;      PRINT PRIME
          ;      K=PRIME+I
          MOV AX,ZPRIME
          MOV CX,ZI
          ADD AX,CX
          MOV ZK,AX
1120:   ;120 IF K>8190 THEN GOTO 160
          MOV AX,ZK
          MOV BX,8190
          CMP AX,BX
          JG IJ4
          JMP I130
IJ4:    ;
          JMP I160
          ;130 D=C+K:POKE D,0
          MOV AX,ZC
          MOV CX,ZK
          ADD AX,CX
          MOV ZD,AX
          MOV SI,ZD
          MOV CX,0
          MOV AX,Z_ZSG
          MOV ES,AX
          MOV [ES:SI],CL
          ;      K=K+PRIME
          MOV AX,ZK
          MOV CX,ZPRIME
          ADD AX,CX
          MOV ZK,AX
          ;      GOTO 120
          JMP I120
1160:   ;160 ++COUNT
          INC ZCOUNT
1170:   ;170 NEXT
          MOV AX,ZI
          INC AX
          MOV ZI,AX
          JMP FOR2
NXT2:   ;180 NEXT
1180:   MOV AX,ZM
          INC AX
          MOV ZM,AX
          JMP FOR1
NXT1:   ;190 PRINT COUNT;:PRINT" PRIMES."
1190:   MOV CX,ZCOUNT
          MOV AH,2
          CALL PNUM
          JMP I190A2
1190A1: DB 32,80,82,73,77,69,83,46
1190A2: MOV BX,OFFSET I190A1
          MOV CX,8
          MOV AH,2
          CALL PSTR
          CALL PLNE
1200:   ;200 END
          INT 20H
          ;
132767: INT 20H
PSTR:   ;Routine to print a string. BX points to string, CX has the
          ;number of characters to print, AH contains the DOS function cod
          e.
          JCXZ PSTRF
          MOV DL,[BX]
          INT 21H
          INC BX
          LOOP PSTR
PSTRF:  RET ;End of print string routine
PLNE:   ;Routine to print a new line. AH contains the DOS function code
          .
          MOV DL,13 ;Send a carriage return to output
          INT 21H
          MOV DL,10 ;And now a line feed
          INT 21H
          RET
PNUM:   ;Routine to print a number. AH contains the DOS function code,
          ;CX contains the number to print
          MOV BX,OFFSET SAREA ;BX now points to 256-byte work area
          MOV SAREA,32 ;put space in for sign
          PUSH AX ;Save AX
          MOV AX,CX ;Put number into AX
          CMP AX,8000H ;Is it negative?
          JB PNUM1 ;No
          NEG AX ;Yes
          MOV SAREA,'-' ;Put in the sign
          PNUM1: MOV CX,10000 ;first divisor
          MOV DX,0 ;Convert AX+DX to doubleword without sign extens
          ion.
          DIV CX ;First division. Quotient in AX, remainder in D
          x.
          OR AL,AL
          JZ PNUM2 ;Skip if leading zero
          INC BX
          ADD AL,48 ;Get ready to move to temporary area
          MOV [BX],AL ;Done, now for next digit.
          PNUM2: MOV AX,DX ;remainder to AX
          MOV CX,1000 ;Second divisor
          CWD
          DIV CX
          MOV CX,OFFSET SAREA ;Where are we?
          CMP BX,CX ;If still at start, check for leading ze
          ro.
          JNZ PNUM3
          OR AL,AL
          JZ PNUM4 ;Still at start, still all zeros
          PNUM3: INC BX
          ADD AL,48
          MOV [BX],AL
          PNUM4: MOV AX,DX
          MOV CX,100
          CWD
          DIV CX
          MOV CX,OFFSET SAREA
          CMP BX,CX
          JNZ PNUM5
          OR AL,AL
          JZ PNUM6

```

Listing 6 continued

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Circle 38 on Reader Service card.

Listing 6 continued

```

PNUM5:  INC BX
        ADD AL,48
        MOV [BX],AL
PNUM6:  MOV AX,DX
        MOV CX,10
        CWD
        DIV CX
        MOV CX,OFFSET SAREA
        CMP BX,CX
        JNZ PNUM7
        OR AL,AL
        JZ PNUM8
PNUM7:  INC BX
        ADD AL,48
        MOV [BX],AL
PNUM8:  ADD DL,48
        INC BX
        MOV [BX],DL      ;Last digit of the number.
        MOV CX,OFFSET SAREA
        SUB CX,BX
        NEG CX          ;Count of characters to print, less one
        INC CX
        MOV BX,OFFSET SAREA ;Address of number to print is in BX again

        n
        POP AX          ;Restore DOS function code
        CALL PSTR       ;Print it
        RET
ZA$     DW 0,SAREA+10
ZB      DW 0
ZC      DW 0
ZM      DW 0
ZCOUNT DW 0
ZI      DW 0
ZD      DW 0
ZPRIME  DW 0
ZK      DW 0
Z_ZATTR DW 7
Z_ZSG   DW 0
SAREA   DW 0
CODE    ENDS
        END _START

```

End

# 80micro

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## MS-DOS

### Designing in 3D

Drafix 3D Modeler by Foresight Resources is a three-dimensional design and drafting tool that works with Drafix 1 Plus or Drafix 1, Foresight's two-dimensional CAD programs. You can transfer any view of a three-dimensional image into either program for enhancements or printing.

A three-dimensional data base lets you view models from any perspective, even from inside. Drafix 3D Modeler's line-removal algorithm removes obstructed lines from view, instead of masking them. You construct models from an array of design tools, including curved surfaces, spheres, cones, ellipses, and Bezier patches. Also, you can use the program's automatic wall generation for architectural applications.

A math coprocessor is recommended. Drafix 3D Modeler sells for \$295 from Foresight Resources Corp., 932 Massachusetts, Lawrence, KS 66044, 913-841-1121.

Circle 551 on Reader Service card.

### Create Interactive Graphics

You can use the Artpak Demonstrator Language to create context-sensitive tutorials or demonstrations that include text, animated graphics, and sound effects. Recommended applications are sales, marketing, and educational presentations.

ADL comes with a mouse-driven drawing board, a charting function, a text and music editor, a run-time command interpreter, and a library of over 170 drawings. You can use graphics from other programs. It can perform high-speed animation and has 37 text fonts in various sizes. Your ADL presentation can accept input and



Drafix 3D Modeler adds new dimension to graphs.

execute branches.

ADL's introductory price is \$299. Contact Maddison-Crosse Associates Inc., 1543 W. Olympic Blvd., Penthouse, Los Angeles, CA 90015, 213-387-4044.

Circle 552 on Reader Service card.

### Word Processing

The Dac-Easy Word II word processor features a pull-down menu screen, a 32,000-record limited data base, a flexible mail-merge template, access to four documents via multiple windows, and a 90,000-word dictionary. Export and import commands let you export Dac-Easy Word II files to ASCII or import ASCII, paragraph-delimited ASCII, and Dac-Easy Word I text files.

The program supports more than 200 printers and includes a 12-lesson tutorial set. Dac-Easy Word II is available for \$49.95 from Dac Software Inc., 4801 Spring Valley Road, Building 110 B, Dallas, TX 75244, 214-458-0038.

Circle 558 on Reader Service card.

### Spreadsheet Compiler

With @Liberty (pronounced "At Liberty") you can create a spreadsheet application or template by using Lotus's 1-2-3 or a compatible program and then distribute executable run-time files for

as little as \$10 per user. End users can run the @Liberty-compiled spreadsheet without the original program. You can also export data to the original program.

For @Liberty's introductory price of \$99.95, you can distribute compiled spreadsheets and documentation to up to 10 end users. For an additional \$99.95, you can purchase a refill pack and license another 15 end users. You can send an unlimited number of spreadsheet applications to an end user. Contact Softlogic Solutions Inc., 1 Perimeter Road, Manchester, NH 03103, 800-272-9900; in New Hampshire, 603-627-9900.

Circle 553 on Reader Service card.

### New Language

Structured Programming Language, a block-structured free-format alternative to Pascal and C, is available as shareware from its developer, Dennis Baer.

