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80 micro

the #1 magazine for Tandy user

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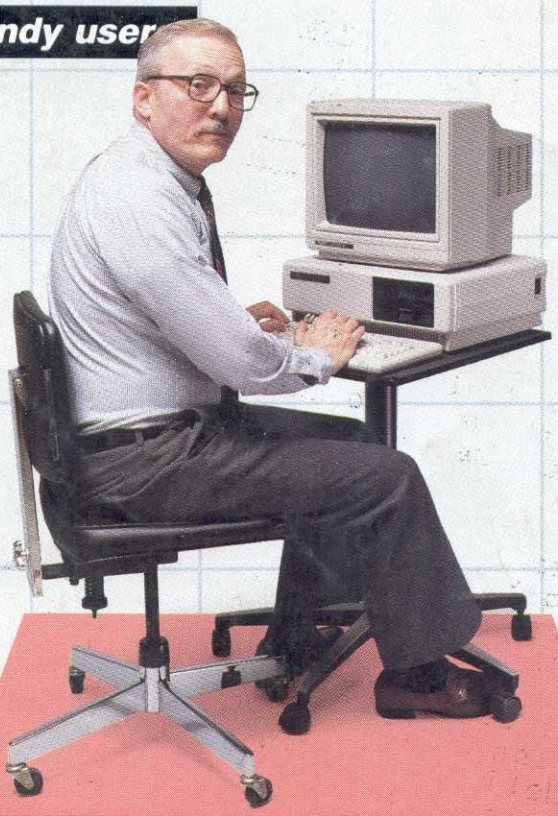

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MS-DOS SCRIPSIT
When Everything Is Not Enough

THE TANDY 1000
Write Your Own Memory-Resident Program

WIN A MODEL I
(No Kidding!) CONTEST ON PAGE 52

SPECIAL FEATURE!
Your Own Stat Program To Type In And Use

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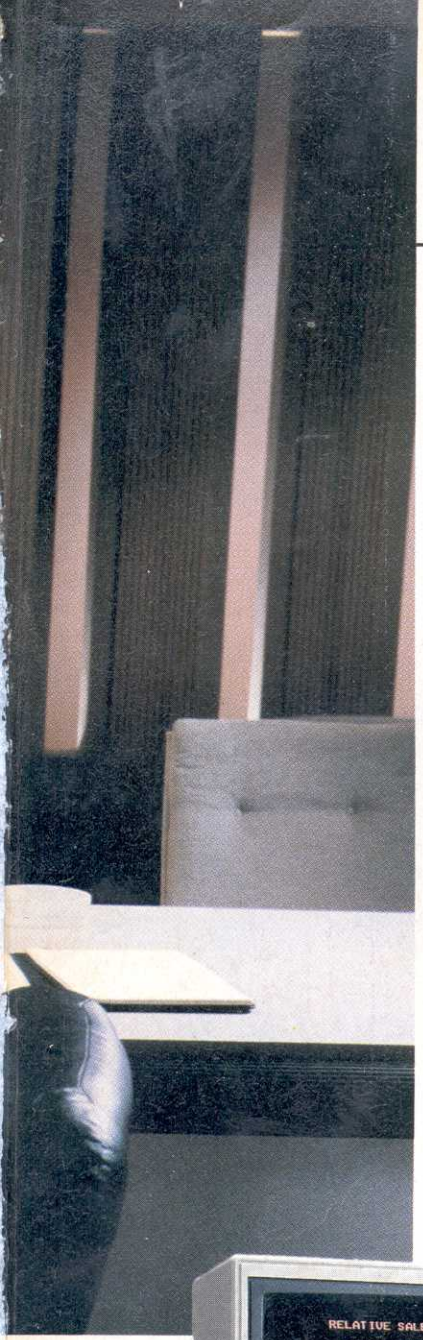
The New Tandy® 3000

The difference is power ...and affordability.



Introducing the Tandy 3000, the affordable alternative to the IBM® PC/AT. Here's the power you need to manage your business, to network computers, or to create a multiuser system.

Unmatched compatibility

The Tandy 3000 uses the advanced MS-DOS 3.1 operating system. And since the Tandy 3000 is compatible with programs designed for the PC/AT, as well as the PC/XT, it cuts through today's software confusion. Choose from advanced word-processing packages, database management and powerful accounting software.

Power to share

The Tandy 3000 is also designed to use the forthcoming XENIX 5.0 multiuser operating system. Two to six people in an office can use the 3000 simultaneously with low-cost data display terminals.

In offices already equipped with MS-DOS computers, the Tandy 3000 is the link that brings them all together. Using our ViaNet local area network, the Tandy 3000's high speed is available to all network users. The Tandy 3000 is your affordable solution for office automation.

Designed for High Performance

The Tandy 3000 comes with an 80286 microprocessor for the ultimate in speed and performance. Its 16-bit architecture operates at 8 megahertz—twice that of the industry standard.

The Tandy 3000 comes with one-half megabyte of main memory (512K RAM). This memory can be expanded to 640K without using an expansion slot. Total internal memory can exceed an astounding 12 megabytes (under XENIX).

As for storage, the Tandy 3000 (25-4001, $2599) is equipped with a high-capacity, 5¼" slim-line floppy disk drive. For the utmost in compatibility, this drive can read 1.2-meg and 360K formats for use with any IBM PC diskettes.

For maximum storage capacity, choose the Tandy 3000 HD (25-4010, $3599) with a built-in 20-megabyte hard disk drive for fast access to volumes of data.

Both versions of the Tandy 3000 feature a built-in real-time clock for time-sensitive applications and a serial/parallel interface.

The Tandy 3000 has ten expansion slots, including seven IBM PC/AT-compatible slots, two PC/XT-compatible slots and a PC/XT-compatible half-slot for the serial/parallel interface board.

Tandy...Clearly Superior™

High performance, compatibility, multiuser and networking capabilities, and remarkable expandability: the Tandy 3000 has the power to put you in command.

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Fort Worth, Texas 76102

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Prices apply at Radio Shack Computer Centers and at participating stores and dealers. MS-DOS and monitor sold separately.
IBM/Registered TM International Business Machines Corp. MS and XENIX/TM Microsoft Corp. ViaNet/TM VIANETIX.

Circle 126 on Reader Service card.

JMG

GREAT PROGRAMS, AND FREE SHIPPING TOO!

Welcome again to our humble corner in this monolithic standard of computer magazine publishing known as 80 Micro. As I write this we are beginning a major change to one of the most efficent computer invoicing/tracking systems being used anywhere, with the result to be better service than we've even been able to offer before. Combined with our top-quality software, it makes us an unbeatable source for TRS-80 products. So, look over our selection, and for now I'll leave you with this pressing question: What do you call an IC from an aging piece of wood? A chip off the ol' block, of course.

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

ZBASIC 3.0

ZEDCOR's brand new basic compiler. Device independent graphics, 54 digit numeric accuracy, built-in interactive Editor and Compiler, structured Programming Constructs, and much more. The commands stay the same for any and all computers!

MODELS I/III and 4 ..... $79.50

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 $69.50
Super Utility MSDOS $79.50

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

T/Maker

T.M.

*** 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) $184.50
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)	$184.50
(MSDOS Ver.)	$294.50
TFC BBS	$ 99.50
Powerdot II	$ 34.50
POWERMAIL PLUS	$ 94.50
POWERMAIL PLUS w/Txt Merge	$124.50
LESCRIPT	$ 94.50
LESCRIPT CP/M	$149.50
LESCRIPT MS/DOS	$149.50
ZORLOF II	$ 49.50
MSCRIPT	$ 52.50
LAZYWRITER	$ 99.50
TYPEITALL	$ 99.50
PowerScript (New Version)	$ 34.50
PowerDriver	$ 24.50
Electric Pencil	$ 74.50
Electric Pencil w / Spell Check	$139.50
EDX Text Editor (Mod I/III)	$ 24.50
TEXTPRESS	$ 39.50
ELECTRIC WEBSTER	$129.50
E.W. Options (each)	$ 38.50
E.W. MS/DOS (Includes options)	$149.50
Datagraph with Pie Option	$109.50
Graphit	$ 34.50
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Mumford's Disk Indexer	$ 34.50
Howe's System Diagnostic	$ 89.50
J & M's Disk Drive Analyzer - I	$ 84.50
J & M's Disk Driver Analyzer - III	$ 74.50
ENBASE Data Base Manager	$ 64.50
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AFM (Auto File Manager	$ 94.50
Home Accountant (Model III)	$ 54.50
VersaLedger II (Models I/III)	$134.50
Versa Series (Models I/III) ..... each	$ 89.50
TAS's ZMAIL Mail List	$ 24.50
Macro Typing Tutor	$ 24.50
Lazycomm Terminal	$ 29.50
Disk Term Terminal	$ 59.50
MTERM Smart Terminal	$ 59.50
DOSPLUS 3.5 (Models I/III)	$ 54.50
DOSPLUS IVA (Model 4/4P)	$114.50

GAMES

SUPREME RULER PLUS	$26.50
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FOOTBALL STRATEGY	$29.50

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ROM ROUTINES Documented	$16.50
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Programmer's Guide to TRSDOS 6	$14.50
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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

Better 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

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SUSPENDED	

UTILITIES

Alcor C Compiler	$ 82.50
Alcor Multi-Basic Compiler	$ 82.50
Super Utility 4/4P	$ 69.50
Super Utility 3.2	$ 59.50
Super Utility MSDOS	$ 79.50
Supercross XT	$ 94.50
Supercross XT w/CnvBasic	$112.50
Autoloader	$ 34.50
PRONTO (Model 4/4P)	$ 54.50
Other MISOSYS Utilities ..... each	$ 28.50
Edas/PRO-CREATE	$ 69.50
DSMBLER III/PRO-DUCE	$ 28.50
Edas/Dsmbler Combo	$ 94.50
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
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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
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NEWBASIC w/Analyst	$ 34.50
Analyst only	$ 19.50
ALE - Assembly Language Editor	$ 39.50
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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 SPOTLIGHT

AFM

The brand new data base manager from PowerSoft. The key-word of this program is "FLEXIBLE". Free-form entry system allows you to enter your data any way you please. Consists of three modules: AFM (Auto File Manager), AFR (Auto File Reporter), and AFU (Auto File Utility). Features fully sorted output by all fields, fully relational, form letter output, relational lookup, mail labels, and much more. Probably the best Data Base Manager available for the TRS-80!

$94.50

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, ie. 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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PowerSoft NewsFlash #6

Advertisement

Thank you for reading our latest installment of ***PowerSoft's Newsflash.*** This space will contain information that doesn't really fit into a regular ad-type format. We'd appreciate knowing if these columns are of any value to you. Remember that these columns are written 2-3 months before they are printed, so if something gets out-of-date, that's why, but we try to keep it current! Thanks to all those who have already written or called with your support! For fastest service on a catalog request, ***DON'T*** use the *Reader"s Service Card,* but call or write instead! We appreciate receiving your comments as well as your orders! ***If you are a new computer owner, welcome!***

Being in this business for over six years, we forget sometimes that there are newcomers every month who don't necessarily know ***who we are or what we do*** here at **PowerSoft.** We thought *EVERYONE* has heard of ***Super Utility*** and the other things that we do, but ***N - O - O - O...*** so we're gonna tell you what we do. **We support the Tandy line of computers, *specifically the TRS-80,* as well as the MS-DOS based machines** with needed products that either solve a problem or make your computing life easier or less painful in case of a problem. We listen to what is needed, and if we can provide it to you at a good value, *then we do it.* ***See our Catalog #6 for further details or check out our XTRA-80 SIG on CompuServe™. Type GO PCS-56 from any prompt to get there!***

TANDY's new attitude towards the competition...

The word from Tandy's public relations manager **Deborah McAlister** is that Tandy is "livid" about press reports and market researcher's figures regarding its sales. *Seems that they are always too low.* (Tandy doesn't give out sales figures.) She states, **"COMPAQ brags in its ads that it sells 10,200 units per month. We're outselling them two-to-one, and you can quote me. On a unit basis, we're outselling the IBM PC."** She continues, **"We're also tired of this *B.S.* that Apple has the education market locked up."** ***Go get 'em, Deborah!***

Tandy turned in its first BILLION DOLLAR quarter ending 12/85.

DATA INSURANCE... Cheap!

We get LOTS of calls asking for ***SUPER UTILITY+*** or ***SU4*** for a TRS-80 running a hard drive. We'd like to explain that the TRS-80 versions of ***SU*** are for floppies only, and will not address hard drives, but we DO have two packages that give you the "SU+" type features you *need* on your hard drive if you're running TRSDOS 6 (any version) or LDOS 5.1.x. These are called ***The LDOS ToolBox*** (for Mod I/III) and ***Model 4 ToolBelt*** (of course for the 4/4P/4D). These sets of tools (utilities) check and repair directories, inspect, verify, and/or modify sectors, remove passwords, copy or kill selected files, and lots of other needed features ala ***SUPER UTILITY*** and written by the same author. They're only $49.95 each or $75 bucks for both. We've received letters from people who swear we've saved their life! One emergency usage makes them worth their weight in gold! We *Federal Express* these tools, as well as ***SUPER UTILITY*** (TRS-80 and PC versions) *many* times a week. Why wait until disaster strikes? Think of them as an insurance policy. *(SUPER UTILITY for the PC does support rigid drives. Different program... it's $89.95)*

In December, our ***SU/PC*** saved the **Ft. Worth Police Dept.** the trouble of having to re-type their DBASE™ data files (one VERY large) that were blown away by accident. It was definitly worth the drive over to Dallas for the computer operator when he discovered that *NORTON's* couldn't do the job! ***SU/PC*** *works on the 2000 too! If interested, send a SASE for a reprint of an article that appeared in the Ft. Worth Star-Text about this.*

Danger... S-T-A-T-I-C

One of the major problems we have experienced is STATIC when the heat is on. We use gas heat here in Texas, and the air becomes very dry. We were zapping equipment left and right! It got dangerous for our data and expensive when we actually blew a few components. We looked into all kinds of solutions, but found the best solution to also be the most economical. Radio Shack sells a bottle of Anti-Static Spray for your carpets that performs miracles! Depending on your situation, you probably will only need to treat the area once a month or so. It totally eliminated *all* static in our office. It dries clear and didn't stain the carpet. Great for home use too. We don't zap our cats (or ourselves) anymore! ****Important Note! Spray the carpets - not the cats!***

AFM DEMO DISK! Only $5 - Tim came up with an in-depth demo/tutorial disk for *AFM* that uses data supplied by *you* to demonstrate the potential of this system. It'll help demonstrate functions that are difficult to explain without seeing in action. We're going to sell this demo disk for only $5 (US - foreign add proper postage) to anyone who wants to see what *AFM* is all about and what they're looking for. ***Mod III only.***

Do you have our Catalog #6? Groups, schools, and computer clubs may write and request whatever number that you need. If you can recommend our products to your associates, please do! Please see our ads elsewhere here in *80-MICRO* for descriptions of a few more of our products. ***Thank you!***

PowerSoft Products
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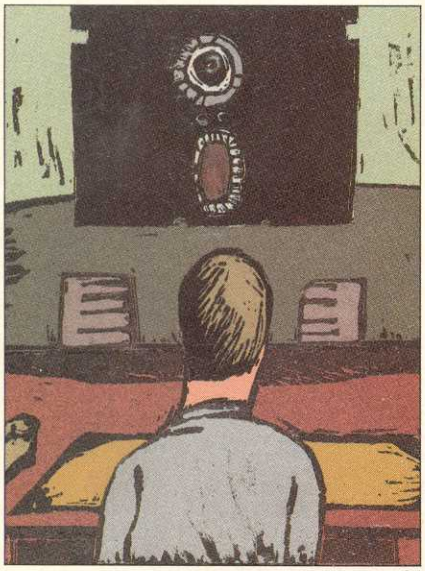
April 1986 80micro



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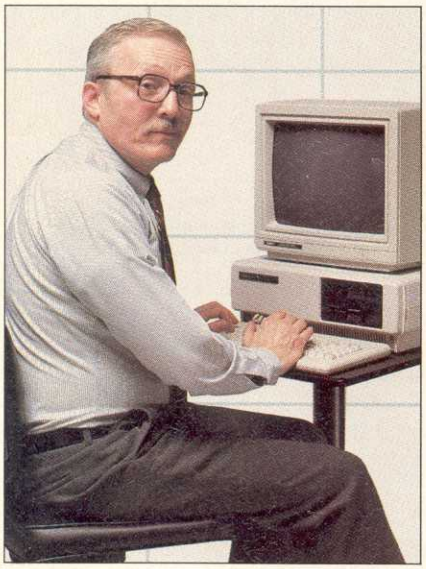

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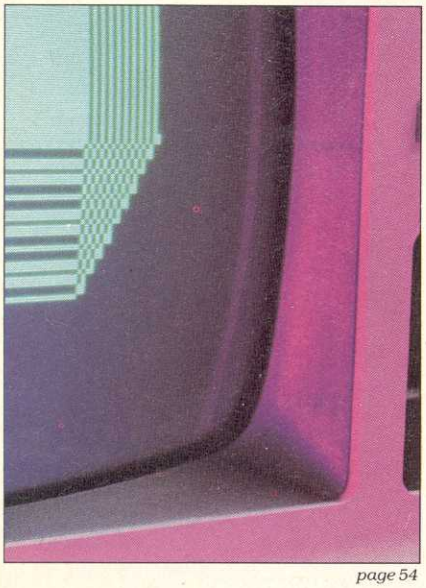

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A survey of commercial statistics software.

44. **Keeping Tabs**
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52. **Name That Computer**
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54. **Quick Draw** *by John D. Wolfskill*
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60. **Taking Up Residence** *by Dave Rowell*
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Multiple Choice
The Tandy Portable Computer
120. **HOT CoCo Section**
Aiming High
True to Form
Draft Pix
Check PPoint
Doctor ASCII
Color Monitor
152. **New Products**
edited by
Mare-Anne Jarvela
160. **Fine Lines**

LOAD 80

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

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

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the instructions provided. If you own a Model I or III disk system, you boot the Load 80 disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a Model 4, copy the Model 4 programs from the Load 80 disk to your TRSDOS 6.x disk using the COPY command.

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

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

Directory

Statistics
Article: Keeping Tabs (p. 44).
System: Models I, III, and 4, 32K RAM.

A low-cost way to compile statistical data.
Language: Disk Basic.
Cassette filespec: B.
Disk filespec: MICROTAB/BAS.

Graphics
Article: Quick Draw (p. 54).
System: Model 4, 64K RAM.

Add graphics commands to Basic.
Language: Basic.
Cassette filespecs: C, DRAW, D, E.
Disk filespecs: DRAW/BAS, DRAW/CMD, DEMO2/BAS, DEMO3/BAS.

Programming
Article: A Closer Look at PEEK and POKE (p. 74).
System: Model III, 32K RAM.

PEEK and POKE applications that expand the power of Basic.
Language: Disk Basic.
Cassette filespecs: F, G.
Disk filespecs: TRACKER/BAS, FOURUP/BAS.

Hardware
Article: Project 80 (p.78).
System: Models I, III, and 4, 32K RAM; 8748 editor/assembler.

Provides hardware or software handshaking for the parallel-to-serial converter.
Language: Assembly.
Disk filespec: PARTOSER/SRC.

Basic Handler
Article: The Next Step (p. 102).
System: Model 4, TRSDOS 6.2, 64K RAM; EDAS editor/assembler.

Easy access to TRSDOS SVCs from Basic.
Language: Basic, Assembly.
Cassette filespecs: HANDLR, H, I, J, K, L.
Disk filespecs: HANDLR/SRC, HANDLR/CMD, SVC/BAS, SCROLL/BAS, WINDOW/BAS, CAPSLOCK/BAS, DISPLAY/BAS.

BAS, OVL, SUB, DAT = Basic *SRC = source code* *CMD = object code*

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Caveat Editor

Slowly and painfully, the microcomputer press has learned to restrain its youthful enthusiasm for new products and technologies. None of us wants to go through the painful embarassment *Popular Computing* experienced when the magazine featured Ovation on its July 1984 cover shortly before the product disappeared into the black hole of unreleased software.

We at *80 Micro* have been burned several times by our own poor judgments, which, while not as glaring as *Popular*'s, have nevertheless made us more cautious journalists. We put bar codes on our November 1983 and October 1984 covers. To say the least, bar codes didn't exactly take the Tandy community by storm. Our January 1984 issue featured the Model 2000, on which I commented, "If [it] lives up to its potential, we can expect [Tandy] to reestablish itself in the microcomputer marketplace over the next year or so." Sure—and if I flap my arms hard enough, I can fly to the moon.

I get a headache when I look back on these issues. We fell into a common trap—we got overly excited by technological innovation. We forgot that the road between the lab and the consumer is full of twists and turns, any one of which can send the most promising product spiraling over a cliff.

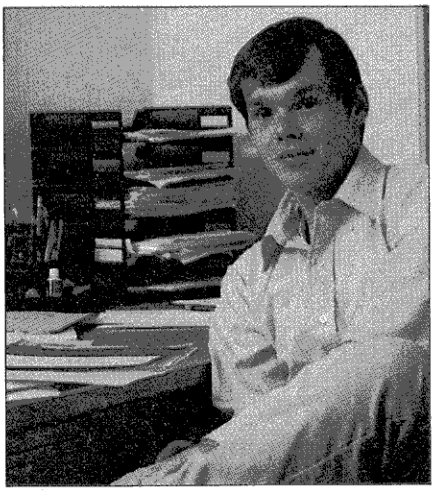
Desktop Disappointment

We're getting better, though. Take, for instance, our cover story on desktop publishing. You'll never read it, because we dumped it.

Nearly every major magazine has done a feature or two on microcomputer-based page layout systems. Two magazines devoted to the topic—one devilishly titled *Desktop Publishing*—have emerged. Some observers say desktop publishing will become a major microcomputer application, with everyone from businesses to clubs madly creating polished newsletters, brochures, and flyers.

We liked the idea. We started to collect software and looked into getting a laser printer. But the more we researched the subject, the more we realized that the story simply didn't exist.

We first discovered that the idea of doing any real desktop publishing on a Model 4 is ridiculous. The computer doesn't have the RAM, and its screen doesn't have the resolution. We looked at one CP/M package that seemed to offer possibilities, but it was too limited and too cumbersome to be taken seriously.



We moved on to the Model 1000 and MS-DOS packages. We quickly found out that serious software costs thousands of dollars, far out of the range of the average Model 1000 owner. We checked out Newsroom, an educational package that goes for under $100, but felt that it was too simplistic for many applications. Our reluctant conclusion was that while desktop publishing is a terrific idea, we'll need to see some major advances in PC technology before the subject is worthy of extensive coverage in *80 Micro*. If you can't wait, you'll just have to buy a Macintosh.

To CD or Not to CD

Our most recent brush with new technology came a couple of weeks ago when Franklin Pierce College, some 20 minutes from Peterborough, got a CD-ROM player, along with a controller board and three CDs containing the Library of Congress catalog. The package, called Bibliofile, comes from Library Corp. in Washington, DC. The system, says the documentation, will run on an IBM PC and "most true PC-compatible microcomputers." Figuring to save the college a few bucks, the library bought a Tandy 1000.

Three Model 1000s and a week of frustration later, one of the librarians called us. The software would initialize the player, but what happened thereafter was anyone's guess. Sometimes the keyboard froze; sometimes the screen filled with garbage; sometimes strange error messages popped up. Clearly, something was wrong, and that something probably had to do with the Model 1000.

We brought the player to our offices and tried it successfully on a PC. We then ran it on a Tandy 1200, again with no problem. The player suffered from indigestion only when hooked up to a Model 1000.

I called Library Corp., the company that sells the package. The first person I talked to said without qualification that the player would run on the 1000. But when I reached someone in customer service, I got another story. They had a whole file on the 1000.

"It runs on some 1000s and not on some others, and we don't know why," the fellow told me. He didn't seem particularly interested in finding out why, either. The story has a happy ending, since the school was able to trade its 1000 for a 1200. But to us, the experience simply highlighted the point that we can't trust a new technology until it has been thoroughly tested. CD-ROMs might be the best thing since donut holes, but they won't do much good if they don't work with the hardware our readers use.

Testing 1-2-Ouch

As a result of our experiences, I seem to have developed an instinct that tells me when we're about to go overboard on a new product. Here's an example of how this early-warning system works.

I was recently flipping through a PC magazine when I ran across an ad from Cauzin Systems for a product called Softstrip. You encode your data on a piece of paper and read it into your computer with a scanner. The ad called it "a simple, reliable and cost efficient way to distribute and retrieve information." In fact, it said the strips are more reliable than most magnetic media. The ad also promised that "most of your favorite magazines and books will soon be using them in addition to long lists of program code."

It sounded great. An inexpensive, efficient, dependable mass-storage device! My pulse went up. My pupils dilated. I reached for the phone to mobilize my staff. But wait. These sure do look a lot like bar codes, don't they?

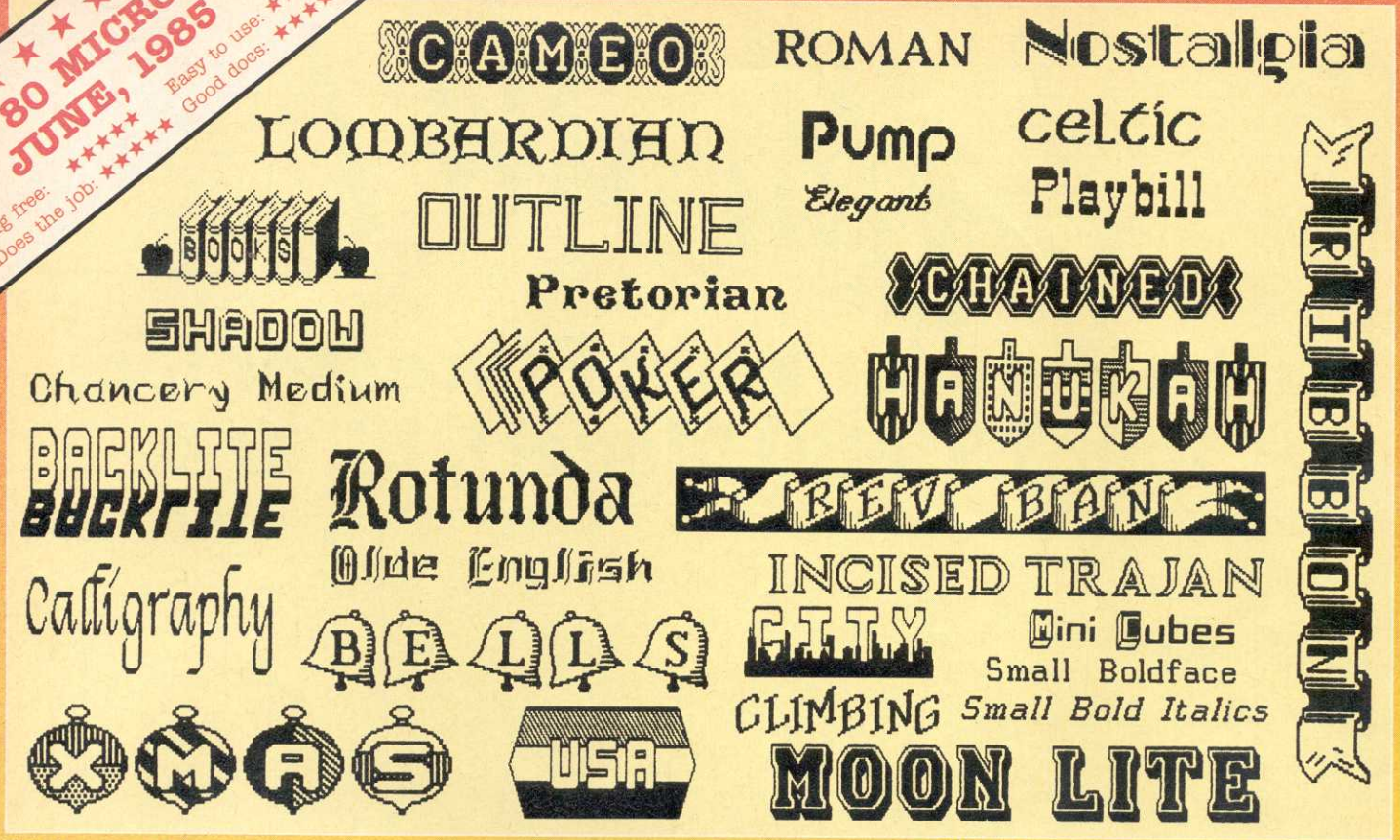
Bar codes. I suddenly felt a sharp pain in my head. It was a familiar pain, a warning pain. *Bar codes.* The pain became worse.

I recognized the symptoms. I closed the magazine. The pain subsided. I put the telephone receiver down. My heartbeat slowed.

I laughed scornfully. Softstrips? Ha! Come back when you've grown up, kid. Then we'll see what stuff you're really made of.■

Photograph by Frank Cordelle

★★★★★ 80 MICRO JUNE, 1985 ★★★★★
Bug free: ★★★★★ Easy to use: ★★★★★
Does the job: ★★★★★ Good docs: ★★★★★



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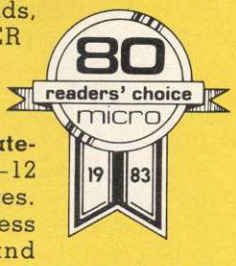

36 more letterset disks are available separately. Each has 3–12 complete typefaces. The disks costs less than $25 each and you may purchase them at any time.

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We printed our samples on an Epson; sizes may vary on other printers. Many of the fonts shown above are available at extra cost.

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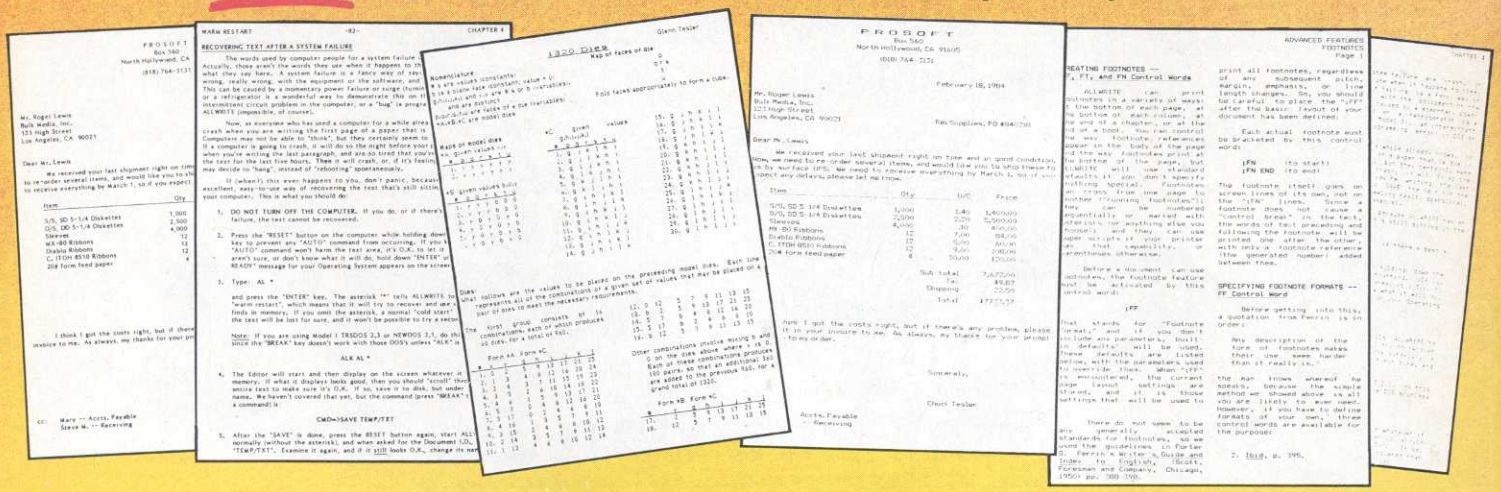

These were printed by ALLWRITE; shown 20% actual size.

We are proud to offer you the one Word Processor that will satisfy all your writing needs: ALLWRITE. It sets new standards for text editing and printing, and will give new life to your TRS-80. Let us tell you why . . .

In an attempt to push the public into expensive 16-bit computers, many manufacturers have been saying that the TRS-80 is obsolete. The truth is that the software, not the hardware, makes the difference. And the best word processor of all is now available *only* on the humble TRS-80, not on those expensive 16-bit machines!

ALLWRITE will save you time and let you produce the highest-quality, most professional-looking letters, term papers, and reports available on a micro-computer.

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Reads a 25,000 character file (10 printed pages) from disk in SIX SECONDS . . . does a global search-and-replace in FOUR SECONDS . . . outruns even the fastest popular micro-printer.

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Change text width at any time; wide lines shift left and right as you type. ALLWRITE preserves double-blanks between sentences, uses the entire screen for text, and displays a complete Status Screen at the touch of a key. Scroll by line, partial screen, full screen, to top or end of file, or to any marked point. Move cursor by character, word, tab, line, or screen.

You can set and change on-screen tabs and store them on disk. The print-time tabbing features are incredibly versatile: they allow left, right, and centered tabs, and even line up your decimal points.

ALLWRITE shows you where you forgot to turn off underlining, boldface, italics, or double-width. Special on-screen Preview feature shows page breaks and page layouts . . . including underlining and boldface. In "Summary" mode, ALLWRITE quickly flags formatting errors without wasting time printing all the text. These standard features make document preparation faster and easier than ever!

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

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

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

ALLWRITE Is Easy To Learn

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

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

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

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

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

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

Customer Comments

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

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

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

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

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You probably know that quality word processors for CP/M and the IBM-PC sell for $300–500, and they don't have ALLWRITE's capabilities or speed . . . or PROSOFT's proven, on-going support. Now, for a fraction of the cost of a new computer, you can have the most complete word processor of all. And you won't have the headaches of starting all over again with a new, different computer.

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ALLWRITE comes with just about every useful word processing feature . . . standard. Here are some highlights: excellent right-justified proportional printing on most printers having that ability; powerful Form Letter and Mailing Label preparation; Instant counts of words, characters, lines, changes; block Move, Copy, Delete, Putfile, Getfile, and List; delete by character, word, line, sentence, paragraph, or block; insert and one-key insert; great RS-232 printer support; accepts all 256 ASCII codes from keyboard; intermix pitches on same line (printer-dependent); 1.5 line spacing, 6, 7, 8, 12 lines per inch (printer-dependent); does multiple-columns on all printers; perfect alignment of hanging indents; variables, logic statements, conditional printing; wildcard Directories; integrated with Electric Webster and DOTWRITER for Models I, III, and 4 (these are sold separately); "Legal" line numbering; paragraph, list, and figure numbering; supports most popular printers (all "printer drivers" included); compatible with high-memory drivers; fully explains all DOS and ALLWRITE error messages; wildcard search-replace; tabs, search-replace, other settings remembered across files; word reversal; up to nine levels of boldface; flexible page titles; footnotes at bottom of page or end of document; Table of Contents and Index generation; and PROSOFT's unmatched text formatting and printing capabilities.

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Visible Means of Support

I've noticed in recent issues that developers have a renewed interest in producing software for the Models I, III, and 4/4P. Another trend I've noticed is the low price of some of this new software—as low as $29.95. This is a welcome relief to those of us who have witnessed a steady decline in vendor support. I believe that TRSDOS users continue to represent a viable market.

I, for one, am pleased with my Model 4. I am not particularly interested in the power of Lotus 1-2-3, dBase III, or FrameWork. I *am* interested in, and will buy, programs that cost less than $99.95, do the job as outlined, and are easy to use.

Hardware and software developers! Are you listening? How about developing TRSDOS spin-offs of some popular MS-DOS programs? PRO-NTO is one example of this.

In return for this renewed or continued support from many *80 Micro* advertisers, I intend to support them by purchasing their products.

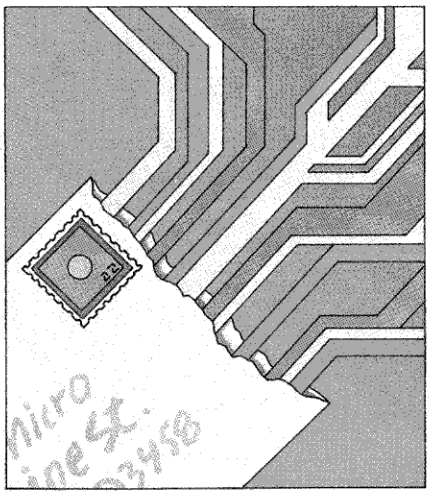
Gus Moyer
Silver Spring, MD

BEEP Backer

Another solution for Mr. Tabor's problem with Model 4 Basic's Common and Chain statements (Input, December 1985, p. 12) might be to acquire the BEEP Basic enhancements from Logical Systems Inc. (P.O. Box 23956, 8970 N. 55th St., Milwaukee, WI 53233). As an undocumented feature, BEEP allows the Common statement in compressed format programs, and it chains compressed programs without loss of the variables in these common statements.

A word of caution, however. If you must break out of a program running under Basic with BEEP installed, always use a Clear statement before doing any program line editing. Failure to do so may result in some unusual and unwanted program line renumbering.

I've been successfully running a BBS (312-772-2452; 300/1,200 baud; UART settings 7 data bits, 1 stop bit, no parity) using Basic and BEEP for nearly a year. As far as I know, I have yet to lose any of



the over 500 variables chained between the 14 different modules.

Bruce Barnes
Chicago, IL

Hide and Seek

We wish to congratulate Andy Levinson for his Tidbit #29 in your December 1985 issue (p. 82). His method of hiding information in a Basic line is essentially the one we used to hide the password in our adventure game TROFF.

Players had to solve the game to get a password entitling them to a free copy of our newest program. Our false password (Peace) could be found by listing the program, and hundreds of people tried to cheat by sending the apparently correct password.

Bob Krotts
Gamester Software
Kettering, OH

Patch for Free

I'm glad that Hardin Brothers mentioned in his review of Alpha Technology's Supermem board ("RAM Tough: Memory for 8 Bits," January 1986, p. 34) that Misosys has patches that let TRSDOS 6.2 properly address the memory board. As the primary author of TRSDOS 6.x, I steadfastly believe in standardization. Thus, I spent my time working with the folks at Alpha Technology as well as with Bentley Mitchell, the now-deceased author of the RAM-Drive package, in order to ensure that programmers had a uniform protocol of accessing the extra memory.

Since the DOS already supported a scheme of bank switching via the @BANK supervisor call, I worked to extend that scheme so as to support the switching of 31 banks rather than the three available in a 128K machine. The extended @BANK support was implemented via three patches to the DOS—two of them quite large. As Hardin reported, Misosys is making these patches available without charge to anyone wanting them.

To get a copy, send a disk in a disk mailer to Misosys Inc. (attn:ATP), P. O. Box 239, Sterling, VA 22170-0239. Enclose a return address label for your mailer and U.S. stamps (or money rounded up to the next dollar) to cover return postage.

You may give copies of the patches to anyone else, make them available on any bulletin board, or print them in any TRS-80 computer club newsletter. Misosys should be credited as the originator of the patches. Note that they have been placed in the public domain with commercial rights reserved by the author.

We are also aware that other hardware companies have developed add-on memory boards for the Model 4. In the interest of standardization, I hope that those companies get in touch with us so that appropriate patches to TRSDOS 6.2 can be developed to communicate with their boards via @BANK.

Roy Soltoff, President
Misosys Inc.

80 Micro's BBS is open 24 hours a day. It offers programs you can up- and download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

Send your correspondence to Input, 80 Micro, 80 Pine St., Peterborough, NH 03458. We reserve the right to edit letters.

Illustration by Mark Fisher

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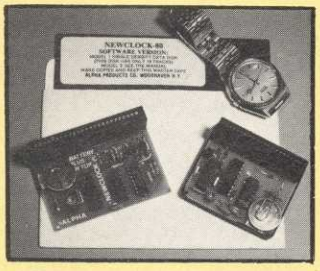

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Send your questions or problems dealing with any area of Tandy/Radio Shack microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Q: Can you tell me how to expand my Tandy 1000 from 256K to 384K? I have the memory expansion card and I'd like to add the memory chips myself. I need to know the exact type and number of chips to order. When I get them, how do I put them in? *(Rob Greenberg, Decatur, IL)*

A: Installing memory chips in the Model 1000 is easy. If you have the cheaper and simpler memory board from Tandy, all you have to do is buy eight good-quality 64K chips and plug them into the board. If you examine the board carefully, you'll notice that each of the memory sockets has a small notch at one end. If you look at the memory chips, you'll see a matching notch at one end. Plug the chips into the sockets so that the notches line up.

If you look at the entire board, you can see that all the chips on it have notches at one end and that all the notches point in the same direction. This is a convention that all circuit boards follow: The chips always point in the same direction.

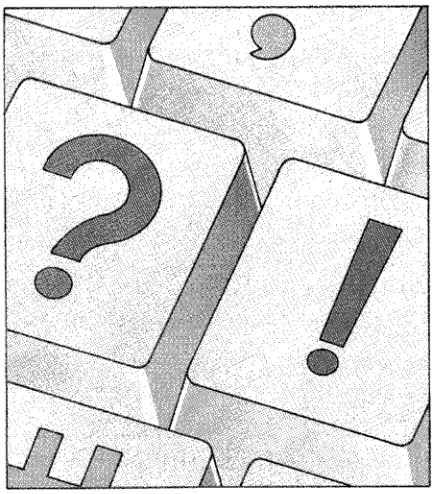
If you have the more expensive memory board, you can use the newer 256K chips and upgrade your computer to 640K using just one slot.

Q: My husband has a Model 4 and I have a Model 4P. We have Scripsit and SuperScripsit. Which dictionary or basic book on computing is best for a beginner? I want to learn terminology and abbreviations.

Can you recommend an inexpensive daisy-wheel printer for the 4P? What about used printers? I don't want anything that won't work well without a lot of service. Thank you for your courtesy. *(Gladys J. Barnette, Tujunga, CA)*

A: I haven't yet found a computer dictionary I like, but the best price bargain is the one sold by Radio Shack in the book section of all their stores. Start with that one.

The best daisy-wheel printer I've seen so far is the Tandy Daisy Wheel II printer. It has only a few print-wheel options, but the machine is sturdy and runs practically forever. If cost is a factor, the Silver-Reed 550 is a good solid workhorse too, and a lot cheaper than



the Tandy unit. Don't buy a used printer unless you've seen it operating nonstop for at least an hour.

Q: I love *80 Micro* but wish some of the material were aimed at people like me. All I know about computers could be put in a No. 9 envelope. I am now facing a problem that may be simple to you, but it has me thoroughly baffled. I have a 128K Model 4 with two disk drives. My printer is a DWP-210 and I use SuperScripsit. I am buying a two-drive Tandy 2000 and a DWP-510 printer. If Tandy ever gets it on the market, I'll buy a 2000 Scripsit word processor.

How can I transfer my 30 disks of information to the new computer? Since I deal in books, a sizable amount of the data is underlined. Is there an answer? If so, please spell it out in simple terms.

Do you know of anybody who puts out a book of instructions for the 2000 that I can understand? *(Russ Kingman, Glenn Ellen, CA)*

A: First, you can easily transfer all your text files from the Model 4 disks to the MS-DOS disks with Powersoft's SuperCross utility (17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475) for $99.95. I don't know if the codes for underlining will be usable on your new machine, but at least all the text will be available.

I haven't yet seen any books on how to use your Model 2000, but I'll be sure to tell you if I find one.

Q: Gary Munson's letter in the May issue (p. 17) brought back a few not-so-pleasant memories of my attempts to get decent double-density operation on my Model I. Fortunately, there is a simple solution: DOSPLUS 3.5. This operating system from Micro Systems Software Inc. comes with a patch for the Radio Shack doubler. Their people told me that the patch creates a 1-bit change that makes the DOS operate on the Radio Shack board. I don't understand it, but if you do it their way, it works. I have yet to find an application that doesn't run on DOSPLUS 3.5.

As long as all your programs are copied onto disks formatted by this DOS, you shouldn't have problems. DOSPLUS 3.5 will also read TRSDOS 2.7/2.8DD disks, so Munson shouldn't lose any of his data. *(Larry R. Minium, Yuma, AZ)*

A: Thanks for writing in with your suggestion.

Q: Some people have had a difficult time making their first double-sided TRSDOS 6.1 system disk. The only trick is to be certain that the SYS0/SYS file is on the front side of the disk, at the beginning of a track; that is, it must begin at the left side of one of the clusters of asterisks that illustrate the disk layout when you execute a Free command.

The simplest way to do this is to first format a double-sided disk, then back up your single system to it by typing in:

```
BACKUP :0 :1 (Q=Y,S,I)
```

Answer "no" to each query except SYS0/SYS. When you move SYS0 in this fashion, the boot track seems to take care of itself. This puts SYS0 at the beginning of relative track 1, the second one on the screen. Do a Free command to check. To back up everything else, do a back-up as follows:

```
BACKUP :0 :1 (NEW,S,I)
```

You can optimize your disk by constructing it in a way that reduces the amount of head travel required to get to the most frequently accessed overlays and files. For instance, SYS0 is accessed once per booting, so it should reside on track 39. Other files are used for each command interpretation; they should be next to the directory track. The simplest way to accomplish this is to fill the disk down to the point where you want the file you are moving; then back up the file you want to move. On an empty double-sided disk, the command:

```
CREATE XXXX:1(size=153)
```

will block out everything down through relative track 17. If you now follow the steps above, the first part of the disk will

Illustration by Mark Fisher

The Amazing A-BUS

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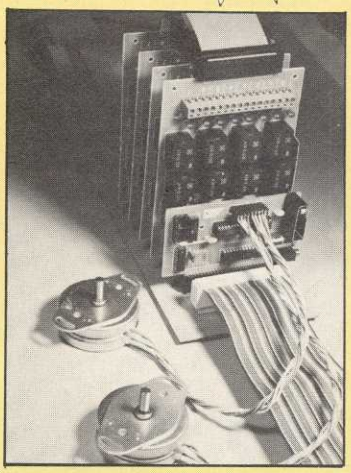

The "A" stands for Amazing, and here is why:

❶ The **A-BUS** works with any TRS-80 models I, III, 4, 4P, 4D, 1000, even 100, 200 and CoCo. In addition, it will also work with IBM or Apple computers. Should you ever move to another system, your investment is protected. Only the low cost adapter card has to be changed!

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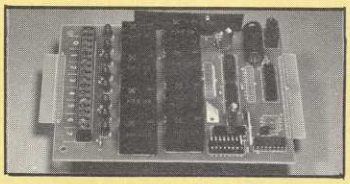
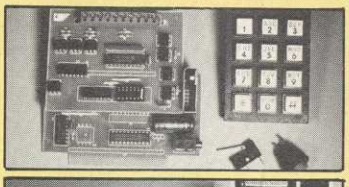


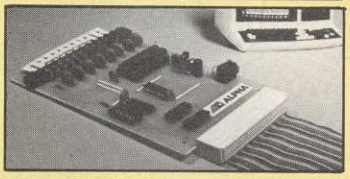
A-BUS new Relay Card: RE-140...$129

This industrial grade output card includes 8 relays. (Contact rated 2 Amp @ 125V) All the decoding necessary is included which means that you can connect up to 64 cards (which is 512 relays.) Easily controlled using "OUT" commands. For example OUT 0,0 turns all the relays off on card #0. Eight LED's show the states of the relays.



A-BUS new Isolated Input Card: IN-141...$49

This optically isolated input card makes it safe and easy to connect external devices (switches, sensors, thermostats, keypads) to your computer. Simple INP commands read the status of the eight inputs. Full address decoding allows up to 64 input cards (that's 512 channels) per computer.



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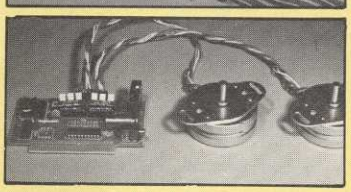

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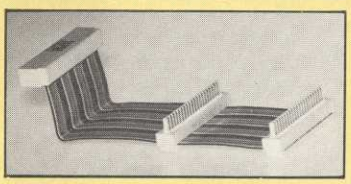

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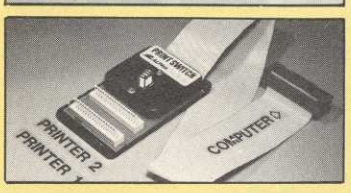

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be empty and the system will surround the directory. You can develop your own theory and shuffle files about to your heart's content. If SYS0 is at the beginning of a track, it will work. Kill off the dummy file, XXXX, when you're finished.

The patch to force the LDOS/TRSDOS 6.1 Format utility to ask about the number of sides to be formatted is:

D0A,88 = 00 00 00 00 00 00 00 00 00 00
F0A,88 = FD E5 3E 65 EF FD CB 0B 6E FD E1

The password is Utility. The utility will format double-sided disks as provided by including (.....,SIDES = 2,.....) in the format command line. Radio Shack doesn't acknowledge that double-sided drives exist, but Logical Systems did us a favor when they wrote the operating system. *(John Carroll, Sheridan, WY)*

A: Thank you very much for your information. As you know, the new Model 4D uses double-sided drives, so we should begin to see more applications that take advantage of them. Also, an article in the January 1986 *80 Micro* ("On the Upgrade," p. 40) shows how to upgrade the Model 4P to use double-sided drives.

Q: On my Model 4, the ROM checksums that the MEMTEST program lists are ROM A 9639 and ROM C 2B91, 2EF8, or 2F64. The actual checksums are ROM A 8F46 and ROM C 48BC. This differs slightly from the list in the April 1985 Feedback Loop (p. 16). Because of the many variations, a patch isn't practical, but there's another way to fix MEMTEST.

First, run MEMTEST and copy down all the possible and actual checksums. Then enter Debug and use the F command to modify MEMTEST/CMD. Locate the checksum messages. If you find only one possible checksum, change it using the proper ASCII code for the hexadecimal (hex) digits. If there's more than one possible checksum, change the first one, then change the next 3 bytes to 2E 0D 03.

Now when you run MEMTEST, it will display only one possible and one actual checksum for each ROM. *(Robert G. McSorley, New Bern, NC)*

A: That is certainly one way to customize the MEMTEST program to your computer's particular ROM checksums, and it eliminates the problem of losing that little piece of paper on which you wrote the checksums for your computer.

Q: Periodically, readers ask how to overcome SuperScripsit's aversion to non-Radio Shack printers, specifically Epsons. Most want to avoid getting compressed print when they choose 10 pitch from the Open Documents option. Here's a patch that does the trick for Epsons using SuperScripsit's DW2/CTL printer driver. From TRSDOS ready type in:

PATCH DW2/CTL (ADD = BB8D,FIND = 0F, CHG = 12)

As you can see, you're changing 0FH (15 decimal, the Epson code for compressed print) to 12H (18 decimal, the Epson code for normal print or 80 characters per line). You can reverse the patch by swapping the find and change values.

In the SuperScripsit manual, the source code for DW2/CTL shows register B loaded with 0EH for 12 pitch. This is 14D, the Epson code for expanded print. For an MX-80 printer you can change this to 0FH (15D) to request compressed print. Yes, I know 12 pitch is 96 characters per line, but I couldn't find out how to set the 16.5 pitch to print compressed font.

If you have an FX-80 printer, you could patch address BB87 to conform to the Epson print code for 96 CPL, elite font instead of compressed font. The patch to change 12 pitch to print compressed font is:

PATCH DW2/CTL (ADD = BB87,FIND 0E, CHG = 0F)

The Find and Change values are the same for Model 4 SuperScripsit, but the Add locations are different, BB92 and BB98 respectively.

On another subject, your answer to Wayne Moore's question about blown Model I power supplies (June 1985, p. 17) was correct as far as it went, but you might have told him that he needn't have bought five power supplies. I also hope he hasn't discarded them, because he probably did nothing more than blow the internal fuse, which can be replaced by prying open the case. As I remember, the fuse is a 1-amp pigtail. I may be wrong about the pigtail, but it is a 1-amp fuse unless he has one of the first power supplies built, which have only half-amp fuses. *(Leigh L. Klotz, McComb, MS)*

A: Before you tear apart Model I power supply cases, check under the rubber feet. Some of the power supplies are screwed together intead of glued. It's much easier to get inside that way than by taking a hacksaw to the case.

Q: I have a possible solution to Wayne Moore's power supply problem. I had a Radio Shack power supply that I used for tests on spare boards. One of the internal rectifiers opened up, but the fuse didn't blow. As a result, the transformer was cooked beyond repair.

However, I was able to use two stock Radio Shack transformers, RS diodes, switches, fuses, and so on to make a unit equivalent to two of the RS power supplies with two output connectors—one for the CPU board and one for the interface. I removed from the interface case the base on which the two RS supplies formerly rested. I mounted my replacement supply on a plastic base that was drilled to replace exactly the old RS base.

I have a switch and an insulated fuse holder on the top of my supply. Everything is dimensioned so that the unit fits the interface exactly. Now, instead of being one power supply short, I have two extra ones available.

The 12-volt and 5-volt potentiometers on the expansion interface and the CPU may have to be adjusted slightly. I was surprised at how close the voltages were before I made slight adjustments (because the source voltages are a little different from those in the RS black box). It's a tribute to Radio Shack's regulator circuits in the CPU and expansion interface. *(Dr. Daniel C. Fielder, Atlanta, GA)*

A: And that should take care of the problem of what to do when National Parts runs out of Model I power supplies. Thanks.

Q: In rereading my December 1984 copy of your magazine, I noticed Charles Steele's inquiry (p. 16) about a problem with Electric Pencil. I may be too late to help him, but since I'm a great fan of the Electric Pencil unit, I feel obligated to respond.

Steele wanted to halt his printer at the end of each page so he could insert a new sheet of paper. You can do this by calling up the printer menu (Clear/P) and invoking the Halt Form command, HFl (the second item from the top in the menu's right-hand column). Each time a Form Feed command appears in the document, the printer will halt. After inserting a new page, you can reactivate the printer by pressing the enter key.

It's important to insert a Form Feed symbol (shift/down-arrow) where you want to end a page. You can use this technique, for instance, to change daisywheel type in the middle of a print job.

By the way, Electric Pencil users interested in obtaining supplies and manuals for their units should be aware of the A & J Micro Drive people (1050 E. Duane Ave., Suite 1, Sunnyvale, CA 94086). They are cooperative in every way. *(L.C. Mayrose, Gainesville, FL)*

A: Good old Electric Pencil. Unfortunately, your solution requires that you figure in advance where the page breaks occur and manually put them in place rather than letting EP print the document from beginning to end automatically. But it's certainly better than nothing.

Q: Regarding Daniel Roth's question about other print wheels for the Tandy DWP-210 printer (Feedback Loop, May 1985, p. 14): I've been han-

dling the C.Itoh line in my Radio Shack dealership and just recently noted that their DWP models (A10–30) made by TEC are identical to the 210. So I tried interchanging the wheels and—lo and behold—they worked. If Roth can locate a dealer who sells C.Itoh or TEC printers, he may find a source of different typefaces for his machine. *(Dave Hancock, Sonora Video & Electronics, Sonora, CA)*

A: Thanks for writing in with your discovery.

Q: You were in error when you answered Howard Eddy's question (Feedback Loop, May 1985, p. 20) by saying that Tandy didn't build Model III computers without an RFI (radio frequency interference) shield. I owned one. As I understand it, Tandy started manufacturing Model IIIs before the FCC changed its rules. I believe that it was legal to make unshielded computers until the new regulations went into effect and that they could be sold even after the regulations were in force, if they were built before the deadline.

Aware of the Model I's TV interference problem, I had waited for the then-new Model III and was assured that it was shielded before I ordered. But the machine produced terrible interference. When I opened up the computer to install disk drives, it was evident that the shield was missing.

If Eddy didn't ask about the shield before he bought the machine, he may well be out of luck. I was told that, in addition to adding a shield, the main board would have to be replaced, since early ones didn't meet later FCC standards. If this is true for Eddy's machine, he might be better off buying another used Model III of later vintage. *(Lyman Lyon, Altadena, CA)*

A: Thanks for the information.

Q: I have a 48K Model III with one single-sided disk drive and I use DOSPLUS. I have a Tandon TM100-2 drive that was in an upgraded IBM PC. Can I install it in my Model III as a second drive? Do I have to make any special cables? *(Doug Algire, Sauk Village, IL)*

A: The TM100-2 should work just fine in your Model III. You might check the internal drive cable to see if it has had any "teeth" (the metal connections inside the plastic edge-card connector) pulled. If it hasn't, you can configure DOSPLUS to use both sides of the drive and triple your on-line storage area instead of just doubling it.

If it has had teeth pulled, you need a new cable to access both sides of your drive. Also, to use both sides on a straight cable, you have to set the drive's internal jumper to DS1 so that it will respond to the drive select for drive 1.

Q: I understand there's a program for the Model III called "Snake" that's comparable to Lotus. However, I haven't been able to find a vendor and hope that you can help. *(Alice E. Buckner, Melbourne, FL)*

A: The only programs I know of called "Snake" are games. Can anyone help?

Q: I have two double-sided, 40-track drives from my Model I system that I'd like to use with my new Model 4P. But the 4P lacks an expansion slot for additional floppies. Is it possible to add an extension cable so I can use these drives? *(Thomas Lareau, Keene, NH)*

A: Just adding the expansion cable isn't enough; you have to modify the computer itself. If you are a do-it-yourselfer, check "On the Upgrade," in the January 1986 issue (p. 40). Alternatively, Aerocomp (Redbird Airport, Building 8, P.O. Box 24829, Dallas, TX 75224, 214-339-8324) and The Alternate Source (704 N. Pennsylvania Ave., Lansing, MI 48906, 517-482-8270) will modify your computer for you. Contact them for price information.

Q: I use a 48K Model I. I want to get IBM PC- or XT-compatibility as cheaply as possible and still keep my Model I software. Any help would be appreciated. *(Jim Hale, Bellaire, TX)*

A: If you want inexpensive IBM PC compatibility, have you considered the Tandy 1000? At $1,000 it isn't that expensive, and with PowerSoft's Supercross/XT utility, you can readily trade Basic programs and file data back and forth.

Q: I've had several Model II Basic program files transferred to 5¼-inch disks, and I'd like to run them on my Tandy 1000. Could you tell me if a conversion program exists? *(Rene Alicea, Hato Rey, PR)*

A: I don't know of any program designed to translate Model II Basic programs to run under GW-Basic. The closest I can come is the software package from PowerSoft (17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475) called CNVBASIC ($29.95), which converts Model I/III programs to MS-DOS Basic. It might just work, because the differences between Model II and Model III Basic aren't great.■

Terry Kepner is a free-lance writer and programmer, and an associate editor of 80 Micro *magazine. He has been writing about microcomputers since 1979.*

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PRESENTS

MONTE'S TOOLKIT $49

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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.

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PRESENTS

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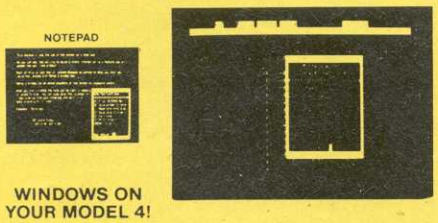

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ANNIVERSARY SALE

Up and Away: Tandy's MS-DOS Line Takes Off

Tandyland

Despite Tandy's 33-percent crash in profits in fiscal 1985, chairman and CEO John Roach is predicting a 30-percent jump in profits for 1986. The reason for his optimism? The Tandy 1000 primarily, which industry observers say is outselling all comers in the PC-clone market. Icing the cake and sweetening Roach's outlook for 1986 are early sales of Tandy's PC AT clone, the Tandy 3000. In late December, Tandy could barely keep enough units on the shelves.

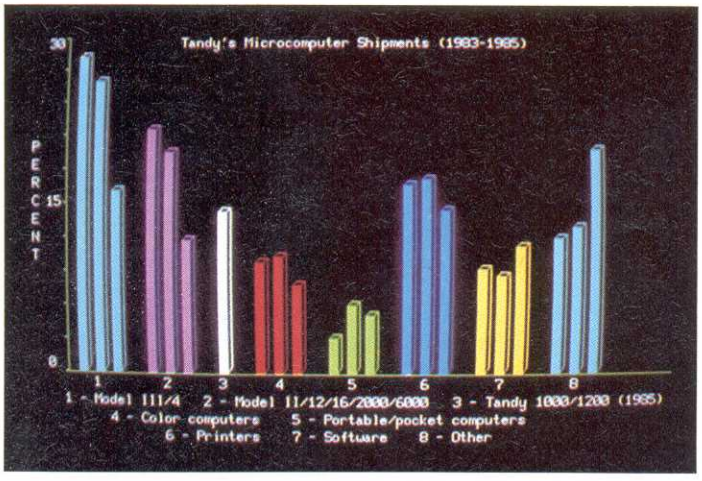

Photo 1. Tandy's worldwide microcomputer shipments (fiscal 1983–1985).

The good news couldn't come too soon for Tandy's computer division, the only area of the company to lose money from fiscal 1984–1985. Every product class in the Tandy/Radio Shack line increased profits during that period, except microcomputers, which posted a 3-percent decline. Warehouse shipments of microcomputers, software, and peripherals were down worldwide by 3 percent as well (see the Table). Although the Model 4 line held off competition from MS-DOS machines in 1985, the situation is certain to be different in 1986 as the Tandy 1000 gains in popularity (see Photo 1).

The introduction of the Tandy 1000 and 1200 compounded the computer division's problems by drawing sales away from the Tandy 2000, the company's first offering in the MS-DOS field. Combined with a sharp decline in raw materials prices, the competition among products led Tandy to concede a major profit loss by writing off $33 million in computer inventory.

The market-share numbers game finally got under the skin of Tandy executives in December. The success of the Tandy 1000 in the PC-clone market has them proclaiming, "We're number 1." If that's true, number 2 must be Compaq Computers of Houston, which has led the PC-clone market since the introduction of MS-DOS.

Tandy has become concerned about its share of the education market. Although Tandy and Apple each held 30 percent in 1983, Tandy's share slipped to 17 percent in 1985. In the same period, Apple's share grew to 55 percent. Tandy's fragmented system base is responsible for the decline in market share, according to the New York-based research firm Talmis, a department of Link Resources.

Tandy supports four systems for the education market: the Color Computer, the Model III, the Model 4, and the Tandy 1000. Marketed as an inexpensive means of installing MS-DOS capability, the 1000 has become the leader of Tandy's current educational offerings. This spring, the company will try to regain a substantial share of the education market with a new campaign emphasizing the Tandy 1000's low price and Apple compatibility.

Apple compatibility? That's right. Diamond Computer Systems of Los Altos, CA, has redesigned its Trackstar Apple II Plus emulator board to run in the Tandy 1000's shorter expansion slots. The company is also working on Apple IIe emulation for the board, which should be available by the time you read this report. Tandy is promoting the products to schools that already have an investment in Apple computers, and to those that have Tandy 1000s but want to take advantage of Apple educational software.

Tandy is also offering a trade-in on Apple computers towards the purchase of a Tandy 1000. For each Apple traded, the company will credit $200 towards a new 1000—an appealing deal for educators who, for an unbeatable price, can install an MS-DOS machine and retain use of their Apple software.

You might have noticed Tandy's advertising blitz in the last quarter of 1985. The $20 million campaign bought television time for Radio Shack during the Christmas buying season, and also involved print ads in a variety of publications, including *The Wall Street Journal*, *Business Week*, *Forbes*, and *Newsweek*.

According to the advertising research firm Communications Trends, Tandy spent $77 million on computer advertising during fiscal 1985. If the recent blitz is any indication, the company appears certain to equal or surpass that amount in fiscal 1986.

Product class	1985	1984	1983	1982	1981
Radios, phono, video	9.4%	8.6%	8.6%	9.4%	11.6%
CBs, walkie-talkies, PAs	5.7	5.5	4.9	6.0	6.8
Audio, tape recorders	18.5	17.8	18.2	21.5	25.4
Electronic parts, batteries	11.9	12.1	11.9	13.0	13.8
Toys, antennas, calculators	12.7	11.9	12.5	12.0	14.1
Phones, intercoms, pagers	10.4	10.5	9.3	7.4	6.5
Micros, software, peripherals	31.4	33.6	34.6	30.7	21.8

Table. Tandy's worldwide warehouse shipments (fiscal 1981–1985).

Photograph by Mark Corliss

Of the 11 million stockholders who trade actively on the major exchanges, over 20 percent own computers. That's the figure cited by Lawrence Silberstein, whose company, Investment Technologies Inc., is teaming up with Radio Shack to offer an on-line investment service called Vestor. The service provides information that allows stockholders to analyze investment alternatives from their homes.

Carroll Reeves, Tandy's director of commercial sales, says, "We've been experiencing an increased demand for financial and investment-oriented software and services in our retail computer centers. We believe this new [service] will be an important factor in realizing the growth potential for PCs in the home."

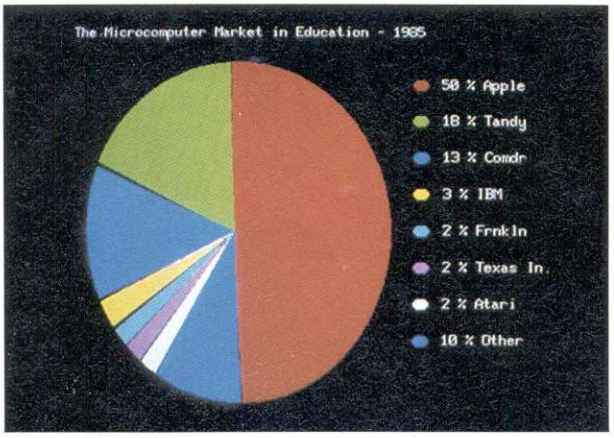

Photo 2. Microcomputers' share of education market in 1985.

MicroTrends

Tandy ranks number 2 in American classrooms and holds an 18-percent share of the education market, according to the market research firm Quality Education Data Inc. (QED) Apple owns the first-place ranking with a 50-percent market share, while Commodore comes in third, only 5 percentage points behind Tandy (see Photo 2). Of the 93,783 microcomputers counted in a QED survey, 47,206 were Apple computers, 16,514 were Tandy/Radio Shack, and 120,174 were Commodore. IBM accounted for 2,411 units. The remainder were manufactured by Franklin, TI, Atari, and other microcomputer vendors.

Events have not been breaking well for Digital Research Inc. (DRI). First, IBM pulled out of an agreement to support GEM, DRI's graphics operating environment (see Pulse Train, January 1986, p. 21). Then Apple Computer threatened a lawsuit, charging that GEM looked too much like the Macintosh operating system and therefore violated Apple's copyright.

Though it denied the charge, DRI decided to settle out of court in what its president and CEO John Rowley called "the spirit of compromise." To make amends, DRI paid Apple an undisclosed amount of cash, changed its advertising strategy for the GEM line of products along with the on-screen look of the program, and agreed to provide Apple with software-development help.

Though not the best way to strike a deal the affair might have a silver lining for DRI. Referring to the development agreement, Rowley said, "We took that [as] a positive step toward future work. We are looking forward to a strong OEM [original equipment manufacturer] relationship with Apple."

Hot Item

According to reports in the Jan. 21, 1986 issue of *PC Week* and on CW Newsnet, IBM's new laptop computer will be called the PC Convertible. Already, IBM has won a lucrative contract from the Internal Revenue Service (IRS) for delivery of 15,000 of the MS-DOS laptops this year.

Though IBM had not officially announced the laptop at the time this column went to press, there was information available about its features. The operating system is an IBM-produced DOS shell that includes a set of utility programs containing most of the functions of Borland International's popular SideKick program. The only thing missing is the ASCII hexadecimal table.

The system hardware is based on the Intel 80C88 microprocessor and houses 512K RAM running MS-DOS 3.2. Much to my surprise, the screen is an 80-column by 25-line liquid crystal display (LCD). I was betting that IBM would use Planar Systems' new high-contrast electroluminescent display (ELD), which offers improved readability over LCDs (see Pulse Train, March 1986, p. 20). The unit uses 3½-inch Sony floppy drives mounted below the flip-up LCD. Optional features expected to be announced are a separate, standalone 3½-inch drive and an ELD. Other options might include snap-on modules called "slices" that contain additional memory, a direct-connect modem, and a thermal printer. The 15-pound unit also has a carrying handle that runs the length of the keyboard. So far, one detail that hasn't leaked out is the laptop's price.

Consumers can expect a barrage of Charlie Chaplin commercials featuring the Little Tramp in a 1957 Chevy convertible, advertising sources say. The TV spots are intended to make consumers identify the laptop with the classic automobile's image of freedom and versatility.

Competing bidders for the IRS contract raised objections over the agency's decision when it became apparent that IBM might win. At issue was the fact that the IBM machine was not available as an off-the-shelf product at the time the contract was signed. Federal regulations require off-the-shelf availability for government purchases.

