

80 micro

the magazine for TRS-80 users*

JANUARY 1986
USA \$4.00
CANADA \$4.50
A CWC/I PUBLICATION

REVIEWED THIS ISSUE:
Model 4 DeskMate
DosTamer
Post Plus
Screen Editor 2.3

P as in POWER!

**How to Give
Your Model 4P**

- ▶ 80-Track Drives
- ▶ A Hi-Res Board
- ▶ Surge Protection
- ▶ 128K of RAM
- ▶ And More!

SUPERMEM
A Meg o' RAM
For Your
Model 4!

THE MODEL 1000
Which Expansion
Board Meets
Your Needs?

CASSETTE MAGIC
How to Run
I/III Tapes
From TRSDOS 6



HOLIDAY GIFT IDEAS FOR

Save on Long-Distance Costs
with Our High-Speed
Telephone Modem



Low As
\$20 Per Month
on CitiLine*

399⁹⁵

Stop wasting money on long-distance calls with a slow 300-bits-per-second phone interface. Get the DC-2212 modem and communicate at 1200 bps! You'll be able to access information services and other computers in one-fourth the time. The direct-connect DC-2212 can be programmed to automatically dial and answer the phone, receive and transmit data, even hang up the phone. Automatically selects 1200/300 bps. Bell 212A-compatible. FCC registered. #26-1176.

Use only with Bell-compatible equipment. Not for multi-line use without optional-extra controller.

5 1/4" Diskette Storage Box



Disks not included

14⁹⁵

Protect up to 50 floppy diskettes from loss, dust and abuse. Five adjustable dividers keep disks organized and easy to find. Storage box is made of sturdy, high-impact styrene. Stackable for convenient storage. #26-1362.

5 1/4" Disk Drive Cleaning Kit



7⁹⁵

A "must" for every owner of a computer with a disk drive. Cleans drive heads safely and easily. Just apply special solution to cleaning diskette and run in drive for 30 seconds. With cleaning diskette, solution and instructions. #26-408.

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Size	Parts	Design	Vertical Perforation	Quantity	Box	Cat. No.	Price
14 7/8 x 11"	1	Greenbar	No	500 sheets	Mini-Pak	26-1330	11.95
14 7/8 x 11"	1	Greenbar	No	3500 sheets	Carton	26-1417	69.96
9 1/2 x 11"	1	Greenbar	Yes	3500 sheets	Carton	26-1403	49.95
9 1/2 x 11"	1	White 15#	Yes	500 sheets	Mini-Pak	26-1423	8.95
9 1/2 x 11"	1	White 20#	Yes	500 sheets	Mini-Pak	26-1387	10.95
9 1/2 x 11"	1	White 20#	Yes	1250 sheets	Tote	26-1427	24.95



Monitor not included

Universal Monitor Pedestal

16⁹⁵

Adjustable platform rotates and tilts so you can position your monitor's screen for best viewing and less eye and neck strain. Holds all Tandy monitors. Color and finish matches monitors, too. Base measures 11 x 10 1/4". #26-1369.

EVERY COMPUTER OWNER

Sale! Computer Workcenter
for Any Home System

Save
\$20 **79⁹⁵**

- The Perfect "Finishing Touch" for Any Serious Computer User
- Organizes Computer and Peripherals in One Place
- Functionally Designed and Solidly Constructed

Every computer buff needs a stylish, roomy desk to hold a complete system and still provide plenty of work space. That's what makes our Computer Workcenter a great choice. It includes a full-width monitor shelf (14³/₄ x 41¹/₂") and adjustable glides for leveling. Simulated oak finish complements any decor. Measures 32 x 43 x 23³/₄". Easy to assemble. #26-1350.



Computer, monitor, printer, disk drive and accessories not included

Helpful Color Computer Books



Getting Started with Extended BASIC. Learn programming with regular BASIC, plus advanced graphics and sound. #26-3197, \$8.95.

Color Computer & MC-10 Programs. Includes 40 ready-to-keyboard listings. #26-3195, \$5.95.

The Color Computer Playground. Includes 42 ready-to-keyboard listings. #26-3196, \$7.95.

Going Ahead with Extended Color BASIC. Advanced graphics and sound. #26-3192, \$5.95.

Color Computer Quick Reference Guide. Covers functions, ROM subroutines and more. #26-3194, \$4.95.

Color Computer Graphics. How to create graphics. #62-2076, \$5.95.

Color Computer Assembly Language Programming. #62-2077, \$6.95.

Certified Computer Media

- Great Stocking Stuffers
- Choose Single or Double-Sided 40-Track Disks
- Disks and Cassettes Are Certified Free of Defects



5 1/4" Single-Sided

Quantity	Cat. No.	Price
1	26-305	3.49
3	26-405	8.99
10	26-406	24.95

5 1/4" Double-Sided

Quantity	Cat. No.	Price
3	26-411	9.95
10	26-412	27.95

Computer Cassette Tapes

Quantity	Deluxe C-20 (26-308) Each	C-20 (26-301) Each	C-10 (26-302) Each
1-11	3.79	2.79	1.89
12-23	3.39	2.49	1.69
24-47	2.99	2.19	1.49
48-Up	2.69	1.99	1.39

Radio Shack®
The Technology Store™

A DIVISION OF TANDY CORPORATION

Circle 75 on Reader Service card.

*CitiLine revolving credit from Citibank. Payment may vary depending upon balance. Workcenter sale ends Dec. 24, 1985. Prices apply at Radio Shack Computer Centers and participating stores and dealers.

SEASON'S GREETINGS * FROM THE STAFF OF JMG SOFTWARE



We'd like to thank all our customers for making 1985 a record year for us. We're working hard to provide even better service and support for the TRS-80 market in 1986, and we wish you and yours a very happy and prosperous New Year.

Geoff *Caro* *John* *Sam* *Dave* *Sandy* *Amos* *Don* *Rob* *White* *Margaret*

PASCAL-80

Easiest version of Pascal to learn! Editor and Compiler are already in memory. Nearly complete subset of standard PASCAL. Offers also many extensions to Pascal, including calls to machine language, screen control, random access files and more!

Models I/III (List \$79) \$59.50

PRONTO

Specifically designed for the 128K TRS-80 Model 4/4P. Window controller program with many applications. Includes calculator, calendar, a sort utility, terminal facility, address cards, on-line help facility, and much more. "Sidekick" for the Model 4!

Models 4/4P \$54.50

POWERDOT II

"The best high-resolution bit-image graphics program on the market for the TRS-80." Screen becomes a window on large full-page drawing board. AUTODRAW feature for lines and circles. POWERDOT II is 100% Machine Language. (Specify printer!)

MODELS I/III \$39.50

PUBLIC DOMAIN DISKS

A fine collection of software from The Alternate Source!

Public Domain Disk (specify #1-#12) Each \$ 9.50
Public Domain Package #1-#6 \$49.50
Public Domain Package #7-#12 \$49.50
Public Domain Package #1-#12 \$89.50

EDAS/PRO-CREATE

One of Misosys' most popular utilities. Both a Full Screen Text Editor as well as a powerful Macro Assembler. Assembler supports nested macros, includes, and conditionals. Works excellently under most DOSes.

Models I/III and 4 \$69.50

SUPER UTILITY

"The indispensable first-aid kit for the TRS-80 users..." Contains over 60 different utilities for repairing, reviving dead files, reformatting, manipulation of files, and lots more!

Super Utility Plus (Models I & III) \$59.50
Super Utility 4/4P & MSDOS \$69.50

PACKAGE DEAL!

★★ **MTERM** ★★
★★ **MSCRIPT** ★★
★★ **DOSPLUS IVa** ★★

A complete operating system has just become very affordable! This new deal offers an operating system that is much faster and easier to use than TRSDOS. Not only is DOSPLUS IVa itself very user-friendly, it also offers a built-in menu driving system, and of course, GREATLY enhanced BASIC. Other included features of DOSPLUS IVa are: Text Editor, Linker, Assembler; Directory Verification/Repair, Disk Mapping, and File & Disk Editing. As if that is not enough, you now also get MSCRIPT with your purchase of DOSPLUS IVa. That's right, one of the easiest and most convenient to use word processors goes with your purchase. Also, MTERM Smart Terminal (one of the best full featured TRS-80 terminal programs available) is included in this deal. In addition to all of the remarkable features of MTERM, it will also enable you to log on to local Bulletin Boards and tell your friends about this fantastic deal!

DOSPLUS IVa / MSCRIPT / MTERM Package Deal
Models 4/4P (List \$329.85) \$159.50

SUPERCROSS XT

Designed specifically for transferring data and program files between TRS-80 disks and those of other computers

Models I/III or 4 \$94.50
with Convert Basic option .. \$112.50



• WORD PROCESSOR • SPREAD SHEET • GRAPHICS •
• DATA BASE • & MORE!

This integrated software package for the Models 4/4P, as well as for MSDOS, combines many functions to become one of the best software deals available for any computer. Included are Word Processing, Spread Sheet Analysis (which provide a full range of mathematical functions), Relational Database Management (allows merging, multiple selection criteria, restructure of DataBase, Multiple Sorting etc.), Spelling Checker (55,000 word dictionary, correction feature, ability to create personal and professional dictionaries), Bar Chart Graphics (created directly from Spreadsheet data and supported on any printer), and finally, Data Encryption. If you are worried about learning T-Maker, worry no longer. It has excellent documentation and comes equipped with a Tutorial on the disk. Not only is it a great program, but it is also at a great price!!

Model 4/4P (List \$299) \$194.50
MSDOS version (List \$450) \$294.50

LE SCRIPT

Great printer support, full Model 4 support and much more! On a 128K Model 4, you can have over 90K of text buffer for use on a single file. Model 4 features available while running in Model III mode. By far LeScript is our most popular program!

Models I/III or 4 (List \$129.95) \$94.50

WORD PROCESSING PACKAGE DEAL

LeScript and Electric Webster together!! Needless to say, these two great programs work excellently together!

W.P. Package (List \$279.90) \$199.50

ELECTRIC WEBSTER

Includes 50,000 word dictionary. Features fast checking, interactive correcting and personal dictionary expansion. (Specify computer and word processor when ordering)

Electric Webster (Models I/III or 4)
(List \$149.95) \$129.50
Grammar or Hyphenation options
(List \$49.95) Each \$38.50

APPLICATIONS/BUSINESS

T-Maker (Model 4/4P) (MSDOS Ver.)	\$194.50
TFC BBS	\$294.50
Powerdot II	\$99.50
POWERMAIL PLUS	\$39.50
POWERMAIL PLUS w/Txt Merge	\$98.50
LESCRIPT	\$128.50
LESCRIPT CP/M	\$94.50
LESCRIPT MS/DOS	\$149.50
ZORLOF II	\$149.50
MSCRIPIT	\$49.50
LAZYWRITER	\$54.50
TYPEITALL	\$99.50
PowerScript (New Version)	\$99.50
PowerDriver	\$34.50
Electric Pencil	\$24.50
Electric Pencil w / Spell Check	\$74.50
EDX Text Editor (Mod I/III)	\$139.50
TEXTPRESS	\$24.50
ELECTRIC WEBSTER	\$39.50
E.W. Options (each)	\$129.50
E.W. MS/DOS (Includes options)	\$38.50
Datagraph with Pie Option	\$149.50
Graphit	\$109.50
PowerDraw	\$34.50
Mumford's Disk Indexer	\$34.50
Howe's System Diagnostic	\$34.50
J & M's Disk Drive Analyzer - I	\$89.50
J & M's Disk Drive Analyzer - III	\$84.50
ENBASE Data Base Manager	\$74.50
EDIT (Models I/III)	\$64.50
Home Accountant (Model III)	\$18.50
VersaLedger II (Models I/III)	\$59.50
Versa Series (Models I/III) each	\$134.50
TAS's ZMAIL Mail List	\$89.50
PowerMail Plus	\$24.50
Macro Typing Tutor	\$98.50
Lazycomm Terminal	\$24.50
Disk Term Terminal	\$29.50
MTERM Smart Terminal	\$59.50
DOSPLUS 3.5 (Models I/III)	\$59.50
DOSPLUS IVA (Model 4/4P)	\$59.50
	\$119.50

GAMES

SUPREME RULER PLUS	\$26.50
FLIGHT SIMULATOR	\$29.50
NUCLIX	\$14.50
APE	\$14.50
SIFTER SHIFTER	\$8.50
BATTLE OF ZEIGHTY	\$8.50
WARRIORS AND WARLOCKS (D&D Adv.)	\$39.50
THE ADVENTURE SYSTEM	\$34.50

THE BOOKSHELF

Using Super Utility	\$14.50
ROM ROUTINES Documented	\$16.50
Model III Assembly Language	\$15.50
The C Programming Language	\$17.50
Programmer's Guide to TRSDOS 6	\$14.50
TRS-80 Disk and Other Mysteries	\$16.50
Basic Decoded and Other Mysteries	\$23.50
TRSDOS 2.3 Decoded	\$23.50
Machine Language Disk I/O	\$23.50
The Custom TRS-80	\$23.50
How To Do It On the TRS-80	\$23.50
Basic Faster and Better	\$23.50
DFBLIB or BFBDEM Disks each	\$17.50
Basic Disk I/O	\$23.50
DFBLOAD Disk	\$23.50

INFOCOM

Botter be careful out there... Infocom's latest adventure seems to be the phasing out of their TRS-80 line. We will do our best to keep these popular games in stock, but once they run out, they are gone for good. Hitchhiker's Guide is our first casualty!

"Standard Level" Each \$34.50

PLANET FALL	WITNESS
ENCHANTER	CUTTHROATS

"Intermediate Level" Each \$39.50

ZORK II	ZORK III
SORCERER	INFIDEL

"Very Difficult Level" Each \$42.50

DEADLINE	STARCROSS
SUSPENDED	

UTILITIES

Alcor C Compiler	\$84.50
Alcor Multi-Basic Compiler	\$84.50
Super Utility 4/4P	\$69.50
Super Utility 3.2	\$59.50
Super Utility MSDOS	\$69.50
Supercross XT	\$94.50
Supercross XT w/CnvBasic	\$112.50
Autoloader	\$34.50
PRONTO (Model 4/4P)	\$54.50
Other MISOSYS Utilities each	\$23.50
Edas / PRO-CREATE	\$69.50
DSMBLR III / PRO-DUCE	\$23.50
Edas/Dsmbler Combo	\$89.50
DIS' n' DATA I/III	\$37.50
DIS' n' DATA (Model 4/4P)	\$46.50
TASMON Monitor (Models I/III/4)	\$34.50
Howe's Monitor #5	\$19.50
CNVBASIC (Models I/III/4)	\$27.50
Model 4 TOOLBELT	\$39.50
TOOLBOX for LDOS	\$39.50
TRAKCESS (Mod I)	\$19.50
TRAKCESS (Mod III)	\$24.50
PRO-ESP Utility Set (Model 4/4P)	\$23.50
6.2 Plus Enhancements	\$36.50
Impakt Utility	\$29.50
NEWBASIC w/Analyst	\$34.50
Analyst only	\$19.50
ALE - Assembly Language Editor	\$39.50
M-ZAL Macro Assembler (Model III)	\$79.50
Mumford's Instant Assembler	\$44.50
Instant Assembler (Model 4/4P)	\$59.50
ZEN Assembler	\$34.50
PASCAL 80 Compiler	\$59.50
PASCAL 80 for CP/M	\$36.50
LC / PRO-LC Compiler	\$114.50
SBE Compiler	\$46.50
ACCEL 3/4 Compiler	\$44.50
ZBASIC Compiler	\$84.50
HartFORTH/PRO-HartFORTH	\$69.50
Backrest Utility	\$84.50
MULTIDOS Version 1.7	\$79.50
MULTIDOS (Model 4/4P)	\$89.50

ELECTRONIC NOTEBOOKS

KSOFT

SUPERLOG 4	\$99.50
SUPERLOG 3 (I/III)	\$99.50
LOG (Model I)	\$44.50
LOG (Model III)	\$44.50

MONTHLY SPOT LIGHT

ZBASIC 3.0

This long-awaited basic compiler is finally here! Enhancements included on this program include Device Independent Graphics, up to 54 digit numeric accuracy, a built-in interactive Editor and Compiler, structured Programming Constructs, and of course that is only scratching the surface. The nicest thing about ZBASIC is that the commands stay the same no matter what computer brand you use! Probably the best basic compiler around for any computer!

\$84.50

CONVERSION PROGRAMS

BASIC 3 TO 4 CONVERT Model 4/4P ONLY (list \$49.95)	\$39.50
BASIC 4 TO 3 CONVERT Model I/III (list \$49.95)	\$39.50
BASIC GW CONVERT Model 4/4P ONLY (list \$99.95)	\$89.50
CONVERT BASIC Models I/III and 4 (list \$29.95)	\$27.50

OUR GUARANTEE:

We sell only top-quality software. If, however you are unsatisfied with a product, you may return it within 10 days (in good condition) for a refund, less \$2.50 handling charge for programs under \$50 (\$5 for programs over \$50). We also ask for a letter stating the reason for your return.

We will also beat any competitor's price by \$1.00 (same conditions as competition, i.e. shipping charges etc.) if you tell us where they advertise their price.

TO ORDER:

We accept orders by phone or mail. Specify your TRS-80 Model, exact program(s) wanted, and method of payment. We accept VISA, MasterCard, Check, and Money Orders (C.O.D. orders add \$2.50 and Gov't Purchase Orders add \$5.00). Electric Webster orders please specify Word Processor. Free shipping to continental U.S. and Canada. All prices are in U.S. Funds. Prices subject to change without notice.

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Niagara Falls,
N.Y. 14305

801 Mohawk Road West
Hamilton, Ontario
Canada L9C 6C2

(416) 575-3201

POWERSOFT NEWSFLASH #3

Advertisement

Thank you for reading our newest holiday installment of PowerSoft's Newsflash. This will contain information that doesn't really fit into a regular ad-type format. Please let us know your comments. This is the third in the series and we need to know from you if they are worth continuing. We would appreciate hearing from you. If you are a brand new TRS-80™ owner, then congratulations and welcome!

WHERE has Radio Shack™ been? Where is their column? Where are their ads?

An editorial from PowerSoft: If you read INFOWORLD, you may have seen that TANDY pulled all ads and support from all CW Communication Magazines (of which 80-MICRO, PC WORLD, and INFOWORLD are a part of) due to a "questionable" quote in a John Dvorak column in INFOWORLD. You probably have noticed that Radio Shack hasn't advertised here since August. Tandy may be right. They may be wrong. That is not for us to decide, but we feel that just because Tandy is upset with the people at INFOWORLD or John Dvorak, they shouldn't cut off 80-MICRO - the one magazine that has provided them constant coverage and support since the beginning! Mr. Roach - if INFOWORLD has done Tandy an injustice, it should not hurt the folks at 80-MICRO or their subscribers. If things are settled by now, and the ads and the "ASK TANDY" column are back... then thank you for not cutting off your loyal supporters any longer than necessary. You've got a very large and loyal following here.

Last minute update... As of our deadline this issue, the word was that Tandy would have ads back in the January issue (this one). No word yet on the TANDY column, however. If there are Radio Shack ads in this issue, that means that Tandy and 80-MICRO have squared things away. We'll keep you posted...

By the way, Mr. Juge, I read your guest column in a recent Creative Computing concerning Tandy's future plans in computing, the future of the TRS-80, and dispelling rumors in general. It was a very good column that all Tandy computer owners might like to read. But only a small fraction of Tandy owners saw that article, compared to if it would have appeared in 80-MICRO (where it was probably originally written for). That article belongs where Tandy specific customers can read it. I hope you submit it here for re-printing.

More news from Ft. Worth... In late December, Tandy will be printing 2,000,000 (that's two million) catalogs of a new variety. They will be SOFTWARE AVAILABLE FROM TANDY catalogs. For free, available for taking home. These will include complete descriptions of not only all the software you see in the computer catalog, but a complete listing with description, by machine, of ALL software that can be ordered through their Third Party program (formerly Express Order) at any store. Considering the number of programs carried in-stock (thousands), the number of retail outlets (supposedly more than McDonalds™), the number of catalogs printed (millions), and the number of machines supported (Model I to MS-DOS to XENIX), this makes Tandy possibly the largest software vendor in the world. They're very serious about changing their image concerning dealing with outsiders. The Third Party program actually works great, and you can have what you need in a matter of days! Supposedly you can order from anywhere in the world there's a Tandy store.

Even MORE news from Ft. Worth... Tandy will be trying a three month experiment starting in late December or January. They will be carrying three computer magazines in their 1540 Radio Shack™ Computer Centers and Plus stores. We hear that the magazines will stop after three months so that Tandy can evaluate the program, however. There will be approximately 6-10 copies of each issue to each store, but it's a start! I'm sure the idea is to sell more computers - not lots of magazines, but I'm not sure a three month trial would really show this or not. Six would be better for test purposes.

What this means to us "outside software vendors" is that many people who were not aware of us before, will now be enlightened to a whole new world outside of Radio Shack! We "outside suppliers" now have a chance to reach that customer! Many good products and companies have disappeared because their intended market simply didn't know they were there!

There's a slight catch, though... The magazines available in the stores will be "special" editions of the magazines, in that only Tandy vendors and Third Party suppliers will be able to advertise in them. That certainly cuts down who can advertise! BUT, when and if people subscribe (which is what the magazines want), they will get the "regular" complete version of the magazine in the mail.

The two version system is how at least one of the magazines involved will handle it. This magazine, currently being published, will feature MS-DOS and portable products only. They will call their "regular" subscription issue the "Classic Edition" and the Radio Shack issue will be the "New Edition". Seems like we've heard this before... I'll have a Pepsi™ please.

The second publisher is starting a completely new publication based entirely on Third Party products. It will mostly be MS-DOS based as well. There will only be one edition of this magazine and it will not solicit ads from non-Tandy vendors. Their goal is to review all the Third Party products by the end of 1986 or so.

The third magazine is still hurriedly planning (at this writing), because they were only included at the very last minute. They are rushing to get something together to be there at the beginning like the other two. They will support The Model 4, III, I, and MS-DOS machines. I think they will use the dual issue method of distribution as well. (I'm really glad that SOMEONE who supports the TRS-80™ got in there! There are many TRS-80 owners who just don't need to buy a new computer, and someone needs to support them!)

** All of the above information was obtained through normal channels without violating any agreements with any party. **

We have a brand new Catalog #61! If you are not on our mailing list and haven't received one by now, and would like one - please drop us a note or call and ask for one. Groups and clubs may write and request whatever number you need. We're here to help you, so if you have ANY questions please write or call. We know about PC's as well as TRS-80's. Adding a hard drive and have questions? We know hard drives inside and out. If you are a member of CompuServe™, we have a support SIG there that you can reach from any prompt by typing: GO PCS-56. Try it. If you can recommend our products to your friends or associates, please do! There are TOO MANY Tandy owners out there who still haven't heard of us! Help us and help your friends. Give them our address and suggest they ask us for a catalog, ok? Thanks.

Happy Holidays! Please drive safely.



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The left bracket, [, replaces the up arrow used by Radio Shack to indicate exponentiation on our printouts. When entering programs published in 80 Micro, you should make this change.

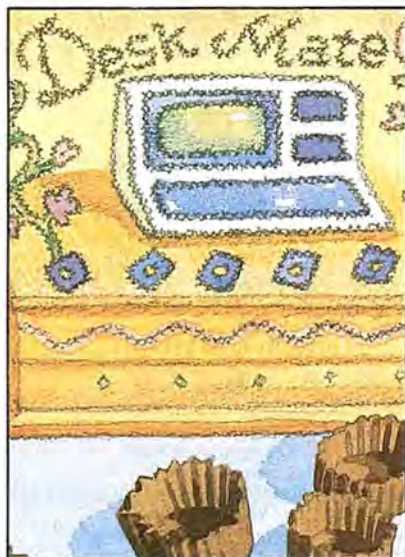
80 formats its program listings to run 64-characters wide, the way they look on your video screen. This accounts for the occasional wrap-around you will notice in our program listings. Don't let it throw you, particularly when entering assembly listings.

Article submissions from our readers are welcomed and encouraged. Inquiries 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.

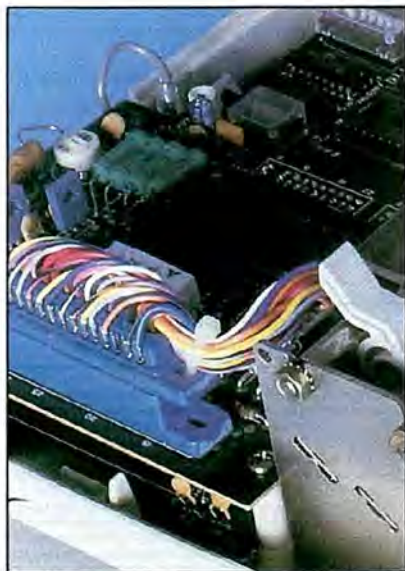
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80 Micro (ISSN-0744-7868) is published monthly by CW Communications/Peterborough Inc., 80 Pine St., Peterborough, NH, 03458. Phone: 603-924-9471. Second class postage paid at Peterborough, NH, and additional mailing offices. (Canadian second class mail registration number 9563). Subscription rates in U.S. are \$24.97 for one year, \$38 for two years, and \$53 for three years. In Canada and Mexico \$27.97—one year only. U.S. funds drawn on a U.S. bank. Nationally distributed by International Circulation Distributors. Foreign subscriptions (surface mail). \$44.97—one year only, U.S. funds drawn on a U.S. bank. Foreign subscriptions (air mail) please inquire. In South Africa contact 80 Micro P.O. Box 782815, Sandton, South Africa 2146. All subscription correspondence should be addressed to 80 Micro, Subscription Department, P.O. Box 981, Farmingdale, NY 11737. Please include your address label with any correspondence. Postmaster: Send address changes to 80 Micro, Subscription Services, P.O. Box 981, Farmingdale, NY 11737. Send Canadian changes of address to 80 Micro, P.O. Box 1051, Fort Erie, Ontario L2A 5N6, Canada. Return postage guaranteed.

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Turbo-charge your Epson printer.
- 58. **Astronomical Delights** by *Michael F. O'Reilly*
With our starfinder system, you won't get lost in space.
(Models I, III, and 4; Load 80; Model 1000)
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Not all programs will run on your system. Some Model III programs, for instance, will run on the Model 4 in the Model III mode, but not in the Model 4 mode. You should check the system requirements box that accompanies the article to find out what system configuration individual programs require.

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Sidereal

Article: Astronomical Delights (p. 58).
System: Models I, III, and 4, 32K RAM.
Starfinder software.
Language: Basic.
Cassette filespec: B.
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Article: A Happy Medium (p. 70).
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EDAS editor/assembler.
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Language: Assembly.
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Article: Blank Expressions (p. 76).
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Blank out the video display for selected input.

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Article: Power Lines (p. 80).
System: Models I and III, 32K RAM; Series 1 Editor/assembler.

Graph your Basic programs' most active lines.

Language: Assembly.
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Stackup

Article: Spreadsheet Beat (p. 114).
System: Model 4, 64K RAM; Multiplan.
Compare three types of loans.
Disk filespec: STACKUP/MP.

BAS = Basic SRC = source code CMD = object code

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1986 Will Be a Dull Year

"1985 could very well be the most important year in Tandy's history, for it will reveal whether the company can reestablish itself as a vigorous participant in the microcomputer marketplace. The three key factors are how well the Model 1000 does, how well Model 4 sales hold up, and how well Tandy can impress itself on the consciousness of the buying public."

—Side Tracks, January 1985

In retrospect, I might have been somewhat hyperbolic when I called 1985 "the most important year in Tandy's history." It was, nevertheless, a critical 12 months, and a brief look at the three key factors is in order.

First, indications are that the Model 1000 met its obligation to lead the Tandy computer line. Tandy claims that for the first 40 days of its lifetime, the 1000 sold more than any other computer the company has introduced. Granted, without numbers that assertion is meaningless, but anecdotal evidence suggests that the 1000 has sold respectably. In fact, according to Tandy's 1985 annual report (covering the fiscal year ended June 30, 1985), the Models 1000 and 1200 were second only to the Model 4 in sales dollars, accounting for 14.2 percent of revenues generated by microcomputer products. And remember, the Model 1000 only became available in December 1984.

One can't underestimate the importance of the 1000's success to Tandy's role in the microcomputer market. The company needed a mainstream computer. The Model 4, despite its remarkable staying power, is the last of its generation, the Model 2000 is a big disappointment, and the Models 100/200 aren't mass-market machines. Simply put, the Model 1000 rescued Tandy from a potentially deadly crisis.

Second, the Model 4 sold well enough to let it hold its number-one ranking and convince Tandy that the system is worth keeping around. Midseason price cuts to the 4 and the discontinued 4P proved that you can still sell an 8-bit computer if the price is right. New features in the 4D—double-sided drives and DeskMate software—are hardly going to make the system competitive with the Apple II or IBM PC, but are perhaps enough to keep that old warhorse, the Z80 CPU, alive for



a while longer. Conclusion: The Model 4 held the line, thus giving the Model 1000 a chance to firm up its place among Tandy's gallery of micros.

Factor number 3 is where, as usual, Tandy fell flat. The company continued with its K-Mart approach to marketing, unable, apparently, to promote itself as a product manufacturer rather than as a retailer. This, unfortunately, helped to negate the Models 4 and 1000's good showings.

The upshot is that Tandy could have done a lot worse in 1985. The company didn't make the comeback I would like to have seen, but on the other hand it didn't sink completely out of sight.

This brings us to 1986. I'm not going to call it the most important year in Tandy's history, or even as important as 1985. Frankly, I've lowered my expectations; Tandy has as much of a chance of regaining its position in the marketplace as I do of becoming pope. What I'm hoping is that Tandy will continue to hold a steady course, and perhaps solidify its niche as a minor, but solid, player in the market. The three key factors are whether the 1000 and 4D continue to sell, whether Tandy can continue to keep up with the most current technology, and whether the company can attract people besides those who already own Tandy machines.

My hunch is that Tandy will sell enough 1000s and 4Ds to keep its head above water. But the 4 has seen its best years, and the 1000 will soon be eclipsed by more advanced microcomputers. Tandy will have to price both machines

aggressively to attract those who might be tempted by the 80286 machines, not to mention the Atari 520 and the Commodore Amiga. The company must milk the current Tandy user base for all it's worth, selling to I, III, and Color Computer owners who want to upgrade. It must pay particular attention to the CoCo market, which is in danger of getting wiped off the map.

Meanwhile, Tandy must continue to shadow the major manufacturers with low-priced, high-performance clones, such as the new Model 3000. A good price/performance ratio is, after all, just about the only reason a prospective buyer has any more for buying from Tandy. If Tandy can't capitalize on its major strength, it might as well get out of the business altogether.

What about exciting new developments, you ask? Forget it—Tandy follows the beat of the loudest drummer in the band. Tandy is not an innovator, and is not going to blaze any paths into the frontiers of computer technology; the company would rather let other manufacturers take the risks, and feed off their successes. If you want flash and excitement, you'll have to look to Commodore, Atari, or Apple.

And finally, we come (again) to Tandy's marketing efforts. You don't need to be an Einstein to figure out that you can't sell a product unless you reach the customer. To put it charitably, Tandy has not done well in this department. If the company wants to sell to more than current TRS-80 and Tandy computer owners, it is going to have to learn how to promote itself and its computers. But what else is new?

Ultimately, I'm ambivalent about 1986. Tandy has proven that it can provide quality products, and can sell to its established customer base. Nothing indicates that the company won't continue to do so. I thus anticipate little further erosion of Tandy's position in the market.

On the other hand, I no longer harbor any illusions that Tandy will make a dramatic comeback to regain its position as one of the Big Three. Like a competent but uninspired actor, Tandy has assumed the role of a minor character in a big production. That might be enough to keep food on the table, but it portends a quiet and uneventful year. ■

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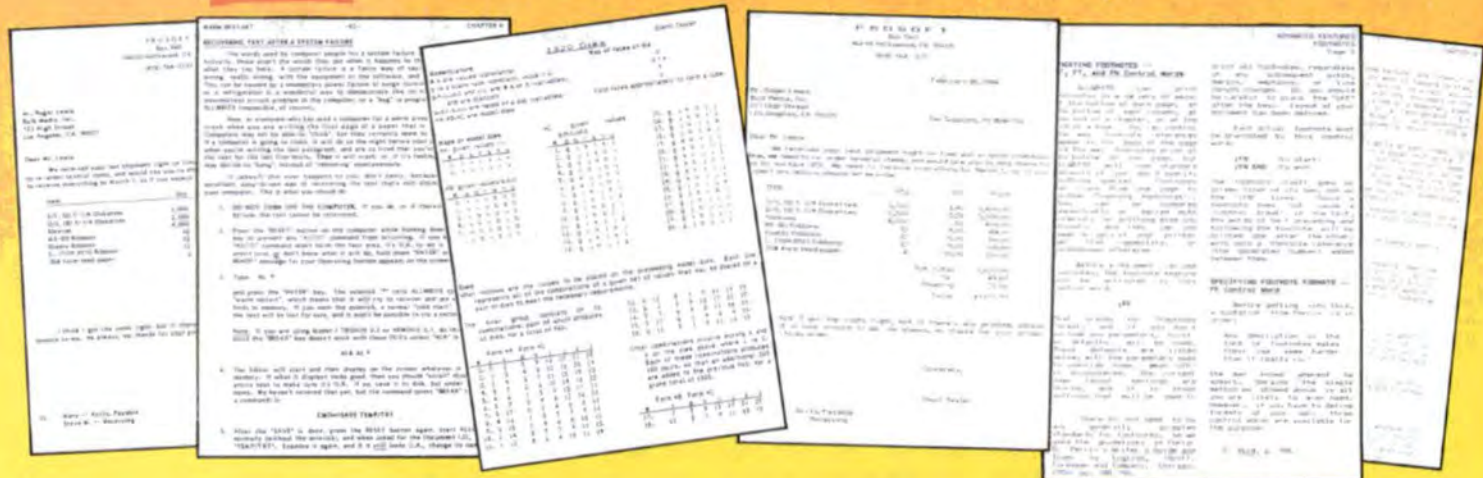


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80 MICRO, Nov., 1984

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Here's Howe

David Dalton's review of Typitall (December 1985, p. 125) is a poor assessment of the program and its capabilities. Dalton takes a negative attitude throughout the review, makes several errors in describing the program's features, and fails to describe some of the features that distinguish this program from other word processors available for TRS-80s.

Dalton's negative attitude is shown by the way he describes ordinary features in a pejorative manner, such as the fact that Typitall doesn't use the extra 64K in a 128K Model 4. The program does have a 41K text buffer, which is quite large by most standards.

Dalton's description of the "weird things" the program allegedly did while he was "blundering around" (and which he was unable to reproduce) is even more puzzling. It is a serious mistake for him to suggest that this, along with his other complaint about an invalid command slightly altering the appearance of text at the cursor location, constitutes poor error-handling in the program.

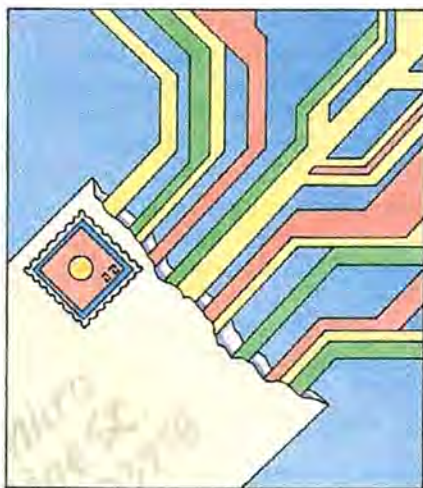
Dalton complains that the spelling checker is slow and awkward to use. These statements are simply wrong. Typitall's spelling checker is one of the fastest available with any word processor, and is activated by typing in a single-letter command. An entire document, filling nearly the entire available space, can be corrected in fewer than two minutes.

Another mistake Dalton made is in his statement that the program doesn't support serial printers. A separate serial printer driver is included with the Model I/III version of Typitall, and it is not necessary on the Model 4 because of its Route command.

For those readers of *80 Micro* who have an interest in finding out more, I would like to point out that the Model I/III version of Typitall was reviewed in the October 1983 issue by William D. Allen. While Allen's review was not entirely favorable to the program, it was at least a competent description of it.

Hubert S. Howe Jr.
President, Howe Software

I didn't think my review of Typitall was quite that negative. It's just that other Model 4 word processors have



more features. Other Model 4 word processors support serial printers without relying on TRSDOS 6.X's Route command. There is more to spelling checkers than looking up the words. While other spelling checkers show a word in context, Typitall does not. The user must search out each misspelled word with the Hunt command. It's this action that makes it awkward.

—David Dalton

Championing Tandy

Hooray, bravo, and all sorts of kind words for Terry Kepner and his October 1985 Feedback Loop (p. 16). As a long-time user of Tandy computers, I've finally seen someone stick up in print for Tandy's customer support instead of complaining about the lack of it. It's certainly unreasonable for everyone to expect Tandy to provide information on how to do this or that to get the Tandy equipment to work with other manufacturers' equipment, while not requiring the same in return.

Tandy presently provides free local phone support for any caller in numerous support centers around the country

80 Micro's BES 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 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

without requiring confirmation of ownership of any Tandy product. In addition, customers can have on-site assistance for approximately one-third to one-half the currently accepted consulting fees.

As for the Feedback Loop question that caused me to write, Tandy sells WordStar Professional that works with Tandy printers, including the Daisy Wheel II and most of the dot-matrix series and provides "proper" carriage return/line feed support. Unfortunately for Gil Seiler, you have to buy it from Tandy. If he had tried for the Tandy 1200 instead of the AT&T 6300, he probably wouldn't have had to write his letter.

Jim St. John
Mundelein, IL

Crosscheck Congrats

My letter concerns the Crosscheck cross-reference program in the September 1985 issue ("A Basic Programmer's Best Friend," p. 66). The author uses a technique that involves calculating checksum totals. This check on my typing effort is most appreciated, and I hope you use this sort of checksum totals for long listings from now on. The idea may be simple but it's brilliant.

Obviously the author gets credit for it, but others there at your workplace must have played a part in working out this idea. Thank you to all, whomever you may be.

Robert B. Lockhart
Yakima, WA

Beve Woodbury of our technical staff is the one to thank.

—Eds.

Correction

Our description of a program that modifies IBM PC and compatible keyboards for use by the disabled ("Key Solution," MS-DOS New Products, November 1985, p. 96) should read: "The program uses the control and alternate keys the same way as the shift key, so you can use them in conjunction with other keys by pressing them successively rather than simultaneously."

—Eds.

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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 have a Model III with two drives and Radio Shack's hi-res board. A friend of mine who has a Model 4 with a hi-res board recently gave me some undocumented features of the Radio Shack graphics board. They are as follows:

OUT 140.n Scroll screen in X direction (n=0-127)
 OUT 141.n Scroll screen in Y direction (n=0-255)
 OUT 142.1:SCREEN 0 Enable mixed text/graphics display

These work on his computer but they don't on mine. I thought the boards for the III and 4 were identical as far as software was concerned.

Why doesn't Tandy publish these codes? Do they really work? Are there any other tidbits we should know about?

Also, I have tried without success to enter and edit the BBS program listings which you ran in your BBS Express column. Where can I get working copies of these programs?

Finally, although your magazine lists the BBS as operating 24 hours a day, I have called many times but it never answered. When is it in operation? (Will Rose, Waukegan, IL)

A: The codes are undocumented because not all hi-res boards support them; that's why they are called "undocumented codes." Obviously there were some differences in the design of the Model III and Model 4 boards because of the design differences in the machines themselves. From a documented code point of view, the boards are identical. If you use only the documented codes, a program can't distinguish between the two boards.

The BBS Express program is marketed as the Towne Crier BBS by Saturday Software, P.O. Box 404, Catlettsburg, KY 41129, for \$15. If you want, you can call their BBS at 606-739-6088.

The 80 Micro BBS number is 603-924-6985. Unless there are technical problems, the board is in 24-hour operation. UART settings are 8N/1.



Q: Edward Hitchens had a problem running the TRSDOS 6 Training Course on his Model 4P (September 1985, p. 14). The 4P requires that you run all applications under TRSDOS 6.01.01 or TRSDOS 6.2. This is plainly stated in the older Model 4/4P *Disk System Owners Manual*, but not mentioned in the TRSDOS 6.X manual shipped with newer computers. Many of Radio Shack's software packages come with TRSDOS 6.00.00 or 6.01.00, which will not run on the 4P.

Solve this problem as follows:
 ▶ Boot the 4P using TRSDOS 6.01.01 (or 6.2).
 ▶ Insert the working (not the master) copy of the application package in drive 1. Be sure to remove the write-protect tab.
 ▶ Type in the command: AUTO ? : 1 <ENTER>. If an Auto command is displayed, write it down exactly as it appears. Otherwise go to step 4.
 ▶ Type the command: BACKUP : 0 : 1 (OLD,SYS,INV) <ENTER>. This command moves the operating system on the TRSDOS 6.01.01 (or 6.2) disk to the disk in drive 1.
 ▶ IMPORTANT: If an Auto command was displayed in step 3, type the following: AUTO : 1 <text> <ENTER>, where <text> is the command you wrote down in step 3.

I hope this helps. (Michael Shrout, Greeley, CO)

Q: I think Edward Hitchens' problem with the TRSDOS 6 Training Course may be the same one I found in

the copy of Multiplan and ALDS I bought. The system looks for a ROM image on drive zero. When it cannot find the image, it displays an error message and aborts. To fix this, boot up with a working TRSDOS 6.X disk and copy the Boot/SYS.LSIDOS file to the disk that has the Training Course on it. Always do that to a back-up copy, because an error could crash your disk; but it should boot up fine after you copy the file. (Rick Stickers, Saint Joseph, IL)

A: Thanks for your suggestions.

Q: I've been looking for an Oasis Systems light pen (or any light pen for the Model I), and the Orch-85 music board from Software Affair, but apparently both companies are no longer in business.

If a company is out of business, and the products they sold are no longer available commercially, is it OK simply to copy them for one's personal use? Is this also true for software? If so, where could I get the schematics and any other relative information about these products? (Bob Shuster, Philadelphia, PA)

A: The patent and copyright laws are very specific about this. You can't copy somebody else's work. An analogy best illustrates this point: Just because a book has gone out of print and is no longer available at a store doesn't mean you can borrow a copy from a friend and then photocopy it. This is a clear violation of copyright and the FBI and court system rigorously enforce the relevant laws.

In the case of software, the courts have ruled that users have the right to make and keep back-up copies of the software they buy, but that they do not have the right to distribute or sell them. Should the user sell the program to another person, either all copies of the program must be given to the new owner, or they must be destroyed.

On the other hand, if you can buy no-longer-wanted hardware/software from someone, then you haven't broken any laws whatsoever. I think that that would be the easiest route to take. Does anyone have either of the two products requested?

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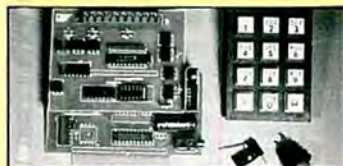


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Q: Can you tell me what could cause the intermittent full-screen flicker on my Model I? I can often stop the flickering by switching to large characters via the shift/right-arrow key combination several times and then hitting the clear key to clear the screen. But once the flickering starts, it won't stop unless I enter these "magic" keystrokes or turn off the computer for a few hours.

Thank you for your help. (Tom Clark, Ellicott City, MD)

A: I think one of the capacitors in your monitor is marginal. You should replace it with a larger unit. Does anyone have another solution?

Dennis Kitsz mentions that this problem is frequently related to line noise introduced to your home's power grid by faulty fluorescent or neon lights and light dimmer switches. Here's how to help determine the source: When the flickering starts, turn off all the lights in the house and everything that might have a neon lamp in it, such as stereos, coffee makers, and so on.

To control video twitch, he suggests inserting a small capacitor (47-220pf) between Z50 pin 3 and ground. If this doesn't solve your problem, you should take the monitor to a TV repair center and have a technician check it out.

Q: I own a 64K Model 4P and recently bought an inexpensive upgrade kit for it. The kit looks fairly easy to install—just plug in the chips and move one jumper. However, I have no idea how to get the plastic case open and would appreciate some detailed instructions. (Kevin Pfeifle, Westhampton Beach, NY)

A: You'll find explicit instructions on opening the 4P case in this month's feature on Model 4P upgrades, p. 40.

Q: In the July 1985 Feedback Loop (p. 16), Ralph H. Turner asked if there were a way to fully utilize a smart printer using cassette-based Scripsit. I have owned a Model III with a Line Printer IV since February 1981. As soon as Radio Shack got an updated version of Scripsit 1.0 that would work on a Model III, I had the same problems Turner reported—I couldn't access the smart printer from Scripsit.

I found a solution from Pioneer Software (1746 N.W. 55th Ave. #205, Lauderdale Hill, FL 33313). The program was called Script 80/83, and it cost me \$9 for the cassette Model III version. I don't know if this program works on cassette Scripsit 3.1. Also, I don't know if Pioneer Software is still in business. Just what is the policy when a software company is no longer in business and one of their

products is still useful to a limited market of cassette-only users? I would give Turner a copy if I had his full address.

I also have a problem: The keyboard switches have started to fail in my Model III. First the "J" failed, and the Radio Shack store fixed it for \$30. Now the "S" has failed. Is this common, and is the keyboard going to randomly fail until I get all the individual switches changed?

Can you just call the National Parts Division and ask them for part numbers if you have the model and serial numbers? I'd like to know what the switches and a brand-new keyboard would cost. (Carl Brown, Kernersville, NC)

A: I'm fairly sure that Pioneer Software is still in business. There is no such thing, though, as a policy to handle software distribution when a company is no longer around to do it. Typically, the rights to the software revert to the author and you need permission before you can copy the programs.

More and more people are reporting keyboard failures to me. You can either replace the keys one at a time or replace the whole keyboard. Replacing one key is far cheaper than the entire keyboard, so I would suggest doing that for the first time or two.

The keys are supposed to last for quite a few years before needing replacement. If you've already had two keys fail and a third follows soon, I suggest replacing the whole keyboard. The keys cost about \$1.04 each and replacing 44 keys one at a time would cost far more than just replacing the keyboard at one fell swoop. If you don't want to spring for a new board, you can buy surplus keyboards from your local repair center and use the keys as yours begin to fail.

Ordering through National Parts (900 E. Northside Drive, Fort Worth, TX 76102, 817-870-5662) is easy; just tell the operator what you want. For exact information on what you need, first call the repair technician at a local Radio Shack Computer Center and ask for advice.

Q: In reference to Ralph Turner's question (July 1985, p. 16), I have two patches for Model I cassette Scripsit that lets you change the printer mode. The simplest is a cassette modification of the disk patch that appeared in the November 1981 issue of *80 Micro* ("Scripsit—Sans Serif," p. 172). It allows you to print an entire document in normal, bold, or condensed type.

The other patch lets you change type styles at the beginning of any line. With a third patch, which I now use on a Model I with disks, you can change fonts in the middle of a line. I see no reason why you couldn't use it with a cassette version but I've never actually done it.

I don't know how the Model III version of Scripsit differs from the Model I version, so I don't know how easy it would be to modify the III version. If Turner has a monitor such as Tasmon and a little knowledge of assembly code, I'd be happy to try to help him. (Humphrey N. Udall, Darien, CT)

A: Anyone interested can reach Udall at 339 Hoyt St., Darien, CT 06820.

Q: I have a Model III with two disk drives, all Radio Shack equipment. A friend of mine turned the computer's power switch off and on several times, in rapid succession. This blew R-25, the 2-ohm fusing resistor in the main power supply.

I replaced R-25, but it blew again when I turned on the power. Do you have any ideas on what I should do next? I have the technical reference manual, a digital voltmeter, and a logic probe. (Don J. Gerhardt, Clemmons, NC)

A: First, disconnect everything from the power supply and disconnect the floppy disk drive power supply from the ac (the drives and the floppy disk controller, being on a separate power supply, shouldn't be affected by the disaster on the rest of the computer). Now replace the fusing resistor with a new one and turn the power supply on. If you're lucky, the fusing resistor will blow again, indicating the power supply is bad, which is the likely problem.

If the fusing resistor doesn't blow, you have a problem with either the CPU board, the RS-232C board, or the video circuitry. Reconnect these three items one at a time in this order: CPU, video, RS-232C. One of these will cause the fusing resistor to blow. If it doesn't and you have a fully functional computer, the problem was a bad connector that was leaking voltage to ground. Replace the connectors just to be on the safe side. Good luck.