SPL supports mathematics, string handling, random/sequential I/O, graphics, and structured programming features such as procedures and begin blocks. Baer is offering SPL translator software that implements the language by translating SPL programs into GW-Basic, Quick Basic, or BasicA. The translator is available from the developer

and from several BBSes, including one in New York (516-334-8221) under the file name SPLLIB.ARC. A 5¼-inch formatted disk and stamped self-addressed envelope must accompany all orders. Donations between \$50 and \$100 are requested. Contact Dennis Baer, 25 Miller Road, Farmingdale, NY 11735, 516-694-5872.

Circle 555 on Reader Service card.

### Graphics Card

The VGA Supreme graphics card gives you reduced display-memory access time, enhanced display quality, 256K of on-board RAM, and EGA/VGA and System/2 compatibility. It features the Interlink Business Network (Brea, CA) BIOS.

The VGA Supreme displays 16 colors with 640 by 480 resolution; resolution is 720 by 400 in alphanumeric mode. It provides monochrome dual scanning of 200-line modes. An auto-emulation feature adjusts display modes as the software requires. The VGA Supreme costs \$149 from IBS Research Inc., 2700 E. Imperial Highway, Building A, Brea, CA 92621, 714-579-0680.

Circle 560 on Reader Service card.

### Home Finance

MVP Software's Home Management II package is a financial planning and management system for the home user. Its five modules are Personal Budget Planning, a recursive budget-planning utility; Budget, a checkbook and income-tracking tool; Stock Broker, a securities-analysis program; Quik Loan, a loan-amortization program; and Typewriter, a basic word processor for such tasks as filling out forms and addressing envelopes.

Home Management II sells for \$59.95. MVP Software, 1035 Dallas SE, Grand Rapids, MI 49507, 616-245-8376. Circle 564 on Reader Service card.

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## NEW PRODUCTS



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### Your First Time

The Ready To Go! Kit is the first product in Learning Technologies Inc.'s Go! Environment package for first-time and infrequent users of personal computers. The kit's disk contains graphics-based functions with hands-on training. A manual is unnecessary. Learning Technologies claims that, within three minutes of setup, even a novice can write letters, make and file notes, do calculations, play games, and more.

The Ready To Go! Kit also includes over \$400 worth of supplies and premiums, as well as more than a dozen software samples. The kit costs \$49.95. Contact Learning Technologies Inc., 4255 LBJ Freeway, Suite 131, Dallas, TX 75244, 800-238-4277; in Texas, 214-385-2351.

Circle 554 on Reader Service card.

### Buttonware Utilities

Jim Button's Baker's Dozen contains 14 utility programs, including a disk utility, mini-spreadsheet, file searcher, sideways printer, file comparison, memory-resident calendar, and keyboard ASCII table. Other programs sort text files, remove directories, set screen colors and border, take pictures of the screen and save them to disk, swap LPT1 and LPT2, and swap COM1 and COM2. You can run the utilities from a menu or as stand-alone programs.

Baker's Dozen sells for

\$59.95. Contact Buttonware, Box 5786, Bellevue, WA 98006, 206-454-0479.

Circle 567 on Reader Service card.

### Try to Remember

Memory Lane is a hard-disk utility that finds and extracts information from any file created by any program. When you press a "hot" key from within your application, you activate Memory Lane. You can then search your hard disk for the information you want, view files, mark text you want to cut, and "paste" that text into your application file.

The program can handle 8,192 files and 33,500,000 bytes across four disks. Memory Lane is available for \$99 from Group L Corp., 481 Carlisle Drive, Herndon, VA 22070, 703-471-0030.

Circle 563 on Reader Service card.

### Communications Software

Smartcom III, a stand-alone communications program, features DOS-level commands, a communications programming language, on-line editing, and dual communication-session capability. The beginner can use a menu, while the experienced user has command-level operations and Simple Communications Programming Environment (Scope) options. Scope lets you automate repetitive and unattended tasks.

Smartcom III is available for \$249 from Hayes Micro-

## NEW PRODUCTS



Millionaire II challenges you to make a million.

computer Products Inc., P.O. Box 105203, Atlanta, GA 30348, 404-449-8791.

Circle 571 on Reader Service card.

### Making Millions

Britannica Software, publishers of Blue Chip Software, has released Millionaire II, a new version of the stock-market simulation Millionaire. In a period of 90 simulated weeks, you try to earn \$1,000,000 by studying the investment environment and trading stocks or options. You can also compete with another player. Millionaire II is available for \$59.95.

Also, Blue Chip Software has introduced The American Investor, a simulation that uses historical stock-market data to teach investment techniques. It sells for \$149.95. Contact Britannica Software, 185 Berry St., San Francisco, CA 94107, 415-546-1866.

Circle 557 on Reader Service card.

### Business Accounting

The Bos Business Accounting package provides double-entry accounting for small businesses. BBA is a menu-driven program designed for people with little or no training in computers or accounting. It integrates general-ledger, accounts-receivable, accounts-payable, sales-and-inventory, and payroll functions in one package.

Among BBA's features are automatic posting of entries; on-screen display of vendors, customers, or inventory items; support for project or

departmental accounting; an on-line tutorial; security code and second-level code; support of up to 32,000 customers, vendors, inventory items, and employees (in 16 departments); data placement in different subdirectories to keep multiple books; and up to seven automatically calculated payroll deductions. BBA retails for \$395. Contact Aristo Computers Inc., 16811 El Camino Real, Suite 213, Houston, TX 77058, 800-327-4786; in Texas, 713-480-6288.

Circle 561 on Reader Service card.

### Magic Menu Update

Magic Menu 2.5 is a menu creation and management system available in single-user, multiuser, generic-network, and Novell-specific versions. You build the menu system with a separate menu-driven editor. The menu-management task requires 17K of memory. Average display time for hard-disk systems is less than half a second between menu screens.

Magic Menu can manage an unlimited number of menu screens in single- or two-column format. You can prepare separate menu systems to support removable media. For data protection, you can attach passwords to any entry on a menu screen and to the exit to DOS.

Format choices for menus include black and white or color, screen color combinations, date/time display, menu character size, use of messages and prompts, and

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### Emulate a TRS-80 on your PC with PC-FOUR!

Now you can now run your favorite TRS-80 Model 4 programs on your PC with PC-Four. Not just BASIC but machine language programs as well! This is another Hypersoft FIRST! PC-Four is a new program that makes your PC or Compatible behave like a TRS-80 Model 4 complete with its operating system, Z80 microprocessor and 128K of memory so you can run many of your favorite Model 4 programs such as ALLWRITE, BASCOM, PFS FILE, PROFILE, SUPERSCRIPIT, VISICALC, Model 4 BASIC, and many more. Tested and recommended by Prosoft for running Allwrite on your PC.

PC-Four even works with assemblers such as MZAL and debugger/monitors such as TASMOM so you can write, assemble, debug and run Z80 machine code programs on your PC. To use it you must transfer your old files to MSDOS disks first. For this we recommend PCXZ or Hypercross—see below for details.

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### Move TRS-80 files to your PC with PC Cross-Zap

PC Cross-Zap (PCXZ) is a utility that runs on your PC or PC-compatible. With it you can copy files to or from TRS-80 disks at will. Suitable for all types of files, BASIC, ASCII and Binary. Converts BASIC and text files automatically as you copy. You can also format a disk, copy disks, explore, read and write sector data, repair bad directories and much more. Long after your TRS-80 is gone you will still be able to read your old disks. Formats Supported: Model I mixed density: DOS+ 3.4, DoubleDOS, LDOS (SOLE), MultiDOS, NEWDOS 80 V2, TRSDOS 2.7/8; Model I/III Double Density: DOS+ 3.5, LDOS 5.x. Model III: DOS+ 3.4, MultiDOS, NewDOS 80, TRSDOS 1.3; Model 4/4P: MultiDOS, DOS+ 4, TRSDOS 6, LSDOS 6.3; Max-80: LDOS 5.1. PCXZ supports single or double sided, 35, 40 and 80 track formats. Requires: PC, XT, AT or compatible, Tandy 1000 (1000EX needs DMA), 1200, 3000. You must have at least one 5 1/4" 360K, 720K or 1.2M drive and 256K memory. An original program from Hypersoft:

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### Also for your PC: XENOCOPY II and MatchPoint

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Matchpoint-PC is the hardware solution to reading and writing Apple and CP/M disks on your PC. A half-size card plugs in your PC and does the job software alone cannot. Reads Apple DOS, PRODOS, SOS, CP/M, and over 200 CP/M formats including hard sectored types like NorthStar. Requires installation.