Representatives from Zenith Data Systems, Kaypro, and Tava, USA voiced concern about the matter, but agreed that if IBM introduced a product and gave the IRS a better price, then all was fair and square. The loudest protest came from Tava's Jim Turner. "I don't think it's fair to allow IBM to come in and build a product in light of the off-the-shelf requirements," Turner said in an interview with *PC Week*. "That's probably grounds for a protest, but I don't know if we'll do it." Tava produces an 80286-based portable.

The contracting officer with the IRS's Office of Contracts and Procurement said the off-the-shelf requirement did not preclude consideration of prototypes in order to ensure purchase of state-of-the-art technology.

Other vendors have adopted a wait-and-see stance pending IBM's actual product announcement and introduction. They will consider filing formal protests if they can demonstrate that their product offerings were superior to IBM's or that their bids were lower.

Parents who have difficulty discussing sex with their children might turn for help to a new software product called Intracourse. No, this is not an April Fool's joke. Intracourse is a real program designed to run on MS-DOS computers. Featuring an on-line sex dictionary, the program allows users to converse with their PCs and obtain information about such issues as group sex and the effects of drug use on sexual behavior.

Developed and marketed by Intracorp Inc. of Miami, FL, the software was introduced last November at a Comdex press conference hosted by self-help consultant Dr. Joyce Brothers. According to Dr. Brothers, the program is not intended as a substitute for professional therapy. Users who indicate behavior that the program considers odd are prompted to seek human counseling, she noted.■

Photograph by Mark Corliss

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- Set hold on any row or column to prevent srolling
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In Reverse

Bennett D. Shulman ("Perfect Host," September 1985, p. 41) reports that a couple of readers wanted to **use Telcom's terminal mode to transfer data from the Model 4 to the Model 100**. You can do this if you set the baud rate to 600 and download data from the Model 4 directly into a Do file using the F2 function key. The job-control language (JCL) file in the Program Listing contains the proper setup for Memdisk under TRSDOS 6.2 (you must make changes if you use it with version 6.1). You can change the size and location of Memdisk if you've upgraded to 128K, but, since the Model 100 needs a line feed, you must do without scrolling to avoid overwriting lines. And don't try to use the forms filter; it will alter the file during transmission.

To effect the transfer, set the Model 100 to 47E1E, enter terminal mode, press the F2 key, and type in the name of the file you're downloading. From the Model 100, type in:

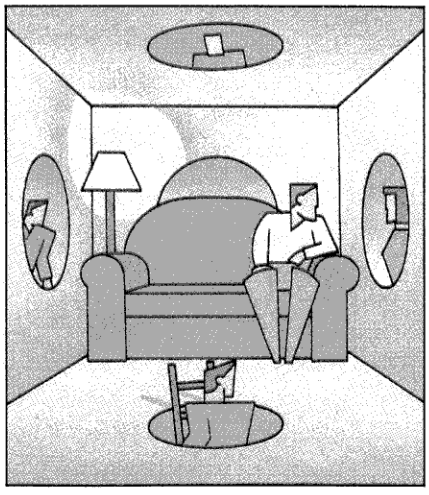
```
COPY FILE/TXT *CL
```

After you've transferred the data, remove the garbage at the beginning and end of the file. To upload to the Model 4, follow the directions in "Perfect Host." If you use a terminal program other than the Model 100, you might be able to send data at a faster baud rate, but be sure to run a few tests to check for bytes lost. The Model 100's liquid-crystal display screen driver slows down the storage of data in the RAM file. While you can overcome this problem by downloading directly to a Do file, the Model 4 no longer functions as a host.

Short Stuff

Like Charles A. Foster, accountant Robert J. Nigro had trouble **linking a Model 4 and a Gorilla Banana printer** (January 1985, p. 28). His solution was to use a connecting cable (stock number 9885) from DAK Industries (8200 Remmet Ave., Canoga Park, CA 91304, 800-325-0800).

If you're wondering about **obtaining an 8087 math coprocessor for the Model 1000** (Reader Forum, January 1986, p. 28), contact Hard Drive Specialist (16208 Hickory Knoll, Houston, TX 77059, 713-480-6000) to check on the availability of their add-on coprocessor. Trionix (3563 #B, Roosevelt St., Carlsbad, CA 92008, 619-434-4439) is also selling an 8087 math coprocessor for the Model 1000.



Humbug

Dale Rogerson noticed an **error in the listing for "Rembrandt Redux"** (December 1985, p. 76). Line 5 of the modification to run Rembrandt under TRSDOS 1.3 contains an incorrect equation. It should read DEFUSR = &HFF00.

Author David H. Pleacher alerted Reader Forum to **possible problems** in his **basketball statistics program** ("Net Results," December 1985, p. 52). To ensure that the If. . .Then. . .Else statement in line 2890 executes properly under all conditions, delete : RETURN from the end of the line and insert 2895 RETURN.

As written, Hoop lets you compile statistics for only 14 players. To make Hoop more flexible, change the Clear statement in line 70 to read CLEAR 2500. If you need to make changes in statistics, you must also add ELSE A(4) = 0 to the end of line 710 and ELSE A(7) = 0 to the end of line 720 so that Hoop accurately recomputes player statistics.

On the Lookout

►Ken Thompson (2701 Mosquito Road, Placerville, CA 95667) was impressed by a program that appeared in *80 Programs for the 80*. He'd like to obtain biographical information about the authors, Liccuardello and Davies Associates.

►Bobby Pellerin (663 Maurice, Repentigny, Quebec J6A 2M8) desperately needs help to solve the game Xenos.

►Enno Bussmann-Quinol (BP 11194, Niamey, Niger) wants to use his English version of Model III SuperScripsit for business correspondence in French and German. He needs help modifying the program so it will accept and print diacritic symbols like accents and umlauts.

►Robert Epstein, executive director of the nonprofit Cambridge Center for Behavioral Studies (11 Ware St., Cambridge, MA 02138, 617-495-9020), welcomes donations of microcomputer equipment. You may call collect for further information on the program.

►Schoolteacher Dee Keaton (Route B, Box 260, Kingston, OK 73439) can't find a printer that strikes the print surface with sufficient force to create a good ditto master. Can anyone suggest a "hard-hitting" printer that works with a Model III using LeScript?

►Lindon R. Webb (12013 D St., NAS Corpus Christi, TX 78419) wants to share information with other Model 4/4P users interested in Basic or Alcor Pascal.

►Francine Leclerc (12441 Boulevard Rolland #7, Montreal-Nord, Quebec H1G 6C5, 514-326-3522) is looking for an astrology program that is compatible with her Model 4's TRSDOS 6.2 and a DWP-210 printer.

►Howard Hobbs (203 Water St., Newburyport, MA 01950, 617-465-7545) desperately needs a travel case for his 4P.

►Dave Rhode (P.O. Box 9783, Arnold, MD 21012) has acquired a lot of software and peripherals for his Model 2000. However, he'd like to obtain a voice synthesizer that includes software support.

►Chess enthusiast James Ellis (319 Croton Ave., New Castle, PA 16101) would appreciate advice on adding a book of moves to his chess program.

►On the subject of chess, Franklin R. Dillman (1888 W. Blue Spring Ave., Orange City, FL 32763) thinks he could use chess to introduce his wife to computers. He'd appreciate information on a version that offers a variety of playing levels and runs on his dual-drive Model 4 system.

►Ray Shumaker (405 Cottage Lane, Monroeville, PA 15146), a 16-year-old Model 4 user, wants to exchange programming ideas and information on public domain software.

►Don Hughes (1147 Nashua Ave., London, Ontario N6K 2C4) needs assistance with his TRSDOS 6.1 file system.

Program Listing. JCL file for data transfer.

```
SYSTEM (DRIVE=2,DRIVER="MEMDISK")
B
D
Y
SET *CL TO COM/DVR
SETCOM (BAUD=600)
LINK *DO *CL
LINK *KI *CL
//EXIT
```

End

Illustration by Mark Fisher

Circle 85 on Reader Service card.

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Mr. Gary Shade, 80 MICRO, May 1985 (4½ stars).

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MS-DOS Scripsit: Honorable Mention, but No Prize

by Eric Grevstad

★★★

Scripsit runs on the Tandy 1000, 1200, 2000, and 3000 (256K) and requires two disk drives (512K and hard disk recommended). Tandy Corp./ Radio Shack, One Tandy Center, Fort Worth, TX 76102. Catalog number 25-1155 and 25-3171. $299.95.

Easy to use: ★★☆☆☆
Good docs: ★★★☆☆
Bug free: ★★★★☆
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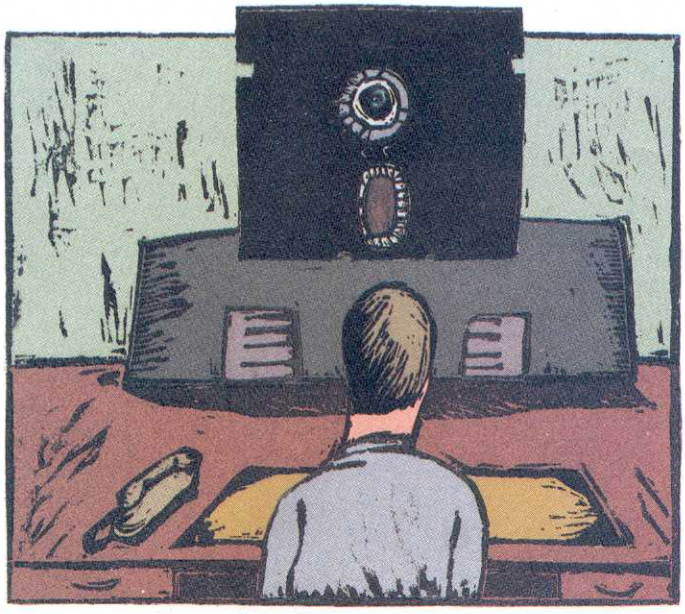

WordStar. Word Perfect. MultiMate. PFS:Write. Microsoft Word. It's not as if owners of Tandy MS-DOS computers don't have word processing programs to choose from. The market is crowded with a hundred contenders chasing the five or six best sellers. What possessed Tandy to release its own premium-priced (and feature-laden) word processor? Stubborn pride? Homage to a classic name from the TRS-80 days? Do buyers really long to see the word "SCRIPSIT" in a comical Model I-style block graphics banner on their 2000s' or 3000s' monitors?

Well, hold on. The first reaction is skepticism, but after the opening screen comes grudging admiration: Conceptually, the new Scripsit is Tandy's most ambitious word processor yet. Its goal is to combine the powers of MultiMate (corporate features galore) and Microsoft Word (fancy layouts and print fonts) with no need for memorization. Function keys, on-screen labels, and help menus handle everything. In features and friendliness, it's a far cry from no-frills TRSDOS Scripsit. You could say it's DeskMate meets MultiMate.

Unfortunately, once you start using Scripsit, you'll form a third impression. Scripsit's good ideas are often awkward in practice. It's an odd mixture of mighty abilities and slow performance, of function-key ease and three-handed commands. And for this you pay $75 more than Microsoft Word's mail-order price.

Up and Lumbering

Scripsit comes in two versions: one (catalog number 25-1155) for the Tandy 1000 and 2000, which have 12 function keys, and one (catalog number 25-3171) for the 1200, 3000, and IBM machines, which have 10 function keys. Commands are arranged differently enough to defy moving between a 1000 at home and 3000 at work. I reviewed it on my 1200HD. Scripsit is not copy-protected; an installation program helps you move it to your machine's floppies or hard disk. And a hard disk is a virtual necessity: Scripsit has over a dozen program files besides Scripsit.EXE.

The installation program lets you choose from 25 Tandy printers, with nothing for other printer owners but a "dumb" driver (it can't even underline). This is not entirely stubborn pride. Teamed with a top dot-matrix like the DMP-2100, Scripsit lets you mix and match not only different typestyles and sizes (such as 10- and 12-pitch regular and correspondence quality) but characters like foreign accent and trademark symbols, even codes of your own design, if you're deft with hexadecimal. Still, would it kill Tandy to include a few other drivers, even ones lacking fancy symbols, instead of snubbing Epson and Diablo for the old Line Printer V?

Once underway, Scripsit looks good. From the main menu, you can create a file, edit or print an existing one, or move to a menu of utilities (also available from within a document) whose functions range from copying a file to changing system defaults and access to DOS. I left a file without saving it, ran other programs with no handicap (except 174K less memory), and jumped back to my text without losing a letter.

When you create a document, Scripsit leads you through a MultiMate-style screen of parameter settings for your printer, page size, and notes. You can use one of Scripsit's ready-made document formats or create your own default and custom style sheets, presetting not only font, margins, and tabs but also text such as "To:" and "From:" in memos. One document type makes ASCII files.

That's just the start of Scripsit's flexibility. Font, spacing, centering, and justification can be changed anytime, for typing new text or reformatting old. It's a snap to edit the ruler line's margins or paragraph outlines, centering, or decimal tabs, and you can store up to 11 rulers on disk for retrieval as often as you like. Margins and tabs are usually positioned in terms of tenths of an inch, but Scripsit lets you narrow that to hundredths for supreme precision.

You can have different headers and footers for odd and even pages, and change them at will. You can manipulate text in columns separated by tabs or let Scripsit sum a column of numbers. Single or double underline, boldface, strikethrough, sub- and superscripts? It's no sweat for Scripsit.

While a formatting whiz, Scripsit isn't a "what you see is what you get" wonder. Line spacing, justification, and page breaks don't appear on-screen, but are indicated in a status line below the ruler.

Illustration by Frances Jetter

And in the case of page breaks, you don't see them until you give a Paginate command (as with Microsoft Word) to change the "Galley Position:" to "Page Position:" counter. Unless you tell it to, Scripsit won't print "widow" lines at the top or bottom of a page.

Slow Off the Mark

I applaud what Scripsit can do on paper but have mixed feelings about it on my computer. Assigning commands to function keys is a good idea that Scripsit takes to extremes: The 1200/3000/IBM's 10 function keys have 50 commands and on-screen labels, while a 1000's or 2000's 12 function keys have 60.

One set of function key commands corresponds to the keys' normal state; you use the other four sets by holding down the alternate, control, or shift keys, or by pressing and releasing the escape key. You don't leave that fifth set by pressing escape again, but by pressing control-C, a sequence Scripsit requires often, including each time you type an unrecognized command and lock up the keyboard. Other word processing programs simply ignore or beep at illegal commands.

The concept of a toggle is unknown to Scripsit. Some word processors let you tap the insert key to go between insert and overtype modes, or use alternate-U to start and stop underlining. With Scripsit, you give a command and then an uncommand, usually the Un key (F10) followed by the original. Insert mode is control-F3, and return to overtype is F10-control-F3.

This logical but slow syntax is aggravated by Scripsit's sluggish performance and mediocre typing response. A simple PgUp or PgDn takes two seconds. And there's the TRSDOS Scripsit tradition of different commands for inserting or deleting one or multiple characters. In overtype mode, the insert key inserts a single dot, which you type or space over. Insert mode so slows reformatting and takes so long to catch up with your typing that you are better off using escape-insert, which splits text with a line of dots. Pressing the delete key closes the gap when you're done.

Some of the function keys, such as F7 (for word) and F9 (for document), serve for cursor movement, advancing or retreating depending on which way you were going. You back up a word at a time by tapping the left-arrow, then F7. The home key moves the cursor to the beginning of a quantity of text: home-F8 for the current paragraph, home-F9 for the top of a file. (To go to the bottom of a file? The end key. Scripsit's commands are rarely symmetrical.)

These quantity keys also work with other commands to define a block of text for moving, copying, reformatting, spelling checking, and so on. For example, the Search command (F6) is as simple as typing the search string and pressing the up- or down-arrow to search backward or forward. A global search, delete, or replace (shift/F6) involves defining the search area (you can only define downwards); pressing F1 (Execute); then entering the string, deletion, or replacement instructions.

A search string, by the way, can contain all kinds of special symbols. An opening plus sign means find both upper- and lowercase. The * and ? characters are wildcards, and @c and @y specify hard carriage returns and soft hyphens, respectively. This is impressive, but will users remember to use the plus sign? Other programs provide "Ignore case?" prompts instead.

I used a search and replace to test Scripsit's speed, changing almost 6,500 e's to asterisks in a 3,600-word document. The program took 12 minutes and 16 seconds. Creaky old WordStar did the job in 3:37.

The Good Points

As the search command symbols indicate, Scripsit has some sophisticated features once you get past the stage of reading all those function-key labels. Besides the DOS command processor, there's a utility to record and play back macro keystrokes. Typing control-F6-escape, a keyboard character, some text, and control-F6-escape stores the text for replay whenever you press escape and the assigned character. If you need even more macros, you're limited only by disk space in adding others, which you call by entering escape, escape and a name or phrase.

You can edit, nest, and loop macros just as with RoseSoft's ProKey. They're handy for stock paragraphs and return addresses, and as shorthand for unwieldy commands. Escape-W, for example, makes an easier "delete word" function than Scripsit's escape-delete, F7, F1, although it's certainly no faster, since macros are read from disk.

Scripsit's spelling checker works smoothly and well. When it finds a word not in its own or your auxiliary dictionary, Scripsit lets you skip it, ignore all future occurrences, flag it for later use, edit or retype it, add it to your dictionary, or correct it. When replacing a word with a new one, you have the options of accepting it, restoring the original, or checking the next or previous suggestion.

The main dictionary is big enough so that most of its questions should involve your friends' names instead of your technical or office vocabulary. Being able to scan a paragraph or page added since the last spelling check (instead of rechecking the whole document) is a big convenience.

After you've studied the manual to get the file formats right, Scripsit's mail-merge function prints like a charm. It's more successful than the background printing feature, which queues files for printing during other work but stops dead if you open a file and maintain a medium typing pace. Take your hands off the keyboard for a second, and the printer may manage a single line.

Documentation

Scripsit's help screens aren't context-sensitive: When prompted to type in the function for which you want help, you can also press the enter key to see a list of all 100-plus topics. But the program does give you a choice between novice (full-screen) and expert (two-line) explanations, with the latter automatically returning to full size if you forget a function.

Help levels and many more choices are found in the system defaults menu, which spans everything from printer setup to "no menu" modes for such operations as document creation, global search, and printing. You can spend a week tinkering with defaults, or use Scripsit out of the box.

The middle part of the manual, an alphabetical index of commands and functions, is nicely detailed. The first section, while good on program installation and the document creation menu, mainly shows how to type a few lines of text, backspace to fix errors, put a word in boldface, and print the file. I felt as if some chapters were missing between "Getting Started" and the reference section.

The third section, "Customizing Scripsit," is a techie's guide to creating fonts, plotting character widths, using Scripsit on a network, and writing printer drivers in Assembly language. This section has a few nuggets for everyday users, including information about the DOS command processor and tips for making boilerplate forms.

Conclusion

Viewed feature for feature, Scripsit stands among the best MS-DOS word processors. If I'm wiping it from my hard disk as soon as I finish this review, it's for more subjective reasons: matters of feel and responsiveness, and awkward commands slowly executed. Scripsit is an attractive program, if you have a fast Tandy 3000 and a Tandy dot-matrix printer. Otherwise, it earns Miss Flite's rebuke in Dickens's *Bleak House*: "You mean well, but are tiresome."■

On the Fast Track

by Bruce W. Tonkin

★★★★

Quick Basic runs on the Tandy 1000/1200/3000 (256K), and requires MS-DOS 2.x and one disk drive. Microsoft Corporation, 10700 Northrup Way, Box 97200, Bellevue, WA 98009. $99.

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

Quick Basic is the best Basic compiler available. Furthermore, it is the best microcomputer language ever. And it costs only $99.

However, Tandy's new version of MS-DOS (2.11.22) refuses to run compiled Quick Basic programs on systems with a hard disk. Meanwhile, *80 Micro* technical editor Dave Rowell has found a fix that involves changing only 1 byte (see sidebar on p. 30).

Quick Basic is a significant improvement over Microsoft's standard compiler. The list of enhancements is impressive.

- Quick Basic supports multiline functions that improve program structure. Functions can contain For. . .Next loops, If statements, and other constructions that make user-defined functions easier to use and far more general.
- You can compile subprograms separately and link them later, making it easy to write general-purpose routines. Subprograms can also pass and return parameters. This encourages modularity and speeds program development.
- You can use global and local variables. Variables used in subprograms needn't be the same as variables in the main program.
- Line numbers are optional, and you can use labels instead. You can thus write structured programs that you can maintain more easily.
- Calling assembler routines is easy. Previous compilers allowed this, but the syntax was difficult to determine.
- Microsoft has added support for DOS 2.1 functions. Quick Basic programs can use, make, and change subdirectories; run DOS utilities; and manipulate the screen in ways the old compiler wouldn't allow.
- You can dimension or redimension arrays at run-time.
- Programs can use as much memory as is available; you are no longer limited to 64K.
- Disk access is up to eight times faster than that of the previous compiler, particularly with long records.

Besides these additions, Quick Basic still supports the compiler extensions many users have grown to love. Character strings are dynamically allocated and can be up to 32,767 characters long. Programs run up to 15 percent faster than with the older compiler and can be 45 times faster than interpreted programs.

Most programs will run three to 10 times faster when compiled and Basic's garbage-collection is virtually eliminated. Quick Basic will run most programs from 10 to over 200 times as fast as the Model 4 Basic interpreter (see Tables 1 and 2). This might be one reason to move from a Model III to the 1000 rather than the Model 4.

Problems

That doesn't mean Quick Basic is perfect. Some flaws mar this otherwise well-conceived and solid package. You can correct a few, while others should be corrected by Microsoft.

First, the documentation is either very good or totally unacceptable, depending on what you've used before. The manual is incomplete, since it is intended to serve as an addendum to the IBM BasicA manual for DOS 2.1 (though a number of DOS 3.1 BasicA features are also included).

If you don't have the IBM Basic manual, the Quick Basic manual will be nearly useless at explaining the advanced features. If you do have the IBM manual, you'll spend a lot of time switching from one manual to the other.

If you have the Tandy 1000 Basic manual, you'll need to buy the IBM manual. That's distressing.

On the other hand, the Quick Basic manual is good at explaining the genuinely new features. The disk contains examples and sample programs, including supplementary documentation explaining features added since the manual was printed. The explanation of using and linking assembler routines is both clear and useful—a first for any version of Microsoft Basic.

For some reason, Microsoft didn't include a LIB library manager, which lets you put compiled subprograms and as-

Record Length	Interpreter	Old Compiler	Quick Basic
128	10.8 (63.8)	7.6 (63.6)	8.1
256	7.0 (63.2)	7.0	5.1
512	5.0 (63.8)	6.4	3.6
1,024	1.8 (35.4)	6.4	1.9
2,048	1.2 (22.6)	6.4	1.2
4,096	1.0 (16.0)	6.2	0.9
8,192	0.8 (12.6)	6.8	1.0
16,384	0.7 (11.2)	6.4	0.8

Table 1. Time to write a 144K data file (in seconds).

	IBM Basic	Quick Basic	Model III (Normal)	Model III (Fast)
Simple Loop	85.80	2.20	252	189
Single-precision Loop	125.90	46.52	327	249
String	178.20	2.90	1,323	1,007

Table 2. Speed tests (in seconds).

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?

Running Quick Basic Programs Under MS-DOS 2.11.22

If you have a hard-disk Tandy 1000 and try to run a Quick Basic compiled program under Tandy's latest operating system (MS-DOS 2.11.22), you'll get the error message "Cannot execute as child of Basic." The problem stems from a single byte in low RAM, so you can easily correct it. Quick Basic-compiled programs expect the byte at memory location 0:050F hexadecimal to be zero. With the new DOS version, it's B0. All you have to do is change that byte to zero and your compiled programs will run.

To make the change using the DOS Debug utility, type in the following:

```
debug          ' enter Debug
-e0:50f 0      'change the byte to zero
-q             'quit Debug
```

This small Basic program will also change the offending byte:

```
10 DEF SEG = 0:POKE &H50F,0:DEF SEG
20 SYSTEM
```

If you named this program Quickfix.BAS, you could call it from a batch file (or from your AUTOEXEC.BAT batch file) with the command BASIC QUICKFIX. ■

—Dave Rowell

How Fast Is Quick Basic?

File input/output (I/O) is much faster with Quick Basic than under the previous Microsoft compiler. Part of the reason is that the new compiler supports the DOS 2.x file handles: DOS itself opens and buffers the file with the appropriate record length.

Table 1 (p. 29) shows the differences. I ran a simple Basic test for writing files, using an IBM PC with two 360K floppy disks, DOS 2.1, and 576K of memory (360K of which was used as a RAM disk). All disk writes are to the RAM disk, except for parenthesized numbers, which are times for writes to a floppy disk. The standard file was 144K in length.

The file access speeds for Quick Basic are fast enough, but the computational speeds are even more impressive. I measured the speed of a simple loop through 100,000 iterations (Table 2). I ran the test on the Model III twice, the first at the III's normal clock speed and the second with the Holmes speed-up enabled (3.4 MHz operation). The latter should be comparable to a Model 4's speed.

Quick Basic is as much as 61 times as fast as interpreted IBM Basic, and as much as 456 times as fast as interpreted Basic on a standard Model III. At worst, Quick Basic on an IBM PC is more than five times as fast as a speeded-up Model III.

In fact, the more garbage collection on the Model III or 4, the better Quick Basic will look. Since many business applications use a substantial amount of string handling, using Quick Basic on a Tandy 1000 or IBM PC, instead of interpreted Basic on a Model III or 4, can save large amounts of time.

Most IBM-compatible machines can also support the Intel 8087 math coprocessor chip. Some earlier Tandy 1000s don't have a socket, while the later model 1000A does. Libraries for the older compiler that used this chip to speed up floating-point operations are available, and I expect that libraries for Quick Basic will be available soon. With such libraries, most floating-point operations will execute at least 90 percent faster.

As if all this speed isn't enough, I'd expect that Quick Basic on the Tandy 3000 (the AT clone with the 80286 CPU running at 8 MHz) will run about four times as fast as it does on an IBM PC. That assumes the Tandy 3000 is compatible enough to run it, of course. If you take the Quick Basic times listed in Table 2 above and extrapolate them, you'll be running some programs nearly 2,000 times as fast as interpreted Basic on a Model III. ■

—Bruce Tonkin

sembler routines into one file and link them to your programs. Without LIB, each is in a separate file, and linking them can become a chore. I'm surprised by the omission, since one of Quick Basic's strengths is its ability to separately compile subprograms. Microsoft should offer Quick Basic with a LIB at an additional modest charge. An alternative might be the library manager in IBM's software series. However, I haven't tried it and don't know if it will work. You can also get a manager by buying the Microsoft Macro Assembler ($150). But that's too expensive, considering Quick Basic's price.

Also, the Quick Basic compiler is much more sensitive to IBM compatibility than the previous compiler (Basic compiler 1.00 from IBM). Programs that would run on the Tandy 2000 with the old compiler won't run with Quick Basic. To be fair, Microsoft advertises Quick Basic as being for the IBM PC or true compatibles. The Tandy 2000 isn't a true compatible, and Tandy doesn't claim it is.

Though I've had no problems running my own Quick Basic programs on a Tandy 1000, I compiled the programs on an IBM PC (it's got a bigger RAM disk). It's also possible that some unexpected incompatibilities will affect certain functions. While I expect that Microsoft will alter the compiler to make it more forgiving of minor differences, some machines will never run Quick Basic.

Version 1.00 has some bugs, but 1.01 will fix most or all of them (or so I have been told by Microsoft). That release, or a later one, should be available by the time you read this.

Most of the bugs aren't serious, and you can work around all of them to some extent. The most important bug I found was that the device name PRN: (printer device) is not supported. The device name PRN (without the colon) is supported, but will double-space all output. The device name PRN: is important only for PC-compatibles, since many don't support the IBM device names for the serial and parallel ports and instead use alternative names. In programming, "PRN" is generally a safe name for the printer; the fact that PRN is not correctly supported can be serious.

Conclusion

Quick Basic is an impressive product that is attractively priced and exceeds the capabilities of any other current microcomputer language. Its only real problem is the flawed documentation.

For those who have left Basic for another language, Quick Basic offers ample reason to return. Basic code can now be at least as modular and as highly structured as Pascal or C. ■

Graphics Two-fer From SOTA

by Wynne Keller

★★★½

Designe and Snapshot run on the Model 4 (64K) and require one disk drive. SOTA Computing Systems Ltd., 213-1080 Broughton St., Vancouver, B.C. V6G 2AB. $39.95.

Easy to use: ★★★★☆
Good docs: ★★☆☆☆
Bugs: ★★★☆☆
Does the job: ★★★★☆

If you've ever struggled to create graphics in Basic, you'll appreciate the convenience of designe and Snapshot, two utilities that speed up the process. Designe creates graphics or text screens that you can convert to Basic or Assembly-language code for use in a program. Snapshot saves screens from other programs and transfers them to designe so you can manipulate them. While intended as programmer's tools, these utilities can handle a variety of graphics functions.

About designe

From designe's main menu, you can create screens, generate Basic or Assembly-language code of a screen, save or load screens to and from disk, see a directory, merge two screens, clear a screen, or kill a disk file.

Designe provides nine screen buffers, each of which holds one full or partial screen. During a session, you can work with any of these buffers. If you need more than nine buffers, you can save some screens to disk to free up buffer space.

The program has two design modes: ASCII mode, for entering text, and graphics mode.

Text can be normal size or large, and inverse mode (black letters on white blocks) is available. The cursor is nondestructive in ASCII mode, and you use the arrow keys to move it around. You have to use the arrow keys, not the enter key, to advance the cursor to the next line, and it's hard to tell where to put the cursor to get even spacing between lines. You can get a display showing the cursor's location (row, column, and Print@ position) at any time.

You can move the entire display in any direction, which wraps it around the screen edges. To erase, move, or repeat a portion of the screen, you mark it as a window. While this works well, the marks disappear once any window command is executed, forcing you to remark the window if you're not finished with it. Window operations are sometimes tricky, and the manual is a little obscure at this point. It takes some trial and error to get everything working.

Designe creates graphics or text screens that you can convert to Basic or Assembly-language code.

To move from ASCII to graphics mode, you press F1. The cursor changes to destructive in graphics mode, so you can lose a character when switching if you're not careful. Also, cursor placement can be a problem. When you switch modes, the cursor returns to wherever it was when you last were in that mode. I usually forgot this and wasted time moving the cursor to the correct spot before switching, only to have the cursor jump to its old location.

In graphics mode, you set the cursor to erase or draw by toggling the F3 key. Cursor movement is with the arrow keys. This works well, but I wish the program had a few rapid cursor movement commands, such as a way to jump to the edges of the screen. The window commands don't work in graphics mode, so you have to switch to ASCII mode to use them.

Apart from a sample For. . .Next loop, the designe manual doesn't attempt to teach you how to use the code the program generates. However, I had little difficulty turning my graphics into program code, even though my Basic is a bit rusty.

While designe is mainly a programmer's tool, you can use it for almost any graphics purpose. For example, I used it for drawing floor plans (one room per screen). I should emphasize that the program isn't just for drawings—you could use it to create menu screens quickly and easily.

A Few Limitations

When using designe, you need to remember that it's a screen-oriented, not a printer-oriented, program. You can dump a screen to the printer, if your printer is capable of printing graphics, but the image will be distorted on most printers because of the difference between screen and printer character sizes.

Although designe doesn't provide any printer support, it is compatible with the Model III program CopyArt. You can transfer any designe screen buffer to CopyArt for printing, but you have to go from Model 4 to Model III mode to do it. Another benefit of this compatibility is CopyArt's ability to generate graphics characters (designe draws only lines).

A couple of times, the program didn't appear to act the way it was supposed to. First, I tried to use designe with Snapshot still in memory (it doesn't work). The other time I misspelled a file name when trying to load it from disk. Somehow, the incorrectly spelled name was created on the disk. I would expect this to happen if I had misspelled the name while saving a file, but it's strange to have a load command do this.

To SOTA's credit, they provide a comprehensive bug report form in the manual. Any user experiencing difficulties is encouraged to describe the problem and make suggestions for improvement. This type of dialogue between user and company is very helpful, and improvements to the product are sure to result.

About Snapshot

Snapshot is a machine-language utility that captures screens from another program and saves them to disk. You have to load Snapshot before running the other program, and the program must respect the high memory pointers and not use the function keys.

To take a picture, you press one of the three function keys (F1 to store it on drive zero, F2 for drive 1, and F3 for drive 2). The first picture's file name will be SNAPA/BUF, the second's SNAPB/BUF, and so on.

To edit the picture or convert it to program code, you reboot your computer to remove Snapshot, load designe, and load the SNAP/BUF file into one of designe's buffers.

Documentation

The manual includes some nice graphics, but its dot-matrix print can be difficult to read. I fussed over one command for several minutes, unable to make it work, before I realized I was misreading a capital "A" for a capital "R." The manual's content is also obscure at times. It doesn't always explain, for example, how to exit from a command. I eventually realized that the program is consistent, and the way to exit from any command is to toggle the same key you pressed originally.

Conclusion

Where were utilities like these when I was programming in Basic? Designe and Snapshot are a good package, and a good value, for programmers and others who need a screen-oriented graphics program.■

Continued on p. 117

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Vital Statistics:

Analyzing Data on Your Micro

by John Cobb Jr.

Microcomputer statistical packages have made life easier for thousands of people who need to collect and analyze lots of numbers. Whether you're a club secretary summarizing the results of a questionnaire or a sales manager analyzing factors affecting your region's sales, you are a potential customer for statistical analysis software.

You can choose from over 100 statistics packages. (See the sidebar on p. 40 for a summary of eight statistical packages that run on Tandy computers.) Not surprisingly, some are simple while others are as sophisticated as their mainframe brethren. What can these packages do for you? How much software muscle do you need to do the job?

I'll try to guide you to some answers. I'll give you a run-down of two popular statistical packages. One is a lower-priced, general-purpose package that runs under TRSDOS, CP/M, and MS-DOS, and the other is a powerful package requiring a endowed MS-DOS computer.

You should be somewhat familiar with statistical procedures or know someone who does before you make a final decision. None of these packages proposes to teach you statistics. They are kits of statistical tools, and the manuals presume that you already know what kind of analyses you want to do.

For Inference

Statistical analysis is a tool for making inferences, generalizations, and conclusions from a collection of data, whether it's a class's test scores or the number of white, middle-aged women watching a certain news program. For valid analysis, your data should contain a large number of cases (usually more than 30).

A case can comprise one or several kinds of information about one person (e.g., age, sex, rank, score, and income) or it can be dozens of kinds of data about a department, a state, a farm, a corporation, or almost any organizational unit. Cases can consist of temperatures, elapsed times, sales figures, costs, lengths, miles-per-gallon, or similar numerical data.

Say, for example, that a teacher wants to find out a class's average test score. Each exam score is a case. Figuring the mean of all cases is the statistical analysis.

Photography by Edward Judice

The programs in a statistical package give you a way to enter the numbers, analyze the data, and print out the results. Let's look at how a typical program sets up the data.

Figure 1 is a data file taken from Walonick Associates' StatPac. It shows the data from a 94-question survey. Each row, or record, contains the information for one person—one case. Each column contains the information for one question—one variable. Thus, the first person's responses to the first five questions were 1, 3, blank, blank, and 1. This rectangular file includes the raw data that is the grist for statistical procedures. (Note that in Fig. 1, each record takes two lines because of the width of the paper.)

```
Data file listing - DSTUDY                    Page 1

Rec    1  13  10414114114245115443552123321324324433333242442444
          43333343333333333333333YNYNYYNNNN

Rec    2      10X11111232115113442432113113333323432343233333343
          3333333333333  33333333YNNYNNNYNNNNYYNNY

Rec    3      10523533344444223334545123333215531312254155533312
          12223351122331332333321YNYNNYNNYNNNNYNNY

Rec    4      10423112245445215455555233221322333423333334 3 4334
          33334333233333333333333YNNNNNNYYNNNYNNNY

Rec    5      10011111111131114334443122111334525445355255555453
          33345254453552555554553YNNYNNNYNNYNNYNNY

Rec    6      10451115155555525455334333221422554555554343433355
          53442131224532325343443YNNNNNYNNYNNYYNNN

Rec    7      20145555454554534455555323342443343333444345353345
          34443343444444412344354YNNNNYYYNNYY1NNNY

Rec    8      10225515255255113454444441213235333334443243434444
          34444444444444444444444YNYNNNNN NNNYYNNY

Rec    9      10424435535452233444335223222333333333333333333333
          33333333333333333333333YNNNNNNYNNNNYNNNY

Rec   10      10621111124224225333453323221325325533333322433355
          34444444444444444444444YNYYYNNYYNNNYYNNY

Rec   11      10534444244434224554444432223333324453255343445344
          44444333233433334323333YNNYNNNYNYYYYYNNY

Rec   12      10311111111111115554555213222333544223355555555555
          53333333333333333333333YYNNNNNNNNNYYYNNY

Rec   13      10911111111111111131251132211333553333342342332453
          53333233333333425333423YYNNNNYNNNNNNNNYY

Rec   14      20722322334335145345455432221313332333354232334233
          33333322234333333333333YNYNNNNNNNNNYYYNY

Rec   15      10031111144134114221554313112325315413344133444455
          23435153543533535444554YNYYNYYYYNYNYYNNY
```

Figure 1. A typical data file. Each record holds the information for one person, or case. Each column holds the information for one variable.

On the Average

The kinds of analyses available in stat packages vary from simple to complex. I'll start with the simpler techniques in some example situations.

You can use averaging techniques to characterize many values with a single value. Teachers commonly describe a class's performance on an exam by calculating the mean of all students' scores. Each student is one case with one variable—the student's score. In such situations, the mean is a descriptive statistic. You can also use the mean to help you calculate more complex statistics.

Standard deviation is another descriptive statistic, used to quantify how much a group of data scatters about its mean. If the values you use to calculate a mean vary greatly, the standard deviation will be large. In some situations, standard deviation indicates the quality of a mean as a descriptor of some variable. Hawaii's mean daily temperature averaged over a year has a much lower standard deviation than Maine's because Hawaii's temperature is more constant. The high standard deviation of Maine's average temperature suggests that four seasonal averages might give a clearer picture of Maine's climate.

Scientists characterize experimental data with mean and standard deviation to compare experimental and control groups. A study of a new hog food additive might compare the mean weights at slaughter of treated and untreated hogs. Most general-purpose statistical programs include procedures to test for the significance of the difference between two such means. For example, a *t*-test indicates the probability that two means are actually different, taking into account the numerical distance between two means, the number of cases in each group, and the amount of data scattered around the mean in each group. Crosstabulation is another simple kind of analysis found in almost every general-purpose package. It lets you easily process surveys and questionnaires. Some specialized packages for survey analysis provide crosstabs as the only type of analysis available.

The best way to explain crosstabulation is with an example. Say that you're the secretary of your computer user's group. Each member fills out a questionnaire listing his or her computer and printer. A simple tabulation, or frequency analysis, would tell you how many people owned each kind of computer and each kind of printer (see Fig. 2). A crosstabulation would tell you how many people owned each computer/printer combination (see Fig. 3).

For example, we can see from Fig. 2 that 22.2 percent of the club's members own Model 4's, while 44.4 percent own Tandy printers. Figure 3 shows us that five people own both. Of those who own Tandy printers, 17.9 percent own Model 4's, and 35.7 percent of the club's Model 4 owners have Tandy printers. (For a simple Model 4/1000 crosstab program, see "Keeping Tabs," p. 44.) Statistical packages usually let you print out chi-square test results along with a crosstabulation, so that you can determine the significance of differences between cells.

Correlation

Correlation is a statistical technique for measuring the degree of relatedness between two variables, or how well they correlate. A sprocket company selling in 40 cities could compare sales figures from all cities with the amount of ad dollars spent in each city. Normally, you'd expect a strong positive correlation between sales and amount of advertising. Correlating sales with the size of each city's sales force might yield similar results. Correlation doesn't imply causality; it's up to the company to determine if sales income depends on ad dollars, size of sales force, or some other factor.

If the sprocket company decided that sales depended on one or both of the vari-

What you should know about commercial statistical software.

ables tested, it might then do a regression analysis to find the straight line that best fits the relationship of sales against each of the other variables when plotted on a two-coordinate graph.

On a plot of sales versus ad dollars spent, for instance, you'd expect regression analysis to produce a line that climbs to the right (as advertising sales income increases). The points plotted for each of the 40 cities should be sprinkled roughly along that line (see Fig. 4). Cities that fall well below the line (low sales for the amount of advertising) might be considered candidates for help.

You can also use regression to make predictions. A company can project next year's sales based on those of the last five years. Regression is the basis of many forecasting packages. Only the largest and most expensive packages include sophisticated statistics like multivariate analysis. There are several types; by definition all involve more than two variables for each case. Factor analysis is one type; this multivariate technique reduces a large number of interrelated variables to a few factors that aren't directly measurable. Market analysts use it to fine-tune market surveys containing many questions. After seeing which questions get lumped by factoring, the analyst can better understand that market.

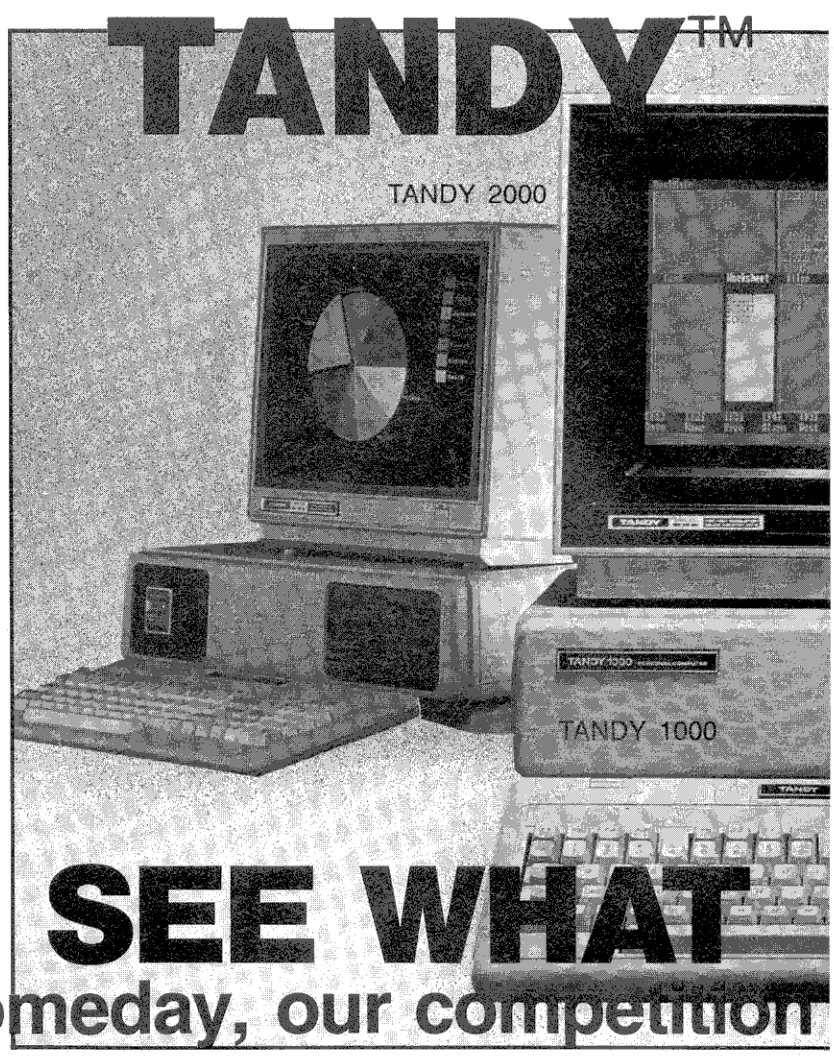
Micro History

In the olden days, you needed a mainframe if you had more numbers than a desk calculator could handle. You recorded your data on a keypunch and submitted your program the same way. Statisticians passed around statistical routines and subroutines to avoid reinventing the wheel.

By the late 1970s, researchers with micros were getting out their stat books, translating computation formulas into Basic, and running statistical analyses on their Model I's. At the same time, a few companies, including Radio Shack, began to sell statistics packages to nonprogrammers. While some packages were developed on microcomputers, others derived their ideas from mainframe packages such as SPSS (Statistical Program for the Social Sciences) and SAS (Statistical Analysis System).

The Radio Shack Advanced Statistical Analysis Package, written in Basic, included two file utility programs and four kinds of data files as well as 10 statistical programs. It also had a program that drew a random sample. With 16K of RAM, you could analyze up to 80 cases by 10 variables (800 data elements).

The most commonly used statistical procedures haven't changed any, but everything else has. Data files are bigger than 35-track single-density disks allow, and RAM requirements are usually higher than 16K or 32K. The hard disk has be-



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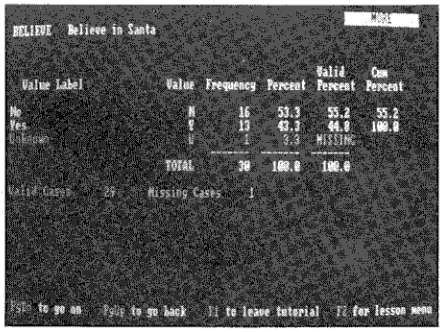

Photo 1. An example of a histogram created by SPSS. This is from the SPSS demo program.

come cheaper and more widely available; some packages recommend it, and a few require it. Some software is now written in machine language for greater speed.

While all of these improvements are appealing, they're also more expensive, and only the full-time professional researcher needs a top-of-the-line system to do data analysis. The power user wants lots of RAM, a chip with 8 MHz clock speed, a hard disk, and machine-language software. His setup might include a Model 3000 with 640K of RAM, a hard disk, and a $500 to $800 statistical package. With that, the professional can analyze data from a file of, say, 1,500 cases with 100 variables, or do correlation and regression analyses.

The rest of us can use less expensive equipment if we will settle for less than blazing speed and leave the most complex multivariate techniques to the professionals. A pair of floppy-disk drives and Basic programs will handle such functions as crosstabulations and descriptive statistics, as long as the data files contain no more than a few hundred cases.

StatPac

An example of what is available for the Models I/III/4 is StatPac from Walonick Associates. It includes 14 statistical programs plus 19 utilities (see Fig. 5, p. 40). (If you own a Model I, you'll need a double-density operating system.) You choose from a menu and then from menus for codebook management (data description), data management, and analysis management. The 124-page manual and screen prompts tell you just how to use the package, but they don't tell you which kind of analysis is appropriate for what kind of data.

StatPac sells for $285. The current TRS-80 version requires 48K RAM. A CP/M version is also available. The Model I version is in Basic and includes machine-language subroutines for extra speed. The Model III/4 version is compiled in machine code; author David Walonick says that it runs five times faster than the Basic version. Both have an enhanced multiple-regression module.

The menus and the manual take you step by step through the sequence of de-

```
User Group Survey Results

Frequency Analysis of Variable 1

   What type of computer do you own?                Number    Percent
----------------------------------------            ------    -------

                  A = Model I                          10      15.9 %
                  B = Model II/12/16                    3       4.8 %
                  C = Model III                        13      20.6 %
                  D = Model 4/4P/4D                    14      22.2 %
                  E = MS-DOS machine                   15      23.8 %
                  F = Color Computer                    5       7.9 %
                  G = Model 100/200                     3       4.8 %
                                                    ------    -------
                   Total                               63     100.0 %

                   Missing cases = 0
                   Response percent = 100.0 %

Frequency Analysis of Variable 2

   What kind of printer do you own?                 Number    Percent
----------------------------------------            ------    -------

                  A = Tandy                            28      44.4 %
                  B = Epson                            15      23.8 %
                  C = Okidata                           9      14.3 %
                  D = Gemini                            3       4.8 %
                  E = Centronics                        6       9.5 %
                  F = Other                             2       3.2 %
                                                    ------    -------
                   Total                               63     100.0 %

                   Missing cases = 0
                   Response percent = 100.0 %
```

Figure 2. A simple tabulation, or frequency analysis, of computer and printer ownership among members of a computer club.

scribing, entering, and editing your data. Then you're shown how to do batch processing by setting up an analysis control file. The file can order one or several analyses. Once you execute the file, you can do something else until your printer stops printing. Crosstabulating a few dozen cases takes only a few minutes. It takes much longer to run a multiple regression problem with several hundred cases.

You can print out your data description (codebook) and your data file to make sure you made no errors before you do your analysis. You can also print out and check your analysis control file before you execute it.

Walonick wrote the original version of StatPac in 1979–80 and offered the TRS-80 version for sale in 1981. Since then he has produced an MS-DOS version, with instructions for either floppy- or hard-disk installation.

MS-DOS StatPac comes on three disks and includes a 222-page manual. It has 18 statistical programs and 33 utilities, all of which you can call from menus or prompts. It is compiled in machine language and runs notably faster than the smaller compiled version for the Model III/4. When installed on a hard disk, it zips along even faster.

Anyone who does statistics on a microcomputer soon discovers that he or she devotes a lot of time to tasks related to entering the data. StatPac lets you choose from one of three data entry programs, depending on your personal taste and the kind of data you're entering.

Heavy Metal Statistics

The power user might want to consider a big package called SPSS/PC, the descendant of a well-known mainframe package. Version 1.1 requires MS-DOS 2.x and at least 320K RAM.

The package comes on nine double-sided disks and includes a tutorial disk. The price is $795.

Installing it on your hard disk is easy; you can transfer the programs on the nine disks in less than 20 minutes. The 33 files occupy over 3 megabytes. See Fig. 6 (p. 40) for a list of SPSS's functions.

A demonstration file called Employ.INC shows you some of the main components of SPSS from a spectator's point of view. It also tells you about some of the new features on version 1.1. For example, you can now use some DOS commands from within SPSS/PC.

Employ.INC has a sample data file of 100 cases. As it moves along, the demonstration recodes the data into five categories and displays the results in both numbers and a graphics display called a histogram (see the Photo). Since only 100 cases are involved, the program takes only a few seconds to load the data from the hard disk before each analysis.

The manual recommends an 8087 math coprocessor to speed up the handling of large data files. SPSS/PC uses a coprocessor automatically.

SPSS is a command-based system, and you must know the commands along with the command structure or syntax. New users will probably get a number of "Error. . .command not executed" messages.

On-line help messages are available, but they're no substitute for the 600-page manual. Over 300 pages are devoted to explaining 21 kinds of statistical procedures, while a dictionary of some 700 commands and key words takes up another 194 pages. Other sections provide output examples, a glossary, an index, and an introduction.

SPSS/PC can do sophisticated multiple regression and factor analysis problems, and the precision of the computation results is up to the best professional standards.

If version 1.1 has a flaw, it is its inattention to data file creation and data entry. You have to look in the last appendix of the manual to find that "you probably will use an editor to prepare command files and data files." The WordStar nondocument mode and the EasyWriter Translate program are offered as examples. EDLIN, the MS-DOS line editor, isn't mentioned but will also work.

While I was checking out SPSS/PC 1.1, a new version called SPSS + was released. It includes an integrated full-screen editor. SPSS Inc. kept the price the same but dropped several advanced statistical procedures and increased the minimum required memory to 384K. To get such features as factor analysis, cluster analysis, and multivariate analysis of variance, you must now buy an Advanced Statistics add-on that requires 448K RAM and costs $295. And for an additional $295 you can get another add-on for "presentation quality tables." This stuff is clearly for the big boys.

How to Buy

To do statistics on a micro, the simplest and least expensive approach is to write your own statistical routines in Basic or copy a listing from a book or an article. This is feasible if you do only one or two analyses periodically. If you do it yourself, the precision and reliability of the results will be directly related to your programming skills.

If you buy a package in Basic, you can usually make changes to suit your needs. Some packages are modular so you can add your own routines. However, a package compiled in machine code will run a lot faster. This is an advantage worth paying for if you have over 100 cases per data set to analyze.

Are the MS-DOS packages better than the ones for the TRS-80? They run faster, and the double-sided disks hold more data and more programs on one disk. The new Model 4D, however, offers a TRS-80 with double-sided disks, negating this particular advantage.

Heavy users will find that the benefits

User Group Survey Results

Crosstabulation of Variables 1 and 2.

What type of computer do you own? - (X Axis)
- - - - BY - - - -
What kind of printer do you own? - (Y Axis)

Number Row % / Column % / Total %		Model A	Model II/12/16 B	Model III C	Model 4/4P/4D D	MS-DOS machine E	Color Computer F	Model 100/200 G	Row Totals
		5	3	4	5	7	3	1	
Tandy	A	17.9	10.7	14.3	17.9	25.0	10.7	3.6	28
		50.0	100.0	30.8	35.7	46.7	60.0	33.3	44.4
		7.9	4.8	6.3	7.9	11.1	4.8	1.6	
		2	0	4	2	5	1	1	
Epson	B	13.3	0.0	26.7	13.3	33.3	6.7	6.7	15
		20.0	0.0	30.8	14.3	33.3	20.0	33.3	23.8
		3.2	0.0	6.3	3.2	7.9	1.6	1.6	
		2	0	3	3	0	0	1	
Okidata	C	22.2	0.0	33.3	33.3	0.0	0.0	11.1	9
		20.0	0.0	23.1	21.4	0.0	0.0	33.3	14.3
		3.2	0.0	4.8	4.8	0.0	0.0	1.6	
		0	0	0	2	1	0	0	
Gemini	D	0.0	0.0	0.0	66.7	33.3	0.0	0.0	3
		0.0	0.0	0.0	14.3	6.7	0.0	0.0	4.8
		0.0	0.0	0.0	3.2	1.6	0.0	0.0	
		0	0	2	1	2	1	0	
Centronics	E	0.0	0.0	33.3	16.7	33.3	16.7	0.0	6
		0.0	0.0	15.4	7.1	13.3	20.0	0.0	9.5
		0.0	0.0	3.2	1.6	3.2	1.6	0.0	
		1	0	0	1	0	0	0	
Other	F	50.0	0.0	0.0	50.0	0.0	0.0	0.0	2
		10.0	0.0	0.0	7.1	0.0	0.0	0.0	3.2
		1.6	0.0	0.0	1.6	0.0	0.0	0.0	
Column Totals		10	3	13	14	15	5	3	63
		15.9	4.8	20.6	22.2	23.8	7.9	4.8	100.0

Chi square	= 21.76	Valid cases	= 63
Degrees of freedom	= 30	Missing cases	= 0
Probability of chance	= 0.863	Response rate	= 100.0 %
Cramer's V	= 0.263		
Contingency coeff.	= 0.507		

Caution: 39 cells contain an expected frequency less than 5

Figure 3. A crosstabulation of computer and printer ownership in the same computer club.

of a hard disk are greater than the costs. If you want faster execution, installing a hard drive is less expensive than buying a new computer with a faster chip.

Which packages are easiest to use? New users like menus. Command-driven packages require more learning time but are faster to use once learned.

Can microcomputer packages produce results with the mathematical precision required for professional use? Yes, no doubt about it. Standard regression problems are often used to check out the precision of computation, and most microcomputer packages have produced results that are clearly up to professional standards. The best micro packages exceed the precision of many mainframe packages.

If you need to make inferences from large sets of numbers, you might want to go to a workshop and tap into the experience of a data analyst. For example, SPSS offers one- and two-day SPSS/PC workshops in major cities. Dr. Phillip Good of Information Research (10367 Paw Paw Lake Drive, Mattawan, MI 49071, 616-668-2049) conducts three-day workshops in Chicago that feature the MS-DOS version of StatPac. ■

Products

SPSS $795
SPSS Inc.
444 N. Michigan Ave.
Chicago, IL 60611
312-329-2400

StatPac $285
Walonick Associates
6500 Nicollet Ave.
S. Minneapolis, MN 55423
612-866-9022

Suggested Reading

Clark, Jeff, and Douglas Downing. *Statistics the Easy Way.* Woodbury, NJ: Baron's Educational Series Inc., 1983.

Herzberg, Paul A. *Principles of Statistics.* New York: John Wiley and Sons, 1983.

Berenson, Mark L., and David M. Levine. *Basic Business Statistics: Concepts and Applications.* 2nd ed. Englewood Cliffs, NJ: Prentice-Hall Inc., 1983.

Levine, Richard I. *Statistics for Management.* 3d ed. Englewood Cliffs, NJ: Prentice-Hall Inc., 1984.

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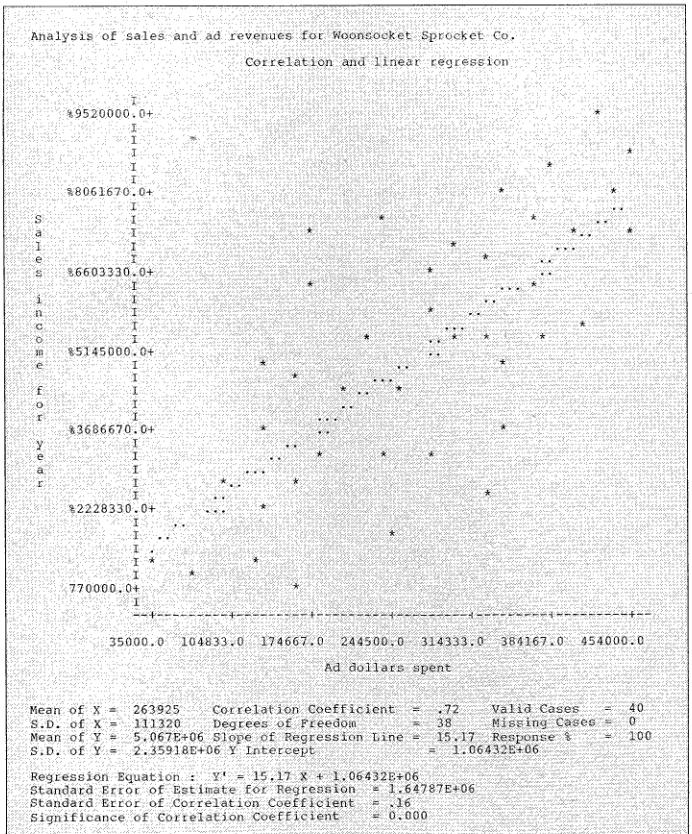

Figure 4. Example of correlation/regression analysis by StatPac demonstrates a fairly strong positive correlation (.72) between sales income and ad dollars spent. The small dots represent the straight line that best characterizes the relationship of the two variables as determined by linear regression analysis.

StatPac statistical capabilities

Frequency analysis (histograms, etc.)
Descriptive statistics (mean and standard deviation)
Crosstabulations (Chi square, Phi statistic, Cramer's V statistic, and contingency coefficient)
Correlation
Linear regression
t-tests (for matched pairs and independent groups)
Multiple linear regression
Analysis of variance (ANOVA)
Multiple variable response analysis (by variable and value labels)

Figure 5. Some of StatPac's features. This is for the TRS-80 version.

SPSS/PC statistical capabilities

Tabulation (bar, hbar, and histogram)
Descriptive statistics
Crosstabulation (Chi square)
Subpopulation means
t-tests
Correlation
Regression
Analysis of variance (ANOVA)
One-way ANOVA
Nonparametric tests
Multiple regression
Discriminant analysis
Factor analysis
Cluster analysis
Multivariate ANOVA
Repeated measures ANOVA

Figure 6. Some of SPSS's features.

Each statistical data analysis package is unique, but most fall into one of several broad categories. General-purpose packages form the largest group. They handle descriptive statistics, crosstabulations, and often correlations and simple analysis of variance. They also include utilities for data entry and editing as well as for printed output. Some include nonparametric statistics.

Special-purpose statistical packages cater to the needs of specialists or vertical markets. Survey packages, for example, are especially for processing questionnaires and polls. These usually feature crosstabulations of two kinds of information in one table. Specialized packages are also used for forecasting and for econometrics (statistics for economists).

Below is a sampling of general-purpose and specialized survey packages ranging in price from $200 to $900. The list is not intended to be comprehensive, but it should give you a good idea of what's available for your micro.

General-Purpose Packages

ABC requires 256K RAM, two disk drives or a hard disk, and MS-DOS 1.x or 2.x. ABC will take advantage of an 8087 math coprocessor if it is installed. Consortium Software, 426 Thompson St., Room 4250, Ann Arbor, MI 48106, 313-763-3482, $200.

ABC, derived from a minicomputer package, is menu oriented and interactive in the sense that you look at the screen and decide what you want to do next. A data entry and editing utility is included. It has programs for frequency distributions, descriptive statistics, crosstabulations up to 13 rows by 10 columns, and correlation and regression using up to 10 variables at a time. You can create new variables and recode or rearrange variables. Online help is provided. For those who have lots of RAM, a 512K version that handles up to 1,000 variables is available at no extra cost. The Inter-University Consortium for Political and Social

Some Statistics Packages

by John Cobb Jr.

Research developed the package and offers special prices to member universities and their representatives.

ABstat 4 requires MS-DOS, 196K RAM, and either two disk drives or 340K total disk storage. Versions are available for the Model 2000 and the Model 1200HD. One version supports the 8087 floating-point math coprocessor. AndersonBell, P.O. Box 191, Canon City, CO 81212, 303-275-1661. $395.

ABstat is command-driven and executes quickly with programs compiled in machine code. All its programs are on one disk. It will handle up to 128 variables, and the maximum number of cases is set only by disk capacity. It can read and write files in dBase II and dBase III. Statistical procedures include listings of values, frequencies and percents, descriptive statistics, correlation coefficients, analysis of variance, several nonparametric tests, and simple and multiple regression.

Crunch Interactive Statistical Package (CRISP) requires 192K RAM, MS-DOS 2.x, and two disk drives. Crunch Software, 2547-22nd Ave., San Francisco, CA 94116, 415-564-7337. $495.

CRISP is an integrated package of 11 statistical programs plus 13 utilities. The utilities let you build, sort, merge, concatenate, correct, copy, and list a system file. You can also read dBase II files, recode and transform variables, use algebraic formulas to create new variables, and specify a subset of cases for analysis. In addition to frequency distributions, descriptive statistics, crosstabulations, and scatterplots, the statistical programs do *t*-tests, nonparametric tests, correlations, analysis of variance, multiple regression, and principal components.

NWA Statpak comes in versions for MS-DOS or CP/M systems that have a compatible Basic interpreter. A CP/M version is available on 8-inch disks. Northwest Analytical Inc., 520 NW Davis, Portland, OR 97209, 503-224-7727. $495.

NWA Statpak is written in Basic. It provides 50 statistical programs but excludes multivariate statistics. You select a category from a main menu and then choose a specific analysis or utility program from a second menu. Utilities for data entry and editing and for report formatting are included. The package does probability calculations, descriptive statistics, several nonparametric statistics, chi-square analysis, *t*-tests, analysis of variance, correlation, and regression.

The Statistician comes in single-user versions for the Models I, III, 4, 1000, 2000, and 3000. It requires 64K RAM (128K RAM recommended) and one disk drive. A Xenix version is available. Quant Systems, P.O. Box 628, Charleston, SC 29402, 803-571-2825. Specially priced at $69 ($149 for the Xenix version) through April 30.

The Statistician is a menu-driven system that incorporates a data base manager for data entry and editing. It is particularly useful for forecasting, since it provides five types of multiple regression analysis: stepwise, all subsets, backward elimination, ridge, and least squares. The package includes programs for descriptive statistics, hypothesis testing, one- and two-way analysis of variance, time-series analysis, and nonparametric statistics.

Editor's note: The Statistician was not reviewed by the author; however, a review of the package appeared in the December 1983 80 Micro *(p. 39).*

Systat requires MS-DOS 2.x or higher, 256K RAM, and two double-sided disks or a hard disk. A CP/M version is available. Systat Inc., 603 Main St., Evanston, IL 60202, 312-864-5670. $495.

Systat is a fast and accurate command-driven system that comes on five double-sided disks. It features a multivariate general linear hypothesis module that does several kinds of advanced statistical analysis. With a hard disk, it can handle up to 2,000 cases with 150 variables each. It has a full-screen editor and a wide range of statistical routines for descriptive statistics, nonparametric statistics, correlation and regression, and crosstabulations. A report writer add-on costs $60.

Special-Purpose Packages For Survey Analysis

ABtab 3 requires MS-DOS, 256K RAM, and 600K of storage on floppies or hard disk. AndersonBell (see address above). $895.

ABtab is a command-driven package that produces crosstabulations, bar graphs, and listings of selected data from each case or respondent. It does banners and stubs, a kind of crosstabulation dear to the hearts of market researchers—columns contain demographic information such as age and sex, while the rows tabulate responses such as which brand you buy. It will handle questions with more than one response, such as, "Which magazines do you read?"

Support for the 8087/80287 math coprocessor has been discontinued since the current release tabulates data faster than release 2 with 8087 support. Release 3 features easy recoding and post-coding of data plus new features of special interest to market researchers who do surveys. The package will handle up to 512 questions and 32,767 respondents.

The Survey System 2.0 requires MS-DOS 2.x, 128K RAM, one disk drive, and an 80-column display. No language interpreter is required. Creative Research Systems, 1649 Del Oro, Pentaluma, CA 94952, 707-765-1001. $495.

The Survey System handles data entry and editing and produces several kinds of tables and charts suitable for including in a professional report. You could use the tables with standardized scores for grading students or rating employees. An optional addition allows input of data via an optical card reader. You can send output to screen, printer, or disk and produce bar charts with either a dot-matrix or daisy-wheel printer. The package is designed to handle up to 32,000 questionnaires. ■

Circle 108 on Reader Service card.

Attention TRS-80™ owners who now have a "PC"

SuperCross/XT

EASILY TRANSFER FILES FROM THE TRS-80™ TO MS-DOS™ OR CP/M™ AND BACK!

80-MICRO summed it up;"The value of this program far exceeds its price... if you work with different computers, it's a must."

*** 4-STAR Review - July 1985 issue ***

Don't be confused by competitors that are really BASIC translators with limited file transfer capabilities! SuperCROSS/XT is the one that moves lots of files FAST!

HUNDREDS OF ENTHUSIASTIC COMPLIMENTS ON FILE!

You just got a new Tandy 1000 or a PC compatible. You've got lots of data on your TRS-80™. You'd like to use it on your new PC. We make it easy for you. *SuperCROSS/XT* will allow you to COPY files back and forth between different operating systems, including PC/MS-DOS 1.x, 2.x/3.x (single or double-sided), CP/M+, or CP/M 2.2 on your TRS-80™ Model 4/4P, III, or I/DD easily and quickly. You can do this with your existing hardware and *SuperCROSS/XT, eliminating* modems, cables, and terminal program transfers. *SuperCROSS/XT runs as a /CMD file under your TRS-80 operating system.* Data files, spreadsheet files, medical records, legal briefs, and text files can easily be moved between machines. Years of Visicalc™ or Multiplan™ files, Scripsit™ or Superscripsit™ files (saved in ASCII), for example.

Comments and letters on-file from registered users are extremely enthusiastic about this product and its ease of use. ***It WILL do what you think it will do, it's easy, and it WORKS GREAT!*** Features in SuperCROSS/XT that others lack include "tagging" files for multiple **COPY**'s or **KILL**'s to eliminate *many* unnecessary keystrokes! *We'll COPY all you want in one pass with TAG!*

"Powerful & easy to use" - GFP, Chicago IL
"A very handy product worth much more than the price."- KA, Port St. Lucie FL
"Excellent product! Works as advertised." - GF, Boise ID
"Works! Rejoice! I can now talk to PC's!" - CN, Sanatoga PA
"Excellent. No problems at all." - RH, Santo Domingo, Dominican Republic
"Super! It performs the task I needed done." - TT, Rockville MD
"Fantastic! I transferred my files within 1 hour!" - PJS, Rolla MO
"Will save 100's of hours! It'll protect my 4P from obsolesence"-RJ, Denver CO
"Superb. Easy to understand documentation." - RES, St. Louis, MO

CNVBASIC/CMD, available seperately, "preps" your I/III BASIC programs before sending over with *SuperCROSS/XT*. It will make most of the syntax and spacing changes required for converting Model I/III BASIC programs for use on GW BASIC or Model 4 BASIC. Commercial application packages written in BASIC probably will not convert 100% over by our *or any other* BASIC translator.

***Some of the DOS Formats Supported:** PC/MS-DOS variations include 1.x, 2.x/3.x single or double-sided (IBM, Tandy 1000/1200/3000, and most compatibles), and Tandy 2000. CP/M variations include most well known single and double-sided formats including CP/M 3.0+, Montezuma Micro 2.2 (*all* versions), and most other popular CP/M formats.

****The stand-alone SuperCROSS/XT package may be ordered through Tandy Express Order at any Radio Shack™ store!***

Important! Please specify Mod I/DD, III (mode), or Mod 4 computer type required.

SuperCross/XT (70 disk formats)*	
Cat# 90-0299 - Model 4, 4P, 4P	$ 99.95
Cat# 90-0300 - Mod III (mode)	$ 99.95
Cat# 90-0301 - Model I Double Density	$ 99.95
CNVBASIC/CMD (converts I/III BASIC programs to Mod 4 or PC)	$ 29.95
BOTH! • COMBO Special!	$119.95

CNVBASIC & Combo Set NOT available through Tandy at this time...