Q: Are the daisy wheels used in the Radio Shack DWP-210 made by, or compatible with, Diablo? I read in *80 Micro* that the ribbons are Diablo.

My buddy just discovered, after several months of phone calls and letters, that his famous Percom drives are Tandon 100-1 drives, which he installed in his Model III. I'll bet there are only one or two companies making disk drives, and that they are Japanese. (Russell L. Lawson, West Suffield, CT)

A: The daisy wheels are not Diablo-compatible, but they are compatible with Ricoh. You can buy Ricoh wheels from Quill Corp. (100 S. Schelter Road, P.O. Box 4700, Lincolnshire, IL 61097).

Tandon, Qume, and now IBM are the major American disk drive manufacturers (although both IBM and Tandon are shifting their production facilities to Taiwan). Among the Japanese there are another dozen manufacturers, including Panasonic, Sanyo, Sony, Mitsubishi, and Canon.

Q: I thought I saw an article in *80 Micro* on a program to convert programs that run on the Model I to run under the MS-DOS system. I think it would be great for us TRSDOS users. I wouldn't mind getting a Model 1000 but I still want to be able to use all the programs that I have. Also, I'm pretty sure my Okidata printer would work with other systems; I assume it's a matter of getting the right cable. But how about disk drives? I have a Radio Shack and an Aerocomp. What systems would they work with? (*Delbert Roberts, Mason City, IA*)

A: The article, "Quick Conversion for Model I/III/4 Basic," was in the October 1984 issue (p. 178). It isn't exactly a conversion to MS-DOS, but a conversion from Models I/III/4 Basic to Model 2000 Basic, which is similar to the GW-Basic used on MS-DOS computers.

Powersoft (17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475) sells CCNVBASIC/CMD for the Models I/III/4 that will convert TRSDOS Basic programs to MS-DOS or CP/M programs. It costs \$29.95, and if you buy it with Supercross, the utility for transferring disks between computers, the package costs \$119.95.

Educational Micro Systems (P.O. Box 471, Chester, NJ 07930, 800-922-0786 [201-879-5982 in NJ]) sells CONV3TOPC V2 for \$139.95. This program includes Hypercross (similar to Supercross), and unlike the Powersoft program, CONV3TOPC runs under MS-DOS. You use it after you get your program on the MS-DOS machine.

Q: My Model 4 has 128K of memory and two disk drives. I also use a Model I with 48K, one Heathkit H14 line printer, and a Brother EM-1 daisy-wheel printer. Whenever, with Memdisk, I recreate banks 1 and 2 into a virtual disk drive, and after transferring all system files to this drive, I get an "Error 07" when I try to declare the virtual drive as drive zero. I also get an error message whenever I try to use the spooler on banks 1 and 2.

My local Tandy dealer suspected the PAL integrated circuits, and as a matter of fact, with new PALs installed, the computer does accept Memdisk as drive zero, but only just once. On a second attempt it shows error 07. I think this is a tough one, because even the top dealer

for Europe in Nanninc/Belgium does not seem to be able to solve the problem.

I might add that the error which is bothering me is not exclusive to my own Model 4; all the other 128K Model 4's in our local shop have the same default. (*Rene Jungblut, Luxembourg*)

A: The problem is that you cannot install Memdisk twice in any one session. When reinstalling Memdisk, you must always use the same parameters as in the first installation. The error message means you are trying to access a record (Memdisk) that has been deleted, which is the case since you have removed the Memdisk device and are now trying to reinstall it.

Q: I own a Tandy 2000 HD. I need to dump monochrome graphics to my dot-matrix printer. The initial system offered only a color graphics dump to a Radio Shack ink-jet printer. In the latest DOS/Basic update (2.11.01) a mysterious new program lists as DUMPBW. A call to Fort Worth confirmed that this is in fact a routine to provide a graphics dump to a dot-matrix printer, and that all you have to do is install the "device" via a CONFIG.SYS program and use control-1 from within the Basic program. So far, no go.

I seem to have three problems: First, the DUMPBW program appears to employ another program on the MS-DOS disk called LPDRVR to set up the printer for graphics. This might work OK for a Radio Shack DMP, but I own another brand of printer. Although I know the control codes for my printer and can use all its functions from within Basic programs on the 2000, the printer driver program called by the DUMPBW program is written in machine language, which prevents me from determining the required format for the driver. Could you please provide me with the necessary format or give me further guidance on how I can get DUMPBW to work with my C. Itoh Prowriter?

The second problem: Documentation on using CONFIG.SYS is rather sketchy. For example, how do you install multiple devices using CONFIG.SYS? Can you just put two DEVICE = . . . statements in the same CONFIG.SYS program?

And finally: Once I get the two previous problems corrected, I could use some specific advice on how to get the entire assembly to work from within a Basic program. It's somewhat disturbing that a new program will appear on an MS-DOS update disk without a single word of documentation about it. (*J. S. Prather, Virginia Beach, VA*)

A: The DUMPBW is a system file that is supposed to let you dump black-and-white graphics to black-and-

white dot-matrix printers. The utility file LPDRVR is a guide to DUMPBW that tells it how to access graphics and how many print pins are in the print head. The documentation that comes with the updated DOS is supposed to show how to use it; you'll have to contact the programmers at Radio Shack to get exact details on how LPDRVR is set up.

Multiple device installation is simply a matter of using the CONFIG command as many times as you require. Unfortunately, you can't have a CONFIG command that addresses more than one item, and its parameters, at a time. Once you get the proper LPDRVR established for your printer, use CONFIG to install the DUMPBW program (with LPDRVR as the target). Once it's installed, typing control-1 from the keyboard will send a copy of the display to your printer.

Q: In the August 1985 issue (p.16) you got a question on converting the 4P to 128K. You told Greg Denson to plug in chips, which was OK, but then you told him to move the board on pins E12 and E13 to E11 and E12. I was just putting in my chips at that time, too, and found that the board has no E11, E12, or E13 jumper pins. The jumper numbers that change it over to 128K are E1, E2, and E3. Those gremlins are at it again. (*Keith Murray, Sterling, IL*)

A: Not gremlins, just Radio Shack. It markets two versions of the Model 4P. The old version has jumpers E11, E12, and E13. The new ones sport jumpers E1, E2, and E3. New 4Ps also have fewer chips and less power than older models.

Q: I have a DC-2212 modem and I use Videotex Plus with it. I can't get the automatic file to work. If I go to Videotex first and wake up the modem, then go to automatic, it works. But if I go straight to auto, it doesn't seem to turn on the modem. I've followed the instructions in the manual, and done several variations, without success. What am I doing wrong? (*Ron Widener, Central Valley, CA*)

A: You're probably doing everything just right; the DC-2212 has a problem with a relay that prevents it from operating properly. The service centers were notified of this problem around the beginning of September 1985. All DC-2212 modems shipped after that time have been corrected. Contact your local service center for details. ■

Terry Kepner is a free-lance writer and programmer who edits monthly columns for several microcomputer magazines. He has been writing about microcomputers since 1979.

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Life Begins at 4D

Tandyland

You might have noticed some cosmetic differences between the new Model 4D and the old Model 4, not the least of which is a change in the nameplate (see the Photo). The 4D no longer carries the Radio Shack name; officially it's the Tandy TRS-80 Model 4D Microcomputer System. But that's not all. The keyboard now features a backspace key on the right side. As for the double-sided drives, they look just like those in the Tandy 1000, with a turnable drive latch to lock in the floppy disks.

According to comments from the field, the new drives sound better than the old ones. This might mean Tandy's using better drives that would require less maintenance.

Tandy has quietly redesigned the 1200 HD, its IBM PC XT clone. They've added two expansion slots and redesigned the mother board so you can add memory directly to the board instead of using an expansion slot.

The additions give the 1200 one half-size and six full-size expansion slots. Also, the new 1200's printer port and floppy disk controller are located on the mother board, instead of on cards as in the old configuration.

Tandy's rumor-control team swung into action early last fall in response to reports of the Model 2000's demise. Public relations people in Fort Worth did some investigating, and eventually traced the rumor to a Tandy assembly plant.

It seems that Tandy manufactured a number of special Model 2000s for their chain stores' internal audit system. When Tandy finished the production run, someone at the plant apparently leaked a story that Tandy was through making the computers. The rumor of a discontinued model line caught fire and



Photo. The Tandy 4D.

spread unabated until Tandy tracked down the source.

Meanwhile, the 2000 is still in the catalogs and continues to get new software support.

Tandy was supposed to debut a new Color Computer this month, but word now is that it won't show until April or May 1986. The postponement gives Tandy a chance to look at Christmas sales of the CoCo II before deciding on a new introduction.

The Tandy 1000 weighs in this decision, too. Some industry observers feel that potential CoCo buyers opt for the 1000 instead, since they get access to MS-DOS software and more computing power for about the price of a fully configured CoCo system.

Update

Talk about the left hand not knowing what the right is doing. At the same time that IBM and Microsoft penned a joint development deal that seemed to exclude any IBM windowing system except MS-Windows (see Pulse Train, December 1985, p. 21), another branch of IBM negotiated a deal with Digital Research to market and support DRI's GEM products and Concurrent PC-DOS.

The confusion ended abruptly when IBM retracted the DRI agreement. CW Newsnet reported the trouble arose because IBM's Information Programming Services office in Atlanta negotiated with DRI while the Entry Systems Division in Boca Raton worked with Microsoft.

Both DRI and IBM downplayed the reversal of the agreement, saying it should not be considered a decision against the DRI products. Nonetheless, the incident shows the potential strength of the Microsoft-IBM alliance and the possible stifling effect it could have on Microsoft's competitors.

In addition to DRI's GEM, IBM's own Topview software will be affected by the Microsoft-IBM pact. Software developers expect increasing compatibility between the two products over the next 12 months, with MS-Windows emerging as the dominant windowing product for MS-DOS machines.

Many observers believe MS-Windows will go on to become the standard operating system for IBM PCs and compatible computers. "I think it has always been Microsoft's intention that Windows become an operating system," said Bob Lefkowitz, an analyst with the Infocorp market research firm in Cupertino, CA. "Why else would they continue with Windows if they felt it was a dead product?"

Before Windows becomes dominant, however, users and developers must more completely accept the idea of windowing operating systems than they do now.

New York publisher Ziff-Davis and industry observer and reporter Esther Dyson have canceled plans to publish *Computer Industry Daily* (see Pulse Train, July 1985 p. 23). Ziff and Dyson will remain in the computer news business with resumption of Dyson's RE-LEASE 1.0 newsletter, which will appear on a monthly basis.

Reasons for the cancellation? In a let-

ter to RELEASE 1.0 subscribers, Dyson wrote. "The decision to close [the *Daily*], in which I shared, was difficult precisely because [it] was getting better and better—but it was also clear that it didn't provide enough value-added to justify the price [\$1,500/year]. The volume of news and the level of people's interest in it simply wasn't enough to sustain a daily publication."

MicroTrends

While market researchers predicted Americans would buy 9 percent fewer microcomputers in 1985 than in 1984, they forecast an increase of more than 50 percent in micro purchases by Europeans. Since the European market is apparently in the same boom the U.S. saw several years ago, manufacturers are clamoring for a piece of the action.

A look at sales figures for 1984 shows who the major players are in that smaller but more diverse market (see the Figure). IBM and Apple are the big names in Europe as they are in the U.S., but from there the market starts to look different. Olivetti, ACT, and Hewlett-Packard follow the big two. Tandy places a distant eighth, just ahead of Compaq.

Attempts to make a name for themselves in Europe have taught U.S. companies that they can't conquer the market with a single campaign. "We hesitate even to use the word European because it differs too greatly from market to market," says Garland Asher, director of financial planning for Tandy.

While the soft market in this country forces manufacturers to look for greener pastures across the Atlantic, gains don't come easily. Sellers have to overcome language barriers, establish distribution channels, and rework advertising campaigns to appeal to the European buyer. These differences aside, Europeans are asking the same questions U.S. buyers ask, questions manufacturers are still trying to answer: "Why should I have a computer and what am I going to do with it?"

In the U.S., manufacturers are wondering what to do with more than a million unsold microcomputers gathering dust in warehouses. As of September 1985, IBM alone had an inventory of almost 500,000 units, broken down to 250,000 PC XT's, 150,000 PCjr's, and 50,000 portable PCs. Apple, Commodore, Hewlett-Packard, and Altos Computer Systems were also weighed down by high inventories.

While the overstock hurts manufacturers, consumers should get more for their money as computer makers offer incentives to dealers to move merchan-

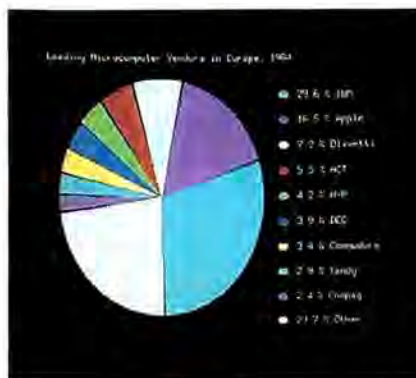


Figure. Top microcomputer sellers in Europe in 1984.

dise. Some analysts predicted that the glut could push the price of an IBM PC-compatible with 256K of RAM and two disk drives down to \$800 by the end of 1985. Considering Christmas sales and the seasonal lull during the first quarter of 1986, prices might be better now than they'll be later on this year.

The home computer market took a battering in 1985 but, according to Future Computing, an industry-wide change in marketing strategy could spell recovery. To make up for declining sales, manufacturers are pushing higher-priced computers. In a survey taken in June 1985, Future found that potential sales for 1985 were about 3.2 million units, a 30 percent decline from 1984. But higher prices for those units should translate into a 4 percent revenue gain.

Of the 36,300 households Future contacted, 10 percent planned to buy a home computer in 1985. Those buyers were looking for machines with more memory and floppy disk storage rather than the low-RAM, ROM-cartridge-based machines popular a few years ago. Future expects half of all home computers to be floppy disk-based by 1986, while only 45

Typical home activities	Use (%)
Games/entertainment	79
Child education	57
Adult education	47
Home finance	46
Hobby	43

Typical office activities	Use (%)
Work from office	39
Run business from home	21

Overlapping activities	Use (%)
Programming	65
Word processing	59

Table. Home computer uses according to a June 1985 Future Computing survey.

percent would be cartridge-based.

In fact, many home computer owners—25 percent of them, by Future's count—use computers usually considered business machines. According to Future's senior analyst, Hilda Uribe, "Computers in the home are used for work like that done by their counterparts in businesses. They are home computers only by virtue of their location."

However, the dominant use for home computers is still games and entertainment (79 percent) while the least common activity is running a business from home (see the Table). Though the buying habits of home computer consumers may be changing, vendors continue to do little to help buyers make a decision. Future's survey reports, "Consumers want computers for purposes they can't clearly define and the industry isn't clarifying what personal computers can do for consumers. Buyers have to sell themselves."

Hot Item

Last fall, industry watchers talked about IBM as a leading contender for an Internal Revenue Service contract to supply 1,500 field agents with lap-top computers, even though IBM hadn't announced a lap-top computer at the time. The battle for the big IRS contract prompted the question: "Would IBM's entry into the lap-top field sanctify the market and boost sales, as Big Blue's entry into the personal computer market did in 1981?" When CW Newsnet posed this question to a group of industry analysts, their response was a uniform "No."

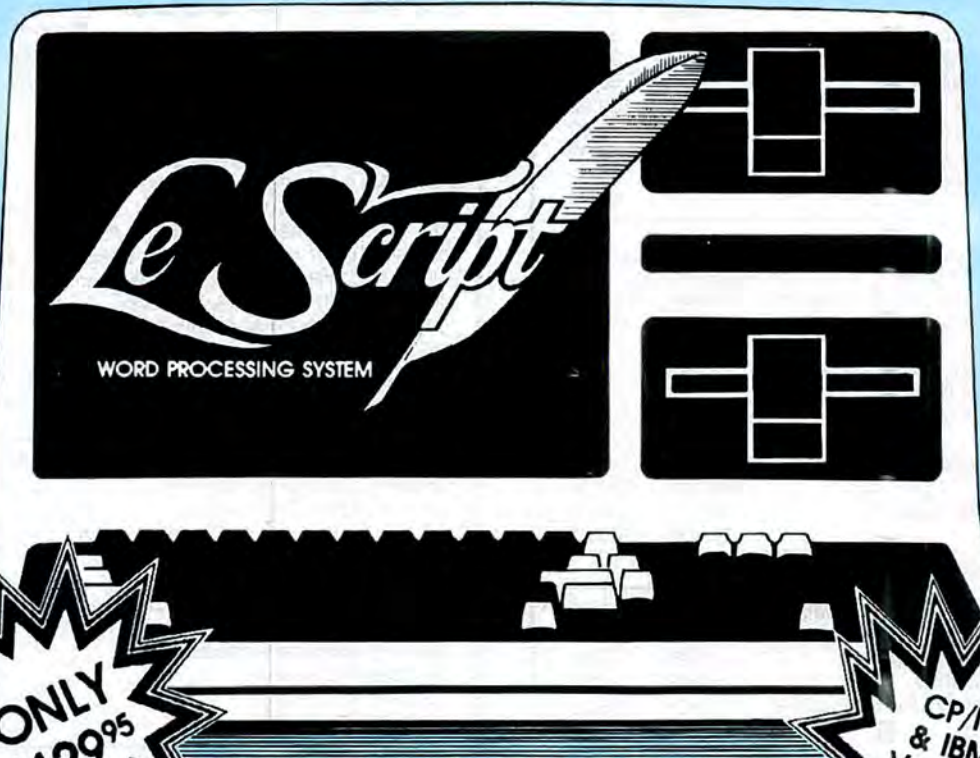
The experts agreed that the lap-top market faces some serious problems. Among the reasons cited for slow sales: limitation of the market to computerists who travel, a \$3,000-\$4,000 price tag for a machine comparable to a desktop, generally poor displays, and a dearth of software. As Aaron Goldberg of International Data Group put it, "IBM's coming in isn't going to bless the market."

Nonetheless, the analysts surveyed felt that IBM's entry in the market might increase third-party manufacturers' support of lap-top machines.

As for a timetable for a possible IBM announcement, Egil Juliussen of Future Computing noted that it would be a mistake for IBM to introduce a consumer product in the fourth quarter of 1985 if the company intended to sell it through dealers.

Kenneth Bosomworth, president of International Resource Development, said that the IRS contract represented "a very nice way of getting into a vertical market," either for a new or established player in the lap-top market. ■

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A Tip or Two

Dexter Walker's **alternative to the PRINT@ statement** (October 1985, p. 25) prompted four people to write with their own methods. Glen M. Harper of Avondale Estates, GA, and John L. Fickett of Bucksport, ME, have the same idea: Use PRINT@ LN*64 + R, where LN is the line number and R is the row. Thus, PRINT@ 4*64 + 32 is the same as PRINT@288. James R. Primm of Paris, MO, fine-tunes it somewhat by substituting a **variable for the line number**, and declaring the variable at the beginning of the program. This lets you port a program to a computer with a different screen size by simply changing the value of the variable. Finally, William Horton of Alfred Station, NY, has a different method. He **defines a function** with the statement DEF FNP(R,C)=(A-1)*64+B-1, and then uses it in the program as, for example, PRINT@FNP(10,2), where 10 and 2 are the row and column, respectively.

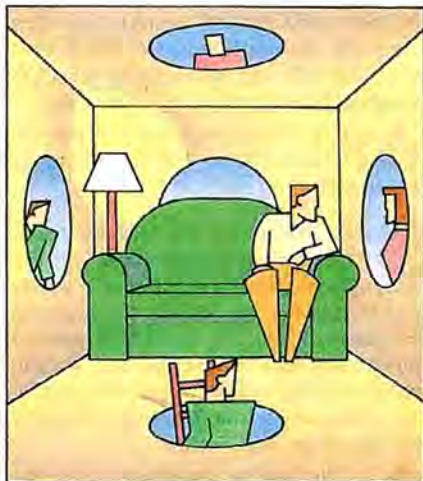
Thomas M. Koller of Blanchard, ID, passes along an experience he has had with a **Model 4, DeskMate, and a non-Radio Shack printer**. It seems that whenever the printer buffer filled up the job would abort. He solved the problem by using TRSDOS's spool function to create a 1K RAM file and a supplementary disk file for overflow.

James R. Primm of PRINT@ fame (see above) reports that he has **successfully copied Microsoft's Flight Simulator** for the IBM PC on his Model 4 using Copycat III. He says that the technique works with other protected PC software, including VisiCalc. Make sure, however, that the disk is single-sided.

How fast is the Model 4? Roberto Refinetti of Santa Barbara, CA, wrote a program that executes the operation A = A + 1 - 1 32,767 times in several languages, with the following results: Assembly language, one second; Pascal, 19 seconds; Model 4 Basic, 119 seconds; Model 4 Basic compiled, 229 seconds; and Model II Basic, 276 seconds.

Revisitations

Garry G. Kraemer, currently living at the Blytheville Air Force Base in Arkansas, has **modified Cameron Snyder's Times2 program** ("The Great Divide,"



August 1985, p. 62) to run under TRSDOS 1.3 and NEWDOS/80. That program, you might recall, lets you run two programs simultaneously on the Model 4 in Model III mode. The Table lists the changes.

Seek and Ye Shall Find

► Frank Harper (20 Pine Acres Road, Allenstown, NH 03275) would like information that would help him hook up an Apple 410 plotter to his Model III.

► Yong W. Choe (2535 Ellsworth St. #4, Berkeley, CA 94704) would like to know how to remove the triangle symbol for double space in Model III SuperScripts.

► H.E. Lamb (108 October Drive Apt. 4, Camp Hill, PA 17011) would like to hear from anyone who has explored the advanced features of Model 2000 Microsoft Word.

► R.B. White (3455 Kenwood Drive, Beaumont, TX 77706) is looking for Charles D. Housc, the author of the UL-TRAPX data base management system, or an updated version of that program. He has recently upgraded from a Model I to a Model 4P.

► James I. Archer (RR 1 (Tanglewood), Bloomington, IL 61701) would like to know how to configure his Line Printer

Line	TRSDOS	NEWDOS
260	LD A,30H	LD A,30H
2410	LD DE,4220H	LD DE,4050H
2450	CALL 4220H	CALL 4050H

Table. Modifications to Times2.

VI to give the letters y, g, j, q, and p true descenders.

► Derek A. Lambert (650 Joseph Bosman St., Silverton, Pretoria, 0184 RSA) wants to know how he can get his LNW-80 to run at 4 MHz. He also would like to know how to get a background color other than black in mode 2.

► Craig Cole (P.O. Box 211, Circleville, NY 10919) is looking for a microMerlin for his Model I.

► Cynthia B. Brown (816 Kinlock Court, Columbia, SC 29223) is fighting a bug in PFS:File and PFS:Report for the Model 2000. Sometimes when she prints a listing of her church's parishioners, the last record is left off when a new page begins to print. Does anyone have a fix?

► Mark D. Deavult (Box 105, Churchview, VA 23032) is looking for a hi-res screen dump routine for Model 4's BasicG and a C. Itoh Prowriter.

Oops

Add to line 120 of the Crosscheck program (September 1985, p. 66) the statement CL = CL - 10.

We failed to mention that six of the seven patches listed in "Patch Maker" (October 1985, p. 76) were from Andy Levinson's "Patch Work" (January 1985, p. 112).

Editor's note: Since publication of the last Ask Tandy column in October 1985, we've received a number of letters. Here they are. We've answered some of them, and invite readers to reply to the rest. "D.R." is 80 Micro technical editor Dave Rowell, while "T.K." is Feedback Loop author Terry Kepner.

Q: Can I use my wife's Brother Electronic 50 typewriter as a printer since it has an outlet in the back for connection to a computer? Also, can an 8087 math coprocessor be added to the Tandy 1000?

A: You'll need an interface sold by Brother along with a printer cable. Check with Brother. —D.R.

Q: I own a Tandy 1000 and a Radio Shack DWP-210. Basic will not LLIST any program over 80 columns wide; I get an "out of paper" error. How can I solve this problem?

A: *The new version of Basic (due "any day now") should have a fix. The simplest solution is to type in WIDTH LPRINT 255 before typing LLIST. See "The Tandy 1000 Tip Sheet," June 1985, p. 42. —D.R.*

Q: My question regards the much-touted and -advertised built-in light pen port on the Model 1000. The local Radio Shack Computer Center doesn't know of any light pen, or even of plans to market one. Why isn't Tandy following up with a product? Is there an IBM light pen that will fit?

A: *Tandy will not be coming out with a light pen, at least not for a while. As for a third-party source, does anybody know of one? —Eds.*

Q: As a consultant to the typesetting industry, I am interested in the Model 1000 as an inexpensive alternative to the IBM PC line, which we normally recommend. The price difference is too great to ignore. But will my clients be happy? What is the compatibility factor here? Does the 1000 run MS-DOS 2.11 or PC-DOS 2.1? What DOS comes with the 1000? What ROM version is used, and how does it differ from IBM's ROM? Also, one of the programs we support requires the Hercules monochrome graphics card. How do you install a Herc card in the 1000? Does Tandy support any external bus, or is there an independent manufacturer who offers the necessary hardware? If we manage to install the hardware, how will the software run?

A: *The 1000 comes with its own version of MS-DOS 2.11. It'll run under PC-DOS 2.1 or 3.X. It uses a Phoenix Compatibility Corp. ROM. The Hercules card will not fit in the 1000 (it's too long). You might be able to find a third-party bus expansion chassis (made for the PC) that will work, but will you save any money? —D.R.*

Q: Is Tandy going to come out with a two-button joystick that will work with the 1000?

A: *None is listed in the 1986 catalog. —D.R.*

Q: I just bought Microsoft Word 1.00.00. I recently read about a new release, 2.00.00, for the IBM PC. Will this new version also be released for the Tandy 2000 and will I get an automatic upgrade?

A: *I doubt that Tandy will produce an updated MS Word for the 2000 any time soon. If they do, you'll probably be notified, but you may have to pay some amount for the update. Perhaps you should check with Microsoft. —D.R.*

Q: After owning seven Radio Shack computers, I was about to leave familiar territory behind and join the exodus to the IBM/MS-DOS standard. That was until I took a careful look at the Model 1200 HD. But while I can set my screen to a color mode in GW-Basic, I cannot discover from the manuals or the people at the local Radio Shack how to set the screen display to anything other than the monochromatic black and white for use while executing MS-DOS commands. Is there a way to do this?

A: *Yes. Check out my column in the November 1985 80 Micro (p. 94). —D.R.*

Q: I'd like to buy the Macro Assembler for the Tandy 1000, but the catalog is unclear on one point. It states that MASM for the 1000 is the same as that for the 2000, but the MASM manual doesn't say so. I believe the only incompatibility is that the 2000 uses quad-density disks, while the 1000 uses double-density disks. Is this true?

A: *The Macro Assembler for the 2000 works on the 1000 after you move it to a double-density disk. —D.R.*

Q: I own a Tandy 1000 and have encountered a small problem with the text application in DeskMate. The prompt for the merge function is the same as that for the save function: "Enter save filename." This can be confusing. In fact, I once accidentally pressed F6 instead of F5 without realizing it, and wiped out a disk file. If Tandy ever revises the program, how can I get the revised version? Or, perhaps Tandy can send me instructions on how to correct this myself.

A: *The new version has the same problem. I checked the code with a utility, and the proper message is in the program: it's just not used (a bug). Tandy should let you know of any DeskMate updates (if you've sent in your card). You might also try the Operating System Group in Fort Worth, TX (817-338-2392). —D.R.*

Q: My Model 2000 is a year and a half old now and I am still waiting for Tandy to correct the communications functions in GW-Basic: in particular, EOF (variable), LOF (variable), and LOC (variable).

Response to a letter that I sent directly to Fort Worth provided little concrete information, except to say that Tandy regretted that they were unable to give me any assistance. This shortcoming is a serious deficiency. When will it be corrected? Tandy seems to be somewhat uninterested in properly supporting RS-232 communications.

A: *Doesn't sound like Tandy will ever fix Model 2000 Basic; patching the RS-232 functions is not going to improve their profits. —D.R.*

Q: Has anyone published a general listing of IBM software that runs without modification on the Tandy 1000? I'm hesitant to grab any IBM software off the shelf.

A: *I don't know of any such list. More reasonable would be a list of software that doesn't run. I'm working on one, and it won't be very long. —D.R.*

Q: Does Tandy plan to make possible the use of an 8087 math coprocessor on the 1000?

A: *I hear that a 1000A is in the works that will accept the 8087. But it doesn't look like you'll be able to put the chip in existing models of the 1000. —D.R.*

Q: I'd like to equip my 1000 with a serial interface, battery clock, and hard disk controller card. Why doesn't Tandy have a multifunction board that can at least give me a serial interface and clock at the same time? To buy a clock/mouse board would be like paying for an entire board and only getting half its use.

Q: Last February I bought a Tandy 1000. Since I've lots of software for the IBM from school, I figured everything would be great—that is, until I ran into problems with the expansion slot size and the memory expansion. I really wanted a multifunction board, one with 512K, a clock, and at least one serial port. I'm getting pretty frustrated, and beginning to wish I'd never bought the 1000. Certainly right now I wouldn't recommend one; in fact, I think I might just get rid of mine, even if I take a loss. But, before I do I'm making one last appeal—I really do want to keep my other two slots free so I want a multifunction board. Is there anyone else who manufactures such a board? Without a solution to the problem, all my other programs are just gathering dust—an expensive and sad state of affairs.

A: *Not even the new Tandy Memory Plus board will give you clock and serial port. You'll have to go third party. See the October 1985 Dave's MS-DOS Column (p. 88) or our review of 1000 add-on boards in this issue (p. 36). —D.R.*

Q: I'm using an inexpensive computer with 64K for business purposes. I only turn off the display and printer at the end of the day (most merchants also use this procedure with their computerized cash registers). Except for

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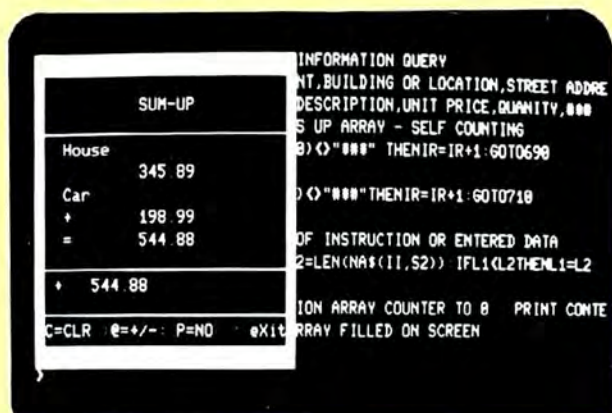
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power outages, this computer has been on for nearly two years. The program is loaded and ready for use all the time. I plan to upgrade to an MS-DOS system. Can I expect the same performance from the Tandy 1000?

A: *Hard to say since the Tandy 1000 hasn't been around for that long. —Eds.*

Q: In your Ask Tandy column of December 1984 (p. 208), you said that Tandy was considering a Z800 board as an upgrade for the Model 4 if Zilog ever introduced it. Is Tandy still looking at the Z800?

A: *Don't bet on it. —Eds.*

Q: I recently bought a used Daisy Wheel II. Is the user's manual available?

A: *Order it direct from National Parts (900 E. Northside Drive, Fort Worth TX 76102, 817-870-5662). —T.K.*

Q: Could you please furnish me with the control codes for a Line Printer IV?

A: *They're listed in the user's manual, which you can order from National Parts (see above question for the address). —T.K.*

Q: Why has TRSDOS 6.2 not been made available free to registered TRSDOS 6.1.X owners, as TRSDOS 6.1.2 was?

A: *The update from 6.1.1 to 6.1.2 was to correct bugs. 6.2 is a new version of TRSDOS; there are fundamental differences between it and 6.1. —T.K.*

Q: Where can I buy print wheels for the DWP-210?

A: *Try Computer Supplies Unlimited (2292 Lincoln Ave., San Jose, CA 95125, 800-621-0854). —Eds.*

Q: In late 1984 I bought a Model 4 and technical manual from DFW Computer Center. I recently purchased a memory expansion kit from Jameco. The problem is that the technical manual was not intended for my CPU board. I have memory sockets U67-U92 and I put the first 64K in U85-U92. The directions for installing the PAL chip say to place it in socket U72. This, however, is one of my memory sockets.

A: *Newer versions of the Model 4 don't use the PAL chip. Ignore that part of the instructions. Just install the chips and follow the rest of the instructions. —T.K.*

Q: What's the best version of SuperScripsit? Is there a way to

know which line number you are on if you change the line spacing within a document using the block command?

A: *1. Version 1.01.01. 2. No. —T.K.*

Questions Unanswered

There must be a way to load a program on the Model PC-3A from the Model II. Both use Basic and ASCII formats. While the PC-3A does not have an RS-232C port, the II should be able to write on the cassette tape through the PC-3A's printer/cassette interface. Is there a tape write subroutine for the II to do this? (Edgar E. Buxton, 903 Hillcrest Drive, Saint Albans, WV 25177)

I unknowingly bought a Model III with a non-Radio Shack disk. I now have a problem with the controller board. I called Radio Shack's National Parts Service and was told the price is \$230.03. I can't understand why it is so expensive. I have now bought a Tandy 1000 and only want to fix the III so I can give it away. Is there a way to get a controller board at a more reasonable price? (Pete Junger, 1504 2nd St., Manhattan Beach, CA 90266)

I have a problem with Radio Shack's Model 4 Accounts Payable 2.01. The written dollar amount of the check is printed in the wrong location, and therefore can be read through the window envelope in which I mail the check. Is it that difficult to revise the program to correct the spacing problem? (J. Randall Haney, The Printery Inc., 606 S. Schumaker Drive, Salisbury, MD 21801)

I use an early Model 4 and find that when I use reverse video to highlight a single capital letter of a word, the letter prints along the upper perimeter of the rectangle. The letter is thus hard to read. What can be done to fix this? (Daryl R. Ramsby, Curly's Sales & Service, 19809 Auten Road, South Bend, IN 46637)

Can anyone tell me if there is a version of Printshop for my Model 4? (Michael B. Bennett, 14313 Killion St., Van Nuys, CA 91401)

SuperScripsit won't support a header when printing using block-action commands. Is there a fix? (Joe Snyder, P.O. Box 231, Exeter, MO 65647)

I am converting a large program from Model III to Model 4 Basic. One module writes a file to disk instead of the printer. Originally, this part of the program was modified by changing LPRINT to PRINT#. In Model 4 mode I get line feeds after almost every variable is printed.

What is going on? (Howard Loewinger, Center on Human Development, College of Education, University of Oregon, Eugene, OR 97403)

When I print a SuperScripsit document the automatic page numbering feature does not resume in appropriate sequence if I interrupt the print process to edit a page. How do I fix this? (Warren L. Davies, 1010 Arc Corner Road, Landenberg, PA 19350)

I own a Royal 620C typewriter-printer that works fine with my Model I. How do I access the Royal's special characters with cassette Scripsit? (Jaime J. Bru, 4101 Courtland Drive, Metairie, LA 70002)

I recently added a TEAC 55F 80-track, double-sided disk drive as the fourth drive on my Model 4. It works fine under DOSPLUS IV, but not under TRSDOS 6.2. How can I configure or patch TRSDOS 6.2 so it will recognize this drive? (Ken Crotty, Newman Road, RD #2, Scotia, NY 12302)

I have a Model 4 and use Radio Shack's Accounting Program, General Ledger, and Accounts Receivable. I also use VisiCalc, PFS:File, and PFS:Report. How can I access the Accounts Receivable data files and transfer selected data to my PFS and VisiCalc programs? (Louis L. Pellegrini, City Select Auto Sales, 2541 Mount Ephraim Ave., Camden, NJ 08104)

We use a Model 12 with Scripsit and would like to use proportional spacing with right justification and bold print. Is there a way to add this capability to Scripsit, or is there another word processor that has these features? We have Daisy Wheel II and DMP printers. (John Sidney, W. Falmouth Tackle, Box 690, W. Falmouth, MA 02574)

Does anyone have schematics for my Model 4, model 26-1069A? (Herbert M. Aumann, 46 Concord Road, Bedford, MA 01730)

How do I hook up a Gorilla Banana GX-100 printer with my Models III and 4P? (Charles A. Foster, R.P. Mahaffey Co., 250 Mount Lebanon Blvd., Suite 407, Pittsburgh, PA 15234)

I'm looking for a copy of TRSDOS 2.8DD. (Allen Binstein, 9700 Odessa Ave., Sepulveda, CA 91343)

Is it possible to transfer files from the Model 16B to a Model II running CP/M? Also, how can we use CP/M 2.25 on our 16? (Mesco, P.O. Box 468, Makati, Metro Manila 3117, Philippines) ■

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Model 4 DeskMate: Tandy's Software Sampler Waddles In

by Bradford N. Dixon

★★★★

DeskMate runs on the Model 4 (64K) and requires two disk drives. Tandy/Radio Shack, One Tandy Plaza, Fort Worth, TX 76102. \$199.95 or free with the purchase of a Model 4D.

Easy to use: ★★★★★☆
 Good docs: ★★★★★☆
 Bug free: ★★★★★☆
 Does the job: ★★★★★☆

Tandy's DeskMate program for the Model 4 is an integrated behemoth (181K) that gobbles up disks and memory in the name of free software for the Model 4D. As an applications sampler, DeskMate provides six easy-to-use modules (word processor, spreadsheet, filer, calendar, telecommunications, and electronic mail center) to show a new user what his new computer can do. But DeskMate lacks the program sophistication a new computer user will want within six months of his purchase.

Tandy furnishes DeskMate free with the Model 4D, and Model 4/4P users can buy the program for \$199.95 (catalog number 26-1608). But think carefully before you make a decision.

The Model 4D DeskMate and the one you can buy for the older Model 4 are functionally the same. However, the 4D version comes on one double-sided disk.

If you look at the directory on the 4D version, you'll notice that there is 91.5K of free space on the disk. This is certainly enough room to keep a few letters or the phone list you'll use in Telecom, but for more serious applications, you'll need to format a data disk and keep it in drive 1.

The Model 4 package comes on two single-sided, double-density disks, a program disk and a data disk. The program disk contains TRSDOS 6.X and most of DeskMate's /CMD files, packed in so tightly that there's only 1.5K of free space on the disk.

The data disk contains the help files



that support each module as well as sample files used in the manual's tutorial. It devotes only 63K to DeskMate files, leaving you with 108K of free space. You can free up even more space by deleting the sample and help files once you're familiar with DeskMate.

Model 4D owners won't encounter any disk space problems with that unit's double-sided drives, but single-sided-drive Model 4 users may find the program a nuisance; they'll need more disks to hold DeskMate files and then use DeskMate's Swap command to change data disks. This is inconvenient and requires a measure of organization. DeskMate is more suited to the 4D than to older Model 4's.

The DeskMate documentation is contained in a three-ring vinyl-covered binder that holds the disks, a reference manual, a tutorial session, and a quick-reference card. The manuals are well organized and easy to follow.

Starting Out

Like its Tandy 1000 predecessor, Model 4 DeskMate divides its opening screen into sections (see the Photo). A current-month calendar appears in the top left-hand corner. The current date and time are shown in the top right-hand corner, above a listing of any events of

the day you've saved for the current date. DeskMate's six program modules (and a list of their individual files) sit in a row across the middle of the screen. The function menu runs along the bottom.

You open program modules or move from file to file by positioning the cursor with the arrow keys and pressing the enter key.

The main function menu at the bottom of the screen lets you alter the current date and time, change the name of a file, delete files, swap disks, and more by pressing the clear key and a corresponding number key.

In addition to the function line at the main menu, a subfunction menu comes up when you press the F2 key that lets you access help files, set and turn off the alarm, define printout options, and call DeskMate's simple-math calculator. After using the Tandy 1000 version of DeskMate, I found it disconcerting and sometimes confusing to remember Model 4 DeskMate's two-key combinations. With only three function keys, Model 4D DeskMate requires more fingers to run it.

Text

The first selection on the main menu is DeskMate's elementary word processor, Text. You can enter text on the screen in one of two modes, which you toggle between by pressing clear-2. The Add mode mimics the Model 100/200 text editor, inserting characters without destroying whatever may already be there. You can switch this to the Replace mode, where you can type over letters you want to change.

Text is by no means a full-featured word processor. It is a simple text entry and editing program. It does, however, include a Find feature for locating specific strings in a document; a Merge option for taking one text file and inserting it in another; block move and delete capability using the select, copy, and de-

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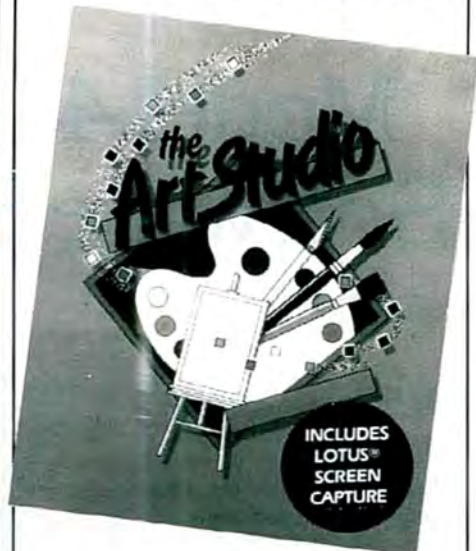


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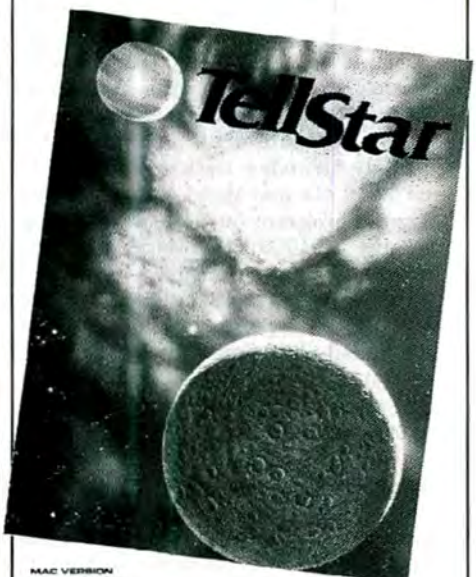


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spond to the messages. You can search the message files for messages to and from a specific person as well as by date or description.

The mail module makes for some interesting possibilities for those people who want to dabble in a simple bulletin board system (BBS) before deciding whether to purchase a full-featured BBS package. When you activate the host mode, callers get a menu that gives them access to the mail message base or any files from the other DeskMate modules. Since this invites security problems, you can configure your system with both a password and security option.

Limitations

Though Tandy has addressed some of the problems it had with the Tandy 1000 DeskMate, they still haven't made it a product you'll use every day.

Text and Telecom have an annoyingly small buffer (16K) for text and file storage. The worksheet program is a large 27K file that works slowly when calculating and gives you fewer than 5.5K of space in which to work.

Filer is an open-ended list program that some will find useful and may help justify the 4D's purchase, but it lacks the power of even low-priced data bases.

Telecom is my favorite of the bunch and though in itself it's not a good reason for older Model 4 owners to buy DeskMate, it is the one module that I think will remain useful after the others are obsolete.

Mail and its host driver are indicators of greater capabilities of the Model 4 in terms of telecommunications. But the premise that it will be popular as a message center seems to me overambitious.

Finally, DeskMate's modules and help files use over 169K of disk space. This makes running DeskMate on a single-sided drive system extremely limiting.

In addition to these observations, DeskMate appears to be incompatible with at least two popular memory-resident programs, DoubleDuty and PRO-NTO (Misosys' Model 4 Sidekick clone).

I see only two ways that DeskMate can be a useful desktop tool: if you get it free with your double-sided drive Model 4D, or if you upgrade your Model 4/4P to double-sided drives or a hard disk.

Conclusion

I'm not overly enthusiastic about DeskMate for the Model 4, having moved on to other, more powerful programs. But, as an all-in-one package designed to get the new computerist up and running, it's a good package at a price you can't beat. For Model 4/4P owners looking for integrated software, keep looking; you're already beyond what DeskMate can offer. ■

RAM Tough: Memory for 8 Bits

by Hardin Brothers

★★★★

Supermem works on the Models I, III, and 4/4P. Alpha Technology, A1A Computer Division, 1902 Highway A1A, Indian Harbour Beach, FL 32937, 305-773-2956. \$229 without memory, \$279 for 256K, \$319 for 512K, \$359 for 768K, \$399 for 1,024K, and (for the Model III only) \$439 for 1,280K, and \$479 for 1,536K.

Easy to use: ★★★★★☆

Good docs: ★★☆☆☆☆

Bug free: ★★★★★☆

Does the job: ★★★★★★

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RAMDrive runs on the Models 4/4P and requires TRSDOS 6.X and one disk drive. Alpha Technology (see address above). \$49.95.

Easy to use: ★★★★★★

Good docs: ★★★★★★

Bug free: ★★★★★☆

Does the job: ★★★★★★

A Fat Mac provides 512K of RAM, but that can't touch the Model 4, which gives you up to 1 megabyte of random-access memory. The 4 doesn't come that way from Radio Shack, but

with a soldering iron and a couple of screwdrivers, you can have the fattest computer on the block.

Alpha Technology's impressive Supermem modification kit comes with 256K, 512K, 768K, 1,024K (1 megabyte), and (for the Model III only) 1,280K and 1,536K of RAM. Alpha also offers its own respectable driver, called RAMDrive, that turns the Supermem board into a fast RAM disk. (Alternatively, you can use another commercial driver or one built in to software that supports RAM disks [see below].)

I installed the 512K kit in an old-style Model 4, one with a black-and-white screen and the RS-232 connector on the bottom of the computer. Installing the board in a newer Model 4, in a 4P, or installation of a different size kit will be different and may involve extensive technical work.

Supermem kits are also available for the Models I and III. The Model III can take more RAM because it has three banks of 16K RAM chips, while the Model 4/4P has only two banks of 64K chips.

The kit is fairly easy to install, but the documentation is pretty sparse. If you don't do any technical work, have somebody else install it for you. The Supermem kit works well, and the RAMDrive software makes for an extremely fast RAM disk.

Installation

I was almost disappointed when I opened the Supermem package. I expected something more than a 3- by 5-inch printed circuit board with 10 chips soldered on it, a couple of wires hanging off the side, 16 memory chips, and five pages of loose-leaf instructions. The kit also included the RAMDrive software with four pages of documentation.

Supermem isn't hard to install as long as you know how to handle integrated circuit chips and a soldering iron. If you don't, you can probably find a local technician to do the modification for you. The job took me less than an hour, including a phone call to Alpha Technology to clarify one step. But I work slowly and I'm sure others could do the job in less time.

You have to open up your computer to install Supermem, which voids Radio Shack's warranty. Also, your Radio Shack service center may be unwilling to do any repair work with Supermem installed, but you can remove it without much trouble.

The installation process is simple. After opening up the computer, you remove the Z80 central processing unit and one small jumper clip. You will also have to remove all the memory chips currently

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?

in your computer along with one of Radio Shack's custom PAL chips. All the chips are socketed, so removing them is simply a matter of prying them out carefully.

Next, you install the Supermem printed circuit card by pressing it into the now-empty Z80 socket on your computer's main logic board. You then put the Z80 into a socket on the Supermem card and plug the Supermem's ribbon cable into the socket from which you removed the PAL chip.

Then it's time to fire up your soldering iron. You should use the smallest diameter solder you can find, because you'll be working in cramped quarters. Four small wires attach to the Supermem board. You solder three of them to pins on various chips on the logic board, and the fourth to both a resistor and a small post on the logic board.

The final step is to install the memory chips supplied with Supermem into the memory sockets on the computer's logic board. The 256K chips are sensitive to static charges, so take standard chip-handling precautions to ensure that you don't damage them.

If you're installing more than 512K, you will have to piggy-back the memory chips and solder some wires to them.

When the chips are in, reassemble your computer and put it through the test listed in the documentation. Boot up in Level II (non-Disk) Basic to run the two-line test program. If everything is OK, your computer should pass with flying colors.

Super Memory

Once you install the memory and get it working, you have to figure out how to use it. The Model 4's Z80 can address only 64K of memory at once. You access the rest of RAM, including the video and keyboard memory, the upper 64K (if you have 128K installed), and Supermem's upper memory areas, by bank selection and switching.

The Model 4 divides all available memory into 32K banks. A 128K Model 4 has two banks of main memory, and two alternate banks of 32K. Supermem follows the same memory scheme. With the 512K Supermem installed, my Model 4 has two banks of main memory with 14 alternate banks of 32K each.