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### TRS-80 Model I/III/4/4P Programs.

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Using HYPERCROSS 3 you can COPY files between TRS-80 disks and those from many CP/M and IBM-PC type computers on your own TRS-80 Model I, III, 4/4P or Max-80. If you have access to more than one kind of computer, or you are changing to a new machine then you need HYPERCROSS to transfer your text files, BASIC, FORTRAN, PASCAL or C programs, Visicalc files, general ledger and accounting files, data bases and even binary files. You can FORMAT alien disks, read their directories, copy files to and from them, even copy directly from one alien disk to another. Formats supported: IBM-PC and MS-DOS including DOS 1.1, 2.0-3.3 Tandy 2000, single and double sided, 3.5 and 5 inch. CP/M from Aardvark to Zorba, including all popular TRS80 CP/M formats such as Holmes, Montezuma, and Omikron. TRS-80 Color Computer format also supported. HyperCross converts Basic files! HyperCross will, as you copy, automatically convert your tokenized Basic file to MSDOS or CP/M, putting in spaces, changing PRINT @, correcting syntax errors and flagging parts needing manual modification. Tried and Tested in 1000s of installations world wide, by Industry, Universities, Government Institutions and nice TRS-80 owners everywhere. Prices include disk and 40 page manual. Upgrades from any version of HyperCross or SuperCross for old disk+\$5+price difference (\$15 min).

HyperCross 2.0 CoCo reads CoCo format (no Basic convert).

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Dbarcode uses Dbase III Plus to print Code 3 of 9, Code 2 of 5, and UPC version A.

automatic screen blanking or logoff. Magic Menu is \$99 for the single-user version, \$199 for the multiuser version (for persons who use DBLDOS, Multilink, and the like), and \$500 per file server for the network versions. Contact Deeresoft Inc., P.O. Box 1360, Melbourne, FL 32902, 305-768-2477.

Circle 569 on Reader Service card.

### Printing Bar Codes

Dbarcode uses Dbase III Plus to print Code 3 of 9, Code 2 of 5, and UPC version A. It can print bar codes with descriptions, or multiple columns of bar codes across a page. Dbarcode allows adjustment of bar and space widths, variable bar-code height, and vertical spacing.

You must have an IBM Graphics-compatible or Hewlett-Packard Laserjet printer to use Dbarcode. The program requires 8K of memory and retails for \$99. Contact Timekeeping Systems Inc., 12434 Cedar Road, Cleveland, OH 44106, 216-229-2575.

Circle 559 on Reader Service card.

### Screen Management

Hi-Screen XL is a programming tool for developing a user interface. It is compatible with Basic, Pascal, C, Cobol, Fortran, Dbase, assembly language, and other programming languages.

Programmers can use Hi-Screen XL to create and manage windows, menus, screens, and data entry.

The package includes a screen editor, a toolbox of utilities, and several font screens. A memory-resident module manages screen display, cursor movement, data checking, and menu management. Applications developed with Hi-Screen XL must include this module. Suggested retail price is \$149. Contact Softway Inc., 500 Sutter St., Suite 222, San Francisco, CA 94102, 415-397-4666.

Circle 562 on Reader Service card.

### Look Before You Print

EXP: The Scientific Word Processor lets you see technical symbols and formatting on the screen as it will appear in print. EXP is an assembly-language memory-resident program. Its features include a variety of fonts, automatic

positioning of mathematical expressions, keyboard macros, windows, proportional spacing, horizontal and vertical line drawing, a file-import utility, and automatic numbering of equations, exercises, and footnotes.

EXP prints on many 8-, 9-, and 24-pin dot-matrix printers. It sells for \$99.95. Contact Brooks/Cole Publishing Co., 511 Forest Lodge Road, Pacific Grove, CA 93950, 408-373-0728.

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### If Your Dog Won't, This Will

Fetch is a hard-disk memory-resident file librarian with pattern-recognition abilities. When you create a file, Fetch prompts you for a 255-character description; this extends the limits of the DOS file name so that you can summarize the file for retrieval.

To search for a file, activate Fetch to check the file-de-

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scription library. On an 8-megahertz (MHz) microcomputer, Fetch takes one minute to search 1,200 library entries. When it finds the correct file, Fetch displays the description, directory, and drive.

Fetch runs on the IBM PC/XT, AT, 80386, and other MS-DOS computers, including the Tandy 1000. It retails for \$54.95. Contact Thought Dynamics, 1142 Manhattan Ave., Suite CP-310, Manhattan Beach, CA 90266, 213-546-2958.

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Chuck Yeager's Advanced Flight Simulator is available for \$39.95 from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404, 415-571-7171.

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With GEM Desktop, Superbase Personal costs \$149.95; it is \$99.95 without GEM. Contact Progressive Peripherals & Software Inc., 464 Kalamath St., Denver, CO 80204, 303-825-4144.

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Xgraf allows importing screens from other packages.

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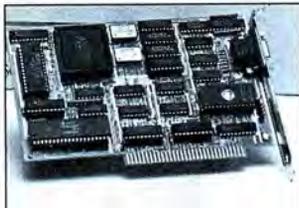
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The HT Short provides Hercules-compatible graphics.

Komputerwerk Inc., 851 Parkview Blvd., Pittsburgh, PA 15215, 412-782-0384.  
Circle 556 on Reader Service card.

### Monochrome Graphics

The HT Short, a high-resolution monochrome graphics adapter, provides Hercules-compatible monochrome graphics, 1,056 by 352 bit-mapped resolution, and 132-column spreadsheet display. It has no input/output (I/O) features.

The HT Short runs CGA software on monochrome monitors by converting colors to 16 shades of gray. You do not need preboot software or special drivers. The board includes driver support for applications such as Microsoft Windows, Lotus's 1-2-3, Symphony, Framework, and AutoCAD. It sells for \$224. Contact STB Systems Inc., 1651 N. Glenville, Suite 210, Richardson, TX 75081, 214-234-8750.

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## TRSDOS

### Vision Enhancement

The LVE (Low Vision Editor) package displays text, prompts, and input in a large graphics font. LVE supplies several sizes of print to compensate for varying degrees of vision impairment. The program features many display formats for reading text such as vertical paging, line rolling, horizontal or spiral scrolling, and word stepping. You can use manual stepping or adjustable-speed automation for all of these. You can store files up to 18K. Documentation, instructions, and help files are on disk for display by LVE. The product includes a printed cue card and

learning exercises.

The LVE23 package uses an enlarged, double-width font: 32 characters per line and 16 lines per screen. Its memory-resident Window module works with most other programs to magnify any screen that you select. LVE and LVE23 cost \$20 each; you can buy them as a combined package for \$25. Contact Donald W. Ady, 56 Oak Ridge Ave., Summit, NJ 07901, 201-277-3365.

Circle 572 on Reader Service card.

## Etc.



Lumitech ES-140T can erase chips in 10 minutes.

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The Lumitech ES-140T EPROM eraser uses custom-designed electronics, a high-intensity UV-C tube, and specular reflectors to assure maximum ultraviolet output. It achieves a typical peak UV intensity of 10,000 microwatts per square centimeter, thus erasing chips in as few as 10 minutes. The ES-140T has a capacity of up to nine chips.

You can preset a programmable timer from 10 to 35 minutes in 5-minute intervals. An alarm sounds at the end of the erasing cycle; the timer resets itself for the next cycle. It also features automatic shutoff. The ES-140T is available for \$99 from Lumitech, Division of TXI Corp., 23312 Madero Road, Suite F, Mission Viejo, CA 92691, 714-951-1600.