Super Utility

for PC/MS-DOS™

Fixed/Floppy Disk-Tools for Tandy 1000, 1200, 2000, 3000, IBM PC™, XT™, AT™, Leading Edge, Compaq, AT&T 6300 and many other compatibles.

Data file recovery, disk exploring, zapping, and MUCH more!

Accidental deletions and disk directory problems *can happen to anyone at anytime...* a power spike, fingerprint, speck of dust, hardware problem, or simply typing DEL *.* in the wrong sub-directory can destroy critical data in a moment *without warning.* Therefore we introduce ***Super Utility*** for the PC - an easy to use disk utility containing many functions sorely needed in PC/MS-DOS.

With ***SU/PC*** you can restore damaged or deleted files using two different methods (one easy, the other a bit tougher). Even clusters of an erased file assigned to another file can still be restored, unless the user has physically written over every byte of the original data. Even if the directory is not readable - crashed- you have a chance of copying the sectors to a new file on anther disk! (Most applicable with word processing files.)

In addition to file repair and recovery, ***Super Utility*** provides sector verify, sector editing, modification of sectors in Hex or ASCII, ease of renaming of files and setting their attributes in the directory (lock and unlock files, etc.), string search, copying sectors to a file, diagnostic sector checking, mapping of the FAT table of a file or an entire drive, visual graphics pertaining to your system, and full directory and sub-directory editing without endless menu-hopping - all in one program. Want to change the name of your sub-directrory without copying all your files to a new one? Just retype a new name over the old one with *SU/PC!* The sector display mode displays all 512 bytes on-screen at one time and allows you to fully explore your disks. SEARCH and CHANGE are nice here too! Will find any occurance of a byte or string on your disk. Compatible with DOS versions 2.0 - 3.1 on most systems. Color, composite, or monochrome video are supported. A great tool for fixed disk users as well as floppy. Also compatible with IOMEGA's Bernoulli Box™ (distributed by Tandy as the Disk Cartridge System). Please do not confuse the MS-DOS version of *Super Utility* with the TRS-80™ version. ***Super Utility for MS-DOS is NOT SU+ from the TRS-80 "ported over". SU/PC*** is a totally new program that fills the gaps that PC users have most need of and have asked us for. It's aimed at the beginner, the "office user", hobbiests, students of the PC, or programmers alike. *Many of our users say SU/PC is much easier to use than NORTON's.* ***Works on Tandy 2000 too!***

So, why not be certain about the safety of your data (and your peace of mind) when you can have Super Utility/PC disk insurance right on hand at an unusually low price? Make"PC" life easier, more fun, and knowledgeable all at the same time. Unprotected.

Requirements: IBM PC or compatible running PC/MS-DOS 2.x-3.x, minimum of 128K memory, and at least one disk drive. Internal fixed drives supported.

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Our *Supreme Hard Disk Driver* packages offer *much greater flexibility and* ***superior performance*** over the standard drivers supplied by Tandy or other hard drive manufacturers for the TRS-80 Mod 4, III, or I. They allow you to split up your hard drive into partitions of differing sizes, and also allow you to define smaller granule sizes and other optimizing operating characteristics to achieve maximum use from your drive. The drivers (once relocated) are very small; less than 256 bytes. Most hard drive companies either sell or recommend our drivers. These drivers can also be used to allow a hard drive to be shared between LDOS 5.1 and TRSDOS™ 6 for Model 4 owners! If you have the 15 meg or 35 meg Tandy drive, you can now format it for full useage - NOT just 5 meg (Mod I, III or 4 mode)! If you have a 4P and a Tandy drive, you can boot directly off the Tandy hard drive without a floppy! *Call or write for complete details.* ***only $99***

Whether you use our software driver or not, you NEED to use BACK/REST! Shame on you if you're not backing up your data!

BACK/REST 1.3

AVAILABLE THROUGH TANDY
- EOS CATALOG #90-0244 -

- *SUPER-FAST Hard Drive "Image" Backup & Restore!*
- *Backups or restores an entire logical drive or file-by-file!*
- *Files larger than a floppy are NO PROBLEM any longer!*

See the 5-Star review in the Oct'85 issue!

"BACKREST is strongly recommended as insurance against possible digital disaster."
-George Antunes, Oct.'85 *80-MICRO*

You know you *should* backup everyday. Let's face it, the normal file-by-file backup method employed by today's operating systems takes so long that it actually discourages people from doing backups. Our experience shows us that with many users, the longer they've owned a hard drive, the less they're prone to backup regularly. *You're okay until the day your drive develops a glitch.*

Then there's the problem of **files too large to fit on a floppy!** Like PROFILE™ or other types of data files. BACK/REST solves all that! It segments those and can restore them back *without you having to worry about it and figure it all out.* BACK/REST can create a mirror-image of your hard drive partition on floppy disks in 20% of the time a file-by-file backup would normally take; *a 5 megabyte drive should take about 10-15 minutes.* ***There is NO EXCUSE for not backing up your hard drive now... do yourself a favor.***

BACK/REST is *simple* to use and will even tell you just how many floppies you will need to have formatted BEFORE you start. Furthermore, only allocated cylinders of the hard drive are copied to speed things up substantially. Platters may be restored either completely or file by file.If you've invested good money into a hard drive system, *it doesn't make any sense not to have a good, fast BACKUP routine.* BACK/REST makes that job easier and saves *much* time. **TIME IS MONEY.** *Don't delay! Save HOURS!* Save yourself a real problem if your hard drive has a glitch. BACK/REST will work with all TANDY hard drives and *most others* that use LDOS or TRSDOS™ 6.

Need some tools? If you run a hard disk, you'll really want and NEED **The Model 4 ToolBELT** *or* **The LDOS ToolBOX**! Directory check and repair tools are included. These programs add *tremendous* power and flexibility to your operating system, as well as performing maintenance and even "surgery", if necessary. Repairs crunched HIT or GAT tables with ease! The utilities include programs for disk analysis and repair, file or directory checking and repair, extensive disk modifier, memory modifier, file modifier, sector verifiers, file and sector comparers, filters, file or disk mapping, password manipulation, password removal, mass file moving, mass file killing, erasing, disk drive exercising, disk and file search/replace, and much, much, MORE. Each program contains a built-in "HELP" prompt. All utilities are written in machine language, contain excellent documentation, and are ***unprotected!***

BACK/REST 1.3 *for TRSDOS 6™ & LDOS* (EOS Cat. #90-0244)	**$ 99.95**
Model 4 ToolBelt (EOS Cat. #90-0245) *Hard Disk Repair & Recover Tools for TRSDOS 6 - Mod 4, 4P, 4D*	**$ 49.95**
LDOS ToolBox *(not available at Tandy)* *Hard Disk Repair & Recovery Tools for LDOS - Mod I/III*	**$ 49.95**

Tandy 1000 and other PC compatible users:

Do you have problems with "protected" disks on your Tandy 1000, 1200, 3000, IBM, or other PC compatible? *We don't mean trading software,* but making archival backups of your purchased MASTER disks and running your protected business applications from your hard disk. We have a program called *COPY II PC* that will handle these tasks for you. *COPY II PC* will backup most protected PC software. It also makes using your hard disk as convenient as it was designed to be! No longer will you need to use a "key disk" on most software (applications - not games). You can run directly from your hard disk with *NOKEY,* included with the *COPY II PC* package. Insert NOKEY in your BATCH file for fast, easy, automatic execution of your "protected" applications.This is sold for making archival backups of your own purchased software for your own use or running from your own hard drive only. TANDY 1000 requires memory card because of needed DMA chip that resides there.
>> Not for Tandy 2000 << Minimum requirements: TANDY 1000 (memory board required), 1200, 3000, IBM™ PC™, XT™, AT™, or other "real" compatibles including Leading Edge, Compaq, etc. One or two disk drives - 128K required.*

COPYII PC with Nokey ***only*** **$39.95**

* * * * *

Do you really like Scripsit™, but wish it did a whole lot more? *You'd like a lot of new features without relearning a whole new system or spending much additional money? Our PowerScript 4.2 is just the answer. PowerScript 4.2* adds two categories of additions to SCRIPSIT™. Directory/File functions (DIR, FREE, KILL CHAIN, LINK), and embedded printer control functions. With all the smarter printers out there, it doesn't make any sense to use a "dumb" word-processor anymore. In this case, "dumb" means it can't really control your printer to its fullest capacity. *PowerSCRIPT 4.2* gives you many new features, including complete printer control, while retaining the commands you already know - at a very low price! All your previous files will, of course, be compatible. *Supports Mod I, III, and 4 versions of SCRIPSIT™. 4+ Stars, 7/85 80-MICRO*

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* * * * *

USING SU+ 3.2, SU4, & POWERTOOL™

Our ever-popular book *INSIDE SU+ 3.x* has been revised and renamed to now include all the changes that have occurred since it was last revised, as well as incorporate our PowerTOOL product, sold by Tandy (26-2022). This perfect-bound, large format, slick 100+ page book explains all the ins and outs of using these powerful utilities to the fullest of their capabilities. If you own *SU+ 3.x, SU4/4P,* or *PowerTOOL* this book will really add to your knowledge and maybe explain some things you didn't understand before. Lots of tips, hints, and suggestions are included. Disk theory is explained as well. The book is a real value at only $19.95, its list price, but this month we're offering it for **only $15!**

Don't own *Super Utility* yet?? Buy our world-famous *SUPER UTILITY+ 3.2* or *SUPER UTILITY 4/4P* and add our new edition of *USING SUPER UTILITY* for only $5 extra! >> *Save $15!* <<

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Super Utility 4 **for the TRS-80™ Model 4/4P/4D**	**$79.95**
USING SUPER UTILITY **Book Sale price**	**$15.00**

>> Special combo SU with new book for only $84.95! <<

Super Utility for the TRS-80 is "protected". It comes with two copies of the program. Upon registering, you may order an unprotected copy for $20 (U.S.) at your option.

* * * * *

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VISA

Keeping Tabs

David C. Andresen and Beverly Woodbury

Compile your own statistical tables with MicroTab, a simple crosstabulation program that handles surveys and questionnaires.

MicroTab appeared in our February 1984 issue (p. 84). We've modified it to let you input data from the keyboard and maintain data files on disk. It also now runs on the Models 4 and 1000. Address correspondence concerning this program to 80 Micro, *Pine St., Peterborough, NH 03458.*

MicroTab (see the Program Listing) is a general-purpose crosstabulation program that gives you a low-cost means of compiling statistical tables. It will easily handle tabulating opinion surveys or election returns. In addition, it will give you an idea of how commercial statistics programs work.

To produce a finished table with MicroTab, you need a set of completed questionnaires (see Fig. 1) and a drawing of the way you want your table to look. Figure 2 illustrates how a skeleton table might look for a political preference poll.

Let's say you interviewed 20 prospective voters to see whether they are leaning toward candidate Smith or candidate Jones. You now want to make a table that divides the results according to the respondents' sex. You specify what you want the table to look like, enter the questionnaire data, and let the program count the responses and calculate the percentages. In addition to column percentages, MicroTab computes row percentages.

It also gives you several printing options (see Fig. 3): raw counts (frequencies), column percentages, row percentages, no data (useful for printing labels alone), or no print (used for dummy rows where you calculate results but don't want to show the data or label).

The number of questionnaires MicroTab processes depends on the length of the questionnaire and the amount of memory in your computer. Experimentation is the best bet for determining the capacity of your system for a particular project.

The program will accommodate a 132-column printer. You can change the LPRINTs to Prints, but be aware that the program can display only small tables on the screen.

Across and Down

From the program's menu, you can access the table column specification section (program lines 1960–2060), which contains the specifications for each of the columns that appear in the table you want to create. For example, in Fig. 2 the first column is Women, the second is Men, and so on.

The specifications themselves consist of regular statements in Basic. They must follow a certain format, however. First, each statement identifies the table column (COL = n). Next, the program determines whether the answer to a particular question in the questionnaire qualifies to

Public Opinion Survey
Candidate Preferences

Hello, I'm taking a public opinion survey about political candidates and I would like to include your opinions. My first question is. . .

1. If the election for mayor were held tomorrow, whom would you most likely vote for? Would it be Smith or Jones? (Interviewer: circle number for answer.)

Smith 1
Jones 2
Don't Know 3
Refuse to Answer 4

2. Now I'm going to read several income categories. Would you tell me when I get to the category that best describes your household's annual income? (Interviewer: read categories and circle number for answer.)

Less than $10,000 1
$10,000 to $14,999 2
$15,000 to $19,999 3
$20,000 to $24,999 4
$25,000 to $29,999 5
$30,000 or more 6
Refuse to Answer 7

3. Sex of respondent:

Female 1
Male 2

Figure 1. Sample questionnaire.

LOAD 80

System Requirements

Models I, III, 4, or 1000
Disk Basic
32K RAM
Printer

go in that column. The format is:

```
IF Q(x) = y THEN GOSUB 2110
```

where x is the question number and y is the value the program tests. If the test is successful, then the program executes the GOSUB, which goes to the row tests. You can use any relational operator permitted by Basic in place of the equal sign.

An example will illustrate the procedure. Let's say you want the first column in the table to be for women. Further, let's suppose that the third question in the questionnaire gives the sex of the respondent, with the number 1 denoting women and the number 2 denoting men. The specification, then, would be written this way:

```
1960 COL = 1:IF Q(3) = 1 THEN GOSUB 2110
```

Write all column specifications in a similar manner. Just remember that you have to give the column number, the question number, and question value.

Row specifications (program lines 2110–2220) are similar to column specifications.

MicroTab gives you a low-cost way to compile statistical information.

They tell the program which row you are working with and what qualifies to go in that row. Their format is as follows:

```
ROW = n: IF Q(x) = y THEN GOSUB 1770
```

where n is the number of the row, x is the question number, and y is the value the program tests. If the test is successful, the program goes to the section where it tallies answers (lines 1770–1780).

For example, the first row in the table is for Smith, and the first question in the questionnaire asks which candidate respondents favor, with the numeral 1 signifying Smith and the numeral 2 signifying Jones (see Fig. 1). The specification for this row is:

```
2110 ROW = 1: IF Q(1) = 1 THEN GOSUB 1770
```

Write all row specifications in a similar way. The program operates by testing each column. If the column test is met, it then tests all the rows, putting a tally mark on its imaginary tally sheet in each row/column intersection where that test is successful.

Setting the Table

When you run the program, MicroTab displays a menu with 17 options, many of which are used for editing the table file. The program must have the table file to perform most of its functions.

To set up a table file, select option 4.

Table 1.
Public Opinion Poll—Mayoral Candidate Preferences

	Women	Men	Total Responses
Smith			
Jones			
Total Responses			

Figure 2. Skeleton table before tabulation.

FREQ—Print the frequency or tally
COL %—Print the column percentage
ROW %—Print the row percentage
NO DATA—Print the row title but not the data in that row
NO PRINT—Don't print anything for this row

Figure 3. Printing options.

Table 1.
Public Opinion Poll—Mayoral Candidate Preferences

	Women	Men	Total Responses	
Smith	7	3	10	←Frequency
	63.64	33.33	50.00	←Col.%
Jones	4	6	10	
	36.36	66.67	50.00	
Total Responses	11	9	20	
	100.00	100.00	100.00	

Figure 4. Finished table.

Program Listing. MicroTab.

```
10  REM * MicroTab, by David C. Andresen
20 REM *    Updated by Beve Woodbury
30 REM ************************************************
40 REM ********** INITIALIZE VARIABLES ******************
50     CLEAR 4000
60     DEFINT A-Z
70     FF$="#######":PF$="####.##"
80     DIM TT$(20), CT$(10), RT$(50)
90 REM ********** INITIALIZE PRINTER (MX-80) *************
100 REM              TO 132-CHARACTER MODE
110 '    LPRINT CHR$(15);
120 REM ************************************************
130 CLS
140 PRINT TAB(22) "MICROTAB"
150 PRINT TAB(5)"A CROSSTABULATION PROGRAM FOR MARKET RESEARCH"
160 REM ************ MENU ******************************
170 PRINT:PRINT "SELECT DESIRED OPERATION:":PRINT
180 PRINT TAB(5) "1) PRINT TABLE          10) EDIT COL TITLES
190 PRINT TAB(5) "2) READ TABLE FILE      11) EDIT ROW TITLES
200 PRINT TAB(5) "3) READ DATA FILE       12) EDIT ROW PRINT SPECS
210 PRINT TAB(5) "4) SET UP TABLE FILE    13) EDIT NO QSTRES"
220 PRINT TAB(5) "5) SET UP DATA FILE     14) EDIT NO. QSTNS/QSTRE"
230 PRINT TAB(5) "6) ADD TO DATA FILE     15) EDIT COL % BASE"
240 PRINT TAB(5) "7) EDIT COL SPECS       16) EDIT ROW % BASE"
250 PRINT TAB(5) "8) EDIT ROW SPECS       17) END"
260 PRINT TAB(5) "9) EDIT TABLE TITLES"
270 PRINT:INPUT "YOUR CHOICE";A
280 IF A<1 OR A>17 THEN 130
290 CLS
300 IF A=1 THEN 1100
310 IF A=2 THEN 450  ELSE IF A=3 THEN 950
320 IF A=4 THEN 2240  ELSE IF A=5 THEN 2580
330 IF A=6 THEN 2680  ELSE IF A=7 THEN LIST 1930-2060
340 IF A=8 THEN LIST 2070-2220 ELSE IF A=9 THEN 2750
350 IF A=10 THEN 2830  ELSE IF A=11 THEN 2910
360 IF A=12 THEN 2990
370 IF A=13 THEN CLS:PRINT "Number of questionnaires  ";NQ :PRINT:INPUT "Enter c
orrect number of questionnaires:  ";NQ:GOTO 130
380 IF A=14 THEN CLS:PRINT "Number of questions per questionnaire  ";NE:PRINT:IN
```

Listing continued

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```
PUT "Enter correct number of questions per questionnaire:  ";NE:GOTO 130
390 IF A=15 THEN CLS:PRINT "Number of Column for Column % Base  ";CB:PRINT:INPUT
 "Enter correct Column number for Column % Base:  ";CB:GOTO 130
400 IF A=16 THEN CLS:PRINT "Number of Row for Row % Base  ";RB:PRINT:INPUT "Ente
r correct Row number for Row % Base:  ";RB:GOTO 130
410 IF A=17 THEN CLS:INPUT "Do you want to save edited Table File: ";YN$:IF YN$<
>"Y" THEN END
420 IF YN$="Y" THEN INPUT "Do you want a new table file name ";NF$:IF NF$="Y" TH
EN INPUT "Enter new file name: ";F$
430 GOTO 2490
440 REM ********** READ TABLE FILE **********************
450 CLS: INPUT "Enter name of Table File to read: ";F$
460 OPEN "I",1,F$
470 CLS: PRINT "READING TABLE FILE"
480 NT=0
490 INPUT #1, W$
500 NT=NT+1
510 IF NT>20 THEN 1800
520 TT$(NT)=LEFT$(W$,110)
530 IF W$="END TABLE TITLES" THEN NT=NT-1:GOTO 550
540 GOTO 490
550 NC=0
560 INPUT #1, W$
570 NC=NC+1
580 IF NC>10 THEN 1810
590 CT$(NC)=LEFT$(W$,40)
600 IF W$="END COLUMN TITLES" THEN NC=NC-1:GOTO 620
610 GOTO 560
620 NR=0
630 INPUT #1, W$
640 NR=NR+1
650 IF NR>50 THEN 1820
660 RT$(NR)=LEFT$(W$,20)
670 IF W$="END ROW TITLES" THEN NR=NR-1:GOTO 690
680 GOTO 630
690 DIM PS(NR,8),PS$(NR,4)
700 W=1
710     FOR I=1 TO NR
720         INPUT #1, W$
730         IF W$="FREQ" THEN W1=1
740         IF W$="ROW %" THEN W1=2
750         IF W$="COL %" THEN W1=3
760         IF W$="NO PRINT" THEN W1=4
770         IF W$="NO DATA" THEN W1=5
780         IF W$="END" THEN PS(I,0)=W-1:PS$(I,W)=W$:W=1:GOTO 830
790         PS(I,W)=W1:PS$(I,W)=W$
800         W=W+1
810         IF W>4 THEN 1830
820         GOTO 720
830     NEXT
840 INPUT #1, W$
850 IF W$<>"END PRINT SPECS" THEN 1840
860 INPUT #1, NQ
870 INPUT #1, NE
880 INPUT #1, CB
890 IF CB<1 OR CB>NR THEN 1870
900 INPUT #1, RB
910 IF RB<1 OR RB>NC THEN 1880
920 DIM Q(NE+1), TB(NR,NC)
930 CLOSE:GOTO 130
940 REM ********** READ DATA FILE **********************
950 IF NQ=0 THEN PRINT "Must have Table File first!":PRINT: INPUT "  Press ENTER
 to continue.";X$:GOTO 130
960 CLS:INPUT "Enter name of Data File to read:";F1$
970 OPEN "I",1,F1$
980 PRINT:PRINT
990 PRINT "PROCESSING QUESTIONNAIRE NO."
1000  FOR I=1 TO NQ
1010           PRINT @ 540,I
1020             FOR J=1 TO NE+1
1030                 INPUT #1,Q(J)
1040             NEXT J
1050           IF Q(NE+1)<>-1 THEN 1860
1060       GOSUB 1960       'DO COLUMN SPECIFICATION CHECKS
1070  NEXT I
1080 CLOSE:GOTO 130
1090 REM ********** PRINT TABLE **************************
1100 IF Q(1) =0 THEN PRINT "NO DATA AVAILABLE!": PRINT:INPUT "Press ENTER to con
tinue.";X$:GOTO 130
1110 INPUT "PRESS ENTER TO PRINT TABLE.";A$
1120 FOR I=1 TO 10:LPRINT " ":NEXT   'SPACE DOWN 10 LINES
1130 IF NT=0 THEN 1170    'IF NO TITLES GOTO 1450
1140        FOR I=1 TO NT
1150           LPRINT TT$(I)        'PRINT TITLES
1160        NEXT
1170 LPRINT " ":LPRINT " ":LPRINT " "    'SKIP DOWN 3 LINES
1180 REM ********** STACK COLUMN TITLES ******************
1190 IF NC<=8 THEN ST=10 ELSE ST=8
1200    FOR I=1 TO NC
1210      AF=0
1220    IF LEN(CT$(I))>40 THEN CT$(I)=LEFT$(CT$(I),40)
1230    IF LEN(CT$(I))/ST - INT(LEN(CT$(I))/ST)=0 THEN 1260
1240    AF=ST*(1-(LEN(CT$(I))/ST-INT(LEN(CT$(I))/ST)))
1250    AF=INT(AF+.5)
1260    CT$(I)=CT$(I)+STRING$(AF," ")
1270    BF=40-LEN(CT$(I))
1280    CT$(I)=STRING$(BF," ") + CT$(I)
1290     NEXT
```

Listing continued

Listing continued

```
1300 REM ********** PRINT STACKED TITLES *****************
1310     FOR I=40 TO 1 STEP -ST
1320        LPRINT TAB(20);
1330        FOR J=1 TO NC
1340          LPRINT STRING$(3," ");MID$(CT$(J),41-I,ST);
1350        NEXT
1360        LPRINT"" "
1370     NEXT
1380     LPRINT TAB(20);
1390 REM *********** UNDERLINE COLUMN TITLES *************
1400     FOR I=1 TO NC
1410        LPRINT "    ";STRING$(ST,"-");
1420     NEXT I
1430     LPRINT " ":LPRINT " "    'SPACE DOWN 2 LINES
1440 REM ********** PRINT ROW TITLES AND DATA *************
1450     FOR I=1 TO NR
1460       IF PS(I,1)=4 THEN 1580    'NO PRINT OPTION
1470       LPRINT RT$(I);      'PRINT ROW TITLE
1480 IF PS(I,1)=5 THEN LPRINT " ":GOTO 1570 'NO DATA OPTION
1490     FOR J=1 TO PS(I,0)     'NO. OF DATA TYPES TO PRINT
1500       FOR K=1 TO NC
1510 TB=23+13*(K-1)+ST-LEN(FF$)   'CALCULATE TAB POSITION
1520    LPRINT TAB(TB);        'TAB OVER
1530               ON PS(I,J) GOSUB 1700 ,1720 ,1740
1540       NEXT
1550       LPRINT " "
1560       NEXT
1570       LPRINT " "
1580     NEXT
1590 REM ********** MENU AFTER TABLE PRINTED **************
1600     CLS
1610     PRINT:PRINT:PRINT "OPTIONS:":PRINT
1620     PRINT TAB(5) "1) PRINT TABLE AGAIN"
1630     PRINT TAB(5) "2) RETURN TO MENU"
1640     PRINT TAB(5) "3) END PROGRAM"
1650     PRINT:INPUT "YOUR CHOICE";A
1660     IF A<1 OR A>3 THEN 1600
1670     ON A GOTO 1100 ,130  ,1680
1680    A=17:GOTO 410
1690 REM ********** DATA TYPES TO PRINT ******************
1700     LPRINT USING FF$;TB(I,K);          'FREQUENCY
1710     RETURN
1720     IF TB(I,RB)=0 THEN LPRINT USING PF$;0; ELSE LPRINT USING PF$;TB(I,K)/TB
(I,RB)*100;     'ROW %
1730     RETURN
1740     IF TB(CB,K)=0 THEN LPRINT USING PF$;0; ELSE LPRINT USING PF$;TB(I,K)/TB
(CB,K)*100;    'COL %
1750     RETURN
1760 REM ********** TALLY TABLE FREQUENCIES ***************
1770    TB(RW,COL)=TB(RW,COL)+1      'TOTAL CELL FREQUENCY
1780    RETURN
1790 REM ********** ERROR MESSAGES ************************
1800     PRINT "NO 'END' STATEMENT OR TOO MANY TITLES.  MAX = 20.":GOTO 1890
1810     PRINT "NO 'END' STATEMENT OR TOO MANY COLUMNS.  MAX = 10.":GOTO 1890
1820     PRINT "NO 'END' STATEMENT OR TOO MANY ROWS.  MAX = 50.":GOTO 1890
1830     PRINT "TOO MANY PRINT SPECS. FOR ROW";I:GOTO 1890
1840     PRINT "ERROR IN ROW PRINT SPECS":GOTO 1890
1850     PRINT "ERROR IN QUESTIONNAIRE DATA":RESUME 1890
1860     PRINT "ERROR IN RECORD NO.";I:GOTO 1890
1870     PRINT "INVALID ROW NO.":GOTO 1890
1880     PRINT "INVALID COLUMN NO."
1890     LPRINT CHR$(7):STOP    'SOUND BUZZER THEN STOP
1900 REM ********** USER SPECIFIES THE KIND OF TABLE HE
1910 REM          WANTS IN THE NEXT SECTION. ***************
1920 REM
1930 REM        PUT SPECIFICATIONS FOR TABLE COLUMNS HERE
1940 REM                    10 COLUMNS MAXIMUM
1950 REM ************************************************
1960 COL=1:IF Q(3)=1 THEN GOSUB 2110  'COL. 1 SPEC -- FEMALE
1970 COL=2:IF Q(3)=2 THEN GOSUB 2110  'COL. 2 SPEC -- MALE
1980 COL=3:GOSUB 2110  'COL. 3 SPEC -- TOTAL RESPONSES
1990 REM     ROOM FOR COL 4 SPEC
2000 REM     ROOM FOR COL 5 SPEC
2010 REM     ROOM FOR COL 6 SPEC
2020 REM     ROOM FOR COL 7 SPEC
2030 REM     ROOM FOR COL 8 SPEC
2040 REM     ROOM FOR COL 9 SPEC
2050 REM     ROOM FOR COL 10 SPEC
2060 RETURN
2070 REM ************************************************
2080 REM        PUT SPECIFICATIONS FOR TABLE ROWS HERE
2090 REM                    50 ROWS MAXIMUM
2100 REM ************************************************
2110 RW=1:IF Q(1)=1 THEN GOSUB 1770  'ROW 1 SPEC -- SMITH
2120 RW=2:IF Q(1)=2 THEN GOSUB 1770  'ROW 2 SPEC -- JONES
2130 RW=3:IF Q(1)>0 AND Q(1)<3 THEN GOSUB 1770  'ROW 3 SPEC -- TOTAL RESPONSES
2140 REM     ROW 4 SPEC
2150 REM     ROW 5 SPEC
2160 REM     ROW 6 SPEC
2170 REM     ROW 7 SPEC
2180 REM     ROW 8 SPEC
2190 REM     ROW 9 SPEC
2200 REM     ROW 10 SPEC
2210 REM     CONTINUE FOR UP TO 50 ROWS
2220 RETURN
2230 REM ********** SET UP NEW TABLE FILE ***************
2240 CLS:PRINT "Setting Up New Table File" :PRINT: PRINT
2250 INPUT "Enter Name of new file:";F$
2260 PRINT:PRINT:NT=0
```

Listing continued

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The program will prompt you for a table file name and then request table titles. You can enter as many as 20 titles, each up to 110 characters in length. When you have finished, type in END and press the enter key.

The program now prompts you for column titles. You can enter column titles up to 40 characters in length. The program, however, assumes a 10-character column width and will break or wrap around the column title after every 10th character. This may lead to some strange-looking word breaks, which you can prevent by inserting characters in the titles. For example, to make the Total Responses column title break correctly in Fig. 4, type in:

```
Total     Responses
```

The program will break the line after the 10th space, before the word Responses. If you did not insert the spaces, the program would break the title like this:

```
Total Resp
onses
```

On a 132-column printer, you can create tables with up to 10 columns. Use fewer columns if your printer does not have a 132-column width.

When you have finished creating column titles, type in END and press the enter key. The program will prompt you for row titles. MicroTab allows you to create 50 rows with titles 20 characters long.

For each row, you must enter at least one of the five print specifications listed in Fig. 3. Be sure to enter the specifications accurately in uppercase letters. Each row may have as many as three different print specifications, as long as they don't conflict. For example, you could choose the specs FREQ, COL %, and ROW %, which would print the tally, column percentage, and row percentage in that order. After you have typed in the print specs for each row, type END to indicate the end of the row. Press the enter key when you have finished.

The program will next ask for the number of questionnaires you want to tabulate, the number of questions on each questionnaire, the number of the row you want to use as a base for column percentages, and the row you want to use as a base for row percentages. Enter these last two numbers even if you do not plan to use column or row percentages. Press the enter key when you have finished.

The program now returns you to the menu. The next step in creating a table is to enter the data you want tabulated. To create a new data file, select option 5. If you want to add data to an already existing file, select option 6. You may also read an already existing file by choosing option 3. After you make your selection, the program will prompt you for the name of the file you want to create, add to, or read.

If you are creating a new data file, you may begin entering data once you have

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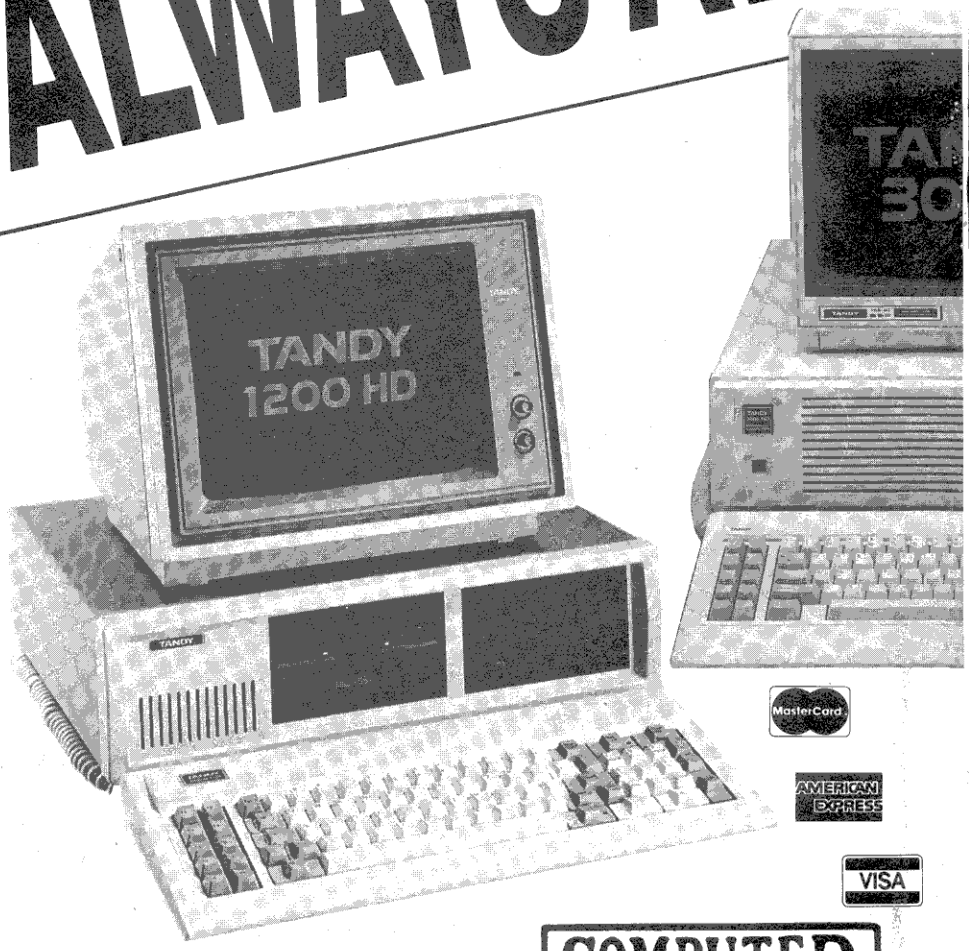

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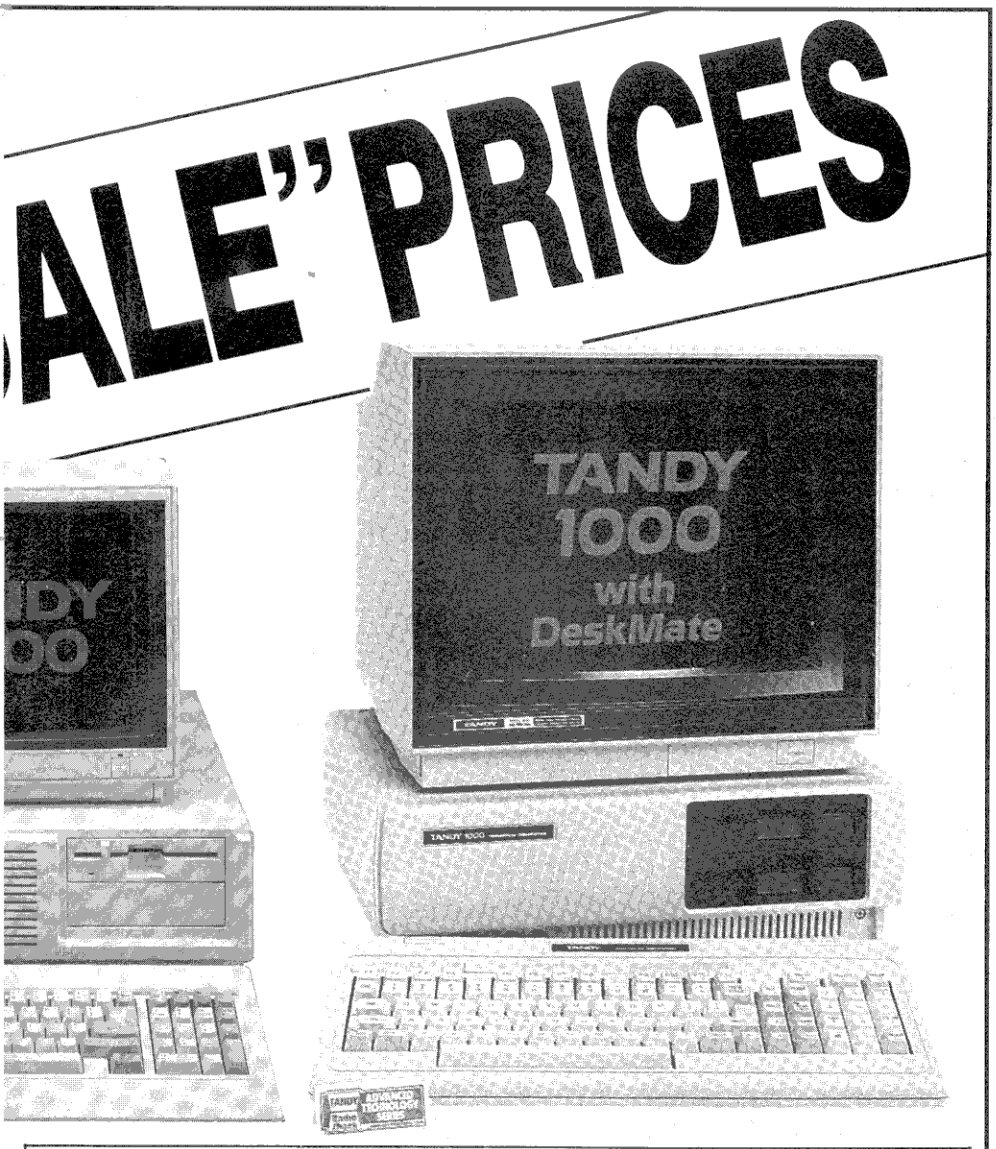

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typed in a file name. If you are reading or adding to an existing file, the program searches the file and prints the number of the questionnaire. You will then be prompted to enter the questionnaire data.

Enter data in integers from −32786 to 32767. You cannot, however, use −1, as the program uses this integer as an end-of-questionnaire marker. The range of integers you may choose from means that any question on the questionnaire may have 65,000 possible answers. While no one would require this many, the figure illustrates the program's flexibility.

Enter a number for each question, reserving one number—zero, for instance—to indicate a blank. If you are adding data to a file, enter the number of new questionnaires; the program automatically changes the number in the table file. It then reads the old data file, writes it to the new one, and requests you to enter the new data for the number of questionnaires you indicated previously. When you have finished with the data entry, type END and press the enter key. The program then returns you to the menu.

Even if you have just entered the data, you must read the data file (option 3) before you can print the table (option 1). The program tabulates the percentages during printing. Array PS(n,n) keeps a code for each type of data that is to be printed for each row (FREQ, COL %, and so on). MicroTab processes the code in line 1490 to see how many different items it needs to print and again in line 1530 to determine which one to print at the moment. The actual printing is called from that line.

When you have finished printing the table, select option 17 to terminate the program. If you have edited the column specs or row specs (options 7 and 8), save the edited program at this point by typing in SAVE "<file name>". Also, if you made any changes to the table file using the edit options (9–16), the program asks if you want to save the new version at this time. If you type Y for yes (be sure to use uppercase), the program asks if you want to create a new file name. Type in Y again and enter the new name. If you type in a letter other than Y, the program automatically saves the file under the existing file name.

Model 4/1000 Modifications

Owners of the Model 4 should change line 140 to read:

```
140 PRINT TAB(30) "MICROTAB"
```

In lines 150 and 180–260, TAB(5) should be changed to TAB(12). On the Model 1000, line 1010 should read as follows:

```
1010 LOCATE 10,20:PRINT I
```

Figure 4 gives an example of how a finished table might look. Market researchers who require more sophisticated analyses can add modules to calculate means, standard deviations, and standard errors. ■

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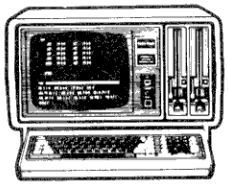

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```
2270 PRINT " TABLE TITLES":PRINT
2280 PRINT:PRINT "Enter TABLE TITLE.  Enter END to end ":PRINT:PRINT
2290 NT=NT+1:INPUT TT$(NT):IF TT$(NT)="END" THEN TT$(NT)="END TABLE TITLES":NT=N
T-1:GOTO 2300  ELSE GOTO 2290
2300 PRINT:PRINT:NC=0
2310 PRINT " COLUMN TITLES":PRINT
2320 PRINT:PRINT "Enter COLUMN TITLE.  Enter END to end ":PRINT:PRINT
2330 NC=NC+1:INPUT CT$(NC):IF CT$(NC)="END" THEN CT$(NC)="END COLUMN TITLES":NC=
NC-1:GOTO 2340  ELSE GOTO 2330
2340 PRINT:PRINT:NR=0
2350 PRINT " ROW TITLES":PRINT
2360 PRINT:PRINT "Enter ROW TITLE.  Enter END to end ":PRINT:PRINT
2370 NR=NR+1:INPUT RT$(NR):IF RT$(NR)="END" THEN RT$(NR)="END ROW TITLES":NR=NR-
1:GOTO 2380  ELSE GOTO 2370
2380 PRINT:PRINT
2390 PRINT " PRINT SPECS":PRINT
2400 PRINT:PRINT "Enter ROW PRINT SPECS -- Up to three per row.":PRINT "  Enter
END to end each row.":PRINT:PRINT
2410 FOR K=1 TO NR:PRINT "Row ";K
2420 FOR J=1 TO 4: INPUT PS$(K,J):IF PS$(K,J)="END" THEN 2430  ELSE NEXT J
2430 NEXT K
2440 CLS: INPUT "Number of Questionnaires";NQ
2450 PRINT:INPUT "Number of Questions";NE
2460 PRINT :INPUT "Row to use for calculating column percentages";CB
2470 PRINT :INPUT "Column to use for calculating row percentages";RB
2480 CLS:PRINT "Writing Table Set Up File  - ";F1$
2490 OPEN "O",1,F$
2500 FOR K=1 TO NT+1:PRINT #1, TT$(K):NEXT K
2510 FOR K=1 TO NC+1:PRINT #1, CT$(K):NEXT K
2520 FOR K=1 TO NR+1:PRINT #1, RT$(K):NEXT K
2530 FOR K=1 TO NR: FOR J=1 TO 4: PRINT #1, PS$(K,J):IF PS$(K,J)="END" THEN 2540
  ELSE NEXT J
2540 NEXT K:PRINT #1, "END PRINT SPECS"
2550 PRINT #1, NQ;",";NE;",";CB;",";RB
2560 CLOSE: IF A=17 THEN END ELSE GOTO 130
2570 REM ******** WRITE NEW DATA FILE ******************
2580 CLS: INPUT "Enter name of new Data File:";ND$
2590 IF NQ=0 THEN CLS: PRINT "Needs Table File Data"
2600 IF NQ=0 THEN PRINT:PRINT:PRINT:PRINT "Press enter to continue":INPUT H:GOTO
 130
2610 OPEN "O",1, ND$:L=1
2620 CLS: PRINT "Enter questionnaire data":PRINT
2630 FOR K=L TO NQ:PRINT "Questionnaire #";K:FOR J=1 TO NE
2640 PRINT "Data for question ";J;"  ";:INPUT D1:PRINT #1,D1
2650 NEXT J:PRINT #1,"-1":NEXT K
2660 CLOSE:GOTO 130
2670 REM ********** ADD TO DATA FILE *********************
2680 PRINT:PRINT:INPUT "How many questionnaires are you going to enter:";Q2:L=NQ
+1:NQ=NQ+Q2
2690 INPUT "Enter name of old data file: ";F2$
2700 INPUT "Enter name of new data file: ";F3$
2710 OPEN "I",2,F2$:OPEN "O",1, F3$
2720 IF EOF(2) THEN CLOSE 2: GOTO 2620
2730 INPUT #2,A$:PRINT #1,A$:GOTO 2720
2740 REM ********** EDIT TABLE TITLES ********************
2750 CLS:   PRINT "TABLE TITLES":PRINT
2760 FOR K=1 TO NT: PRINT K;"   ";TT$(K):NEXT K
2770 INPUT "Enter number of title to change: ";X1
2780 INPUT "Enter new title: ";TT$(X1)
2790 PRINT:INPUT "Change another title";YN$
2800 IF YN$="Y" THEN 2750
2810  GOTO 130
2820 REM ********** EDIT COLUMN TITLES *******************
2830 CLS:   PRINT "COLUMN TITLES":PRINT
2840   FOR K=1 TO NC:PRINT K;"   ";CT$(K):NEXT K
2850  INPUT "Enter number of column title to change: ";X1
2860  INPUT "Enter new column title : ";CT$(X1)
2870  PRINT:INPUT "Change another column title ";YN$
2880  IF YN$="Y" THEN 2830
2890   GOTO 130
2900 REM ********** EDIT ROW TITLES **********************
2910 CLS:   PRINT "ROW TITLES":PRINT
2920   FOR K=1 TO NR:PRINT K;"   ";RT$(K):NEXT K
2930  INPUT "Enter number of row title to change: ";X1
2940  INPUT "Enter new row title : ";RT$(X1)
2950  PRINT:INPUT "Change another row title ";YN$
2960  IF YN$="Y" THEN 2910
2970   GOTO 130
2980 REM ********** EDIT ROW PRINT SPECS *****************
2990 CLS:   PRINT "PRINT SPECS":PRINT
3000  FOR K=1 TO NR:PRINT "Row";K:FOR J=1 TO 4:PRINT J;"   ";PS$(K,J):NEXT J
3010 PRINT:INPUT "Do you want to change this print spec: ";YN$
3020 IF YN$="Y" OR YN$="y" THEN 3030  ELSE 3110
3030 FOR J=1 TO 3:PRINT "Enter new print specs :";J;"  ";:INPUT PS$(K,J)
3040 IF PS$(K,J)="EREQ" THEN PS(K,J)=1
3050 IF PS$(K,J)="ROW %" THEN PS(K,J)=2
3060 IF PS$(K,J)="COL %" THEN PS(K,J)=3
3070 IF PS$(K,J)="NO PRINT" THEN PS(K,K)=4
3080 IF PS$(K,J)="NO DATA" THEN PS(K,J)=5
3090 IF PS$(K,J)="END" THEN PS(K,0)=J-1:GOTO 3110
3100 NEXT J:PS$(K,4)="END":PS(K,0)=3
3110 PRINT:INPUT "Quit change print spec ";YQ$
3120 IF YQ$="Y" THEN GOTO 130
3130 NEXT K
3140 GOTO 130
```

End

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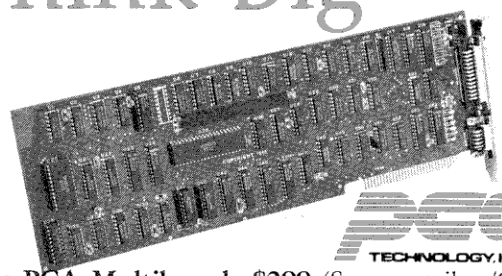

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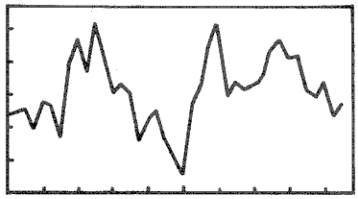

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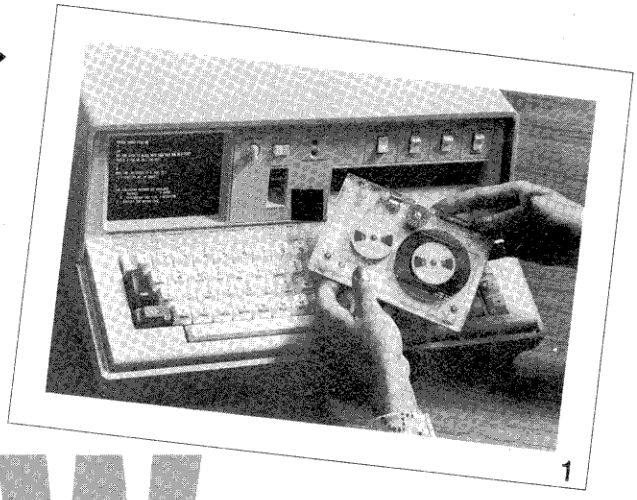
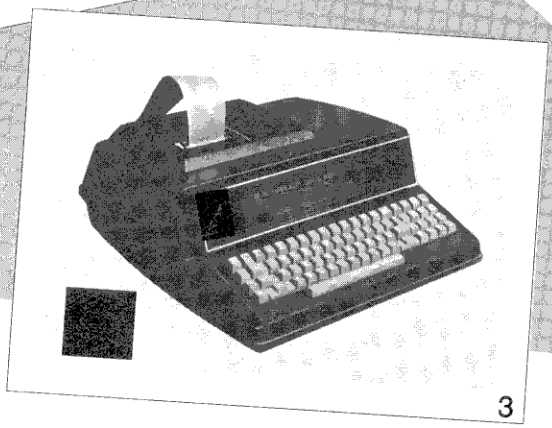


1

2



3

While taking our annual inventory recently, we discovered that we had a surplus of Model I's gathering dust in the barn. This seemed like a terrible waste, and we thought long and hard over what to do with them. Then we got the idea for a Name That Computer contest, in which readers would have to identify 10 obsolete microcomputer systems from photographs. What could be a more appropriate prize than one of the grand-daddies of modern microcomputing, the Model I?

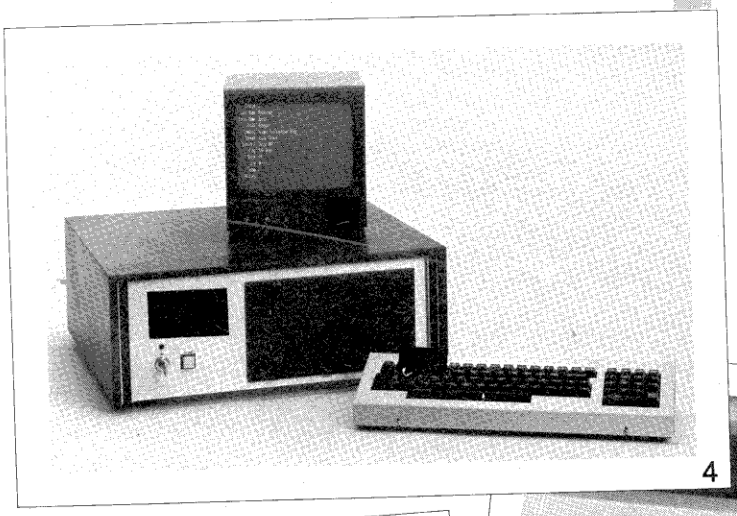
To be eligible, all you have to do is tell us what these 10 microcomputers are. Some were very popular in their time while others came and went with barely a ripple. Most were manufactured before 1980. We have, of course, blanked out name plates and other identifying marks. When you're done, see whether you can identify the person (what you can see of him) in Photo 9.

Send your entry by April 15. First prize will go to the reader who identifies all 10 computers correctly. If we get more than one perfect entry, the entrant who names the person in Photo 9 will be the winner. If there's still a tie, we'll toss the entries into a hat and pick one out.

Anyone with a perfect score who doesn't win the grand prize will get a consolation prize: an "I Break for *80 Micro*" bumper sticker.

By the way, the Model I comes with Expansion Interface, two disk drives, and monitor. This computer is well-used, but we guarantee that it works.

Send your entry to Name That Computer, *80 Micro*, 80 Pine St., Peterborough, NH 03458.



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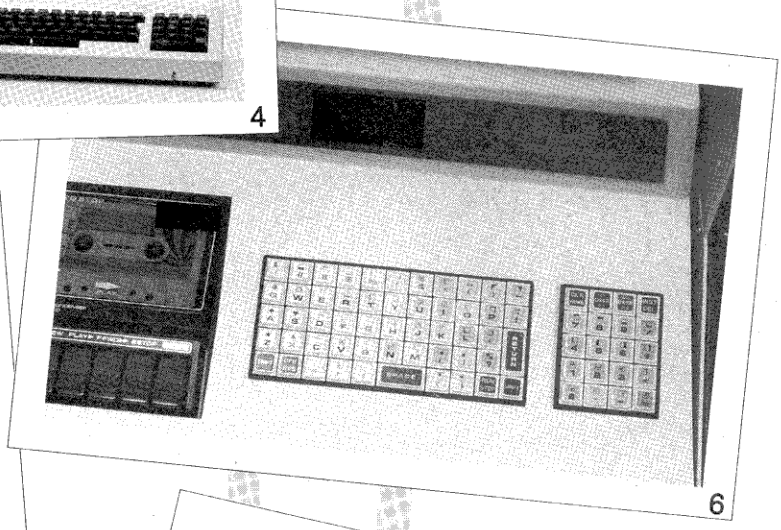

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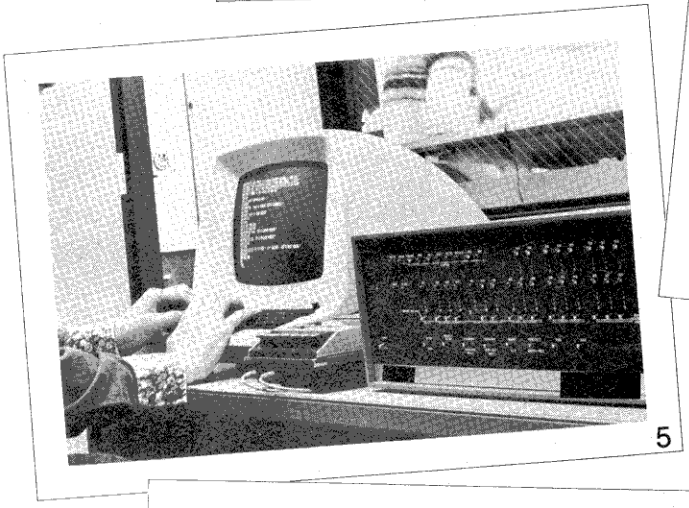

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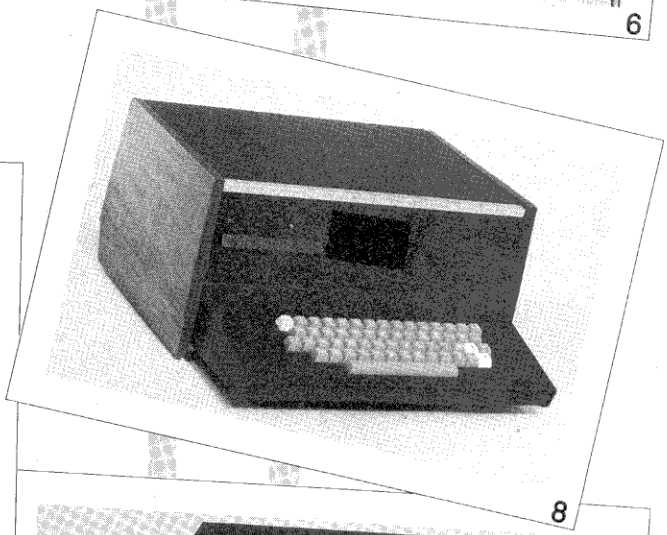

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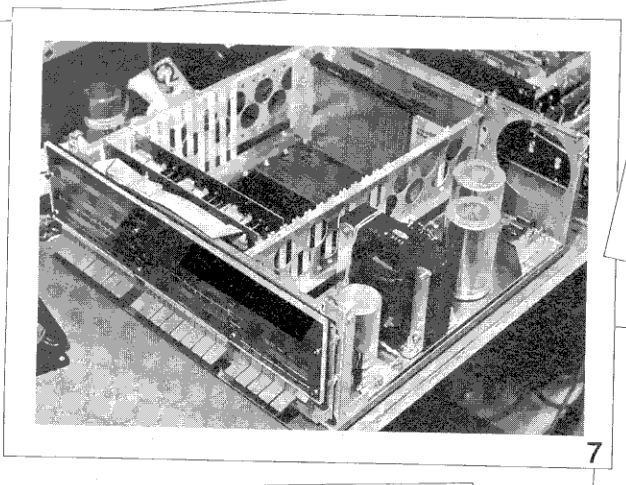

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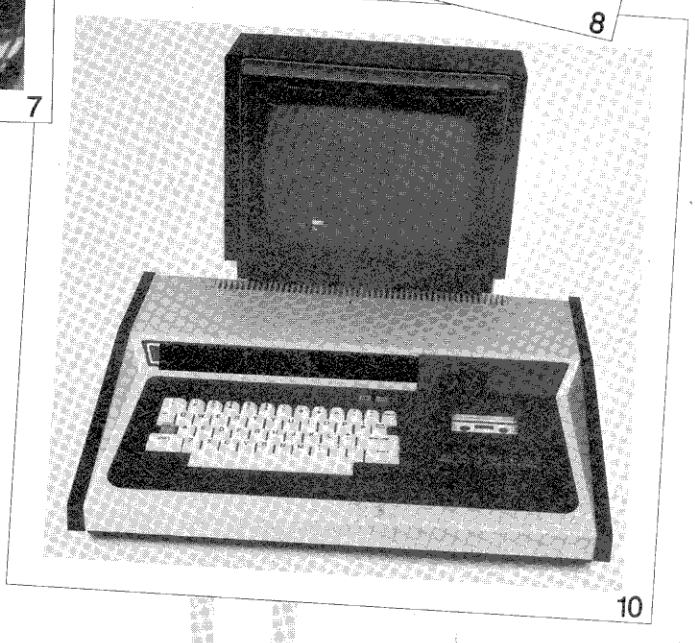

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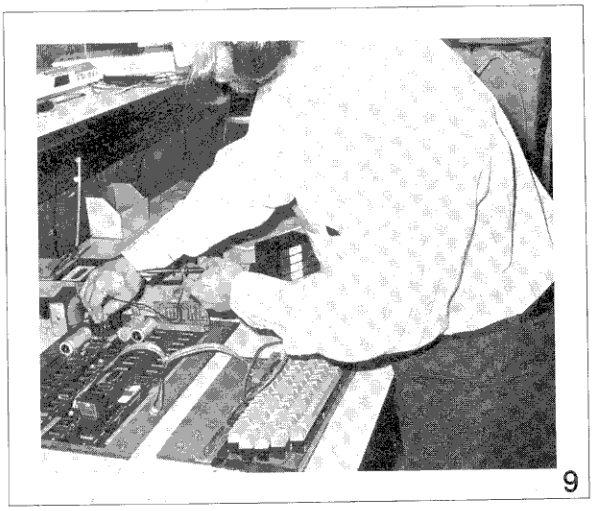

9

Add dash and speed to your Model 4 Basic graphics programs.

A Quick Draw

by John D. Wolfskill

The Model 4 has its virtues, but graphics power isn't one of them. Its Basic lacks the built-in drawing commands that make graphics programming on other machines, like the Model 1000 or 2000, so convenient. My machine-language subroutine, Drawstring, adds graphics commands to Disk Basic and gives you pixel-level control of the Model 4's display.

While you can't use Drawstring to create perfect circles in 16 blazing colors, you can draw or erase in eight directions, jump over pixels, and build animated sequences. The subroutine is extremely fast. You use string variables to pass drawing commands to the subroutine; a single string can send up to 254 sequential commands without returning to Basic.

Preliminaries

Drawstring must be installed in memory before your Basic programs can call it. To create a Draw/CMD file, go into Basic and run Program Listing 1. Then exit to TRSDOS and type in:

```
DUMP DRAW/CMD (START = X'FE9A,END =
X'FFFF,TRA = X'FE9A)
```

Thereafter, you can install Drawstring by typing in DRAW from TRSDOS Ready.

If you have filters or modules that normally reside in high memory, use the TRSDOS Memory command to set the system HIGH$ marker below FE9A hexadecimal. If you find you're getting "Illegal function call" error messages, try using a clean copy of TRSDOS 6.x.

With the subroutine installed, you can run Program Listings 2 and 3 for a demonstration of some of Drawstring's capabilities. Listing 2 shows how rapidly the program draws and erases patterns and inverts video from white-on-black to black-on-white (see Photo 1). Listing 3 displays a blinking diamond character that you can move around the screen without destroying the image underneath (see Photo 2).

Writer's Workshop

Drawstring is a programmer's tool. Once you understand how the commands work, you can begin to experiment with the subroutine in your own Basic programs.

You must include the statements:

```
CLEAR,65177!:DEFINT X,Y:DRAW = &HFE9A
```

in the first line of any program that will call the subroutine (see lines 30 and 50 of Listings 2 and 3, respectively). Note that variables must be defined as integers.

First, select a screen starting point. Set the variables X and Y equal to the row (zero to 71) and column (zero to 159) pixel coordinates of the location you want. For example:

```
X = 0:Y = 0
```

tells the subroutine to start drawing at the upper-left corner of the screen.

Define a string variable that will pass a sequence of commands to the subroutine. Table 1 lists the commands that Drawstring recognizes. Letter commands control the direction of drawing; follow them with a number from 1–255 to specify the distance in pixels. For example:

```
X = 0:Y = 0:BORDER$ = "D71R159U71L159$"
```

tells Drawstring to draw a border around the edge of the display, starting in the upper-left corner and moving counterclockwise: down 71 pixels, right 159, up 71, left 159.

The B command moves the pixel pointer without drawing. The * command complements (inverts) pixels while drawing, making black pixels white and vice versa. Use % to toggle between the complement and draw options within a single command sequence.

Make sure that you enter alphanumeric string commands as uppercase characters. If you issue a direction command without a number, the pixel pointer will move just one step in the direction you indicate.

The dollar sign ($) must be the last character in each string, since Drawstring uses it as an end-of-string delimiter. This helps the subroutine keep track of the data in case the computer shuffles it to high memory for processing.

Now, place a call to the subroutine, listing the appropriate variables as parameters. For the sample screen border above, the statement would look like this:

```
CALL DRAW (X,Y,BORDER$)
```

The subroutine picks up the current value of the variables from Basic and feeds the information in the strings to the pixel processor. The program returns control to Basic when it encounters the dollar sign ($) at the end of your command sequence.

Direction Commands

Direction	Command
Up	U
Down	D
Left	L
Right	R
Up and Left	E
Up and Right	F
Down and Left	G
Down and Right	H

String Control Commands

Action	Command
Move Pixel Pointer	B
Draw and Set	%
Draw and Complement	*
End of Data	$

Table 1. Drawstring commands.

A Few Tips

Since Drawstring disregards any character not listed in Table 1, stray letters or numbers won't crash your program. They might, however, produce unexpected results. For instance:

```
FILL$ = FOUR SCORE AND SEVEN YEARS
AGO$"
```

will develop its own unique graphics signature.

Drawstring doesn't check your number entries to make sure they stay within the allowed range, because TRSDOS provides its own error check by refusing to read or write to any bytes outside video memory. The subroutine accepts integer pixel values from 1–255. Try experimenting with numbers outside the normal coordinate range. You can create some interesting graphics by using numbers that are large enough to make the processor wrap around and continue drawing at the opposite end of the screen.

You can load and save data strings as disk files in the normal manner, and you can manipulate the data using any of Basic's string-handling functions. For example, run this economical two-liner that uses the INKEY$ function:

```
5 DRAW = &HFE9A:X = 0:Y = 0
10 X$ = INKEY$:X$ = X$ + "$":CALL DRAW
   (X,Y,X$):GOTO 10
```

It lets you draw in any of eight directions by pressing the letter keys listed in Table 1.

The easiest way to draw complex figures is to construct a paper graph in row/column block form. Divide each video byte into six individual pixel cells. Remember to size the cells using the proper ratio; each horizontal pair of pixels within a byte is a different vertical size.

When your graph picture is complete, translate the image into string commands. The pixel-counting algorithm is pretty

Program Control Options

Action	POKE Value
Draw	&HFFF9,0
Complement	&HFFF9,1

Table 2. POKE address and values for controlling the draw/complement toggle.

LOAD 80

System Requirements

Model 4
TRSDOS 6.x
Basic

straightforward. Examine Listing 2 and you should quickly catch on to the logical pixel-counting progression.

Moving Pictures

One of Drawstring's powerful features is its ability to move objects around the display without destroying the background. You can draw (%) a pattern on the screen, then redraw the string starting at the same location, this time using a leading complement sign (*) to erase it. You can also turn complementing on and off from within your Basic program so you don't have to define the string twice. Table 2 provides the POKE address and values for controlling the draw/complement toggle.

The complement option inverts pixels as it proceeds across the display. When it encounters a set bit (on), it resets the bit (off) and vice versa. Combining this action with directional movement lets an object travel across the screen without altering the background. Listing 3 demonstrates this technique.

When you design animated screens that use the same data to draw and erase an object, keep in mind that you cannot backtrack over a pixel that has been set. Retracing your steps will turn off the pixel that you might have just turned on. If you get cornered while plotting a figure, it's a simple matter to jump over a set pixel using the B command.

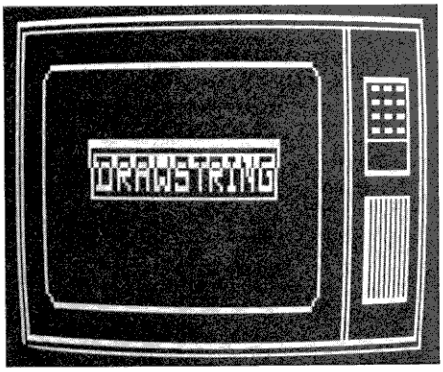

Photo 1. Program Listing 2 demonstrates drawing, erasing, and inverting patterns.

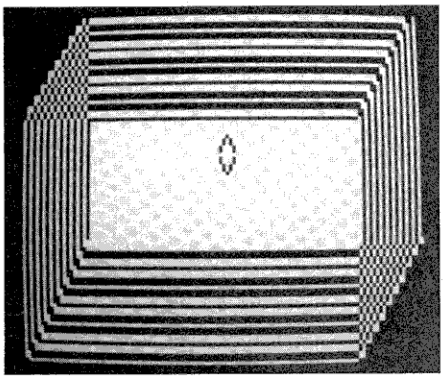

Photo 2. Program Listing 3 demonstrates animation; the diamond-shaped character can move across the screen without destroying the figure underneath.

End Notes

I expanded the string data in Listing 2 to make it easier for you to understand how Drawstring works. You can increase the program's drawing speed by omitting the spaces and compressing the arrays into longer strings.

I've barely scratched the surface of Drawstring's capabilities. The best way to discover what it can do is by experimentation. In fact, you might consider using it to develop a full package of graphics commands for the Model 4. ■

John D. Wolfskill welcomes comments and suggestions. Send correspondence to 201 Puritan Drive, Middletown, RI 02840. Enclose a stamped, self-addressed envelope for a reply.

