

80 micro

the magazine for TRS-80* users

NOVEMBER 1985
USA \$4.00
CANADA \$4.50
A CWC/I PUBLICATION

REVIEWED IN THIS ISSUE:

PRO-NT0

Profile 4 Plus

DSM4

The Multi-Basic Compiler

WHAT'S THE GOOD WORD?

80 Micro Compares:

- ▶ Allwrite
- ▶ Lazywriter
- ▶ LeScript
- ▶ MScript
- ▶ Scripsit
- ▶ PowerScript
- ▶ Typitall
- ▶ SuperScripsit

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- **CHARSET:** Display All Video Characters
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- **TERM:** A Really Small Terminal Program
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- ✓ 99 Page User Manual is Provided

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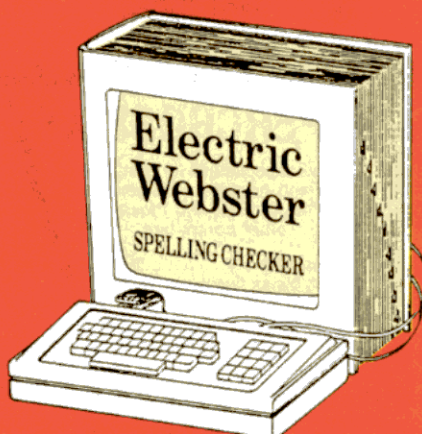
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GREAT PROGRAMS, AND FREE SHIPPING TOO!

This month's spotlight is on Misosys' PRONTO, a window applications manager program with some very useful applications built right in. Also continuing is our Word Processing special deal, two great programs at a great price. Or, for you Model 4/4P owners, we have a great deal with our complete integrated package, T/MAKER, now also available for the Tandy 1000. Plus, of course, our regular assortment of top quality stuff. Coming next month: How to hunt for computer programs. . . just follow the disk tracks.

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80 formats its program listings to run 64-characters wide, the way they look on your video screen. This accounts for the occasional wrap-around you will notice in our program listings. Don't let it throw you, particularly when entering assembly listings.

Article submissions from our readers are welcomed and encouraged. Inquires should be addressed to: Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of "How to Write for 80 Micro." Payment for accepted articles is made at a rate of approximately \$50 per printed page; all rights are purchased.

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LOAD 80

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

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the instructions provided. If you own a Model I or III disk system, you boot the Load 80 disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a

Model 4, copy the Model 4 programs from the Load 80 disk to your TRSDOS 6.X disk using the COPY command.

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

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly subscriptions to Load 80 are \$199.97 for disk, or \$99.97 for cassette. Individual loaders are available on disk for \$21.47 or on cassette for \$11.47, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to Load 80, 80 Pine St., Peterborough, NH 03458.

Directory

Merger

Article: Merge Right (p. 54).
System: Models I and III, 32K RAM, Apparat editor/assembler.

Merge non-ASCII files.

Languages: Disk Basic, Assembly.

Cassette filespecs: MERGER (source code), MERGER (object code), B.

Disk filespecs: MERGER/SRC, MERGER/CMD, MERGER/BAS.

Disquick

Article: Fast Figures (p. 60).
System: Models I and III, 48K RAM.

Faster reads and writes with binary I/O.

Language: Disk Basic.

Cassette filespec: C.

Disk filespec: DISQUICK/BAS.

Unprotect

Article: Password Bypass (p. 72).
System: Models I, III, and 4; 32K RAM; EDAS editor/assembler.

Get access to protected files.

Language: Assembly.

Cassette filespecs: UNPROT (source code), UNPROT (object code).

Disk filespecs: UNPROT/SRC, UNPROT/CMD.

Loan

Article: Savings and Loan (p. 83).
System: Models I, III, and 4; 32K RAM.

Calculate interest by the Rule of 78s.

Language: Disk Basic.

Cassette filespec: D.

Disk filespec: LOAN/BAS.

String Convert

Article: The Next Step (p. 102).
System: Model 4, 64K RAM, EDAS editor/assembler.

Strip trailing blanks, encode and decode strings.

Language: Assembly.

Cassette filespecs: ROUTIN (object code), E, F.

Disk filespecs: LIST1/SRC, LIST2/SRC, ROUTINES/LIB, LIST3/BAS, LIST4/BAS.

Budget

Article: Spreadsheet Beat (p. 108).

System: Model 4, 64K RAM, Multiplan.

Maintain a monthly personal budget.

Disk filespec: BUDGETER/MP.

Speed

System: Model 4/4P, 64K RAM, TRSDOS 1.3.

4MHz operation in Model III mode.

Language: Assembly.

Cassette filespec: SPEEDD.

Disk filespecs: SPEEDDOS/CMD, SPEED4P/BLD.

Rembrandt

New version of REMBRAN4/BAS; replaces the program on the September 1985 Load 80.

/BAS = Basic /SRC = source code /CMD = object code

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Fiscal Fitness: Tandy Falls Behind

The only poll that counts, politicians are fond of saying, is the one on voting day. You might make a similar statement about a business: The only numbers that count are the ones on the bottom line of the year-end budget sheet.

Few entrants in the microcomputer sweepstakes live this philosophy as faithfully as Tandy Corp. Despite a rapidly decreasing market share and near-invisibility in the computer press, Tandy has doggedly adhered to the doctrine that profit is the only thing that matters.

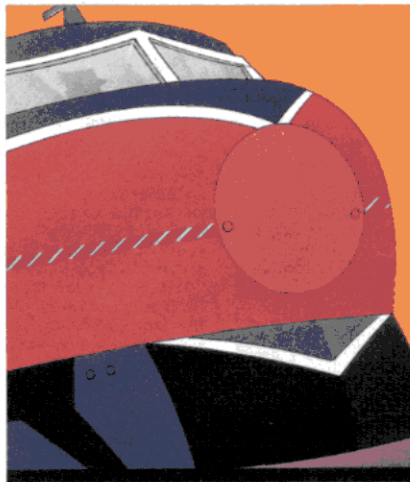
I find nothing inherently wrong with this approach, if it works. And through fiscal 1984, it apparently had. From 1978, when Tandy introduced the Model I, to 1984, net income rose from \$66.1 million to \$281.8 million, a whopping 316 percent increase.

But Tandy's earnings report for fiscal 1985 tells a different story. The company took a good, swift kick in the profit center, netting 33 percent less than it did in fiscal 1984. Its revenue was up 2.5 percent, but its expenses rose by 11 percent, resulting in \$92.8 million less in the till.

It's too early to say exactly why Tandy had such a disappointing year—the annual report will give us the best information—but you can bet dollars to donuts that a depressed microcomputer market, along with Tandy's decreasing share of that pie, have played a major role. By selling fewer computers at lower prices, Tandy simply hasn't been able to keep up with its rising expenses.

The rather depressing financial picture Tandy has sketched out serves to underline the point made by several studies that have crossed my desk recently—that Tandy's computers have all but faded from the consumer's mind as serious options.

The first, from Future Computing, says that while 10 percent of current home users own Tandy machines, only 3 percent of prospective buyers are considering one. Tandy ranks fourth behind Apple (32 percent), IBM (26 percent), and Commodore (19 percent), and is a single percentage point ahead of Atari. Tandy's 3 percent might even be optimistic: Future conducted the survey before the new Atari and Amiga computers hit the stores.



The second, from Dun & Bradstreet, cites similar figures for business users: 3.1 percent of businesses currently using PCs are planning to buy a Tandy computer, while 6 percent of businesses without PCs are looking at Tandy as a viable option. In the first category, Tandy finishes behind IBM (72.4 percent), Apple (8.1 percent), NEC (7 percent), Compaq (5.9 percent), and AT&T (3.9 percent). In the second category Tandy fares somewhat better, trailing only IBM (90 percent) and Apple (27 percent).

From a financial point of view, Tandy's loss of market share was probably inevitable and possibly desirable. If Tandy tried to hold on to the position it enjoyed in the late 1970s and early 1980s, it might have done itself more harm than good. The company makes its living by selling more value for the dollar; the resources it would have had to invest to compete with IBM would have either siphoned off whatever revenues additional sales mustered or forced Tandy to maintain higher prices.

Furthermore, computers aren't like hamburgers—you don't have to sell a billion of them to net a healthy profit, especially if you can control your costs. Tandy's massive chain of ubiquitous Radio Shack stores undeniably helps them hold the line on expenses.

However, Tandy might have made a disastrous miscalculation of just how much market share it could afford to lose. Tandy executives scoff at studies such as the ones cited above, but the overall trends are clear: The company

has all but ceased to be a viable alternative to the majority of potential buyers in both the home and business markets.

The possible scenario is not pretty: If Tandy's position erodes much more, the company will find itself selling computers exclusively to current Tandy owners, a group on whom attrition is slowly taking its toll.

For several years now, we've heard Tandy executives proclaim that the company is about to launch a serious marketing campaign to promote its computers and try to regain some lost ground. The evidence, however, is that Tandy ultimately is either unwilling or unable to do so. Perhaps the company's disappointing performance in fiscal 1985 will stimulate the company to re-evaluate its marketing strategies before entropy once and forever sets in.

Don't Ask Tandy

Ask Tandy didn't appear in last month's issue, nor does it appear this month. Unfortunately, Tandy has withdrawn all of its editorial support from ComputerWorld Communications publications, due to comments concerning Tandy that John Dvorak made in his Inside Track column in the June 10, 1985, issue of *InfoWorld*. (Dvorak reported possible price cuts on the 1200. Tandy officials denied the rumor and claimed that Dvorak was trying to hurt the company by publishing false information.)


We regret the inconvenience this has caused readers who have submitted questions to the column. In January, we'll publish the letters we've accumulated as a special edition of Reader Forum, along with as many answers as we can supply.

Readers should send all future questions concerning Tandy and Tandy computing to Reader Forum.

Quotable Quote

"The Tandy/Radio Shack headline says 'clearly superior,' but there is nothing clearly superior about it. It's Bill Bixby sitting at a terminal—if you know him—or just some guy if you don't. This ad can come from any company for any product. The ad is not tragic, but it's boring." —Mike Greenly, Mike Greenly Marketing, quoted in *Hi-Tech Marketing* ■

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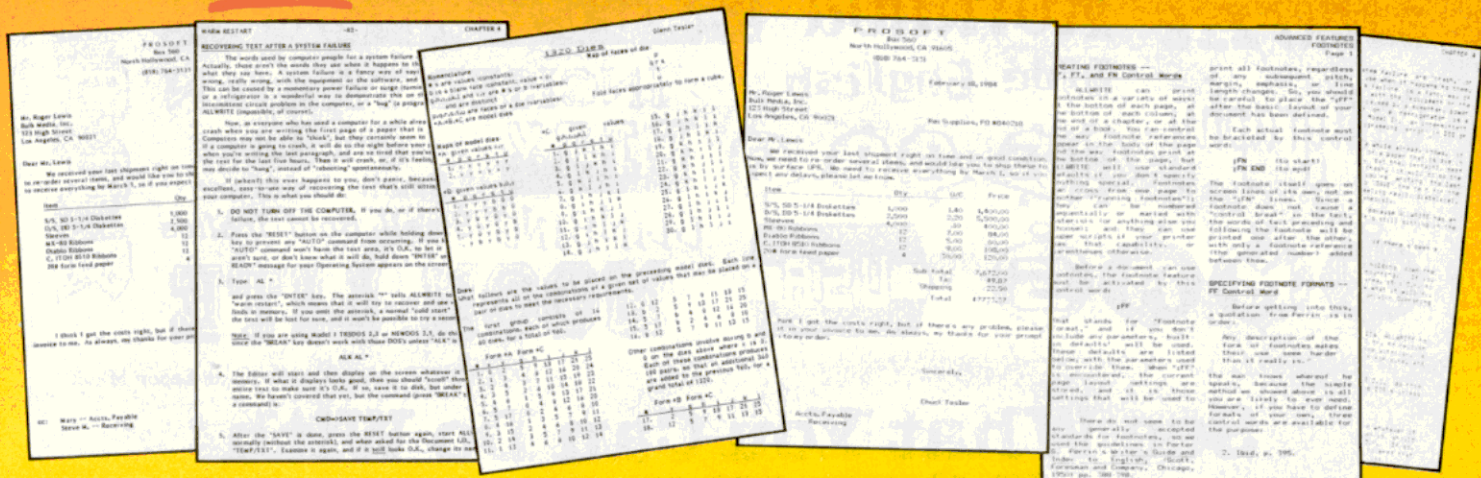
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ALLWRITE shows you where you forgot to turn off underlining, boldface, italics, or double-width. Special on-screen Preview feature shows page breaks and page layouts... including underlining and boldface. In "Summary" mode, ALLWRITE quickly flags formatting errors

without wasting time printing all the text. These standard features make document preparation faster and easier than ever!

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There is no upper-limit on document size with ALLWRITE, because it chains files *backwards* as well as forwards, even across diskettes. Switch from one chained file to another in less than six seconds by pressing two keys. Select portions of other files for inclusion at print time... great for stock paragraphs.

ALLWRITE salvages text from bad disks! If a sector goes bad, you won't lose the entire file, because it

TAKES FULL ADVANTAGE OF YOUR MODEL 4.

The model 4 version of ALLWRITE uses **the entire 80-by-24 screen**. On a 64K machine, you can edit **over 34,000 characters** of text. On a 128K machine, you can edit **THREE FILES AT THE SAME TIME!** The second and third files can be over 32,600 characters each, for a total of **almost 100,000 characters** of text in memory.

will skip bad sectors, read the rest of the file, and then show you where the lost text belongs. This advanced error recovery turns a disaster into a feeling of profound relief.

User-Definable Soft Keys Reduce Typing Time

You can store 22 phrases or commands at a time into "soft-keys," then press just two keys to retrieve them. This makes frequently-used phrases and formatting controls a snap to use. You can store these definitions on disk and build a library of hundreds of pre-programmed keys to fit every one of your applications.

Our specially-designed templates fit right on your keyboard to let you see your settings at all times. Each template is also a Reference ("Cue") Card, so it is always right in front of you when you need it, without using up valuable screen space.

ALLWRITE Is Easy To Learn

ALLWRITE's commands and control keys are easy to remember because they use the first letters of common English words: 'CE' stands for 'Center,' 'Search' and 'Replace' do just that, and so forth. The on-line HELP menu offers over fifty screens of topics.

ALLWRITE's superb documentation will get you started quickly. Portions of it are designed for beginners, with every feature clearly explained in step-by-step tutorial style. Since you won't always be a beginner, other parts of the book offer advanced topics. There is a cross-reference summary chapter, a 14-page comprehensive index, and a detailed Table of Contents. We've been developing computer programs and manuals for over 23 years, and understand the importance of good documentation.

ALLWRITE works with all major DOS's on Models 1, 3, and 4/4P.

PROSOFT'S On-Going Customer Support

Perhaps the best reason of all for having ALLWRITE is the continuing support we offer you: friendly, expert, direct support that is unsurpassed in the micro-computer industry.

Note to students: with its Footnote, Table of Contents and Index features, ALLWRITE is ideal for your reports and Term papers.

Note to teachers: ALLWRITE makes it very easy to generate multiple-choice exams and answer keys. Ask for free instructions when ordering.

"ALLWRITE is a professional system that sets a new standard in word processing. It's powerful and easy to learn and use."
80 MICRO, Nov., 1984

Customer Comments

"This is the best software package I have ever received . . . superb, easy to use, fast, and has more features than the business word-processor at the office." (E.R.L.)

"Your company and products have to be one of the strongest factors I can think of for keeping me with the TRS-80!" (J.R.H.)

"NEWSSCRIPT is the Cadillac of word processors. ALLWRITE is the Mercedes Benz!!" (B.E.)

"... a very readable manual." (D.S.)

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MS-DOS Disillusion

Two of my friends and I have a large library of TRS-80 programs and we've been investigating the desirability and necessity of converting these programs to MS-DOS Basic. We've used Super-cross as a conversion utility. The final product is the best one can do with a conversion program and normally won't run under MS-DOS Basic.

New MS-DOS Basic users will be totally frustrated by the operating system and virtually all the features we've had for years under NEWDOS/80—and recently under TRSDOS 6.2—are either missing from MS-DOS or are so complex to invoke that they're useless.

Now comes the debugging of the converted MS-DOS Basic to get it to run on the new 1985 machine. It's so bad that we recommend you do all your editing on the original NEWDOS/80 (or TRSDOS or LDOS or . . .) program before converting it to MS-DOS.

Add to this MS-DOS's inability to handle a 64-character by 16-line screen and a terrible character font, even on the Tandy 1000, and the system looks very disappointing.

We recommend that you not buy an MS-DOS-compatible machine if your main interest is in developing programs. Nor should you expect to get satisfactory performance from a converted TRS-80 program without a lot of hard work in an unfriendly environment. We don't believe MS-DOS Basic is a useful language, and we think that MS-DOS as an operating system is worse than the earliest TRSDOS systems.

*Mike Barlow and friends
Pierrefonds
Quebec, Canada*

View From the U.K.

The ACT/Tandy deal doesn't seem as lopsided in the U.K. as you suggest (Pulse Train, June 1985, p. 21). Tandy's computers have been too expensive for the hobbyist market and the business users were unlikely to go into Tandy's High Street shops.

ACT, on the other hand, never got involved in the hobby market, but has established a good name in the business world. They also have an outside chance in the educational market, which is



beginning to look seriously at MS-DOS machines.

You shouldn't consider the merger in terms of a shop count, but look at what each has to offer at this moment. ACT can provide a good name and a satisfied customer base, and Tandy has the international standing and resources.

*D. Traylen
Hornchurch
Essex, England*

On the Bias

I was profoundly disappointed and angry at the way you handled Betty Burnett's Pronoun Protest in your June issue (p. 12). What you are saying is that you simply don't care to correct an offensive Victorian practice that doesn't bother anyone except some women. It seems to be too much trouble for you to expend any energy at all on removing bias from the language.

I found the last sentence in your answer to Burnett's letter to be patronizing and offensive. You say, "Fortunately, people generally understand that this is a term of convenience rather than a purposeful bias." When your attention is

80 Micro's BBS is open 24 hours a day. It offers programs you can up- and download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1200 baud, 8-bit words, 1 stop bit, no parity.

called to an outdated and outmoded bias and it is too much trouble to attempt to change it, people begin to understand that it is also your purposeful bias.

*Sandy Tate
Pasadena, CA*

Kudos

Thanks to 80 Micro and other publications, a wealth of information is available concerning TRS-80 computers and their workings. Things that "couldn't be done" were done; TRS-80 users have had software available at a reasonable cost and, perhaps best of all, the TRS-80 crowd has been able to learn microcomputers from the bottom up.

Some people seem to be critical of Tandy and their marketing strategies, but we must remember that the microcomputer revolution is new to everyone. I would like to ask some of the critics if they have ever approached anything new and not made a mistake, or wished they had done something differently.

*Mike Rozek
Winona, MN*

Reluctantly Yours

In my experience as a TRS-80 user, I have gone from a 4K Model III to a 48K Model III to a Model 4. I have an unsatisfied gripe with Tandy, and that is their seeming reluctance to provide user support. Example: Since I have a lot of experience with the Model III, it would be a great help for Tandy to publish a comparison of the way the Model III and Model 4 operate.

Also, Tandy seems reluctant to tie their equipment to other products. For example, my Epson MX-80 manual included instructions on how to get a complete printout of supported characters using the form feed/line feed buttons. My new RX-80 F/Tx offers the same sort of instruction, but for the Model III only, not for the Model 4. Neither Tandy nor Epson seems interested in acknowledging that they should be a team rather than stand-off competitors.

*Willard R. Nichols
Houston, TX*

Send your correspondence to Input, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Check these features:

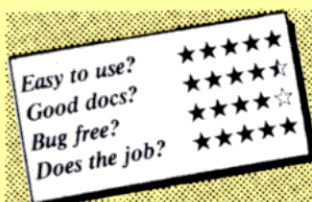
Talker 2.0 and Talker 4.0 software:

- ✓ Unlimited translation of English text to clear speech.
- ✓ Powerful video or keyboard echo can be switched on or off at any time.
- ✓ Can be used in BASIC with 2 new commands: PRINT* "I can talk" speaks any expression. PRINT! "Hello" speaks *and* prints on screen.
- ✓ Reads numbers up to 999 trillion.
- ✓ Speaks many abbreviations, such as Mrs., Mr., lb., oz., Co., etc.
- Walks the dog.
- ✓ Many control codes to tailor the system to your wishes. (Pitch, speed, etc.)
- ✓ Only 6¼K long.
- ✓ Talker relocates itself into available high memory. Compatible with any DOS (not CPM).

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- ✓ Super efficient: About 50 bytes per sentence.
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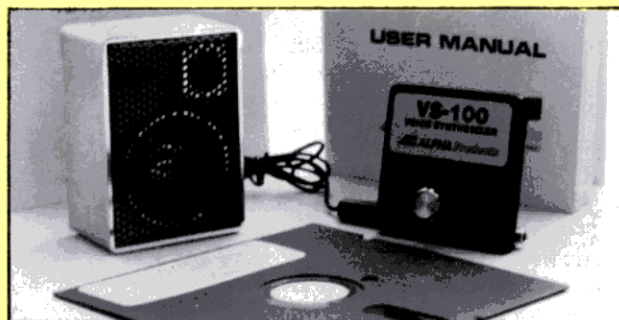
See the detailed
review in 80-Micro
December 1984.



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Send your questions or problems dealing with any area of Tandy/Radio Shack microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Q: I want to contact a BBS such as CompuServe using my Model 4 and the Qube stand-alone modem. Any help you can give me in selecting a software package will be appreciated. (Bill Sullivan, Oxnard, CA)

A: My favorite telecommunications package is Omniterm, available for the Models I, III, and 4/4P, as well as MS-DOS computers. Lindbergh Systems (41 Fairhill Road, Holden, MA 01520) sells Omniterm for \$99.95. But it probably has many more features than you'll need, such as character filtering and translation.

Why haven't you used the communication program (COMM/CMD) supplied with TRSDOS 6.X? It lets you up- and download, and its macros let you assign any characters you want to the keyboard so you can store passwords and numbers for instant access.

COMM/CMD also supports direct-connect and acoustic modems. While it may not make full use of a Hayes Smartmodem, it will let you use it. In fact, the communication program supplied with TRSDOS is the only one I use with my 4P. I suggest you try it before spending money on a new program. After using it a while, you may find that you need some of those advanced features.

Finally, consider getting a public-domain program such as XModem, primarily a CP/M package that offers many of the features you want. You can download it for free from CompuServe or any other BBS that has it in their data base. Also, you might find a public-domain program modified for TRSDOS, especially if you hook into the BBSes specifically for TRS-80 computers (see the July 1985 issue [p. 41] of 80 Micro for a comprehensive list of BBSes).

Q: I'm trying to connect a Model 12 running TRSDOS-II 4.2 with a C. Itoh Starwriter F10-40 parallel printer using a standard Radio Shack 34-pin header to 36-pin plug parallel printer cable. I spoke to the technical department at Leading Edge (the U.S. vendor for the



printer) without success. I set the DIP switch as specified in the printer manual (and any number of other combinations) to no avail.

When I send data to the printer, it prints approximately 255 characters. I then get a "Printer not ready" error message. When running Basic, I get an "Input/output error" error message.

I ran the printer's self-test and it works fine. I have successfully run the printer off another computer (Sanyo MCB 555), and I have run a Radio Shack DWP-410 without problem. I also tried a different printer cable, but that made no difference.

I am enclosing copies of the parallel pin assignments for the computer, the C. Itoh printer, and the Radio Shack printer in case they may help. (Rodney A. Lubinski, Detroit, MI)

A: The C. Itoh printer has a 255-character printer buffer. When

you fill this buffer, the printer sends a "stop" signal to the computer until the C. Itoh prints those characters and has room for more. Your problem is that the C. Itoh printer is not getting the "continue" (clear-to-send) signal back to the computer.

You need a new printer cable that properly connects the errant signals. Take both pin-out diagrams to a computer technician and have him manufacture a cable for you.

Q: This letter is in response to an article in the April 1985 Feedback Loop (p. 18). Darrell Sherrin asked for a disk-cleaning program for the Model III. The public-domain program I use appears in Program Listing 1. I tried to find the original author to give credit, but couldn't.

The program runs the drives for 30 seconds, and requires that you set Basic for three variable-length files. Once in Basic, just load and run the program, following the prompts. (Lawrence Pauco, Mountain Top, PA)

A: Thanks for the program.

Q: I wrote you some time ago regarding reboots and a frozen computer whenever any heavy traffic passed my house. I think I have found the solution.

My LNW doubler is connected to the Expansion Interface board only by the pins in the integrated circuit (IC) socket. The board is heavy and off balance. Highly susceptible to vibration, it works itself

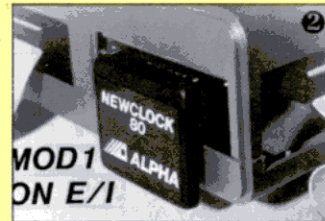
Program Listing 1. Disk drive cleaning program.

```
10 CLS:Z$=""
20 PRINT"Remove all disks from drives and press <ENTER>"
30 A$=INKEY$:IF A$="" THEN 30
40 PRINT"Press <A> to clean all drives or <S> for a specific drive"
50 A$=INKEY$:IF A$="" THEN 50
51 IF A$="A" THEN 70
60 INPUT"Enter drive to clean";D:IF D>3 THEN 60
62 IF D=0 THEN D=1 ELSE IF D=1 THEN D=2 ELSE IF D=2 THEN D=3 ELSE IF D=3 THEN D=4
63 GOTO 100
70 FOR C=0 TO 3 IF C=0 THEN D=1 ELSE IF C=1 THEN D=2 ELSE IF C=2 THEN D=3 ELSE IF C=3 THEN D=4
71 PRINT"Insert cleaner disk into drive";C;"and press <ENTER>"
72 B$=INKEY$:IF B$="" THEN 72
73 FOR R=1 TO 3900:OUT 244,DR:NEXT R:IF A$="S" THEN 200 ELSE NEXT C
74 GOTO 100
100 PRINT"Insert cleaner disk into drive";D;"and press <ENTER>"
101 B$=INKEY$:IF B$="" THEN 101
102 FOR R=1 TO 3900:OUT 244,DR:NEXT R
200 PRINT"Cleaning completed."
201 END
```

End

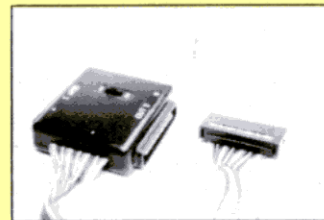
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The right time at the right price! Keep the time and date with quartz accuracy, even when your computer is off. The backup lithium battery (included) will last for over 2 years. Software on tape or disk, please specify. Use "TIMES" once to set the clock. Use "SETCLK" to set your computer's internal clock (at power up) or use "TSTRING" so that the "TIMES" function reads the Newclock. Connection: Model I: plugs into the keyboard or expansion interface. Model III: plugs into the 50-pin I/O bus. Compatible with all operating systems.



Printswitch \$59.00

Do you have 2 printers? Get a Printswitch. Stop plugging and unplugging those printer cables. With the Printswitch, you can have 2 printers connected to your computer and you can select either one at the flick of a switch. Works with any printer, plotter, or device that uses the parallel printer port. Simply plug the 14 inch Printswitch cable into your computer, and plug your existing printer cables into the Printswitch. This is the nicest unit on the market. Superior quality board with gold plated edge connectors. For Models I,III, 4 and 4P.



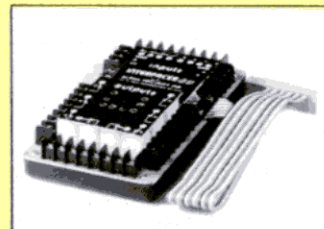
Alpha Joystick \$27.95

When it's time for fun, don't be without your Alpha Joystick. Do you know that most action games are Joystick compatible? Stop pounding on your keyboard and enjoy real arcade control. The joystick can also be used with BASIC programs; simply do J=INP(0) to read the joystick position (8 directions and fire button). Model I: plugs into keyboard or expansion interface. Model III, 4 and 4P: plugs into 50-pin I/O bus. The Alpha Joystick comes fully assembled and tested, ready to plug in and enjoy. (Specify Model I, or Model III,4).



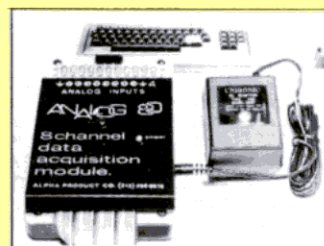
Interfacer-80 \$159.00

Low cost input and output device. The outputs consist of 8 relays (rated 2 Amp @125V), easily controlled using "OUT" commands. For example, OUT 0.0 turns all the relays off. Eight LED's show the states of the relays. The 8 inputs are optically isolated, so it's safe and easy to connect external devices (switches, sensors, thermostats, etc.). Simple "INP" commands read the inputs. Connection: Mod I: 40 pin bus. Mod III, 4, 4P: requires 50-pin I/O bus converter (\$39.95) plugs into 50-pin I/O bus. Comes complete with power supply, cable, and detailed manual. (Up to 8 interfacers can be connected to your TRS-80 using our Y- cables).



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Disk drive extender cable (8")...C160:\$9.95

Y-Cable for Mod I bus (40 pin): •X2-40...\$29 •X3-40...\$44 •X4...\$59 •X5...\$74
Y-Cable for Mod 3 & 4 bus (50-pin): •X2-50...\$34 •X3-50...\$49 •X4-50...\$64

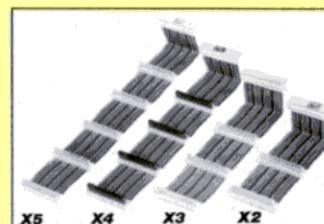
Disk drive cable (34 pin): •2-drive...C162:\$32 •4-drive...C163:\$45

Extension cable, 4 foot: •For printer and drive (34-pin)...C165:\$22

•For Mod I bus (40-pin)...C167:\$24 •For Mod 3 & 4 bus (50-pin)...C169:\$28

Keyboard to E/I (40-pin, 8")...C161:\$21

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loose after a while. With even the slightest jolt, it freezes the machine or reboots.

Last week I used a good old pink eraser, trimmed to size, as a wedge between the bottom of my Expansion Interface and the doubler board—much

the same thing you do for the RS-232, which isn't fighting gravity.

I haven't had a reboot since, and have experienced the usual run of trailer trucks, kids breakdancing on the desk, and air conditioners and other appli-

ances cutting in and out. (Joel M. Reed, New York, NY)

A: Thanks for the update on your problem. It sure was a stickler, but in hindsight the solution was rather obvious.

Program Listing 2. A Model III screen-to-RX dump program.

```
990 'MX SCREEN DUMP FOR MIXED GRAPHICS-TEXT V.3 ** RRKEEGAN COPR
    . '85
991 SC=15360:LPRINTCHR$(27)"A"CHR$(4):AL$=STRING$(3,240):A0$=STR
    ING$(3,0):I7=128:FORI=0TO15:I6=I*64:GOSUB995:FORJ=0TO4STEP2:XX=2
    [J:I1=XX+XX:LPRINTCHR$(27)"K"CHR$(128)CHR$(1):;FORK=0TO63:P=PEEK
    (I6+K+SC):IFP<I7THENP=I7
992 IF((P-I7)ANDXX)THENLPRINTAL$;ELSELPRINTA0$;
993 IF((P-I7)ANDI1)THENLPRINTAL$;ELSELPRINTA0$;
994 NEXTK:LPRINT:NEXTJ:NEXTI:LPRINTCHR$(27)"@":LPRINTCHR$(13)CHR
    $(13)CHR$(13):RETURN
995 FORK=0TO63:P=PEEK(I6+K+SC):IFP>126ORP<32THENP=32
996 LPRINTCHR$(P);:NEXTK:LPRINTCHR$(27)"J"CHR$(0):;:RETURN
```

End

Program Listing 3. Modification to Program Listing 2.

```
991 SC=15360:LPRINTCHR$(27)"A"CHR$(6):AL$=STRING$(3,252):A0$=STR
    ING$(3,0):I7=128:FORI=0TO15:I6=I*64:GOSUB995:FORJ=0TO4STEP2:XX=2
    [J:I1=XX+XX:LPRINTCHR$(27)"K"CHR$(128)CHR$(1):;FORK=0TO63:P=PEEK
    (I6+K+SC):IFP<I7THENP=I7
```

End

Program Listing 4. A screen dump program for Models I/III block graphics.

```
1 GOSUB 8000 'CODES FOR SCREEN DUMP GRAPHICS
7990 'SETUP FOR MX-80 SCREEN DUMP WITH GRAPHTRAX
8000 DIM Q5(64),Q6(64),Q7(64),Q8(64)
8010 FOR IX=1 TO 16
8020 READ QX,QY
8030 Q5(IX)=QX: Q5(IX+16)=QX: Q5(IX+32)=QX: Q5(IX+48)=QX
8040 Q6(IX)=QY: Q6(IX+16)=QY: Q6(IX+32)=QY: Q6(IX+48)=QY
8050 NEXT IX
8060 DATA 0,0,240,0,0,240,240,240,15,0,255,0,15,240,255,240
8070 DATA 0,15,240,15,0,255,240,255,15,15,255,15,15,255,255,255
8080 FOR IX=1 TO 16: Q7(IX)=0: Q8(IX)=0: NEXT IX
8090 FOR IX=17 TO 32: Q7(IX)=240: Q8(IX)=0: NEXT IX
8100 FOR IX=33 TO 48: Q7(IX)=0: Q8(IX)=240: NEXT IX
8110 FOR IX=49 TO 64: Q7(IX)=240: Q8(IX)=240: NEXT IX
8120 RETURN
9990 ' MX-80 SCREEN DUMP WITH GRAPHTRAX
10000 LPRINTCHR$(18)CHR$(27)"U"CHR$(1)
10010 FOR XZ=15360 TO 16320 STEP 64
10020 LPRINTCHR$(27)"A"CHR$(136);
10030 FOR PZ=0 TO 63
10040 AZ=PEEK(XZ+PZ)
10050 IF AZ<32 THEN AZ=32
10060 IF AZ>127 AND AZ<192 THEN 10070 ELSE 10110
10070 LPRINTCHR$(27)"K"CHR$(6)CHR$(0);
10080 FOR JX=1 TO 3: LPRINTCHR$(Q5(AZ-127));: NEXT JX
10090 FOR JX=1 TO 3: LPRINTCHR$(Q6(AZ-127));: NEXT JX
10100 GOTO 10120
10110 LPRINTCHR$(AZ);
10120 NEXT PZ
10130 LPRINT: LPRINTCHR$(27)"A"CHR$(132);
10140 FOR PZ=0 TO 63
10150 AZ=PEEK(XZ+PZ)
10160 IF AZ>127 AND AZ<192 THEN 10170 ELSE 10210
10170 LPRINTCHR$(27)"K"CHR$(6)CHR$(0);
10180 FOR JX=1 TO 3: LPRINTCHR$(Q7(AZ-127));: NEXT JX
10190 FOR JX=1 TO 3: LPRINTCHR$(Q8(AZ-127));: NEXT JX
10200 GOTO 10220
10210 LPRINT" ";
10220 NEXT PZ
10230 LPRINT
10240 NEXT XZ
10250 LPRINTCHR$(27)"@"
10260 RETURN
```

End

Q: I'm writing in response to James Criscimagna's request for a screen dump for his Epson RX-80 (February 1985, p. 19). I wrote a subroutine for the MX-80 with Grafrax Plus, but it should do for the RX as well (see Program Listing 2). The screen prints out wide because of the Model III's skinny pixels. Changing line 991 gives you a screen-like aspect ratio (see Program Listing 3), but the text lines are spread vertically. (Bob Keegan, Fayetteville, AR)

A: Thanks for sending a copy of your program.

Q: Here's a response to James Criscimagna's request for a screen dump for an RX-80 printer (see Program Listing 4). My program works on an Epson MX-80 with Grafrax Plus or on an RX-80. On Epsoms, a character takes the equivalent of six dots, including one dot between characters. This spacing is matched for block graphics by printing six dots in the wider dot-addressable mode (LPRINT CHR\$(27)"K"), using a three- by four-dot block to represent a lit pixel.

Since graphics blocks are taller than alphanumeric characters, the program prints each line on the screen in two passes. Line 10020 sets line spacing at eight dots high for the first pass, which prints alphanumeric characters and the top two rows of graphics pixels. Line 10130 then changes line spacing to four dots high for the second pass to print the bottom row of pixels.

Nested loops scan all print positions on the screen. On the first pass across each line (lines 10030-10120), the program PEEKs the ASCII code for each position. Then it prints the left and right halves of any graphics character it finds in that position; otherwise, it prints the alphanumeric character.

In the second pass on each line (lines 10140-10230), the program prints lit pixels in the bottom row of each graphics character. Line 10000 ensures that the printer uses 80 characters a line and directs the printer to use unidirectional printing to make block graphics line up. Line 10250 turns off all printer codes before leaving the subroutine. (Donald B. Heckenlively, Hillsdale, MI)

A: Thanks for your program and explanation. ■

Terry Kepner is a freelance writer and programmer who has been writing about microcomputers since 1979.

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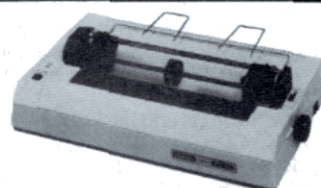
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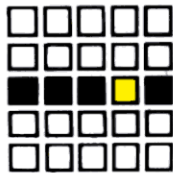
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Microsoft's MS-Windows: Too Little, Too Late?

MicroTrends

Shortly after Microsoft introduced its Windows operating system in the summer of 1985, several major software developers turned up their noses at the new graphics operating environment (see the Photo).

Companies with no plans to develop new products or adapt current ones for MS-Windows include Ashton-Tate, Lotus Development Corp., Software Publishing Corp., and MicroPro International Corp.

Key reasons for the cold reception are lack of customer interest and the unproven commercial viability of graphics operating environments. As Danielle Baudry, of Software Publishing's product development group, puts it, "The fundamental reason why the top developers haven't committed to Windows is (that) their customers aren't demanding it." She added, "It's not clear what the value of this kind of product is to the customer, and that is a key question."

Nonetheless, Microsoft's marketing manager for MS-Windows, Rick Dill, confidently predicted that developers would use his product. But he wouldn't be more specific, citing nondisclosure agreements.

As of early August 1985, Microsoft still wasn't saying when it would offer its long-overdue program to the public, but a September 1985 release seemed likely.

The other major force in graphics operating environments, Digital Research's GEM (Graphics Environment Manager), initially received a cool response, too. But because it was the first program of its type for MS-DOS computers, GEM gained a following among manufacturers and developers.

Atari, Commodore, Tandy, and Apricot already offer GEM in one form or another, whether as the primary operating environment for Commodore's new Amiga or as a software option available in Radio Shack Computer Centers.

There's no doubt that Microsoft has

marketing clout and proven success in operating systems. What is less certain, however, is how long it will take the industry to forget Windows' troubled past and start putting the product to work.

The prescription for success in the home computer market this Christmas is simple, according to analyst Hilda Uribe of Future Computing: "Companies must advertise, advertise, and advertise some more."

Apparently, a demand for computers exists. Ten percent of the consumers responding to a Future Computing survey said they planned to buy a home computer this year. And since more than a third of the computer industry's annual sales comes in the fourth quarter, Uribe feels the season's outlook is good. But she warns against complacency; micros have to compete with other electronic devices for Christmas shoppers' money. "It's up to the industry to persuade (people) to put their money into computer equipment and software instead of a VCR."

Future Computing's survey indicated that buyers plan to use their computers for productivity, word processing, self-improvement, and financial management. To be successful, manufacturers have to convince buyers that their products meet these needs.

As for peripherals, 28 percent of the prospective buyers plan to add monitors, 37 percent want disk drives, and 46

percent plan to buy printers. Consumers are more likely to buy their micros at a computer specialty store and to spend more than \$1,000 for them (not including peripherals), according to the survey.

These people have already decided to buy a computer before the year is out. The industry's real task now is to sway potential buyers who haven't quite made up their minds. Says Uribe: "The industry needs to take the consumers' ideas about how a computer might be useful and find

creative ways to explain the benefits of having and using a computer at home." Otherwise, consumers might decide they're better off with a VCR.

Partial results of International Data Corp.'s (IDC's) global computer census are in. According to IDC's count, Commodore's C-64 is the most popular personal computer in the world, with an installed base of 3.9 million units (see Table 1).

IBM's PC is second, but way behind the Commodore, with 1.9 million units. Number three worldwide is Apple's II/IIe line of micros. The best Tandy/Radio Shack performer is their Model III/4 desktop line, far back in the pack with only 330,000 units installed worldwide.

Market analysts at Future Computing expect that Apple computers will be the most popular micro brand over the next 12 months. They've found that almost a third of the consumers planning to buy a computer over the next year want an Apple. Twenty-six percent say an IBM machine is in their future; only 3 percent are considering Tandy machines.

Future Computing's research supports the contention that new buyers are looking for power and utility in a personal computer instead of entertainment. Its statistics chart the shift in home market penetration (see the Figure). Commodore, with 30 percent of the

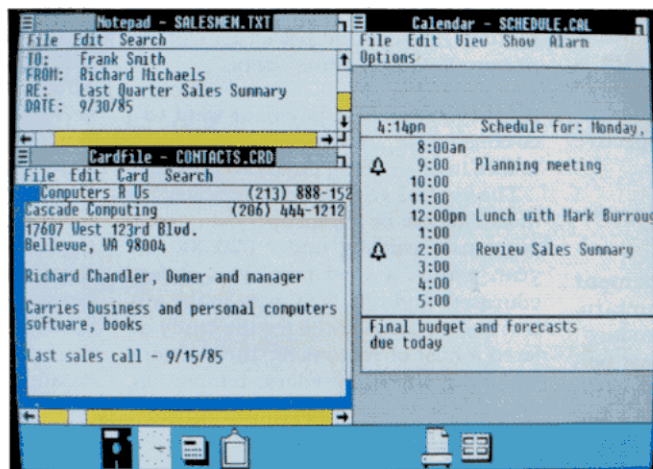


Photo. Microsoft takes the wraps off MS-Windows.

current home installed base, and Tandy, with 10 percent, face a decline in expected sales to home users. Meanwhile, Apple, with 16 percent of the home installed base, and IBM, with only 8 percent, are gaining ground in the home.

For printer manufacturers, things look even better. While 58 percent of the home computer owners already own a printer, 82 percent are planning to buy a printer over the next year. In fact, sales for all peripherals except joysticks should remain the same or increase over the next year (see Table 2).

It looks as if the joystick market is headed for a crash—while 58 percent of the current home systems include joysticks, only 14 percent of the prospective computer buyers plan to buy one.

Hot Item

In an unprecedented announcement last July, IBM said that the much-rumored PC II was a "mythical product" and that the firm planned no new personal computer introduction this year.

William Lowe, president of IBM's Entry Systems Division, said he made the non-announcement because rumors of the new machine are "probably hurting competitors' sales." But IBM watchers say that's not the only reason. IBM, along with everyone else, has seen inventories soar in the current down market, so it decided to stimulate demand for its older products by essentially telling buyers not to wait for a new product. Brian Jeffery, an analyst with International Technology Group, noted, "Surveys have shown that 10 percent to 20 percent of . . . end users were holding off on their purchases because of the PC II."

Dealers complained that speculation about the PC II was hurting sales to the point that IBM either had to introduce the product or quell the rumors. Despite the announcement, analysts expect a new version of the PC perhaps as early as the first quarter of 1986, when the market should stabilize and inventories should come down to more manageable levels.

Update

What kind of person commits computer fraud? The U.S. Department of Health and Human Services (HHS) looked into that question and came up with some interesting results. It turns out that government workers most likely to defraud Uncle Sam are case workers, technicians, and clerks for benefits programs.

HHS outlined three types of fraud schemes: manipulating data on existing cases in an ongoing payment system, creating false claims in a one-time pay-

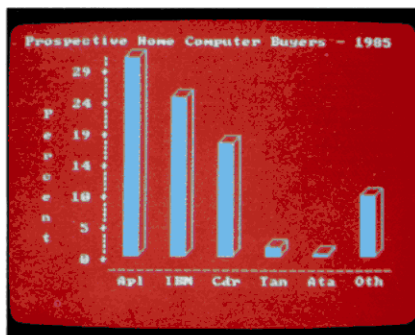


Figure. Prospective purchases of peripherals among home users.

ment system where payment went to a co-conspirator, and adding false records to files in an ongoing payment program.

The typical government "cracker" is most likely to be a nonsupervisory computer user earning under \$20,000 per year, young, a good employee, college educated, and relatively new to the job. Defrauders interviewed for the study offered a host of reasons for their actions including stress, boredom, temptation, and a lack of fear that they would get caught.

"We have a little ways to go yet, but the (personal computer) will be a practi-

cal device." So said Karl Klessig, chairman of Quadraton Systems of Encino, CA, at the conclusion of a disappointingly slow National Computer Conference in Chicago in July 1985.

Klessig, in a published interview, voiced the concerns of the micro industry, which is awash in red ink. But Klessig thought the future looked more promising. "PCs are used now less than 14 percent of the available time in the business world and probably less elsewhere. In five years, we'll see a PC on everyone's desk, but it will be radically different. . . smaller and using less power. There will be only thin, flat screens and, because of lower power consumption, we'll be able to have computers only two inches high."

Many industry analysts believe that telecommunications is the key to making the computer an indispensable business or home appliance. Future hardware configurations will accommodate voice and data transfers, accessibility to on-line data services, and telebanking and -shopping.

Much of the needed technology for these applications already exists but isn't extensively used, while on-line systems that exploit these new capabilities aren't generally available. ■

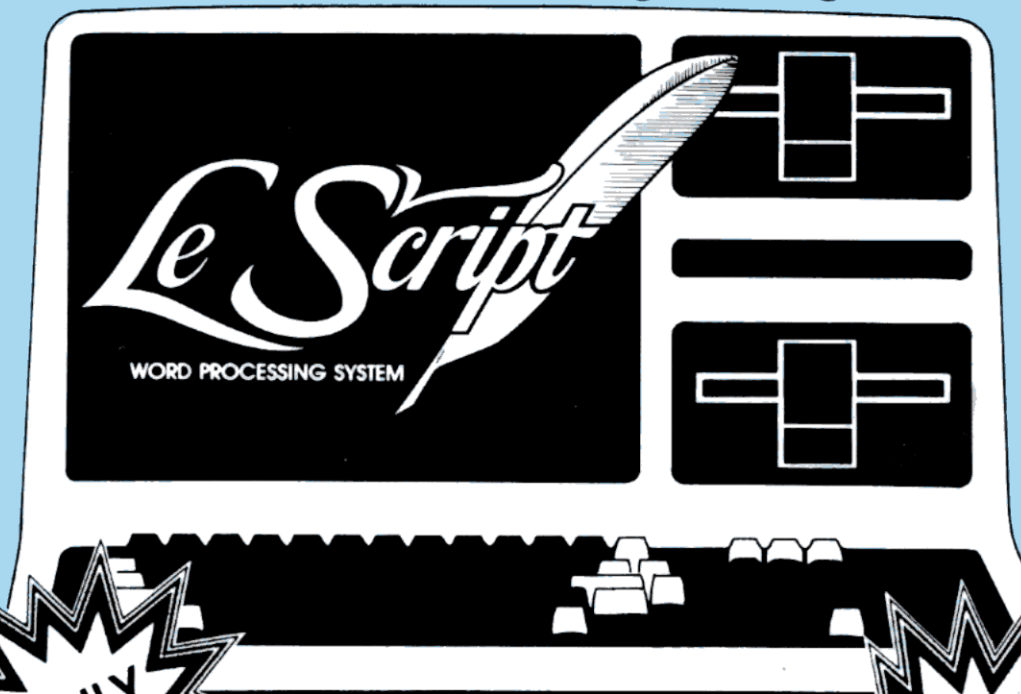
Vendor	Model	USA (x1,000)	World (x,1000)	Rank
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IBM	PC	1,645	1,955	2
	PC XT	340	435	5
	PCjr	250	250	9
	PC AT	22	25	13
Apple	II, Ile	1,285	1,720	3
	Ile	550	600	4
	Mac	235	275	8
Tandy/	III, 4	275	330	6
Radio Shack	CoCo	245	300	7
	100	168	195	10
	16	69	77	11
	2000	60	65	12
	1000/1200	2	2	14

Table 1. IDC's worldwide personal computer census.