TRSDOS 6.X can theoretically address up to 288K of RAM through bank switching and the @BANK supervisory call. Unfortunately, the current version won't handle more than 128K. TRSDOS will, however, see the lowest 128K of Supermem exactly the same as 128K of Radio Shack-installed memory.

If you program in Assembly language, you can access the rest of Supermem's memory directly by using the Out com-

mand. You can select any 32K bank and move it to either the top or bottom half of the Z80's address space. Model 4 Basic doesn't support bank switching, so Supermem won't affect Basic programs at all.

RAMDrive

I got a copy of RAMDrive with my Supermem kit, a program that can turn all or part of the memory into a fast-access RAM disk. You install RAMDrive the same way you do Memdisk. It examines memory, determines how much you have available, and, if you want, performs an extensive test on the upper memory banks to ensure that the chips are good. After you install Supermem and run the short Basic test program, you should probably run RAMDrive for a thorough check of the new memory.

RAMDrive allows you several options for configuring the upper banks of memory. You can dedicate it all to a RAM disk or leave the first two banks vacant for use by programs that require or use 128K (such as LeScript, OverDrive, PRO-NTO, DoubleDuty, or Multiplan), and leave the other banks open for customized programs. Normally, however, you will want to dedicate all of the upper memory to a RAM disk.

I usually use Supermem and RAMDrive to create a 448K RAM disk. I back up my system disk to it and set the RAM disk as the new system disk. This process (run as a job control language [JCL] file) takes about two minutes.

Unlike Memdisk, RAMDrive has room to hold all the system files, utilities, and application programs you use most often, and a large amount of text or data also. The increase in disk access speed can be amazing: Basic loads in less than a second, and you can load LeScript with this entire article in about 10 seconds.

Problems

I like both Supermem and RAMDrive, although each could use some improvement. The Supermem installation instructions are sparse and, at times, a little confusing. The instructions aren't nearly as clear or as thorough as Heathkit instructions, for example.

If you are familiar with the insides of your Model 4 and know how to handle a soldering iron and memory chips, you shouldn't have any problems installing the kit. However, most Model 4 users would be better off if they had a technician install it for them.

One of the instructions said to remove a jumper connecting two pins on the Model 4's logic board. But the jumper in my computer was connecting different pins than the ones described in the documentation. I called Alpha Technology and they answered my question quickly

and clearly. They also told me there was another error in the installation instructions and that I should reverse two wires. Alpha has corrected these errors in later versions of the documentation. After the phone call, I was able to complete the installation without problem, and the new memory worked properly as soon as I turned on the computer.

Also, Supermem's pins are too short and don't press far enough into the Z80 socket on my Model 4. I couldn't press the Supermem board fully into the socket. After Supermem ran smoothly for several weeks, I opened my computer to do some other work and apparently disturbed the board. This caused my computer to crash. I worked with a technician to find the source of the trouble, which seemed to be the weak connection between the Supermem board and the Z80 socket. Once I reinstalled the board, the problem disappeared.

Alpha Technology has sanded all identification numbers off the chips on the Supermem board, a practice I view with the same distaste as copy-protected software. Not only does it defeat my own curiosity about how the board works, it makes the board almost impossible to repair should one of the chips ever fail.

I also discovered a problem with RAMDrive. If I dedicate all banks above 64K to a RAM disk, I can turn it into a system disk with a JCL program without any problem. However, if I reserve 128K for normal operations, TRSDOS won't back up any system files to the RAM disk because of RAMDrive's space allocation scheme. You can use one of RAMDrive's options to make the smaller RAM disk into a system disk, but it's impossible to install it and back up your application programs and data files with a JCL program on your boot disk.

Conclusion

As yet, few programs take advantage of all this extra memory.

Two companies, Misosys and Anitek, actively promote the Supermem board. Misosys has developed a set of patches to TRSDOS 6.2 that give the DOS full power to mediate and process requests for all banks of memory on the board up to a full megabyte of RAM. With these patches installed, software developers can modify current programs that use the @BANK supervisor to locate free memory banks on the Supermem board regardless of what other programs also use banks of high memory.

If you have a hard disk, a 448K RAM disk may not speed up your computer enough to make Supermem worthwhile. For the rest of us, however, the added efficiency and processing speed available with Supermem and RAMDrive makes this an extremely attractive package. ■

**Perfect Fit:
Model 1000
Multifunction Boards
by Dave Rowell**

★★★★★

TanPak runs on the Models 1000/1200. Hard Drive Specialist, 16208 Hickory Knoll, Houston, TX 77059, 713-480-6000. \$329 without memory, \$429 with 512K.

Easy to install: ★★★★★☆
Bug free: ★★★★★★
Good docs: ★★★★★★
Does the job: ★★★★★★

★★★★★

MFB-1000 runs on the Models 1000/1200. PBJ Inc., P.O. Box 813, 911 Columbia Ave., North Bergen, NJ 07047, 201-861-0126. \$299.95 with 128K, \$339.95 with 512K.

Easy to install: ★★★★★★
Bug free: ★★★★★☆
Good docs: ★★★★★☆
Does the job: ★★★★★★

★★★★★

MM-4N1 runs on the Tandy 1000. Micro Mainframe, 11285-E Sunrise Gold Circle, Rancho Cordova, CA 95670, 916-635-3997. \$259.95 without memory, \$515.95 with 512K.

Easy to install: ★★★★★★
Bug free: ★★★★★★
Good docs: ★★★★★☆
Does the job: ★★★★★★

Unrated (see text).

Memory Plus runs on the Tandy 1000. Tandy/Radio Shack, One Tandy Plaza, Fort Worth, TX 76102. Catalog number

25-1011. \$319.95 with 256K, \$519.90 with 512K.

Although the Tandy 1000 boasts near-100 percent IBM PC software compatibility, it imposes stringent hardware requirements for expansion boards (none over 10.5 inches and an installed direct memory access [DMA] chip). This rules out many boards designed for the IBM PC. While Tandy and other manufacturers produce short single-function and limited multifunction boards, you can fill the 1000's three open slots quickly when you're putting together a power machine.

Fortunately, several board makers compensate for this with capable and inexpensive multifunction boards for the 1000. I've had the pleasure of comparing four such boards (two of which, the TanPak and MFB-1000, you can use in the 1200).

All the boards install easily and perform capably. Those with RS-232 ports communicated properly at 300 and 1,200 baud. They all provide DMA capability for faster processing and increased compatibility with some software protection schemes. All had adequate documentation and warranty coverage (parts and labor). You'll have to base your purchasing decision on features and price (see the Table), and on what you already have in your 1000.

TanPak

Hard Drive Specialist's TanPak uses all its allotted space to provide up to 512K of random-access memory (RAM), a clock/calendar, and a serial port. It just squeaks into a 1000 expansion slot. The software that comes with the board (a

well-designed RAM disk and print spooler) distinguishes it from the rest of the bunch. And the TanPak's clear set of instructions made installation painless.

The TanPak board takes up the maximum length the 1000 allows, and a fraction more than the available height. I had to lightly push the 1000's case down to slide the board the last half-inch over the back panel, and again to fit the left front case screw into its hole. But I don't foresee any problems arising from the shoehorn fit.

Sandwiching the DMA chip onto the side of the main board has its advantages. You can buy a version without DMA (\$80 cheaper) so that it fits in an IBM or compatible, or use the TanPak as a second memory board for the 1000. The TanPak has a support bracket that will fit in either machine. Other plug-in sideboards from Hard Drive Specialist will be available that provide a second serial or parallel port (both with DMA).

The only drawback to the TanPak design is that you must remove the DMA board to change the clock battery (approximately once a year) or to change the configuration of the serial port from COM1 to COM2.

The serial port connector on the board's back plate is female, following Tandy tradition. If you have IBM RS-232 cables lying around, you'll need a male-male "gender-bender" to use them. The board comes with the serial port configured as COM1, but you can reconfigure it as COM2 with jumpers. The instructions provide technical information and pin-outs for the RS-232.

The TanPak comes properly config-

Continued on p. 121

Product/ Manufacturer	RAM (K) (min/max)	DMA configurable	Serial port	Clock/ calendar	Software bundled	Warranty (p&l)*	Price (min. RAM)	Price (max. RAM)
TanPak Hard Drive Specialist	0/512	Yes	Yes (COM1 or 2)	Yes w/driver	RAM disk print spooler	1 year	\$329	\$429 #
MFB-1000 PBJ Inc.	128/512	Yes	Yes 2 (COM1 or 2)	Yes w/driver	No	90 days	\$299.95	\$359.95
4N1 Micro Mainframe	0/512	No	Yes (COM1 or 2)	Clock/mouse option (\$99.95) + + †	No	1 year	\$259.95	\$515.95
Memory PLUS Tandy Corp.	256/512	No	Option (\$99.95) + +	Clock/mouse option (\$99.95) + +	No	90 days	\$319.95	\$519.90

+ + Not available at time of review.

* Parts and labor.

† Uses Radio Shack or Apple mouse.

Varies with chip prices.

Table. Model 1000 multifunction board features compared.



MONTEZUMA MICRO

PRESENTS

MONTE'S TOOLKIT

\$49

WOW!
ANOTHER
NEW
PRODUCT
FROM
MONTE

REQUIRES: Montezuma Micro CP/M® 2.2 version 2.21+

Monte's Toolkit is a collection of utilities that will prove useful to every owner of Montezuma Micro CP/M (you all are owners, aren't you?). It's a disk full of programs that perform functions that are difficult, cumbersome or expensive to do any other way. Monte has tried, in his own way, to briefly explain each function for you below. Read on and be saved.

DOUBLECROSS™ allows unlimited file transfers between CP/M®, IBM-DOS and Model 3/4 LDOS™ /TRSDOS™ with unsurpassed ease and speed. In fact, you can move just about anything from any disk to any other disk but you might have to make changes for program operation. Lotus 123™ just flat won't run on your Model 3 and I doubt that you could ever modify Scripsit™ enough to run on the IBM. Simple menu guide you through the operation with minimal keystrokes. Just tag the files you want in the directory display and go. You won't get doublecrossed with **DBLCROSS**.

FREEFORM™ formats and backs up Model 3/4 LDOS/TRSDOS and IBM MS & PC-DOS (versions 1.x, 2.x and 3.x), both single side and double side plus there is a special "clone" copy when you just don't know or care what you have. Just insert a disk and copy away. All you have to know about the disk is how to get it into the drive. The Analysis feature lets you look at and print the actual structure of a disk - even the ones with "funny" formats.

WSPR lets you print to almost any printer using almost any control code. It's nearly magic and does a whole lot more than I can talk about here including letting you print *anything* your printer can print.

FILEFIX™ gives you the ability to "fix" your "files" by adding line-feeds when your files are going from CP/M or IBM-DOS to LDOS/TRSDOS or take them away if you are transferring the other way. You can remove the control codes from a WordStar™ document thereby converting it to a non-document file. The fix will also fix up Scripsit files so they can be used by CP/M and IBM-DOS based wordprocessors (you know - the real ones). All this is accomplished with the use of simple menus and boy, it is fast.

SYS2M requires 128K and our CP/M. The CCP and the BDOS are moved to drive M and the BIOS is modified to allow a Warm Boot from Drive M. So what you say. Well, you still have to have a disk in drive A but it no longer has to have the CP/M system resident. It can be anything. This little jewel copies frequently used programs to drive M and searches there first for all program requests resulting in much faster program loading. Slick isn't it?

AUTO is a little goodie that lets you issue multiple commands from the command line. Eliminates the *pain* of Submit. As in all the other parts of **MONTE'S TOOLBOX**, complete and comprehensive instructions are included and it's available right now.



MONTEZUMA MICRO

PRESENTS

MONTE'S WINDOW™

NOTEPAD



WINDOWS ON
YOUR MODEL 4!



CALENDAR



TAKES NO
USER RAM!



CALCULATOR



Pop Up Menus!

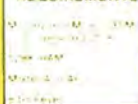
\$49

Easy to Use!

INDEX
CARD FILE



REQUIREMENTS



A touch of the keyboard opens a window in your screen for - a Note Pad, an Appointment Calendar, a Calculator, even a Mini Data Base. All yours for just \$49! Need RAM? Monte's Christmas gift to you - 64K and the window, both for \$99!

Once Upon A Time,

Monte Zuma, our Founder, President and King, has always had trouble keeping his desk organized. The Sidekick™ from Borland International would solve the problem, but alas, it was not available for CP/M™. So Monte asked his favorite nephew, the legendary LaMont E Zuma (distant cousin to Rondo Talbot, a direct descendant of Monte Zuma himself) to work on the problem as best he could during recess at the home. LaMont, a true legend in his own time, really outdid himself this time. A touch of both shift keys halts your application program in its tracks and up pops **Monte's Window™** ready to use. What could be simpler? Put an end to the fumbling and pawing around the pile of papers on your desk. You will find **Monte's Window™** indispensable. When you are finished, break back to your application program and it resumes without error. **Monte's Window™** is truly a breakthrough. See for yourself - Look through **Monte's Window™** on your Model 4. How did you ever get along without it? See the page opposite for order information. **Monte's Window™** is available right now.



MONTEZUMA MICRO

PRESENTS

MONTE'S BASIC

Your TRSDOS BASIC (01.01.00) will work the same, for the most part, under CP/M as it does under TRSDOS. However, for the most part isn't good enough. But, with some changes provided by our **BASCON™** program, you can be 100% compatible with the standard BASIC used with CP/M. True, you lose some of the TRSDOS BASIC features while gaining new features such as FILES, NULL, RESET, etc. **BASCON** alters your TRSDOS BASIC, which was included with your Model 4 when you bought it, so that it will function under CP/M. You must have the unaltered original TRSDOS BASIC as above in order to convert with **BASCON**. The program operation is fully automatic and quick. The resulting BASIC runs any CP/M 2.2 BASIC program that previously required MBASIC™. Programs written for TRSDOS BASIC may require modification to run correctly under the converted BASIC. Fully compatible with MBASIC. We even provide for additional documentation that is keyed by page number to your TRSDOS BASIC manual. **MONTE'S BASIC** is available right now.

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Double-Side/80tk drive support	YES	NO
Format, read/write other CP/M formats	YES	NO
Communication program included	YES	NO
Share HD with TRSDOS/LDOS	YES	NO
Assign multiple drives to HD	YES	NO
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Popular terminal emulation	YES	NO
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"WE KEEP YOU RUNNING"



On the Upgrade

by Tsun Tam

Seven modifications that transform your Model 4P from timid transportable to mondo machine.

Your 4P's "transportable" moniker shouldn't limit your vision. With the modifications I'll describe below, you can give your 4P a power boost that makes it a worthy competitor to its full-blown desktop brothers, the Models 4 and 4D.

I'll show you how to add two double-sided, 40-track internal drives and two double-sided, 40- or 80-track external drives for a total of 2.16 megabytes of disk storage, install gold printer cable plugs, add Radio Shack's high-resolution board, increase RAM to 128K, screen the ventilation grill, incorporate electrical surge protection, and customize your Model 4 DOSes (see Table 1 for a complete parts list).

One preliminary note, however: Tandy doesn't sanction these modifications, so you'll void your warranty by making them.

Two 4Ps

Tandy made two versions of the 4P: The original has a black-and-white monitor, and the later version, which uses gate arrays, has a green screen. Aside from basic circuitry changes, there isn't much functional difference between the two; I'll note any relevant differences.

Drive Time

You can install two internal 40-track dual-headed drives to give your 4P a total internal storage capacity of 720K. In addition, you can add and control two external, double-sided drives. I'll describe how to do both.

First, remove the 4P's snap-on cover and leave the keyboard inside the computer. Next, put the 4P on a soft surface—you can use several layers of bathroom towels—with the hidden base of the keyboard toward you.

The case is attached to the chassis by six Phillips-head screws. The four beige-colored ones are adjacent to the cover latches; remove them and put them in a safe place. The last two are chrome-plated machine screws hidden under the carrying handle. Tip the 4P up so that the screen

rests on the towels. Raise the carrying handle with one hand and remove the screws with the other.

Now gently remove the case by pulling straight up—it should dislodge easily. Be careful, the keyboard may suddenly fall onto your workbench. Should it remain standing with its back to you, lay it flat on the workbench and protect the keys with a towel.

You need to remove the 4P's two original Tandon disk drives from the side of the computer as a single unit. Nine screws hold the drives in place: Four are on top; two are on the base deep inside, below the assembly; one is on the outer side; and finally, two chrome-plated screws attach the assembly to the front computer bezel. Be sure to keep track of the two screws at the base of the drives; they tend to fall into the computer. If this happens, remember to take them out when you remove the main printed circuit (PC) board.

Remove the two power connectors and the drive cable from the two disk drives, and save the drive cable for later. Gently lift out the two drives. Remove the six machine screws that attach the drives to the subchassis, and remove the drives. If you have either TEAC or Panasonic drives, make sure you orient them with the latch levers down. You should install the Mitsubishi drives with the light-emitting diode (LED) down.

You can measure the exact hole locations for the new drives by inserting the drives in the subchassis. The front edge of the drives must extend from the top front of the subchassis by $1\frac{1}{16}$ inches—too much and the drives won't fit your computer, too little and you'll have a gap between the drives and the front computer bezel. The best thing to do is drill out the

System Requirements

Model 4P

holes to a slightly larger size and use washers on the screw heads. Then adjust the position of the drives before tightening the screws. This way, you can position the drives without a lot of fancy measuring and drilling.

Before you install the drives, you need to set the DIP shunts or jumpers according to Fig. 1. Make sure you have the drive-select settings correct. Use DS0 for the drive closest to the monitor and DS1 for the other. In addition, the drives should load their heads when the computer sends the "motor on" signal.

You should also short out the HM shunt and remove the terminating resistor pack, an integrated circuit-like package usually blue and socketed.

With the drives properly programmed, install them inside the subchassis using your six screws and put the assembly aside.

Power Cables and Drive Connectors

If you use TEAC or Panasonic double-sided drives internally, the 4P's original power cables will work fine. But if you plan to use Mitsubishi drives you must extend the power cable by about 3 inches. For this, you need three 3-inch lengths of wire, a soldering iron and solder, heat-shrink tubing, and a combination wire cutter and stripper.

To access the computer's power supply, which is screwed to the top of the main chassis, remove the six screws that hold the top plate to the chassis and then remove the four top screws that attach the back plate. Two connectors attach to the power supply. Remove them by carefully prying them off with your small flat-bladed screwdriver.

The drive power cable feeds to the drives through a small rubber grommet-

lined opening. Locate this cable and cut it at a point where you can splice in the three lengths of wire. Use the heat-shrink tubing to insulate the splicing joints. After making the splices, don't replace the power supply yet, as you'll make an ancillary modification to it later.

To make the two new drive controller cables, you can re-use the connectors on the original internal drive cable—a small X-Acto knife is handy here. Make the cables using the new 34-pin edge connectors and parts from a disk drive extender cable. The modification requires the use of the "reversed" connectors, with the odd- and even-numbered pins reversed from those of their counterparts. Clamp the male connector onto the internal drive cable and the female onto the external drive cable.

Cut a piece of 34-conductor cable 20 inches long, squaring off the ends. Using a vise or hammer, make the internal drive cable according to the dimensions in Fig. 2. Treat the male connector from the extender cable carefully, and attach a female connector to it to prevent damage when you crimp on the ribbon cable. Use a vise to squeeze the connector to the cable, or a hammer to gently tap the cable onto the connector (see Fig. 2).

After you make the internal cable, prepare the cable for the two external drives, again using the dimensions in Fig. 2. Note that the original internal drive cable may have reusable connectors. You can use these connectors successfully if you dismantle and reassemble them correctly.

If you reuse the old connectors, note that pins are missing from each of the even-numbered rows. This is Radio Shack's way of electrically selecting the two internal disk drives, as both original-equipment manufacturer drives are configured identically. All odd-numbered pins are grounded.

When you install these old connectors on your new external drive cable, position them so that pin 34 becomes the "new" pin 1 and pin 33 becomes pin 2. The odd row must mate with the even numbers on the disk drive PC board, as you need full access to lines 6, 14, and 32 of the drives. The first two select drives 3 and 2 respectively, and line 32 selects a corresponding side.

Modifying the Main Printed Circuit Board

With the two cables done, your double-sided drive conversion is nearly complete. Before the final reassembly, you need to modify the main PC board for controlling the two external drives.

Remove the back chassis plate to access the main PC board. If you have an internal modem connected, remove the modem cable from the computer's RS-232 socket. Remove the back plate by undoing all the visible black screws and the four screws holding the U-shaped channel or bracket that supports the computer handle. Two of these screws are in the the disk drive bay near the ventilation fan (see Photo 1). Lift the back plate off and set it aside.

The main PC board is encased inside a pan assembly screwed together with eight screws, four on each side (see Photos 2 and 3). Remove the screws and put them in a safe place. Gently pry the two halves of the pan assembly apart (see Photo 4). Rest the bottom pan (the part with the PC board) on the keyboard. Four connectors supply the PC board with power and communication data; gently remove them from the board. With the connectors separated (they are polarized for easy reassembly), pull the lower pan assembly from the rest of the computer. Make certain that you are grounded with the proper grounding straps, as you'll be handling CMOS devices.

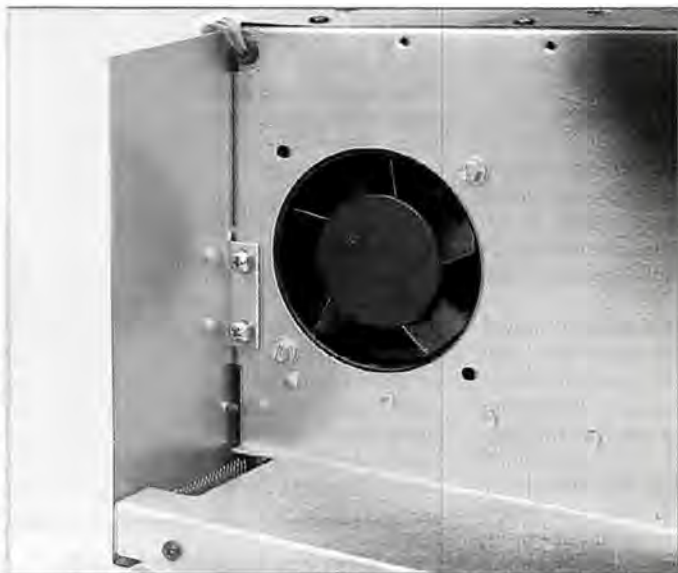


Photo 1. Two of the screws that hold the computer's back plate are located in the disk drive bay near the ventilation fan.

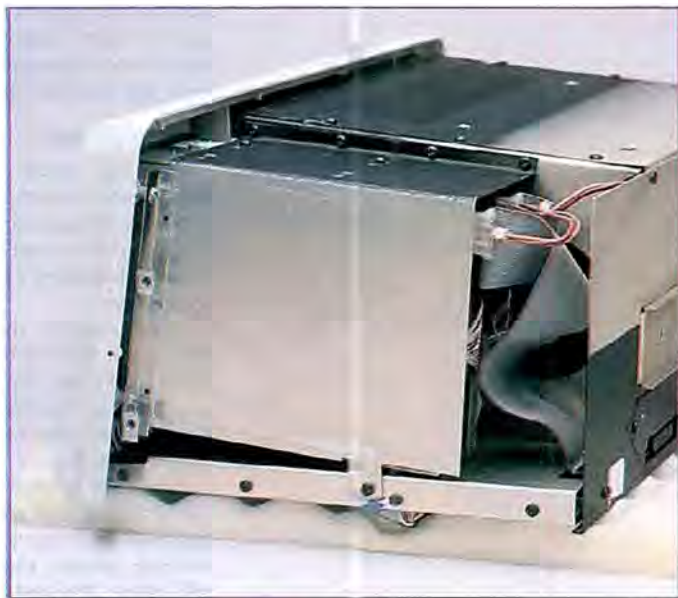


Photo 2. The main PC board is encased in a pan assembly held together with eight screws, four per side.

Remove the keyboard cable from the main PC board, then separate the PC board itself from the lower chassis by removing the supporting screws. Don't confuse these chrome-plated sheet metal screws with the machine screws.

Lift the PC board off, put it on a towel, and look for the correct integrated circuits (ICs). For the original Model 4P, first locate U75 (74LS02) (see Figs. 3 and 4). Sever the connections to pins 1, 2, and 3 by cutting these pins with your wire clipper. Make the cuts as close to the IC body as possible. Next, modify the new 74LS260 by following the diagram in Fig. 5. Bend all pins straight out except for pins 7 and 14 (the power pins). You may cut off pins 4, 6, 8, 9, 10, and 11, as you won't use them.

Locate U53 and piggyback the 74LS260 onto it (I'll refer to the top chip as U53A). You must align pin 1 of both chips. Solder pins 7 and 14 of U53A to U53. Follow the jumper diagram of Fig. 6 and solder your connections using wire-wrapping wire (refer to Table 2 for these connections). Check each connection as you make it. Note that the solid lines in both Figs. 6 and 7 are made on the component side of the PC board. Also note that pins 7 and 10 of U32 have two jumpers connected. The dotted lines are made on the solder side of the board; now make these connections.

If you have the gate array version of the 4P, you only need to add four jumper wires, as Radio Shack supplies all the parts for this conversion. See Figs. 7 and 8 for details. Of the two versions, this one is by far the neatest.

Your 4P is now hardware-ready for up to four disk drives. Reassemble the PC board to the lower chassis pan and reconnect the keyboard cable. Complete this operation by refitting the PC board assembly to the main chassis.

Good as Gold

If you want to install gold printer cable plugs, do so now before you reattach the main PC board to the subchassis pan (you can order gold adapters from E.A.P. Co., P.O. Box 14, Keller, TX 76248, 817-498-4242). After you make this installation, reattach the main PC board to the lower chassis pan with the chrome-plated sheet metal screws. Don't reassemble the chassis at this point if you want to install the Radio Shack high-resolution (hi-res) adapter.

Look Sharp

Locate J7 and look for two holes in the main PC board near U7. Your hi-res kit (Radio Shack catalog number 26-1126) includes two black plastic PC board retainers. Insert them into the main PC board (see Photo 5). If you have the gate array 4P, check to see that your U1 on the hi-res board is an 82S1531FL chip and *not* a 10L8PAL, which won't work here.

For the gate array version, modify the hi-res board by cutting the trace at U5, pin 7 and adding a jumper to U1, pin 1. For the original version, install the hi-res board into U7 by aligning pin 1 of the socket to pin 1 of the plug. Make sure you clip the board onto the two retainers to prevent it from loosening up.

To activate the hi-res board, remove the jumper on the main PC board labeled E4-E5 (both versions of the 4P use the same label for this jumper).

RAM Charge

You can upgrade RAM to 128K by adding one bank of eight 4164 dynamic random-access memory chips (150 nS or 200nS) in socket locations U153-U160 (see Photo 5). These chips are static-sensitive, so be sure to ground yourself. Insert the RAM chips and move the jumper at

E12-E13 to E11-12 (original version), or E2-E3 to E1-E2 (gate array version). Your machine now has 128K.

Venting Yourself

To prevent alien material from falling into the 4P's innards, you need a small piece of fiberglass screen door material, which you can get at most hardware stores. Cut this into two pieces, one 3 by 15 inches, the other 1 by 16 inches.

To glue the fiberglass inside the case, first lay out the screening material so that it covers the entire grill area. Using the hot-melt glue gun, deposit a 2- to 3-inch bead of glue on the outer edges of the screen. Let it sit for 30 seconds. Then, lay the silicone paper (silicone side down) on the glue bead and press with your fingers. This will spread the glue out and bond the screen to the ventilation opening.

To complete this operation, run the glue bead all around the grill. Cover the ventilation area below the monitor in a slightly different manner. Lay the 1- by 16-inch screen material in the area. Using the glue gun, drop small beads of glue all around the edges and let it harden.

Clear RTV silicone glue also works well for this modification although it requires a long cure time. Just lay down a thin film and press the screen into it.

Good MOVE

To relieve your 4P of the Glitch Syndrome, you need three General Electric or Panasonic metal oxide varistor (MOV) surge protectors (Radio Shack catalog number 276-568) or Sprague Transorbs, and four pieces of plastic insulation tubing one-half inch long (you can use the insulation from common 18-gauge zip cord).

Get the power supply you put aside earlier and remove the circuit board from the



Photo 3. The left side of the 4P, showing the screws holding the main PC board in the pan.

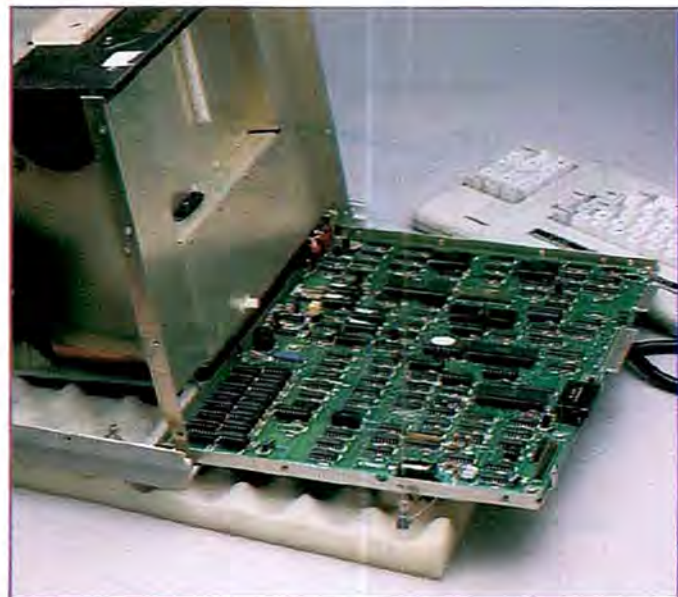


Photo 4. Gently pry the two halves of the pan assembly apart.

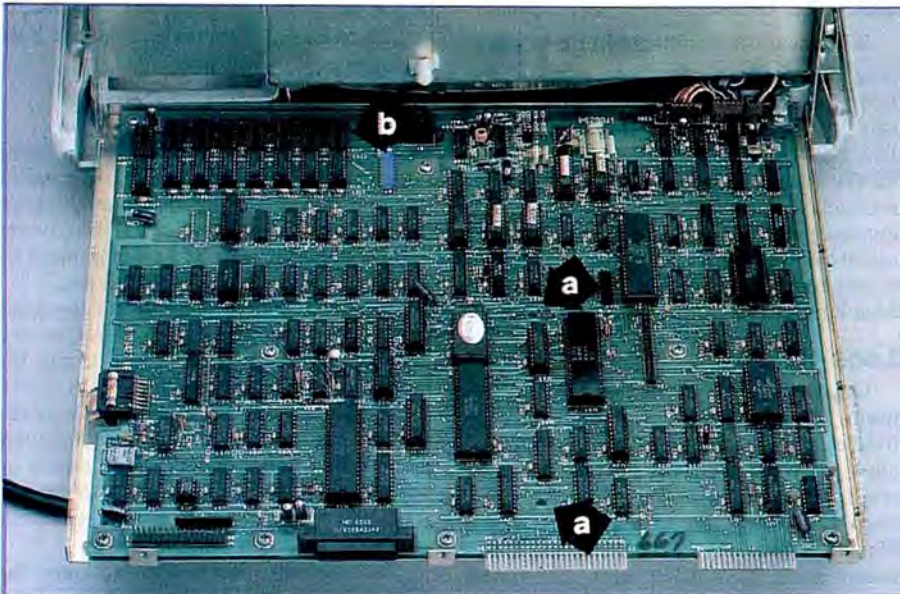


Photo 5. (a) Insert the two black plastic PC board retainers into the main PC board. (b) Add one bank of eight 4164 dynamic random-access memory chips in socket locations U153-U160.

**Mitsubishi Disk Drives
Radio Shack
Settings**

1U --- 15-C: DS0 and DS1
MM --- HM ---

**Panasonic
Radio Shack
HH---**

Figure 1. Set the DIP shunts or jumpers according to these specifications.

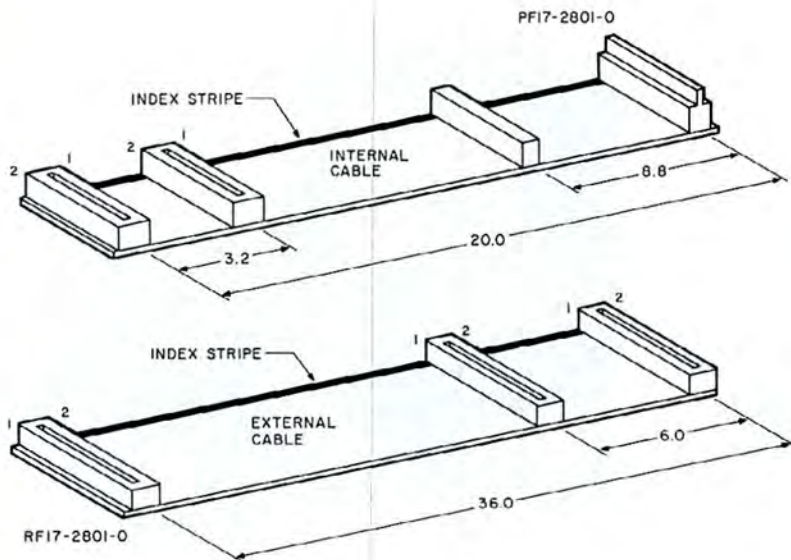
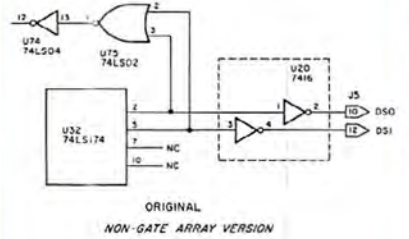
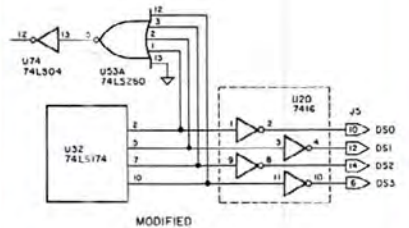


Figure 2. Dimensions for making the new internal and external cables.

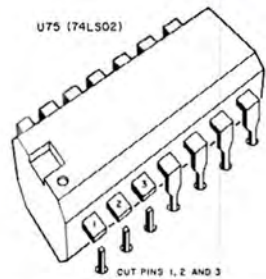


ORIGINAL
NON-GATE ARRAY VERSION



MODIFIED

Figure 3. Original 4P version showing the original and modified main PC board.



CUT PINS 1, 2 AND 3

Figure 4. Original 4P version. Make the cuts as close as possible to the IC body.

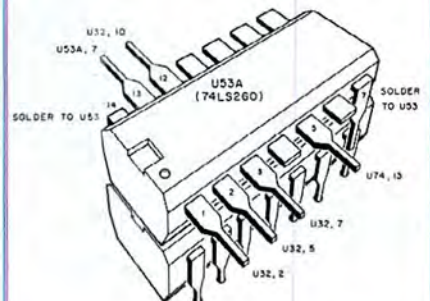


Figure 5. Original 4P version. Modifying the new 74LS260; soldering pins 7 and 14 of U53A to U53.

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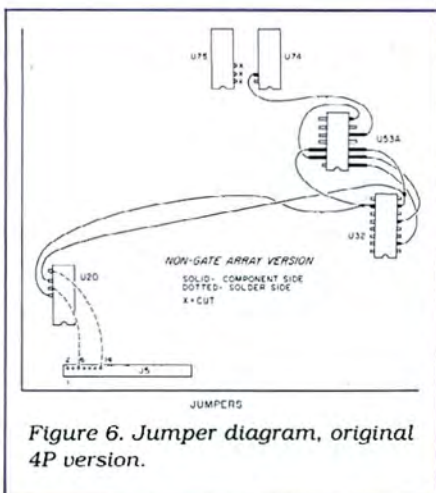


Figure 6. Jumper diagram, original 4P version.

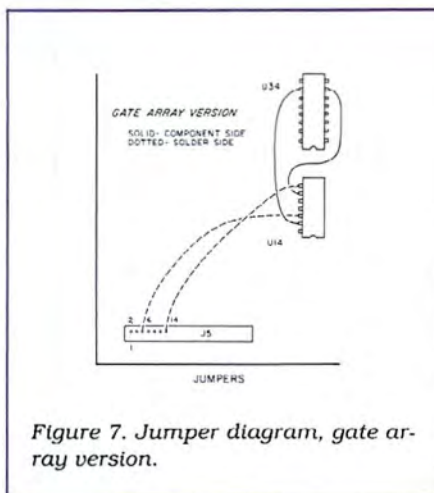


Figure 7. Jumper diagram, gate array version.

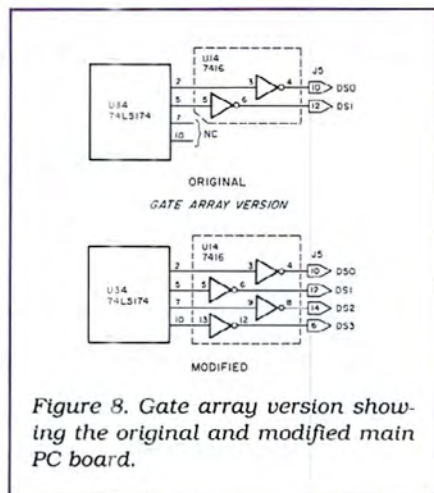


Figure 8. Gate array version showing the original and modified main PC board.

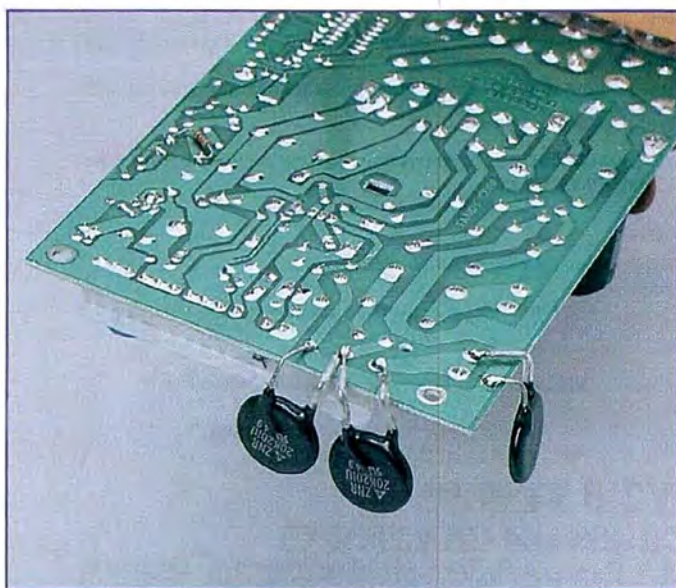


Photo 6. Solder the three MOVs to the power supply PC board.

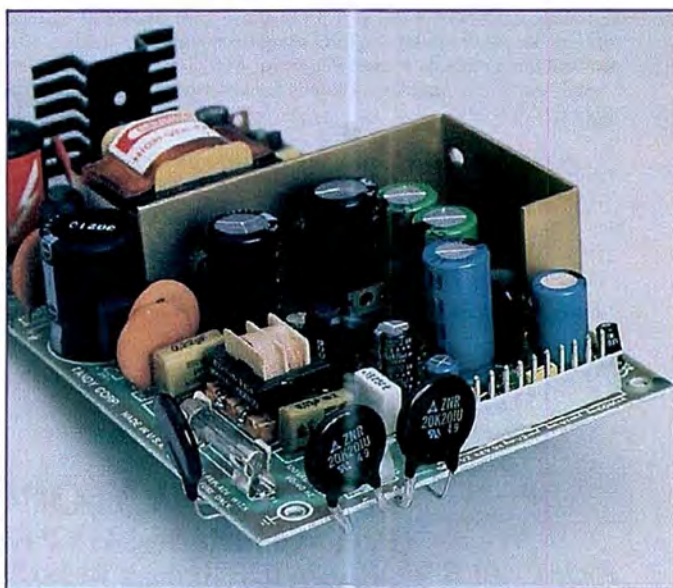


Photo 7. Bend the three MOVs to look like these, so the power supply board fits back into place.

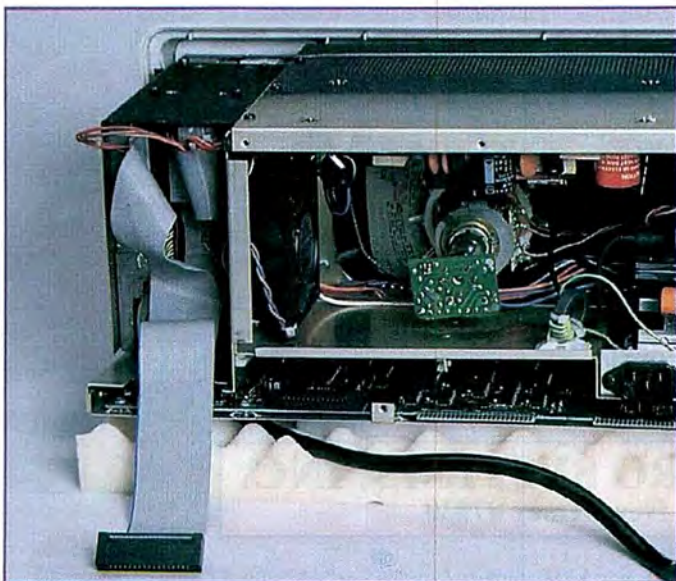


Photo 8. Reconnect the two power connectors to the two new disk drives and attach the internal drive cable.

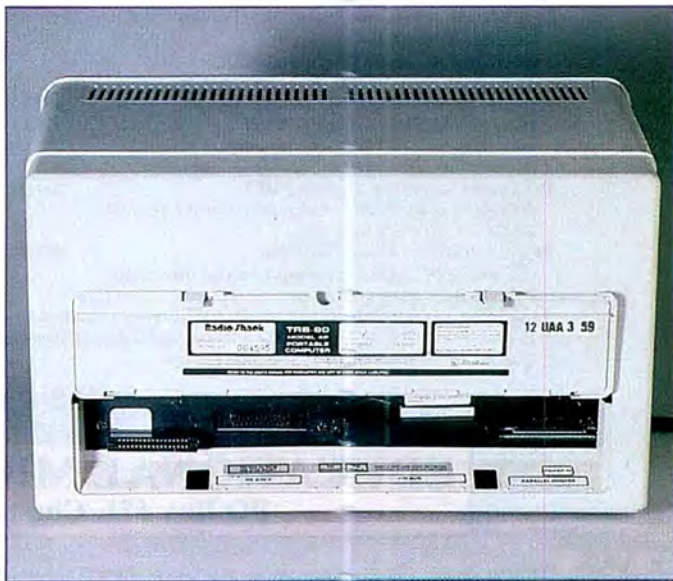


Photo 9. The modified rear of the 4P. Make sure the external drive cable is accessible for proper operation.

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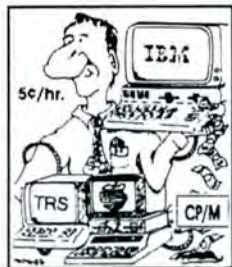
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sheet metal subchassis by undoing the four chrome machine screws. Lift off the power supply and prepare the solder side by referring to Fig. 9. Locate the corner of the power supply PC board where the ac power connector is soldered. On the solder side, scrape off the green solder protection layer at the designated areas in Fig. 9 using a small knife or single-edge razor blade. Tin the affected areas with a bit of solder.

Now slip the four pieces of plastic insulation tubing over the leads of the MOVs. Following Fig. 9 and Photo 6, solder the three MOVs to the power supply PC board. MOVs aren't polarized, so there's no need to orient them in any specific way. Once you do this, your 4P has common- and differential-mode glitch protection. Before replacing the PC board on the subchassis plate, bend the three MOVs so they look like those in Photo 7.

Reinstallations

You can now reattach the power supply section to the main computer chassis, making sure to use the correct screws. Don't install the chassis back plate yet, as you still have more to do.

You can reinstall the disk drives now. However, if you have Mitsubishi drives, you'll have to alter the computer's front bezel (see Fig. 10). Carefully mark the location and size of the cut-out area. Make the two horizontal cuts first. As this may take some effort, try using a hacksaw blade without its frame. Next, use your utility knife to cut and remove the plastic material between the two horizontal cuts. Line the area with paper to prevent plastic waste chips and filings from getting inside the computer.

If you're using TEAC drives, also see Fig. 10. Some Model 4Ps require that you

trim and alter the front bezel around drive 1. Mark off the center of the alteration with your X-Acto knife and, with a round file, remove enough plastic for clearance for the door latch of drive 1. After cutting and filing, you may want to use a small amount of black model makers' paint to color in the exposed beige area.

Now you can reinstall the drive subassembly onto the main computer chassis. To facilitate attaching the two screws to the bottom of the subassembly, use a little adhesive tape to hold the screw to the screwdriver. Reconnect the two power connectors to the two new disk drives and attach the internal drive cable, using Photo 8 as a guide. A tab on the chassis pan encases the main PC board. Make sure you properly route the cable behind this tab; you may have to bend it.

Now reattach the chassis back plate. Run a bead of hot-melt glue on the back of

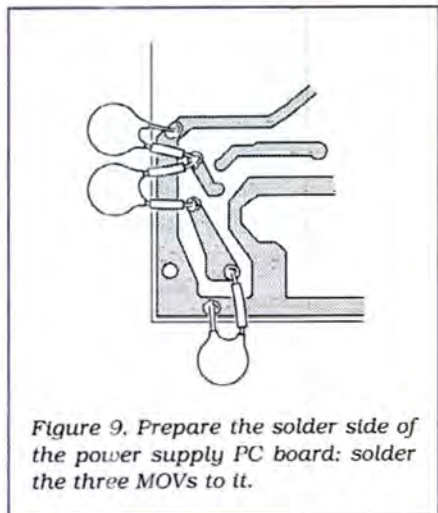


Figure 9. Prepare the solder side of the power supply PC board: solder the three MOVs to it.

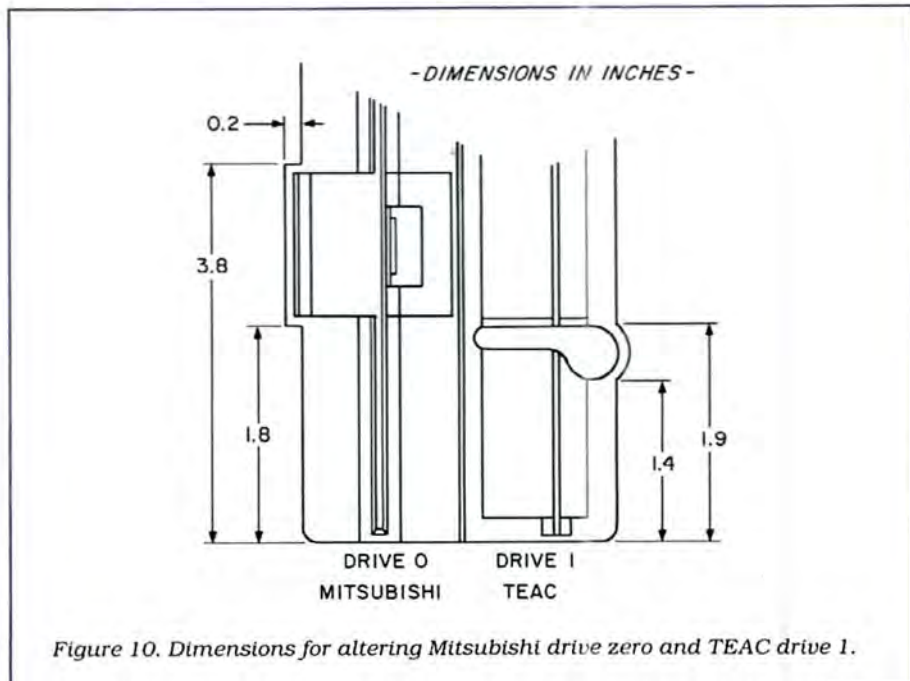


Figure 10. Dimensions for altering Mitsubishi drive zero and TEAC drive 1.