Program Listing 1. Drawstring.

```
20 REM ******************************************
30 REM *                                        *
40 REM *              DRAWSTRING                *
50 REM *                                        *
60 REM *                 BY                     *
70 REM *                                        *
80 REM *           JOHN  D. WOLFSKILL           *
90 REM *           201 PURITAN  DRIVE           *
100 REM*           MIDDLETOWN,RI 02840          *
110 REM*                                        *
120 REM******************************************
130 CLEAR, 65177!:PRINT CHR$(15);
140 CLS:PRINT@240,"Verifying DRAWSTRING Data   ":PRINT
150 L=250
160 FOR J=1 TO 36:B=0:L=L+10
170 FOR K=1 TO 10:READ A:B=B+A:NEXT K
180 READ C
190 IF B=C THEN 200 ELSE PRINT "Error in Line ";L:END
200 NEXT J:RESTORE
210 PRINT "Data Correct --  Loading DRAWSTRING......";
220 FOR J=&HFE9A TO &HFFFF
230 X=X+1:IF X=11 THEN READ Q:X=1
240 READ AD:POKE J,AD:NEXT J
250 PRINT@480,"Successful Load..";:PRINT CHR$(14);:END
260 DATA 253,229,221,229,229,221,225,213,253,225,2298
270 DATA 3,10,95,3,10,87,27,6,5,33,279
280 DATA 250,255,54,0,35,16,251,62,255,50,1228
290 DATA 255,255,19,26,33,223,255,6,12,190,1274
300 DATA 40,50,35,35,16,249,214,48,250,186,1123
310 DATA 254,254,10,242,186,254,213,245,58,251,1967
320 DATA 255,183,32,11,60,50,251,255,241,50,1388
330 DATA 252,255,209,24,213,58,252,255,79,62,1659
340 DATA 90,30,10,239,193,128,50,252,255,209,1456
350 DATA 24,196,254,67,250,12,255,58,253,255,1624
360 DATA 183,32,22,60,50,253,255,35,126,50,1066
370 DATA 254,255,24,174,58,253,255,183,32,5,1493
380 DATA 35,110,38,255,233,27,58,252,255,183,1446
390 DATA 32,4,60,50,252,255,213,205,171,255,1497
400 DATA 58,250,255,183,204,64,255,58,252,255,1834
410 DATA 183,32,240,50,251,255,50,253,255,50,1619
420 DATA 250,255,209,195,186,254,62,93,221,94,1819
430 DATA 0,14,2,239,213,245,62,93,253,94,1215
440 DATA 0,14,3,239,103,241,111,34,247,255,1247
450 DATA 123,135,209,131,95,46,1,175,187,40,1142
460 DATA 5,29,203,37,24,248,229,62,15,6,858
470 DATA 1,42,247,255,239,203,127,40,25,225,1404
480 DATA 245,58,249,255,254,0,40,4,241,173,1519
490 DATA 24,2,241,181,79,62,15,6,2,42,654
500 DATA 247,255,239,201,175,203,255,24,226,62,1887
510 DATA 1,50,250,255,195,186,254,221,225,253,1890
520 DATA 225,201,175,24,2,62,1,50,249,255,1244
530 DATA 195,186,254,33,252,255,53,42,254,255,1779
540 DATA 233,221,53,0,201,221,52,0,201,253,1435
550 DATA 53,0,201,253,52,0,201,221,53,0,1034
560 DATA 253,53,0,201,221,52,0,253,53,0,1086
570 DATA 201,221,52,0,253,52,0,201,221,53,1254
580 DATA 0,253,52,0,201,76,179,82,183,85,1111
590 DATA 187,68,191,69,195,70,202,71,209,72,1334
600 DATA 216,66,147,36,155,37,160,42,163,0,1022
610 DATA 0,0,0,0,0,0,0,0,0,0,0
```

End

Program Listing 2. Drawing demonstration.

```
20 REM ******* DRAW DEMONSTRATION *************
30 CLEAR,65177!:DEFINT X,Y:DRAW=&HFE9A:X=0:Y=0
40 CLS:PRINT CHR$(15);
50 REM  ........................................
60 REM  . DRAWING DATA (SPACES MAY BE OMITTED) .
70 REM  . UPPERCASE LETTERS ONLY                .
```

Listing 2 continued

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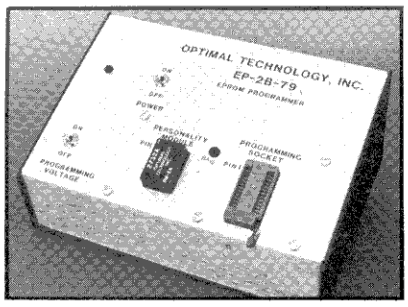

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Listing 2 continued

```
80 REM  . STRING LENGTH 1-255 CHARACTERS       .
90 REM  ........................................
100 MESSAGE$(0)="R2 U5 E R5 D6 L3 BR5 $"
110 MESSAGE$(1)="R U6 R4 D3 L3 G3 BR2 $"
120 MESSAGE$(2)="R U6 R4 D2 BL3 D R3 D3 BR2 $"
130 MESSAGE$(3)="R U6 BR BD5 D F U R D G R U6 BR2 BD6 $"
140 MESSAGE$(4)="BU R D R4 U3 L4 U3 R4 D BR3 $"
150 MESSAGE$(5)="U R4 BD BL L D5 BR3 $"
160 MESSAGE$(6)="R U6 R4 D3 L3 G3 BR2 $"
170 MESSAGE$(7)="R2 U6 L BU BR2 D BD5 D BR2 $"
180 MESSAGE$(8)="R U6 G2 D G BU4 R D6 BR2 $"
190 MESSAGE$(9)="R U6 R4 BD2 BL D R D3 L3 BR5 $"
200 MESSAGE$(10)="U8 L70 D10 R70 U2 $"
210 TV$(0)="BD71 R159 U71 L159 BG2 D67 R155 U67 L155 BR125 $"
220 TV$(1)="D66 BR R U65 BL12 BD10 D45 H3 L100 E3 U45 F3 R100 $"
230 TV$(2)="G3 BR18 R17 D20 L17 U20 BG2 R3 BR2 R3 BR2 R3 BD2 $"
240 TV$(3)="D L2 BL2 L3 BL2 L3 BD2 D R2 BR2 R3 BR2 R3 BD2 D L2 BL2 $"
250 TV$(4)="L3 BL2 L3 BL2 BD D R16 BD12 L17 D22 R17 U22 BL2 D22 L2 $"
260 TV$(5)="U22 BL2 D22 BL2 U22 BL2 D22 BL2 U22 BL2 D22 BL2 U22 $"
270 PATTERN$(1)="R D34 BR R U34 BR $"
280 PATTERN$(2)="* R D34 BR R U34 BR $"
290 REM **** DRAW OUTLINE ****
300 X=0:Y=0
310 FOR J=0 TO 5
320 CALL DRAW(X,Y,TV$(J))
330 NEXT
340 REM **** DRAW TEST PATTERN ****
350 FOR L=1 TO 2
360 X=15:Y=17
370 FOR J=1 TO 25
380 CALL DRAW(X,Y,PATTERN$(L))
390 NEXT:NEXT
400 REM **** DRAW EXPANDING BOX ****
410 L=0:GOSUB 420:L=1:GOSUB 420:GOTO 490
420 X=65:Y=34:POKE &HFFF9,L
430 FOR J=4 TO 48 STEP 2
440 BOX$="D"+STR$(J)+"R"+STR$(J)+"U"+STR$(J)+"L"+STR$(J)+"BE"+"$"
450 CALL DRAW(X,Y,BOX$)
460 NEXT
470 RETURN
480 REM **** DRAW MESSAGE ****
490 L=0:GOSUB 500:L=1:GOSUB 500:L=0:GOSUB 500:GOTO 570
500 X=31:Y=36:FOR TD=1 TO 700:NEXT
510 POKE &HFFF9,L
520 FOR J=0 TO 10
530 CALL DRAW(X,Y,MESSAGE$(J))
540 FOR TD=1 TO 100:NEXT
550 NEXT:RETURN
560 REM **** INVERT MESSAGE ****
570 INVERT$="*R73$"
580 GOSUB 590:GOSUB 590:L=1:GOSUB 500:CLS:GOTO 300
590 X=28:FOR TD=1 TO 1400:NEXT
600 FOR Y=26 TO 40
610 CALL DRAW(X,Y,INVERT$):X=28
620 NEXT:RETURN
```

End

Program Listing 3. Animation demonstration.

```
20 REM ........................................
30 REM .     ANIMATION DEMONSTRATION           .
40 REM ........................................
50 CLEAR,65177!:DEFINT X,Y:DRAW=&HFE9A
60 X=0:Y=0:CLS:PRINT CHR$(15);
70 TOP$="*E3R6L6F3G3H3$":BORDER$="FHD40FHR100FHU40FHL100BR2BU2$"
80 FILL$="*R80$"
90 X=20:Y=16
100 FOR J=1 TO 10
110 CALL DRAW(X,Y,BORDER$)
120 NEXT
130 X=39
140 FOR Y=18 TO 37
150 CALL DRAW(X,Y,FILL$):X=39
160 NEXT
170 X=80:Y=26
180 X$=INKEY$
190 IF X$="" THEN GOSUB 300 ELSE GOSUB 300
200 IF X$=CHR$(3) THEN 70
210 IF X$="U" THEN Y=Y-1
240 IF X$="D" THEN Y=Y+1
250 IF X$="L" THEN X=X-1
260 IF X$="R" THEN X=X+1
265 IF X$="E" THEN X=X-1:Y=Y-1
268 IF X$="F" THEN X=X+1:Y=Y-1
270 IF X$="G" THEN X=X+1:Y=Y+1
280 IF X$="H" THEN X=X-1:Y=Y+1
290 GOTO 180
300 POKE &HFFF9,0:GOSUB 310:POKE &HFFF9,0:GOSUB 310:RETURN
310 CALL DRAW(X,Y,TOP$):RETURN
```

End

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by Dave Rowell

Taking Up Residence

A guided tour through the complexities of a memory-resident video display routine.

Video displays left unattended for long periods often grow weak from phosphor burn-in. You can extend your computer screen's useful life with Screen (Program Listings 1 and 2), a small memory-resident program that automatically blackens the display when you're not using it. You can control the length of time before Screen blanks out your display, and turn the program on or off. Any keyboard activity makes your blackened display reappear immediately.

While anyone with a Tandy 1000 or 1200 (or IBM PC) can use Screen, the accompanying article is for readers interested in Assembly-language programming. Taking Screen as an example, I'll explain how you can create your own memory-resident program and also intercept system interrupts with your own interrupt handlers. You'll need an understanding of 8088 memory addressing (segments and offsets) and a hazy knowledge of software interrupts. In the reference table, I've listed two good books that can get you going.

The source code I've provided is for MS-DOS MASM version 1.1 (see Listing 1). If you don't have an assembler, you can still create Screen using Debug's Assemble function to enter Listing 2. The instructions on p. 63 ("Creating Screen.COM Without an Assembler") should be of some help.

There's not much to using the program; Fig. 1 shows how. Screen works on the Tandy 1000, and on the 1200 and IBM PC with DOS 2.x and color graphics card or monochrome board. It doesn't work adequately with PC-DOS 3.x on the IBM PC with a color board (the background colors stay on). Also, when used with the IBM AT or Tandy 3000, Screen leaves the screen border on.

In Memory

Commercial memory-resident programs abound. All clamor for memory space, and, in an effort to take control, each program links itself into your computer's interrupt system, adding processing time to the affected interrupts. (SideKick, for instance, links into 10 interrupts.) With several such programs crowded into memory, the system interrupts could slow down noticeably.

Not all of these programs are well-behaved; some programs don't get along with others. A few, like SideKick, insist on being loaded into memory last. In contrast, Screen is well-behaved. It uses little RAM (320 bytes) and interrupt processing time, and it doesn't care when it's loaded. Screen coexists peacefully with SideKick, SuperKey, CopyIIPC's Nokey, and ANSI.SYS, which are all memory-resident, and I've yet to find a foreground program with which it won't work.

Screen is really a program within a program. Its core becomes the memory-resident interrupt handler, and I wrote it to add as little processing time as possible to the preexisting interrupt routines. The nonresident shell has several functions. It loads the core into residence, parses any command line parameters, and alters three interrupt addresses (vectors) to point to resident Screen. Since the shell portion can determine if the core is already resident, it won't load more than one copy into memory. You can call Screen at any time to adjust the trigger period or turn it on or off.

To load Screen, type in SCREEN at the DOS prompt, followed by optional parameters as in the examples below. If you use no parameters, your display will go blank after one minute of inactivity. If you have a monochrome board in a 1200 or IBM PC, you must use the /M parameter.

You can change the settings from DOS by typing in SCREEN followed by new parameters.

You can type Screen's parameters in upper- or lowercase, and a slash must precede each one. Minutes (range one to 60) should be an integer value. Use the /M parameter only on a 1200, IBM, or other clone with an IBM-type monochrome monitor board (not on the 1000).

When Screen has turned off your screen, press a shift key to recover your display without affecting its contents.

Command	Description
Screen	Defaults: one-minute trigger period on Tandy 1000, 1200, or IBM PC with color board.
Screen/5	Sets to five minutes.
Screen /OFF	Turns Screen temporarily off.
Screen /ON/2	Turns on and sets for two minutes.
Screen /M	Setting for 1200 or IBM mono boards.
Screen/MX/1	Reverses the monochrome and sets for one minute.

Figure 1. Using Screen.

```
10 WHILE INKEY$="":WEND
20 DEF SEG = 0:M = PEEK(&H465):DEF SEG
30 A=M AND &HF7
40 OUT &H3D8,A    'use &H3B8 for 1200/IBM mono board
50 WHILE INKEY$="":WEND
60 OUT &H3D8,M
```

Figure 2. This program should turn the display off and on in any mode. Use it to determine if Screen will work on your computer.

System Requirements

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Assembly language

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Program Listing 1. MASM (version 1.1) source code to create Screen.EXE. Use EXE2BIN to convert to Screen.BIN after linking, then rename to Screen.COM.

```
;[Thanks to Warren Witherell for testing of SCREEN on IBM machines.]

;*****************************************************************************
;                              EQUATES
; Necessary because of conversion to COM file, and because of
; downshift of resident portion into PSP. These values create addresses
; that make sense after the code is in place.

res             equ     92      ;where resident portion will start in PSP
reslength       equ     resident_end - resident_start
time            equ     1092            ;default timer value (1 min)
clockoff        equ     clock - resident_start + res
vidoff          equ     video - resident_start + res
kbdoff          equ     keyboard - resident_start + res
sourcestart     equ     resident_start - start + 100H
clockaddr       equ     clockint - resident_start + res
videoaddr       equ     videoint - resident_start + res
keyboardaddr    equ     keyboardint - resident_start + res
colorport       equ     03D8H   ;color board mode select register port
monoport        equ     03B8H   ;monochrome control port
counterword     equ     counter - resident_start + res
timerword       equ     timer - resident_start + res
flagbyte        equ     vidflag - resident_start + res
on_offbyte      equ     on_off - start + 100H
on_off_res      equ     on_off - resident_start + res
vidportword     equ     vidport - start + 100H
vidportres      equ     vidport - resident_start + res

;*****************************************************************************
code    segment                 ;code segment begins

;-----------------------------------------------------------------------------
        assume  cs:code, ds:code

;-----------------------------------------------------------------------------
screen  proc    far             ;start of main routine

start:  jmp     short check_presence    ;jump past data and resident code

;-----------------------------------------------------------------------------
resident_start:         ;resident code starts here

;the data

timer           dw      time                    ;user set time value
counter         dw      time                    ;program counter
clockint        dd      ?                       ;storage of BIOS INT 8 vector
videoint        dd      ?                       ;storage of BIOS INT 16 vector
keyboardint     dd      ?                       ;storage of BIOS INT 22 vector
vidflag         db      11111111B               ;flag for video on/off
on_off          db      11110111B               ;switch for SCREEN on/off
vidport         dw      colorport               ;port for mode select reg.

;the clock interrupt routine.

clock:
        dec     cs:word ptr counterword ;decrement counter
        jnz     old_int         ;if counter not zero, continue to old int.
        sti                     ;enable other interrupts (considerate)
        push    cx
        mov     cl,cs:byte ptr on_off_res       ;SCREEN on/off switch
        call    subr            ;subr will disable video if switch off
        pop     cx
        cli                     ;disable interrupts before jumping to old int.
old_int:
        jmp     cs: dword ptr clockaddr ;old interrupt

; the video interrupt interruption

video:  sti                     ;enable interrupts
        push    cx
        mov     cl,11111111b    ;switch for video on
        call    subr            ;video control subroutine
        pop     cx
        cli                     ;disable interrupts
        jmp     cs: dword ptr videoaddr ;old interrupt

; the keyboard interrupt interruption

keyboard:
        sti                     ;enable interrupts
        push    cx
        mov     cl,111111111b   ;switch for video on
        call    subr            ;video control subroutine
        pop     cx
        cli                     ;disable interrupts
        jmp     cs: dword ptr keyboardaddr  ;old int.

;the video control subroutine

subr    proc    near

        push    ax                              ;save ax
        mov     ax,cs:word ptr timerword        ;reset counter
        mov     cs:word ptr counterword,ax      ;with timer value
        test    cl,8                            ;is switch on or off?
```

Listing 1 continued

Video Out

Disabling and enabling the video display is surprisingly simple, considering the difficulty of programming the video (CRT) controller chip. You can do it with just a few lines of Basic (see Fig. 2). When set, bit 3 of the mode-select register enables the video signal; when cleared, it disables the signal. Port 3D8 hexadecimal (hex), which is one of the 1000's few IBM-compatible video ports, writes to the mode-select register. (Port 3B8 hex is the equivalent port if you use a monochrome board in the Tandy 1200 or IBM PC.)

To turn an RGB display off, send a byte out port 3D8 hex with bit 3 cleared. To turn the display back on, reset bit 3. The other 7 bits must retain their original values (they control other attributes of the display).

Port 3D8 hex is write-only, so you can't read it to know its contents before changing it. The BIOS video routines have the same problem, but, fortunately, they store the current value of the mode-select register in the BIOS data area in low RAM (0000:0465 hex). Screen reads the byte at this address, alters bit 3, then sends the byte out port 3D8 or 3B8 hex to turn the video signal on or off without affecting other video attributes.

If you're not sure Screen will work on your system, run the test routine in Fig. 2 in different graphics modes. Press any key to disable your display. A second keypress reenables it and ends the program.

Switching the video on and off requires few instructions. Most of Screen's resident core spends its time intercepting three system interrupts: the clock, low-level keyboard, and BIOS video interrupts. Screen uses the clock interrupt (INT 8) as the tick in a countdown timer. When the timer reaches zero, Screen cuts your video.

Any keyboard activity (INT9) or BIOS (and therefore DOS) video activity (INT 16) resets the timer, keeping your display active. Screen returns control to the original interrupt routines with the 8088's registers intact.

The 1000, 1200, and PC clock chips initiate the clock interrupt (INT 8) 18.2 times per second to update a counter from which your operating system calculates the time. In addition, the INT 8 clock routine issues an INT 28 that points to a dummy IRET instruction in ROM. DOS provides the dummy INT 28 for you to redirect to a routine of your own in programs that need a timer. It's best not to mess with the low-level clock interrupt (INT 8) if you don't have to.

One problem with using INT 28, though, is that any program loaded after Screen could usurp the user clock interrupt for its own purposes and knock Screen out of action permanently. Therefore, I chose to intercept INT 8 directly, which is what all the memory-resident programs I've decoded do. INT 8 is sacred. Other programs may intercept it, but none

Creating Screen.COM Without an Assembler

You can enter Screen using the Debug program on your DOS disk and Listing 2. If your DOS disk doesn't have enough room for two files totalling 4,000 bytes, copy Debug.COM to a disk with more space and use that disk in drive A.

Use Edlin or a word processor that creates ASCII files (not DeskMate) to type in the code in Listing 2. Leave out the eight-digit numbers that start most lines and the hyphen prompts. This is how the first five lines of your listing should look:

```
N Screen.COM
A
JMP     0181
DW      0444
DW      0444
```

and the last eight:

```
MUL     CX
MOV     [0102],AX
JMP     027B
        ;blank line is necessary
RCX
21F
W
Q
```

Save your listing in ASCII format under the name Screen.SRC on the disk with Debug.COM on it. At the DOS prompt type:

```
DEBUG < Screen.SRC
```

Debug will read in your listing file (Screen.SRC) and create the program file Screen.COM.

Put a copy of Screen.COM in the root directory of your boot-up disk. For automatic loading, put Screen in the AUTOEXEC.BAT file on your boot-up disk with any parameters following it. ■

will cut off programs already linked into it for fear of disabling the system clock.

The best way for memory-resident programs to monitor the keyboard is by tapping into INT 9, the interrupt generated by the keyboard when you press or release a key. I tried using the mid-level BIOS keyboard interrupt (INT 22) that is provided for reading the keyboard buffer, but it is polled constantly while DOS waits for keyboard input, so Screen's counter never runs down to zero.

Screen tests for video activity through the BIOS video interrupt (INT 16). Programs that write directly to memory when creating video displays don't use an interrupt. If you work with such a program and don't have to use the keyboard often, Screen may blacken the display. To resolve this, either turn off Screen or

Listing 1 continued

```
        jz      cont                            ;if yes, cont with subr
        test    cs:byte ptr flagbyte,8          ;is video enabled?
        jnz     return                          ;if yes, then return
cont:   push    bx                              ;save registers
        push    dx
        push    ds
        mov     ax,40H                  ;load data segment with start of
        mov     ds,ax                   ;               BIOS data area
        mov     bx,65H                  ;offset of mode select reg. setting
        cli                             ;disable interrupts - sensitive area
        mov     al,[bx]                 ;get mode select register setting
        and     al,cl                   ;switch in cl turns video on or off
        mov     dx,cs:word ptr vidportres       ;mode select register port
        out     dx,al                   ;the whole program for this one line
        sti                             ;enable interrupts again
        mov     cs:byte ptr flagbyte,cl ;store enable/disable state of video
        pop     ds                      ;restore used register
        pop     dx
        pop     bx
return: pop     ax
        ret

subr    endp                            ;end of video control subroutine

resident_end:                           ;end of resident code

;-------------------------------------------------------------------------
;Is SCREEN already resident? Program checks vector interrupt table from
;INT 60H to 67H (addresses 0:0180-01BFH) for an FFFFH value. SCREEN puts
;multiple signatures in that area when first loaded to identify itself,
;filling all empty vector slots (up to 8). Each FFFFH signature is followed
;by SCREEN's segment (if the program is resident).

check_presence:
        xor     ax,ax           ;zero value for bottom of memory
        mov     es,ax           ;ES to reference vector interrupt table
        mov     cx,8            ;loop counter, 8 interrupt vectors to check
        mov     si,180H         ;start of user interrupt area in vector table
find_FFFF:                      ;start of loop find FFFF hex
        mov     ax,es:[si]      ;get first word of vector
        cmp     ax,0FFFFH       ;is it resident flag?
        je      resident        ;yes it is
        add     si,4            ;next vector in table
        loop    find_FFFF
        jmp     short not_resident      ;flag not found, assume not resident
;-------------------------------------------------------------------------
; Modify resident program according to on_off flag and value in timer.

resident:
        inc     si              ;point to resident program seg address
        inc     si              ; after FFFF marker
        mov     ax,es:[si]      ;get that segment address
        mov     es,ax           ;es holds resident segment
        mov     ax,es:word ptr timerword        ;get resident timer setting
        mov     ds:word ptr timer - start + 100H,ax     ;store it
        mov     si,on_off_res   ;address of resident on/off switch
        mov     al,es:[si]      ;get resident switch setting
        mov     di,on_offbyte   ;address to store switch
        mov     [di],al         ;store it
        mov     ax,es:word ptr vidportres       ;get resident video port
        mov     ds:word ptr vidportword,ax      ;store it


        call    parser          ;process any command parameters and modify
                                ;settings just stored if specified

        mov     ax,ds:word ptr timer - start + 100H     ;get timer setting
        mov     es:word ptr timerword,ax        ;put back in "residence"
        mov     si,on_offbyte   ;address of stored on/off switch
        mov     al,[si]         ;get switch
        mov     es:byte ptr on_off_res,al       ;put it in resident program
        mov     ax,ds:word ptr vidportword      ;get video port number
        mov     es:word ptr vidportres,ax       ;back in resident program

; exit to DOS
        mov     ah,4CH          ;exit to DOS function number
        int     21H             ;DOS function call interrupt

;-------------------------------------------------------------------------
; Set up resident program in memory

not_resident:

        call    parser          ;process any command parameters

; get and save current addresses of INTs 8, 16 and 22 so that resident
; SCREEN can return control to the original interrupt routines

        mov     al,8            ;clock video interrupt number
        mov     ah,53           ;get interrupt vector DOS function
        int     33              ;DOS function call interrupt
        mov     ds:word ptr clockint - start + 100H,bx  ;store address offset
        mov     ax,es
        mov     ds:word ptr clockint+2 - start + 100H,ax        ;store seg
        mov     al,9            ;BIOS low-level keyboard interrupt
        mov     ah,53           ;same as with clock interrupt
        int     33
        mov     ds:word ptr keyboardint - start + 100H,bx
        mov     ax,es
        mov     ds:word ptr keyboardint+2 - start + 100H,ax
        mov     al,16           ;BIOS video interrupt
        mov     ah,53           ;same as with clock interrupt
        int     33
```

Listing 1 continued

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Listing 1 continued

```
        mov     ds:word ptr videoint - start + 100H,bx
        mov     ax,es
        mov     ds:word ptr videoint+2 - start + 100H,ax

; Move resident portion lower, down into program segment prefix (PSP) with
; a string move command. Pushing the code down into the unused part of the
; PSP makes the resident program smaller.

        push    cs              ;move code segment
        pop     ds              ;into ds (source segment)
        push    cs
        pop     es              ;and into es (destination segment)
        mov     si,sourcestart  ;current offset of resident code in program
        mov     di,res          ;destination offset (byte 92 decimal in PSP)
        mov     cx,reslength    ;length of resident code
        cld                     ;clear direction flag (up)
rep     movsb                   ;byte string move (block move)

; store signature and resident segment address in interrupt vector table so
; that SCREEN can find itself later. The following loop fills any empty
; locations in the user area of the vector table.

        xor     ax,ax           ;zero value
        mov     es,ax           ;ES to reference vector interrupt table
        mov     cx,8            ;loop counter, 8 interrupt vectors to check
        mov     si,180H         ;start of user area in interrupt table
        xor     bx,bx           ;bx is flag for successful signature
find_0000:                      ;start loop
        mov     ax,es:[si]      ;get first word of vector
        cmp     ax,0            ;is it occupied?
        jne     skip            ;if yes, then skip over
mark:   mov     es:[si],0FFFFH  ;mark unoccupied table entry
        mov     ax,cs           ;segment of resident SCREEN
        mov     es:[si+2],ax    ;stow it in table after FFFFH marker
        inc     bx              ;flag successful successful
skip:   add     si,4            ;next vector in table
        loop    find_0000
        cmp     bx,0            ;is bx 0? (user section was full?)
        jnz     sig_ok          ;if not, signature was successful
        sub     si,4            ;OK, we tried being polite, but there's
        inc     cx              ; no space, so we'll take the last (8th)
        jmp     short mark      ; user interrupt for SCREEN's signature
sig_ok:

; reset clock, low-level keyboard, and BIOS video interrupts to point
; to routines in SCREEN

; clock interrupt (INT 8)
        push    cs              ;ds must hold segment of new routine
        pop     ds
        mov     dx,clockoff     ;clock routine offset
        mov     al,8            ;the interrupt number
        mov     ah,37           ;set interrupt DOS function
        int     33              ;DOS function call interrupt

; keyboard interrupt (INT 9)
        push    cs
        pop     ds
        mov     dx,kbdoff       ;kbrd routine offset
        mov     al,9            ;the interrupt number
        mov     ah,37           ;set interrupt DOS function
        int     33              ;DOS function call interrupt

; video interrupt (INT 16)
        push    cs
        pop     ds
        mov     dx,vidoff       ;video routine offset
        mov     al,16           ;the interrupt number
        mov     ah,37           ;set interrupt DOS function
        int     33              ;DOS function call interrupt

; terminate but stay resident using DOS interrupt
        mov     dx,reslength + res      ;address at end of resident code
        int     27H                     ;DOS terminate-but-stay-resident

screen  endp            ;end of main routine

;-------------------------------------------------------------------------
; Get any parameters following the SCREEN command. If /ON, set the on_off
; flag byte to F7H; if /OFF , set the on_off byte to FFH. On is the default
; for the first time. A number following a slash indicates the number of
; minutes in the trigger period (1-60). For 1200/IBM monochrome boards, the
; /M changes the port for the select register (and /MX changes it back).

parser  proc    near            ;start of near subroutine

        push    cs              ;move code segment into data segment
        pop     ds
        mov     si,80H          ;start of parameter area in PSP
        mov     al,[si]         ;get number of characters in parameter text
        inc     si              ;point to first character
        cmp     al,0            ;are there any?
        jnz     find_slash      ;there are characters so look for slash
pars_ret:
        ret                     ;no parameters, so leave subroutine
find_slash:
        mov     al,[si]         ;get parameter character
        cmp     al,0DH          ;carriage return (end of text)?
        jz      pars_ret        ;end of text, so return
        cmp     al,2FH          ;slash character?
```

Listing 1 continued

lengthen its trigger time to several minutes.

Another problem could arise with programs that don't use the system cursor. For instance, when ThinkTank is in the editing mode, it uses BIOS video routines to produce blinking highlighting instead of a cursor. This constantly resets Screen's timer so the screen stays on when you're not there. Unfortunately, there's no solution for this.

How It's Done

Screen's memory-resident core contains separate routines for the three interrupts, but they share data and the subroutine that turns the video on or off. I tried to make the core small, but I was more concerned with the processing time added to the normal interrupt routines, especially the clock interrupt, which runs 1,092 times a minute.

During most clock interrupts, Screen just decrements its counter before making a far jump to the old clock routine (three instructions). Decrementing rather than incrementing the counter saves a comparison operation. When the counter decrements to zero, setting the zero flag, a conditional jump is made to the subroutine. All calls to the subroutine, including the clock interrupt's, reset the counter with the timer value you set. As a result, the clock interrupt doesn't constantly call the subroutine after disabling the video signal.

Two flags and the contents of the CL register determine what happens in Screen's resident subroutine. The keyboard and video routines always call the subroutine to reset the counter. Once in the subroutine, they test a flag (Vidflag) to determine the screen's condition. If it's off, they reenable the video signal. If it's on, they return, saving steps. Another flag (On _ off) indicates if you've turned Screen off. If you have, the clock routine acts like the keyboard and video routines, resetting the clock only on its infrequent visits to the subroutine.

To determine its course of action, the subroutine tests the value that the calling interrupt routine put in CL. Not only does the CL register determine whether the screen is turned on or off, the value in CL actually does the dirty work. CL ANDs the mode-select value from the BIOS data area to set or clear bit 3 before sending it out port 3D8 or 3B8 hex.

The keyboard and video routines always put FF hex in CL (bit 3 set) before calling the subroutine. The clock routine puts flag On _ off in CL before calling the subroutine. When Screen is on, the flag contains F7 hex (bit 3 cleared) to disable video. When Screen is off, flag On _ off contains FF hex, and the clock routine goes through the subroutine resetting the counter only. Whenever the subroutine sends a value out a video port to the mode-select register, it puts the flag value (FF or F7 hex) Vidflag to indicate whether the screen is on or off.

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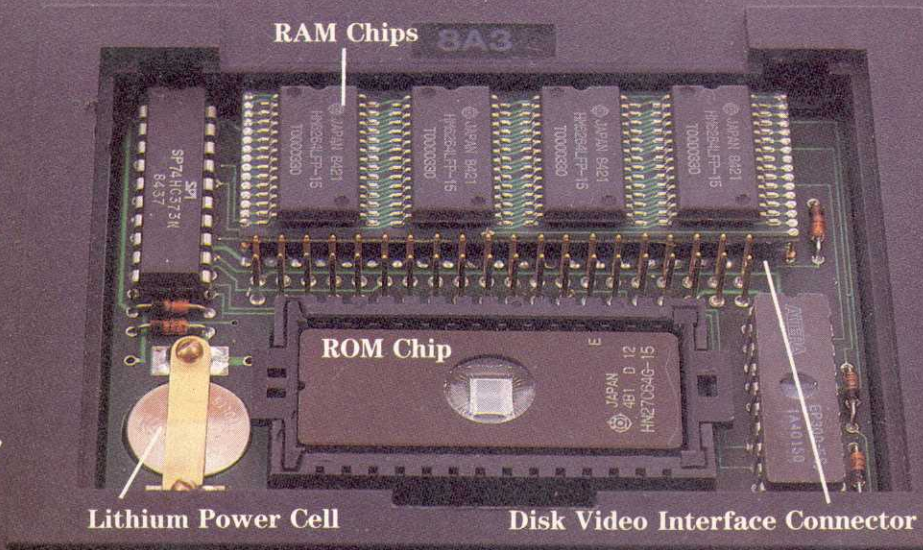

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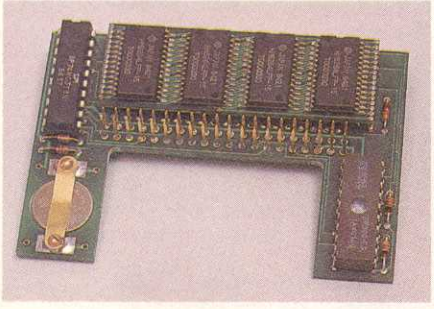

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Interrupt Etiquette

When the 8088 executes an interrupt (hardware or software), it saves the flag register and the address of the next instruction in the interrupted process on the stack, and it clears the interrupt flag, disabling further maskable interrupts. Your interrupt routine must save (with Push) other registers before using them, then restore them (with Pop) before returning control to the interrupted program. Good form requires that you keep the 8088 interrupt flag set (using STI) to let other interrupts butt in if your handling routine is at all long.

You should clear the interrupt flag only when necessary. Screen's subroutine clears the interrupt flag (CLI) before getting the current contents of the mode-select register (from 40:65 hex) then resets the interrupt flag after sending the altered value to the mode-select register. If the BIOS video interrupt cuts in to change the screen mode between the getting and sending instructions (while Screen was reenabling video), Screen would scramble the screen by sending out a suddenly stale mode value.

When you write an independent interrupt-handling routine, you must end it with the IRET instruction after restoring used registers. Before returning control to the interrupted process, IRET restores the flag register. RETF 0002, or a combination of POPF and RETF, does the same thing.

If your routine intercepts an existing interrupt, however, you must eventually return control to it. Screen does this, after completing its own business, with a far jump to the intercepted interrupt handler. Screen's shell saves the addresses of the three intercepted interrupts in its data area before redirecting the vectors to Screen's own routines. Because the ROM interrupt handlers expect the interrupt flag to be cleared, your intercepting code should clear it before the jump.

SideKick takes a different approach; I suspect this is because it adds so much code to the interrupts it links into. SideKick immediately gives control to the intercepted routine with a simulated INT instruction (PUSHF and a far call to the old interrupt vector), then it does its own work, and ends with an IRET.

A warning to those writing their own memory-resident programs: It's a bad practice to hold up disk I/O for any length of processor time (e.g., with a pop-up menu).

Shell Services

When you call Screen from DOS, its shell first determines if the core is resident. When Screen installs itself as a memory-resident program, it sticks multiple copies of a signature (FFFF hex) and Screen's code segment in the user section of the interrupt vector table (starting at 0000:0180 hex). If the program finds the signature, it knows the core is resident. It

Listing 1 continued

```
        jz      find_param      ;found slash so evaluate what comes after
        inc     si              ;ignore anything else, so next character
        jmp     short find_slash
find_param:
        inc     si              ;point to character after slash
        mov     al,[si]         ;get character
        cmp     al,20H          ;a space?
        jz      find_param      ;if yes, ignore spaces after slash
        cmp     al,4FH          ;upper case O?
        jz      onoroff         ;if yes, check for on or off
        cmp     al,6FH          ;lower case o?
        jz      onoroff         ;if yes, check for on or off
        cmp     al,4DH          ;upper case M?
        jz      mono            ;if yes, change to mono port
        cmp     al,6DH          ;lower case M?
        jz      mono            ;change to mono port
        cmp     al,30H          ;compare to ASCII 0
        jb      find_slash      ;if below, look for next slash
        cmp     al,39H          ;compare to ASCII 9
        ja      find_slash      ;if above, look for next slash
        jmp     short minutes   ;must be a number, how many minutes?
onoroff:
        inc     si              ;point to character after O
        mov     al,[si]         ;get that character
        cmp     al,4EH          ;N?
        jz      flag_on         ;yes, set flag for on
        cmp     al,6EH          ;n?
        jz      flag_on
        cmp     al,46H          ;F?
        jz      flag_off        ;yes set flag for off
        cmp     al,66H          ;f?
        jz      flag_off
        jmp     short find_slash        ;garbage, so look for next slash
flag_on:                        ;set program on_off switch byte for on
        mov     al,11110111B    ;switch for SCREEN on (7FH)
        jmp     short on_cont   ;skip next instruction
flag_off:
        mov     al,11111111B    ;switch for SCREEN off (FFH)
on_cont:
        mov     di,on_offbyte   ;load the switch byte address
        mov     [di],al         ;load the switch byte with value
        jmp     short find_slash        ;look for next slash

mono:   inc     si              ;point to character after M
        mov     al,[si]         ;get character
        cmp     al,58H          ;is it X?
        jz      color_on        ;if yes, use color board port
        cmp     al,78H          ;is it x?
        jz      color_on        ;use color port
        mov     dx,monoport     ;port for IBM mono card
        mov     ds:word ptr vidportword,dx
        jmp     short find_slash        ;look for next slash
color_on:
        mov     dx,colorport
        mov     ds:word ptr vidportword,dx      ;port for 1000 or color card
        jmp     short find_slash

; Following routine is from "Bluebook of Assembly Routines for the IBM PC &
; XT" by Cristopher L. Morgan, The Waite Group. It converts ASCII numeric
; characters into a hexidecimal value.

minutes:
        xor     dx,dx           ;zero dx for result
min_loop:
        sub     al,30H          ;convert ASCII to hex
        jl      min_end         ;if less than zero (not a number)
        cmp     al,9            ;compare to 9
        jg      min_end         ;if greater than 9 (not a number)
        cbw                     ;convert byte (al) to word (ax)
        push    ax              ;save one's place
        mov     ax,dx           ;move current result (subtotal) into ax
        mov     cx,10           ;set up for multiplication by 10
        mul     cx              ;ax = ax * cx
        mov     dx,ax           ;store product in dx
        pop     ax              ;restore last digit
        add     dx,ax           ;sum in dx
        inc     si              ;point to next character
        mov     al,[si]         ;get that character
        jmp     short min_loop  ;convert to number
min_end:                        ;store number (if any) in timer
        cmp     dx,1            ;is number less than 1?
        jb      min_ex          ;if yes, then leave timer at default
        cmp     dx,61           ;more than 60 minutes?
        jb      min_cont        ;if 60 or below
        mov     dx,60           ;set at highest, if too high
min_cont:
        mov     ax,dx           ;minutes in ax
        mov     cx,1092         ;18.2 * 60 (1 minute of 8088 clock ticks)
        mul     cx              ;ax now has timer value (ax = ax * cx)
        mov     ds:word ptr timer - start + 100H,ax ;store new timer value
min_ex: jmp     find_slash      ;go look for next slash

parser  endp                    ;end of subroutine
;--------------------------------------------------------------------------
code    ends                    ;code segment ends

;**************************************************************************
        end     start
```

End

then uses the word following the signature to locate the resident core for any modifications you specify on the command line. I used FFFF hex as the signature because it can't be an offset in an interrupt vector.

If Screen doesn't find its signature, it installs itself in memory and leaves its signature and code segment in any of the eight user vectors that are unused, assuming a zero word means unused. If all eight user entries are occupied (highly unlikely), the shell usurps the eighth user entry.

Whether or not Screen is resident, its shell calls on the parser subroutine to interpret any parameters you entered along with the Screen command. DOS stores any command line parameters in ASCII format starting at location 81 hex in a COM program's 64K segment. Location 80 hex contains the number of characters typed on the command line after the program name (not including the carriage return). Depending on what you type, the parser alters either flag On _ off, the timer value, or the port value in the nonresident core data area, or any combination of the three. If Screen isn't resident, the modified data goes along as part of the core when it's installed.

If Screen is already resident, the shell routine first gets the current settings from the resident program and puts them into the data area. The parser interprets the command line and modifies the settings as necessary. Then it places the data back in the resident core by using the segment found earlier in the interrupt vector table and kept in the ES register.

The parser works simply, but is also forgiving. You must precede any parameter with a slash. The parser looks for the first nonspace character after a slash. If it's the letter "O" or "o," the parser determines if it is on or off and sets flag On _ off accordingly. If it's an M or m, Screen checks for a following X or x and alters the video port value. If the character following the slash is a number, the parser converts it from minutes to equivalent clock cycles and places the result in the word labeled Timer. Then the parser begins looking for the next slash ignoring other characters. The parsing routine ends when it encounters the carriage return code (0D hex).

Establishing Residency

The processes of getting interrupt vectors, changing them, and making a program resident are easy if you use the services DOS provides. As a first step in establishing residency, Screen preserves the original clock, keyboard, and video interrupt vectors with DOS function 53. You should put the interrupt number in AL and 53 in AH, and then execute INT 33, the DOS function interrupt. For each interrupt, Screen stores the vector returned in EX:BX in the core data area so that resident Screen will know where to send control when through with its operations.

The next step is to move the core program lower in memory, into the unused part of the program segment prefix (PSP). In a COM program, the PSP occupies the first 100 hex bytes of your program area. The PSP contains several things: a hodgepodge of information DOS uses when running your program, the command line text already mentioned (at 80 hex), and a lot of space for potential I/O buffers. According to *The Peter Norton Programmer's Guide to the IBM PC*, you can safely lower a program down to offset 92 (5C hex) before making it memory resident, potentially shaving 164 bytes from its total size. Screen uses the MOVSB (move byte string) instruction to accomplish this.

After placing the FFFF hex signature and program segment in the interrupt vector table, Screen calls DOS function 37 to set new interrupt vectors pointing to its own routines. Place the current code segment in DS, the offset of the interrupt routine in DX, and the interrupt number in AL before invoking the DOS funtion. Cal-

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Stylus has uniquely powerful and extensive non-text features for utilities, graphics, animations, a BASIC statement screen compiler, and screen capturing. Utility features include scrolling hex dumps, undumps, searches, and verifications. All file types can be examined or modified. Graphics can be combined with text. All graphics functions are instantly active at the same time in one mode. There is Jot Stylus pixel drawing, defined line drawing, full screen motion, and Brush Stylus drawing—set an entire screen as a complex drawing "pixel" and then rapidly draw with it. There are many other instant action keys to flip, overlay, fill, invert, etc. Doodling with a sort of electronic kaleidoscope effect is easy to do.

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culating the routine offset is tricky. A COM program starts at offset 100 hex in its 64K segment, but I've lowered the core to start at 5C hex (92) to conserve space. The equates take care of the calculations. As soon as Screen changes the interrupt vectors, the program starts working.

The last step is the DOS terminate-but-stay-resident interrupt (INT 27 hex). The DX register holds the number of bytes you want to keep resident; this should equal the offset of the end of the core section. The actual resident program takes only 219 bytes, of which 92 bytes come from the old PSP. DOS, however, assigns 320 bytes of memory to Screen, some for housekeeping and some to start the next program on an even 16-byte paragraph. ■

Write to Dave Rowell at 80 Micro, 80 Pine St., Peterborough, NH 03458.

Additional References:

Franklin, Mark A. *Using the IBM PC: Organization and Assembly Language Programming.* New York: Holt, Rinehart, and Winston, 1984.

Norton, Peter. *The Peter Norton Programmer's Guide to the IBM PC.* Bellevue, WA: Microsoft Press, 1985.

Program Listing 2. Script for assembling Screen.COM with Debug.

```
-N SCREEN.COM
-A
3C82:0100 JMP     0181
3C82:0102 DW      0444
3C82:0104 DW      0444
3C82:0106 DW      0 0
3C82:010A DW      0 0
3C82:010E DW      0 0
3C82:0112 DB      FF
3C82:0113 DB      F7
3C82:0114 DW      03D8
3C82:0116 CS:
3C82:0117 DEC     WORD PTR [005E]
3C82:011B JNZ     0129
3C82:011D STI
3C82:011E PUSH    CX
3C82:011F CS:
3C82:0120 MOV     CL,[006D]
3C82:0124 CALL    014A
3C82:0127 POP     CX
3C82:0128 CLI
3C82:0129 CS:
3C82:012A JMP     FAR [0060]
3C82:012E STI
3C82:012F PUSH    CX
3C82:0130 MOV     CL,FF
3C82:0132 CALL    014A
3C82:0135 POP     CX
3C82:0136 CLI
3C82:0137 CS:
3C82:0138 JMP     FAR [0064]
3C82:013C STI
3C82:013D PUSH    CX
3C82:013E MOV     CL,FF
3C82:0140 CALL    014A
3C82:0143 POP     CX
3C82:0144 CLI
3C82:0145 CS:
3C82:0146 JMP     FAR [0068]
3C82:014A PUSH    AX
3C82:014B CS:
3C82:014C MOV     AX,[005C]
3C82:014F CS:
3C82:0150 MOV     [005E],AX
3C82:0153 TEST    CL,08
3C82:0156 JZ      0160
3C82:0158 CS:
3C82:0159 TEST    BYTE PTR [006C],08
3C82:015E JNZ     017F
3C82:0160 PUSH    BX
3C82:0161 PUSH    DX
3C82:0162 PUSH    DS
3C82:0163 MOV     AX,0040
3C82:0166 MOV     DS,AX
3C82:0168 MOV     BX,0065
3C82:016B CLI
3C82:016C MOV     AL,[BX]
3C82:016E AND     AL,CL
3C82:0170 CS:
3C82:0171 MOV     DX,[006E]
3C82:0175 OUT     DX,AL
3C82:0176 STI
3C82:0177 CS:
3C82:0178 MOV     [C06C],CL
3C82:017C POP     DS
3C82:017D POP     DX
3C82:017E POP     BX
3C82:017F POP     AX
3C82:0180 RET
3C82:0181 XOR     AX,AX
3C82:0183 MOV     ES,AX
3C82:0185 MOV     CX,0008
3C82:0188 MOV     SI,0180
3C82:018B ES:
3C82:018C MOV     AX,[SI]
3C82:018E CMP     AX,FFFF
3C82:0191 JZ      019A
3C82:0193 ADD     SI,04
3C82:0196 LOOP    018B
3C82:0198 JMP     01D8
3C82:019A INC     SI
3C82:019B INC     SI
3C82:019C ES:
3C82:019D MOV     AX,[SI]
```

Listing 2 continued

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C ITOH STARWRITER F-10-40 / DIABLO HYTYPE II — Carbon Film Black	5/16 x 130	$18/3	$60/12	$342/72	$5 ea 3-11	$4 ea	12 or more	$24/6	$42/12	$234/72
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Fabric (Long Life), DWP 210 (Hytype II) Black (1458)	5/16 x 17	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$21/3	$78/12	$432/72
DW II, DWP 410-510, RICOH 1200-1300-1600 Black (1449)	NOT EZ-LOAD 1/4 x 25	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$21/3	$78/12	$432/72
DMP-100, LP VII, COMMODORE 1525, GORILLA BANANA (1424)	Inker Loop	$18/2	$51/6	$ 96/12	.....			.....		
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-Fabric -2000-3500 (Can Reload All)	1/2 x 14	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$15/3	$54/12	$288/72
-5500-7700 (Can Reload All)	1/2 x 13	$15/2	$42/6	$ 78/12	$8/1	$7 ea	2 or more	$15/3	$54/12	$288/72
Pinwriter P1-P2	1/2 x 20	$25/2	$69/6	$126/12	$7/1	$6 ea	2 or more	$15/3	$54/12	$288/72
P3	1/2 x 27	$30/2	$84/6	$156/12	$8/1	$7 ea	2 or more	$18/3	$66/12	$360/72
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Microline 182-192-193	Inker Loop	$20/2	$57/6	$108/12						
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```
3C82:019F MOV     ES,AX
3C82:01A1 ES:
3C82:01A2 MOV     AX,[005C]
3C82:01A5 MOV     [0102],AX
3C82:01A8 MOV     SI,006D
3C82:01AB ES:
3C82:01AC MOV     AL,[SI]
3C82:01AE MOV     DI,0113
3C82:01B1 MOV     [DI],AL
3C82:01B3 ES:
3C82:01B4 MOV     AX,[006E]
3C82:01B7 MOV     [0114],AX
3C82:01BA CALL    026E
3C82:01BD MOV     AX,[0102]
3C82:01C0 ES:
3C82:01C1 MOV     [005C],AX
3C82:01C4 MOV     SI,0113
3C82:01C7 MOV     AL,[SI]
3C82:01C9 ES:
3C82:01CA MOV     [006D],AL
3C82:01CD MOV     AX,[0114]
3C82:01D0 ES:
3C82:01D1 MOV     [006E],AX
3C82:01D4 MOV     AH,4C
3C82:01D6 INT     21
3C82:01D8 CALL    026E
3C82:01DB MOV     AL,08
3C82:01DD MOV     AH,35
3C82:01DF INT     21
3C82:01E1 MOV     [0106],BX
3C82:01E5 MOV     AX,ES
3C82:01E7 MOV     [0108],AX
3C82:01EA MOV     AL,09
3C82:01EC MOV     AH,35
3C82:01EE INT     21
3C82:01F0 MOV     [010E],BX
3C82:01F4 MOV     AX,ES
3C82:01F6 MOV     [0110],AX
3C82:01F9 MOV     AL,10
3C82:01FB MOV     AH,35
3C82:01FD INT     21
3C82:01FF MOV     [010A],BX
3C82:0203 MOV     AX,ES
3C82:0205 MOV     [010C],AX
3C82:0208 PUSH    CS
3C82:0209 POP     DS
3C82:020A PUSH    CS
3C82:020B POP     ES
3C82:020C MOV     SI,0102
3C82:020F MOV     DI,005C
3C82:0212 MOV     CX,007F
3C82:0215 CLD
3C82:0216 REPZ
3C82:0217 MOVSB
3C82:0218 XOR     AX,AX
3C82:021A MOV     ES,AX
3C82:021C MOV     CX,0008
3C82:021F MOV     SI,0180
3C82:0222 XOR     BX,BX
3C82:0224 ES:
3C82:0225 MOV     AX,[SI]
3C82:0227 CMP     AX,0000
3C82:022A JNZ     0238
3C82:022C ES:
3C82:022D MOV     WORD PTR [SI],FFFF
3C82:0231 MOV     AX,CS
3C82:0233 ES:
3C82:0234 MOV     [SI+02],AX
3C82:0237 INC     BX
3C82:0238 ADD     SI,04
3C82:023B LOOP    0224
3C82:023D CMP     BX,00
3C82:0240 JNZ     0248
3C82:0242 SUB     SI,04
3C82:0245 INC     CX
3C82:0246 JMP     022C
3C82:0248 PUSH    CS
3C82:0249 POP     DS
3C82:024A MOV     DX,0070
3C82:024D MOV     AL,08
3C82:024F MOV     AH,25
3C82:0251 INT     21
3C82:0253 PUSH    CS
3C82:0254 POP     DS
3C82:0255 MOV     DX,0096
3C82:0258 MOV     AL,09
3C82:025A MOV     AH,25
3C82:025C INT     21
3C82:025E PUSH    CS
3C82:025F POP     DS
3C82:0260 MOV     DX,0088
3C82:0263 MOV     AL,10
3C82:0265 MOV     AH,25
3C82:0267 INT     21
3C82:0269 MOV     DX,00DB
3C82:026C INT     27
3C82:026E PUSH    CS
3C82:026F POP     DS
3C82:0270 MOV     SI,0080
3C82:0273 MOV     AL,[SI]
3C82:0275 INC     SI
3C82:0276 CMP     AL,00
3C82:0278 JNZ     027B
3C82:027A RET
3C82:027B MOV     AL,[SI]
3C82:027D CMP     AL,0D
3C82:027F JZ      027A
3C82:0281 CMP     AL,2F
3C82:0283 JZ      0288
3C82:0285 INC     SI
3C82:0286 JMP     027B
3C82:0288 INC     SI
3C82:0289 MOV     AL,[SI]
3C82:028B CMP     AL,20
3C82:028D JZ      0288
3C82:028F CMP     AL,4F
3C82:0291 JZ      02A9
3C82:0293 CMP     AL,6F
3C82:0295 JZ      02A9
3C82:0297 CMP     AL,4D
3C82:0299 JZ      02CB
3C82:029B CMP     AL,6D
3C82:029D JZ      02CB
3C82:029F CMP     AL,30
3C82:02A1 JB      027B
3C82:02A3 CMP     AL,39
3C82:02A5 JA      027B
3C82:02A7 JMP     02E8
3C82:02A9 INC     SI
3C82:02AA MOV     AL,[SI]
3C82:02AC CMP     AL,4E
3C82:02AE JZ      02BE
3C82:02B0 CMP     AL,6E
3C82:02B2 JZ      02BE
3C82:02B4 CMP     AL,46
3C82:02B6 JZ      02C2
3C82:02B8 CMP     AL,66
3C82:02BA JZ      02C2
3C82:02BC JMP     027B
3C82:02BE MOV     AL,F7
3C82:02C0 JMP     02C4
3C82:02C2 MOV     AL,FF
3C82:02C4 MOV     DI,0113
3C82:02C7 MOV     [DI],AL
3C82:02C9 JMP     027B
3C82:02CB INC     SI
3C82:02CC MOV     AL,[SI]
3C82:02CE CMP     AL,58
3C82:02D0 JZ      02DF
3C82:02D2 CMP     AL,78
3C82:02D4 JZ      02DF
3C82:02D6 MOV     DX,03B8
3C82:02D9 MOV     [0114],DX
3C82:02DD JMP     027B
3C82:02DF MOV     DX,03D8
3C82:02E2 MOV     [0114],DX
3C82:02E6 JMP     027B
3C82:02E8 XOR     DX,DX
3C82:02EA SUB     AL,30
3C82:02EC JL      0305
3C82:02EE CMP     AL,09
3C82:02F0 JG      0305
3C82:02F2 CBW
3C82:02F3 PUSH    AX
3C82:02F4 MOV     AX,DX
3C82:02F6 MOV     CX,000A
3C82:02F9 MUL     CX
3C82:02FB MOV     DX,AX
3C82:02FD POP     AX
3C82:02FE ADD     DX,AX
3C82:0300 INC     SI
3C82:0301 MOV     AL,[SI]
3C82:0303 JMP     02EA
3C82:0305 CMP     DX,01
3C82:0308 JB      031C
3C82:030A CMP     DX,3D
3C82:030D JB      0312
3C82:030F MOV     DX,003C
3C82:0312 MOV     AX,DX
3C82:0314 MOV     CX,0444
3C82:0317 MUL     CX
3C82:0319 MOV     [0102],AX
3C82:031C JMP     027B
3C82:031F
-RCX
CX 0000
:21F
-W
Writing 021F bytes
-Q
```

End

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A Closer Look At PEEK and POKE

Use two familiar commands in unfamiliar ways to explore and modify Basic code.

If you're a Model III owner, you probably use Basic's PEEK and POKE commands regularly for purposes like setting printer line width, changing the cursor character, and creating or saving graphics displays. But few programmers go beyond these standard uses. This article explains some less common applications of PEEK and POKE—applications that expand the power of Basic and even let you look inside the interpreter itself.

Most programmers know that PEEK(X) returns the contents of memory location X, and that POKE X,Y stores the value Y at memory location X. And they know that the POKE command is powerful. As the Model III Basic manual warns, "Indiscriminate POKEing can be disastrous. You might have to reset or power off and start over again. Unless you know where you are POKEing—don't." That's true, but with a little knowledge and some caution, you can PEEK or POKE anywhere. You can, for example, examine and modify an existing program or track the value of a variable as a program executes.

Now You See It Now You Don't

I'll start with a demonstration. Type in and run Demo (Program Listing 1), a simple routine that prompts you for a number and prints its square and square root. Then list it and add lines 50 and 60 from Fig. 1, making sure you type them exactly as shown. Run the program again. It should work as it did before, except for a slight pause between the second line of output and the Ready prompt. List it again. Only the first line appears on the screen. The program hasn't disappeared, since it still works, but it won't list.

This demonstration serves two purposes. It shows how you can use POKE to alter program code; in this case, you've POKEd an end-of-program marker where it doesn't belong (see below). It also shows what can happen if you don't know what you're doing.

Program Listing 1. Demo.

```
10 CLS
20 INPUT A
30 PRINT A;"squared is";A*A
40 PRINT "The square root of";A;"is";SQR(A)
```

End

Program Listing 2. Tracker.

```
100 CLS
110 L = PEEK(16548)+256*PEEK(16549)
120 IF PEEK(L+2)+256*PEEK(L+3) < 170
    THEN L = PEEK(L)+256*PEEK(L+1):
       GOTO 120
130 INPUT "Shall I go to 180, 190, or 200";LN$
140 FOR I = 1 TO LEN(LN$)
150   POKE L+5+I,ASC(MID$(LN$,I,1))
160 NEXT I
170 GOTO XXX
180 PRINT "Line 180": END
190 PRINT "Line 190": END
200 PRINT "Line 200": END
```

End

Program Listing 3. Four Up.

```
100 DEFINT A,B
110 CLS
120 L = PEEK(16548)+256*PEEK(16549)
130 IF PEEK(L+2)+256*PEEK(L+3) < 210
    THEN L = PEEK(L)+256*PEEK(L+1):
       GOTO 130
140 INPUT "Two integers, please";A,B
150 INPUT "Two strings please"; C$,D$
160 INPUT "Which variable would you like to see (A,B,C$,D$)";V$
170 V$ = "  " + V$
180 FOR I = 1 TO 3
190   POKE L+14-I,ASC(MID$(V$,LEN(V$)+1-I,1))
200 NEXT I
210 VL = VARPTR(XXX)
220 PRINT V$;" = ";
230 IF RIGHT$(V$,1) <> "$"
    THEN
      PRINT PEEK(VL)+256*PEEK(VL+1): GOTO 300
240 ' ELSE
250       ST = PEEK(VL+1)+256*PEEK(VL+2)
260       FOR I = 0 TO PEEK(VL)-1
270         IF ST+I < 32768
              THEN PRINT CHR$(PEEK(ST+I));
            ELSE PRINT CHR$(PEEK(-1*(65536-ST-I)));
280       NEXT I
290       PRINT
300 END
```

End

LOAD 80

System Requirements

Model III
32K RAM
Disk Basic

Background

Before you can POKE into an existing program, you must understand how and where the program is stored. First the how. The text of each line (numbers as

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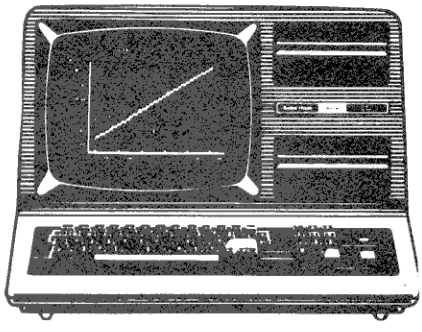

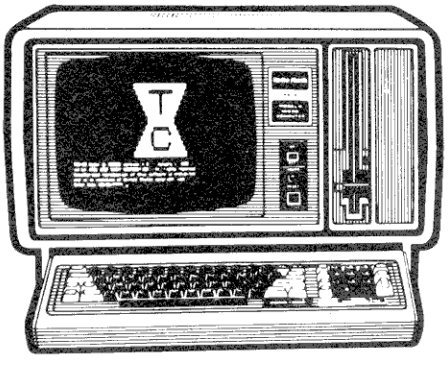

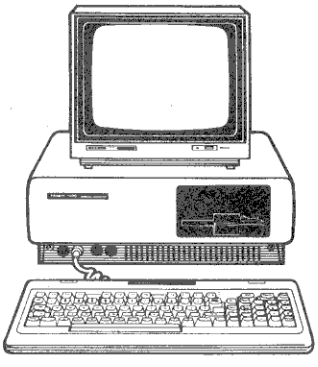

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```
10 CLS
20 INPUT A
30 PRINT A;"squared is";A*A
40 PRINT "The square root of";A;"is";SQR(A)
50 L=PEEK(16548)+256*PEEK(16549):L0=L
60 IF PEEK(L)<>0 OR PEEK(L+1)<>0
   THEN L1=L:L=PEEK(L)+256*PEEK(L+1):GOTO 60
 ELSE POKE L0+1,INT(L/256):POKE L0,L-256*INT(L/256):
    POKE L1,0:POKE L1+1,0
```

Figure 1. Additions to Program Listing 1.

```
Next-line   Line
Pointer     Number   Text
131 106     10 0     132 0
139 106     20 0     137 32 65 0
164 106     30 0     178 32 65 59 34 83 81 85 65 82 69 68
                     32 73 83 34 59 65 207 65 0
203 106     40 0     178 32 34 84 72 69 32 83 81 85 65 82
                     69 32 82 79 79 84 32 79 70 34 59 65 59
                     34 73 83 34 59 221 40 65 41 0
  0   0
```

Figure 2. Shows how the computer stores the lines in Program Listing 1.

well as alphabetic characters) is stored in a series of contiguous bytes, with each byte containing the ASCII code of a single character. (The *Basic Language Reference Manual* contains a list of codes, beginning on p. 228.) The only exception is that key words have their own special codes, called tokens. Tokens save storage space; the code for the key word Input, 136, takes only 1 byte, whereas the ASCII codes would take 5 bytes (see pp. 237 and 238 of the manual for a list of key words and tokens).

For example, the line:

IF X = 150 THEN PRINT "150"

would be stored as:

143,32,88,213,49,53,48,32,202,32,178,32,34,
49,53,48,34,0

where 143 is the token for IF, 32 is the ASCII code for a blank, 88 is the ASCII code for X, and so on. The zero at the end is an end-of-line marker.

Two pairs of bytes precede each line's text: one for the line number and one for a pointer to the next line. (A pointer is a memory location that contains the address of another memory location.) The first byte of each pair is the least-significant byte (LSB) and the second is the most-significant byte (MSB). Together, they can store any number between zero and 65535. To convert from the LSB/MSB version to an actual number, use the formula:

number = LSB + (256*MSB)

For example, the byte pair 232,3 converts to the line number 1000, since 1000 = 232 + (256*3). Converting from a line number or memory location to a byte pair is equally easy. The formula for the MSB is:

INT(number/256)

and the formula for the LSB is:

number – 256*MSB

If the number were 27255, the MSB would be INT(27455/256) = 106, and the LSB would be 27255 – (256*106) = 119. Therefore, 27255 would be stored as 119,106 (the LSB is always listed first).

Now look at Fig. 2 to see how the computer stores Demo's four lines. Though not shown, memory locations 16548 and 16549 always contain a pointer to the first byte of the first line of the program, which in this case is in memory location 27261. The program's first line uses 6 bytes of memory: two for the pointer to the beginning of the second line, two for the line number, one for the token for CLS, and one for the zero to mark the end of the line. The next-line pointer tells the machine that the second line begins at memory location 27267 (131 + 256*106), which you can verify by counting up 6 bytes from 27261.

In the same way, the second line's pointer (139,106) indicates that the third line begins at 27275 (139 + 256*106). Note that the lines are stored in line number order. This happens regardless of how you enter them or if you add or delete lines. If you add a line 15, lines 20, 30, and 40 move down to make room for it. Likewise, if you delete line 30, line 40 moves up to close the gap. The end of the program is marked by a line whose next-line pointer is zero.

The pointers that tie the lines together create a structure called a linked list. Linked lists are commonly used in applications like mailing lists that must accommodate frequent additions and deletions and still keep the data in a particular order. The pointers use up storage space, but they make it easier to update the list; after you insert a new record, the computer maintains the sequence by changing the pointer on the preceding record. This is much simpler than moving all the records that follow the new one.

Applications

A linked list seems like a logical structure for storing program lines, since it doesn't have to move data after additions and deletions. So why does Basic go to the trouble of moving data in the first place? The answer is that when you run a program, Basic executes the lines in the order in which it comes to them, except, of course, when it encounters a GOTO or GOSUB.

Basic uses the pointers for editing and listing lines and locating those to which a program branches. Here's an example of the editor's use of pointers. Load in Demo and PEEK (in the immediate mode) at the first-line pointer to find out where the program begins. (It should start at 27261.)

Now type in POKE 27263,100 and list the program. You'll see that the change has been made and line 100 is still at the beginning because the listing apparatus follows the pointers, which haven't changed. When you run the program, it works perfectly. But if you try to edit line 20, the editor will tell you there's no such line. The editor follows the pointers until it finds the specified line (line 20) or a higher-numbered one. In this case, it finds line 100 and concludes that line 20 doesn't exist.

I'll demonstrate the listing and locating uses of pointers by POKEing to change a next-line pointer. Load Demo again and add the line:

50 IF A < 5 THEN A = A – 1: GOTO 30

In the immediate mode, change the next-line pointer in line 20 so it is the same as the one in line 40. This doesn't alter line 30's physical position, but it does disconnect the line from the linked list. Since the List command follows the pointers, line 30 won't appear when you list the program. If you run the program now, line 30 will be executed once, but when the interpreter reaches line 50 and attempts to branch back, it won't be able to find line 30.

Going with the Flow

So far, I've shown how to use PEEK and POKE to provide information about how a program is stored and how Basic acts upon it. You can also use PEEK and POKE to broaden the scope of GOTO statements.

The program line 90 GOTO A contains a syntax error because GOTO's argument cannot be a variable. This is seldom a problem, because a programmer generally either knows the exact line to branch to or can at least specify a range of possibilities with ON. . .GOTO.

Every once in a while, however, you're faced with a situation in which the stan-

dard forms of GOTO just won't work. While writing a program to track another program and execute one statement at a time, I had no trouble identifying GOTOs or their destinations in the subject program, but I needed to make the tracking program branch to the same line. I solved the problem by writing my code as GOTO XXXXX, and then POKEing in the number once I knew it. As far as the interpreter knew, the number had always been there, and the program worked fine.

The actual tracking program is too complicated to be used as an example, but Program Listing 2, Tracker, illustrates the idea. Line 110 loads L with the location of the first line of the program. Line 120 is a single-line loop that follows the next-line pointers until it finds line 170 (the GOTO). Each time through the loop, L and L + 1 contain the LSB and MSB of the next line's location, L + 2 and L + 3 hold the LSB and MSB of the line number, and the text begins at L + 4.

The For. . .Next loop in lines 140–160 POKEs the ASCII codes of the three characters in the destination line number into memory locations that originally held three X's. I use X's because a string of 88's (X's ASCII value) in memory is easy to spot, but any character is acceptable. Just be sure to use at least as many dummy characters as the number of digits in the highest line number you'll want to POKE in.

The easiest way to determine the first argument for the POKE (in this case, L + 5 + I) is to PEEK at the portion of memory that contains the program, find line 170, and count over to where the X's are. The code for the PEEKing is:

```
FOR Q = <starting location> TO <ending location>: PRINT PEEK(Q);: NEXT Q
```

If you try to PEEK without looking at memory, remember that the token for GOTO uses only 1 byte and each blank also uses a byte.

Finding Value

My tracking program brought up another problem that I solved in much the same way: how to display the value of a variable chosen by the user. VARPTR( ) returns either the location of the variable in parentheses or its length and a pointer to its first character. However, code such as:

```
60 INPUT V$
70 LET L = VARPTR(V$)
```

returns the location of V$, not its contents. Here again, I wrote the code with a dummy argument for the VARPTR, then POKEd in the real value once I knew it.

Program Listing 3, Four Up, is an example of this technique. It prompts you for two integers and two strings, asks you to choose one of the four, and prints it. Lines 120 and 130 locate the line in which you want to POKE (line 210). Lines 160 and 170 get the name of the variable to be displayed and pad it on the left with two blanks to guarantee that it's at least three characters long. Since only the first two characters of a variable name are significant, the VARPTR statement needs room only for those two plus a type tag.

The loop in lines 180–200 POKEs the variable name into the VARPTR( ), line 210 returns the address of the variable or of a pointer to it, and the rest of the program prints the value of the variable. Lines 230–270 are actually one long If. . .Then. . .Else statement.

POKEing Fun

You've seen some examples of unusual uses for PEEK and POKE; perhaps you'll discover more on your own. However, be sure you understand how programs are stored, or you could destroy one. And remember to save your programs before running them. That way, if you accidentally turn your code into gibberish, you won't have to struggle to undo the damage. ■

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Ever the Twain Shall Meet

The serial-to-parallel converter project in the February issue let you use a parallel printer with your computer's RS-232C serial port. This month's parallel-to-serial converter lets you do the obverse: use a serial printer with your computer's parallel interface (see the Photo). While most printers have an RS-232C port, some lack a standard Centronics parallel interface.

Overview

Figure 1 shows the block diagram for the parallel-to-serial converter. The computer recognizes the board as a printer with a Centronics parallel interface, and the printer sees the board as a computer's RS-232C port. This allows the devices to interact without problems.

You can use the board in other ways, too, like putting your parallel printer in a location remote from your computer (see Fig. 2). A parallel interface generally limits you to a 6-foot distance, while an RS-232C allows over 50 feet.

Interface

This project uses two standard interfaces. One is an official standard (the RS-232C), the other a de facto standard (the Centronics parallel printer interface). The RS-232C is an EIA (Electronics Industries Association) standard. You can get the specification from the EIA, as indicated in the reference list at the end of this column.

I detailed RS-232C serial and Centronics parallel interfaces in previous columns; see Project 80, January 1984 (p. 197) and September and October 1984 (pp. 102 and 146, respectively) for more on interfaces.

The 8250 UART

An 8250 asynchronous communications element (ACE), more commonly referred to as a universal asynchronous receiver/transmitter (UART), handles the serial interface on the parallel-to-serial converter board. The 8250 is a 40-pin chip with a single serial channel, a crystal oscillator, a baud rate generator, and interrupt-generation circuitry. Figure 3 shows a block diagram of the 8250; you can find a further description in the July 1985 Project 80 (p. 84).

LOAD 80

System Requirements

Models I, III, 4, and 1000
Assembly language
8748 Assembler

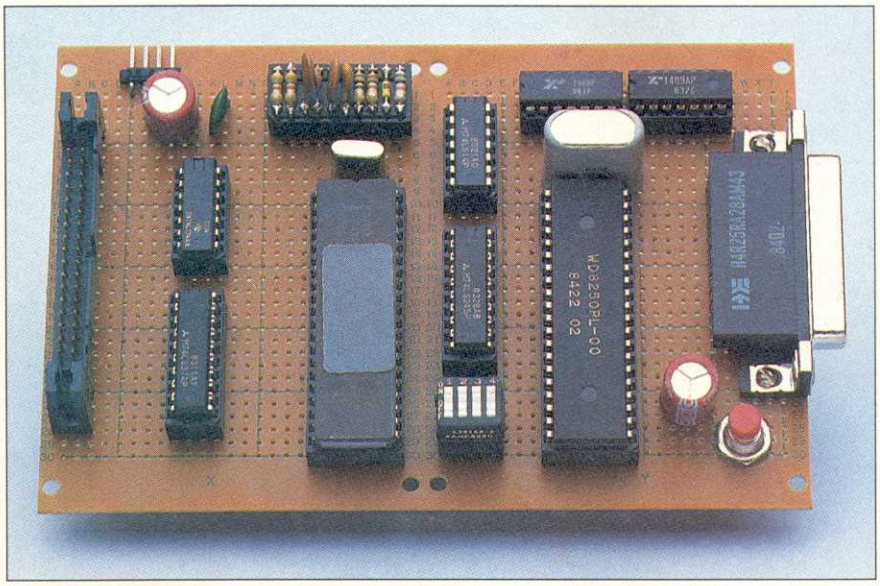

Photo. Parallel-to-serial converter.

