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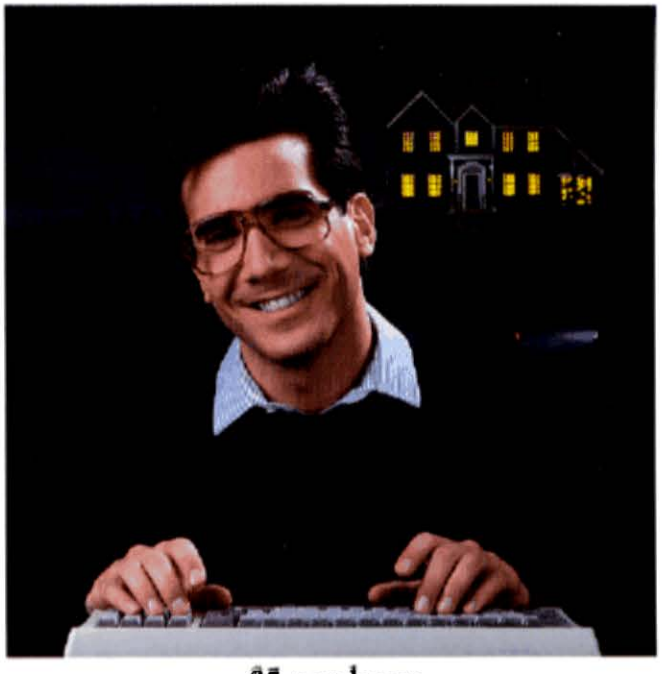

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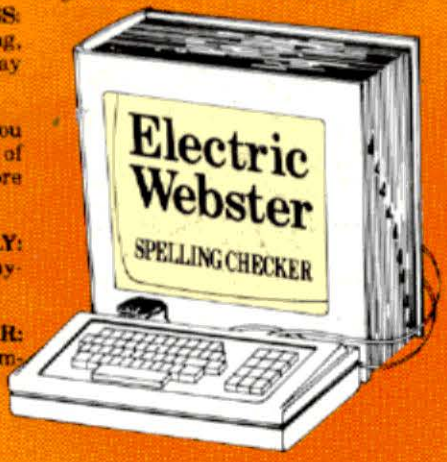

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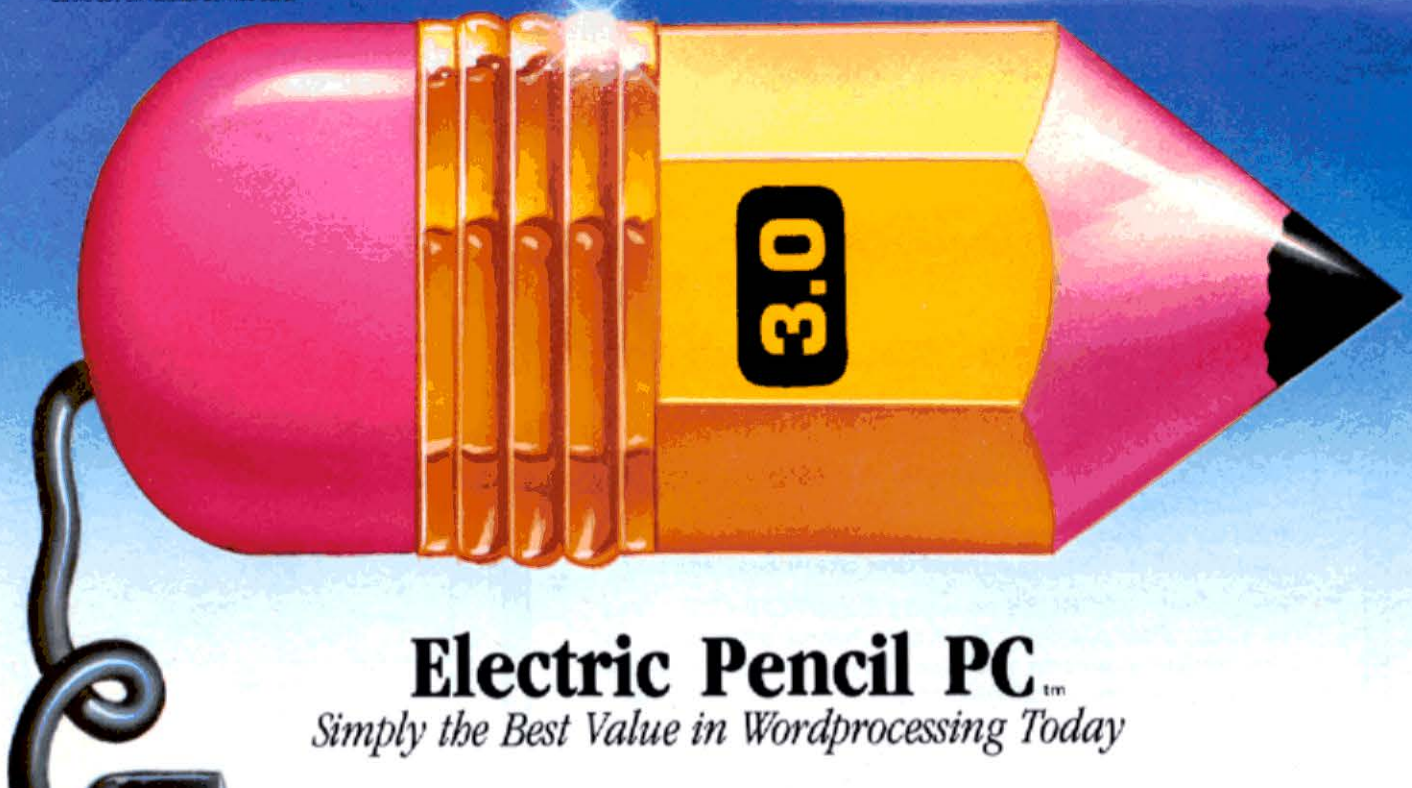

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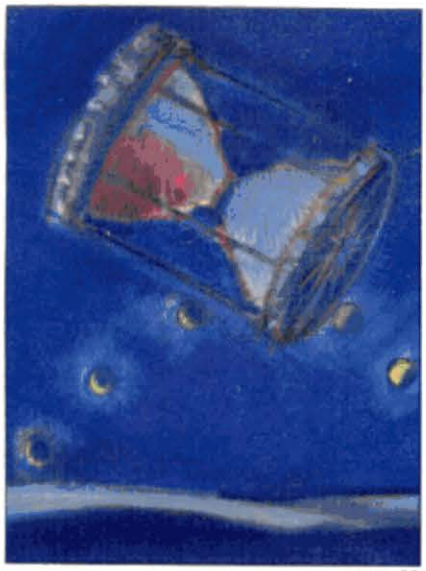

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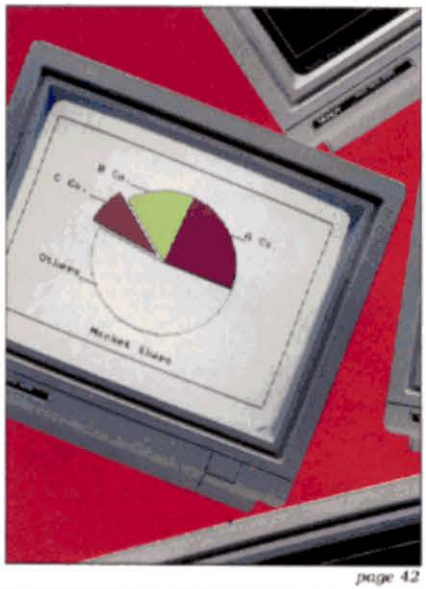

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Features

Departments

The *80 Micro* Disk Series

(formerly Load 80)

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

The *80 Micro* Disk Series programs are ready to run, and can save you hours of time typing in and debugging listings. The Disk Series 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.

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

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly disk subscriptions to The *80 Micro* Disk Series are $149.95. Individual loaders are available on disk for $17.95, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to The *80 Micro* Disk Series, 80 Elm St., Peterborough, NH 03458.

Directory

Payroll

Article: Payday Made Easy (p. 56).
System: Model 4, 64K RAM, printer.

Calculate and print current and month-to-date payroll reports.
Language: Basic.
Filespec: PAYROLL/BAS

Bulletin Board

Article: Supercharge Your BBS (p. 74).
System: Model 4, 64K RAM (Pro-Create 4.3a editor/assembler is optional).

Set up and run an advanced bulletin-board system.
Language: Basic.
Filespecs: BBS/ASM, BBS/DVR, BOARD/BAS.

File Recovery

Article: In Search of Lost Superscripsit Files (p. 114).
System: Models I/III/4, 32K RAM, Superscripsit.

Reconstruct crashed Superscripsit files easily.
Language: Basic.
Filespecs: RECOVER/BAS, CONVERT/BAS.

Direct Access

Article: The Next Step (p. 128).
System: Model 4, 64K RAM (Pro-Create 4.3a editor/assembler is optional).

Directly access directories in assembly language.
Language: Assembly.
Filespecs: MODFLAG/ASM, MODFLAG/CMD, MACLIB/ASM.

Checksum

Article: How to Use *80 Micro* Program Listings (p. 132)
System: Models I/III/4, 32K RAM.

Use our checksum program to check the accuracy of the Basic listing you type in.
Language: Basic.
Filespec: CHECKSUM/BAS

Loc-Editor

System: Models I/III, 32K RAM.

A program that finds errors for you.
Language: Basic.
Filespec: LOCEDITR/BAS

BAS = Basic, ASM = source code, CMD and DVR = object code.

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80 MICRO Review, November 1985

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System requirements - IBM-PC Compatible: One disk drive, 128K memory, color or monochrome monitor, and DOS 2.0 or higher.
TRS-80 Model 1/3/4/4D/4P: One disk drive and 48K memory.

Is Brand Loyalty Dead?

Few people remain loyal to specific makes of products. Yes, we all know somebody who wants to be buried in a Ford or who would sell the kids before giving up the Trinitron. But most of us are promiscuous consumers. An Amana refrigerator sits next to a Westinghouse stove; a Stanley hammer shares a toolbox with a Craftsman ratchet set. We buy what's readily available, what's on sale, what catches our eye at our neighbor's house.

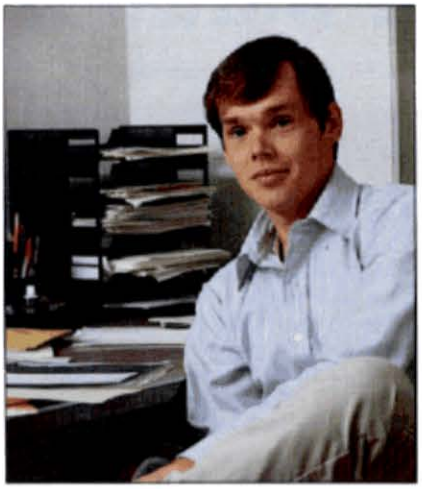
My purchases of audio and video equipment are typical. In my living room I've got a Toshiba television and a Zenith VCR. My stereo system comprises a Denon receiver, a Technics turntable, a Scott compact-disc player, two Sony cassette decks, and a pair of EPI speakers. In the bedroom I have a Montgomery Ward TV, an Hitachi receiver, an old Garrard turntable (used only for 78s and 45s), and even older Radio Shack Solo 3-A speakers.

I also own a Panasonic tape deck in my car, a cheap Claricon stereo in my office, an early 1960s Seeburg 100 Select-o-Matic juke box, an old Silvertone floor-model radio, a similar Philco, a set of BSR MacDonald headphones, and a Boston Red Sox transistor radio shaped like a can of California Acrylic House Paint.

It used to be that microcomputer users were different. In the early days, when the IBM PC was but a gleam in Armonk's great red eye, users displayed a ferocious chauvinism for their systems. Commodore, Heath, Apple, Atari, and Radio Shack people were as righteous about their computers as sports fans are about their home teams.

Of all the groups of computer owners, the TRS-80 people were the most loyal. The computers were ugly, the DOS intolerable, the manufacturer graceless. But that was all right, because TRS-80 people loved adversity and the challenge of making the computer do tricks the Shack said it wasn't meant to do. They relied on each other to find out what they needed to know.

The zealotry could become overbearing at times. I always thought that giving a computer a pet name or referring to it as "she" was a bit annoying. And I never understood readers who wrote to claim without qualification that their I's, IIIs, and CoCos were easily



equal to or better than the then-new IBM PC. Loyalty was one thing; lunatic raving was another.

But the spirit that such devotion engendered was what made computing fun. When you bought a TRS-80 you bought into a community that saw computing as part of its lifestyle. And while that community eventually became invisible to the rest of the computer world, it wielded a significant amount of power. Were it not for all those faithful customers staying with Tandy when everyone else was buying PCs, Apples, and Macintoshes, Tandy's computer line would not have survived into the late 1980s.

Regrettably, the halcyon days of idiosyncratic machines and their diehard devotees are nearly over. IBM's homogenizing effect has overwhelmed the market, forcing competitors to trade in their individualistic visions for more practical strategies. The quaint neighborhoods of the computing community are being replaced by high-rise apartments and tract housing projects.

Ironically, Tandy, with its legions of TRS-80 aficionados, was the first to get out the bulldozers. The Model 1000 signaled Tandy's ardent endorsement of IBM's scheme for urban redevelopment. The Model 4, once the staple of the line, teetered on the brink of extinction. Improvements to the system were few and largely cosmetic; support was kept to a minimum.

Tandy has done an admirable job of exploiting the PC's success and has ensured its future as a micro computer manufacturer. I wish, however, that Tandy had found a way to reestablish itself without sacrificing the old TRS-80 community. The I/III/4 neighborhoods look like a mill town without a mill: abandoned buildings, broken windows, buckling sidewalks. The excitement is gone, and with it a lot of the fun of being a TRS-80 user.

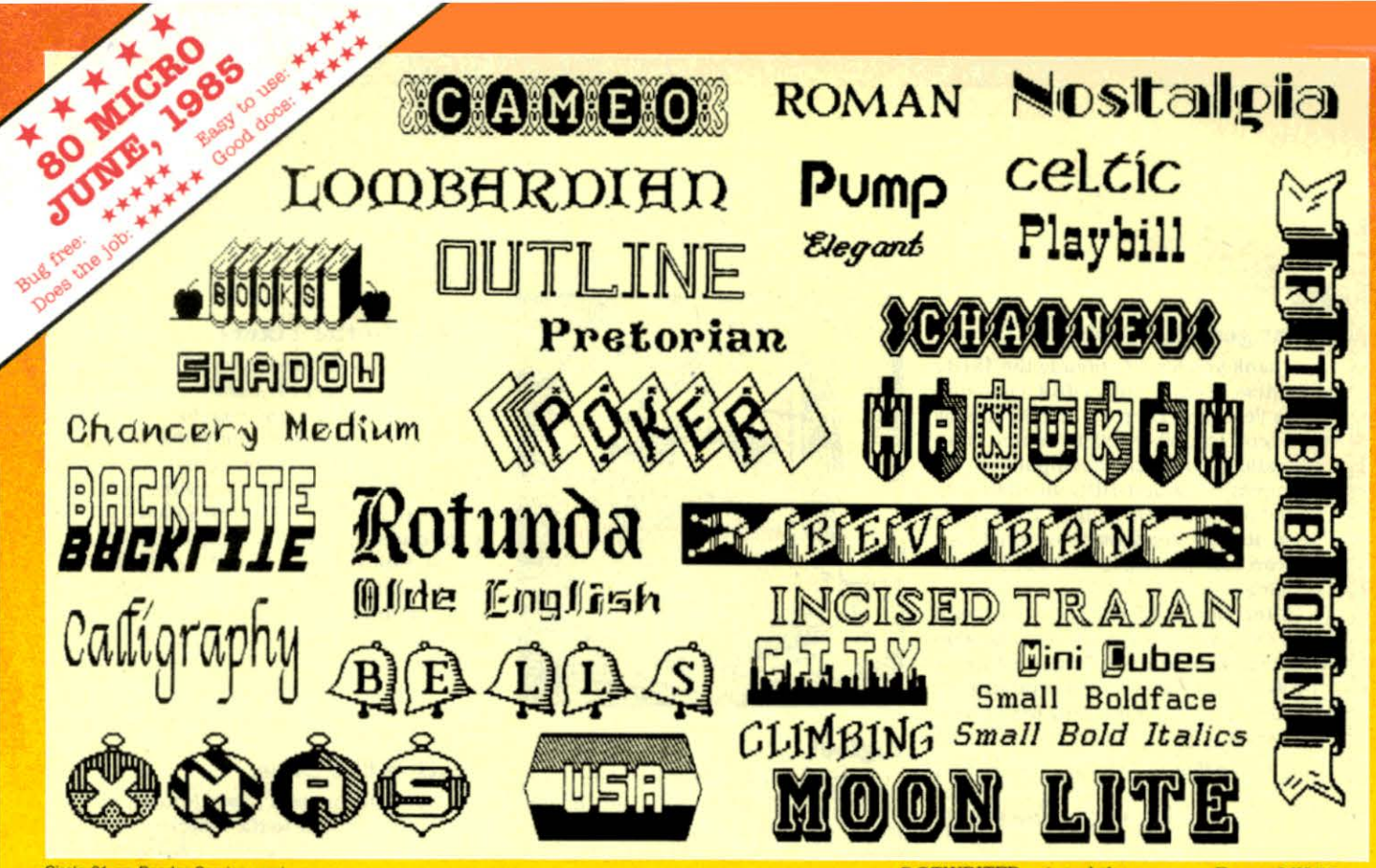
The other major computer manufacturers are now following Tandy's course. Commodore has its PC10-1 and PC10-2 clones and Atari a low-end MS-DOS machine. You can run IBM software on an Apple or Macintosh. It soon won't make much difference where you shop for a computer; if you want PC compatibility, you can have it.

Of course, what separates Atari, Commodore, Amiga, and Apple from Tandy is that they've held on to a piece of the old dream. Apple, Tandy's old nemesis, has fought particularly hard to maintain its identity as an alternative to IBM, with a fair amount of success. You've got to wonder why they could do it but Tandy couldn't. Does Apple have better computers than Tandy? Better marketing strategies? Or simply more guts? Whatever the reasons, I admire Apple's staying power. It'll be a sad day when the flag of PC compatibility flies alone over Cupertino.

The possibility exists that the Models 1000 SX and EX will stimulate the same kind of community that the TRS-80 did. Certainly many current 1000 owners are long-time Radio Shack customers. The number of people who own three or more Tandy or TRS-80 computers is remarkable. But the community can never be as large or as enthusiastic as it was. The more Tandy slavishly pursues PC compatibility, the more its customers' loyalties will dwindle. And soon people will buy Tandy equipment for the same reasons they buy any other piece of electronic gear: availability, price, a neighbor's recommendation.

So computers have become commodities and their users mere consumers. Ah, well, these are the prices we must pay if we are to reap the benefits of having a burgeoning, successful industry. It's a small price for companies such as Tandy whose concerns must be survival and profitability, but a large one for those who remember when being the owner of a Radio Shack computer was something a little special. ■

Photograph by Frank Cordelle



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Changes at T-BUG

Thank you for mentioning the Tandy Business Users Group (T-BUG) in January's Feedback Loop (p. 16). We are, as you reported, an excellent source of information about Tandy computers.

Inquiries about T-BUG should be directed to me c/o MEDX Inc., 1500 Hicks Road, Rolling Meadows, IL 60008. Readers can call me at 312-665-7215 in the evening.

After March 15 Roger Carlson will take over as president and membership chairman. Readers can write him at 1406 Colwyn Drive, Schaumburg, IL 60194. His telephone number is 312-843-1886.

Ellen D. Weinstein, President
T-BUG
Rolling Meadows,IL

Warning!

I purchased a Tandy 1000 in September 1985 and then, in January and February 1986, purchased an internal modem, memory board, and a mouse/calendar.

When I tried to operate the computer after installing the three boards, it locked up and would not reboot. My local Radio Shack was unable to fix the problem, but charged me $100 for trying. They then called Fort Worth and were told that the three boards could not be used simultaneously.