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Quantity	Description
2	Double-sided disk drives
6	#4-40 English screws or 6-32 or 3mm metric screws
4	standard 34-pin female drive connectors, and one pair of reversed male and female 34-pin connectors
56 inches	34-conductor ribbon cable
1	74LS260 (original 4Ps only)
3	3-inch lengths of electrical wire (for Mitsubishi drives only)
8	4164 dynamic RAM chips
3	GE or Panasonic MOVs (Radio Shack part number 276-568) or Sprague Transorbs
#2 Phillips screwdriver with at least a four-inch blade	Miniature wire clippers
Portable electric drill with a 3/16-inch bit (or a Whitney-type sheet metal punch)	Wire-wrapping wire
Small flat-bladed screwdriver or IC remover	Fiberglass screening
Wire stripper	Utility knife
Heat-shrink tubing	Small piece of silicone-treated paper (discarded floppy disk label sheets work well)
Soldering iron and solder	Hot-melt glue gun or RTV silicone glue
Small X-Acto knife or single-edge razor blade	Hacksaw blade
Machine-shop bench vise	Round file
	Hammer

Table 1. Parts list.

Original Version

1. Cut pins 1, 2, and 3 on U75 (74LS02)
2. Prepare the pins on your new 74LS260 (U53A)
3. Piggyback the 74LS260 on top of U53.
4. Solder pins 7 and 14 of U53A to U53

Solder these jumpers

	From	To	Length of Jumper
5.	U32, pin 2	U53A, pin 1	1-1/4"
6.	U32, pin 5	U53A, pin 2	1-1/2"
7.	U32, pin 7	U53A, pin 3	1-1/2"
8.	U32, pin 10	U53A, pin 12	1-1/2"
9.	U53A, pin 7	U53A, pin 13	1"
10.	U74, pin 13	U53A, pin 5	1-1/2"
11.	U20, pin 8	J5, pin 14 (DS2)	1-1/2"***
12.	U20, pin 10	J5, pin 6 (DS3)	1-1/2"***
13.	U32, pin 7	U20, pin 9	6"
14.	U32, pin 10	U20, pin 11	6"

** denotes that these connections are made on the solder side of the main PCB.
Unused gates used in this conversion: U20, pins 9 and 8; U20, pins 11 and 10.

Gate Array Version

	From	To	Length of Jumper
1.	U14, pin 9	U34, pin 7	2-1/2"
2.	U14, pin 13	U34, pin 10	2-1/2"
3.	U14, pin 8	J5, pin 14 (DS2)	2-1/2"***
4.	U14, pin 12	J5, pin 6 (DS3)	2-1/2"***

** denotes that these connections are made on the solder side of the main PCB.
Unused gates used in this conversion: U14, pins 9 and 8; U14, pins 11 and 10.

Table 2. Connections for the original and gate array Model 4Ps.

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the male connector of the internal drive cable and attach this connector to the chassis back plate. Reattach the handle support bracket using the four long chrome machine screws.

Before you reinstall the case, position the keyboard so that the keys are up against the chassis where the main PC board is located. Carefully lower the outer case over the computer and position it properly so you can fasten it with the six screws. Photo 9 shows the modified rear of the 4P.

Use the external drive cable you made earlier to connect to the external drive adapter at the rear of the modified 4P. Make sure this cable hangs down for proper operation (see Photo 9). Mate the two drive connectors on the external cable to the drives' PC board edge by observing proper pin orientation. Pin 1 on the connector mates with pin 1 on the PC board.

Software

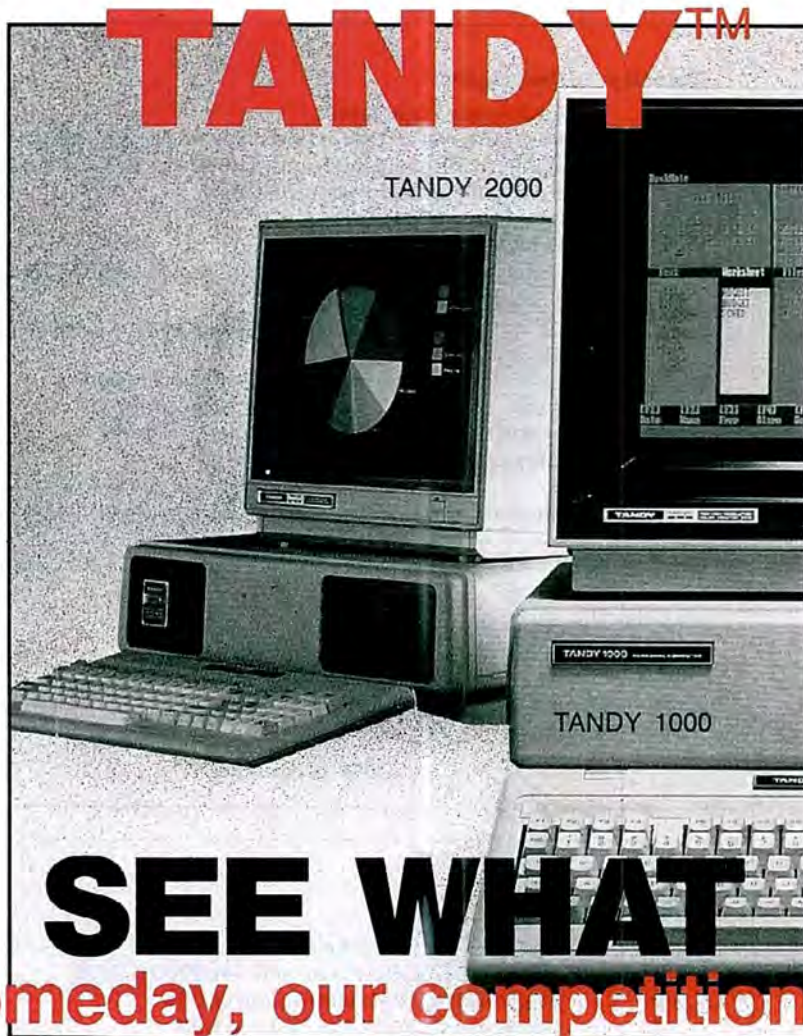
You now have a Model 4Plus! Before the internal double-sided drives spring to life, however, you need to modify and patch your operating system. The Radio Shack Model 4 series has two very capable DOSes—Tandy's own TRSDOS 6.2 and Micro Systems Software's DOSPLUS IV. Each comes as a single-sided master disk. The following procedures let you customize each of these DOSes so that they access both sides of a disk and up to four drives. If you're using TEAC drives, the labels on the disk must face away from the monitor screen. The labels must face the screen on all other drives.

For TRSDOS 6.2, you need a copy of the original version of the DOS and a blank disk. Insert the copy in drive zero and the blank in drive 1. Invoke the Format command by typing in `FORMAT :1 (SIDES = 2)`. Answer the format prompts accordingly and use `DOS62X2` as the new disk name. This alerts you that this version of the DOS is double-sided. After you format the disk, check the drive-1 directory to see all those added K's.

Transfer the system and all related files from the master copy to your disk formatted for two sides by typing in `BACKUP $:0 :1 (SYS, INV)`. This takes time, as TRSDOS needs to copy by files rather than execute an exact-image copy. With this done, put away your single-sided TRSDOS, put the new disk in drive zero, and boot up. Now check the directory to see the amount of free space available. Check it again with the `DOS Free` command. Your TRSDOS is now usable, but to make it format automatically in double-sided fashion and acknowledge the two external drives, apply the following patches (otherwise TRSDOS treats the drives as illegal):

```
PATCH FORMAT/CMD.UTILITY
(D09.5B = 02:F09.5B = 00)
```

Even though you patch the Format util-



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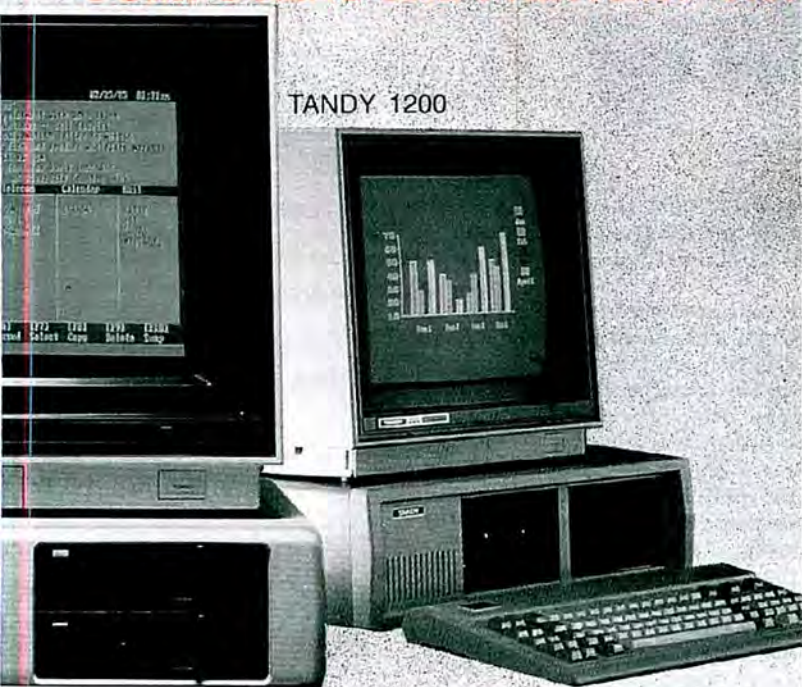
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ity, you can still format single-sided disks by specifying the sides parameter as 1.

The patch below makes your DOS access the two external drives. At TRSDOS Ready, type in:

```
PATCH BOOT/SYS.LSIDOS:0  
(DO2,84 = C3:FO2,84 = C9) PATCH BOOT/  
SYS.LSIDOS:0 (DO2,8E = C3:FO2,8E = C9)
```

After you apply the two patches, reboot the system to test the accessibility of the two external disk drives. Notice that drives 2 and 3 are no longer illegal. When you're satisfied that the DOS behaves properly, label this disk as your master double-sided TRSDOS disk and write-protect it. Use it to make working copies and store your master in a safe place.

For the DOSPLUS IV alteration, you need a copy of your master DOSPLUS IV disk and a blank. Put the blank in drive 1 and the copy of DOSPLUS in drive zero. Format the blank by typing in `FORMAT :1`. Answer all prompts accordingly and use `DOS + X2` as the new disk name. Make sure you specify two sides when prompted. After you format the disk, transfer the operating system over to it by `SYSGEN` it. Type in `SYSGEN :1`.

Finish everything off by copying all the remaining resident files. Type in:

```
COPY */*:0 :1  
(INVIS.ECHO.SPW = 'PASSWORD')
```

DOSPLUS already recognizes the two external drives. All you need to do is label this disk as your new DOSPLUS master and write-protect it. Use it to make working copies and safely store your original master. ■

Tsun Tam is director of information systems for a national commercial real estate company. You can write to him at P.O. Box 655, Closter, NJ 07624.



Speed Writing

by Joe Lindsey

If you own an Epson MX-series printer, you're wasting time. That's because your Epson prints at a fraction of its potential. Imagine a 40 percent increase in printing speed—that's what you'll get with this modification. By replacing your printer's 6-megahertz (MHz) crystals with ones rated at 10 MHz, you can print out both text and graphics faster. And you can make this simple modification for about \$6 and a half hour of your time.

Here's how the modification works: The Epson's 6-MHz crystals govern the printer's master clock. When you change the crystals, you change the clock frequency. The faster the system clock, the more instructions-per-second the printer's central processing unit (CPU) executes. And when the CPU goes faster, the Epson goes faster.

Printer Fix

You first need to buy two 10-MHz crystals from an electronics supply house. You also need a Phillips screwdriver, some masking tape, and a soldering iron.

Disconnect the Epson's external cable and power cord, put your printer on a table or other level surface, and you're ready to begin.

Pull the manual paper feed knob off the right-hand side of the printer and remove the smoked plastic cover: Flip it up to a vertical position and lift it out, left side first.

On the MX-100, reach inside the right side of the printer (by the control buttons) and unplug the cable to the buttons. This will make it easier to remove the case. Look along the front of the printer; you'll see three screws where the base of the gray cover was, and one screw in each of the back corners. Remove all five screws and lift off the case.

Turn the printer upside down, making sure you don't damage anything that sticks out of the top, and unscrew the four Phillips screws at each corner of the bottom of the case. Cover the holes with masking tape to keep the screws from falling out.

Turn the printer right side up and remove the top cover by lifting up on the left side and sliding the cover off the paper feed shaft that sticks out the right side.

You'll see some tied wires running up to the printer's control panel on the right side of the machine (see Photo 1). Unplug the connector in the top cover at the operator panel and the whole cover should come free. Set it aside for now.

Turn the printer around so the back

faces you. I'll refer to the right and left sides as you view the printer from the rear: I'll use "front" and "rear" in their true senses.

Look carefully at your printer from the rear to get acquainted with its components. The power supply appears on your left. A large control circuit board lies at the bottom of the machine behind the paper feed mechanism. A smaller board, called the driver circuit board, sits on the right side and on top of the control board.

Remove the driver board from the control board by removing the two Phillips screws along the right side of the driver board (see Photo 2). The left side of the driver board plugs into a couple of sockets (CN4 and CN5) on the control board. Carefully work the pins out of the sockets underneath, making sure you don't bend them. You may want to remove the big, blue male plug (CN6) on the right side of the driver board. I left mine plugged in and let the whole board dangle by the attached wiring. Remove the driver board by grasping it and working it loose while pulling straight up.

A single ground wire connector (FG) attaches to the rear of the control board, just to the left of the external printer connector (CN1). Slip it off the pin onto which it plugs. You need to remove two power supply connectors (CN2 and CN6), both of which are on the left rear corner of the control board, near the largest of the two capacitors mounted there (C1) (see Photo 3).

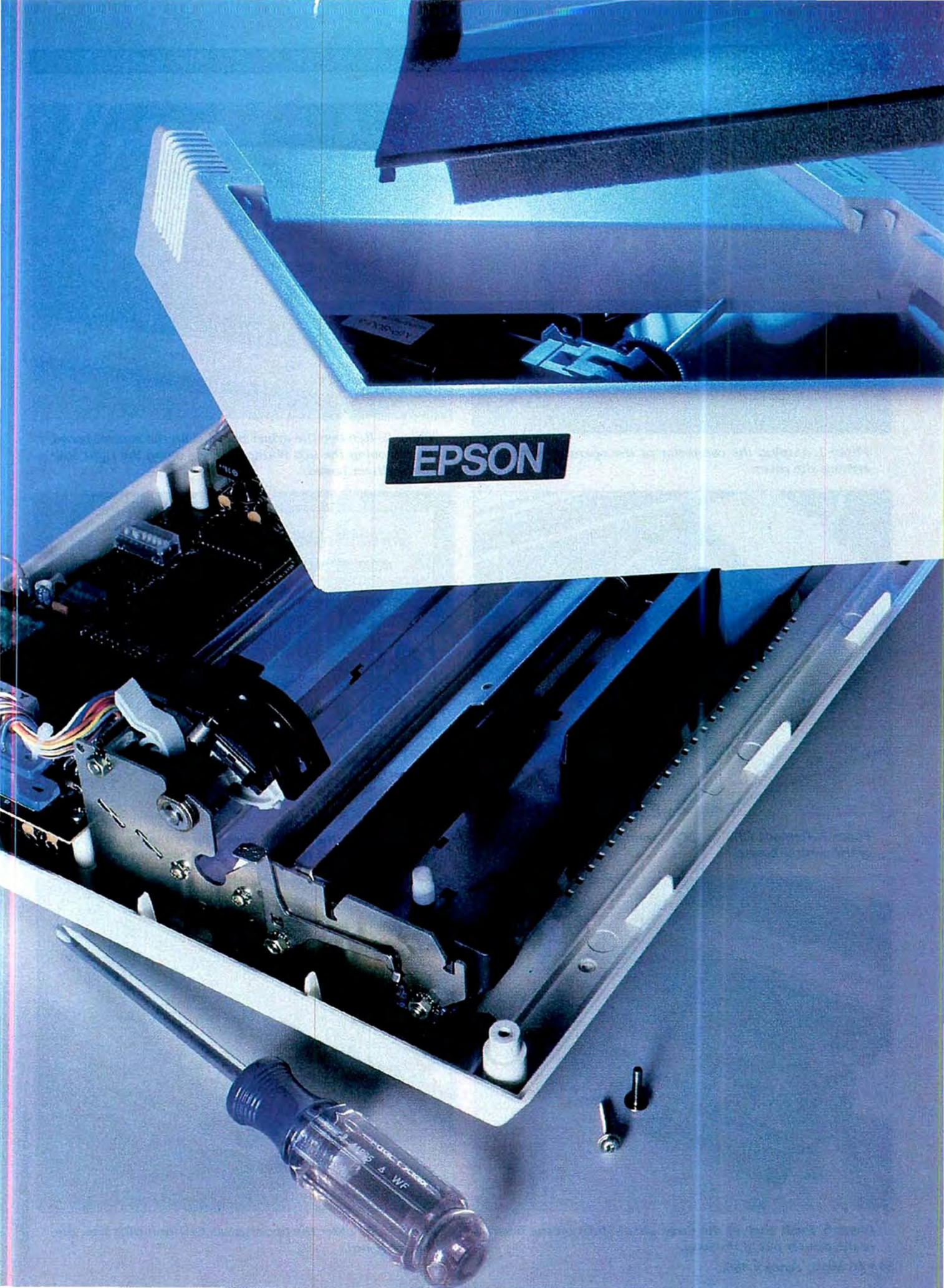
To free the control board, you have to remove three Phillips screws. One is in the center of the printer just behind the paper feed assembly, between the integrated circuits labeled 2C and 3C (midway between the two white standoff posts protruding up through the control board from the bottom). The other two screws sit at the left side of the board in front of the power transformer (see Photo 4).

The only things holding the control board in place now are three plastic tabs molded into the base, two along the rear of the board, the third on the right side. Push each plastic tab out of the way enough to clear the board, then lift the corner of the board out from under the tab (see Photo 5).

A simple, inexpensive modification to Epson MX-series printers that increases printing speed by up to 40 percent.

System Requirements

Epson MX-series printer



EPSON

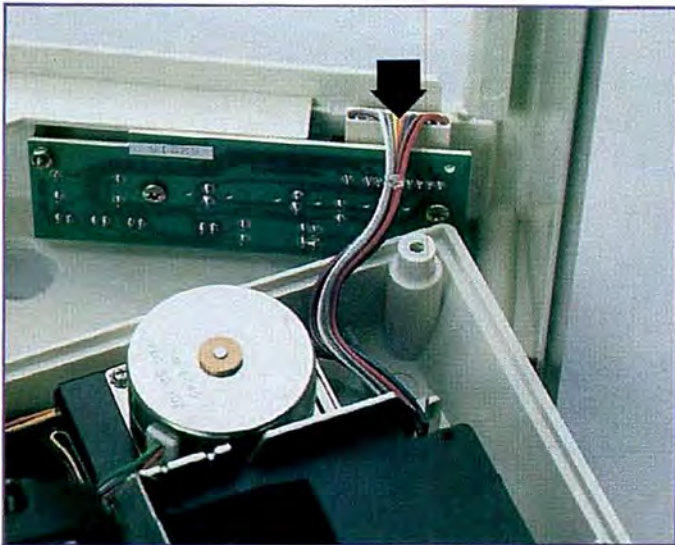


Photo 1. Unplug the connector at the operator panel to remove the cover.

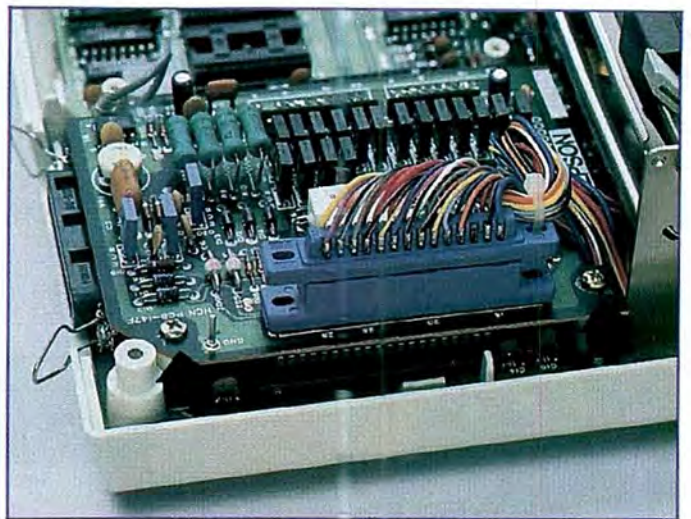


Photo 2. Remove the driver board from the control board by removing the two Phillips screws along the right side of the driver board.

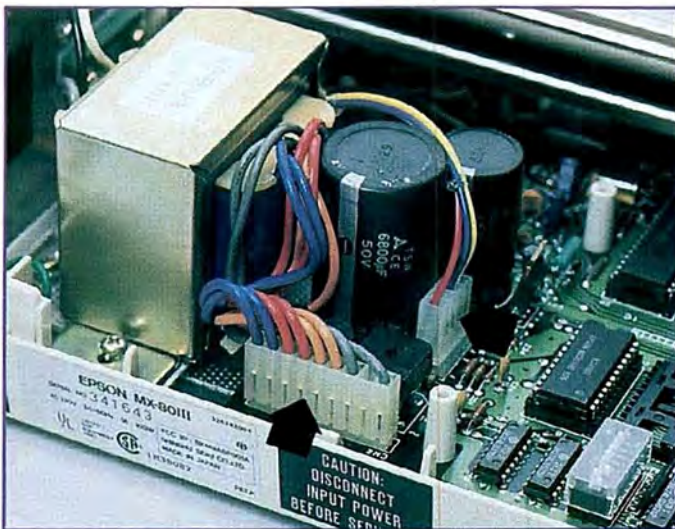


Photo 3. Remove CN2 and CN6 from the left rear corner of the control board.

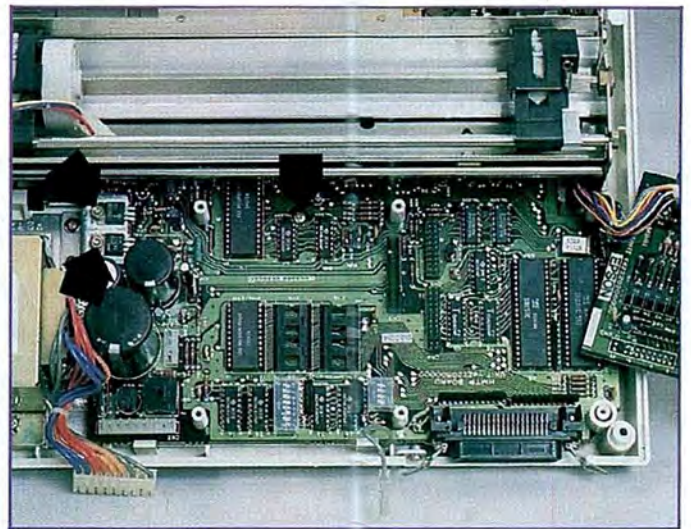


Photo 4. Free the control board by removing the three Phillips screws at the left side of the control board.

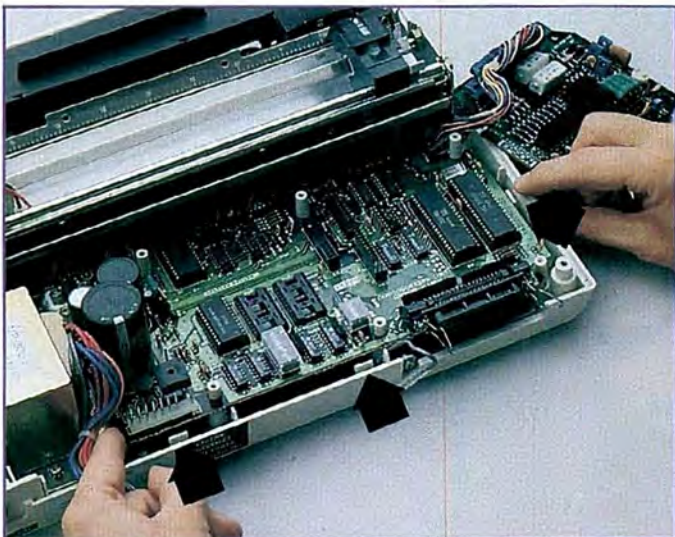


Photo 5. Push each of the three plastic tabs on the base of the printer out of the way.

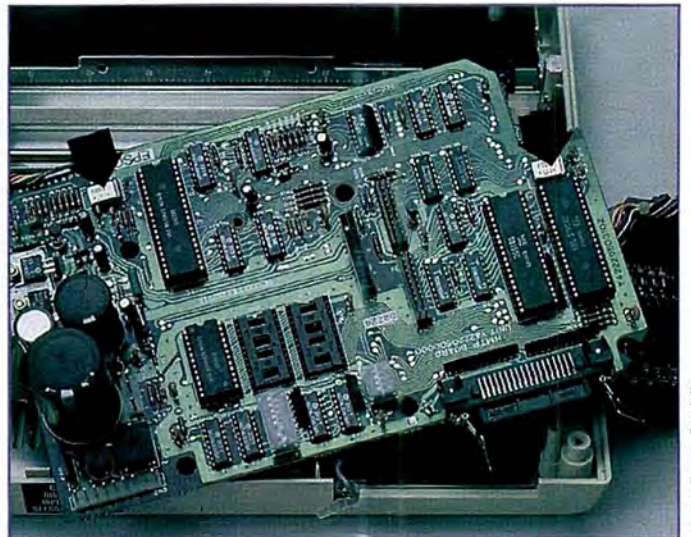


Photo 6. Unsolder the two crystals CR1 and CR2 from the control board.

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Raise the control board over the stand-offs molded to the base and slide it out from under the paper feed assembly. The board is made of a paper laminate material that breaks and chips easily, so be careful when removing it. Also, use caution when soldering or unsoldering, as excessive heat will destroy the board.

Unsolder the two 6-MHz crystals (CR1 and CR2) from the control board and solder the 10-MHz crystals in their place, keeping the lead lengths the same as the original (see Photo 6). CR1 is located toward the left and on the front of the control board just to the left of the large integrated circuit labeled 1C. CR2 is on the right side of the control board just in front of the large integrated circuit labeled 9B.

The crystals in my printer were also held in place by double stick tape. I had to pry up on them slightly to break the tape bond, but the tape was still sticky enough so that I didn't have to replace it. The new crystals came encased in metal, so I stuck a small piece of black electrical tape to the bottoms to keep them from shorting out to any circuitry close by.

Now you can reassemble your printer, reversing the above procedure. Be sure you put all connectors back in their original positions without bending any of the pins. Make sure that the connectors line

up properly between the driver board and main printed circuit board. Don't force anything. Additionally, when you reinstall the PC board you need to push each of the plastic tabs out of the way before you gently push the board into place. Don't expect the board to move the tabs. Finally, don't forget the control panel plug in the top cover of the printer.

Printer Ready

The operation I've just described for speeding up your MX-80 is reversible—you can put the old 6-MHz crystals back in and your printer will work the way it did before. If you ever need to take your printer in for service, you may need to put the original crystals back in to return it to "normal" speed. Epson won't fix a modified printer without unmodifying it, and you can't exchange any boards to which you've soldered.

I do offer one caveat: I wouldn't try to increase the speed over 10 MHz, since the CPU and memory can't safely drive the Epson any faster than that.

I've noticed no change in print quality and no skipping of dots after increasing the speed of my MX-80, even in heavy graphics printing. You'll hear a noticeable change in pitch as it prints, but I don't think it's any louder. Another positive re-

sult is that the skip and space speed of the paper feed has also increased. ■

Joe Lindsey has been involved in electronics since 1956. He has worked for over 15 years in program support for a large computer company, helping users interface their applications programs with their operating systems. You can write to him at 14828 Holden Way, San Jose, CA 95124.



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January 1986 will host a once-in-a-lifetime event for most people—the return of Halley's Comet after a 76-year absence. If you want to get in on the fun and join the ranks of amateur astronomers, build a starfinder out of cardboard that, when used with a Model I/III/4/1000 program called Sidereal, lets you locate celestial objects such as stars, nebulae, planets, and comets with the naked eye.

Star Search

All professional and serious amateur astronomers locate and observe celestial objects with a telescope mounted on an axis parallel to the axis of the earth, a setup known as an equatorial mount system. The setting circles device you'll build is a miniature version of an equatorial mount, with a viewfinder instead of a telescope (see Fig. 3h for a finished version).

You'll locate heavenly bodies with the setting circles and a program called Sidereal, which measures sidereal time (see the Program Listing). Sidereal time is a measurement of time relative to the stars (by contrast, we measure "normal" time with respect to the sun).

Knowing the correct sidereal time is crucial in locating heavenly objects, especially if you're unfamiliar with the constellations. Until the advent of the small computer, you could derive sidereal time only from tables or expensive sidereal clocks. Now all you need is about 1K of RAM.

Assembling the Setting Circles

To assemble the setting circles, first make photocopies of Figs. 1 and 2 (pp. 62 and 66). It's important to make the photocopies as close as possible in quality to the originals as you'll use the setting circles outdoors under poor lighting conditions.

Mount the photocopies on good-quality cardboard, about $\frac{1}{16}$ of an inch thick. This thickness should be just thin enough to allow folding with slight difficulty, but thick enough to be rigid when you assemble the device. Rigidity is important because if you use cardboard that's too thin, it will absorb moisture in the cool night air and become flimsy, losing its accuracy.

You can mount the circles on cardboard by applying a spray-type adhesive to both surfaces and carefully joining them. You can also dry-mount them (or have a photo studio do so). I don't recommend using liquid cement or glue as they tend to wrinkle the photocopies.

After you mount the copies, carefully

cut out all five elements along the thick black lines. Then, along the dotted lines marked "Fold," cut the cardboard with a hobby knife to a depth of about one-third the thickness of the cardboard to make folding easier.

Fold the base as shown in Fig. 3a. What you do now depends on where you live. For example, if you live in Minneapolis, MN, your latitude is 45 degrees north. You would score the latitude scale with a knife at the point marked "45" to the focal point of the converging lines (see indicating arrows in Fig. 3b). Then you would fold along this line. If you lived south of the equator, say at -45 degrees south latitude, follow the same procedure.

Fold the base as shown in Fig. 3c, carefully aligning the latitude segment with the guide marks on the outer face of the semicircle marked "Sidereal Time." Staple or glue in place. Perforate with a nail at the point marked "Pivot" as shown in Fig. 3d.

Assemble the right ascension arm as shown in Fig. 3e, making sure that the plane of the small pivot segment lies at an exact right angle to the large right ascension/declination segment. Now perforate at the point marked "Pivot."

Of the two circles, find the one with the star named Polaris near the center and on the back write "North Celestial Pole"; on the other circle, write "South Celestial Pole." If you live north of the equator, perforate the wheel marked "South Celestial Pole" and mount it on the base as shown in Fig. 3f. If you live south of the equator, follow the same procedure, but mount the wheel marked "North Celestial Pole."

You can use a small machine bolt as an axle for the polar wheel and the right ascension arm. Tighten the bolt enough so that friction holds the right ascension arm and polar wheel at any position without slipping. Fold and staple the viewfinder tube as shown in Fig. 3g and secure it temporarily to the right ascension arm as shown in Fig. 3h.

Introducing Sidereal Time

Now turn on your computer and type in Sidereal, making sure you have all the large constants correct. Run the program and it will prompt you to enter your longitude with respect to Greenwich, England, the locale that serves as the basis for standard time worldwide.

Again assuming you live in Minneapolis, MN, your longitude is approximately 93.2 degrees west of Greenwich. Therefore, you would answer the longitude

prompt with a negative number (-93.2). If you lived east of Greenwich, say 40 degrees east, you would answer the prompt with a positive number (40.0).

Sidereal then prompts you for the current date and the Universal time. You can find Universal time by listening to any international short-wave broadcast station. You can also calculate it by accounting for how many hours off Greenwich Mean Time you are.

For example, if you live in Minneapolis, you are in the Central time zone, six hours behind Greenwich time. If it is 22:32 standard time in Minneapolis (on a 24-hour clock), Universal time is 22:32 plus six hours, or 28:32. Subtract 24 hours if necessary so that the result falls within the normal range of zero to 24—28:32 Universal time translates to 4:32 Universal time.

The following list indicates the hours behind Greenwich Mean Time of each U.S. time zone:

Atlantic	4
Eastern	5
Central	6
Mountain	7
Pacific	8

Say you answered Sidereal's prompts for June 1, 1985, at 1:35 Universal time. Sidereal gives you the following results:

```
UNIVERSAL TIME = 1.35
JULIAN DATE = 2446217.5
*****LOCAL APPARENT SIDEREAL TIME = 11:59
GREENWICH APPARENT SIDEREAL TIME = 18:13
-----
NEW TIME?
```

The local apparent sidereal time is the only data you need to work the setting circles (if you are currently using Daylight Saving Time, ignore that fact and calculate Universal time using standard time). On June 1, 1985, 1:35 Universal time in Minneapolis is 11:59 sidereal time. (The Greenwich apparent sidereal time, 18:13, is the sidereal hour at Greenwich at 1:35 Universal time. The Julian Date is important in astronomical computations; it is a count of days from noon on Jan. 1, 4713 B.C.)

You can enter a new time increment, Universal time, at the "New time?" prompt without having to enter all the



System Requirements

Models I, III, 4, and 1000
32K RAM
Basic

Celestial object and description	Right ascension (A)	Declination (B)
Sirius. The brightest star in the sky.	6h 42.9m	-16° 39'
Great nebula in Orion. Visible to the naked eye as a hazy object.	5h 32.9m	-5° 25'
Pleiades. Spectacular cluster of seven stars. Many more stars are visible with optical aid.	3h 44m	+5° 25'
Mira (Wonderful Star). Varies in magnitude from 3.4 to 9.2 over a period of 332 days. If you don't see it, it may be below naked-eye visibility.	2h 18.8m	-3° 12'
Great Andromeda nebula. External galaxy. The most distant object seen with the unaided eye. It is 1.5 million light years distant. It appears as a slightly elongated hazy object.	0h 40m	+41° 00'
Center of our galaxy. An interesting region rich with stars along the Milky Way.	17h 42m	-38° 30'
Antares. A star with a diameter 300 times that of the sun. Orange in color.	16h 26.3m	-26° 19'

h = hours m = minutes ° = degrees ' = minutes

Table. Selected celestial objects.

other data. After you do so, the program returns new results.

Working with the Setting Circles

Now you're ready for the stars. Choose an outdoor observation site with a clear, unobstructed view to the north (to the south if you live in the southern hemisphere). The best platform for the setting circles is a camera tripod, but you can also use a pier or a 2- by 4-inch board with one end buried in the ground. The top should not be so high as to keep children from using it. You can use a table or any level surface, but it's not the best solution because it limits free access to some sides of the device.

On a cloudless night when you have a clear view to the north (or south if you live south of the equator), compute the proper sidereal time for your viewing site. Mark with a paper clip your correct sidereal time on the outer edge of the wheel that is not mounted. Now hold the wheel as shown in Fig. 4a.

If you're in the Northern Hemisphere, look north with the paper clip pointing straight up. Find the pole star, Polaris. The star field printed on the wheel should

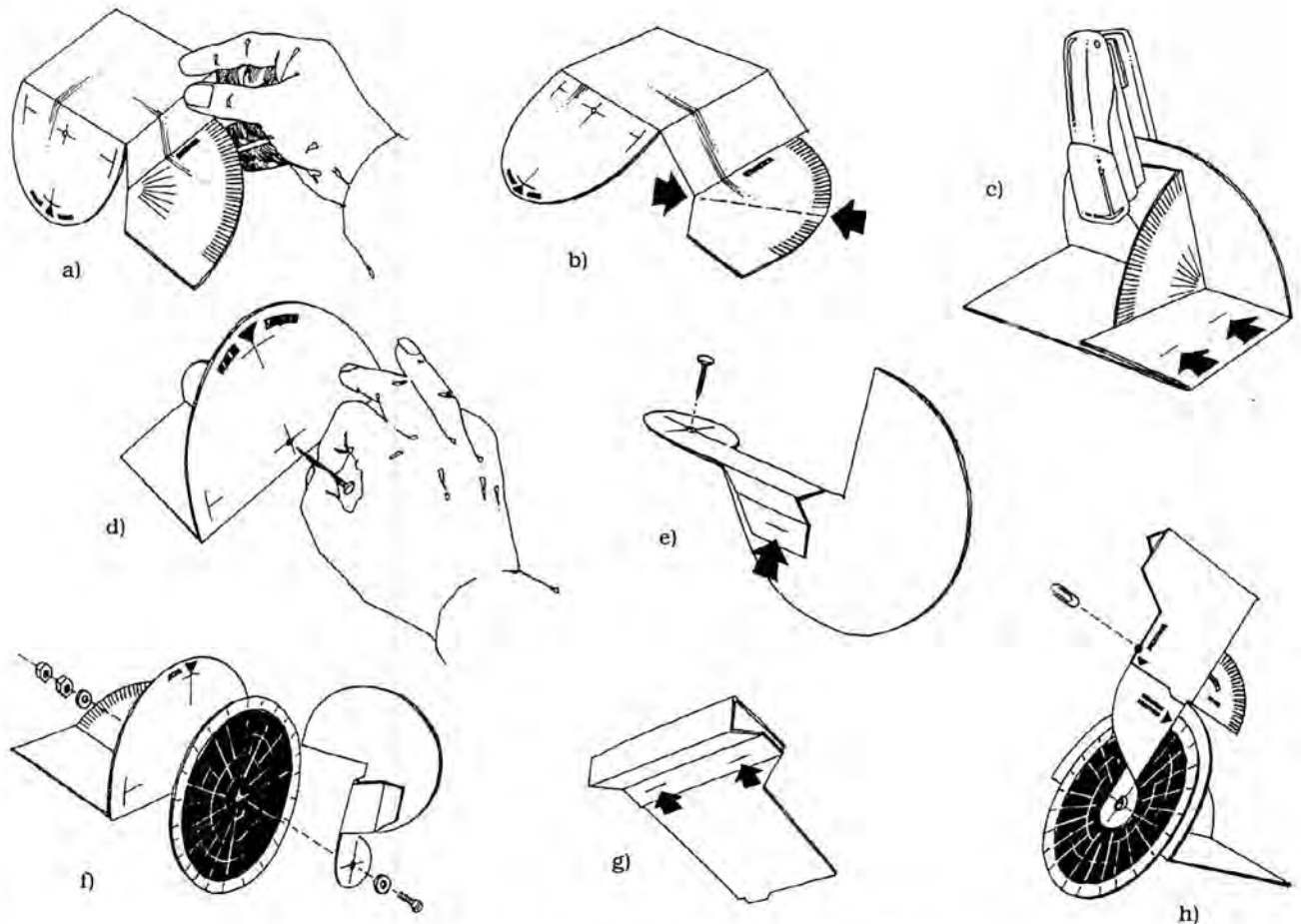


Figure 3 a-h. Assembling the setting circles device.

coincide with what appears in the heavens. The pole star is easy to identify as it is the last star in the handle of the Little Dipper (Ursa Minor). If the Big Dipper (Ursa Major) is in the sky, you can also use it to orient yourself. The outer two stars of the Big Dipper align with Polaris.

In the Southern Hemisphere, you'll find it more difficult to orient the device to the south celestial pole because no distinguishable pole star exists as in the north. Looking south, align the viewfinder with the area of sky that corresponds to the exact center of the unmounted wheel (-90 degrees). (Incidentally, viewing Halley's Comet will be better the farther south you happen to be.)

Set the sidereal time wheel to zero hours (C in Fig. 4e). Now set the right ascension segment to zero hours (A in Fig. 4c). Set the declination pointer to +90 degrees and secure with a paper clip (B in Fig. 4d).

Put the device on a level surface and, while looking through the viewfinder (see Fig. 4b), locate Polaris (north) or the area of center sky (south). Without moving the device, secure it with tape or tacks if you're using a wood surface, or a machine bolt if you're using a camera tripod head.

Program Listing. Sidereal.

```

2 REM ***** SIDEREAL *****
5 DEPDBL A-Z
10 CLS:PRINT"SIDEREAL -----":PRINT
20 PRINT"ENTER YOUR LONGITUDE, (+) IF EAST AND (-) IF WEST OF GREENWICH"
30 INPUT"(USE A DECIMAL POINT TO SEPARATE DEGREES AND MINUTES)";LG
40 ZZ=FIX(LG):XX=LG-ZZ:XX=XX*.016666666#*100:LG=ZZ+XX
50 INPUT"ENTER YEAR (RANGE = 1950 TO 2000)";K
60 INPUT"ENTER MONTH (1 TO 12)";M
70 INPUT"ENTER DAY OF MONTH";I
80 PRINT"ENTER UNIVERSAL OR GREENWICH MEAN TIME IN HOURS AND MINUTES"
90 INPUT"(USE A DECIMAL POINT TO SEPARATE HOURS AND MINUTES)";UTHM
100 CLS
110 PRINT"UNIVERSAL TIME =";UTHM
120 UD=(1.666666667#*(UTHM-INT(UTHM))+INT(UTHM))
130 JD=367*K-INT(7*(K+INT((M+9)/12))/4)+INT(275*M/9)+I+1721013.5#+UD/24-.5*SGN(100*K+M-190002.5#)+.5
140 JB=367*K-INT(7*(K+INT((M+9)/12))/4)+INT(275*M/9)+I+1721013.5#-.5*SGN(100*K+M-190002.5#)+.5
150 T0=(JB-2451545#)/36525#
160 T=(JD-2451545#)/36525#
170 GMST=6.697374560000002#+2400.051336#*T0+2.58622E-05*T0^2+1.002737909#*UD
180 IF GMST>=0 THEN GOTO 210
190 GMST=GMST+24
200 IF GMST<0 THEN GOTO 190
210 LNODE=125.04452#-1934.13626#*T+.002071#*T^2
220 LNODE=LNODE/57.29577951000001#
230 E=-.00029*SIN(LNODE)
240 GAST=GMST+E
250 LAST=GAST+LG/15
260 IF LAST<0 THEN LAST=LAST+24
270 PRINT"JULIAN DATE";JD
280 HOUR=INT(LAST):DE=LAST-HOUR:MM=INT(DE*100):MM=MM/100:MM=MM*60:MM=INT(MM+.5)
290 PRINT"***** LOCAL APPARENT SIDEREAL TIME =";HOUR:"";MM
300 HUR=INT(GAST):DE=GAST-HUR:MM=INT(DE*100):MM=MM/100:MM=MM*60:MM=INT(MM+.5)
310 PRINT"GREENWICH APPARENT SIDEREAL TIME =";HUR:"";MM
320 PRINT:PRINT"-----"
330 INPUT"NEW TIME";UTHM:GOTO 110
340 END

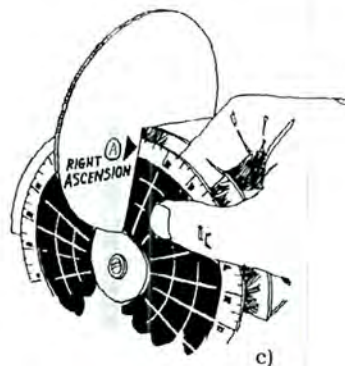
```



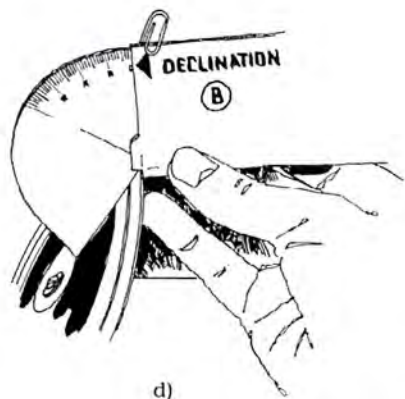
a)



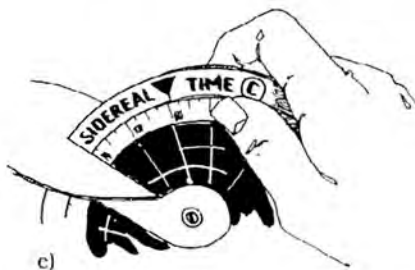
b)



c)



d)



e)



f)

Figure 4 a-f. Aligning and using the setting circles.

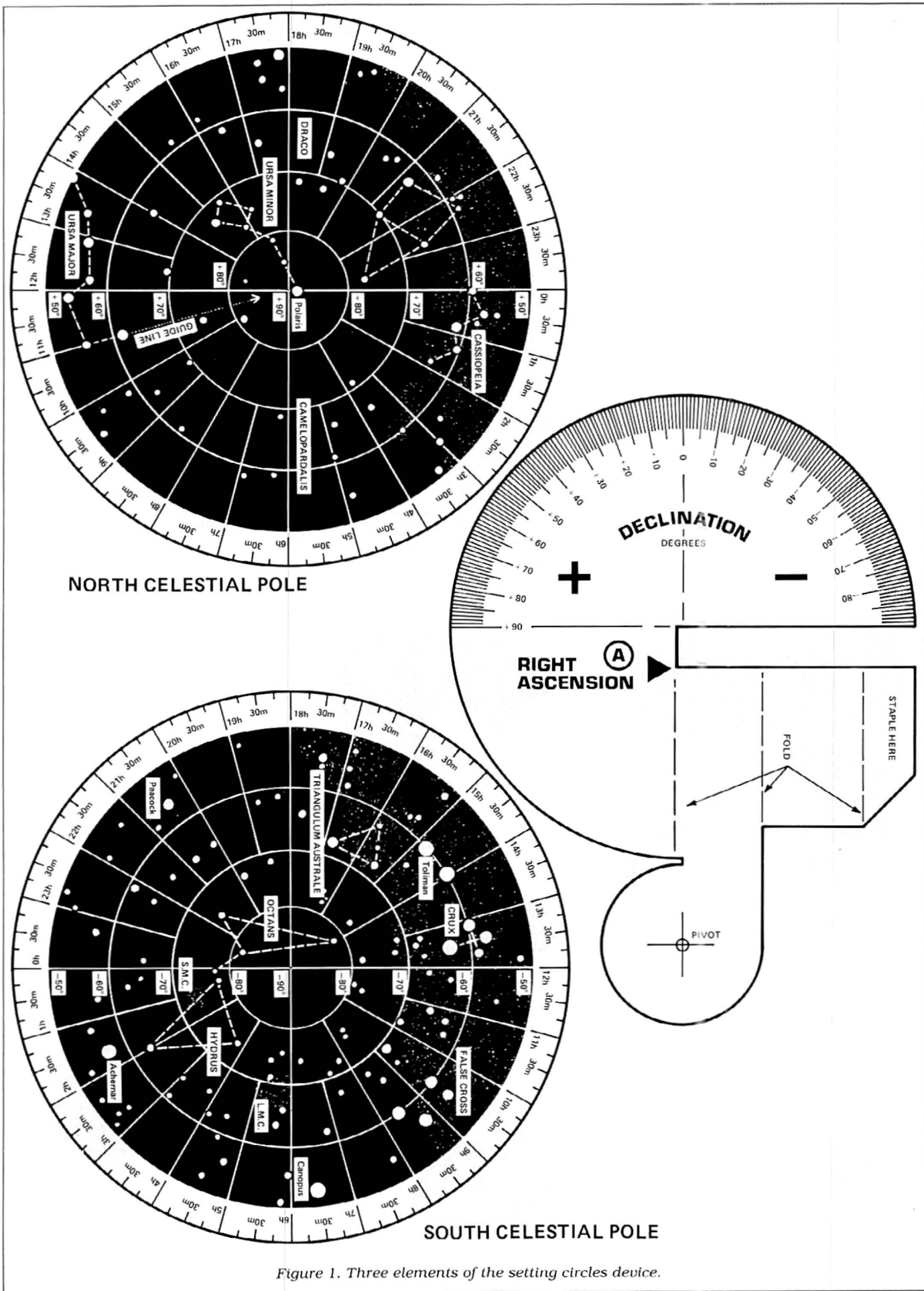


Figure 1. Three elements of the setting circles device.