Peripheral	Present Owners (%)	Prospective Buyers (%)
Disk Drive	63	65
Monitor	50	50
Printer	58	82
Modem	19	22
Joystick	58	14
RAM upgrade	22	26
Mouse	5	13

Table 2. Prospective computer purchases among home users.

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A Couple of Questions

Daniel Onbekent of Belgium writes with a question: How can he **access PFS:File data from Basic?** Unfortunately, says tech editor Dave Rowell, you can't do so easily. PFS:File saves data in a complex manner, storing records in a linked list, with each record pointing to the next. It stores actual data in non-ASCII format (ASCII with the eighth bit set). "The storage format," concludes Rowell, "would take several pages to describe in enough detail to design a Basic program that could access that data." He suggests you do some research and testing with a good file-editing program.

Data-handling seems to be on everybody's mind these days. Brian D. Harney wants to know **how DeskMate stores data** on disk; like Onbekent, he wants to access the data from Basic. According to Rowell (who else?), DeskMate files comprise three parts: a short header that looks like it might describe the data; a template of the entry screen with field names, sizes, and placements; and the data itself. Most of the file appears in ASCII, including the numbers in the header.

"If you know the structure of a record—how many fields and what they are—you can pick out the data with a Basic program," says Rowell. "Each record starts with a carriage return (0D hexadecimal [hex]), used for no other purpose in the file. An uppercase 'A' before the actual first field follows the carriage return. Each field within a record ends with a tab character (09 hex). With an empty field, you'll see two tabs in a row, one to end the preceding field, the second to mark the empty field. The last field in a record ends with the hex sequence 2E 09 0D, with 0D marking the next record.

"There is no clear marker at the end of the last record, because a little garbage (part of the last record) precedes the normal MS-DOS end-of-file marker (1A hex)."

Rowell adds that you'll have trouble adding records from a Basic program unless you know the structure of the header and how to update it after modifying the file.

Scroll-Playing

Raymond Boggs' **scroll protection program for the Model 4** ("Stationary



Department," May 1985, p. 74) prompted three people to send in alternatives. The first, from L.L. Miller of Rehoboth Beach, DE, uses an integer array to install a machine-language routine, which a VARPTR statement then accesses. Program Listing 1 gives an example, with lines 100–170 comprising the routine. US(4) indicates the number of lines you want protected; 15872 equals zero. You call the routine in lines 1000–1010. You determine how many lines you want to protect by adding a number from 1 to 7 to 15,872 and assigning the resulting value to US(4). The above example, for instance, protects seven lines (15872 + 7 = 15879). You remove protection in lines 1020–

Program Listing 1. Model 4 screen protect routine, version 1.

```
100 DEFINT U
110 US(1)=10779
120 US(2)=1733
130 US(3)=3591
140 US(4)=15872
150 US(5)=4337
160 US(6)=11839
170 US(7)=13855
180 GOSUB 1000
190 FOR I=1 TO 50
200 PRINT "SCROLL PROTECTION"
210 NEXT I
220 GOSUB 1920
225 FOR I=1 TO 50
230 PRINT "NO SCROLL PROTECTION"
240 NEXT I
250 STOP
1000 REM SCROLL PROTECTION
1010 US(4)=15879:PROTECT=VARPTR(US(1)):CALL PROTECT:RETURN
1020 REM REMOVE SCROLL PROTECTION
1030 US(4)=15872:PROTECT=VARPTR(US(1)):CALL PROTECT:RETURN
```

End

Program Listing 2. Model 4 screen protect routine, version 2.

PSECT	2600H		;Start the program at the beginning
			;of the overlay area so that it may
			;be called from DOS or Basic
@VDCTL	EQU	15	
@ERROR	EQU	26	
;-----			
START	LD	A,(HL)	;HL-->first nonblank character after
			;program name
	CP	38H	;A>'8'?
	JR	NC,ERROR	;Yes--value too high
	CP	30H	;A<'0'?
	JR	C,ERROR	;Yes--value too low
	LD	C,A	;Get number of lines to protect into
			;reg C
	LD	B,7	;@VDCTL scroll protect
	SVC	@VDCTL	;Do it
	JR	EXIT	;Done
ERROR	LD	C,@ECH	;Parameter error+C0H (sets bits 6, 7)
	SVC	@ERROR	;Display error message
EXIT	LD	HL,0000H	;Set no-error condition prior to exit
	RET		;If command was entered from DOS,
			;return will be to DOS; if called
			;from Basic, return will be to Basic
END	START		

End

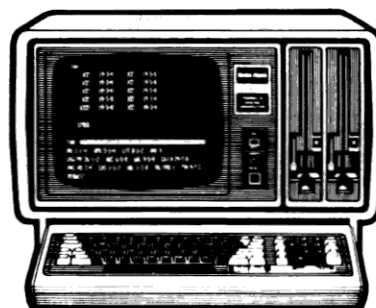
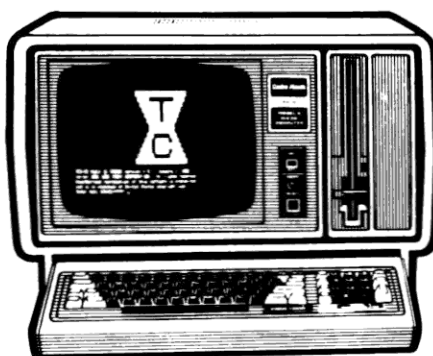
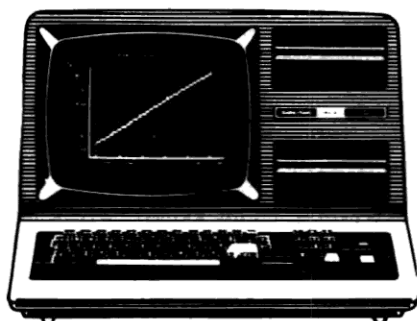
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1030. If you want more details on how the program works, run the program, get the address of US(1) with PRINT VARPTR(US(1)), enter Debug, and look at US(1)-US(7).

The second version, from Kenneth Stahl of Manassas, VA, is actually a modification of Boggs' program, and is shown in Program Listing 2. Stahl's variation won't let input outside the range zero to 7, and reduces the number of bytes the program takes.

Version 3, from C.G. Dumas of Belleville, IL, is the one-liner presented in Program Listing 3.

Follow-Ups

In our July column (p. 25), Gregory Cannon bemoaned the fact that the **Basic terminal program in the Model III manual didn't work** under LDOS. Peter Jenkins of Rochester, NY, offers Program Listing 4 as an alternative. Be sure to first issue the following two commands from DOS Ready: LINK *KI *CL

and LINK *DO *CL. Jenkins also suggests the LCOM program that comes with LDOS 5.1.4.

Wayne Staats asked in our July issue (p. 25) **how to tell if an Epson MX-80/FT has Grafrax Plus** installed. P.F. Skeberdis of Fremont, MI, points out that Grafrax Plus will print italics and subscripts, while a regular Epson will not. Grafrax-80 will print in italics only. Use this simple program to find out which one you've got:

```
100 LPRINT CHR$(27)"4": "Italic printing"
200 LPRINT CHR$(27)"5"CHR$(27)
"5"CHR$(1): "Subscript printing"
300 LPRINT CHR$(27)"T"
```

Oops

Line 420 of Autorun ("Run-O-Matic," July 1985, p. 78) should read:

```
COMM$=COMM$+" "+PROG$(PROG)+"":
"+DRIVE$+ENTER$:PRINT COMM$:
COMM$=USR2(COMM$)
```

Also, in the Exit/JCL listing of Program Listing 2 in "Storage to Spare"

(June 1985, p. 54), change BACKUP /CTL:1:0 to BACKUP /CTL:2:0.

Some backslashes are missing from Program Listing 6 in Clifford Knight's "Summer Romance" (August 1985, p. 38). In line 40, X%56 should be X%\256, and in lines 110, 130, and 150, PTR%56 should be PTR%\256.

Finally, in our July list of bulletin board systems (p. 41), the numbers 301-997-7163, 201-992-4847, and 214-824-7455 are not BBSes.

Seeking Help

►George Mercado (1251B Willow St., Myrtle Beach AFB, SC 29577) wants to read 1,500-baud Model III tapes with his Model I. Does anyone have a listing of the Model III read/write routines?

►William Tatam (332 Warwick Way, Lawton, OK 73501) wants to know of a way to run Fortran 77 under LDOS or TRSDOS 6.2.

Program Listing 3. Model 4 screen protect routine, version 3.

```
65000 DATA 62,15,6,7,14,0,239,201:SP$=STRING$(8,1):SP=PEEK (VARPTR (S
P$)+1)+256*PEEK (VARPTR (SP$)+2):SP=SP+(SP>32767)*65536:FOR X=SP TO
SP+7:READ Y:POKE X,Y:NEXT:DEF USR0=SP
```

End

Program Listing 4. LDOS terminal program.

```
10 CLS:PRINT@,;
20 AS=INKEY$
30 PRINT AS;
40 GOTO 40
```

End

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PRO-NTO: TRSDOS 6.X's Sidekick

by John B. Harrell III

★★★★★

PRO-NTO runs on the Model 4/4P (128K) and requires two disk drives. Misosys Inc., P.O. Box 239, Sterling, VA 22170, 703-450-4181. \$59.95.

Easy to use: ★★★★★

Good docs: ★★★★★

Bug free: ★★★★★

Does the job: ★★★★★

Finally, TRSDOS 6.X users have a program comparable to Borland's MS-DOS Sidekick and Montezuma Micro's CP/M Monte's Window. Like these packages, PRO-NTO gives you a memory-resident calendar, calculator, index-card filer, and phone dialer at the touch of a pair of keys, even from within another application. In addition, you can link your own applications to PRO-NTO's windows. All in all, PRO-NTO is one of the most useful products for the Model 4 I've seen.

How it Works

PRO-NTO resides in high memory and reserves a 32K RAM bank for its programs and various buffers. When you call up PRO-NTO, it saves your current screen and the DOS overlay library in one of these buffers.

You can call up to four windows simultaneously, though you can work only in the most recently called window. When you finish using PRO-NTO, it closes any open window, restores the previous screen's contents and the DOS overlay, and returns control to your interrupted program.

One of PRO-NTO's notable features is its system of data transfer between windows and applications, referred to as



data import and export. PRO-NTO lets you import data into a window from a previous screen or export data from the current screen to another application. For example, I used PRO-NTO to generate a small job control language (JCL) file with the note card application. When I finished writing it, I used the export capability to feed the text to the DOS Build command. This very capably overcomes TRSDOS's lack of a text editor.

The Applications

When you type in PRONTO at TRSDOS Ready, the program loads itself, links into your system, and installs a keyboard filter. PRO-NTO then loads its four default applications (the calendar, calculator, index-card filer, and phone dialer) into the alternate RAM bank, along with a DOS library and a user-defined universal application, and returns control to DOS. You can change the default applications to any of PRO-NTO's seven other applications with a supplied utility.

Pressing control-P activates PRO-NTO—it instantly lists the installed appli-

cations (see Fig. 1). I'll describe all 11 of them below.

►Address maintains an index-card file of addresses you use like a Rolodex file or as a mailing list (the data structure matches that of Powermail Plus).

Address accommodates all standard address-file entries, like names and addresses, and adds a few new ones. In addition to two-line street addresses, you can include a company name and nine-digit zip codes. Address provides two other fields for key words (useful for sorts) and telephone numbers. It also offers up to 24 flags you can set or reset for use as search criteria. For example, you

could set flag 6 for customers who get a 10 percent discount on merchandise.

►BRINGUP, a reminder file and appointment book, lets you schedule up to 12 entries for each day in priority/time order. The only limit to the number of entries you can store is the amount of disk space available. BRINGUP represents the only PRO-NTO application that doesn't use Misosys' standard data base format.

BRINGUP defaults to the system date on initial display. If you invoke it from the calendar, it defaults to the date currently selected. Unfortunately, PRO-NTO doesn't highlight dates on which you've scheduled activities.

►PRO-NTO's perpetual calendar displays the month for any year from 1582 to 4902. PRO-NTO highlights the current date with a pair of flashing angle brackets. You can pass this date to the BRINGUP mode if you invoke it from the calendar.

►PRO-NTO's floating-point calculator provides a rudimentary four-function capability with a one-number memory.

Application	Description
ADDRESS/APP	Mail and rotating index file
AFPCALC/APP	Floating-point calculator
BRINGUP/APP	Appointment file
CAL/APP	Perpetual calendar
CARD/APP	Notecard files and notepad
CHARSET/APP	Display full 256-character ASCII set
DIALER/APP	Telephone list and dialer
DOSAVE/APP	Save the previous video screen
RPNCALC/APP	Reverse Polish notation calculator
TERM/APP	Simple terminal communications
TYPYER/APP	Typewriter application

Default PRO-NT0 Applications

1. Floating-point calculator
2. Calendar
3. Card filer
4. Dialer
5. Universal Application Invoker*
6. Library command shell*

* Note—These two applications are fixed and cannot be changed by the default installation program.

Figure 1. PRO-NT0's applications.

You make entries to the calculator using algebraic notation. PRO-NT0 considers all operators of equal precedence and calculates the formula from left to right in the sequence entered.

PRO-NT0 displays results in decimal or scientific notation. If a number exceeds the decimal limits, PRO-NT0 displays it in scientific notation (for example, it displays 0.0000002567 as 2.567000E-8). The calculator works with single-precision floating-point numbers and maintains six or seven decimal digits of precision.

►The reverse Polish notation (RPN) four-function calculator is really a programmer's tool and provides for data entry in binary, octal, decimal, and/or hexadecimal format. You can use three additional operations: logical And and Or, and Exclusive Or. While the calculator doesn't support negation and complements, you can quickly calculate these using simple arithmetic operations.

Unlike the floating-point calculator, the RPN calculator lets you enter an operation sequence as a string and you can edit this prior to pressing the enter key.

You have to separate operators and operands by a space. The default result base is decimal and you can change this to any other base by appending the appropriate designation to the entire expression.

►The card filer and notepad (Card) provides a convenient way to store individual notes of 12 lines by 40 characters. PRO-NT0 lets you identify a Card file with an eight-character key; it automatically appends the date and time to the record.

Card supports commands for adding, deleting, and finding records in the notepad. You can move forward and backward through the data base with single-key commands. You can select and print a single card or all the cards in the data base. Also, a simple editor lets you make changes to the note.

►CHARSET displays all 256 ASCII characters in a single window. When you position the cursor on a character, CHARSET displays the character's hexadecimal and decimal numbers. You can toggle to the alternate character set (characters in the hexadecimal range COH-FFH) with a simple keystroke.

The best feature of this application is the ability to build a string and then export it back to a waiting application. For example, you might build a graphics string by locating the appropriate character(s) in CHARSET with the arrow keys and pressing the enter key for each character. When you finish, you can transfer the generated string to the waiting program.

►The telephone list and dialer application (Dialer) is a small data base of phone numbers and descriptions. Dialer fully supports the Hayes SmartModem and compatibles. You can dial numbers directly from the data base or manually enter a number for Dialer to call. You can also export a number from the address (or any other) application.

The storage field for the actual telephone number is only 16 characters long, but this isn't really a limitation for those services that require more numbers; Dialer supports 15 user-defined macro keys you can use to store up to 16 characters in the original phone number.

►The DOSAVE application saves the contents of the previous screen to a disk file as 24 strings of 80 characters each. This application has limited use and is provided in source form as an example of how to write an application for PRO-NT0.

►The terminal communications program (Term) is another example of a simple application written for use with PRO-NT0. The only filtering performed converts a form feed signal to the traditional Screen Clear command. Term won't run unless you install the *CL device with COM/DVR.

►Typer jerry-rigs your keyboard and printer so that the printer types out the character you press on the keyboard. It uses a two-line window so you can type a line at a time directly to the printer. Here again, this program seems more a demonstration of PRO-NT0 than a practical application. MisoSys provides Typer's Assembly-language code so you can peruse it.

In addition to the four default applications PRO-NT0 loads on boot-up, it loads two other programs, the Library Executive (LIBEXEC) and the Universal Application Invoker. LIBEXEC lets you access all TRSDOS commands. You can also run other programs with the Run command if you know that it will run in the DOS overlay area.

The Universal Application Invoker runs any PRO-NT0 application from disk, since you can configure PRO-NT0 for only four of the supplied applications. This feature gives you access to PRO-NT0's other (uninstalled) programs.

The Utilities

PRO-NT0 includes three utilities. PRUN lets you bypass PRO-NT0's program menu so you can call an application much as you would from DOS. Instead of answering prompts to invoke an application, you call a program by typing in PRUN FILE NAME from DOS. You can also use PRUN in an autoexecute file to automatically load one of PRO-NT0's programs on boot-up.

PSort, a sort function written specifically for PRO-NT0 data base files, can be easily used for other data structures. MisoSys has provided complete documentation on the data structure required for this utility.

MisoSys also includes a full help utility. It provides documentation for each of PRO-NT0's features and is a partitioned data set similar to the TRSDOS 6.2 Help command.

Blemishes

PRO-NT0's major strength is also its weakness: The generic nature of the program means that it won't work with several software packages, such as SuperScript and LeScript. Both of these programs ignore PRO-NT0 because they don't read characters from the standard TRSDOS keyboard driver (*KI).

Also, I found that having only four PRO-NT0 applications in the RAM bank just wasn't enough—I continually referenced the program disk for other applications. Even after I customized the default set-up (see Fig. 2a), I needed the PRO-NT0 disk handy when I wanted an uninstalled application.

Since I was using only one of my alternate 32K RAM banks, I thought I could

- (a) 1. Calculator
2. Calendar
3. Card
4. Address
- (b) . PRO-NT0 INSTALLATION
.
PRO-NT0
SYSTEM (DRIVE = 2,
DRIVER = "MEMDISK")
C
S
Y
BACKUP /DAT:0 :2
COPY BRINGUP/APP:0 :2
COPY CHARSET/APP:0 :2
COPY DIAL/APP:0 :2
COPY RPNCLC/APP:0 :2
COPY DOSAVE/APP:0 :2
COPY TERM/APP:0 :2

Figure 2a. Custom PRO-NT0 default setup.

Figure 2b. TRSDOS 6.2 JCL file that installs a modified PRO-NT0 and loads the other 32K RAM bank with additional applications and data bases. The responses to Memdisk concern the second RAM bank and single-density operation.

put the other to use. Figure 2b shows a JCL procedure that loads PRO-NT0 and copies specified applications and data bases to Memdisk. You must format Memdisk for single-density operation to keep the granule size as small as possible and to minimize wasted space.

While DOSAVE preserves the contents of the video screen, you can't simply restore the screen by listing the contents. Each 80-character line ends with a carriage return and this makes the display double-space. Also, writing to the last location on the screen (lower right corner) scrolls the entire screen.

I discovered a problem while using the LIBEXEC function. Apparently, LIBEXEC sets a flag to let TRSDOS know that it can use only the overlay buffer region. LIBEXEC did not clear this flag and subsequent uses of DOS commands or applications after exiting PRO-NT0 worked incorrectly. Misosys supplied a patch to correct this problem.

Conclusion

PRO-NT0 is an excellent tool. Not only does it have applications immediately available for use, but the large amount of technical information provided makes it easy for programmers to use it for other applications. And the documentation (90 pages) is clear and succinct. Disregarding the few problems mentioned, this package is truly outstanding. ■

Talking Through Windows

by Edward Spitzbarth III

★ ★ ★ ★

Window-Comm runs on the Model III (48K) and requires one disk drive. Pacific Software Consultants, P.O. Box 5, San Luis Rey, CA 92068. \$18.95.

Easy to use: ★ ★ ★ ★

Good docs: ★ ★ ★ ★

Bug free: ★ ★ ★ ★

Does the job: ★ ★ ★ ★

Window-Comm is a unique Model III program that combines telecommunications with pull-down windows that display system options and up to four independent disk files, all while the telecom program runs. Window-Comm not only makes telecommunicating relatively painless, it makes fairly good use of windows within the program. But the file display windows only let you peek at documents—they're too small to qualify as truly utilitarian.

According to the manufacturer, the Model 4 Window-Comm, which should be out by the time you read this, will feature a number of enhancements over the Model III version, including the ability to make larger windows.

Set-Up

When you start the program, the main menu window automatically appears. Here, you change baud rate and parity and stop bits, and enter another mode to configure the terminal program to your specifications.

You answer questions on 20 parameters to set control codes, receive codes, and auto-dial codes. Control codes dictate which keys activate which program functions. For example, you might set control-S to pause data coming in from a mainframe. This convenient system obviates the need to remember hex codes to assign functions.

The receive codes open and close the buffer and assign a default file name to any data captured in Window-Comm's buffer. The auto-dial codes comprise the characters you send to your modem if it has auto-dial capability. If you don't want to change any option, pressing the enter key leaves it unchanged. After you set program options, the terminal configuration setup screen rolls aside, bringing you back to the main menu window.

You enter the communications mode from the main menu. Pressing the break key pulls down a window allowing you to auto-dial a number, disconnect the line, review the data captured in the buffer, or pull down a help window.

However, when you hit the break key to pull down a window or hit the clear key to go back to the main menu, Window-Comm freezes the characters on the screen but doesn't stop the host computer from sending information. This becomes a problem when you go back into communications mode and discover you missed something that was sent while you were using the windows.

The capture buffer has a nice feature. While it can only store 4K, it automatically sends a pause code to the host computer when it is full, saves the buffer's contents to disk, and then starts receiving again.

File Display

One of Window-Comm's handiest options lets you display disk files in windows. You can examine files from within the terminal program or even while you communicate with another computer. When you call up an ASCII file, a window rolls down from the top of the screen, displaying the first few lines of the file.

You can scroll through the file by using the down-arrow key. It's possible to open up other types of files besides those in ASCII format (like Basic programs), but they usually show up as garbage.

You can open up to four files at once, each successive window bigger than the previous one and partially covering it. One drawback I found was the size of the windows—they're tiny, the first one being only 23 characters wide by eight lines long and the last one 29 characters wide by 13 lines long.

While you have a file open, you can open an "actions" window to access different file functions. The first option spools and prints a file. You can also display a disk directory, go back into communications mode, send and receive files, kill files, access a help window, and display the date and time. If you use the printer spooler, you can invoke any option in the window, open and close other files, or do any other action (except go back to the communications mode) and the program will continue to print the file.

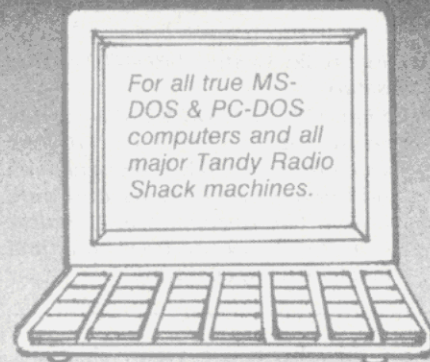
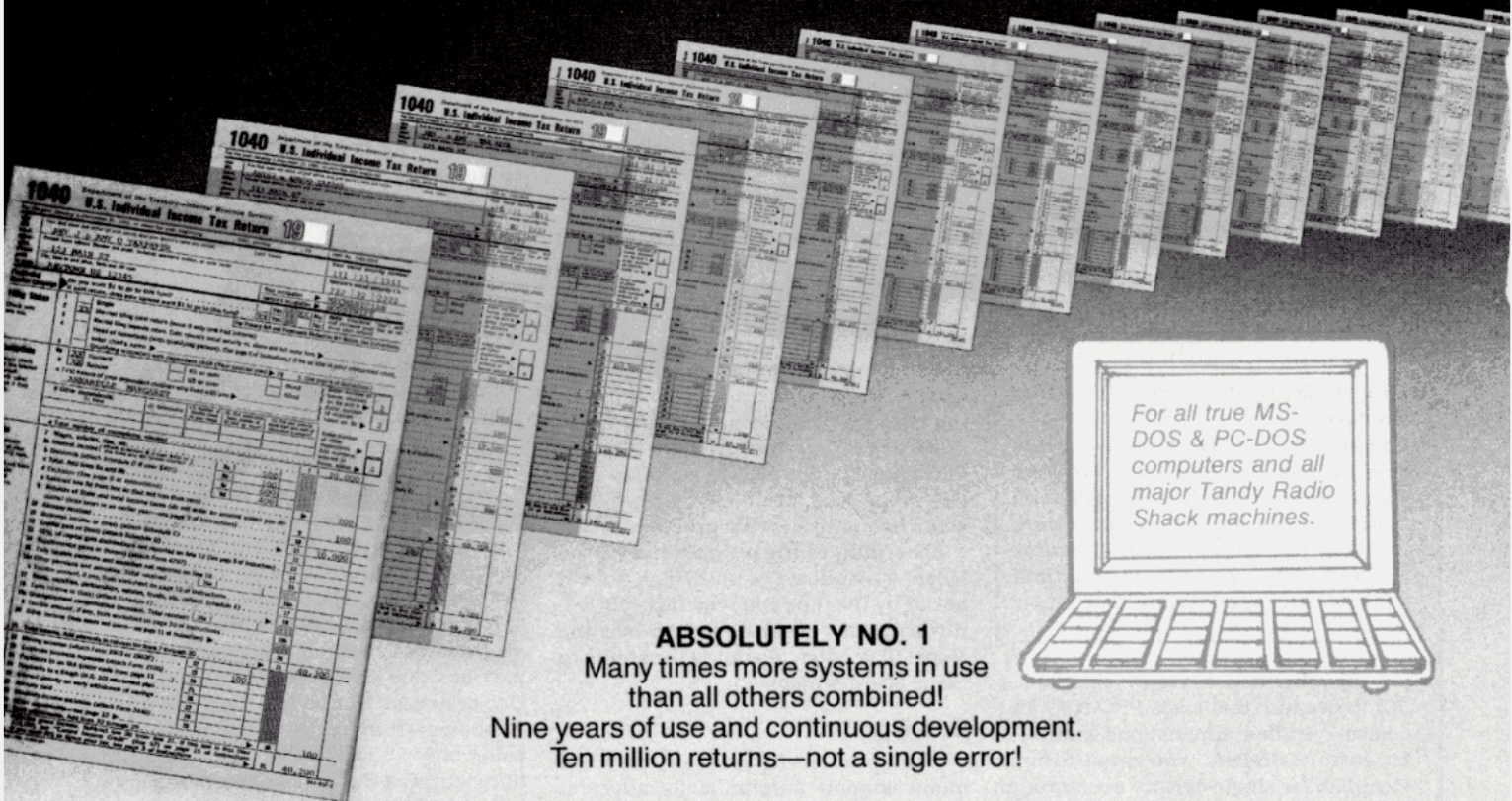
Even if you go into communications mode, the program continues printing where it left off if you reenter the main menu. Also, if you left any files open when you went into communications mode, you'll find them still open when you come back into the main menu. This is handy if you want to quickly reference a file while you are communicating with another computer.

Conclusion

Window-Comm is a unique application for the Model III. It's a good terminal program for someone looking for easy operation without a lot of confusing features. ■

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Multifunction Multi-Basic Compiler

by Mark D. Goodwin

★★★★

The **Multi-Basic Compiler** runs on the Models I, III (48K), and 4 (64K) and requires two disk drives. Alcor Systems, 1132 Commerce Drive, Richardson, TX 75081. \$89.95 for one version, \$110.95 for two, and \$131.95 for all three.

Easy to use: ★★★★★

Good docs: ★★★★★

Bug free: ★★★★★

Does the job: ★★★★★

Alcor Systems' Multi-Basic adds some interesting new twists to Basic compilers. Not only can it compile both Microsoft Basic and CBasic (CP/M) programs, it lets you extend Basic's capabilities by supporting user-defined procedures and functions. And you can write programs developed under Multi-Basic as a collection of separate program modules in a Pascal-like fashion while retaining Basic's versatility. Although Multi-Basic exhibits a few problems, it is a superior compiler.

The Multi-Basic System

The Alcor system comes on TRSDOS data disks, with patch files included for the LDOS (I/III), NEWDOS/80 (I/III), MULTIDOS (I/III), and DOSPLUS (I/III/4) operating systems. While the disks contain an extensive number of programs, the Multi-Basic system comprises only six major programs: a text editor, compiler, optimizer, code generator, run utility, and linking loader.

Alcor's full-screen text editor supports numerous features, including character insertion and deletion; line insertion, deletion, duplication, split, and merge; block insertion and deletion; tab setting and clearing; string search and replacement; automatic indentation; and more. Although the manual provides full explanations for the editor, three on-line help files provide quick references.

Because of memory limitations on the Models I and III, the compiler (called MUBAS) runs a series of program overlays during program compilation. The Model 4 version of MUBAS works as a stand-alone compiler for small and medium-length programs and as an overlaid compiler for longer ones.

You have to save your files in ASCII format to compile them. Also, you must make each program line fewer than 256 characters long and include leading and trailing spaces with all Basic key words.

Although Model 4 Basic programs meet these spacing requirements, you have to modify Model I/III programs. Alcor supplies a utility to make the necessary changes.

MUBAS compiles a Basic program in one pass and generates a pseudo-code (p-code). Because it generates the p-code in this single pass, the code isn't as efficient as it could be. Therefore, Alcor includes a p-code optimizer to reduce a compiled program's size by 10 to 30 percent.

You can increase a compiled program's execution speed by translating the p-code into machine language with the code generator provided (CODEGEN). Although CODEGEN can greatly increase execution speed, the resultant machine-language program will be from two to three times larger than the original p-code. While machine code translation of entire programs is sometimes impractical, you can realize substantial increases in execution speed by translating carefully selected program modules.

Once you compile a program, you can easily test it with either the BRuntime utility or the linking loader (Linkload). Besides executing a program, Linkload can generate /CMD files of compiled programs. Multi-Basic produces /CMD files by linking the program modules with any necessary machine-language routines, the library routines, and the run time support overlay.

Alcor provides two different run time support overlays: Runtime/OVY and BRuntime/OVY. While Runtime/OVY supports Multi-Basic modules only, BRuntime/OVY provides additional support for Alcor Pascal and Alcor C program modules.

Basic Support

Multi-Basic supports almost all Microsoft Basic key words, with a few minor differences. In addition, it supports a number of predefined procedures and functions (see Fig. 1) that you must declare as externals to use within a program.

As mentioned, Multi-Basic also supports user-defined procedures and functions, including nesting, local and global variables, local error-trapping, and recursion. Some of its other features include unlimited string size, no string garbage collection delays, only referenced program lines with line numbers or descriptive labels, and variable names of up to 255 characters.

Incompatibilities and Bugs

Although many programs compile correctly, a few incompatibilities exist between Multi-Basic and the TRS-80 versions of Microsoft Basic. Under TRS-80 Basic, single- and double-precision numbers can represent values in the range of

The Star Ratings

80 Micro's star ratings reflect our reviewer's impression of a product.

In most cases, the overall rating is an average of the ratings in each of the four specific categories. However, some overall ratings may be higher or lower than this average, depending on the reviewer's subjective opinion.

The stars mean:

- ★★★★ Superior;
- ★★★★ Excellent;
- ★★★ Good;
- ★★ Fair;
- ★ Poor.

The ratings terms translate as follows:

Easy to use: How easy is it for the new user to use the hardware/software/book?

Good docs: Is the documentation clear and helpful in explaining the product's use and anticipating user problems?

Bug free: Did the reviewer encounter any bugs while using the product?

Does the job: How well does the product do what it was designed for?

BREAKKEY		Enables and disables the break key
CALLASM		Calls a machine-language subroutine
CALLDOS	(Models I/III)	Executes a DOS command
	(Model 4)	Calls an SVC
EXTMEM	(128K Model 4 only)	Passes data to and from the top 64K
GETC		Gets a byte from a disk file
PUTC		Sends a byte to a disk file
NO-MESSAGE		Disables stack and heap message at program termination
Set		Sets a graphics pixel
Reset		Resets a graphics pixel
Point		Tests a graphics pixel

Figure 1. Multi-Basic functions.

$\pm 1^{38}$ to $\pm 1^{36}$ with seven and 16 significant digits, respectively. However, Multi-Basic single- and double-precision numbers can represent values in the range of $\pm 1.7^{36}$ to $\pm 1.7^{38}$ with six and 16 significant digits, respectively.

Unlike TRS-80 Basic, Multi-Basic resets the line position only after a carriage return. Therefore, Print and LPRINT statements may need slight modifications for proper operation. The Multi-Basic Chain statement functions like Microsoft Basic's Run statement, not like the Model 4 Chain statement. And the Multi-Basic LOF function does not return the number of records in a file. Instead, it returns the number of bytes in a file.

While I was putting Multi-Basic through its paces, a few bugs cropped up. The Model III RUNB didn't display

Most integer tests showed dramatic speed increases, but single-precision results were disappointing.

the prompt string for Line Input and Input Line statements. However, Linkload handled both statements correctly.

All versions of MUBAS fail to correctly compile Print statements that end with a comma following a variable. When

Multi-Basic executes such a statement, it invokes a carriage return after printing the variable. Nevertheless, you can easily overcome this compiler error by inserting a null string (" ") between the variable and the comma.

Performance

To test Multi-Basic's performance, I compiled the benchmark programs found in 80 Micro's "Marking Time" article (May 1984, p. 96). The results of the tests appear in Fig. 2.

Almost all the integer tests showed dramatic speed increases after compilation with Multi-Basic. However, I was disappointed with the single-precision test results. Because Microsoft Basic doesn't support double-precision For...Next loops, I was only able to perform four of the benchmark tests using double-precision variables.

Nevertheless, the four tests do illustrate a significant reduction in program execution time. While the single-precision operations are slow, most programs don't use single-precision number types extensively. A well-written program should only use single- and double-precision numbers when it's absolutely necessary. Compiled versions of well-written Basic programs usually run many times faster than their interpreted counterparts.

Documentation

Multi-Basic comes with an extensive manual (400 pages) that's divided into five sections: beginner's guide, editor manual, system manual, reference manual, and the advanced development package.

The beginner's guide covers topics such as making program back-ups, overview of the editors, and the program development process. The other four manuals cover the specifics of each part of the system.

Each of the five manuals has a complete table of contents and an extensive index. Perhaps the only improvement to the documentation would be the addition of a quick-reference card. While I found the manual well organized, its massive size makes it difficult to find a particular topic quickly.

Conclusion

Multi-Basic compiles most programs with few or no modifications. Furthermore, the resulting programs almost always run faster. The best part of Multi-Basic is its support of user-defined procedures and functions. Anybody who wants to compile existing programs or write Basic programs in a Pascal-like fashion should consider Multi-Basic a must purchase. ■

Continued on p. 114

Program	Integer (in seconds)				Single-precision (in seconds)				Double-precision (in seconds)			
	III		4		III		4		III		4	
	PC	ML	PC	ML	PC	ML	PC	ML	PC	ML	PC	ML
For...Next loop	33	11	40	20	308	292	400	383				
Counting loop	11	2	19	6	51	47	73	73	51	48	68	64
Arithmetic statement using variables	14	8	22	16	87	85	110	108	64	64	67	67
Arithmetic statement using constants	13	8	24	17	99	98	133	131	68	68	74	74
GOSUB loop	15	8	27	16	91	89	128	125	68	67	74	72
For...Next loop, GOSUB, and array setup	19	8	28	12	151	155	203	196				
Array-handling within a For...Next loop	18	6	24	9	128	122	152	147				
Sieve of Eratosthenes	12	2	17	6	77	73	100	96				
String manipulation using the MID\$ statement	109	102	152	144	162	159	207	203				
String manipulation using a bubble sort	37	22	36	18	100	94	107	100				
Disk input/output and screen printing												
Write	25	25	114	114	25	25	157	157				
Read	200	200	183	183	230	220	200	200				
Print	125	125	93	87	154	154	107	107				

PC = p-code version

ML = machine-language code version

Results are a percentage of the execution speed of the interpreted Basic program.

Figure 2. Multi-Basic's benchmark results.

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for the model 1 or 3 using
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includes full screen text editor and
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Multi-Basic compiler

for the model 1 or 3, or 4 using
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DOSPLUS, or MULTIDOS;
includes full screen text editor and
advanced development package

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Sale Price \$89.95

This is a full K & R standard implementation of C that includes a Unix compatible function library. The package also includes a 450 page manual with a tutorial on using the C language. If you've been wanting to learn C, this is the package you need.

Features Include

char	8 bits	initializers
short	8 bits	typedef
int	16 bits	static
unsigned	16 bits	auto
long	32 bits	extern
float	32 bits	struct/bit fields
double	64 bits	union

Execution speed on the Model 3 for 10 iterations of the prime number program published in Byte, Jan 83, page 284.

LC Compiler	105 secs.
Alcor C	78 secs.

Special Bonus

Buy one version for \$89.95 and get the version for the other model for only \$21.

Multi-Basic is a TRS-80 BASIC compatible compiler. The Model 4 version supports everything in the TRSDOS 6 BASIC interpreter except the COMMON statement. The same support is provided in the Model 1 and 3 versions so programs are portable. The CMD statement is the only statement from the Model 1 and 3 BASIC interpreters that is not supported.

Multi-Basic also supports advanced language features like multi-line procedures and functions, recursion, and dynamic string management (no long pauses for garbage collection).

Execution speed on the model 3 for 10 iterations of the prime number program published in Byte, Jan 83, page 286.

BASIC Interpreter	4570 secs.
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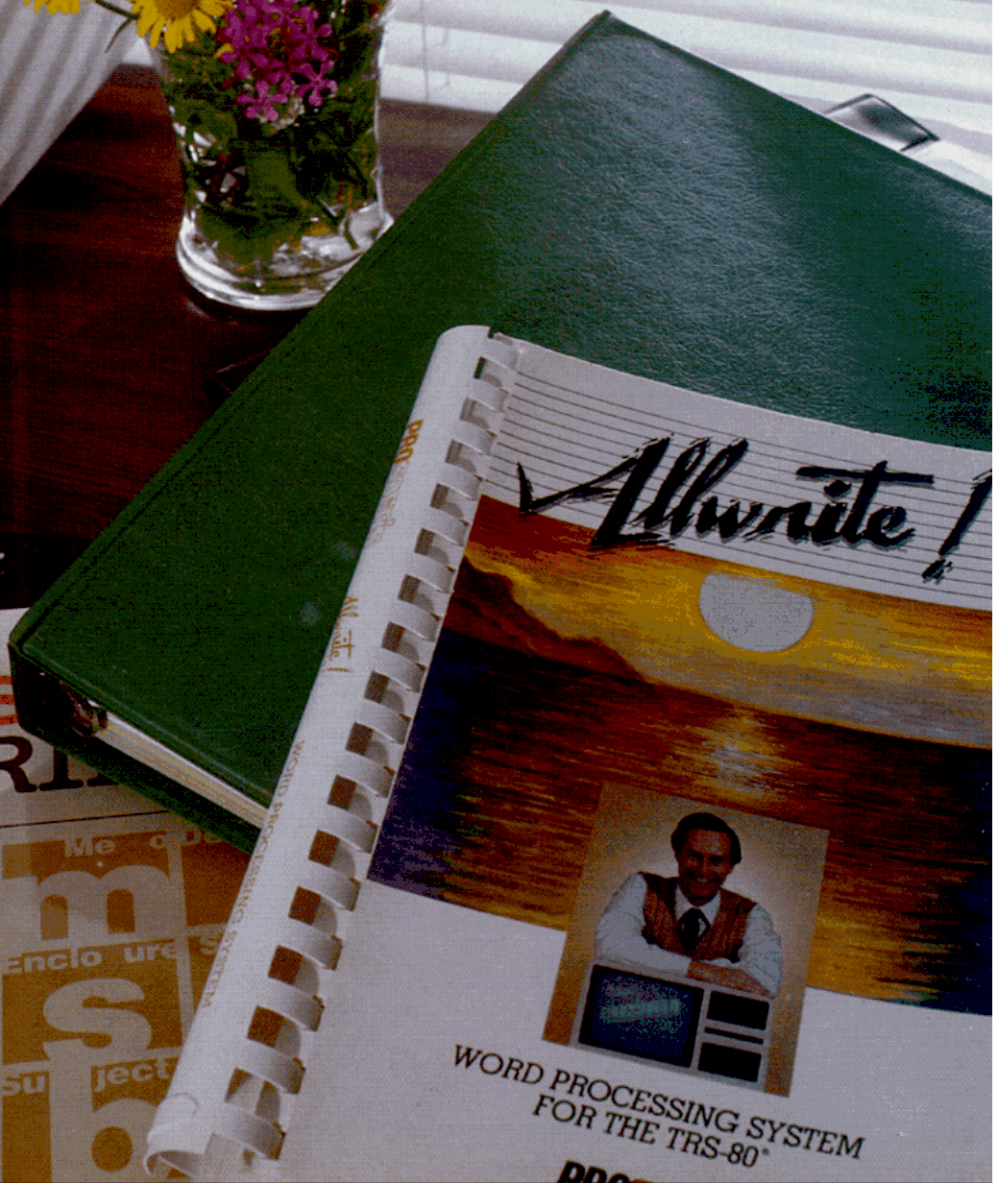
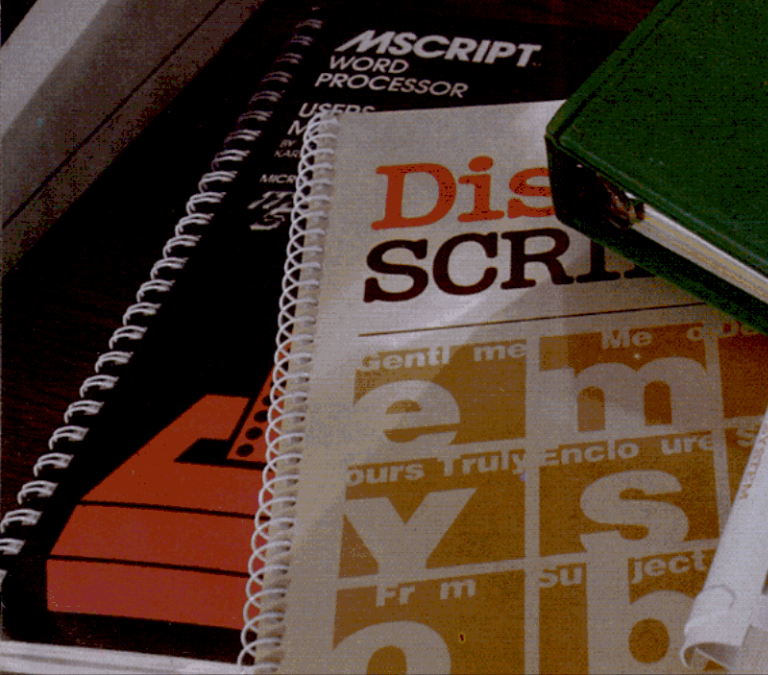
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Unix is a trademark of Bell Laboratories
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WORD PROCESSING SYSTEM
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Prose and Cons: Advanced Model 4 Word Processing

A look at the advanced features available with Model 4 word processors.

by David Dalton

On the desk at my office is a terminal wired to an Atex publishing system, a mainframe. The computer itself fills a room and can handle more than 100 users simultaneously. It's connected to a satellite receiver and numerous telephone lines that constantly provide it with information. Rounding out the system are three expensive, high-speed typesetting machines. That's word processing power.

On my desk at home is a Model 4. It's connected to a 10-megabyte hard disk drive, a modem, and two printers, one a dot-matrix, the other a daisy-wheel. That, too, is word processing power.

The fact is, you can do almost any word processing job you want on a Model 4—if you have the right software. You'll find programs suited to scholarly work, heavy business use, personal use, or telecommunications. Nowadays, all word processors can handle functions like search-and-replace and block moves; it's the extras that distinguish one program from another. In this article, I'll compare eight Model 4/4P word processors, concentrating on advanced or special features. I include a quick-reference chart that lists special features for each program (see Table 1).

Allwrite

This word processor isn't for everyone. It's powerful (and therefore complex), and it's also expensive (see Table 2 for information about manufacturers and prices). Allwrite is best suited for office use or for people who need complex printer formatting. Allwrite treats a printer much like a typesetting machine and is perfect for producing camera-ready documents for reproduction.

Like many mainframe systems, Allwrite treats editing and formatting as separate functions. You use the editor to type in the text. A separate formatter program reads your text file from disk and talks to your printer. This process gives Allwrite far greater formatting capabilities than other word processors: complex indentation (including hanging indent, which lets you indent several lines within a paragraph), neatly aligned tables, multiple columns on a single sheet, and footnotes. Allwrite is the only product discussed here that produces footnotes efficiently, and would be an excellent choice for anyone writing scholarly papers or books.

Allwrite has powerful features for handling form letters and mailing labels. It can even do indexes. To use Allwrite for indexing, you embed control words in the text. Allwrite automatically sorts these control words into alphabetical order, combines multiple references, and sorts the page numbers into numerical order. You can produce a table of contents through a similar process.

Most programs give up if they encounter a bad sector while reading a disk file, so you can't load any of the file. Allwrite skips the bad part and continues reading the file; it replaces the unreadable text with graphics characters so you can see how much is missing. All programs should be so kind.

If you have 128K of RAM in your Model 4, Allwrite divides the extra 64K of memory into two banks of 32K each. This way, you can have two extra files in memory—as many as three files at once. You can switch from one file to another, but you can't stretch a file from one memory bank to another.

With most word processors, you simply press the enter key to start a new paragraph. Allwrite gives you a second way: embedded commands. The command `":pp"` tells the formatter to start a new paragraph. The command `":sk 2"` tells it to skip two lines. All these control words, and Allwrite sports a lot of them, are two-letter mnemonics that you must precede with semicolons.

If you're used to a word processor such as Scripsit, which doesn't rely on embedded formatting commands, these control words will seem awkward. Allwrite tries to make it easier for you by giving you macro keys, called "soft keys," to print common commands automatically.

Another disadvantage of this type of formatting is that what you see on your screen may bear almost no resemblance to the printed output—paragraphs don't look like paragraphs. Allwrite tries to overcome this with a nice "print-to-screen" feature.

For all its complexity, Allwrite is surprisingly easy to use. It comes with one of the best setup utilities I've seen. Before you begin, you run an installation program that asks you a series of questions about your printer (Allwrite supports a long list of printers) and gives you a number of program initialization options.

The editor is fast, powerful, and friendly. The Help command brings up a menu of help files. A Whoops command lets you undo something you wish you hadn't done (with some limitations). You can use the entire screen to type in text since no status line appears on the screen until you execute the Status command.

You can program each of Allwrite's 22 soft keys to contain up to 22 characters. This saves time in typing frequently used phrases or commands.

Another nice feature is Allwrite's ability to link files. You can't have a single file larger than available RAM (over 30,000 characters). If you're working on a book, you might have a separate disk file for each chapter. Allwrite lets you "link forward" chapter 2 to chapter 3, and "link backward" chapter 2 to chapter 1. The files don't have to be on the same disk. Linking also works for printing, so you could print out a book manuscript automatically.

Allwrite can also handle right-justified proportional printing if your printer supports it. In proportional printing, not all characters are the same width; a "w," for example, is wider than an "i." A typewriter, and nonproportional printers, print all letters at the same width. "Justified" simply means that the right and/or left margins are even rather than ragged. Allwrite did a good job with proportional justification on my Juki 6100 daisy-wheel printer.

The ads for Allwrite are correct when they say you don't need an expensive computer for heavy-duty word processing. If Allwrite and a Model 4 won't do what you need, then you probably need a \$10,000 computer and a real typesetter.

Lazywriter

This program should never have been named "Lazywriter." The name makes it sound as if the program were lazy or only lazy people used it. It's not a lazy program at all. It's a full-featured, well-designed word processor I wish I'd discovered long ago.

Lazywriter has one feature that's unique among Model 4 word processors: built-in telecommunications. You can make a call via modem using Lazywriter and capture a file for editing and printing. You can also upload files to other computers. Some of the bells and whistles you'd expect to find on a full-fledged terminal program, such as auto-dialing, are missing in Lazywriter.

but, after all, it's a word processor. I found it a simple matter to use Lazywriter to write a text file and transfer it by modem to the mainframe at my office. If you use your computer heavily for both word processing and telecommunications, as I do, you'll appreciate this feature.

When you buy Lazywriter for the Model 4, you get two versions: one for use in Model 4 mode under TRSDOS 6.X or Model 4 DOSPLUS, and one called "Model 4 + 3" that you can use in Model III mode with any of the major Model III DOSes. The Model III version enables Model 4 features like the 80-column by 24-line video display and faster clock.

Lazywriter's Search and Replace commands are excellent and include wildcard and backwards searching. You can mark a spot in a file and return to it with a command. A disk catalog utility is built-in. The rescue utility for saving lost text is probably the most powerful of any Model 4 word processor. A strip utility removes control codes from files or translates any character to any other character. You can adjust the speed of scrolling, repeating keys, and so on as you please.