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### Software Newsletter

Software Technology Report, a quarterly newsletter, features information about current software design, implementation, testing topics, and product reviews. It ad-

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### Rating Educational Software

The editors of *Only the Best: The Discriminating Software*

*Guide for Preschool-Grade 12* used the conclusions of 30 evaluation services to determine which programs would earn mention in the guide. For each of the 146 highest rated programs, *Only the Best* lists appropriate grade levels, application tips, hardware requirements, conclusions of the evaluation services, information about the producers, magazine review citations, and availability of lab packs, network use, and site licenses.

Copies of *Only the Best* are \$21.95 prepaid and \$23.95 for billed orders. For more information, contact Education News Service, P.O. Box 1789, Carmichael, CA 95609, 916-483-6159.

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The package also has general-ledger, accounts-receivable, accounts-payable, inventory-control, purchase-order, and system-reports modules. Key Autoservice's single-user version sells for \$1,995; the multiuser version is \$2,695.

For more information, contact Softkey Software Products Inc., 630 Mello Lane, Santa Cruz, CA 95062, 408-462-5370.

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*New Products listings are based on information supplied in manufacturers' press releases. 80 Micro has not tested or reviewed these products and cannot guarantee any claims.*

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## REVIEWS

Continued from p. 43

## Adventures in the House of DOS

by Harry Bee

**An Introduction to MS/DOS, Talk-To-Me Tutorial** runs on an audio cassette player. Talking Computers Inc., 6931 North 27th Road, Arlington, VA 22213, 703-241-8224. \$69.

It's possible for some innocent, knowing no better, to reformat a hard disk full of data before the end of side one of this three-cassette tutorial. The instruction begins that carelessly. And since this introductory tour of MS-DOS targets novice users, such a disaster may even be likely.

Maybe I'm slow, but I have trouble following the logic of moving from turning the computer on, answering the date and time prompts, and clearing the screen, through a painstaking inspection of every last key on the keyboard, to a hurried hard-disk partitioning and a formatting, all in the first 23 minutes. No matter. None of this is serious. DOS is an adventure!

Tour guide Doug Wakefield plays his part in the adventure perfectly. He's as charming and disarming as Mr. Rogers. But he could have used a better script—or any script at all—and some rehearsal. The third time he said, "Well, uh, now it's time to really do something," his golly-whiz delivery was wearing thin. The fourth time he said "asterick" I was beside myself.

The character who held my interest was Wakefield's assistant and foil, a speech synthesizer called Mechanical Max. Max's job is to read all the DOS prompts, messages, keyboard input, and program output that appear on the screen—which gives him all the best lines. Max is a rock. Despite being told to hush every few minutes, being echoed repeatedly, and referred to in the third person as the one with the speech impediment, Max remains steadfast, loyal, and professional to the end.

Together Doug and Max lead you on a romp through the house that MS-DOS built. If their direction is haphazard and the pace uneven, it only adds to the homey image of two bumpkins lost in a huge mansion, not knowing where to look first.

Side two finishes the formatting begun on side one, and then Doug and Max try changing drives, copying and comparing files, and looking at directories. Near the end of it, Doug remembers to warn that such things as Format and Diskcopy can be hazardous to the data on your hard disk.

Advanced file handling begins on side

three with another format operation. Then it's off to make and change directories, and copy more files. The Prompt command makes a cameo appearance before you learn to Erase, Rename, and Type files.

When Doug and Max introduce Edlin on side four, you discover that the "I" command, for insert, is a "pneumonic," or maybe a "new monic." They show you how to write an Autoexec file using Prompt and two programs you probably don't have. I didn't. Doug talks about the Path command, but slyly avoids using it. Instead he writes another batch file that takes you, him, and Max into Wordperfect to see how the cursor moves up and down as well as right and left. I didn't have Wordperfect and couldn't join in.

---

**The tour guide  
... plays his  
part perfectly.  
He's as  
charming and  
disarming as  
Mr. Rogers.**

---

On side five, you type files a page at a time with More. You learn about shareware, print screens, and look at directories with Tree. Then it's off to "advanced" Basic to write a four-line gem, for the feel of it, and run a couple of programs that Doug apparently found bundled with his copy of DOS. They weren't included with mine, so I was again left out.

The final installment, side six, is a sprint through some 30 DOS commands. Since half of them were at least mentioned previously, it's part reprise, part peeking into dimly lit rooms. In the movie version, I picture Doug and Max, skittering down a corridor growing dark as night falls, throwing doors open in a frantic effort to find any escape from the House of DOS.

The information in An Introduction to MS/DOS is accurate, as far as it goes. Instruction on audio cassette is legitimate, as applications from Berlitz language courses to Joe Gerard's sales seminars prove, and the idea of an MS-DOS talk-through seems to me especially appropriate. Even the casting of Mechanical Max as the computer might have been a stroke of genius in another setting. But the lack of a well-thought-out lesson plan, the off-the-cuff, unscripted and unrehearsed presentation, make this effort, however sincere, too easy to laugh at. ■

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## The Golden Retriever

by G. Bruce Libengood

**Zyindex** runs on the Tandy 1000/1200/3000 (256K) and requires DOS 2.x and two floppy-disk drives, or one floppy drive with a hard disk or RAM disk. Zylab Corp., 233 E. Erie St., Chicago, IL 60611, 312-642-2201. \$145.

If you store numerous word-processing or data-base files on disk, you know it is easy to forget where you stored a particular chunk of information, and hard to find that information once you've lost track of it. Hence the need for a program like Zyindex, which maintains an index of disk files, searches the index for specified text, and retrieves the text for display or printout.

Zyindex is ideal for hard-disk users who handle large numbers of text documents and need a way to summon specific information quickly. Its search criteria are unusually versatile, allowing development of complex, custom search requests. Zyindex is less than ideal on floppy-disk-based systems, however, owing to trouble in handling large files.

Zylab has three versions of Zyindex: Standard, Professional, and Plus. This review covers only the Standard package.

### In the Beginning. . .

Zyindex's major program functions are divided into three modules: indexing, searching, and a general utility for listing and removing indexed file names. Each module is accessed through ready-to-run batch files. Program operations consist of installing index lists (which are automatically customized to handle files from one of more than 15 popular word processors), indexing selected text files, searching for text, displaying retrieved files, and the optional printing of entire or portions of retrieved text.

The installation procedure is required for each index list you create; you're limited to one index list per disk. The standard version permits only one resident hard-disk index, but you can create an unlimited number of floppy index-list disks if you have a dual-floppy system.

Zyindex cannot search text files unless you've indexed them. Text files to be indexed can't exceed 64,000 content words (about 200 typewritten pages).

You can choose menu or direct indexing methods. Menu indexing steps you through the procedure with screen menus; you select files to index from a screen at a time. With direct indexing you can specify the files you wish to index by wild card directly from the DOS prompt.

Zyindex's hard-disk operations are fluid and impressive. With menu index-

ing, you specify a subdirectory; then the program displays screens of unsorted file names to be indexed. Each screen displays a maximum of 64 file names for optional marking. A one-stroke, mark/unmark feature for all the displayed file names is optional.

The time required to index each screen varies depending on your computer and the number and size of the files selected. The impatient will fault Zyindex here: At 8 megahertz (MHz), my machine took 42 minutes to index 93 word-processing files, and that was at hard-disk speed. That's just over two minutes per file. On the other hand, adding a group of brief outlines, messages, or personal letters to the index list can take little time—fewer than 20 seconds in some cases for the entire assignment.

But Zyindex's slow file indexing makes its outstanding search attributes possible. Indexing is normally a one-session process required for original (and completed) text files; however, if you update a file after indexing, you must reindex it.

### Weaknesses with Floppies

A dual-floppy-drive setup processed indexes for multiple small files at an acceptable pace. But on individual files approaching 35,000 words, Zyindex performed sluggishly. It spent 13 minutes processing a 42,000-word catalog file and then choked, rendering my index list partially useless for searches.

It also balked at recognizing a freshly installed index list on a high-density (1.2 megabyte) floppy disk. Apparently, designers of Zyindex's standard version forgot about or intentionally restricted use of high-density disks. Fortunately, the standard version does permit searches with an unlimited number of 360K index-list disks.