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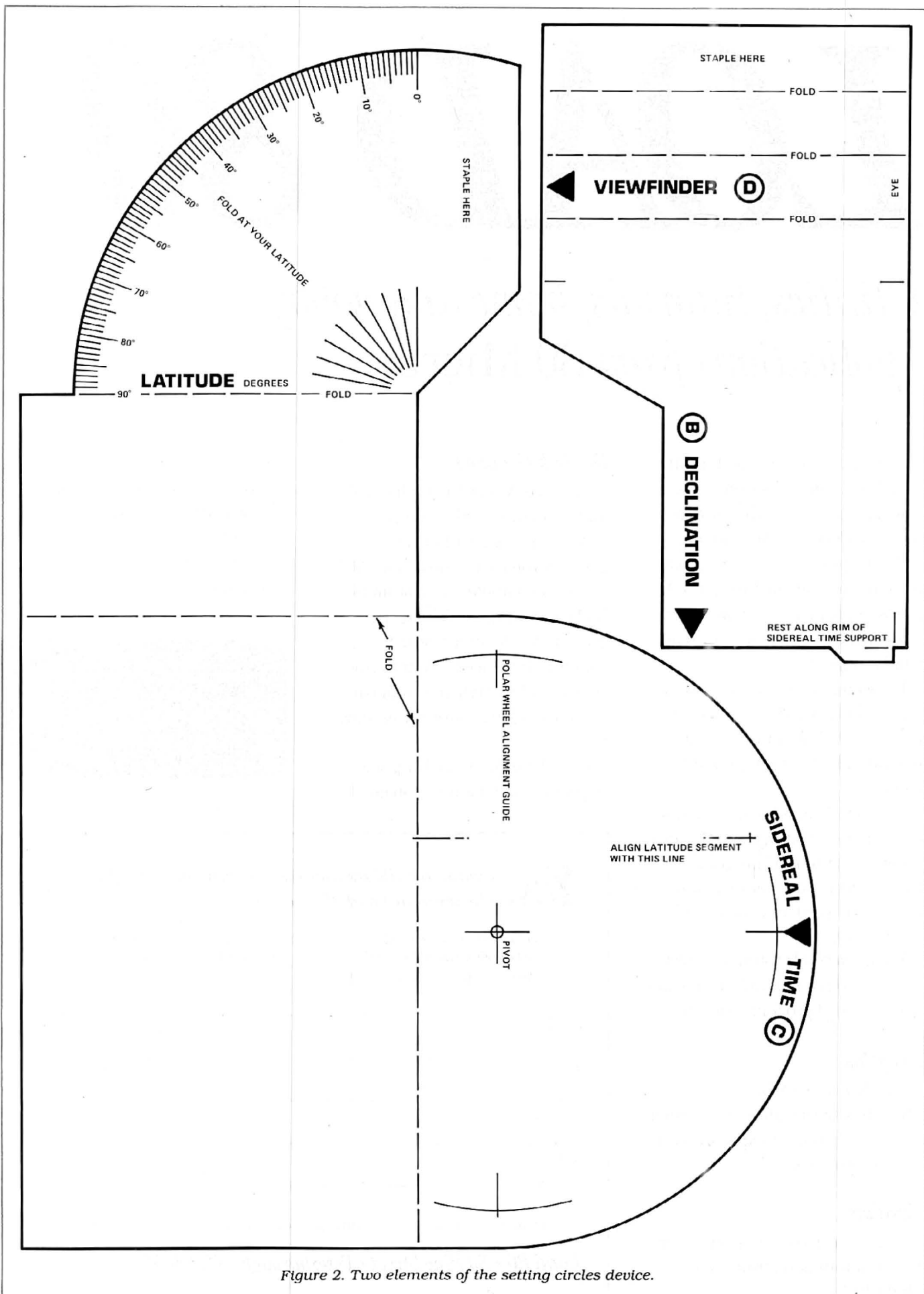


Figure 2. Two elements of the setting circles device.

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Searching the Heavens

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To get you started, I have prepared a list of interesting celestial objects that you can see from the northern and southern hemispheres (see the Table). Your geographical location, time of year, and sidereal time will determine which of these objects you'll be able to see.

Compute the correct sidereal time and choose an object from the Table whose right ascension is close to your sidereal time. I suggest a star rather than a nebula for your first try. Set the right ascension wheel (A) to the object's right ascension (see Fig. 4c). Now set the declination pointer (B) to the object's declination (see Fig. 4d).

Compute the exact local sidereal time and move the star field wheel so that the hour markings align with the sidereal time pointer (C in Fig. 4e). Make sure that when you move the star field wheel, the right ascension arm moves with it. Look through the viewfinder as shown in Fig. 4f and you should be able to find your chosen object within the enclosed area of the viewfinder.

Now try some of the other objects within range by repeating the above process. If the object is out of viewing range at the time you are observing, the viewfinder will point below the horizon. Some of the objects, such as nebulas, are difficult for the untrained eye to find. If you live in the city, these objects may be impossible to see because of "light pollution."

If your computer isn't conveniently located near your viewing site, you can transfer the sidereal time to your wristwatch. First compute the present sidereal time and set your watch to that hour. The sidereal day is shorter than the solar day by about four minutes; therefore, every six hours set your watch back one minute. Keep in mind that we are using military (24-hour) time and you should remember this if you're using a conventional watch.

Viewing Planets and Comets

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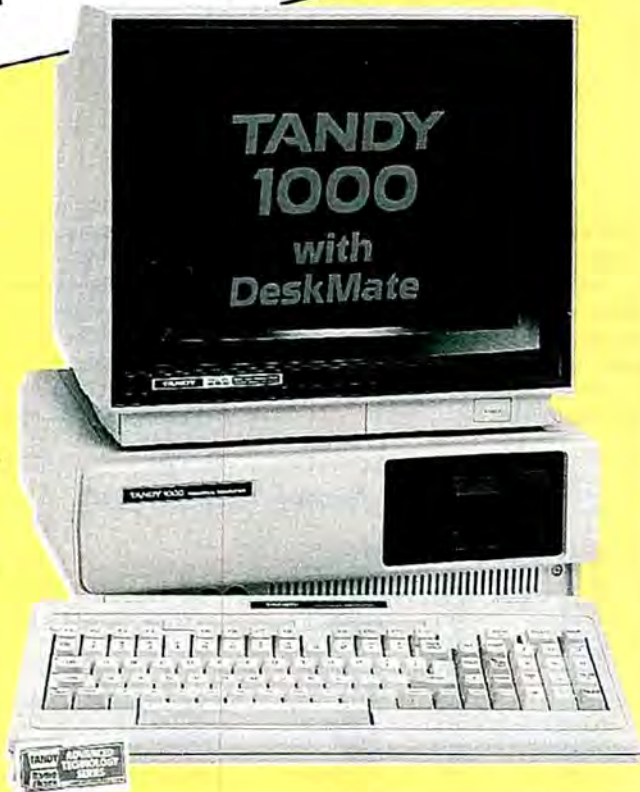
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You can write to Michael F. O'Reilly at Condominio El Pueblo No. 102, Apartado 284, 1100 Tibas, Costa Rica, Central America.

Related Articles

Carrera, Don. "Planetary Orbit," January 1983, p. 156. Finding a planet's location in the past or future (Models I and III).

Conviser, Sam. "Physically Astronomical," October 1983, p. 148. Learn about physics while you tour the stars with your CoCo.

Fox, James H., "Ephemeris for Comets and Minor Planets," October 1983, p. 90. Project the positions of comets and asteroids (Models I and III).

Lilly Jr., Adron D., "What's Up and When," October 1983, p. 114. A Model III program to stay in sync with the stars.

Rea, Edward H., "Solar Altitude Plotter," August 1981, p. 294. Tracking the sun's position (Model I).

Skramstad, Harold K., "Sunrise... Sunset," October 1981, p. 272. Program your computer to calculate time and place all year (Model I).



A Happy Medium

Running Model I/III cassette software on the 4—without running into trouble.

For many Model 4 owners, tape is a four-letter word. Transferring Model I/III cassette software to disk—and getting it to run properly—can be tricky. My utilities, TLOAD and Go (Program Listings 1 and 2), make things much easier. They load Model I/III system tapes, save them to a TRSDOS 6.X disk, and execute them from Model 4 mode. The utilities use the Model 4's memory-switching capability to switch in the Model III ROMs, so you don't need the Model III DOS.

Memory Line

The biggest problem with running Model I/III software in Model 4 mode is that the two modes' memory layouts, or memory maps, differ considerably. In Model III mode, Basic ROMs, which provide necessary functions and subroutines, are located in addresses 0000-3BFF hexadecimal (hex). Video RAM, which stores characters for display on the screen, also resides low in memory, along with the addresses the computer uses to scan the keyboard.

In Model 4 mode, the computer switches out the Basic ROMs and moves the video and keyboard addresses higher in memory. Most Model III software uses ROM and video RAM extensively, and would therefore crash TRSDOS 6.X.

Loading cassette software onto a Model III TRSDOS disk would work for some programs. However, Model III TRSDOS resides quite high in memory, up to 5000 hex. Since many programs reside below 5000 hex, they would collide with and bomb the operating system when you loaded them. You could devise a scheme to load programs into a safe area high in memory and then relocate them down

low, but this presents problems if you want to load down 10 or 15 programs.

Another solution is to modify your cassette software to run under Model 4 TRSDOS. But this involves adding supervisor calls (SVCs) and doing extensive debugging and disassembling, and wouldn't be practical for simpler applications, such as game software.

The solution I used takes advantage of the Model 4's memory-switching capability to switch in Model III ROMs on demand. This requires two programs: a system tape loader to load programs onto a TRSDOS 6.X disk, and a run-time program to read the program, switch in the Model III ROMs, and then run the software. The Model 4 is ideal for this application.

Program Listing 1. TLOAD.

```

00100      ORG      3000H
00110 TLOAD: LD      HL,NAMMSG
00120      LD      A,10
00130      RST     20H
00140      LD      A,86H          ;Switch in video RAM
00150      OUT    (84H),A
00160      DI
00170      IN     A,(0FFH)      ;Turn cassette on
00180      OR     02H
00190      AND    0BFH        ;Slow system clock (2 mhz)
00200      OUT    (0ECH),A
00210 RDLEAD: CALL   RDBIT     ;Start looking for sync byte
00220      CP     0A5H
00230      JR     NZ,RDLEAD    ;No sync? Keep looking...
00240      CALL  RDBYTE
00250      CP     55H          ;Is it a system tape?
00260      JR     NZ,ERROR
00270      LD      A,'*'      ;Put asterisks in corner of screen
00280      LD      (0F04EH),A
00290      LD      (0F04FH),A
00300      LD      B,6
00310      LD      DE,DMPMSG+05H
00320 NAMELP: CALL   RDBYTE
00330      CP     ' '
00340      JR     Z,SKPSPC
00350      LD      (DE),A
00360      INC   DE
00370 SKPSPC: DJNZ  NAMELP
00380      LD      C,4
00390      LD      HL,DMPMSG+31H ;Extension saved in TRA address buffer
00400      LDIR
00410 BLOCK: CALL   RDBYTE     ;Read in data token
00420      CP     3CH          ;Data block follows?
00430      JR     Z,RDBLCK
00440      CP     70H          ;TRA address follows?
00450      JR     Z,ENDBLK
00460 ERROR: LD      HL,ERRMSG ;Not TRA or data then error
00470      LD      A,10
00480      RST     20H
00490 CASOFF: IN     A,(0FFH)  ;Turn off cassette
00500      AND    0FDH
00510      OR     40H          ;Fast system clock
00520      OUT    (0ECH),A
00530      EI
00540      RET
00550 RDBLCK: CALL  RDBYTE     ;Read block of data
00560      LD      B,A          ;Save block count
00570      LD      A,(0F04FH)  ;Blink one of the asterisks
00580      XOR    0AH
00590      LD      (0F04FH),A
00600      CALL  RDBYTE
00610      LD      L,A          ;Save load address
00620      LD      C,A
00630      CALL  RDBYTE
00640      LD      H,A
00650      ADD   A,C
00660      LD      C,A

```

Listing 1 continued

**LOAD
80**

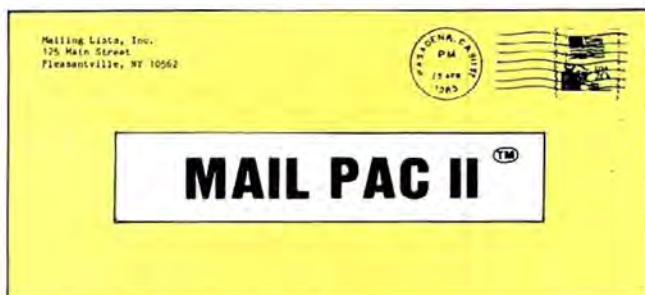
System Requirements

Model 4
64K RAM
Assembly language
Editor/assembler
Cassette recorder

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Listing 1 continued

```

00670 LD A,3FH ;Is load address in video RAM?
00680 CP H
00690 JR C,ADDTST
00700 LD HL,BUFFER ;Video RAM, don't load it...
00710 JR DATA
00720 ADDTST: LD DE,(FSTADD) ;Is this the lowest address?
00730 XOR A
00740 PUSH HL
00750 SBC HL,DE
00760 POP HL
00770 JR NC,DATA
00780 LD (FSTADD),HL ;Lowest, then save it as "Start"
00790 DATA: CALL RDBYTE ;Read data & save it
00800 LD (HL),A
00810 INC HL
00820 ADD A,C
00830 LD C,A
00840 DJNZ DATA
00850 CALL RDBYTE ;Read in checksum
00860 CP C ;Checksum Ok?
00870 JR NZ,ERROR
00880 DEC HL
00890 LD DE,(LSTADD) ;Is this the highest address?
00900 XOR A
00910 PUSH HL
00920 SBC HL,DE
00930 POP HL
00940 JR C,BLOCK
00950 LD (LSTADD),HL ;Highest address, save it
00960 JR BLOCK
00970 ENDBLK: CALL RDBYTE ;Now load in TRA address
00980 LD E,A
00990 CALL RDBYTE
01000 LD D,A
01010 LD A,99
01020 LD HL,DMPMSG+31H ;Convert TRA address
01030 RST 28H
01040 LD A,99 ;Convert start address to hex
01050 LD DE,(FSTADD)
01060 LD HL,DMPMSG+19H
01070 RST 28H
01080 LD A,99 ;Convert end address to hex
01090 LD DE,(LSTADD)
01100 LD HL,DMPMSG+25H
01110 RST 28H
01120 CALL CASOFF
01130 LD HL,DMPMSG
01140 LD A,10
01150 RST 28H
01160 LD HL,DMPMSG
01170 LD A,24 ;Execute command line
01180 RST 28H
01190 RDBYTE: PUSH BC ;Read one byte from cassette
01200 LD B,8
01210 BYTELP: CALL RDBIT ;Read 8 bits
01220 DJNZ BYTELP
01230 POP BC
01240 RET
01250 RDBIT: PUSH BC ;Read one bit from cassette
01260 PUSH AF
01270 RDBIT1: IN A,(0FFH)
01280 RLA
01290 JR NC,RDBIT1
01300 LD B,6EH
01310 DLAY1: DJNZ DLAY1
01320 LD A,04H
01330 OUT (0FFH),A
01340 LD B,98H
01350 DLAY3: DJNZ DLAY3
01360 IN A,(0FFH)
01370 LD B,A
01380 LD A,4
01390 OUT (0FFH),A
01400 POP AF
01410 RL
01420 RLA
01430 POP BC
01440 RET
01450 ERRMSG: DEFM 'Tape Error!'
01460 DEFM 13
01470 NAMMSG: DEFM 'TLOAD - Model 4 system tape loader'
01480 DEFM 0D0AH
01490 DMPMSG: DEFM 'DUMP (START=X)'
01500 DEFM 39
01510 DEFM '0000'
01520 DEFM 39
01530 DEFM ',END=X'
01540 DEFM 39
01550 DEFM '0001'
01560 DEFM 39
01570 DEFM ',TRA=X'
01580 DEFM 39
01590 DEFM '/CMD'
01600 DEFM 39
01610 DEFM ')'
01620 DEFM 13
01630 FSTADD: DEFM 0FFFFH
01640 LSTADD: DEFM 4000H
01650 BUFFER: DEFS 256 ;Garbage buffer for video data
01660 END TLOAD

```

since TRSDOS 6.X ends well below the Model III-mode RAM addresses and therefore can't possibly conflict with your programs.

Loading Docs

Listing 1. TLOAD. loads in a Model I/III low-speed (500-baud) system tape and saves it to disk. It thoroughly checks the tape during loading and displays a message if it detects an error. TLOAD resides low in memory so the program loading in won't erase it. It stores programs in a file format exactly like any other TRSDOS /CMD file, which means you can copy or debug them.

To load a Model I/III program and write it to disk, you set up your cassette recorder, type in TLOAD, and press the enter key. A blinking asterisk appears on screen during loading, then TLOAD displays the file name with a /CMD extension and saves the program to disk. Model I programs work only if they're Model III-compatible. Also, you can load only low-speed programs, but most commercial programs run at the low baud rate.

Listing 2. Go. runs programs previously saved to disk using TLOAD. Go initializes RAM, loads your program, switches in the Model III ROMs, and runs the program. If the program doesn't exist or if a disk error occurs, TRSDOS displays an error message and returns to TRSDOS Ready. It's important to note that Go resides high in memory, and may conflict with any filters or drivers you've installed. Since Model III mode doesn't support these features, you should remove them before running Go.

To run a Model I/III program, you simply type in GO FILE NAME and press the enter key. If you don't specify a file name, Go puts you in Model III cassette Basic. To return to TRSDOS 6.X, you have to press the reset button.

I haven't yet found a program that won't work with TLOAD and Go, with the exception of some Model I programs that aren't Model III-compatible. Among the programs I've used successfully are Radio Shack's Pyramid, Raakatu, Bedlam, Debug, and TBUG; Acorn Software's Misosys Disassembler 1.4; and Big Five Software's Cosmic Fighter.

You should bear in mind that TLOAD and Go don't allow a program that uses cassette I/O to access disk. TLOAD doesn't change your program, it simply stores it on disk. This method, then, is particularly suited to games and other types of software that require a minimum of cassette I/O. ■

David M. Roberts is a field service engineer who maintains phototypesetting computer systems. He owns a Model I and a Model 4, and is interested in programming and hardware design. You can write to him at 15 Lord St., Attleboro, MA 02703.

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Program Listing 2. Go.

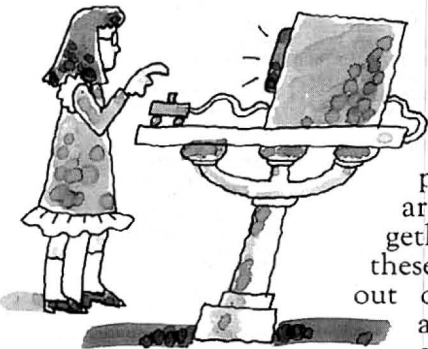
```

00100      ORG      0F000H
00110 GO:   LD      A,(HL)      ;Get 1st char & test for CR
00120      CP
00130      JR      Z,INIRAM
00140      LD      (BASFLG+1),A
00150      LD      DE,FCB      ;Test for valid filename
00160      LD      A,78
00170      RST     28H
00180      JR      Z,ADDEXT
00190      LD      C,53H      ;Signal invalid filename
00200      LD      A,26
00210      RST     28H
00220 ADDEXT: LD      HL,FILEXT ;Add /CMD extension to filename
00230      LD      A,79
00240      RST     28H
00250 INIRAM: DI
00260      LD      (SPBUF+1),SP ;Prepare to initialize RAM
00270      LD      SP,407DH ;Save TRSDOS's stack pointer
00280      LD      A,04H      ;Switch in ROMs
00290      OUT     (04H),A
00300      LD      HL,36AAH ;Now initialize RAM
00310      LD      DE,4000H
00320      LD      BC,004CH
00330      LDIR
00340      LD      L,0F9H
00350      LD      DE,41E5H
00360      LD      C,40H
00370      LDIR
00380      CALL    028DH
00390      LD      DE,4080H
00400      LD      HL,18F7H
00410      LD      BC,0027H
00420      LDIR
00430      LD      HL,42E5H
00440      LD      (HL),3AH
00450      INC     HL
00460      LD      (HL),B
00470      INC     HL
00480      LD      (HL),2CH
00490      INC     HL
00500      LD      (40A7H),HL
00510      LD      B,1CH
00520      LD      HL,4152H
00530 LOOP1: LD      (HL),0C3H
00540      INC     HL
00550      LD      (HL),2DH
00560      INC     HL
00570      LD      (HL),01H
00580      INC     HL
00590      DJNZ   LOOP1
00600      LD      B,15H
00610 LOOP2: LD      (HL),0C9H
00620      INC     HL
00630      INC     HL
00640      INC     HL
00650      DJNZ   LOOP2
00660      LD      HL,43E8H
00670      LD      (HL),B
00680      LD      SP,42F8H
00690      CALL    1B8FH
00700      LD      HL,0FFFFH
00710      LD      (40B1H),HL
00720      LD      L,0CDH
00730      LD      (40A0H),HL
00740      CALL    1B4DH
00750      LD      HL,3030H
00760      LD      (4177H),HL
00770 BASFLG: LD      A,00H      ;See if Basic was selected
00780      OR      A
00790      JR      Z,BASIC
00800      LD      A,87H      ;Now switch out ROMs
00810      OUT     (04H),A
00820 SPBUF: LD      SP,0000H ;Restore TRSDOS's stack pointer
00830      EI
00840      LD      DE,FCB
00850      LD      A,76
00860      RST     28H      ;Now load in file
00870      LD      (DONE+1),HL
00880      JR      Z,BASIC
00890      OR      40H      ;Signal error during load
00900      AND     7FH
00910      LD      C,A
00920      LD      A,26
00930      RST     28H
00940 BASIC: DI
00950      LD      SP,0FFCBH
00960      XOR     A
00970      OUT     (04H),A ;Switch in ROMs again
00980      CALL    01C9H ;Clear screen
00990      LD      A,1A19H ;Now jump to transfer address
01000 FILEXT: DEFM 'CMD'
01010 FCBC:  DEFM 32
01020      END
    
```


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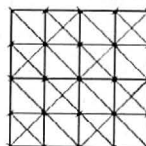


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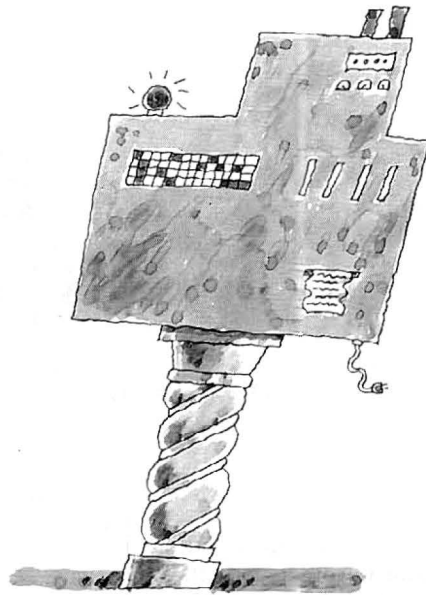
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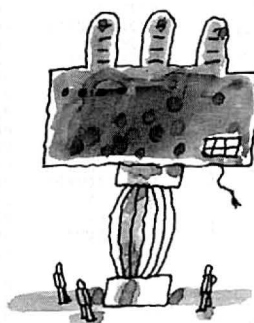
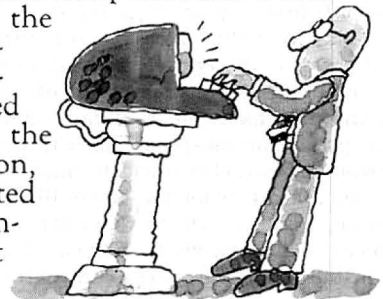


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evolution of personal computers and a catalog highlighting the Museum's collections. If your submission is accepted for addition to the Museum collection, you will be invited to the grand opening of the exhibit and will receive a bound edition of the catalog. If your item is selected as one of the five best "finds", you will also receive an all-expense-paid trip to Boston for the grand opening party.



So, get up to the attic, down to the cellar and into your closets, and tell us what you find! Call or write the Museum for an official entry form, or send a photo and description of your items by March 1, 1986

to: The Computer Museum, Personal Computer Competition, 300 Congress St., Museum Wharf, Boston, Massachusetts USA 02110, (617) 426-2800, Telex: 62792318.

Blank Expressions

Protect your file passwords from prying eyes.

TRS-80 DOSes are unique in letting you password-protect your files. However, a password isn't any good if you have to type it in in full view of a nosey Parker. You need a way to prevent your passwords from appearing on-screen.

One way to do this, of course, is to turn down your computer's video brightness dial until the entire screen goes blank. But, knowing that some mainframe computers provide an escape sequence to stop password display, I became determined to write such a driver for the Model III. My program, Blanker, will work under any Model III DOS; it also works in Basic. Once you install the driver, press control-B to keep subsequent input from showing up on your video screen.

For example, when you load a password-protected file in Basic, you type LOAD"FILE.PASSWORD" and press the enter key. With my program installed, you can press control-B just after the period, and only LOAD"FILE. shows up on the screen, protecting your password. (Remember that on the Model III, shift/down-arrow serves as the control character.)

When you want your input to appear again, press the enter, break, or clear key, or press control-B again.

Installing the Driver

Type in the Program Listing and assemble it as BLANKER/CMD. To install the driver, type in BLANKER and press the enter key at the DOS Ready prompt. The installation portion of the program gets the address of the current keyboard driver and stores it in Blanker's driver (thus preserving any special keyboard features you may have installed), finds the top of avail-



System Requirements

Model III
Assembly language
Editor/assembler

Program Listing. Blanker.

```

00100 ;BLANK by JR
00110 ;
00120 ;@KI driver which cuts off the video display
00130 ;whenever <CTRL-B> is hit, and turns it back
00140 ;on with <ENTER>, <BREAK>, <CLEAR>, or
00150 ;another <CTRL-B>.
00160 ;
00170 ;The following code is the actual driver which
00180 ;will be relocated to the top of available
00190 ;memory.
00200 ;
5700 00210 ORG 5700H
5700 CD0000 00220 NEWKI CALL 0000 ;ORIG @KI ADDR GOES HERE
5703 E5 00230 PUSH HL
5704 1600 00240 FI LD D,0 ;ON/OFF FLAG STORED HERE
5706 FE02 00250 CP 2 ;<CTRL-B>?
5708 280E 00260 JR Z,CTRLB
570A FE0D 00270 CP 0DH ;<ENTER>?
570C 2822 00280 JR Z,BACKON ;IF SO, TURN @DO BACK ON
570E FE01 00290 CP 01 ;<BREAK>?
5710 281E 00300 JR Z,BACKON
5712 FE1F 00310 CP 1FH ;<CLEAR>?
5714 281A 00320 JR Z,BACKON
5716 E1 00330 DONE1 POP HL
5717 C9 00340 RET
5718 7A 00350 CTRLB LD A,D ;GET @DO FLAG
5719 B7 00360 OR A
571A 3E00 00370 LD A,0 ;CLEAR CHAR
571C 2012 00380 JR NZ,BACKON ;IF NZ, @DO IS OFF
571E 2A1E40 00390 TURNOFF LD HL,(401EH) ;GET @DO ADDR.
5721 220000 00400 DI LD (0000),HL ;STORE IT
00410 ;THE ABOVE WILL CONTAIN THE ADDRESS OF DOSTORE
5724 214300 00420 LD HL,0043H ;PLACE THE ADDR. OF A
5727 221E40 00430 LD HL,(401EH),HL ;"RET" IN @DO DCB
572A 210000 00440 B1 LD HL,0000 ;WILL PT. TO "LD D,0"
572D 34 00450 INC (HL) ;I=@DO OFF
572E 18E6 00460 JR DONE1
5730 F5 00470 BACKON PUSH AF ;SAVE KBD CHAR
5731 7A 00480 LD A,D ;GET ON/OFF FLAG
5732 B7 00490 OR A ;WAS @DO ON?
5733 280A 00500 JR Z,DONE ;IT WAS ON--DO NOTHING
5735 2A0000 00510 D2 LD HL,(0000) ;GET STORED @DO ADDR.
5738 221E40 00520 LD HL,(401EH),HL ;RESTORE IT TO DCB
573B 210000 00530 B2 LD HL,0000 ;GET ADDR OF FLAG
573E 35 00540 DEC (HL) ;@=@DO ON
573F F1 00550 DONE POP AF ;RESTORE CHAR
5740 18D4 00560 JR DONE1
0002 00570 DOSTORE DEFS 2 ;ORIG. @DO ADDR GOES HERE
00580 ;
00590 ;The following code relocates the driver to the
00600 ;top of available memory, adjusts HIMEM$, and
00610 ;calculates and places all necessary addresses
00620 ;within the driver.
00630 ;
5744 2A1640 00640 START LD HL,(4016H)
5747 220157 00650 LD (NEWKI+1),HL ;PLACE ORIG. @KI ADDR
574A 2A1144 00660 LD HL,(4411H) ;MODEL III HIMEM$
574D 014400 00670 LD BC,START-NEWKI ;CALC DVR LENGTH
5750 AF 00680 XOR A ;CLEAR CARRY FLAG
5751 ED42 00690 SBC HL,BC ;CALC NEW HMEM$
5753 221144 00700 LD HL,(4411H),HL ;STORE IT
5756 23 00710 INC HL
5757 221640 00720 LD (4016H),HL ;STORE NEW @KI ADDR
575A EB 00730 EX DE,HL ;PUT 'SAVE TO' ADDR IN DE
575B D5 00740 PUSH DE ;SAVE ADDR
575C 210057 00750 LD HL,NEWKI ;'MOVE FROM' ADDR
575F EDB0 00760 LDIR ;RELOCATE DVR
5761 DDE1 00770 POP IX ;IX POINTS TO DVR START
5763 DDE5 00780 PUSH IX
5765 E1 00790 POP HL ;TRANSFER IX TO HL
5766 E5 00800 PUSH HL ;RESAVE IT
5767 014200 00810 LD BC,DOSTORE-NEWKI;HL WILL NOW POINT TO
576A 09 00820 ADD HL,BC ; TRUE DOSTORE LOCATION
0022 00830 D1OFF EQU D1+1-NEWKI ;OFFSET TO D1

```

Listing continued



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Listing continued

```
576B DD7522 00840 LD (IX+D1OFF),L ;STORE DOSTORE AT NEW
576E DD7423 00850 LD (IX+D1OFF+1),H ; D1 LOCATION
0036 00060 D2OFF EQU D2+1-NEWKI ;OFFSET TO D2
5771 DD7536 00870 LD (IX+D2OFF),L
5774 DD7437 00880 LD (IX+D2OFF+1),H
5777 E1 00890 POP HL
5778 010500 00900 LD BC,F1+1-NEWKI
577B 09 00910 ADD HL,BC
002B 00920 B1OFF EQU B1+1-NEWKI
003C 00930 B2OFF EQU B2+1-NEWKI
577C DD752B 00940 LD (IX+B1OFF),L
577F DD742C 00950 LD (IX+B1OFF+1),H
5782 DD753C 00960 LD (IX+B2OFF),L
5785 DD743D 00970 LD (IX+B2OFF+1),H
5788 C32D40 00980 JP 402DH
5744 00990 END START
```

End

**Blanker will
work under any
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it also works
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able memory and relocates the new driver as high as possible, and adjusts the high-memory pointer.

I had to work out several problems when I wrote this program. One was its relocatability. Any good driver must be relocatable, but a truly relocatable program cannot use any absolute internal addresses, such as those for Calls or address storage locations. Since this driver uses both, I had to include an installation routine that would calculate all the new absolute addresses according to the driver's new memory location (as determined by the HIMEM\$ pointer).

Another trick was "shutting off" the video driver. At first I tried having the installation routine get and store the video driver address, but that wouldn't work if you installed a new video driver after installing the new keyboard driver. So Blanker now fetches the video driver address each time it uses the blanking action, and stores it at the location named DOSTORE. Then Blanker replaces the true video driver address (in the video device controller block) with the address (in ROM) of a Return Instruction. From then until you turn off the blanking function, all calls to the video driver will simply return without doing anything.

Whenever you press control-B, Blanker checks to see if you've already turned off the video; if it didn't do so and if the video were turned on, the program would irretrievably lose the true video driver address.

You can change the key used to invoke the video blanking to any key desired by inserting a different ASCII code in place of the 2 in line 250.

Under DOSPLUS 3.5 and LDOS, you can save this driver as part of the system configuration or a configuration file, so you don't have to install it each time you reboot (see the DOS manual for instructions). ■

Write to John Ratzlaff at Mount Pisgah Academy, Candler, NC 28715.

Related Article

Conley, Michael, "The Invisible Password," August 1980, p. 107. Hide your Model I passwords from prying eyes by using the INKEY\$ function.

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Refer to Department 1A

Power Lines

Maximize Basic program speed by identifying and streamlining lines that execute most frequently.

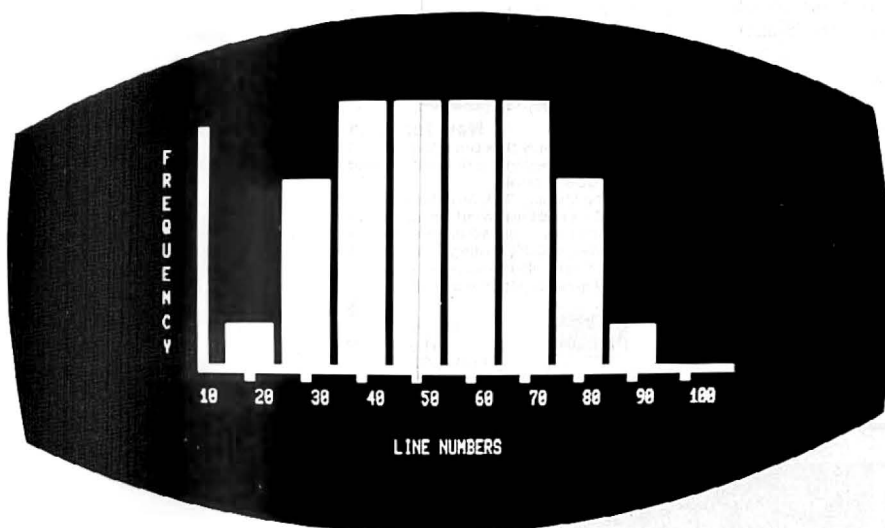


Photo. Graph for lines 10-100 of Program Listing 2.

As the final step in writing a new program, most programmers "optimize" the code—make the program run as efficiently as possible. This is especially important in Basic, a notoriously slow language. One difficulty in improving Basic's speed is determining what sections of a program will benefit most from optimization, i.e., which lines execute most frequently.

Counter, a Model I/III machine-language program, pinpoints lines in a Basic program that execute most often (see Program Listing 1 and the Photo). It works in the background as a Basic program runs and draws a bar graph indicating the relative frequency of execution of each section of that program. You can then concentrate on rewriting those lines to produce a more efficient program.

**LOAD
80**

System Requirements

**Models I and III
32K RAM
Editor/assembler
Assembly language**

Counter Active

Using an editor/assembler, type in Listing 1. Assemble the program to disk using the file name Counter/CMD. When you type in its file name from DOS, Counter clears the screen and prompts you for the starting and ending lines of a Basic program you want to analyze. You then put a disk with that program in drive zero and run it; Counter does the rest. When the program finishes running, you type in COUNTER DISPLAY and Counter displays its bar graph.

This Is a Test

Program Listing 2 provides a small Basic test program, Test/BAS. Run Counter and type in 10 as the starting line number and 100 as the ending line number to graph the entire program; Counter then returns you to DOS Ready. Now, enter Basic and set memory size to 64190 to prevent Basic from interfering with Counter's operation.

From Basic, load and run the test program. As Test runs, Counter invisibly samples the program. After the program ends, exit to DOS; when you type in COUNTER DISPLAY, Test's bar graph ap-

pears on the screen. Press any key to return to DOS.

Counter Points

The labels along the horizontal axis divide the range of line numbers into nine equal segments. In the Photo, the graph divisions correspond to the program's line number increments, but that won't always happen.

The vertical graph lines represent the relative frequency of execution of program lines—the longer the bar, the more often Basic executes the statements within that line range.

For instance, the Photo shows that most activity in Test/BAS occurs between lines 30 and 80. Of course, most Basic programmers could see this by looking at the program in Listing 1, but in longer, more intricate programs, the pattern might not be as obvious.

You can run Counter a number of times to zero in on segments of a Basic program. You could, for example, run Counter and Test a second time, specifying lines 30-80 as starting and ending line numbers. When you request the bar graph display, the graph indicates the most active of those lines.

Improving Ground

You could do little to speed up a Basic program as simple as Test. But you can use a number of techniques to modify the most active lines of complex programs. Define variables found in those lines early in the program, and replace single- or double-precision variables with integer variables wherever possible. Eliminate spaces and remarks in the most active lines. Combine separate lines within the active range into as few lines as possible. Using these techniques to rewrite the lines that Counter indicates as used most often gives you a more efficient program with a minimum of effort. ■

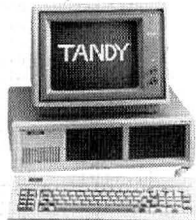
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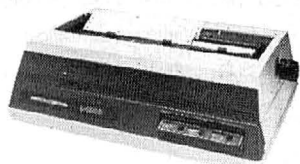
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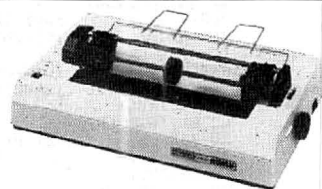
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Program Listing 1. Counter.

```

00100 ; COUNTER VERSION 2.0
00110 ; BY STEWART F. HUNTER
00120 ;
00130 VID EQU 3C00H
00140 PSECT 0FAC0H
00150 ENTER PUSH HL
00160 CALL 01C9H ;CLEAR THE SCREEN
00170 POP HL
00180 LD A,(HL) ;GET COMMAND CHARACTER
00190 CP 'D' ;IF CHAR. IS 'D'
00200 JP Z,DSPLAY ;JUMP TO DISPLAY GRAPH
00210 BEGIN LD HL,SLMSG
00220 CALL DISP ;ASK FOR START LINE #
00230 LD HL,INBUFF
00240 LD B,6
00250 CALL 40H ;INPUT LINE #
00260 CALL 1E5AH ;CONVERT LINE # FROM ASCII
00270 LD (STRTLN),DE ;SAVE IT
00280 LD HL,ELMSG
00290 CALL DISP ;ASK FOR END LINE #
00300 LD HL,INBUFF
00310 LD B,6
00320 CALL 40H
00330 CALL 1E5AH
00340 LD (ENDLN),DE
00350 EX DE,HL
00360 LD DE,(STRTLN)
00370 XOR A ;SET CARRY
00380 SBC HL,DE ;COMPUTE LINE NUMBER RANGE
00390 LD A,9
00400 CALL DIV ;DIVIDE RANGE BY 9
00410 LD (INCREM),DE ;SAVE QUOTIENT
00420 LD IX,TABLE
00430 LD HL,(STRTLN)
00440 LD (IX),L ;STORE START LINE #
00450 LD (IX+1),H
00460 LD (HOLD),HL
00470 LD HL,(ENDLN)
00480 LD (IX+36),L ;STORE END LINE #
00490 LD (IX+37),H
00500 LD B,8
00510 XOR A
00520 STOR INC IX
00530 INC IX
00540 LD (IX),A
00550 LD (IX+1),A
00560 INC IX
00570 INC IX
00580 LD HL,(HOLD)
00590 LD DE,(INCREM)
00600 ADD HL,DE
00610 LD (HOLD),HL
00620 LD (IX),L
00630 LD (IX+1),H
00640 DJNZ STOR
00650 LD (IX+2),A
00660 LD (IX+3),A
00670 LD HL,0FFFH ;SET BASIC LINE POINTER
00680 LD (40A2H),HL
00690 LD A,1
00700 LD (IPFLAG),A
00710 LD HL,(4016H)
00720 LD (EXIT+1),HL
00730 LD HL,COUNT
00740 LD (4016H),HL
00750 JP 402DH
00760 COUNT PUSH IY
00770 PUSH IX
00780 PUSH HL
00790 PUSH DE
00800 PUSH BC
00810 PUSH AF
00820 LD HL,(40A2H) ;GET BASIC LINE POINTER
00830 LD A,L
00840 CP 0FFH ;LINE = FFFF?
00850 JP NZ,COUNT2
00860 CP H
00870 JP Z,CONT ;JUMP IF SO
00880 LD A,(IPFLAG)
00890 OR A
00900 JP Z,CONT ;JUMP IF IPFLAG RESET
00910 LD DE,(TEMP)
00920 LD A,H
00930 CP D
00940 JP NZ,COUNT3
00950 LD A,L
00960 CP E
00970 JP NZ,COUNT3
00980 JP CONT
00990 COUNT3 LD (TEMP),HL
01000 LD B,10 ;NUMBER OF ENTRIES
01010 LD IX,TABLE
01020 GETNO LD E,(IX)
01030 LD D,(IX+1)
01040 LD A,H ;LINE POINTER > LINE #?
01050 SUB D
01060 JP NZ,$+5
01070 LD A,L
01080 SUB E
01090 JP Z,GETNO2 ;JUMP IF SO
01100 JP C,GETNO2
01110 INC IX
01120 INC IX
01130 INC IX
01140 INC IX
01150 DJNZ GETNO
01160 CONT POP AF
01170 POP BC
01180 POP DE
01190 POP HL
01200 POP IX
01210 POP IY
01220 JP EXIT
01230 GETNO2 LD A,10
01240 CP B ;1ST ENTRY IN TABLE?
01250 JP Z,CONT ;JUMP IF SO
01260 DEC IX
01270 DEC IX ;BACK UP TO HIT COUNT
01280 LD L,(IX)
01290 LD H,(IX+1)
01300 INC HL ;INCREMENT HIT COUNT
01310 LD (IX),L
01320 LD (IX+1),H
01330 LD A,7FH
01340 CP H
01350 JP NZ,CONT ;JUMP IF HIT COUNT<>32767
01360 LD A,0FFH
01370 CP L
01380 JP NZ,CONT
01390 XOR A
01400 LD (IPFLAG),A ;RESET FLAG IF COUNT=32767
01410 JP CONT
01420 ;DRAW A BAR GRAPH USING PREVIOUSLY CALCULATED DATA
01430 DSPLAY CALL 01C9H ;CLEAR SCREEN
01440 LD HL,(EXIT+1) ;RESTORE KEYBOARD DCB
01450 LD (4016H),HL
01460 LD HL,VID+69
01470 LD (4020H),HL
01480 LD B,10
01490 LD A,191
01500 CALL 33H
01510 LD A,26
01520 CALL 33H
01530 LD A,24
01540 CALL 33H
01550 DJNZ $-15
01560 LD HL,VID+709 ;DRAW GRAPH BASE LINE
01570 LD A,131
01580 LD (HL),A
01590 LD DE,VID+710
01600 LD BC,58
01610 LDIR
01620 LD HL,VID+714
01630 LD DE,6
01640 LD B,9
01650 TIC LD A,(HL) ;DRAW TIC MARKS
01660 OR 12
01670 LD (HL),A
01680 ADD HL,DE
01690 DJNZ TIC
01700 LD HL,VID+773
01710 LD (4020H),HL ;SET CURSOR POSITION
01720 LD (POS),HL
01730 LD IX,TABLE
01740 LD B,10
01750 LNUM PUSH BC ;DISPLAY LINE NUMBERS
01760 LD L,(IX)
01770 LD H,(IX+1)
01780 CALL CVRT ;CONVERT LINE # TO ASCII
01790 CALL DISP
01800 INC IX
01810 INC IX
01820 INC IX
01830 INC IX
01840 LD HL,(POS)
01850 LD DE,6
01860 ADD HL,DE
01870 LD (POS),HL
01880 LD (4020H),HL
01890 POP BC
01900 DJNZ LNUM
01910 LD HL,VID+922
01920 LD (4020H),HL
01930 LD HL,LNMSG
01940 CALL DISP ;DRAW GRAPH LABELS
01950 LD HL,VID+129
01960 LD (4020H),HL
01970 LD HL,FMSG
01980 DRW LD A,(HL)
01990 OR A
02000 JP Z,FIND
02010 CALL 33H
02020 LD A,26
02030 CALL 33H
02040 LD A,24
02050 CALL 33H
02060 INC HL
02070 JP DRW
02080 LD IX,TABLE ;FIND LARGEST VALUE OF HITS
02090 LD HL,0
02100 LD B,9 ;COUNT OF TABLE ENTRIES
02110 LD E,(IX+2)
02120 DISPI LD D,(IX+3)

```

Listing 1 continued

Listing 1 continued

```

02130 CALL 18H ;IS HL<DE?
02140 JP NC,DISP2 ;JUMP IF NOT
02150 LD (FACTOR),DE
02160 EX DE,HL
02170 DISP2 INC IX
02180 INC IX
02190 INC IX
02200 INC IX ;POINT TO NEXT TABLE ENTRY
02210 DJNZ DISP1 ;JUMP IF NOT END OF TABLE
02220 LD A,2 ;LARGEST COUNT NOW IN FACTOR
02230 LD (40AFH),A ;SET INTEGER FLAG
02240 LD HL,(FACTOR)
02250 LD A,L ;CHECK FOR ZERO COUNT
02260 OR H
02270 JP Z,DONE
02280 LD (4121H),HL
02290 CALL 0AB1H ;CONVERT COUNT TO SNGL PREC.
02300 LD DE,0
02310 LD BC,8570H
02311 PUSH HL
02312 LD HL,4080H
02313 LD (HL),0C9H
02314 POP HL
02320 CALL 08A2H ;DIVIDE 30 BY COUNT
02330 LD DE,(4121H)
02340 LD BC,(4123H)
02350 LD (FACTOR),DE ;PUT QUOTIENT IN FACTOR
02360 LD (FACTOR+2),BC
02370 ;MULTIPLY EACH COUNT IN TABLE BY FACTOR AND
02380 ;SUBTRACT RESULT FROM 33. PUT REMAINDER IN TABLE2.
02390 LD IX,TABLE
02400 LD IY,TABLE2
02410 LD B,9
02420 MHIT PUSH BC
02430 LD L,(IX+2)
02440 LD H,(IX+3)
02450 LD (4121H),HL
02460 LD A,2
02470 LD (40AFH),A
02480 CALL 0AB1H
02490 LD DE,(FACTOR)
02500 LD BC,(FACTOR+2)
02510 CALL 0847H ;MULTIPLY COUNT*FACTOR
02520 CALL 0A7FH ;CONVERT RESULT TO INTEGER
02530 LD DE,(4121H)
02540 XOR A
02550 LD HL,33
02560 SBC HL,DE ;SUBTRACT FROM 33
02570 LD (IY),L ;PUT IN TABLE2
02580 INC IY
02590 INC IX
02600 INC IX
02610 INC IX
02620 INC IX
02630 POP BC
02640 DJNZ MHIT ;CONTINUE IF NOT END OF TABLE
02650 LD A,16 ;SET X COORDINATE TO 1ST LINE
02660 LD (XCORD),A
02670 LD IY,TABLE2
02680 PUTEND LD A,(IY) ;GET ENTRY FROM TABLE2
02690 LD (ENDY),A ;SAVE AS ENDING Y COORDINATE
02700 CP 33 ;CHECK FOR RANGE WITH NO HITS
02710 JP Z,SETXY3
02720 LD A,33
02730 LD (YCORD),A ;SET Y COORD. TO 33
02740 SETIT LD B,10 ;EACH BAR IS 10 PIXELS WIDE
02750 LD A,(XCORD)
02760 LD (INBUFF),A ;SAVE X COORDINATE
02770 PLA
02780 SETXY PUSH BC
02790 LD HL,RETRN
02800 PUSH HL
02810 LD HL,PAR
02820 LD A,128 ;A=SET CODE
02830 PUSH AF
02840 LD A,(XCORD) ;GET X COORDINATE
02850 PUSH AF
02860 LD A,(YCORD) ;GET Y COORD.
02870 JP 150H ;GO TO PIXEL SET ROUTINE
02880 RETRN POP BC ;RETURN HERE FROM ROUTINE
02890 LD A,(XCORD)
02900 INC A
02910 LD (XCORD),A
02920 DJNZ PLA
02930 LD A,(INBUFF)
02940 LD (XCORD),A ;RESTORE X COORDINATE
02950 LD A,(YCORD)
02960 DEC A ;DECR. Y COORD.
02970 LD HL,ENDY
02980 CP (HL)
02990 JP NZ,SETIT ;Y=ENDING COORDINATE?
03000 SETXY3 INC IX ;JUMP IF NOT
03010 LD A,(XCORD) ;POINT TO NEXT TABLE2 ENTRY
03020 ADD A,12
03030 LD (XCORD),A ;ADD 12 TO X COORD.
03040 CP 124 ;END OF GRAPH?
03050 JP NZ,PUTEND ;JUMP IF NOT
03060 DONE CALL 49H ;ELSE WAIT FOR KEY PRESS
03070 JP 402DH ;AND EXIT TO DOS
03080 ;
03090 ;CONVERT HL REG TO ASCII. ON ENTRY HL=16 BIT VALUE
03100 ;ON EXIT HL POINTS TO ASCII VALUE.