You can chain many files for unattended printing. You can "print" to a disk file, a nice feature if you use a hardware printer buffer or a software print spooler. You can

also "print" to the screen to check your formatting. You can program "X keys" with text strings or commands to save yourself keystrokes. You can even do indexing, though Lazywriter's indexing abilities aren't as complete as Allwrite's.

The Lazywriter manual is thorough, and its index is decent. A command summons a help file.

Lazywriter's formatting abilities are excellent, though not in Allwrite's league. You can get hanging indent, vertical centering, and ragged left. Proportional justification is available, but you must buy a custom driver at extra cost (\$29.95).

Lazywriter comes with plain vanilla printer drivers for both serial and parallel printers. Certain printer functions, such as underlining, boldface, or italics, aren't as automatic with Lazywriter as with some word processors. Yet Lazywriter does let you embed codes in your text for special tricks such as underlining or italics. (An upgrade to Lazywriter was due for release as this article went to print.)

Lazywriter would be acceptable for office use if you don't use form letters (if you do, then you want Allwrite, SuperScript, or LeScript). Lazywriter is ideal as a personal word processor for serious and heavy use—or for writers, in other words, who aren't lazy.

LeScript

LeScript is fast, nimble, and has a pleasing personality. When I need a word processor in a hurry, say, to read a file I've captured over the telephone from another computer, I always load LeScript.

Like Lazywriter, LeScript runs in Model III mode and enables the Model 4's 80 by 24 screen and high-speed clock. It takes you a step further, though. If you have 128K, LeScript will use your extra RAM, even in Model III mode. This means that a single LeScript file can be more than 90,000 characters long. Allwrite can have more than 90,000 characters in memory at once, but not in a single file.

LeScript has excellent printer support and includes custom drivers for dozens of printers. If your printer supports proportional printing, LeScript can handle it. Its printer formatting abilities are good, but LeScript's ease of typing and editing are what I really like.

Routine jobs like inserting, deleting, moving blocks, or simply scrolling all seem faster and more efficient with LeScript. Formatting boldface, underlining, and italics is easier with LeScript than with any other Model 4 word processor, and you can see what you're doing on the screen. To underline, for example, you position the cursor over the character you

	Allwrite	Lazywriter	LeScript	MScript	Scriptit	PowerScript	Typitall	SuperScript
Indexes	•	•						
Table of contents	•	•						
Form letters	•		•				•	•
Footnotes	•	•						
Files bigger than memory								•
Use extra 64K	•		•					
"Print" to disk file	•	•					•	
"Print" to screen	•	•	•				•	
Macro keys	•	•	•				•	•
On-line help	•	•	•	•		•	•	•
DOS commands or directories	•	•	•	•		•	•	•
Text recovery	•	•	•	•		•	•	
Proportional printing	•	•	•					•
Hanging indent	•	•	•	•				•
Serial printers	•	•	•		•	•	•	•
Legal line numbering	•		•					
Multi-column printing	•							
Model 4 features in III mode		•	•					
Control codes to printer	•	•	•	•		•	•	•
Chain files for printing	•	•	•			•		

Table 1. Model 4 word processor features.

ZBASIC

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Apple IIe, IIc (6502)	*	N/A	N/A	N/A	N/A
Macintosh	4th Qtr.	N/A	N/A	N/A	N/A
CP/M-80 2.2, 3.0	*	*	*	N/A	N/A
TRS-80 Mod I, III, 4, 4p	*	N/A	*	N/A	N/A
Direct commands	*	N/A	N/A	*	*
Maximum scientific digits of accuracy (COS, SIN, ATN, LOG, EXP etc.)	6 to 54 selectable by the user	11 Binary BCD N/A	16	16	6
Device Independent Graphics (same CMDs all graphic models and computers)	*	N/A	N/A	N/A	N/A
SAME File commands all computers?	*	N/A	N/A	N/A	N/A
STRUCTURED: Labels, Functions, LONG IF etc.	*	*	N/A	*	N/A
Same editor commands all versions/computers	*	*	N/A	N/A	*
Sieve benchmark (Byte January 1983, 10 iter/s)	13.7 sec.	14.1 sec.	14.9 sec.	261 sec.	2190 sec.
Shell-Metzner SORT (Sybex-BASIC for Scientist's and Eng. 2,000 5 char strings)	19 sec.	28 sec.	71 sec.	194 sec.	2700 sec.
Executable Machine Leng. & approx. File size	12k	12k	32k	N/A	N/A
PRICE with BCD BCD=No rounding errors)	89.95	109.95	450.00	N/A	N/A
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All benchmarks and accuracies apply to standard 800-PC and 8086. Other: computer and/or CPU benchmark speeds.

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<input type="checkbox"/>	ZBASIC Apple IIe, IIc (128K, Dos 3.3)	\$89.95	\$ _____
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<input type="checkbox"/>	ZBASIC TRS-80 (48K) (Circle Model 1,3 or 4—6.2)	\$89.95	\$ _____
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want to underline and hit a key. The character starts flashing alternately with the underline character (the 4 can't display both at once). You don't have to look up underline codes for your printer and use special printer commands to turn underlining on and off. Once you've told LeScript what kind of printer you're using, all this is easy and automatic.

Of all Model 4 word processors, LeScript is the friendliest to non-LeScript files. It's great for handling plain ASCII files that you never intend to print. I use LeScript for maintaining the many text files on my bulletin board. LeScript can also handle Basic programs (saved in ASCII), EDTASM files, Scripsit files, and even VisiCalc files.

Other features include form letters, chaining files for unattended printing, disk directories, special characters available from the keyboard, and up to 55 programmable macro keys that can contain text strings and command strings with no limit on length. The most recent version of LeScript, version 1.6, adds on-line help. If you replace the help file with a file of your own, you can cheat and edit two files at once.

Do you ever process words in French? It's no accident, apparently, that this program is named "LeScript." If you enter LeScript with a certain command, it talks to you in French. If you have Tandy's European AZERTY keyboard and European character ROM, you'll have something a lot better than a French typewriter.

LeScript is powerful enough for an office word processor. It's great for professional writers or once-in-a-while writers. I'd say that LeScript comes the closest to being the right word processor for the largest number of people.

MScript

When you work with word processors as much as I do, it's easy to forget that many people don't care about complicated new features. They just want a nice, easy-to-learn and easy-to-use word processor for personal use. MScript aims to be such a word processor. It will serve you fine if you need a word processor only for producing such simple documents as letters or school reports.

Using MScript won't tax your brain. The manual assumes you're a beginner and even tells you what a cursor is. MScript provides all the usual means of typing and editing text and a few other important features: you can get disk directories without exiting the program or send special codes to your printer. You also get a small on-line help screen and the ability to recover text after an accidental exit or accidental reboot, nice features for beginners.

The manual even mentions form letters, but MScript's method of producing form letters involves copying blocks and is hardly automatic. If you need form letters or fancy formatting, MScript isn't for you.

Allwrite \$199.95

ProSoft
Box 560
N. Hollywood, CA 91603
818-764-3131

Lazywriter \$124.95
AlphaBit Communications
13349 Michigan Ave.
Dearborn, MI 48126
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LeScript \$129.95
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Scripsit \$99.95
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One Tandy Center
Forth Worth, TX 76102

PowerScript \$39.95
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Dallas, TX 75248
214-733-4475

Typitall \$129.95
Howe Software
14 Lexington Road
New City, NY 10956
914-634-1821

SuperScripsit \$199
Tandy/Radio Shack
One Tandy Center
Fort Worth, TX 76102

Table 2. Product information.

Scripsit

What can you say about Scripsit? It's the plainest word processor around. When Scripsit first appeared for the Model I back in the infancy of personal computers, it was nothing less than wonderful. You could type right over your errors! You could move blocks! You could search for a character string and replace it with something else! You could hyphenate! It was wonderful then. It's boring now.

Tandy's Model 4 version is not much different from its Model I and Model III versions: It uses the 80 by 24 video and that's about it. You still can't send special codes to the printer. You can't even use the function keys.

You should consider Scripsit as your word processor only if you don't process many words.

PowerScript

Scripsit's deficiencies inspired two Model 4 word processor products: PowerScript

and Typitall. To use PowerScript, you must already own Model 4 Scripsit. You can even use Model I or III Scripsit, but those versions won't let you use the entire 80 by 24 screen. An installation program reads Scripsit from disk, then asks you some questions about how you want to customize PowerScript. When you have made your choices, the installation program writes the file PSCRIPT/CMD to disk.

Most of the choices have to do with your printer. PowerScript comes with built-in tables for common printers such as the Epson MX-80 and Gemini. You may customize the tables for other printers. This makes it easier for you to enter commands in your text for underlining, boldface, and so forth. You can also select a Dvorak keyboard driver.

PowerScript's main purpose is to support embedded printer control codes, something Scripsit can't do. It has other nice features, though. PowerScript will give you an alphabetized disk directory, and you can load or kill files directly from the directory.

PowerScript also adds on-line help and the ability to recover text lost through an accidental reboot or failure to save a document to disk.

Consider PowerScript if you like Scripsit but need more printer control. Before I got my Model 4, I used the Model III version of PowerScript for quite a while and found it highly satisfactory.

Typitall

Typitall, like PowerScript, was inspired by Scripsit's deficiencies. Unlike PowerScript, though, it is a complete, stand-alone word processor—you don't have to own Scripsit.

In all its basic functions, Typitall behaves like Scripsit, and it can handle your old Scripsit files. But Typitall adds a lot of features. For example, it supports printer spooling. You can print one file while you work on another. Typitall is the only Model 4 word processor that does this.

Typitall uses the function keys to simplify insertion and deletion. You can send control codes to your printer. You get on-line help and programmable macro keys for commonly used text strings or commands. You can customize Typitall to control such things as the speed of repeating keys and printer functions. You can produce form letters, though its form-letter handling isn't as powerful as LeScript's, Allwrite's, or SuperScripsit's. If you exit Typitall and forget to save your text, you can reload the program with your text intact.

You can use Typitall to edit Basic programs. It can even load a /CMD file and display it in hexadecimal form.

Typitall would be an excellent choice for someone who used and liked Scripsit, but who wants a more powerful program without having to start from scratch.

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PowerSoft News-Flash

PowerSoft Products sends out a neat little newsletter periodically to its customers. We're going to try a limited mini-version of our newsletter here in *80-MICRO* that will contain information that doesn't really fit into regular "ad-type format". This will be a selection of items in a newsletter-type format. So here goes our first... Check it out and see if you like it. Let us know your comments about this type of format - good or bad. We appreciate hearing from you. We appreciate your orders and support as well.

Ok, what's new? *The Model 4D!* The Mod 4 LIVES! The 4D is not the machine that we had first heard rumors of or had hoped for maybe (hi-res built-in, 128K built-in, internal hard disk option, etc.) but it does live on, and that's the main thing. The 4D is the standard desktop Model 4 (newer version with green screen), except that it now contains two *DOUBLE-SIDED* drives (the same ones used in the Model 1000), a *BACKSPACE* key (up where it should be), and now includes *DESKMATE™*. The 4D shows a continued commitment to the Model 4 by Tandy, and we welcome this new addition. With our *SuperCROSS/XT*, you'll be able to directly read PC/MS-DOS™ disks in the 4D! *HURRAY* to Tandy on this one. Now, how about an internal thinline hard drive, please? Minimum of 10 meg. 15 or 20 would be better.

Old-Timer Dept. - What ever happened to Lance Micklus?

Oh yeah... you old-timers probably just had a brain cell jogged into recognition. Lance was a columnist for *SOFTSIDE* (remember that magazine?), wrote several once-popular games and utilities and was also *THE MASTER* of tele-communications and the author of the *ST80-III Smart Term* package (and many other once famous programs) that many of you may have heard of, owned, "borrowed", etc. Well, Lance is back and he's represented by PowerSOFT this time! To get things rolling, we're offering his *ST80-III v.3.5 Smart Term* program (formerly \$150), his *X-10 HOST* package (allows you to leave your computer "on-line" securely with full password protection, etc. (formerly \$50)), and Lance's *Personal Bulletin Board System* (formerly \$40) all together now in one package for the **special price of only \$69.95!** You save **OVER \$150!** If you have a modem (especially a Hayes or other auto-answer type) and don't have good software, *this is the one to get!* Now all three sets of doc and programs are packaged in one binder! Now get **EVERYTHING**, in the way of telecom software, for your computer at one low price! Requires only a single disk drive and 32k of memory. Please specify Model I or III/4 (III mode). \$69.95 + \$3 s/h.

Where's the book? The new edition of *USING SUPER UTILITY+ 3.X, SUPER UTILITY 4/4P & POWERTOOL* is finally shipping! Our ever-popular book *INSIDE SU+ 3.x* has been completely revised and renamed to now include all the changes that have occurred in the past two years since it was last revised. This perfect-bound, large format, slick 100 page+ book explains all the ins and outs of using these powerful utilities to the fullest of their capabilities. If you own any of these programs, this book will really add to your knowledge and maybe explain some things you didn't understand before. Lots of tips, hints, and suggestions are included, as well as helpful information for the novice as well as the "pro". Disk theory is explained as well. The book is now shipping, and a real value at only \$19.95 + \$3 s/h. If you are a new Model 4 owner and a new SU4 owner as well, and never bought the earlier edition of this book then NOW is the time to get some great reading material about what you have!

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SuperScriptsit

It takes considerable effort to learn how to use SuperScriptsit, but Tandy gives you a lot of help. You get two manuals: the usual owner's manual and a training manual. You also get four cassette tapes with lessons explaining SuperScriptsit's features. The manuals are thorough and professional, and the training tapes are a comfortable way to learn as complex a system as SuperScriptsit.

Once you learn SuperScriptsit, though, you have one of the most powerful and capable word processing programs available for any type of microcomputer. SuperScriptsit was clearly designed for office and professional use. You shouldn't consider it as a personal word processor unless your needs are sophisticated and unless you are sophisticated in the use of computers.

SuperScriptsit uses menus heavily. When you load the program, you get a menu asking you what you want to do. Every file carries its "Open Document Options" containing the file name, the author's and operator's names, comments, printer type, and certain information about the document's formatting. Menus also guide you through setting up SuperScriptsit for your computer and printer.

SuperScriptsit's formatting abilities are powerful and quite different from Allwrite's embedded codes. Each paragraph can have its own "tab lines" and margins, and as you scroll through a file with detailed formatting you see this formatting on your screen. A status report, showing you the page number and line number you're working on, always lines the bottom of your screen.

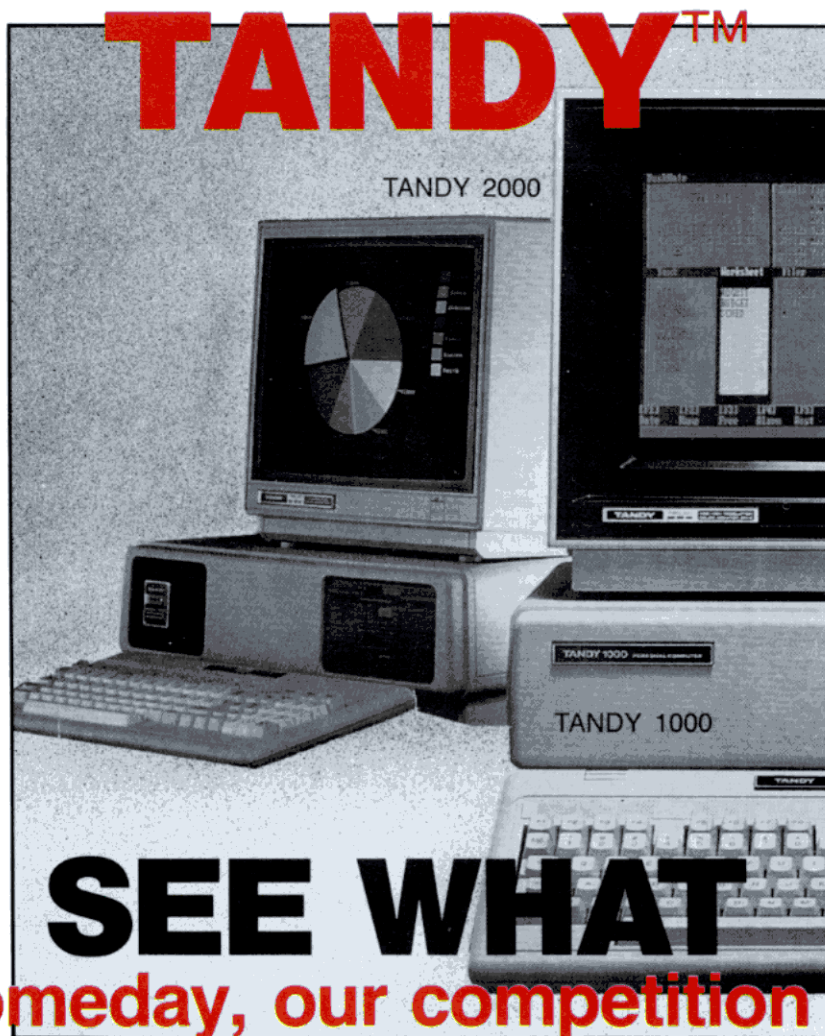
If you give SuperScriptsit commands that don't make sense, it immediately asks you if you want some help.

SuperScriptsit does form letters very efficiently. You can use Profile III Plus to create your "variables file" for SuperScriptsit form letters (other data base programs also have this ability).

Model 4 SuperScriptsit behaves just like Model III SuperScriptsit with some enhancements. It uses the Model 4's 80 by 24 video and uses reverse video to highlight blocks of text. It also uses the Model 4 function keys to make inserting and deleting text easier.

SuperScriptsit can handle very long files—more so than any other Model 4 word processor. It's often said that the only limit on SuperScriptsit file length is available disk space. That's wrong. The actual limit is in the neighborhood of 174,000 characters. With a floppy disk system, it would be almost impossible to exceed the limit. With a hard disk system, it can be done. I created a long file just to see what would happen when SuperScriptsit choked. It said: "There is no more space left on this diskette." That was a fib. There was plenty of disk space.

It's nice to be able to work with files too



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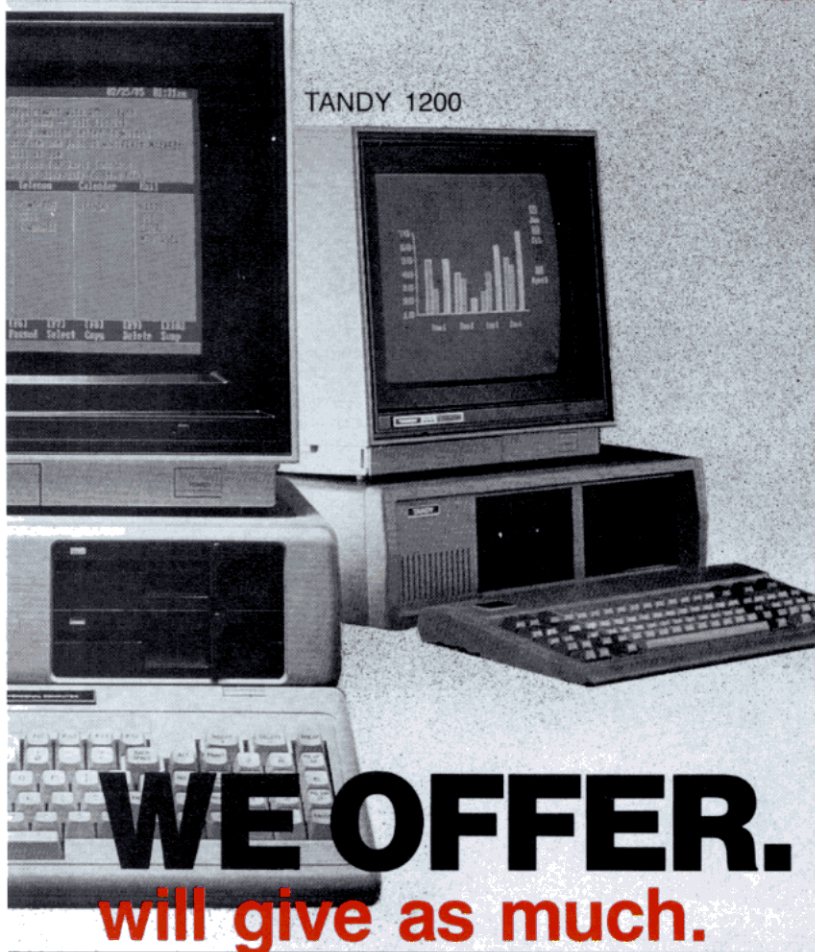
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long to fit in your 64K of memory, but you pay a price for this luxury. SuperScript must often pause to read from or write to disk when you're working on a long file. SuperScript has to access the disk at other times, too; for example, when you're copying blocks.

These waits can be quite long on a floppy disk system. On a hard disk system, though, SuperScript is quick and frisky. I highly recommend SuperScript for a hard disk system (and, conversely, I highly recommend a hard disk system for SuperScript).

You might have a hard time mating SuperScript to non-Radio Shack printers. SuperScript requires printer drivers—disk files that tell SuperScript how your printer's special features work. Tandy supplies drivers for Radio Shack printers; if you have a different brand of printer, make sure a driver is available. I use SuperScript with a Juki 6100 daisy wheel and a Juki printer driver; all the printer's features, including proportional justification, work fine.

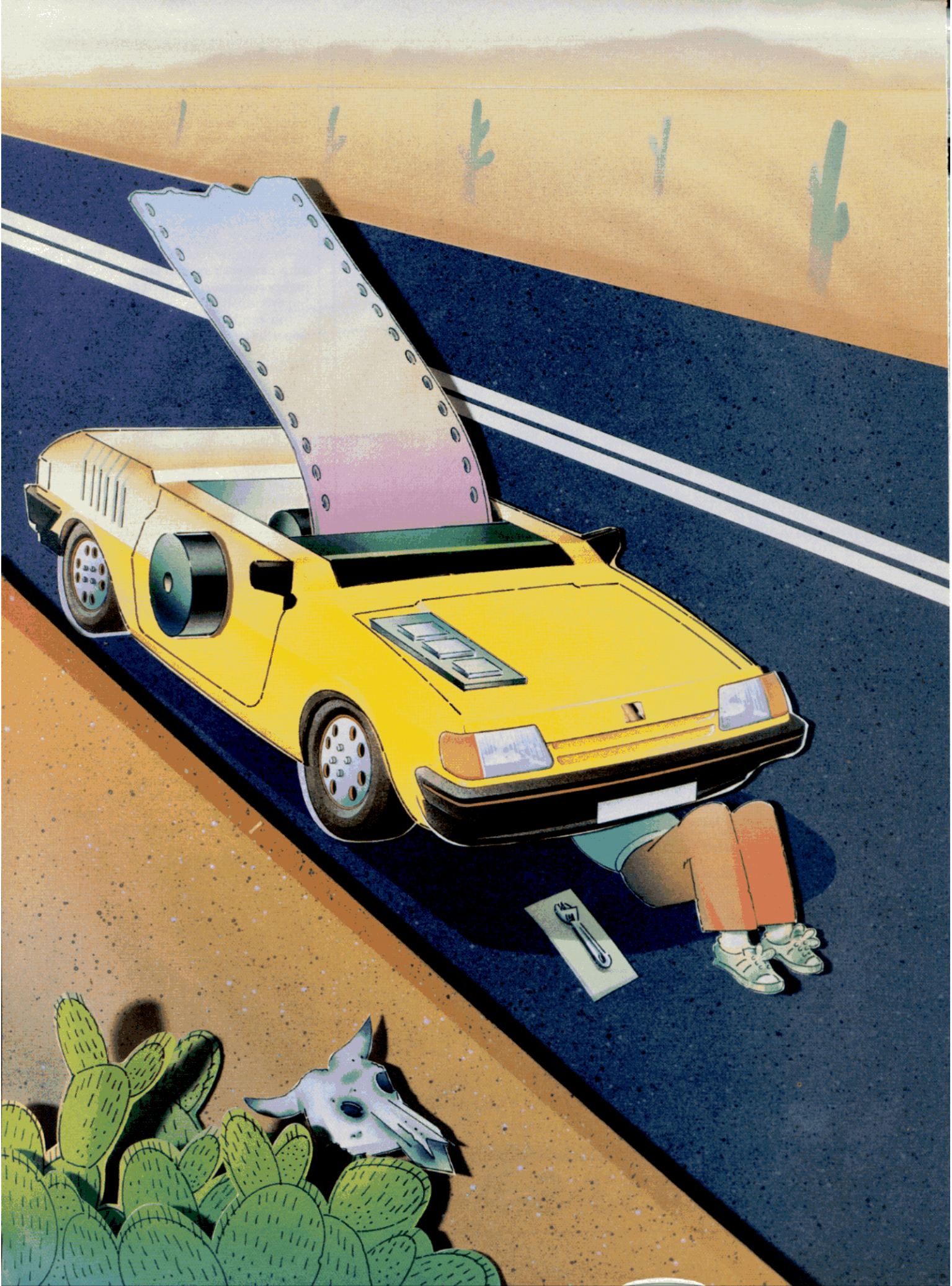
If you process a lot of words, and especially if you have a hard disk on your Model 4, SuperScript is a good choice.

The Last Word

The next time you hear someone talk about "standard" word processing software like WordStar, don't be jealous. You're not missing anything. You should have no trouble finding Model 4 software with the special features you need. Finally, I bet you're wondering which word processor I used to write this piece. I used LeScript. ■

David Dalton has been working with computers and publishing for 15 years. You can write to him at P.O. Box 3159, Winston-Salem, NC 27102, or call his bulletin board at 919-922-3308.





Printer Preservation

A professional technician tells you how to keep your printer in top form.

by Vincent E. Meyer

You've probably put a lot of miles on your printer since its last tune-up. And when was the last time you checked the oil? Like any piece of equipment, your printer needs regular preventive maintenance to keep it running. While you probably know that, you might not know that you can do the upkeep yourself. I'll show you how to clean, oil, adjust, and check out most TRS-80-compatible dot-matrix printers, including the TRS-80 LP and DMP series, the entire Epson family, all Star Micronics dot-matrix printers, NEC models, and more. Most procedures apply to daisy-wheel printers, too. I'll also tell you how to do some simple repairs.

The Fundamentals

All draft-quality printers currently on the market use dot-matrix technology; that is, a series of dots forms the letters. The column of pins on the print head strikes the ribbon and paper in a particular pattern as the print head moves across the page (see the Figure).

Some dot-matrix printers form letters when a column of small heating elements strikes heat-sensitive paper—these thermal printers, as they're called, aren't as common as they once were. Thermal dot-matrix printers are basically the same as impact type printers, even if the print head is a bit different.

I won't go into much detail on letter-quality or daisy-wheel printers that print whole characters at a time. These printers are easy to maintain, but usually require a trained technician to repair them.

Most mechanical printers, be they impact, thermal, or daisy-wheel, involve the same maintenance procedures. I'll address the differences as I get to them. Just keep in mind that your printer's ribbon or screws might be in a different place from that shown in the accompanying photos.

The Big Picture

Before you take your printer apart, you should have some idea of what makes it tick. Almost all printers comprise the same three basic components: a power supply, a control logic or CPU (central processing unit) board, and a printer mechanism (see Photo 1).

The power supply converts ac voltage from the wall outlet to the various voltages needed to run the CPU logic board, printer motors, print head, and so on. The printer will have either a linear or a switching power supply. The more common linear supplies use a simpler design. The smaller TRS-80 printers, the Epson, and most Star Micronics printers use linear power

supplies. The larger TRS-80 printers, the Epson LQ-1500, and some of the Star printers use switching power supplies. The main difference from the standpoint of simple repairs is that you really can't fix a switching supply without knowing what you're doing; linear supplies are easy to fix.

The control logic board includes the CPU, memory, various timing generators, a buffer, and the circuitry that drives the print head and motors on the printing mechanism. Nothing on this board needs regular attention, but many repairs involve this part of the printer. Manufacturers often refer to this as the "mother-board" or "main logic board."

The printer mechanism does the mechanical printing. It consists of the paper feed mechanisms, comprising the line feed motor and related gears; the carriage feed mechanism, comprising the carriage motor and related gears, belts, and cables; the ribbon feed mechanism, which keeps the ribbon moving; and, of course, the print head, which creates the dots that make up the characters. Most problems that I'll cover here involve the print mechanism.

Prep Talk

The procedures I'll describe are simple enough that just about anyone can do them. Don't be afraid of your printer. You won't hurt it, as long as you're careful, and it won't hurt you, if you follow a few common-sense rules. The main thing to remember is to keep your hands out of the power supply's high-voltage area. This is usually well protected, and on most printers it's limited to the fuse and on/off switch. Just about everything else is safely low-voltage.

Before you do any preventive maintenance or simple repairs, you need a few things:

- ✓ A Phillips-head screwdriver
- ✓ Alcohol
- ✓ Q-Tips or cleaning swabs
- ✓ Sewing machine oil or Tri-Flow
- ✓ Windex or Glass Plus (other cleaners might short out the machine)
- ✓ Paper towels or clean cotton rags
- ✓ Small metric sockets or nut drivers (optional)
- ✓ Set of feeler gauges
- ✓ Dr. Scat platen cleaner (available at most office supply stores)
- ✓ A new ribbon or fresh reload ribbon
- ✓ A half-inch wide paintbrush
- ✓ A small flat-blade screwdriver
- ✓ A can of spray degreaser

Ideally, you should use metric tools. Most printers trace their roots to the Orient, where fasteners come in what are called "ISO" sizes, meaning that even

non-metric screwdrivers won't fit perfectly. If you don't have metric wrenches, screwdrivers (yes, metric screwdrivers do exist), and the like, you can usually make do with the nearest English size.

Under the Hood

I'll begin with a routine maintenance session. First, open the top of your printer as you would to thread the paper. On most printers this cover comes off. If you've got an Epson MX or RX series, the smoked gray cover hinges up, and you can remove it by gently pulling up on the left side of the cover. Star printer owners can lift the cover right off. If you're not sure, check your manual.

Take a look around inside the printer, and compare what you see to Photo 2. Your printer might be arranged differently, but if a part in your machine looks like one in the photo, it's probably the same thing. Take a few minutes to familiarize yourself with everything. Note that the print head sits on a carriage that rides on a pair of steel rails. A gear belt or steel cable drives the print head carriage.

Remove the ribbon. If you have an old TRS-80 LP-II or Centronics printer, the ribbon winds into the top of the printer. The easiest way to remove one of these is to hold the printer upside down over a trash can and let the ribbon fall out, then gently remove it from in front of the print head and disengage it from the friction rollers that pull it along.

If you have a Star Micronics printer, start with one spoke and work the ribbon out of all the guides, then remove the other reel. Okidata printers involve the same procedure. I think these are the only common printers with messy ribbons; all the others use some kind of cartridge. If you get ink on your hands, go wash them now, as the ink is easy to get on things and hard to get off.

With the ribbon out of the way, you can get a better look at your printer's inner workings. If you use cheap ribbons or haven't cleaned your printer in a while, you'll see a buildup of glop around the ribbon guides. This mixture of ink, paper dust, ribbon lint, and anything else that may be floating in the air around your printer stains like crazy.

The first step in regular maintenance is cleaning out the printer. Wipe the bigger globs of ribbon buildup off the guides with a dry Q-Tip, then wipe the guides themselves with a rag or swab soaked with alcohol or Dr. Scat. Dr. Scat is specially formulated to dissolve ribbon ink and works a little better. Be careful not to get

either one of them on any clear plastic parts, as the chemicals fog the plastic.

Use a rag or a swab and some Dr. Scat to wipe the ribbon glop from the area near the front of the print head and from any metal parts inside the printer. Use a paintbrush to brush out the paper dust and debris—this stuff can get in the gears and gum up the works.

The rails are precision-ground steel bearing surfaces and they go through holes in the print head carriage to form a linear bearing. It might not look like it, but the carriage and rails form a close, precise fit. Since the carriages on most printers are molded out of a plastic, they might wear if you don't keep them clean and oiled.

Most daisy-wheel printers have heavier carriages to support extra components, and therefore usually have metal bearings. The cleaning procedures are the same. To clean the rails, simply wipe them off with a clean rag and some alcohol.

Before you oil the rails, check to see that the carriage moves easily. On most printers, with three important exceptions, you can reach inside and gently slide the print head carriage back and forth. The exceptions are the TRS-80 LP-VII and DMP-120, and the Leading Edge Gorilla Banana, which are all the same printer. Their print heads are fed by a cable wound on a drum by a gear train, which you should never force, as it jams the feed mechanism. If the carriage binds or feels tight, it means the carriage is worn, some-

thing's stuck between the print head and the platen, or the gears that drive the carriage feed mechanism are binding.

Put a couple of drops of oil on each of the rails that the carriage rides on and gently slide the carriage back and forth. The carriage should slide a little easier than before oiling and should leave a thin, smooth film of oil on the rails. You might need to put a couple more drops of oil along the rails as you slide the print carriage back and forth.

If the carriage was tight before you oiled the rails and got a lot smoother and less tight after you applied oil to the rails, you have a worn-out carriage assembly. Replacing it is a job for your local computer repair company, as it usually requires taking the printer mechanism completely apart. You can probably get a few more months of life out of the old carriage if you keep it oiled, but you'll have to replace it sooner or later.

Removing the Print Head

The best way to clean the print head is to remove it and wipe it off. On a Star Micronics printer, carefully remove the two screws near the front of the print head, set them aside, and pull the print head straight up. On an Epson, look on the left side of the printer carriage for the print head locking lever. Pull the lever out and pull the print head straight. For other printers with easily replaceable print heads, follow the directions in the manual.

For all printers except the Star Micronics, wet a Q-Tip with alcohol or Dr. Scat and clean the ink buildup from the front of the print head. This buildup wears the print head and degrades print quality. The print head doesn't have to be spotless, but it shouldn't have any ink caked up on it. The print head is the only really fragile part of your printer, so handle it carefully. Make sure you don't tear the cable that connects it to the printer and don't scrub too hard when you clean it.

On Star Micronics printers, glue holds the wire guide to the front of the print head. It dissolves if you use a solvent on it. Use a clean, dry Q-Tip to wipe the ribbon buildup and ink from the front of the print head. If the guide looks loose, falls off, or bulges out, your wire guide has become unglued and you'll probably have to replace the print head.

Daisy-wheel printers usually have a lever that lets you change the daisy wheel. This pulls the print head solenoid back away from the platen so you can get at all the guides. Now is a good time to remove the daisy wheel and clean off any ink that might have built up in the hollows of letters like "O," "Q," and "D." Clean plastic wheels with alcohol or Dr. Scat and a Q-Tip or soft cloth. Be careful not to break off any of the petals.

Use a Q-Tip soaked with Dr. Scat or alcohol to remove all traces of ink from the ribbon mask. Use a rag or paper towel and some Dr. Scat to clean the platen. With the

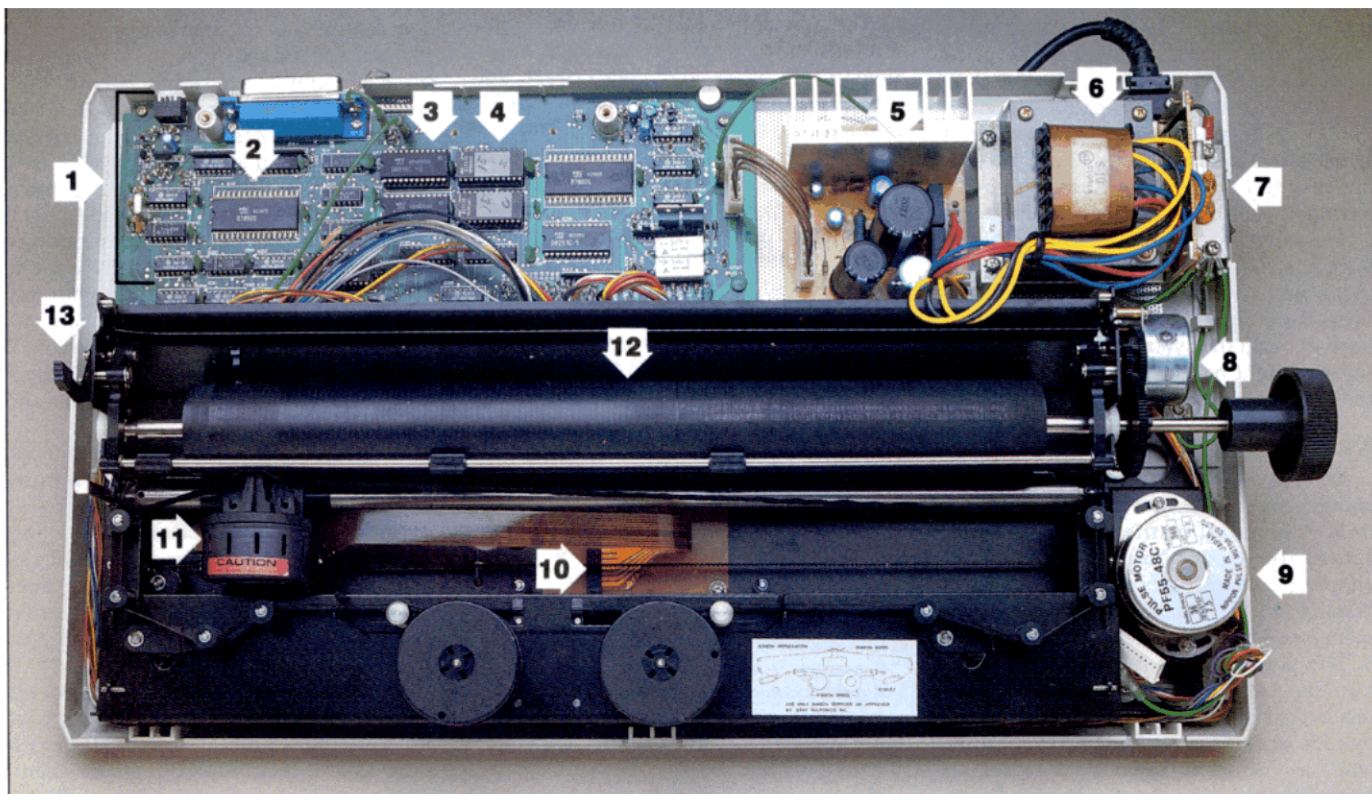


Photo 1. Top view of the Star Gemini-15. (1) Main logic board. (2) CPU. (3) RAM chips. (4) ROM chips. (5) Power supply circuit board. (6) Power transformer motor. (7) Power filter board (danger—high voltage). (8) Paper feed motor. (9) Carriage feed motor. (10) Print head connector. (11) Print head. (12) Platen. (13) Paper release lever.

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paper advance knob, rotate the platen as you wipe it back and forth. Continue until you've removed most of the residue.

Put the print head back the way you removed it. If it was fastened with screws, tighten them finger tight. Be careful. Take your time. Don't force the print head. If the print head slides forward and backward, try to line it up to its original location. You'll probably see a mark from the screw heads or print head body to guide you. On Epson printers, move the locking lever to the right to lock the print head onto the carriage.

For daisy wheels, install the daisy wheel as described in your manual. If you have a TRS-80 DW-II printer, be sure that you line up the red dot on the print head with the red area where the daisy wheel sits, and see that the print wheel clicks into place. Be sure that the print carriage is in the proper operating position (not in the position where you can remove the print wheel).

Install a new ribbon if you have one available. It's not a good idea to use re-inked ribbons, as they seem to shed more ink and lint than fresh ones. Don't use re-inked ribbons with a Star Micronics printer. And don't lubricate re-inked ribbons by spraying them with WD-40. Many re-inkers use an ink formula that eats the glue holding the wire guide on the front of the print head, and WD-40 definitely eats it. WD-40 is OK for other places in the printer you usually oil.

Windex, Glass Plus, or any of the popular window cleaners with ammonia work well for cleaning the case. Spray the cleaner on the outside of the printer and wipe with a clean rag or paper towel. Most of the ink will come off. Don't use Fantastik or other cleaners that feel slippery—they not only conduct electricity when wet, they also leave a film that conducts electricity whenever it gets a little humid. This is OK on the outside of the printer, but if a drop lands in the wrong spot inside, the printer will malfunction.

Clean up the case and cover and reinstall the cover. You've now done a complete preventive maintenance job on your printer.

Mechanics Illustrated

When a printer dies, the problem is either electrical or mechanical. Mechanical problems are relatively easy to fix and you usually don't need much in the way of test equipment. Electrical problems, on the other hand, can be difficult to track down and repair without some knowledge of electronics and the proper tools.

The three most common mechanical problems I see are labels stuck under the platen (usually because the owner tried to remove the labels by turning the platen knob backward), trouble with paper feeds, and trouble with ribbon feeds. The first is the one that gives us the most headaches.

When you roll pressure-sensitive labels backward through the paper path, you push the labels away from the platen and

metal paper guides. The edge of a label catches on something, peels off its backing, and sticks to the paper guide. The farther you turn the platen knob back, the more the label gets stuck. Usually, you have to remove the platen and dissolve the label glue with some kind of solvent. Here's how you do it.

If you have an Epson MX- or RX-series printer with a rubber platen (also known as a friction feed or F/T platen), remove the gray cover, the paper feed knob, and the case's top screws; gently unplug the connector by the board with the buttons on it; and carefully lift off the printer cover. The procedure is the same for most popular dot-matrix printers: Stars, NECs, and so on.

If your printer has a tractor-feed assembly over the platen, remove that, too. On the Star, release the levers on the side and lift the assembly out.

Epson, Star, and Okidata printers have a metal cover over the top of the platen you have to remove. The Epson has two screws on the top; the Star's screws are on the sides. Look at the platen cover's sides or edges to see how it's held on. Remove the screws and put them and the cover where you won't lose them.

On Epson, Star, Okidata, and NEC printers, remove the print head.

Most platen rollers are held in place with bushings, which for the most part are held in with C washers. The best way to remove a C clip is to pry it off with a small

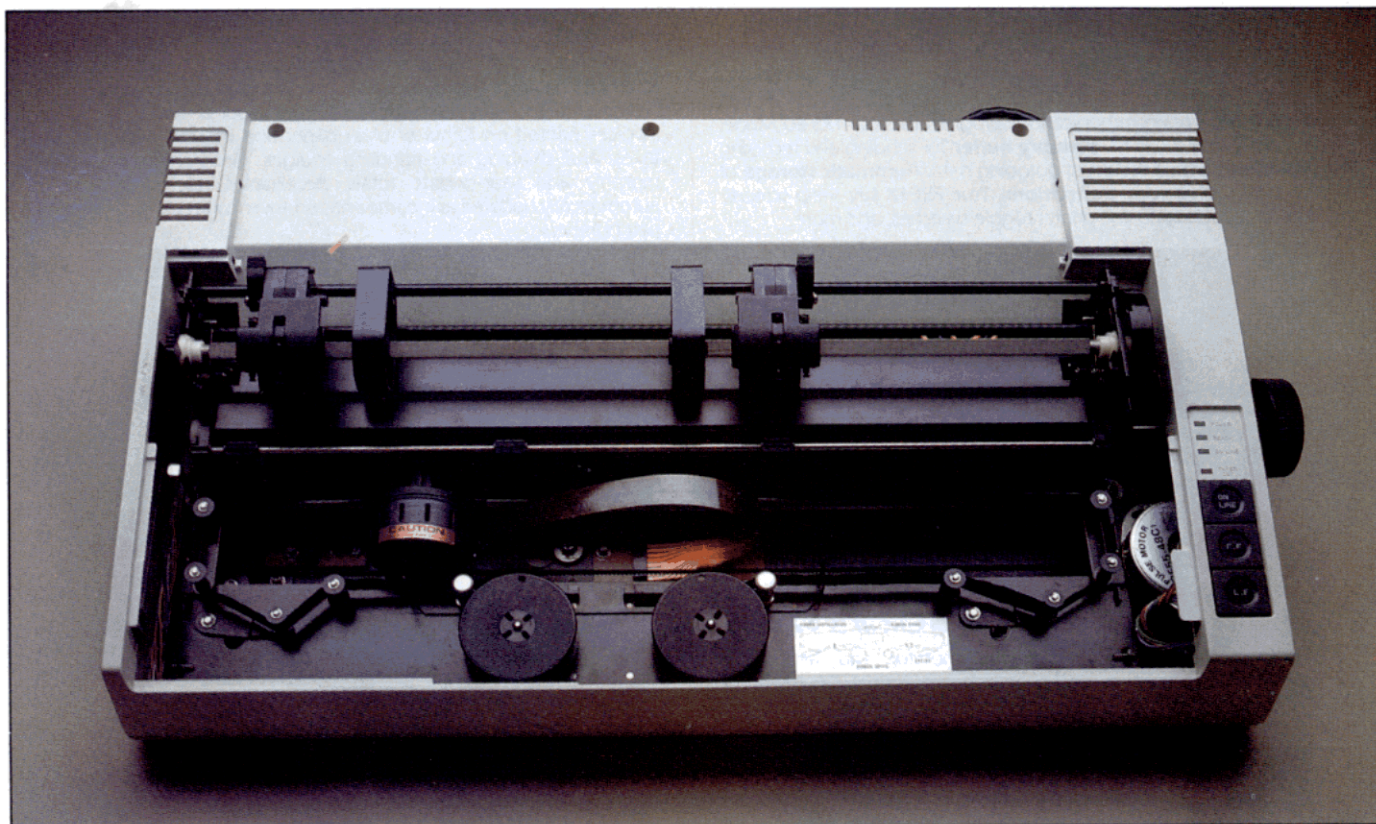
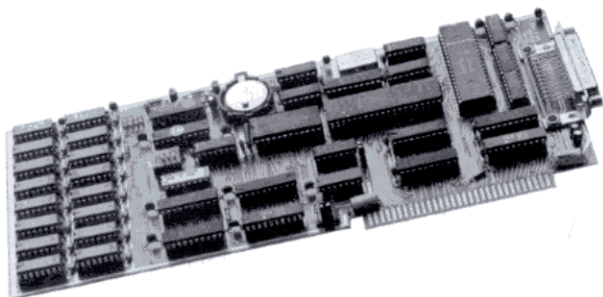


Photo 2. Top view of the Star Gemini-15's print mechanism. The print head is held on with screws; the ribbon goes between the print head and metal shield.

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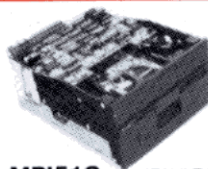
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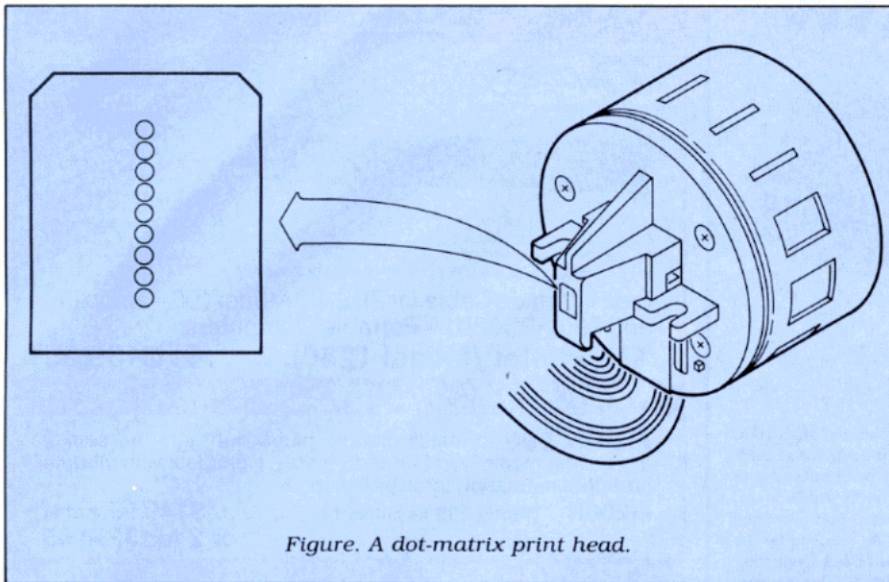


Figure. A dot-matrix print head.



Photo 3. The Star's paper feed gears. The arrow marks the idler gear, which must be moved before you remove the platen.