After I filed a complaint, Tandy wrote me a letter stating, "Our computers have several expansion and upgrade options available. We do not state, nor is it reasonable to expect, that they can all be used in the computer at the same time".

I urge future Tandy customers to pay close attention not only to what the company's ads say, but also to what they *don't* say.

James C. McCord
Fairbanks, AK

A Quick Question

I find that my Basic programs are easy to compile in Quickbasic, but I would like to know more the language. Is there any chance that *80 Micro* will publish a Quickbasic tutorial?

Darrell Sherrin
Kelowna, BC

We are planning a tutorial on Quickbasic for an upcoming issue.—Eds.

Bigfoot

Ever since I first saw a picture of the 1000 EX, I've wondered about the odd placement of its disk drive. I have never used the machine, but it seems that having the opening on the side precludes the possibility of placing anything to the immediate right of the computer. The actual footprint of the 1000 EX is, then, considerably larger than its stated dimensions.

The 1000 SX, on the other hand, appears to be such a promising machine that I should be kicking myself in the pants for having bought a 1000A in 1986. Do you know if Tandy will come up with a replacement motherboard kit to update my machine?

Yoe Itokawa
Birmingham, AL

We haven't heard of any such upgrade from Tandy.—Eds.

A Sweeping Complaint

Why couldn't we foreigners participate in the *80 Micro* Sweepstakes? Many of us are good and faithful customers.

Fernando Convers
Bogota, Colombia

Unfortunately, Fernando, we could not extend eligibility for the Sweepstakes to foreign readers because of federal customs laws. It was not a policy decision by us.—Eds.

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

Unfair to the Fixers

Mark D. Goodwin's review of Profix IV and Proaid 4+ in your January 1987 issue (p. 38) does a disservice to two excellent programs and might dissuade Profile 4 users from buying them.

The Small Computer Co., which created Profile 4, neglected to follow up with Forms-, Lookup-, or Profix-type programs. Profix IV and Proaid 4+ fill the gap admirably and are, I feel, necessary in order to use the power of Profile to the fullest. These fine programs deserve four stars.

Charles Harris, MD
Toms River, NJ

Beating the Bugs

In conjunction with Lewis Rosenfelder's excellent article in the October 1986 issue ("The Complete Guide to Basic Debugging," p. 34), I want share some of my infamous Basic bugs.

Entering the following line:

```
10 TOTAL=0
```

results in a syntax error because TO is a reserved word in Basic.

If your program includes

```
100 FOR I=1 TO N:IF X(I)<0 THEN X(I)=0:NEXT I
```

watch out. The program will only work if all X(I)s are less than zero.

I also don't like to include many IF P%<0 THEN PRINT P%:STOP statements. I prefer to add GOSUB 1000 as follows:

```
1000 IF P%<0 THEN PRINT ...
1010 IF INKEY$=" " THEN 1010 ELSE
     RETURN
```

It is quicker to enter GOSUB 1000 than a longer statement and quicker to hit the space bar than to enter CONT.

Jacques Weill
Veigne, France

Pros and Cons

I want to comment on Mr. Herbst's letter in the December 1986 issue (p. 10) concerning the relative merits of Superscripsit and Scripsit Pro. I purchased my Model 4 because of Superscripsit's ability to prepare complex documents. I found problems with the block-action commands; composing files from pieces of others was very slow. Because of these problems and Terry Kepner's review

Illustration by Anthony Russo

(September 1986, p. 27), I bought Scripsit Pro.

Scripsit Pro did improve block action, and its system of windows lets you build new files quickly. Some of the features Mr. Kepner mentioned, such as column creation, are actually transferred unchanged from Superscripsit. Mr. Kepner neglected to mention that Scripsit Pro uses space more efficiently than Superscripsit does.

The greater efficiency (a full Superscripsit disk becomes two-thirds of Scripsit Pro disk) is made possible by Scripsit Pro's module system. (Mr. Herbst's statement that you must name the successive modules is incorrect—conversion programs do that for you.) Since a module can contain 32K of memory space and one side of a disk can contain up to six modules (in fact it will not contain more than four after a conversion), you should not have any naming problems.

When you are creating new text, you can set up a system of file naming (such as Book/An, where n can run from zero–99) that can link as much text as you can possibly produce. The system of modules also allows you to scan text much faster in Scripsit Pro than you could in Superscripsit.

Unfortunately, if you are scanning backwards with the up-arrow-P command and come to the beginning of the module, the keyboard locks and you must reset your computer to unlock it. When you do this you lose all of your unsaved text. You can, of course, recover it with the Rescue utility.

Other bugs in Pro Scripsit include problems deleting text with F2, disappearance of the cursor on the tab line when you turn off the view mode, and trouble with the block-action print command.

Saul Moskowitz
Marblehead, MA

A Step Beyond

Apparently the primary intention of Hardin Brothers' The Next Step column in the November 1986 issue (p. 94) was to illustrate some of the more sophisticated abilities of Misosys's Pro-Create and MRAS assemblers by creating a Model 4 command-line editor. He did this expertly, accomplishing nearly 80 percent of the assembly with a set of conditional macros. His listing is neat and finely crafted.

Mr. Brothers did, however, use just over eight sectors (2,080 bytes) for an intrinsically simple job. I was sure that the job could be done with less code by avoiding the complex macros. My editor includes insert and delete functions, as Hardin suggested, as well as a few extra goodies, and is under 1,000 bytes long. I did leave out the screen display; including it adds fewer than 500 bytes.

In Model 4 file structure 1,536 bytes is one granule. If you go over that figure, you use two granules. Since the editor is intended to be a SYS13/SYS file, it must go on the boot disk where granule space is scarce.

There is usually a trade-off when you use highly structured programming techniques. A program can be beautifully logical at the language level, but the object code can waste a lot of space. This is a serious consideration in view of the the Z80's 64K addressable memory limit and 180K of disk space.

Many thanks to Mr. Brothers. If I had not played around with his program and gotten mad, I never would have written my own. I suspect that getting folks going was just what Hardin had in mind!

James Hawes
New Orleans, LA

I strongly object to Bruce Tonkin's ridiculous contention that Basic is superior to Pascal in all respects.

Pro Bruce

Bruce Tonkin's assessment of the relative merits of Basic, C, and Pascal seems right on the money to me (Art of Programming, January 1987, p. 96). Bruce focused on languages for MS-DOS computers, however. I want to point out an alternative to his Microsoft Quickbasic compiler for the Model I/III/4 crowd.

The ZBasic 3.0 compiler is reasonably priced and first-rate. With ZBasic and a little knowledge of assembly language you can compile just about any program you can conceive of.

I bought Alcor C, and after years of study, am still trying to figure out how to accomplish tasks that are simple in Basic. Alcor C's cmd files are, if anything, larger than Basic's.

Pat Anderson
Fall City, WA

Pro Pascal

In Bruce Tonkin's January The Art of Programming column (p. 96), he stated that "Basic is clearly superior" to Pascal and C regarding data types. Mr. Tonkin either chose to ignore the strongest point in favor of Pascal or else is ignorant of the rich variety of data types available in the language.

There is more to data types than internal string storage. Mr. Tonkin did not mention record types, pointer types, sets, user-defined types, or any of the other types alien to Basic. A programmer can create and manipulate stacks, queues, linked lists, binary search trees, and other data structures in Basic, but not as easily or efficiently as with pointers in Pascal or C. Readers should not be dissuaded from trying Pascal or any other language by Mr. Tonkin's article.

Don Gray
Dalton, GA

Language wars are silly, and as I tell my students, the best language is probably the one that you know best (unless a specific programming situation warrants a change). Each language has its strengths and weaknesses.

I have no quarrel with Bruce Tonkin's preference for Basic. I do, however, strongly object to his ridiculous contention that Basic is superior to Pascal in all respects. He raises only two valid objections to Pascal. The first is that the semicolon as a statement-separator is annoying, and the second is the lack of double-precision reals in some applications of Turbo Pascal. He ignores many of Pascal's strengths, including its consistent syntax, ability to self-document, powerful data-structure possiblities, and overall efficiency.

Joel R. Villa
Worcester, MA

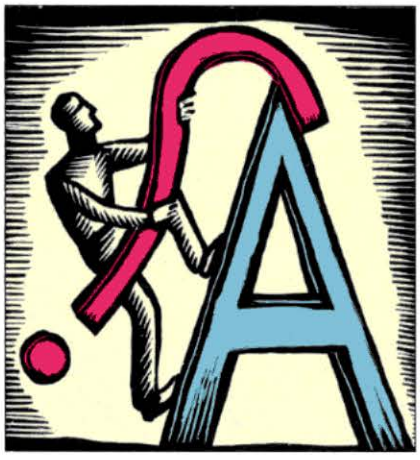
I am one of those readers who would welcome more information in your magazine about CP/M. I am mostly interested in Turbo Pascal, which John B. Harrell III introduced me to in the November 1986 issue ("A Language of Choice," p. 40). It has advantages such as portability between 8-bit CP/M and 16-bit MS-DOS.

I read Bruce Tonkin's The Art of Programming column in the December issue (p. 106). Mr. Tonkin cleary prefers Basic, while Mr. Harrell appears to be quite a Turbo Pascal buff. The diversity of opinion among your writers helps me determine what best fits my needs.

Frank Billington
Saint John, NB

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

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



Wanted: Hi-Res Software

Q. I have Microlab's Graphyx Solution for the Model 4P. I'm interested in buying the software and documentation that comes with Radio Shack's high-resolution graphics board. I'd like to obtain the BasicG and the Fortran subroutine library along with the documentation. *(John Dehalian, Mt. Clemens, MI)*

A. Radio Shack doesn't sell the software without the high-resolution board. You might find someone who will sell you his or hers, though.

Better Text Display

Q. I'd like to improve the resolution of my Model 4's monitor for displaying text. Are there any products on the market that might help? *(Mark Roeder, Sioux City, IA)*

A. Your choices are limited. You can buy a different CRT tube, such as the amber phospher ones sold by Langely-St. Clair Instrumentation Systems (132 W. 24th St., New York, NY 10011, 800-221-7070). Many people prefer the amber CRTs, saying they are easier on the eyes. Getting one might help enough.

Or you can buy a high-resolution graphics board. However, software for the board is limited; you can't run word-processing programs such as Scripsit with it.

Bar-Code Label Woes

Q. I have a Model 4 with 64K, two disk drives, and a DMP 200 printer. I am looking for software that will let me print bar-code labels in accordance with the MIL-STD-1189A and MIL-STD-129J standards. *(Stan Kistner, Hilliard, OH)*

A. We published a tutorial on bar codes, along with a program to print labels for the Model III, in our October 1984 issue ("Fine Lines," by Davey S. Thornton, p. 45). It covered Code 128 and Tandy-code. I'm not familiar with the MIL-STD codes, but you might be able to change the program to suit your needs.

The Need for Backups

Q. I am considering purchasing a Tandy 1000 SX system, but I live in Mexico and the electrical supply here is erratic. I plan to power the computer through a voltage regulator and use spike and interference filters, but knowing the power will fail at some time, I worry about my software disappearing from my disks or showing up with all sorts of errors.

Most MS-DOS software is copy-protected, and a 500-mile trip to the Texas border and spending several days replacing damaged software would be most expensive. Are there any programs available that will back up protected software? *(Robert W. Bruggemeyer, Zacatecas, Mexico)*

A. You seem to be taking all the right precautions in terms of protecting your computer. However, most MS-DOS software isn't copy-protected any more, and you can make multiple backups for your own use (and protection).

For the programs that are copy-protected, Copy II PC (Central Point Software, 9700 SW Capitol Highway, Suite 100, Portland, OR 97219, 503-244-5782; $39.95) helps you make archival backups of protected software. Just remember to have backups available for all your data and programs, and you should weather your electrical problems in fine shape.

4P Cassette Port

Q. Is there any way to add a cassette port to my Model 4P? Also, are there any add-on boards that would let me run MS-DOS on my computer? *(Mark Hershberger, El Dorado, AR)*

A. I don't know of anyone who has installed a cassette port in a Model 4P. While there have been a few attempts to make MS-DOS add-on boards for Model 4's, they didn't work particularly well, and the companies that made them have gone out of business. It would be cheaper to buy an MS-DOS computer.

The CM-5 That Wouldn't

Q. I just purchased a new Tandy 1000 SX and have noticed two things that I suspect are problems. First, an area in the left center of the video screen (on the CM-5 monitor) has a different color than the rest of the screen, especially when I run game programs or colored text. Using the MS-DOS command Colormap shows the difference clearly. Could this be a defect in the tube's phosphor?

Second, I hear a very high-pitched tone whenever the video is being accessed. It is frequent and annoying. I'd appreciate any help. *(Gary Spielman)*

A. Run (do not walk) to the store where you bought your computer and monitor. It looks like you received a bad monitor. Have them check out the high-pitched tone also. It shouldn't make that sound.

Mod 4 Upgrade for the 1000

Q. Is anyone developing a Model 4 emulator board for the Tandy 1000? I am interested in upgrading, but I would like to have the best of both worlds. *(Gene McCormack, Lynn Haven, FL)*

A. I've heard that a couple of companies might be attempting such a board, but nothing definite yet. Once we hear something, we'll let our readers know. Watch New Products for such information.

Printer Driver for the BGAP

Q. I bought the Business Graphics Analysis Program (BGAP) for my Model III four years ago. Later, I bought a DMP 2100 printer but couldn't use it with the BGAP because a driver wasn't available (according to the local Radio Shack store).

I've tried unsuccessfully to get a driver for my printer (as well as for the CGP 220 color printer) through the stores in San Juan and Mayaguez. Several months ago, I wrote to Radio Shack's main office in Texas but received no response. Are these drivers available, and if so, how do I obtain them? *(Adolfo Perez-Comas, Mayaguez, PR)*

A. You have version 1 of BGAP. Upgrade to version 2, which has the drivers for the DMP 2100 and the CGP 220. The

Illustration by Anthony Russo

Circle 282 on Reader Service card.

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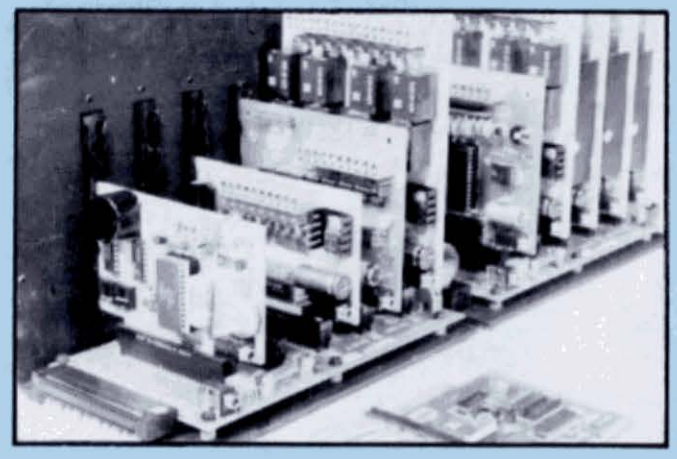

An A-BUS system with two Motherboards
A-BUS adapter (IBM) in foreground

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

About the A-BUS:

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

Relay Card — RE-140: $129

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

Reed Relay Card — RE-156: $99

Same features as above, but uses 8 Reed Relays to switch low level signals (20mA max). Use as a channel selector, solid state relay driver, etc.

Analog Input Card — AD-142: $129

Eight analog inputs. 0 to +5V range can be expanded to 100V by adding a resistor. 8 bit resolution (20mV). Conversion time 120us. Perfect to measure voltage, temperature, light levels, pressure, etc. Very easy to use.

12 Bit A/D Converter — AN-146: $139

This analog to digital converter is accurate to .025%. Input range is −4V to +4V. Resolution: 1 millivolt. The on board amplifier boosts signals up to 50 times to read microvolts. Conversion time is 130ms. Ideal for thermocouple, strain gauge, etc. 1 channel. (Expand to 8 channels using the RE-156 card)

Digital Input Card — IN-141: $59

The eight inputs are optically isolated, so it's safe and easy to connect any "on/off" devices, such as switches, thermostats, alarm loops, etc. to your computer. To read the eight inputs, simply use BASIC INP (or PEEK).

24 Line TTL I/O — DG-148: $65

Connect 24 input or output signals (switches or any TTL device) to your computer. The card can be set for: input, latched output, strobed output, strobed input, and/or bidirectional strobed I/O. Uses the 8255A chip.

Clock with Alarm — CL-144: $89

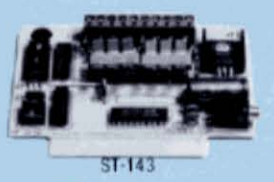
Powerful clock/calendar with: battery backup for Time, Date and Alarm setting (time and date); built in alarm relay, led and buzzer; timing to 1/100 second. Easy to use decimal format. Lithium battery included.

Touch Tone® Decoder — PH-145: $79

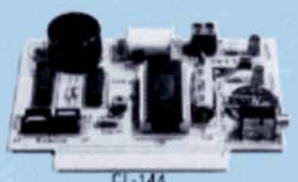
Each tone is converted into a number which is stored on the board. Simply read the number with INP or POKE. Use for remote control projects, etc.

A-BUS Prototyping Card — PR-152: $15

3½ by 4½ in. with power and ground bus. Fits up to 10 I.C.s

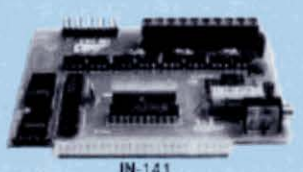


ST-143

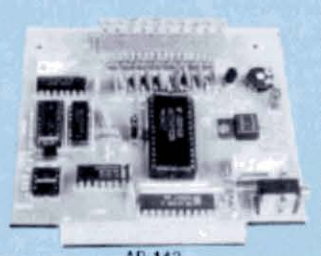


CL-144

RE-140



IN-141



AD-142

Smart Stepper Controller — SC-149: $299

World's finest stepper controller. On board microprocessor controls 4 motors simultaneously. Incredibly, it accepts plain English commands like "Move arm 10.2 inches left". Many complex sequences can be defined as "macros" and stored in the on board memory. For each axis, you can control: coordinate (relative or absolute), ramping, speed, step type (half, full, wave), scale factor, units, holding power, etc. Many inputs: 8 limit & "wait until" switches, panic button, etc. On the fly reporting of position, speed, etc. On board drivers (350mA) for small steppers (MO-103). Send for SC-149 flyer.

Remote Control Keypad Option — RC-121: $49
To control the 4 motors directly, and "teach" sequences of motions.

Power Driver Board Option — PD-123: $89
Boost controller drive to 5 amps per phase. For two motors (eight drivers).

Breakout Board Option — BB-122: $19
For easy connection of 2 motors. 3 ft. cable ends with screw terminal board.

Stepper Motor Driver — ST-143: $79

Stepper motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with them. Each card drives two stepper motors (12V, bidirectional, 4 phase, 350mA per phase).

Special Package: 2 motors (MO-103) + ST-143: **PA-181: $99**

Stepper Motors — MO-103: $15 or 4 for $39

Pancake type, 2⅛" dia, ⅛" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

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Apple II, II+, IIe. Uses any slot.	AR-134...$49
TRS-80 Model 102, 200. Plugs into 40 pin "system bus".	AR-136...$69
Model 100. Uses 40 pin socket. (Socket is duplicated on adapter).	AR-135...$69
TRS-80 Mod 3,4,4 D. Fits 50 pin bus. (With hard disk, use Y-cable)	AR-132...$49
TRS-80 Model 4 P. Includes extra cable. (50 pin bus is recessed).	AR-137...$62
TRS-80 Model I. Plugs into 40 pin I/O bus on KB or E/I.	AR-131...$39
Color Computers (Tandy). Fits RDM slot. Multipak, or Y-cable.	AR-138...$49

A-BUS Cable (3 ft, 50 cond.) — CA-163: $24

Connects the A-BUS adapter to one A-BUS card or to first Motherboard.