```

```

03110 CVRT LD IY,ATABLE
03120 LD BC,BUFFER
03130 CVRT2 XOR A
03140 LD D,(IY+1)
03150 LD E,(IY)
03160 CVRT3 OR A
03170 SBC HL,DE
03180 JP C,CVRT4
03190 INC A
03200 JP CVRT3
03210 CVRT4 ADD HL,DE
03220 OR 30H
03230 LD (BC),A
03240 INC BC
03250 INC IY
03260 INC IY
03270 LD A,1
03280 CP E
03290 JP NZ,CVRT2
03300 LD HL,BUFFER
03310 LD A,(HL)
03320 OR A
03330 JR Z,S+8
03340 CP 30H
03350 RET NZ
03360 INC HL
03370 JR S-8
03380 DEC HL
03390 RET
03400 ATABLE DEFW 10000
03410 DEFW 1000
03420 DEFW 100
03430 DEFW 10
03440 DEFW 1
03450 BUFFER DEFS 5
03460 DEFB 0
03470 ;
03480 ;DIVIDE HL BY NUMBER IN A. QUOTIENT IS IN DE.
03490 DIV NEG
03500 LD C,A
03510 LD B,0FFH
03520 LD DE,0
03530 DIV2 ADD HL,BC
03540 JP NC,DIV3
03550 INC DE
03560 JP DIV2
03570 DIV3 RET
03580 ;
03590 ;DISPLAY ASCII CHARACTERS AT ADDRESS IN HL
03600 DISP LD A,(HL)
03610 OR A
03620 RET Z
03630 CALL 33H
03640 INC HL
03650 JP DISP
03660 ;
03670 SLMSG DEFM 'STARTING LINE NUMBER?'
03680 DEFB 0
03690 ELMMSG DEFM 'ENDING LINE NUMBER?'
03700 DEFB 0
03710 LNMSG DEFM 'LINE NUMBERS'
03720 DEFB 0
03730 FMSG DEFM 'FREQUENCY'
03740 DEFB 0
03750 INBUFF DEFS 7
03760 STRTLN DEFW 0
03770 ENDLN DEFW 0
03780 INCREM DEFW 0
03790 IPFLAG DEFB 0
03800 HOLD DEFW 0
03810 TEMP DEFW 0FFFFH
03820 POS DEFW 0
03830 PAR DEFM ') '
03840 FACTOR DEFW 0
03850 DEFW 0
03860 XCORD DEFB 0
03870 YCORD DEFB 0
03880 ENDY DEFB 0
03890 TABLE DEFS 10
03900 EXIT DEFB 0C3H ;JUMP COMMAND (ADRS. MODIFIED)
03910 TABLE EQU $+2
03920 END ENTER

```

End

Program Listing 2. Test. Sample Basic Program.

```

10 DEFINT A-Z
20 FOR I=1 TO 6
30 FOR J=1 TO 4
40 FOR K=1 TO 2
50 PRINT I;
60 PRINT J;
70 PRINT K;
80 NEXT K 'INNER LOOP
90 NEXT J 'MIDDLE LOOP
100 NEXT I 'OUTER LOOP

```

End

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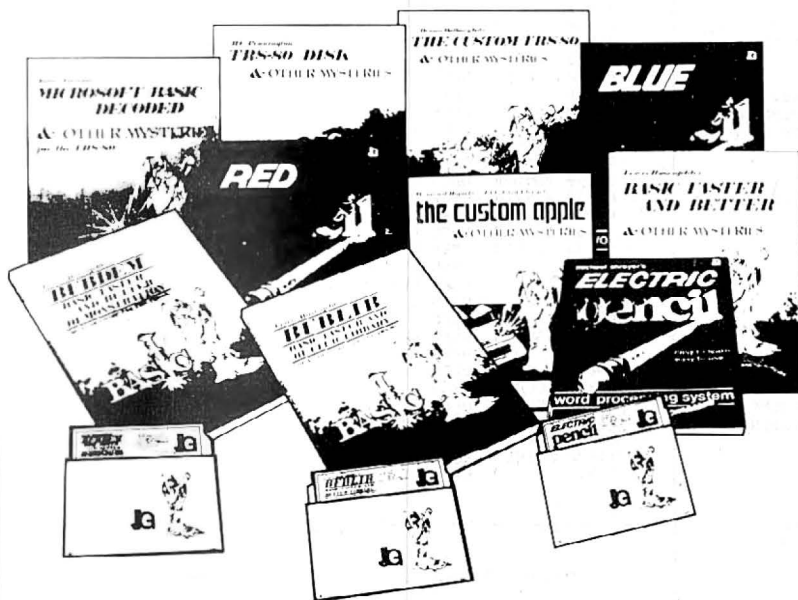
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25-3508 PC 1 Carrying Case	21
25-3508 PC 2 Carrying Case	21
25-3512 PC 2 HS-232C Interface	36
25-3551 PC 4 Cassette Interface	33
25-3553 PC 4 1/8" Ram Module	16
25-3654 PC 4 Carrom Card	5
25-3804 Model 100 AC Adapter	34
25-3805 Model 100 AC Adapter	34
25-3809 Model 100 Carrying Case	17
25-3811 Model 100 Soft Carrying Case	34
25-3812 Model 100 Legs (pair)	24
25-4154 Model 12/16B Internal 15MB Hard Disk Kit	2245
25-4155 Model 12/16B External 15MB Primary Hard Disk	1355
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25-4157 Model 2/12/16 Installation Kit for 26-4155	299
25-5111 Model 2000 VM-1 Color Monitor	169
25-5112 Model 2000 CM-1 Color Monitor	309

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25-1324 Computer Table	68
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25-4303 Deluxe System Desk	229
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25-1455 Acoustic Cover	63
25-1459 Bi-Directional Tractor for DWP-410	16
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25-1461 Model 100 Printer Cable	13
25-1461 Model 210 12000 Printer Cable	25
25-1490 10 RS-232C Cable	33
25-1492 50 RS-232C Cable	33
25-1493 100 RS-232C Cable	70
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25-1564 Model 1/3 MicroPilot	23
25-1565 Model 1/3 SCRIP/SIT	23
25-1568 Model 1/3 Medical Office Systems	254
25-1569 Model 1/3 SuperSCRIP/SIT	254
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25-1602 Model 1/3 Profile	21
25-1603 Model 3/4 Orchestra 99	68
25-2011 Model 1/3 EGA - Tagup Version	127
25-2012 3/4 Assembly Language Development Course	126
25-2013 EDAS, Disk Version Model 1/3	29

25-2015 Model 3 Instruction Tapes	21
25-2016 Model 3 Assembly Language Course, Tape	34
25-2017 Model 3 Assembly Language Course, Disk	34
25-2019 TRSDOS 6.x Training Course	64
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25-6210 Inventory	339
25-6211 Accounts Payable	339
25-6212 Accounts Receivable	339
25-6213 Inventory Control System	339
25-6214 Order Entry/Invoicing	339
25-6215 Inventory	339
25-6216 Accounts Payable	339
25-6217 Accounts Receivable	339
25-6218 Inventory Control System	339
25-6219 Order Entry/Invoicing	339
25-6220 Inventory	339
25-6221 Accounts Payable	339
25-6222 Accounts Receivable	339
25-6223 Inventory Control System	

Off and On Work: Designing Digital Systems

Many readers have told me they enjoy reading Project 80 but would like a better understanding of digital logic. This month's Project 80 is a short basic course in digital logic design, with a simple project to illustrate some of the design techniques described.

This will be for introductory and intermediate levels. I have compiled a reference list that does, however, list books for more advanced readers (see Table 1).

Black Boxes And Truth Tables

Digital logic is binary in nature, using only two values, referred to as zero and 1, or low and high, or false and true. A typical digital system (like your computer) represents a digital 1 with a high voltage level (2-5 volts) and a digital zero with a low voltage level (zero to 0.8 volts). I'll use the terms "true" and "false" for consistency.

First I want to introduce the concept of the black box, as applied to digital systems. Figure 1 shows a typical digital black box. It has two inputs (A and B) and one output (C). The box performs an operation on the two inputs, producing the output. A given output value (either true or false) will always occur for a specific combination of input values.

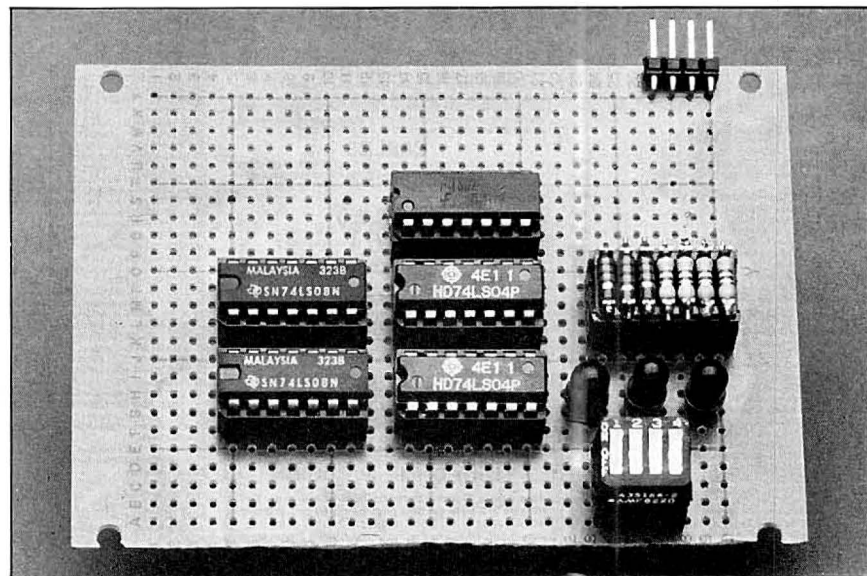


Photo. Sample black box.

Since the box has two inputs, and each input may have either of two possible values, four combinations of inputs are possible.

You can generate a table that shows what value will appear at the output for each input combination. Such a table is called a truth table (see Fig. 2). Here, it indicates a true output if A is false and B

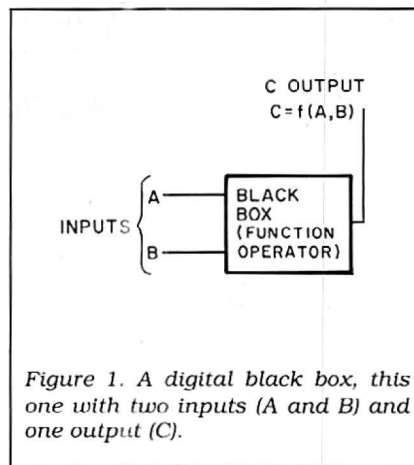


Figure 1. A digital black box, this one with two inputs (A and B) and one output (C).

INPUTS		OUTPUT
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

Figure 2. A truth table for the black box in Fig. 1.

Introductory

An Introduction to Computer Logic
by H. Troy Nagle Jr.

B. D. Carroll and
J. David Irwin

Prentice-Hall

Digital Logic and Computer Design
by M. Morris Mano

Prentice-Hall

*Microcomputers/Microprocessors:
Hardware, Software, Applications*
by John L. Hilburn and Paul M. Julich
Prentice-Hall

The Art of Electronics
by Paul Horowitz and Winfield Hill
Cambridge University Press

Intermediate

Digital Design With Standard MSI

and LSI (2nd Edition)

by Thomas R. Blakeslee
Wiley-Interscience

*Microprocessor Interfacing
Techniques*

by Rodney Zaks and Austin Lesea
Sybex

Advanced

Microcomputer Interfacing
by Bruce A. Artwich
Prentice-Hall

*Mini/Microcomputer Hardware
Design*

by George D. Kraft and Wing N. Toy
Prentice-Hall

Microcomputer Interfacing
by Harold S. Stone
Addison-Wesley

Table 1. Books on digital design and microprocessor interfacing.

Tandy 1000

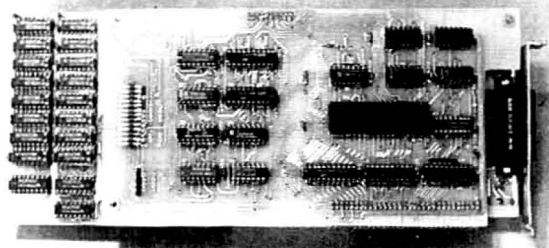
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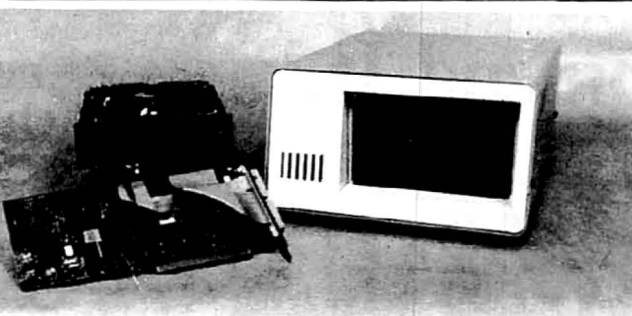
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TanTel

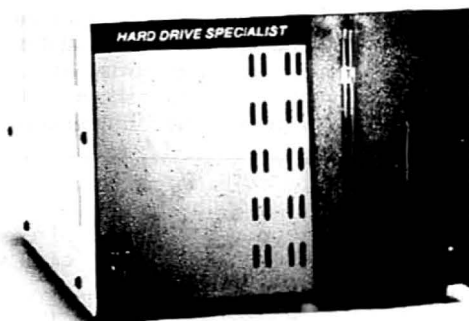
Internal 300/1200 Baud Modem \$249

8087 Board

8087 Math Co-processor board for the Model 1000. Plugs in internally but does not use one of the 3 expansion slots \$249.

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Model 1, 3, 4 Hard Drives

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is true, or if A is true and B is false, and a false output otherwise.

Introduction to Gates

The basic gates used by the digital designer, along with their respective truth tables, are shown in Figs. 3a-e. These gates are black boxes that perform a predetermined operation on the inputs to produce the output. The names of the

gates indicate their actual functions. For example, the AND gate (shown in Fig. 3a) produces a true output when and only when both inputs A and B are true. The OR gate in Fig. 3b produces a true output if either input A or B (or both) is true, and produces a false output otherwise. Another useful gate is the inverter, shown in Fig. 3c. This output is simply the inversion (opposite value) of the input.

Figs. 3d and 3e appear similar to 3a and 3b. These NAND and NOR gates look the same as the respective AND and OR gates, except for the little bubble at their output. The bubble indicates inversion of the output. So the NAND (for "not AND") is an AND gate with an inverter on the output, and a NOR (for "not OR") is an OR gate with an inverter on the output. The truth tables illustrate this.

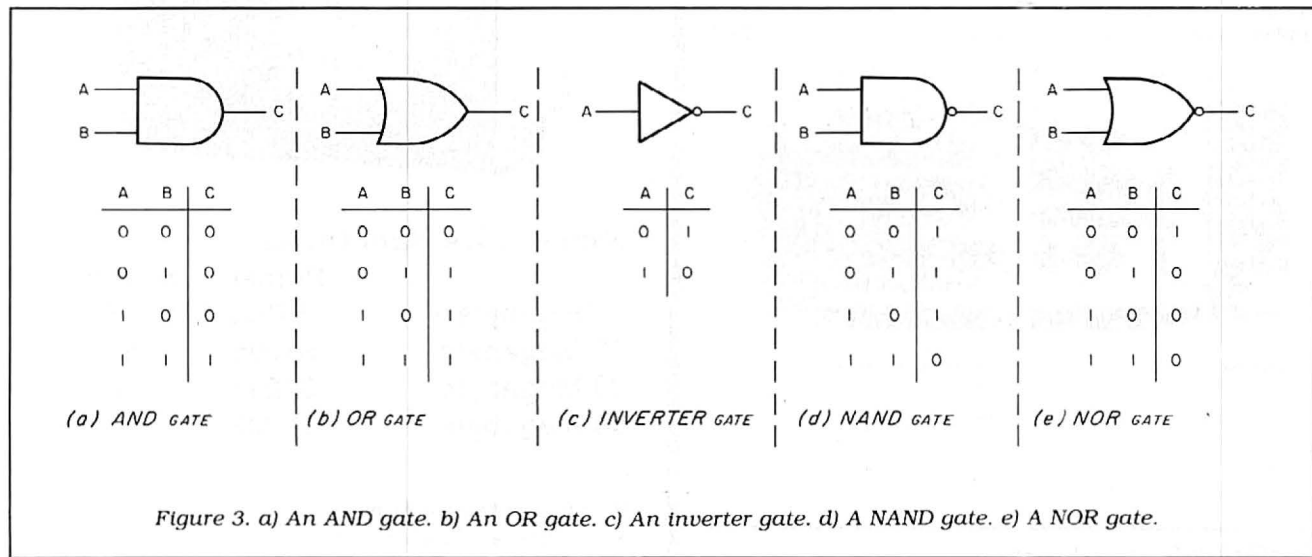


Figure 3. a) An AND gate. b) An OR gate. c) An inverter gate. d) A NAND gate. e) A NOR gate.

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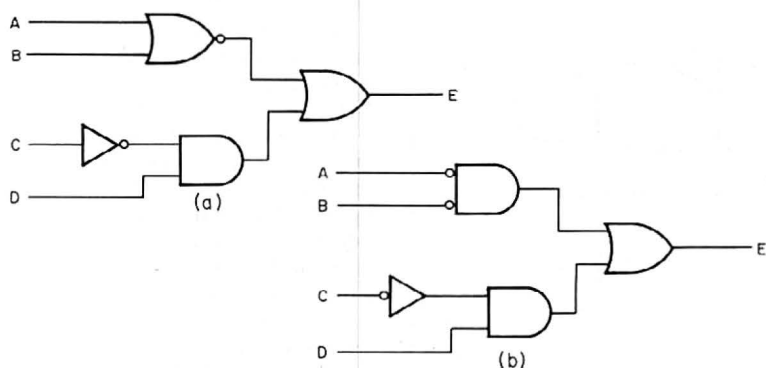


Figure 7. Logically identical circuits, but 7b uses bubbles properly and is easier to read.

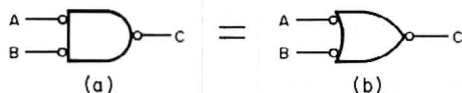


Figure 8. a) An AND gate with both inputs and the output inverted. b) . . .OR equivalent of Fig. 8a.

lier. The gate shown in Fig. 5c is logically equivalent to a NOR gate. Likewise, the inverted-input OR gate in Fig. 6 is logically equivalent to the NAND gate.

This ability to present different graphic representations for the same logic function is helpful, and simplifies many digital designs. It lets you talk through and read your design operation to see what's really going on. Look at Figs. 7a and 7b. They provide logically identical circuits, but 7b is easier to read because of the proper use of bubbles. I know that if A is false and B is false or if C is false and D is true, then E is true.

Note the use of the bubble on the input of the inverter instead of the output, as well as on the AND gate with the A and B inverted inputs (actually a NOR function). Since you're looking for the case when A is false and B is false, it is much easier to draw the circuit shown in Fig. 7b.

After designing your bubble, it's easy to determine the actual logic functions for the gates with the inverted inputs. All you have to do is switch the gate type (from AND to OR or vice versa) and invert all inputs and the output. If you have an AND gate with both inputs and the output inverted, as shown in Fig. 8a, change the AND to an OR and invert

Circle 347 on Reader Service card.

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both inputs and the output to get the OR gate shown in Fig. 8b.

If you look back, you'll see this is also true for the AND with the two inverted inputs in Fig. 7b changing to an OR with an inverted output in Fig. 7a.

Logic Equations

It is common to use mathematics to aid in various aspects of logic design. The math for a two-valued (binary) system is called Boolean algebra.

I'll describe how to present logic equations according to Boolean algebra. Since you are dealing with a two-valued world, each variable must have a representation for true and false. In general, you indicate a false value by a bar over the signal name and a true signal by the lack of a bar. Since I can't type overbars with my word processor, I will use a slash suffix to indicate a false value. Thus the signals A/, K/, and L/ are false while the signals A, K, and L are true signals.

Boolean algebra uses the add (+) and multiply (* or no symbol) symbols to represent logical ORing and ANDing. The logic equation for the circuit in Fig. 7 is: $E = (A/*B) + (C/*D)$. I added the parentheses for clarity, but like traditional algebra, the multiplication operator

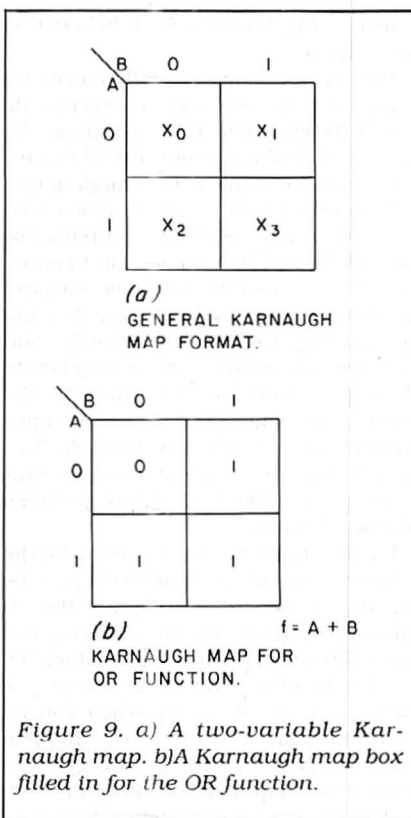
(ANDing) has precedence over the sum (ORing), allowing the parentheses to be removed without corrupting the equation's meaning.

Karnaugh Maps

A Karnaugh map (or Veitch diagram) minimizes the amount of logic needed to represent a given logic (black-box) function. You develop an equation from the map in sum-of-products (SOP) form (several ANDed signal combinations ORed together). Each group of ANDed signals is called a minterm.

The Karnaugh map is a diagram made up of squares. It has 2^n squares for an n-variable map. A two-variable Karnaugh map is shown in Fig. 9a. It has four boxes, with a different term in each box. I have also specified two variables (the input variables to the black box), A and B, and put possible values for the two variables next to the appropriate boxes on the respective sides of the map.

The first thing you should do is fill in the boxes with the value of the output for each combination of inputs. Figure 9b shows the box filled in for the OR function. The boxes are true whenever A is true and whenever B is true. So the equation for the output of the map



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shown in Fig. 9b is $C = A + B$ (where C is the output).

The Karnaugh map usually has many variables. The best way to describe its use is by example. I will describe, design, and build a hypothetical circuit you can solve with the Karnaugh map.

Assume we have a circuit (black box) with four inputs and three outputs. For each of the 16 (2^4) possible input combinations, I'll specify what the outputs must be according to the truth table given in Fig. 10 (chosen randomly). You now need to design a circuit to generate the logical function described by the truth table. Since you have four input variables, you'll use four-variable Karnaugh maps. Since you have three outputs, you'll need to develop three Karnaugh maps.

Figure 11a shows the first map, for the E output. The binary numbering on the top and left side of the map (for the CD and AB variable combinations) is not normal binary: The 11 value comes before the 10 value. This is because only 1 bit can change at a time when you go from one square to the next. This lets you specify horizontal or vertical sections of the map, where a particular variable is always true or always false (see

INPUTS				OUTPUTS		
A	B	C	D	E	F	G
0	0	0	0	1	1	1
0	0	0	1	0	1	1
0	0	1	0	0	1	0
0	0	1	1	1	1	0
0	1	0	0	1	0	1
0	1	0	1	1	0	1
0	1	1	0	1	0	0
0	1	1	1	1	0	0
1	0	0	0	1	0	0
1	0	0	1	0	0	1
1	0	1	0	0	1	0
1	0	1	1	1	1	1
1	1	0	0	0	0	0
1	1	0	1	0	0	1
1	1	1	0	0	0	0
1	1	1	1	1	0	1

Figure 10. A truth table for a black box you should build.

Fig. 11b). This allows you to generate the minterms for the map equation.

Fill in the map in Fig. 11a according to the E output specification of the truth table in Fig. 10. When you do this, you must group the 1's together. Do this so that you group as many 1's as possible together, in powers of four (e.g., 1, 2, 4, ...). These 1's must be all together in a symmetrical rectangle (or square), such as two 1's together, four 1's in a row or column, or four 1's in a square. Because of the map's design, you must also look at wraparound (think of the map as having the left and right sides wrapped around together, as well as the top and bottom sides wrapped together). A 1 in each of the four corners constitutes a group. A group may consist of only one square, but you must try to group as many together as possible. You may use a square more than once.

Looking at the map in Fig. 11a, you can see my grouping. The third column to the right and the second row down are two groups with overlap. Also, I grouped the top left and bottom left corners together using the wraparound topology of the map.

Once you finish the grouping, it's pretty easy to generate the correspond-

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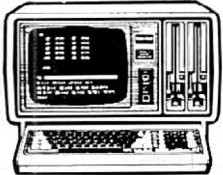

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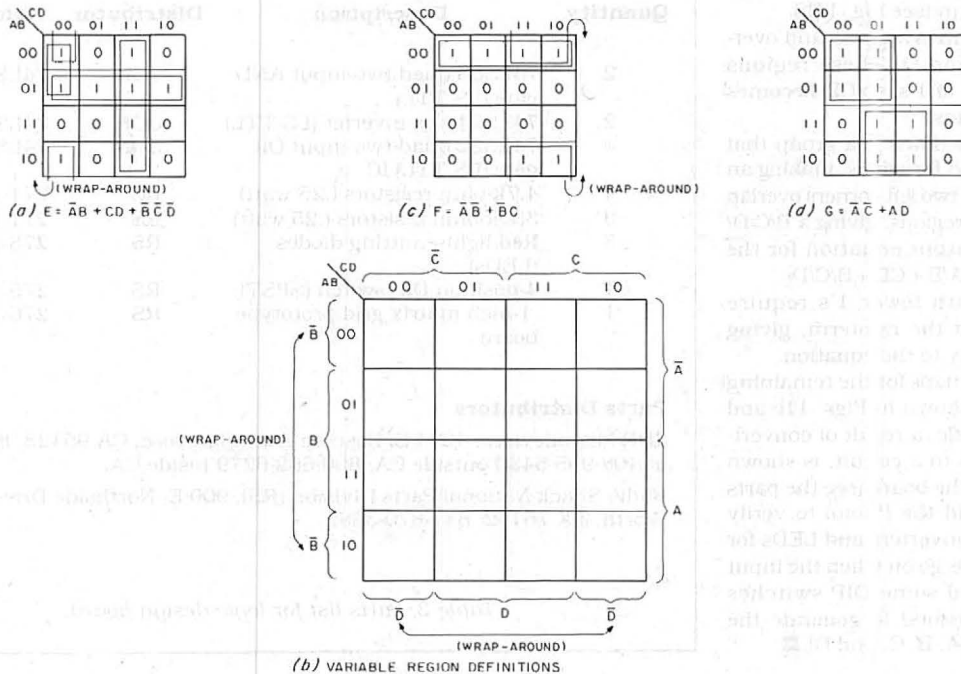
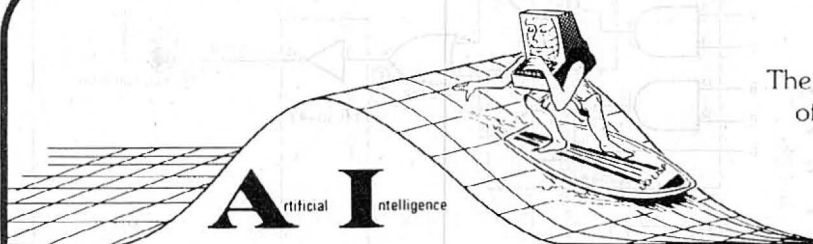


Figure 11. a) Karnaugh map indicating the exercise circuit's E output. b) You can specify vertical or horizontal sections of the map according to a variable's condition. c) and d) Karnaugh maps of the remaining two outputs.

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ing SOP equation. Look at which regions overlap and specify the corresponding group as a minterm (see Fig. 11b).

The third column is a group and overlaps regions C and D. These regions specify the group of 1's, so CD becomes one of the minterms.

The second row down is a group that overlaps the A/ and B regions, making an A/B minterm. The two left corners overlap the B/, C/, and D/ regions, giving a B/C/D/ minterm. The output equation for the map, then, is $E = A/B + CD + B/C/D/$.

The groups with fewer 1's require more variables in the minterm, giving greater complexity to the equation.

The Karnaugh maps for the remaining two outputs are shown in Figs. 11c and 11d. The schematic, a result of converting the equations to a circuit, is shown in Fig. 12. I built the board (see the parts list in Table 2 and the Photo) to verify operation. I used inverters and LEDs for output (since LEDs go on when the input signal is low) and some DIP switches (with pull-up resistors) to generate the true/false inputs (A, B, C, and D). ■

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1	74LS32 quad two-input OR gate (LS TTL) IC	JDR	74LS32	.29
4	4.7k-ohm resistors (.25 watt)	RS	271-1330	.08
3	330k-ohm resistors (.25 watt)	RS	271-1315	.08
3	Red light-emitting diodes (LEDs)	RS	276-041	.35
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Table 2. Parts list for logic design board.

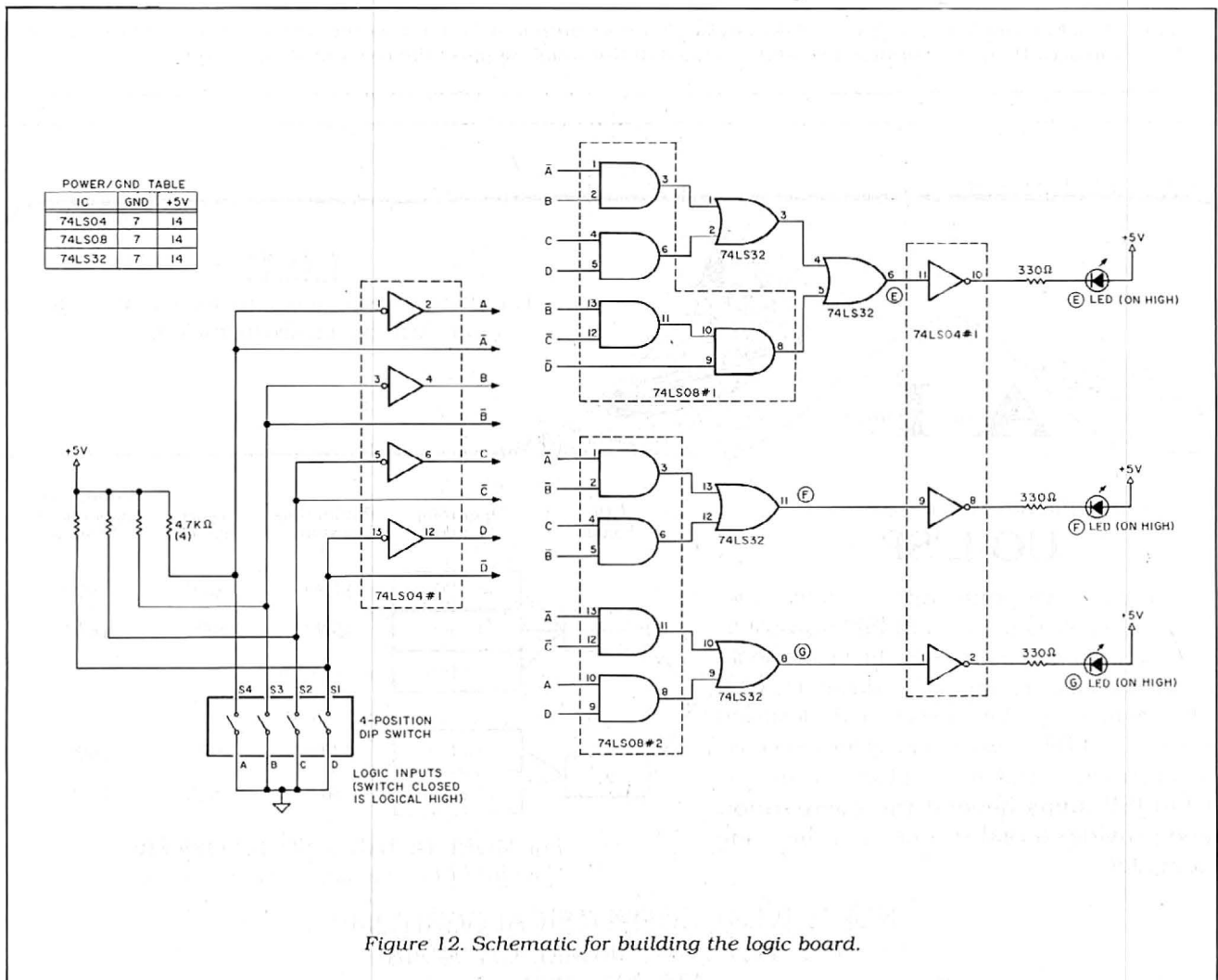


Figure 12. Schematic for building the logic board.

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Drive Ins and Outs: Controlling Your Hard Disk

Heaven is running CHKDSK on drive C and finding that my new hard disk gives me 10,592,256 bytes of storage. Hell is putting several hundred files on the disk and trying to manage them all.

Fortunately, the *raison d'être* of MS-DOS 2.X and its subdirectories is to clean up such messes. This month I'll describe some of the headway I've made.

First, I put each application (even DOS files) with its data files in a separate subdirectory. I access a particular program through a batch file (kept in a batch file subdirectory) with a short name I can remember.

A typical batch file changes the default directory to the application subdirectory, then runs the program (see Fig. 1). The program stores its data files in its subdirectory. After I run the program, the batch file returns to the root directory. The batch file in Fig. 1 is named MP.BAT. To run Multiplan, I just type in MP.

The Path command makes files in specified directories available from any other directory. I use Path to point to the root directory and to the subdirectories containing DOS and my batch files (named, of course, DOS and Batch). They contain files that I always want available as tools no matter what subdirectory I'm in. Semicolons separate paths in the list: PATH C:\;C:\DOS;C:\BATCH.

Whenever you type in the name of a .COM, .EXE, or .BAT file, DOS searches the current directory, then goes through the directories listed in the last Path command. It's best to put the Path command in your AUTOEXEC.BAT file so you don't have to bother with it each time you turn on your computer. You must have the AUTOEXEC.BAT file in the root directory so DOS can find it when you boot up.

For one subdirectory containing many executable programs, I've got a fancier batch file, U.BAT (see Fig. 2). It's slick because it can take a parameter (the name of the program I want to run), but can also handle a missing parameter if I can't remember the name of a program. I keep the Norton Utilities and Super Utility in a sub-



directory named Utility. To run NU or SU, I type in U NU or U SU. If I want to use one of those Norton Utilities I can never remember, I just type in U, and a directory of that subdirectory appears.

The trick to U.BAT lies in its third line. The %1 in Fig. 2 represents any file name I type in with the name of the batch file. If I type in a file name, then the equality becomes false and logic falls through to the next line, which executes the named program, then returns me to the root directory. If I don't add a file name, %1 is nothing, and the equality becomes true (. = = .). Logic goes to the :dir label and I get a short-form directory (/w) of all .COM files in the Utility subdirectory. I'm still in the subdirectory and can run any of the programs listed there. I use another batch file to return to the root directory. Because Path points to the subdirectory Batch, DOS can find and run it from within the Utility subdirectory.

You can use other characters for the two periods in the third line, as long as they're both the same. They're just fillers. I had first tried the line IF NOT .%1 = = . GOTO RUN. It should work, according to the rules in the manual, but it doesn't.

One thing that's always bothered me about DOS 2.X is that you can't run a program that's not in the current direc-

tory, even if you specify its full path-name (unless you've selected its subdirectory with Path). You can list, copy, or delete the file, but not execute it. The DOS prompt returns with no message after you press the enter key. PC-DOS 3.X solves this problem.

By the way, I'm using an internal 10 megabyte hard drive from Hard Drive Specialist (\$549 with controller). Getting a PC-compatible hard drive to work on the 1000 involves major changes to the controller board ROM, and several companies are going ahead. The good news is that a glut of 10M and 20M drives is driving prices down. I'll be looking at several hard drives next month.

U's News

John Harrell put me on to some problems with Super Utility on the Tandy 2000. It's usable but annoying. The display isn't quite right, and the drive description section doesn't recognize drive B.

I tried the Norton Utilities on the 2000 as well. You have to use the /D1 parameter when you load the program or you'll have to reboot. Typing NU/D1 changes the video driver for less compatible machines. Also, when I used MS-DOS 2.11 on a 256K 2000, I didn't have enough room left to run the Norton Utilities.

I find myself going for Super Utility to do disk editing. Some of the Norton Utilities, however, are essential to a hard drive system. The FILEFIND program, for instance, can find a file no matter how deeply buried in subdirectories, and it uses wildcards. LISTDIR lists all the subdirectories on a drive.

Achilles' Heel

Protected Basic files aren't invulnerable. Some very clever people have found ways to bypass the protection scheme. I've heard of programs that can decode protected files right off the disk. It's easier, however, to unprotect them in memory.

Here are two ways to do it.

The first was in John Harrell's 2000 Plus column (December 1984, p. 162), submitted by B.L. Price of Newark, OH. It's basically a way to recover any program after typing in NEW, which erases the program in memory. It works on the 1000, too. When you type in NEW, programs in memory aren't really erased. Some pointers at the beginning are changed to indicate there isn't a program anymore, but the rest still resides in memory. New also turns off program protection. This method puts a new first line in memory and links it, after a fashion, with the old program. The first line of the old program is lost in the process.

Load a protected program and type in NEW. Then type in PRINT CHR\$(14), and a musical note appears. Put the cursor on that note and, using the insert key, type in 10 PRINT "" before the note symbol. The symbol should end up right after the quotation mark. Press the enter key and list the program. The protected program should reappear with some garbage between the new first line and the old second line. You cannot edit it at this stage without hanging up the computer. Save the file in ASCII format and edit it with a text editor.

A second method works only on the 1000. Because it uses the Shell command to load Debug over Basic, there isn't enough memory on a 128K machine to do this. You first find Basic's data segment (see last month's column, p. 92) by typing in PRINT HEX\$(PEEK(PEEK(&H04A6))):HEX\$(PEEK(&H04A5)) right after loading Basic. Write down the resulting four-digit hex number. Load the protected program and type in the lines in Fig. 3, putting in your hex number in the second line where "XXXX" appears. You must also type the last zero in the third line. Your Basic program is now unprotected and intact. Save it.

Only 1 byte in RAM makes the difference. Everything else is the same. The 1000's Basic checks the value of that byte before letting you list, POKE, edit, save, or merge. If you try to save a protected

```
cd multipln 'change to subdirectory
mp          'run application
cd \        'back to root directory
```

Figure 1. The MP.BAT batch file.

```
echo off
cd c:\utility
if %1 == . goto dir
%1
cd c:\
goto end
:dir
dir *.com/w
:cmd
```

Figure 2. The U.BAT batch file.

```
SHELL "DEBUG"
-e XXXX:05B9
XXXX:05B9 FE.0
-q
SAVE "UNPROTCT.BAS"
```

Figure 3. Commands to unprotect Basic programs.

```
c:          'change default to RAM
           drive
copy b:%1 'copy data file to RAM
           disk
a:twriter  'load application on A:
copy %1 b: 'modified data back to
           floppy
a:         'default drive back to A:
```

Figure 4. T.BAT, batch file for using data file on RAM disk.

program over itself. Basic wipes out the original file and displays an "Illegal function call" message (a bug, I think).

The byte is 1,465 (05B9 hexadecimal [hex]) in Basic's data area and Todd Roy, who hangs out in the Tandy SIG on CompuServe, discovered it. If this byte is 00, the program is at your mercy. If it's 254 (FE hex), you can run it, but that's all. If you write a program, then type in POKE 1465,254; it becomes protected and you can't UNPOKE it. You can't even save it.

RAM Disk Deluxe

Now that I'm up to 640K, I'm finding that a RAM disk is quite handy. It's a

convenient place to put temporary files when I'm transferring scraps of text among applications. I don't have to worry about deleting them later. It's also a good place to download messages or data from CompuServe or other on-line services before editing for more permanent storage. A RAM disk is immediate and silent.

If you've got a word processor or program like ThinkTank that constantly accesses a data disk in drive B, a RAM disk can also save you time and drive wear. The batch file in Fig. 4 loads a copy of a selected data file from your data disk in drive B to RAM disk. The application program works on the RAM disk version, which is copied back to the floppy when you're through.

I named the file T.BAT. To work on a data file named Work.TXT, I type in T WORK.TXT. The %1 in the two Copy command lines is a batch file variable representing the file I name in the command line. The second Copy command ensures that I save the RAM file to a floppy. If I lose power, however, I've lost my work.

Odds and Ends

Chan Shippy of Colome, SD, wrote regarding his suggestion for using the screen's 25th line with View Print (September 1985, p. 82). Don't edit Basic programs on the bottom line. Results are unpredictable.

If you have the original Model 1000 Basic, you may find your cursor missing at times. That's not your doing, but a bug in Basic. The easiest way to recover the cursor is to use the Shell command to execute the DOS Mode program (you must have Mode.EXE in the current directory):

```
SHELL "MODE CO80" 'for color monitor, or:
SHELL "MODE BW80" 'for black-and-white
monitor.
```

The ultimate solution is to upgrade to the latest version of Basic and DOS for free. Improvements to the new version of DOS include wider printer support for the graphics screen dump program, Graphics.COM—it handles Epson printers as well as Tandy's. In addition, SYS.COM now lets you put system files on disks formatted by other versions of MS-DOS. You can thus make certain copy-protected disks bootable.

I've talked several times with reader JoAnn Ream. She finds that Framework operates nicely on the Tandy 1000, once you install KEYCNVRT.SYS via the CONFIG.SYS file. I assume she's got lots of RAM. ■

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

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Quill Corp.'s Accounting Partner I meets the bookkeeping needs of small- and medium-size businesses. Designed by Star Software Systems, the package includes general ledger, accounts receivable, inventory, accounts payable, purchase orders, and payroll.

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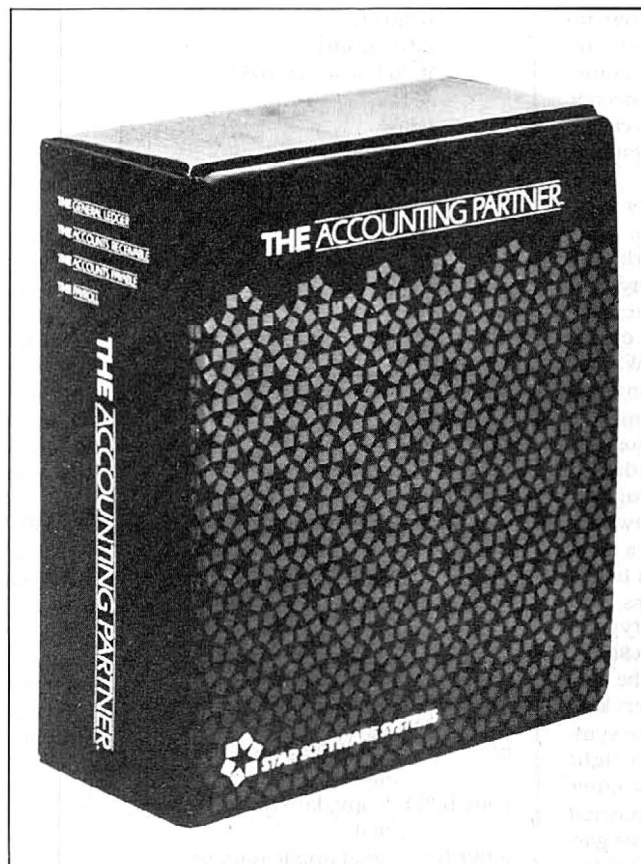
The package runs on an IBM PC or compatible with floppy disks or a hard disk drive and costs \$294.87. For more information, contact Quill Corp., 100 S. Schelter Road, Lincolnshire, IL 60069, 312-634-4800.

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Fastback is a self-contained hard disk back-up system for the IBM PC, XT, AT and compatibles that run MS-DOS 2.0 or higher. Fastback (along with its companion restore utility, Frestore) comes on a single 360K disk.

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For more information, contact Software Publishing Corp., 1901 Landings Drive, Mountain View, CA 94043, 415-962-8910.

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Taxes Due

EZWare Corp.'s new EZTax-Plan Pro (\$295) for the Models 1000, 1200, and 2000 lets you plan tax deposit requirements, make decisions regarding shift of income or expense into future years, de-

termine acquisition timing and tax elections of recovery property and real estate, develop the best strategy under current tax laws, and examine what-if alternatives.

EZTax-Plan Pro parallels tax forms 1120 and 1040 and related schedules, and provides five templates to facilitate tax planning. The templates compute income tax, alternative minimum tax, self-employment tax, tax under income averaging, investment tax credit, and more.

The program works with Multiplan, Lotus 1-2-3, and Excel. It includes both current law and proposed tax reforms.

For further information, contact EZWare Corp., 29 Bala Ave., Bala Cynwyd, PA 19004, 215-667-4064.

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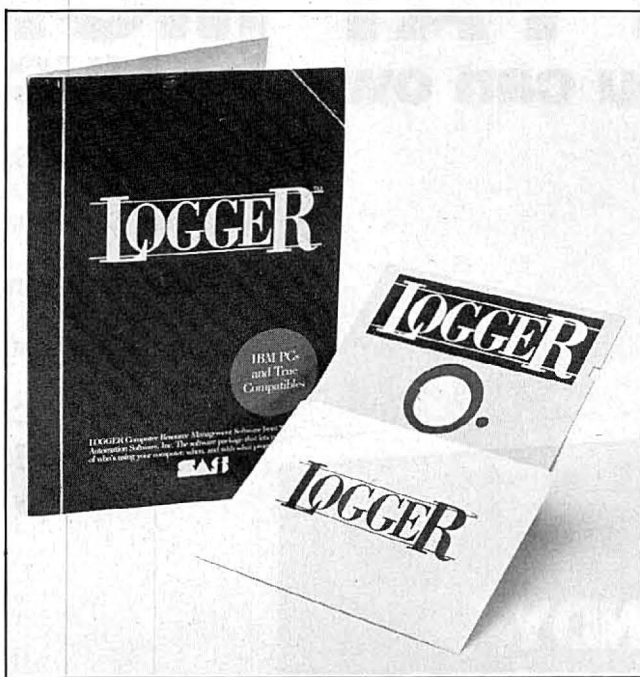
The program keeps track of what files and programs you access, what you do with them, who does it, and when. You activate Logger at the start of the day and it remains in memory and invisible until you shut down the computer. Logger reports include user name, weekday, date, time-in and time-out, directory name, and a variety of user-defined parameters.

You need 128K, two floppy disk drives or one floppy drive and one hard drive. For more information, contact System Automation Software Inc., 8555 16th St., Silver Spring, MD 20910, 301-565-8080.

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Geminy SW offers seven disks for Tandy computers that help you learn Basic programming skills as you play games. The disks include a chess game, a rummy game, and game-related projects.

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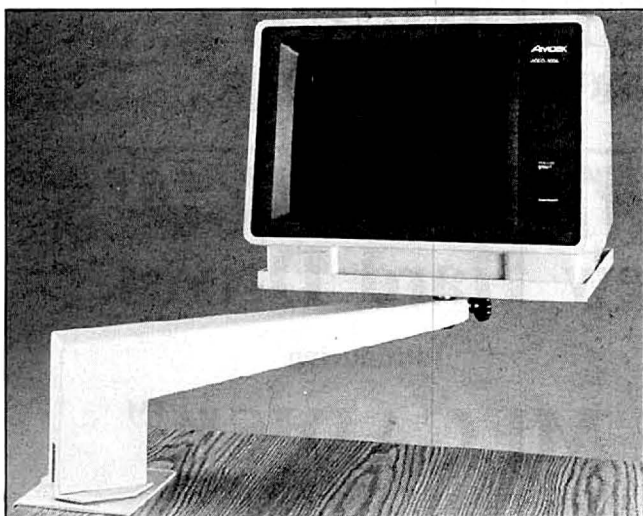
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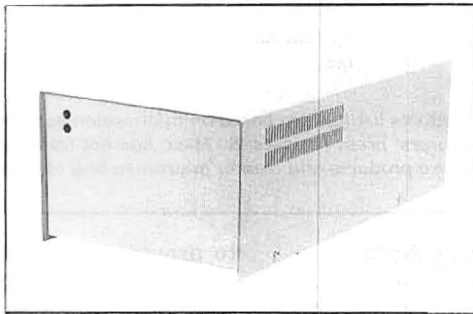
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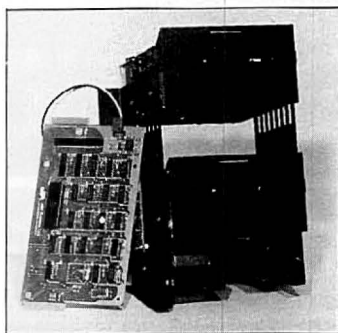
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Character Building: Using Control Codes in Basic

Dismay turned to delight when I discovered I could make the tiny characters on my Model 4P twice as fat just by going into Basic, typing in `PRINT CHR$(23)`, and pressing the enter key. The result was a sight for sore bifocals.