The user's guide reports that "you may index approximately 400 files, averaging 700 words in length, on one Index List Diskette." This could be deceiving to the unwary. What should count is the program's ability to store total indexes from accumulated text, rather than any particular number of files. With floppies, Zyindex falls short here, as my tests indicated. So thumbs down for Zyindex on floppy-disk systems, unless you handle small text files only.

After files are indexed, Zyindex can go to work searching for and retrieving specific text strings. Zyindex's searches are impressively swift and remarkably effective. The program allows great flexibility in specifying search strings—it permits wild-card entries and the special connectors Or, And, Not, and Within/n (W/n).

The connectors let you design search inquiries to broaden or narrow search re-

quirements. A search request can contain up to 144 characters—a generous allowance.

Particularly useful is the W/n feature, which finds occurrences of two or more words or phrases in a text within a specified word range (1 to 30,000) of each other. Use of parentheses simultaneously with the special connectors, such as algebraic terms work, allows development of complex, extended search criteria. The user's guide clearly explains these powerful search enhancements.

### Display and Print Text

Once a search is complete, the screen shows the number of retrieved files containing the specified text. Press one key, and a list of those files appears; from this you can mark the name of a file you want to display. If the chosen file is resident on disk, its text is immediately displayed in the center of the screen. (Floppy-disk users are prompted with the name of the disk containing the specified file.)

On command, the program rapidly finds and displays subsequent high-lighted occurrences of the searched-for string. There is even a single-keystroke exit command that brings up the starting text of the next retrieved file. Marking blocks of retrieved text is also possible at this point; these tagged portions can be saved in files or sent to the printer for later perusal.

These excellent features, unfortunately, are marred by poor screen design. The display appears cluttered with trivia, reducing the viewing area and hampering readability.

### Summary

Zyindex is a superior information retriever for the serious specialist who creates and handles numerous documents, transcripts, or data bases on hard disk. Moreover, the program could be a very effective research tool, depending on the type of documents indexed. For example, I was surprised that the advertising hype didn't mention that programmers could index their ASM files to find those old forgotten subroutines buried in their source-code files. Zyindex worked admirably at this chore as well as with brief excursions through data-base files.

Zyindex is competent at indexing small text files on floppy disks, but I don't recommend it for moderate- to large-scale text files on floppies.

Zyindex's hard-disk power rests with its search-connecting features, which are impressively fast and versatile. In fact, with enough ingenuity in specifying search criteria, you should be able to retrieve virtually any section of text, no matter how dimly you remember its original form. ■

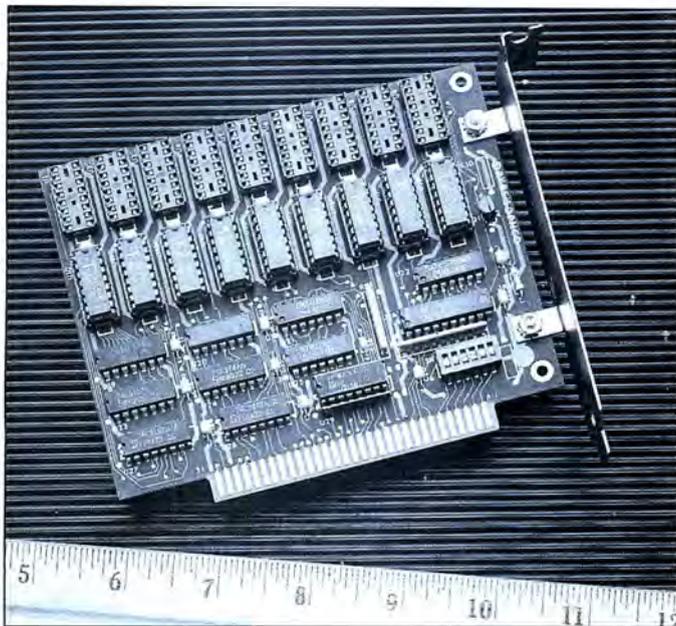
## Hicard

**Hicard** fits the Tandy 1000/1200/3000 and requires MS-DOS 2.x. RYBS Electronics Inc., 5721 Arapahoe Ave., Suite A, Boulder, CO 80803, 303-444-6073. \$179 with no memory; \$249 with 256K.

Until now, if you wanted to expand your computer's memory, you had three options: a multifunction board, an LIM EMS (Lotus/Intel/Microsoft Expanded Memory Specification) board, or an EEMS (Enhanced Expanded Memory Specification) board. Hicard is a memory-expansion product that does its job a little differently from the others. While you can use it to expand your memory to 640K, Hicard can also make use of address space above 640K. Depending on your system's configuration, you can have up to 704K for application programs and up to another 192K for RAM disks, spoolers, or memory-resident utilities. The older 1000s will need a DMA chip.

Hicard fits in a short slot; you can fill it with one or two rows of 256K memory chips (for 256K or 512K of total memory). It comes with a disk of software, including a collection of public-domain utilities for dealing with terminate-and-stay-resident (TSR) utilities.

The manual that came with the version I tested consisted of a few pages of



*Hicard fits in a short slot and can give you up to 704K.*

text stapled together and was not a model of clarity. I was told that a new manual was "ready to go to the printer," but I did not receive a promised draft in time for this review.

A menu-driven installation program makes it easy to install the necessary software. It selects one of two programs depending on whether you intend to use the memory above 704K for device drivers or TSR utilities. The package comes with two drivers: one for a RAM disk and one for a spooler.

If you plan to use the high memory for TSR programs, the installation program copies a different program and adds a

line to your Autoexec.BAT file. This program, which runs every time you boot up, spends an annoying 25 seconds testing and initializing memory.

You can substitute other device drivers for the one supplied, and it is possible to use the high memory for both a driver and TSR programs. The manual doesn't include instructions for this setup, but the developer will supply them on request.

What if you want a 256K RAM disk and you have only 128K of high memory? No problem. Hicard will combine the high memory with another 128K from system memory. You can also install TSRs both in high memory and in the usual spot in system memory.

Hicard did everything it was supposed to do, except for one minor problem. When I set it up in the device-driver mode, it refused to extend my system memory to the 704K level. This may be due to a quirk in MS-DOS 2.11. In any event, I solved the problem by running the program designed for TSRs.

The growing popularity of disk caches and RAM disks makes Hicard a worthwhile investment for Tandy owners.

The package puts usually unattainable memory space at your service, and does so at a price that gives you the pleasure of getting a bargain.

—David A. Williams

## The Slippery Resource

*Pascal Wizard* by Richard S. Wiener. John Wiley & Sons, 605 Third Ave., New York, NY 10158-0012. \$19.95.

*Pascal Wizard* honestly bills itself as a "reference guide . . . for experienced programmers" and that's where its strengths lie. It's not a book for novices. In fact, it could cause more problems than it solves for readers who are just getting started with Pascal.

The book's first section presents an overview of the Pascal language. However, its illustrations and advice are, in some cases, misleading and, in others, downright erroneous. It wouldn't do, for instance, to follow the instructions and type three apostrophes (''') to have one displayed in a string. It only takes two apostrophes to do that. The book also il-

lustrates defining a constant in terms of another constant, which might be legal in some Pascal dialects, but it's the exception rather than the rule.

Author Richard Wiener obviously is familiar with many forms of Pascal, and I imagine that some of his slips are due to his not taking sufficient care to distinguish between standard and extended features of the language. This sometimes leads the book to disagree with itself. For example, the overview on lexical structure says that an identifier can include the underscore character (a common, but by no means universal, extension), while later text and a syntax diagram in an appendix clearly state that only letters and digits are allowed under the standard definition.

In discussing Boolean literals, the book warns against trying to print out the current value of a Boolean variable. However, standard Pascal permits this; it's a handy debugging tool.

Readers already comfortable with the language should be able to sort things out, but these errors and inconsistencies make *Pascal Wizard* a slippery resource for the beginner.

There aren't many readable references that go beyond the basics of Pascal, so *Pascal Wizard* offers some good hints for handling pointer variables, conformant-array parameters, and procedural parameters that are worth having. It also provides helpful comparisons of three major Pascal implementations for micros: Turbo Pascal, UCSD Pascal, and Microsoft Pascal. There's an interesting outline of the differences between Pascal and Modula-2; the book also provides the full source code for a couple of case-study solutions.