Special cable for two A-BUS cards: CA-162: $34

A-BUS Motherboard — MB-120: $99

Each Motherboard holds five A-BUS cards. A sixth connector allows a second Motherboard to be added to the first (with connecting cable CA-161; $12). Up to five Motherboards can be joined this way to a single A-BUS adapter. Sturdy aluminum frame and card guides included.

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Program Listing. Demo for high-intensity colors on the Tandy 1000.

```
1000 CLS:SCREEN 0                                                    '*  1037
1010 FOR BACKGROUND=0 TO 7                                           '*  1616
1020 COLOR 0,BACKGROUND:LOCATE ,15                                   '*  2146
1030 PRINT"Background =";BACKGROUND;   ' NO BLINK                    '*  2664
1040 NEXT BACKGROUND                                                 '*  1316
1050 FOR BACKGROUND=0 TO 7                                           '*  1620
1060 COLOR 16,BACKGROUND:LOCATE, 15                                  '*  2205
1070 PRINT"Background=";BACKGROUND;     ' BLINK                      '*  2636
1080 NEXT BACKGROUND                                                 '*  1320
1090 COLOR 3,0                                                       '*   792
1100 LOCATE 20,20:PRINT"1  HIGH INTENSITY BACKGROUND"                '*  3373
1110 LOCATE 21,20:PRINT"2  BLINK (NORMAL) MODE"                      '*  2840
1120 LOCATE 22,20:PRINT"3  QUIT DEMO"                                '*  2228
1130 A$="":WHILE A$="":A$=INKEY$:WEND                                '*  2156
1140 IF A$="1" THEN OUT &H3D8,9 :GOTO 1130  'RESET BIT 5             '*  2349
1150 IF A$="2" THEN OUT &H3D8,41:GOTO 1130  'SET BIT 5               '*  2363
1160 OUT &H3D8,41                           'NORMALIZE FOR EXIT      '*   942
```

End

it's not possible to specify a background color value higher than 7 with the Color statement. While this is true, you can display background colors above 7 by resetting bit 5 of port 3D8H, which controls the blink attribute.

With bit 5 set, foreground color values greater than 15 produce blinking characters. However, resetting bit 5 disables blinking, and foreground values greater than 15 set the background to high intensity. The Program Listing demonstrates this effect.

Make It Perfectly Clear

David Goben of Mansfield Center, CT, sent the following complaint/suggestion, "Several readers, myself included, respond to other's problems published in Feedback Loop with patches to programs, such as the Superscripsit patch by Robert B. Ormsley of Newhall, CA (January 1987, p. 18).

"The problem is that this patch already exists on the Model 4's Superscripsit version 1.01.01, but in a different disk location, and Ormsley's patch is incompatible with it, because other patch code exists where he intends his patch.

"What version was Ormsley's patch for? Is it compatible with other patches? There have been two Radio Shack updates since then, creating versions 1.01.02 and 1.01.03, and it isn't compatible with them.

"When things like this occur in columns like Feedback Loop, they can hinder rather than help those who do not enjoy performing exploratory surgery on their programs. Once a patch is installed, that should be the last the user should have to worry about it.

"As a way around such problems, I suggest that anyone who has a question or a solution to submit to Feedback Loop include the following information: the proper program name, its version number, and the computer it is operating on. Also include any non-standard system configuration (which, in some cases, can be the cause of a problem or why a particular solution works)."

I agree with David wholeheartedly! Let me add a few more items to include: the DOS version you are using, your telephone number (not for publication, unless you request it), and a stamped, self-addressed envelope.

Help for PC-2 Users

Tim Worcester's December 1986 request for a technical reference manual for the Radio Shack PC-2 pocket computer prompted several responses. Sharp manufactured the PC-2 for Radio Shack, and the machine is functionally identical to the Sharp PC-1500, which has a complete reference manual available. Send $15 and a request for the *PC-1500 Technical Reference Manual* to Sharp Electronics Corp., Sharp Plaza, Mahwah, NJ 07430, Attn: Product Literature, Box DD.

Sharp also offers peripherals for the PC-2 and PC-1500: an RS-232 module ($239), a cassette interface and printer/plotter combination ($259), an 8K RAM chip ($119), a 16K RAM chip ($179), and a mathematics ROM chip ($65). Thanks to Frank Billington of St. John, New Brunswick (Canada); N. Wenri of Great Falls, VA; and Jim Dawkins of Caldwell, TX.

Jeffery S. Foy of Puget Sound Computer, Programming Service, 14509-8th N.E., Seattle, WA 98155, says he has written a 700-page manual for the PC-2. Send him $75 for a source-code listing, the manual, and a brochure describing other PC-2 products.

Jeff Shoaf of Winston-Salem, NC, says back issues of Radio Shack's publication, *TRS-80 Microcomputer News*, also contain information on the PC-2. They ran a series of articles on assembly language for the PC-2 that spanned several issues in 1983 and 1984.

Radio Shack has put the issues for each year in book form and sells the bound editions for $9.95 each. Order copies (catalog no. 26-2241) through any Radio Shack store or Computer Center. Specify the year.

Gate-Array Update

I thank Will Ramsey Jr. of Gainesville, FL, for correcting my answer in the January 1986 (p. 14) issue concerning a gate-array 64K to 128K RAM upgrade for the Model 4. Mercedes regrets any confusion the incorrect information might have caused our readers. Here is the correct procedure for that upgrade:

In addition to plugging the eight RAM chips into sockets U67–U74, use a low-power (25–35-watt) soldering iron to disconnect the jumper wire connected to the lower lead of capacitor C39 and resolder it to pin 16 of chip U33. Don't attempt this upgrade unless you know how to use a soldering iron.

SEEKING HELP

Help Wanted

►Roger Desai (97 Stratton St. South, Piscataway, NJ 08854) wants to know how to get graphics on a Tandy DMP 200 printer using an IBM PC.

►Tom Jerrard, RR #2, Erin, Ontario N0B 1T 0, would like to know if anyone in the Toronto area can repair non-standard Radio Shack computers.

►George C. Lysy, 2120 E. Orangehill Ave., Palm Harbor, FL 33563, is running a program using Newdos/80 2.0, on an LNW-80 Model I (a TRS-80 Model I clone) with a Percom Doubler. His program uses the Z80 Halt instruction to cause the system to reboot after a one- or two-hour period of inactivity from a disk drive.

When he runs the program on a single-density Newdos/80 system disk, the program reboots with no problem and the DOS Boot command works properly. When he runs the program on a Newdos/80 double-density system disk (boot sector #0 is single-density), the system freezes as soon as it executes a Z80 Halt instuction or Newdos/80 Boot command.

When George presses the reset switch (two keys labeled RST on the keyboard) to initiate a hardware reset, the system boots up with no problem. Does anyone have any advice?

►Stan Kilmer, 6088 SW 2nd, Laverne, OK 73848, is looking for a printer driver to use with the Formation program on his Model 4 with a Citizen MSP-25 printer (an Epson FX work-alike.)

►William Engelhardt, 2243 Rumble Road, Modesto, CA 95350, is looking for two programs: Paharo, by RDS Software, and AIT Lisp, by Artificial Intelligence Tech.

►Nancy McKown, 1587 Oak Drive, Allegan, MI 49010, is looking for a tractor drive for her DWP 210 printer, Radio Shack catalog no. 26-1443.■

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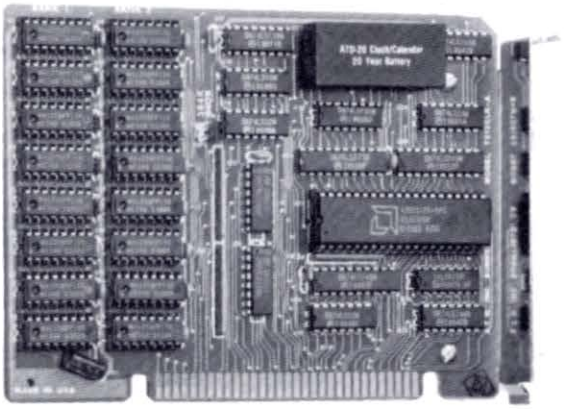

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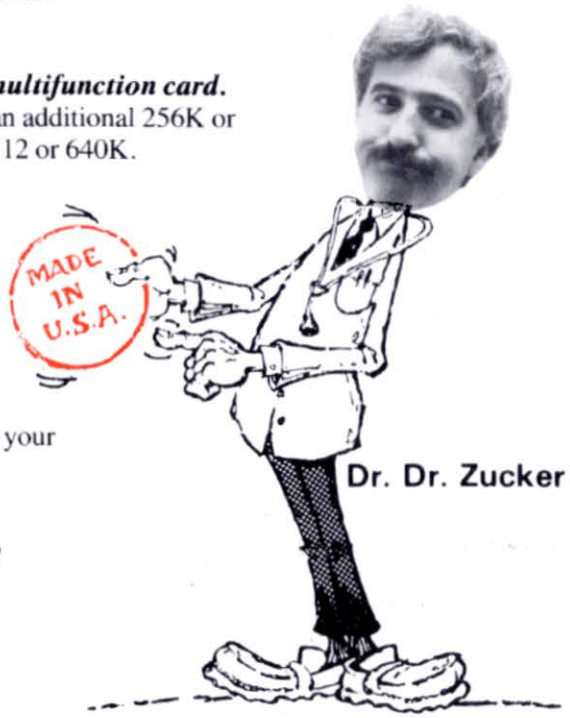

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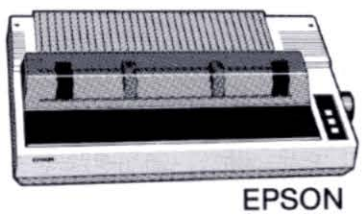

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	FX 286e		595.00
	LX 86		225.00
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	3000 HD	(25-4010)	2528.00
	3000 HL	(25-4070)	1178.00
TANDY Printers	DMP 130	(26-1280)	258.00
	DMP 430	(26-1277)	528.00
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Tandy's Green Christmas

Tandyland

Photo. Tandy worked overtime filling 1000 SX orders.

Christmas 1986 was, in many ways, a repeat of the previous one, as Tandy racked up impressive Tandy 1000 sales and then promptly lowered prices on several machines during the new year.

Holiday business was "great . . . exceptionally good. . .better than last year," said Ed Juge, Tandy's director of marketing information. Company officials wouldn't give out numbers to show just how exceptionally better "great" was, except to say that fourth-quarter computer sales exceeded the previous year's 32-percent jump.

Juge said Tandy came close to a complete sellout of the 1000 EX and that the 1000 SX was back-ordered for up to six weeks. Tandy assigned extra production shifts and moved up parts originally scheduled for April to meet the demand.

If all that excitement wasn't enough, the price of Tandy's stock jumped 49 percent between September and January, and the *New York Times* noted "the 1000 SX has reaffirmed Tandy's status as a durable contender in the personal computer business."

Barely a week after Tandy had enticed consumers into buying an SX or EX by throwing in a monitor for free came news of significantly lower prices for three of its machines. Both the SX and the EX dropped $200 as of Jan. 1 (to $999 and $599, respectively) while the less-than-compatible Tandy 2000 might as well have had a "buy one, get one free" sign on it. The 2000, which was introduced in late 1983 at $2,750, plummeted to $699 during a January-only sale.

Tandy Chairman John Roach says he wants his company to remain a price/performance leader, according to Juge, who added, "now that we have our learning curve under control, we can look at cost-reducing the product." Nearly the same thing happened a year earlier, when lower production costs for the original 1000 translated into several price cuts.

The price reductions came a month after IBM lowered the dealer price of the PC XT by 42 percent. At the same time, rumors were rampant that IBM was planning to introduce a "clone-buster" 8086-based PC sometime in 1987.

Down to the PX for an SX. . .Starting last fall, military personnel with a hankering for hacking could find Tandy computers sharing the aisles with bread and cigarettes at the PX (post exchange) on base. The new Tandy 1000 models joined Apples, Amigas, and Zeniths in the limited line of microcomputers being sold in 100 Army and Air Force PXes and 35 Navy and Marine BXes (base exchanges). Good news for Tandy: Its discounted machines appeared to be comfortably outselling the competition.

According to *Micro Marketworld*, an Air Force PX buyer said "the post exchanges have been able to sell every 1000 SX they can get their hands on and are selling the EX almost as fast." Competitive pricing must have been a factor, as Tandy offered its we'll-throw-in-the-monitor Christmas deal for less than what the general public paid: $1,049 for the SX and $699 for the EX.

Tandy sold 667,500 computers in the U.S. last year, if statistics from International Data Corp., a Framingham, MA, market-research firm, are correct. John Roach agreed last spring to supply select research groups with sales figures broken down by operating system after the *Wall Street Journal* and *Business Week* botched articles mentioning Tandy's competitors (see the Figure).

Tandy's proprietary systems (TRS-80s, Color Computers, Model 16s, and Xenix-based machines) collectively accounted for 41.3 percent of the total, with 276,000 units sold. Close behind were MS-DOS computers (40.7 percent; 272,000 units) followed by pocket computers and portables (17.9 percent; 119,500 units).

Since Tandy officials refuse to say what the numbers mean, it's up to the rest of us to decipher them. Not surprising is the fact that about 58 percent of the computers were sold in the fourth quarter alone. Although Tandy's sales figures were already gaining momentum, such strong fourth-quarter sales can be partly attributed to the Christmas rush and to corporations meeting year-end buying deadlines.

MS-DOS machines outsold those in the other two categories for the first three quarters of the year, further testimony to the importance of IBM compatibles in Tandy's marketing strategy. The Tandy proprietary machines were the biggest fourth-quarter sellers, however, which was probably the result of strong demand for the new CoCo 3 and marked-down CoCo 2 as holiday gifts.

Tandy doesn't attach dollar amounts to these numbers, but you don't have to be an economist to figure out that the company rakes in far more dough from its line of compatibles than it does from the inexpensive CoCos.

If you want to buy a CM-10 color monitor for your 1000 SX, you might

Photograph supplied by Tandy Corp.

have wondered why the CM-11 started showing up instead in Radio Shack catalogs and stores. Did Tandy sneak in an upgrade while no one was looking?

Sort of. Juge said that, after buying the first order of CM-10s from a third-party manufacturer, Tandy decided to improve the radio-frequency interference (RFI) shielding by modifying the cases on the next batch of CM-10s. No one (the Federal Communications Commission included) made Tandy change the monitors, according to Juge. It is Tandy's policy to assign new model numbers to modified products.

Update

Fans of Microsoft's Quickbasic 2.0—and there appear to be many of them among serious programmers—shouldn't worry about being able to use the compiled language with the Tandy 1000, SX, and EX keyboard. Microsoft will introduce a Quickbasic update for 1000 owners in the near future, according to John Jenkins, Tandy account manager for the Redmond, WA, based software company. Jenkins wouldn't say when the product would be released, but confirmed that it would be sometime this year.

At least one user complained to Microsoft with a list of keystrokes that don't work in Quickbasic 2.0, along with problems in using the Screen command. Function keys 11 and 12 send the 1000 into an infinite Inkey$ loop, requiring rebooting; control-break doesn't work in the Quickbasic editor; the insert key doesn't do anything; and you must use the numeric keypad for arrow keys. In addition, the Screen 7, 8, 9, and 10 commands won't work with an EGA (enhanced-graphics adapter) card.

David Frager, product manager for the 1000 line, attributed the problems to Microsoft's failure to support the computer's keyboard "enhancements," a situation that Jenkins said will change with the update. Further, the video incompatibilities arise, Frager said, probably because Quickbasic doesn't support some extensions of the 1000's color-graphics adapter (CGA).

Many alternative keystrokes for IBM-compatible programs are already documented in a driver program called KEYCNVRT.SYS that comes with every Tandy 1000, Frager said. In addition, a Readme.DOC file in Quickbasic explains the alternative cursor keys.

Micro Trends

Connectivity, compatibility, and portability are three slogans that all point to the same goal: getting the inhabitants of Babel to speak a common language. With that goal in mind, a Palo Alto, CA, software company is working on a "portable" version of MS-DOS in C language that will "permit DOS and DOS software to be as portable across computer architectures as are Unix and Unix software."

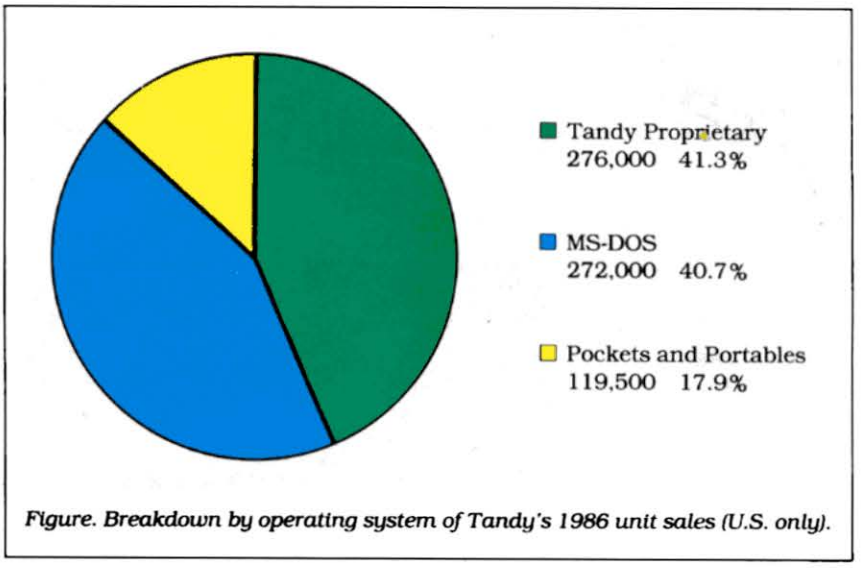

Figure. Breakdown by operating system of Tandy's 1986 unit sales (U.S. only).

Hunter Systems has joined forces with Motorola and several hardware and software developers to come up with a high-level "XDOS Standard" that would let users run recompiled PC- and MS-DOS software. Colin Hunter, president of Hunter Systems, said he hoped to demonstrate the product before spring.

"All the software vendors, even the ones that write in high-level languages, have written their own assembly-language interface to DOS, the BIOS, and the video RAM," Hunter said. "Moving their code to another architecture, even one with an implementation of DOS, would involve much more than simply recompiling their C code—it would mean rewriting all the low-level routines and then maintaining another parallel version of their products."

Hunter's original plan was to supply makers of non-Intel-based hardware with customized compilers and encourage them to adopt the XDOS standard. But a better alternative presented itself: giving users a means of converting existing programs to run with XDOS.

A major advantage of this approach is that it lets you use advanced features of newer processors, such as Intel's 80386, with old programs. "It frees a lot of PC-DOS software from the rigid constraints of IBM PCs," Hunter said.

Look for more CD-ROM products to be introduced in 1987. Production standards for the laser-based technology were established early last year, but manufacturers were slow to develop microcomputer applications, partly because they feared CD-ROM would become obsolete before it had a chance to mature. Now it appears the market is ready to grow.

CD-ROM (compact disc, read-only memory) is a data-storage technique that replaces floppies with the same kind of shiny plastic discs used in digital recording. Current CDs can hold 550 megabytes of data, compared with 360K on most floppies. In CD-ROM, data can be read from but not written to disc, a limitation that has led to the invention of even more sophisticated devices. WORM (write-once, read-many) allows just what its name implies, while CD-I (compact disc/interactive) mixes audio and video with text. Many hardware and software developers are so intrigued by CD-I that they are no longer so sure CD-ROM is worth risking millions of dollars in development costs.

Regardless of which system wins out, companies have started bringing CD-ROM applications to the marketplace. Late last year, Microsoft announced MS-DOS extensions that will support CD-ROM drives, and this year several companies are making full- and half-height drives that could start appearing in newer PCs. Grolier Inc. has put all 20 volumes of its *Academic American Encyclopedia* on a disc. Financial, medical, legal, and other information-intensive services are now offering large libraries on CD.