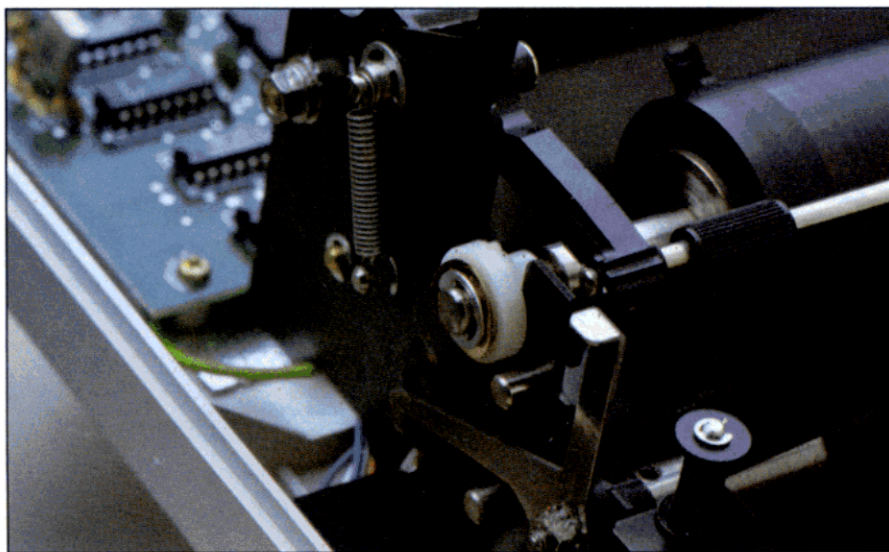


Photo 4. Bushings on the carriage's left side. Note which way the wavy washer is bent.

screwdriver. Here's a step-by-step for the MX- and RX-80s:

1. Slide the print head carriage all the way to the left.
2. Remove the C washer retaining clip from each end.
3. Push in the brass bearing on the end of the shaft until it clears the hole and slips inside the frame.
4. Lift out the platen by lifting the left side out first.

The only difference with the Star Gemini printers is that the idler gear sits in the way (see Photo 3). A small C clip holds it on. Just be careful when you remove the C clips—they have a habit of shooting across the room and getting lost in the rug.

After you remove the C ring, slide the idler gear out of the way and remove the C rings on the platen shaft; remove the wavy washer, plastic washer, and bushing on the left end of the platen. Push the roller to the left until the bushing on the right side clears the hole, then lift out the roller (see Photos 4, 5, and 6).

All printers are a variation on this theme. If I haven't covered your printer, look over your printing mechanism and make a drawing of where the parts go when you take it apart, so you'll be able to put it back together.

If you have a Radio Shack Daisy Wheel II, you're lucky; all you have to do is push down the levers and lift the platen roller out.

Epsons without a friction feed platen have a solid platen held in place with two screws on each end of the printer mechanism. It's easy to remove, but you have to get a lot of stuff out of the way first. Here's how:

1. Remove the two screws that hold the paper feed motor on the printer mechanism.
2. Remove the C clip and the idler gear.
3. Remove the two screws on each end and lift the platen out.

Now that you've got the printer apart, how do you get the labels out? There's only one way—soak them off. Peel off the bulk of the debris by hand, then dissolve the glue with Dr. Scat or some other solvent that eats glue but not on plastic. Alcohol works. So does soap and water, given enough time. Don't ever scrape off a label with a knife or sharp object. Scratches in the paper guides make the paper catch, or cause other problems. Take your time and do it right; a platen is expensive to replace and metal paper guides can be hard to find.

Be sure you get all the glue and label off, then put the printer back together. Assembling it is just like taking it apart, only backwards. Consult the photos or the drawing you made. When you put the motor back on an Epson, start the screws in their holes, push the motor as far away from the idler gear as possible, and tighten the screws. This gives the proper amount of free play and clearance between the motor and the gears.

C clips can be tricky to put back on. The best way is to line them up in the groove and press them in place with a pair of pliers.

Ribbon Blues

You can trace most other mechanical problems to worn or bent parts. When working with a printer, it's important not to force things; printers have many plastic and sheet-metal parts that can break if you're not careful.

When the ribbon starts to bind, it's usually telling you that it's over the age of retirement. A worn-out or defective ribbon can prevent the printer from working properly. On Epsoms and Stars, the motor that moves the carriage feeds the ribbon, too, so a jammed ribbon can keep the print head from moving. To find out if the problem is with the printer or the ribbon, remove the ribbon cartridge and see if the ribbon drive works by moving the print head back and forth. Or put paper in the printer and run the self-test without the ribbon in place. The ribbon drive should move freely.

If the ribbon is motor-driven and the motor doesn't seem to be working, it's probably time for a trip to the service shop. Most printers with separate ribbon feed motors use stepper motors—motors that require special electronics to drive them. When a motor goes, it usually takes the electronics with it, so putting in a new motor won't solve the problem.

When a printer with a mechanical ribbon drive stops working, it's usually because dirt and inky goo gums up the works. Careful cleaning and light oiling should fix the printer. The best cleaner for this job is a solvent in a spray can, like Tune-O-Wash from Chemtronics (681 Old Willets Path, Hauppauge, NY 11788), or a plain, non-silicone tuner cleaner (available from Radio Shack).

When using this cleaner, put newspaper under the printer to protect your work surface and make sure you put clear plastic case parts out of the way, as these solvents will fog them. Direct the spray into the gears where the gunk is. Wear old clothes when working on dirty printers, as spray solvents can spatter ink all over the place.

If the ribbon drive doesn't work after cleaning and oiling, the gears probably need replacing. As strange as it might seem, many plastic mechanical parts tighten up when they wear.

Feeding Frenzy

When paper doesn't feed, it usually means that you've got jammed paper feed gears or a burned-out paper feed motor. With the power off, see if the paper feed knob turns freely. If it does, you probably have a motor or electrical problem. If you can feel the gears binding, the gears are either worn or dirty.

Spray cleaner comes in handy here, too. Spray the gear train with a degreaser

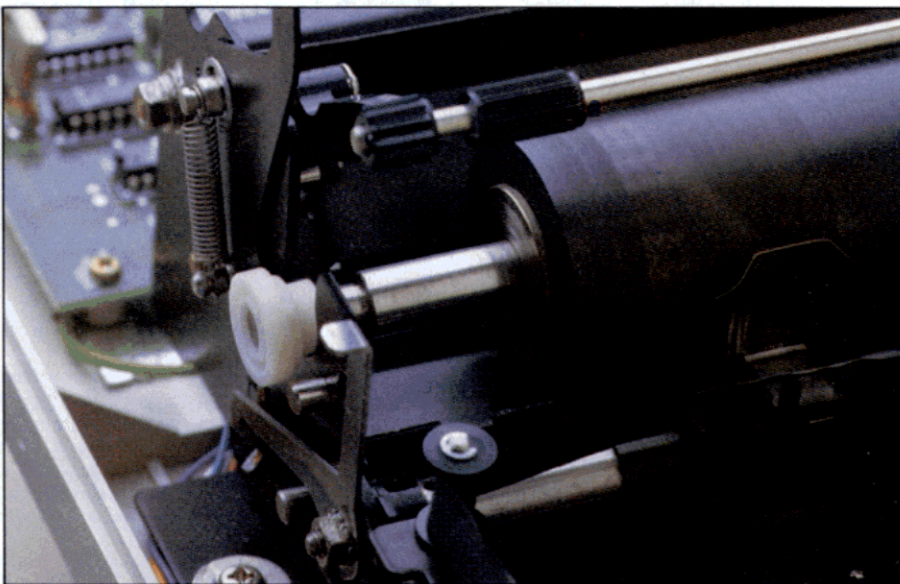


Photo 5. Push the platen so the wide part of the bushing clears the end plate.

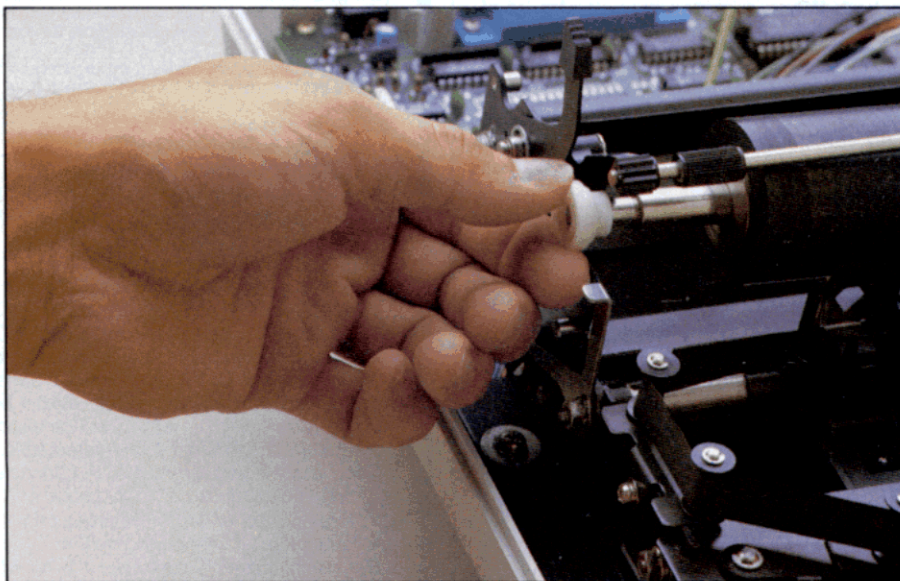


Photo 6. Lift the platen out.

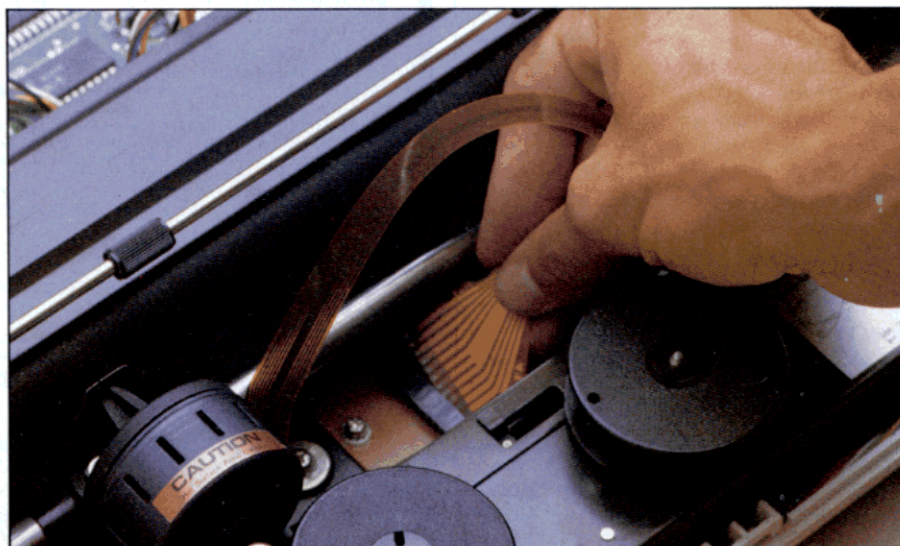


Photo 7. When unplugging the print head, pinch and pull.

until you get all the gunk out of the gears, then lightly oil them. If the paper feed still doesn't work properly, you probably need a new gear train. Replacing it is easy enough if you can get the parts; or, you might want to have your local service center check it out.

If the paper feed knob turns freely with the power off, and the paper doesn't form feed or line feed properly, you probably have a bad motor or bad driver electronics. If you're handy with electrical stuff and have access to an ohmmeter, trace out the wires from the paper feed motor, unplug the motor from the logic board, and measure the windings' resistance. Most printer stepper motors are split stepper motors, meaning that each half of the motor has two coils sharing a common wire.

The idea is to measure the resistance between each hot wire and the common wires. The four windings should be within a couple of ohms of each other. If one of the windings is shorted or open, the motor is bad. When a motor goes, it almost always takes out the transistors that drive it (or the transistors take out the motor). Since motors are hard to get, you might have to take the printer to a repair shop. If you can get a motor, it's a good idea to replace the four transistors (or the transistor array) that drive it.

Many printers have a transistor that switches the motor voltage up when the printer has to move and back down to a lower holding voltage when paper isn't feeding. If this transistor shorts, the motor voltage is too high and burns out the motor. You can find the transistors related to the paper feed motor if you know how to read the printer's schematic—the printer technical manual comes in handy for this kind of problem.

Fuse and Far Between

Most electronic problems are in driving circuitry (the paper and carriage feeds and the print head drive) or in the computer input buffer. Since the main logic board is fragile and soldering to the PC boards in most printers is difficult, this may be one for the repair shop.

When a printer goes dead, check the fuse; replace it with one of the same size and type if it's blown. If the fuse blows again, don't replace it—take the printer in for service.

Missing dots on your printouts are usually a sign of a dead print head or a blown driver transistor. Most print heads are easy to replace, but if you don't check out the electronics, too, chances are you'll just burn out another print head.

Replacing a print head with the cable attached is easy. The Epson's and Star's print heads plug into a socket on the base of the printer. Unplug the old print head—grasp the flat cable by pinching it near the connector, and pull it straight out (see Photo 7). Two screws hold the Star's print

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head in; remove them and pull the print head straight up. Epson secures its print heads with a lever; flip the lever to the left and pull the print head straight up.

Plug the new print head into the connector where the old print head was. Don't mount the print head in the carriage; set it on the table so you can see the print wires. Watch the print wires and turn the printer's power on, but only for about a second. If any of the print wires pushes out, turn the power off fast. Leaving the power on longer could burn out your new print head. When a wire pushes out, it indicates a shorted driving transistor for that dot and you should replace it. It's a good idea to have a technician do this; you should also check out the other parts in the print head's driving circuit.

If no wires push out, chances are the electronics are OK. Repeat the test, this time for a few seconds. If everything still looks OK, install the print head in the carriage and fasten it in place with the screws, clips, or whatever and test out the printer.

What if you replace the ribbon and clean the print head and ribbon guides, and you still don't get clear, clean letters on your printouts? You need to adjust the print head-to-paper distance or replace the print head. Try backing off the print head-to-paper clearance with the paper thickness adjustment lever and print out something. If the printout looks smudged, it's time for a new print head.

Dot's All, Folks

The basic procedures I've outlined will help you keep your printer in top condition. If you do routine maintenance twice a year and keep your printer clean and properly oiled, it will probably last forever. ■

Vincent E. Meyer is a freelance technical writer and president of The Micro Clinic, formerly Wildwood Data Systems, a computer service and support company. You can reach him at 105 State St., Schenectady, NY 12305.







Merger lets you link disk-based non-ASCII Basic subroutines with programs in RAM.

by Andy Levinson

Most Basic programmers aren't in it for the typing practice. That's why Basic's Merge command is valuable; you can keep a library of subroutines on disk and merge them with new programs instead of retyping them.

However, the Merge command isn't as versatile as it could be. All standard Model I/III Disk Basics, except NEWDOS/80, require that you save the Basic program in ASCII format to merge it (SAVE "TEST/BAS".A), rather than saving it in standard, compressed format. And ASCII files usually aren't as convenient to use.

To make life easier, I wrote Merger, a machine-language routine that merges standard Basic program files. Merger uses fewer than 700 bytes of protected high memory. Program Listing 1 is Merger's Assembly-language source code; Program Listing 2 is the Basic version. Merger works with all standard Model I/III Disk Basics. Even though I used ROM routines, Merger also works on the Models 4 and 4P in Model III mode.

What's Wrong with ASCII?

ASCII-format files exhibit several disadvantages. They take up more disk space than standard files because ASCII spells out everything. For example, Basic normally stores the word "Print" as one special character, but in ASCII format, the same word requires five characters, one for each letter.

This means you're far more likely to run out of room with a disk full of ASCII files than with compressed files. To make matters worse, when you save a program line in ASCII format, it might be too long for the computer to read back into Basic. When this happens, you get the infamous "Direct statement in file" error message.

Also, ASCII format doesn't accept packed strings and program lines, that is, machine-language code or graphics saved directly within Basic program lines.

Merger works only with non-ASCII program files, any files you haven't specifically saved in ASCII format. If you want to merge ASCII files, use Basic's Merge command.

The Logic Behind Merger

Merger takes advantage of Model I/III Basic's built-in ROM routines that accept and merge code—when you type in a program line, Basic automatically merges it with the program in memory. Merger works by reading a compressed Basic program from disk one line at a time and getting the computer to accept that line as if you had just typed it in from the keyboard.

Once I decided to use this technique in Merger, I had to figure out how to jump back and forth between ROM and RAM.

ROM routines don't readily give up execution control; that's why the computer always returns you to Basic Ready from the edit mode. I wanted ROM to return control to the program, so I could read and merge an entire Basic program from disk.

The solution lies in hooks provided in TRS-80 ROMs for expanding Basic. Because you can't modify ROM, the Basic code periodically jumps to a hook in RAM, which you can change. In Disk Basic, control then jumps from the hook to another address where you can add expanded Basic options. Memory address 41B8 hexadecimal (hexadecimal) holds an escape hatch that Basic calls after it accepts a line of Basic code. That's the spot where Merger snatches control from the computer ROMs.

Merger, then, works like this: It reads a line of code from disk and puts it where Basic would expect it if you had typed the line in from the keyboard. Program control then jumps to ROM. Merger bypasses ROM's tokenizing routine because compressed Basic code is already tokenized. Basic merges the program line with the program residing in memory, and control jumps from ROM to the hook at 41B8 hex. Merger intercepts that location and regains control, then reads in the next program line from disk.

Getting Merger on Disk

Before using Merger, you have to save the program to disk, in assembled form if you use Listing 1, in Basic if you use Listing 2. If your system requires high memory drivers, you'll have problems with Listing 2, since it loads the code to the top of memory. The program warns you if HIMEM might already be in use.

When you run Listing 2, the program asks whether you want to load Merger at the top of memory for a 32K or a 48K system. Merger then resets memory size to protect its code, POKEs the code into high memory, and self-destructs. Because of this last feature, be sure to save the program to disk before you run it the first time; otherwise, you might have to type it in all over again.

If you've saved Listing 2 to disk, you have the option of creating a machine-language file for the program. Run Merger, then return to DOS Ready using Basic's CMD "S" command. Next, you must immediately use the DOS Dump command to create the machine-language file; check your manual for your DOS's syntax.

Usually, the command looks something like this:

```
DUMP FILENAME  
(START = XXXX,END = YYYY)
```

XXXX is the dump's starting address. In

Listing 2, that address is FD6D hex for a 48K system and BD6D hex for 32K. YYYY is the dump's ending address—FFFF hex for 48K and BFFF hex for 32K. You can use a dumped file as if you'd created it with an editor/assembler.

Some Preliminaries

Initializing Merger takes two steps. First, you have to load the program in memory. Using a Basic file, you run Listing 2; Merger resets memory size and loads the program. However, you'll lose any program already in memory when you load Merger.

You have two other options if you've saved Merger as a machine-language file, either with an editor/assembler or with the Dump command. One is to type in "LOAD MERGER/CMD" from DOS Ready, using the file name you've selected. This puts Merger in high memory.

Then you have to load Basic, immediately setting memory size to protect the code. Protect memory starting at FD6D hex (64877 decimal) on a 48K machine, BD6D hex (48493 decimal) on a 38K computer.

The other option lets you load Merger when you're already in Basic without destroying the program in memory. You must be using a Disk Basic that can load a machine-language file; most versions do. The syntax varies from DOS to DOS, but it's usually CMD "LOAD FILENAME" or CMD "L", "FILENAME", where file name is the name you've given Merger.

However, you have to load Merger into protected memory, so before you load it, you must set memory size. Normally, you'd do so before getting into Basic. To do so within Basic you have to change the pointer at memory locations 16561 and 16562. This pointer tells Basic the address of the highest memory location it can use.

You must also issue a Basic Clear command followed by a number, such as CLEAR 50. This makes Basic recognize the new memory size. The Clear command also resets all program variables, so you should use it only at the very beginning of a running program or directly from the keyboard at the Basic Ready prompt.



System Requirements

Models I and III
Model 4/4P in Model III mode
32K RAM
Disk Basic
Assembly language
Editor/assembler optional

1. Select the memory size you want to protect, meaning the lowest memory location that Basic shouldn't touch. As an example, use 40,000.
2. Subtract 1 from the number you selected in step 1. Remember, Basic's high memory pointer indicates the highest location Basic can use. Example: 40,000 minus 1 is 39,999.
3. Divide the result of step 2 by 256. Use only the integer result; throw out everything to the right of the decimal point. Example: 39,999 divided by 256 equals 156.24609. The integer result is 156.
4. Multiply the result of step 3 by 256. Example: 156 times 256 equals 39,936.
5. Subtract the result of step 4 from the result of step 2. Example: 39,999 minus 39,936 equals 63. You should get a number from 0-255, inclusive. If not, check your math.
6. POKE the result of step 3 into memory location 16,562.
7. POKE the result of step 5 into memory location 16,561.
8. Type in a CLEAR ### command, where ### is a number. The computer won't reset memory size unless you include a number after the Clear statement. Clear resets all program variables, setting numbers to zero and strings to null. You might want to use 50, the normal Basic default.

Table. How to change memory size within Basic.

Before you set memory size, be sure that any program you want protected is in memory locations above the address the pointer indicates. Then use the simple eight-step method outlined in the Table to change memory size. You can use this method any time you want to change memory size from Basic, even from a running program.

Once you've protected high memory and loaded Merger, you must use a DEFUSR statement to tell Basic where Merger is located. Disk Basic supports 10 USR calls, numbered 0-9. Pick one and set the memory address to the start of Merger (the ORG statement in the machine-language routine). On a 48K computer with USR call 7, the statement would be DEFUSR7 = &HFD6D. Load, Save, and even New commands don't affect a USR call definition; you have to redefine it only after you leave Basic or when your program uses and redefines the call. Listing 2 sets the USR definition for you.

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Getting Down to Business

Now you're ready to put Merger to work. To call the program, type in X=USR-(0), where "-" is the USR call number in your definition. As soon as you press the enter key, the screen clears and Merger prompts you to enter a file name.

Merger is asking for the name of a compressed Basic program file to merge with the Basic program already in memory. As with the Basic Input statement, you can use the left arrow key to backspace or the shift and left arrow keys together to erase the entire line.

Pressing the break key aborts the merge and returns you to Basic Ready.

After you've typed in a file name, Merger tries to find that program on disk. If it doesn't find the file, Merger displays an error message. Otherwise, it checks the file to make sure it contains a standard compressed Basic program. All such files start with an FF hex byte. Merger rejects all other files, including ASCII-format Basic files.

It's possible, though highly unlikely, that an unsupported file might start with an FF hex byte; because Merger has no special error check for this, it could crash your system. It's up to you to select properly formatted files.

Once Merger determines that it has a standard Basic file, it tells you it's merging the file. The merge might be instantaneous; it could take 30 seconds or longer, however, if the programs are long. Be patient; Merger tells you when it's done. In most cases, Merger is faster than the standard Disk Basic Merge command.

Because you can't properly display or edit program lines longer than 255 characters, Merger checks for these super-long lines and stops the merge if it finds one.

As with the standard Merge command, Merger replaces a program line in memory if a disk program contains a line with the same number.

Merger runs only from the Basic Ready level, and not from a running program. A program might be able to initiate Merger, but Merger always returns to Basic Ready. ■

Andy Levinson is a computer programmer and consultant who also practices law. You can reach him at 11575 Sunshine Terrace, Studio City, CA 91604; please enclose a stamped, self-addressed envelope for a reply.

Related Articles

Decker, Jack, "Memory Sizer," October 1980, p. 114. Setting Model I memory size from Basic.

Salsbury, Nate, "Clear N," September 1981, p. 312. What the Model I Clear N statement does.

Program Listing 1. Merger's source code.

```

00001 ;*****
00002 ;*   MERGER: Non-ASCII Basic File Merge Routine   *
00003 ;*   by ANDY LEVINSON                             *
00004 ;*   11575 Sunshine Terrace, Studio City, CA 91604 *
00005 ;*   -----
00006 ;*   This program will merge a standard (compressed) *
00007 ;*   Basic program saved on disk with a program that is *
00008 ;*   already in memory. For all DOS's: Models I & III. *
00009 ;*   Usage: Load this program into protected memory. *
00010 ;*   Set a DEFUSR to the ORG address. Call by X=USR(0). *
00011 ;*****
00012 ;
00013 ;
00014 ;===== EQUATES =====
00015 ACCEPT EQU 1A9EH ;ROM Accept Code Line
00016 BYTE EQU 13H ;DOS 1-Byte Disk Read
00017 CLS EQU 01C9H ;ROM Clear Screen
00018 ERROR EQU 4409H ;DOS Error Routine
00019 GOBACK EQU 19AEH ;ROM Basic Re-Entry
00020 INPUT EQU 40H ;ROM Input Routine
00021 KEYBUF EQU 40A7H ;ROM Key-Buffer Pointer
00022 LINK EQU 41B8H ;ROM Link to DOS
00023 OPEN EQU 4424H ;DOS Open Existing File
00024 READY EQU 1A18H ;ROM Almost Basic Ready
00025 SHOW EQU 2B75H ;ROM Display Message
00026 SYNTAX EQU 441CH ;DOS Validate Filespec
00027 ;
00028 ;
00029 ORG 0FD6DH ; = 64877 decimal
00030 ;This sets the program for the top of
00031 ;a 48K machine. For the top of a 32K
00032 ;machine, use 0BD6DH or 48493 decimal.
00033 ;
00034 ;===== ENTRY TO ROUTINE =====
00035 ENTRY CALL CLS ;First Clear the Screen
00036 LD HL,CREDIT ;Ready Credit Message
00037 PREASK CALL SHOW ;Display It
00038 ;
00039 ;===== INPUT FILESPEC =====
00040 NAME LD HL,ASKER ;Ready Query Message
00041 CALL SHOW ;Display It
00042 LD B,23 ;Maximum Input Length
00043 LD HL,(KEYBUF) ;Get Buffer Address
00044 CALL INPUT ;Get Name of Program
00045 JP C,BASIC ;Exit if Break Pressed
00046 ;
00047 ;===== VALIDATE FILESPEC/MOVE IT TO FCB =====
00048 LD DE,FCB ;Ready the FCB
00049 CALL SYNTAX ;Validate Name Given
00050 JR Z,OPENIT ;Continue if All OK
00051 REDO CALL OUCH ;else Display the Error
00052 JR NAME ;and Start Again
00053 ;
00054 ;===== OPEN EXISTING FILE =====
00055 OPENIT LD HL,BUFFER ;Ready the Disk Buffer
00056 LD B,0 ;Use Full Records
00057 CALL OPEN ;Open Existing File
00058 JR NZ,REDO ;Try Again if Error
00059 ;
00060 ;===== MAKE SURE IT'S A COMPRESSED BASIC FILE =====
00061 MOVEON CALL BYTE ;Get 1st Byte of File
00062 JR NZ,REDO ;Error - Try Again
00063 INC A ;Is it Basic? (0FFH?)
00064 LD HL,WRONG ;Ready for an Error
00065 JR NZ,PREASK ;Restart if Wrong Type
00066 LD HL,MERGER ;Ready Start Message
00067 CALL SHOW ;and Display It
00068 ;
00069 ;===== SAVE BASIC LINK WITH DOS =====
00070 LD HL,LINK ;Ready DOS/Basic Link
00071 LD A,(HL) ;Get 1st Byte of Link
00072 LD (OUT+1),A ;and Save It
00073 LD A,0C3H ;Ready Z80 "JP" Instr.
00074 LD (HL),A ;Put Code in RAM
00075 LD HL,(LINK+1) ;Get Balance of Link
00076 LD (OLDWAY+1),HL ;and Save it Also
00077 LD (CALLER+1),HL ;Save It Here Also
00078 LD HL,MORE ;Get New Link Address
00079 LD (LINK+1),HL ;and Leave It for Basic
00080 ;
00081 ;===== GET LINE POINTER FOR NEXT BASIC LINE =====
00082 LINE LD DE,FCB ;Restore FCB Address
00083 CALL BYTE ;Read LSB Line Pointer
00084 JR NZ,OPPS ;Exit if Error
00085 LD L,A ;else Save it
00086 CALL BYTE ;Read MSB Line Pointer
00087 JR NZ,OPPS ;Exit if Error
00088 OR L ;Check if Both are Zero
00089 JR Z,DONE ;Yes - All Done if So
00090 ;
00091 ;===== GET BASIC PROGRAM LINE NUMBER =====
00092 CALL BYTE ;Get LSB Line Number
00093 JR NZ,OPPS ;Exit if Error
00094 LD L,A ;Otherwise Save It
00095 CALL BYTE ;Get MSB Line Number
00096 JR NZ,OPPS ;Exit if Error
00097 LD H,A ;else Save it Also
00098 LD (NUMBER+1),HL ;Save Line Number
00099 LD HL,(KEYBUF) ;Get Buffer Location
00100 DEC HL ;and Backup
00101 DEC HL ;by Two
00102 LD BC,4 ;Initialize Byte Count
00103 ;
00104 ;===== GET PROGRAM LINE INFORMATION =====
00105 LOOP CALL BYTE ;Get Data Byte
00106 JR NZ,OPPS ;Exit if Error
00107 INC BC ;else Bump Byte Count
00108 LD (HL),A ;Put Byte in Buffer
00109 INC HL ;Ready Next Position
00110 OR A ;Zero? (End of Line?)
00111 JR Z,NUMBER ;Yes - Move On
00112 LD A,C ;Get Counter
00113 CP 4 ;Read in 256 Bytes?
00114 JR NZ,LOOP ;No - OK to Continue
00115 LD HL,TOOBIG ;Line Length Error
00116 JR ALMOST ;Exit with Error
00117 ;
00118 ;===== JUMP TO ROM FOR MERGING =====
00119 NUMBER LD DE,0 ;Get Basic Line Number
00120 LD HL,(KEYBUF) ;Restore Buffer Address
00121 DEC HL ;to the Very
00122 DEC HL ;Beginning
00123 DEC HL ;Less Another One
00124 SCF ;Tell Basic to Encode
00125 JP ACCEPT ;Jump to Basic Routine
00126 ;
00127 ;===== RETURN FROM ROM FOR MORE CODE =====
00128 MORE INC SP ;Back Again
00129 INC SP ;First Clear the Stack
00130 CALLER CALL 0 ;Do the Old Code Also
00131 JR LINE ;and Process More Lines
00132 ;
00133 ;===== COMPLETION OF ROUTINE =====
00134 DONE LD HL,FINISH ;Ready Done Message
00135 ALMOST CALL SHOW ;Display It
00136 ;
00137 ;===== RESTORE BASIC LINK WITH DOS =====
00138 OUT LD A,0 ;Get Old DOS/Basic Link
00139 LD (LINK),A ;Restore the 1st Byte
00140 OLDWAY LD HL,0 ;Get the Rest
00141 LD (LINK+1),HL ;and Restore That Also
00142 ;
00143 ;===== BACK TO BASIC READY =====
00144 BASIC LD BC,READY ;Prepare for Basic Exit
00145 JP GOBACK ;Return to Basic Ready
00146 ;
00147 ;===== DISPLAY ERROR THEN EXIT PROGRAM =====
00148 OPPS CALL OUCH ;Display Error Message
00149 JR OUT ;Restore Link and Exit
00150 ;
00151 ;===== DISPLAY DOS ERROR SUBROUTINE =====
00152 OUCH OR 0C0H ;Set Message + Return
00153 JP ERROR ;Do DOS Error Routine
00154 ;
00155 ;===== PROGRAM MESSAGES =====
00156 CREDIT DEFB 'MERGER for Standard Basic '
00157 DEFB 'Files - by Andy Levinson'
00158 DEFB 0DH ;Down One Line
00159 DEFB 0 ;End of Message
00160 ;
00161 ASKER DEFB 0DH ;Down One Line
00162 DEFB 'Input File Name / <BREAK> to Exit'
00163 DEFB 0DH ;Down Another Line
00164 DEFB 0 ;End of Message
00165 ;
00166 WRONG DEFB 'Wrong File Type!'
00167 DEFB 0DH ;Down One Line
00168 DEFB 0 ;End of Message
00169 ;
00170 TOOBIG DEFB 'Line Too Long!'
00171 DEFB 0DH ;Down One Line
00172 DEFB 0 ;End of Message
00173 ;
00174 MERGER DEFB 'Merging . . .'
00175 DEFB 0DH ;Down One Line
00176 DEFB 0 ;End of Message
00177 ;
00178 FINISH DEFB 'Finished!'
00179 DEFB 0DH ;Down One Line
00180 DEFB 0 ;End of Message
00181 ;
00182 ;===== PROGRAM STORAGE/BUFFER AREA =====
00183 BUFFER DEFS 256 ;for Disk I/O Buffer
00184 FCB DEFS 50 ;for File Control Block
00185 ;Can use only 32 except for TRSDOS 1.3 and 2.7DD
00186 ;
00187 END 402DH ;DOS Ready

```



End

Program Listing 2. Basic version of Merger.

```

100 'MERGER: Non-ASCII Basic File Merge by Andy Levinson
110 '
120 'This program will initialize MERGER for you. It will:
130 ' 1) Reset memory size.
140 ' 2) POKE the routine into high memory.
150 ' 3) Set USR call "0" to run MERGER.
160 ' 4) Self-Destruct (using "DELETE").
170 '
200 CLS:PRINT "MERGER INITIALIZATION PROGRAM by Andy Levinson"
210 CLEAR 50:DEFINT A-Z:L=108:H=253
220 X1=17425:IF PEEK(293)<73 THEN X1=16457
230 X1=PEEK(X1)+256*PEEK(X1+1):IF X1=65535 OR X1=49151 THEN 280
240 PRINT:PRINT "DANGER: High Memory May Be in Use!":XS=INKEY$
250 PRINT "Indicate: <C>ontinue or <Q>uit ";CHR$(14);
260 XS=INKEY$:IF XS="C" OR XS="c" THEN PRINT:GOTO 280
270 IF XS="Q" OR XS="q" THEN PRINT:GOTO 280 ELSE 260
280 PRINT@128, "Load MERGER at the Top of 48K or 32K?"
290 PRINT@192, CHR$(31);:INPUT XS
300 IF XS <> "32" AND XS <> "48" THEN 290
310 X=VAL(XS):POKE 16528,X:IF X=32 THEN H=189
320 POKE 16561,L:POKE 16562,H:CLEAR 50:DEFINT A-Z
330 X=0:C=0:S=PEEK(16528):POKE 16553,255:RESTORE
340 QS=CHR$(34):P=-660:IF S=32 THEN P=-17044
350 PRINT "Now POKEing Code into Memory . . ."
360 FOR X=1 TO 353:READ B:C=C+B
370 IF S=48 THEN 400
380 IF X=29 OR X=94 THEN B=191
390 IF B=254 AND X>144 THEN B=190
400 POKE X+P,B:NEXT X
410 IF C=31583 THEN 440
420 PRINT:PRINT "Error in Data Statements!"
430 PRINT "Initialization Aborted. Try Again.":PRINT:END
440 PRINT:PRINT "Checksum works out OK."
450 PRINT:PRINT "Now setting MERGER to USR0 call."
460 DEFUSR0=P+1:PRINT
470 PRINT "Enter ";QS;"X=USR0(0)";QS;" to Call MERGER.":PRINT
480 'DELETE 100-970:REM WARNING! Do NOT remove the REMark
490 'starting Line 480 until the program is debugged and saved.
500 END
510 '
600 'Machine Language Code in DATA Statements - 353 Elements
610 DATA 205, 201, 1, 33, 58, 254, 205, 117, 43, 33
620 DATA 110, 254, 205, 117, 43, 6, 23, 42, 167, 64
630 DATA 205, 64, 0, 218, 42, 254, 17, 206, 255, 205
640 DATA 28, 68, 40, 5, 205, 53, 254, 24, 226, 33
650 DATA 206, 254, 6, 0, 205, 36, 68, 32, 241, 205
660 DATA 19, 0, 32, 236, 60, 33, 146, 254, 32, 202
670 DATA 33, 180, 254, 205, 117, 43, 33, 184, 65, 126
680 DATA 50, 32, 254, 62, 195, 119, 42, 185, 65, 34
690 DATA 37, 254, 34, 21, 254, 33, 18, 254, 34, 185
700 DATA 65, 17, 206, 255, 205, 19, 0, 32, 96, 111
710 DATA 205, 19, 0, 32, 90, 181, 40, 64, 205, 19
720 DATA 0, 32, 82, 111, 205, 19, 0, 32, 76, 103
730 DATA 34, 6, 254, 42, 167, 64, 43, 43, 1, 4
740 DATA 0, 205, 19, 0, 32, 59, 3, 119, 35, 183
750 DATA 40, 10, 121, 254, 4, 32, 240, 33, 164, 254
760 DATA 24, 23, 17, 0, 0, 42, 167, 64, 43, 43
770 DATA 43, 55, 195, 158, 26, 51, 51, 205, 0, 0
780 DATA 24, 175, 33, 195, 254, 205, 117, 43, 62, 0
790 DATA 50, 184, 65, 33, 0, 0, 34, 185, 65, 1
800 DATA 24, 26, 195, 174, 25, 205, 53, 254, 24, 234
810 DATA 246, 192, 195, 9, 68, 77, 69, 82, 71, 69
820 DATA 82, 32, 102, 111, 114, 32, 83, 116, 97, 110
830 DATA 100, 97, 114, 100, 32, 66, 97, 115, 105, 99
840 DATA 32, 70, 105, 108, 101, 115, 32, 45, 32, 98
850 DATA 121, 32, 65, 110, 100, 121, 32, 76, 101, 118
860 DATA 105, 110, 115, 111, 110, 13, 0, 13, 73, 110
870 DATA 112, 117, 116, 32, 70, 105, 108, 101, 32, 78
880 DATA 97, 109, 101, 32, 47, 32, 60, 66, 82, 69
890 DATA 65, 75, 62, 32, 116, 111, 32, 69, 120, 105
900 DATA 116, 13, 0, 87, 114, 111, 110, 103, 32, 70
910 DATA 105, 108, 101, 32, 84, 121, 112, 101, 33, 13
920 DATA 0, 76, 105, 110, 101, 32, 84, 111, 111, 32
930 DATA 76, 111, 110, 103, 33, 13, 0, 77, 101, 114
940 DATA 103, 105, 110, 103, 32, 46, 32, 46, 32, 46
950 DATA 13, 0, 70, 105, 110, 105, 115, 104, 101, 100
960 DATA 33, 13, 0
970 'End of DATA Statements / Checksum = 31583

```



End

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Fast Figures

Save time and disk space when you write numeric files.

Your programs can read or write files of numeric data five to 13 times faster than they currently do, and at a disk space savings of 30-70 percent. DisQuick (see the Program Listing) gives you these features—all you sacrifice is an extra kilobyte of program space. As a bonus, DisQuick lets you initialize and copy arrays more quickly than you can by other means.

DisQuick's secret is that it replaces conventional ASCII-formatted input/output (I/O) with binary I/O. In the former case, your computer must convert each data item from binary to ASCII for storage. In binary I/O, the computer simply copies the bits of data as they appear in RAM. This process requires less time and disk space.

Bits and Pieces

Speed is binary I/O's most important advantage. Binary reads and writes occur faster than their ASCII counterparts because they don't involve data conversion overhead. Converting a number from binary to a string of characters or back slows down I/O considerably. This is especially true for real (single- and double-

precision) numbers. Binary I/O occurs at essentially the same speed in either direction and depends on the number of bytes you're dealing with, not the data type.

To see how binary I/O saves space, consider the following example. Say that the variable X has the value -32768. Your computer stores the number in RAM using 2 bytes: 10000000 and 00000000. But when you send the number to disk, the computer converts it to the character string -32768, which requires 7 bytes.

Here are a couple of important rules: A single-precision value requires 3-14 bytes in ASCII and 4 bytes in binary. A double-precision value needs 3-23 bytes in ASCII and 8 bytes in binary. Thus, integers

stored in ASCII can take 1½ to 3½ times as much space as they would in binary.

So if binary I/O is so great, why isn't it already a part of Disk Basic? Well, Disk Basic does have binary I/O capability. In fact, writing or reading direct-access files is essentially binary I/O. You open a file with a statement like OPEN "R", 1, "FILENAME/RND". Then you define a format for the I/O buffer with one or more Field statements, specifying (in effect) the position and number of bytes for each of the data items that together make up a single record.

Each read or write to a direct-access file moves a record of data, 256 bytes. However, the computer considers the information in the record as character data.



System Requirements

Models I and III
64K RAM
Disk Basic

Data placed in file	Total data (bytes)	ASCII-formatted Disk Basic file		DisQuick binary file		% text file size
		File size (bytes)	Records /grans	File size (bytes)	Records /grans	
Integer array	4002	9791	39/13	4096	16/6	42
Set of arrays	7458	15579	61/21	7680	30/10	49
Program set of vars and arrays	15044	31332	123/41	15360	60/20	49

Note: Data included about 8 percent zeros. For text files of mixed types of data, the more zeros, the smaller the file.

Table 1. Binary and ASCII file sizes compared.

Data put in file	ASCII-formatted Disk Basic file				DisQuick binary file			
	Total data bytes	Write time (seconds)	Read time (seconds)	Average data bytes /second	Write time (seconds)	Read time (seconds)	Average data bytes /seconds	% of text speed
Integer array	4002	42	38	100	7	7	572	572
Set of arrays	7458	96	97	77	11	11	678	881
Program set of vars & arrays	15044	192	294	62	18	18	836	1348

Note: All times include file open and close time. Data values were generated randomly and included about 8 percent zeros.

Table 2. Binary and ASCII I/O compared.



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Using For...Next

Using MOVE\$DATA

	Total bytes copied	Time (seconds)	Bytes per second	Time (seconds)	Bytes per second	% of loop speed
Fill array with a constant	3200	8.2	390	0.4	8000	2051
Copy one array into another	3200	14.5	221	0.4	8000	3619

Table 3. Speed comparison for data movement.

Program Listing. DisQuick.

```

1 REM * * * * *
2 REM * * * * * D I S Q U I C K * * * * *
3 REM * * * * *
4 REM * * * * * Routines for Fast Binary (Unformatted) * * * * *
5 REM * * * * * File I/O and Data Movement * * * * *
6 REM * * * * *
7 REM * * * * * Copyright 1985, Richard J. Wagner * * * * *
8 REM * * * * * 11920 N.W. Oatfield Ct. Portland, OR 97229 * * * * *
9 REM * * * * *
10 GOTO 100
11 GOTO 23 : MOVE$DATA
12 GOTO 27 : WRIT$QWIK
13 GOTO 34 : READ$QWIK
14 GOTO 41 : GATHER$WRITE
15 GOTO 46 : SCATTER$READ
16 GOTO 51 : OPEN$FILE
17 GOTO 57 : SAVE$RANGE
18 GOTO 63 : LOAD$RANGE
19 GOTO 70 : INIT$VARS
20 GOTO 79 : INIT$ARRAYS
21 REM * * * * *
22 REM * * * * * MOVE$DATA(ZF,ZT,ZR)
23 ZM(1)=ZF: ZM(3)=ZT: ZM(5)=ZR: ZM=0
24 DEFUSR9=VARPTR(ZM(0)): ZM=USR9(ZM): RETURN
25 REM * * * * *
26 REM * * * * * WRIT$QWIK(ZN,ZF,ZB)
27 ZT=ZB: ZR=256
28 IF ZN<256 THEN ZR=ZN: ZN=0 ELSE ZN=ZN-256
29 GOSUB 23 : PUT ZO: IF ZN=0 THEN RETURN
30 IF ZF<32768-ZR THEN ZF=ZF+ZR ELSE ZF=ZF-65536+ZR
31 GOTO 28
32 REM * * * * *
33 REM * * * * * READ$QWIK(ZN,ZT,ZB)
34 ZF=ZB: ZR=256
35 IF ZN<256 THEN ZR=ZN: ZN=0 ELSE ZN=ZN-256
36 GET ZO: GOSUB 23 : IF ZN=0 THEN RETURN
37 IF ZT<32768-ZR THEN ZT=ZT+ZR ELSE ZT=ZT-65536+ZT
38 GOTO 35
39 REM * * * * *
40 REM * * * * * GATHER$WRITE(ZA(),ZZ,ZO$,ZO)
41 ZK=ZA(0,0)
42 GOSUB 51 : FOR ZI=1 TO ZK: ZF=ZA(ZI,0): ZN=ZA(ZI,1)
43 GOSUB 27 : NEXT ZI: CLOSE ZO: RETURN
44 REM * * * * *
45 REM * * * * * SCATTER$READ(ZA(),ZZ,ZO$,ZO)
46 ZK=ZA(0,0)
47 GOSUB 51 : FOR ZI=1 TO ZK: ZT=ZA(ZI,0): ZN=ZA(ZI,1)
48 GOSUB 34 : NEXT ZI: CLOSE ZO: RETURN
49 REM * * * * *
50 REM * * * * * OPEN$FILE(ZO$)
51 OPEN "R", ZO, ZO$: FIELD ZO, 1 AS ZB$: ZI=VARPTR(ZB$)
52 IF ZI=32767 THEN ZI=-32768 ELSE ZI=ZI+1
53 ZB=PEEK(ZI): IF ZI=32767 THEN ZI=-32768 ELSE ZI=ZI+1
54 ZB=ZB+256*PEEK(ZI): RETURN
55 REM * * * * *
56 REM * * * * * SAVE$RANGE(ZF,ZT,ZO$)
57 GOSUB 51 : REM Call OPEN$FILE
58 IF ZF<0 OR ZT>0 THEN ZN=ZT-ZF ELSE ZN=65536-ZF+ZT
59 IF ZN<1 THEN CLOSE ZO: STOP

```

Listing continued

The program puts strings in the I/O buffer with the LSET or RSET commands. It must also move numeric data into the buffer, and therefore must convert it to a string with the MKI\$, MKR\$, or MKD\$ functions. (Actually, no change in the bit pattern or data size takes place. An integer will use only 2 bytes in the I/O buffer and in the disk file.)

The problem with these set and string functions is that they slow down I/O. Also, the Basic code for direct-access numeric files is inconvenient and tricky to write. Packing 128 integers into a record involves 128 calls to MKI\$ and LSET, plus a messy set of Field statements. In short, direct-access I/O for numeric arrays can be a real headache.

To summarize, standard Disk Basic I/O is fine for character strings and minor amounts of numeric data, but you need something better when you read or write lots of numbers. Since direct-access I/O does binary reads and writes, all you need is a fast way to move a block of data between variable storage space and the direct-access I/O buffer, plus a convenient way to manage the sequence of blocks. DisQuick gives you this and more.

Binary I/O Using DisQuick

DisQuick gives you routines for the following:

- A single array.
- A set of arrays, which need not be contiguous (touching) in memory nor of the same data type.
- A range of memory encompassing both simple variables and arrays; for example, the entire set of nonstring variables in a program.

You do the I/O through a single GOSUB call, making the process relatively painless.

The DisQuick routines take up about 1K, exclusive of remark lines and spaces.

How DisQuick Works

To see how DisQuick works, I'll walk you through the procedure for writing an array to a binary file. You first assign your file's name and location, and the number of bytes in the array, to special DisQuick variables. You then call routine WRIT\$QWIK, which opens the file for direct access, finds the location of the TRSDOS I/O buffer, uses MOVE\$DATA to copy data from the array to the buffer, and writes the buffer contents to the file in binary. It repeats the last two steps until the program has written the number of bytes in the array to the file.

The READ\$QWIK routine is similar, moving data from the file to the array. The other DisQuick routines are extensions of WRIT\$QWIK and READ\$QWIK.

Note that you must run routines INIT\$VARS and INIT\$ARRAYS at the beginning of the program to initialize variables and arrays and install the COPY\$QWIK Assembly-language routine.