8748 Single-Chip Microcomputer

The 8748 single-chip microcomputer is a nifty 40-pin device with 1K of EPROM (erasable programmable read-only memory), 64 bytes of RAM, one counter/timer, 24 general-purpose input/output lines, three additional special input lines, an on-chip crystal oscillator, and interrupt control circuitry. While you're limited by its instruction set and architecture, the chip is certainly adequate for small control projects.

Figure 4 shows a block diagram of the 8748. A further discussion of the 8748 microcomputer is given in the July 1985 Project 80 (p. 84).

Building the Parallel-to-Serial Converter Board

Figure 5 shows the schematic diagram of the parallel-to-serial converter board. The parts list appears in Table 1. Besides the items indicated in the parts list, you'll need two 40-pin IC sockets, two 20-pin sockets, and four 14-pin sockets (plus an 8-pin socket if you socket the DIP [dual in-line package] switch). I also used a 20-pin component carrier for resis-

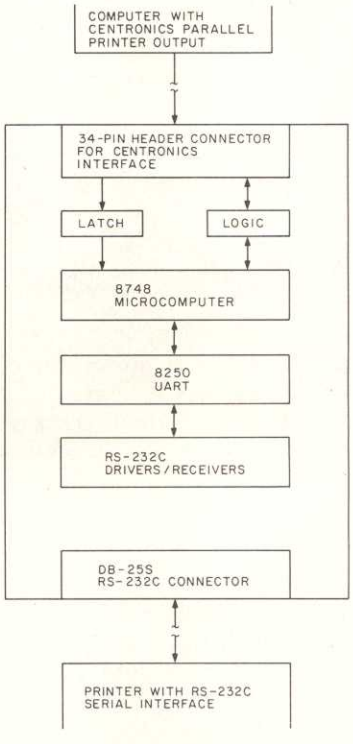

Figure 1. Block diagram of the parallel-to-serial converter.

Photograph by Frank Cordelle

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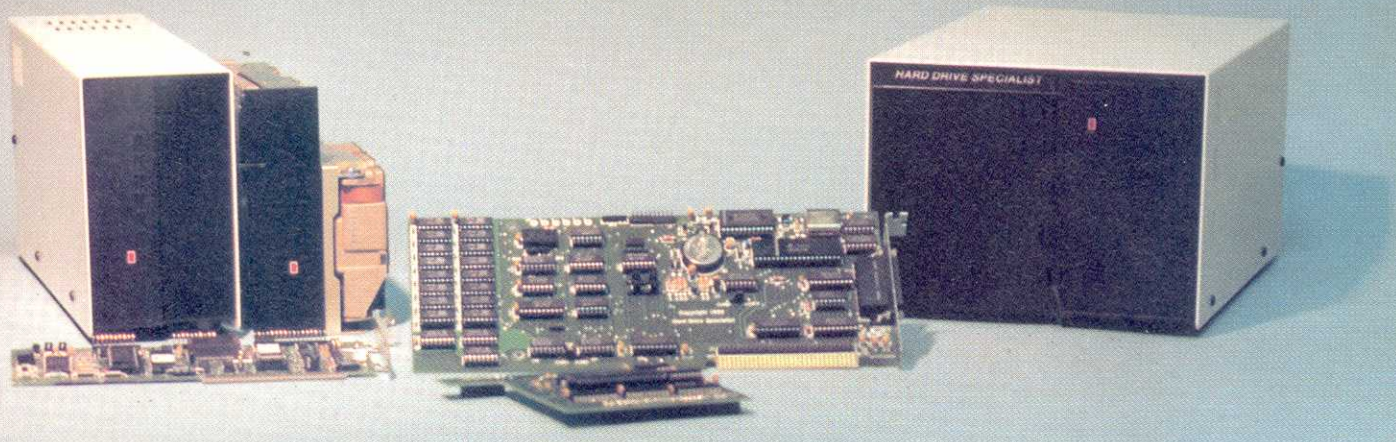

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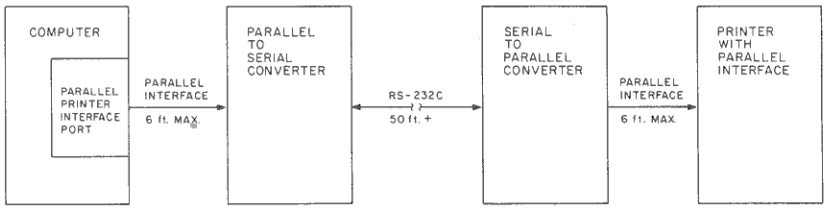

Figure 2. Remote printer for computer using parallel printer port.

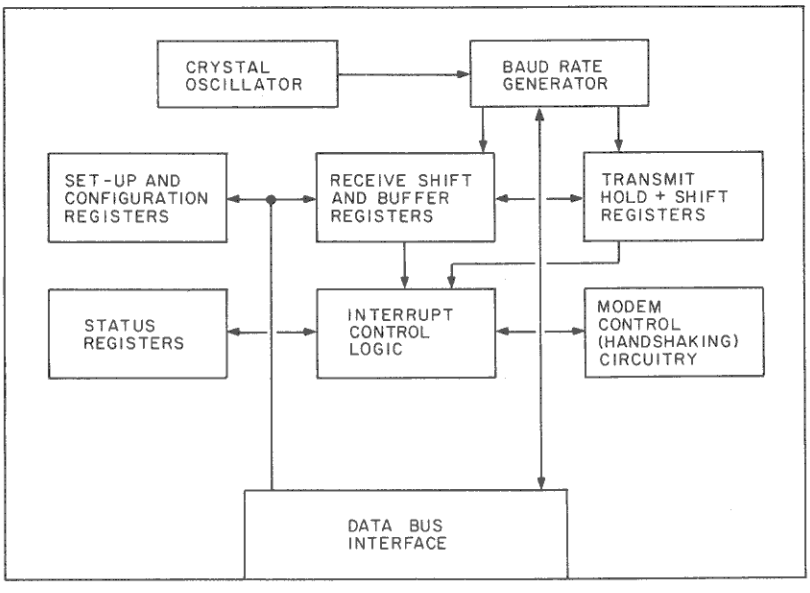

Figure 3. 8250 UART block diagram.

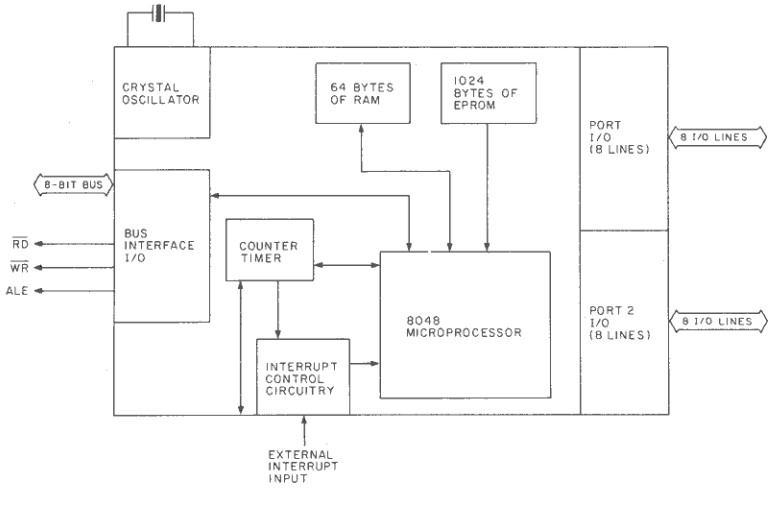

Figure 4. 8748 block diagram.

tors, diodes, and small capacitors, which required an additional 20-pin socket. For power, you will need a +5-volt at 400 milliamps supply and ±12-volt to a ±15-volt at 100 milliamps supply.

Figure 6 shows the board layout I used. Note that the connector for the Centronics parallel printer interface is a 34-pin male header connector, not the standard 36-pin female Centronics connector. The header connector is designed for a ribbon-cable attachment, which has a 34-pin female socket connector on one end (that mates with the header) and a female Centronics connector on the other end. It is important to note the position of pin 1 of the header connector in Fig. 6. To avoid confusion, the pin numbering of the header connector appears in Fig. 7. Figure 8 shows the cable assembly; it's the same cable used in both printer switch projects (October and November 1985, pp. 82 and 88, respectively) as well as the printer buffer project (September and October 1984, pp. 102 and 146, respectively).

I chose the header connector approach instead of the female PC-mount (printed circuit-mount) Centronics connector because the Centronics connector doesn't have 0.1-inch pin-to-pin spacing, making it difficult to mount on a standard prototyping board. The DB-25S has a similar problem, but the pins are close enough to 0.1 inch that they are easily mounted if you clip off the unused pins. If you want to use two fewer connectors for this board (the header and socket connectors), you may use a PC-mount female Centronics connector mounted on the board in place of the header connector and cable assembly. The pin numbers for the Centronics connector are given in parentheses on the schematic.

Building the board is fairly straightforward. Pay careful attention to the DB-25S pin numbers, which you should see marked on the connector. Power and ground connections for the chips are given on the schematic (see Fig. 5). A note concerning the DIP switch is in order. The switch numbers are given on the schematic in Fig. 6. The left-most switch is switch 1, and the right-most is switch 4. If you wire the DIP switch correctly, the three right switches select the baud rate, with the right-most switch being the low-order baud rate select switch.

Handshaking

The DB-25S RS-232C connector is wired as a DTE (data terminal equipment) device, the same as most computers. If your printer also has a DTE-configured RS-232C port, you'll need a null modem cable between the printer and the parallel-to-serial converter (see Fig. 9). If your printer has a DCE-confi-

Circle 396 on Reader Service card.

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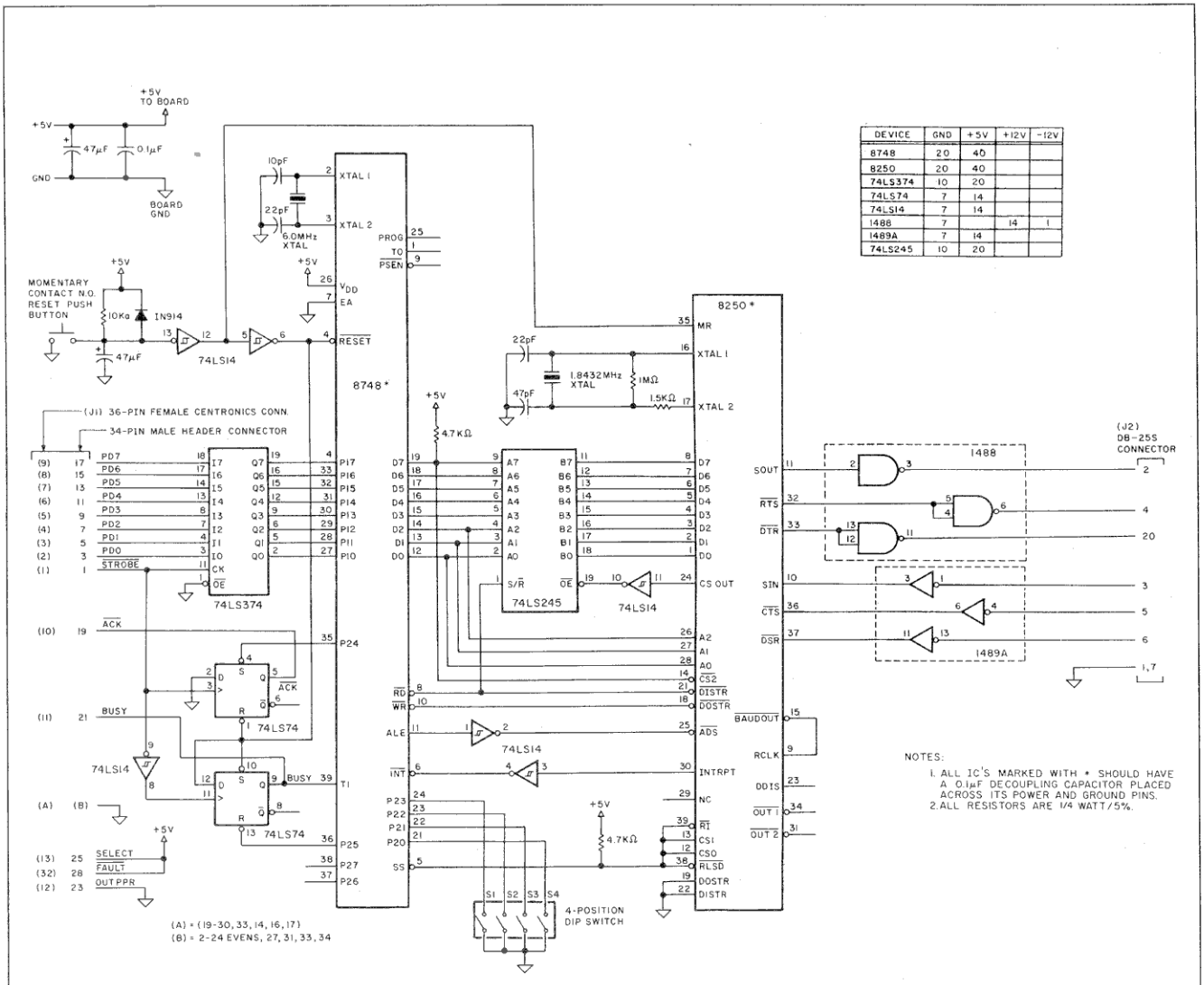

DEVICE	GND	+5V	+12V	-12V
8748	20	40		
8250	20	40		
74LS374	10	20		
74LS74	7	14		
74LS14	7	14		
1488	7		14	1
1489A	7	14		
74LS245	10	20		

Figure 5. Power and ground connections for chips.

gured RS-232C interface, you'll need a straight-through cable. Because of the importance of understanding handshaking to fully understand the operation of this project, I will reiterate the brief discussion of serial communication handshaking presented last month.

Handshaking controls the information transferred between two or more systems. Many systems can't receive and process incoming information as rapidly as other systems can transmit it. For instance, a computer can typically send characters to a printer faster than the printer can process them. The receiving system needs to indicate to the sending system when it is OK to send information and when it is not. This is called handshaking.

Generally, serial communications use

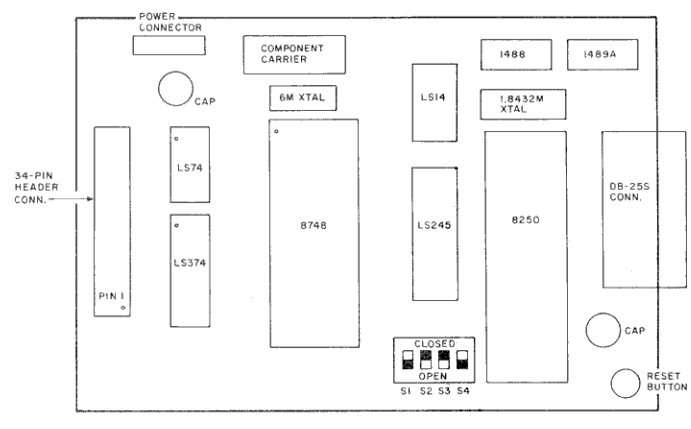

Figure 6. Component layout of the parallel-to-serial converter.

Circle 198 on Reader Service card.

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LAPDOS allows you to easily use your database, spreadsheet, or word processing files while on the road with your Tandy or NEC laptop computer. In fact, LAPDOS includes a program called "The Exchanger" which allows you to use ThinkTank and Sidekick files with the IDEA! outline processor available from Traveling Software on a software chip called The Ultimate ROM II.

LAPDOS is only $89.95, which includes a special hardware adapter which allows the disk drive to plug into any IBM PC or compatible computer with a serial RS232 port. The LAPDOS software comes on an IBM 5¼" disk with a complete owner's manual. And if you already own the Ultimate ROM II, or are purchasing it now, you will receive a $20 discount off the cost of LAPDOS.

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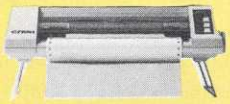

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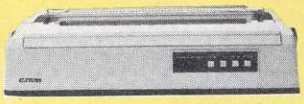

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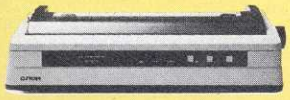

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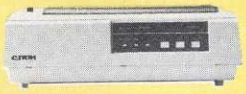

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1	1.8432 MHz Crystal	JDR		3.95
1	74LS14 Hex Inverter/Schmitt trigger (LS TTL) IC	JDR	74LS14	.59
1	74LS245 Bidirectional bus buffer (LS TTL) IC	JDR	74LS245	1.49
1	LM1488 Quad RS-232C Driver IC	JDR	LM1488	.69
1	LM1489A Quad RS-232C Receiver IC	JDR	LM1489	.69
1	DB-25S/RA Right-angle D-subminiature connector	JDR	DB25SR	4.42
1	34-position Cable header (w/w)	DK	R230-ND	1.90
1	4-position DIP switch (SPST)	RS	275-1304	1.49
1	Momentary contact SPST switch (mini)	RS	275-1571	.80
2	47 µF/35 V Electrolytic capacitors (PC-mount)	RS	272-1027	.69
3	.1 µF/50 V Disc capacitors	RS	272-135	.25
1	10 pF/500 V Disc capacitor	DK	P4000	.08
2	22 pF/500 V Disc capacitors	DK	P4004	.08
1	47 pF/50 V Disc capacitor	RS	272-121	.20
1	1N914 Small signal diode	RS	276-1122	.10
1	1 M ohm Resistor (¼watt)	DK		.05
1	10 Kohm Resistor (¼ watt)	RS	271-1335	.08
1	1.5 Kohm Resistor (¼ watt, 5%)	DK		.05
1	34-position Ribbon cable socket connector	DK	R305-ND	2.24
6 feet	34-conductor Ribbon cable	DK	R026-ND	—
1	74LS74 Dual D-type flip-flop (LS TTL) IC	JDR	74LS74	.35
2	4.7 Kohm Resistors (¼ watt)	RS	271-1330	.08
1	36-position Centronics-type ribbon cable connector (female)	JE	CEN36F	9.75
1	74LS374 Octal tri-state latch	JDR	74LS374	1.39

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Table 1. Parts list for parallel-to-serial converter.

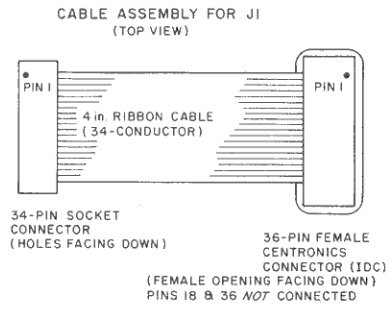

Figure 8. How to build the cable assemblies.

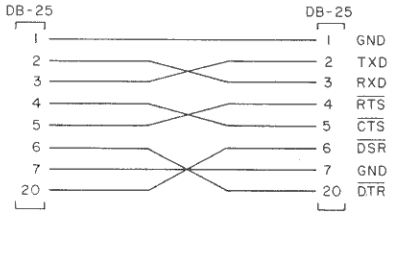

Figure 9. Null modem cable configuration.

34	+	+	33
32	+	+	31
30	+	+	29
28	+	+	27
26	+	+	25
24	+	+	23
22	+	+	21
20	+	+	19
18	+	+	17
16	+	+	15
14	+	+	13
12	+	+	11
10	+	+	9
8	+	+	7
6	+	+	5
4	+	+	3
2	+	+ +	1

(Top view)

Figure 7. Pin number for header connector.

two handshaking methods: hardware and software. Hardware handshaking uses dedicated lines on the communications interface (the RS-232C port in this case), while software handshaking involves sending special characters to stop and start character transmissions.

The RS-232C standard specifies several lines for handshaking. The most common are RTS/ (request to send), CTS/ (clear to send), DTR/ (data terminal ready) and DSR/ (data set ready). These signals work in pairs (RTS/-CTS/ and DTR/-DSR/), such that on any given interface connector, one of the signals in each pair is an output while the other is an input.

Serial communications provide several software handshaking methods, the most prevalent of which is XON/XOFF (transmission on/transmission off). This method uses two ASCII characters designated as XON and XOFF. The ASCII DC1 character (11H or control-Q) represents the XON specifier, while the ASCII DC3 character (13H or control-S) provides the XOFF character. When DC3 goes to the transmitting system, the transmitting system responds by stopping its data transmission. It then resumes data transmission on receiving a DC1 character.

Transmitting systems can't always respond immediately to a change in handshaking status. This is important to remember when telling the transmitting system to stop sending characters.

If the receiving system can buffer up to 100 characters, and it waits until it receives the 100th character before telling the transmitting system to stop sending characters, the transmitting system won't be able to respond until it sends two or three more characters. It's

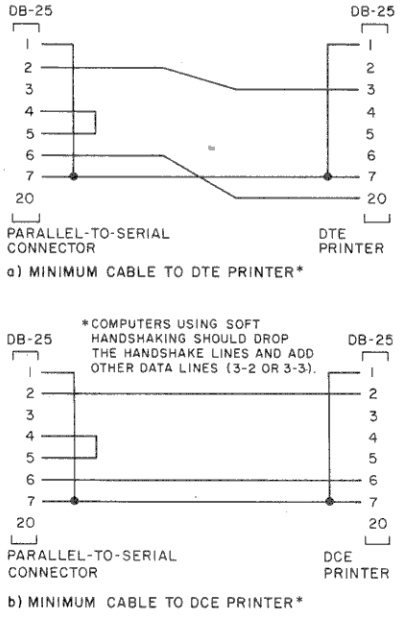

Figure 10. a) Minimum cable requirements for a DTE printer. b) For a DCE printer.

important for the receiving system to tell the transmitting system to stop transmitting when room still exists in its buffer.

Most microcomputers that have RS-232C ports support hardware handshaking. Systems that have an RS-232C interface without hardware handshaking and systems that use an interface that doesn't support hardware handshaking resort to software handshaking, such as the XON/XOFF protocol.

The parallel-to-serial converter described this month supports both RS-232C hardware handshaking and the XON/XOFF software handshaking protocol. The option is DIP-switch selectable.

The cable between the parallel-to-serial converter and your printer is probably a null modem cable. If your printer has a DCE interface (transmits on pin 3 and receives on pin 2), however, you'll need a straight-through cable, where lines 1–7 and 20 connect to the corresponding pins on each of the two DB-25 connectors on the cable.

You won't need all the lines since the parallel-to-serial converter board will stop sending information to the printer if either of the two handshaking lines (pin 5, CTS/, and pin 6, DSR/) goes inactive.

If your printer has the standard DTE interface (transmits on pin 2 and receives on pin 3), then pin 20 from the printer should connect to pin 6 on the parallel-to-serial converter's RS-232C port (assuming your printer uses pin 20

Program Listing. PARTOSER/A48.

```
                ;*************************************************************
                ;
                ;                       PARTOSER/A48
                ;
                ; This program controls the Project 80 Parallel to Serial
                ; Converter, executing on an 8748-type microcomputer. The
                ; program allows either hardware "modem-control" handshaking
                ; or XON/XOFF handshaking.
                ;
                ;          *****   Written by Roger C. Alford   *****
                ;
                ;                Last modification: 12/05/85
                ;                Version: 1.0
                ;*************************************************************
                ;
                ; SYSTEM EQUATES:
0011            XON:    EQU     11H     ;ASCII XON CHARACTER (DC1)
0013            XOFF:   EQU     13H     ;ASCII XOFF CHARACTER (DC3)
0003            LCR:    EQU     03H     ;8250 UART "LINE CONTROL REGISTER"
0001            DLM:    EQU     01H     ;8250 UART "DIVISOR LATCH MSB" REG.
0005            LSR:    EQU     05H     ;8250 UART "LINE STATUS REGISTER"
0000            RBR:    EQU     00H     ;8250 UART "RECEIVER BUFFER REGISTER"
0000            THR:    EQU     00H     ;8250 UART "TRANSMITTER HOLDING REG."
0001            IER:    EQU     01H     ;8250 UART "INTERRUPT ENABLE REGISTER"
0004            MCR:    EQU     04H     ;8250 UART "MODEM CONTROL REGISTER"
0006            MSR:    EQU     06H     ;8250 UART "MODEM STATUS REGISTER"
0020            STRAM:  EQU     20H     ;START OF FREE RAM IN 8748
0020            CHRBFR: EQU     STRAM   ;INCOMING CHARACTER BUFFER
0020            BFRLEN: EQU     40H-CHRBFR ;LENGTH OF CHARACTER BUFFER
0040            BFREND: EQU     CHRBFR+BFRLEN ;END ADDR. + 1 OF CHAR. BUFFER
                ;
                ;*************************************************************
                ; THIS SECTION OF CODE CONTAINS THE RESET AND INTERRUPT
                ; VECTORS, AND THE RESET INITIALIZATION CODE.
                ;
0000                    ORG     000H
0000  0409      RESET:  JMP     INIT            ;SYSTEM RESET -- INIT. BELOW
0003                    ORG     003H
0003  0473      URTINT: JMP     PRCURT          ;UART INTERRUPT -- PROCESS IT
0009                    ORG     009H
0009  15        INIT:   DIS     I               ;MAKE SURE INT'S DSBLED
000A  B800              MOV     R0,#00H         ;PREPARE R0 AND R1 FOR POWER-
000C  B900              MOV     R1,#00H         ; UP STABILIZATION DELAY.
                                                ; (APPROX. 823 MS DELAY.)
000E  F8        DLYLP:  MOV     A,R0            ;GET R0 (LOW DELAY BYTE) VALUE
000F  07                DEC     A               ;DECREMENT THE LOW DELAY BYTE
0010  A8                MOV     R0,A            ;STORE NEW DELAY BYTE VALUE
                                                ; BACK IN R0.
0011  960E              JNZ     DLYLP           ;IF R0 NOT ZERO, LOOP AGAIN
0013  F9                MOV     A,R1            ;ELSE GET R1 (HI DLY BYTE) VLU
0014  07                DEC     A               ;DECREMENT THE HI DELAY BYTE
0015  A9                MOV     R1,A            ;STORE NEW DELAY BYTE VALUE
                                                ; BACK IN R1.
0016  960E              JNZ     DLYLP           ;IF R1 NOT ALSO 0, LOOP AGAIN,
                                                ; ELSE DELAY COMPLETE.
0018  1495              CALL    SETURT          ;SET-UP THE UART
001A  B920              MOV     R1,#CHRBFR      ;INIT. R1 TO START OF BUFFER
001C  BA20              MOV     R2,#CHRBFR      ;INIT. R2 TO START OF BUFFER
001E  BB00              MOV     R3,#00H         ;BUFFER IS INIT. CLEAR
0020  BD00              MOV     R5,#00H         ;CLEAR "XOFF MODE" FLAG
0022  9ACF              ANL     P2,#0CFH        ;CLEAR P2 BITS 4 & 5 TO
                                                ; PARALLEL DATA TO BE RCV'D.
0024  8AFF              ORL     P2,#0FFH        ;SET P2 BITS HIGH AGAIN
0026  05                EN      I               ;ENABLE UART INTERRUPTS NOW
                ;
                ;*************************************************************
0027            MAIN:
                ;
                ; THIS SECTION OF CODE IS THE MAIN CONTROLLING LOOP, WHICH
                ; DETERMINES WHEN TO SEND CHARACTERS TO THE PRINTER AND WHEN
                ; TO STORE INCOMING CHARACTERS IN THE INTERNAL BUFFER AREA.
                ;
                ;       CERTAINS REGISTERS ARE DEDICATED AS FOLLOWS:
                ;               R1 -- BFRON: BUFFER ON POINTER
                ;               R2 -- BFROFF: BUFFER OFF POINTER
                ;               R3 -- BFRCNT: BUFFER CHARACTER COUNT
                ;               R4 -- HSFLAG: HANDSHAKE FLAG (0=SOFT)
                ;               R5 -- XOFFLG: XOFF MODE ACTIVE FLAG
                ;
0027  FB                MOV     A,R3            ;GET BUFFER COUNT VALUE
0028  C644              JZ      CKCHIN          ;IF NO CHARS, LOOK FOR INPUT
002A  FC                MOV     A,R4            ;ELSE GET HANDSHAKE FLAG
002B  C637              JZ      SOFTHS          ;IF XON/XOFF, GO BELOW
002D  B806              MOV     R0,#MSR         ;GET ADDRESS OF UART MSR
002F  80                MOVX    A,@R0           ;GET HANDSHAKE STATUS BYTE
0030  43CF              ORL     A,#0CFH         ;SET INSIGNIFICANT BITS
0032  37                CPL     A               ;COMPLEMENT ACCUMULATOR TO SEE
                                                ; IF BOTH H.S. LINES ACTIVE.
0033  9644              JNZ     CKCHIN          ;IF A NOT ZERO, H.S. INACTIVE,
                                                ; CAN'T SEND A CHARACTER.
0035  043A              JMP     SEND            ;ELSE GO BELOW AND SEND CHAR.
0037  FD        SOFTHS: MOV     A,R5            ;IS "XOFF" MODE ACTIVE?
0038  9644              JNZ     CKCHIN          ;IF YES, DON'T SEND CHAR.
003A  FA        SEND:   MOV     A,R2            ;GET BUFFER OFF POINTER
003B  A8                MOV     R0,A            ;PUT POINTER INTO R0
003C  F0                MOV     A,@R0           ;GET NEXT BUFFER CHARACTER
003D  145C              CALL    SENCHR          ;SEND CHARACTER OUT SERIAL
003F  FA                MOV     A,R2            ;GET BUFFER OFF POINTER AGAIN
0040  1469              CALL    UPDPTR          ;UPDATE THE POINTER VALUE
0042  AA                MOV     R2,A            ;STORE UDPATED VALUE
```

Listing continued

Listing continued

```
0043  CB              DEC     R3              ;DECREMENT BUFFER COUNT VALUE
0044  FB        CKCHIN: MOV     A,R3            ;GET BUFFER COUNT VALUE
0045  03E0            ADD     A,#0FFH-BFRLEN+1 ;IS THE BUFFER FULL?
0047  C627            JZ      MAIN            ;IF YES, GO BACK AND LOOP
0049  4627            JNT1    MAIN            ;IF NO RECEIVED CHARACTER, GO
                                                ; BACK AND LOOP.
004B  09              IN      A,P1            ;ELSE GET RECVD CHAR.
004C  9AEF            ANL     P2,#0EFH        ;CLEAR ACKNOWLEDGE
004E  8AFF            ORL     P2,#0FFH
0050  A1              MOV     @R1,A           ;STORE RECEIVED CHAR IN BUFFER
0051  F9              MOV     A,R1            ;GET BUFFER ON POINTER
0052  1469            CALL    UPDPTR          ;UPDATE THE POINTER VALUE
0054  A9              MOV     R1,A            ;STORE UPDATED POINTER VALUE
0055  1B              INC     R3              ;INCREMENT BUFFER COUNT VALUE
0056  9ADF            ANL     P2,#0DFH        ;CLEAR BUSY
0058  8AFF            ORL     P2,#0FFH
005A  0427            JMP     MAIN            ;GO BACK AND LOOP AGAIN
                ; END OF MAIN CONTROL ROUTINE: MAIN.
                ;
                ;*************************************************************
005C            SENCHR:
                ;
                ; THIS SUBROUTINE SENDS THE CHARACTER IN THE ACCUMULATOR OUT
                ; THE UART, AS SOON AS THE UART PERMITS A CHARACTER TO BE
                ; LOADED INTO ITS TRANSMITTER HOLDING REGISTER. REGISTERS A,
                ; R0 AND R6 ARE AFFECTED.
                ;
005C  AE                MOV     R6,A            ;STORE CHAR. TO BE SENT IN R6
005D  B805              MOV     R0,#LSR         ;POINT AT UART "LINE STATUS
                                                ; REGISTER".
005F  80        WTTX:   MOVX    A,@R0           ;GET UART STATUS REGISTER
0060  5320              ANL     A,#20H          ;IS THE TRANSMITTER FREE?
0062  C65F              JZ      WTTX            ;IF NOT, JUST WAIT
0064  FE                MOV     A,R6            ;ELSE GET CHAR. BACK FROM R6
0065  B800              MOV     R0,#THR         ;POINT AT UART "TRANSMITTER
                                                ; HOLDING REGISTER".
0067  90                MOVX    @R0,A           ;SEND CHARACTER OUT UART
0068  83                RET                     ;ACC. CHARACTER SENT -- RETURN
                                                ; TO THE CALLING ROUTINE.
                ; END OF SUBROUTINE: SENCHR.
                ;
                ;*************************************************************
0069            UPDPTR:
                ;
                ; THIS SUBROUTINE UPDATES THE CHARACTER BUFFER POINTER PASSED
                ; IN THE ACCUMULATOR. SINCE THE CHARACTER BUFFER IS A CIRCULAR
                ; BUFFER (LOGICAL QUEUE), THE POINTER MUST BE RESET TO THE
                ; BEGINNING OF THE BUFFER IF IT IS INCREMENTED BEYOND THE END.
                ; REGISTERS A AND R0 ARE AFFECTED.
                ;
0069  17                INC     A               ;INCREMENT THE POINTER VALUE
006A  A8                MOV     R0,A            ;STORE TEMP. IN R0
006B  03C0              ADD     A,#0FFH-BFREND+1 ;POINTER EXCEEDED BUFFER END?
006D  9671              JNZ     PTROK           ;IF NOT, EXIT BELOW
006F  B820              MOV     R0,#CHRBFR      ;ELSE MOVE POINTER BACK TO
                                                ; START OF THE BUFFER.
0071  F8        PTROK:  MOV     A,R0            ;PUT UPDATED POINTER VALUE
                                                ; BACK INTO ACC.
0072  83                RET                     ;ACC. POINTER UPDATED --
                                                ; RETURN TO THE CALLING
                                                ; ROUTINE.
                ; END OF SUBROUTINE: UPDPTR.
                ;
                ;*************************************************************
0073            PRCURT:
                ;
                ; THIS IS THE INTERRUPT SERVICE ROUTINE TO PROCESS RECEIVED-
                ; CHARACTER INTERRUPTS FROM THE 8250 UART. IF THE RECEIVED
                ; CHARACTER IS AN XOFF CHARACTER, THE XOFF FLAG (R5) IS SET.
                ; IF IT IS AN XON CHARACTER, THE XOFF FLAG IS CLEARED. IF THE
                ; RECEIVED CHARACTER IS NEITHER, IT IS MERELY IGNORED.
                ;
0073  D5                SEL     RB1             ;SELECT REG. BANK 1
0074  AA                MOV     R2,A            ;STORE THE CURRENT ACC. VALUE
0075  C5                SEL     RB0             ;SELECT REG. BANK 0 AGAIN
0076  F8                MOV     A,R0            ;GET CURRENT R0 VALUE
0077  D5                SEL     RB1             ;SELECT REG. BANK 1 AGAIN
0078  AB                MOV     R3,A            ;STORE CURRENT R0 VALUE HERE
0079  C5                SEL     RB0             ;GO BACK TO REG. BANK 0
007A  B800              MOV     R0,#RBR         ;POINT AT THE UART "RECEIVER
                                                ; BUFFER REGISTER".
007C  80                MOVX    A,@R0           ;GET RECVD CHARACTER FROM UART
007D  A8                MOV     R0,A            ;STORE CHAR. IN R0 FOR NOW
007E  03ED              ADD     A,#0FFH-XOFF+1  ;XOFF CHARACTER?
0080  9686              JNZ     CKXON           ;IF NOT, CHECK FOR XON
0082  BDFF              MOV     R5,#0FFH        ;SET XOFF FLAG
0084  048D              JMP     INTDUN          ;INTERRUPT SERVICE DONE
0086  F8        CKXON   MOV     A,R0            ;GET RECVD CHARACTER AGAIN
0087  03EF              ADD     A,#0FFH-XON+1   ;XON CHARACTER?
0089  968D              JNZ     INTDUN          ;IF NOT, INTERRUPT SERVICE DUN
008B  BD00              MOV     R5,#00H         ;ELSE CLEAR XOFF FLAG
008D  D5        INTDUN: SEL     RB1             ;ELSE RESTORE ACC. AND R0
008E  FB                MOV     A,R3            ;GET ORIG. R0 VALUE
008F  C5                SEL     RB0             ;SELECT REG. BANK 0
0090  A8                MOV     R0,A            ;STORE VALUE BACK INTO R0
0091  D5                SEL     RB1             ;SELECT REG. BANK 1 AGAIN
0092  FA                MOV     A,R2            ;GET ORIG. ACC. VALUE
0093  C5                SEL     RB0             ;SELECT REG. BANK 0 AGAIN
0094  93                RETR                    ;UART PROCESSING DONE --
                                                ; RETURN TO NORMAL PROGRAM
                                                ; CONTROL.
                ; END OF INTERRUPT SERVICE ROUTINE: PRCURT.
                ;
```

Listing continued

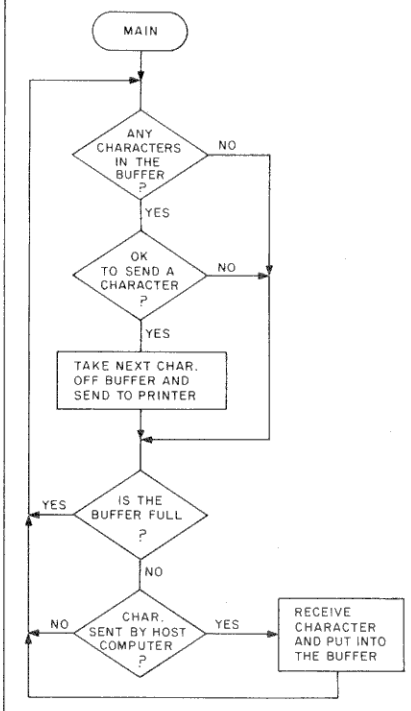

Figure 11. Main software section flowchart.

for handshaking; check your printer manual). If your printer has a DCE port, however, connect the printer's handshaking line (pin 6) to the converter board's pin 6.

If you aren't using software handshaking, you don't have to include the serial data input line (pin 3) from the parallel-to-serial converter in your cable, since you need data input only if you use software handshaking.

The DB-25S connector on the parallel-to-serial converter provides three RS-232C input lines; serial data input (pin 3), CTS/ (pin 5), and DSR/ (pin 6). Since the 8748 controller software treats the input handshaking lines (CTS/ and DSR/) identically, you can use either or both of these lines for handshaking. You use the serial data input line, however, if you choose software handshaking, and you must connect it.

Since both of the input handshaking lines are treated equally, if you connect only one to the printer, you should also connect the other to either the same signal or to pin 4 on the DB-25S (which is always active).

The minimum cable configurations for a printer with a DTE RS-232C port appear in Fig. 10a and b. Be sure the DB-

Baud	S2	S3	S4
110	Off	Off	Off
300	Off	Off	On
600	Off	On	Off
1200	Off	On	On
2400	On	Off	Off
4800	On	Off	On
9600	On	On	Off
19200	On	On	On

(On = Closed, Off = Open)

Table 2. DIP switch baud rate options.

25 connector on the printer end of the cable mates with the DB-25 connector on your printer. If your printer uses a connector other than a DB-25, you must use the signal names to configure your cable.

The DIP switch on the converter board selects both the serial port baud rate and the handshaking mode. Switches 2–4 select the baud rate according to Table 2. Note that switch 4 is the low-order switch. Switch 1 selects the handshaking mode. If the switch is open, you've selected hardware handshaking; if closed, you'll get software handshaking.

The parallel-to-serial converter uses available 8748 RAM to buffer incoming characters (coming in via the parallel input port). The 8748 reserves 32 bytes to buffer incoming characters. Whenever the buffer fills, no further characters are accepted until space becomes available in the buffer.

Program Operation

The 8748 controller software appears in the Program Listing. This is followed by the "system equates" section, which defines the XON/XOFF characters, the 8250 UART registers and the input character buffer (storage) area. This is followed by the vector and initialization area.

When an 8748 reset occurs, execution always starts at location 000H. This location usually has a jump instruction to the start of the controller program ('INIT' in this case). An interrupt generated by an external device (the 8250 UART in this system) calls a subroutine (with automatically disabled interrupts) to location 003H. I also put a jump (to PRCURT) at the same location.

INIT starts the initialization code for the controller program. First, the program executes a delay loop of slightly less than a second to ensure that power has stabilized to all board devices. After the power stabilization delay, the program calls the SETURT subroutine.

SETURT sets up the 8250 for 8-bit characters (standard for printers), no

Listing continued

```
                ;*************************************************************
0095            SETURT:
                ;
                ; THIS SUBROUTINE SETS UP THE 8250 UART. THE PARAMETERS
                ; INCLUDE 8 DATA BITS, NO PARITY, AND 1 STOP BIT. THE BAUD
                ; RATE IS SELECTED BY THE CONFIGURATION OF THE ON-BOARD DIP
                ; SWITCH, AS INDICATED BY THE BAUD RATE DIVIDER VALUE TABLE,
                ; "BAUDTB".
                ;
0095  B803              MOV     R0,#LCR         ;GET THE ADDR. OF THE 8250
                                                ; "LINE CONTROL REGISTER".
0097  2303              MOV     A,#03H          ;SELECT 8-BIT, NO PARITY,
                                                ; 1 STOP BIT CHARACTERS.
0099  90                MOVX    @R0,A           ;WRITE VALUE TO THE 8250
                                                ; "LINE CONTROL REGISTER".
009A  B901              MOV     R1,#IER         ;GET THE ADDR. OF THE 8250
                                                ; "INTERRUPT ENABLE REG.".
009C  2301              MOV     A,#01H          ;SELECT INTERRUPT ENABLED FOR
                                                ; RECVD DATA AVAILABLE.
009E  91                MOVX    @R1,A           ;WRITE VALUE TO THE 8250
                                                ; "INT. ENABLE REG.".
009F  B904              MOV     R1,#MCR         ;GET THE ADDR. OF THE 8250
                                                ; "MODEM CONTROL REGISTER".
00A1  2303              MOV     A,#03H          ;SET RTS AND DTR (ACTIVE)
00A3  91                MOVX    @R1,A           ;WRITE VALUE TO THE 8250
                                                ; "MODEM CONTROL REGISTER".
00A4  2383              MOV     A,#83H          ;GET LINE CONTROL REGISTER
                                                ; VALUE AGAIN, BUT SET DLAB
                                                ; BIT.
00A6  90                MOVX    @R0,A           ;SET DLAB BIT IN THE "LINE
                                                ; CONTROL REGISTER".
00A7  0A                IN      A,P2            ;GET P2 BYTE CONTAINING BAUD
                                                ; RATE AND HANDSHAKING SWITCH
                                                ; SELECTIONS.
00A8  D3FF              XRL     A,#0FFH         ;COMPLEMENT THE BITS
00AA  5307              ANL     A,#07H          ;CLEAR ALL BUT VALID BAUD BITS
00AC  E7                RL      A               ;SHIFT THE VALUE LEFT ONE BIT
                                                ; POSITION TO CREATE AN OFFSET
                                                ; INTO THE BAUD RATE DIVIDER
                                                ; TABLE, "BAUDTB".
00AD  0300              ADD     A,#BAUDTB-300H  ;ADD THE BASE ADDRESS OF THE
                                                ; BAUD RATE DIVIDER TABLE TO
                                                ; POINT AT THE DESIRED ENTRY.
00AF  A9                MOV     R1,A            ;PLACE THE ADDRESS INTO R1 TO
                                                ; SAVE IT TEMPORARILY.
00B0  E3                MOVP3   A,@A            ;GET THE LOW-ORDER BAUD RATE
                                                ; DIVIDER BYTE.
00B1  AA                MOV     R2,A            ;SAVE IT TEMP. IN R2
00B2  F9                MOV     A,R1            ;GET THE BAUD RATE DIVIDER
                                                ; ADDRESS BACK.
00B3  17                INC     A               ;POINT AT THE HIGH-ORDER DIV.
                                                ; BYTE.
00B4  E3                MOVP3   A,@A            ;GET THE HIGH-ORDER BAUD RATE
                                                ; DIVIDER BYTE.
00B5  B901              MOV     R1,#DLM         ;POINT AT THE 8250 "DIVISOR
                                                ; LATCH MSB" REGISTER.
00B7  91                MOVX    @R1,A           ;WRITE THE HIGH-ORDER BAUD
                                                ; RATE DIVIDER BYTE TO IT.
00B8  C9                DEC     R1              ;POINT AT THE 8250 "DIVISOR
                                                ; LATCH LSB" REGISTER.
00B9  FA                MOV     A,R2            ;GET THE LOW-ORDER BAUD RATE
                                                ; DIVIDER BYTE.
00BA  91                MOVX    @R1,A           ;WRITE THE LOW-ORDER BAUD RATE
                                                ; DIVIDER WORD TO THE 8250
                                                ; "DLL" REGISTER. THE BAUD
                                                ; RATE IS NOW SET.
00BB  2303              MOV     A,#03H          ;GET ORIGINAL "LCR" VALUE
                                                ; BACK, CLEARING THE HIGH-
                                                ; ORDER "DLAB" BIT, TO ALLOW
                                                ; ACCESS TO THE RECEIVE CHAR.
                                                ; REGISTER.
00BD  90                MOVX    @R0,A           ;WRITE THE NEW "LCR" VALUE TO
                                                ; THE 8250.
00BE  0A                IN      A,P2            ;GET DIP SWITCH BYTE AGAIN
00BF  5308              ANL     A,#08H          ;CLEAR ALL BUT THE "HAND-
                                                ; SHAKING" BIT (BIT 3).
00C1  AC                MOV     R4,A            ;STORE HANDSHAKE FLAG. IF 0,
                                                ; XON/XOFF H.S., OTHERWISE
                                                ; MODEM H.S.
00C2  83                RET                     ;8250 SET-UP DONE -- RETURN TO
                                                ; THE CALLING ROUTINE.
                ; END OF SUBROUTINE: SETURT.
                ;
0300                    ORG     300H
                ;*************************************************************
0300            BAUDTB:
                ;
                ; THIS TABLE HOLDS THE 2-BYTE 8250 TIMER DIVIDE VALUES FOR
                ; THE BAUD RATES PERMITTED BY THIS SYSTEM, AS SELECTED BY
                ; THE ON-BOARD DIP SWITCH.
                ;
0300  1704              DB      17H,04H         ;110 BAUD -- LOW/HIGH BYTES
0302  8001              DB      80H,01H         ;300 BAUD -- LOW/HIGH BYTES
0304  C000              DB      0C0H,00H        ;600 BAUD -- LOW/HIGH BYTES
0306  6000              DB      60H,00H         ;1200 BAUD -- LOW/HIGH BYTES
0308  3000              DB      30H,00H         ;2400 BAUD -- LOW/HIGH BYTES
030A  1800              DB      18H,00H         ;4800 BAUD -- LOW/HIGH BYTES
030C  0C00              DB      0CH,00H         ;9600 BAUD -- LOW/HIGH BYTES
030E  0600              DB      06H,00H         ;19,200 BAUD -- LOW/HIGH BYTES
                ;
                        END

Error total = 0
```

End

After reset initialization, execution enters the controlling code section.

parity, and 1 stop bit. Note that this still lets the UART properly receive characters with 2 stop bits. The subroutine then configures the 8250 to generate an interrupt (to the 8748) whenever it receives a character, and it enables the handshaking lines.

After SETURT configures the handshaking lines, it sets the baud rate by reading in the DIP switch settings for switches 2–4 and using the complemented binary value (shifted left one bit position) as an offset to the baud rate divider table, BAUDTB. SETURT then sends the appropriate divider bytes to the 8250. As a final step before exiting the subroutine, SETURT reads in the value of switch 4 and puts it into a special flag register (R4), with all other bits in the byte cleared.

If R4 is zero (switch closed), the routine selects software handshaking. Otherwise, it establishes hardware handshaking. Note that the baud rate and handshaking modes are selected during system reset processing. If you change the DIP switch setting, the changes have no effect until the next board reset.

After SETURT sets up the UART, the final initialization step sets up registers R1–R3 and R5 for their respective special purposes, enables printer characters to come in from the computer, and enables interrupts.

When reset initialization is complete, execution enters the main controlling code section, Main. This section works according to the flowchart in Fig. 11. It first checks to see if the converter has buffered any characters. If so, it checks to see if it is OK to send a character. If yes again, the program transmits the next character from the buffer out the serial port. If a character isn't available or it can't be sent out, execution moves to the CKCHIN section.

CKCHIN first checks to see if any room exists on the buffer. If not, it goes back to the start of Main. Otherwise, it then checks to see if CKCHIN has received a character from the computer. If not, execution goes back to Main. If so, CKCHIN reads in the character and stores it in the buffer. Execution then returns to the start of Main.

PRCURT is the interrupt service routine to service serial characters the 8250 UART receives. If it gets an XOFF character, it sets the XOFF FLAG (R5) with a OFFH value to indicate transmitting should halt. If PRCURT receives an XON character, it clears the XOFF FLAG. It ignores all other characters.

Using the Parallel-to-Serial Converter Board

To use the parallel-to-serial converter board, connect the power supply, RS-232C, and parallel printer cables to the appropriate systems, and configure the DIP switch according to the handshaking protocol and baud rate desired. You can apply the power to the board before or along with the power to the computer and printer. The board will require one to 1.5 seconds for power-up initialization before it can accept characters from the host computer.

Conclusion

I used Mumford Micro Systems' 8048 assembler for these last two projects. Mumford has agreed to offer the assembler to Project 80 readers for $50 during the months the 8748-related projects run (it normally costs $125). The assembled source code is also available on Load 80. This is a good assembler and I recommend it to anyone interested in the 8048 family of processors. The assembler is available for Models I and III only (I run mine in Model III mode on my 4P). Contact Mumford Micro Systems at Box 400, Summerland, CA 93067 (805-969-4557). ■

Write to Roger Alford at P.O. Box 2014, Ann Arbor, MI 48106. Please enclose a self-addressed, stamped envelope for a reply.

References

RS-232C Interface Standard ($13):
Electronics Industries Association
Engineering Department
2001 Eye Street, N.W.
Washington, D.C. 20006

8748 Microcomputer Data Book:
MCS-48 Family of Single Chip Microcomputers User's Manual
Intel Corporation
Literature Department
3065 Bowers Avenue
Santa Clara, CA 95051

8250 UART Data Sheet:
INS8250-B Asynchronous Communications Element Data Sheet
National Semiconductor Corporation
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Santa Clara, CA 95051

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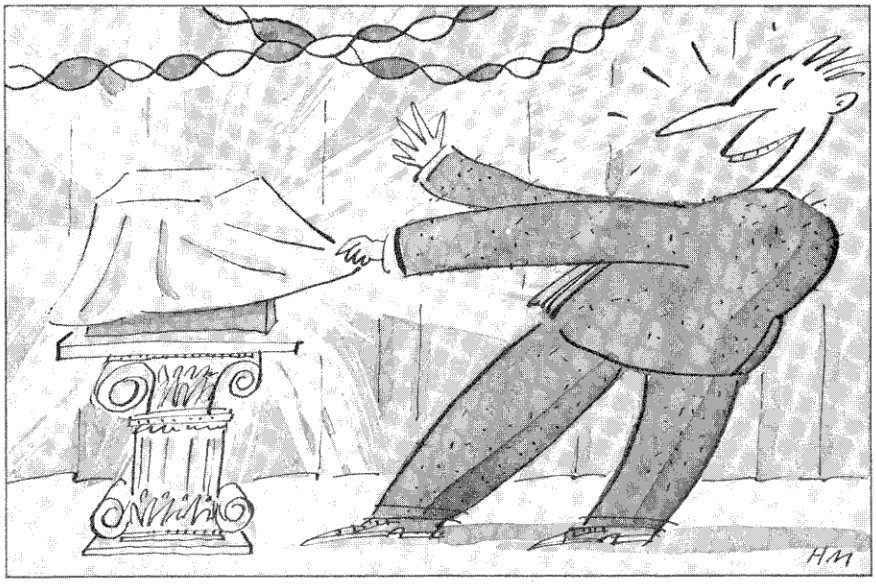

As of this month, I'm using the Tandy 1000's new DOS and Basic. You should, too. Tandy has increased IBM compatibility and added some useful enhancements. And fixed-up GW-Basic works as the manual promises. I'll go over the changes, new features, and bugs (there are a few). Of course, I have suggestions—like hang on to a copy of the old DOS.

The upgrade to MS-DOS 2.11.22 (and Microsoft's GW-Basic, Tandy version 1.01.00) is mandatory; Radio Shack no longer supports the old versions. If you're using an outdated DOS, take the original master disk to a Radio Shack Computer Center and they'll copy the free upgrade onto it (the stock number is 700-2604). If you weren't notified of the upgrade, write to Radio Shack Software Registration, Dept. 7879, 400 Atrium, One Tandy Center, Fort Worth, TX 76102.

DOS Details

Using the DOS file-compare program (FC.COM), I found that 12 DOS files have changed in addition to Basic. There are also some new names in the directory. Peruse the README.DOC file using the Type command (TYPE README.DOC) or print it out using the DOS Print command (PRINT README.DOC). This newly added file details the changes, but not all of them. I've found some surprises—mostly good ones—and a few bad ones.

Only one MS-DOS system file changed. IO.SYS, invisible on your DOS disk and always present in your computer's memory, has grown slightly. Changing this file had made the new DOS incompatible with Microsoft's QuickBasic compiler on 1000s with hard drives (see p.29 for information and a fix). Tandy will correct this problem. MSDOS.SYS, the other invisible system file, and Command.COM, the DOS command processor, are unchanged.

The Mode command has two important enhancements. First, you can change your display colors with Mode's new Colormap option. If you map black to blue, blue will show where black is supposed to be. I was relieved to discover this feature, because the new ANSI.SYS no longer clears the screen to a color as it did under the old DOS (see my November 1985 column, p. 94). Unlike the ANSI method of coloring the screen, Mode's colormapping carries over to all your application programs.

I added two lines to my AUTOEXEC.BAT file to change the screen colors to bright white on blue when I power up: MODE COLORMAP BLACK,BLUE and MODE COLORMAP GRAY,WHITE. I also have a batch file to load Basic after changing to Basic's subdirectory. That batch file changes the colors back to black and gray (MODE COLORMAP returns to default colors), because Mode af-

System Requirements

Model 1000

Program Listing 1. Disable control-break.

```
10 KEY(19) ON:ON KEY(19) GOSUB 500
20 KEY(20) ON:ON KEY(20) GOSUB 500
30 KEY 19,CHR$(&H4)+CHR$(&H54)
40 KEY 20,CHR$(&H44)+CHR$(&H54)
50 A$=INKEY$
60 IF A$="1" THEN END ELSE GOTO 50    'Press 1 to end program.
500 PRINT "BREAK":RETURN
```

End

Program Listing 2. Random Circles.

```
10 CLEAR ,,,32768!:CLS:KEY OFF:SCREEN 6
11 RANDOMIZE VAL(RIGHT$(TIME$,2))
15 PALETTE 0,5:PALETTE 1,11:PALETTE 2,15:PALETTE 3,13
20 X=INT(RND*640):Y=INT(RND*200):R=INT(RND*150)+5
30 EDGE=INT(RND*3)+1:COL=INT(RND*4)
40 CIRCLE (X,Y),R,EDGE:PAINT (X,Y),COL,EDGE
50 GOTO 20
```

End

Illustration by Hal Mayforth

Circle 453 on Reader Service card.

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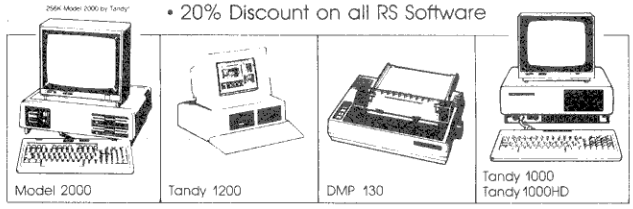

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fects Basic's coloring, too. The Basic batch file resets colormapping to blue and white when it's through.

If you use SideKick, load it before you change the colors. SideKick makes the current colormapped colors the permanent defaults when it loads.

The second undocumented change to Mode.COM lets you direct printing to a serial port: MODE LPT1:=COM1. This feature has always been available with IBM's PC-DOS 2.x. I didn't have a serial printer to try it on, but the command does produce the message "Printer output redirected to COM2." With the old MS-DOS 2.11.00 you'd get an "Invalid parameters" message.

I found another use for this new feature that doesn't involve a serial printer. When you have no printer at all attached to your 1000 and you hit the print key by mistake (it waits like a land mine below the insert key), the computer hangs up. If you redirect the printer to a serial port with Mode, however, you can regain control by pressing control-break, then the print key followed by the A key. Control-break (not break by itself) brings up the following message: "Write fault error writing device PRN. Abort, Retry, Ignore?"

You must press the print key to undo your original transgression before answering with the A key or you'll hang it up again. If you don't have a printer, stick this version of the Mode command in your AUTOEXEC.BAT file.

Tandy has tremendously enhanced Graphics.COM. This memory-resident DOS utility is designed to print graphics displays to your printer when you press the shifted print key. The original 1000 version worked only with the CGP-220 color ink jet printer, but the new version can handle all recent Tandy printers, even those set in PC mode. Consequently, Graphics.COM now works with IBM and Epson dot-matrix printers. README.DOC gives full instructions for using printers.

SYS.COM now installs system files on disks formatted with PC-DOS 2.x or higher (not just with Tandy's DOS). Tandy 1000 users have always had trouble with copy-protected programs that include this command in their installation process to make a bootable disk. The old SYS.COM would choke on a PC-DOS disk when there was plenty of room for the 1000's DOS system files.

On the other hand, the new Format.COM now causes trouble during installation of some commercial programs. Here's where you'll be glad you saved a copy of the old DOS. Tom Sirianni of Hillsboro, OR, resorted to the old Format when installing Digital Research's GEM Draw on his 1000. There may be a similar problem with Microsoft's Windows.

With the new Basic, clearing a graphics screen or filling a large area with color no longer creates mental anguish.

Once installed (using another Format or another DOS 2.x or higher), both applications work on the 1000, given adequate memory.

Another totally new file, SHIPTRAK.COM, parks the read/write heads of your Tandy hard drive away from the boot and directory tracks so jostling doesn't damage these sensitive areas. SHIPTRAK has always come with the 1200HD. Use this program only with the hard drives it was designed for: the Tandon drives sold by Tandy. SHIPTRAK can damage some other hard drives (for instance, the Rodime drives sold by Osicom).

Not So Basic

Not only has the 1000's unfinished Basic been completed (with some faster graphics), but it has also undergone major renovations for the sake of IBM compatibility. They even managed to shave its size by several hundred bytes.

An added program called BasicA.COM essentially serves to load Basic.EXE. Many commercial programs written in Basic come on bootable disks with startup procedures that expect to find BasicA, the prevalent IBM Basic. Now you don't have to alter batch files if you want to call Basic instead.

BasicA.COM also loads Basic higher in memory (if space is available) so that certain IBM programs using low RAM for data storage and machine-language subroutines will run successfully on the 1000. Basic.EXE itself now translates PEEKs and POKEs meant for the IBM PC to the appropriate Tandy 1000 addresses. I will investigate this ability fully in a future column.

One seemingly bizarre move toward IBM compatibility is a change in the workings of the break key. You must now press control-break, just as you do on the IBM PC. Pressing the break key by itself no longer halts a program or a screen listing. This move makes the 1000's behavior consistent with software documentation written for the IBM PC. Control-C doesn't work anymore either, although it still functions for editing Basic program lines.

I've noticed another undocumented change for compatibility that will cause confusion. The mapping of the arrow keys used by the On Key trapping function has been lowered by two. As with IBM BasicA, the numbers for the arrow keys are now 11–14, not 13–16. Only function keys F1–F10 have trapping numbers now. F11 and F12 have been eliminated; you can now assign these two keys to one of the user-defined key traps (15–20) with the Key statement:

```
KEY 15,CHR$(0)+CHR$(&H59)
```

which assigns unshifted F11 to user key 15. I never could get the user key numbers to work before.

There are two things the manual doesn't tell you about defining keys for On Key trapping. You must use zero in the first CHR$() if the trapped key is unshifted (F11 is trapped when it's unshifted in the example above). You look up the hexadecimal (hex) scan codes for the second CHR$( ) in the Basic manual Appendix B. F12 has scan code 5A hex.

The manual also doesn't tell you how to trap for a key when several of the special keys such as Caps Lock, Num Lock, or Alt are pressed. What you do is add up the key values shown in the manual under Key/Trap. For example, Program Listing 1 traps for control-break with and without the Caps Lock key on. You can almost disable control-break completely, but you must trap for every possible key combination, so you run out of user keys.

For instance, you must trap for the condition when the Caps Lock, Num Lock, and one of the shift keys is depressed when you press control-break. In this case, you'd add the hex values 40, 20, 04, and 02 (or 01), and place that value in the first CHR$( ) function of your user key definition. This way, you can simulate a disabled Break function. Unless a user knows your trick, he or she won't try one of the more unusual combinations of special keys with control-break. Has anyone found a way to disable the Basic control-break function completely? Perhaps one of the IBM POKEs handled by the 1000's new Basic will do the job.

Improved graphics is the other major change to the 1000's Basic. Not only have tiling (patterns with Paint) and paging been implemented, but existing capabilities now run faster. Clearing a graphics screen or filling a large area with color no longer creates mental anguish. Try the circles program in Program Listing 2.

I'll have more to say about this new Basic next month.

Sort Of

MS-DOS provides a sorting program

(Sort.EXE) you can use to order data files, lists entered from the keyboard, or even the output of the DIR command. Your MS-DOS reference manual gives an example of the last use; try typing in DIR|SORT instead of DIR. The pipe symbol (|) directs the output of the DIR command into the Sort filter program, giving you a sorted directory. Ignore the first two files, %PIPE1.$$$ and %PIPE2.$$$. They're temporary files created by the piping process and they're automatically deleted.

Bob Keller (Stanton, CA) discovered through experience how Sort picks items out of a data file. The character code combination of 10 and 13 (carriage return/line feed) must separate each item for Sort to work properly. As a result, you can sort the lines in an ASCII text file (for example, a grocery list) or the records in a Basic sequential-access file.

Sort treats a Basic random-access file as one long record, because the records aren't delimited with carriage return/line feed (CR/LR) characters. Bob found he could sort random-access files, however, by adding a last field consisting of CR/LF to each record in the file. He defines the last field as EO$, then LSETs CHR$(13)+CHR$(10) into that field.

The only problem is that code 26 is the end-of-file marker for Sort (and DOS files in general). If you have integer 26 in your random file, the sort will stop right there. Bob avoids using 26. A 26 byte can also crop up in other Basic number types, so you should store numbers as ASCII character strings if you use this technique.

Addenda

Since reviewing several hard drives for the 1000 in my February 1986 column (p. 84), I've noticed one minor problem with Hard Drive Specialist's 10-megabyte unit. I can't boot copy-protected programs like the old Infocom Zork games from drive A on my 1000. Fortunately, you can run most current game programs, including Infocom's, after booting from another disk.

To move SideKick's windows around on an IBM PC display, you press the PC's scroll lock key, then use the arrow keys to position a window. There is no scroll lock key on the 1000, but alternate-break works instead, at least with SideKick.

Tandy says you can use the Model 2000's two-button mouse (stock number 26–1197) on the Model 1000. The only deluxe joystick for the 1000 is the one-button (number 26–3012). ■

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

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Communicate It

Hilgraeve's HyperAccess for the IBM PC and compatibles lets you communicate via modem or cable with almost any other computer.

HyperAccess supports any auto-dial, acoustic-coupled, or direct-connect modem, including 2,400-baud modems. It also transfers files using XMODEM, Kermit, or a variety of text transfer methods at rates above 1K per second. The program lets your computer emulate most popular terminals or act as an unattended host.

You can execute other programs, DOS commands, or DOS macros while on-line. The program's script language lets you automate a sequence of keystrokes or steps; create custom functions, prompts, and menus; or accomplish unattended communications.

The package costs $149 and includes a program disk, a tutorial disk, and a manual. For more details, contact Hilgraeve Inc., P.O. Box 941, Monroe, MI 48161, 313-243-0576.
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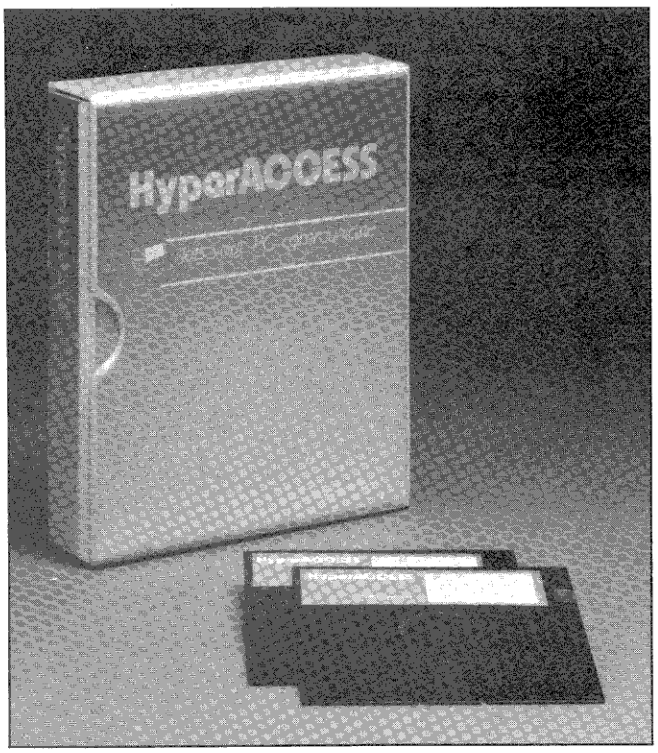

HyperAccess is a communications package with many features.

Answering Machine

Dialectron Inc. offers Smart Answering Machine (SAM), a voice communications and telephone management system for the IBM PC/XT/AT and compatibles.

As a telephone answering machine, SAM lets you leave messages and screen calls. It provides up to 999 mailboxes in which callers can retrieve and leave messages; the mailboxes are accessed via codes entered on a touch-tone telephone.

As a message delivery system, SAM can make unattended calls in three modes: It can forward incoming messages as soon as they are recorded, deliver messages at a preselected time and date, or deliver a single message to any number of individuals.

An internal phone book allows auto-dialing, alphabetical sorting, and automatic suppression of local area code dialing.

You can program the system from any remote telephone. The package costs $295 and consists of a half-sized plug-in board and software. It requires 256K and MS-DOS 1.1 or higher. For further information, contact Dialectron Inc., 2035 California St., Suite 17, Mountain View, CA 94040, 415-960-3040.
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Draft Assistance

Generic Software's Generic CADD is a full-featured computer-aided design and drafting package priced at $99.95. The program runs on the IBM PC and compatibles with 256K.

Generic CADD can be used for design, drafting, schematic capture, mechanical drafting, fine art, architectural design, and printed circuit board layout. You create line drawings with a mouse or digitizer, and a plotter inks the drawing on paper. Dot-matrix printer support will soon be available. For more information, contact Generic Software Inc., 6 Lake Bellevue, Suite 203, Bellevue, WA 98005, 206-462-1944.
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Easy Statistics

Statpro 2.0 is an upgrade to Penton Software's statistics and graphics data base management package. It runs on the IBM PC/XT/AT and compatibles. It features programs for descriptive statistics, regression, analysis of variance, time series, and multivariate statistics. The new version adds color, improves speed, and uses function keys to access parameter screens. A crosstabulation module lets you present and analyze multiple factor data in multidimensional tables. You can produce multicolor charts, graphs, histograms, distributive curves, regression plots, box plots, and more.

The data transfer utility lets you exchange data between Statpro and other file formats and applications programs; it supports ASCII files, dBase II and III, Lotus 1-2-3 and Symphony, and DIF and SYLK file formats.

The program costs $795. For more information, contact Penton Software, 420 Lexington Ave., Suite 2846, New York, NY 10017, 800-221-3414.
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Role-Play

Activision's Alter Ego simulates life experiences from birth to the golden years. You respond to the computer's questions as yourself or as someone you would like to be. You then learn the outcome without having to pay the real-life consequences of your decisions.

The game begins by establishing a personality profile on which your experiences will be based. You can begin at any of seven stages of life. A status report shows how your responses determine your alter ego's skills in social, intellectual, emotional, physical, familial, and vocational areas.

Versions are available for men and for women. The program runs on the IBM PC and the Model 1000 and costs $39.95. For more information, contact Activision Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043, 415-960-0410.
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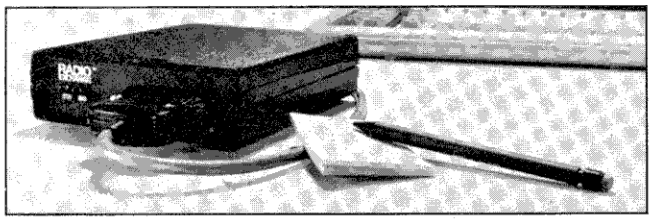
Something Artificial

PC Scheme ($95) is an implementation of the LISP programming language for developing artificial intelligence applications on the IBM PC and compatibles.