Some analysts think CD-I and CD-ROM represent the next major advances in microcomputing because they put high-volume data retrieval and interactive video within easy reach of the home and business user. The "glamor" applications may be a couple of years away, but you will likely be able to buy an affordable CD-ROM drive and your first monster disc before the year is out.■

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5 - Display directory (PC or TRS-80™)
6 - Exit

Shown above is the Main Menu displayed when running TRSCROSS on your PC or compatible.

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DOS formats listed above flagged with * signify that earlier versions of these DOS's are readable as well, but one or more sectors may be skipped due to a format problem in that version of the DOS. One or more sectors may also be skipped on NewDOS/80 formats. (Disks that were formatted with SUPER UTILITY + or SU4/4P do not, and have never had this problem.) TRSDOS 6.02.01, or higher should not have this problem. Disks formatted in any 80 track format, any single density or mixed density (Model I "boot" disks) are not supported.

TRSCROSS requires: PC or compatible computer, 128K and a normal 360KB (40 track drive) PC drive. Double-sided operation is fully supported. If you have more than one disk drive, fixed drive, or RAM disk, operation will be much smoother. TANDY 1000 requires extra memory card because of the required DMA chip that resides there. TANDY 3000 is supported as long as you have a 360KB drive to use for transferring, rather than the hi-density drive. TANDY 2000 is not supported at this time due to a difference in disk controller and floppy drives. TANDY 1200 is OK. "Special" data files like PROFILE +™ would need to be converted to ASCII on a TRS-80 first before they would be of any use on a PC or compatible.

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MS-DOS 3.2 Bug

When I bought a 10-megabyte hard drive for my Tandy 1000, I upgraded to MS-DOS 3.2 from 2.11 (I originally had MS-DOS 2.10). When I tried load programs under MS-DOS 3.2 that had run fine under 2.11, I got the error message "File allocation table damaged." This happened no matter what drive I used. A friend had the same problem with his 1000 SX.

I rebooted the computer with MS-DOS 2.11 and all my disks loaded and ran normally.

On further investigation, I found that once I got the error message, every disk I tried to load thereafter would give the same message. I had to reboot to clear the condition. I also found that the trouble disks had not been formatted under either MS-DOS 2.11 or 3.2.

To solve the problem, I first formatted a couple of disks under MS-DOS 3.2. I then booted the computer with MS-DOS 2.11. Next, I put a 3.2-formatted disk in drive B and put a troubled disk in drive A. I then used the wildcard prompt, *.*, to copy all files from drive A to drive B. The resulting disk was readable by either MS-DOS 2.11 or 3.2.

Using Diskcopy to transfer files doesn't work. You must use the COPY*.* command.

Roy A. Cartier
Winchester, VA

Too Much Protection

TRSDOS 6.x Disk Basic's Save command has an option that protects the file from prying eyes: SAVE"file name",P. Unfortunately, if you lose the original, unprotected file, you must retype or re-create the file.

When you save a file normally, the value of the first byte is FF hexadecimal (hex); the program follows it exactly as it was stored in memory. When you use the P option, the value of the first byte is FE hex, and the rest of the file is saved on disk in encrypted form. This prevents anyone from listing it from Basic.

Type in and run the Program Listing under Disk Basic 1.01.00 or later. It creates a file called Decode/CMD, which can recover an encrypted program.

To use Decode/CMD, enter Basic and load the target encrypted file. Then return to DOS via the System command and enter DECODE filespec, where the filespec is an unused file name with the BAS extension, since the file will become an unencoded Basic file.

When the TRSDOS Ready prompt returns, enter Basic and load the newly created file.

David Goben
Mansfield Center, CT

Program Listing. Basic code that creates Decode/CMD.

```
10 CLEAR:OPEN"O",1,"DECODE/CMD":RESTORE          '*  2489
20 READ A$:IF A$="END" THEN CLOSE 1:END          '*  2320
30 PRINT#1,CHR$(VAL(A$));:GOTO 20                '*  1963
40 DATA 1,81,0,48,17,79,48,62,78,239             '*  1849
50 DATA 40,9,246,192,79,62,26,239,62,21          '*  1993
60 DATA 239,33,111,48,6,0,62,59,239,40           '*  1933
70 DATA 243,62,58,239,32,232,33,72,128,54        '*  2088
80 DATA 255,229,35,126,35,182,40,7,43,126        '*  2086
90 DATA 35,102,111,24,244,35,193,237,66,197      '*  2187
100 DATA 227,193,197,78,35,62,4,239,32,198       '*  2152
110 DATA 193,11,120,177,32,242,62,60,239,32      '*  2167
120 DATA 187,24,191,2,2,0,48,END                 '*  1689
```

Foolproof Forms

The following patches let you set the Model 4 forms filter, Forms/FLT, to the requirements of your printer and paper size:

PATCH FORMS/FLT.FILTER (D02,7C = xx 00 yy:F02,7C = 42 00 42)
PATCH FORMS/FLT.FILTER (D02,84 = zz:F02,84 = 00)

The xx is the page length, yy is the lines per page, and zz is the number of characters. Calculate these values in hex.

Alternatively, you can build a FIX file to do the job:

BUILD FORM/FIX
D02,7C = 42 00 42 00 00 00 00 04 00
F02,7C = xx 00 yy 00 00 00 00 04 zz

Press the break key to save the file and then type:

PATCH FORMS/FLT.FILTER USING FORM/FIX

Rene Verbruggen
Ranst, Belgium

The Invisible File

Debbie Cooper's file-protection utility for the Tandy 1000 from the August 1986 issue ("File Safe," p. 74) is great, but I've found a better way.

Her program appends a CHR$(255) to the last byte of the file name to create the password. This is invisible to the user, but not the computer. You can do the same task using the alternate key and the numeric keypad.

Use the Rename command to add the invisible character, CHR$(255), to the end of the file name by holding down the alternate key and pressing 255 on the keypad. A CHR$(255) is sent to the screen when you release the alternate key. For example:

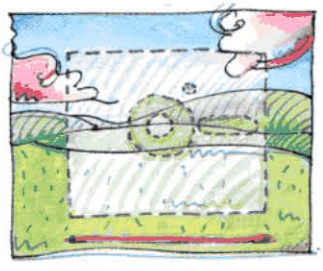
A> RENAME SAMPLE.DOC SAMPLE.DOalternate-2-5-5

You can remove the invisible character by renaming it back to the original filespec. Access invisible files by using the visible name and a CHR$(255). For instance:

A> TYPE SAMPLE.DOalternate-2-5-5

With this technique, you can access protected files using most DOS commands. You can use a different CHR$; check an ASCII chart for other unprintable characters. Be sure that you keep track of the characters that you use.

Jack E. McCoy
Texarkana, TX



Lining Up with Allwrite

You don't have to see underlining on your screen to make effective use of it with Allwrite on the Model 4. You can use control words to set print-time tabs.

It is easy to draw lines between tabs by turning underlining on at one end and off at the other. The line length is limited only by your printer, not by how you set your screen width.

I have used the control words ;SE, ;AR, and ;IF to make music manuscript paper. (By the way, the ;IF statement does work as Allwrite's manual says, but not as the example on p. 273 shows. In that example, the line ;IF 4>9 should have been ;IF @@4>9.) I call the file Clefrite, and I numbered the lines for easy reference. Omit the line numbers when entering the file:

```
1 ;PI10
2 ;LM9;LL76;LI12
3 ;SE1=5
4 ;LB staff
5 ;TB +2,66
6 +@$ +@%
7 ;AR 1 -1
8 ;IF @@1>0
9 ;AP clefrite:2,staff
10 ;IF
11 ;SK5
12 ;SE1=5
13 ;AP clefrite:2,staff
```

The first line sets pitch, which really isn't important. Line 2 sets the left margin, maximum line length, and line spacing. I had to set the left margin at nine and the first tab at two to get underlining to start at 10. Tabbing at position 1 doesn't work (printing normally begins there, so tabbing isn't necessary).

Line 3 sets variable 1 to five. Line 5 sets tabs at positions 2 and 66. Line 6 turns underlining on at the first tab and off at the second. The tab setting at 66 causes the line to stop at position 65, the result being a six-and-a-half-inch line drawn across the page, 1 inch in from the left edge of the paper.

Line 7 decrements variable 1 by one. Line 8 appends the file to itself beginning at the label "staff" if variable 1 is greater than zero. I couldn't use the ;GO LABEL statement because the test follows the label in this case and ;GO only searches forward.

Line 9 puts the file on a Memdisk, drive 2, to minimize drive wear. After five lines are drawn, the routine skips five lines (line 11), resets variable 1 to five (line 12), and begins the process again. Don't leave this running unattended, as it is an endless loop. You can specify at run time how many pages you want with the ;PGn,n statement. For example, ;PG1,4 gives you four pages of manuscript paper.

You can put this technique to use in other ways. For example, you can create blank address labels with underlining.

Patrick A. Gainer
Tanner, WV

More on Memdisk, Part I

I found Don Coffin's Memdos/JCL file (January 1987, p. 69) to be very useful, but I have a faster way to load it.

I format a disk with the command FORMAT :1 (D=1) to locate the directory on cylinder 1. I then do a mirror-image backup of the Memdisk to the physical disk.

Each time I use Memdos, I just create the Memdisk and do a mirror-image backup of the physical disk to it using the following JCL file:

```
SYSTEM (DRIVE=2,DRIVER="MEMDISK")
D
D
Y
BACKUP :1 :2
Y
SYSTEM (SYSTEM=2)
```

I removed password protection from my disk using the patch:

```
PATCH SYS2/SYS.LSIDOS (D02,33=18:F02,33=00)
```

Doug Hayworth
Birmingham, AL

(Ed. note: Thanks also to Jim Shepherd of Winnemucca, NV, for submitting a similar idea.)

More on Memdisk, Part II

Richard Kunc said in the January 1987 Reader Forum (Superscripsit + Memdisk = Fast, p. 25) that you cannot place all of Superscripsit in Memdisk due to space limitations. I've put Superscripsit (except for Move/CTL, which seems to work best on a data disk) and two printer drivers on Memdisk with 13.5K to spare. The following JCL file, Memstart, does the trick (The Figure shows drive 2's directory after executing Memstart):

```
BUILD MEMSTART/JCL
SYSTEM (DRIVE=2,DRIVER="MEMDISK")
D
D
Y
BACKUP SCR$/CTL:0 :2
BACKUP SCRIPSIT/CMD:0 :2
COPY DMP105/CTL:0 :2
COPY DWP210/CTL:0 :2
```

See Steve Woicik's "Storage to Spare" (June 1985, p. 54).

Don Coffin's "Set Drive Zero Free" (*80 Micro*, January 1987, p. 69) left out one piece of information that could get the new Memdisk user into trouble. If you have created a configuration file using Sysgen, particularly if it is a large one enabling outside drives, KSM/FLT, Forms, and so on, it will overload Memdisk. To avoid moving configuration files to Memdisk, use the wildcard backup:

```
BACKUP SYS$$/SYS:0 :2
```

This puts all 13 system files into Memdisk.

Tom Trigg
Fort Riley, KS

```
Drive :2 MEMDISK   14 Cyl, DDEN, Free = 13.50K /  63.00K, Date 08-Dec-86
BOOT.SYS SIP    DIR/SYS SIP     DMP105/CTL      DWP210/CTL
SCR16/CTL       SCR17/CTL       SCR18/CTL       SCR19/CTL
SCR32/CTL       SCR33/CTL       SCR35/CTL       SCR38/CTL
SCR50/CTL       SCRIPSIT/CMD    SCRIPSIT/CTL
```

Figure. Drive 2 directory after executing Memstart.

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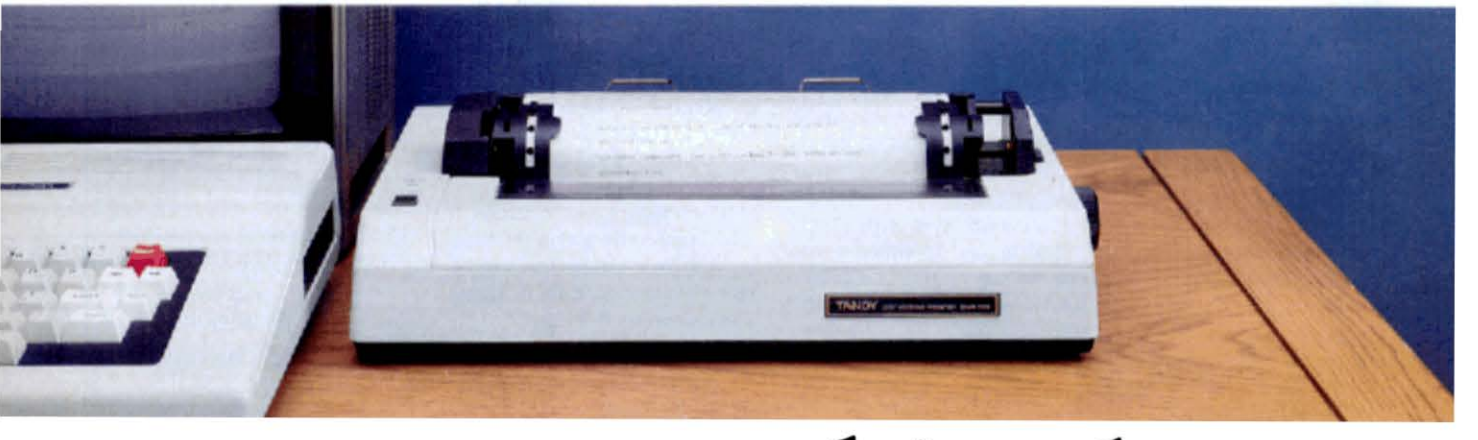

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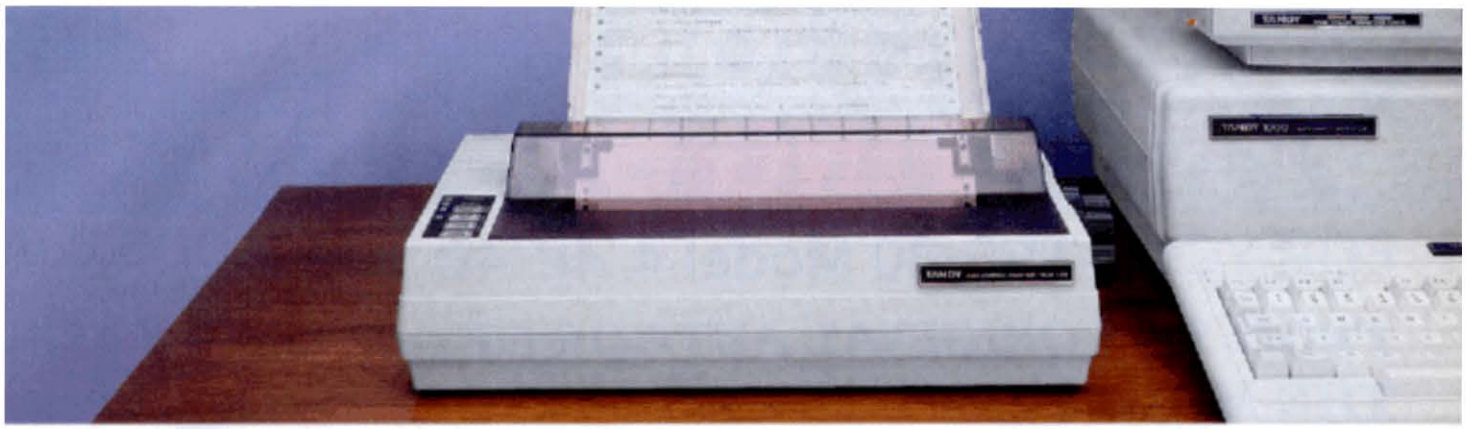

Tandy printer.

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The DMP 430 (26-1277, $699.00) is a dot-matrix printer with an 18-wire print head that delivers superior correspondence fonts in a single pass. Prints 10, 12, or 16.7 cpi, plus elongated, standard, elite and condensed. You can also get micro, italic and double-high fonts. Prints original, plus two copies at 180 characters per second. IBM PC compatible.

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- **Upward compatible with TRSDOS 6.x versions.**
- **Expanded date range, 1980 through 1999.**
- **Files now have a modification Time Stamp as well as a date.**
- **The directory display shows file dates and times.**
- **New SVCs for screen print and decimal display.**
- **All new, easy to use full screen ASCII text editor.**
- **Conversion program for pre-6.3 version disks adds new time/date information.**
- **Automatic date/time conversion when copying from TRSDOS 6.x to version 6.3.**
- **One pass format and disk duplication program.**
- **Variable and line number cross reference utility for BASIC programs.**
- **Many "user requested" changes/additions/enhancements have been made.**
- **Several changes to increase "user friendliness."**
- **Many enhancements to BASIC:**

— including —

- *Line copy and block move with automatic line reference renumbering.*
- *Search and display variable, line numbers, and keywords.*
- *Selective block renumbering.*
- *High speed load and save.*
- *Direct access to DOS SVCs.*
- *List next or previous line(s) with a single keystroke.*
- *Single letter abbreviations for Auto, Delete, Edit, and List.*

HURRY!
TRSDOS 6.2x DATE HANDLING WILL END DEC. 31st, 1987

A documentation update describes all new features and utilities, and contains technical information changes and additions.

Since this is an update to TRSDOS 6.2, all customers are expected to have purchased or received and have in their possession a legitimate copy of the TRSDOS 6.x DOS and documentation.

To provide support only to legitimate owners, all LS-DOS 6.3 master disks contain an individually encoded customer service ID and serial number. This entitles customers to support directly from LSI.

Ordering information:

To save COD, handling and shipping charges, send a check or money order for **$39.95** to:

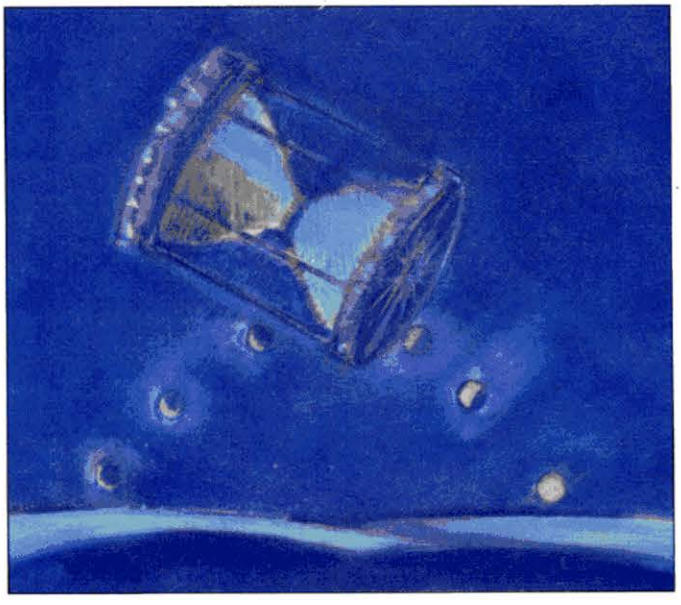
Logical Systems, Inc.
PO Box 55235
Grand Junction, CO 81505

Credit card and COD orders call: **(303) 243-7070**

Mastercard and Visa cards are accepted. Credit card and COD orders are **$44.95**, including shipping and handling. No COD orders accepted outside the United States. No purchase orders or on account orders will be accepted. Orders will be shipped post paid inside the U.S. Canada and Mexico please add **$5.00** for airmail shipping. All other foreign orders, please add **$10.00** for air postal shipping. All funds must be in U.S. dollars. Allow 2-4 weeks for delivery. LS-DOS is available for American keyboards only. Not available for French or German keyboards.

LOGICAL SYSTEMS INC.

Beyond 1987



by Hardin Brothers

★★★★

LS-DOS 6.3 runs on the Model 4/4P/4D and requires one disk drive. Logical Systems Inc., P.O. Box 55235, Grand Junction, CO 81505. 303-243-7070. $29.95.