Save the DisQuick routines (lines 1-90

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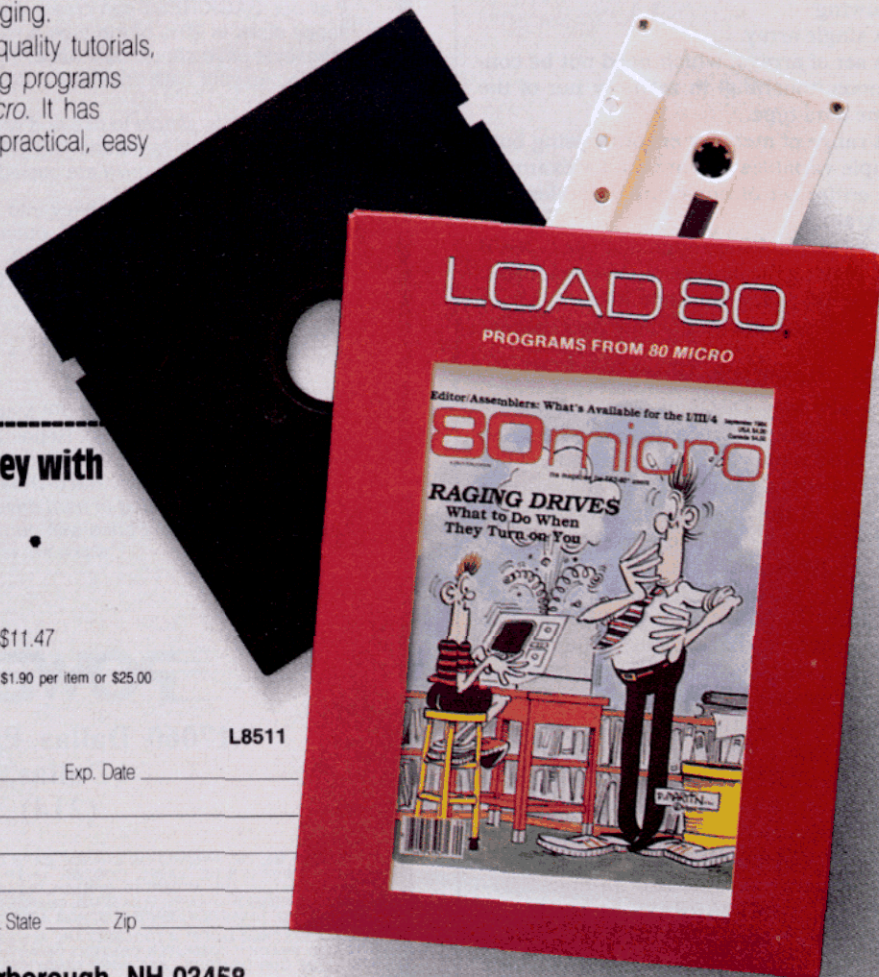
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of the Listing) as an ASCII file for merging with your program. Notice the vector table at the top. Your program can either GOSUB the vectors or the line numbers to which they point.

Below is a summary of DisQuick's routines:

COPY\$QWIK is an Assembly-language routine that all the other DisQuick routines use. The program stores COPY\$QWIK in a small array, and INIT\$ARRAYS builds it. I padded COPY\$QWIK with NOPs (zeros) so you can change parameters with assignment statements. DisQuick assigns the USR function the address of the array, as returned by VARPTR.

COPY\$QWIK invokes the LDIR instruction, which block-moves data from one part of memory to another. Once COPY\$QWIK activates LDIR, you can't stop it; it may bomb part of your program if you put inappropriate values in the Z80's registers. So be sure to save your program before running anything using DisQuick.

MOVE\$DATA copies ZR bytes starting at address ZF to memory starting at ZT. It invokes the Assembly-language COPY\$QWIK routine and changes variable ZM.

Other DisQuick routines normally call MOVE\$DATA during binary I/O. You can also call it to fill an array with a constant. The following short application program will white out the display:

```
100 GOSUB 19:GOSUB 20: REM set variables,
    arrays, and install COPY$QWIK
110 ZF = 15360: ZT = 15361: ZR = 1023: POKE
    ZF, 191: GOSUB 11
```

The white-out appears to be instantaneous. Compare its speed with the equivalent FOR I = 15360 TO 16383: POKE I,191: NEXT statement. To copy the contents of array X!(10,20) to Y!(10,20) you might use these lines:

```
100 GOSUB 19:GOSUB 20
110 ZF = VARPTR(X!(0,0)): ZT = VARPTR(Y!(0,0))
120 ZR = FN Z2(10,20,4): REM "4" is the data
    size
130 GOSUB 11
```

You must dimension arrays X!() and Y!() and fill X!() first. The above routine is about 36 times faster than this one:

```
10 FOR I = 0 TO 10: FOR J = 0 TO 20
20 Y!(I,J) = X!(I,J): NEXT J,I
```

You can also use MOVE\$DATA to copy the screen display to an array or to protected RAM, so that another call to MOVE\$DATA can instantaneously retrieve it. This might be useful for menus in interactive programs.

WRIT\$QWIK writes out ZN bytes, starting at address ZF, to the open file, starting with the next record. It calls MOVE\$DATA and changes variables ZN, ZF, ZT, and ZR.

READ\$QWIK reads ZN bytes into memory starting at location ZT from open file buffer ZO, starting with the next record. It calls MOVE\$DATA and changes variables ZN, ZT, ZF, and ZR.

Listing continued

```
60 GOSUB 27 : CLOSE ZO: RETURN
61 REM * * * * *
62 REM          LOAD$RANGE(ZF,ZT,ZO$)
63 GOSUB 51 : REM Call OPEN$FILE
64 IF ZF<0 OR ZT>0 THEN ZN=ZT-ZF ELSE ZN=65536-ZF+ZT
65 REM You can remove next line after testing your program
66 IF ZN<1 THEN CLOSE ZO: STOP
67 ZT=ZF: GOSUB 34 : CLOSE ZO: RETURN
68 REM * * * * *
69 REM          INIT$VARS()
70 ZN=0: ZT=0: ZF=0: ZB=0: ZM=0: ZR=0: ZI=0: ZJ=0: ZK=0
71 ZO=1: ZZ=20: ZO$="": ZB$=""
72 REM Functions to compute nr. bytes in arrays of 1, 2 and 3
    dimensions:
73 DEFFN Z1(ZU,ZM)=ZM*(ZU+1)
74 DEFFN Z2(ZU,ZV,ZM)=ZM*(ZU+1)*(ZV+1)
75 DEFFN Z3(ZU,ZV,ZW,ZM)=ZM*(ZU+1)*(ZV+1)*(ZW+1)
76 RETURN
77 REM * * * * *
78 REM          INIT$ARRAYS()
79 DIM ZA(ZZ,1), ZM(7)
80 REM          COPY$QWIK
81 REM Hex value:      Assembly-language source code:
82 ZM(0)=&H2100: REM   NOP; LD HL,
83 ZM(1)=&H0000: REM   0000H; Source location
84 ZM(2)=&H1100: REM   NOP; LD DE,
85 ZM(3)=&H0000: REM   0000H; Destination location
86 ZM(4)=&H0100: REM   NOP; LD BC,
87 ZM(5)=&H0001: REM   256 ; Nr of bytes to move
88 ZM(6)=&H00ED: REM   LDIR ; ZAP! - -
89 ZM(7)=&H00C9: REM   RET ; - - all done!
90 RETURN
95 ' START OF APPLICATION PROGRAM
100 CLEAR 50: CLS: PRINT"DISQUICK verification test"
110 DEFINT A-Z
120 GOSUB 19 :REM Call INIT$VARS to declare all DISQUICK
130 GOSUB 1070 :REM Initialize program variables and arrays
140 GOSUB 20 :REM Call INIT$ARRAYS to declare all DISQUICK
150 GOSUB 1280 :REM Fill test arrays with "random" values
160 M=1 :REM Error flag for test
170 PRINT "Writing integer array to binary file"
180 ZO$="TESTFIL1/BIN" :REM Select output file
190 GOSUB 16 :REM Call OPEN$FILE
200 ZF=VARPTR(XX(0)) :REM Set source pointer
210 ZN=FNZ1(X1,2) :REM Set byte count
220 GOSUB 12 :REM Call WRIT$QWIK
230 CLOSE ZO :REM Close file
240 REM Change some values in the array
250 XX(0)=XX(0)/2:XX(X1/10)=XX(X1/10)/3:XX(X1/20)=XX(X1/20)/4
260 PRINT "Reading integer array from binary file"
270 ZO$="TESTFIL1/BIN" :REM Select file for input
280 GOSUB 16 :REM Call OPEN$FILE
290 ZT=VARPTR(XX(0)) :REM Set destination pointer
300 ZN=FNZ1(X1,2) :REM Set byte count
310 GOSUB 13 :REM Call READ$QWIK
320 CLOSE ZO :REM Close file
330 PRINT "Verifying data read in"
340 FOR I=0 TO X1 STEP 10: IF XX(I)=XV(I) THEN NEXT:GOTO 360
350 PRINT " ERROR in data read in"
360 PRINT "Writing set of arrays to binary file"
370 ZO$="TESTFIL2/BIN" :REM Select file for output
380 ZA(0,0)=3 :REM Set data set count
390 ZA(1,0)=VARPTR(XX(0)) :REM Set 1st source pointer
400 ZA(1,1)=FNZ1(X1,2) :REM Set 1st byte count
410 ZA(2,0)=VARPTR(YY!(0,0,0)) :REM Set 2nd source pointer
420 ZA(2,1)=FNZ3(Y1,Y2,Y3,4) :REM Set 2nd byte count
430 ZA(3,0)=VARPTR(WW$(0,0)) :REM Set last source pointer
440 ZA(3,1)=FNZ2(W1,W2,8) :REM Set last byte count
450 GOSUB 14 :REM Call GATHER$WRITE
460 REM Change some values in first two arrays
470 XX(X1/10)=XX(X1/10)/2: XX(0)=XX(0)/3
480 YY!(0,0,0)=YY!(0,0,0)/4: YY!(Y1,Y2,Y3)=YY!(Y1,Y2,Y3)/3
490 PRINT "Filling an array with a constant"
500 WW$(0,0) = -82345.54321 :REM Put constant in array
510 ZF=VARPTR(WW$(0,0)) :REM Point to start of array
520 ZR=FNZ2(W1,W2,8)-8 :REM Set byte count
530 ZT=ZF+8 :REM Set destination to start + data size
540 GOSUB 11 :REM Call MOVE$DATA
550 PRINT "Verifying fill of array"
560 WJ#=WW$(0,0)
570 IF WJ#=WW$(1,1) AND WJ#=WW$(W1,W2) THEN 590
```

Listing continued


```

580 M=0: PRINT " ERROR in array fill"
590 PRINT "Reading set of arrays from binary file"
600 ZO$="TESTFIL2/BIN" :REM Set file name
610 ZA(0,0)=3 :REM Set array count
620 ZA(1,0)=VARPTR(XX(0)) :REM Set pointer to 1st array
630 ZA(1,1)=FNZ1(X1,2) :REM Set byte count " "
640 ZA(2,0)=VARPTR(YY!(0,0,0)) :REM Set pointer to 2nd array
650 ZA(2,1)=FNZ3(Y1,Y2,Y3,4) :REM Set byte count " "
660 ZA(3,0)=VARPTR(WW#(0,0)) :REM Set pointer to 3rd array
670 ZA(3,1)=FNZ2(W1,W2,8) :REM Set byte count " "
680 GOSUB 15 :REM Call SCATTER$READ
690 PRINT "Verifying data read in"
700 IF XX(X1/10)<>XV(X1/10) OR XX(0)<>XV(0) THEN 730
710 IF YY!(0,0,0)<>YV!(0,0,0) OR YY!(Y1,Y2,Y3)<>YV!(Y1,Y2,Y3)
    THEN 730
720 IF WW#(0,0)=WV#(0,0) AND WW#(W1,W2)=WV#(W1,W2) THEN 750
730 M=1: PRINT " ERROR in data read in"
740 REM Assign value to some test program variables and arrays
750 XI=-7: YI!=0.251421: WI#=929389481
760 AA=XI: XX(X1/2)=XI: RR#=WI#: YY!(Y1/2,0,Y3/3)=YI!
770 PRINT "Saving range of variables and arrays to binary file"
780 ZO$="TESTFIL3/BIN" :REM Set filename
790 ZF=VARPTR(AA) :REM Point to start of data set
800 ZT=VARPTR(EE(0)) :REM Point to var just AFTER data set
    (dummy array)
810 GOSUB 17 :REM Call SAVE$RANGE
820 REM Change some variable and array values
830 AA=XI+200:YY!(Y1/2,0,Y3/3)=YI!+61:RR#=RR#-0.1:XX(X1/2)=XI-99
840 EE(0)=16385: REM To verify that excess data is NOT read in
850 PRINT "Loading range of variables and arrays from binary file"
860 ZO$="TESTFIL3/BIN" :REM Set filename
870 ZF=VARPTR(AA) :REM Point to start of data
880 ZT=VARPTR(EE(0)) :REM Point to var just AFTER data set
890 GOSUB 18 :REM Call LOAD$RANGE
900 PRINT "Verifying variable and array data read in"
910 IF AA<>XI OR YY!(Y1/2,0,Y3/3)<>YI! THEN 930
920 IF RR#=WI# AND XX(X1/2)=XI AND EE(0)=16385 THEN 940
930 M=0: PRINT " ERROR in data read in"
940 PRINT "Demonstrations completed"
950 IF M THEN PRINT " no errors" ELSE PRINT " test FAILED"
960 END
970 REM * * * * *
980 REM Declare program variables and arrays
990 REM
1000 REM Array: Data type: Bytes/value: Total bytes:
1010 REM XX(2000) INTEGER 2 4002
1020 REM YY!(3,1,7) REAL 4 256
1030 REM WW#(3,99) DBL PREC 8 3200
1040 REM Arrays XV(2000), YV!(3,1,7) and WV#(3,99) are used
1050 REM to hold reference copies of data in the above arrays.
1060 REM
1070 AA=0: REM First data item for range-save or range-load
1080 REM
1090 REM Loop counters, flags, test values, dummy vars:
1100 I=0: J=0: K=0: L=0: M=0: RR#=00: WI#=0: XI=0: YI!=0: WJ#=0
1110 B=1000: C=-1: D=32000: E=100: F=50: G=-3: H=-32768
1120 A#=3.2D30:B#=3.3D-30:C#=1.7035D10:D#=0.00013:E#=9876543210
1130 A1=1.5E5: B1=2.5E-10: C1=3.3333E20: D1=.5:E1=987654
1140 REM Array dimensions:
1150 X1=2000: Y1=3: Y2=1: Y3=7: W1=3: W2=99
1160 DIM WW#(W1,W2),XX(X1),WV#(W1,W2),YV!(Y1,Y2,Y3),YY!(Y1,Y2,Y3),
    XV(X1)
1170 REM
1180 REM Array EE() is used to "mark" the end of program array
1190 REM space for SAVE$RANGE and LOAD$RANGE use.
1200 DIM EE(0)
1210 RETURN
1220 REM * * * * *
1230 REM Initialize program arrays
1240 REM
1250 REM Use MOVE$DATA to quickly and "randomly" initialize the
1260 REM arrays of test values, by copying parts of ROM.
1270 REM
1280 ZR=FNZ3(Y1,Y2,Y3,4): ZF=RND(12000-ZR)
1290 ZT=VARPTR(YY!(0,0,0)): GOSUB 11 : ZT=VARPTR(YV!(0,0,0)):
    GOSUB 11
1300 ZR=FNZ2(W1,W2,8): ZF=RND(12000-ZR)
1310 ZT=VARPTR(WW#(0,0)): GOSUB 11: ZT=VARPTR(WV#(0,0)): GOSUB 11
1320 ZR=FNZ1(X1,2): ZF=RND(12000-ZR)
1330 ZT=VARPTR(XX(0)): GOSUB 11: ZT=VARPTR(XV(0)): GOSUB 11
1340 RETURN

```

End

GATHER\$WRITE uses unformatted I/O to write a set of data to file ZO\$, as specified by the contents of array ZA(ZZ,1). ZA(0,0) is the number of data sets (ZZ sets maximum). ZA(K,0) points to the start of the K data set. ZA(K,1) is the number of bytes in the K data set. **GATHER\$WRITE** calls **OPEN\$FILE** and **WRITE\$QWIK** and changes variables ZK, ZI, ZF, ZN.

SCATTER\$READ uses binary I/O to read in a set of data from file ZO\$, distributing data as specified by array ZA(ZZ,1). It is the inverse of **GATHER\$WRITE**. It calls **OPEN\$FILE** and **READ\$QWIK** and changes variables ZK, ZI, ZT, ZN.

OPEN\$FILE opens file ZO\$ for direct access, sets up I/O buffer ZO for a record size of 256 bytes, and puts the address of the I/O buffer in ZB. It changes variables ZI, ZB, ZB\$.

SAVE\$RANGE saves a range of memory from ZF to (but not including) ZT to file ZO\$. It calls **OPEN\$FILE** and **WRITE\$QWIK** and changes variable ZN.

LOAD\$RANGE loads a range of memory from ZF up to (but not including) ZT from file ZO\$. It calls **OPEN\$FILE** and **READ\$QWIK** and changes variable ZN.

You must declare all simple variables. **DisQuick** routines use before calling **SAVE\$RANGE** or **LOAD\$RANGE**, if you're saving any arrays. Also, you'll get an error if ZT is less than ZF + 1.

INIT\$VARS allocates all **DisQuick** simple variables. This is necessary if you're going to call **SAVE\$RANGE** and **LOAD\$RANGE**, and is good programming practice any time. **DisQuick** variables all start with a "Z." I arbitrarily assigned ZO, the file buffer variable, a 1. Adjust ZZ (maximum arrays for **GATHER\$WRITE** and **SCATTER\$READ**) as appropriate.

INIT\$ARRAYS allocates space for **DisQuick** arrays and sets up the Assembly-language subroutine **COPY\$QWIK**. If you will call **SAVE\$RANGE** or **LOAD\$RANGE**, be sure to call **INIT\$ARRAYS** after executing all other program dimension statements.

SAVE\$RANGE and **LOAD\$RANGE** represent **DisQuick**'s most powerful routines. They let you read or write the values of all the nonstring simple and array program variables with a single subroutine call. The speed advantage is impressive, especially when you're dealing with large amounts of data. You may also find that using **DisQuick** reduces the total size of a program, even after adding the **DisQuick** routines.

You might use these routines as follows: Use **SAVE\$RANGE** to write out program data initialized in a temporary subroutine containing assignment and data statements. Then change the program to call **LOAD\$RANGE** to do the initialization, and omit the call to **SAVE\$RANGE**. When everything works, delete both **SAVE\$RANGE** and the conventional initialization subroutine.

The speed and simplicity of these two

routines stem from the fact that they don't try to identify individual variables. They simply read or write a range of memory. Thus they will read or write both variable data and Basic's data headers. (The headers include the identifier characters, data types, array sizes, and so on.)

However, you must be careful if you want to save both simple variables and arrays in the same file. This is because Basic moves arrays down in memory every time it encounters a new simple variable. Basic thus groups all simple variables, giving you faster access to them. You must therefore declare all simple variables before you call `SAVE$RANGE`. Otherwise, a later call to `LOAD$RANGE` may make your program hang up when Basic tries to access a bombed variable.

You declare a variable by using it. When Basic encounters the statement `ZZ = 0`, it adds a header and data space for `ZZ` in the variables storage area. Basic assigns variables space in the appropriate section of memory in the order it encounters them.

The Listing covers the variables declaration procedure with the routine `INIT-$VARS`. Be especially careful not to mix numeric and string variable declarations; you must separate them in memory. The next section should explain why.

What About String Data?

Basic adds string variable headers to variable storage in the same manner it does with other variables. However, the computer puts the character strings themselves in string space, a protected area of RAM.

The string variables contain pointers to string space. If you wrote string variables to a file using `DisQuick`, you would save only the pointers, not the character data. The pointer values change periodically because of the way Basic manages string space.

You could certainly add `DisQuick` routines for string data I/O, but why bother? Strings are already in essentially the correct format for text files. Any gain in speed over normal sequential or random-access I/O would likely be offset by the complex processing involved.

Table 1 compares the size of `DisQuick` binary files with Disk Basic text files containing exactly the same randomly generated data. The minimum space savings is over 50 percent for the data used. In other tests of random data, I found the savings as high as 65 percent.

Table 2 compares `DisQuick` I/O speed with that of Disk Basic `PRINT#` and `INPUT#` I/O, again for identical data. `DisQuick` works up to 13 times as fast as regular text I/O.

Table 3 compares non-I/O uses of `DisQuick` with conventional Basic programming. You can find uses other than those shown; lines 1280-1340 of the Listing comprise a variation of array-copying that you can use to put random values in an array.

DisQuick Test Program

Lines 100-1340 of the Listing provide a test and example of how you can use `DisQuick`. It verifies that you've entered `DisQuick` correctly and that the routines work. You'll need at least 36 grams of free space on your drive-zero disk. Save the program before you run it; if you made any typos, you might bomb RAM.

The program provides examples of ways to call the routines to save or load numeric data in a single array, save or load data in a set of (possibly noncontiguous) numerical arrays, initialize an array to a constant, and save or load a contiguous set of nonstring variables and arrays.

For the test, you must declare A-Z as integers. For `DisQuick` routines in your application program, you need only declare Z as an integer; A-Y can be whatever types your application program needs.

"Data size" in these examples refers to the number of bytes of memory allocated for each value. Data size is 2 for an integer value, 4 for a single-precision value, and 8 for a double-precision value. ■

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What would you say if you saw this program line:

```
100 A = (B = 65)
```

Or:

```
110 Y = (X$ = "B")
```

You'd probably think these lines would generate a syntax error, but that's not the case. The lines translate to:

```
100 IF B = 65 THEN A = -1 ELSE A = 0
110 IF X$ = "B" THEN Y = -1 ELSE Y = 0
```

You can replace the equals sign with any other relational operator (<, >, <=, >=, or <=) or replace simple with complex variables. Even better, you can join two or more of these expressions by And or Or operators. To top it off, they can become variables in an equation.

Using the Command

Type in and run Program Listing 1. Type in the three symbols as indicated at the prompt (y, n, and ?), one at a time. Now try typing in the two alphabetic symbols in uppercase, or type in anything else you may have on your keyboard. Unless you type in a "y," an "n," or a "?," you get no response whatever (as with most Basic programs, the sole exception is the break key).

In effect, each expression inside the parentheses in line 210 represents a separate If statement. When the condition proves true, the program evaluates it as -1, but when the condition is false, the program evaluates it as zero. In each case, line 210 negates the expression by the minus sign before it, so its value becomes either +1 or zero.

Program Listing 1. Example using three variables.

```
10 POKE 16409,0 'SET UPPER/LOWERCASE
20 PRINT "TYPE <y>, <n>, or <?>."
30 GOSUB 200:GOTO 20
200 A$=INKEY$:IF A$="" GOTO 200
210 ON-(A$="y")-(A$="n")*2-(A$="?")*3 GOSUB 300,400,500:RETURN
300 PRINT "THE ANSWER IS YES.":RETURN
400 PRINT "THE ANSWER IS NO.":RETURN
500 PRINT "I DON'T KNOW.":RETURN
```

End

Program Listing 2. Example using If and If Not expressions.

```
10 POKE 16409,1 'SET CAPS ONLY MODE
20 PRINT "ENTER AN <A> OR A <B>."
30 GOSUB 200:GOTO 20
200 A$=INKEY$:IF A$="" GOTO 200
210 A=(A$="A"):B=(A$="B")
220 IF NOT A AND NOT B THEN PRINT "YOU GOOFED!":RETURN
230 IF A THEN PRINT "YOU ENTERED AN <A>":RETURN
240 IF NOT A THEN PRINT "YOU ENTERED A <B>":RETURN
```

End

Program Listing 3. Example using ASC functions.

```
10 CLEAR 100:POKE 16409,0 'SET TO UPPER/LOWERCASE
20 PRINT "ENTER ANY LETTER OR A SPACE."
200 A$=INKEY$:IF A$="" GOTO 200
210 A=((ASC(A$)>64) AND (ASC(A$)<91)) OR ((ASC(A$)>96) AND (ASC(A$)<123)) OR (A$=" ")
220 IF NOT A GOTO 200
230 PRINT A$:GOTO 200
```

End

Program Listing 4. Maxima/minima search.

```
10 DIM V(100):RANDOMIZE N=RND(99)+1 'SET ITEMS FROM 1 TO 100
20 FOR I=1 TO N:V(I)=RND(999):NEXT 'FILL TABLE
30 MX=-1:MN=1001 'SET MX BELOW AND MN ABOVE THE RANGE OF VALUES
40 CLS:PRINT "THERE ARE N VALUES."
50 FOR I=1 TO N:PRINT V(I),
60 MX=(MX>V(I))*MX-(MX<=V(I))*V(I)
70 MN=(MN<V(I))*MN-(MN>=V(I))*V(I)
80 NEXT I:PRINT
90 PRINT "MAXIMUM VALUE IS"MX
100 PRINT "MINIMUM VALUE IS"MN
```

End

System Requirements
Models I, III, 4, 1000, and 1200
Basic

```
10 DIM V(100):RANDOMIZE TIMER: N=INT(RND*100)
20 FOR I=1 TO N: V(I)=INT(RND*1000):NEXT
```

Figure. Model 1000/1200 modifications to Program Listing 4.

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Then the program multiplies the value of the second expression by 2 and the third by 3, to provide the correct value for the On. . . GOSUB statement. Note that one, and only one, of the expressions can be true at any given time. All three will be false if you type in anything not provided for. In such a case, the program "falls through" to the Return command following the colon in line 21C.

Run Program Listing 2 to observe a slightly different application. As long as you don't alter the values of the variables set in line 210, you can use the If and If Not expressions as often as you want in your program. Make sure you set the values of A and B before you use them.

Program Listing 3 is the core of a most useful application—limiting user input. Note that you can enter any upper- or lowercase letter or a space, but nothing else has any effect, except the break key. It's even simpler to limit the input to numerals, or to numerals plus a decimal and a minus sign. You can use literals rather than the ASC, but I wanted to show that you can use functions. You must use the ASC function, or the CHR\$ function, to use nonprintable characters such as backspace, form feed, and escape.

On the Model III, you enter most of the nonprintable characters from the keyboard with the left shift/down-arrow keys plus one of the other keys. On some computers, several characters are available directly via function keys or the control key plus another key. Crash-proofing the control characters is very important, as this is where hitting the wrong key is most likely to spell disaster.

Plotting in Basic

This command has numerous mathematical applications as well. For example, suppose you have a long list of numbers for which you need to determine the maximum and minimum values (see Program Listing 4 and the Figure). I use this maxima/minima search when I need to make plots of stock market data. After determining MX and MN, I use them to select the scale factors automatically for the plots. This is a great help in getting a plot with the largest amount of variation possible, regardless of the percentage variation of the data itself.

Now that you know how to use these expressions, let your imagination go in discovering new applications. ■

You can reach Viron E. Payne, Sr. at 200 Juniper Ave., Merritt Island, FL 32953.

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Rutledge, Jerry. "In Command." November 1981, p. 300. A tutorial on Basic commands.

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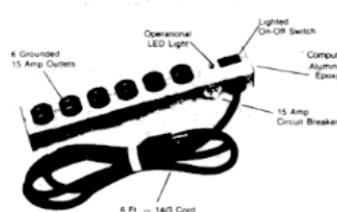
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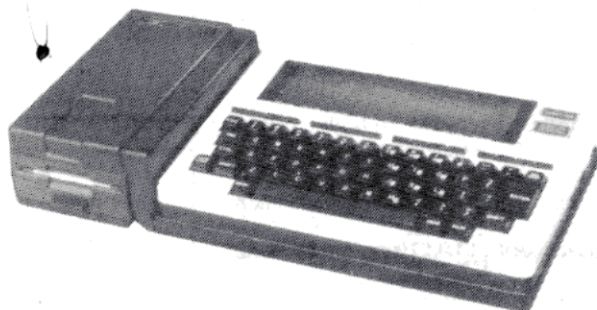
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Password Bypass

Don't let an unknown password stand between you and your files—Unlock gives you a master key to Model I/III/4 files.

Seeing a protected file listed in your directory and not knowing the password is a little like seeing the gold at Fort Knox from the visitor's booth: It's frustrating not being able to get at it. While file protection has its place, you may end up gnashing your teeth because you can't remember a password or realize you originally mistyped it. Unlock, a Model I/III/4 file protection remover, gives you a master key to protected files (see the Program Listing).

Unlock removes file protection by file name, common extension, wildcard parameter, or for an entire disk. In addition, you can change a disk's master password without knowing the current one. Unlock runs under LDOS for the Models I, III, and 4, and under TRSDOS for the Model 4.

Unprotecting Files

The syntax Unlock uses to unprotect files is similar to that LDOS and TRSDOS use for file manipulation (see Table 1). UNPROT FILE/CMD:O unprotects the file FILE/CMD on drive zero. You have to include the drive specification or Unlock returns you to DOS Ready with an error message (see Table 2). Also, don't include any spaces on the command line except for the one that precedes the file name.

To unprotect all files with a given extension, type in UNPROT \$/EXT:O, where EXT is the target extension.

To unprotect all files using a wildcard extension, type in the name of the file you want to unprotect followed by the wildcard symbol (\$). For example, to unprotect LBASIC and all its overlays, type in UNPROT LBASIC/\$:O.

To unprotect every file on a given disk, type in UNPROT \$:O. In this case, the dollar sign provides the wildcard symbol for any file name. As Unlock unprotects each

file on the disk, it prints the message, "FILENAME/EXT :D is now unprotected."

To change a disk's master password, type in UNPROT :D. The computer responds: "The master password is now PASSWORD." This is useful if you can't change the master password by ordinary means.

Being Specific

To use Unlock under LDOS, first set the

keyboard input driver (KI) and load the supervisor call (SVC) table (see Table 3). At LDOS Ready, type in SET *KI TO KI/DVR, then type in SYSTEM (SVC).

If you haven't loaded the SVC table before using Unlock, you'll get a system error. This is because the program uses the supervisor calls with restart vectors for compatibility among the Models I, III, and 4. The SVC table won't work properly if

Command

UNPROT FILENAME/EXT:D
UNPROT FILENAME/\$:D

UNPROT \$/EXT:D

UNPROT \$:D
UNPROT FILENAME:D
UNPROT :D

Description

Unprotect file with extension in drive D.
Unprotect file with any extension in drive D.

Unprotect all files with extension in drive D.

Unprotect all files in drive D.
Unprotect file with no extension in drive D.
Change the master password of the disk in drive D to PASSWORD.

Table 1. Unlock syntax.

Error Message

Illegal command parameter

File parameter not found

Disk write-protected

Sys error

Reason for error

Drive number not given or spaces typed within the command.

File not on disk or end of listing when global functions such as \$:D are used.

Write-protected or the requested drive is not in the system.

SVC not loaded prior to using Unlock.

Table 2. Error messages.

Name

CKDRV
EXIT
ERROR
RDSSC
DSP
DSPLY
WRSSC

SVC

33
22
26
85
02
10
54

Description

Check for valid drive number.
Normal DOS return.
Process error message.
Read a system sector.
Display a character.
Display a line.
Write a system sector.

Table 3. Supervisor calls.



System Requirements

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Bit Use

7	1 = extended directory record 0 = primary directory record
6	1 = system file 0 = non-system file
5	--- Reserved for future use ---
4	1 = the record is in use 0 = the record has been killed
3	1 = invisible 0 = visible
	Protection status:
2	000 = FULL 001 = KILL 010 = RENAME 111 = NO ACCESS 011 = reserved

Table 4. Bit structure for DIR + 0.

you don't set KI/DVR. (Hardin Brothers explains restart vectors in the September 1983 Next Step [p. 24]. I use them because the system call addresses of all three machines are different, but the SVC table for the three are just about the same.)

Unlock supports both single- and double-density disks. If you assemble Unlock under double-density for double-density use, you can use the program as is. If you want to use Unlock under single-density, change line 2390 to read:

2390 CP 8: single density

or patch the assembled program by typing in PATCH UNPROT/CMD (x'7E48' = 08) at LDOS Ready.

If, after you change Unlock for single-density operation, you upgrade your system to double-density, you can reconvert

Unlock from single- to double-density with a patch. At LDOS Ready, type in PATCH UNPROT/CMD (x'7E48' = 10).

Because of the calls used, you should log in your disk before unprotecting a file on it because Unlock loads the directory sectors into RAM and then writes them back again. The computer needs information such as the disk's density and number of sides for this task.

Type in LOG :D at LDOS Ready, where D is the drive you want to log in. The computer prompts you to change disks if necessary. Put the disk you want to unprotect in the drive you're logging and press enter to unprotect your files on that disk.

Unlock at Work

Unlock starts out by converting any lowercase letters to uppercase. Even though you can use lowercase letters to load a program, the operating system stores all information using uppercase letters on the directory.

To check if a character is lowercase, the program compares the character to 96 decimal (lowercase "a"), stored in the accumulator (see line 240 in the Listing). When the Z80 makes a comparison, it subtracts the character being compared from the contents of the accumulator. If the result is zero (both numbers are equal), Unlock sets the Z flag. If the value compared is greater than the contents of the accumulator, then the program sets the carry flag, since the comparison results in a negative number.

After Unlock converts all characters to uppercase, it tests to see if the next character is a carriage return. If so, you've made an error by not specifying a drive. Otherwise, Unlock goes to the routine specific for the first nonspace character, that is, a colon, dollar sign, or character.

When the program has determined the file name, it invokes a restart to SVC 33 CKDRV to see if the specified drive really exists, contains a disk, and is ready. If it's ready, Unlock loads each sector of the directory into a buffer called DIRBUF. Unlock then compares each entry to what it's searching for. If it finds a positive comparison, it tests the first byte to see if the entry is active (not killed), and if it's an extended directory record (those records that have used all the space [four entries] for extents on the primary entry).

Unlock doesn't have to test to see if the entry is an extended directory record or not, since only bytes zero, 1, and 21-31 are significant in extended entries. But it checks anyway for compatibility with any future version of LDOS that might use the file-name bytes.

After it finds a match, Unlock changes byte zero of the file's directory record to 10H (see Table 4 for bit structure of byte zero), and it changes the file's access password to 9642H, the hash code for "PASSWORD." Now the computer allows total access to your file, since the default pass-

Program Listing. Unlock.

```

00010 ; UNPROT      Version 514.3
00020 ; by Jeffrey Terry, P.O.Box 41 Southold, NY 11971
00030 ; Model I,III - LDOS 5.1.x   Model 4 - TRSDOS 6.x
00040 ;
0021 00100 CKDRV EQU 33 ;check for valid drive #
0016 00110 EXIT EQU 22 ;normal DOS return
001A 00120 ERROR EQU 26 ;process error
0055 00130 RDSSC EQU 85 ;read a sector
0002 00140 DSP EQU 82 ;display a character
000A 00150 DSPLY EQU 18 ;display a line
0036 00160 WRSSC EQU 54 ;write a sector
7D00 00170 ORG 32000
7D00 00 BEGIN NOP
00190 ;
00200 ;uppercase conversion
00210 ;
7D01 E5 00220 PUSH HL ;save input pointer
7D02 7E 00230 UPLOOP LD A,(HL) ;get character
7D03 FE60 00240 CP 96
7D05 D4447D 00250 CALL NC,UPCONV ;if >96 then lowercase
7D08 77 00260 LD (HL),A ;put char back
7D09 FE8D 00270 CP 13 ;are we done?
7D0B 28B3 00280 JR Z,SYNTAX ;if so,go check syntax
7D0D 23 00290 INC HL ;increment pointer
7D0E 18F2 00300 JR UPLOOP ;go check next character
00310 ;end uppercase conversion
00320 ;-----
00330 ;
7D10 E1 00340 SYNTAX POP HL ;get input pointer back
7D11 11D27E 00350 LD DE,SEARCH ;buffer to hold input
7D14 7E 00360 LD A,(HL) ;get character
7D15 FE8D 00370 CP 13
7D17 CAC07E 00380 JP Z,ILLEG ;illegal parameter
7D1A FE24 00390 CP '$'
7D1C 2843 00400 JR Z,WILD ;extension or whole disk
7D1E FE3A 00410 CP ':'
7D20 CA997D 00420 JP Z,MASTER ;master password
00430 ;
00440 ;filename unprot
00450 ;
7D23 12 00460 LOOP LD (DE),A ;load buffer with byte
7D24 13 00470 INC DE
7D25 23 00480 INC HL ;increment for next char
7D26 7E 00490 LD A,(HL)
7D27 FE2F 00500 CP '/' ;is there an extension?
7D29 281C 00510 JR Z,PADIT ;pad for extension
7D2B FE8D 00520 CP 13
7D2D CABA7E 00530 JP Z,ERR
7D30 FE3A 00540 CP ':'
7D32 20EF 00550 JR NZ,LOOP ;if no enter,more data
7D34 CDB67D 00560 FNAME CALL DCHK
7D37 118B05 00570 LD DE,050BH ;len = 11:begin at byte 5
7D3A ED53C97E 00580 LD (FLEN),DE
7D3E CDFE7D 00590 CALL FIND ;find entry/change it
7D41 3E16 00600 LD A,EXIT
7D43 EF 00610 RST 28H ;return to DOS
00620 ;end filename
00630 ;-----
00640 ;upconv
00650 ;
7D44 D620 00660 UPCONV SUB 32 ;lowercase-32 = uppercase
7D46 C9 00670 RET
00680 ;end upconv
00690 ;-----
00700 ;
00710 ;
7D47 23 00720 PADIT INC HL ;increment input pointer
7D48 7E 00730 LD A,(HL) ;get next character
7D49 FE24 00740 CP '$' ;is it a wild symbol?
7D4B 280A 00750 JR Z,WEXT ;if so,go to wild exten.

```

Listing continued

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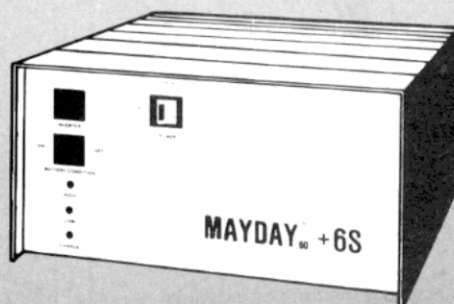
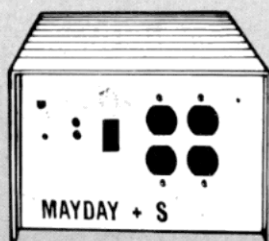
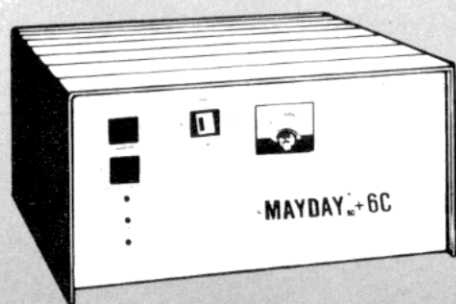
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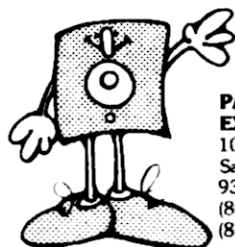
word for all files is PASSWORD. Unlock then indicates that it's unprotected your file and returns you to LDOS Ready. ■

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Listing continued

```

7D4D 11DA7E 00760 LD DE,SEARCH+8 ;where extensions go
7D50 010300 00770 LD BC,3 ;loop 3 times
7D53 ED80 00780 LDIR
7D55 18DD 00790 JR FNAME
00800 ;end padit
00810 ;-----
00820 ;
00830 ;wild extension
00840 ;
7D57 110805 00850 WEXT LD DE,0508H ;len=8:begin at byte 5
7D5A ED53C97E 00860 LD (FLEN),DE ;save length and start
7D5E 23 00870 INC HL
7D5F 182D 00880 JR DO
00890 ;end wext
00900 ;-----
00910 ;
00920 ;WILD: check if whole drive or extension
00930 ;
7D61 23 00940 WILD INC HL ;increment input pointer
7D62 7E 00950 LD A,(HL) ;get character
7D63 FE2F 00960 CP '/' ;is it an exten. marker?
7D65 281A 00970 JR Z,EXT ;go to extension program
00980 ; whole drive
7D67 CDB67D 00990 CALL DCHK ;check for valid drive
7D6A 2AD07E 01000 TOTAL LD HL,(ADDR) ;get current buffer addr.
7D6D 7E 01010 LD A,(HL) ;get character
7D6E FE00 01020 CP 00H ;is there a record?
7D70 280A 01030 JR Z,NOPE ;go if no
7D72 CB7F 01040 BIT 7,A ;is it a primary entry?
7D74 2006 01050 JR NZ,NOPE ;go if not a primary entry
7D76 2AD07E 01060 LD HL,(ADDR) ;get address pointer
7D79 CD687E 01070 CALL UNPROT ;go unprotect it
7D7C CD2C7E 01080 NOPE CALL NEXTR ;get next record
7D7F 18E9 01090 JR TOTAL
01100 ;end whole disk
01110 ;-----
01120 ;
01130 ;ext
01140 ;
7D81 23 01150 EXT INC HL ;increment input pointer
7D82 010300 01160 LD BC,3 ;loop for 3 characters
7D85 ED80 01170 LDIR ;transfer to search buff.
7D87 11030D 01180 LD DE,0D03H ;len=3:begin at byte 13
7D8A ED53C97E 01190 LD (FLEN),DE ;save information
7D8E CDB67D 01200 DO CALL DCHK ;check for valid drive
7D91 CDFE7D 01210 CALL FIND ;go find record & change
7D94 CD277E 01220 LOOP2 CALL NOMTCH ;go get next record
7D97 18FB 01230 JR LOOP2
01240 ;
01250 ;-----
01260 ;
01270 ;master change master password
01280 ;
7D99 CDB67D 01290 MASTER CALL DCHK ;check for valid drive
7D9C 3E00 01300 LD A,0
7D9E 32CD7E 01310 LD (SEC),A ;sector to load = 0
7DA1 CDD67D 01320 CALL LDDIR ;load directory
7DA4 21E042 01330 LD HL,42E0H ;PASSWORD hashing
7DA7 22AB7F 01340 LD (DIRBUF+206),HL ;put it in the buffer
7DAA CDEC7D 01350 CALL DDIR ;dump the buffer to disk
7DAD 210E80 01360 LD HL,MPASS ;get address of message
7DB0 3E0A 01370 LD A,DSPLY
7DB2 EF 01380 RST 28H ;print the message
7DB3 3E16 01390 LD A,EXIT
7DB5 EF 01400 RST 28H ;return to DOS
01410 ;end master password change
01420 ;-----
01430 ;
01440 ;drive check. load drive # and check if valid
01450 ;
7DB6 7E 01460 DCHK LD A,(HL) ;get the character
7DB7 FE3A 01470 CP '/' ;
7DB9 C2C07E 01480 JP NZ,ILLEG ;if not : then bad param.
7DBC 23 01490 INC HL ;next character of input
7DBD 7E 01500 LD A,(HL) ;get the character
7DBE 32CC7E 01510 LD (DR),A ;load it into drive buff.
7DC1 4F 01520 LD C,A
7DC2 3E21 01530 LD A,CKDRV ;check for valid drive
7DC4 EF 01540 RST 28H
7DC5 C2BA7E 01550 JP NZ,ERR ;go if error
01560 ;end dchk
01570 ;-----
01580 ;
01590 ;setup
01600 ;
7DC8 1614 01610 SETUP LD D,20
7DCA 1E02 01620 LD E,2
7DCC ED53CD7E 01630 LD (SEC),DE ;start at sector 2
7DD0 21DD7E 01640 LD HL,DIRBUF ;get buffer address
7DD3 22D07E 01650 LD (ADDR),HL ;save it
01660 ;end setup
01670 ;-----
01680 ;
01690 ;directory loader
01700 ;
7DD6 11DD7E 01710 LDDIR LD DE,DIRBUF ;get buffer address
7DD9 2ACD7E 01720 LD HL,(SEC) ;get sector number
7DDC EB 01730 EX DE,HL ;exchange registers
7DDD 3ACC7E 01740 LD A,(DR) ;get drive number
7DE0 4F 01750 LD C,A
7DE1 3E55 01760 LD A,RDSSC
7DE3 EF 01770 RST 28H ;load directory

```

Listing continued

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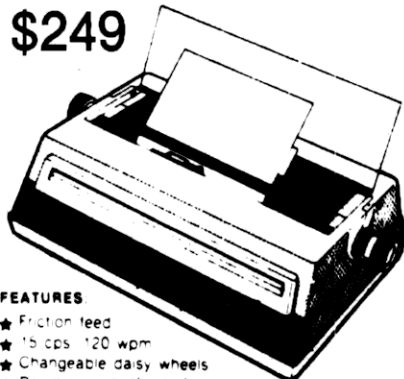
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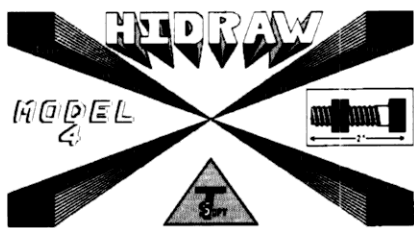
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Listing continued

```

7DE4 ED53CD7E 01780 LD (SEC),DE ;save possible new track #
7DE8 C2BA7E 01790 JP NZ,ERR
7DEB C9 01800 RET
01810 ;end directory load
01820 ;-----
01830 ;
01840 ;dump directory back to disk
01850 ;
7DEC 11DD7E 01860 DDIR LD DE,DIRBUF ;get buffer address
7DEF 2ACD7E 01870 LD HL,(SEC) ;get sector number
7DF2 EB 01880 EX DE,HL ;exchange registers
7DF3 3ACC7E 01890 LD A,(DR) ;get drive number
7DF6 4F 01900 LD C,A
7DF7 3E36 01910 LD A,WRSSC
7DF9 EF 01920 RST 28H ;write back directory
7DFA C2BA7E 01930 JP NZ,ERR ;go if error
7DFD C9 01940 RET
01950 ;end directory write
01960 ;-----
01970 ;
01980 ;find
01990 ;
7DFE 2AD07E 02000 FIND LD HL,(ADDR) ;get buffer pointer addr.
7E01 ED5BCA7E 02010 LD DE,(BFIND) ;where to start looking
7E05 19 02020 ADD HL,DE
7E06 11D27E 02030 LD DE,SEARCH ;get input-line address
7E09 3AC97E 02040 LD A,(FLEN) ;get length of search
7E0C 47 02050 LD B,A
7E0D 0E00 02060 LD C,0
7E0F 1A 02070 LOOP6 LD A,(DE) ;get search character
7E10 BE 02080 CP (HL) ;compare against entry
7E11 2B14 02090 JR NZ,NOMTCH ;no match,get next entry
7E13 23 02100 INC HL ;increment pointer
7E14 13 02110 INC DE
7E15 10F8 02120 DJNZ LOOP6 ;check next character
7E17 2AD07E 02130 LD HL,(ADDR) ;get address pointer
7E1A 7E 02140 LD A,(HL)
7E1B FE00 02150 CP 00H ;is the file active
7E1D 2B08 02160 JR Z,NOMTCH ;go if it is not
7E1F CB7F 02170 BIT 7,A ;is it a primary entry?
7E21 2B04 02180 JR NZ,NOMTCH ;if not,get next record
7E23 CD687E 02190 CALL UNPROT ;unprotect entry
7E26 C9 02200 RET
02210 ;
02220 ;NOMTCH CALL NEXTR ;get next record
7E2A 18D2 02230 JR FIND
02240 ;
02250 ;
7E2C 3ACF7E 02260 NEXTR LD A,(REC) ;get current record #
7E2F FE07 02270 CP 7
7E31 2B12 02280 JR Z,NEXTS ;if 7, get next sector
7E33 3ACF7E 02290 LD A,(REC)
7E36 3C 02300 INC A
7E37 32CF7E 02310 LD (REC),A ;save incremented rec.#
7E3A 2AD07E 02320 LD HL,(ADDR) ;get buffer addr. pointer
7E3D 112000 02330 LD DE,32
7E40 19 02340 ADD HL,DE ;point to next entry
7E41 22D07E 02350 LD (ADDR),HL ;save pointer
7E44 C9 02360 RET
02370 ;
7E45 3ACD7E 02380 NEXTS LD A,(SEC) ;get sector number
7E48 FE0F 02390 CP 15 ;*** SINGLE DENSITY: 7
7E4A 2B13 02400 JR Z,FERR ;if 16, then end of dir.
7E4C 3C 02410 INC A
7E4D 32CD7E 02420 LD (SEC),A ;save next sector number
7E50 3E00 02430 LD A,0
7E52 32CF7E 02440 LD (REC),A ;start at record 0
7E55 21DD7E 02450 LD HL,DIRBUF
7E58 22D07E 02460 LD (ADDR),HL ;move pointer to beginning
7E5B CDD67D 02470 CALL LDDIR ;load the next entry
7E5E C9 02480 RET
02490 ;end find
02500 ;-----
02510 ;ferr
02520 ;
7E5F 21F57F 02530 FERR LD HL,FNF ;get error message
7E62 3E0A 02540 LD A,DSPLY
7E64 EF 02550 RST 28H ;print message
7E65 3E16 02560 LD A,EXIT
7E67 EF 02570 RST 28H ;go to LDOS ready
02580 ;end ferr
02590 ;-----
02600 ;
02610 ;change protection level
02620 ;
7E68 7E 02630 UNPROT LD A,(HL) ;get protection level,etc
7E69 E6F0 02640 AND 0F0H ;mask out protection
7E6B 77 02650 LD (HL),A ;save protection level
02660 ;end unprot
02670 ; continue from UNPROT.....
02680 ;change access password
02690 ;
7E6C 111200 02700 ACCESS LD DE,18 ;start at byte 18
7E6F 19 02710 ADD HL,DE ;hash for no access....
7E70 3696 02720 LD (HL),96H ;... password ....
7E72 23 02730 INC HL ;....
7E73 3642 02740 LD (HL),42H ;....
7E75 CDEC7D 02750 CALL DDIR ;dump dir back to disk
7E78 CD827E 02760 CALL PRREQ ;print filename/ext:d
7E7B 213080 02770 LD HL,UNPR ;get address of message
7E7E 3E0A 02780 LD A,DSPLY
7E80 EF 02790 RST 28H ;print a line on video
7E81 C9 02800 RETURN RET ;file unprotected

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Listing continued

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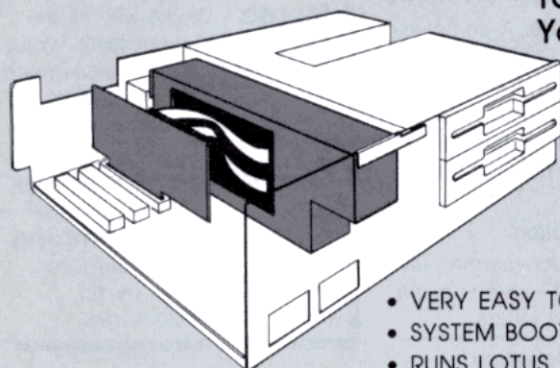
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02810 ;end access
02820 ;-----
02830 ;
02840 ; print the request out/drive,etc..
02850 PRREQ LD HL,(ADDR) ;get buffer pointer
02860 LD DE,5
02870 ADD HL,DE ;start at entry + 5
02880 LD B,8 ;loop 8 times
02890 LOOP4 LD C,(HL) ;get character
02900 LD A,DSP
02910 RST 28H ;print the character
02920 INC HL ;get next character
02930 DJNZ LOOP4 ;loop if not done
02940 LD C,32
02950 LD A,DSP
02960 RST 28H ;print a space
02970 LD HL,(ADDR) ;get buffer pointer
02980 LD DE,13
02990 ADD HL,DE ;start at entry + 13
03000 LD B,3 ;loop 3 times
03010 LOOP5 LD C,(HL) ;get extension character
03020 LD A,DSP
03030 RST 28H ;print the character
03040 INC HL ;increment to next char.
03050 DJNZ LOOP5 ;loop if not done
03060 LD HL,SP1 ;get address of the space
03070 LD A,DSPLY
03080 RST 28H ;print the space
03090 LD C,':'
03100 LD A,DSP
03110 RST 28H ;print a :
03120 LD A,(DR) ;get drive number
03130 LD C,A
03140 LD A,DSP
03150 RST 28H ;print drive number
03160 RET
03170 ;end prreq
03180 ;-----
03190 ;
03200 ;error
03210 ;
03220 ERR LD C,A
03230 SET 6,C
03240 LD A,ERROR
03250 RST 28H ;error routine
03260 ;end error
03270 ;-----
03280 ;
03290 ;illegal
03300 ;
03310 ILLEG LD HL,IPE ;illegal parameter error
03320 LD A,DSPLY
03330 RST 28H ;print a line on video
03340 LD A,EXIT
03350 RST 28H ;normal return to DOS
03360 ;end illegal
03370 ;-----
03380 ;
03390 ;
03400 ;-----
03410 ;-----
03420 ;-----
03430 ;-----
03440 FLEN DEFB 00H ;file length
03450 BFIND DEFW 00H ;first byte of search
03460 DR DEFB 0 ;drive number
03470 SEC DEFB 0 ;current sector number
03480 CYL DEFB 0 ;directory cylinder
03490 REC DEFB 0 ;current record number
03500 ADDR DEFW 00H ;address pointer
03510 SEARCH DEFW ' ;11 bytes padded with 20H
20 20 20 20 20 20 20 20 20 20 20 20
0100 03520 DIRBUF DEFS 256 ;256 byte space for DIR
7FDD 49 03530 IPE DEFW 'Illegal parameter error'
6C 6C 65 67 61 6C 20 70
61 72 61 6D 65 74 65 72
20 65 72 72 6F 72
7FF4 0D 03540 DEFB 13
7FF5 46 03550 PNF DEFW 'File parameter not found'
69 6C 65 20 70 61 72 61
6D 65 74 65 72 20 6E 6F
74 20 66 6F 75 6E 64
800D 0D 03560 DEFB 13
800E 4D 03570 MPASS DEFW 'Master password now: PASSWORD'
61 73 74 65 72 20 70 61
73 73 77 6F 72 64 20 6E
6F 77 3A 20 50 41 53 53
57 4F 52 44
802B 00 03580 DEFB 0
802C 20 03590 SP1 DEFW ' ;first spacer
20 20
802F 03 03600 DEFB 03H
8030 20 03610 UNPR DEFW ' ***** now unprotected *****'
20 20 20 20 20 2A 2A 2A
2A 2A 20 6E 6F 77 20 75
6E 70 72 6F 74 65 63 74
65 64 20 2A 2A 2A 2A 2A
8051 0D 03620 DEFB 13
03630 ;
03640 ;-----
7D00 03650 END BEGIN
00000 Total errors

```

End

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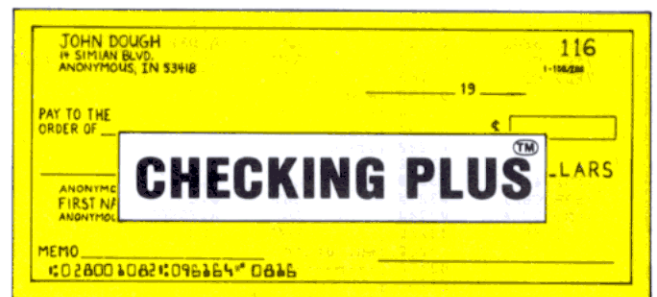
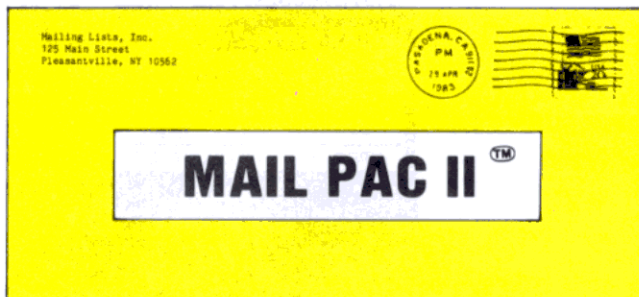
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You save money by paying off a car or personal loan ahead of time, but you don't save as much as you might think. The fine print on your payment schedule probably says something about interest for early payoff being calculated by the Rule of 78s. As I'll explain below, this means you pay more than the simple-interest balance if you settle a loan ahead of schedule.