Most often, the command `PRINT CHR$(X)` displays a character on the screen. The `CHR$(X)` numbers from zero to 31 are different. They are called control codes and you can use them singly and in combination to move the cursor around the screen; turn the cursor on and off; start and end reverse video (in the Model 4); set 32- or 64-character lines in the Model III, or 40- or 80-character lines in the Model 4; erase screen data; and activate special characters.

Control Code Stratagems

You can use most Basic-activated codes from `CHR$(0)` to `CHR$(31)` to perform neat bits of legerdemain in your programming (see your manual for a definition of the character codes). `CHR$(0)` is an interesting little thing. It's a null character in that it exists in computer memory if you put it there, but you can't see it. In Basic, type in `A$ = "M" + CHR$(0) + "E"` and press the enter key. Then type in `PRINT A$` to see the word "ME." Now type in `PRINT LEN(A$)` to prove to yourself that `A$` has three characters in it, though only two show.

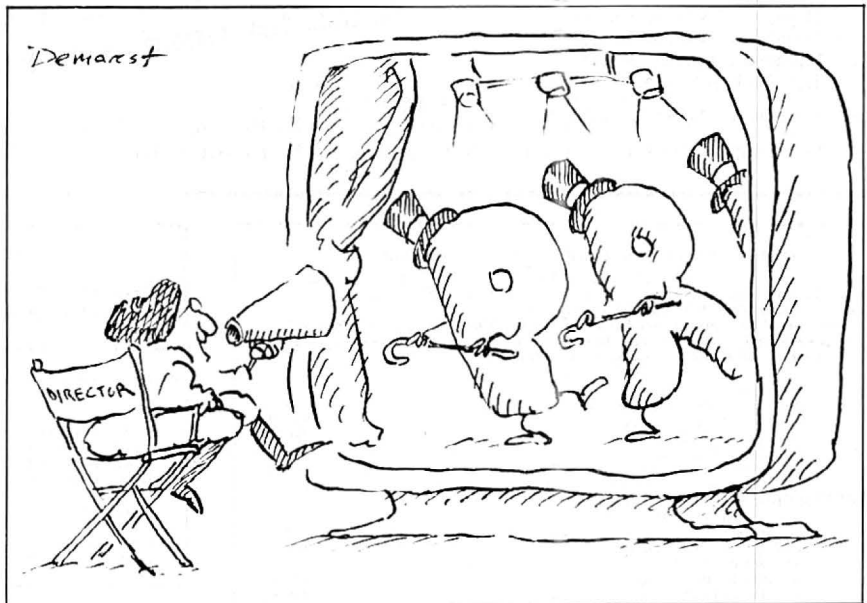
In the Model 4, `CHR$(0)` has a stated use. It prints 31 special characters. In the Model III, you must `POKE` these characters into video RAM. Type in the following Model 4 listing:

```
100 CLS: CLEAR
110 FOR X = 1 TO 31
120 PRINT CHR$(0);CHR$(X);" ";
130 NEXT X: PRINT CHR$(14): END
```

How you use these 31 special characters may depend on your knowledge in other fields. For example, the following listing puts the umlauts where they should be in an aphorism written in German:

System Requirements

Models III and 4/4P
Basic



```
100 CLS: CLEAR: PRINT "Ein unn";
110 PRINT CHR$(0);CHR$(21);
120 PRINT "tz Leben ist ein fr";
130 PRINT CHR$(0);CHR$(21);
140 PRINT "her Tod"; PRINT
150 PRINT " —Goethe"; END
```

Taking More Control

Codes 1-7, 11, 12, and 18-20 are given no discernible functions in Basic. But they do have uses. Your printer may use them. You might find them embedded in word processors, and their values can serve purposes in Assembly language.

So we skip to `CHR$(8)`. It backspaces and crases, just as tapping the left-arrow key does. The following listing shows how. Line 160 does it:

```
100 CLS: CLEAR
110 A$ = "The amazing disappearing line."
120 PRINT A$:
130 FOR T = 1 TO 500: NEXT T
140 FOR G = 1 TO LEN(A$)
150 FOR T = 1 TO 100: NEXT T
160 PRINT CHR$(8);: NEXT G: END
```

The semicolons in lines 120 and 160 keep the cursor position where it belongs. Otherwise, a print statement takes the cursor to the next line.

`CHR$(9)` moves the cursor to the next tab position, which is every eighth position across the line. The next listing demonstrates it by printing each character of

the sentence you enter at successive tab positions:

```
100 CLS: CLEAR
110 PRINT "Type a sentence and enter."
120 INPUT A$: FOR X = 1 TO LEN(A$)
130 PRINT MID$(A$,X,1);CHR$(9);: NEXT:
END
```

`CHR$(10)` and `CHR$(13)` might confuse because they both appear to move the cursor to the start of the next line. `CHR$(10)` is the same as pressing the down arrow, and `CHR$(13)` is the same as pressing enter. As you might imagine, they are involved in line printer commands to create carriage returns where needed. The following listing uses an `INKEY$` test for a pressed enter key to make sure the program user follows directions:

```
100 CLS: CLEAR: N = 1
110 PRINT "Press enter to continue."
120 A$ = INKEY$: IF A$ = "" THEN 120
130 IF A$ <> CHR$(13) THEN N = N + 1:
GOTO 120
140 PRINT "It took you "N":
150 IF N = 1 THEN PRINT "try";: END
ELSE PRINT "tries";: END
```

`CHR$(14)` turns the cursor on, while `CHR$(15)` turns it off. Type `PRINT CHR$(15)` to see it disappear. The absence can be confusing. Sometimes, when fiddling around, you can lose the cursor. Now you know how to reclaim it.

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BASIC TAKES

Why ever turn off the cursor? Try the next listing:

```
100 CLS: CLEAR: PRINT CHR$(14)
110 FOR X = 1 TO 500: ? @ 0,"X": NEXT: END
```

See the flickering appearance of the cursor each time it prints "X"? Insert 105 PRINT CHR\$(15) and see the calm difference. This is how you can avoid cursor flicker. CHR\$(16) reverses video, so characters are printed in black on a white background. CHR\$(17) returns to white on black. Here's how you might highlight information by reversing it:

```
100 CLS: CLEAR
110 PRINT @ 128,CHR$(17);"CODE NAME";
CHR$(16);"VULTURE";CHR$(17)
120 FOR X = 1 TO 10: PRINT: NEXT: END
```

Toggling Talk

You can make CHR\$(21) and CHR\$(22) toggle between different characters available in the range CHR\$(192) to CHR\$(255). Try CHR\$(22) first:

```
100 CLS: CLEAR: PRINT CHR$(23)
110 FOR X = 192 TO 255: PRINT CHR$(X)::
NEXT
120 PRINT CHR$(22):: FOR T = 1 TO 500:
NEXT: GOTO 120
```

Each time line 120 loops back on itself and prints CHR\$(22), the characters on the screen switch back and forth between

sets. Press the break key to stop the action on either set. You should remember the toggling alternates every time you use CHR\$(22), and to take care in bringing up the characters you want.

Now try another toggle state:

```
100 CLS: CLEAR: PRINT CHR$(23)
110 PRINT CHR$(21)
120 FOR X = 192 TO 255: PRINT CHR$(X)::
NEXT: END
```

Each time you run the listing you see a different effect. What's happening when the cursor simply flickers over the screen? Something important. When you turn on the computer, and every second CHR\$(21) toggle thereafter, you can use space compression codes that work like SPACE\$ but store blanks in fewer bytes. It takes only eight bytes to store a printable 64 blank spaces in a variable.

You may print these spaces as literals: PRINT CHR\$(204), or assigned to variables: A\$ = CHR\$(197).

The following listing gives an example. If a character resembling a funny little figure appears at the top of the screen, break into the program and run it again to toggle to space code compression. Then answer the prompts to see requested spaces printed between two asterisks. Notice the form in line 140. Making the value 192 plus a number from

zero to 63 is an easy way of keeping track of a value.

```
100 CLS: CLEAR
110 PRINT CHR$(21);CHR$(254)
120 INPUT "HOW MANY SPACES:
0 TO 63";X
130 X = INT(X): IF X < 0 OR X > 63 THEN CLS:
GOTO 120
140 PRINT "*****";CHR$(192 + X);"*****": PRINT:
GOTO 120: END
```

CHR\$(23) switches to a 40-character line, as you learned at the beginning of the article. CHR\$(28) switches back to 80 characters, as well as moving the cursor to the upper left corner of the screen.

The rest of the codes are cursor movers that you can activate within a program: 24 backspaces without erasing, 25 advances, 26 moves down, 27 moves up, 29 erases a line and starts at its beginning, 30 erases to the end of a line, and 31 erases from cursor position to end of screen display.

As with all Basic knowledge, uses for these tricksters will spring from specific needs. Backing up a cursor without erasing may now seem like an electronic parlor trick, but sooner or later it will be the perfect answer to a needed program event. ■

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TIDBIT #31

BasicG, the Basic that comes with Radio Shack's high-resolution boards for the Modcls III and 4, provides a way to write text to the graphics screen using the function PRINT#-3. However, the lowercase letters "g," "j," "p," "q," and "y" lack true descenders.

It's relatively easy to modify those letters for a better appearance. BasicG stores the letters in a table that represents each character as a sequential string of 8 bytes. Each byte is a bit image of one horizontal line of a character, so each character is in an 8- by 8-bit matrix with a null byte as its lower byte. You simply move the let-

ters "g," "j," "p," "q," and "y" down one line and add a dot to the "j."

The Table shows the characters' locations in the disk file BasicG/CMD. Basic and the corrected bytes. The easiest way to make the changes is with a disk zap utility such as the Model 4 program Zap Master (April 1985, p. 62). Once you know where the letter tables are, you can modify the characters CHR\$(32)-CHR\$(127) at will, but bear in mind that an 8- by 8-bit matrix won't allow for a particularly fancy font.

John Ragle
Amherst, MA

CHR	Model III	Bit Image	Model 4
g	RSEC 31, D2-	00 00 1E 22 22 1E 02 1C	RSEC 102, 2C-
j	RSEC 31, EA-	00 02 06 02 02 02 22 1C	RSEC 102, 44-
p	RSEC 32, 1A-	00 00 2C 32 22 36 20 20	RSEC 102, 74-
q	RSEC 32, 22-	00 00 1A 26 22 1E 02 02	RSEC 102, 7C-
y	RSEC 32, 66-	00 00 22 22 22 1E 02 1C	RSEC 102, CO-

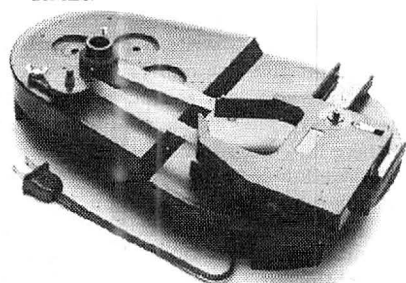
Table. Locations for letters with descenders in BasicG. RSEC 31 is track 7, sector 8. RSEC 32 is track 7, sector 9. RSEC 102 is track 34, sector 12.

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Macro Instructions: How to Increase Program Efficiency

I own five well-known books on Assembly-language programming that share one disturbing characteristic: They all say little or nothing about macro instructions and how to use them. Their assumption seems to be that macros are too complex for most programmers.

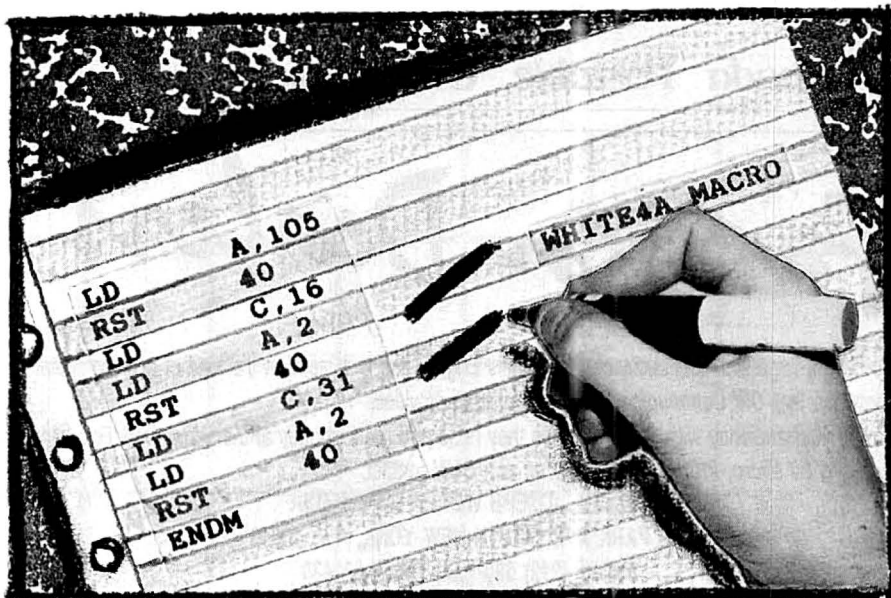
However, if you use the LDOS or TRSDOS 6 KSM/FLT, or a word processor that lets you insert a word or phrase with a single keystroke, you already use macros. If you use Basic's user-function commands (DEF FN and FN), you already know how to program one kind of macro. (If you don't use those instructions in Basic, you might want to read Lewis Rosenfelder's *Basic Faster and Better* for an excellent description of this often-neglected Basic command.)

Good Assembly-language programmers use macro commands both to save time and to make their programs easier to understand and debug. Unfortunately, not all assemblers support macro instructions, and most macro assemblers use different syntax for the same instructions. In the following discussion, I'll use the syntax required by the Miso-sys assemblers: EDAS (versions 4 and up), PRO-CREATE, MRAS, and PRO-MRAS. At the end of the column, I'll explain how to change that syntax to fit the other TRS-80 macro assemblers.

Macros for the Millions

In its simplest form, a macro instruction is merely a way to get the assembler to write some of your source code for you. When you write a macro instruction, you give it a name. As the assembler converts your source code to object code and comes across that name somewhere in a program, it inserts the macro instruction code into your program just as if you had typed it in manually.

An example should make the process clearer. On the Model 4, the easiest way to white out the screen is to clear the screen and print ASCII characters 16



and 31. The first character turns on reverse video, the second erases to the end of the screen. Using the Assembly-language supervisor calls (SVCs) 105 (clear screen in TRSDOS 6.2 only) and 2 (display a character), you can write a Model 4 white-out macro like this:

```
WHITE4A MACRO
LD      A,105
RST    40
LD      C,16
LD      A,2
RST    40
LD      C,31
LD      A,2
RST    40
ENDM
```

The first line defines the following block of code as a macro instruction and gives it the name WHITE4A. The next seven lines are the actual assembly instructions. The ENDM directive in the last line tells the assembler that it has reached the end of this particular macro definition.

If you include those nine lines near the beginning of an Assembly-language program, you could clear the screen any time in the program by including the single command WHITE4A like this:

```
ROUTINE  some instructions
        WHITE4A
        more instructions
```

During assembly, the assembler will replace the single line WHITE4A with the seven lines of code in the original macro instruction and then assemble that code normally. Notice that the macro name, WHITE4A, is indented as though it were a machine command like LD or an assembler directive like DEFB.

You may think that a macro instruction is similar to a subroutine. However, a macro doesn't usually involve a Call or RET instruction (although it could) and a macro doesn't take up any space in your assembled program unless you use it.

That second difference is important, because it means you can merge an entire library of macro instructions into the beginning of a program without making the resulting program any longer. The only macros that would appear in your final object code would be those you invoked. Unused macros will be in your source code (and you can prevent them from listing with the List Off directive) but the assembler will ignore them.

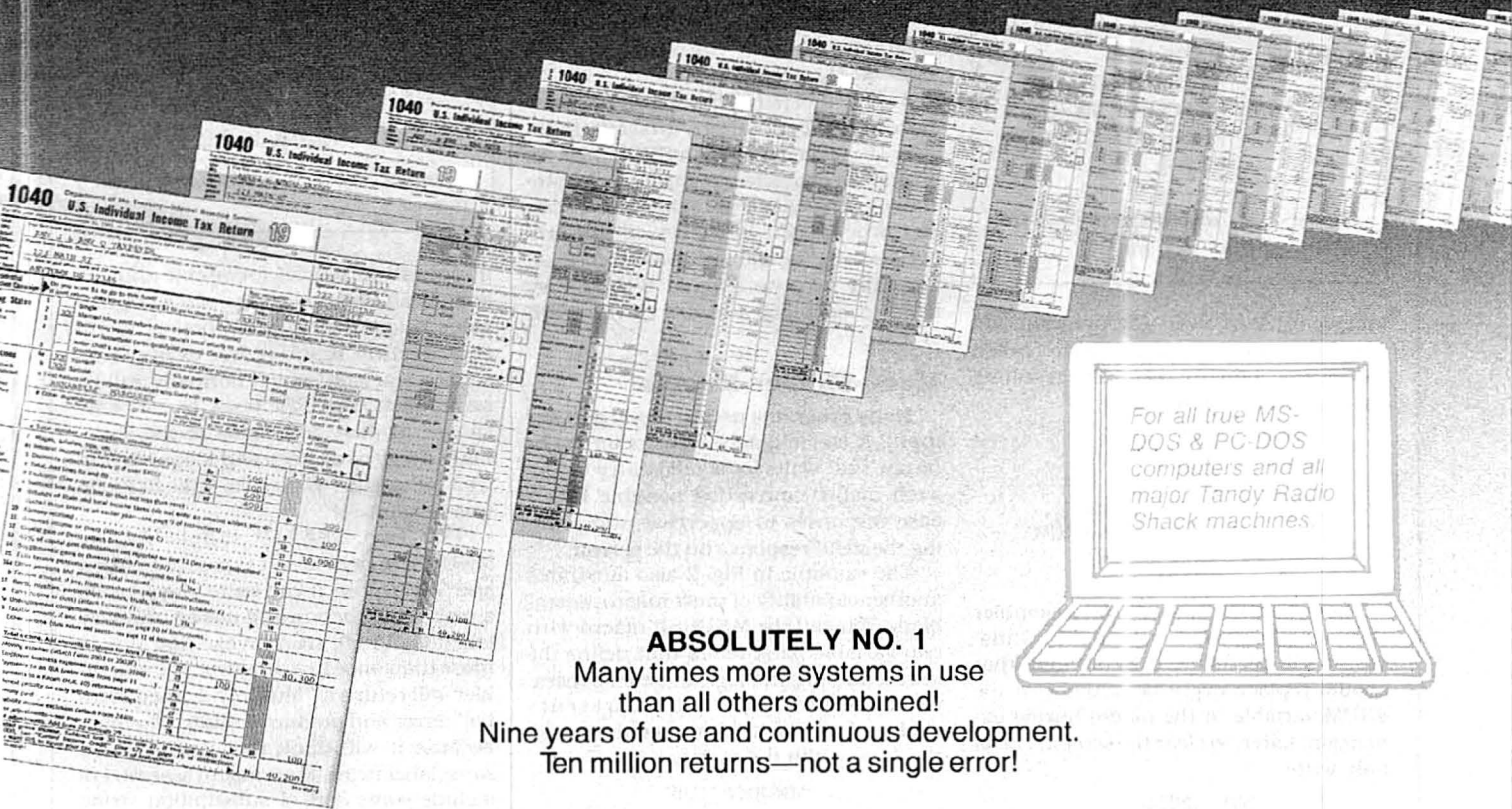
Of course, not all macro instructions are as simple as that in the example above. Every macro assembler I know of supports variable replacement inside the macros. This means that you don't need to know the actual values you want to use in a macro when you write it; you can use variables instead. For example, at the beginning of a Model 4 program, I

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```

INVON EQU 16
CLREND EQU 31
:
PRTCHR MACRO #CHAR
LD C,#CHAR
SVC @DSP
ENDM
:
WHITE4 MACRO
SVC @CLS
PRTCHR INVON
PRTCHR CLREND
ENDM
    
```

Figure 1. A nested version of the white-out macro.

include a list of SVCs the program will use. Then I define a single macro called SVC that will invoke them. The resulting code looks something like this:

```

@DSP EQU 2
@CLS EQU 102
:
SVC #NUM
LD A,#NUM
RST 40
ENDM
    
```

Those instructions tell the assembler that whenever you invoke the SVC macro, it will be followed by a value that should replace every occurrence of the #NUM variable in the macro during expansion. Later, to clear the screen, I need only write

```
SVC @CLS
```

and the assembler will turn that line into the following two lines of code:

```
LD A,102
RST 40
```

My command—SVC @CLS—is easier to understand. The two lines that result are necessary for the assembler to create the code the computer can process.

You can also nest macros—use one inside another. After defining the SVC macro above, I can rewrite WHITE4 to be much more intelligible. First, I'll add a few more equates to our program. Then I'll define a new macro called PRTCHR, which prints a single character on the screen. Finally, I'll rewrite WHITE4 in a way that makes its operation fairly understandable, even without comments (see Fig. 1).

The version of WHITE4 shown in Fig. 1 comprises only three instructions: clear the screen (using an SVC), print an inverse-on character, and print a clear-to-end-of-frame character. When the assembler processes it, however, it will produce exactly the same code as WHITE4A. You may want to expand WHITE4 by hand to convince yourself of the truth of that.

Menu-Minder Macros

Many programs use menus to get user input. A useful macro instruction might be one that waits for a valid entry to any such menu, converting possible lowercase responses to uppercase and printing the valid response on the screen.

The example in Fig. 2 also illustrates another capability of most macro assemblers. You call the MNURSP macro with two variable parameters that define the lowest and highest legitimate responses. For example, if the menu presents choices 1 through 5, you would invoke the macro with the command:

```
MNURSP '1','5'
```

Notice that 1 and 5 are in quotes to show that they are characters, not numeric values.

MNURSP begins by waiting for a keystroke with the @KEY SVC. It then converts that keystroke to uppercase by ANDing the value returned with 5F hexadecimal (hex). This macro takes a shortcut by assuming that you won't use

```

@KEY EQU 1
:
MNURSP MACRO #LOW,#HIGH
$$?1 SVC @KEY
AND 5FH
CP #LOW
JR C,$$?1
CP #HIGH+1
JR NC,$$?1
LD C,A
SVC @DSP
ENDM
    
```

Figure 2. A sample menu-response macro.

punctuation marks for menu choices and doesn't test the range of the original value before the AND instruction. It will change curly brackets, for example, to square brackets, which normally will be no problem. MNURSP tests the user's response against both ends of the legitimate range of choices and loops back to wait for another keystroke if the first one was invalid.

The two "\$\$?1" labels in the MNURSP macro aren't typos, but have a special purpose. If you write a loop inside a macro instruction and use an ordinary label like LP10, then invoke that macro more than once in a program, the assembler will return a "Multiply defined symbol" error and produce a faulty assembly because it will think that you used the same label twice. Most macro assemblers include some sort of substitution string that you can utilize for label names inside a macro to avoid confusing the assembler.

Misosys assemblers use a question mark for the substitution string. Each time the assembler expands a macro, it increments a two-character counter that it then inserts in place of all question marks.

TIDBIT #32

On the Model 100, I find it easier to type in Basic programs using Basic's Edit function. However, I sometimes get caught without enough memory to convert the edited file back to Basic. Here's the method I use to save the complete edited file and return to Basic:

1. Press the F8 key and wait until the "Memory full" message appears and you're prompted to press the spacebar for the Text mode. After you press the spacebar, the cursor appears at the end of a Basic line statement; this is the last line converted to Basic.
2. Move the cursor to the beginning of that line number.
3. Press the F7 key (the Select key).

4. Press control/up-arrow to go to the beginning of the program. The part you selected will appear in reverse video.
5. Press the F6 key to delete the selected text; these are the program lines you already converted to Basic.
6. Press the F7 key and then the F6 key to clear the Select buffer.
7. Press the F8 key to return to Basic from the Edit mode.
8. Repeat the procedure until you've converted the whole program to Basic.

You can use a similar method to convert a .DO file to Basic when you're running out of memory. Get into Basic and load your file (LOAD

"FILE NAME.DO). If the "?OM error" message appears, use this procedure:

1. Use the F5 key to list the file and see the last line number converted.
2. Return to the menu and load the .DO file.
3. Delete the converted lines from your text file as described above.
4. Press F7 and then F6 to clear the Select buffer.
5. Return to the menu, then go into Basic. Your converted lines will still be there.
6. Type in MERGE"FILE NAME.DO".
7. Repeat the procedure until you convert the whole file.

Thomas L. Quindry
Burke, VA

THE NEXT STEP

In the first expanded macro in your program, the assembler will replace question marks with AA; in the next macro, it will replace them with AB, and so on. If you face the possibility of having more than 676 macro expansions in a single program, you can add a local prefix character before the two letters.

The two dollar signs also have a purpose. You need to make sure that the labels inside your macros cannot possibly conflict with label names in the rest of your program. If you keep a number of macro instructions in a library included at the top of every program you write, the convention of starting all macro labels with a double dollar-sign should help you avoid all possible conflicts.

Conditional Assembly

Nearly all assemblers that allow macro instructions, as well as some that don't, also support conditional assembly. You generally use conditional statements to generate different programs for different machines or to write "smart" macros that will expand to different code based on the values of the variables when the assembler expands the macro.

For example, suppose you want to write a macro instruction that can determine whether it is being assembled to run on a Model III or a Model 4 and will generate white-out code for the appropriate computer. The macro definitions might look something like those listed in Fig. 3.

The first macro definition defines a screen white-out for the Models I and III. The second defines a general screen white-out that produces the appropriate code for either a Model I/III or a Model 4. The code actually produced is just as efficient as the original versions of each, but makes the assembler work a little harder.

How does the assembler know which version to assemble? You have to tell it before invoking the macro. One way is to include two lines at the beginning of the program that look like this:

```
MODEL4 EQU    @@1
MODEL3 EQU    .NOT.MODEL4
```

Then, when you call EDAS to assemble the code, you could use the command EDAS (P1), which says "Start EDAS and set @@1 equal to TRUE." A similar method would be to simply change the first line above to:

```
MODEL4 EQU    TRUE
```

or

```
MODEL4 EQU    FALSE
```

which does the same thing but forces you to alter the source code slightly before starting to assemble it.

The macro definition in Fig. 4, which moves a block of memory from one lo-

```
WHITE3  MACRO
LD      HL,3C00H
LD      DE,3C01H
LD      BC,3FFH
LD      (HL),191
LDIR
ENDM

:
WHITE   MACRO
IF      MODEL4
WHITE4
ELSE
WHITE3
ENDIF
ENDM
```

Figure 3. Conditional white-out macro definitions.

```
MOVE
MACRO  #SRC,#DST,#BYTES
LD     BC,#BYTES
IFGT  #SRC,#DST
LD     HL,#SRC
LD     DE,#DST
LDIR  ELSE
LD     #HL,#SRC + #BYTES - 1
LD     #DE,#DST + #BYTES - 1
LDDR
ENDIF
ENDM
```

Figure 4. A memory-move macro using conditional expressions.

cation to another, demonstrates another use of conditional expressions.

The Move macro first loads the BC register with the number of bytes to transfer, since that instruction will be the same whether you're moving the block up or down in memory. Next, the macro compares the source and destination addresses.

If you're moving the block down in memory, the macro sets up and executes an LDIR instruction; if you're moving the block upwards, the macro creates the necessary instructions for an LDDR move. In either case, it's possible to make the move without danger of destroying part of the block by writing it on top of itself.

Combining conditional and macro instructions gives you a great deal of flexibility. If you wanted, you could write enough macro instructions so you would rarely, if ever, have to think about registers and specific addresses at all. In fact, some compilers are mostly a collection of complex macro instructions. The code you write in the high-level language is turned into Assembly language with a series of macros applied to each line of your program. The resulting Assembly-lan-

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guage code, along with a library of functions (sometimes written as other macros), then becomes the final object code.

Missing Macros

The problem with using macro instructions, especially for listings published in magazines like *80 Micro*, is that some editor/assemblers don't support them at all, and each macro assembler uses a different syntax. If you have an assembler that doesn't support macro instructions (for example, Radio Shack's Series 1 Assembler), you will have to manually expand the macro instructions you find in printed listings. Although the job can be tedious, it is rarely difficult.

You can easily expand by hand the SVC macro I often use in programs for this column. If you see a line of code that reads, for example, SVC @DSP, you would merely type in two lines of code:

```
LD A,
    DSP
RST 40
```

(If your assembler does not support the @ symbol in labels, you can simply drop it both in the above line and the equates table.)

In general, you need to make the substitutions that a more powerful assembler could make for you. You would use

**Although
expanding
macro
instructions
by hand
can be tedious,
it's rarely
difficult.**

the same process to expand more complex and nested macros, in much the same way that you would evaluate a complex expression with several levels of parentheses in Basic.

As far as I know, there are three Model 4 assemblers, other than those from Mimosys, that support macro instructions: ALDS, M-ZAL, and ZEN.

If you use ALDS, you need to rename each replacement variable as a pound sign followed by a single character, like #3 and #M. ALDS doesn't permit updating label names each time it expands a macro, so you'll have to manually calculate how far a loop jumps and use, for

example, lines like JR C,\$-9 and JR NC,\$-13 in the MNURSP macro above. Also, and most unfortunately, ALDS won't let one macro invoke another, so the white-out routine above would have to contain the code for Model III and Model 4 white-outs, not just calls to other macros that call other macros.

On the other hand, ALDS has several built-in "extended instructions" that serve the same purpose as the macros that many programmers automatically include in their programs and that make up for some of its weakness in handling macro instructions.

M-ZAL insists that you start replacement variable names with a question mark instead of a pound sign. It also uses "?INDEX" instead of a simple "?" as its substitution string for labels inside of macros. It allows 10,000 macro invocations before it starts recycling label names, more than anyone would likely be able to fit into a program that runs on a 64K machine.

M-ZAL also lets macro instructions call themselves recursively, so you overcome some of that assembler's other limitations. On the other hand, M-ZAL doesn't allow an Else statement in conditional assembly instructions and has a much smaller set of assembly operators and

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THE NEXT STEP

conditionals than the Misosys assemblers.

The ZEN assembler does not have direct macro capabilities but is supplied with a Basic program that reads a source code file and a macro library file simultaneously. It then creates a new source code file with the macros expanded and ready for assembly. Macro variables can be given any name and do not require any particular character to signal their occurrence in the body of the macro instruction. ZEN supports two conditional statements, If and IFEQ (if equal), but no Else statement.

Finally, in September 1984 in this column (p. 144), I presented another Basic preprocessor that, like the program supplied with ZEN, can expand macros in your source code before you assemble them. Several people have suggested improvements to that program, including the ability to recognize longer variable names and open a separate file for each macro found. That preprocessor has its own syntax, which I explained in that article and which I chose to make the Basic program as simple as possible.

A Final Note

This month marks the end of the first three years of The Next Step, a long time for a column that was originally planned as a five-part series.

I'd like to thank you all for the comments and suggestions you have sent me, both the criticism and the praise. Some of you have complained that material in The Next Step is too difficult and others have complained that it is too elementary, so I must be doing something about right.

If you have sent me a letter with a stamped envelope and haven't received a reply, I apologize. I try to answer mail as it comes in but sometimes fall far behind. I also apologize for any errors that have appeared in the column during the last three years that have kept you awake nights looking for bugs.

If you have any suggestions for topics or programs you'd like to see in The Next Step, please let me know. More than half of my columns are born from readers' suggestions or from questions I'm asked on CompuServe.

Most of all, I would like to thank each of you for reading, for learning about these marvelous machines along with me, and for encouraging me to keep learning in order to write these columns. ■

You can contact Hardin Brothers on CompuServe. Go PCS-117 to the Writers' and Editors' SIG and leave your message. You can also write him at 280 N. Campus Ave., Upland, CA 91786. Enclose a stamped, self-addressed envelope if you want a reply.

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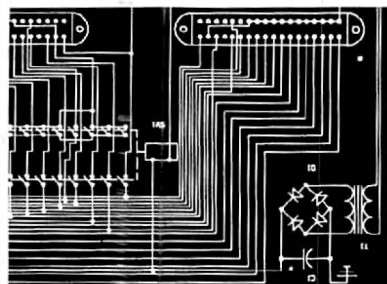
Computer-Aided Drafting How to select a CAD system

by Christopher Fara

If you are an architect or engineer, manufacturer or educator, draftsman or student, if your work or hobby involves technical drawing, then you should consider CAD. Why? Simply because it is a very efficient drafting tool and you will be more productive (and have more fun) than with pencil and straightedge.

Last time (80-micro, October 1985, page 72) we discussed some basic concepts of CAD. Today we'll talk about selection criteria. The most obvious thing to consider is the ratio of price to performance. In general the more you spend, the more you get. But twice the cost will not double your productivity. Don't buy a system more expensive and complex than you need. On the other hand beware of "easy" CAD systems at "breakthrough" prices, because most likely you'll get a toy instead of a tool.

A good basic CAD system should allow you to create exact scale drawings in any common technical format up to 24x36 inches, but it also should let you "zoom" onto a smallest detail anywhere on the sheet. It should let you copy, enlarge, reduce, rotate, mirror, merge and clip any part of the drawing, and save and recall frequently used symbols and templates. It should permit "overlay" drafting. And, perhaps most importantly, the vendor should be willing and able to discuss your needs any time not in terms of computers, but in terms of design and drafting you are concerned with.



Part of a drawing designed on Model 4

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So whether you are a novice to CAD, or an experienced user in need of a convenient personal workstation, ask your Tandy dealer for "express order" T.CAD, or directly contact Microdex Corporation, 1212 North Sawtelle, Tucson, Arizona 85716, telephone (602) 326-3502.

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Loan Survivor: Making the Right Borrowing Decision

This month's template was submitted by Stephen D. Crocker of Bloomfield Hills, MI.

The July 1985 Spreadsheet Beat (p. 108) presented a template for calculating fixed-rate loan amortization. But with the variety of loans that exist, you can't make an informed decision by analyzing this one form of loan.

StackUp (see Fig. 1) compares the monthly payments and total amounts paid for a new car with three types of loan: a fixed-rate mortgage, a variable-rate conventional, and a guaranteed value (or balloon payment).

For an explanation of a fixed-rate loan, see the above-mentioned column. A variable-rate loan is based on fluctuations in the prime interest rate. It usually bears an interest rate 1-2 percent above the prime.

The most interesting loan presented here is the guaranteed value loan. This loan guarantees in advance the expected value of the item you buy when the loan expires. You pay interest only on the part of the value financed. But at the end of



the loan period, you don't own the item; you have to make a final ("balloon") payment of the guaranteed value to complete the transaction.

Using StackUp

Enter the spreadsheet data using Fig. 1 for the text, Fig. 2 for the formulas, and Fig. 3 for the special cell formats. (Fig. 1 requires a printer capable of printing 132 characters across the line. You can set your printer from within Multiplan with the Print Options Setup command; other

spreadsheets offer similar capabilities.)

Once you have the template set up, enter the 11 data items in the spreadsheet's left-most column beginning with the name and type of car and its total cost. You must obtain the rest of the data from lending agencies.

You get the data in column 6 (rows 10, 12, 14, and 15) from the annual percentage rate (APR) of interest entered in column 1 by dividing that column's value by 1,200. This yields a fractional value representing a monthly interest rate.

LOAD 80 System Requirements

Multiplan

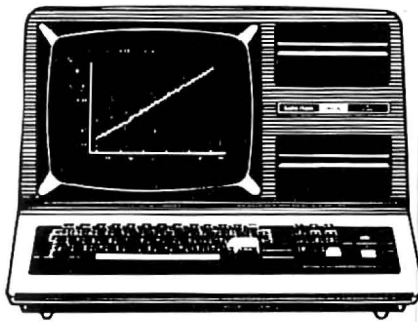
1	2	3	4	5	6	7	8	9	10
1 COMPARISON OF GUARANTEED VALUE AUTO LOANS TO CONVENTIONAL FIXED AND VARIABLE RATE LOANS									
2									
3 Enter date below (11 items) ***** This does not include processing charges by the lending institution.									
4 These additional charges must be added to the final totals.									
5	Ramrod eight	Automobile name/type							
6	\$15,360.00	Total cost of car							
7	48	Months financed							
8	\$6,200.00	Guaranteed value of car							
9	\$1,536.00	Down payment for guaranteed value loan							
10	12.25	Guaranteed interest rate							
11	\$2,304.00	Down payment for conventional loan							
12	11.50	Fixed rate loan interest rate							
13	\$3,072.00	Down payment for variable rate loans							
14	10.50	Variable rate interest rate							
15	5.50	Maximum available SAVINGS interest rate							
16									
17	Guaranteed/	-----monthly	loan payment	-----/	Savings of	Accrued	Difference	/-----	-----Including down payments
18	loan amount	Guaranteed	Fixed rate	Variable	fixed % vs	savings in	of total in	/-----	-----Total paid to own car
19	financed	value loan	loan	rate loan	guaranteed	5.5	savings acct	Guaranteed	Fixed rate
20	(principal)				each month	% account	& guaranteed	value loan	loan
21									
22	\$7,624.00	\$265.00	\$340.62	\$314.61	\$75.62	\$4,068.24	\$2,131.76	\$20,455.90	\$18,653.67
									\$18,173.49

Figure 1. Spreadsheet template for StackUp.

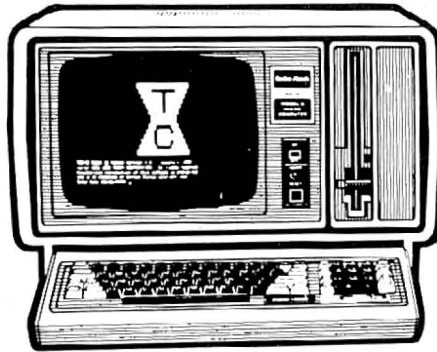
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The formulas in row 22 represent the heart of the template. Beginning in column 2, the formulas calculate the payments for each of the loans. I used the same basic formula in all three calculations:

$$PMT = \frac{(i * PV)}{(1 - (1 + i)^{-np})}$$

In the formula, "i" is the monthly interest rate, "PV" is the principal value of the loan (amount financed), "np" is the number of payments, and "PMT" is the calculated value of the payment.

The formula in R22C6 calculates the amount accrued in savings from depositing the difference between the guaranteed value loan and the fixed-rate loan. I did this because I wanted to see how much I would accumulate over the loan period. If I want to keep the car at the end of the guaranteed loan period, paying off the value of the car (the balloon payment) could put a big dent in my wallet.

Be careful to input reasonable data. Your evaluation of the loans will only be as good as the data you collect. Also, you may have other charges, such as life insurance, to add to the total cost of the loan. You can extend this template to cover a wide variation in input parameters and types of loan calculations. ■

Printing With Multiplan

At some point, you've probably wanted to underline something in a spreadsheet. Underlining a spreadsheet title with an entire row of dashes is pretty klutzy. Why not use the printer control codes? You say your spreadsheet doesn't allow that. I'll bet it does, and here's how you do it.

I'll use Multiplan in this example, but Lotus works the same way. First decide what printer attributes (such as underlining and enhanced/emphasized printing) you want to use on a regular basis. I'll show you how to set up an Okidata Microliner 92 with the IBM Plug 'N Play ROMs for printing using normal or compressed print type, double-wide characters, and enhanced and emphasized print modes. I didn't use underlining because of the codes required and a limitation in Multiplan, which I'll discuss later on.

Enter Multiplan with a blank worksheet, and move to an area of the spreadsheet you seldom use. In Fig. 4, I moved down to row 100 in column 1. This is important, because you'll later merge this simple spreadsheet with a more complex one and this may over-

write data if you don't pick a remote area.

Now refer to Fig. 4 and set up your printer codes as follows. Enter an alphabetic string in each location in column 2 for each of the printer control strings. I annotated each of my cells in column 1 with an appropriate function name so I can quickly refer to what I've installed. I also named each of the cells in column 2 with the same label for quick reference, using the Name command in Multiplan (Range Name Create in Lotus). Once you create this simple worksheet, save it in symbolic or SYLK format

using the Transfer Options command. Exit from Multiplan.

Now load the symbolic file using a text processor that allows you to enter control characters. EDLIN works fine; you can even use Debug if you're desperate. Replace each of the text strings with the appropriate printer control strings and rewrite the file to disk. You should also delete the default formatting control statement as indicated in Fig. 4.

Figure 5 shows what the altered SYLK file should look like when you display it with EDLIN after making the changes. When you're entering

CELL	FORMULA
R10C6	RC[-5]/1200
R12C6	RC[-5]/1200
R14C6	RC[-5]/1200
R15C6	RC[-5]/1200
R19C6	R[-4]C[-5]
R21C1	REPT("-",130)
R22C1	R[-16]C-R[-14]C-R-13]C
R22C2	((R[-12]C[+4]*RC[-1])/(1-((1+(R[-12]C[+4]))^(-R[-15]C[-1]))))+(R[-14]C[-1]*R[-12]C[+4]
R22C3	(R[-10]C[+3]*(R[-16]C[-2]-R[-11]C[-2]))/(1-((1+R[-10]C[+3])^((-R[-15]C[-2]))))
R22C4	(R[-8]C[+2]*(R[-16]C[-3]-R[-9]C[-3]))/(1-((1+R[-8]C[+2])^((-R[-15]C[-3]))))
R22C5	RC[-2]-RC[-3]
R22C6	RC[-1]*((1+R[-7]C)^((1+R[-15]C[-5]))-(1+R[-7]C))/R[-7]C
R22C7	RC[-14]C[-6]-RC[-1]
R22C8	RC[-6]*R[-15]C[-7]+R[-14]C[-7]+R[-13]C[-7]
R22C9	RC[-6]*R[-15]C[-8]+R[-11]C[-8]
R22C10	RC[-6]*R[-15]C[-9]+R[-9]C[-9]

Figure 2. Formulas for StackUp.

Default: Column width default is 13, default cell format is for "Continuous text". The "format comma option" is on.

F10D: (Cells R10:15C6) Formatted for Fixed-point decimal display of 10 digits precision with default cell alignment.

DOR: (Cells R17:20C1:10) Formatted for default display format with zero digits precision and right cell alignment.

\$2D: (Cells R6C1, R8C1, R9C1, R11C1, R13C1, and R22C1:10) Formatted for display as a dollar value amount with two decimal digits in the default cell alignment.

I0D: (Cells R7C1) Formatted for integer display in the default cell alignment.

F2D: (Cells R10C1, R12C1, R14C1, and R15C1) Formatted for fixed decimal display with two digits of precision in the default cell alignment.

Figure 3. Special cell formats for StackUp.


```

1      2
97
98
99
100  TENCPI  a
101  COMPRSD b
102  DBLON   c
103  DBLOFF  d
104  EMPON   ee
105  EMPOFF  ff
106  ENHON   gg
107  ENHOFF  hh
    
```

EXAMPLE SYMBOLIC (SYLK) FILE GENERATED FROM THE SEGMENT ABOVE

```

ID;PMP
F;DG0G10                <----- Delete this line
B;Y107;X2
NN;NTENCPI;ER100C2
NN;NCOMPRSD;ER101C2
NN;NDBLON;ER102C2
NN;NDBLOFF;ER103C2
NN;NEMPON;ER104C2
NN;NEMPOFF;ER105C2
NN;NENHON;ER106C2
NN;NENHOFF;ER107C2
C;Y100;X1;K"TENCPI"
C;X2;K"a"                <----- First code for
                          replacement
C;Y101;X1;K"COMPRSD"    <----- Second
C;X2;K"b"
C;Y102;X1;K"DBLON"     <----- Third
C;X2;K"c"
C;Y103;X1;K"DBLOFF"    <----- Fourth
C;X2;K"d"
C;Y104;X1;K"EMPON"     <----- Fifth
C;X2;K"ee"
C;Y105;X1;K"EMPOFF"    <----- Sixth
C;X2;K"ff"
C;Y106;X1;K"ENHON"     <----- Seventh
C;X2;K"gg"
C;Y107;X1;K"ENHOFF"    <----- Last printer code of
C;X2;K"hh"              example
W;N1;A1 1
E
    
```

Figure 4. Example cell layout for print formatting.