Most Model 4 users have experimented with their computers enough to discover a disturbing fact: The date prompt that appears whenever they boot TRSDOS 6 will not accept any date past Dec. 31, 1987. This limitation is not caused by a conspiracy at Radio Shack to make the Model 4 obsolete by the end of this year. Rather, it is a result of the way in which the date was stored in the disk directory when the first versions of TRSDOS for the Model I were written.

LS-DOS 6.3 is an upgrade to TRSDOS 6 that extends the date command, and the possible dates of disk files, to December 31, 1999. If it only added extended dates, LS-DOS 6.3 would be little more than a series of patches. However, Logical Systems has created a major upgrade of the Model 4 operating system—one that is worth far more than its modest selling price. I'll discuss some of the enhancements in this version of the Model 4 operating system.

All files have a modification time stamp as well as a date stamp. At first, this might seem like an annoyance, since you are asked to enter the time as well as the date when you boot up the computer. However, with the time stamp you can tell which of several versions of a program or data file you've created or modified most recently. Also, some useful programming tools might become available either commercially or in this magazine that make use of the time stamp for each file.

A convert utility can change any TRSDOS 6 data or system disk to the LS-DOS 6.3 time and date format. You can use older disks in their unconverted form, but even new files on them will not have a time stamp until you run the convert program.

A disk-copy program makes an exact copy of any 5-inch, double-density, floppy disk in a single pass. You no longer have to run Format and Backup separately if you want to copy an entire disk.

A text editor, Ted/CMD, includes full-screen cursor movement, forward and backward paging, search and replace, block movements and block-delete functions, and insert and overstrike modes. This is not a full-featured word processor, but it is a vast improvement over the TRSDOS Build command for creating JCL files, patch files, and the like. It is useful for some kinds of programming, as well.

Additions to Basic

LS-DOS 6.3 also has many new additions to Basic. Essentially, LSI has added their Beep extension package to the Basic supplied with TRSDOS 6.2 and 6.2.1. Included are single-letter synonyms for Auto, List, Edit, and Delete; a renumbering utility that can work on a block of lines in the middle of a program; a line-copy command; a block-move command that moves a group of lines to a new location in a program; a command to find all references to a line, variable, or keyword; a command to search for such references and display the lines containing them one at a time; a command that gives Basic programs full access to the operating system supervisory calls (SVCs); and greatly enhanced Load and Save speeds for tokenized files.

A cross-reference utility for Basic runs from LS-DOS Ready and produces a complete cross-reference of all variables or line references in a Basic program.

Two new SVCs are included for programmers. @HEXD is similar to the existing @HEXDEC SVC but doesn't require a full 5-byte buffer to receive the ASCII value of a binary number. @VDPRNT performs a screen print without requiring that you press control-asterisk (*).

The Star Ratings

80 Micro's star ratings reflect our reviewer's impression of a product. The stars mean:

★★★★★ Superior
★★★★ Excellent
★★★ Good
★★ Fair
★ Poor

Manual Update

The 16-page manual is meant as an addendum to the TRSDOS 6.2 manual. To save on publication costs, LSI assumes that you already have the 6.2 manual (and technical manual, if you are interested in using the SVCs). The LS-DOS 6.3 documentation clearly explains disk upgrading, the text editor, enhancements to Basic, the cross-reference utility, and the new SVCs.

A new library command, ID, displays a unique identification number that will be registered for each purchaser of LS-DOS 6.3. Logical Systems will provide support to everyone, but will use the identification number to make sure they don't have to give support to those who steal a copy.

LS-DOS 6.3 has some trade-offs that you might dislike. The most important

Illustration by Eric Fowler

might be that files will no longer have both a user and an owner password. If you rely heavily on TRSDOS's system of dual passwords, you will have to find a new way of working.

Also, although this new DOS can work with disks created with older forms of TRSDOS, the reverse is not true. Once you create a disk with or convert it to LS-DOS 6.3, the new time and date stamp replaces the user password. If you then try to use the disk with TRSDOS, the time stamp will be interpreted as a password and you might be unable to gain access to any files.

If you use a Basic enhancement package other than Beep on your Model 4, you might not want to give up the commands you already know for the new commands in this Basic. However, you don't need to change versions of Basic—you should be able to use your present version of Basic without any problem under LS-DOS 6.3.

It is easy to install this new operating system on your present floppies.

The text editor, Ted, is adequate but not great. For example, it doesn't have any way to distinguish between multiple marked blocks during block-move operations, nor can it print a file. If you want a printout of something you've created with Ted, you must first save the file, then return to LS-DOS ready, and finally send the file to your printer with the List command.

Overall, however, this is an excellent package. The documentation is clear, and it is easy to install this new operating system on your present floppies and on a hard disk. You will not have to reformat your hard disk but merely copy new system files onto it. If your Model 4 is useful to you, you don't have to discard it in favor of a newer computer, and LS-DOS 6.3 should keep it working productively for you until the end of this century.

Don't look for LS-DOS 6.3 in your local Radio Shack store or Computer Center. Logical Systems has no plans to sell it through Radio Shack or even via the Express Order Software program. Instead, you'll have to order it directly from LSI, and you will probably feel that you got more than your money's worth. ■

Checking Out the Library

by John B. Harrell III

★★★★★

Wordperfect Library version 1.0 requires two disk drives (a hard drive preferred) with 384K of RAM running DOS 2.1 or later. It supports Lotus/Intel/Microsoft expanded memory. Wordperfect Corp., 288 W. Center, Orem, UT 84057. 801-225-5000. $149.

I have been using Wordperfect's word processor for years and marveled over each upgrade, wondering how it could possibly get any better. Although this extraordinary word processor satisfies most of my needs, I always wanted a few desktop tools as well, such as a calculator, calendar, and so on. You could resort to Sidekick or some other memory-resident utility to accomplish these tasks, but now Wordperfect Corp. also has an answer in its Library.

Inside the Library

Library is a collection of utilities specifically designed to run with the Wordperfect word processor and Mathplan spreadsheet. These utilities consist of a menu shell, calendar, calculator, file manager, macro editor, program editor, notebook, and game.

The shell is a menu for simple, quick access to programs. But it also integrates the Wordperfect package and a "clipboard" for transferring data between applications. The shell comes preinstalled for a standard configuration of all your Wordperfect software. All you do is change each entry to reflect your system. Simply push a key; type the program name, default directory, and a few other parameters; and exit.

Once you install the shell, you can execute any application from the shell menu by pressing a key. You can interrupt Wordperfect and leave it resident while you return to the shell to perform other tasks. It takes only 29K of memory and lets you switch rapidly between any applications.

Applications

Calc is a powerful calculator with memory storage that also writes a "tape" of each mathematical entry. You actually get five calculators in one: a basic four-function calculator plus percentages, a programmer's calculator with Boolean math functions, a scientific calculator with the most popular transcendental functions, a financial assistant, and a statistical analyst.

You can enter numbers in decimal, hexadecimal, octal, and binary. Calc can display real numbers with a precision of zero to 8 fractional digits or in scientific notation. Displays include commas for easy reading with the European mode of using decimals as an option.

You can save the tape to a disk file or to the shell clipboard for later use or print it out as a permanent record of your transactions. You can also save individual results on the clipboard and later place them in your word-processing documents.

No desktop utility is complete without a calendar, and Wordperfect Library has a fine one. Like Sidekick's calendar, the Library screen displays the current month with one day highlighted and can contain additional indicators for items pertinent to that day (memos, a to-do list, or appointments). Calendar automatically displays them when it highlights each day. On the other side of the screen is a list that you can switch from a to-do list to an appointment schedule. The to-do list is prioritized. The appointment schedule lets you format your day any way you like. You can enter an entire day's appointment outline schedule with a single keystroke. The to-do items and appointments can be longer than one line of text (up to 255 characters).

A small resident part of the calendar schedules alarms for the day's appointments and rings the alarm a preset number of minutes prior to the appointment. You can also schedule ending times for each appointment, and Calendar automatically tracks the appointment block and highlights conflicting appointments.

File Manager displays two columns of files down the screen with two status lines at the top depicting the subdirectory and wild-card path, subdirectory size, and free disk space. A simple command menu is at the bottom of the screen, and files are in alphabetical order with the file size and last modification date. You can select the starting directory and sort options with simple command-line parameters.

File Manager performs all the normal file-manipulation functions, such as copying, renaming, and deleting. You can also manipulate blocks of files for copying, deletion, and encryption. File Manager searches the disk for files matching a wild-card pattern or containing a certain word pattern. You can also "lock" a file by encrypting it.

File Manager lets you select files by wild-card pattern. You can also select files that you revised before, after, or on a particular date. You can sort files by name, extension, or time and date.

One of the most useful programs in the Library is the Notebook. Notebook is a simple list manager that will organize your addresses and phone numbers. It is powerful enough to perform several other tasks. If you have a modem, you can also use Notebook to dial your phone.

Notebook integrates exceptionally well with Wordperfect. The data records are stored as Wordperfect secondary merge files and can be used as direct input for merge-printing letters and envelopes. Once you set up the fields using Notebook, you can read the file with Wordperfect and format the display screen for each record by using the word processor's sophisticated line-draw functions.

That leaves the editors—the Program Editor and the Macro Editor. One of the most annoying aspects of Wordperfect is the inability to change a macro definition. If you make a mistake keying it in, you either attempt to correct the error by more strokes or reenter the entire macro.

Macro Editor reads your macro definition and displays it in the familiar Wordperfect format. It highlights special key functions and displays regular keystrokes in normal intensity. Macro Editor recognizes macros for itself, the word processor, the program editor, Mathplan, and the shell, and uses the special key definitions pertinent to each application package.

Program Editor also provides the familiar Wordperfect interface for writing programs or text files. This is a powerful text editor that incorporates most of Wordperfect's best features storing ASCII text files without special control characters. You can also specify an auto-indentation mode for writing structured code.

The most important feature of this powerful collection is the feeling of uniformity. Each application maintains a high degree of keystroke compatibility with the others. You do not have to learn a completely different set of function keys for each product (including Mathplan).

Library comes in a standard IBM-style binder and contains a sample introduction, reference section, and index for each utility in Library. The manual is well written and contains excellent illustrations. The only part of the manual that is disappointing is the discussion of setting up the modem under Notebook. I found it somewhat confusing and had to read it several times.

Conclusion

If you are using Wordperfect's word processor, Library makes the perfect companion. Library integrates the Wordperfect software packages and provides utilities that overshadow many on the market. I have little need for any other popular desktop utilities. What's more, the Library utilities do not continually fight over your hardware as do some of the others available.■

Split Image
by Harry Bee

★★★

Switch-It runs on the Models 1000/1200/3000 (256K) and requires one disk drive. Vusoft Inc., 248 Tower Road, Lincoln, MA 01773. 617-259-0686. $49.

Switch-It is a simple idea, nicely done. The memory-resident utility divides your computer's available memory into two partitions that you can treat, in a limited way, as two computers running independently.

The limit is that Switch-It does not run a second application in the background. Rather, while you work with a program in one partition, whatever you're running in the other remains suspended at the point you left it.

When you use Switch-It's default "hot key," or a key combination you establish, movement from one program (partition) to the other is virtually instantaneous.

With the operating system and other memory-resident programs installed, dividing 640K RAM about in half will give you two partitions of less than 300K each, enough to run two ordinary applications.

Split Memory

I found it more effective to allocate less memory to the secondary partition in order to give a heftier program the room to operate efficiently in the primary.

The smallest partition you can establish is 64K, but you can't run many applications in such tight quarters. Most require 128K, minimum.

The first time you enter the secondary partition, Switch-It looks for and runs a file called AUTOSW.BAT, just as DOS executes Autoexec.BAT on boot-up. You can use AUTOSW.BAT to set up a discrete environment in the secondary partition, an obviously useful component of which is a distinct prompt.

An auxiliary program takes the place of the hot key within batch files. Intended to let you automate Switch-It's initialization, the program also speeded up many other batch processes.

Documentation

If anything, Switch-It's documentation is overdone. Vusoft is so careful to explain concepts, issue caveats, provide solutions for potential problems, and suggest uses that they've buried the unadorned instructions you need to install and implement the program.

While the attention to detail is laudable, much of it is self-serving: It covers the wide variety of conditions under

which Switch-It might fail. More attention to organization would better serve the user. In fact, I had few real problems running under Switch-It.

Like many memory-resident utilities, this one wants you to load it last. Whether or not this is critical, whether Switch-It will peacefully coexist with other memory-resident programs the way you're used to positioning them, you discover by experimentation.

Likewise, you have to experiment to find out which of your applications work best in which partition and which won't work at all.

While more ambitious programs are available. . ., Switch-It keeps it simple.

As a minimum, you'll need to know how much memory your applications need to operate; the more you know about them, the quicker you'll reach a happy accommodation.

Those programs that bypass DOS to take direct control of hardware, especially the video display, stand the least chance of working with Switch-It. Where no compatibility exists, you can remove Switch-It without rebooting your system.

Other Uses

Although running two different programs is the most obvious use for Switch-It, the manual suggests others. For example, running the same program in both partitions let me compare the contents of files and transfer data between them more quickly than the program's native functions permitted.

What I found most consistently valuable, however, was to maintain a minimal secondary partition for direct access to DOS.

I encountered no conflicts using Switch-It this way, not even with programs running under interpreted Basic, and it answered such fundamental questions as "What do you do when you're ready to save data and you don't have a formatted disk?"

Conclusion

While more ambitious programs are available that depend on expanded memory and hard disks to maintain several applications simultaneously, Switch-It keeps it simple. The benefits of its simplicity are worth considering.■

Sideviews And Banners

by Jack Feldman

★★★½

Twist and Shout run on the Model 4 under CP/M and the Models 1000/1200/3000 under MS-DOS. They require one disk drive and a dot-matrix printer. Spectre Technologies Inc., 22459 Ventura Blvd., Suite E, Woodland Hills, CA 91364. 818-716-1655. $34.95.

Twist and Shout are two programs combined on one disk by someone who obviously has a sense of humor. The two programs are unrelated; Twist will print your spreadsheet files sideways, and Shout is a banner program. However, combining them allows an upbeat name for the package and use of the same printer driver for both programs.

The program disk comes in several formats: Kaypro, Osborne, and Morrow for CP/M, and MS-DOS. The Model 4 running CP/M can read all three CP/M formats. Inside the package I found a well-thought-out manual and two nice programs.

The manual is the clearest that I have read since the Multidos documentation. The explanations are easy to follow and cover every question you might have about how the programs operate. Updates are in the Read.me file. For those who always have questions, there are several ways to get help from the company. In addition to a hot line, Spectre also maintains electronic-mail numbers on Compuserve, The Source, and Easylink.

All that you need for installation is to find the name of the printer file that works with your printer and change the name of that file to "Printer." If you have MS-DOS, you must rename the appropriate Twist file for your version. If you don't find your printer, let Spectre know and the company will try to add your printer to the list. When you have installed the printer, you are ready to run Twist.

The program's author knows that users are an impatient lot, and the section for each program starts with instructions "For the Impatient User." You simply type TWIST followed by the ASCII file name of the spreadsheet file you wish to Twist, and off you go. However, if you want or need to change the defaults, entering TWIST brings you to a menu that lets you change and save the default options.

The menu displays the changeable parameters and invites you to choose one. The parameters include the size of the printout, tabs, margins, and some of the printer options. One option handles spreadsheets that divide their output

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PC-DeskMates, a powerful multi-function memory resident utility, is included so you can start using the Clone when you receive it. You get an alarm, clock, calculator, calendar, notepad, phone dialer, typewriter, and access to DOS level commands. The Clone also comes with Qmodem, the famous modem program which enables you to access the world of telecommunications. PC-Write, probably the best shareware word processor available, is also furnished. Your Clone comes ready to work for you.

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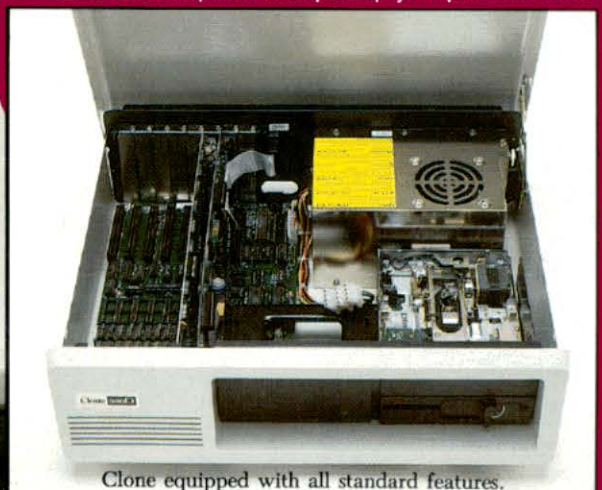

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US VS. THEM

FEATURES	CLONE	IBM PC/XT	TANDY 1000 EX (SX)	LEADING EDGE Model D
Microprocessor: Intel 8088 @ 4.77mHz	YES	YES	YES	YES
	8mHz Optional	NO	7.16mHz STD	NO
Power Supply Rating	150 WATT	63.5 WATT	54 WATT	130 WATT
IBM Standard Bus:	YES	YES	NO	YES
Operating System:	MS-DOS 3.2	EXTRA	MS-DOS 2.11 (3.2)	MS-DOS 3.1
Disk BASIC:	YES	IN ROM	YES	YES
MS-DOS and BASIC Ref. manuals:	YES	EXTRA	EXTRA	YES
Standard System RAM:	640K	256K	256K (384K)	512K
Cost to Expand RAM:	-0-	$$	$259 ($129)	$
Keyboard:	'AT' STYLE	STD	NON-STD	STD
Video Monitor: (composite)	INCLUDED	EXTRA	EXTRA	INCLUDED
Video Outputs:	BW/NTSC/RGB	EXTRA	NTSC, RGB	B/W, RGB
Disk Drive Capacity:	1-360K	1-360K	1-360K (2-360K)	2-360K
Max Number of Internal Drives:	4	4	1 (2)	2
Internal Expansion Slots:	8	5	1 (5)	4
Accepts Standard IBM Cards:	YES	YES	NO (10" Only)	YES
8087 Math Co-Processor Option:	YES	YES	NO (YES)	YES
Sturdy Steel Case:	YES	YES	PLASTIC	PLASTIC
Standard Parallel Ports:	1	0	1	1
Standard Joystick and Light Pen Ports:	YES	NO	J (J/LP)	NO
Standard Serial Ports:	2 (1 Optional)	0	0	1
Warranty	1 YEAR	90 DAYS	90 DAYS	15 MONTHS
Clock/Calendar	YES	NO	NO	YES
Cost Ready-to-Run	$699	$3,063	$1,398 + ($1,683 +)	$1,295
8mHz Option	$799			

Add $35 for ground delivery; $70 for air.

IBM XT cost figures*: Video Display Adapter $250; Video Display $275; IBM XT computer $2,145; Additional Ports, serial port, game port, parallel port, 640K RAM $308; DOS 3.2 and BASIC $85; Total $3,063. Does not include the battery back-up clock calendar. No light pen port.

Tandy 1000 cost figures*: DOS 2.11 and BASIC reference manuals $29 +; Memory Plus Expansion Board (to 384K) $129 +; 256K Additional RAM $129 +; One serial Port $79 +; Battery Back-up Clock Calendar $99 +; Composite Monochrome Monitor $129 +; Model 1000 EX Computer $799; Model 1000 SX Computer $1199; We were not able to equip the Tandy 1000 to directly compare with the Clone because of the 1000's inherent design limitations.

*The above prices are list prices as best we could determine. Both the IBM and Tandy are available at a discount.

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30mb 40ms Seagate Internal HD	699	HiRes Mono Monitor 720 x 348	110
80286 SpeedKit. Makes XT faster than AT	399	5339 Accounting Keyboard	89
300-1200 Internal Modem & Software	149	300 Watt Uninterruptable Power Supply	299

OUR GUARANTEE

Simply, if anything is wrong with your Clone or any of its peripherals, we'll fix it free for up to one year after you've received your Clone. You have probably read other manufacturers' warranties, and gotten confused, suspicious or even mad. You're probably skeptical about anything as simple and straightforward as our warranty. So here's the fine print.