My program, *Loan*, compares payment schedules calculated by simple interest and by the Rule of 78s. It shows your penalty for paying off a loan early, information your banker might not readily supply. And it gives you a truer account of your indebtedness; at any time before the end of the loan term, you'd have to pay the amount calculated by the Rule of 78s to settle your debt to the bank.

Genesis of the Rule

So what is this Rule of 78s? It seems that for small loans, banks don't want to do too much calculating. Such loans justify only one calculation of monthly payments and the resulting finance charge. The finance charge is the sum of payments minus the loan amount; it might be only the total interest, or it could include other fees.

If the borrower pays off a loan before the agreed term, calculating interest paid to date would involve recalculating the loan for the shorter term. This doesn't work well, since most loan officers use tables based on term increments of six months. A more practical approach to early payoff would be to apply a table of consistent factors to the original loan amount. The Rule of 78s represents such an approach.



System Requirements

Models I, III, 4, 1000,
and 1200
32K RAM
Disk Basic
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COMPARISON OF SIMPLE INTEREST AND RULE-OF-78'S

LOAN = 10000
TERM = 36 MONTHS
INTEREST = 18 % PER YEAR
MONTHLY PAYMENT = \$ 361.52

	SIMPLE INTEREST			RULE-OF-78'S			78's EXCESS INTEREST TO-DATE
	MONTHS INTEREST	MONTHS PRINCIPAL	BALANCE REMAINING	MONTHS INTEREST	MONTHS PRINCIPAL	BALANCE REMAINING	
1	150.00	211.52	9788.48	162.97	198.55	9801.45	12.97
2	146.83	214.69	9573.79	158.44	203.08	9598.37	24.58
3	143.61	217.91	9355.88	153.91	207.61	9390.76	34.88
4	140.34	221.18	9134.70	149.39	212.13	9178.63	43.93
5	137.02	224.50	8910.20	144.86	216.66	8961.97	51.77
6	133.65	227.87	8682.33	140.33	221.19	8740.78	58.45
7	130.23	231.29	8451.04	135.81	225.71	8515.07	64.03
8	126.77	234.75	8216.29	131.28	230.24	8284.83	68.54
9	123.24	238.28	7978.01	126.75	234.77	8050.06	72.05
10	119.67	241.85	7736.16	122.23	239.29	7810.77	74.61
11	116.04	245.48	7490.68	117.70	243.82	7566.95	76.27
12	112.36	249.16	7241.52	113.17	248.35	7318.60	77.08
13	108.62	252.90	6988.62	108.64	252.88	7065.72	77.10
14	104.83	256.69	6731.93	104.12	257.40	6808.32	76.39
15	100.98	260.54	6471.39	99.59	261.93	6546.39	75.00
16	97.07	264.45	6206.94	95.06	266.46	6279.93	72.99
17	93.10	268.42	5938.52	90.54	270.98	6008.95	70.43
18	89.08	272.44	5666.08	86.01	275.51	5733.44	67.36
19	84.99	276.53	5389.55	81.48	280.04	5453.40	63.85
20	80.84	280.68	5108.87	76.96	284.56	5168.84	59.97
21	76.63	284.89	4823.98	72.43	289.09	4879.75	55.77
22	72.36	289.16	4534.82	67.90	293.62	4586.13	51.31
23	68.02	293.50	4241.32	63.38	298.14	4287.99	46.67
24	63.62	297.90	3943.42	58.85	302.67	3985.32	41.90
25	59.15	302.37	3641.05	54.32	307.20	3678.12	37.07
26	54.62	306.90	3334.15	49.80	311.72	3366.40	32.25
27	50.01	311.51	3022.64	45.27	316.25	3050.15	27.51
28	45.34	316.18	2706.46	40.74	320.78	2729.37	22.91
29	40.60	320.92	2385.54	36.21	325.31	2404.06	18.52
30	35.78	325.74	2059.80	31.69	329.83	2074.23	14.43
31	30.90	330.62	1729.18	27.16	334.36	1739.87	10.69
32	25.94	335.58	1393.60	22.63	338.89	1400.98	7.38
33	20.90	340.62	1052.98	18.11	343.41	1057.57	4.59
34	15.79	345.73	707.25	13.58	347.94	709.63	2.38
35	10.61	350.91	356.34	9.05	352.47	357.16	0.82
36	5.35	356.17	0.17	4.53	356.99	0.17	-0.00
SUM	3014.89	9999.83	0.17	3014.89	9999.83	0.17	-0.00

Figure. Sample output for a \$10,000 loan.

Some Arithmetic

Some clever soul found that you could approximate simple interest by applying equal units of interest to each month of the loan term. The name "Rule of 78s" derives from the number of such units in a one-year loan. If you pay 12 units of interest the first month of a one-year loan, 11 units the next month, and so on down to one unit the last month, then you pay 78 units: $12 + 11 + 10 + \dots + 2 + 1 = 78$.

This is easier to work with than simple interest, especially for an unusual term

like 10 months. You could write tables for all sorts of combinations, but there's an alternative.

Since the series is a decreasing one, it's simpler to look at the loan amount remaining, or the rebate. You can calculate this by starting at the end of the period and counting toward the beginning to yield an increasing series ($1 + 2 + 3 + \dots$).

When you pay off a one-year loan with one month to go, the finance charge rebate is only $\frac{1}{78}$ of the total charge. If you pay off two months early, the rebate is

[illegible]

The Rule of 78s penalty is vastly outweighed by the financial advantage of paying off a loan early. However, the penalty isn't negligible. Calculating your loan payments by the Rule of 78s won't help you avoid that penalty, but at least you'll know where you really stand with the bank. ■

David McAnaney, a senior project engineer with a Boston firm, designs wastewater collection and treatment systems for municipalities. He's been using computers since 1963 for mathematical modeling, design, and word processing. You can write to him at 70 Court St., Exeter, NH 03833.

Conhaim, R.L., "The Real Rule of 78s," July 1981, p. 289. A Model I program that calculates interest savings for early payoff.

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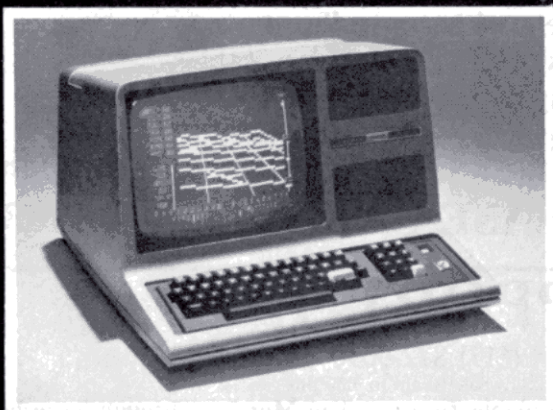
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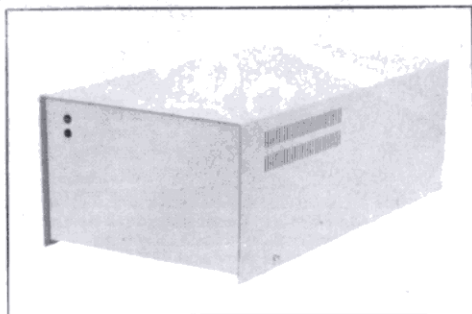
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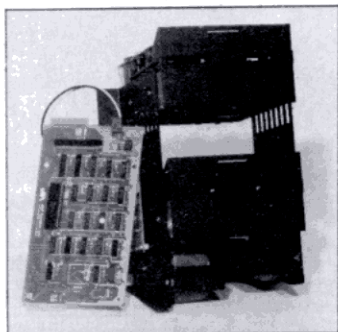
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Making the Switch: One Computer, Two Printers

Last month, I showed you how to build an electronic switch box so two computers could access a single printer (p. 82). This month, I'll do the obverse: build a box that lets you switch one computer between two printers (see the Photo).

Like the switch box described last month, you operate the two printer/single computer box either by a toggle switch, two pushbuttons mounted on the box, or by digital outputs from a computer (or other remote device). This gives the box a great deal of flexibility and its electronic switching provides greater reliability.

Most printers use either an RS-232C serial or Centronics parallel interface. Like last month's project, this month's box uses the Centronics parallel interface (see the September and October 1984 Project 80s [pp. 102 and 146, respectively] for detailed information on the Centronics printer interface).

Building the Board

The schematic diagram for the switch box appears in Fig. 2. As shown, it involves only four integrated circuits (ICs), requiring two 16-pin IC sockets and two 14-pin sockets (Table 1 gives the power and ground connections for the ICs).

Figure 3 shows the board layout I used (see the Photo). Note the pin-1 positions on the three header connectors (J1, J2, and J3). I chose these orientations to permit simple ribbon cable connections, which are the same as described last month.

Figure 4 shows a sketch of how you should build the cable assemblies. I used ribbon cable, and crimp-on socket and Centronics connectors to simplify assembly (see Table 2). Again, you should note the pin-1 position for each connector on the different assemblies.

J1 and J2 represent the interfaces for printer 1 and printer 2, and J3 serves as the computer interface. The numbers following the dash after the connector identifier for J1, J2, and J3 signals (e. g., J2-1) indicate the pin numbers for the respective header connector. Remember that on a header connector, all odd pins

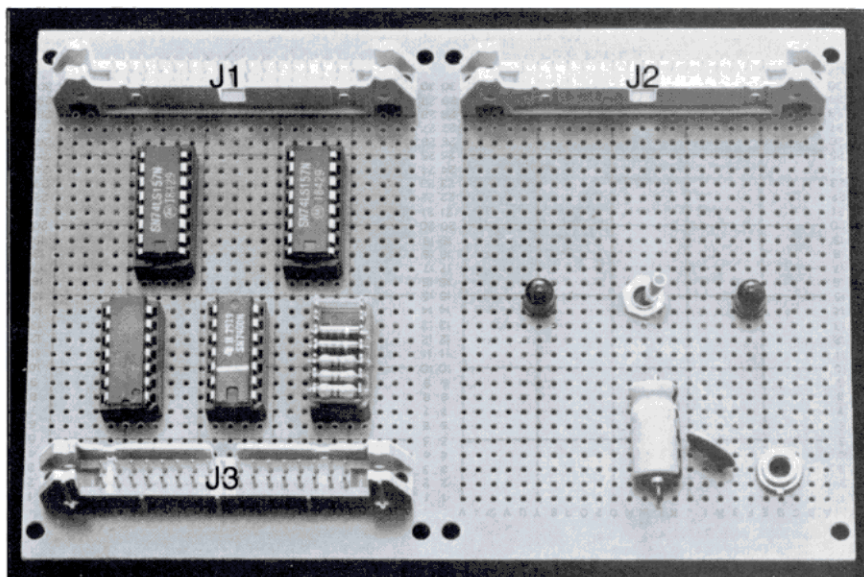


Photo. An electronic printer switch box.

are in the same row as pin 1, and all even pins are in the other row, with pin 2 being immediately opposite pin 1.

J3 connector signals also have a number in parentheses next to them. These numbers indicate the (female) Centronics connector pin number where the signal is to go. If you want to save a little money by eliminating two connectors (one header connector and one ribbon cable socket connector), you can buy a printed circuit board-mountable female Centronics connector instead of using the header/ribbon cable approach. The main problem with this is that the pin spacing of the Centronics connector is not 0.1 inch, making it awkward to mount on a standard prototyping perfboard.

The board ports two special input signals, which you can connect in a variety

of ways. The signals are C1SELECT/ and C2SELECT/, used to select which printer you want activated. Probably the simplest and most likely connection to these signals is an SPDT (single pole, double

IC	GND	+5V
7400	7	14
74LS32	7	14
74LS157	8	16

Table 1. Power connections for the ICs.

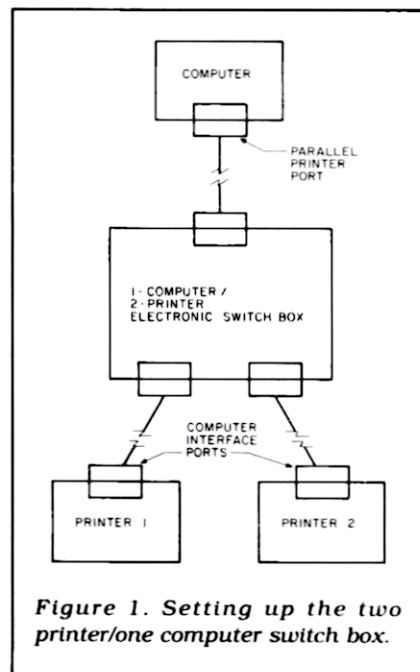


Figure 1. Setting up the two printer/one computer switch box.

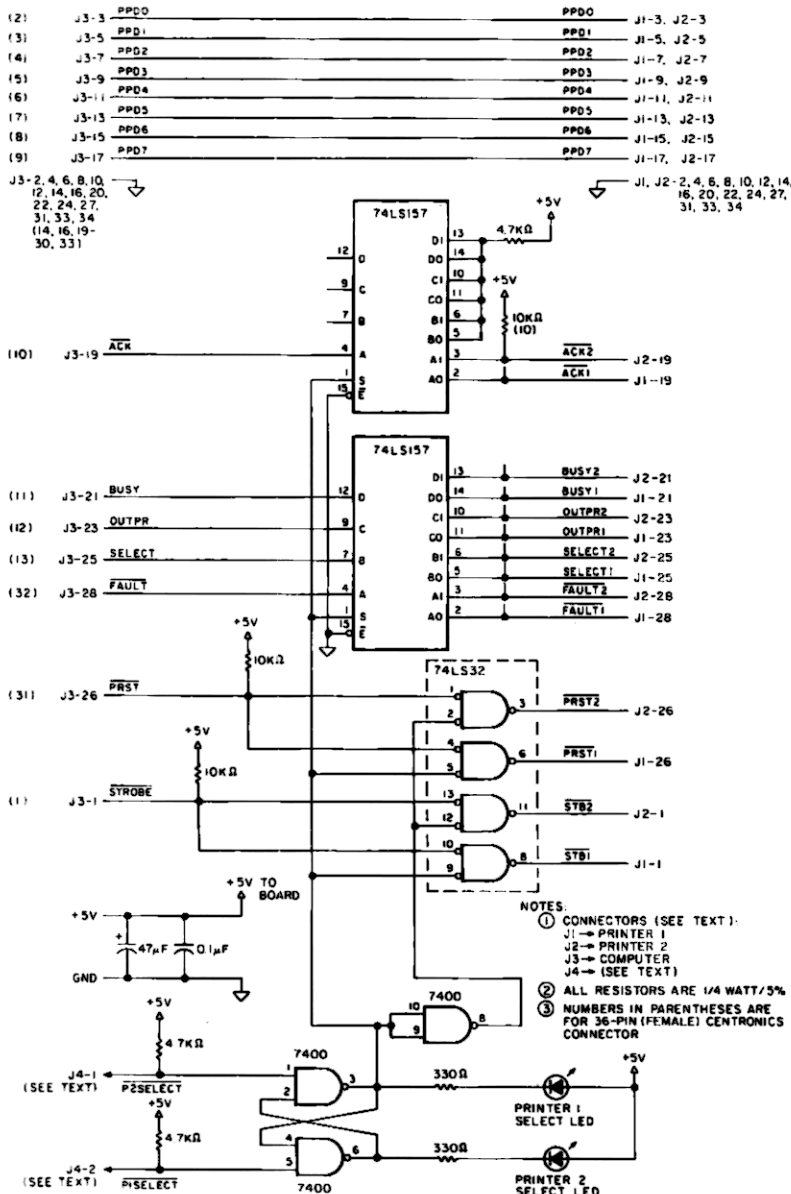


Figure 2. Schematic of the electronic switch box.

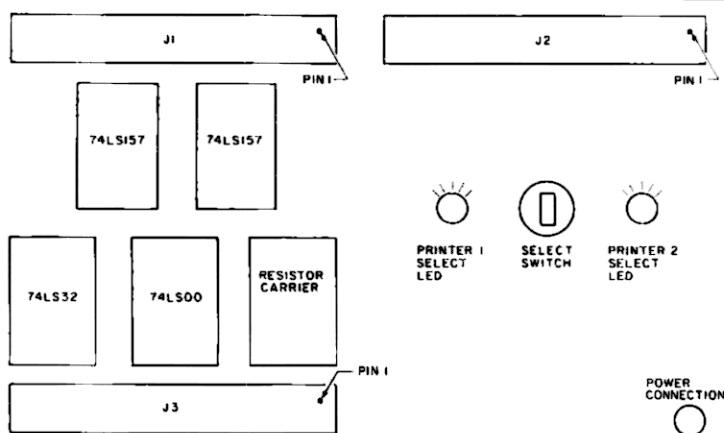
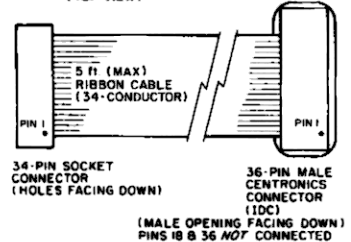


Figure 3. Board layout of the switch box.

throw) toggle switch (see Fig. 5), which is what I used in my implementation. The setting of the toggle switch determines the printer selected.

Another possible connection to the C1SELECT/ and C2SELECT/ signals is the use of two momentary-contact SPST (single throw) switches (see Fig. 6). These let you switch the active printer at the touch of a button. The main disadvantage of this method is that on power-up, the electronic printer switch randomly selects one of the two printers and you can't predict which printer it will choose.

CABLE ASSEMBLY FOR J1 AND J2 (TOP VIEW)



CABLE ASSEMBLY FOR J3 (TOP VIEW)

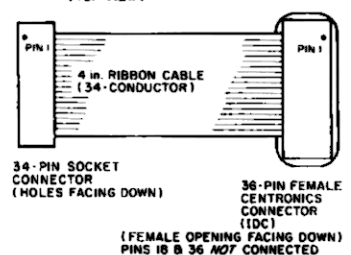


Figure 4. How to build the cable assemblies.

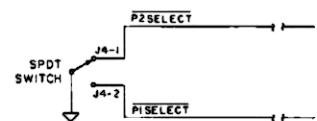


Figure 5. How to connect the SPDT toggle switch.

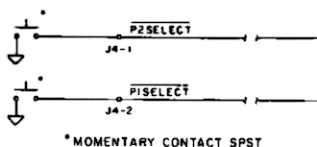


Figure 6. How to connect the SPST switch.

A different approach to controlling the electronic switch operation is to connect two digital outputs from an electronic device (such as a computer) to the C1SELECT/ and C2SELECT/ signals (see Fig. 7). If you go this route, make sure you don't have both outputs simultaneously low at any time. Once you bring a printer select line low, the selected printer remains selected even after you bring the line high. Be sure to bring the current printer-select line high before taking the other one low.

Figure 8 shows an approach using both SPST momentary-contact switches and outputs from a computer. In this case, you must use open-collector outputs so you can select a printer with either a low output or by pressing a switch. This allows the computer to select a printer under software control (or select

a default printer during computer reset), and you can manually change or override it by pressing a switch.

A final approach involves using only one digital output from a device, and using the spare NAND (7400) gate on the board as an inverter (see Fig. 9). You select printer 1 with a low digital output, printer 2 with a high output. This is better than the other approaches since you need only one output and you can't inadvertently select both printers simultaneously.

Besides the items indicated on the parts list or already mentioned, you will

also need a +5-volt power supply capable of providing at least 100 milliamps.

Operating the Switch

The specifics of how you operate your particular switch depend largely on how you connect the C1SELECT/ and C2SELECT/ signals. I will assume you chose the SPDT approach, but be aware of any differences that may apply if you use one of the other configurations.

The two combined NAND gates with the C1SELECT/ and C2SELECT/ inputs act as a debounced latch that selects which printer the computer can access. The lit LED (light-emitting diode) indicates the currently active printer.

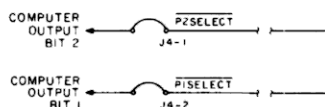


Figure 7. How to connect the two digital outputs from the computer.

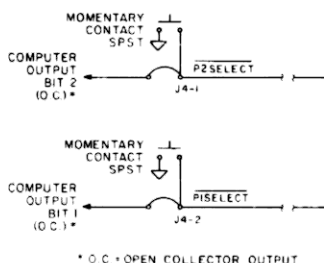


Figure 8. How to connect both the SPST switch and outputs from the computer.

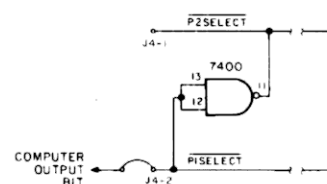


Figure 9. How to connect the digital output using the NAND gate on the board.

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1	74LS32 quad 2-input OR gate (LS TTL) IC	JDR	74LS32	.29
1	74LS00 quad 2-input NAND gate (TTL)	JDR	74LS00	.24
12	10k-ohm resistors (.25 watt)	RS	271-1335	.08
2	330k-ohm resistors (.25 watt)	RS	271-1315	.08
3	4.7k-ohm resistors (.25 watt)	RS	271-1330	.08
1	.1 µF/50-volt disc capacitor	RS	272-135	.25
1	47 µF/50-volt electrolytic capacitor (PC mount)	RS	272-1027	.69
3	34-pos. cable header*	DK	R230-ND	1.90
3	34-pos. ribbon cable socket connector*	DK	R305-ND	2.24
2	36-pos. Centronics-type ribbon cable connector (male)	JE	CEN36M	8.69
1	36-pos. Centronics-type ribbon cable connector (female)*	JE	CEN36F	9.75
2	Red light-emitting diodes (LEDs)	RS	276-041	.35
1	SPDT micro-mini toggle switch*	RS	275-625	1.59

* See text.

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Radio Shack National Parts Division, (RS), 900 E. Northside Drive, Fort Worth, TX 76102, 817-870-5662.

Digi-Key (DK) Corporation, Highway 32 South, P.O. Box 677, Thief River Falls, MN 56701, 800-346-5144 or 218-681-6674.

Jameco (JE) Electronics, 1355 Shoreway Road, Belmont, CA 94002, 415-592-8097.

Table 2. Parts list for the electronic switchbox.

The 74LS157s are quad two-to-one multiplexers. These ICs switch the various output signals from the selected printer to the computer. You switch the FAULT/, SELECT, PAPEREND, BUSY, and ACK/ signals from the printers using the 74LS157s.

The 10k-ohm pull-up resistors on the inputs to the 74LS157s and other gates prevent potential logic level problems that may occur if one (or both) of the printers is not connected.

The 74LS32 switches two of the computer output signals to the currently selected printer, RESET/ and STROBE/. The eight data line outputs from the computer are routed directly to the inputs of both printers, since the only time a printer will read the data lines is when you activate its STROBE/ signal, which happens only with the currently selected printer. Because of this, you don't need to switch the data lines.

To operate the electronic switch, plug the printer cable from the computer into the female Centronics input connector on the switch, and connect one or both

of the male Centronics output connectors to the printer(s). Then you select which printer you want connected to the computer.

You can switch between printers any time during operation, but you shouldn't switch printers while you're transmitting data, since this causes unpredictable results (as it would with even a mechanical switch).

Also, you should power up the electronic switch before or together with the printers, and before or together with the computer.

Coming Up

In coming installments of Project 80, I'll present projects for Centronics-to-RS-232C and RS-232C-to-Centronics converter interfaces, which lend themselves to a wide variety of applications. ■

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In Search of IBM PC Incompatibility

I booted up Flight Simulator on my Model 1000 recently and plugged in some Color Computer joysticks. Applying throttle with one stick and controlling elevators and ailerons with the other, I lifted off for a short cruise over Lake Michigan. I was surprised; Tandy warns that joysticks might not work with all IBM PC software.

I've started a list of IBM PC programs that don't work on the 1000, whether because the joysticks won't function, the printer won't print, or the program simply won't load. But I can't try them all. So if you're having problems with any IBM PC software, let me know; I'll either get the software and test it or ask the developer for the facts. Then I'll publish my findings. You should include details about the machine on which you're trying to run the program.

Owners of early 1000s will have more problems than recent buyers. Tandy has quietly modified the 1000 as it has discovered problems. The printer port now works with the PFS series and other software, and the video output to monochrome monitors is brighter. Several early 1000s I know of (including my first review model) would freeze up for no good reason. Tandy replaced them.

ANSI Color

Speaking of fixed problems, I notice that I no longer have to set the video mode to color after booting up my newer 1000 to get programs like SideKick running in color (probably the video port modification).

When I mentioned the color problem in my June article ("The Tandy 1000 Tip Sheet," p. 38), several readers thought the solution (using Mode CO in the AUTOEXEC batch file) would put even DOS in color. It doesn't, but there's a way to get MS-DOS running in color using ANSI.SYS (the extended screen and keyboard driver) and the DOS Prompt command.

The ANSI driver lets you manipulate keyboard and display parameters using ANSI codes. The Prompt command, in addition to controlling the appearance of



the DOS prompt, is one way to send codes to the ANSI driver.

John Harrell summarized the use of Prompt with the ANSI driver in his April 1985 installment of 2000 Plus (p. 104). He provided tables of Prompt parameters and ANSI codes you'd find only if you bought both the MS-DOS and the programmers' reference manuals.

You can do some interesting tricks with that information. Here's how to get a blue screen with bright white text when you boot up any of Tandy's MS-DOS machines. (Note that a typo appears in the table on p. 106 of that column; in the third from last code sequence, "I" should be "1." Also, the 1000's Prompt command lets you put an equals sign in the DOS prompt using \$q.)

You must first install the ANSI driver in the CONFIG.SYS file on your boot-up disk. If you don't have a CONFIG.SYS file, you can create it as follows. Put your DOS disk in the default drive. Type in COPY CON CONFIG.SYS and press the enter key; then type in DEVICE = ANSI.SYS and press the enter key again. Then press the F6 key (it produces a ^Z, an end-of-file character) and the enter key to write the file to disk.

CON (the console or keyboard) is the source of text you want copied to the new

CONFIG.SYS file. If you then type in TYPE CONFIG.SYS, the computer displays the new configuration file. You should see just one line (DEVICE = ANSI.SYS). If you already have a CONFIG.SYS file, add the ANSI line to it by using the append form of the Copy command:

```
COPY CONFIG.SYS + CON
DEVICE = ANSI.SYS
<F6>
```

MS-DOS adds what you type in from the "console" to the existing configuration file. (With this form of the Copy command you can add the contents of several files to the file immediately following the Copy command by using multiple plus symbols. The appended files are copied, not destroyed.)

With the ANSI driver installed (you must reboot), you can alter screen attributes with the Prompt command. To get bright white letters on a blue background, type in:

```
PROMPT $e{1:37:44m$g
CLS
```

Type in all the letters as you see them. Case is important (and you must send all codes in one Prompt command). The screen won't turn totally blue until MS-DOS executes the Clear Screen command (CLS).

Add these two lines to the AUTO-EXEC.BAT file on your boot-up disk or create that file with these two lines. Do it just as I described above for the CONFIG.SYS file. Your computer will now boot up in color. If you have an early 1000, you might have to add MODE CO first to get it in color mode. You can also use EDLIN to create or edit these files.

The codes following the Prompt command do the following:

The `$e` sends an escape character to the ANSI driver followed by the code sequence [1;37;44m. The three numbers (1, 37, and 44) are video codes. The `$n` puts the current drive letter in the prompt, and `$g` represents the `>` symbol. In other words, I restored the normal DOS prompt after setting the color attributes. (You can't use the `>` symbol directly as text in the Prompt command because DOS interprets it as indicating I/O redirection.) I've summarized the video codes in the Table so you can experiment with them.

ANSI.SYS has drawbacks. It slows screen display and causes an annoying

zero	Off, black on white
1	Bright foreground
5	Blinking
7	Reverse video
30-37	Black, red, green, yellow, blue, magenta, cyan and white foregrounds
40-47	The same colors for the background

Table. Model 1000 video codes for ANSI driver.

```
-n desk.fix      'name of file
-l              'load file
-e 12dc 70 71   'enter 70 and 71
                  starting at 12dc
-e 12ed 67      'enter 67 at 12ed (re-
                  placing a3)
-w             'write the patched
                  file to disk
-q             'quit Debug
```

Fig. 1. Patch to let DeskMate run on the 1200.

```
-E 121 50
-W
-Q
```

Fig. 2. Debug LF/COM.

flicker during scrolling. Also, in this example, you must restore the color after running a black-and-white program by using the CLS command.

DeskMate Generic

Now that the improved and repaired DeskMate 01.01.00 is out, I've updated the patch that lets you use DeskMate on the 1200 and IBM PC. The table of extended codes for the function keys has been moved, but the idea's the same: Replace the codes for F11 and F12 with the codes for alternate-F9 and alternate-F10. A further refinement is to replace the code for shift-F12 (used to exit without saving changes) with control-F10. (Although there's an entry in the code table for all function keys and all possible uses of each—with the shift, control, and alternate keys—most of the codes aren't used.)

I couldn't fix the compatibility problem with the Print key, which is necessary to print a document from text. You can still use Shift-Print to print a screen at a time (small consolation).

If you use a disk utility like the Norton Utilities or Super Utility, all the action's in the eighth sector of Desk.EXE. The codes for F11 and F12 are 98 and 99. You'll find them 36 bytes from the end of the sector. Change them to 70 and 71. The code for shift-F12 (A3) is 19 bytes from the end and you can change it to control-F10 (67).

If you use Debug, make a copy of the DeskMate disk and change Desk.EXE's extension from EXE with Rename. Call it Desk.FIX (Debug won't alter EXE files). Type in DEBUG to load it, put the disk with Desk.FIX on it in drive A, and type in the lines in Fig. 1, ignoring the comments. Rename the patched file back to Desk.EXE and try it out.

If DeskMate starts blinking on your IBM PC or compatible, you can fix it by changing the display colors. From DeskMate's main menu, press the F1-F4 keys while holding down the control key to cycle through the available colors. Each of the four function keys controls the color of one area of the DeskMate screen, and there are 16 possible colors. Eight of the 16, the lighter colors (arranged contiguously), cause blinking.

You can play with any or all of the four keys. Once you find a pleasing combination that doesn't blink, you can save

it with alternate-F10 (the old F12) to leave DeskMate. On the 1000, you'll get blinking after you call up SideKick. Fix it the same way.

Basic Listings

You can use MS-DOS's printer driver (LPDRVR.SYS) to get formatted Basic listings. It presents some complications, however, so it's only worth setting up if you need nice listings. As a default, the driver does not send a line feed after carriage returns.

If your printer is non-Tandy or is switched for no auto line feed, the driver, as is, will print a whole page on one line. You must set the driver to new parameters through a small Basic program (see the Program Listing). A machine-language program also works.

You must install the driver in CONFIG.SYS (DEVICE=LPDRVR.SYS), and then run the program in the Listing before printing. The driver, once set, also caused problems with my word processor's printing routine.

If you have a Tandy printer, or one set for auto line feed, omit the first three codes in line 100. The code sequence 27-78-6 makes the driver skip six lines over the perforation. Code 12 sends a form feed. Your printer will execute a form feed when you run this setup program so you'll know where the driver thinks the top-of-form (TOF) is. The semicolon in line 160 is critical; Basic will interleave the codes with carriage returns if it's not there. You need line 50 to prevent losing the wraparound character in lines longer than 80 characters. The driver codes are found in the back of the 1000 MS-DOS manual.

If you use the first version of LP.COM (or LPINST.EXE) to prevent extra line feeds on your printer, you'll still lose the wraparound character in long lines, according to 80 Micro reader Paul Van Huysen. Tandy supplied him with the patch in Fig. 2 to LF.COM to make it work with LPDRVR.SYS. One remaining minor bug is an extra carriage return with form feeds. ■

You can write to Dave Rowell at 80 Micro, 80 Pine St., Peterborough, NH 03458.

Program Listing. Printer setup for Basic listings.

```
10 'Set up printer for Basic listing: Skip perforation and
20 'disable linefeed suppression for non-Tandy mode.
50 WIDTH LPRINT 255
100 DATA 27,89,0,27,78,6,12
110 DATA 255
150 READ A : IF A=255 THEN END
160 LPRINT CHR$(A) : GOTO 150
```

End

Printer Talk

The NEC Spinwriter Elf Model 350 (\$545), a letter-quality printer for the small business and home computer market, is plug-compatible with the IBM PC, XT, AT, and PC-compatibles.

It supports software like WordStar, Lotus 1-2-3, Symphony, dBase, PFS:Write and MultiMate and prints full 132-column financial spreadsheets.

The Elf prints up to 190 words per minute, and offers bold, shadow, and underscore fonts and bidirectional printing. It comes with a cut-sheet guide; an optional unidirectional tractor is available for continuous forms. For further information, contact NEC Information Systems Inc., 1414 Massachusetts Ave., Boxborough, MA 01719, 617-264-8000.

Circle 570 on Reader Service card.

Decision Maker

Programmed Press offers version 1.2 of its Options & Futures software package for IBM PC and compatible MS-DOS computers (including Tandy).

The package contains 10 interactive programs that provide data analysis and forecasting, and actuarial values for investment decision-making.

Among the 10 programs are some of the best option valuation models, including Merton & Black-Scholes, Stoll-Parkinson, the empirical Bookbinder models, Conversion and Reverse Conversion Arbitrage, and Stock Index Futures.

Options & Futures costs \$100; a 220-page handbook is \$19.95. The book provides all the programs in Basic. A sample run follows each list-



Spinwriter Elf Model 350 from NEC.

ing. It also includes discussions of each program and its applications.

For more details, contact Programmed Press, 2301 Baylis Ave., Elmont, NY 11003, 516-775-0933.

Circle 571 on Reader Service card.

Key Solution

A program that modifies IBM PC and compatible keyboards (including Models 1000 and 1200) for use by the disabled is available from Rev. Bradley Murray (Loyola College, 4501 N. Charles St., Baltimore, MD 21210, 301-323-1010).

The program lets a person who only types with one hand, or with a mouth or head stick, press keys successively rather than simultaneously. For example, pressing the shift key followed by the 3 key produces the pound symbol. The control and alternate keys work as usual.

The program works with most software packages, including Word Perfect, Word, MultiMate, dBase III, R:Base

and ST-100. It doesn't work with packages that modify certain interrupt vectors, like Sidekick (a version is in the works for this class of programs).

The program is \$10. Contact Rev. Bradley Murray for further information.

Circle 573 on Reader Service card.

Super Printing

SourceView Software International offers EPSWord for MS-DOS machines. EPSWord (\$39.50) modifies WordStar to take advantage of Grafrax Plus capabilities on Epson and IBM printers.

The program is fully integrated with WordStar. It lets you choose any combination of special print features, including compressed font, italics, doublestrike, emphasized characters, or half-height superscripts. This gives you the power to create highlighted text, footnotes, eye-catching headings, and other special effects.

For more information, contact SourceView Software In-

ternational, 835 Castro St., Martinez, CA 94553, 415-228-6220.

Circle 574 on Reader Service card.

New Improved Better

Volkswriter Deluxe version 2.2 is available from Lifetree Software. It's a full-featured word processor compatible with software like Lotus 1-2-3, SuperCalc, and dBase II.

Version 2.2 is faster than earlier versions, has new documentation and features, and works with the Models 1000 and 1200. It loads and operates 20-80 percent faster than before (depending upon the function) and supports copy-and-paste and windowing functions. You can set the keyboard to repeat up to 30 characters per second, three times the normal speed. A new communications file filter strips files of all control characters and transmits only the pure ASCII characters.

You can upgrade Volkswriter 2.0 or 2.1 for \$30 and version 1.2 and International Edition for \$100. Retail cost for Volkswriter 2.2 is \$295. For further information, contact Lifetree Software Inc., 411 Pacific St., Monterey, CA 93940, 408-373-4718.

Circle 577 on Reader Service card.

Looking Good

Lumena (\$299.95) from Tandy creates presentation graphics for advertising, education, and business on your Model 2000.

Features include multiple pen and "brush" sizes for freehand drawing; eight solid colors and 28 dithers (mixed colors selected by you); two screen buffers with the ability to overlay screens; automatic creation of circles, boxes, polygons, and curves; user-de-

MS-DOS NEW PRODUCTS

```

GOLF MAIN MENU          20:04:18    03-29-1985
                        Therlee Park Country Club

Options:

1      End Processing
2      Change League Profile
3      Player/Scores File Maintenance
4      Score Transaction Processing
5      Compute Handicaps
6      Report Writer
7      Tournament Reporting (G.O.L.F.T.)
8      HELP

Select an option of 1 through 8_

```

G.O.L.F., a score-keeping and handicapping golf program.

finer brushes; magnification of picture areas for precise work; rotation of picture elements; text manipulation using size, shadows, outlines, colors, and fonts (eight provided) with a user defined font creation option; and more.

Lumena operates with a mouse or graphics tablet. For further details, contact Tandy Corp./Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102.

Circle 575 on Reader Service card.

Golfing Around

G.O.L.F. (Golfing On-Line Facility) keeps scores and handicaps on the IBM PC and compatibles (including the Model 1000). The program tracks both home and away rounds, and maintains name, phone number, and last 20 rounds played for up to 999 players (400 on a floppy disk).

The program uses the 1985

U.S. Golf Association handicapping formula to calculate handicaps, but you can modify the formula. You can display member handicaps and records on the screen or on printed reports. You can print out league rosters, handicap rankings, score posting sheets, and player personal scoresheets.

You need 128K, one disk drive, and an 80-column IBM-/Epson-compatible printer. The program is \$199.95. You can order a demo disk for \$3. GOLFR (\$49.95) is an optional report program. It uses the G.O.L.F. data base to print a wide (14 7/8 inch) utility listing and a wide working-records report on a 132-column printer. For more information, contact Taylor Consulting, 51590 Bridgewater Court, South Bend, IN 46637, 219-272-9513.

Circle 576 on Reader Service card.

MS-DOS New Products Index

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Teac FD55F Bare	
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Teac FD55G	
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Sound Advice For the 4/4P

You can be the Beethoven of the Model 1000, which has enough Basic commands for spirited, varied music, or the Mozart of the Model 100, which boasts 16,384 tones, but inspiration may come harder if you want to make music on the Model 4/4P. With only eight Basic-activated sounds—and it's almost too charitable to define them as notes—the 4's musical possibilities seem limited. Despite this, you can learn to use these sounds for both utilitarian and creative purposes.

Sound Introduction

The Sound command's format appears as SOUND, X,Y, where "X" represents the sound's tone with a value from zero to seven and "Y" dictates the tone's duration with numbers from zero to 31.

Type in SOUND 0,0. You'll hear the 4's lowest note, an E, play for the shortest available duration, about a half second. Type in SOUND 7,31 to hear the highest note, a B, play for the longest duration, about 15 seconds.

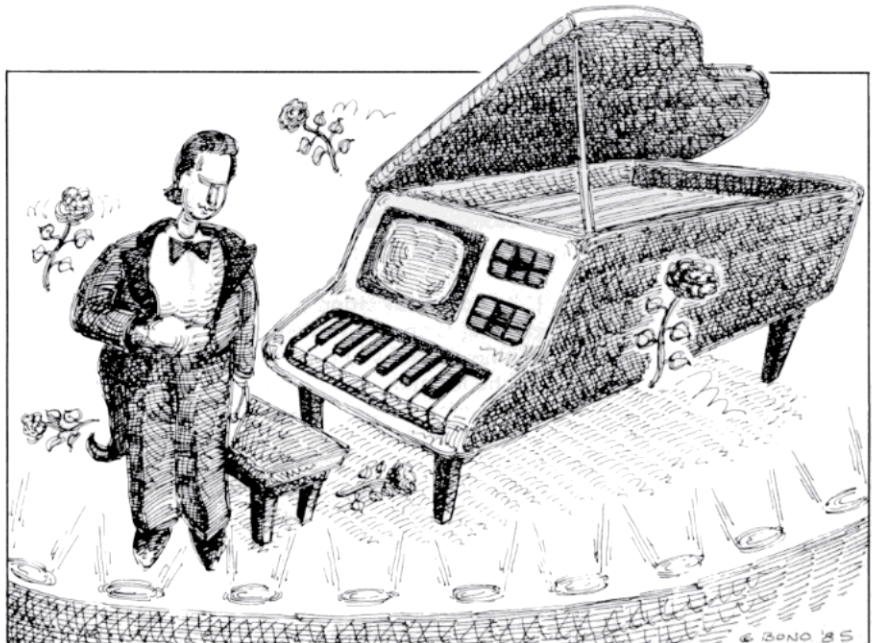
Multiply the 4's eight tones by their 32 possible durations and you find that you can generate up to 256 different sounds. The following listing runs through the entire repertoire. I bet you press the break key to quit long before the program ends:

```
100 FOR A=0 TO 31
110 FOR B=0 TO 7
120 SOUND B, A
130 NEXT B, A
140 END
```

The fact that you can use numeric variables as values for tone and duration opens up some possibilities. I've come up with these values by comparing tones on a Model 100 to those on the 4: zero equals E flat, 1 equals E, 2 equals F, 3 equals F sharp, 4 equals G, 5 equals A, 6 equals B flat, and 7 equals B. The

System Requirements

Models 4 and 4P
Basic



following random tone and duration generator is at least unpredictable:

```
100 SOUND RND(8) - 1,RND(32) - 1
110 GOTO 100
120 END
```

Perhaps the best use of the Sound command is as an alarm to indicate that

some event has occurred. See Program Listing 1 for a simplistic example. The program searches numbers 1-1,000 to find one evenly divisible by 2, 5, and 25. It sounds a tone when it's successful or has exhausted the search pool.