If you know enough about Pascal to separate the wheat from the chaff, *Pascal Wizard* can be a handy reference. ■

—Thomas Krehbiel

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**Data-Log-96:** A menu driven data base for MSDOS computers. Easy file and format creation. Why pay more? A real bargain at \$19.95 pp. The Cepac Co., 27233 Kane Lane, Oak Ridge North, TX 77385-9028.

## More on Calendars

If you choose option 3 in Calmaker (see "Calendars to Go," September 1987, p. 73) and then attempt to make another calendar before you finish the first, the program bombs. Because the variable P is used in the Fill portion of the program, it loses the pitch value. To retain the pitch value for a second run, change lines 180 and 1250 as follows:

```
180 P$ + STR$(P) : US = CHR$(124)
```

```
1250 CLOSE:PRINT:P = VAL(P$) : GOTO 250
```

I originally wrote Calmaker for use with Scripsit. The program includes the option of printing an activity calendar in 15 characters per inch, which requires the word processor to format and print 164 characters wide.

However, Scripsit limits screen printer width to 132 characters, so you need to extend these limits. When the printer buffer is extended, it runs into the text buffer, so you must move the text buffer up higher in memory. You must also move the storage location just before the text buffer.

The patches for Model III Scripsit 3.2 (see Figures 1-4) accomplish this. Apply it only to a copy of Scripsit 3.2.

*Howard W. Mueller  
Pocahontas, MO*

```
PATCH SCRIPSIT/CMD (ADD=6611,FIND=85,CHG=B5)
PATCH SCRIPSIT/CMD (ADD=6740,FIND=85,CHG=B5)
PATCH SCRIPSIT/CMD (ADD=6942,FIND=85,CHG=B5)
```

*Figure 1. Patch to change screen-width limit from 132 to 180.*

```
PATCH SCRIPSIT/CMD (ADD=769D,FIND=84,CHG=B4)
PATCH SCRIPSIT/CMD (ADD=779D,FIND=84,CHG=B4)
```

*Figure 2. Patch to change print buffer width limit from 132 to 180.*

```
PATCH SCRIPSIT/CMD (ADD=5338,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=54DB,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=55F7,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=5A54,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=5A8C,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=5A8E,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=6417,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=6450,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=671F,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=69F4,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=6E65,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=745E,FIND=B8,CHG=E8)
PATCH SCRIPSIT/CMD (ADD=746C,FIND=B8,CHG=E8)
```

*Figure 3. Patch to move text buffer up in memory from 7DB8 to 7DE8 hex.*

```
PATCH SCRIPSIT/CMD (ADD=5361,FIND=E7,CHG=E7)
PATCH SCRIPSIT/CMD (ADD=5C9C,FIND=E7,CHG=E7)
```

*Figure 4. Patch to move 1-byte storage up in memory from 7DB7 to 7DE7 hex.*

## Even Easier Input

I amended two small problems with Roger A. Smith Jr.'s Formatter program in "Easy Input" (November 1984, p. 109), an excellent machine-language version of the familiar Basic routines. First, a test for the break key is missing. Second, the handling of the caps lock needs adjustment.

I added four lines to the program, modified two others to fix these problems, and tested them with TRSDOS 1.3.

Lines 2123, 2126, 3473, and 3476 in Figure 5 restore processing of the break key. It works with the Propack program I needed it for as well as in Basic the way you would expect. You get the usual "Break in. . ." message, and the pointers are set so you can execute a CONT if you want to continue. The CMD "B", "ON" and CMD "B", "OFF" commands in TRSDOS 1.3 also turn the break key on and off.

Line 3470 calls the ROM keyboard scan routine, which tests for special keys. Pressing the break key loads the Accumulator with a 1. Line 3473 tests for this 1. A series of returns gives control back to the main lines after the Call in line 2120 that started the scan. Line

Circle 85 on Reader Service card.

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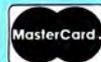
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2123 again tests the Accumulator for the break key. If it has been pressed, line 2126 jumps out of Formatter to the ROM break key processing routine at 1DBE hexadecimal (hex).

Using Formatter I found that if I press the break key when I have caps lock on in one of my programs, shift-zero (0) won't unlock caps.

In the original program, Roger used bit zero in 4019 hex for mixed upper- and lowercase, and bit 5 for uppercase lock (which works because bit 5 is a non-zero value). It turns out that shift-zero only toggles bit zero at 4019 hex. Bit 5 never gets cleared, so you end up locked in uppercase.

I simply switched the definitions of bit

zero and bit 5 (see Figure 6). Change the 32 in line 3450 to 1 to make bit zero caps lock, and change the 1 in line 3630 to 32 to make bit 5 numerals only. Use a weight of 1 for caps lock and a weight of 32 for numerals only when you calculate the flag byte.

Because Formatter resets the caps lock on every scan, shift-zero still appears not to work. But it works after you leave Formatter, either in Basic or other programs.

*Michael L. Scofield  
Denver, CO*

### Nasty Bug

I found a nasty bug in my DISASM program ("A Disassembler for all DOSes,"

August 1987, p. 86). This is only a problem on LDOS 5.3.

To fix it, in line 120 of the Datapoke listing on page 89, change the 1E value after 31 to FE, and change the -853 at the end of the line to -1077. Also, change the 1E in line 230 (sixth data element) to FE, and change the -725 at the end of the line to -949.

Or you can patch DISASM/CMD with the following patches.

For LDOS 5.3:

```
PATCH DISASM/CMD (D00,1F = FE)
PATCH DISASM/CMD (D00,C8 = FE)
```

For TRSDOS 1.3:

```
PATCH DISASM/CMD (ADD = 5669,FIND =
1E,CHG = FE)
PATCH DISASM/CMD (ADD = 5712,FIND =
1E,CHG = FE)
```

For TRSDOS/LS-DOS 6:

```
PATCH DISASM/CMD (D00,1F = FE;
F00,1F = 1E)
PATCH DISASM/CMD (D00,C8 = FE;
F00,C8 = 1E)
```

DISASM should now run fine.

*David Goben  
Mansfield Center, CT*

```
02123    CP      1      ;BREAK?
02126    JP      2,1DBEH ;If yes then jump to ROM BREAK
03473    CP      1      ;BREAK?
03476    RET     2      ;If yes then return
```

Figure 5. Insertions for Formatter to process the break key.

```
03450    AND     32      ;BIT 5 - OLD LINE
03450    AND     1       ;BIT 0 - NEW LINE
03630    AND     1       ;BIT 0 - OLD LINE
03630    AND     32      ;BIT 5 - NEW LINE
```

Figure 6. Changes to unlock the caps in Formatter.

Circle 232 on Reader Service card.

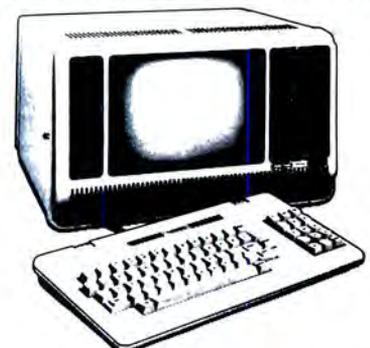
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Continued from p. 114

Gosubs and the like that make it difficult to follow and debug. Instead of Basic, how about some Fortran?

Recently you provided some good assembly listings, but when I typed up the listing for a quick reboot (see "Quick Boot," by Dave Rowell, May 1987, p. 46), compiled it, and linked it, there was a computer hangup. I tried the Basic version as a test. No hangup, no action. I have problems with every program I try from your magazine.

Richard Crimi  
Chula Vista, CA

As the author of "Quick Boot," I am dismayed to hear that you didn't get my program running. If you could provide me with more details (such as DOS version, memory-resident programs, and device drivers in Config.SYS), perhaps I could get the program to work for you.

Even better would be a copy of the programs that you typed on floppy disk. I could check your version against mine and return you a version that works on your machine.

By the way, I have been lobbying for coverage of other languages besides Basic.