You can void your warranty by failing to exercise normal care when hooking up or operating your Clone. Or trashing the guts with a hammer. Or running it over with something. Or burning it up.

You have thirty days after receipt of your Clone to see if you and it are going to be compatible. If you are not satisfied with your Clone for any reason within that time you may return it to us for a full refund, less shipping charges. Just don't write in the manuals or lose anything that was in the original container as it all has to be intact.

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Clone Clone™

into sheets for pasting. It takes a lot more effort to read the manual than to use the program. Once you are happy with the options, all you ever have to do is type Twist followed by a file name and you will have your sideways printout.

Shout requires more effort to get going. When you call the program, it presents you with a menu. The menu lets you choose print-head cooling, 8½- or 14½-inch-wide paper, double strike, quick output, and auto-centering. When you choose the quick output, the program asks you to choose to print the banner either using all asterisks or a single character. Otherwise, it automatically prints the banner character using its normal-size character. Automatic centering comes into play when you plan to have more than one line on your banner. You can have a banner with one large line or with four smaller lines (six on 14½-inch paper). It is unlikely that all the lines will have the same number of characters, so automatic centering centers each line in relation to the longest one.

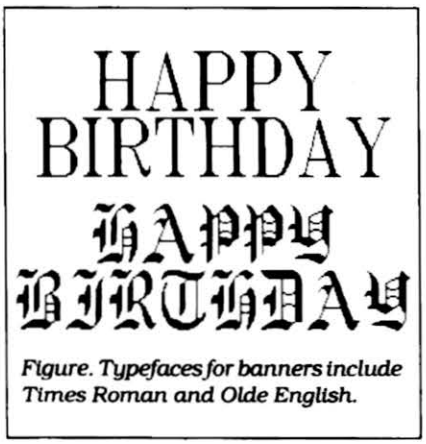


Figure. Typefaces for banners include Times Roman and Olde English.

Once you make these choices, you can get to the banner. You enter the information one line at a time and follow it with a choice of typeface: Times Roman, Olde English, or Sans Serif. (See Figure.) When you have entered the line as you wish it, the program shows it to you on the menu. At this point, you are ready to print your banner by selecting "P" on the menu.

Twist and Shout are two nice utilities. The manual is clear, and the programs are easy to use. Twist is foolproof. Shout takes a little more effort to use, since you have to go through several steps in order to set a line to print in the banner. The largest criticism I have is that the shape of the banner letters is rather crude, with curves done in blocks rather than in smoothly rounded shapes. It is the one mar in an otherwise nicely done banner program. However, I considered the banner program a pleasant extra in a low-cost package.■

Improve Your Computer Literacy

by David Engelhardt

★★★★

Guide to Training for IBM PC-DOS runs on the Tandy 1000 (128K) and requires at least one disk drive. Cdex Intellisance Corp., 1885 Lundy Ave., San Jose, CA 95131. 800-982-1213. $124.95.

★★½

Guide to Training for IBM Basic runs on the Tandy 1000 (128K) and requires at least one disk drive. Cdex Intellisance Corp. $99.95.

If you are just starting out with MS-DOS Basic or PC-DOS, you can understand your system without poring over dozens of arcane technical manuals. Try a disk-based training program. Cdex Intellisance provides many such training packages that let you learn at your own pace. Courses cover MS-DOS Basic, PC-DOS, Dbase III, and others. I reviewed the training courses for learning IBM PC-DOS and MS-DOS Basic using a Tandy 1000 computer.

Both courses provide the concepts needed to understand the subject along with lessons for hands-on experience. System requirements for both training courses are at least one disk drive and 128K bytes of memory.

Cdex wrote and distributes the PC-DOS training course. It consists of two lesson disks. Areas of instruction covered in this course are disk preparation and copying, tree-structured directories, use of a fixed-disk system, print options, the PC-DOS shell, advanced DOS commands, batch files, and the Sort and More filters.

This program starts by asking for coresidency installation, your name, and whether you have a color or monochrome monitor, manual or auto mode, and sound. Once you enter your name, the main menu containing all subject categories appears on the right side of the screen.

A unique and useful feature of this course is coresidency. It lets you switch back and forth instantly between the training course and DOS. You can learn about a feature or command, then switch back to DOS for hands-on experience.

Once satisfied, you can re-enter training with one keystroke. You must have a minimum of 192K of memory for this feature. Before installation, you are warned that it might conflict with other memory-resident programs.

As an option, you can set the program to auto-execute each screen without waiting for an input prompt. You can set this feature at start-up or anytime during the course. This is handy for quick review. The auto feature lets you set the time delay from 1 to 99 seconds.

During the course, the left side of the screen is reserved for the topic header and question/procedure prompt information for the specific subject being covered. As each topic starts, the session gives a short description of the last topic covered and what the current one is about.

Both courses provide the concepts to understand along with hands-on lessons.

Course feedback uses sound and color-display prompts, which I found pleasing. Each lesson provides many examples while prompting you for feedback to view the next screen or answer questions.

If you answer a question and make a mistake, the program informs you of your error and sometimes gives helpful hints. If you can't guess the correct answer after a few tries, the course selects it for you.

In most cases, an option bar or line at the bottom of the screen tells you the commands that are appropriate to the current screen.

Some of the option commands let you move backward to the previous screen or menu, move forward, and select auto/manual. This feature is helpful if you want to review the previous screen or start over with the same or a new subject.

The Guide to Training for IBM Basic was written by another firm but is distributed by Cdex. This training course contains three disks; two are lesson disks. The third disk contains sample programs, some of which are the same as those in the course.

The seven topics covered are variable usage, saving/loading programs, loop control, decision making, arrays, and disk-file control. An introduction topic covers the keyboard layout and key designations for an IBM PC. It's not exactly the same as a Tandy 1000 keyboard, but you can relate the information to your Tandy without much difficulty.

The course gets you involved in the

material by making you answer questions or having you press any key to move on to the next screen. All lessons prompt you to enter lines to create a program pertaining to the subject covered. Once you enter the program, the lesson runs it so you can see the actual results. The lesson also teaches you the use of the function keys for such commands as Run and List.

The course uses simple screen pictures throughout to help you understand the current subject along with related lesson material included in the manual. Some of the lessons in the manual contain helpful flowcharts.

Topics are divided between the two lesson disks. If appropriate, the course instructs you to insert the proper disk for the selected subject. To run the lesson on the other disk, you must select the same lesson number again. It should be unnecessary to make the same selection twice.

When the lesson instructs you to enter program lines, you must enter them exactly as shown throughout the course or an error results. The course insists that you enter the program line correctly before you can proceed.

I found this frustrating, since the course does not limit the number of errors you can make. You could conceivably make the same error forever.

Many of the prompted program lines contain a mixture of upper- and lowercase letters. This causes you to spend more time paying attention to what you're typing than to the lesson itself. One upper-/lowercase error in a line causes the lesson to make you reenter the line.

The training course is set to use a monochrome monitor; it comes out gray and white on a color one. I was disappointed by the lack of sound and color usage throughout the lessons. I also found that the installation procedures in the manual are out of date and do not apply to the program's current version.

The manuals for both courses were of good quality, short but to the point. They are mostly lesson aids, as they let you put to use the concepts covered on the computer.

I was satisfied with the PC-DOS course. It was exciting to use and incorporated good feedback to keep the topics interesting. The coresidency feature is a useful addition, and other training courses could benefit from this concept.

The Basic-training course was informative, slightly frustrating, and dull. Sound and color would enhance the program considerably.

I recommend these courses, since they contain information useful to start you on a selected subject. The Basic-training course, however, should be improved.■

End Run Around Dbase

by Richard Green

★★★★

VP-Info 1.09 runs on the Tandy 1000/1200/3000 and requires two disk drives. Paperback Software International, 2612 Eighth St., Berkeley, CA 94710. 415-644-2116. $99.95 (non-copy-protected disk, an additional $10 plus licensing agreement).

My first impression of VP-Info was that the program is simply a low-cost clone of Dbase II. This is not so. VP-Info, although it has a certain resemblance to Dbase, is a very different program. VP-Info has improved upon its Dbase beginnings by including a built-in report generator, program compiler, advanced commands, and the ability to generate pull-down windows that can include explanatory information or menus.

Dbase Compatibility

VP-Info's similarity to Dbase is no accident; the program's introduction says, "Its language is based on Dbase II. . .." Despite this confession, VP-Info is not compatible with Dbase program files. VP-Info cannot execute programs written in Dbase, nor can Dbase execute programs written in VP-Info. This is not entirely true of data-base files. You can format files to be compatible with Dbase or only for VP-Info. Files formatted unique to VP-Info can have up to 256 fields per record. If you use multiple files, a total of up to 512 fields are allowed for all the files being used.

The default format of VP-Info is for Dbase II-compatible files. However, even here there is not complete compatibility. VP-Info does not use date or memo fields. Date fields in a Dbase file are converted in VP-Info to character fields; memo fields are effectively ignored. VP-Info cannot read any index file created with Dbase III, although it can read Dbase II indexes.

Installation

VP-Info requires a minimum 256K of memory (384K on the Model 1000) and at least two drives, one of which can be a RAM drive. Putting VP-Info into the RAM disk and using a floppy for data lets the program run on single-drive systems if they have at least 512K of RAM. Program speed increases appreciably when it is resident on a RAM drive—so much so that I used it in this manner despite having a 20-megabyte fixed disk on my system.

VP-Info is copy-protected in that it requires a key disk, the original program disk, to be resident in drive A for the program to start. Once the program has started, you can remove the disk. This lets you install and run VP-Info on fixed-disk systems. For $10 and a signed license agreement, you can buy an unprotected disk directly from Paperback Software. Installation is as simple as copying the distribution disk to either a fixed disk or RAM disk. Two-floppy systems without enough memory to create a RAM disk must use the original distribution disk in drive A.

Documentation

VP-Info is packaged in a paperback book, with the disks in a pasteboard carrier glued into the back of the manual. The program resides on a single disk; a second disk contains the help and example files. The manual is divided into 20 chapters, six appendixes, and one index. At the back of the book are pages that you are supposed to cut out to register the program and to order a back-up disk or an unprotected disk.

The first 16 chapters consist of explanatory and tutorial information. The tutorial is based on the information needs of a mythical video-tape rental business, that is called Video Visions. As you work through the tutorial, you create programs to track tape check-outs, check-ins, daily cash flow, and overdue customers. Finally, all these are tied into a single system using the menu and windowing features of VP-Info.

Additionally, the manual has a topical reference section and an alphabetical reference to commands and functions. Index A is a discussion and tutorial of compiling program files, and index C is a reference to networking VP-Info.

The form of the manual, a tightly bound book, is quite inconvenient. The disk carrier in the back soon breaks free, leaving the back cover loose. The only way to get the book to lie open to any reference section is to bend the back. This soon causes pages to detach from the binding glue.

Ease of Use

VP-Info is enough like Dbase that learning it is simple if you are already familiar with Dbase. If you have not used Dbase, however, learning VP-Info is not a trivial task. Like Dbase, VP-Info is a full programming language. To use it as more than a simple file-card program requires considerable programming expertise.

You create a data base by typing the command Create, followed by a file name for the data base to be created. This brings up the create/modify screen with prompts for defining the file structure. You must name each field and specify its type (character, numerical, or

logical), length, and number of decimal places. Once you create a file structure, you can enter data.

You can index files on any field, and you can establish fields as keys to create relations among files. You can establish relations among several files, with the provisions that you have no circular references and that no more than one master file reference the same look-up (or subsidiary) file.

Although VP-Info is neither menu-driven nor has an application generator, it does include a report generator. You can reference up to six files at one time. You can generate simple columnar reports by typing the command Fields, followed by a hyphen and a list of the fields to be included in the report in the order that they are to print. You can include column headings of unlimited length and specify subtotals and totals. VP-Info can also create more elaborate reports, including borders and boxes, to emphasize important data.

The Language

The programming language is much like that of Dbase. It includes looping commands such as While, If, and Case statements. It has program-flow control statements that allow the use of subroutines. VP-Info contains many commands that neither Dbase II nor III have. Specifically, 118 commands and functions in VP-Info are lacking from Dbase II, and 104 are not contained in Dbase III.

Among these commands is Post, which automates the updating of a master file from a transaction file. This command greatly simplifies programming accounting applications such as the linking of a daily sales journal to the sales and accounts-receivable ledgers. The command Append To lets you copy a record in the current file to a different file.

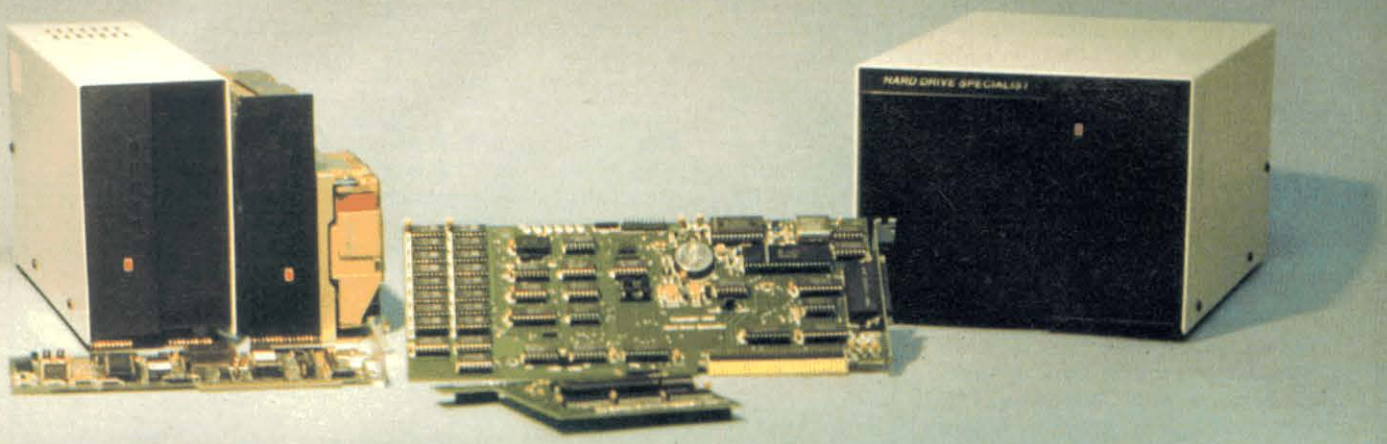
On Error lets you include an error-handling routine in a program. This can be especially helpful during program development, when errors often happen. If you use it correctly, it can specify the error encountered and continue the program execution. Write brings up a built-in text editor that you can use to create and modify program and report-definition files.

Debugging

VP-Info has a built-in debugging tool called Debug. This command works much like a display command. In effect, it is a dump that lets you chart the progress of the program as it runs. You can put Debug commands anywhere in a VP-Info program, followed by the fields that you might like to see. During program execution, if you select the Debug On option, the contents of the designated fields

Continued on p. 136

The Best Money Can Buy . . .



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UNDERSTANDING

TANDY 1000 GRAPHICS

by Don Inman
and Bob Albrecht

Figures and designs that you create on your screen are at the mercy of engineers and programmers who design computers and video displays. What you think you are drawing is seldom what actually appears on the screen. Therefore, you must have a thorough understanding of your video display, common coordinate systems, GW-Basic screen modes, and GW-Basic graphics commands to effectively control the graphics displays of your Tandy 1000 computer.

We will cover several factors that contribute to graphics distortions, giving examples in the form of short Basic listings. These listings provide starting points for you to write graphics routines of your own.

Screen Modes and Colors

The Screen and Color commands set video-screen resolution and available colors for graphics on the Tandy 1000. Table 1 (see p. 48) shows the six possible graphics screen modes. We do not discuss screen mode zero because it is a text mode. The examples use medium-resolution graphics (screen mode 1) for simplicity, but the concepts apply to the other screen modes as well.

The colors that you can use depend on the screen modes. The palette which you select determines the colors that are available for screen mode 1. Table 2 (see p. 48) shows these colors.

System Requirements

Tandy 1000
GW-Basic
Color Monitor

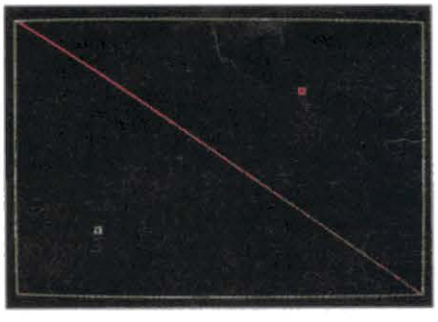

Photo 1. Plotting demo.

The background can be any of the 16 colors:

black (0)
blue (1)
green (2)
cyan (3)
red (4)
magenta (5)
brown (6)
gray (7)
dark grey (8)
light blue (9)
light green (10)
light cyan (11)
light red (12)
light magenta (13)
yellow (14)
white (15)

You can select the screen mode and color set as the following examples show.

```
110 SCREEN 1,0 'screen mode 1; color on
120 COLOR 0,1 'black background; palette 1
```

or

```
110 SCREEN 1,0
120 COLOR 9,0 'light-blue background; palette 0
```

Screen mode 1 produces a graphics display consisting of 200 rows of picture elements, or pixels (see Fig. 1, p. 44). Each row consists of 320 pixels in the medium-resolution screen mode.

Before you can construct an object on the video display, you must have an orderly way of numbering these rows and columns of pixels. That method of designating individual points is called a coordinate system. We discuss two commonly used coordinate systems: screen coordinates and real-world coordinates.

Screen Coordinates

Computer designers invariably number graphic screens in the same order that they number text screens. Since the first row of text is at the top of the screen, the first row of graphics is numbered from the top of the screen. Row numbers increase as you move down the screen. This is the opposite way from how we number things in real life. If you bought a ticket for row 1 on the 50-yard line at a stadium designed by a computer engineer, you would find yourself sitting with Bob Uecker at the top of the stands.

The normal origin of the 1000's screen-coordinate system is the upper-left corner of the video screen. Pixels number horizontally from left to right (columns) and top to bottom (rows; see Fig. 2, p. 44).

Pairs of coordinates locate points on the screen. The letters X (horizontal) and Y (vertical) usually designate the coordinate pair. The first coordinate pair (X) measures the number of pixels to the right of the origin. The second (Y) measures the number of pixels down from the origin (see Fig. 3, p. 46).

Program Listing 1 (see p. 50) demonstrates the orientation of the screen-coor-

dinate system by dividing the screen with a diagonal line from the screen's minimum coordinates (0,0) to its maximum coordinates (319,199).

It then draws a small square in each area (lower left and upper right). The program turns off the key definitions at the bottom of the screen, sets graphics mode 1, sets black as the background color, selects color palette zero, and clears the screen (lines 110–130).

Line 210 draws a brown line diagonally across the screen from point (0,0) to point (319,199). Line 220 plots a small green box in the lower-left portion of the screen and a small red box in the upper-right portion of the screen. Line 230 draws a green rectangle to enclose the graphics area (see Photo 1, p. 42). Notice that the border area is not used for graphics. All lines in this program are drawn using the following form, sometimes using the B option.

```
LINE (RIGHT1,DOWN1)-(RIGHT2,DOWN2),
COLOR,B
```

The B option (indicated by letter B in the line above) uses the coordinates as opposite corners of a rectangle.

To find a point on the screen, go right for the number of units specified left of the comma and go down the number of units to the right of the comma. For example, to find coordinate (60,150) go right 60 units, then down 150 units.

Screen positions number from (0,0) in the upper-left corner. The lower-right corner is (319,199) in screen mode 1. Notice that positive Y is down instead of up. If you do not carefully select screen coordinates for drawing, your picture might be displayed upside-down. If you want to draw objects as they appear in the real world, you must write Basic statements that draw in the same direction that you observe things. This requires a real-world-coordinate system.

Real-World Coordinates

As you look at an object, you measure its width from left to right and its height from bottom to top. When you draw objects as they appear, the origin of the video display should be at the lower left of the screen as shown in Fig. 4 (see p. 46). We call this the real-world-coordinate system to distinguish it from the computer's normal screen-coordinate system.