```

ID;PMP
B;Y107;X2
NN;NTENCPI;ER100C2
NN;NCOMPRSD;ER101C2
NN;NDBLON;ER102C2
NN;NDBLOFF;ER103C2
NN;NEMPON;ER104C2
NN;NEMPOFF;ER105C2
NN;NENHON;ER106C2
NN;NENHOFF;ER107C2
C;Y100;X1;K"TENCPI"    <----- Printer code 1
C;X2;K"R"
C;Y101;X1;K"COMPRSD"   <----- Printer code 2
C;X2;K"O"
C;Y102;X1;K"DBLON"     <----- Printer code 3
C;X2;K"N"
C;Y103;X1;K"DBLOFF"    <----- Printer code 4
C;X2;K"T"
C;Y104;X1;K"EMPON"     <----- Printer code 5
C;X2;K"[E"
C;Y105;X1;K"EMPOFF"    <----- Printer code 6
C;X2;K"[F"
C;Y106;X1;K"ENHON"     <----- Printer code 7
C;X2;K"[G"
C;Y107;X1;K"ENHOFF"    <----- Printer code 8
C;X2;K"[H"
W;N1;A1 1
E
    
```

Note:

Codes in the form of "[A" represent pressing the Ctrl and the corresponding key simultaneously. For example, [A is equivalent to a decimal value 1 and [Z is equivalent to a decimal value 26. Codes in the range from 27 to 31 are generated by the following control code sequences:

- 27 (ESC) -- Ctrl + [
- 28 -- Ctrl + \
- 29 -- Ctrl +]
- 30 -- Ctrl + {
- 31 -- Ctrl + }

Figure 5. Modified SYLK file with printer codes embedded.

control codes such as control-R or escape, type in control-V followed by the letter or code required. For example, to enter an escape-code character, hit control-V followed by a left bracket.

One word of caution: Multiplan doesn't like strings that have a zero byte in them (a control-@). That's why I can't use underlining in this manner. I can turn it on but can't turn it off. Hint: Some printers ignore the eighth bit; try sending 80H instead of 00H if you have a similar problem.

Now you're ready for printer magic. Reload Multiplan and create your masterpiece. When you're ready for the printer controls, select the Symbolic mode on the Transfer Options menu and load the printer codes. They will merge into the current spreadsheet where you previously created them and will automatically add the cell names to your current template. I recommend you save your current worksheet first in case you lose your work by setting the Transfer Options wrong.

Put your cursor on the cell containing the text that you want to highlight. Select the Edit option and the text will appear on the command, that is, "Text string." Use the cursor positioning commands to move to the beginning of the string (prior to the opening quotation mark).

If you want to print this string in emphasized print mode, insert the cell name EMPON in the text string at this point. Move back to the end of the string and insert the cell name EMP-OFF to turn off emphasized print mode. Don't forget to use the string concatenation operators between the cell names and the original text string. When you're done, the edited line should look like this:

EMPON&"Text string"&EMPOFF

Press the enter key to store the string as you see it. You may also press the "!" key and then the enter key to store the string in final, converted form. This adds an exceptional capability to your templates: a well-formatted document.

—John B. Harrell III

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See opposite page ▶▶▶▶▶▶

MODEL I DOUBLE DENSITY BOARD

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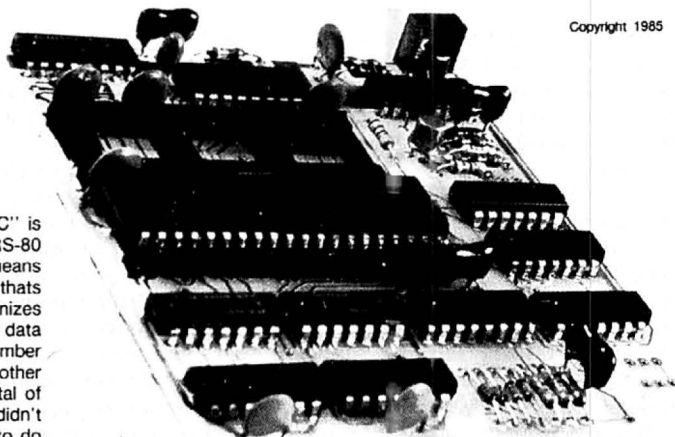
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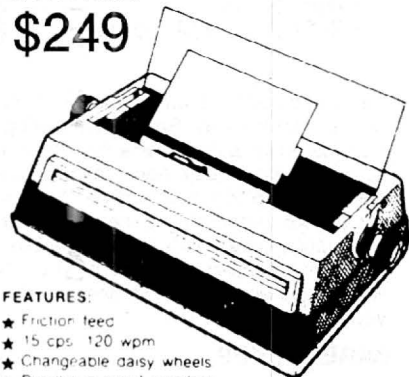
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Continued from p. 36

ured for the amount of memory you order. Memory configuration is a bit complex (setting five jumpers) if you're adding your own chips. The instructions, however, are quite clear.

Hard Drive Specialist provides three pieces of software with the TanPak. They're as nicely written as the instructions, with error-trapping for any dumb thing a user might do. You actually need only the clock driver to use the board, and the RAM disk and print spooler are extras. If you'd rather read instructions on-screen, a Read.Me file on the disk succinctly describes how to use the software. You're provided with sample configuration and auto execution files (CONFIG.SYS and AUTOEXEC.BAT) if you're unsure of how to create your own.

You should have the clock driver (TANCLOCK.COM; 1,197 bytes) in your AUTOEXEC.BAT file so it sets the date and time when you boot up. When you install the board, the command TANCLOCK/S resets the battery-powered clock with the current system date and time. If your CONFIG.SYS file invokes the clock program without a board installed, you'll get an error message.

You have to install the RAM disk driver (TANDISK.SYS; 931 bytes) in a CONFIG.SYS file. To set aside a 200K RAM disk, you'd use: device = tandisk.sys 200. If you don't specify a size, the system reserves a 32K default, and displays an appropriate message at boot-up along with the drive letter. On a two-floppy system, the RAM drive is C (D with a single hard drive). You can set aside up to 512K for the RAM drive on a 640K system.

You should invoke the print spooler (TANSPOOL.COM; 2,131 bytes) at boot-up with an AUTOEXEC.BAT file. You can set aside up to 64K to hold text you want to print out while your 1000 does other things, although more slowly than usual.

The command TANSPOOL 10 sets aside a 10K print buffer and, once allotted, you can't recover this memory space for any other use unless you reboot. If you type in just TANSPOOL, you'll see the printer buffer's current status (size and number of bytes used); TANSPOOL/F flushes the print buffer if you want to stop printing for some reason.

MFB-1000

The MFB-1000 from PBJ Inc. is the price leader for full-blown 512K boards. They've managed to put memory, DMA, clock, and serial port on one thin board with room to spare. The instructions are complete, and you can jumper the DMA off if you want to use it in an IBM or as a second 1000 board. The RS-232 connector is male like an IBM's, so you'll need a gender-changer.

The instructions include a table of contents, a section detailing use of the MFB-1000 as a second board, pin-outs for the RS-232 port, and a table of the clock circuitry's input/output registers. PBJ also clearly lays out the steps for service or repair.

If you're installing memory chips yourself, the MFB instructions aren't very clear, since neither the figure nor the board indicates which memory bank is zero and which is 1. This can be critical since you must fill bank zero if you're only installing 256K of memory. If you're installing the board with memory, installation goes smoothly.

You can configure the serial port on the newer PBJ boards as COM1 or COM2 by changing a jumper. Earlier MFB-1000 boards from PBJ came with the RS-232 set as COM1, but you can change them to COM2 by replacing a PAL chip, which PBJ will send or change for you.

You can turn off the DMA capabilities with a jumper if your computer already has DMA (a Tandy 1200, for instance). In addition, you must remove three chips.

The clock battery (Panasonic type CR-2025) should last a year. The more you use your computer, the longer the battery will last. The small and efficient program that runs the clock is a device driver (Clock.COM; 890 bytes), which you install in the CONFIG.SYS file, and which thereafter sets the system date and time at boot-up. You can also set the clock using the DOS Date and Time commands. While the device driver approach requires that programs displaying the date and time get this information through DOS calls, there are some "poorly behaved" programs that bypass DOS and attempt to get the time via BIOS calls, usually with erroneous results.

MM-4N1

The Micro Mainframe 4N1 board comes with up to 512K, an RS-232, and an optional clock/mouse board (not available at time of review). Micro Mainframe guarantees for life the RAM chips it installs. I reviewed their 256K model. I assume they named the board 4N1 (four-in-one) to make the point that it replaces four Tandy single-function boards (it was introduced before Tandy released its Memory PLUS board).

The 4N1 instructions are quite adequate, but not fancy (two double-sided, photocopied sheets with an addendum). They have their highlights: theory of operation for the RS-232, and a good section on troubleshooting for bad RAM chips (assuming you've put in your own).

As with the previous boards, the 4N1 comes with an RS-232 port fully equivalent to one of IBM's or Tandy's, rated

for transfer rates between 50 and 9,600 baud. A jumper lets you easily configure the serial port as COM1 or COM2. Unfortunately, you can't turn off the DMA. The clock/mouse board plugs onto the side of the 4N1, and is supposed to use both Radio Shack and Apple mice.

Micro Mainframe even has a BBS for users (916-636-6175) that supplies information on their products and fixes for problems with other manufacturer's boards. If you have a modem, you can get further information here.

The TanPak's RAM drive appeals to me. But if you're using PC-DOS 3.1 on your 1000, you have a supplied RAM disk anyway. If you have a 1000HD, the Memory PLUS board comes as standard equipment. You then have to decide what to put in that last slot, such as a short input/output board providing several serial and parallel ports.

Memory PLUS

The Memory PLUS board is Tandy's acknowledgement that single-function boards don't go very far in a three-slot machine, even though the 1000 has several functions built-in that would require separate boards in an IBM PC. This board comes standard in the 1000HD and has a plug to add an additional board (serial or clock/mouse). Although I wasn't able to receive a review board from Tandy, our local Radio Shack Computer Center was helpful in letting me look one over.

The instructions are well laid out and easy to follow, with plenty of diagrams, detailed steps, and precautions. As usual, Tandy doesn't provide as much technical information as some of the other board manufacturers. I noticed that some 1000s have a prong connector meant to accept a wire on the corner of the Memory PLUS board. Other 1000s (mine included) don't have the connector and you can remove the wire.

Like several Tandy boards I've seen, the Memory PLUS has a metallic backing attached to it to cut down on RFI (radio frequency interference). The support bracket has no holes for ports, but the instructions detailing installation of the add-on boards shows that Tandy provides a new support bracket with PLUS option boards for cable connections. Unfortunately, the board limits you to one option, so you may have either an RS-232 or a clock/mouse.

Making a Decision

How do you choose a multifunction board? If you have the desk space and desire for a mouse, you'll have to go with the more expensive boards, the 4N1 or Memory PLUS.

With 256K chip prices falling, you may be tempted to buy a bare board and add separately bought memory. PBJ charges fewer than \$40 for 256K. You'll have to shop around to get it cheaper. At \$50 for 256K, you may not find it worthwhile to put your own chips on the TanPak. Micro Mainframe charges \$128 for 256K (but with a lifetime guarantee), and Radio Shack charges \$200. It may be worth voiding the Tandy warranty to put your own chips on the Memory PLUS board.

If you decide to buy your own chips, you'll need 41256 chips (200 or fewer nanoseconds) to add 256K (eight chips) or 512K (16 chips). The first upgrade must be to 256K on the 1000. If you've already got 64K chips on your board, you'll have to pull them; you can't mix 64K and 256K chips. Both chip types go in the same sockets. All four boards have instructions for chip placement and configuration with switches or jumpers. If you buy a chip kit meant for an IBM, you will get nine chips instead of eight because Tandy doesn't use the extra chip for memory parity checking.

If you're really power hungry, wait a little. Several boards in the works (and perhaps already available by the time this review comes out) will push your 1000 over the 640K memory limit. The ones I've heard of use the Intel/Lotus/Microsoft standard to provide 1 or more megabytes of memory.

Hard drive caveat: If you've got a hard drive in your 1000 or you're thinking of buying one, check with the manufacturer of your multifunction board for any incompatibility problems. Some owners of 1000s with the original BIOS version 1.00.00 have experienced problems with Western Digital hard drive controller boards. The original Model 1000 BIOS improperly programmed the DMA controller (that comes on the multifunction boards). Tandy will upgrade your 1000 to BIOS 1.01.00 for around \$30. Tandy has also added jumpers to the Memory PLUS to fix the problem and PBJ has reprogrammed a chip on their MFB-1000. ■

Soothe the TRSDOS 6.X Beast

by Gary A. Ludwick

★★★★☆

DosTamer 6.X runs on the Models 4/4P (64K) and requires TRSDOS 6.X and one disk drive. Babbage Patch Inc., P.O. Box 252, Temple City, CA 91780. \$69.95.

Easy to use: ★★★★★

Good docs: ★★★★★☆

Bug free: ★★★★★☆

Does the job: ★★★★★

TRSDOS 6.X's complicated command syntax has kept many people from using its more powerful functions. Most of us find working with a 10-pound manual on our laps difficult at best.

DosTamer 6.X, a DOS shell utility that acts as translator between the user and system, greatly simplifies invoking TRSDOS 6.X commands without sacrificing any of the DOS's power. In addition, DosTamer offers some features TRSDOS 6.X never dreamed of.

Directory Assistance

DosTamer makes good use of the Model 4's unique capabilities. When you call a disk directory, DosTamer displays the first file on that disk in reverse video. You use the arrow keys to move from file to file, and DosTamer highlights each file name.

Move to a selected file, hit either the E or the enter key, and DosTamer executes the file. This works for both /CMD files and Basic files. If you have a file of another type, DosTamer automatically goes into Basic and tries to load it. If the file is neither, you have to execute a System command to get back to TRSDOS, then reenter DosTamer.

In all, you can issue 44 different file or directory commands from the directory page without knowing TRSDOS 6.X syntax or command structure (see Fig. 1).

You can copy, kill, list, rename, or print out a file. In addition, you can mark or tag files for mass manipulation. Sim-

ply move to the appropriate file and hit the T key to mark the file. As you tag files, DosTamer keeps a running total of their size, to track memory requirements for the other disk.

Once you mark all the files you want to manipulate, you can (with a single keystroke) make those files visible or invisible, remove or set modification flags, copy them to another disk, remove their passwords, or kill them. You can also execute two-step functions, such as copying the files to another disk, then returning and removing them from the original disk. If DosTamer 6.X did nothing else, it would be worth every penny. It makes disk library updates and file maintenance a breeze.

On Commands

In addition to its directory and file manipulation capabilities, you can reduce even the most complicated TRSDOS commands and functions to a single keystroke. For example, you can assign this command to a single key:

```
Format : 1 (abs,sides = 1,cyl = 40,
mpw = "dostamer",name = "d x 6)
```

You can implement up to 10 command menus that let you assign one command line to each of 20 keys on your keyboard (see Fig. 2). That gives you up to 200 user-defined keys.

You can also handle complicated filter and device formats with single or consecutive keystrokes. You can configure Memdisk, SetComm, and the forms filter through menus, and put system, purge, and format commands into menus for instant access.

DosTamer's author hints at other possible uses for the menu feature, and provides a menu of Epson escape codes as an example. No need to remember long control codes to get superscript in italics—just tap two keys.

File Facilities

DosTamer offers two other capabilities you'll find useful. Once you accumulate more than 10 program disks, you'll ex-

```
CONVICMD:1 DOSTAMER/JCL DTCMT/TXT DX6/BAK DX6/CMD
DXC/BAK DXC/CMD MEMDISK/DCT MENU/CMD XTRA0/CIM
XTRA1/CIM XTRA2/CIM XTRA7/CIM XTRA8/CIM XTRA9/CIM
```

Data *Disk* 5K Free

O-7	Get Drive	A	Dir Vis/Inv	I	Dir Inv.	V	Dir Vis.	S	Dir Sys.
E	Execute/Ret	T	Tag Files	U	Untag Files	e	Execute Tag	L	List File
P	Print File	R	Rename File	C	Copy File	F	Free Space	B	Basic
/	Put Comment	?	Get Comment	#	Delete Cmnt	2	Reset File	N	Name Disk
*	Print Dir	X	Dos Command	K	Kill File	M	Free Map	D	Dir A
CTL D	Debug	CTL U	Dir Mod	CTL P	Dir Prot	SPACE	Page	ENTER	Execute
F1	User Menu	F2	View Cmts	F3	Set Search	BREAK	Exit	TAGGED	OK

Figure 1. DosTamer directory.

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NAME	DESCRIPTION
1 RULF78	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	Breakeven analysis
7 DEPRSL	Straightline depreciation
8 DEPRSY	Sum of the digits depreciation
9 DEPRDB	Declining balance depreciation
10 DEPRDDB	Double declining balance depreciation
11 TAXDEP	Cash flow vs. depreciation tables
12 CHECKK2	Prints RAPIDFORMS checks along with daily register
13 CHECKBK1	Checkbook maintenance program
14 MORTGAGE/A	Mortgage amortization table
15 MCHTMON	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 REGWTH	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 BONDDVAL	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 BONDDVAL2	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 QJQUE1	Single server queuing (waiting line) model
49 CVP	Cost-volume-profit analysis
50 CONDPFROF	Conditional profit tables
51 OPTLOSS	Opportunity loss tables
52 FQJQOQ	Fixed quantity economic order quantity model
53 FQJQOWSH	As above but with shortages permitted
54 FQJQOQPB	As above but with quantity price breaks
55 QJQUECB	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 MERGANAL	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 FUJPRINF	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	DOME business bookkeeping system
77 TIMECLCK	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 LOANAFDD	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
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perience file amnesia. With DosTamer, you can create a three-line, 240-character description of each disk file. When a file name fails to ring a bell, move your reverse-video cursor to the file name, press the ? key and your memory-jogging file description appears at the bottom of the screen. Writing or changing your file comments is just a keystroke away.

The second helpful extra is the ability to search or tag directories using a wildcard approach. If you type in "/cmd," DosTamer displays only files with that extension. Type in "**C" and only files with "C" as the third character appear in your directory. And, once you set your search parameters, they remain in effect until you reset your computer, which means you can search all the drives currently in use. By switching disks in and out of your drives, you can search every disk you own in a matter of minutes.

Not Perfect, but Close

By now, you know that I like DosTamer. I've installed it on every system disk that had room (the main program and its supplementary files need a minimum of 15K free disk space).

DosTamer apparently hides itself in high memory. (I say apparently because the small [15-page] but complete manual provides no technical information.)

I've installed DosTamer on every system disk that had room.

This occasionally leads to a problem: Your applications programs can overwrite DosTamer. Various driver programs (such as printer or keyboard drivers in word processing programs) tend to go for the same space.

However, the worst that happens is that you go back to TRSDOS Ready rather than the DosTamer directory menu. Issuing the DX6 or DXC (the memory saving version without the screen menu) commands will bring it back. For those with 128K machines, installing DosTamer on Memdisk circumvents the problem.

DosTamer is one of the best values in utility programming I've used. It is also one of the most consistently useful. I know that many manufacturers have made that claim, but it rings true with DosTamer: Once you have it, you'll wonder how you ever got along without it. ■

Post Plus: Commercial Data Bases Made Easy

by David Dalton

★ ★ ★ ★

Post Plus runs on the Model 4/4P (64K) and requires one disk drive. MCTel Inc., Three Bala Plaza East, Suite 505, Bala Cynwyd, PA 19004, 215-668-0983, \$160.

Easy to use: ★ ★ ★ ★ ☆

Good docs: ★ ★ ★ ★ ☆

Bug free: ★ ★ ★ ★ ☆

Does the job: ★ ★ ★ ★ ☆

Telecommunications can be a lot of fun, but logging on and winding through interminable nested menus can be tiresome. Post Plus, a Model 4 communications program, uses macros (strings of commands that you program) to simplify accessing electronic data base services.

While Post Plus also has word processing and terminal capabilities, its macro keys make using data bases' repetitive command sequences easy. For example, Post Plus can automatically dial MCI Mail, log on, download your mail, save it to disk, and log off. It can also send mail automatically, although this process is more complicated.

Custom Job

When you first get Post Plus, the first thing you'll want to do is run the package's menu-driven customizing utility. Select from the list the name of the host service for which you want to customize, including MCI Mail, Dow Jones, Easy-Link, The Source, CompuServe, Delphi, NewsNet, OAG, BRS After Dark, and GTE Telemail. You'll need to supply your modem type, user name on the host service, password, and the host telephone number.

When you answer the questions for each host service you plan to use, you'll have a disk file containing control information to automatically log you on to each service. Post Plus is capable of more than that, but you'll have to set it up yourself.

Macros

If you have some programming experience and thoroughly understand the host service you're going to use, you can do some fancy tricks with the macros Post Plus supports. And once you write a macro, you can do some complex jobs by pressing only a few keys.

For example, a clerk in the office who knows little or nothing about MCI Mail or

Execute Mode	Active File CONV/CMD:1	Current Menu 0
A DIR :0 (A,S,I)^	.....	Extended Directory For Drive 0^
B DIR :1 (A,S,I)^	.....	Extended Directory For Drive 1^
C FREE :0^	.....	Free Map of Drive 0^
D FREE :1^	.....	Free Map of Drive 1^
E FORMAT :1		
	(ABS,CYL = 40,SIDES = 1,MPW = "PASSWORD",NAME = "NEW"	^
F SET *FF TO FORMS/FLT^	.....	1-Set FORMS/FLT to Phantom Device ^
G FILTER *PR *FF^	.....	2-Filter Printer through Phantom Device.^
H FORMS (CHARS = 48)^	.....	3-Print 48 characters wide (dir label) ^
I PURGE :0^	.....	C A U T I O N ^
J PURGE :1^	.....	C A U T I O N ^
K SET *CL COM/DVR^	.....	SET UP RS232 COMMUNICATIONS^
L LIB^	.....	Display System Library Commands^
M SYSTEM		Setup MEMDISK as Drive 3 ^
	(DRIVE = 3,DRIVER = "MEMDISK")^	
N SYSTEM (DATE = OFF)^	.....	No Date Prompt on Boot Up^
O SYSTEM (BLINK = 143)^	.....	Blinking cursor = character 143 {8FH}^
P SET *CL CLICK/FLT^	.....	1-Set Device to CLICK/FLT and then. . .
Q FILTER *KI *CL^	.....	2-Filter through the Keyboard^
R SYSTEM (GRAPHICS = YES)^	.....	Allow Graphic & Control Codes to Print^
S !LOAD ^	.....	Load ACTIVE FILE (Return to TRSDOS)^
T *LOAD ^	.....	Load ACTIVE FILE (Return to DOS-TAMER) ^
A-T Execute	0-9 Recall Menu	F2 Edit Mode BREAK Return

Figure 2. DosTamer command menu.

EasyLink could dial up the host computer, fetch the morning mail, and bring you a printout, all without experience in telecommunications.

As with other terminal programs, you can program Post Plus to send command strings to a modem or host computer and to wait for prompts. You can also call up more than 70 functions, including features to change the baud rate, transmit text from the text processor, turn the printer on, and kill the contents of the receive buffer.

With all these functions, you can build macros of great length and complexity and store them on disk. The greater your skill at building macros, the more automatic Post Plus is.

Other Utilities

Post Plus has a decent little text processor with a full range of commands for cursor control; writing to and reading from disk; searching and replacing; printing; tabulating; and moving, deleting, or copying blocks.

Two buffer areas let you put two messages in memory at once. You can also transmit both memory areas to a host computer using a macro command. The text processor has one drawback, though: I found it painfully slow at scrolling.

In addition to the customize utility, Post Plus includes a file management utility called PBP. You can use the PBP utility to scramble and unscramble a file. PBP can also error-check the transmission of a file by computing its checksum and comparing it with that of the original file.

Of course, the person at the other end of the transmission would also need Post Plus and PBP in order to compute the original file's checksum and verify proper transmission.

PBP also adds or removes line feeds from a text file. Some word processors (most MS-DOS word processors, for example) expect a line feed character after each carriage return. TRS-80-compatible word processors generally don't support line feed characters. The ability to add or subtract line feeds can save you a lot of headaches when you transfer text files between different types of computer.

Conclusion

Post Plus has clear, detailed documentation, with a nice technical section and a good index. It's printed on heavy 5½- by 8½-inch paper stock and comes in a box, a documentation format I wish were standard. And the disk isn't copy-protected.

Post Plus is an easy-to-use package that can certainly make life easier with its macros. If your office uses electronic mail heavily, or if you have any repetitive telecommunications tasks, Post Plus can save you time and make your job easier. ■

Screen Editor 2.3: The Best of Both Worlds

by Mark D. Goodwin

★★★

Screen Editor 2.3 runs on the Models I, III (48K), and 4 (64K) and requires Basic and one disk drive. Micro-Link, P.O. Box 2666, Sumter, SC 29151, 800-334-9612. \$24.95.

Easy to use: ★★★★★☆

Good docs: ★★☆☆☆☆

Bug free: ★★★★★☆

Does the job: ★★★★★☆

While most Basic programmers consider Microsoft's line editor adequate for minor program revisions, they know it's too slow and awkward for extensive programming. Instead, many programmers use either text editors or word processors to write and debug Basic code.

Unfortunately, this means switching back and forth between the text editor and Basic, disrupting the writing or editing process. Screen Editor neatly overcomes this problem. It's a versatile Basic editor that links into Basic, giving you the editing capabilities you need while maintaining interactivity with Basic.

Using the Screen Editor

Unlike Basic's line editor, you can use Screen Editor's control keys to enter or edit lines you list on-screen.

Besides simple line entry and editing, Screen Editor allows some other useful tricks: duplicating and moving program lines, turning command-mode lines into program lines, and turning program lines into command-mode lines. For example, you can duplicate a line by listing it, changing the line number, and passing it back to the Basic interpreter.

Reconfiguration

Micro-Link recognizes that you might prefer a different set of controls and provides SECONFIG, a menu-driven reconfiguration program. You can change any of the control keys to suit your taste.

Conclusion

Screen Editor's 14-page manual is adequate and briefly covers installation, use, and reconfiguring the control keys.

Besides the terse installation instructions, I found fault with two other things: The Model III version disables the Disk Basic single-key commands, and you can't use Screen Editor with non-TRSDOS operating systems. Even with these problems, I think Screen Editor deserves a spot in any Basic programmer's library. ■

PFS: Write

★★★

PFS:Write runs on the Tandy 1000/1200 and 2000 (128K) and requires a single disk drive. Tandy/Radio Shack, One Tandy Center, Fort Worth, TX. Catalog numbers 25-1142 (Model 1000/1200) and 26-5309 (Model 2000). \$140.

The PFS series of software has long been known for its easy operation and reasonable prices. PFS:Write is a full-featured word processor that offers reports, memos, documents, and envelope preparation at a cost significantly less than its competitors.

Within minutes of booting up my disk, I was able to find my way through the opening menus and select a document. I didn't even need the documentation until I wanted to explore some of Write's more exotic features.

The type/edit portion of the application is excellent. It provides all the standard text manipulation commands you need. You select commands with the function keys in conjunction with other keys.

PFS:Write supports advanced features to search and/or replace text strings; remove, copy, and move blocks of text; underline and boldface; and send special codes to your printer. You can also insert other documents (even from other word processors) in current text or include graphs, reports, and spreadsheets. Formatting your printout is as easy as answering a few questions. This includes specifying up to two lines of text for headers and footers.

Printing a document is just as easy as the rest of the system. PFS:Write supports printing of partial documents, multiple copies, stops between pages, and multiple output devices including disk files. It also supports a special print mode for extracting envelope addressing information directly from your document.

The only thing wrong with PFS:Write is that it's copy-protected, and comes with only one back-up copy. While you can install the system on a hard disk (and up to five installations are allowed), I don't like the limitation of working with master disks and the inability to back up my software. If you can accept this qualification, I certainly recommend PFS:Write for those who need an inexpensive word processor that doesn't act cheap.

—John B. Harrell III

T-View

★★★★★

T-View runs on the Model 100. Traveling Software, 1050 Fifth Ave N.E., Seattle, WA 98125. 206-367-8090. \$39.95.

Model 100 owners have become used to their computer's 40-column display. They may not like it, but until now, they couldn't do anything about it. T-View lets you view text and even telecommunicate with a 60-column display. The compressed characters are readable, though sometimes requiring a bit of squinting. While this mode is available for only a few functions, it does have its uses.

You access T-View by selecting it from the main menu. A second menu appears, letting you choose a text-viewing routine, a text-entry routine, and a telecommunications routine.

If you have a .DO (text) file already in RAM, you can view it in 60-column format. While you can scroll up and down within the document, you can't edit it. With a keystroke, however, you can toggle between 40- and 60-column mode, returning when necessary to a version of Text that lets you edit in 40-column mode.

You can also enter some text while in 60-column mode. You can type in text material and see it on the screen 60 characters wide. You can backspace and type over the text to make corrections, but the cursor keys aren't available to correct or edit text entered on previous lines. When you exit to the main menu, you'll find the entered text in the paste buffer. You then enter Text and use the Paste key to get the text into a .DO file.

T-View offers a subset of the TELCOM commands for telecommunications in 60-character mode. You can download while in 60-character mode, but the Upload, Half/Full, and Prev keys are unavailable.

If your .DO file contains a control code or graphics code, don't expect to be able to see it in 60-character mode. T-View can't handle it, putting a nonsense pattern on the screen in place of the character.

T-View actually offers an odd sort of display that may be thought of as 80 characters wide. Strictly speaking, you can define a display width of up to 80 characters, and move a 60-column window back and forth with the cursor-control keys. It works, though such a window is obviously not as useful as a true 80-column screen.

T-View comes with an attractively typeset and bound 60-page manual, complete with index. Installation instructions are given twice, once in brief mode for experienced users, and again in detail for new users. Like other Traveling Software manuals, this one has dozens of pages of advice about memory management, .CO files, cassette storage, and other Model 100 topics that may otherwise puzzle new users.

If you have a use for 60 columns of characters while using Text or TELCOM, T-View may be the program for you.

—Carl Oppedahl

Monte's Basic

★★★★★

Monte's Basic runs on the Model 4 (64K) and requires TRSDOS Basic 01.01.00, Montezuma Micro CP/M 2.2, and one disk drive. Montezuma Micro, P.O. Box 32027, Dallas, TX. \$49.

While all Model 4 computers come with Microsoft Basic, that doesn't help if you want to run Basic under CP/M. The TRSDOS 6.X Basic interpreter won't run with either of the two CP/M disk operating systems (CP/M 2.2 and CP/M Plus) available. And buying CP/M Basic from Microsoft costs a lot of money.

What you need is a way to make Basic run under CP/M. Monte's Basic (BASCON) does just that. BASCON converts the TRSDOS Basic interpreter into a standard CP/M interpreter, making it fully compatible with Microsoft CP/M MBasic 5.2. However, Montezuma left out several features peculiar to the TRSDOS environment and some TRSDOS Basic programs may require conversion.

In addition, Montezuma changed some of the Basic commands in order to make it functional under CP/M. For example, they deleted the Clear Screen command and replaced it with the CP/M equivalent, Print CHR\$(26).

Montezuma provides complete documentation for these changes in the form of a disk manual, organized by pages referring to the Model 4 TRSDOS reference manual. You print this out and insert the pages in your Basic manual.

BASCON is the only way to use Basic in CP/M without paying big money. What's more, once you convert the Basic interpreter to CP/M format, it will work under Radio Shack's CP/M Plus.

—John B. Harrell III

Disk +

★★★★★

Disk + runs on the Model 100. Portable Computer Support Group, 11035 Harry Hines Blvd. No. 207, Dallas, TX 75229, 214-351-0564. \$149.95.

Disk + is a snap-in ROM cartridge for the Model 100 that lets you transfer disk files between it and another TRS-80, a Tandy 1000/1200, an IBM PC-compatible, or an Apple, Epson, Kaypro, Osborne, Xerox, or CP/M computer. In addition to the ROM cartridge, you get a program disk for the second computer.

Disk + offers the maximum flexibility and convenience possible in transferring files at 9,600 baud. All keyboard entry and screen display takes place on your 100. You can elect to look at either the Model 100 menu or the Disk + directory

or subdirectory. You use the arrow keys to position the cursor to select a file and then press a function or enter key to transfer, save, load, or kill a file.

You can save and load all or selected programs from the menu in a subdirectory. Once you create a subdirectory, you can save, load, or kill individual files in that directory.

Document files are easy to transfer back and forth, and you can do so from either computer. My only complaint with Disk + is that it creates its own directory, and you can't see all the files you've saved at once. You can look at either the main directory or a subdirectory at one time. Either directory holds only 18 entries.

—Thomas L. Quindry

Computer Diplomacy

★★★★★

Computer Diplomacy runs on the Model III (48K) and requires one disk drive. Tandy/Radio Shack, One Tandy Plaza, Fort Worth, TX 76102. Catalog number 26-1957. \$19.95.

Like its board game counterpart, Computer Diplomacy lets you guide the destiny of a European power through the intricacies of international politics, seeking control of Europe by careful planning and negotiated alliances with other players. This game tests your ability not only to plan offensive and defensive military campaigns but also to outwit your fellow players. In addition, it's a realistic game of strategy, with nothing left to luck.

You play Computer Diplomacy in two ways: as a stand-alone game where players compete against each other or as the standard Diplomacy board game, with the computer as gamesmaster.

As the game opens, you see a portion of the European map. Land masses appear black and seas appear white, with the countries set off by heavy, solid lines. You use the arrow keys to scroll across the map and display the desired provinces and seas. It's hard to tell land masses apart, because the game doesn't support high-resolution graphics.

Playing the computer version of Diplomacy has its advantages. The computer checks all moves for validity and a clock shows remaining time for the different signals and diplomacy periods.

You can also get a printout of the game's progress, and save adjourned games for reloading and continuing later. Except for a few minor differences, all rules of regular Diplomacy apply.

If you like the board version of Diplomacy, you'll probably like the computer version.

—Paul J. Perry

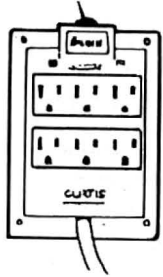
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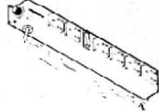


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Speed It Up

Speed Reading from Viking Inc. doubles your reading speed in two weeks or they'll refund your purchase price. The program automatically seeks your maximum reading speed and then challenges you with faster speed, wider segments of text, and continuing practice in developing proper eye movements.

Speed Reading deals with fundamental reading skills and their associated problems. It comes on disk or cassette and is \$29.95. The program works on the Models I, III, 4, and 1000. For more information, contact Viking Inc., 910 Soo Blvd., Rice Lake, WI 54868, 715-234-2680.

Circle 561 on Reader Service card.

Keyboard Key

Educational Systems, publishers of MICROREF quick-access guides for popular software packages, offers write-on, washable keyboard templates for Lotus 1-2-3, MultiMate, and WordStar guides. The guides include index tabs, a built-in easel, illustrations, a glossary and index, and complete step-by-step procedures for all beginning and advanced commands.

The 18-inch foldable plastic templates describe simple and advanced operating procedures and keystroke command sequences arranged in logical sections. You can stack the templates on your keyboard for easy reference. Each guide and its template costs \$19.95. For more information, contact Educational Systems Inc., 1000 Skokie Blvd., Wilmette, IL 60091, 312-256-4750.

Circle 551 on Reader Service card.

Picture This Sound

Effects Graphics Editor from SourceView Software International, for the Models I, III, and 4, lets you include sound and graphics in Basic



Quick-reference guides now include keyboard templates.

or Assembly-language programs. The program lets you embed graphics and sound routines in RAM or on disk.

The editor includes routines to create and store effects. You can create graphics within "boxes" you can save, recall, overlay, invert, or delete. When you generate sounds, you can define frequently used notes so you don't have to regenerate them. Effects Graphics Editor costs \$99. Contact SourceView Software International (835 Castro St., Martinez, CA 94553, 415-228-6220) for more information.

Circle 566 on Reader Service card.

Souped-Up DOS

SUPERDOS 1.3 (\$29.95) from Diskcount Data is a complete set of enhancements for TRSDOS 1.3. It works on the Models III and 4/4P.

Along with a fast boot-up, SUPERDOS removes all password checking, logs system files into the directory as normal files, displays a short directory format, and maintains the long TRSDOS directory format while eliminating the directory screen scroll problem. It features a high-memory version of Debug that lets you dump areas of memory below 5600 hexadecimal.

SUPERDOS also enables/disables the date and time

prompts, speeds disk I/O, and date-stamps files for the month and day. The List command defaults to ASCII and the Copy command is faster than TRSDOS 1.3's. For further information, contact Diskcount Data, 2701-C W. 15th St., Suite 612, Plano, TX 75075, 214-680-8268.

Circle 558 on Reader Service card.

Dog Days

Software Exchange offers two greyhound racing analysis packages for the Models III, 4, 100/200, or IBM PC-compatibles that base predictions on past performance.

The Greyhound Racing Analysis Program (\$29.95) lets you input the most important data from the racing program (available at the track). Racing Analysis evaluates all the dogs in a race with a rating number after only five minutes of data entry.

Enhanced Greyhound Racing Analysis (\$49.95) is an improved version of the original program. It analyzes 12 data items for a more detailed evaluation of each dog, including track length (distance), track length (last race), post position, odds, times, positions in the stretch, and finish positions. The computer calculates and displays the ratings on screen or paper.

Both programs include a Bet Return Analysis program, which tracks wins and losses. It also gives you the percent gain, if any, for the number of races you bet on. For more information, contact Software Exchange, 2681 Peterboro Road, P.O. Box 5382, W. Bloomfield, MI 48033, 313-626-7208.

Circle 555 on Reader Service card.

It's a Draw

BV Engineering offers Actfil, a computer-aided design (CAD) program for electronic engineers that designs low-pass, high-pass, band-pass, and band-reject active filters. The program is fully compatible with other BV Engineering products.

Actfil is an active transform synthesis and filter realization program that provides detailed design parameters and transfer function coefficients given the desired filter characteristics.

It's menu-driven and fully interactive with free-form input. It works with TRSDOS, MS-DOS, and CP/M-80 operating systems and costs \$72.95. For more information, contact BV Engineering, 2200 Business Way, Suite 207, Riverside, CA 92501, 714-781-0252.

Circle 564 on Reader Service card.

Deeper Into C

Gerald E. Sobelman and David E. Krekelberg's *Advanced C: Techniques and Applications* focuses on the advanced features and capabilities of the C programming language.

The book covers advanced programming features including coding style, pointers, structures, and recursion; implementation of complex data structures in C, including linked lists and trees; and advanced applications, including graphics programming, the development

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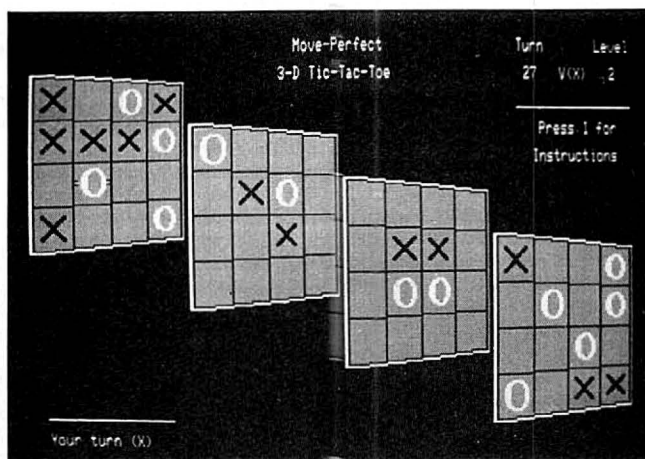
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detail and clarity. The program is \$29.95. For more details, contact Micro-Labs Inc., 902 Pinecrest, Richardson, TX 75080, 214-235-0915.

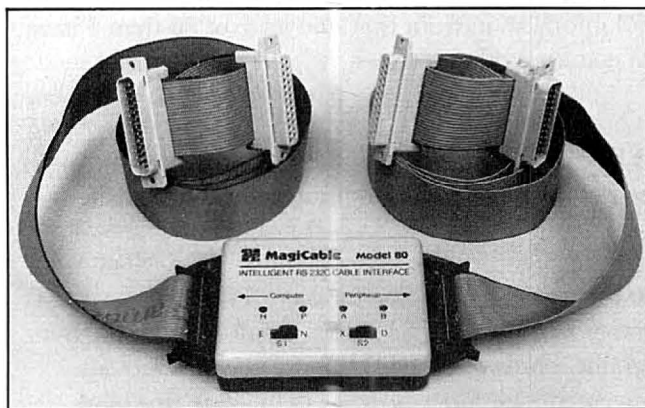
Circle 554 on Reader Service card.

Intelligent Cable

The MagiCable Model 80 (\$89.50) by Patton Electronics is a semiautomatic RS-232C interface designed to solve problems normally associated with the RS-232 interface standard. A small box in the middle of the 6-foot cable contains logic circuitry that automatically reconciles data and handshake lines. It also has male and female connectors on both ends.

The cable requires no batteries or external power, works at any data rate, and disregards protocol, word length, or character format. For further details, contact Patton Electronics Co., 11129 Arroyo Drive, Rockville, MD 20852, 301-493-9665.

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MagiCable from Patton Electronics Co. configures itself.

NEW PRODUCTS



Build a solid oak rolltop cabinet for your computer.

Hide-Away

A rolltop home computer center in kit form is available from Craftsman's Corner for \$589.95 plus shipping. The oak rolltop unit is 55 inches high, 36½ inches wide, and 23 inches deep. It accommodates a full range of personal computer systems, including processing unit, disk drives, keyboard, monitor, printer, and paper, plus supplemental storage pigeonholes.

The complete kit includes all wood parts and hardware plus detailed instructions. Wood components are pre-cut, shaped, sanded, and ready for assembly, predominantly a clamping and gluing process. For more informa-

tion, contact Craftsman's Corner Inc., 4012 N.E. 14th St., P.O. Box AP, Des Moines, IA 50302, 515-265-3239.

Circle 559 on Reader Service card.

Phone Home

Electronic Specialists' Kleen Line PDS-11 (\$69.95) for standard four-pin telephone modular connectors suppresses damaging telephone line spikes caused by lightning, spherics, or phone office switch gear.

The Kleen Line security system uses two-stage semiconductor and gas discharge tube suppression techniques. An isolated ground isolates equipment from damaging lightning discharge current.



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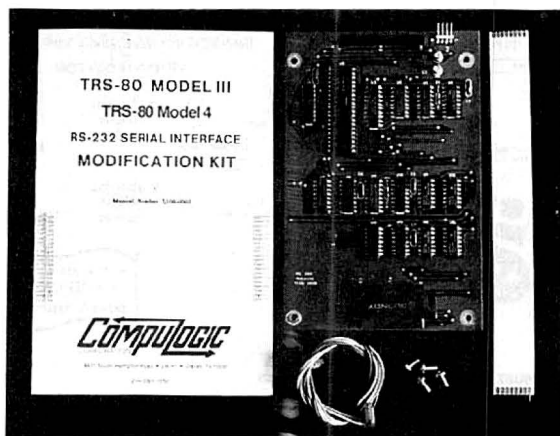
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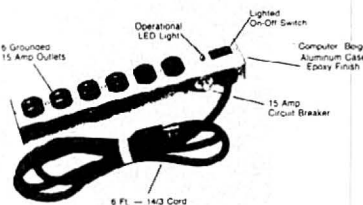
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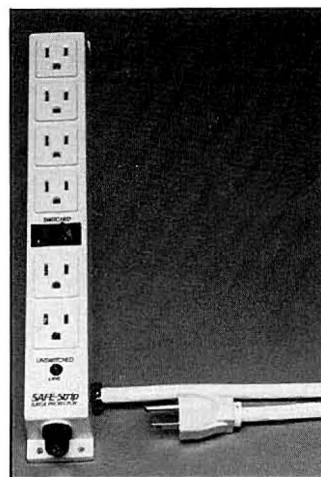
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nated on/off switch, a 7-inch grounded power cord, and built-in mounting brackets. The Safe-Strip comes complete with 15-amp fuse protection against overloads.

For more information, contact Curtis Manufacturing Co., 305 Union St., Peterborough, NH 03458, 603-924-3823.

Circle 553 on Reader Service card.

More Fonts

Prosoft offers 47 additional typefaces for its Model I/III/4/4P Dotwriter printer driver. The Dotwriter library now provides 290 fonts.

The fonts come in groups of three to eight typefaces per standard disk. The disks cost \$24.95 apiece, or three disks for \$49.95. For more information, contact Prosoft, Box 560, N. Hollywood, CA 91603, 818-764-3131.

Circle 556 on Reader Service card.

Learn That Xenix

Xenix By Example from M & M Technologies is a training guide with detailed explanations of all commands in the Microsoft Xenix core system. Its real-life situations section presents realistic problems and solutions.

The Xenix guide costs \$39.95 plus \$3.50 postage and handling. For more information, contact M & M Technolo-

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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.

NEW PRODUCTS

gies Corp., P.O. Box 237, Herndon, PA 17830, 717-758-9260.

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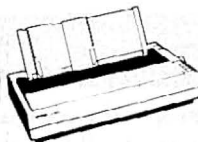
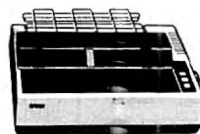
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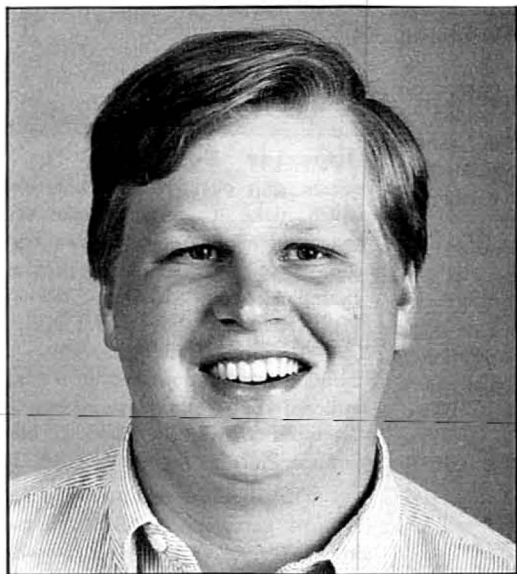
The DEVELOPMATE is extremely compact. Both the PROM programmer and the In-Circuit-Emulator are in one small plastic box only 3.2" x 5.4". A line-plug mounted power supply is included. The PROM programmer has a "personality module" which defines the voltages and connections of the PROM so that future devices can be accommodated. However, the system comes with a "universal" personality module which handles 2758, 2508(8K), 2716, 2516(16K), 2532(32K), as well as the new electrically alterable 2816 and 48016/16K EEPROMs!

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Abbreviated Abacus

In case you missed last issue, *80 Micro* has started a new back-page contest. Each month we pose a programming problem you can sink your teeth into. Maybe you'll learn some new tricks. We might even throw you a bone—an "I Break for *80 Micro*" bumper sticker. If we really like your solution you may even get an *80 Micro* T-shirt.

You can also win a prize for submitting contest ideas we use. Think you've created a clever little subroutine? See if other readers can improve on it. Here are the rules again:

1. Owners of all TRS-80 and Tandy systems with the exception of the Pocket Computers are eligible. We'll consider degree of difficulty when comparing solutions created on different machines.

2. The deadline will always be the 21st of the issue month. Thus, this month's deadline is

Jan. 21. We realize that this doesn't give everyone the same amount of time to come up with their entries (we apologize to our overseas readers especially), but postponing the deadline any longer would add another month to our publishing the answers.

3. Speaking of the answers, they'll appear three issues from the issue in which the problem appears. Thus, this month's winners will make their appearance in the April 1986 issue.

4. Employees of CW Communications are not eligible.

5. We will not be able to return entries.

6. Specify your T-shirt size. Bumper size not required.

Contest the Second

This month's problem is to create a four-function calculator with a memory, in two lines of Basic. We almost got a two-function reverse Polish notation calculator in one line (see the Program Listing). Let's see what you can do. ■

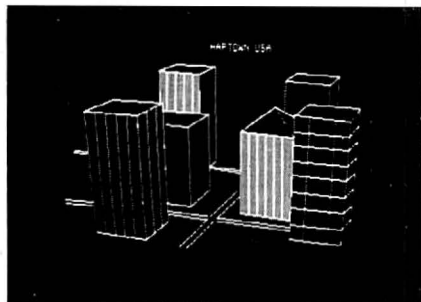
Program Listing. The reverse Polish notation calculator.

```
10 AS=INKEYS:IF AS>"/"AND AS<":"THEN NS=NS+AS ELSE IF AS="+"THEN R=R+VAL(NS):PRI
NT"+";NS:PRINT R:NS=""ELSE IF AS="-"THEN R=R-VAL(NS):PRINT"-";NS:PRINT R:NS=""EL
SE IF AS="c"OR AS="C"THEN R=0:NS=""PRINT"0"ELSE IF AS="e"OR AS="E"THEN NS=""
20 GOTO 10
30 REM C clears it. E clears the current number you're entering. Type in the num
ber then the + or - symbol.
```

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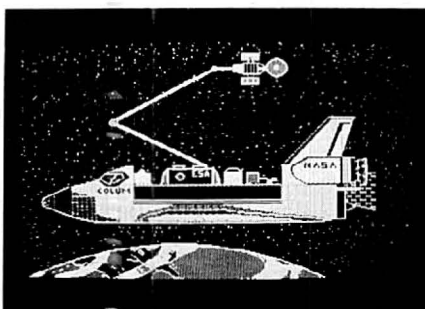
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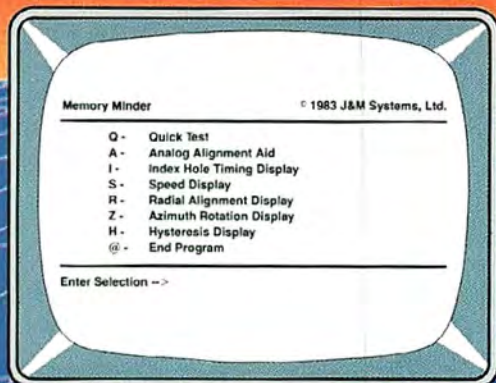
Superior Software. The board comes with over 40 programs and files which make it easier to use, serve as practical applications, demonstrate its capabilities, and serve as programming examples. The software works with TRSDOS 1.3, 6.1.2, 6.2, LDOS, NEW-DOS80, and DOSPLUS. The Grafyx Solution is also supported 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.

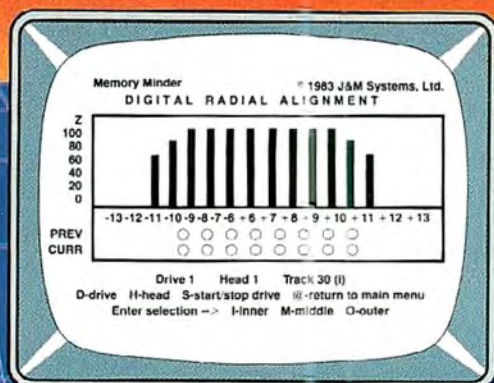
MICRO-LABS, INC. 214-235-0915
902 Pinecrest, Richardson, Texas 75080

MEMORY MINDER ^{T.M.}

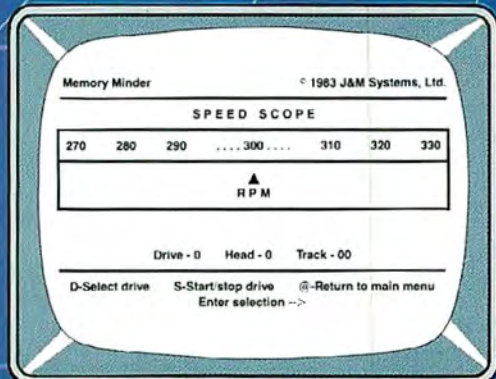
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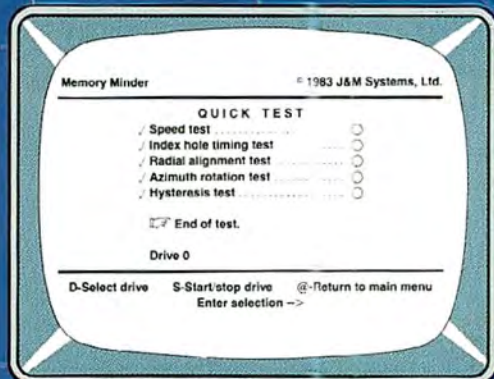
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