PC Scheme is particularly effective for symbolic com-



The Radio Exchange is a digital radio interface for your computer.

puting. Its compiler produces code that can execute three to 10 times faster than interpretive LISP programs. Among other features are a powerful editor and extensions for debugging, graphics, and windowing.

You need MS-DOS 2.1 or higher and 320K. For more information, contact Texas Instruments Inc., Data Systems Group, P.O. Box 809063, H-833, Dallas, TX 75380, 800-527-3500.

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Radio Cities

Telemet America's Radio Exchange, a digital radio interface, links an IBM PC or compatible with Telemet's National Digital Broadcast Network. Subscribers to the network get unlimited access to stock, options, commodities quotes, and business news for $25 a month with no phone charges, connect-time fees, or per-quote charges.

The service is now available in Atlanta, Boston, Chicago, Cleveland, Dallas, Denver, Detroit, Houston, Los Angeles, Miami, New York, San Francisco, and Washington, DC. Telemet is adding a new city every two months.

The basic service provides delayed quotes for the NYSE, AMEX, and NASDAQ stock exchanges and the CBT, CME, CEC, NYFE, and KCBT futures exchanges; real-time quotes for all options exchanges and major market indices; limit and news alerts; and portfolio review and valuation. Quotes include last, high, low, volume, net change, and tick. Real-time quotes for all exchanges and access to the business news channel are available as optional features.

The interface comes with the Personal Gains software package, which lets you analyze, store, and display investment data. The Radio Exchange also interfaces with all popular spreadsheets.

You need 192K, a serial port, and two disk drives to use the service. The combined price of the Radio Exchange and Personal Gains is $394. The basic subscription fee for news and market quotes is $25 per month. For more information, contact Telemet America Inc., 515 Wythe St., Alexandria, VA 22314, 800-368-2078.

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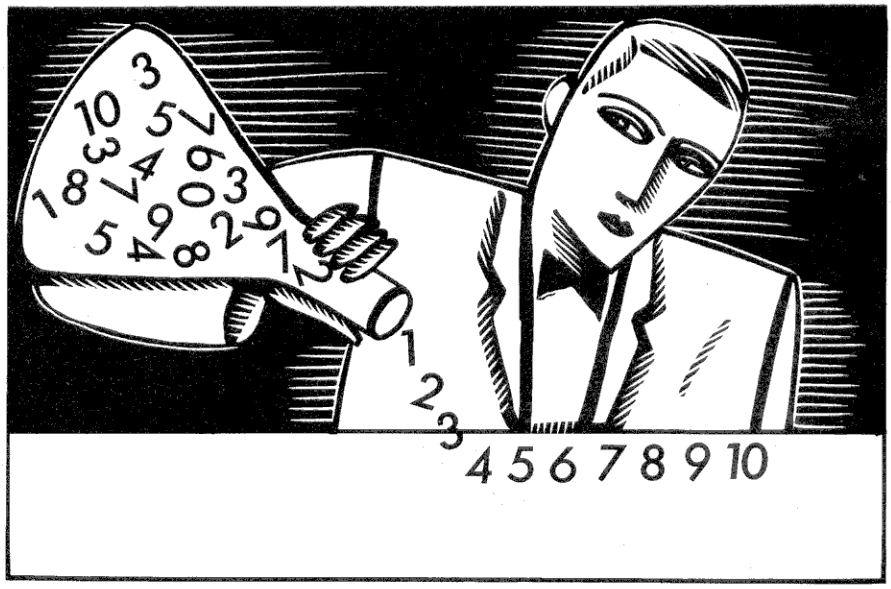

Illustration by Anthony Russo

Fifteen numbered billiard balls are scattered over a pool table. How would you go about lining them up numerically? Using one hand, you might find the 1 ball, put it at the left, then follow through with the 2–15 balls. Using two hands, you might switch a few positions, sweep left or right, and such.

However you did it, you'd be duplicating the action, and maybe the exact mechanics, of a computer data sort. The computer would be stupid and precise. You would be intuitive, require fewer moves, and perhaps have to correct a miscue or two.

As alchemists once dreamed of changing lead to gold, computer programmers creatively daydream of methods for faster sorting. The difference between the two is that every now and then someone comes up with a faster method of putting computer data into order. Speed is the goal: Business machines spend a significant amount of their time sorting data.

Basic Numbering

The first sort I encountered put names in alphabetical order. It was a wondrous feat. It gave me the mistaken impression a Basic sorting routine was only for alphabetizing. I soon discovered it dealt with numbers, and only with numbers, even when distinguishing between "aardvark" and "zyzzogeton."

A Basic sort "ASCII-izes."

ASCII stands for American Standard Code for Information Interchange. Every character printable by the computer has an ASCII number. To see ASCII characters in their order, in Basic type FOR X=32 to 254: ? CHR$(X);: NEXT and press the enter key.

There is logic to the placement of numbers in ASCII positions 48 (for zero) through 57 (for 9), of the uppercase alphabet from 65 (for A) to 90 (for Z), and of the lowercase alphabet from 97 (for a) to 122 (for z).

System Requirements

Models 4 and 4P
Basic

Program Listing 1. String Low.

```
100 REM * STRINGLOW * MODEL 4/4P
110 REM * Listing 1 - Basic Takes - April '86
120 CLEAR: CLS
130 PRINT "Type two words separated by a comma"
140 PRINT: PRINT "as in ... first,second"
150 PRINT: PRINT "and press Enter."
160 INPUT A$,B$
170 CLS
180 IF A$>B$ THEN PRINT B$" "A$
190 IF A$<B$ THEN PRINT A$" "B$
200 IF A$=B$ THEN PRINT "They're the same."
210 END
```

End

Program Listing 2. Bubble Sort.

```
100 REM * Bubble Sort * Model 4/4P
110 REM * Listing 2 - Basic Takes - April '86
120 CLEAR: CLS
130 PRINT "Type something and press Enter."
140 INPUT B$
150 CLS: H=LEN(B$)
160 PRINT CHR$(15): DEFSTR A: DIM A(H)
170 FOR X=1 TO H: A(X)=MID$(B$,X,1): NEXT
190 SYSTEM "time 00:00:00"
200 C=0: FOR X=1 TO H-1
210 IF A(X)>A(X+1) THEN C=1
220 IF A(X)=>A(X+1) THEN SWAP A(X), A(X+1)
230 PRINT @ 0,"";
240 FOR Y=1 TO H: PRINT A(Y);: NEXT Y,X
250 IF C<>0 THEN 200
260 PRINT: PRINT "Sort time: "TIME$
270 PRINT CHR$(14): END
```

End

You probably know that Basic can recognize if one number is equal to, greater than, or less than another. What you may not know is that Basic can perform the same sort of "reasoning" about two or more strings—groups of characters. It uses ASCII values internally, but on the surface it simply seems to draw alphabetical distinctions. Try Program Listing 1, String Low, for proof that it works. It will alphabetize or recognize the equality of any two strings you type.

All you need to sort huge lists of numbers or strings is a Basic algorithm—a formula—that compares items in a list and exchanges them until they are in ASCII order.

I'll describe, but not program, a low-level method that goes from first to last item, storing the lowest value and exchanging its position with the first item in the list. Then the process repeats from the second item. After that. . .you get the idea. It's not very useful for long lists.

Program Listing 3. Shell Sort.

```
100 REM * Shell Sort * Model 4/4P
110 REM * Listing 3 - Basic Takes - April '86
120 CLEAR: CLS
130 PRINT "Type something and press Enter."
140 INPUT B$
150 CLS: H=LEN(B$)
160 PRINT CHR$(15): DEFSTR A: DIM A(H)
170 FOR X=1 TO H: A(X)=MID$(B$,X,1): NEXT
180 SYSTEM "time 00:00:00"
190 M=H-1
200 M=INT(M/2): IF M=0 THEN 330
210 K=H-M: J=1
220 I=J
230 L=I+M
240 IF A(I)<=A(L) THEN 280
250 SWAP A(I),A(L)
260 I=I-M
270 IF I>=1 THEN 230
280 J=J+1
290 IF J>K THEN 200
300 PRINT @ 0,"";
310 FOR Y=1 TO H: PRINT A(Y);: NEXT Y
320 GOTO 220
330 PRINT: PRINT "Sort time: "TIME$: PRINT CHR$(14): END
```

End

Bubble Sorts

Program Listing 2, Bubble Sort, demonstrates a method that's easy to understand and useful for short lists, say up to 50 items. Computer lore says the bubble sort was so named because items bubble up through the arrays to find their ASCII-stipulated level. You'll see a kinetic view of this proceeding, for I've set the program up to print the current state of the array holding the sort items after each pass.

In most sorting routines, an initial job is to assign each item a place in an array. Here, you're asked to type in something, and each character you type gets a place in an A(H) array, with the H standing for the length of the string you typed.

The real work is done within lines 200–250. The program runs through the array, from first to last item. If the current item is equal to or greater than the next item, the two are exchanged. If the current item is greater than the next item, variable C gets a value of 1. If C equals zero after any given pass, then no

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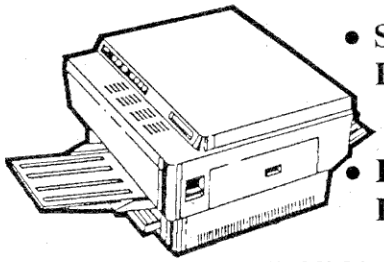

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Program Listing 4. Namelist.

```
100 REM * Namelist * Model 4/4P
110 REM * Listing 4 - Basic Takes - April '86
120 CLEAR: CLS
130 PRINT "This program sorts names into alphabetical order."
140 INPUT "How many names on your list";H
150 DEFSTR A: DIM A(H)
160 FOR X=1 TO H: CLS: PRINT "Entry"X
170 PRINT: LINE INPUT "First name: ";F$
180 IF F$="" THEN 170
190 PRINT: LINE INPUT "Last name: ";L$
200 IF L$="" THEN 190
210 A$(X)=L$+CHR$(128)+F$: NEXT
220 PRINT "I am working for you. Be patient."
230 M=H-1
240 M=INT(M/2): IF M=0 THEN CLS: GOTO 330
250 K=H-M: J=1
260 I=J
270 L=I+M: IF A(I)<=A(L) THEN 310
280 SWAP A(I),A(L)
290 I=I-M
300 IF I>=1 THEN 270
310 J=J+1: IF J>K THEN 240
320 GOTO 260
330 FOR X=1 TO H
340 M=INSTR(A(X),CHR$(128))
350 PRINT MID$(A(X),M+1)" "LEFT$(A(X),M-1)
360 NEXT: END
```

End

exchanges have been made and all is in order. In this case the program ends. Otherwise, another pass is made.

Try Bubble Sort with varied responses. Try XXXXXAAAAA to get a good idea of its flow.

Shell Sorts

Program Listing 3 is Shell Sort, the fastest sort we'll experiment with. Try entering the same character strings in both Bubble and Shell to see how much faster and more efficient Shell is. The Shell races through the items of an array in increments starting from first and next-to-last, then decreasing by half with each half. When the final search is made, everything is in position to be put in the ultimate order. You'll see those exchanges taking place when you try it.

Program Listing 4, Namelist, uses the Shell sort. It lets you type in a specified number of names—first, then last—and sorts them by last name. It also reverses the two elements to put the final list back in first name, last name order. The two parts of the name are assigned as an array value with a CHR$(128) between them. When the sort is complete, line 340 uses an instring test to find the numbered position of the CHR$(128), and line 350 reverses the order. Lines 230–320 contain the Shell sort routine.

I've seen the Shell sort take a very long time on some computers. I'm happy to report its performance is admirable on the 4/4P, for which we must thank the computer's speed. In a program not published here, I generated random number lists and sorted them in timed sequence. It took three minutes, 41 seconds to sort a thousand items. That's not too bad.■

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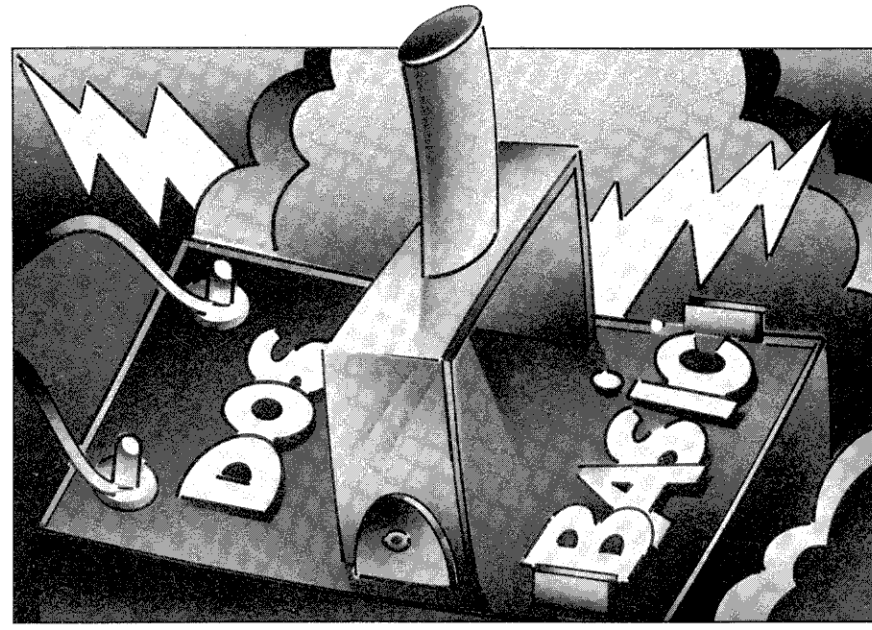

How do you set scroll protection in Basic? Or test the caps-lock key? Can a Basic program determine the free space on a disk or read a directory? How can a Basic program save part of a screen for later use?

Tasks like these are simple in Assembly language if you use TRSDOS 6's supervisory calls (SVCs). But Basic doesn't give you a direct method of calling or receiving information from TRSDOS routines. The closest you can come is to invoke a TRSDOS library function with the System command. Unfortunately, most of the library commands are (correctly) written to give information to a user, not to a program.

One solution to this dilemma, although awkward, is to route the video display to a disk file, call a library function (such as DIR) and have it send its data to that disk file, and then write a Basic subroutine to read the file and interpret the data. The usual solution is to write individual machine-language routines for each DOS function you want to invoke, hook each to your Basic programs, and harness the power of TRSDOS through them.

However, when I'm using Basic to work on a new idea or test an algorithm, I usually don't want the trouble of writing a new machine-language subroutine. By the time I've developed and debugged it, I've half-forgotten the idea I was originally working on. Instead, I'll often change the design of my program or write dozens of extra lines of Basic to emulate what could be done with a few simple Assembly-language commands.

To help speed up my own work, I finally decided to write a short Basic module that gives me access to any TRSDOS SVC. I only need to merge it with the program I'm writing and add a single GOSUB during initialization.

LOAD 80

System Requirements

Model 4
TRSDOS 6.2
Disk Basic
Assembly language
Editor/assembler

SVC with a Smile

This module (Program Listing 1) is slow but flexible. It defines a variable for each of the Z80's registers and register pairs, and a user function for combining two 8-bit registers into a 16-bit pair. To use a TRSDOS SVC, you need only load the correct values into the register vari-

Program Listing 1. Basic SVC handler.

```
49990 '    BASIC SVC Handler
49992 ' Written by Hardin Brothers
49994 ' Save as   "SVC/BAS",A

49998 'Handle an SVC call -- SVC number is in REG.A%
50000 REG.AF% = FN REG.PAIR%(REG.A%,0)
50002 REGISTER%(1)=REG.AF%:REGISTER%(2)=REG.BC%:REGISTER%(3)=REG.DE%:REGISTER%(4
)=REG.HL%: REGISTER%(5)=REG.IX%:REGISTER%(6)=REG.IY%
50004 SVC% = VARPTR(SVC%(1))
50006 REGISTERS% = VARPTR(REGISTER%(1))
50008 CALL SVC% (REGISTERS%)
50010 REG.AF% = REGISTER%(1):REG.BC% = REGISTER%(2):REG.DE% = REGISTER%(3):REG.H
L% = REGISTER%(4):REG.IX% = REGISTER%(5):REG.IY% = REGISTER%(6)
50012 REG.A% = REG.AF% \ 256:REG.F% = REG.AF% MOD 256
50014 Z.FLAG% = ((REG.F% AND 64)=64):C.FLAG% = ((REG.F% AND 1) = 1)
50016 RETURN
50098 '  Initialize data handler; call once at the beginning of the program
50100 DIM REGISTER%(6),REGISTERS%,SVC%(27),SVC%
50102 DIM REG.AF%, REG.BC%, REG.DE%, REG.HL%, REG.IX%, REG.IY%
50104 DIM REG.A%, REG.F%, REG.B%, REG.C%, REG.D%, REG.E%, REG.H%, REG.L%
50106 DIM Z.FLAG%, C.FLAG%
50108 DEF FN REG.PAIR%(X%,Y%)= CVI(CHR$(Y%)+CHR$(X%))
50110 RESTORE 50130
50112 COUNT% = 1
50114 READ Q%
50116 WHILE Q% <> 1
50118   SVC%(COUNT%) = Q%
50120   READ Q%
50122   COUNT% = COUNT% + 1
50124 WEND
50126 RETURN
50128 '
50130 DATA 9086, 28518, -6695, 8661, 0, -11803, 14835, -1575
50132 DATA -15887, -7727, -7715, -7683, -5159, -5319, -1031
50134 DATA -4135, -5159, -1549, -9749, -6659, -6691, -10779
50136 DATA -2619, -1575, -11781, -9759,  201
50138 DATA 1,   'Dummy value to mark end of list
```

End

Illustration by Phil Geraci

Program Listing 2. Assembly-language code for SVC handler.

```
00100 ;   Basic SVC handler
00110 ;   Machine-language module
00120 ;
00130 ;Calling sequence:  REGISTERS% = VARPTR(REGISTER%(1))
00140 ;                  CALL SVC% (REGISTERS%)
00150 ;
00160         ORG     0E000H          ;Program is fully relocatable
00170         LD      A,(HL)          ;Get array
00180         INC     HL              ;  address
00190         LD      H,(HL)          ;  into HL
00200         LD      L,A             ;  HL==> REGISTER%() array
00210 ;
00220         EXX                     ;Switch to prime registers
00230         PUSH    HL              ;Save original values
00240         PUSH    DE              ;  of HL' & DE'
00250         LD      HL,0            ;Zero out HL
00260         PUSH    HL              ;  and
00270         POP     DE              ;  DE registers
00280         DI                      ;*** NO INTERRUPTS ***
00290         ADD     HL,SP           ;Save SP address
00300         EXX                     ;Switch to regular regs.
00310 ;
00320         LD      SP,HL           ;SP==> REGISTER%() array
00330         POP     AF              ;Load all registers
00340         POP     BC              ;  from array
00350         POP     DE
00360         POP     HL
00370         POP     IX
00380         POP     IY              ;Registers loaded
00390 ;
00400         EXX                     ;Switch to prime set
00410         EX      DE,HL           ;HL = 0
00420         ADD     HL,SP           ;Save SP ==> end of array
00430         EX      DE,HL           ;HL = original stack
00440         LD      SP,HL           ;Restore orginal stack
00450         EI                      ;*** INTERRUPTS OKAY ***
00460         EXX                     ;Back to regular set
00470 ;
00480         RST     28H             ;Perform SVC
00490 ;
00500         EXX                     ;Switch to prime set
00510         EX      DE,HL           ;HL==> end of array
00520         DI                      ;*** NO INTERRUPTS ***
00530         LD      SP,HL           ;SP ==> end of register array
00540         EX      DE,HL           ;HL = original stack
00550         EXX                     ;Back to regular set
00560 ;
00570         PUSH    IY              ;Save all registers
00580         PUSH    IX              ;  in the array
00590         PUSH    HL
00600         PUSH    DE
00610         PUSH    BC
00620         PUSH    AF              ;Registers saved
00630 ;
00640         EXX                     ;Bring up prime set
00650         LD      SP,HL           ;Restore original stack
00660         EI                      ;*** INTERRUPTS OKAY ***
00670         POP     DE              ;Restore original values
00680         POP     HL              ;  of HL' and DE'
00690         EXX                     ;Back to regular set
00700         RET                     ;Back to Basic
00710         END
```

End

Program Listing 3. SVC demonstration—set scroll protect.

```
1 '     SVC Demonstration -- Set Scroll Protect
2 '     Merge with SVC/BAS (Listing 1) before running
3 '
4 '     Uses function 7 of @VDCTL SVC (#15)
5 '
10 GOSUB 50100
100 CLS:PRINT "Number of lines to protect (0 - 7) ==> ";:SCROLL% = -1
110 WHILE SCROLL% < 0 OR SCROLL% > 7:SCROLL% = VAL(INPUT$(1)):WEND:PRINT SCROLL%
120 REG.B% = 7:REG.C% = SCROLL%:REG.BC% = FN REG.PAIR%(REG.B%,REG.C%)
130 REG.A% = 15
140 CLS:FOR Z% = 1 TO SCROLL%:PRINT STRING$(80,"#");:NEXT Z%
150 GOSUB 50000
160 FOR Z% = 1 TO 100:PRINT Z%:NEXT Z%:END
```

End

Program Listing 4. SVC demonstration—pop-down window.

```
1 '     SVC Demonstration -- Pop Down Window
2 '     Merge with SVC/BAS (Listing 1) before running
3 '
4 '     Uses function 9 of @VDCTL SVC (#15)
5 '     For use with TRSDOS 6.2 & later only
```

Listing 4 continued

ables and then GOSUB to the SVC-handler module. It does the work of passing the register values to a short machine-language routine, which then calls the appropriate TRSDOS SVC. Before control returns to your Basic program, all of the resulting values are loaded back into the appropriate register variables so that your program can read TRSDOS's response.

I should stress that Listing 1 is a tool for experimentation and program development. Instead of incorporating it into a finished application, you will probably want to write a dedicated machine-language program that is faster and more memory efficient.

TRSDOS 6 allows up to 128 SVCs (numbered from zero to 127). It doesn't have that many; some of the SVC numbers are reserved for possible future enhancements, and others are reserved for user-written functions. To call an SVC from an Assembly-language program, you load the SVC number into the Z80's A register, set up other registers in a manner that is particular to each SVC, and then issue an RST 28 hexadecimal (hex) instruction. TRSDOS finds the actual address of the SVC routine from a table in low memory, loads one of the system overlays if it is needed for the SVC, fills your request, and returns to your program.

When an SVC has completed its task, it often returns information to your program in the Z80's registers. Some SVCs return values that indicate whether they have succeeded; others return more detailed or specialized data. Many SVCs put information into a buffer that your program must provide. Generally, the state of the Z-flag in the Z80's flag register indicates the success or failure of an SVC.

The process for calling an SVC from a Basic program with Listing 1 is much the same. You put the SVC number into a variable called Reg.A%, set the other register variables as needed, and GOSUB to 50000. When that subroutine is finished, your program can read the values returned in the register variables and check a variable called Z.Flag% to be sure that the SVC has succeeded. If an SVC needs a buffer, you can create one by dimensioning an integer array. When you are done with the buffer, you can use Basic's Erase command to reclaim its memory space.

Assembly Required

Program Listing 2 is the low-level Assembly-language program that does all this. It assumes that it will receive a 14-byte integer array containing values for the Z80's seven general-purpose and index registers (AF, BC, DE, HL, IX, and IY). It loads the values it receives into the Z80's registers, calls the SVC with the re-

Disable interrupts when the stack pointer is used to manipulate data.

start command, then copies the registers back into your array and returns to Basic.

An unusual feature of Listing 2 is the way it copies values into and out of your array of register values. It could do the copying by pointing to the array with HL or an index register. Instead, it points the stack pointer register to the array and then merely pops or pushes the appropriate registers.

There is an inherent danger in using the stack pointer this way. If a hardware interrupt occurs while the stack pointer is pointing to the array, part of Basic's data area will be destroyed. The effect, usually, is that Basic will either lock up or else not be able to find any arrays in memory. The solution is to disable interrupts during the times when the stack pointer is being used to manipulate data.

The SVC handler in Listing 1 sets up the array and calls the machine-language routine. You should initialize it with a GOSUB 50100 command at the beginning of your program, and then execute an SVC with a GOSUB 50000. The program assumes that you have loaded the SVC number into the Reg.A% variable, and that you have correctly loaded any other necessary values into the register-pair variables (Reg.BC%, Reg.DE%, Reg.HL%, etc.). If you need to combine two 8-bit values into a 16-bit register pair, you can use the REG.PAIR% function defined on line 50108. Program Listings 3–6 illustrate how the register variables should be set up and some of the ways that the SVC handler can be used.

When you use the SVC handler, you need to be aware of how Basic allocates variable space. Basic divides all memory above itself into five sections, each of which keeps changing both in size and location. The lowest section contains your program in a semi-compiled form (see the December 1985 Next Step, p. 108). Above that is a table of all simple variables. Numeric values are stored directly in that table; string variables are stored as pointers to the text of the string.

Above the simple variables is a table of array variables. Again, numeric values are stored in the table and string values are stored as pointers. At the very top of free memory, Basic reserves an area (you can adjust its size with the Clear command) for its own stack. Below the stack is an area for the text of all string variables except those defined as literals in your program.

A side effect of this variable storage technique is that whenever your program creates a new simple variable, Basic must push all of the current array variables up in memory. Therefore, once you have found the memory location with the VARPTR function, your program must not use any new variable names until it has finished using the ar-

Listing 4 continued

```
6 '
10 GOSUB 50100
20 DIM SCREEN%(40,7)
30 '
100 CLS:FOR LOOP% = 1 TO 20:PRINT STRING$(80,".");:NEXT LOOP%
110 'Save the top 7 lines of the screen
120 FOR LOOP% = 0 TO 6:REG.B% = 9:REG.C% = 1:REG.BC% = FN REG.PAIR%(REG.B%,REG.C
%)
130   REG.H% = LOOP%:REG.HL% = FN REG.PAIR%(REG.H%,0)
140   REG.DE% = VARPTR(SCREEN%(1,LOOP%))
150   REG.A% = 15:GOSUB 50000:IF NOT Z.FLAG% THEN PRINT "SVC error (line 150)":S
TOP
160 NEXT LOOP%
170 'Display a window
180 FOR LOOP% = 0 TO 4:PRINT @(LOOP%,25),"! This is a pop-down window !";:NEXT L
OOP%
190 PRINT @(5,25), "! Press any key to continue !";:PRINT @(6,25), STRING$(29,"*
");
200 WHILE INKEY$<>"": WEND:WHILE INKEY$ ="": WEND
210 'Restore the screen
220 FOR LOOP% = 0 TO 6:REG.B% = 9:REG.C% = 0:REG.BC% = FN REG.PAIR%(REG.B%,REG.C
%)
230   REG.H% = LOOP%:REG.HL% = FN REG.PAIR%(REG.H%,0)
240   REG.DE% = VARPTR(SCREEN%(1,LOOP%))
250   REG.A% = 15:GOSUB 50000:IF NOT Z.FLAG% THEN PRINT "SVC error (line 250)":S
TOP
260 NEXT LOOP%
270 PRINT @(20,0),;:END
```

End

Program Listing 5. SVC demonstration—toggle caps-lock key.

```
1 '     SVC Demonstration -- Toggle CAPS LOCK
2 '     Merge with SVC/BAS (Listing 1) before running
3 '
4 '     Uses @FLAGS SVC (# 101) to find CAPS toggle
5 '
10 GOSUB 50100
20 '
100 REG.A% = 101:GOSUB 50000
110 KFLAG% = REG.IY% + ASC("K") - ASC("A")
120 'Set to lower case
130 POKE KFLAG%, PEEK(KFLAG%) AND (NOT 32)
140 CLS:PRINT "Lower-case set":LINE INPUT "Type something ==> ";X$
150 'Set to upper case
160 POKE KFLAG%, PEEK(KFLAG%) OR 32
170 CLS:PRINT "Upper case set":LINE INPUT "Type something ==> ";X$
180 END
```

End

Program Listing 6. SVC demonstration—disk information display.

```
1 '     SVC Demonstration -- Display Disk Information
2 '     Merge with SVC/BAS (Listing 1) before running
3 '
4 '     Uses @DODIR SVC (#34)
5 '
10 GOSUB 50100
20 DIM LOOP%, BUFFER%(10), DISK.NAME$, DISK.DATE$, ORIG%, FREE%
30 'Get information into the buffer
100 CLS:PRINT "Which disk drive do you want information for (0-7) ==> ";
110 DRIVE% = -1:WHILE DRIVE% < 0 OR DRIVE% > 7:DRIVE% = VAL(INPUT$(1)):WEND:   P
RINT DRIVE%
120 REG.C% = DRIVE%:REG.B% = 4:REG.BC%= FN REG.PAIR%(REG.B%,REG.C%)
130 REG.HL%= VARPTR(BUFFER%(1)):REG.A% = 34:GOSUB 50000
140 IF NOT Z.FLAG% THEN PRINT "SVC Error #";REG.A%:STOP
150 DISK.NAME$="":FOR LOOP%=1 TO 8:DISK.NAME$ = DISK.NAME$ + CHR$(PEEK(REG.HL%))
:REG.HL% = REG.HL% + 1:NEXT LOOP%
160 DISK.DATE$="":FOR LOOP%=1 TO 8:DISK.DATE$ = DISK.DATE$ + CHR$(PEEK(REG.HL%))
:REG.HL% = REG.HL% + 1:NEXT LOOP%
170 ORIG% = BUFFER%(9)
180 FREE% = BUFFER%(10)
190 CLS:    PRINT "Disk name          ==> ";DISK.NAME$:PRINT "Creation date
 ==> ";DISK.DATE$:PRINT USING "Total disk space   ==> #### K";ORIG%:PRINT USING
"Free space on disk ==> #### K";FREE%
200 END
```

End

ray's address and contents. If you don't follow this rule, you are likely to find that your machine-language subroutines behave erratically or cause program crashes for no apparent reason.

If you look through the list of SVCs in the *Technical Reference Manual*, you will find many that are duplicated by Basic functions. In general, you should use Basic's built-in facilities whenever possible and use the SVC handler only when Basic can't duplicate the function you need. You can also duplicate some of the SVC functions with the System command from a Basic program. However, there is no obvious way to duplicate the video control and directory functions in Basic, nor to control the disk drives directly.

A Precautionary Measure

One final warning: The SVC handler is powerful and a small programming error can result in a major catastrophe. I suggest you save any Basic program that uses the SVC handler, and even remove your disks from the drives, before you first test your program. If you have a hard disk, you might want to turn it off and reboot. These precautions might seem foolish at first, but are worthwhile if you want to avoid accidentally writing sectors of garbage data to your disks because of a relatively minor programming error of loading an incorrect value into the Reg.A% variable. If the system accidentally reboots (which mine did several times while I was writing these programs), you'll have lost nothing but the few minutes needed to reload Basic and your program.

Such precautions are standard for most Assembly-language program development. Basic programmers are used to relying on the Basic interpreter to prevent such catastrophes. Assembly-language programs, as well as the SVC handler, have more control over the system and also a greater potential of causing a spectacular system crash.

Don't let these warnings scare you away from using the SVC handler. Once you are sure that your program is relatively bug free, you can use Listing 1 in your own programs with confidence that it is as safe as any other Basic program. And, if you don't normally write in Assembly language, you'll find that your programs suddenly have access to the full power of one of the best operating systems available for any microcomputer. ■

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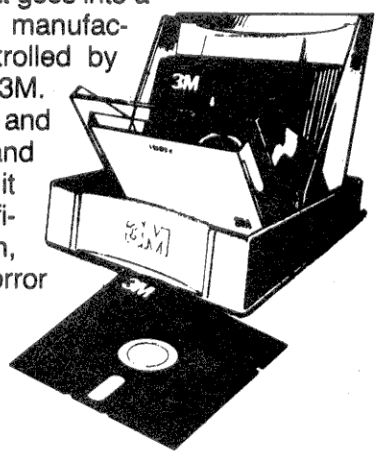

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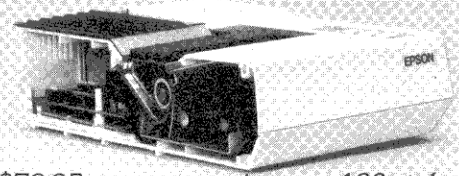

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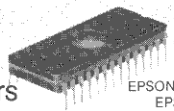

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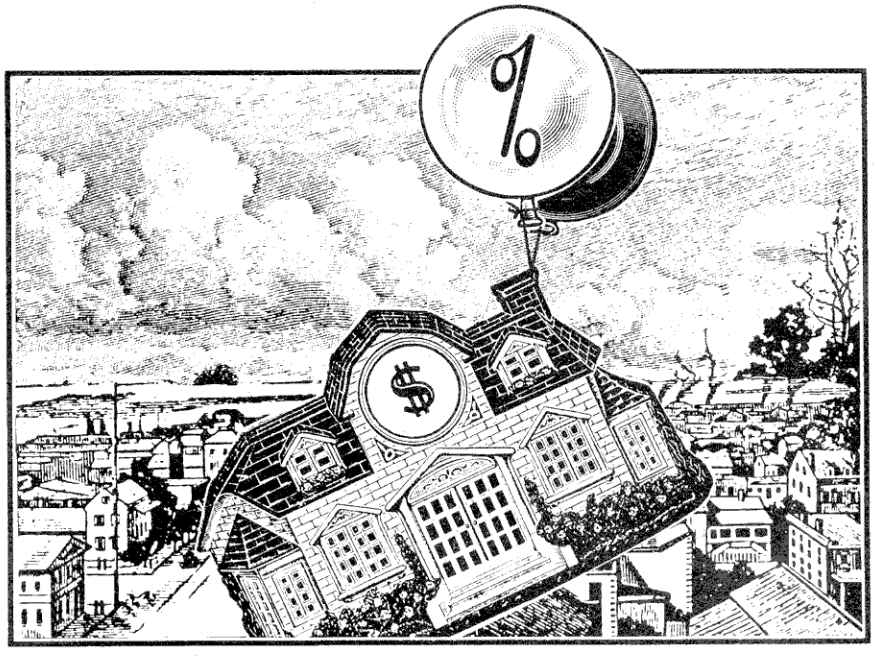

This month's template was submitted by T.A. Faircloth of Chicago, IL.

Many home buyers borrowed money a few years ago when interest rates approached 18 percent. Now that rates have fallen, refinancing at a lower percentage seems attractive because it might reduce the cost of the property over the life of the mortgage.

But the falling interest rate isn't the only factor to consider. Points (prepaid interest), legal fees, and other up-front costs influence the benefits of refinancing. Furthermore, since many homeowners sell their houses before their mortgages expire, the savings earned through renegotiating might not be enough to offset the cost of getting the loan. Banker, the spreadsheet template shown in the Figure, can help you analyze all costs and determine whether refinancing is worthwhile.

Developing a Plan

If you use Multiplan, you can create the spreadsheet directly from the Figure and Tables 1 (cell names), 2 (cell formatting requirements), and 3 (template formulas). Cell names are a particularly useful feature of Multiplan; they let you name a specific cell, row, column, or block of cells. These names make the formulas easy to understand, and Multiplan manages the cell locations automatically as you edit the template.

To create cell names, invoke Multiplan's name command by pressing the N key and typing in the information in Table 1. Then press the tab key to select the cell range definition. Enter the cell reference from Table 1 and press the enter key. Multiplan stores the name, making it a permanent part of the template no matter what information you have stored in that cell.

Follow the normal Multiplan spreadsheet format: general precision with general formatting alignment. Set the cell width to 10.

Adaptations for VisiCalc

VisiCalc users will need to do a little more work, since VisiCalc's formatting function isn't as versatile as Multiplan's. Consult Table 2 for the modifications.

Once you have set up the headings and basic data for Banker, use the Replicate command and the cell references shown in Table 4 to fill the remaining areas. VisiCalc prompts you for the source and target areas and then asks for each cell reference in the source formula.

After you enter the formula for cell A32, you copy it into other cells in column A (rows 33–50), using the Replicate command and indicating a relative cell reference for A31. Similarly, replicate the formulas for C32 and E31 down their respective columns.

The method for filling in formulas for the columns labeled "New Cumulative Interest," "Old Cumulative Interest," "After Tax Savings," and "Remaining Costs" is more complex. The formulas for cell addresses B31, D31, F31, and G31 contain more than one cell reference. In all cases, you treat only one cell reference in each formula as a relative reference; the other values remain constant. For example, the reference to C31 in D31's formula is relative, so its value changes as you replicate the formula. In contrast, the other references in the formula—C5 (monthly payment), D25 (number of prior payment), D20 (old monthly interest rate), and C3 (total number of payments)—are fixed. The other relative references are A31 in cell B31, E31 in cell F31, and F31 in cell G31.

Cell	Cell Reference
i3	R20C4
i4	R21C4
Total Cost	R22C4
p2	R23C4
m2	R24C4
n2	R25C4
p1	R2C3
t1	R3C3
n1	R4C3
m1	R5C3
i1	R6C3
t2	R9C3
i2	R10C3
Tax	R12C3
Costs	R15:18C3

Table 1. Cell names for Multiplan.

Savings on Loans

To successfully interpret the data Banker provides, you must understand how the template works. The formulas for the cells in row 20,column 4 (R20C4) and R21C4 calculate the monthly equivalent of the annual percentage rate (APR) for the old and new loans. The equation in cell R22C4 computes the sum of the costs of refinancing a loan from the figures entered in rows 15–18 of column 3. You can expand this calculation to encompass other costs.

The amount of the new loan includes the unpaid principal plus the refinancing costs figured by the formula in cell R23C4. The formula in cell R24C4 calculates the payment amount for the new principal at the new interest rate. The equation in cell R25C4 computes the previous payment number from the in-

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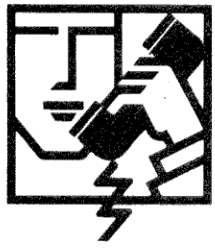

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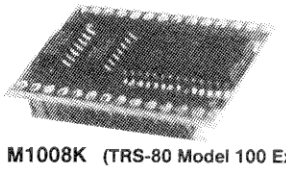

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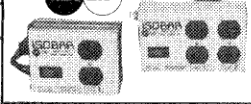

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put value of the next payment number.

The group of formulas that you enter in rows 31 and 32 generates the analysis table shown in rows 31–50 of the Figure. Banker uses the data you enter to calculate the cumulative interests and present the figures for the old and new mortgages in tabular form. To compute the savings, Banker simply finds the difference between the new and old interest amounts.

The column labeled "After Tax Savings" adjusts the gross difference in the two cumulative interests by the amount of additional tax you would have to pay in your tax bracket. This represents the net earnings gained by refinancing the loan. The last column applies the net earnings to the cost of refinancing the loan. By analyzing the data in this column, you can see how long you must maintain the new loan before you offset refinancing costs.

Case Study

The Figure shows actual calculations for a homeowner with an existing mortgage that has a remaining principal of $56,160, monthly payments of $701.88, and an annual interest rate of 14.75 percent. The mortgage schedule was for 30 years, and the owner's next scheduled payment is number 25. The template data also reveals that mortgage rates have declined to an APR of 11.625 per-

	1	2	3	4	5	6	7
1	ORIGINAL LOAN:						
2	Principal Balance		56160				
3	Total Number of Payments		360				
4	Number of Next Payment		25				
5	Monthly Payment ($)		701.88				
6	Annual Interest Rate		14.75				
7							
8	NEW LOAN:						
9	Total Number of Payments		360				
10	Annual Interest Rate		11.625				
11							
12	INCOME TAX BRACKET:		46				
13							
14	REFINANCING COSTS:						
15	Prepayment Penalty		200				
16	Origination Costs		300				
17	Mortgage Points		550				
18	Other Costs		350				
19	= = =

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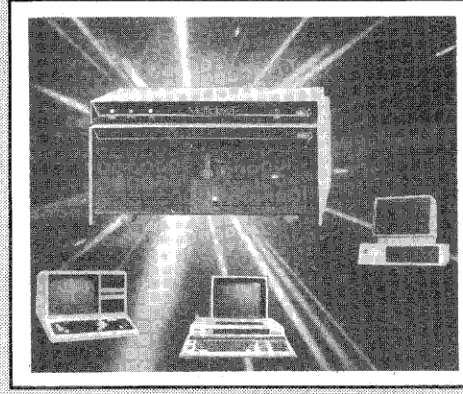

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Cell	Format
R1:18C1:2 R20:25C1:3	Formatted using the default alignment mode with continuous text formatting. This allows cells wider than one column to spill over into succeeding columns. VisiCalc users must enter text one column width at a time.
R27:29C1:7 R31:50C1 R31:50C3	Formatted using the default cell formatting. Contents of the cell are centered. VisiCalc users must manually center text or use right-justified mode for rows 27–29. Numeric data in rows 31–50 of columns 1 and 3 will be right-justified.
R31:50C2 R31:50C4:7	Contains numeric dollar figures. Formatted using the default cell alignment and fixed decimal point numbers with two digits of precision. VisiCalc users should format this area using the /F. option.

Table 2. Cell format requirements.

cent and that the homeowner is in the 46 percent tax bracket. He will incur the following refinancing costs: $200 for prepayment penalty, $300 for new loan origination costs, $500 for loan points, and $350 for legal fees and other closing costs.

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Cell Address	Formula
R20C4	i1/1200
R21C4	i2/1200
R22C4	SUM(Costs)
R23C4	p1 + (SUM(Costs))
R24C4	p2*(i4)/(1 – (1 + (i4))^ (– t2))
R25C4	(n1) – 1
R31C1	1
R32:50C1	R[– 1]C + 1
R31:50C2	m2*(RC[– 1] – (((1 + i4)^(RC[– 1] – t2)) /i4) + (((1 + i4)^ (– t2))/i4))
R31C3	n1
R32:50C3	R[– 1]C + 1
R31:50C4	m1*(RC[– 1] – n2 – (((1 + i3)^(RC[– 1] – t1)) /i3) + (((1 + i3)^(n2 – t1))/i3))
R31:50C5	RC[– 1] – RC[– 3]
R31:50C6	RC[– 1]*(1 – (TAX/ 100)
R31:50C7	(TCOST – RC[– 1])

Table 3. Template formulas for Multiplan.

Cell Address	Formula
D20	+ C6/1200
D21	+ C10/1200
D22	@SUM(C15. . .C18)
D23	+ D22 + C2
D24	+ D23*D21/(1 – ((1 + D21)^(– C9)))
D25	+ C4 – 1
A31	1
A32	+ A31 + 1
B31	+ D24*(A31 – ((((1 + D21)^(A31 – C9))) /D21) + ((((1 + D21)^ (– C9)))/D21))
C31	+ C4
C32	+ C31 + 1
D31	+ C5*(C31 – D25 – ((((1 + D20) ^(C31 – C3)))/ D20) + ((((1 + D20)^(D25 – C3)))/D20))
E31	+ D31 – B31
F31	+ E31*(1 – (C12/100))
G31	+ D22 – F31

Table 4. Template formulas for VisiCalc.

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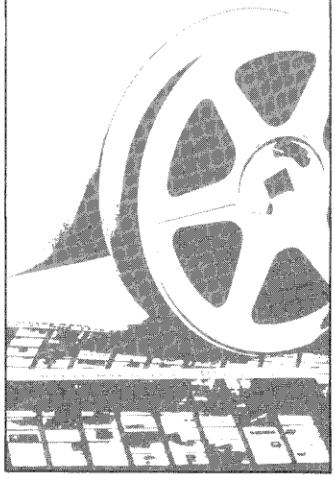

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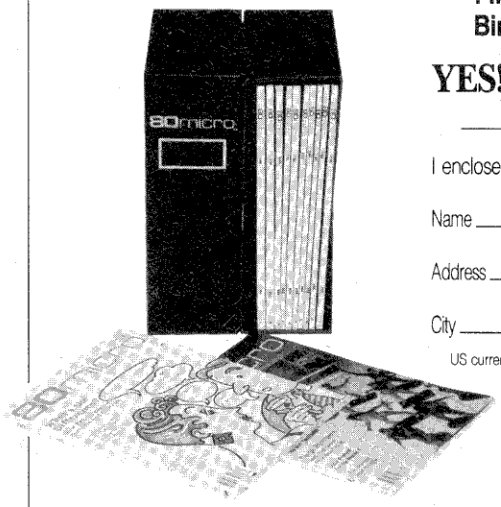

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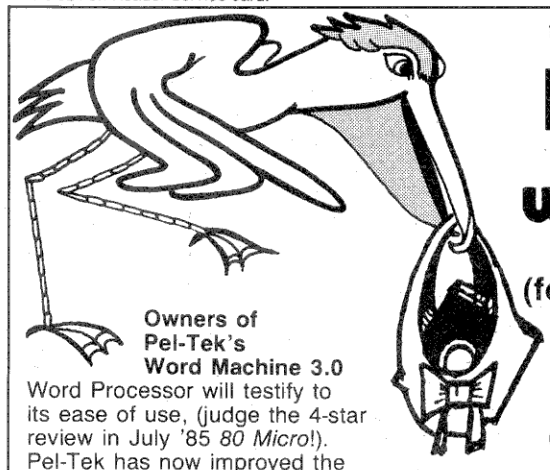

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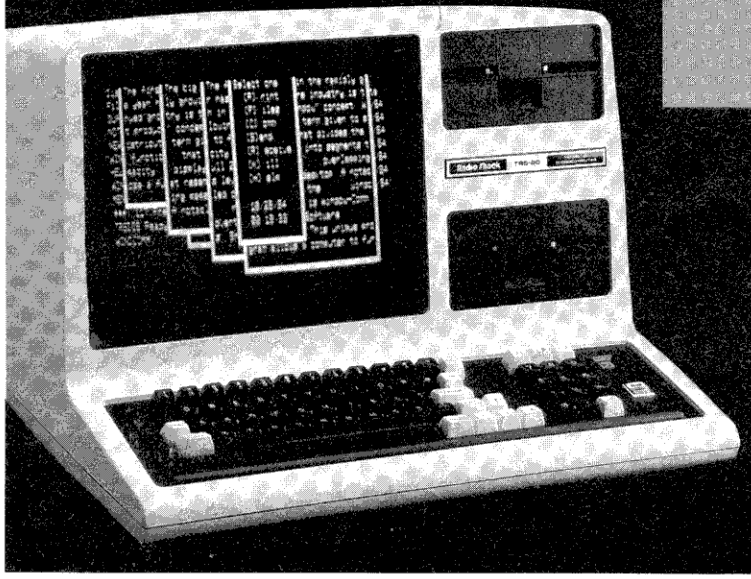

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1. ☐ I own an MS-DOS, IBM compatible system.
2. ☐ I intend to purchase.
3. ☐ I'm interested but have no immediate plans to purchase.
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B. On a scale of 1 (no interest) to 5 (great interest), please rate your interest in seeing the following types of programs published in 80 Micro:
___ 1. Business applications
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___ 3. Home management applications
___ 4. Money management applications
___ 5. Games
___ 6. Programming Utilities

C. *Excluding yourself*, how many people read your copy of 80 Micro?
1. ☐ One
2. ☐ Two
3. ☐ Three
4. ☐ Four
5. ☐ Five or more

D. What type of TRS-80/Tandy Computer do you own? Check all that apply.
1. ☐ Model I
2. ☐ Model II/12
3. ☐ Model III
4. ☐ Model 4/4P
5. ☐ Model 4D
6. ☐ Model 16/16B/6000
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9. ☐ Model 1000
10. ☐ Model 1200
11. ☐ Model 2000
12. ☐ Model 3000
13. ☐ Color Computer
14. ☐ Pocket Computer

E. Approximately when did you purchase your TRS-80 computer?
1. ☐ 1977–1978
2. ☐ 1979–1980
3. ☐ 1981–1982
4. ☐ 1983–1984
5. ☐ 1985–1986

F. Do you subscribe to an information utility, such as Compuserve, Dow Jones News Retrieval, etc.?
1. ☐ Yes
2. ☐ No
3. ☐ Not now, but intend to within 12 months.

G. Do you plan to purchase another TRS-80/Tandy Computer during the next 12 months?
1. ☐ Yes
2. ☐ No
3. ☐ Don't know

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79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
101 106 111 116 121	251 256 261 266 271	401 406 411 416 421	551 556 561 566 571
102 107 112 117 122	252 257 262 267 272	402 407 412 417 422	552 557 562 567 572
103 108 113 118 123	253 258 263 268 273	403 408 413 418 423	553 558 563 568 573
104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
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___ 4. Money management applications
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8. ☐ Model 600
9. ☐ Model 1000
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11. ☐ Model 2000
12. ☐ Model 3000
13. ☐ Color Computer
14. ☐ Pocket Computer

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1. ☐ Less than 1 year
2. ☐ 1–2 years
3. ☐ 2–3 years
4. ☐ 3–4 years
5. ☐ More than 4 years

F. Do you subscribe to an information utility, such as Compuserve, Dow Jones News Retrieval, etc.?
1. ☐ Yes
2. ☐ No
3. ☐ Not now, but intend to within 12 months.

G. Do you plan to purchase another TRS-80/Tandy Computer during the next 12 months?
1. ☐ Yes
2. ☐ No
3. ☐ Don't know

H. Where do you use your TRS-80/Tandy Computer? Check all that apply.
1. ☐ At home
2. ☐ At work
3. ☐ At school

I. The articles in 80 Micro are:
1. ☐ Too simple
2. ☐ Too complex
3. ☐ Just right

J. How many purchases have you made based on an ad you saw in 80 Micro?
1. ☐ 0
2. ☐ 1–3
3. ☐ 4 or more

K. Which of the following columns do you read? Please rate them on a scale of 1 (seldom read) to 5 (always read).
___ 1. Side Tracks
___ 2. Feedback Loop
___ 3. Pulse Train
___ 4. The Art of Programming
___ 5. The Next Step
___ 6. Dave's MS-DOS Column
___ 7. Spreadsheet Beat
___ 8. Project 80
___ 9. Reader Forum
___ 10. Reviews
___ 11. New Products
___ 12. Hot CoCo

L. If you are not a subscriber, please circle 500.

M. If you would like a one year subscription to 80 Micro, please circle 501 on the Reader Service Card. Each subscription costs $24.97. (Canada & Mexico $27.97, Foreign Surface $44.97, one year only). Please allow 10–12 weeks for delivery.

Reader Service: To receive more information from any of the advertisers in this issue, circle the number of the Reader Service Card that corresponds with the Reader Service number on the ad in which you are interested. You will find numbers. Complete the entire card, stamp and drop into a mailbox. In 4–6 weeks you will hear from the advertiser directly.

1 6 11 16 21	151 156 161 166 171	301 306 311 316 321	451 456 461 466 471
2 7 12 17 22	152 157 162 167 172	302 307 312 317 322	452 457 462 467 472
3 8 13 18 23	153 158 163 168 173	303 308 313 318 323	453 458 463 468 473
4 9 14 19 24	154 159 164 169 174	304 309 314 319 324	454 459 464 469 474
5 10 15 20 25	155 160 165 170 175	305 310 315 320 325	455 460 465 470 475
26 31 36 41 46	176 181 186 191 196	326 331 336 341 346	476 481 486 491 496
27 32 37 42 47	177 182 187 192 197	327 332 337 342 347	477 482 487 492 497
28 33 38 43 48	178 183 188 193 198	328 333 338 343 348	478 483 488 493 498
29 34 39 44 49	179 184 189 194 199	329 334 339 344 349	479 484 489 494 499
30 35 40 45 50	180 185 190 195 200	330 335 340 345 350	480 485 490 495 500
51 56 61 66 71	201 206 211 216 221	351 356 361 366 371	501 506 511 516 521
52 57 62 67 72	202 207 212 217 222	352 357 362 367 372	502 507 512 517 522
53 58 63 68 73	203 208 213 218 223	353 358 363 368 373	503 508 513 518 523
54 59 64 69 74	204 209 214 219 224	354 359 364 369 374	504 509 514 519 524
55 60 65 70 75	205 210 215 220 225	355 360 365 370 375	505 510 515 520 525
76 81 86 91 96	226 231 236 241 246	376 381 386 391 396	526 531 536 541 546
77 82 87 92 97	227 232 237 242 247	377 382 387 392 397	527 532 537 542 547
78 83 88 93 98	228 233 238 243 248	378 383 388 393 398	528 533 538 543 548
79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
101 106 111 116 121	251 256 261 266 271	401 406 411 416 421	551 556 561 566 571
102 107 112 117 122	252 257 262 267 272	402 407 412 417 422	552 557 562 567 572
103 108 113 118 123	253 258 263 268 273	403 408 413 418 423	553 558 563 568 573
104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
128 133 138 143 148	278 283 288 293 298	428 433 438 443 448	578 583 588 593 598
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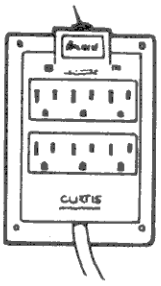

Kill Spikes, Fight Surge!
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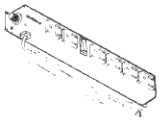

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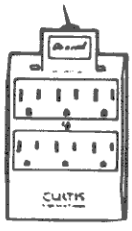

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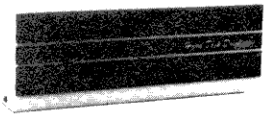

Comes complete with cable and choice of software driver* (CPM, LDOS, TRSDOS)

10 Megabyte Hard Drive	$899
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- For TRS-80 Model 3-4-4P
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- Continuous Duty Power Supply
- Error Checking & Correcting
- Continuous Duty Fan
- Size 11.5" x 12.5" x 5.0"
- All Contacts Gold Plated

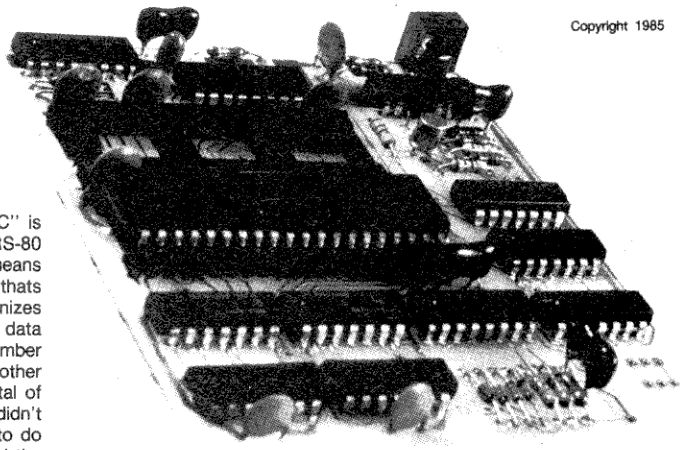
*Model 3 requires LDOS
Model 4 requires TRSDOS 6.2 or Montezuma Micro CP/M 2.2

There are firms which offer benefits, experience or products seemingly too good to be true. Now why would you want to expose yourself to unhappiness when Aerocomp has a proven record of thousands of happy, satisfied TRS-80 customers. Just take a minute to look through back issues of this magazine. You won't find many companies that have been around as long as Aerocomp. We fully support TRS-80 computers and most all operating systems including CP/M 2.2. Aerocomp leads the way to low hard disk prices so you can afford to enjoy the benefits of increased storage and faster disk I/O. These units are precision engineered, tested and delivered complete and ready to use, right from our stock. Each unit is guaranteed for one year parts and labor. You can count on us to be here if you should ever need us. As always, your satisfaction is assured with our 14 day free trial offer. If, for some reason, you are dissatified with our drive merely return it for a full refund (less shipping). How can you go wrong? Specify the software driver of your choice and start enjoying your computer's real capability. Do it today! Call our toll-free number now!

See opposite page ▸▸▸▸▸▸

MODEL I DOUBLE DENSITY BOARD

Add 80% more capacity to your disk system with the Double Density Controller (DDC) from Aerocomp.



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The Story

Some products have what it takes to seem to last forever. Our "DDC" is one of those products. What it does is allow you to operate your TRS-80 Model 1 disk system in double density. In this case double density means almost doubling the storage capacity of your diskettes. Single density, thats the way Radio Shack designed your Model I expansion interface, organizes your disk into 10 sectors per track. Each sector contains 256 bytes of data for a total storage capacity of 2,560 bytes or 2.5K per track times the number of tracks your drive is capable of adressing. Double density, on the other hand, writes 18 sectors per track each containing 256 bytes for a total of 4,608 bytes or 4.5K. That is 80% more data in the same space. Why didn't Radio Shack do that in the beginning, you ask? Well it costs money to do double density because it is more difficult to do than single density and the data is harder to capture reliably. That means more cost and the Model I was meant to be a low-cost computer for the masses. Therefore, no double density for the original Model I.

The Facts

Other companies introduced double density controllers for the Model I but they were not so good. We waited and waited but, even new models failed to correct problems with data separation that kept cropping up. So we went to work and came up with a new design to cure the old problem. At last! A double density controller for the Model I with a higher probability of data recovery than with any other double density controller on the market then or since. Our analog design phase lock loop data separator has a wider capture window than the digital types the others use. This allows high resolution data centering. Our "DDC" analog circuit allows infinately variable tuning. The attack and settling times are optimum for 5.25" diskettes. The oft-stated fears of adjustment problems rumored by digital dilettantes have been proved groundless by thousands of satisfied users the world over. The bottom line here is state-of-the-art performance and reliability.

ORDER YOURS TODAY

TRS-80 Model I disk system owners who are ready for reliable double density operation will get 80% more storage per diskette; single and double density data separation with far fewer disk I/O errors; single density compatibility; simple plug-in operation. You will need a disk operating system that has the necessary double density software. All the popular DOS's (except TRSDOS) have the drivers. We have put together two special packages in the event you don't already have one of the more popular DOS's.

Please add $4 handling & shipping

"DDC" by itself	$ 99
"DDC" and LDOS	159
"DDC" and NEWDOS 80 2.0	179

☞40 Track
☞80 Track
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☞Dual Head
☞Bare
☞Complete
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DISK DRIVES

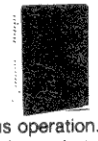
Aerocomp leads the way to the BEST value in disk drives and related peripheral products on the market today. Sound engineering, high performance, quality construction, no-risk free trial, outstanding warranty service and a reputation for doing the right thing make your decision to buy Aerocomp the correct one. Please look over our offerings and make your selection. When you have made your choice call our toll-free number and place your order. If you need assistance in making your selection, please call our information number. It's listed in the box at the bottom of this ad along with the technical assistance number for those of you who want to get right to the nitty-gritty. Thanks, we all appreciate your business and will continue to do our very best to support you.

BARE DRIVES Add $4 S&H

These drives are completely burned-in and tested for your ultimate satisfaction. Add that extra drive today! These are new factory drives. No blems, seconds, closeouts or defunct manufacturers surplus (MPI, Shugart, etc). Instruction manual included at no extra cost. Service manuals are also available. See "Miscellaneous Goodies" for information.

40tk SS half high TEAC FD35-A	$ 99
40tk DS half high TEAC FD35-B	109
80tk DS half high TEAC FD35-F	129
40tk SS full size Tandon TM100-1	119
40tk DS full size Tandon TM100-2	119
40tk SS half high TEAC FD55-A	89
40tk DS half high TEAC FD55-B	99
80tk DS half high TEAC FD55-F	119
8" SS Thinline Tandon TM848-1E	260
8" DS Thinline Tandon TM848-2E	335

8" FLOPPY DRIVES Add $12 S&H



These 8" Thinline drives work with the Model 2 and 16 plus others that use standard drives. The rugged all-steel cabinet has an extra heavy duty power supply rated for continuous operation. A removeable air filter allows only clean air to circulate. Cabinets with single drives are supplied with a blank panel to cover the unused space. A second drive can be added at any time. Service manuals are available. See "Miscellaneous Goodies" for info.

1-8" SS Tandon TM848-1E & case	$ 389
2-8" SS Tandon TM848-1E's & case	649
1-8" DS Tandon TM848-1E & case	439
2-8" DS Tandon TM848-2E's & case	699

MISCELLANEOUS GOODIES $2 S&H

Model 1 TRSDOS 2.3 disk & manual	$ 25
Model 3 TRSDOS 1.3 disk & manual	25
Model 4 TRSDOS 6.2.x disk & manual	20
LDOS (specify Model I or III)	69
NEWDOS 80 v2.0 (specify Model I or III)	99
Montezuma Micro Model 4 CP/M 2.2	169
Tandon TM100-1/2 Service Manual	20
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10 SSDD disks in library box, Lifetime Guar	12
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5.25" drive power supply & enclosure	59
8" drive pwr sply & encl w/fan 5V-24V	150
5.25" 1-drive cable, a nice length	19
5.25" 2-drive cable, a 44 incher	24
5.25" 3-drive cable, just the right size	29
5.25" 4-drive cable, the top dog	34
5.25" Extender cable with gold contacts	10

COMPLETE DRIVES Add $6 S&H

Fits TRS-80 Models 1,3,4 and the Color Computer plus the others that use standard drives. The drive of your choice is mounted in a sturdy, all-steel cabinet. An external gold plated drive connector allows cabling without disassembly of the cabinet. Half-high drives come in a full-size cabinet that will hold and power our half-high drives. Single drives have a panel covering the unused space allowing a second drive to be added at any time. All are shipped fully assembled ready to use. Specify silver or beige cover. Stainless Steel covers are available for $12 additional.

1-40tk DS 3.5" FD-35B in dual case	$ 159
2-40tk DS 3.5" FD-35B's in dual case	259
1-80tk DS 3.5" FD-35F in dual case	179
2-80tk DS 3.5" FD-35F's in dual case	289
40tk Single Side full size TM100-1	149
40tk Double Side full size TM100-2	159
1-40tk SS half-high FD-55A in dual case	129
2-40tk SS half-high FD-55A's in dual case	219
1-40tk DS half-high FD-55B in dual case	139
2-40tk DS half-high FD-55B's in dual case	259
1-80tk DS half-high FD-55F in dual case	159
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Use your Aerocomp hardware product for up to 14 days. If you are not satisfied for **ANY REASON** (except misuse, damage or improper handling), return it (insured) in the original shipping container for a full purchase price refund, less shipping. **Sorry, this offer does not apply to software. Defective software will be replaced.** Any hardware/software specials will be prorated and the software will be charged at the regular unbundled price. We have confidence in our products and we know you will be satisfied.

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Convert your cassette Model III or 4 to disk operation with one of our complete kits. You receive our own advanced disk controller board with gold plated edge contacts capable of 4-drive operation; our own power supply; plated steel mounting towers complete with RFI shield plus all the cables and hardware necessary. Detailed instructions are included. All you need is a screwdriver and a pair of pliers. System kits come with 40 track single-side drives or just order the basic kit and pick the drives you want from the selection in the next column.

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(Everything you need - less drives and DOS)
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Substitute DS drives for only $10 each.
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Model 3 TRSDOS 1.3 disk/manual	25
Model 4 TRSDOS 6.2.x disk/manual	20
LDOS 5.1.4disk/manual	69
NEWDOS 80 version 2.0disk/manual	99
CP/M 2.2 by Montezuma Micro	169

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If you have a Model I and an Expansion Interface this is what you need to get started with disks. Included is one 40 track single-side disk drive complete with matching silver case and power supply, a 2-drive cable, a TRSDOS 2.3 disk operating system and TRSDOS manual plus all insurance and delivery charges to your door (lower 48 states).

Yours for only **$ 199**

LDOS 5.1.4 disk/manual	69
NEWDOS 80 version 2.0disk/manual	99

You can add our renowned "DDC" double density controller to either the Radio Shack or the LNW Expansion Interface for 80% more storage capacity on your drive. Order it at the same time as our starter package above and we'll pay the shipping. Go ahead, you deserve increased density. See the opposite page for the latest technical details.

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Now you can **CROSS** the barrier between computers! Using **HYPERCROSS** you can **COPY** files between TRS-80 disks and those from many **CP/M** and **IBM-PC** type computers. If you have access to more than one kind of computer, or you are changing to a new machine then you need HYPERCROSS to transfer your text files, BASIC, FORTRAN PASCAL or C programs, Viscalc files, general ledger and accounting files, data bases and even binary files. HYPERCROSS lets you format alien disks and copy files on your own TRS-80 or MAX-80 without using cables.

Formats supported: IBM-PC and MS-DOS compatibles include DOS 1.1, 2.x/3.0 single and double sided and Tandy 2000. CP/M from Aardvark to Zorba, including all popular TRS80 formats such as Holmes, Montezuma, and Omikron. TRS-80 Color Computer format also supported.

New Feature: Hypercross converts Basic files Now Hypercross includes a feature to automatically change the tokens in a TRS-80 file to the correct format for CP/M, MSDOS or CoCo. Syntax of the program is not changed.

PRICES Inc. disk manual, S/H. All versions include Basic convert.

Hypercross CoCo with TRS80-Color Computer	**$54.95 ppd**
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Upgrade at any time for price difference plus $5 plus old disk.

Please specify TRS-80 Model I (needs doubler), III, 4/4P. or MAX-80.

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Do you want to back up your precious copy of Copycat 3, or SU. Do you want to fix or modify a disk - if so then **you need HYPERZAP!** On the market for 3 years, **HYPERZAP** is **more** than just another disk copying program - it is **the** program for analyzing, copying, repairing, creating floppy disks of all kinds. It works with TRS-80 formats as well as many others such as CP/M, PC, CoCo etc. Designed to handle mixed density sectors on any track in **any** sequence. Many features for reading, writing, editing track and sector data. **Hyperzap** is **the** tool that lets **you** be in charge. **Make your own self booting disks.** Take your own CMD file and turn it into a dual booting Mod 1/III/IV disk. **Autopilot mode** allows learns, saves and repeats procedures. Disk comes with fascinating examples. Use Hyperzap as a learning tool - find out how things are done!

HYPERZAP 3.2G - nothing else even comes close! . . . . . **$49.95 ppd**

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Hartforth First Class FORTH for TRS80 1, 3 or 4 versions	$65.00
Pascal Superb Editor, Compiler and Run-Time	$65.00
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Mysterious Adventure Series 1-10 3 or 4 per disk	$29.95
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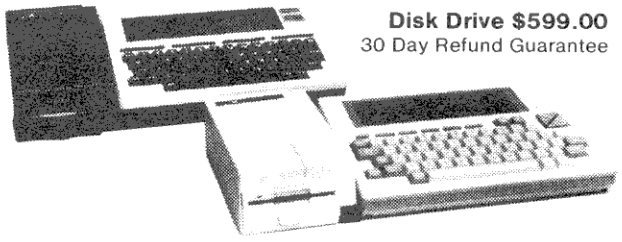

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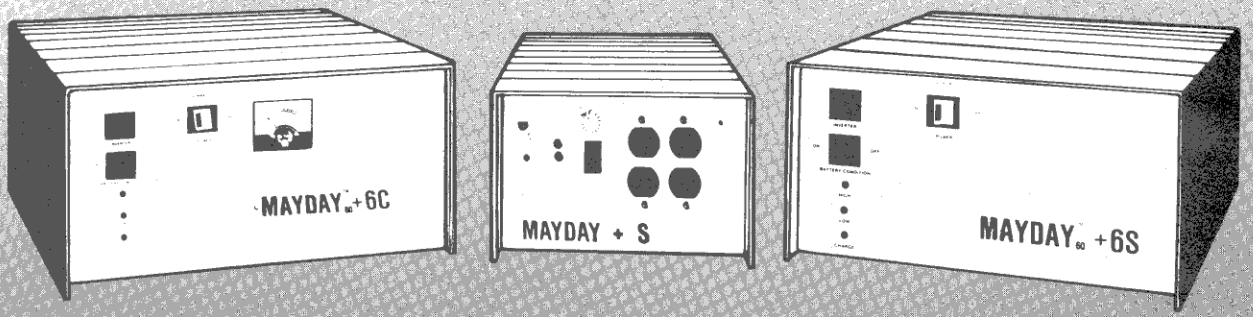

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Continued from p. 31

Hello, Mainframe

by David Dalton

★★★★★

Teleterm runs on the Models III (48K), 4 (64K), and 1000/1200/2000 (256K). Telexpress Inc., P.O. Box 217, Willingboro, NJ 08046, 609-877-4900. $195. Express Order Software numbers 90-0117 (Model 4 version); 90-0116 (Model 2000 version); 90-0250 (Model 1000/1200 version).

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

If you use your computer and modem only to call bulletin boards or networks such as CompuServe, you don't really need a terminal emulator, software that makes your computer mimic a particular type of terminal so a mainframe gets full control of your screen. However, if you regularly access mainframes or minicomputers, terminal emulation can be essential.