Your 1000 is very good at performing detailed tasks. It can transform points from the real-world-coordinate system to the screen-coordinate system. It does not have to change the X coordinate, but it must reflect the Y coordinate around an imaginary horizontal line halfway down the screen. One way to produce this transformation is to flip-flop the Y coordinate of each point with the simple Basic statements:

```
YSCREEN = 199 - YWORLD : XSCREEN =
XWORLD
```

Figure 5 (see p. 46) illustrates this.

Imagine that you want to plot a triangle whose real-world coordinates are (0,0), (50,50), and (100,0). If you draw the triangle with these coordinates, the computer normally interprets them as screen coordinates. The triangle is displayed upside-down in the in the upper-left corner of the screen.

Program Listing 2 (see p. 50) draws the triangle as it appears in screen-coordinate. Lines 210–250 assign the following values:

```
YWORLD(1) = 0,  YWORLD(2) = 50,  and
YWORLD(3) = 0
```

These are the Y coordinates for the vertices of the triangle. Line 230 sets YScreen coordinates equal to these values. Line statements draw the triangle (lines 310–340). Notice the abbreviated form of Line in lines 330 and 340.

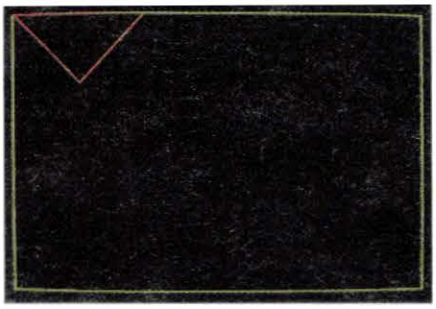

Photo 2. Triangle in screen coordinates.

Photo 3. Triangle transformed to real-world coordinates.

Since the first coordinate pair is omitted, this statement draws a line to (100,YSCREEN(3)) from the last point that line 320 referenced (50,YSCREEN(2)).

Line 340 draws a line to (0,YSCREEN(1)) from the last point that line 330 referenced (100,YSCREEN(3)).

This short form of the Line statement is handy when you are drawing a series of connected lines. Photo 2 shows the product of Listing 2.

You can reflect the vertices of the triangle with the equations in Table 3 (see p. 48). The triangle is then displayed as you envisioned it in real-world coordinates. It is drawn in the lower-left corner of the screen as Photo 3 shows. You can make the transformation by changing line 230 of Listing 2 to:

```
YSCREEN (N) = 199 - YWORLD
```

This "brute force" method of transforming coordinates produces right-side-up drawings, but requires much thought and planning. Fortunately, Microsoft provided a GW-Basic statement to do the transformation for us.

Window to the Real World

The GW-Basic Window command lets you look through a window and see pictures in whichever coordinate system you want: the right-side-up world of real-world coordinates or the upside-down world of screen coordinates. The Window command looks like this for screen coordinates:

```
WINDOW SCREEN(X1,Y1)-(X2,Y2)
```

and like this for real-world coordinates:

```
WINDOW (X1,Y1)-(X2,Y2)
```

The coordinates (X1,Y1) and (X2,Y2) specify the minimum and maximum limits of the display window. If you use the full limits of the 1000 in screen mode 1, the minimum and maximum coordinates would be (0,0) and (319,199). These coordinates are at opposite corners of the display, as Fig. 6 (see p. 46) shows.

If you use the Screen option, the positive Y direction is down (screen coordinate). If you omit the Screen option, the positive Y direction is up (real-world coordinate). For example:

```
WINDOW SCREEN(0,0)-(319,199) 'screen coordinate
WINDOW(0,0)-(319,199) 'real-world coordinate
```

Program Listing 3 (see p. 50) demonstrates the Window command, first with the Screen option, then without it. It draws arrows by combining a rectangle and a triangle. The lower-left corner or the rectangle is at (95,10). The screen-coordinate arrow is red, and the real-world-coordinate arrow is green (see Photo 4, p. 44).

The Line statement, in its minimal form, specifies the end points of a line segment and draws a line between them. For example:

```
LINE(95,10)-(145,50)
```

If you add the B option, the computer draws a box (rectangle), which has the points you specify as opposite corners. For example:

```
LINE(95,10)-(145,50),1,B
```

Listing 3 uses the Line statement with

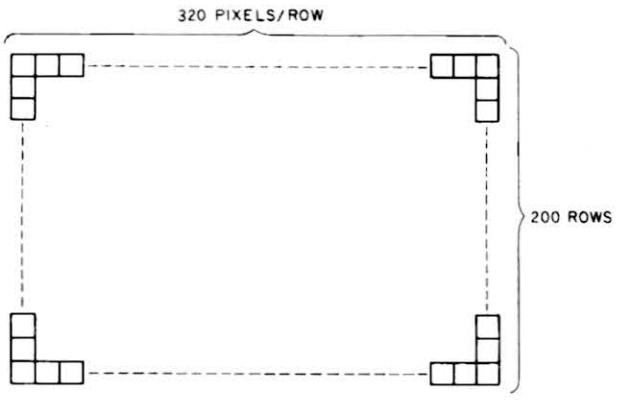

Fig. 1. Pixel arrangement in screen mode 1.

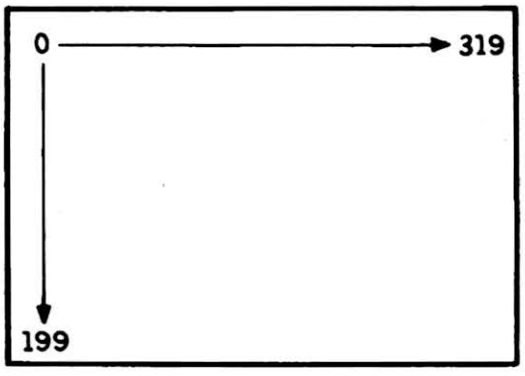

Fig. 2. Pixel numbering in screen mode 1.

the B option (lines 330 and 510), and it also uses the Step option in front of the second coordinate pair. These instructions tell the computer to use the first coordinate pair as one corner of the rectangle.

The Step option tells the computer to use the second coordinate pair as an increment to the first in order to locate the opposite corner. This gives the computer realistic parameters for drawing a rectangle in real-world coordinates. For example, in line 510 110 and 10 are the corner coordinates. –STEP(20,40) instructs the computer to increase 110 by 20 and 10 by 40. C tells the computer you've chosen color C. Lines 220 (C = 2) and 320 (C = 1) set the value of C. B tells the computer to draw a box.

Lines 520–540 add the triangle. Line 520 tells the computer to start at (70,50) and move 100 units to the right. Line 530 tells it to move left 50 units and up 40 units, and line 540 tells it to move left 50 units and down 40 units.

The program draws the arrow pointing down the screen in red (set by line 220) using screen-coordinates. A Window statement changes the format to real-world coordinate and draws the same arrow in green. The new Window statement does not affect the red arrow. Window statements only affect graphics statements that follow them. A Window stays in effect until you execute a new Window statement.

Limitations of Window

When you execute a Window statement, it interprets graphics commands to conform to its limits until you enter a new Window statement or the program ends. Images always conform to the Window statement under which they are drawn and are not affected by subsequent Windows.

A Window statement does not affect the commands in Draw statements (graphics-definition-language commands). Draw commands conform to screen coordinates and are oriented to a full screen ((0,0)-(319,199)) in screen mode 1.

Text appears in rows and columns and is not affected by Window statements.

Program Listing 4 (see p. 50) performs the following operations:

- Uses Window (50,50)-(269,149)

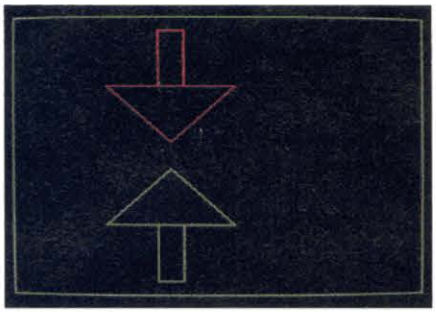

Photo 4. Arrows in screen coordinates and real-world coordinates.

Photo 5. Squares in a window.

- Draws a 50- by 50-pixel cyan square with a Draw statement
- Draws a 50- by 50-pixel magenta square with a Line statement
- Draws dotted lines enclosing the window.

The Draw statement's movement commands in line 220 are as follows:

- C1 is color number 1 (cyan in palette 1).
- BM 20,20 is a blank move to position (20,20). It does not draw a line.
- R50 draws right 50 units.
- D50 draws down 50 units.
- L50 draws left 50 units.
- U50 draws up 50 units.

Other Draw commands are:

- En moves diagonally up and right n points.
- Fn moves diagonally down and right n points.
- Gn moves diagonally down and left n points.
- Hn moves diagonally up and left n points.

Since Window statements do not affect Draw commands, the cyan square is drawn as if on a full screen ((0,0)-(319,199)) in screen coordinates.

Because the Window statement affects the Line statement in line 230, it draws its magenta square in real-world coordinates using a window whose lower-left corner is at (50,149). The window boundaries are expanded to fill the screen. Most of the square (whose lower-left corner is at (20,20) in real-world coordinates) lies outside the window and is not visible. Photo 5 shows the squares.

Line 240 draws a dotted white line around the window's boundaries. Notice that it coincides with the graphics area of a full screen. A new option (&HCCCC) at the end of this Line statement creates the dotted line. &H tells the computer that a hexadecimal (hex) number follows. The four hex digits (CCCC) set the format of the line style.

The line style is formed by the 16 bits of a binary number equivalent to the four hex digits. This is illustrated in Fig. 7 (see p. 48).

The dotted white line ((50,50)-(269,149),3,&HCCCC) encloses the entire graphics area. This expands the window to fill the entire screen.

Scaling

Since the screen pixels are taller than they are wide, a figure that you draw with an equal number of vertical and horizontal units appears vertically elongated. If you

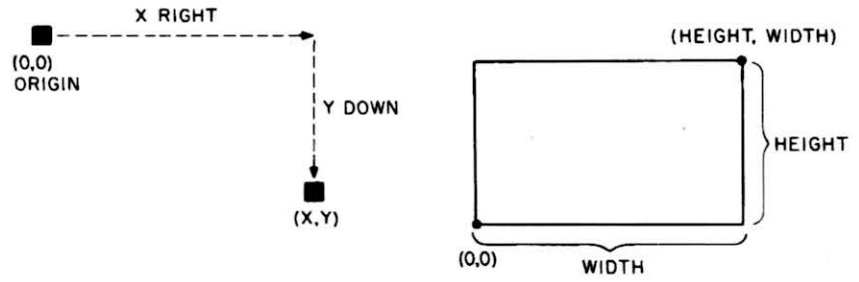

Fig. 3. Order of coordinates.

Fig. 4. Real-world coordinates.

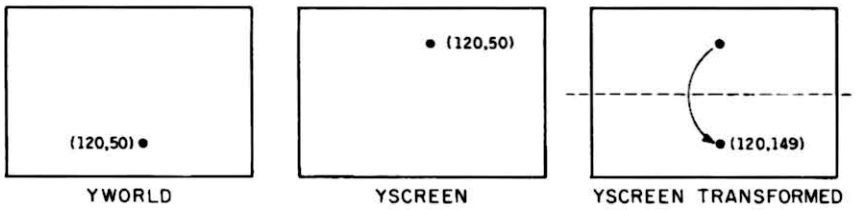

Fig. 5. Graphical transformation of a point.

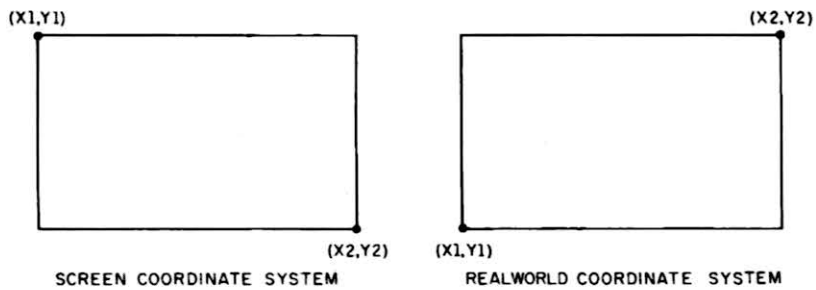

Fig. 6. Screen coordinate and real-world coordinate.

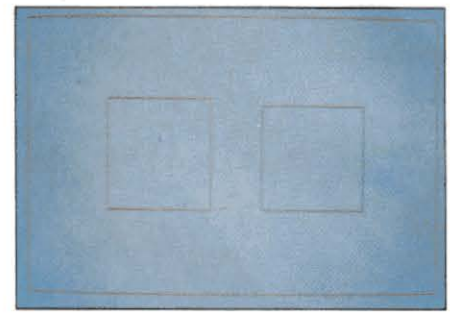

Photo 6. Unscaled and scaled squares.

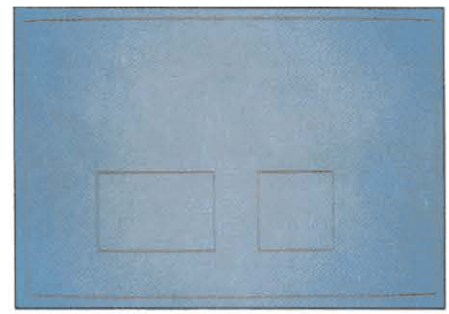

Photo 7. Scaling with Window.

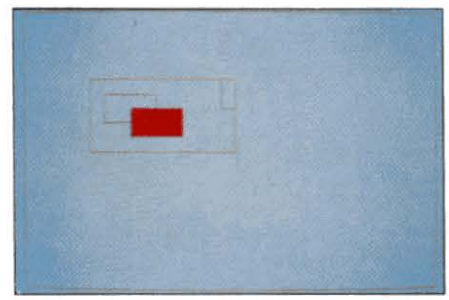

Photo 8. Viewport (50,50)-(160,100).

want a square to look square you can use a scale factor to change the number of either horizontal or vertical units in the screen.

Two factors contribute to scaling changes:

- The ratio of horizontal pixels to vertical pixels in the display screen. For example: in screen mode 1 there are 300 horizontal pixels and only 200 vertical pixels.
- The aspect ratio of the display monitor.

To correct for the first factor, multiply all points plotted on a full, medium-resolution screen by 200/320 (5/8).

The second factor (aspect ratio) occurs because a television or display monitor is wider than it is high. To determine aspect ratio, measure the screen area of your monitor you are using. It is likely to have a width-to-height ratio of 4/3, or 1.33. Our Tandy CM-4 measures approximately 11 inches by 8.1 inches. This gives it an aspect ratio of 1.35, which is within measuring accuracy of 4/3.

The 1000 uses part of its display area as a border (see Fig. 8, p. 49). The actual area that it uses to plot points on a graphics screen is, therefore, smaller in width and height than the display area. You should use the aspect ratio of the actual plotting area when you are calculating the scale factor.

Check the aspect ratio of your monitor before you use a scale factor by drawing a rectangle using the screen's maximum and minimum coordinates as in this example:

```
110 KEY OFF: SCREEN 1,0
120 COLOR 7,0: CLS
130 LINE(0,0)-(319,199),,B
140 GOTO 140
```

Run these lines and measure the width and length of the rectangle that they draw. Remember, our CM-4's display has an aspect ratio of 1.35. The rectangle we drew with the screen's minimum and maximum coordinates is approximately 10 inches by 6 2/3 (6.67) inches. This gives the graphics area an aspect ratio of:

$$10 \div 6.67 = 1.5$$

The final scale factor is therefore:

$$5/8 \times 3/2 = 15/16.$$

We checked this scale factor with Program Listing 5 (see p. 51). If you arrive at a different scale factor than we did, use your scale factor in line 120 to check your monitor. Line 210 draws an unscaled red box in the left part of the window. The Step option draws the box with sides 80 units long. Line 130 draws a scaled green box in the right part of the screen (see Photo 6).

The scale factor works on the vertical component of the green box in line 310. The green box appears square, while the red box appears to be higher than it is wide.

If you send a screen print of the display to your printer, you'll discover another scaling problem. You might have to experiment with the scale factor to discover the correct value for printing equivalent horizontal and vertical units. A scale factor of 65/72 (slightly less than our screen factor of 15/16) produces a square with equivalent sides on our printer.

Using Window to Scale

You can draw an individual image to scale by scaling its vertical component as in Listing 5. You can use the Window statement to automatically scale all figures that you draw after executing it. Consider again the factors that affect scaling:

- Number of pixels. You can use Window to specify an equal number of pixels both

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horizontally and vertically. For example:

Window (0,0)-(179,179) = 180 wide and 180 high
Window (0,0)-(149,149) = 150 wide and 150 high
Window (0,0)-(119,119) = 120 wide and 120 high

- Aspect ratio of your monitor. By reducing the vertical component of the maximum Window values, you can correct for the aspect ratio. For example:

Window (0,0)-(179,179) corrects only for pixels, while
Window (0,0)-(269,179) corrects for pixels and for aspect ratio (270/180 = 3/2).

Program Listing 6 (see p. 51) draws two rectangles, one green and one red. Both rectangles have 50-unit sides. The computer draws the green rectangle using Window (0,0)-(179,179), with the lower-left corner at (30,30). It draws the red rectangle using Window (0,0)-(269,179), with the lower-left corner at (120,30). The red rectangle appears as a true square, since the Window statement corrects for both pixel and aspect ratios. The Window for the green rectangle only corrects for the pixel ratio, as Photo 7 (see p. 46) shows.

Table 4 shows typical values for the maximum coordinates of a Window using an aspect ratio of 3/2 (assuming the Window has a minimum coordinate of (0,0)).

A Window View

A viewport is a rectangular viewing region on the screen. The viewport limits for graphics mode 1 are initially the limits of a full screen (0,0)-(319,199). You can write a View statement that will make the viewport larger or smaller than the Window limits. You can even make several small viewports on the screen. The following statement controls viewport placement:

VIEW [screen] (X1,Y1)-(X2,Y2)[,color,boundary]

in which (X1,Y1) and (X2,Y2) designate opposite corners. Optional parameters are enclosed in square brackets. Screen, color, and boundary are all optional. Screen controls mapping, color designates the color that fills the viewport (background), and the boundary parameter sets the boundary color of the viewport frame.

The View command's Screen option works differently than Window's Screen option. If you use the View command with the Screen option, it sets the corners of the viewport this way:

VIEW SCREEN (X1,Y1)-(X2,Y2)

The upper-left corner of the viewport is (XMIN,YMIN), where XMIN is the minimum of X1 and X2, and YMIN is the minimum of Y1 and Y2. The lower-right corner of the viewport is (XMAX,YMAX), where XMAX is the maximum of X1 and X2, and YMAX is the maximum of Y1 and Y2.

Lines are drawn according to their absolute values rather than relative to the viewport. Points outside the viewport are not shown.

If you omit the screen option, the minimum coordinates take on the minimum values of the upper-left corner of the screen. The maximum values equal the difference between the specified view coordinates. Fig. 9 (see p. 49) gives an example of:

VIEW (20,20)-(160,100),2,1.

Try entering and running these two sequences of statements; first:

```
110 KEY OFF: SCREEN 1,0: COLOR 7,0: CLS
120 LINE (0,0)-(319,199),,B
130 VIEW SCREEN (20,20)-(160,100),0,3
140 LINE(30,30)-(40,40),1,B
150 LINE(30,60)-(180,80),2,B
160 GOTO 160
```

Second, change line 130 in the previous sequence to:

130 VIEW (20,20)-(160,100),0,3

The first sequence produces a viewport with limits of (20,20) and (160,100) within a (0,0)-(319,199) window. When you change line 130 for the second sequence, the minimum values of the viewport convert from (20,20) to (0,0) and the (160,100) maximum values become (140,80). Anything you draw outside the viewport is clipped.