—Dave Rowell

## We Will Survive

I was disappointed that in your tenth anniversary special (see "Where Are They Now?" August 1987, p. 52) you ignored pioneers Chuck Tesler, David Welsh, Dennis Brent, and myself, whose dedication and service have enabled our software products to flourish and survive through the years.

I also remind you that the first spelling checker for a microcomputer, Microproof, was published in 1980 by Cornucopia Software. An advertisement for it ran in the premier TRS-80 magazine, *80 Microcomputing*, as it was then called. It boasted a 50,000-word dictionary and 56K, and it was eventually succeeded by Electric Webster.

Ten years from now, when you publish your next anniversary issue, please remember to include the pioneers who survived.

Philip Manfield  
President, Cornucopia Software Inc.  
Albany, CA

## Long May You Run

I work for a Fortune 500 company, and I use my Models III and 4P every day. I am still happy with their reliable service. They are *not* Edsels, as Mark Zimmerman suggests (see "Of Edsels and Ferraris," July 1987, p. 116). I think they are DC-3s. They might fly forever.

My company still uses over 200

80 Micro's BBS is open 24 hours a day. It offers programs you can download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

TRSDOS computers at this location, and they will run until they can't be repaired anymore. Large data bases are the only things I run on my IBM PC. Perhaps this is why I can't get interested in your MS-DOS coverage.

I am most thankful for Hardin Brothers' column and the makers of Hypercross, which lets my PC run on Model 4 software. I often buy products for my Models III and 4 from the advertisements in *80 Micro*.

Please continue covering the TRSDOS machines. Many of us still depend on you.

Douglas Kelley  
St. Louis, MO

## We Can Be Heroes

How about making *80 Micro* a hero by publishing a program to extend the TRSDOS calendar to the year 2000? I would gladly buy the disk.

Ben DeRoy  
Philadelphia, PA

Readers can download Mike Zarowitz's patch that extends TRSDOS 6.2's calendar to 1997 from the *80 Micro* BBS (603-924-6985). It is under the file name *Datefix.DOC*.—Eds.

## The Troubles of a 2000 Owner

I have been an *80 Micro* reader since 1979. Your Side Tracks column is quite good, but I feel you don't delve into the problems of the Tandy Model 2000 owner enough. I joined a new user group called the Orphans (see "Tandy 2000 Orphans," *Input*, August 1987, p. 116). It has much to say about the troubles experienced by 2000 owners, specifically the lack of support from Tandy.

The 2000, though not perfect, is a fine machine. In many ways it is superior to the "standard" and deserves enough support to allow the current users (who happen to be Tandy customers) to get at least a few more years of work before we are totally abandoned. The least Tandy could do is allow a third party to manage 2000 support.

Barry Mason  
Los Angeles, CA

## Mirror Image

I have some words of caution about two Radio Shack manuals for the Model

III. Presently, the service manual for the III with catalog no. 26-1061/1062/1063 sells for \$24.95. A few years ago, I bought *The Technical Reference Manual* (catalog no. 26-2109) for \$9.95, but it is no longer available.

With the exception of three pages of test and troubleshooting information in the Power Supply section, the entire contents of the original service manual were copied word for word and diagram for diagram for the new version, with only a few omissions. The parts that were copied contain little information about repair, troubleshooting, or testing. There are four pages of maintenance, alignment, and adjustment instructions for the disk drives, however.

I spoke to a Computer Center employee who hadn't seen reference to the fact that one was only a slightly revised version of the other. The employee thought they were two completely different books.

Robert B. Koehler  
Hopewell Junction, NY

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## Good Friend

Thank you for your special, nostalgic look at the history of Tandy computing. However, I take friendly issue with comments made by Eric Maloney in his Side Tracks column (see "Ode to the Model I," August 1987, p. 8) that the history of the TRS-80 is of no relevance to new MS-DOS owners. Not true!

In 1979 I plunked down my life savings for a Model I that had a whopping 16K RAM. At the time I was in the 10th grade. After upgrading to level II Basic and fighting the pesky cassette player, I sold my old friend to buy a Model III with 64K RAM. A year after adding disk drives, I sold the III to buy a snow-white Model 4 in 1983. I entered college to earn an Engineering Computer Science degree and christened the MS-DOS era in 1985 with a Tandy 1000 that included two drives and a high-resolution color monitor.

That same 1000 now includes a 20-megabyte hard drive with 640K and other goodies, and I used it to write this letter. Tandy influenced not only a thoroughly enjoyable hobby, but a career choice as well; I am now a systems analyst. Thanks, Tandy. What a great friend you've been.

David Whitney  
Oklahoma City, OK

(P.S. You left out *Softside* magazine from your list of defunct publications.)

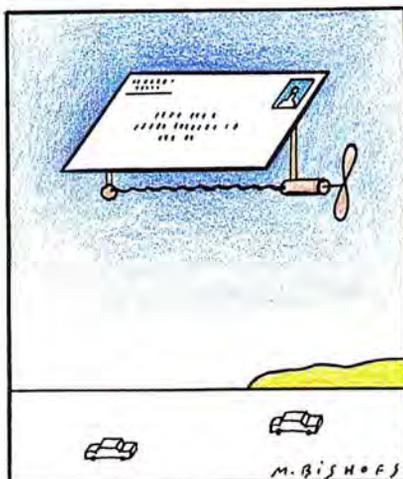
*Leaving off Softside is quite an embarrassment when you consider that it was published a few miles down the road from us. Sorry.*

—Eds.

## Abandoned Ships

I have been a Tandy supporter for several years, and I feel the same sense of abandonment by Tandy as Michael Joerms expressed in his letter (see "Give the People What They Want," Input, August 1987, p. 115).

I started with a Model 4 and loved it. I wanted more speed, so I updated to the Tandy 1000 and then to the 1000A HD. Although the 1000 is a good machine, moving it is difficult. To this day I can't understand why Tandy didn't make the 1000 in the same cabinet as the Model 4



or 4P. I would like to find a machine built like the Model 4 that is also MS-DOS. I would sell my 1000 HD in a second.

Robert George  
Flower Mound, TX

## Like a Rock

I have been an *80 Micro* reader for the past 18 months. I consider it a versatile publication—one I would not consider giving up.

I switched to Tandy after owning an Osborne I for four years. If Model I-4 owners think they have problems, "they ain't seen nothin'." The only reason I stayed with Osborne was the user group.

What about Tandy? When my memory board went on sale for much less than I paid, Tandy returned \$104 to me. Name another company that does that. When I had trouble with my third-party memory chips, Tandy tested my board and gave me a new one within hours. If the local Tandy people don't know an answer to a question, they know the number to call. There is more, but you get the idea.

Consider the alternatives. Epson's local store closed less than a year after it opened. Compaq? IBM? The local branch of a regional chain only talks full price. The branch store closed recently. Kaypro? Zenith? Sometimes a local store with good prices carries them—sometimes not. I wanted an Amiga, but the local dealer didn't know about repairs. Software for the Amiga is expensive and scarce. My experience with Osborne and driving more than 100

miles for Xerox service showed me that a service contract doesn't mean much if they can't fix the machine.

Tandy provides me with solid hardware from a stable company at reasonable cost. I suggest to all the TRSDOS users who dislike MS-DOS articles in *80 Micro* that these articles can ease the transition to a new machine.

Maybe they can do better than Tandy. I know this—they can do a lot worse!

Charles E. Hansen  
Midland, MI

## Mixed Review

John McCormick's review of the Trackstar 128K Apple-emulation board (see "The Apple Polisher," June 1987, p. 109) was generally good. However, I would like to point out some minor problems.

The only Diamond Computer Systems' product that Radio Shack currently offers is the Trackstar 128K board. The Trackstar 128K board replaced the original Trackstar board with additional memory and features.

The Trackstar 128K emulation board (catalog no. 25-1028) is available from any Radio Shack store or dealer in the United States. The product might be stocked in Radio Shack Computer Centers. It is not an Express Order product.

The current retail price of the Trackstar 128K board is \$399.95. A 20 percent discount is available for all schools.

Radio Shack supports the Trackstar and the Trackstar 128K emulation boards in the original Tandy 1000 and Tandy 1000 SX only. We don't support or recommend its use in the Tandy 1000 EX or 3000.