Teleterm is an excellent emulation program. It's powerful and easily configured, with easy-to-use menus. It has a built-in text editor and it can operate unattended to handle tasks like automatic file transfers. It also supports XMODEM error-checking. Teleterm can even handle the Model 4's block graphics.

Emulation

A terminal (or computer) calling a host computer must first identify its terminal type. Programs on the host will then have full control of the calling computer's screen. Teleterm comes with emulation tables for several common terminals, including DEC's VT-100 and VT-102, Televideo's 910 and 925, Lear-Sigler's ADM5, and Adds' Viewpoint. It can also emulate the TRS-80 Model 16 console. If you have some programming experience, you can create your own emulation tables using Teleterm's menus.

Terminals respond to codes sent from the host computer. These codes do all sorts of things: tell the cursor to move to any position on the screen, open a blank line between two lines of text, delete a line of text and close the gap, switch to reverse video, and so on. The host computer maintains a data base of control codes for any number of terminals.

Using Teleterm

I tested Teleterm mainly as a VT-100 emulator, calling into a Unix system. The Unix screen editor called "vi" worked just fine with Teleterm. I even tried it out with a program that creates overlapping windows on the screen. Teleterm's graphics capabilities produced neat windows and it handles reverse video perfectly. Teleterm is set up to use Hayes and Hayes-compatible modems and the Radio Shack Modem II. The auto-dial function worked flawlessly with my U.S. Robotics modem, which is Hayes-compatible. I also tried Teleterm on a high-speed direct-wired link using a null modem cable. Baud rates of up to 9,600 worked with no problem.

All Teleterm's functions are menu-driven. It comes with an excellent setup utility called Creator, which takes you step by step through a series of menus asking you how you want Teleterm configured. These are classy menus with flashing hands pointing out where you are and little check marks to show you which options you have selected. Everything about Teleterm seems to be adjustable: RS-232 parameters, video configurations, CTS/RTS signals, DTR indicators, XON/XOFF parameters, nulls, and break timing. You can also edit its input/output tables for RS-232, printer, video, graphics, and keyboard input, with menus to help you along.

The text editor is quite handy. You can invoke it from DOS or with a command while still connected to a host computer. You can use it to edit disk files or the memory buffer.

File Transfers

Teleterm offers options for file transfers, including XMODEM protocol and a special Teleterm protocol, which you can use only with another computer running Teleterm. You can transfer an ASCII buffer from disk or memory using XON/XOFF flow control, with or without prompts. You can also automate file transfers for a predetermined time of day. Teleterm has an unattended mode, which uses unattended operation files. These are ASCII files that store commands for Teleterm to execute, such as dialing, automatic log-on, and automatic file transfers. This smart function even includes a Case command to allow decision-making and branching in the unattended-operation file. Setting up these files requires some programming experience.

Conclusion

The Teleterm manual isn't elegantly printed, but it's fat and full of technical information, with many sample screens. My main complaint is the lack of an index (though there is a good table of contents).

Teleterm can turn a micro into a smart terminal with the added plus of disk storage. It could be useful in businesses where desktop computers need to communicate with their mainframe and minicomputer counterparts. ■

Window Watching

by Edward Spitzbarth III

★★½

SASSE and Memoir run on the Model III (48K) and require TRSDOS 1.3 and one disk drive. En Fleur Corp., 2494 Sun Valley Circle, Silver Spring, MD 20906, 301-598-4532. $75.

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

SASSE is a Model III free-form filing system that can be used as a data base manager. Memoir, a memory-resident notepad, works with SASSE or independently. While SASSE uses windows in an interesting way, it has some aggravating problems. There are too many windows to move through, and basic functions like paging through a file and entering data are unusually cumbersome.

Features

The SASSE master disk comes with a do-file that automatically backs up the disk. When you run the program, it displays a window with two smaller windows inside, one of which contains the main menu. You scroll through the menu with the up- and down-arrow keys and use the enter key to select one of the options. The other small window constantly scrolls the name of the program, serial number, time, date, name of file open, and other information about that file.

When SASSE reads a file, it replaces the main menu window with four overlapping windows. The current record, of which only part is shown, is on top; you scroll through it using the up- and down-arrow keys. Hitting the break key enlarges the window so you can see more of the record at once. The right- and left-arrow keys move you sequentially through the file, one record at a time. As you do this, previous records are pushed to the windows underneath the current one.

I wouldn't want to scroll through a file with many records, because the program redraws the windows every time you push a left- or right-arrow key, making the paging process long and tedious.

From the Read mode, you can press the enter key to bring up the main menu and perform any of the menu's operations on the file. Selecting the Write option opens another window containing the Write menu, which lets you create a new file or add a record to an existing file.

If you choose to create a new file, the program asks you for a file name. One annoying problem with SASSE is that

you can't escape this prompt; you have no choice but to make a new file.

After naming the file, you create a format for the file's records. For example, you could format an address file with the fields:

Name:
Address:
City: State: Zip:

SASSE includes this template in every record you add.

When you opt to add a new record from the Write menu, you encounter one of the program's major problems. SASSE doesn't automatically position the cursor after the field names, so you have to space over them manually. This makes data entry unforgivably slow and tedious. You can use the left-arrow key to delete, but it deletes field names, too. The delete function, shift/down-arrow/D, didn't work.

The Edit menu lets you edit a record or kill a file. You can't delete individual records, which seems odd. The editing keys are the same as those you use to add a record.

As with creating a file, you can't escape the delete file prompt once you call it up. You have to kill a file or reboot the computer.

SASSE supposedly sorts files by their records' first lines, skipping over the field name. I couldn't get this to work with the files I created. Also, the program should permit sorts by any field, not just the first.

From the Print menu, you can print out the current record or the entire file.

Memoir

The package includes the Memoir program, which you can use with or without SASSE. Memoir uses a small menu window and a larger display window, and features an appointment calender, a list of area codes, penmanship tips, and a metric conversion table. You can also create your own notes. The displays suffer from occasional misspellings.

Conclusion

The SASSE documentation consists of two small manuals: the *Operations and Reference Manual* and the *Help and Reference Manual*. Only the *Operations and Reference Manual*, which gives fairly good descriptions of each function, is really useful. The *Help and Reference Manual's* descriptions are vague. Both manuals are stored on disk and can be accessed from the main menu. Memoir has no printed documentation, but you can call an instruction file from its menu.

While SASSE and Memoir are unique in the way they use windows, their shortcomings make them less than useful for serious applications. ■

Electric Webster Grammar and Style Checker

★★★★

Electric Webster Grammar and Style Checker runs on the Model 4 (64K) and requires one disk drive (two are recommended). Cornucopia Software Inc., P.O. Box 6111, Albany, CA 94706, 415-524-8098. Grammar and Style Checker, $49.95; Hyphenation, $49.95. (You must also own the Electric Webster Spelling Checker, $89.95; $149.95 with correcting feature.)

Grammar checkers, of course, can't really analyze sentences for grammar, at least not yet. But they can find errors in your word processor documents that a spelling checker will miss. The Electric Webster Grammar and Style Checker is an excellent addition to Model 4 Electric Webster (for a review of the spelling checker, see March 1985, p. 116). It checks your file against a data base of questionable words and phrases and lets you decide whether to accept the program's recommendation. It can also flag punctuation and capitalization errors.

The setup takes a lot of disk space. Two disks must contain your DOS and word processing program, Electric Webster's 50,000 word dictionary, the grammar checker's 22.5K data base, all of Electric Webster's command files, and your document. You'll probably want to kill off Basic to make room.

Electric Webster's Install utility takes you through installation step by step, prompting for the information it needs. You configure the grammar checker to flag or ignore categories such as awkward phrases, words that sound alike and are sometimes confused, imprecise words, possible double negatives, the passive voice, slang, and cliches. You can also set the program to flag words, sentences, and paragraphs that exceed the length you specify.

Like the Electric Webster spelling checker, the grammar checker is menu-driven and is a breeze to use. After you've checked your spelling, the program asks if you want to check grammar. It displays the questionable phrases it finds, and a menu gives you the options of leaving the phrase as is, typing in a change, or accepting the program's suggestion.

The data base of questionable words and phrases is good. If you know your bad habits, you can add to the list. After checking grammar, Electric Webster displays a list of statistics, including number of words, average sentence length, and average paragraph length.

The hyphenation feature, sold as a separate option, is useful only with Allwrite, Lazywriter, or LeScript, word processors that use discretionary, also called soft, hyphens. A soft hyphen indicates where the program can split words when breaking lines of text. Electric Webster's hyphenation feature scans a document and installs soft hyphens in the proper places. This makes hyphenating your printouts automatic and correct.

Hyphenation is also done from a menu. The process is very fast. When you return to your document, you'll see the soft hyphens. I use this option with LeScript, which displays the hyphens as blinking characters.

Electric Webster, with its Grammar and Hyphenation options, offers fast, easy, complete checking of your documents. You'd be surprised how many pesky errors it will find.

—David Dalton

BSORT51

★★★★★

BSORT51 runs on the Model III (48K) and requires one disk drive. Misosys, Inc., PO Box 239, Sterling, VA 22170-0239. 703-450-4181. Call for price.

A good Basic interpreter should come equipped with a high-speed sort utility. Model III Basic does, which is more than you can say for the Model 4. But the III's CMD"O" sort function suffers from a few serious weaknesses. It limits string arrays to one dimension, sorts only in ascending order, and provides insufficient error-trapping. Logical Systems' BSORT 51 offers the Model III user a much more versatile sort utility.

BSORT51 works as an overlay, which means Basic loads it in from disk when you call it. The statement CMD"BSORT 51, followed by the appropriate parameters, invokes the sort. The two major parameters are a primary sort array and the number of elements to be included in the sort. As with all other BSORT51 array types, the primary sort array can be integer, single-precision, double-precision, or a string array. And the array can be one- or two-dimensional.

Besides simple single-level array sorts, you can do multilevel sorts by specifying secondary sort arrays in the parameter list. Additionally, you can do tag arrays, which take on the order of the sort. Although the tag arrays are reordered with the primary sort array, multilevel sorting is not performed on them as would be done on a secondary sort array.

Other advanced features include mid-string sort keys for easy sorting of complex record strings containing multiple

fields, optional index arrays for disk file handling, and complete error-trapping to prevent attempts to sort past array boundaries.

The manual, though only 13 pages long, adequately explains BSORT51's advanced features, and is full of examples for putting the program through its paces.

Without a doubt, BSORT51 is the finest Basic sort utility available for the Model III. Even if you do only a modest amount of sorting, it demands a place in your software library.

—Mark Goodwin

Multiple Choice

★★★★★

Multiple Choice runs on the Tandy 1000 and 1200 (256K) and requires one disk drive. Awesome Technology Inc., 177 Webster St. Ste. A-416, Monterey, CA 93940, 800-548-2255 ext. 803. $64.

While Multiple Choice from Awesome Technology is not awesome, it is worth the $64 the company is asking for it. Billed as the "Poor Man's TopView," Multiple Choice is a multi-tasking utility that lets you switch from one application program to another with a single keystroke. You can have up to eight applications in memory at one time, depending on how much memory is available. And the more memory available, the better Multiple Choice works. You would want at least 512K to get the most out of it.

Multiple Choice divides your computer's memory into what are called channels. Each program in memory is run in one of the assigned channels. Say, for example, WordStar is running in channel 6 and channel 1 is currently in use at the DOS A> prompt. You can start a directory listing in channel 1, then switch to channel 6 by pressing the control-6 key combination. The WordStar menu appears on the screen. Switch back to channel 1, and the DOS has finished its directory listing.

The program can take a "snapshot" of the screen and save its contents to disk so you can integrate information from various sources in one application. Another nice feature is its ability to run background programs such as Borland's Sidekick. Install Sidekick before running Multiple Choice, then call it from any channel currently executing.

The program is easy to use and lives up to every claim the manufacturer makes. The documentation, in the form of a file on the distribution disk, is clear and complete.

If you need to run multiple applications simultaneously, Multiple Choice is a much better buy than IBM's TopView.

—Gary A. Shade

The Tandy 200 Portable Computer

★★★★

The Tandy 200 Portable Computer. David A. Lien. 595 pp. paperback, 7 by 9 inches. Tandy/Radio Shack, One Tandy Center, Fort Worth, TX. Catalog number 26-3869. $19.95.

If the Tandy 200 is your first computer, I strongly suggest you get *The Tandy 200 Portable Computer*. Although Tandy includes a user's manual with the computer, it's more a reference than a tutorial. David Lien's book goes into the details a neophyte needs.

The book is divided into two sections plus nine appendices and an index. The first section tells how to set up the 200 and describes its word processing, scheduling, address, spreadsheet, and telecommunications functions. The second section teaches you Basic programming.

Lien shows you where everything is on your computer. Each description is accompanied by a diagram of the computer and keyboard with the appropriate keys indicated. This section is much better than the one in the Tandy manual.

While the chapters describing Text won't turn you into a professional key puncher, they are again better than the Tandy manual. Schedule, Address, and MSPLAN get one chapter apiece. While Schedule and Address are simple enough, MSPLAN is complex and deserves more thorough treatment. And the example in the MSPLAN chapter was so simplistic as to be useless (illustrating how to add two numbers in a spreadsheet).

The five chapters on Telcom and telecommunicating cover hardware needs, explain how to download and upload a letter to CompuServe (you get a password and one hour of free time on CompuServe when you buy your Radio Shack modem cable), and tell how to hook up the 200 to a Model III and to another 200. While it isn't exhaustive, this section provides enough information to get you started.

The section on Basic starts with a simple program. Each chapter builds on the previous one and ends with a brief recap. After you've mastered the simpler commands and have learned how to edit, you're given programming assignments to apply what you've learned.

Cartoons throughout the book liven things up. Boxes in the text highlight information or ask questions to provoke a little thought about the subject at hand.

Despite its incomplete treatment of MSPLAN, this book is a must-have for any new Tandy 200 owner.

—Terry Kepner

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Aiming High

by Milton T. Simpson

Having a 64K CoCo without OS-9 can be like having money in the bank without a way to get it out. The 64K Enable program (*HOT CoCo*, June 1985, p. 40) opens up the upper 32K of memory, but only cartridge memory, addresses 49152–65279, remains completely usable because Color Basic (or Extended Color Basic) and input/output functions reside in high memory. Often it's as easy to write a program that uses the cartridge memory area of the CoCo's upper 32K.

Storing machine-language routines in upper memory is the usual method for using high memory; you can load your program from Assembly language or POKE it into memory using a Basic loader. You can also POKE data into high memory from a Basic program in low memory, thus freeing space in low memory for longer, more complex programs. I'll illustrate the procedure using Cash, a routine that uses high memory as an accumulator for financial data (see Program Listing 1). In my application, a Basic program loads the files from tape, POKEs the data into high memory, and later PEEKs the same data back into Basic to produce a printout of a summary.

Taking a PEEK

Since Cash deals with both real numbers (a whole number with a decimal fraction—e.g., 12.50) and integers (a whole number without a decimal fraction—e.g., 12), I wrote Demo to examine how PEEKs and POKEs affect such values (see Program Listing 2). When you enter a number, Demo POKEs it into memory location 16000 and then PEEKs the value stored at 16000 onto the screen.

Experimenting with Demo reveals that the CoCo PEEKs 1 to the screen when you POKE in a value of 1. However, if you POKE 1.1, Demo PEEKs 1 to the screen. Similarly, entering 255 returns 255; entering 255.99 returns 255. Before deciding how to resolve this discrepancy, you must consider another factor. Because the CoCo has 8-bit memory, it can store only whole numbers between zero and 255. If you type in a value greater than or equal to 256, you get an FC error message for line 30.

For Cash to work properly, you must provide a way to handle numbers greater than 256 as well as decimal fractions. To understand the principles of the solution, assume that you can store only whole numbers between zero and nine. If you want to use 9.87, you must first multiply it by 100 to eliminate the decimal fraction. Of course, you will eventually divide by 100 to restore the original value.

To work with the new number, 987, you must express it as 9*100+8*10+7*1. If you establish a consecutive series of addresses and assign a multiplier to each address, you can store 9 at the 100 address, 8 at the 10 address, and 7 at the 1 address. By setting up an "address book," you can later look up the contents and restore the original value by multiplying each digit by its multiplier, summing the results, and dividing by 100.

Cashing In

Examine Cash more closely to see how this technique works. Line 10 sets the index for the address book formula. I chose address 29500 so that Cash would run without 64K Enable. You can use any address in RAM that doesn't overwrite a function you need. (If you choose to run 64 Enable, you can safely use 49152, but

System Requirements

64K RAM
Color Basic

```
K =  1  VALUE =          1.75  ADDRESS =  29500
K =  2  VALUE =         99.75  ADDRESS =  29503
K =  3  VALUE =    167,772.15  ADDRESS =  29506
K =  4  VALUE =     99,999.99  ADDRESS =  29509
K =  5  VALUE =    100,000.00  ADDRESS =  29512
K =  1  VALUE =          1.75  ADDRESS =  29502
K =  2  VALUE =         99.75  ADDRESS =  29505
K =  3  VALUE =    167,772.15  ADDRESS =  29508
K =  4  VALUE =     99,999.99  ADDRESS =  29511
K =  5  VALUE =    100,000.00  ADDRESS =  29514
```

Figure. Example of output from Cash.

Program Listing 1. Cash.

```
10 B=29500
20 FORK=1TO5
30 PRINT:INPUT"ENTER ANY NUMBER
FROM 0.0 TO    167772.15";A
40 AD=B+(K-1)*3
50 GOSUB160
60 A=A*100
70 GOSUB190
80 NEXT:PRINT#-2,""
90 FORK=1TO5
100 AD=B+(K-1)*3
110 GOSUB320
120 A=(65536*MS+256*LS+DS)/100
130 GOSUB160
140 NEXT
150 END
160 PRINT#-2,USING"  K = ##";K;:
PRINT#-2,USING"  VALUE = ###,###
,###.##";A;
170 PRINT#-2,USING"  ADDRESS = #
#####";AD
180 RETURN
190 MS=INT(A/65536)
200 LO=65536*(A/65536-MS)
210 LS=INT(LO/256)
220 DO=256*(LO/256-LS)
230 XX=DO-INT(DO)
240 IFXX>.5THEN DS=INT(DO)+1ELSE
 DS=DO
250 IFMS>255THENPRINT:PRINT"MSBI
T TOO BIG    ";"NUMBER = ";A:K=K-
1:RETURN
260 POKEAD,MS
270 AD=AD+1
280 POKEAD,LS
290 AD=AD+1
300 POKEAD,DS
310 RETURN
320 MS=PEEK(AD)
330 AD=AD+1
340 LS=PEEK(AD)
350 AD=AD+1
360 DS=PEEK(AD)
370 RETURN
```

End

Program Listing 2. Demo

```
10 INPUT"ENTER A NUMBER";A
20 PRINTA
30 POKE16000,A
40 PRINTPEEK(16000)
50 GOTO10
```

End

Circle 487 on Reader Service card.

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...
— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.
The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.
Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

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be sure you don't overwrite functions residing above 65179—they contain Basic and input/output functions.)

Lines 20–80 define an input loop. In line 30, I set 167772.15 as the upper limit for A because the program must store three values between zero and 255. Therefore, you can store 16,777,216 values (256*256*256). Since the lowest value is zero, the highest value must be 16,777,215. You must divide this value by 100 if you want to include two decimal places; thus the upper limit is 167,772.15.

Line 40 calculates the starting storage address for each value you enter. The formula increments the index (B) by three for each value (K). If you must process a number higher than the stated limit, you can add addresses and increment the index accordingly. Line 50 sends the numbers you enter to a printer so that you can compare them with the values the program returns after POKEing and PEEKing. Line 60 eliminates the decimals. If you want to change Cash to accommodate more decimal places, you must increase the multiplier accordingly (e.g., multiply by 1,000 for three decimal places).

The subroutine beginning at line 190 calculates the values Cash POKEs into memory. Line 190 computes the value of the leftmost number, the most-significant byte. Lines 200 and 210 calculate the value of the next byte to the right; lines 220–240 calculate the value of the next byte. The formula in line 240 prevents the results of the division operation in previous lines from being incorrectly truncated. Without this line, the program would give 7.0 as the result if the operation produced a value of 7.999.

Line 250 contains an error trap to prevent an FC error if you violate the input limit. Lines 260–300 POKE the calculated values (MS) into the proper addresses (AD). Lines 270 and 290 increment the address by one to fill the "blanks" created by the increment in line 40.

Up and Running

After you load and run Cash, you can type in the following sample values: 1.75, 99.75, 167772.15, 9999.99, and 100000.00. This produces the sample printout shown in the Figure. To satisfy yourself that this technique really works, you might want to experiment further with other values.

PEEKing and POKEing information to and from high memory isn't difficult. If you know what addresses you can safely use, it's a matter of learning to manipulate data so that you can accurately recall the data you've stored. ■

Milton T. Simpson welcomes your comments or questions on this program. Write to him at 831 Hillcrest Drive, Martinsburg, WV 25401. Enclose a self-addressed envelope for a reply.

True to Form

by Lynard Barnes

In geometry, the shortest path between points is obvious, but that's not always true in the real world. When I needed to create a series of forms for the local library's computer center, using a word processor seemed the quickest way to do the job. Unfortunately, drawing lines proved tedious, and making the small adjustments needed to perfect form design required extensive editing.

In the end, taking the time to write and debug Forms, a short Basic program, produced better results (see the Program Listing). Forms does all the work, prompting you for top and bottom titles, column (horizontal) and row (vertical) labels, and form size. If the first printout doesn't match your expectations, you can quickly adjust the specifications and reprint the form.

COMPUTER SIGN-UP SHEET

DAY/DATE	TIME	COMPUTER	SOFTWARE	
				NAME:
				NAME:
				NAME:
				NAME:
				NAME:
				NAME:

Figure 1. Example of form produced using centered column headings.

Formula for Success

Type in the Program Listing and save it to tape. Once you've made preliminary design decisions, you're ready to run Forms. The opening prompt requests a top title. To omit this label, press the enter key to bring up the form-width prompt and then specify how many characters wide your form should be. Next, you must supply the number of lines the form will contain.

After you type in the number of column headings, Forms lets you choose centered or variable-width headings. If you choose to center column headings, Forms calculates a uniform column

System Requirements

16K RAM
Extended Color Basic
Printer

width using the value you supplied in response to the form-width prompt. Figure 1 contains four centered labels; form width was set to 40. If you choose not to center column labels, Forms uses only as much space for each column as is necessary to fit the label. In Fig. 2, for example, I entered 32 horizontal headings consisting of one space; the resulting form is 64 characters wide. If you need more space for a particular heading, pad the label with blank spaces.

Next, Forms displays the number of lines you've chosen and asks you to specify how many row headings you need. Using the values for the number of lines and headings, Forms computes the form length. The length of the form is rarely the same as that set in the number-of-lines prompt. Two variables work in tandem: The number of vertical headings (VH) is divided into the number of lines (FL), and if the result is not an even number, Forms reduces the number of lines for the form (see lines 200 and 240 of the Listing).

If the computed form length is not appropriate, type in N at the "Is this okay?" prompt and change the value accordingly. Once you've set a form length value, Forms asks whether you want row headings printed on the left or right. To print them on the left, you must also provide a maximum heading length. Forms then prompts you for the column and row headings and requests a bottom title.

Before printing out your form, you must specify whether you want to use the special print mode. As written, Forms uses 15, the condensed print code for my Epson MX-80 printer. If your printer uses another code, change the value of B in line 150. If your printer doesn't have a condensed print mode, type in N to print the form.

You may need to make other changes to adapt Forms to your computer system. In line 20, substitute CHR$(58) for VR$ if your printer doesn't have the vertical rule character CHR$(124). To use Forms on other TRS-80s, rewrite the PRINT#M statements in the print subroutine (beginning in line 1000) using LPRINT.■

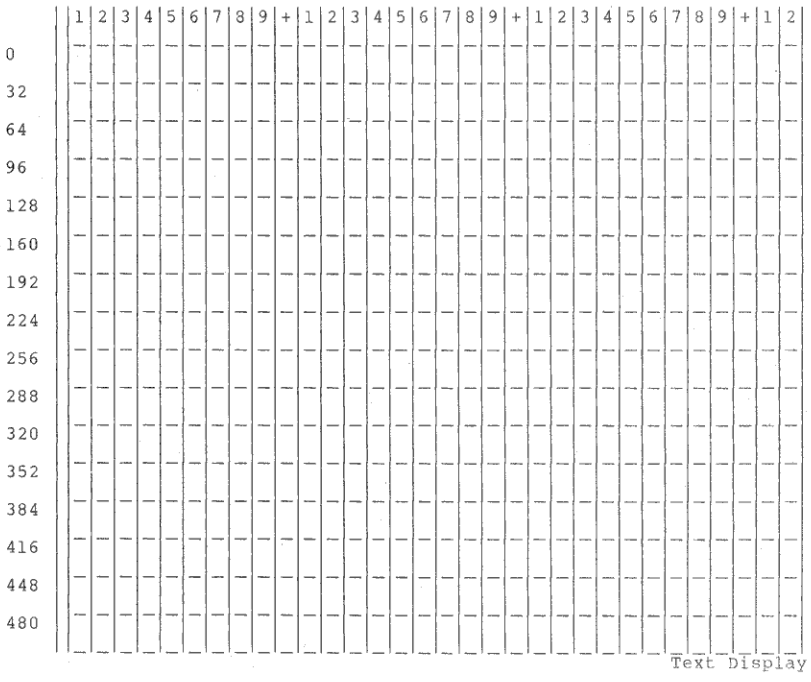

Figure 2. Example of form produced without centered column headings. To obtain the double line at the beginning of the sheet, leave the first column heading blank.

Write to Lynard Barnes at 320 S. Whipple St., Chicago, IL 60612.

Program Listing. Forms.

```
100 CLS:CLEAR1000:MX=100
110 DIM HD$(MX)  :REM Vertical h
eadings
120 VR$=CHR$(124):REM Vertical R
ule Character
130 UL$=CHR$(95) :REM Underline
character
140 E=27         :REM Escape Cod
e for printer
150 B=15:        :REM Code for C
ondensed print
160 SW=32        :REM Max screen
 width
170 M=-2:CR$=CHR$(13):REM Device
 number -2=Prt -1=Cass, CR
180 PRINT"IF form HAS TOP TITLE,
 TYPE";PRINT"IT NOW. PRESS enter
 IF NONE.":INPUTT1$
190 INPUT"FORM WIDTH: ";LL
200 INPUT"NUMBER OF LINES: ";FL:
IF FL/2=INT(FL/2) THEN FL=FL+1
210 PRINT"horizontal headings":P
RINTTAB(5)"NUMBER: ";:INPUT ACR
220 PRINTTAB(5)"CENTER IN COLUMN
 (Y/N)";:INPUTA$:IFLEFT$(A$,1)="
Y"THENCNT=1ELSE IFLEFT$(A$,1)="N
"THEN CNT=0ELSEGOTO220
230 PRINT"vertical titles (0-"FL
-1")":PRINTTAB(5)"NUMBER: ";:INP
UTVH:IF VH=0 THEN VH=1:GOTO280
240 IF FL/VH<>INT(FL/VH) AND FL<
MX THEN FL=FL-1:GOTO240
250 PRINTTAB(5)"form length must
 be"FL+3:PRINTTAB(5)"is this oka
y (Y/N)";:INPUTA$:IFLEFT$(A$,1)=
"N"GOTO190
260 PRINTTAB(5)"<left/right> SID
E (L/R)";:INPUT A$:IFLEFT$(A$,1)
="L"THEN DNT=1 ELSE IF LEFT$(A$,
1)="R" THEN DNT=0 ELSEGOTO260
270 IF DNT=1 THEN PRINTTAB(5)"MA
X LETTERS IN: ";:INPUT VC:LL=LL-
VC
280 SP=LL/ACR:IF LL/ACR<>INT(LL/
ACR) THEN LL=LL+1:GOTO280
290 PRINT:PRINT"enter horizontal
 headings":HA$=VR$:HB$=HA$:HZ$=H
A$:IF CNT=1 THEN PRINT"maximum l
etters:"SP
300 REM ** horizontal heading:HA
$=TOP COLUMNAR HEADS  HB$=COLUMN
AR FIELDS  HZ$=UNDERLINED FIELDS
 HD$(I)=VERTICAL HEADS
310 FOR I = 1 TO ACR:PRINTTAB(5)
I": ";:LINE INPUT A$:HH=LEN(A$):
HL=HL+HH:IF HH>SP AND CNT=1 THEN
 PRINT "**EXCESS IGNORED: ";:A$=
LEFT$(A$,SP-1):PRINTA$:GOTO310
320 IF CNT=1 THEN SA=INT(SP/2)-(
LEN(A$)/2):SA$=STRING$(SA,32)+A$
+STRING$(SA,32):HD$=STRING$(LEN(
SA$),32)+VR$:HL$=STRING$(LEN(SA$
),UL$)+VR$ ELSE SA$=A$:HD$=STRIN
G$(LEN(A$),32)+VR$:HL$=STRING$(L
EN(A$),UL$)+VR$
330 HA$=HA$+SA$+VR$:HB$=HB$+HD$:
HZ$=HZ$+HL$:NEXT
340 IF DNT=1 THEN HC$=STRING$(VC
,32):HA$=HC$+HA$:HB$=HC$+HB$:HZ$
=HC$+HZ$
350 PRINT:PRINT"enter"VH" vertic
al headings:":HD$=HB$
360 FOR I = 1 TO VH
370 PRINTTAB(5)I": ";:LINE INPUT
 A$
380 IF DNT=1 AND LEN(A$)>VC THEN
 PRINT"too long, redo":PRINT:GOT
O370
390 IF DNT=1 THEN HD$(I)=A$+STRI
NG$(VC-LEN(A$),32) ELSE HD$(I)=A
$
400 NEXT:     REM  printer mode
410 PRINT:PRINT"IF form HAS BOTT
OM TITLE, TYPE":PRINT"IT NOW. PR
ESS enter IF NONE.":INPUTT2$
420 SP=LEN(HA$):T2$=STRING$(SP-L
EN(T2$),32)+T2$
430 PRINT:PRINT"WANT SPECIAL PRI
NT MODE (Y/N)";:INPUTA$:IFLEFT$(
A$,1)="Y" THEN PRINT#M,CHR$(E)CH
R$(B) ELSE IF LEFT$(A$,1)<>"N" T
HEN GOTO430
440 REM * M=-2 for printer; prin
t form
450 CLS:PRINT:PRINT"FORM TO PRIN
TER...":GOSUB1000
460 CLS:PRINT:PRINT"WANT ANOTHER
 COPY (Y/N)";:INPUTA$:IF LEFT$(A
$,1)="N"THEN CLS:END ELSE IF LEF
T$(A$,1)="Y" THEN GOTO 440 ELSE
GOTO460
1000 REM ** output M=-2 to print
er m=-1 to cassette
1010 IF T1$<>"" THEN PRINT#M,T1$
:PRINT#M,CR$
1020 VP=INT(FL/VH):X=0:HC=1:HU=1
:PRINT#M, HA$:PRINT#M,HZ$
1030 X=X+1: IF X>VP THEN X=1
1040 IF DNT=1 AND X<>1 THEN PRIN
T#M,HB$ ELSE IF DNT=1 AND X=1 TH
EN PRINT#M,HD$(HC);RIGHT$(HB$,LE
N(HB$)-VC):HC=HC+1
1050 IF X<VP THEN GOTO 1090
1060 IF X=1 AND DNT=1 THEN GOTO
1080
1070 IF HU=1 THEN GOTO1100 ELSE
IF HU<>1 AND DNT<>1 THEN PRINT#M
,HZ$;HD$(HC):HC=HC+1:GOTO1100
1080 IF DNT=1 THEN PRINT#M,HZ$
1090 IF DNT=0 THEN PRINT#M,HB$
1100 HU=HU+1:IF HU<FL+1 THEN GOT
O 1030
1110 IF T2$<>"" THEN PRINT#M,T2$
1120 RETURN
1130 END
```

End

Draft Pix

by Joe Finamore

The growing array of computerized drawing programs has awakened an interest in computer-aided design and graphics among Color Computer enthusiasts. While Extended Color Basic's commands simplify graphics programming, the CoCo's limited resolution—256 by 192 in PMode 4—makes producing detailed drawings difficult.

You can't improve screen resolution, but you can get more detailed printouts if you create a buffer to store information and use windowing to display part of the buffer on-screen. Draft (Program Listing 1), a multifunction drafting program, does just that, dividing the buffer into overlapping quadrants and displaying a PMode 4 screen in the window (see Fig. 1).

You control cursor movement with the arrow keys or a joystick and enter commands from the keyboard. Draft accepts text typed in from the keyboard, lets you select from 15 print sizes for letters and numbers, and saves and loads picture files to and from tape. An Assembly-language routine dumps the entire buffer to a printer; the resulting printout is a clean, accurate drawing (see Fig. 2).

To give you a complete view of Draft's features and programming techniques, I'll explain how to run the program, provide a complete list of commands, annotate program structure, and offer advice on adapting Draft to disk-drive systems.

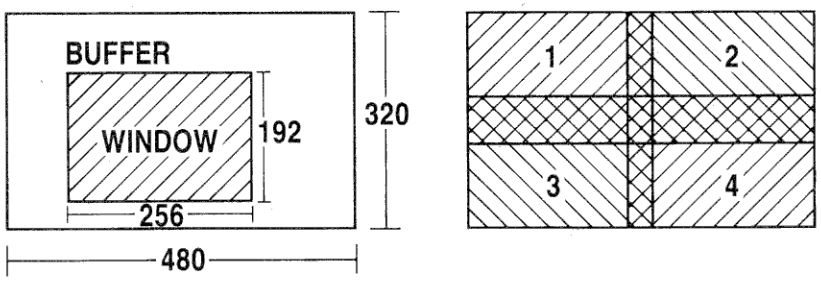

Figure 1. Draft's buffer comprises four overlapping windows.

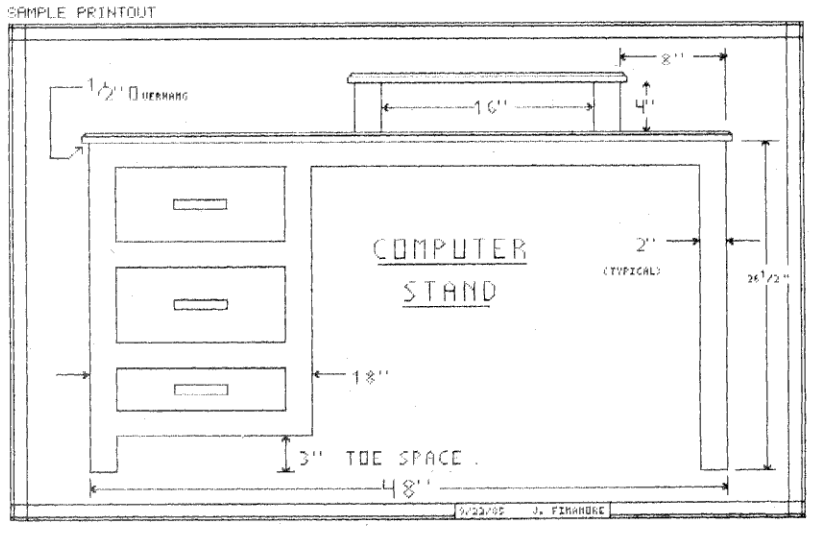

Figure 2. Example of printout created using Draft.

In the Running

Type in and save Draft to tape. To create a machine-language file from the Basic driver, type in Program Listing 2 and run it. Then save the file directly after the Basic listing by typing in:

```
CSAVEM"DISPLA",&H3400,&H34E8,&H3400
```

To use the program, load and run Draft, leaving the cassette recorder's play button depressed until the machine-language file loads. Draft prompts you for the scale of the drawing and displays a blinking cursor centered in a blank screen.

Draft uses a number of single-keystroke commands to control cursor movement, line placement, text insertion, and file management (see Table 1). The screen window moves (scrolls) eight dots in the appropriate direction whenever the cursor "bumps" into the edge of the screen.

After you invoke the L command and set the first point, you can't scroll to another screen. If you need to draw a line that is longer than the screen allows, draw a partial line and scroll the screen

System Requirements

32K RAM
Extended Color Basic
Cassette
Disk drive (with changes)
Joystick

Circle 101 on Reader Service card.

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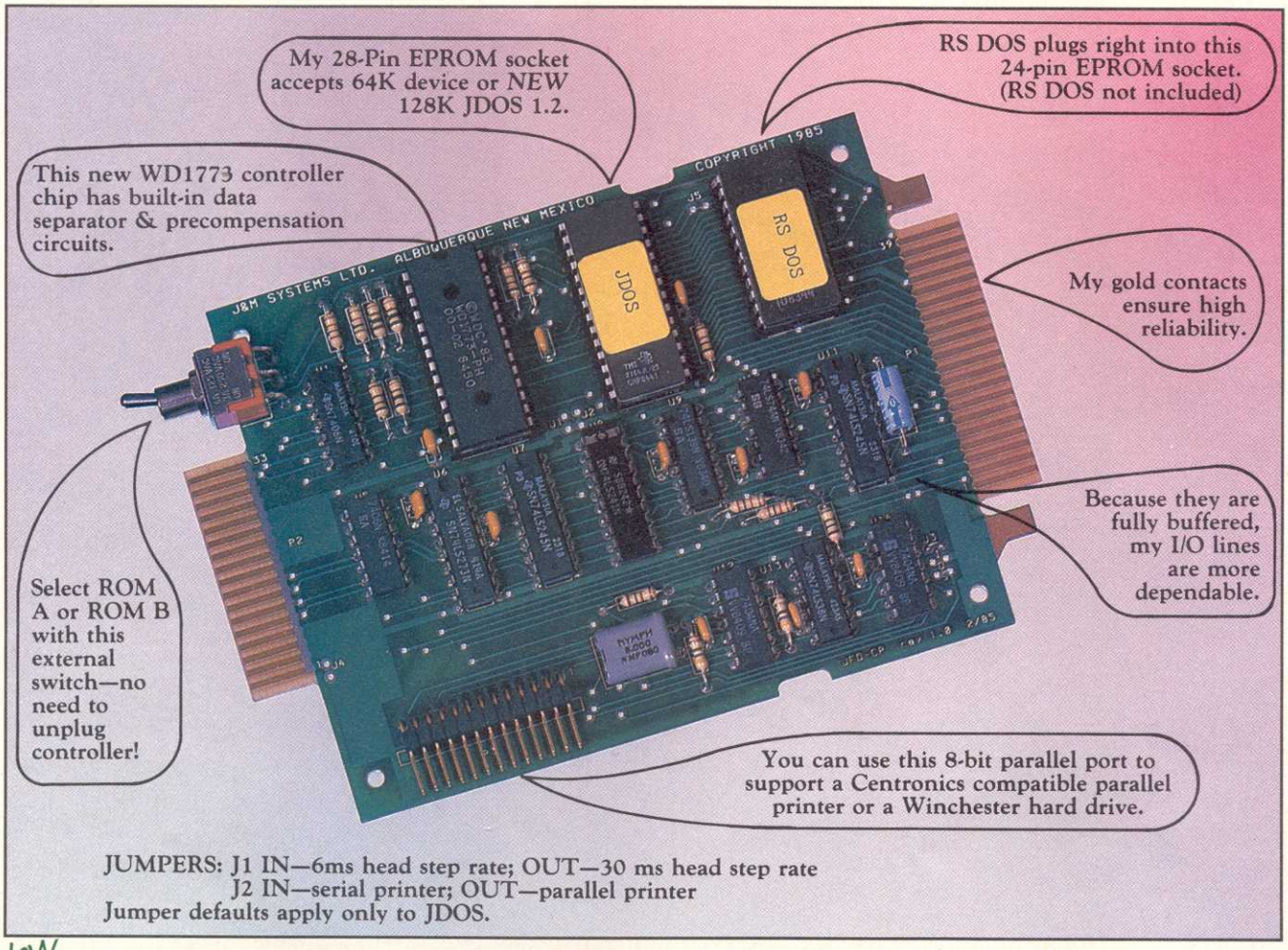

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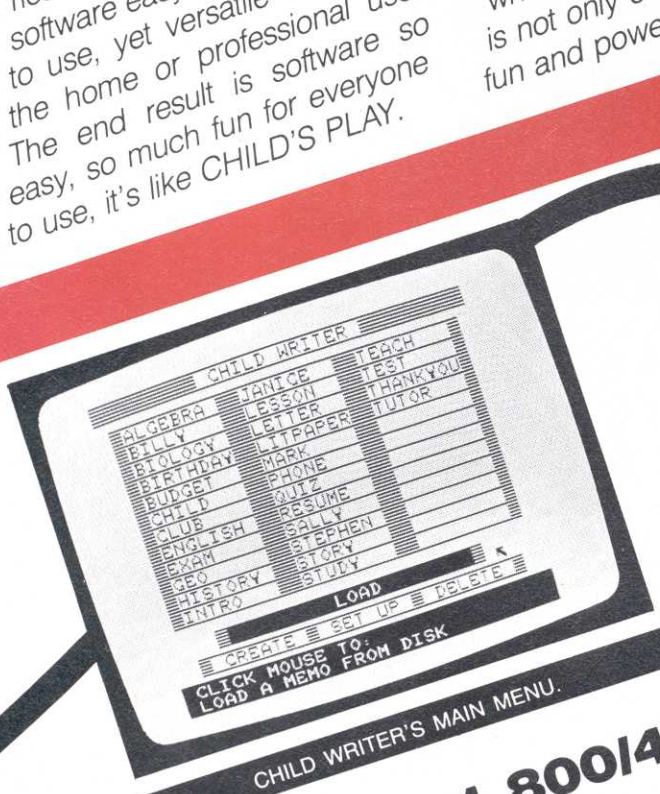

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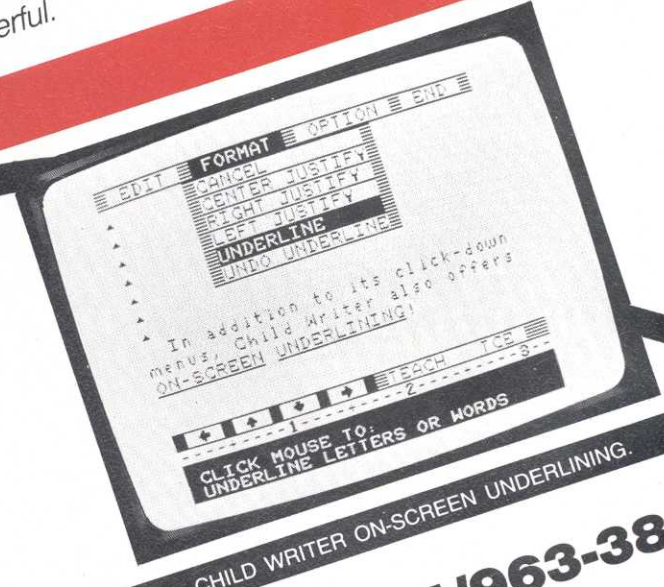

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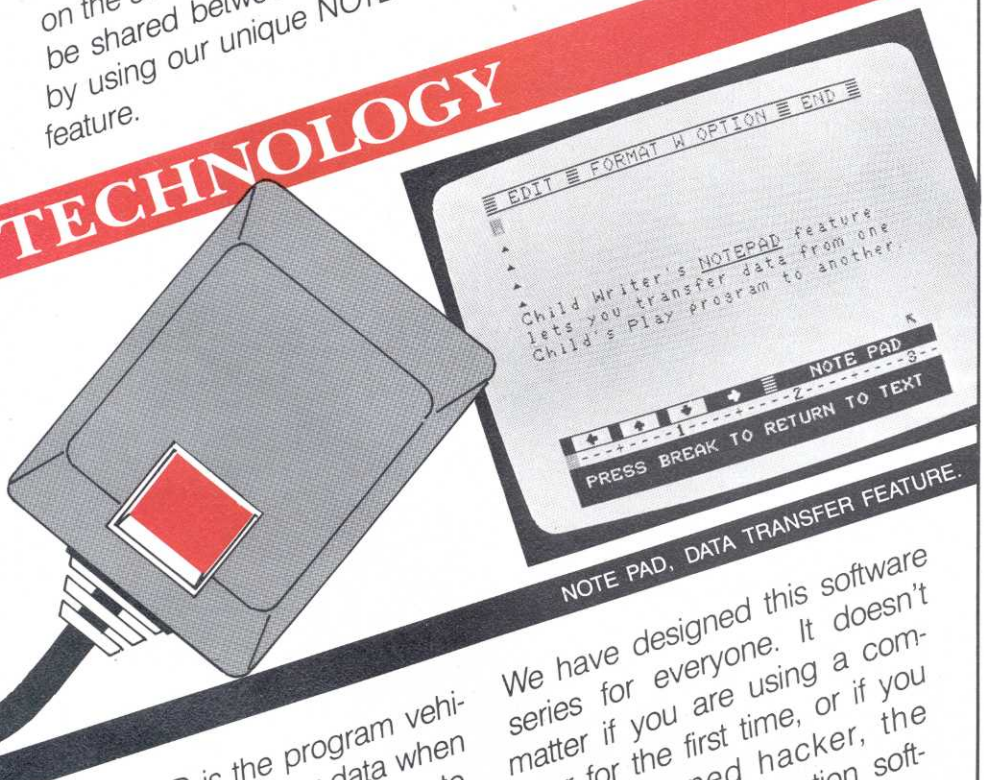

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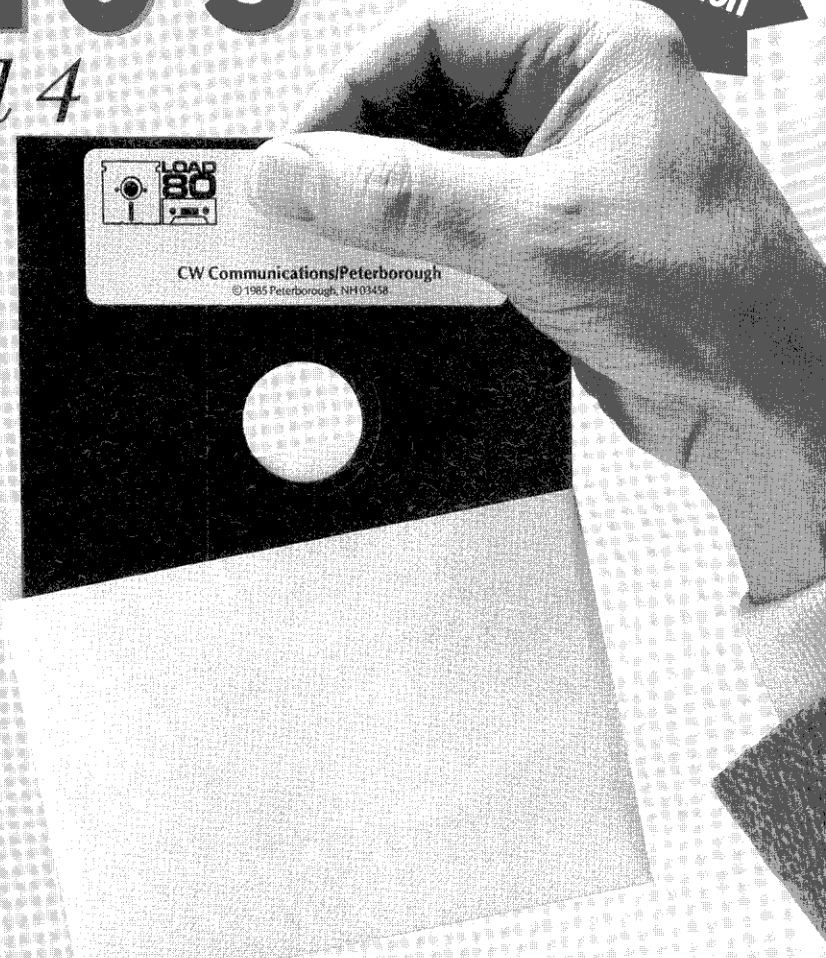

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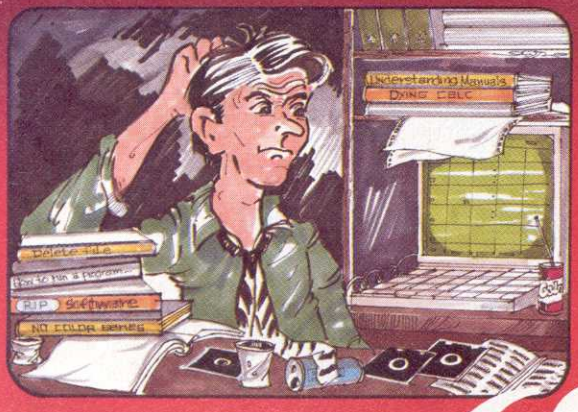

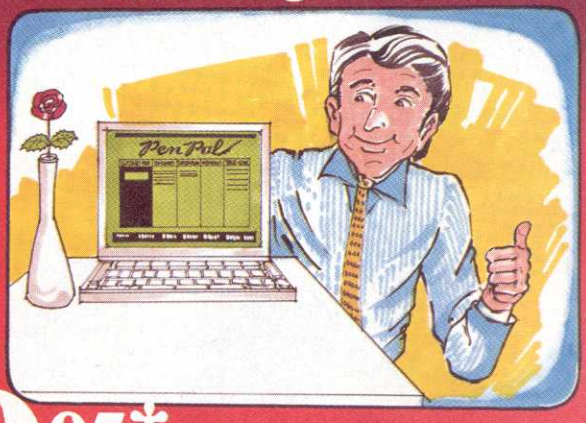

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Command	Description
/	Draws a single letter (determined by the next keystroke) at the current cursor position and at the current size.
Q	Displays the quadrant you specify (see Fig. 1).
F	Brings up the files menu for loading, saving, or printing a file.
Clear	Erases the entire buffer.
H	Displays the help menu.
C	Defines a nondestructive cursor.
P	Defines a cursor that sets (PSets) the dots in the cursor's path.
R	Defines a cursor that erases (PRESets) the dots in the cursor's path.
S	Allows the user to set a scale for ASCII characters.
L	Enters line ("rubber band") mode. Press the joystick's fire button to set the first point, stretch the line out using the joystick, and press the fire button to set the end point.
T	Enters text mode. Press the enter key to exit.
M	Enters movement mode.

Table 1. Command summary.

Lines	Description
2–6	Initialize the program, allocate memory, load machine-language program, set variables, and enter drawing scale.
8–32	The main program loop falls between lines 8 and 32. Draft strobes the keyboard for arrow keys and legal commands. When a valid command is entered, Draft calls the appropriate subroutine.
10–18	Read the right joystick and adjust the cursor accordingly.
20	In line mode, draws a temporary line from the current cursor position to the predetermined starting point.
22–26	Set up flashing cursor.
28–32	Test the fire button. If depressed and the program is in line mode, the point is set. Loop back to line 8.
34–40	Subroutine for incrementing cursor movement initiated by arrow keys or joystick. Call lines 92–106.
42–46	Toggle the cursor type (nondestructive, TT = – 1; PSet, TT = 0; PRESet, TT = 1).
42–56	Data lines.
64–88	File-handling routine. Line 68 sends the contents of the buffer to the printer. Line 72 erases the buffer. Lines 76–78 save buffer contents as a binary file; lines 82–88 load a file into the buffer.
92–106	Called from lines 34–40 to check the validity of x,y coordinates. Draft invokes subroutines to scroll vertically or horizontally if cursor is about to go off screen.
108–112	Present help menu when H is pressed in command mode.
114–116	Handle large-scale cursor movement. Call lines 134–136.
118–122	Contain screen prompts for line mode.
124	Allows quick printing of ASCII text on screen. Automatically spaces characters.
126–128	Offer a quick means of moving to one of the four main quadrants as shown in Fig. 1.
134–136	Called from lines 114–116. Determine whether movement is absolute, scaled, or relative.

Table 2. Draft's program structure.

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```
2 CLS:PRINTTAB(11)"DESIGN-AID":C
LEAR5Ø,&H33FF:PMODE4,1:PCLS:TT=-
1:S=4:RO=Ø:CO=Ø:POKE&H34F4,Ø:POK
E&H34F5,Ø:DEFUSRØ=&H3444:DEFUSR1
=&H3452:LT=Ø:CM$=CHR$(8)+CHR$(9)
+CHR$(1Ø)+CHR$(12)+"^/QCFHMTPRSL
"
4 LOADM"DISPLA":EXEC&H346Ø:X=128
:Y=96
8 X1=X:Y1=Y:A$=INKEY$:IFA$=""THE
N1ØELSEIFA$="X"THENENDELSEM=INST
R(1,CM$,A$):ONM GOSUB34,36,38,7Ø
,4Ø,48,126,46,64,26,114,124,42,4
4,9Ø,118
5Ø DRAW"BM"+STR$(X1)+","+STR$(Y1
)+";S"+STR$(S):FORM=ØTO(ASC(A$)-
32):READA$:NEXT:DRAWA$:PP=PPOINT
(X1,Y1):RESTORE:RETURN
78 SAVEMA$,&H34F6,&H7FFF,Ø
82 CLS:INPUT"FILENAME";A$
84 LOADMA$
```

Figure 3. Changes to Draft for disk systems.

to complete the line. (Exercise caution when entering text along window boundaries: Placing text too close to the boundary flattens the letters.) You can't scroll off the edges of the buffer.

M, the movement command, permits three types of movement: absolute, relative, and scaled. Absolute movement lets you relocate the cursor at a specified screen position. For example, to move to screen location 31,49, you would type in 31 in response to the "X = Column (0–255)" prompt and 49 in response to the "Y = Row (0–191)" prompt.

You initiate relative movement using the current cursor position as a reference point. A minus sign relocates the cursor to the left (X axis) or up (Y axis); a plus sign relocates it to the right (X axis) or down (Y axis). For instance, to move 20 dots to the right, type in +20 and +0 in response to the prompts.

With scaled movement, you define cursor relocation in terms of the scale of the drawing, coding the change by appending IN (inches) or FT (feet) to the value entered. Assume that you have defined the drawing scale as eight points per inch. To move the cursor up 10 inches, type in +0 and −10IN for the X and Y values, respectively. Draft accepts this mixture of relative (+0) and scaled (−10IN) directives and moves the cursor up by 80 dots. However, the program won't accept values that will move the cursor outside the window.

With Draft's M command you can carry out absolute, relative, and scaled movement.

You can invoke the M command at any time, even when you are in line mode. This combination gives you greater control over line placement. To create a 20-inch horizontal line starting at 11,23, type L to enter line mode. At the "Set first point" prompt, type in M and then enter 11 and 23 as the X and Y values. When you press the joystick's fire button to set the first point, the "Set second point" prompt appears. Enter movement mode and type in +20IN and +0. Finally, set the second point by pressing the fire button again.

Program Listing 1. Draft

```
2 CLS:PRINTTAB(11)"DESIGN-AID":C
LEAR6Ø,&H33FF:PMODE4,1:PCLS:TT=-
1:S=4:RO=Ø:CO=Ø:POKE&H34F4,Ø:POK
E&H34F5,Ø:DEFUSRØ=&H3444:DEFUSR1
=&H3452:LT=Ø:CM$=CHR$(8)+CHR$(9)
+CHR$(1Ø)+CHR$(12)+"^/QCFHMTPRSL
"
4 DIMAL$(58):FORX=ØTO58:READAL$(
X):NEXT:CLOADM"DISPLA":EXEC&H346
Ø:X=128:Y=96
6 PRINT@256,"SET SCALE OF (I)NCH
ES OR (F)EET ":GOSUB74:IFA$="I"T
HENPRINT:INPUT"# OF POINTS/INCH-
";IN:FT=12*IN:SCREEN1,ØELSEIFA$=
"F"THENPRINT:INPUT"# OF POINTS/F
OOT-";FT:IN=FT/12:SCREEN1,ØELSE6

8 X1=X:Y1=Y:A$=INKEY$:IFA$=""THE
N1ØELSEIFA$="X"THENENDELSEM=INST
R(1,CM$,A$):ONM GOSUB34,36,38,7Ø
,4Ø,48,126,46,64,1Ø8,114,124,42,
44,9Ø,118
1Ø XX=JOYSTK(Ø):YY=JOYSTK(1)
12 IFXX<15THENGOSUB34
14 IFXX>45THENGOSUB36
16 IFYY>45THENGOSUB38
18 IFYY<15THENGOSUB4Ø
2Ø IFLT=2THENLINE(LX,LY)-(X,Y),P
SET
22 GOSUB24:PP=PPOINT(X,Y):SN=((S
N+1)AND1):IFSN=ØTHENPRESET(X,Y):
GOTO28ELSEPSET(X,Y):GOTO28
24 IFTT=1THENPRESET(X1,Y1)ELSEIF
TT=ØTHENPSET(X1,Y1)ELSEIFPP=ØTHE
NPRESET(X1,Y1)ELSEPSET(X1,Y1)
26 RETURN
28 IF(PEEK(6528Ø)AND1)=1THEN3ØEL
SEIFA=1THENEXEC&H341A:LX=X:LY=Y
:LT=2:GOSUB12ØELSEIFLT=2THENEXEC
&H342F:LINE(LX,LY)-(X,Y),PSET:LT
=Ø:GOTO8
3Ø IFLT=2THENEXEC&H342F
32 GOTO8
34 X=X-1:GOTO96
36 X=X+1:GOTO92
38 Y=Y+1:GOTO1ØØ
4Ø Y=Y-1:GOTO1Ø4
42 TT=Ø:RETURN
44 TT=1:RETURN
46 TT=-1:RETURN
48 GOSUB74:IFA$<" "ORA$>"Z"THEN4
8ELSEPRESET(X1,Y1)
5Ø DRAW"BM"+STR$(X1)+","+STR$(Y1
)+";S"+STR$(S):A$=AL$(ASC(A$)-32
):DRAWA$:PP=PPOINT(X1,Y1):RETURN

52 DATABL,UBU2U2,BU3U8L2D,UNRNL2
U2NRNUL2NUNLD2NLD,NU5L2R3EHLHER2
,BRUBL2NGUE2BL3U,LREHNGHEUDG2DF,
BU3UL,HU2E,BLEU2H,U2NF2NR2NE2NU2
NH2NL2G2,U2DNRL,DUL,BU2LR2,ULDR,
BLUE2U,EU2HGD2F,U4G,RL2E2UHL,LRE
HEHL,BRU4D2L2U2,LREHLU2R2,EHGNFU
2E
54 DATAUEU2L2,EH2EFG2F,EU2HGFE,D
BU3U,NDNLBU2U,BRH2E2,BEL2BU2R2,B
LE2H2,U2EHL,NEHEFU2HL,BRU2NL2UHG
D3,LREHNLEHLD4,RLHU2ER,LREU2HLD4
,RL2U2NRU2R2,BLU2NRU2R2,RNU2LHU2
ER,BRU2NL2U2BL2D4,NRNLU4NRL,HFEU
3,BRUHNLEUBL2D4,RL2U4,BRU4GHD4
56 DATABLU4F2D2U4,RU4L2D4R,BLU4R
FGL,BRHBDEU2HGD2F,BLU4RFGNLFD,LR
EH2ER,U4LR2,RNU4L2U4,ENU3GHU3,BR
NU4HGU4,BRUH2UBR2DG2D,U2EUBL2DF,
RL2UE2UL2
64 EXEC&H341A:CLS:PRINT"(S)AVE,
(P)RINTER, (L)OAD, OR (R)ETURN":
GOSUB74:M=INSTR(13,CM$,A$):ON(M-
12)GOTO68,8Ø,76,82
66 GOTO64
68 CLS:INPUT"PRINTER READY - PRE
SS <ENTER>";A$:EXEC&H346B:GOTO8Ø

7Ø CLS:PRINT"ARE YOU SURE (Y/N)"

72 A$=INKEY$:IFA$="Y"THENPCLS:PP
=Ø:TT=-1:EXEC&H346Ø:GOTO8ØELSEIF
A$="N"THEN8ØELSE72
74 A$=INKEY$:IFA$=""THEN74ELSERE
TURN
76 CLS:INPUT"FILENAME";A$
78 CSAVEMA$,&H34F6,&H7FFF,Ø
8Ø SCREEN1,Ø:RETURN
82 CLS:INPUT"FILENAME; <ENTER> I
F UNKNOWN";A$:IFA$=""THEN88
84 CLOADMA$
86 CO=Ø:RO=Ø:POKE&H34F4,Ø:POKE&H
34F5,Ø:EXEC&H342F:PP=PPOINT(X,Y)
:GOTO8Ø
88 CLOADM:GOTO86
9Ø CLS:INPUT"SCALE FACTOR (1-15)
";S:IFS<1ORS>15THENGOSUB13Ø:GOTO
9ØELSES=INT(S*4):GOTO8Ø
92 IFLT=2THENX=X+(X=256)ELSEIFX=
256ANDCO<28THENX=248:X1=247:CO=C
O+1:A=USRØ(CO)ELSEIFX=256THENX=2
55
94 RETURN
96 IFLT=2THENX=X-(X=-1)ELSEIFX=-
1ANDCO>ØTHENX=7:X1=8:CO=CO-1:A=U
SRØ(CO)ELSEIFX=-1THENX=Ø
98 RETURN
1ØØ IFLT=2THENY=Y+(Y=192)ELSEIFY
=192ANDRO<121THENY=184:Y1=183:RO
=RO+8:A=USR1(RO)ELSEIFY=192THENY
=191
1Ø2 RETURN
1Ø4 IFLT=2THENY=Y-(Y=-1)ELSEIFY=
-1ANDRO>7THENY=7:Y1=8:RO=RO-8:A=
USR1(RO)ELSEIFY=-1THENY=Ø
1Ø6 RETURN
1Ø8 CLS:PRINTTAB(11)"help menu":
POKE1Ø39,32:PRINT:PRINT"(P)-SET
POINTS IN CURSOR PATH":PRINT"(R)
-RESET POINTS IN CURSOR PATH":PR
INT"(C)-NON-DESTRUCTIVE CURSOR":
PRINT"(S)-SET SCALE OF LETTERS":
PRINT"(F)-FILES"
11Ø PRINT"<CLEAR>-THE DRAW SCREE
N":PRINT"(M)OVE TO NEW SCREEN PO
SITION":PRINT"(L)-DRAW A LINE":P
RINT"(T)-ENTER TEXT MODE":PRINT"
(Q)-GO TO TO SPECIFIED QUADRANT"
:PRINT"(X)-EXIT PROGRAM"
112 GOSUB74:GOTO8Ø
114 GOSUB24:CLS:INPUT"X-COLUMN (
Ø-255)";A$:L=X:GOSUB134:X2=LL:IF
X2<ØORX2>255THENGOSUB13Ø:GOTO114
ELSEX=X2
116 PRINT:INPUT"Y-ROW (Ø-191)";A
$:L=Y:GOSUB134:Y2=LL:IFY2<ØORY2>
191THENGOSUB13Ø:GOTO116ELSEY=Y2:
GOTO8Ø
118 CLS:PRINT"SET FIRST POINT":L
T=1:GOTO122
12Ø PRINT:PRINT"SET SECOND POINT
":LT=2
122 GOSUB132:GOTO8Ø
124 TT=-1:GOSUB74:IFA$=CHR$(13)T
HENRETURNELSEIFA$<" "ORA$>"Z"THE
N124ELSEGOSUB24:GOSUB5Ø:M=X1+S:I
FM>255THENRETURNELSEX1=M:X=M:PP=
PPOINT(X,Y):GOTO124
126 IFLT=2THENRETURNELSEGOSUB24:
CLS:PRINT@128,"WHICH QUADRANT?
  1  2";PRINT:PRINTTAB(19)"3  4"
:GOSUB74:M=VAL(A$):X2=X+CO*8:Y2=
Y+RO:IFM<1ORM>4THENGOSUB13Ø:GOTO
126ELSECO=((M+1)AND1)*28:A=USRØ(
CO):RO=(((M-1)AND2)/2)*128:A=USR
1(RO)
128 X=(ABS(X2-CO*8))AND255:Y=(AB
S(Y2-RO)AND255)+(Y>191)*64:PP=PP
OINT(X,Y):X1=X:Y1=Y:GOTO8Ø
13Ø PRINT"OUT OF BOUNDS"
132 FORM=ØTO1ØØØ:NEXT:RETURN
134 IFRIGHT$(A$,2)="IN"THENLL=IN
:A$=LEFT$(A$,LEN(A$)-2)ELSEIFRIG
HT$(A$,2)="FT"THENLL=FT:A$=LEFT$
(A$,LEN(A$)-2)ELSELL=1
136 LL=LL*VAL(A$):IFLEFT$(A$,1)=
"-"ORLEFT$(A$,1)="+"THENLL=LL+L:
RETURNELSERETURN
```

End

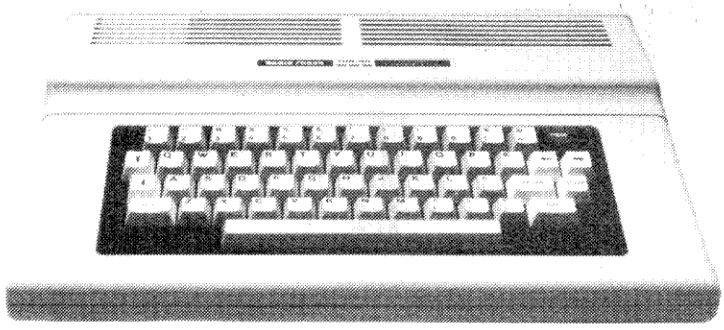
Program Listing 2. DISPLA. Basic driver for machine-language code.