A sound alarm is useful for any pro-

Program Listing 1. Sound search.

```
100 FOR X=1 TO 1000
110 IF X/2=INT(X/2) AND X/5=INT(X/5) AND X/25=INT(X/25) THEN 130
120 PRINT "Nothing found.": GOTO 150
130 PRINT "The answer is"X
140 SOUND 0,0
150 NEXT
160 END
```

End

Program Listing 2. Wake Up.

```
100 REM * Wake Up Call *
110 CLS: CLEAR
120 START$=TIME$
130 PRINT "It is now "START$
140 INPUT "When shall I wake you";T$
150 CLS: PRINT "Happy dreams."
160 PRINT @ 440, "The time is "TIME$
170 IF T$<>TIME$ THEN 160
180 CLS
190 PRINT "Wake up! ";
200 SOUND RND(8)-1,0
210 GOTO 190
220 END
```

End

Tandy 1000

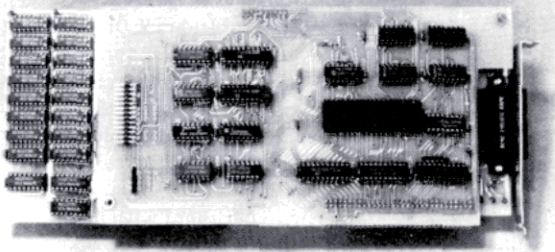
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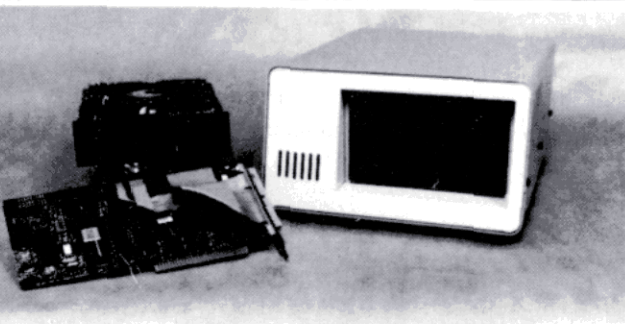
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HDS Hard Drives for the Tandy 1000 allow booting directly from the Hard Drive using the Tandy DOS. All units are complete with controller, ready to plug in and use. The Internal Hard Drive Units replace the top disk drive inside the 1000, or request an external unit for only \$150. more.

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TanTel

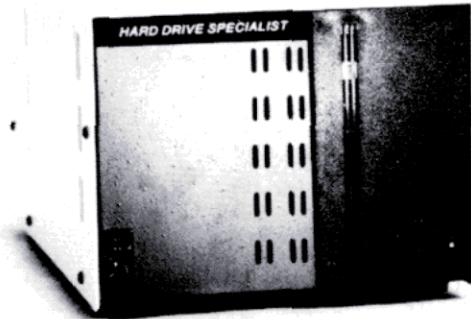
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Plugs in internally but does not use one of the 3 expansion slots
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Model 1, 3, 4 Hard Drives



Model 1, 3, 4 Hard Drives

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Program Listing 3. Player.

```

100 REM * Player *
110 CLS: CLEAR: DEFSTR A-B
120 PRINT "Press key x"
130 X$=INKEY$
140 IF X$<>"x" AND X$<>"X" THEN 130
150 IF X$="X" THEN PRINT "Press CAPS key and re-start program.": END
160 PRINT "Play keys q w t"
170 PRINT "      a sdf g"
180 A="qawsdfgt"
190 B=INKEY$
200 IF B=CHR$(32) THEN N$=""
210 Z=INSTR(A,B)
220 IF B="" OR Z=0 THEN 190
230 Z=Z-1
240 PRINT @ 440,"tone: ";Z
250 SOUND Z,0
260 N$=N$+B
270 IF LEN(N$)=255 THEN PRINT "Song is over.": PRINT: PRINT N$: END
280 GOTO 190
290 END

```

End

gram whose run you need not monitor. You could run Program Listing 2, Wake Up, take a short snooze, and be assured the computer will awaken you at the time you select. To try it and get quick results, answer the prompt by typing in a time figure that's a few seconds after the time shown on the screen.

If the TIME\$ statement is a new concept, you should know you can set the time in Basic by typing in SYSTEM

"TIME 12:00:00". The 12:00:00 can be any legal set of figures in 24-hour time, from 00:00:00 to 23:59:59. The second example contains each two-digit field's highest usable number.

Tickling the Ivories

Although the Model 4 doesn't offer a full octave of notes, try Program Listing 3, Player, to turn some of the keyboard buttons into musical keys. At the start

of the run, the program asks you to tap key "x." This tests to see if you've pressed the Caps Lock key. If you have, Player asks you to press it and run the program again. This ensures that the keys you tap are in lowercase mode so the program works.

Player shows you the keys you can play. If the computer keyboard were a piano, keys q, w, and t would be black notes and keys a, s, d, f, and g white notes. Tapping the keys produces tones for the shortest duration, and Player prints the tone number on the screen. If you have an aptitude for playing by ear, you may even work out a melody.

Player is a bit more than a sound tap- per. As you play, it stores the notes you strike in the string variable N\$. If you play 255 notes, the program ends and prints the value of N\$ on-screen.

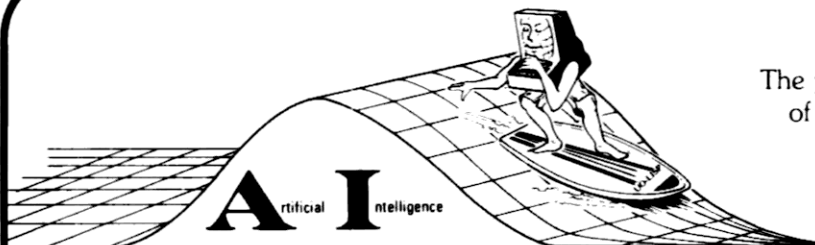
You can experiment with Player. If you make a miscue, press the spacebar to wipe out the value of N\$. If you manage to play a song perfectly, press the break key to stop the run, then type in PRINT N\$. Write down the characters in N\$ and I'll show you how to store your melody in a program.

Computerola, Program Listing 4, lets you store a melody string. Run the pro-

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gram and press 1, 2, 3, or 4 as your selection. The first three melodies you'll recognize, but the fourth is no melody you've ever heard. The idea was to simulate bagpipes.

I stored the melody strings I got from experimenting with Player in string array variables P\$(1) to P\$(4) in lines 130-160. They are keyed to the title clues, stored in S\$(1) to S\$(4). When you make a choice, the loop in lines 270-320 runs through the sequential midstring values of the chosen melody string. A\$ is a sequence of eight possible notes. The in-string test of line 290 gives Z a numeric value equal to the position of the note in the A\$ string. Player must reduce that value by 1 in line 300 so the values are in the correct 0-7 range. Line 310 plays the Z tone for a duration of M. In line 260, M is given the briefest duration except if you play the bagpipe mimicry; then it's extended a bit.

Some Closing Notes

As you can see, my musical system leaves much to be desired. There are no rests, no prolonged notes. One could write more precise music with some attention to For...Next loops for pauses and different durations for appropriate

notes. The task would be a handcrafted program beyond the quick-and-dirty automation available in Computerola. But it's helpful to know that 4/4P sounds are there should you need them.

I'll leave you with a scene from a spy movie. You've just been handed the secret microfilm and you're walking along

the busy Hauptstrasse in Heidelberg. Then in the distance, you hear this chilling sound:

100 SOUND 0.0: SOUND 7.0: GOTO 100 ■

Write to Richard Ramella at 1493 Mountain View Ave., Chico, CA 95926.

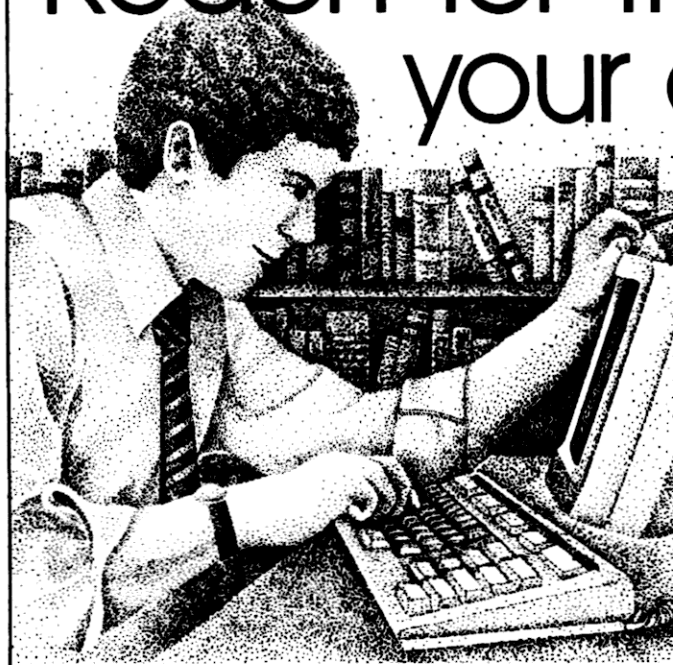
Program Listing 4. Computerola.

```
100 REM * Computerola *
110 CLS: CLEAR: DIM S$(4), P$(4)
120 DATA Ode,Deck,Mary,Bagpipes
130 P$(1)="ddfggfdasasddssddfggfdasasdaa"
140 P$(2)="gfdasdasdfdsdaa"
150 P$(3)="dsasddssddggdsasddssdsda"
160 P$(4)="aadgdsagadfgaadgdsasda"
170 FOR X=1 TO 4: READ S$(X): NEXT
180 A$="qawsdfgt"
190 PRINT "Selections": PRINT STRING$(10,"-")
200 FOR X=1 TO 4
210 PRINT X;S$(X)
220 NEXT: PRINT
230 INPUT "Choose 1, 2, 3 or 4 and ENTER";Q
240 Q=INT(Q)
250 IF Q<1 OR Q>4 THEN CLS: GOTO 190
260 IF Q=4 THEN M=3 ELSE M=0
270 FOR A=1 TO LEN(P$(Q))
280 B$=MID$(P$(Q),A,1)
290 Z=INSTR(A$,B$)
300 Z=Z-1
310 SOUND Z,M
320 NEXT A
330 END
```

End

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Calling All Subroutines From Model 4 Basic

Model 4 Basic provides two commands that let you link Basic programs to machine-language subroutines: USR and Call. The Model 4 manual explains USRs fairly well, but it's confusing enough about Call to keep many programmers from using it.

The USR statement is your best choice when your Basic program needs to send a single argument to a machine-language routine or receive a single integer argument from that routine. But if you want to send several arguments, or none at all, or if you need to return several values, you should consider the Call statement.

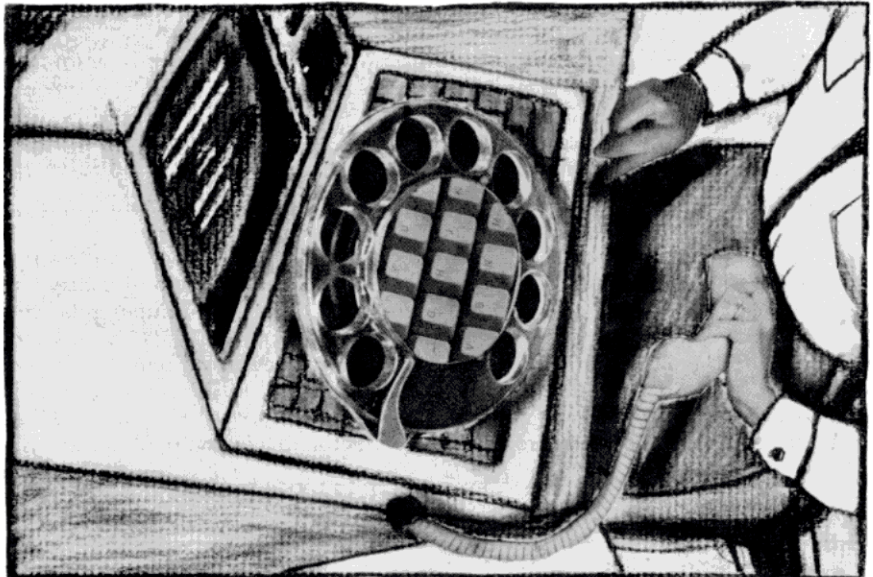
Setting up a subroutine for a Call instruction is easy. If you don't pass any variables in either direction, your Basic program merely needs to put the address of the routine into an integer variable and then issue an instruction like CALL ADDR%. You should make the variable that contains the address an integer variable, one that isn't part of an array. Basic's Call command will pass control to your machine-language routine, which will return to Basic with a simple RET instruction.

Sending arguments to your machine-language routine isn't much more difficult; it's certainly easier than the Model 4 manual suggests. You can put any variables (but not constant values or expressions) in parentheses after the routine address, and Basic will pass the addresses of the variables to your machine-language routine in the Z80 registers. You can pass variables of any type, though most machine-language routines accommodate either integers or strings best.



System Requirements

Model 4
64K RAM
Disk Basic
Assembly language
Editor/assembler



Program Listing 1. Utility to strip trailing blanks from strings.

```

00100 ; -----
00110 ; Model 4 Program -- Utility for Model 4 Basic
00120 ; Strips trailing blanks from string and converts
00130 ; all alphabetic characters to uppercase for sorting
00140 ; -----
00150 ; CALL this program with single argument: TARGET_STRINGS
00160 ; -----
00170 ; This program assembled with EDAS/Pro-Create -CI switch.
00180 ; See text if you use a different assembler.
00190 ; -----
00200 ;
00210 ; ORG 0000H ;See text
00220 ;
00230 ; Check string length
00240 ;
0000 7E 00250 LD A,(HL) ;Get string length
0001 B7 00260 OR A ;Is it 0?
0002 C8 00270 RET Z ;Yes -- return
00280 ;
00290 ; Point HL to last character in string
00300 ;
0003 E5 00310 PUSH HL ;Save addr. of descriptor
0004 4F 00320 LD C,A ;Store length in C
0005 23 00330 INC HL ;HL=> string address
0006 7E 00340 LD A,(HL) ;LSB of addr to A
0007 23 00350 INC HL ;HL=> MSB
0008 66 00360 LD H,(HL) ;MSB of addr to H
0009 6F 00370 LD L,A ;HL=> target string
000A 09 00380 ADD HL,BC ;HL=> end char. + 1
000B 2B 00390 DEC HL ;HL=> last char of string
00400 ;
00410 ; Strip trailing blanks
00420 ;
000C 3E20 00430 LD A,' ' ;ASCII space for comparison
000E BE 00440 CP (HL) ;Point to space?
000F 2004 00450 JR NZ,S1 ;No -- jump out of loop
0011 0D 00460 DEC C ;Decrement string length
0012 2B 00470 DEC HL ;Point to prior character
0013 18F9 00480 JR LOOP1 ;Loop until non-space found
00490 ;
00500 ; Save address in string descriptor
00510 ;

```

Listing 1 continued

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THE NEXT STEP

If you send a single argument to your routine, the program passes it through the HL register pair. It passes the second argument in the DE register, and the third in the BC register. If you send more than three arguments, BC points to a special block of arguments for values 3 and up.

For example, suppose you want to write a simple machine-language routine to chop a string down to some maximum length (admittedly, you might find this easier to do without leaving Basic by using LSET). Assuming that ADDR% contains the address of your routine, and that S\$ contains the string and LENG% the maximum length, the call instruction would look like this: CALL ADDR%(S\$,LENG%).

The question the TRSDOS manual doesn't answer clearly is exactly how BASIC passes SS\$ and LENG% to the routine. Since you have two arguments, BASIC passes them in the HL and DE register pairs. A rule of thumb states that the value sent to your machine-language routine always equals the VARPTR of the variable.

Since DE receives an integer variable, it will contain the address of a 2-byte value of the variable LENG%. And because HL receives a string variable, it will contain the address of the string descriptor: HL will point to the address of the string length, and the string resides in memory at HL + 1 and HL + 2. You can similarly pass single- and double-precision variables with the Call instruction, but generally you'll find these variables more difficult to handle in machine language.

Although the Call instruction does not explicitly let you send values from a routine to Basic, your machine-language program can directly alter values in some of the variables passed to it and thereby return as many values as required. However, you must write the machine-language and Basic programs so that they both know how many values you'll pass in each direction.

Installing a Subroutine

Whenever you use a machine-language subroutine with a Basic program, you face a dilemma: Where in memory should you put the routine and how are you going to get it there? Traditional methods include POKEing it into a literal string in the program or into a remark statement, loading it into a string variable or into an array of integers, or simply loading the routine into high memory before loading Basic.

While the last method is best for long, complex programs, it can cause two subtle problems if you aren't careful. First, if you program in Model I or III Basic, you must protect the program by setting the

Listing 1 continued

[illegible]

End

Program Listing 2. String encode/decode utility.

```

00100 ;
00110 ; MODEL 4 String encode/decode utility for Model 4 Basic
00120 ; Encodes or decodes a string by XORING each
00130 ; character with a corresponding character from
00140 ; a password. String lengths may be unequal.
00150 ; -----
00160 ; CALL this program with two arguments: Password$, Target$
00170 ;
00180 ; This program assembled with EDAS/Pro-Create -CI switch.
00190 ; See text if you use a different assembler.
00200 ; -----
00000 ;
00210 ; ORG 0000H ; See text
00220 ;
00230 ; Test lengths of target string & password
00240 ;
0000 1A 00250 LD A,(DE) ;Get length of target string
0001 B7 00260 OR A ;Greater than 0?
0002 C8 00270 RET Z ;No -- Return
0003 F5 00280 PUSH AF ;Save length
0004 7E 00290 LD A,(HL) ;Get length of password
0005 B7 00300 OR A ;Greater than 0?
0006 2002 00310 JR NZ,ADDR ;Yes -- go
0008 E1 00320 POP HL ;Else clear the stack
0009 C9 00330 RET ;Back to Basic
00340 ;
00350 ; Both lengths are greater than 0
00360 ; Get addresses in DE and HL
00370 ;
000A 4F 00380 ADDR LD C,A ;C = length of password
000B 23 00390 INC HL ;HL==> password addr.
000C 7E 00400 LD A,(HL) ;Get LSB
000D 23 00410 INC HL ;HL==> MSB of addr
000E 66 00420 LD H,(HL) ;Get MSB
000F 6F 00430 LD L,A ;HL==> password
0010 E5 00440 PUSH HL ;Save password addr.
0011 2B 00450 DEC HL ;Adjust for addition
0012 0600 00460 LD B,0 ;BC = length of password
0014 09 00470 ADD HL,BC ;HL==> last char. of password
0015 CBFE 00480 SET 7,(HL) ;Set high bit flag
0017 EB 00490 EX DE,HL ;HL ==> target VARPTR
0018 23 00500 INC HL ;HL ==> target addr.
0019 5E 00510 LD E,(HL) ;Get LSB of address
001A 23 00520 INC HL ;Point to MSB
001B 56 00530 LD D,(HL) ;And MSB of address

```

Listing 2 continued

Program Listing 3. Model 4 library loading program.

```

1  '
2  '      Model 4 Library Loading Program
10 'This program will place a machine-language subroutine
20 'into a library of routines called ROUTINES/LIB
30 'Load the subroutine into protected high memory before
40 'you run this program. You must know the address
50 'of the first byte of the routine (in decimal notation)
60 'before you run this program.
100 CLS
110 INPUT "Which drive contains the ROUTINES/LIB file";DRIVE$
120 PRINT
130 INPUT "What is the decimal address of the new routine";ADDR%
140 '
150 OPEN "R",1,"ROUTINES/LIB:"+DRIVE$
160 FIELD #, 128 AS A$(0), 128 AS A$(1)
170 SECTOR% = LOF(1)+1
180 PRINT
190 PRINT "This routine will be stored on sector";SECTOR%
200 TEMP$=""
210 FOR I% = ADDR% TO ADDR%+127
220   TEMP$ = TEMP$ + CHR$(PEEK(I%))
230 NEXT I%
240 LSET A$(0) = TEMP$
250 TEMP$ = ""
260 FOR I% = ADDR%+128 TO ADDR%+255
270   TEMP$ = TEMP$ + CHR$(PEEK(I%))
280 NEXT I%
290 LSET A$(1) = TEMP$
300 PUT 1,SECTOR%
310 CLOSE
320 END

```

End

port macros. I will try to explain macro instructions, as well as some other advanced programming techniques, in detail in a future column. In the meantime, maybe a quick explanation will help.

The macro instructions that I use in all the programs in this column are sim-

ple to expand yourself, without benefit of a special assembler. The simplest macro, and one I use often, takes this form:

```

SVC  MACRO      #NUM
      LD         A,#NUM
      RST        40D
      ENDM

```

This tells the assembler that every time it sees SVC (the macro name) used instead of a "normal" opcode like LD or Call, it should write two lines of code. The first will load the A register with a special value, and the second will perform an RST 40. The macro also tells the assembler that it can find the special value by looking at the operand area of the line that contains the SVC command. For example, somewhere in the middle of the program you might see a line of code like:

```
SVC  @KEY
```

Since the @KEY label was defined as 1 at the beginning of the program, the assembler will expand this single line to:

```
LD   A,@KEY
RST  40
```

Last month's program included this macro definition:

```

SHOW MACRO      #MSG
      LD         HL,#MSG
      SVC        @DSPLY
      ENDM

```

This definition includes a call to the SVC macro defined earlier. To expand the macro call:

```
SHOW SIGNON
```

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either you or the assembler would write the following:

```
LD    HL,SIGNON    :Point to the message
LD    A,@DSPLY     :Get the SVC number
RST   40           :Process the SVC
```

In other words, one command easy for a human to understand, SHOW SIGNON, requires three lines of assembly code that are somewhat less direct.

One problem with macros is that every assembler expects a slightly different syntax for designating the macro's variables. The above examples work with EDAS and Pro-Create. ALDS doesn't accept variables like #NUM and #MSG but instead wants variables such as #0 and #1. The macro preprocessor I presented in September 1984 (p. 90) expects variables labeled #P1 and #P2. M-ZAL handles macros in a completely different way. EDTASM, the Series 1 assembler, and ALE don't handle macros at all.

Therefore, unless you have the assembler that was used to develop a program, you might need to alter the syntax of macro instructions and calls, or expand the macros manually. Unless the macros are extremely complex, neither task should be too difficult as long as you understand how your assembler works. ■

Program Listing 4. Demonstration program.

```
1 '      Model 4 Demonstration Program
2 '      Using Machine-Language Routines Stored in a Disk Library
3 '
10 '      This program assumes that sector 1 of ROUTINES/LIB
20 ' contains the machine-code for Listing 1 and that
30 ' sector 2 contains the machine code for Listing 2
40 '
100 CLS
110 OPEN "R",1,"ROUTINES/LIB"
120 GET 1,1           'Load the first routine
130 ADDR% = VARPTR(1) 'Address of machine-language routines
140 '
150 PRINT "Type in a string. Include trailing blanks if you wish."
160 LINE INPUT "=="> " ;S$
170 PRINT
180 PRINT "Type in a password of any length"
190 LINE INPUT "=="> " ;PWS$
200 CLS
210 PRINT "Length of original string ==> ";LEN(S$)
220 PRINT "Original string      ==> ";S$
230 PRINT
240 CALL ADDR% (S$)
250 PRINT "Length of converted string ==> ";LEN(S$)
260 PRINT "Uppercase string without blanks ==> ";S$
270 '
280 GET 1,2: CLOSE      'Get encoding routine
290 CALL ADDR% (PWS$,S$)
300 PRINT
310 PRINT "Length of encoded string ==> ";LEN(S$)
320 PRINT "Encoded string          ==> ";S$
330 '
340 CALL ADDR% (PWS$,S$)
350 PRINT
360 PRINT "Length of decoded string ==> ";LEN(S$)
370 PRINT "Decoded string          ==> ";S$
380 END
```

End

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This month's spreadsheet was submitted by T.A. Faircloth of Chicago, IL.

Does a tally of your monthly budget show either too little money or too much month? I wrote a spreadsheet template, Budgeter, that records how much you actually spend each month and compares it to what you plan to spend (see Figs. 1a and 1b). It also accepts monthly checkbook transactions and automatically posts the amounts to the appropriate budget category.

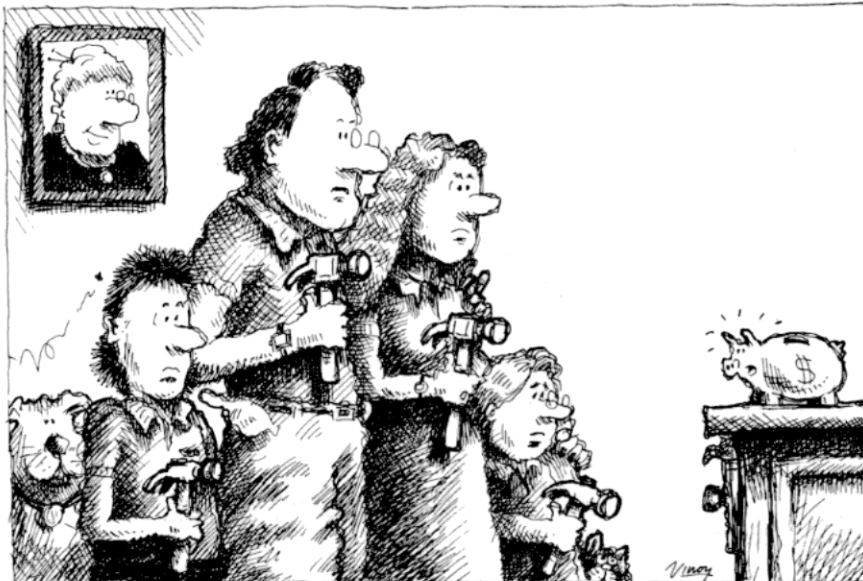
The Formulas

Enter Budgeter's cell formulas first (see Fig. 2). Figure 2 also lists the names applied to some of the spreadsheet cells. Multiplan refers back to these named cells in subsequent calculations. Make sure you disable the automatic recalculation feature when you enter the formulas and data; you can recalculate when you finish.

After you enter the formulas, set the cell formats according to those outlined in Fig. 3 (note that this figure also contains the default spreadsheet format).

Then enter the text data from the template in Fig. 1, customizing entries to reflect your needs. Don't forget to select Multiplan's iteration feature and the completion test at R54C1 under the Options command when you disable the recalculation feature for data entry.

You enter your monthly budget information by category in rows 5-12. As long as these amounts remain the same from month to month, you only have to enter them once; the spreadsheet carries them over for subsequent months. Enter pay-outs beginning in row 17. The codes in column 5 should correspond to those in the budget input area.



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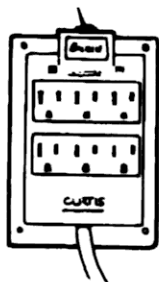
Figure 1a. Page 1 of Budgeter's template.

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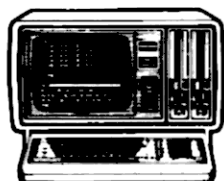
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(5) Household Incidentals	15.00	0.00	15.00
(6) Food	400.00	380.00	20.00
(7) Clothing	75.00	100.00	-25.00
(8) Personal Care	35.00	20.00	15.00
(9) Health Care	60.00	50.00	10.00
(10) Transportation	100.00	113.00	-13.00
(11) Insurance	45.00	38.25	6.75
(12) Education	75.00	75.00	0.00
(13) Recreation	25.00	20.00	5.00
(14) Contributions	25.00	20.00	5.00
(15) Debt Service	333.33	333.33	0.00
(16) Miscellaneous	25.00	0.00	25.00
	2048.33	2238.58	-190.25

THE VARIANCE IS UNFAVORABLE

Figure 1b. Page 2 of Budgeter's template.

Cell name	Cells referenced	Comments or description
AMT	R17:36C6	Cells referenced to calculate the total disbursements for the month.
Categ	R17:36C5	Cells referenced in the iterative process to determine the budget category of an item.
TVAR	R79C7	The total deviation from the predicted budget used in the formula in cell R81C1.
Actual	R17:36C6	Identical to AMT and used to summarize the monthly expenditures.
Page1	R1:52C1:7	Defines the area printed for page 1.
Page2	R55:83C1:7	Defines the area printed for page 2.

Formula cell	Formula
R38C6	SUM(AMT)
R54C1	ITERCNT() > = COUNT(Categ)
R62C5	R5C4
R63C5	R6C4
R64C5	R7C4
R65C5	R8C4
R66C5	R9C4
R67C5	R10C4
R68C5	R11C4
R69C5	R12C4
R70C5	R5C7
R71C5	R6C7
R72C5	R7C7
R73C5	R8C7
R74C5	R9C7
R75C5	R10C7
R76C5	R11C7
R77C5	R12C7
R79C5:7	SUM(R[-17]C:R[-2]C)
R81C1	IF(TVAR<0,"THE VARIANCE IS UNFAVORABLE", "THE VARIANCE IS FAVORABLE")
R62:77C6	IF(ISNA(ITERCNT()),0,IF(INDEX(Categ,ITERCNT())= ROW()-61,RC+INDEX(Actual,ITERCNT()),RC))
R62:77C7	RC[-2]-RC[-1]

Figure 2. Cell names and formulas.

Budgeter uses a unique feature of Multiplan and other spreadsheets. It allows "circular" references (the result for the current cell depends on itself in some way) and controls the iterations to allow solving complex problems such as iterative simultaneous equations and your personal budget.

How It Works

The heart of the template is in the cells in column 6, from rows 62-77. These formulas use Multiplan's index function to scan the entries in the Check Amount column and tabulate the amounts according to the Budget Codes entered in the preceding column.

The number of items that are contained in the check register (defined by the name "Categ") controls the number of items Budgeter looks up.

For each figure you enter in the check register, Budgeter tabulates one entry in the summary section (see Fig 1b). The first part of the formula, ISNA (ITERCNT()), is true when Budgeter starts to recalculate each spreadsheet. This makes the initial sum zero for each category. ■

Time-Outs

Formatting this template for Multiplan represented my first experience using Multiplan's iterative solutions. Much to my surprise, the first recalculation I performed took longer than expected. Since the delay was so noticeable, I thought you'd find it interesting to see some representative times on various computers.

I used the example from Fig. 1 for these items. I timed each trial starting when I entered a new number in one cell and ending when the command display reappeared.

Tandy's Model 2000 took 22 seconds to recalculate, the IBM PC/XT 51 seconds, the Model 4P (CP/M with RAM disk) 87 seconds, and the Model 4P (TRSDOS with RAM disk) 96 seconds.

—John B. Harrell III

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Default format:

F:DCOG10:

F

:DCOG10

Format record type.

Default cell format is for "continuous" text display in a "general" alignment. Default cell column width is 10 spaces.

Special formats:

Format COD: Cells are formatted in continuous text mode in the default alignment.

R3C3:5 and R57C3:5.

Format DOL: Cells are formatted in the default format and all entries are left-justified.

R14:15C5 and R16:53C1

Format DOR: Cells are formatted in the default format and all entries are right-justified.

R15C6 and R60C5:7

Format DOC: Cells are formatted in the default format and all entries are centered in the column.

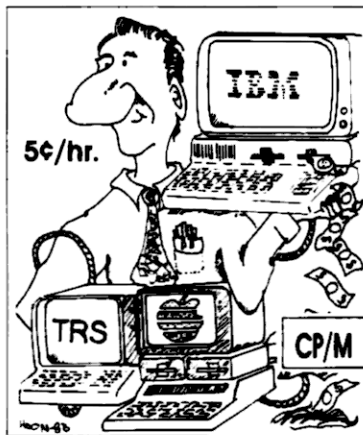
R17:36C5

Format F2D: Cells are formatted in the default alignment and displayed with a fixed-point precision of two decimal digits.

R5:12C4, R5:12C7, R17:36C6, and R62:79C5:7

Figure 3. Budgeter's cell formats.

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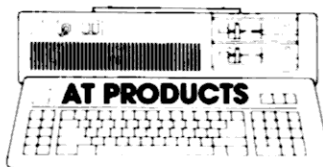
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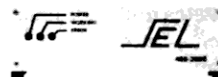
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Continued from p. 34

A Different Profile: 4 Plus

by Hardin Brothers

★★★★

Profile 4 Plus runs on the Model 4 (64K) and requires two disk drives. Tandy/Radio Shack, One Tandy Center, Fort Worth, TX 76102. Catalog number 26-1635. \$249.95.

Easy to use: ★★★★★

Good docs: ★★★★★

Bug free: ★★★★★

Does the job: ★★★★★

Tandy's venerable Model III data base manager, Profile III Plus, makes its debut for the Model 4 as a familiar system. While Profile 4 Plus allows more fields per record than the Model III version, it retains the same basic structure. Although it isn't state-of-the-art and other data base programs do more, Profile 4 Plus still competently handles most data filing needs at a reasonable price.

Starting Out

Profile 4 Plus lets you custom-design your data base. You use the supplied creation disk to dictate the look of user menus, input screens, reports, and mailing labels; include math formulas that manipulate input data; and move specified data to VisiCalc or SuperScript files.

Your first step in building a data base is to define a file. With Profile, you create a standard form for all the records in a file, then enter each record's data according to that form. Profile stores the form independently of the data, so you can make the forms as self-explanatory as you want without worrying about wasting disk space.

You create up to 10 input (and display) screens. You label each of the record's fields and indicate the length and type of information acceptable. The form can contain up to 99 fields, though you probably won't use that many.

You can associate each form to all or part of the information in a file, and you have wide latitude in defining the placement of fields and additional prompts on the screen.

You can define input areas to accept all keyboard input, numbers only, dollar amounts, or dates; you can decide to require that certain fields be filled before a record will be filed; and you can even instruct Profile to automatically insert the current date into a field.

Profile's most unique feature lets you create several different forms for the

same file, so you enter a single record's data by filling in a number of forms. For example, you could use one form for a customer's name and address, a second for recording the last purchase that customer made, and a third for keeping track of which sales brochures and catalogs you sent to that customer. While Profile holds all this information on disk as a single record, you can focus on just the information you're concerned with each time you sit down to update your files.

Profile 4 Plus lets you split up a record's fields into four groups, or segments, of your own choosing so you can manipulate information in smaller chunks. For example, you can use the fields assigned to segment 1 to sort records quickly; you can use fields in other segments as sorting keys too, but the process takes more time.

One convenient Profile feature is its ability to associate fields of a file. You define associated fields when you create the file; afterward, when you search through records in a file, you can sort or select information from associated fields as a group. For example, you could select the records of customers whose last name is Weber and who live on Weaver St.

If you want, you can designate certain fields to hold the results of calculations. Profile 4 Plus lets you define up to 16 formulas for any data file. Its math operations, however, are significantly more limited than those of most spreadsheets. You can add, subtract, multiply, and divide, as well as use integer or floating-point results. However, you can't do advanced calculations (such as square roots or averages or trigonometric functions) or use parentheses to direct the order of operations.

You can create up to 36 report forms for each file. However, like many other data base programs, Profile is generally weaker at generating reports than it is at gathering and storing information. Although Profile allows for report titles and page headings, you are limited to no more than two lines to display information from each record in a printed report. You can include any or all of the fields of information in each report, as well as gather subtotals and totals of any numeric information.

Finally, the creation programs let you build user menus. These menus permit someone unfamiliar with the Profile system to add information to a file, create reports and labels, and access most of the run time functions without having to answer any prompts or make decisions (or make any mistakes that could destroy data). You can also add a password to any file to keep important information confidential.

Run Time Processing

Once you create and define a file, you add data to it. At this point, you can put away the creation disk and start using Profile's run time disk. The first choice on the run time menu, Expand Files, tells Profile to add blank records to the disk copy of a file. You must expand a file before you can add information to it, for the input procedures can only change information in a record; they can't create space for additional records on your disks.

Though this process of first expanding a file and then adding information to it may seem a little clumsy, it offers one distinct advantage: If you don't have any room on your data disks to hold more records in a file, the expand function fails but information that you've already put in the file should still be intact.

After you expand a file, you can add new records. Profile's data-entry routines are easy to use, though they include one anomaly that I have a hard time getting used to. If you completely fill the allotted space in a field as you add information, Profile automatically advances the cursor to the next field. However, if you do not completely fill a field, you must press the enter key when you finish adding information. You almost always fill fields that hold dates or zip codes. However, fields that hold names or dollar amounts may not be. It's annoying to have the cursor automatically jump out of some fields but not others.

Besides expanding files and adding information to them, the run time menu also lets you browse through the information already in a file, update and correct stored data, print reports and labels, and send data to VisiCalc and SuperScript files. Most of these procedures are fairly simple to perform, though all offer several options. The most complex function available from the run time menu, however, is building indexes.

Normally when you browse through information or create a report with Profile, you have all the records in a file at your disposal and can sort the file or enter criteria for selecting certain records as you work. But you may find the simple sort and select routines normally available not powerful enough for your purposes, and you may want to sort the information in your file according to several different parameters. Also, you can't normally sort a file based on fields stored in segments 2, 3, or 4. You can, however, build indexes to the records in your file to circumvent these problems.

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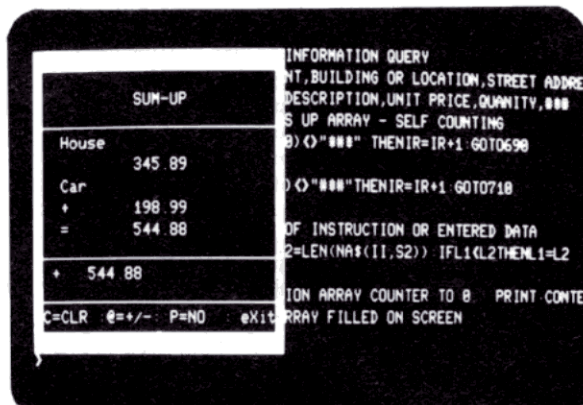
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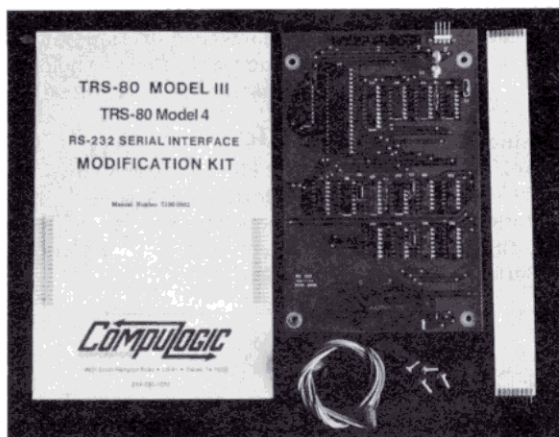
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define an index and the fields included in a sort. Profile builds the index immediately. If you later add new information that would affect that index, you must rebuild it.

After you define the sort and selection criteria for an index, Profile reads through the entire file, applies your criteria, and finishes with a list of records in sorted order, which it stores in a separate disk file. Further printing or browsing based on that index will be much faster than normal sorting and reporting because Profile merely has to read through the index to find the correct order of records to retrieve and display.

Drawbacks

While Profile produces information you can send to VisiCalc (or any other program using DIF format files) and to SuperScript, it provides no facility for sending data to any other external program, nor does the documentation explain the disk files' internal organization.

Actually, you can easily use Profile to create data for a Basic program, a word processor, or any other program to which you want to transfer data. Profile stores data in files identical in form to Basic's random-access files; you need only moderate programming skill to access those files directly. Also, if you use the TRSDOS Route command, you can send Profile's printed reports to a disk file that you can access in the same manner as a sequential file.

Profile lacks the ability to read new information from disk files prepared by other programs. While it can send data to VisiCalc, it can't read any of the various files that VisiCalc produces.

Documentation

Profile 4 Plus comes with two well-written pieces of documentation. The reference manual explains every option in detail and gives a fair amount of technical information on the system. A 100-page book called *Instant Profile* leads you through the process of creating and using a complex mailing list file.

Conclusion

I found Profile to be a solid, workable system. It can spread a file of information across several disks, so the only limit to the number of records you can save is the amount of disk space available. It responds quickly to commands and uses the Model 4's capabilities well.

Profile 4 Plus isn't the most advanced data base available. For example, it can't relate information in one record to that in another. But it has enough options and features to handle record keeping tasks for most individuals and small businesses. ■

DSM4: Sorting at The Speed of Light

by David Engelhardt

★★★★

DSM4 runs on the Model 4/4P (64K) and requires TRSDOS 6.2 and one disk drive. Logical Systems Inc., P.O. Box 23956, Milwaukee, WI 53223, 414-355-5454. \$99.

Easy to use: ★★★★★

Good docs: ★★★★★

Bug free: ★★★★★

Does the job: ★★★★★

I consider TRSDOS 6.X's lack of a built-in sort routine the biggest loss in the transition from the Model III to the Model 4. DSM4, a high-speed sort utility for random-access files, effectively corrects this.

DSM4 sorts up to 65,535 logical records and makes good use of the Model 4's function keys and inverse video capability. It sorts data files created by other programs in any manner, and builds an index file that a Basic program can use to read random-access data files in an orderly manner.

This program works fast. It sorts a name, zip code, and two double-precision fields in fewer than 30 seconds from a floppy disk, 20 seconds from a hard disk. I sorted a data file with 1,006 records in under three seconds.

DSM4 supports logical record lengths of up to 1,024 bytes, with field lengths of up to 253 characters. Also, you can sort by up to 24 different fields.

Working with DSM4

DSM4 comprises two machine-language programs, DSM4 itself and DSORT. You specify the sort criteria—field name, Boolean operators, and so on—with DSM4. Afterward, DSORT automatically starts sorting. Both pro-

grams come on a single disk and you can copy them to any of your existing disks. After you type in DSM4, the program divides the screen into four sections that describe the sort (see the Figure). The top three sections describe the file you're going to sort, the fields involved in the sort, and the sort criteria. The last section presents DSM4's commands.

Input File

At the first command, Input File, you enter the name of your data file and the logical record length (LRL) of each record within the file. The top portion of the screen displays the name of the selected file with the number of records it contains.

Whenever you need to enter information in response to a prompt, a line of periods represents the maximum allowed entry. The manual states that as you enter characters, DSM4 replaces the periods with the keyboard entries. However, this didn't happen with the version I reviewed. Nothing replaced the periods and I couldn't tell whether I made any typing mistakes.

Only after pressing the enter key can you see the entered value displayed on the screen. At this point, you can correct any typing errors with DSM4's line editor (Edit Input in the Figure).

Describe

At the next command, Describe, you name the fields by which you want to sort. You don't have to define them in any specific order because the program uses the offset starting position from 1 to identify their locations within the record. DSM4 allows field overlapping, the only restriction being that no field can extend beyond the end of the record.

Output File

The Output File option lets you define sorting specifications for the fields in the Describe section. This section offers four subfields: Select, Edit Select, Mark Delete, and Return.

```
FILE 1: TEST/FIL,128 (1005)
```

```
-----INPUT FILE-----
1 POS:1 LEN:1      2 POS:2 LEN:1      3 POS:3 LEN:2
4 POS:5 LEN:4 BS   5 POS:9 LEN:30    6 POS:39 LEN:30
7 POS:69 LEN:20    8 POS:89 LEN:10    9 POS:99 LEN:30
```

```
-----INPUT FIELDS-----
1 FILE:1 FIELD:8 S ?????????? REL: EQ CON: AND
2 FILE:1 FIELD:7 S ?????????????????????? REL: EQ CON:
```

```
-----OUTPUT FIELDS-----
INPUT FILE  DESCRIBE  OUTPUT FILE  EDIT INPUT  SORT
```

Figure. Recreated example of a typical DSM4 sort setup.

CONVERT YOUR TRS-80 MODEL III OR 4 INTO A DEVELOPMENT SYSTEM

Now you can develop Z-80 based, stand-alone devices such as games, robots, instruments and peripheral controllers, by using your TRS-80 as a development system. The DEVELOPMATE plugs into the expansion connector of your TRS-80 and adds **PROM PROGRAMMING** and **IN-CIRCUIT-EMULATION** capabilities to your system.

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Since the program is kept in TRS-80 RAM, changes can be made quickly and easily. When your stand-alone device works as desired, you use the Developmate's PROM PROGRAMMER to copy the program into a PROM. With this PROM, and a Z-80 in place of the emulation cable, your stand-alone device will work by itself.

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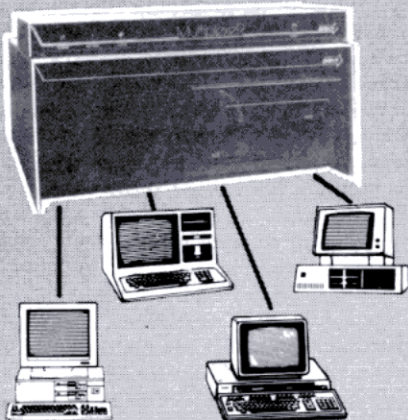
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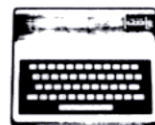
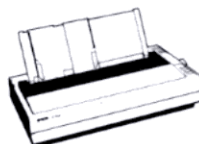
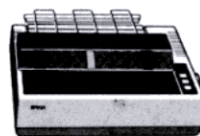
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DSORT would load into memory, but at times it exited to TRSDOS without doing the sort.

You specify the criteria used to sort the file with the Select feature. Relation prompts, which are really Boolean operators, determine how DSM4 selects and includes records in the sort. You use them to establish relative limits for the fields. These operators chain specific fields together to further define your sort limits.

When selecting the appropriate fields, you must define a select string to determine which records within the data file you want to select for the sort. The maximum length is 32 characters and all characters are used in the sorting process.

DSM4 supports a wildcard character (?) if you'll accept any character for a specific location. If you wanted to sort all last names of Smith or just all last names beginning with a P, the entries would look like "Smith??????" and "P?????". The number of question marks depends on the length of the described field.

The Edit Select option lets you redefine or newly define fields you want included in the Describe section (and therefore in the sort). You can change, rename, or insert fields at any time.

DSM4's Mark Delete feature lets you specify a single character within a record as a "delete record" indicator. As DSM4 sorts your file, it ignores records with this character. You enter the delete character in decimal form with a value between zero and 255. You also have full use of the same Boolean operators previously described in the Describe section.

You can invoke an option that writes the deleted records (which really aren't deleted) to a master index file with a /DEL extension. You can use this file to separate label records containing different codes that have specific meanings.

The Sort

The last command at the main menu is to sort the selected file. This doesn't actually sort the file, but it creates a master index file (Map) allowing access to the information.

You next answer a few more prompts. The first asks if you want to save the Map file, which contains the previously entered information on the sort. You can

use the Map file in a job control language file or to perform the sort routine using the same parameters later.

You are asked for the name of your master output or index file and then the sort direction, which allows sorting in either ascending or descending order.

If you previously selected the Mark Delete option, you are asked to name the delete file. This file is given a /DEL extension with the same name as the master file.

Finally, you are asked which drive you want installed as a temporary work file. DSM4 uses this file to sort data files too large to be contained in memory. It automatically creates the file and assigns it to the selected drive with a /TMP extension, whether or not you use it.

After you answer the last prompt, DSM4 begins sorting. It loads DSORT from disk, clears the screen, and displays messages indicating the sort's progress.

A message indicator shows each increment of 100 records DSM4 loads in from the data file. DSM4 reads as many records as possible into memory and sorts them (it uses the temporary file only if memory runs out). After it finishes the sort, DSORT creates an index file and displays the number of records written to the file and the total number sorted.

Problems

I encountered some trouble with the transition from DSM4 to DSORT. DSORT would load into memory, but instead of sorting the designated file, at times it would exit to TRSDOS without doing the sort. I could still sort the file by typing in DSORT and the file name for the master index file, but this glitch could cause some real problems. You should save all entered data into a Map file in case this occurs. Also, sometimes the sort messages displayed were different from the ones described in the manual.

It turned out that DSM4 will only work with TRSDOS 6.2, which wasn't noted in the documentation nor in some of Logical System's advertising.

Conclusion

The manual was well written and offered good examples for using DSM4. The greatest shortcoming was that the program failed to match the described operation due to bugs in the software. A Basic program at the end of the manual demonstrates how to extract the index values and use them to access records within your data files. This example was straightforward and easy to understand.

While it does have some problems, DSM4 can still be a valuable addition to any user's library. It is versatile in setting up its parameters and sorts like nothing else around. DSM4 fills a much needed void in the Model 4 world. ■

Peek-A-Boo File Manipulation

by Gary Shade

★★★★★

WindowDOS runs on the Tandy 1000/1200 (256K) and requires one disk drive and MS-DOS 2.X. WindowDOS Associates, Box 300488, Arlington, TX 76010. 817-467-4130. \$49.95.

Easy to use: ★★★★★

Good docs: ★★★★★

Bug free: ★★★★★

Does the job: ★★★★★

WindowDOS is a memory-resident utility that gives you access to all MS-DOS files on your current disk while you run other programs. You can copy, find, erase, hide/unhide, rename, list, and view files. In addition, you can create subdirectories, change a default file specification, read a directory, and see how much free space you have. In all, WindowDOS provides over 23 concurrent file manipulation commands.

Once you load WindowDOS, you can call it up by pressing the control and insert (zero on the Model 1000's numeric pad) keys simultaneously. WindowDOS displays all directory entries for the current pathname. You can also display subdirectories and files with the Tree command.

I tested WindowDOS while running Sidekick and other utilities. It ran flawlessly. Although the user's manual states that other programs may use special drivers for certain DOS interrupts that are incompatible with WindowDOS, I didn't have any problems.