Fran McGehee  
Marketing Information Representative  
Radio Shack  
Fort Worth, TX

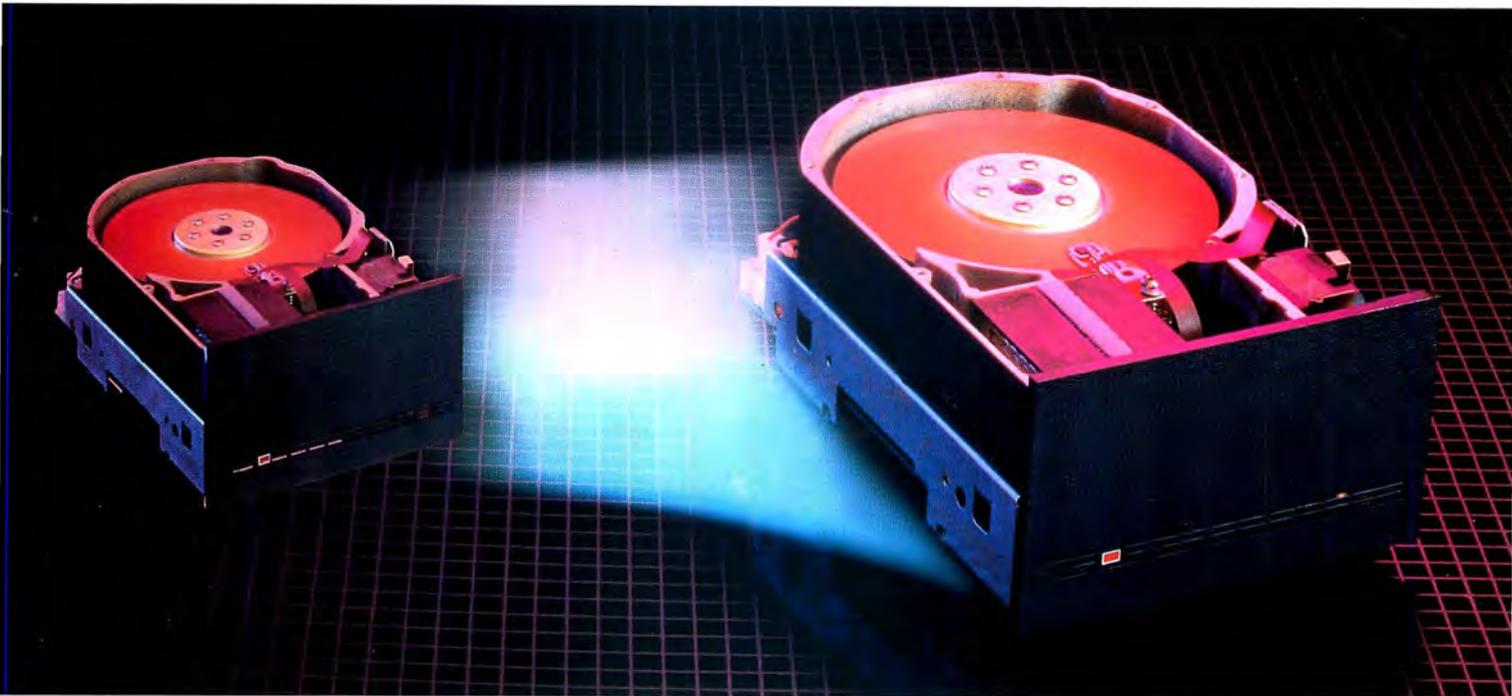
## A Vote for Fortran

I want to commend you for some excellent technical information, but I find the program listings in your magazine to be aggravating at best.

It seems that most of your writers think everyone programs in Basic. I refuse to learn the language because it allows for sloppiness. Basic is full of

Continued on p. 113

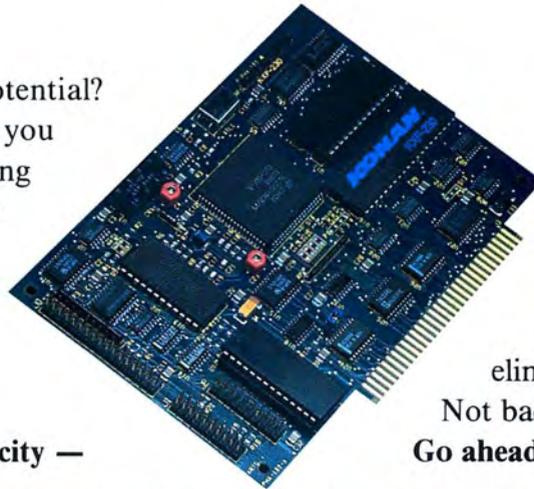
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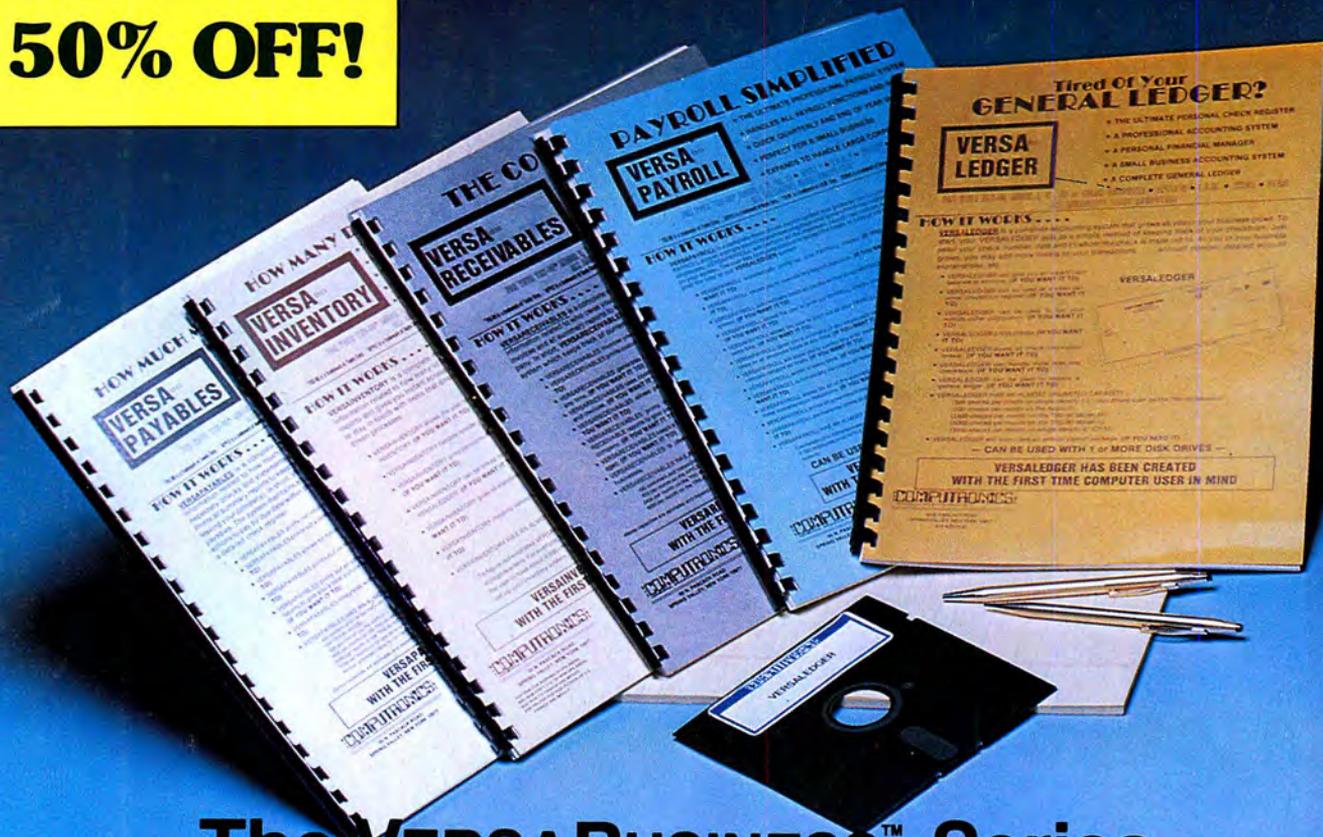
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