```
1Ø CLEAR2ØØ, 13311:FOR X= 13312T
O 13544:READ A:POKE X,A:NEXT:END

2Ø DATA 222,186,31,48,139,24,52,
6,142,52,246,246,52,245,134,6Ø,6
1,48,139,246,52,244,58,11Ø,248
3Ø DATA 2,141,228,198,32,166,192
,167,128,9Ø,38,249,48,136,28,17,
163,228,37,239,53,15Ø,141,2Ø7,19
8
4Ø DATA 32,166,128,167,192,9Ø,38
,249,48,136,28,17,163,228,37,239
,53,15Ø,189,179,237,52,4,141,2Ø7

5Ø DATA 53,4,247,52,244,32,221,1
89,179,237,52,4,141,193,53,4,247
,52,245,32,2Ø7,142,52,246,111
6Ø DATA 128,14Ø,127,245,35,249,5
7,134,254,151,111,134,18,173,159
,16Ø,2,127,52,233,134,7,183,52,2
36
7Ø DATA 2Ø6,52,246,127,52,234,12
7,52,235,52,64,52,64,246,52,236,
142,52,237,166,196,167,128,51,2Ø
Ø
8Ø DATA 6Ø,9Ø,38,246,142,52,244,
134,1,1Ø4,13Ø,73,42,251,173,159,
16Ø,2,252,52,234,195,Ø,1,253
9Ø DATA 52,234,16,131,1,224,39,1
Ø,196,7,38,223,53,64,51,65,32,19
9,134,13,173,159,16Ø,2,124
1ØØ DATA 52,233,246,52,233,53,8Ø
,51,2Ø1,1,164,193,45,34,9,37,167
,198,5,247,52,236,32,16Ø,134
11Ø DATA 3Ø,173,159,16Ø,2,15,111
,57
```

End



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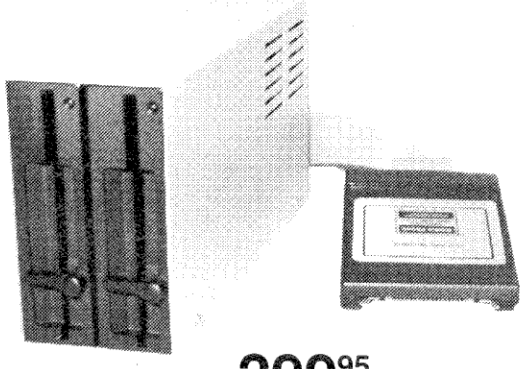

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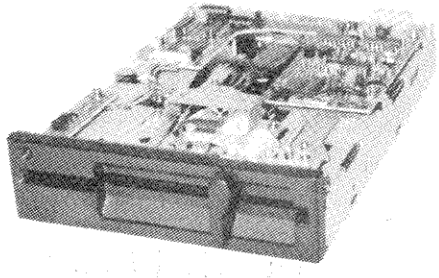

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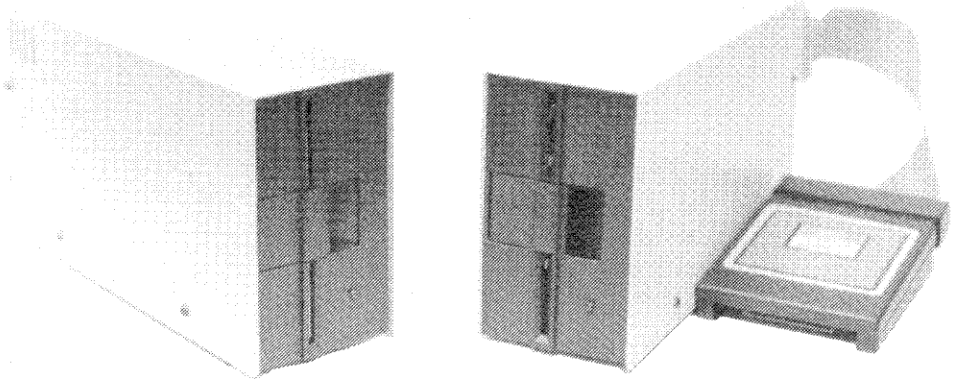

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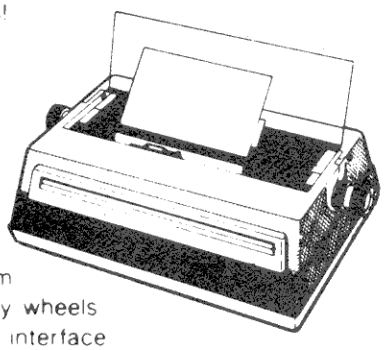

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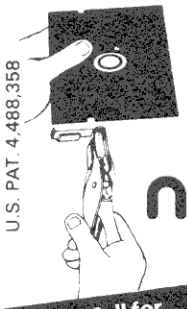

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The Complete Picture

Table 2 outlines Draft's structure. Necessary parameters are passed from Basic via USR functions and by POKEing data into protected memory.

The screen-dump routine should work for any Radio Shack compatible printer. In graphics mode, the most-significant bit is set to select graphics; the remaining 7 bits denote a vertical column of seven dots. The least-significant bit represents the uppermost dot.

With some printers and DIP (dual in-line package) settings, you don't need both a carriage return and a line feed because the printer automatically empties its buffer when it becomes full. If your printer is of this type, POKE the data values 19–24 (line 90 of the Basic driver) with 12 hexadecimal (hex) and save the modified machine-language file. This replaces values 134, 13, 173, 159, 160, and 2 of the Basic driver with 18.

Try Disk

You can convert Draft to run on disk systems; however, you sacrifice memory. Draft's buffer stretches from addresses 34F6–7FF5 hex, the machine language routines use 3400–34F5, Basic sets up house in low RAM (0000–3FFF), and the CoCo uses 400–5FF for the text screen. On the CoCo, a hi-res screen gobbles up 6K of RAM. Because Disk Extended Color Basic resides at 600–HDFF hex, page 1 of the hi-res screen gets pushed to E00–25FF, leaving only 2600–33FF for program and variable storage. That amounts to about 3.5K.

To convert the program to disk, substitute the lines from Fig. 3 in Listing 1. Instead of storing data in arrays, Draft will then read in data values each time a letter is drawn. You must also delete lines 88, 108, 110, and 112. Lines 108–112 set up the help menu—a nice, but inessential feature of Draft.

Final Draft

Draft isn't only for draftsmen; with a little tinkering, you can convert it to a drawing program. For example, to add a Paint (or Brush) command, simply insert :GOTO10 at the end of line 8 and add:

```
9 IF A$="B"THENGOSUB138
```

Add a subroutine at line 138 to set up the Paint routine. You'll have room for a few such commands if you use a cassette system, but a disk system would require further program modification. I don't recommend altering CM$ in line 2 to add commands, since I used it in two command-decoding lines. ■

Joe Finamore welcomes your comments and questions. Write to him at 1100 S. Cedar, Marshfield, WI 54449. Enclose a self-addressed, stamped envelope for a reply.

Related Articles

Anderson, Ken, "Introduction to Multicolor Graphics," *HOT CoCo*, August 1983 (p. 40), September 1983 (p. 62), October 1983 (p. 52). A three-part series on mixing colors and graphics.

Einem, Eric, "Video Van Gogh," *HOT CoCo*, March 1984, p. 92. Test out the CoCo's graphics capabilities.

Roney, William H., "Color Computer Art," *HOT CoCo*, August 1983, p. 84. Eight graphics programs for the CoCo.

White, Eric, "CoCo Sketchpad," *HOT CoCo*, October 1985, p. 26. An easy-to-use graphics system.

Check PPoint

Drawing a Blank

After reading about Infocom's decision to market its fine adventure games for the CoCo, I called its toll-free number to order Hitchhiker's Guide to the Galaxy. The pleasant woman who took my order assured me that Infocom would send my copy within two weeks. A week later, I received a postcard saying that Hitchhiker's Guide was temporarily out of stock because demand had exceeded expectations. I stashed the card away.

Three weeks later, I had still not received my copy of Hitchhiker's Guide. Finally, after four weeks and two days, the product arrived. Excitedly skimming the instructions, I broke down, booted the disk, and attempted to load the program. My CoCo returned an NE error. I tried again, following the loading instructions exactly, but I still got an NE error. When I tried to get a directory, I got an OK. There was no directory and no game; I'd paid $34.95, plus $2 for shipping, for a blank disk.

When I got through to Infocom's number for technical errors, I reached another pleasant woman who told me to send the disk back to be checked. What's there to check? There's nothing on the disk. The next day I sent in my Hitchhiker's Guide blank disk for "repairs." My verdict is still out.

Eric Brown
N. Wales, PA

The technical support personnel at Infocom acknowledge that they've encountered two problems with the CoCo version of Hitchhiker's Guide to the Galaxy. Some copies of the program were shipped with incorrect loading instructions. To successfully load Hitchhiker's Guide, turn on the CoCo and its disk drive, insert the program disk in drive zero, type in DOS at the OK prompt, and press the enter key. CoCo I users who have Extended Color Basic 1.0 should contact Infocom's technical support department (55 Wheeler St., Cambridge, MA 02138, 617-576-3190) and ask for the patch that will let them run Hitchhiker's Guide on their machines.

If neither change works, call the number listed above. Don't worry if you can't get a directory; that's normal and doesn't indicate that your disk is blank.

—Eds.

Strong Link

I developed a routine that lets you link the CoCo's Print command to the screen or the printer (see the Program Listing). It works with Disk Extended Color Basic 1.0 and Color Basic 1.1. To use the routine with other systems, PEEK addresses 359–361 just after you turn the machine on; insert the values returned by the PEEKs in line 50.

Before enabling the link, set the printer line width and baud rate. Each time the link calls the subroutine in line

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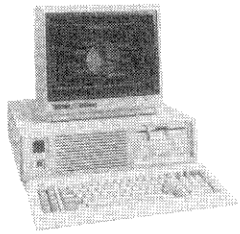

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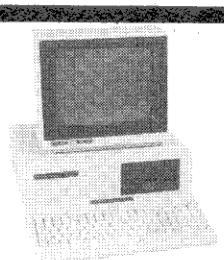

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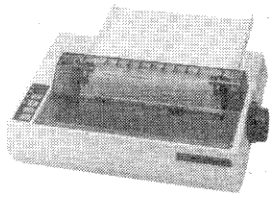

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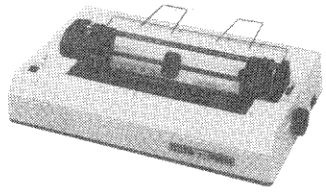

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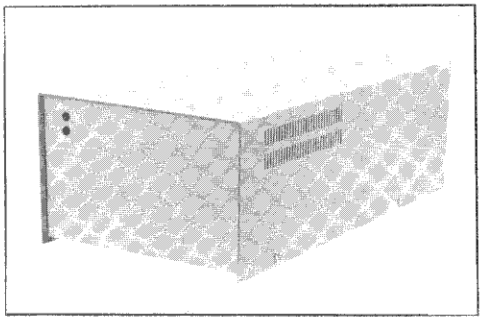

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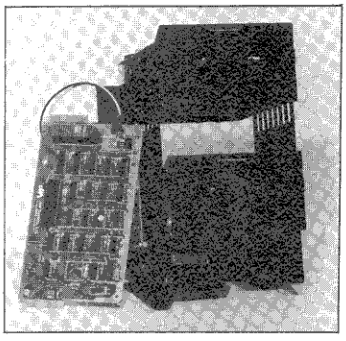

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20 'PROGRAM BODY HERE. DO A GOS
UB 30 FROM WITHIN THE PROGRAM T
O TOGGLE PRINTER LINK ON AND OF
F
30 P=1-P: IFP THEN P$="PRINTER
ON": RESTORE: FOR X=1 TO 15: RE
AD A: POKE 1007+X,A: NEXT: POKE
359,126: POKE360,3: POKE361,240
: RETURN
40 DATA 52,22,198,254,215,111,1
90,160,2,173,3,15,111,53,150
50 P$="PRINTER OFF": FOR X=1007
TO 1022: POKEX,0: NEXT: POKE35
9,126: POKE360,203: POKE361,74
: RETURN
```

Program Listing. Printer/screen link.

30, the printer toggles on or off. When you link up to the printer, the value of P is one, and the printer is on. When the value of P is zero, the program prints to the screen.

Bob Helms
Midwest City, OK

Oops

The Program Listing for William Bonnell's improved data base manager ("Some Added Mastery," *HOT CoCo*, January 1986, p. 50) contains a bit-drop error. Line 3010 should end with EA,45 instead of EA,4.

Program Listing 2 of Milton T. Simpson's regression analysis program ("Swami Says," *HOT CoCo*, February 1986, p. 46) needs a few modifications. To ensure that you do not exceed the range for Y, thus causing an FC error, add the following lines:

```
3583 IF Y<4 THEN Y=4
3586 IF Y>187 THEN Y=187
```

For the program to operate properly, you must also add:

```
5135 ON I GOSUB 2270, 2370, 2470, 2550
```

Finally, substitute E$ for G$ in line 5150.

One other item in the article deserves clarification. The summary at the top of Fig. 1 didn't list the curve data tabulation formula for beam strength versus thickness. As the graph at the bottom of that figure clearly states, the formula is y = A*x^B.

Assistance Needed

►Eric Anderson (Box 495, Goodwell, OK 73939) would like to obtain a karate program that will run on his CoCo.

►Jay Kellett (10 Savage Drive, Langhorn, PA 19047) is looking for a way to monitor the carrier on the CoCo's serial port.

►Richard M. Wetz (728 Miller Road, Lebanon, OH 45036) wants to trade information about the CoCo. He's especially interested in CoCo users who have hints on Madness and the Minotaur, Pyramid, or Rakkatu.

Clubhouse

►The MC-10 User's Group (Box 103, Owensville, IN 47665) is now on line courtesy of Nation Serve Information Service. Write for information.

►The King's Byte Color Computer Club (718-763-4233 [voice] or 718-837-2881 [24-hour BBS; type in GO CLUBS]) meets at 7 p.m. on the first Monday of most months at the Brooklyn Union Gas Company, 195 Montaque St. The club welcomes entire families. Call for information on the next scheduled meeting.

►The California Computer Federation is an antipiracy Color Computer club currently serving at least 75 percent of the state of California. For information, contact your local chapter:

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►The Essa Color Computer Club meets at Our Lady of Grace School on Roth St. in Angus, Ontario, every other Monday at 7:30 p.m. Call Eldon Doucet (705-424-1354) or Lee Lay (705-728-9481) for more information.

►The Gargon/CoCo Games, a combination club and BBS, is working on circulating public-domain games for the CoCo. For information, send a self-addressed, stamped envelope (c/o Bill Mittel, 112 Strangeway Ave., Lodi, WI 53555, 608-592-3597).

►Two CoCo users in Nevada are interested in hearing from others who want to establish a club in the Las Vegas area. Call Jim Woods (702-458-9340) between 2 and 8 p.m.

►A Color Computer club in the Sioux City, NE, area is looking for new members. Contact Alan Pedersen (611 D St., S. Sioux City, NE 68776, 402-494-2284 [voice] or 712-258-0234 [BBS, leave a message for ABP]).

On Line

►The Colorama BBS of Cookeville, TN (sysop Pat Oakley, 615-528-2864), is open from 10 p.m. to 6 a.m., seven days a week.

►Duke Norris writes that the Colorama BBS in Shelbyville, IN (317-392-2769), is on line all day every day. The communications protocol is: 300 baud, 7 bit, even parity, one stop bit.

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by Richard E. Esposito and Ralph E. Ramhoff

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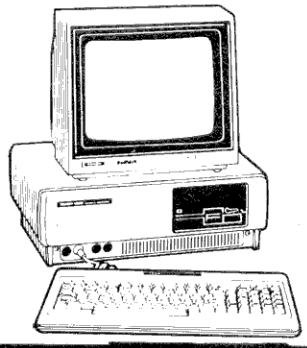

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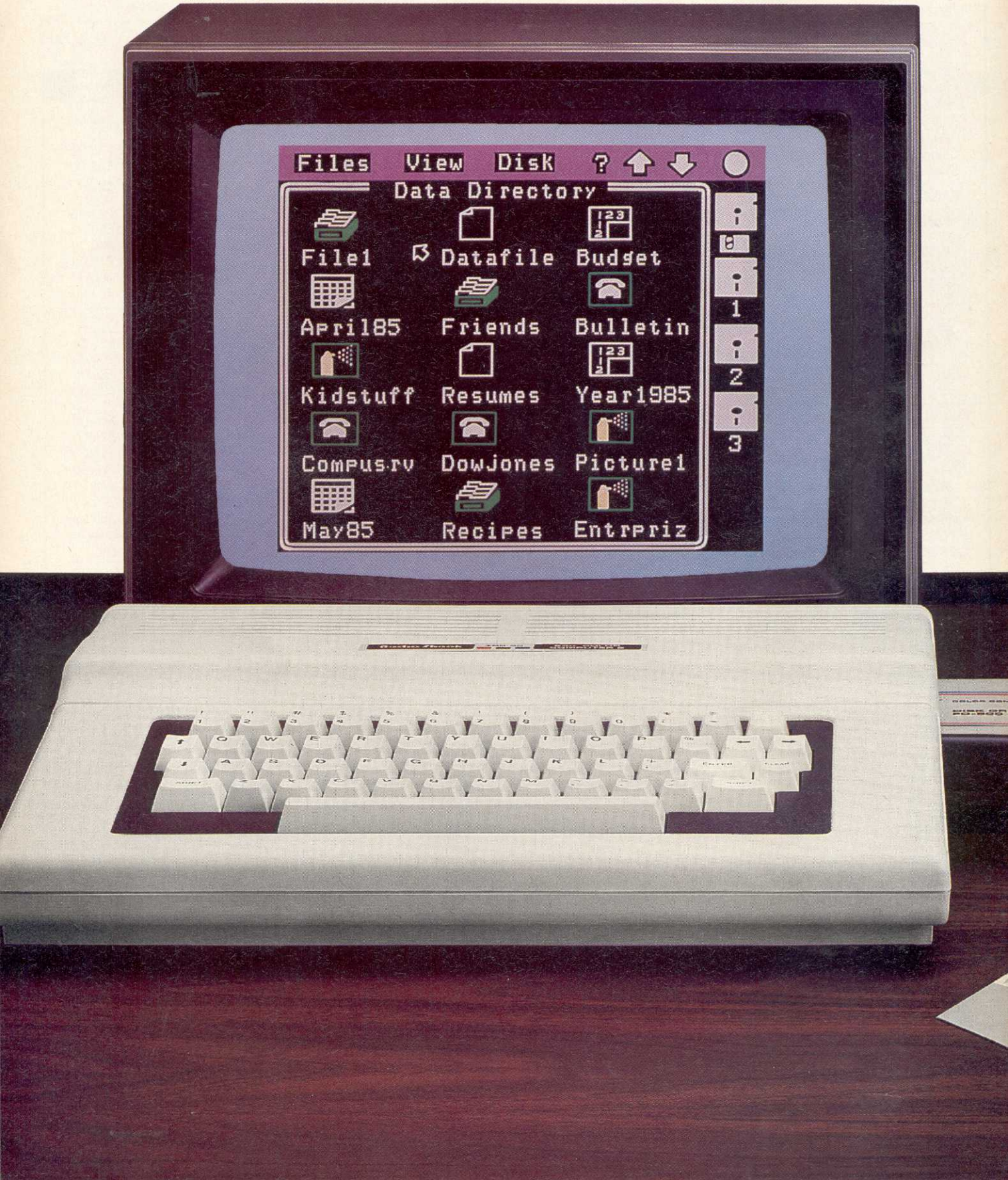

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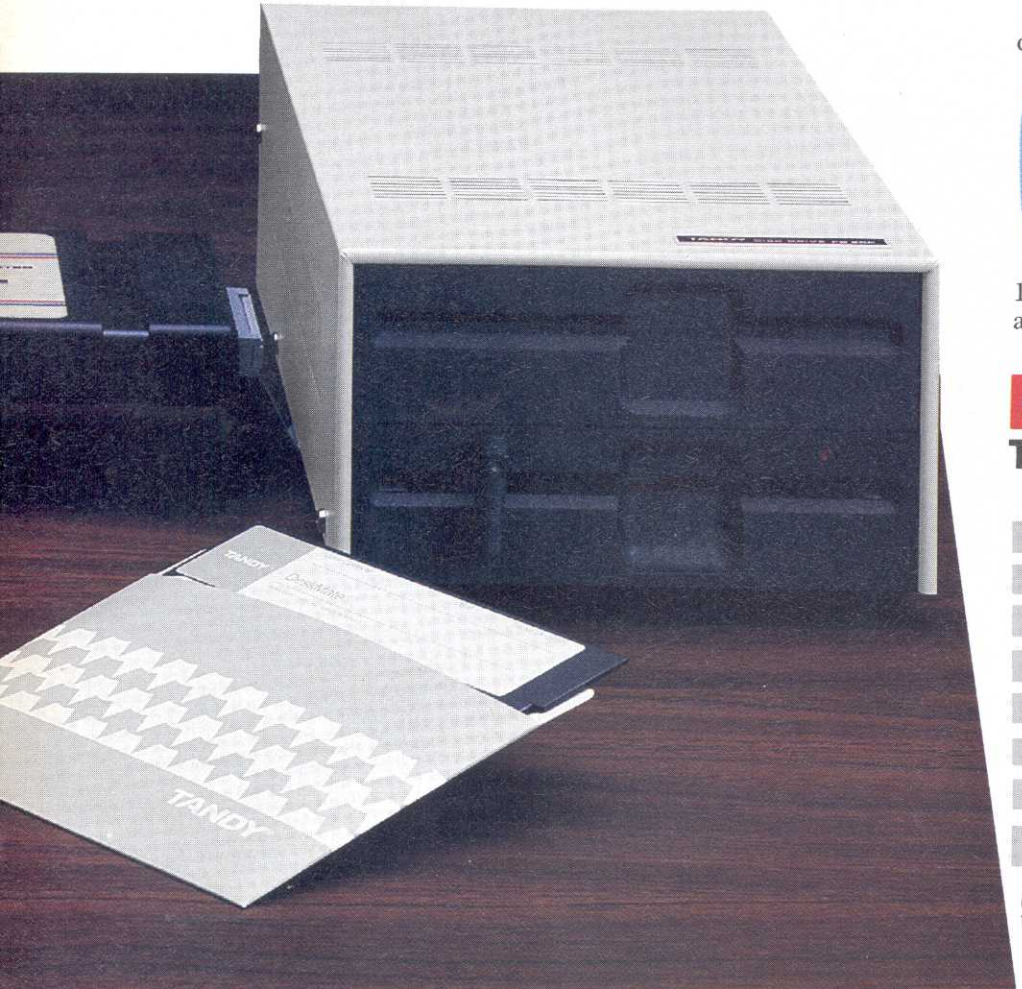

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an editor/assembler? Do other companies produce similar products? (*Ray Jurgmann, Buckholtz, TX*)

A: CBasic is an integer-only compiler that uses a dialect of Basic similar to the CoCo's interpreted Basic. A compiler is a compromise in that you generally don't get the speed of execution attainable from Assembly language, but you have the advantage of programming in a high-level language. Since the result of compilation is machine language, you should expect faster execution than you get from interpreted Basic, especially if the program you compile contains looping. The most popular CoCo compilers are the OS-9 version of C, Pascal, and Basic-09 (the latter "compiles" to intermediate code, which is interpreted). These OS-9 compilers supply features comparable to those used on mainframe computers.

Q: I might add a non-Tandy disk drive and a Centronics-type printer to my CoCo. I don't want to spend $25 or $30 for a simple cable to connect them. Are there alternatives? What is the cheapest way to add a disk drive? (*Judith Briggs, Cambridge, MD*)

A: The March 1985 *Popular Mechanics* contained an excellent article entitled "Set Up Your Computer System with Hitch-Free Hook-Ups." Author Walter Salm tells how to build your own cables using the connectors and ribbon cables you can buy at most electronics parts stores. If you have trouble, the problem may lie in the cable or in an improperly set configuration switch in your printer. Generally speaking, you can make a cable more cheaply than you can buy one, provided you know how to check for problems.

Tandy's drive zero for $199.95 (including controller, two-drive power supply, case, and cable) is hard to beat. Even if you want double-sided drives, 40 tracks, or 80 tracks, it still pays to buy the Tandy drive zero. You can discard the supplied single-sided drive and cable and buy suitable replacements—the TEAC 55B (40-track, double-sided, double-density) or the TEAC 55F (80-track, DSDD). However, an 80-track drive won't read 40-track disks, so you'll want to keep at least one 40-track drive.

Q: Do all editor/assemblers for the CoCo share the same instruction set? If so, can you use another assembler with the Assembly-language listings produced by EDTASM+?

Also, my CoCo is white, but its case is the same size as the original gray CoCo. The model number is 26-3003B. Is it a CoCo I or CoCo 2? (*Waddhana Prom, E. Windsor, CT*)

A: Since all CoCo editor/assemblers produce 6809 machine code, they use the same mnemonics (symbolic operation codes) that Motorola supplied with the spec sheet for the chip. You can use any 6809 assembler code with any of the assemblers, but there are syntactic variations.

Your computer is a CoCo I with a revision F (so called by hobbyists) PC board.

Q: Some companies, like Zenith, categorize a monitor's resolution in terms of dots (e.g., 640 by 200). Others, like NAP, speak in terms of lines (e.g., 800). I've heard that the resolution permitted by the CoCo's hardware makes the purchase of a high-resolution monitor a waste of money. Is that true? Is there any real difference among 15, 18, and 20 MHz units? (*Harold Dowda, Columbia, SC*)

A: The CoCo's video display generator can produce a display of only 256 by 192 pixels, so buying a monitor with higher resolution is not worthwhile. In fact, a monitor will give you the same picture you are getting on a TV set: the same number of characters on the same number of lines. The only advantage is a possible reduction in radio frequency interference. If you add an 80-column board such as PBJ's WordPak, you'll need a monochrome monitor with a bandwidth of at least 18 MHz.

Q: I am considering upgrading my 16K D board CoCo to 64K. How does your method ("Fat CoCo," *HOT CoCo*, September 1985, p. 28) compare to the one described by B.H. Alsop in the March 1983 issue of *Rainbow*?

Also, I converted my ROM Paks to disk with no problems using ROMEND and ROMFIX ("Disk Utilities," *HOT CoCo*, September 1983, p. 134). I had trouble with Typing Tutor, for which ROMEND gave an end address of CFFF or DFFF. I decided to try DFFF and it worked. Can you explain why? (*Paul Whiting, Madison, WI*)

A: The upgrade technique described in *HOT CoCo* makes your machine fully compatible with the newer boards; therefore, you can further upgrade it to 256K RAM and soon to 512K.

Since Tandy decided to save money by incompletely decoding its ROM Paks, the code seems to repeat itself when you PEEK locations beyond the ROM's limits. ROMEND looks for this repeated sequence but can be fooled if a ROM pak contains a code repetition or more than one ROM placed noncontiguously in memory.

Q: I have a 64K CoCo 2 and software worth hundreds of dollars. I have no problem loading Basic programs to

disk, but I can't load machine-language programs because I don't know the start, end, or execution address. (*Robert M. Faden Sr., Burbank, CA*)

A: You can follow the procedure below if you have a program that requires you to type in EXEC to begin execution. (It won't work for programs that execute automatically.) To find the necessary addresses, CLOADM the program without connecting the disk controller. Then type in PRINT PEEK(487)*256+PEEK(488) to find the start address. PRINT PEEK(126)*256+PEEK(127)-1 gives you the end address; PRINT PEEK(157)*256+PEEK(158) gives you the execution address. If the starting address is below 3584, you need the Tapefix disk utility (*HOT CoCo*, September 1983, p. 134). Tapefix works only with programs shorter than 24K (24,576 bytes).

Q: Can I CLOAD a program into memory without erasing the one already there? (*Keith H. March, Continental, OH*)

A: The technique for loading multiple programs into memory is simple. CLOAD the first program and type in PRINT HEX$(PEEK(25)*256+PEEK(26)), noting the value returned. Then type in PRINT HEX$(PEEK(27)*256+PEEK(28)-2) and again note the value returned. POKE the values from the previous step into locations 25 and 26 by typing in POKE 25,value:POKE 26,value. CLOAD the second program and renumber it if there are conflicting line numbers. Finally, POKE the values from the first Print statement into locations 25 and 26. You can repeat this process to merge as many programs as memory can accommodate. ■

Color Monitor

by Scott Norman

I once saw my home computer as becoming a tireless and devoted personal assistant, able to keep track of my schedule and maintain an inventory of electronic office supplies to boot. The key to my system would be a desktop accessory package, with such functions as a calculator, memo pad, and telephone dialer.

Alas, I soon found out that the CoCo doesn't have the muscle to handle a full-fledged electronic desktop program. It lacks two essential features: lots of memory and high-capacity disk drives.

I'm going to look a little more closely at these limitations. Then I'll explore the alternatives, including a CoCo accessory package from Computerware called the Complete Electronic Organizer (CEO).

No Room at the Inn

Of course, the electronic desk is immensely popular with businesspeople who use IBM PCs or Macintoshes. Borland International's SideKick is one of the industry's major success stories. Workalikes abound. Users can now access everything from simple calculators and message pads to 1000-cell spreadsheets with integrated graphics capabilities.

Rapid access is the key ingredient. If you're working with a word processor or spreadsheet, you can suspend its operation, call up one of the accessories to do a quick job, and then return to the application. While you can still run only one program at a time, such auxiliary routines increase the computer's effectiveness.

You can also transfer data from an accessory to the main program by electronically cutting and pasting, using an intermediate "clipboard" file to hold the information while you jump between applications.

On a PC, you can keep some accessories in RAM for nearly instantaneous recall and others on the operating-system disk. The CoCo's 64K of RAM can't hide accessories and still do meaningful work with the main program, and its 156K disks can't store both types of software. Further, RSDOS doesn't easily let you sus-

Product Information

Computerware
4403 Manchester Ave.
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February 1985: Line and bar graph program, GW-Basic, and easy Assembly-language programming.
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pend one program while you use another.

CEO works around these limitations by making a sacrifice: You must devote your computer to your accessories. You thus give up word processing, spreadsheets, accounting, and other functions in favor of having the machine keep track of your day's appointments, phone numbers, memos, and the like. Is the trade-off justified?

Letting the CEO Run the Show

CEO (it also stands for chief executive officer) gives you simple versions of six popular accessories: a calendar, free-form data file, memo pad for messages of short term interest, four-function calculator, telephone directory, and real-time clock with alarm. You need a 64K computer, and while the program works with one disk drive, procedures get so complicated that I recommend two drives for daily use.

The start-up screen, your home base when moving among functions, consists of a picture of a desktop, windows in which the date and time appear, and two menus—one for applications, the other for utilities. You use the arrow keys to move your cursor to the desired item and press the enter key. The calendar also uses a cursor and icons for your choices.

Since the CoCo doesn't have its own real-time clock, you have to give CEO the date and time at the start of each session. You can set the clock and the alarm from the utility menu. You can also select an Other Things option, which lets you respecify the number of disk drives and printer baud rate or customize a short sign-on message. Other options let you format a data disk or quit the program and return to Basic.

The Heart of the Matter

The applications are, of course, the heart of the program. The calendar function is an abbreviated version of Computerware's earlier stand-alone program, Don't Forget, which I discussed in August 1985 (*HOT CoCo*, Computer Room, p. 18). Like its predecessor, CEO can display either a monthly calendar page or a daily appointment schedule, but its capacity is more limited. Each day has 10 hourly divisions, along with space for a single memo and a special-occasion notice. The appointment slots can hold 15-character notes; the memos and special-occasion notices can hold only 32-character messages.

That might not be enough room to record your affairs. I fill my regular desk calendar (containing two pages for each week) with lots of notes to myself. I would be hard-pressed to get by with CEO's restricted space.

The program does well at moving information around, though. You can use miniature scissors, clipboard, duplicator, and disk icons at the top of each daily schedule page to copy an entry from one hourly slot to another, or from one day to another. In a two-drive system, you can carry birthdays, anniversaries, and similar events from year to year (a single data file can cover only one year) without retyping—simply use the arrow keys to select a data item, icon, or menu entry as appropriate.

CEO doesn't support joystick or mouse control of the cursor. However, it searches automatically to help you find items buried in the depths of your calendar file. After you specify a key word, the system prints the schedule of any day containing it, as long as the date falls within the limits you specify. This feature proves handy for making a list of your associates' birthdays, anniversaries, and so on. Unfortunately, CEO doesn't offer an analogous screen report.

Although the icons make the calendar CEO's flashiest feature, many people will find Note Keeper's unstructured data filer more useful. Each note (or record, in conventional data base parlance) can consist of up to 5,400 characters. Note Keeper lets you organize the text in any way you please, since notes are not broken down into specific fields. If they are short, you can store as many as 479 notes on a data disk. CEO stores each note under a title, which you can search for by key word.

Because many of my filing applications are for pieces of text rather than structured information, I like free-form data filers. Thus I expected to enjoy Note Keeper. I did, but had one reservation: Note Keeper is line-oriented (whatever lies between two carriage returns is treated as a single piece of text). I would have preferred a full-screen editor.

Fortunately, the lines aren't restricted to the width of the video display; they can be up to 232 characters long. Nevertheless, you must keep track of the line you are on if you want to jump between command and exit modes. That's another drawback: separate modes for text entry and modification. Perhaps I've been spoiled by Telewriter-64, but Note Keeper's system seems too cumbersome for a process that should be intuitive. However, because the editing commands are similar to Extended Color Basic's, you don't need to learn much new material.

CEO's Memo Pad works exactly as Note Keeper does, except that it creates only one record (also called Memo Pad). Whenever you use it to write a reminder, you overwrite the old message. However, Note Keeper can read and rename Memo Pad and add it to its own data file, so your brightest brainstorms need not be lost in the pileup.

It might seem ludicrous to pull out a hand-held calculator to do quick figuring while seated at a computer keyboard, but most of us have probably done so. CEO includes a simple four-function calculator display to save you the trouble. You must enter the numbers from the CoCo's keyboard. Unlike the many calculator accessories supporting the Macintosh, this one doesn't let you use a cursor to "press" buttons on the screen. Answers do, however, appear in their proper place on the imaginary calculator's window.

CEO's last function is Phone Directory, a simple routine to keep track of names and telephone numbers. You can't interface it to a telecommunications program for automatic dialing, and it won't store names and addresses for use with a mail-merge program. Phone Directory does seem to keep its data file in RAM whenever it's in use, since it always keeps the file sorted when you add or delete names. I detected no time lag as a result of the sort.

Because the sort uses names exactly as you record them, you should enter them in last name, first name order. The search routine is limited—it can find only matches that begin with the first character of the name. Therefore, Phone Directory will find S, Sm, or Smi, but not John Smith.

Phone Directory has a final quirk: It accepts duplicate entries and has no way to warn you that a given name/number combination already exists.

How Are Things At the Office?

It would be nice if a 64K Color Computer could juggle both a major program and CEO's desk accessories, but it can't. If I'm busy with the machine and get the urge to check my next dental apppointment, it had better be written down somewhere. I can't click on a screen menu and have CEO's calendar appear, and shutting down my main program to load CEO's disks is impractical.

CEO will be most useful to the user who doesn't use an application for long periods but who is still willing to leave the CoCo running all day. Such a situation would give the accessories a workout. If they're available, you'll use them.

The features themselves are interesting, if limited. At the very least, they can give you a taste of what it's like to have an electronic desk.■

Scott Norman is the manager of solid-state science at GTE Laboratories in Waltham, MA. Write to him at 8 Doris Road, Framingham, MA 01701.

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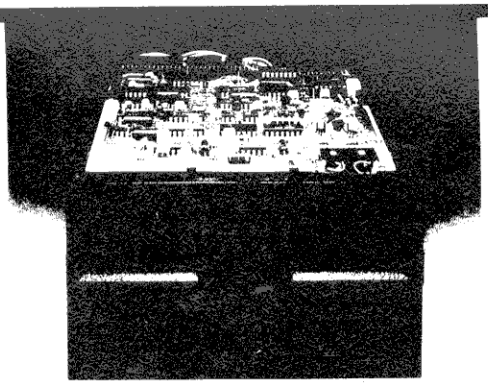

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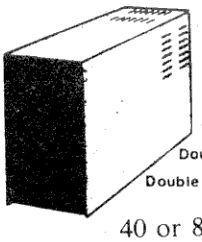

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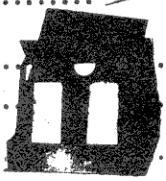

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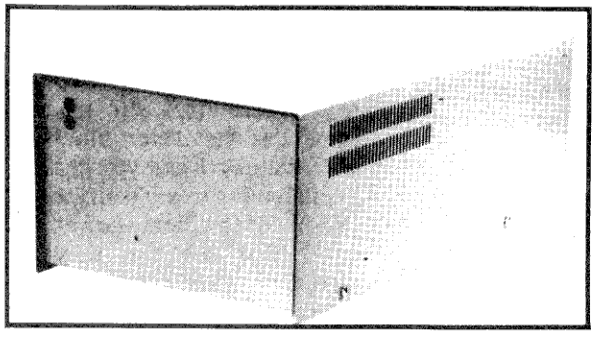

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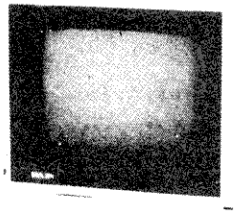

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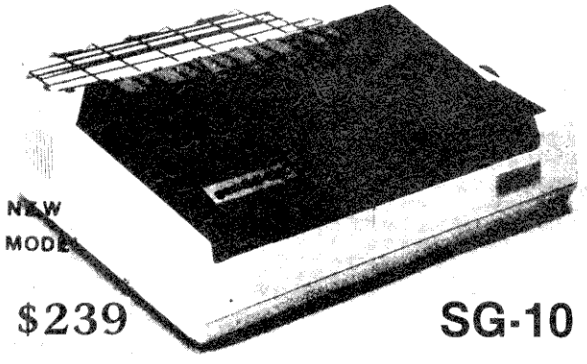

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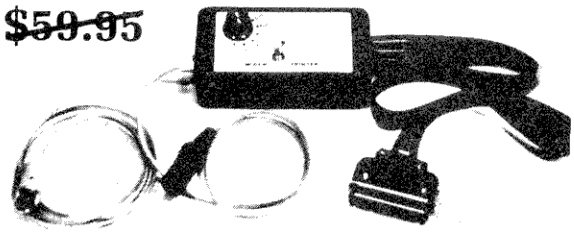

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Epson's FX-286 ($749), a 136-column dot-matrix printer, lets you print assorted types of documents and forms, including those combining graphics and text. It emulates the IBM Proprinter and is fast in both draft (200 characters per second) and near letter quality (40 cps) modes

The FX-286 connects to most computers via a built-in industry standard parallel interface. A built-in 8K print buffer frees the host computer for other tasks while printing is in progress. The printer comes standard with both friction and tractor paper feed. Options include a serial interface board and cut-sheet paper feeder. For more details, contact Epson America, Computer Products Division, 2780 Lomita Blvd., Torrance, CA 90505, 800-421-5426.

Circle 581 on Reader Service card.

Writing Help

Reference Manual for Scripsit from PowerSoft covers Model I and III disk and tape versions and Model 4 Scripsit. It's a supplement to Tandy's manual, but is complete enough to stand alone.

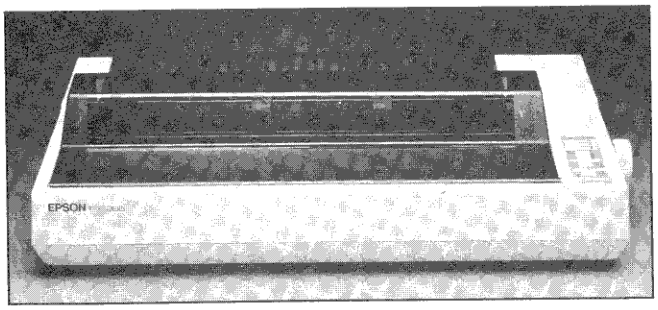
The manual includes all the word processor's commands and gives many examples. It contains a comprehensive index to the Tandy I/III Scripsit manual as well as its own index.

The price is $7.95 plus $3 for shipping and handling. For more information, contact PowerSoft Products, 17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475.

Circle 561 on Reader Service card.

A New File

Master File from Ultimate Software is a data base manager for the Models III and 4/4P/4D. You can create your own filing system, and record and store any type of information (alphabetical, numerical, or a mixture of both). The program requires 32K, one disk drive, and a printer.



The Epson FX-286 emulates the IBM Proprinter.

You can add or change fields anytime; add, delete, edit, search, and print records; sort by any field in ascending or descending order; and count or total any field.

The print option provides hundreds of print format possibilities. You can print reports and labels using the same data entries. The program includes a mail-list management system that prints mailing labels or lists.

Master File costs $59. For further information, contact Ultimate Software, P.O. Box 1291, Hayden Lake, ID 83835, 208-772-7634.

Circle 568 on Reader Service card.

Wired

Houghton Mifflin's Infomania: The Guide to Essential Electronic Services by Elizabeth Ferrarini is an exhaustive, entertaining guide to hundreds of on-line services. It gives the lowdown on their quirks and benefits, saving you time and money.

Infomania tells you how to get in touch with Wall Street, call a free job data base, find a date for Saturday, get into the U.S. government's free data bases, and more. It also informs you about new trends and techniques, gives you alternatives to expensive search methods, and explains how to shop in the Electronic Mall. The book costs $14.95. For more information, contact Houghton Mifflin Co., 2 Park St., Boston, MA 02108, 617-725-5972.

Circle 553 on Reader Service card.

Easy Calculations

AlphaBit Communications offers Sum-Up, a calculator program for the Models I, III, and 4 under TRSDOS 6 or MULTIDOS 80/64. The calculator works as a window that pops up over almost any application program and uses 5.5K of memory.

You can add, subtract, multiply, and divide by forward or reverse notation. It also contains a decimal-to-hexadecimal converter. You can send calculations to the printer and include labels.

The calculator is $24.95. For further details, contact AlphaBit Communications Inc., 13349 Michigan Ave., Dearborn, MI 48126, 313-581-2896.

Circle 558 on Reader Service card.

Statistically Speaking

DBi Software offers Trajectories, a statistical processing system, for the Tandy 6000 under the Xenix operating system. The program is also available for the Models 1000, 1200HD, and 2000; and for the Models II and 12 under CP/M.

Trajectories is menu- and prompt-driven and offers over 120 different statistical functions. It offers regression analysis and precise calculations: Many programs are accurate up to 12 decimal places. The package includes a two-way mainframe interface.

Optional time series and data base modules are available as is the basic source code. The Xenix multiuser version is $595 and the single version is $395. For more information, contact DBi Software Products, 206 W. Michigan, Suite 100, Mt. Pleasant, MI 48858, 800-221-3791.

Circle 555 on Reader Service card.

Compressing Business

Lap Coder is a text compression program for the Models 100 and 200 from Mu-Psi Computer Consulting. By compressing files, the program increases your computer's text storage capacity by 50 percent. It also cuts cassette save/load time and modem transmission time by about a third, and it reduces errors, since fewer characters are stored or sent.

The program and an instruction manual cost $27.95 plus $2 for shipping and handling. For more information, contact Mu-Psi Computer Consulting, 1010 Turquoise St., Suite 250, San Diego, CA 92109, 619-459-5579.

Circle 557 on Reader Service card.

Get Booking

B. Erickson Software's Book program for the 32K Color Computer lets you format booklets, letters, and more. Most ASCII data files or programs load into Book, or you can use its built-in editor to write a file.

Book prints up to 255 pages (on one or both sides) and works with single sheets or form-feed paper. Pages can be five to 66 lines long, lines five to 138 characters wide. You can number pages.

The program has four formats: word-wrap, justified, basic program, and data. The cassette version is $39, and

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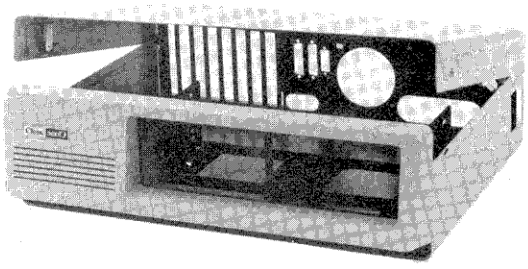
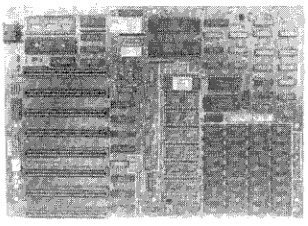


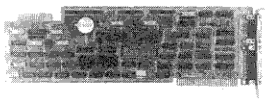


Now for the heart of your IBM clone: the Main Board. No cost has been spared in manufacturing this fully IBM compatible, 640K RAM (all on the main board), 8 slot Clone of the IBM XT. The latest in technology including the famous NEC V20 8088 CPU chip, gives faster performance than the Tandy 1000 or 2000. There is even a socket for the 8087 numeric coprocessor. The board fits the case like a fine glove. Plug in the power connector, hook up the speaker and you are ready for the next step toward real IBM compatibility . . . . **$ 249**

Add our 135W (twice IBM's) power supply for all the power you are likely to ever need. It has outputs for the main board plus up to 4 disk drives. The IBM-style side switch mates with our case . . . . . **$ 99**

2X THE POWER OF AN IBM

The Multi I/O card provides for 5 major functions—floppy disk drives (up to 4 DS/DD 360K drives); IBM parallel printer port; 2 serial (RS-232) ports, 1 populated, 2nd optional ($10); Game port; Battery backup clock/calendar. Includes clock software and internal disk drive cable . . . . . **$ 149**

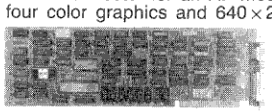


Standard . . . . . $ 89

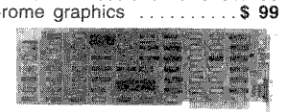
Deluxe . . . . . $ 129

Keyboards are one area where nobody copied IBM. Many feel the standard IBM keyboard leaves a lot to be desired. We have the most popular aftermarket keyboards. The 5150 and the 5151 are capacitive types with the feel professionals demand. Both models offer lighted NumLock and Caps keys and the deluxe model has lighted Power and Cursor Pad keys along with a Reset key and a separate cursor and numeric keypad.

Two video boards are available. The color graphics video card has 3 outputs; RGB TTL; composite color; composite monochrome, plus a light pen port and a connector for an RF modulator. Standard IBM resolution of 320 × 200 four color graphics and 640 × 200 monochrome graphics . . . . . **$ 99**



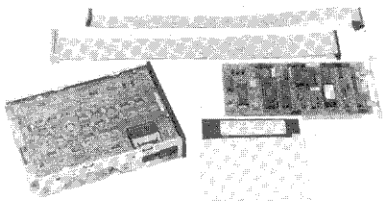
Hi-Res Monochrome . . . . . **$ 179**

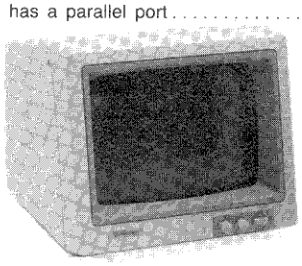


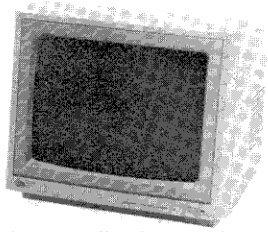
Color Graphics . . . . . **$ 99**

Our monochrome graphics display card is Hercules compatible with a 720 × 348 TTL monochrome output. It runs Lotus 1-2-3 graphics and also has a parallel port . . . . . **$ 129**

Want to go with a hard drive? How about a 20MB half-high, low-power hard disk drive? Our complete kit includes the drive, cables, controller and software. It fits right inside your Clone and you can forget the floppy. Boot directly from the hard disk. Future expansion is assured as the controller accepts a second hard drive whenever you are ready . . . . . **$ 489**

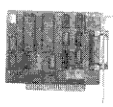






In order to finally see what you are doing we offer 2 monochrome video displays. The TTL display is able to display the hi-res output (720 × 348) of the Hercules or compatible card. This 12″ video display has a non-glare display. Green or amber . . . . . **$ 110**
The composite model is also able to display hi-res monochrome characters and graphics. Green and Amber with a 12″ display . . . . **$ 99**

The standard floppy disk controller is also available. It controls 2 internal and 2 external floppys like the Multi I/O card. This card comes with the internal 2-drive cable . . . . . **$ 59**



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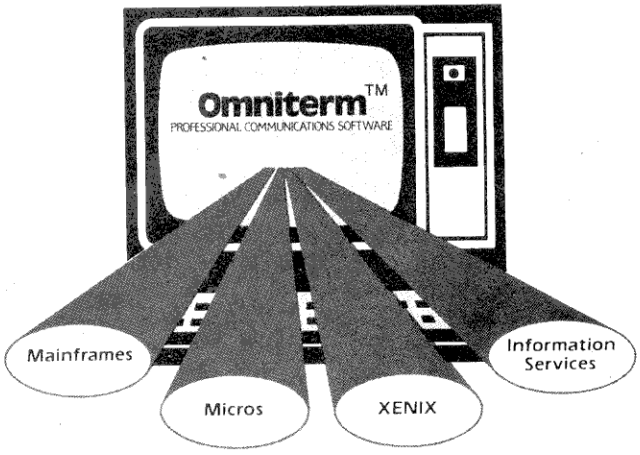

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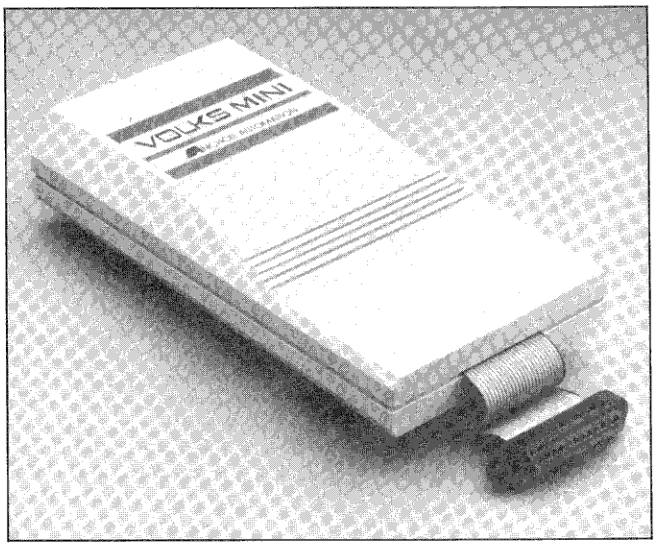


You get manual dial and manual or auto-answer with the Volks Mini modem.

the disk version is $49. Contact B. Erickson Software, P.O. Box 11099, Chicago, IL 60611, 312-276-9712.
Circle 565 on Reader Service card.

Phone Talk

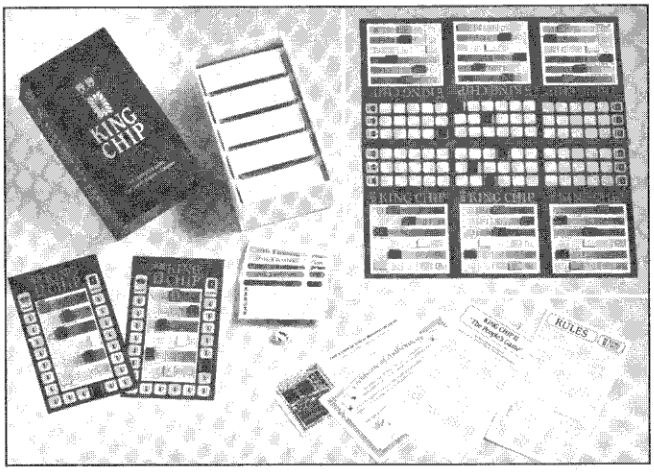
The Volks Mini modem from Anchor Automation (6913 Valjen Ave., Van Nuys, CA 91406, 818-997-7758) provides 300- or 1,200-baud data transmission for any computer or terminal with a standard serial communications port. You don't need an ac outlet, power supply, or additional interconnection cables. The modem plugs into your computer's RS-232C interface and connects to a touch-tone telephone via a modular jack.

The Volks Mini allows manual dial and manual or auto-answer. When inactive, it does not interfere with normal telephone use. The price is $199. Contact Anchor Automation Inc.
Circle 554 on Reader Service card.

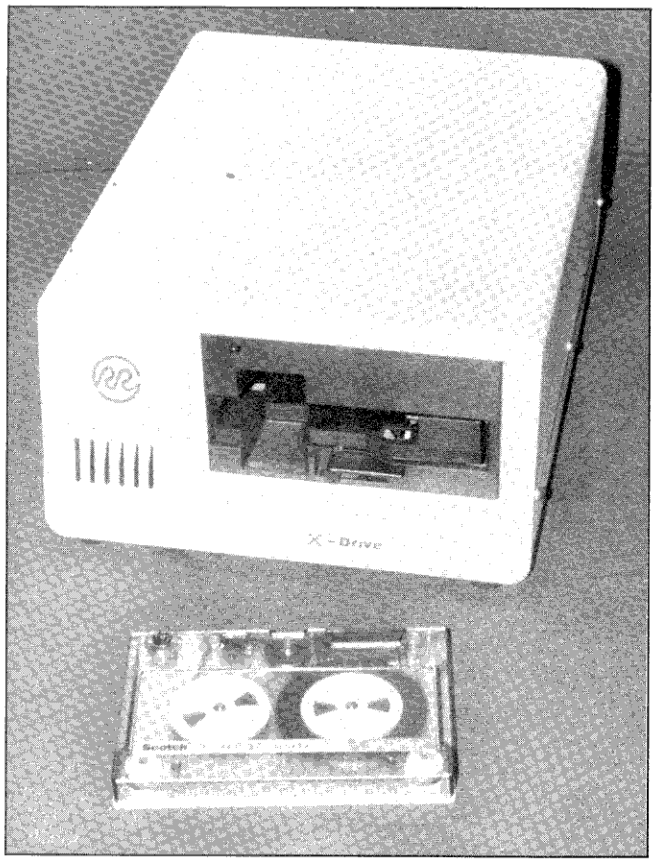
Game of Facts

King Chip from XYLYX Computer Entertainment Ltd. challenges your computer and high technology knowledge. It's a game about computers that doesn't require a computer. Your objective is to attain King Chip's throne and keep it as long as possible.

The game has five levels of difficulty, ranging from beginner to guru. It contains over 4,050 questions, and answers are supplemented by educational explanations. King Chip is $39.95 plus $2



Computer knowledge can win you King Chip's throne.



X-Drive provides fast back-up security.

for shipping and handling. For more details, contact XY-LYX Computer Entertainment Ltd., 20 Torbay Road, Markham, Ontario, Canada L3R 1G6, 416-477-4053.
Circle 560 on Reader Service card.

Xenix Back-up

X-Drive ($1,495) from Radio Ranch is a fast cartridge tape back-up device for Xenix 1.0–3.1. It does image back-ups to streaming tape without supervision at 2 megabytes per minute. One tape holds 25 megabytes of data after formatting, equivalent to 20–40 8-inch floppies.

The X-Drive uses a standard floppy interface and accepts Xenix's TAR, SYSADMIN, Dump, and DD commands. It also includes formatting and diagnostic utilities. For more information, contact Radio Ranch Inc., Radio Ranch Airport, Rt. 3, Polo, IL 61064, 815-946-2371.
Circle 552 on Reader Service card.

The Thinker

Proteus—The Idea Processor from Research Design Associates helps you generate and develop ideas and information on the Models III, 4, 1000, and 3000. It's a menu-driven program that uses the discovery method to foster critical, analytical, and lateral thinking. Proteus offers five "prewriting" strategies, with help screens available to aid you if you don't know what to say.

The program stores information automatically, retrieves data, prints out information from any point in the program, and transfers files to any word processor (including Scripsit).

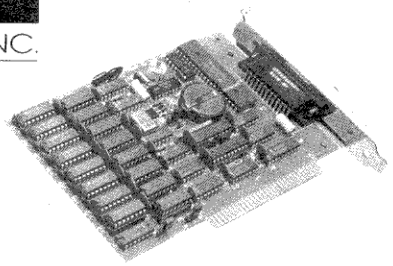
Proteus costs $79.95 and is available through Radio Shack's Express Order Software. For more information, contact Research Design Associates Inc., P.O. Box 848, Stony Brook, NY 11790, 516-928-5700.
Circle 566 on Reader Service card.

Desperately Seeking Software

Garland Publishing has announced Ted Kruse's *Locating Computer Programs*, a

Circle 286 on Reader Service card.

EPD ENGINEERING INC.
DATATRON



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The EPD Half Megaboard + DMA is the price/performer leader!

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256K RAM	$40 additional
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Half Megaboard W/O DMA	(ØK–512K, serial, clock/calendar, RAM disk & print spooling software, fits short slot.)	**$199**
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Circle 299 on Reader Service card.

T.CAD Computer Aided Drafting software for Models III 4 4D 4p 1000 1200

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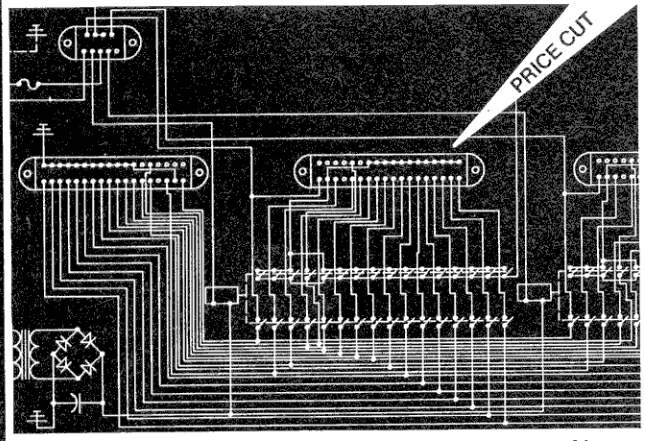

MICRODEX CORPORATION
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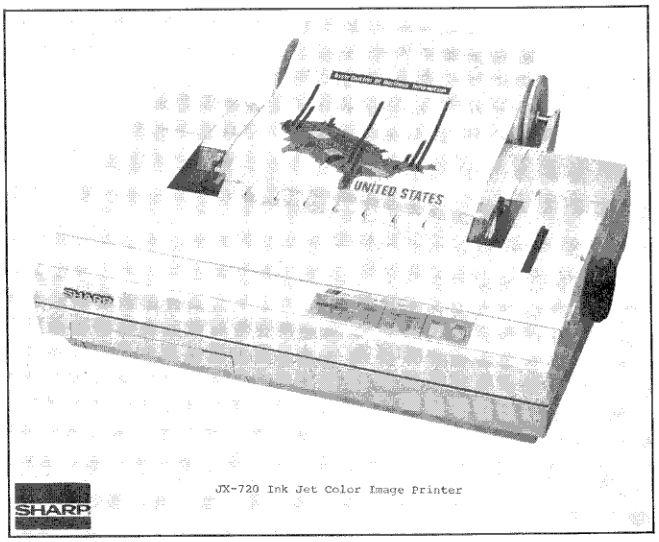


The JX-720 is a versatile ink jet printer.

bibliography/sourcebook that helps you find the programs you need. It guides you to over 300 sources of software, software reviews, books of complete programs, national organizations that share software, and data bases of software specifications.

The book emphasizes software sources for personal computers, but also includes information about programs for mainframes and mini computers.

It costs $17. Contact Garland Publishing, 136 Madison Ave., New York, NY 10016, 212-686-7492.

Circle 562 on Reader Service card.

Jet Set

Sharp Electronics Corp. has announced the JX-720, a compact ink jet printer that uses yellow, cyan, magenta, and black ink cartridges to produce up to 256 basic color combinations.

The JX-720's automatic print head cleaning station minimizes nozzle clogging problems. It accepts 8½- by 11-inch cut sheets, overhead projector transparencies, or roll paper. The printer prints text at 35 characters per second, either bi- or uni-directionally, at a resolution of 120 dots per inch.

The cost is $1,495. Contact Sharp Electronics Corp., Systems Division, 10 Sharp Plaza, Paramus, NJ 07652, 201-599-3856.

Circle 551 on Reader Service card.

Hold That Disk

Ideaco's DiscRack is a temporary holding rack for six disks. It's made of clear acrylic with a fleece base and holds disks with or without the sleeves.

The rack is $3.95 plus $2 for shipping and handling. Custom imprinting is available. For more information, contact Ideaco, P.O. Box 783, Fall City, WA 98024, 206-222-7836.

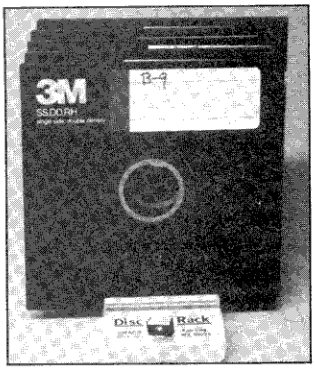
Circle 559 on Reader Service card.

Computer Health

40 Ways to Keep Your Micro Happy from Sorbus (a Bell Atlantic Co.) tells you how to reduce costly and inconvenient down time by following a few basic preventive maintenance rules.

For a free copy of the booklet, contact Tips for Micros, Sorbus, 50 E. Swedesford Road, Frazer, PA 19355.

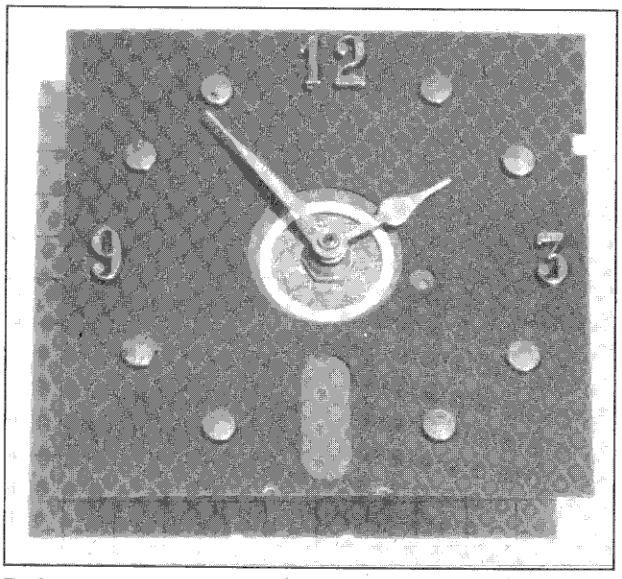
Circle 569 on Reader Service card.



Put your disks on hold in DiscRack.

NEW PRODUCTS

DIFFERENT TRACK



Disk is the latest timepiece by Clocks from Mike of San Diego.

What's the Time?

The Disk Clock from Clocks by Mike gives new meaning to the phrase "flexible time." It's a wall clock made from a 5¼-inch floppy disk.

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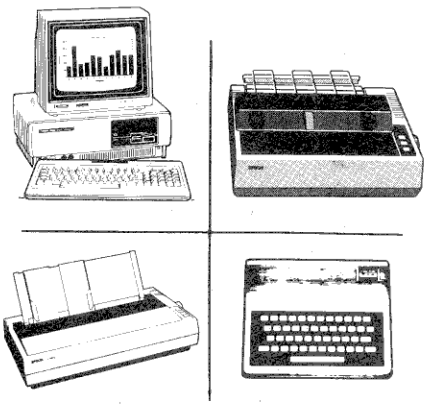

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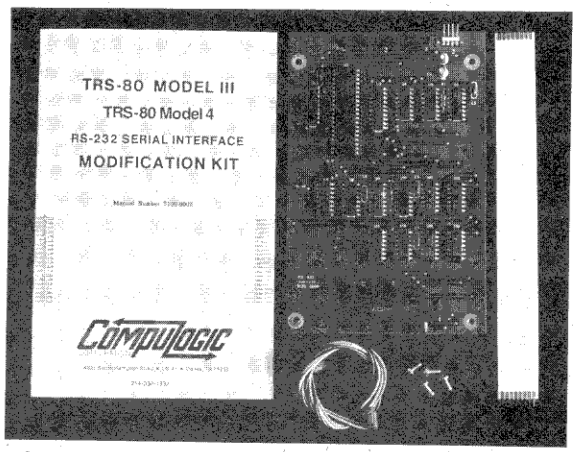

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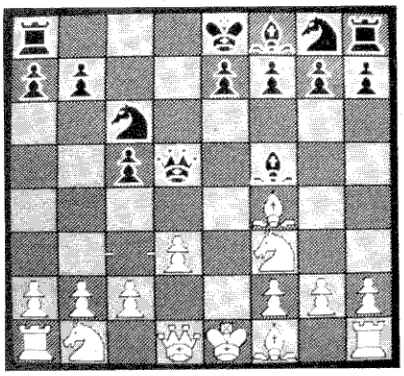

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Total Success

80 Micro's panel of experts picked two winning two-line calculators from entries in January's contest. Our decisions were based on function and programming technique. These factors may be related; innovative techniques usually create more room for cramming in functions.

Steve Woicik (Turlock, CA) combined While. . .Wend statements and logic operators to create a Model 4 clone of a Hewlett-Packard RPN calculator—right down to the four-register stack and enter key (to shift numbers up the registers in the stack).

Woicik's calculator (Program Listing 1) gives you the four basic math operations in double precision, and exponentiation in single precision (control-E). You can roll the stack down (down-arrow), move a value between the memory and the X register (control-S and control-R), clear the X register (control-C), get last X (control-L), and exchange X and Y registers (control-X).

Les Wilson (Covington, KY) submitted a more businesslike calculator (Program Listing 2) written on his Model III. We liked its ease of use and display of both total and memory contents. You can change the number of decimal places displayed (up to 14) by typing a number followed by D.

To run Wilson's program, you must type in CLEAR 500:CLS:RUN. The calculator's commands are as follows: enter adds, – subtracts, * or @ multiplies, / divides, + totals to memory, @ without an entry clears the total, M stores the total to memory, a number followed by M stores that entry to memory, R recalls memory, X clears either a number being entered or the memory, and / with no entry changes the sign of the total.

Two entries are worth mentioning for their programming techniques. Although many entries used INSTR( ) to evaluate an INKEY$ input, only Chuck Swinehart (Lancaster, PA) used the space-saving trick of putting the INKEY$ statement right in the INSTR( ) argument:

```
A = INSTR(" + - */ = Mm0123456789",
    INKEY$)
```

The most innovative program was sent in by Bruce Tonkin (Round Lake, IL). His five-function RPN calculator (Program Listing 3 for the Model 4 and MS-DOS micros) displays a stack that can hold 63 numbers. It crashes easily but is worth examining closely for technique. Tonkin uses random file functions to code single-precision numbers as 4-byte characters in the stack string. Numbers are put on the stack using the enter key. You then perform operations on them by typing in one of the math operators (+, –, *, / or ^).

This will be Tonkin's last entry. He starts a new column in next month's *80 Micro*. It's about programming, of course.

Contest *du Jour*

Can a two-line Basic program outperform GEM Draw or the Macintosh? We're betting *80 Micro* T-shirts and bumper stickers that it can't be done. David Green (Edmonton, Alberta) gets a bumper sticker for suggesting this month's contest idea: A two-line graphics editor. Keep in mind that *80 Micro* can't judge your graphics gem if it uses special functions of a printer we don't have. The rules:

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 15th of the issue month. Thus, this month's deadline is April 15. 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 July 1986 issue.
4. Employees of CW Communications are not eligible.
5. Send your entry to: *80 Micro*, Fine Lines, 80 Pine St., Peterborough, NH 03458. We will not, unfortunately, be able to return entries.
6. Specify your T-shirt size. Bumper size not required.

Too *?&$#&%*@ Long

If you tried typing in last month's winning programs, you may have found TRSDOS Basic unable to swallow those long lines of code. You must resort to tricks to enter super-long program lines. The first is to use Basic's edit mode. When Basic stops accepting the characters you type, press the enter key to put that line in memory. If, say, you're working on line 10, type in EDIT 10, press the enter key, and then press X (for extend). Your code line will appear with the cursor at the end, and you'll be able to finish a full 255-character line.

If the line is still too long, then you must replace any Print statements with a question mark (Basic's abbreviation for Print). To do this without retyping the whole line, consult your Basic manual for other editing functions. ■

Program Listing 1. Steve Woicik's two-line calculator.

```
1 CLS:DEFDBL L-Z:DEFSTR A,E:PRINT@912,X;:E="":WHILE E=""OR E>"9":E=INKEY$:WEND:C
=ASC(E)-10:IF C=-7 THEN X=0:A="":C=3ELSE IF C=-5 THEN X=Y^X:C=34ELSE IF C=0 THEN
 S=X:X=Y:Y=Z:Z=T:T=S ELSE IF C=2 OR C=3 OR C=8 THEN T=Z:Z=Y:Y=X:A=""ELSE IF C=14
 THEN SWAP X,Y
2 M=M-(X-M)*(C=9):X=X-(M-X)*(C=8)-(L-X)*(C=2)-Y*(C=33)+(2*X-Y)*(C=35)-X*(Y-1)*(C
=32):WHILE C>31 AND C<36 OR C=37:X=-X*(C<>37)-Y/X*(C=37):Y=Z:Z=T:C=0:WEND:WHILE
C>37 OR C=36:WHILE D<>3:T=Z:Z=Y:Y=X:A="":D=3:WEND:A=A+E:X=VAL(A):L=X:GOTO 1:WEND
:D=C:GOTO 1
```

End

Program Listing 2. Les Wilson's two-line calculator.

```
1 K$=INKEY$:K=INSTR("0123456789.+-*/MRDX@"+CHR$(13),K$):IFK=0THEN1ELSEV$=V$+K$:F$=
STRING$(16-D,35)+",,"+STRING$(D,35):PRINT@0,V$CHR$(30);:IFK<12THEN1ELSER#=VAL(V$):
V$="":F=K-12:T#=T#-R#*(F=9)+R#*(F=1):IFF=2ORF=8THENT#=T#*R#ELSEIFF=3THENT#=T#/(R#+
(R#=0))
2 IFF=4ORF=0ORF=7THENM#=-R#*(F=4)-T#*(R#=0ANDF=4)-(F=0)*(M#+T#)-M#*(R#<>0ANDF=7):P
RINT@512,;:PRINTUSINGF$;M#;:PRINT" M"CHR$(30):GOTO1ELSEIFF=5THENVS=STR$(M#):GOTO1E
LSEIFF=6THEND=R#+R#*(R#>15):GOTO1ELSEPRINT@256,;:PRINTUSINGF$;T#;:PRINT" T"CHR$(30
):GOTO1
```

End

Program Listing 3. Bruce Tonkin's two-line calculator.

```
1 OP$="CPD+-*/^":L=LEN(B$):FOR I=1 TO L-3 STEP 4:PRINT CVS(MID$(B$,I,4)):NEXT:INPU
T A$:IF VAL(A$)<>0 OR A$="0" THEN B$=B$+MKS$(VAL(A$)):GOTO 1:ELSE A=INSTR(OP$,A$):
IF A=0 THEN 1:ELSE IF A=1 THEN B$="":GOTO 1:ELSE IF A=2 THEN B$=LEFT$(B$,L-4):GOTO
 1
2 IF A=3 THEN B$=B$+MID$(B$,L-3):GOTO 1;ELSE X=CVS(MID$(B$,L-7,4)):Y=CVS(MID$(B$,L
-3,4)):B$=LEFT$(B$,L-8):IF A<7 THEN B$=B$+MKS$(-(A=4)*(X+Y)-(A=5)*(X-Y)-(A=6)*(X*Y
)):GOTO 1:ELSE IF A=7 THEN B$=B$+MKS$(X/Y):GOTO 1:ELSE B$=B$+MKS$(X^Y):GOTO 1
```

End

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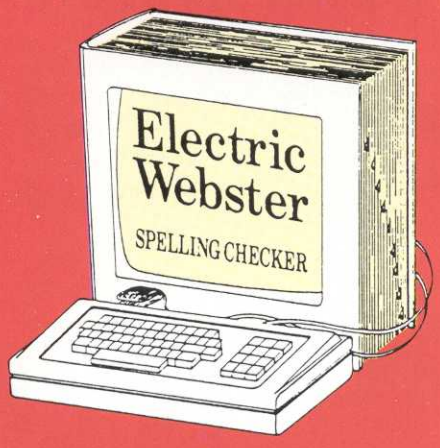

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