WindowDOS can prove invaluable. For example, with the Find command, you can search a disk for a specified file or group of files. WindowDOS searches not only the current directory but all available directories for the file, an excellent feature for those who occasionally misplace an important file.

One of WindowDOS's nicest features is that you can mark files for batch copying or erasing. You can also control the directory display. You can sort the directory by file name, extension, creation date, or size in ascending or descending order.

The Hide/Unhide command lets you change a file's attribute. You can also display, copy, erase, or rename hidden files, which you can't do from DOS.

Conclusion

WindowDOS was a real pleasure to use with WordStar and other programs where you need to get back into DOS but don't want to disturb your document. And it's reasonably priced. ■

CopyIIPC

★★★★★

CopyIIPC runs on the Tandy 1000/1200 (128K) and requires one disk drive. Central Point Software Inc., 9700 S.W. Capitol Highway #100, Portland, OR 97219, 503-244-5782. \$39.95.

Lotus 1-2-3, DBase III, Harvard Project Manager, Flight Simulator. All these programs are copy-protected. You either can't make back-up copies or you can only make a certain number of back-ups. That is, until CopyIIPC came along. CopyIIPC lets you make archive copies of programs for your personal use. It successfully defeats most copy-protection schemes, including the tough Prolock system.

CopyIIPC's documentation adequately describes copy-protection schemes and gives you step-by-step instructions on how to copy your software.

A disclaimer on the package states that you should use the program for personal use only: "Under copyright law, you, the new owner of a copy of a computer program, are entitled to make a new copy for archival purposes only and this product will enable you to do so." The documentation lists 141 copy-protected programs that CopyIIPC will clone. The obvious benefit of the program is that you can protect your initial software investment.

CopyIIPC will also install programs like Lotus 1-2-3 on a hard disk so you can run your programs from it. (1-2-3 requires you to have a system disk in drive A at all times. This can prove inconvenient and at the least a general nuisance.) CopyIIPC's Nokey.COM program releases the floppy drive for other uses so you can run Lotus and other protected programs from a hard drive.

—Gary Shade

FastType

★★★★★

FastType runs on the Models III and 4/4P. Press A Software, Box 364, Jerome, AZ 86331, 602-634-2688. \$39.95.

I like to write but I've always hated the actual process of typing. If you despair of ever reaching the magical typing plateau of 50 words per minute, FastType can help. FastType drills typing skills into your head (and fingers). Not only does it improve your overall typing skills, it hones your hand at Basic and TRSDOS commands. You can even customize FastType's lessons for troublesome words or phrases.

Of course, FastType is heavy on repetitive drills. AS, AD, DAD, FAD, LAD, HAD, KAG, HAK, JAG, and the like com-

prise a large portion of the lessons. Like any skill, the more you practice, the better you get. FastType may not be fun, but it does work.

FastType's documentation is minimal but adequate. A wall chart displays which keys go with which fingers, and details how you make up your own lessons.

How much has my typing improved? I'm a little more comfortable at the keyboard, and my fingers are starting to understand where they should go, instead of contorting in unnatural gyrations. But I'm a poor pupil because I don't practice enough. If I practiced every day, I could finish that book I've started, blazing through chapter after chapter. If only I practiced. But then, that's what my mother said about my violin lessons.

I do offer one caveat: The disk contains its own operating system, and you can't read from it or write to it with any of the usual DOSes. This also means that you can't back up the disk.

—Ryan Davis-Wright

The Programmer's Guide to LDOS/ TRSDOS Version 6.X

★★★★★

By Roy Soltoff. Softcover, 208 pp. Miso-sys Inc., P.O. Box 239, Sterling, VA 22170, 703-450-4181. \$14.95.

This is the best book I've read on how to work with an operating system. It's easy to understand, full of clear examples, and discusses every aspect of LDOS/TRSDOS.

Author Soltoff is particularly well qualified to discuss LDOS/TRSDOS, since he was one of its designers. He starts out with a comprehensive overview of the DOS, reviewing the purpose and function of its major components, followed by clear discussions of some practical considerations for managing information on disk. Soltoff briefly touches on the supervisor call (SVC) concept and provides a simple memory map.

Then he explains the techniques you need to take advantage of TRSDOS 6.X's device independence. He covers device control blocks and techniques for chaining, filtering, and routing devices. He also provides the exact requirements for interfacing devices, the subtleties of the Set and Filter commands, and the resident system drivers.

Soltoff carries the discussion of disk input/output (I/O) to its logical extensions. He discusses on the inner workings of drive control tables, vectors, and flags, as well as floppy and hard disk controllers.

If you've ever tried to puzzle out the directory structure, the *Guide* provides a clear and elegant roadmap. Of course,

a directory isn't much use if you can't get at the files. A chapter on disk file access rectifies this.

TRSDOS 6.X provides the programmer with hooks into the DOS by using the SVC interfaces, which allow access to many functions: PEEKs and POKEs to the screen, locating and positioning the cursor, displaying and printing text, binary to ASCII conversions, and access to the 26 system flags (with a complete description of every bit of each byte).

An extensive appendix discusses the DOS boot sequence, how to detect the break, shift-@, and enter keys, how to create load modules, system error messages, and more. The book ends with a thorough, five-page index. In short, the *Guide* is ideal for programmers or others interested in how their operating system works.

—Nate Salisbury

The Grafyx Solution

★★★★★

The Grafyx Solution installs on the Models III (48K) and 4/4P (64K) and requires one disk drive. Micro-Labs Inc., 902 Pinecrest Drive, Richardson, TX 75080, 214-235-0915. \$199.95 (includes hardware and software).

The Grafyx Solution is an easy-to-install high-resolution graphics board that comes with Graphics Basic (GBasic). It costs less than Radio Shack's high-resolution board.

Installation is simple. I needed only about 20 minutes to get it up and running on a Model 4. Installing the board on a Model III is only slightly more difficult.

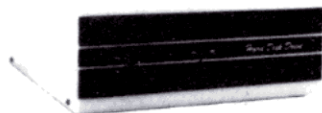
The Grafyx Solution board provides a resolution of 512 by 199 pixels in Model III mode, 640 by 240 pixels in Model 4 mode. GBasic works with TRSDOS 1.3, 6.1.2, 6.2, LDOS, NEWDOS/80, and DOSPLUS. You'll need Basic 1.1.0 if you have a Model 4.

GBasic has about 20 more commands than Radio Shack's BasicG, and the board works in both Models III and 4 mode. The GBasic disk includes 40 Basic and Assembly-language files, some of which demonstrate the system and others provide screen displays.

When the board is in the 640-by-240-pixel mode, it works exactly like the Radio Shack board. Assembly-language software written for the Radio Shack board runs without a hitch. However, you have to make some modifications to run Basic programs written for one board on the other. If you have a Radio Shack high-resolution board and want the added features of Micro-Labs' GBasic, you can buy it for \$49.95.

—Mare-Anne Jarvela

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*Model 3 requires LDOS

Model 4 requires TRSDOS 6.2 or Montezuma Micro CP/M 2.2

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See opposite page ▶▶▶▶▶▶

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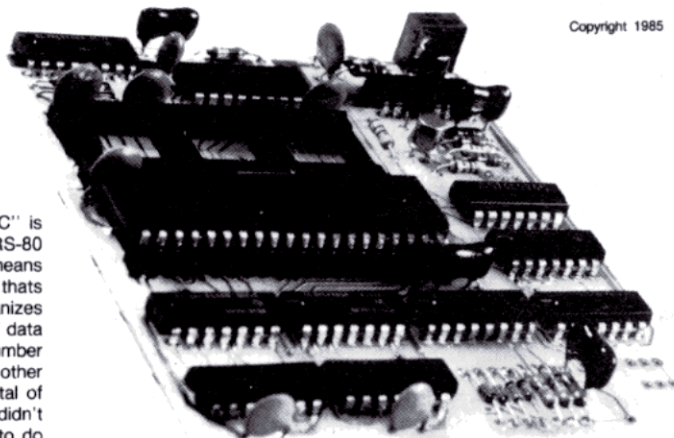
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2-40tk SS half-high FD-55A's in dual case	219
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Model 4 TRSDOS 6.2.x disk/manual 20

LDOS 5.1.4 disk/manual 69

NEWDOS 80 version 2.0 disk/manual 99

CP/M 2.2 by Montezuma Micro 169

No S & H charge when ordered with kit

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DISK CONTROLLER ONLY 110

RS-232 BOARD & KIT 69

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OUR FAMOUS MODEL I STARTER PACKAGE

If you have a Model I and an Expansion Interface this is what you need to get started with disks. Included is one 40 track single-side disk drive complete with matching silver case and power supply, a 2-drive cable, a TRSDOS 2.3 disk operating system and TRSDOS manual plus all insurance and delivery charges to your door (lower 48 states).

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LDOS 5.1.4 disk/manual	69
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You can add our renowned "DDC" double density controller to either the Radio Shack or the LNW Expansion Interface for 80% more storage capacity on your drive. Order it at the same time as our starter package above and we'll pay the shipping. Go ahead, you deserve increased density. See the opposite page for the latest technical details.

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Manage Your Information

DiskCount Data offers Infoscane 2.8 for the Models I, III, and 4/4P. The full-featured information manager uses fixed windows for its menu and command functions, and either a large or small display window area for data entry and retrieval.

Infoscane organizes, stores, and retrieves any type of useful information in any format. It combines the features of a word processor, data manager, and screen form generator.

You can store information of unrelated types in the same data files, but still in different sort groups. In less than one second you can display any record on the screen.

Infoscane costs \$49.95. Contact DiskCount Data (2701-C W. 15th St., Plano, TX 75075, 214-680-8268) for more information.

Circle 555 on Reader Service card.

Educational Matters

Micro Services offers a new series of scholastic software for the Models III and 4/4P. The programs cover a wide range of subjects, including verbal skills, foreign languages, acronyms, and math.

The verbal and math skills series help students prepare for college board exams like the SAT. The verbal skills group comprises a vocabulary builder, word analogy, and sentence-completion program (\$30 for each program, \$75 for all three). The math skills group (\$60) contains



Infoscane 2.8 is a word processor, data manager, and screen form generator.

two disks covering algebra, geometry, and trigonometry.

Acronyms (\$30) deals with acronyms used in business, government, and science. The foreign-language series emphasizes building a vocabulary in German, French, Spanish, or foreign words used in English. Each sells for \$30.

Each self-contained, menu-driven program includes a resident editor so you can add to the existing data base or edit existing files. Demo disks cost \$15. For more information, contact Micro Services, 879 Loraine Drive, Newport News, VA 23602, 804-877-3892.

Circle 557 on Reader Service card.

Personality Profile

Self Development Software (SDS) offers The Personality Analysis Program (\$29.95). It's the first of a series of expert system programs for the Models III and 4.

The program introduces you to the subject of personality types. It gives you a sim-

ple word test and calculates which of four personality types fits you. The personality types are a simplification of eight types originally suggested by the psychologist Carl Jung.

You can display the results on a screen in the form of circles to graphically illustrate the components of your personality. You can also get printouts with an explanation of the graphics. Separate printed sheets describe the characteristics and vocational attributes of each type. For further information, contact Self Development Software, 210 Third Ave., Haddon Heights, NJ 08035, 609-546-1627.

Circle 561 on Reader Service card.

Pay Day

Microcomputer Applications' Super-P/R general-purpose payroll system is available for the IBM PC and PC-compatibles, as well as the Models I, III, and 4/4P.

The system includes ma-

chine-language sorts, employee departments, and a comprehensive report generator for W2 forms, 941As, and nonstandard reports.

Super-P/R's configuration feature lets you print reports by employee name, employee department, or employee number. You can establish base rates for each employee for all defined earnings/deduction categories (you can have up to 14 categories).

The system comes with an automatic installation program, sample data files, a user's manual, ongoing support, and a Super-News newsletter. You need two disk drives or one hard drive, and an 80-column printer. Super-P/R is \$210 plus \$2.50 shipping. For more information, contact Microcomputer Applications, 3485 Mock Orange Court S., Salem, OR 97302, 503-364-1090.

Circle 559 on Reader Service card.

Design Maker

Locipro (\$72.95) from BV Engineering, a computer-aided design (CAD) program, lets system, control, and electronic engineers model complex control systems and determine closed-loop system stability before actually building the system.

Locipro solves the locus of roots for systems up to the 26th order and 10 loop elements. You can send output data to a line printer or data files. The menu-driven program supports free-format input. Locipro runs under PC/MS-DOS, CP/M-80, and TRSDOS. For additional in-

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BUSINESS PAC 100 PROGRAM LIST

NAME	DESCRIPTION
1 RULE78	Interest Apportionment by Rule of the 78's
2 ANNU1	Annuity computation program
3 DATE	Time between dates
4 DAYYEAR	Day of year a particular date falls on
5 LEASEINT	Interest rate on lease
6 BREAKEVN	Break-even analysis
7 DEPRSL	Straightline depreciation
8 DEPRSY	Sum of the digits depreciation
9 DEPRDB	Declining balance depreciation
10 DEPRDOB	Double declining balance depreciation
11 TAXDEP	Cash flow vs. depreciation tables
12 CHECK2	Prints RAPIDFORMS checks along with daily register
13 CHECKBK1	Checkbook maintenance program
14 MORTGAGE/A	Mortgage amortization table
15 MULTMON	Computes time needed for money to double, triple, etc.
16 SALVAGE	Determines salvage value of an investment
17 RRVARIN	Rate of return on investment with variable inflows
18 RRCONST	Rate of return on investment with constant inflows
19 EFFECT	Effective interest rate of a loan
20 FVAL	Future value of an investment (compound interest)
21 PVAL	Present value of a future amount
22 LOANPAY	Amount of payment on a loan
23 REQWITH	Equal withdrawals from investment to leave 0 over
24 SIMPDISK	Simple discount analysis
25 DATEVAL	Equivalent & nonequivalent dated values for oblig.
26 ANNUDEF	Present value of deferred annuities
27 MARKUP	% Markup analysis for items
28 SINKFUND	Sinking fund amortization program
29 BONDVAL	Value of a bond
30 DEPLETE	Depletion analysis
31 BLACKSH	Black Scholes options analysis
32 STOCVAL1	Expected return on stock via discounts dividends
33 WARVAL	Value of a warrant
34 BONDVAL2	Value of a bond
35 EPSEST	Estimate of future earnings per share for company
36 BETAALPH	Computes alpha and beta variables for stock
37 SHARPE1	Portfolio selection model-i.e. what stocks to hold
38 OPTWRITE	Option writing computations
39 RTVAL	Value of a right
40 EXPVAL	Expected value analysis
41 BAYES	Bayesian decisions
42 VALPRINF	Value of perfect information
43 VALADINF	Value of additional information
44 UTILITY	Derives utility function
45 SIMPLEX	Linear programming solution by simplex method
46 TRANS	Transportation method for linear programming
47 EOQ	Economic order quantity inventory model
48 QUELIE1	Single server queueing (waiting line) model
49 CVP	Cost-volume-profit analysis
50 CONDPFOT	Conditional profit tables
51 OPTLOSS	Opportunity loss tables
52 FQUOQ	Fixed quantity economic order quantity model
53 FQEOQSH	As above but with shortages permitted
54 FQEOQPB	As above but with quantity price breaks
55 QUEUECB	Cost-benefit waiting line analysis
56 NCFANAL	Net cash-flow analysis for simple investment
57 PROFIND	Profitability index of a project
58 CAPI	Cap. Asset Pr. Model analysis of project

59 WACC	Weighted average cost of capital
60 COMBAL	True rate on loan with compensating bal. required
61 DISCBAL	True rate on discounted loan
62 MORGANAL	Merger analysis computations
63 FINRAT	Financial ratios for a firm
64 NPV	Net present value of project
65 PRINDLAS	Laspeyres price index
66 PRINDPA	Paasche price index
67 SEASIND	Constructs seasonal quantity indices for company
68 TIMETR	Time series analysis linear trend
69 TIMEMOV	Time series analysis moving average trend
70 FUPRINF	Future price estimation with inflation
71 MAILPAC	Mailing list system
72 LETWRT	Letter writing system-links with MAILPAC
73 SORT3	Sorts list of names
74 LABEL1	Shipping label maker
75 LABEL2	Name label maker
76 BUSBUD	DOE business bookkeeping system
77 TIMECLK	Computes weeks total hours from timeclock info.
78 ACCTPAY	In memory accounts payable system-storage permitted
79 INVOICE	Generate invoice on screen and print on printer
80 INVENT2	In memory inventory control system
81 TELDIR	Computerized telephone directory
82 TIMUSAN	Time use analysis
83 ASSIGN	Use of assignment algorithm for optimal job assign.
84 ACCTREC	In memory accounts receivable system-storage ok
85 TERMSPAY	Compares 3 methods of repayment of loans
86 PAYNET	Computes gross pay required for given net
87 SELLPR	Computes selling price for given after tax amount
88 ARBCOMP	Arbitrage computations
89 DEPRSF	Sinking fund depreciation
90 UPSZONE	Finds UPS zones from zip code
91 ENVELOPE	Types envelope including return address
92 AUTOEXP	Automobile expense analysis
93 INSFILE	Insurance policy file
94 PAYROLL2	In memory payroll system
95 DILANAL	Dilution analysis
96 LOANAFFD	Loan amount a borrower can afford
97 RENTPRCH	Purchase price for rental property
98 SALELEAS	Sale-leaseback analysis
99 RRCONVBD	Investor's rate of return on convertible bond
100 PORTVAL9	Stock market portfolio storage-valuation program

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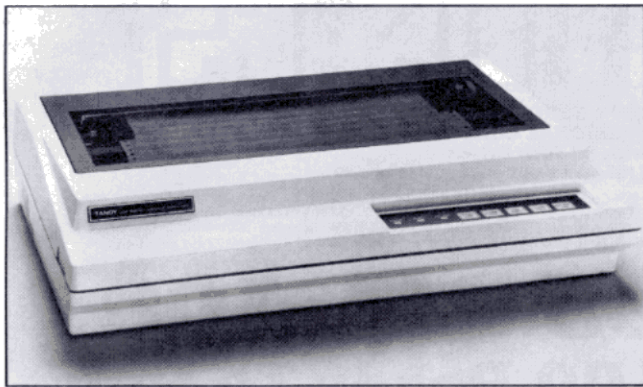
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DMP 2200, a fast dot-matrix printer from Tandy.

formation, contact BV Engineering, 2200 Business Way #207, Riverside, CA 92501, 714-781-0252.

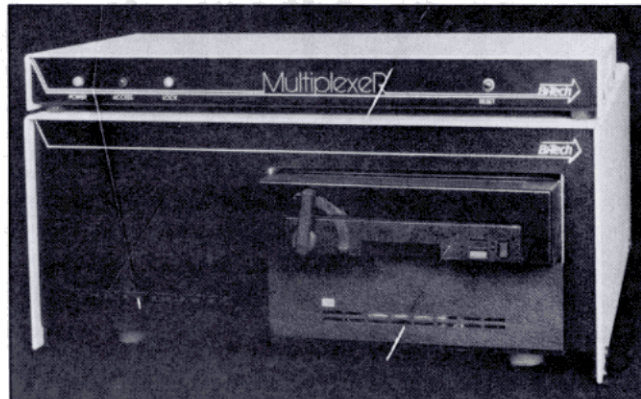
Circle 554 on Reader Service card.

Printer News

Tandy's new DMP 2200 is a fast, high-density, triple-mode dot-matrix printer. It prints up to 380 characters per second. The fastest results are available in data processing mode. Use word processing mode for letter

writing, and graphics mode for drawing pictures, figures, or graphs.

The printer provides a variety of fonts: standard, near-letter-quality, italic, and microfont. Font attributes include condensed, elongated, bold, doublestrike, underline, double-high, and super- and subscripts. Other software-controlled features include bi-directional, logic-seeking carriage motion, and support of Tandy or IBM character sets.



The Bi-Tech Multiplexer puts one hard disk to work with several computers.

The DMP 2200 costs \$1,695 and is available at Radio Shack Computer Centers and participating Radio Shack dealers (catalog number 26-1279). For more information, contact Tandy/Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102.

Circle 562 on Reader Service card.

Hard Disk Sharing

Bi-Tech Enterprises Inc.

(10 Carlough Road, Bohemia, NY 11716, 516-567-8155) offers the Bi-Tech Multiplexer that, when combined with a hard disk, lets you access the disk with four computers (which can be of different types). You can also add a slave unit to allow up to eight computers to share the hard disk. The Multiplexer is compatible with Models I, III, 4, II, 12, 1000, 1200, and 2000.

Circle 56 on Reader Service card.

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PROGRAMS:

2758	2716	27128	2815	8741*	8748*
2516	2732	27128A	2816	8742*	8749*
2532	2732A	27256	2817	X2212*	8751*
2564	2764	68764	27C-Series		8755*

*Requires low cost personality adapter

SOFTWARE AVAILABLE FOR: **

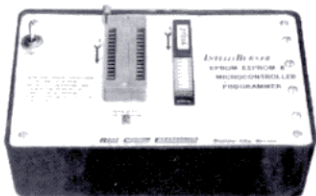
CP/M systems on 8" SSD - many 5 1/4 formats
TRS-80 Model I & III TRSDOS - NEW! TRSDOS 6.X
Heath H8/H89 HDOS & CP/M
ZENITH 290 & Z100 CP/M - Z100 ZDOS - Z150
KAYPRO II/IV/10/16/286/2000
IBM PC, PC/XT, AT - many MS-DOS systems

IntelliBurner Programmer with Software	\$299.00
Stand-Alone RAM OPTION with 64K Bit RAM	
(Expandable to 256K Bq)	89.00
RS-232 Interconnect Cable	12.00
IntelliBurner PC Board, EPROM, Plans & Software	99.00

Low Cost "DumbBurner" serial programmers harness the power of your personal computer with the supplied software for full programming capabilities:

DumbBurner II Programmer for 28 Pin and 24 Pin EPROMs and EEPROMs (with Software)	\$199.00
DumbBurner II Bare PC Board, Plans & Software	59.00
16K/32K DumbBurner for 24 Pin EPROMs (with Software)	149.00
16K/32K DumbBurner PC Board, Plans & Software	39.00

Add \$3 Shipping & handling (\$2 Bare Board). C.O.D. accepted. Foreign Orders add required postage. Specify Environment and Media Requirements. H8, H89, Z100 are "Heath/Zenith, CP/M is "Digital Research, TRS-80 is "Tandy Corp., IBM PC, PC/XT, AT are "IBM, MS-DOS is "Microsoft



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MC/VISA

The Multiplexer is a parallel transfer device that allows transfer speeds up to 5 megabits/second. It is compatible with Bi-Tech's line of 5¼-inch fixed and removable hard drives as well as those from many other manufacturers.

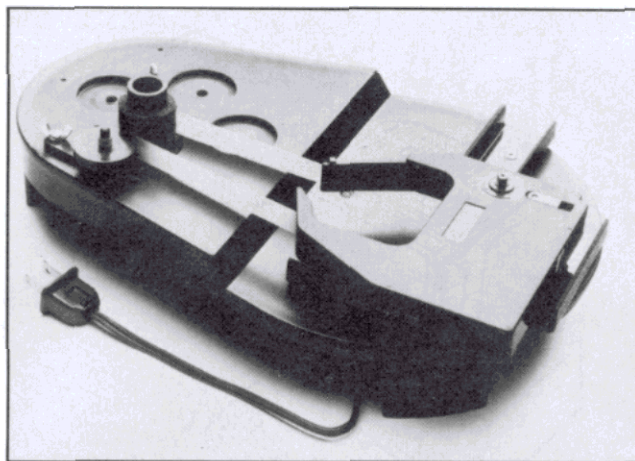
The Multiplexer is \$795 (without the hard drive). You also need a host adapter (\$325) for each computer you want to connect. For more information, contact Bi-Tech Enterprises.

Circle 566 on Reader Service card.

Referred Programs

Refer, a utility from James Halstead & Associates, runs under PC-DOS, MS-DOS, TRSDOS, and CP/M. It processes and analyzes programs in Assembly, Basic, C, Cobol, dBase, Fortran, and other languages. While reading a program, Refer produces a source listing and a cross reference of variables, values, key words, line numbers, and/or labels.

The package (\$39) includes



Mac Inker lets you reuse printer ribbons.

source code, compiled code, and examples. For details, contact James Halstead & Associates, 1551 Plainfield, Joliet, IL 60435, 815-725-0346. Circle 567 on Reader Service card.

Reusable Ribbons

Computer Friends offers Mac Inker, a universal ribbon re-inker for just about any fabric ribbon cartridge avail-

able. Its lubricated, carbonless ink yields a printout darker than many original ribbons. A re-inked ribbon lasts longer than the average original ribbon and you can re-ink a good-quality ribbon 80-100 times. You can also ink and re-ink blank cartridges in any of six colors (red, blue, green, brown, yellow, and purple) or combinations thereof.

Mac Inker's universal base costs \$60 and each cartridge driver kit is \$8.50. For more details, contact Computer Friends, 6415 S.W. Canyon Court, Suite 10, Portland, OR 97225, 800-547-3303.

Circle 552 on Reader Service card.

Secret Messages

+CODA+ 4.2 (\$160) is an encryption system that works on your Model I or III. It uses a stream cipher to mix your data, character by character, with pseudo-random characters.

The complexity of the encryption process makes +CODA+ a secure program. The encryption keys differ for all programs sold so the data you encrypt can't be decrypted by another customer with a different version of the program.

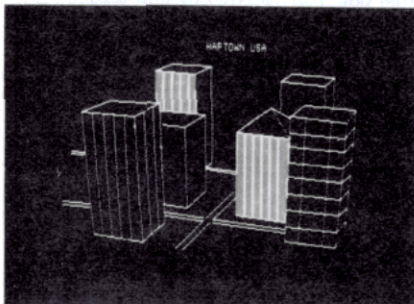
+CODA+ also lets you encrypt and decrypt files with embedded printer control codes and other unprintable characters.

You need 32K to run the

Circle 464 on Reader Service card.

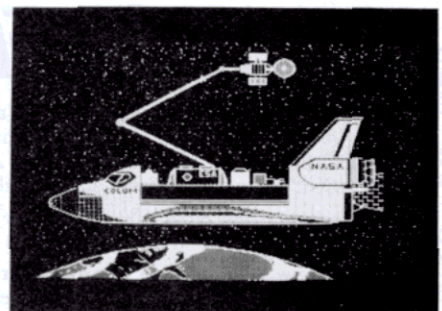
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High-Resolution Graphics for Mod 4/4P/III



Superior Hardware. The Grafyx Solution provides 153,600 pixel elements which are arranged in a 640 x 240 or on the Model III a 512 x 192 matrix. Hundreds of new business, personal, engineering, and educational applications are now possible. The hi-res display can be shown on top of the standard display containing text, special characters, and block graphics. This simplifies program debugging, text labeling, and upgrading current programs to use graphics. The Grafyx Solution fits completely within any tape or disk based Model 4, 4P, or III. Installation is easy with the plug-in, clip-on board.

Superior Basic. Over 20 commands are added to the Basic language. These commands will set, clear or complement points, lines, boxes, circles, ellipses, or arcs. The hi-res screen can be printed on any of 20 popular printers or saved or loaded to disk without leaving Basic. Areas may be filled in with any of 256 patterns. Sections of the screen may be saved and then put back using any of five logical functions. Labels can be printed in any direction. The viewing area can be changed. The entire screen can be complemented or cleared. Graphics Basic provides dot densities of 640 x 240, 320 x 240, 160 x 240, and 160 x 120, all of which can be used in the same display.



Superior Software. The board comes with over 40 programs and files which make it easier to use, serve as practical applications, demonstrate its capabilities, and serve as programming examples. The software works with TRSDOS 1.3, 6.1.2, 6.2, LDOS, NEW-DOS80, and DOSPLUS. The Grafyx Solution is also supported by a number of optional applications programs: Draw, Bizgraph, xT.CAD, 3D-Plot, Mathplot, Surface Plot, Biorhythm & USA, Music.

The Grafyx Solution package is shipped complete for \$199.95 (reduced from \$299.95). A manual for review is \$15. Payment may be by check, Visa/MC, or COD. Domestic shipping is free on pre-paid orders. Texas residents add 5% tax.

MICRO-LABS, INC. 214-235-0915
902 Pinecrest, Richardson, Texas 75080

program. For more information, contact D.S. Brown, 17 Douglas Ave., Newcastle-Upon-Tyne, NE3 4XD, England, 091-285-8667.

Circle 558 on Reader Service card.

Upgraded Profile

The Yankee Co. sells No-Limits, an add-on Profile data formatter, for \$20. It works with the Models I, II, III, 4/4P, and 12.

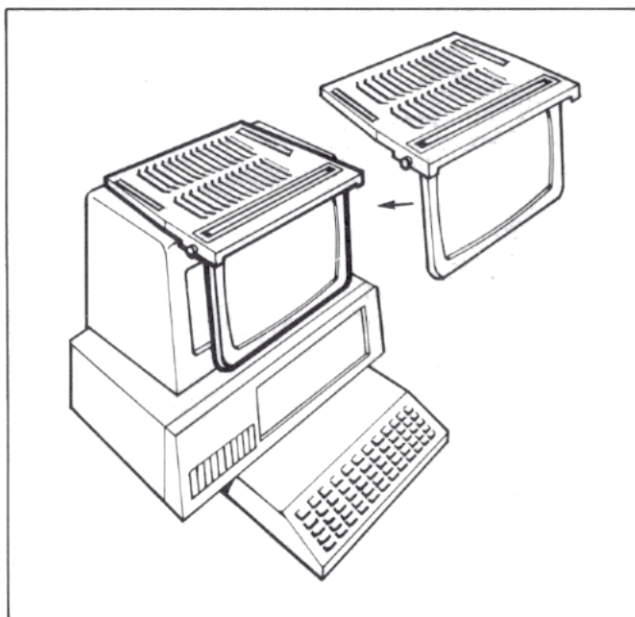
For more information, contact The Yankee Co., Route 940 and Camelot Drive, P.O. Box 613, Pocono Pines, PA 18350, 717-646-2114.

Circle 553 on Reader Service card.

A Church Book

The Church Computer Manual (\$12.95) by Lowell Brown and Wes Haystead (Tyndale House Publishers) helps you select, install, and use a computer in your church.

The book contains an introduction to computers and terminology; a discussion of



A diagram of the Compu-Lenz screen.

areas where you can use a computer; and charts, graphs, assignments, worksheets, and humor to keep things interesting. The book also lists church manage-

ment software and vendors.

For details, contact Tyndale House Publishers Inc., 336 Gundersen, Wheaton, IL 60187, 312-668-8300.

Circle 556 on Reader Service card.

Magnified Letters

Compu-Lenz, a clip-on monitor attachment, reduces glare while increasing screen characters up to twice their normal size.

Compu-Lenz is a combination Fresnel lens, glare filter, and universal holder. It attaches to most monitors and you can adjust it to meet your needs.

The price of the unit is \$149.95. For more information, contact Compu-Lenz, 220 Commerce Ave., Port Richey, FL 33568, 813-842-3231.

Circle 563 on Reader Service card.

Build a Bridge

The Desktop/Laptop Bridge from Traveling Software allows you to exchange information between your Model 100 or 200 and the IBM PC or compatible computers (including the Models 1000 and 1200).

The program comes on a disk with any of the programs from the Business Manager

Circle 470 on Reader Service card.

Circle 281 on Reader Service card.

96K MODEL 100

The PG Design 64K RAM module adds two additional 32K RAM banks to your existing Model 100. The firmware that comes in your Model 100, BASIC, TEXT, TELCOM, ADDRSS, SCHEDL, are all present in each additional RAM bank.

You may transfer files from one RAM bank to any of the other RAM banks by using the function keys.

We designed our RAM module to allow clear access to the ROM slot and we provided a forty pin, male connector to utilize Radio Shack's DVI or other disk drive systems. We have installed a lithium power cell to maintain the memory of the module for six months if you should remove it from your Model 100. But, while in the Model 100, the power cell has a life span over six years!

The RAM module snaps easily into the expansion port in the bottom of your Model 100.

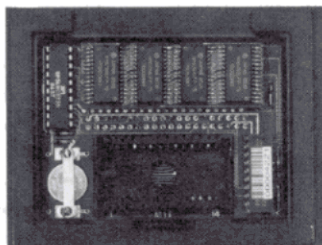
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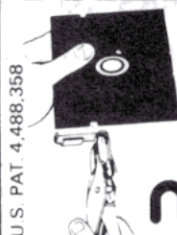
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NEW PRODUCTS

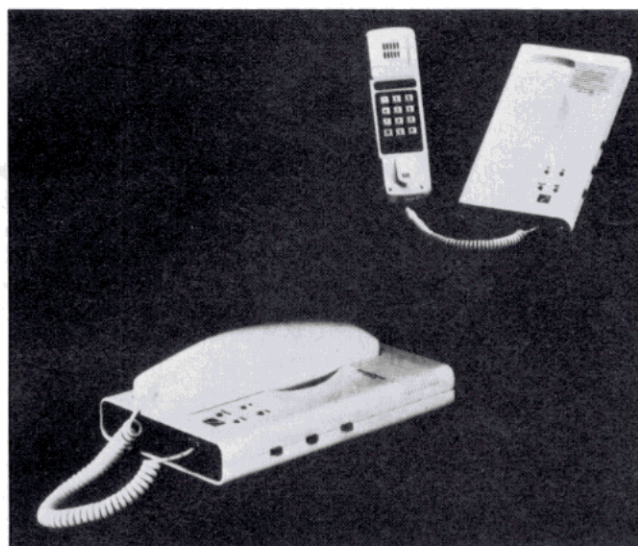
Series, a family of products designed to help professionals increase their work productivity. The programs available include Traveling Appointment Manager, Traveling Expense Manager, Traveling Project Manager, Traveling Sales Manager, and Traveling Time Manager. For \$99.95 you get the program of your choice plus the Desktop/Laptop Bridge.

You can take any of these programs into the field with your laptop computer; back in the office, you convert your information for use with your desktop computer and then, if you wish, back to the portable. For more information, contact Traveling Software Inc., 11050 Fifth Ave. N.E., Seattle, WA 98125, 206-367-8090.

Circle 565 on Reader Service card.

Zap Mat

The Static-Master mat from Formica Corp. is an anti-static laminate mat that permanently dissipates static elec-



The Smart Modemphone has a built-in clock/calendar and speaker.

tricity harmful to computers and other types of electronic equipment.

You put the mat under your equipment and install the ground cord. When you touch the mat it dissipates static electricity with no de-

tectable shock. The mat comes in almond, putty, gray, oak, and walnut in a matte finish. It is 1/8 inch thick and is available in 18- by 20-inch (\$49.95) and 26- by 26-inch (\$79.95) sizes. For more information, contact Formica

Corp., Static-Master Dept., 10155 Reading Road, Cincinnati, OH 45241, 513-786-3400.

Circle 560 on Reader Service card.

Phone Modem

Theall Engineering's Hayes-compatible 1,200-baud Smart Modemphone offers auto-dial, auto-answer, and auto-baud-rate-select features, and a built-in telephone for voice communications.

The Modemphone includes a tone-sensing circuit, a 2-inch built-in speaker, and a clock/calendar so you can track the length of telephone calls on-screen. It also provides auto-redial for busy signals, a self-test, and battery back-up.

The \$289.95 Smart Modemphone connects to a standard RS-232C port. For more information, contact Theall Engineering Co., P.O. Box 167, Oxford, PA 19363, 215-932-3488.

Circle 551 on Reader Service card.

Circle 152 on Reader Service card.

NEW PRINTERS ADDED! FIND YOURS BELOW.

Good This Month

RIBBON SALE

EXACT REPLACEMENTS

PRINTER MAKE, MODEL NUMBER Contact us if your printer is not listed. We have many more in stock. We can probably RELOAD your old cartridges.	RIBBON SIZE Inches by Yards	NEW CARTRIDGES From the various manufacturers or made in our own shop. Ready to use.	RELOADS You SEND your used CARTRIDGES to us. WE put OUR NEW INSERTS in them.	INSERTS EZ-LOAD™ DROP IN, NO WINDING! EXACT REPLACEMENTS made in our own shop. Cartridges NOT included.
BASE 2, DIP 81-82-84-85, MPI 88-99-GX	1/2 x 20	\$20/2 \$57/6 \$108/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
C ITOH Prowriter 1550-8510, NEC 8023-8025, APPLE DMP-IMAGEW	1/2 x 18	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
C ITOH STARWRITER F-10-40 } Carbon Film Black	5/16 x 130	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
DIABLO HYTYPE II } Fabric Black	NOT RELOADED 5/16 x 17	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$21/3 \$78/12 \$432/72
RADIO SHACK-TOSHIBA-COMMODORE-PANASONIC-RICOH				
Carbon Film - DWP 210 (Hytype II)	Black (1445)	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
DW II, DWP 410-510, RICOH 1200-1300-1600	Black (1419)	1/4 x 145 \$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
Red, Green, Blue, Brown	Colors (1419)	1/4 x 130 \$21/3 \$72/12 \$420/72	\$6 ea 3-11 \$5 ea 12 or more	\$30/6 \$54/12 \$234/72
Fabric (Long Life), DWP 210 (Hytype II)	Black (1458)	5/16 x 17 \$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$21/3 \$78/12 \$432/72
DW II, DWP 410-510, RICOH 1200-1300-1600	Black (1449)	1/4 x 25 \$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)	Inker Loop	\$18/2 \$51/6 \$ 96/12		
DMP-200, 120, (430 Inserts & Reloads Only) (1296) (1483)	1/2 x 20	\$20/2 \$57/6 \$108/12	\$7/1 \$7 ea 2 or more	\$15/3 \$54/12 \$288/72
DMP-400-420, LP VI-VIII, PANASONIC KXP-130 (1418)	5/16 x 14	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
DMP-500 (1482)	1/2 x 20	\$22/2 \$63/6 \$120/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
DMP-2100, TOSHIBA P1340-1350-1351-351 (1442)	1/2 x 20	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
LP-I-II-IV, CENTRONICS 730-737-739-779 (Zip Pack) (1413)	9/16 x 16			\$12/3 \$45/12 \$252/72
LP III-V (1414)	1/2 x 15	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
EPSON LQ 1500				
MX-FX-RX 70-80, IBM PC (Standard Paper), LX 80 (5/16 x 7)	1/2 x 14	\$22/2 \$63/6 \$120/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
MX-FX-RX 100, IBM PC (Wide Paper)	1/2 x 30	\$14/2 \$36/6 \$ 66/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
		\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$18/3 \$66/12 \$360/72
NEC Spinwriter-Carbon Film -2000-3500 (Reloads BCCOMPCO Only)				
	5/16 x 145	\$21/3 \$78/12 \$450/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
	1/4 x 145	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
-Fabric	1/2 x 14	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$15/3 \$54/12 \$288/72
	1/2 x 13	\$15/2 \$42/6 \$ 78/12	\$8/1 \$7 ea 2 or more	\$15/3 \$54/12 \$288/72
	1/2 x 20	\$25/2 \$69/6 \$126/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
Pinwriter P1-P2	1/2 x 27	\$30/2 \$84/6 \$156/12	\$8/1 \$7 ea 2 or more	\$18/3 \$66/12 \$360/72
P3				
OKIDATA Pacemark 2350-2410 Black				
Microline ML-80-82-83-92-93 (Call for ML-84 Prices)	1/2 x 100	\$32 each	\$20/1 \$18 ea 2 or more	36/3 \$132/12 \$720/72
	1/2 x 16	Spool \$36/12 \$198/72		
MANNESMAN-TALLY MT-160				
MT-180	9mm x 11	\$19/2 \$54/6 \$102/12		
-Spirit 80 (SP80) COMMODORE 1526 (Multistrike)	9mm x 13	\$20/2 \$57/6 \$108/12		
	1/2 x 35	\$16/2 \$45/6 \$ 84/12		
PANASONIC KXP-1090-1091-1092-1093				
	5/16 x 3	\$20/2 \$57/6 \$108/12		
BROTHER HR-15-25-35				
COMREX DX-15, II	Carbon Film (Multistrike or Correctable)	5/16 x 82 \$18/3 \$60/12 \$342/72		
	Fabric (Call for Comrex 420 Prices)	5/16 x 17 \$15/2 \$42/12 \$ 78/72		

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DIFFERENT TRACKS



Use the Note Wedge for messages and notes.

Don't Forget

The Note Wedge from Car Soft Co. is a desk-top accessory that eliminates misplaced messages or notes and saves money on paper. Its baked porcelain/steel writing surface doesn't stain, scratch, or blister. You can write on the Wedge with any felt-tip pen and wipe it off with a tissue or cloth.

The woodgrain finish has a felt-covered base. The Note Wedge, with pen, costs \$11.95. For more details, contact Car Soft Co., Box 28313, Tempe, AZ 85282, 602-820-3775. Circle 564 on Reader Service card.

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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.

THE CLASSIFIED 80micro

SOFTWARE

Coin Collectors! Unique program uses built-in market value file and prices your U.S. collection. Brochure available. Compu-Quote 6914 Berquist, Canoga Park, CA 91307 (818) 348-3662.

CHESS•RUMMY! Play it or Change it. You against the computer. Plus BASIC source code you can change. Chess disk (MS-DOS) \$35. Program technical manual with listing \$30. Rummy card game \$30. Technical manual \$25. VISA/MC/\$\$/check + \$3.50 s/h. GEMINY SW, Dept. 8, PO Box 192, Belmont, CA 94002, (415) 595-3001

HARDWARE

Megabyte board for the Tandy 1000, Tandy 1200. Multifunction board includes IMB RAM, DMA controller, clock/calendar, serial/expansion port for \$555. Halfmeg only \$395. Matthew Electronics, Inc., 386 Avenida Vereda, Ojai, CA 93023 (805) 646-7790.

Low Cost Alternative to Disk. Model I/III interface \$49.95, 14X faster, HHCI, 725 Idlewild, Bel Air, MD 21014. 301-838-7692.

64K RAM installed in Key-board: TRS-80 M1-LII. Superior performance with or without EI. \$59.95 with 90-day warranty. ICE; 100 Mill Street;

Drakes Branch, VA 23937; (800) 424-3311.

SERVICES

NationServ Online Information Network. 618-847-2291. Job service, Downloads, Play Games, Classifieds, Message Center, Shopping Mall, Etc.

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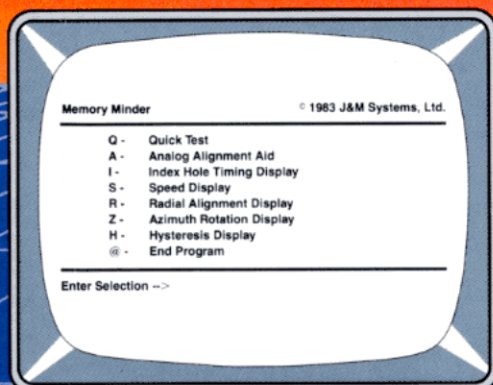
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Disks, Program Packaging. Low prices on BASF, Memorex, Verbatim, Dysan. Binders, Slips like Tandy 1000, 2000. Much more. Free Catalog. Anthropomorphic, 376 East Saint Charles, Lombard, IL 60148 (312) 629-5160.

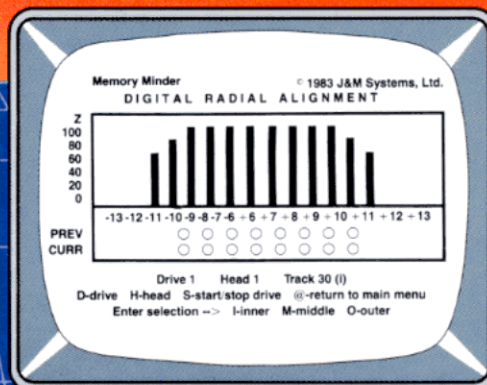
MEMORY MINDER

T.M.

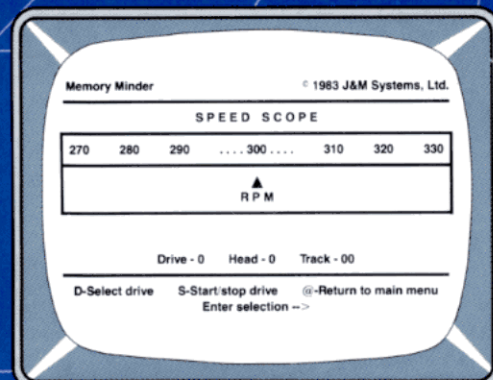
... A UNIQUE APPROACH TO DISK RELIABILITY!



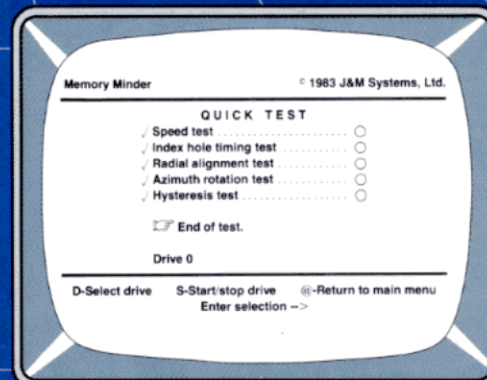
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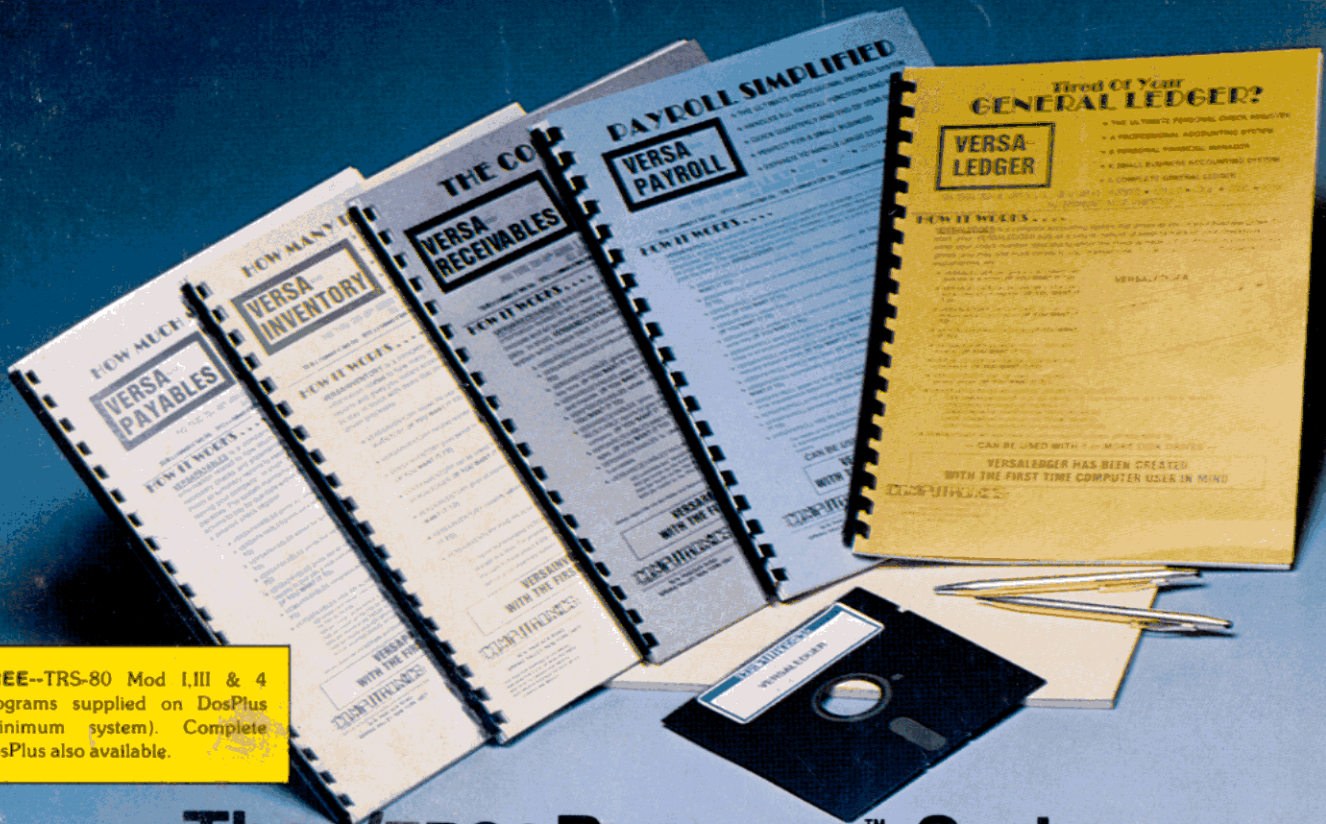
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