Program Listing 7 (see p. 51) demonstrates how to place objects inside a viewport (see Photo 8, p. 46). Default provides a full window for the display screen (no Window statement). Line 120 defines the viewport by the screen coordinates (50,50) and (160,100). White (color zero is the current background) is the viewport

Screen-mode number	Colors available	Screen resolution	Text width	Memory needed to fill one screen
1	4 (2 palettes)	320 × 200	40	16,384
2	2	640 × 200	80	16,384
3	16	160 × 200	20	16,384
4	4	320 × 200	40	16,384
5	16	320 × 200	40	32,768
6	4	640 × 200	80	32,768

Table 1. Screen modes.

Color number	Palette 0	Palette 1
0	current background color	current background color
1	green	cyan
2	red	magenta
3	brown	white

Table 2. Colors for screen mode 1.

XSCREEN = XWORLD
YSCREEN = 199 – YWORLD

(0,0) to (0,199)	(50,50) to (50,149)	(100,0) to (100,199)
XSCREEN = 0	XSREEN = 50	XSCREEN = 100
YSCREEN = 199 – 0 = 199	YSCREEN = 199 – 50 = 149	YSCREEN = 199 – 0 = 199

Table 3. Transformation equations.

(269,179)
(224,149)
(179,119)
(134,89)

Table 4. Upper limit of scaled window.

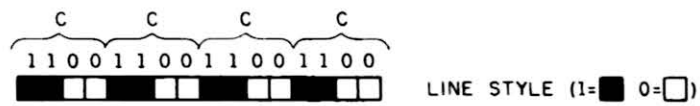

Fig. 7. How the line style is formed.

Company	Market share
A	24
B	15
C	9
others	52

Table 6. Market share.

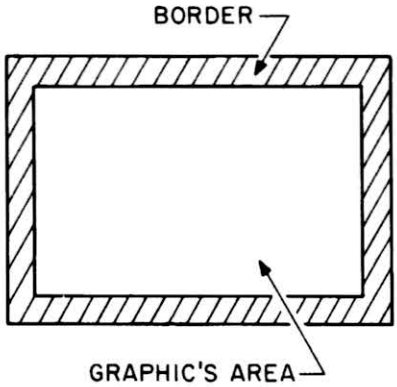

Fig. 8. Display screen with border.

fill color, and brown (color 3) is the boundary color.

The Line statement (line 210) draws a green rectangle, the left corner of which lies inside the viewport. Line 220 draws an unfilled red rectangle that lies entirely within the viewport. Line 230 draws an overlapping filled rectangle that also lies entirely within the viewport. Line 240 changes the viewport to full screen, and line 250 draws the display-screen boundaries.

Multiple Views

Program Listing 8 (see p. 51) demonstrates how viewports display three different types of graphs depicting the same data. Each graph is in a different viewport so that you can select the graph that best represents the data.

The program uses a full (0,0)-(319,199) window to create the graphs. It draws graphics as they would appear on a full screen in real-world coordinates. View statements transform them to fit the screen-coordinate viewports. Figure 10 is an interpretation of the first viewport of Listing 8. The drawings are full-scale in real-world coordinates. You see them, as shown in Fig. 10, reduced in size through a viewport. Photo 9 (see p. 50) shows the graphs in their appropriate viewports. Table 5 shows the structure of Listing 8.

Circles and Ellipses

The Circle command draws an ellipse, the center and radius of which you specify. If an ellipse is round, it's called a circle. You control the roundness of an ellipse with the aspect option of the Circle command. You can use the GW-Basic Circle

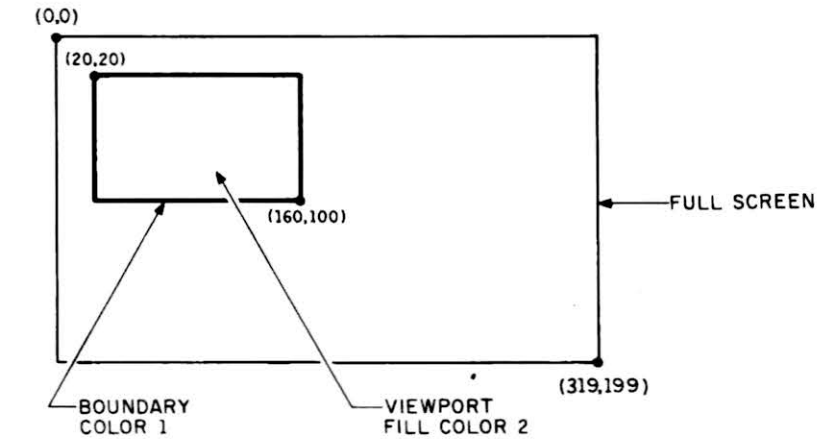

Fig. 9. Viewport (20,20)-(160,100).

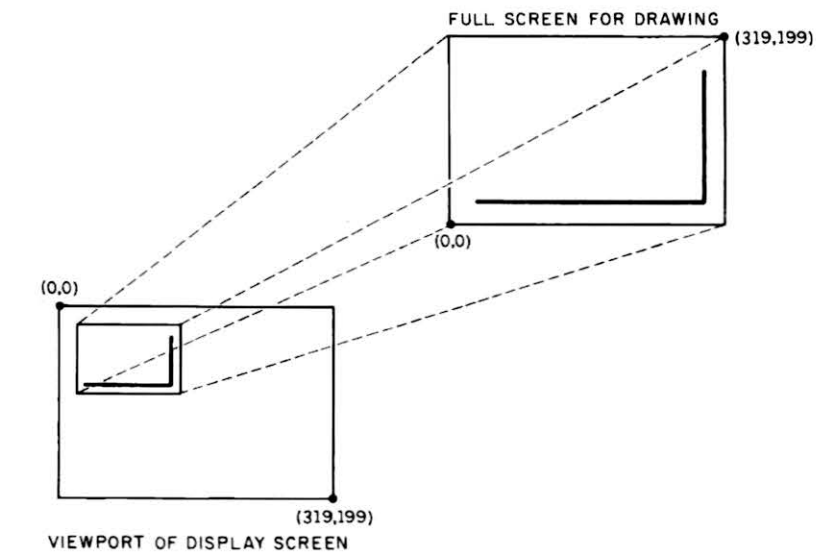

Fig. 10. Picture through viewport.

Lines 100–199—	define the graphics screen and a full-size window in real-world coordinates. They draw the window boundaries.
Lines 200–299—	provide and read in the data for the graphs.
Lines 300–399—	define the first viewport (upper-left part of the screen) in screen coordinates. They draw the axes and plot the line graph in reduced size to fit the viewport.
Lines 400–499—	define the second viewport (upper-right part of the screen) in screen coordinates. They draw axes and plot the high/low/close graph reduced in size to fit the viewport.
Lines 500–599—	define the third viewport (lower-left part of the screen) in screen coordinates. They draw the axes and plot the bar graph reduced in size to fit the viewport.
Lines 600–699—	print the title in the lower-right part of the screen. (Notice that Window and View have no effect on printing, which is done according to normal row and column positions.)
Lines 2000–2999—	contain a subroutine to draw axes.
Lines 3000–3999—	contain a subroutine to plot the line graph.
Lines 4000–4999—	contain a subroutine to plot the high/low/close graph.
Lines 5000–5999—	contain a subroutine to plot the bar graph.

Table 5. Structure of Program Listing 8.

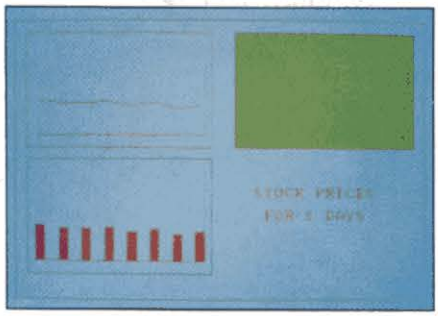

Photo 9. Graphs in three viewports.

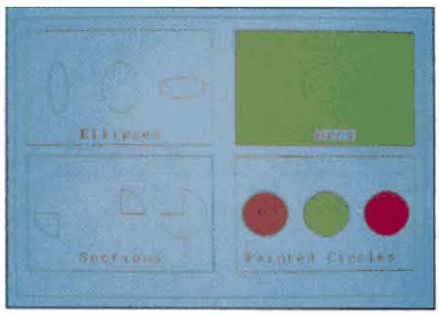

Fig. 10. Picture through viewport.

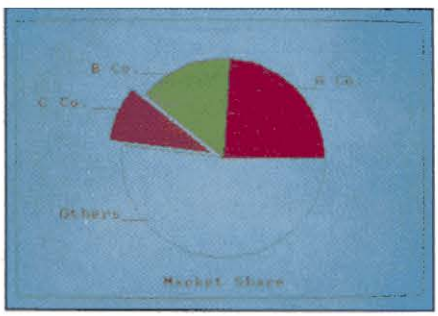

Photo 11. Pie graph.

command to make pie charts. The Circle command looks like this (options in square brackets):

CIRCLE [STEP] (X,Y),R [,color [,start,end [,aspect]]]

in which X and Y are the center coordinates, R is the radius, color designates the drawing color, start and end are the end points of the partial circle (arc), and aspect controls shape. The Step option designates the center coordinates relative to the last referenced graphics point. You could attach an ellipse to the end of a line by using a statement like this:

```
210 LINE(20,100)-(80,100)
220 CIRCLE STEP(20,0),20
```

in which (20,0) designates the circle's center as (80 + 20,100 + 0), and 20 gives it a radius of 20.

If you omit the Step option, the center of the ellipse lies at the absolute coordinates that you specify as (X,Y). For example:

```
220 CIRCLE(20,20),20
```

in which (20,20) puts the circle's center at (20,20), and 20 gives it a radius of 20.

The radius is the distance from the cen-

Program Listing 1. Demonstration of the screen-coordinate system's orientation. See p. 132 for information on using checksums in Listings 1–10.

```
1 REM - - - PLOTTING DEMO - - -                                    '*  1753
2 REM - - - PROGRAM 1 - - -                                        '*  1421
99 '
100 REM - - - SET SCREEN - - -                                     '*  1615
110 KEY OFF                                                        '*   662
120 SCREEN 1,0: COLOR 0,0                                          '*  1445
130 CLS                                                            '*   406
199 '
200 REM - - - DRAW BROWN LINE (0,0) TO (319,199) - - -             '*  2879
201 REM - - - DRAW GREEN & RED SQUARES - - -                       '*  2505
202 REM - - - BOX THE GRAPHICS AREA - - -                          '*  2330
210 LINE(0,0)-(319,199),3                                          '*  1281
220 LINE(60,150)-(64,154),1,B: LINE(220,50)-(224,54),2,B           '*  2877
230 LINE(0,0)-(319,199),1,B                                        '*  1391
299 '
300 REM - - - PRESS ANY KEY TO QUIT - - -                          '*  2377
310 A$=INKEY$: IF A$="" THEN 310                                   '*  1772
320 END                                                            '*   396
                                                                   End
```

Program Listing 2. Screen-coordinate triangle.

```
1 REM - - - TOPSY-TURVY TRIANGLE - - -                             '*  2319
2 REM - - - PROGRAM 2 - - -                                        '*  1422
99 '
100 REM - - - SET SCREEN - - -                                     '*  1615
110 KEY OFF: SCREEN 1,0: COLOR 0,0: CLS                            '*  2334
199 '
200 REM - - - READ YWORLD COORDINATES- - -                         '*  2524
210 FOR N=1 TO 3                                                   '*   908
220   READ YWORLD(N)                                               '*  1200
230   YSCREEN(N) = YWORLD(N)                                       '*  1706
240 NEXT N                                                         '*   611
250 DATA 0,50,0                                                    '*   782
299 '
300 REM - - - DRAW TRIANGLE - - -                                  '*  1833
310 LINE(0,0)-(319,199),1,B                                        '*  1390
320 LINE(0,YSCREEN(1))-(50,YSCREEN(2)),3                           '*  2351
330 LINE-(100,YSCREEN(3))                                          '*  1462
340 LINE-(0,YSCREEN(1))                                            '*  1364
399 '
400 REM - - - PRESS ANY KEY TO QUIT - - -                          '*  2378
410 A$=INKEY$: IF A$="" THEN 410                                   '*  1774
420 END                                                            '*   397
                                                                   End
```

Program Listing 3. Demonstrations of the Window command.

```
1 REM - - - SCREEN AND WORLD COORDINATES - - -                     '*  2777
2 REM - - - PROGRAM 3 - - -                                        '*  1423
3 REM - - - DRAW ARRROW IN EACH SYSTEM - - -                       '*  2621
99 '
100 REM - - - SET SCREEN - - -                                     '*  1615
110 KEY OFF: SCREEN 1,0: COLOR 0,0: CLS                            '*  2334
199 '
200 REM - - - USE SCREEN COORDINATES- - -                          '*  2444
210 WINDOW SCREEN (0,0)-(319,199)                                  '*  1874
220 C = 2: GOSUB 510                                               '*  1078
299 '
300 REM - - - USE REAL WORLD COORDINATES - - -                     '*  2745
310 WINDOW (0,0)-(319,199)                                         '*  1395
320 C = 1: GOSUB 510                                               '*  1078
330 LINE(0,0)-(319,199),1,B                                        '*  1392
399 '
400 REM - - - PRESS ANY KEY TO QUIT - - -                          '*  2378
410 A$=INKEY$: IF A$="" THEN 410                                   '*  1774
420 END                                                            '*   397
499 '
500 REM - - - SUBROUTINE: DRAW ARROW - - -                         '*  2506
510 LINE(110,10)-STEP(20,40),C,B                                   '*  1751
520 LINE(70,50)-STEP(100,0),C                                      '*  1598
530 LINE-STEP(-50,40),C                                            '*  1323
540 LINE-STEP(-50,-40),C                                           '*  1369
550 RETURN                                                         '*   666
                                                                   End
```

Program Listing 4. Demonstration of the relationship of Window and Draw statements.

```
1 REM - - - DRAW AND LINE STATEMENTS IN A WINDOW - - -             '*  3268
2 REM - - - PROGRAM 4 - - -                                        '*  1424
99 '
100 REM - - - SET SCREEN - - -                                     '*  1615
110 KEY OFF: SCREEN 1,0: COLOR 0,1: CLS                            '*  2335
199 '
200 REM - - - DRAW IN THE WINDOW - - -                             '*  2146
210 WINDOW(50,50)-(269,149)                                        '*  1467
220 DRAW "C1; BM 20,20; R50 D50 L50 U50"                           '*  2106
230 LINE(20,20)-STEP(50,50),2,B                                    '*  1690
240 LINE(50,50)-(269,149),3,B,&HCCCC                               '*  1921
299 '
400 REM - - - WAIT HERE FOR KEYPRESS - - -                         '*  2460
410 A$=INKEY$: IF A$="" THEN 410                                   '*  1774
420 END                                                            '*   397
                                                                   End
```

Program Listing 5. Verification of scale factor.

```
1 REM - - - SCALING THE VERTICAL - - -                          '*  2207
2 REM - - - PROGRAM 5 - - -                                     '*  1425
99 '
100 REM - - - SET SCREEN AND SCALE - - -                        '*  2250
110 KEY OFF: SCREEN 1,0: COLOR 7,0: CLS                         '*  2341
120 SCALE = 15/16                                               '*   916
130 WINDOW(0,0)-(319,199)                                       '*  1363
140 LINE(0,0)-(319,199),,B                                      '*  1342
199 '
200 REM - - - UNSCALED RED BOX - - -                            '*  2007
210 LINE(60,60)-STEP(80,80),2,B                                 '*  1702
299 '
300 REM - - - SCALED GREEN BOX - - -                            '*  1995
310 LINE(180,60)-STEP(80,SCALE*80),1,B                          '*  2155
399 '
400 REM - - - WAIT FOR A KEY PRESS - - -                        '*  2265
410 A$=INKEY$: IF A$="" THEN 410                                '*  1774
420 END                                                         '*   397
```

End

Program Listing 6. Demonstration of scaling.

```
1 REM - - - SCALING WITH WINDOW - - -                           '*  2168
2 REM - - - PROGRAM 6 - - -                                     '*  1426
99 '
100 REM - - - SET SCREEN - - -                                  '*  1615
110 KEY OFF: SCREEN 1,0: COLOR 7,0: CLS                         '*  2341
120 LINE(0,0)-(319,199),,B                                      '*  1340
199 '
200 REM - - - DRAW BOX; TWO DIFFERENT WINDOWS - - -             '*  3090
210 START = 30: LIMIT = 179                                     '*  1560
220 FOR C=1 TO 2                                                '*   897
230     WINDOW(0,0)-(LIMIT,179)                                 '*  1716
240     LINE(START,30)-STEP(50,50),C,B                          '*  2137
250     START = 150: LIMIT = 269                                '*  1743
260 NEXT C                                                      '*   602
299 '
400 REM - - - WAIT FOR A KEY PRESS - - -                        '*  2265
410 A$=INKEY$: IF A$="" THEN 410                                '*  1774
420 END                                                         '*   397
```

End

Program Listing 7. Demonstration of placing objects inside a viewport.

```
1 REM - - - VIEW DEMO - - -                                     '*  1443
2 REM - - - PROGRAM 7 - - -                                     '*  1427
99 '
100 REM - - - SET SCREEN - - -                                  '*  1615
110 KEY OFF: SCREEN 1: COLOR 7,0: CLS                           '*  2282
120 VIEW SCREEN (50,50)-(160,100),0,3                           '*  1986
199 '
200 REM - - - DRAW GREEN RECTANGLE MOSTLY OUTSIDE VIEWPORT - - - '*  4061
201 REM - - - DRAW UNFILLED RED RECTANGLE INSIDE VIEWPORT - - -  '*  3922
202 REM - - - DRAW FILLED RECTANGLE INSIDE VIEWPORT - - -        '*  3509
210 LINE(150,30)-(250,70),1,B                                   '*  1476
220 LINE(60,60)-(100,80),2,B                                    '*  1428
230 LINE(80,70)-(120,90),2,BF                                   '*  1505
240 VIEW SCREEN(0,0)-(319,199)   'DRAW THE                      '*  1688
250 LINE(0,0)-(319,199),,B       'SCREEN BOUNDARY               '*  1344
299 '
300 REM - - - PRESS ANY KEY TO QUIT - - -                       '*  2377
310 A$=INKEY$: IF A$="" THEN 310                                '*  1772
320 END                                                         '*   396
```

End

Program Listing 8. Demonstration of how viewports display graphs.

```
1 REM - - - 3 VIEWPORTS - - -                                   '*  1609
2 REM - - - PROGRAM 8 - - -                                     '*  1428
99 '
100 REM - - - SET SCREEN AND WINDOW - - -                       '*  2362
110 KEY OFF: SCREEN 1,0: COLOR 7,0: CLS                         '*  2341
120 WINDOW (0,0)-(319,199)                                      '*  1394
130 LINE(0,0)-(319,199),1,B                                     '*  1390
199 '
200 REM - - - READ DATA - - -                                   '*  1498
210 FOR N=1 TO 8                                                '*   913
220   READ HI(N),LO(N),CLO(N)                                   '*  1647
230   HI(N)=3*HI(N): LO(N)=3*LO(N): CLO(N)=3*CLO(N)             '*  2885
240 NEXT N                                                      '*   611
250 DATA 28.8,25.8,27.5, 27.3,25.1,26.1                         '*  1965
260 DATA 26.6,24.6,25.6, 26.6,22.4,26.6                         '*  1965
270 DATA 26.9,22.4,23.8, 25.9,23.5,25.8                         '*  1970
280 DATA 25.9,22.1,22.6, 24.6,21.8,24                           '*  1858
299 '
300 REM - - - FIRST VIEWPORT - - -                              '*  1965
310 VIEW (10,10)-(150,90),0,3                                   '*  1458
320 GOSUB 2000                                                  '*   791
330 GOSUB 3000                                                  '*   793
399 '
400 REM - - - SECOND VIEWPORT - - -                             '*  2018
410 VIEW(170,10)-(310,90),1,3                                   '*  1481
```

Listing continued

ter of an ellipse to either of its furthest points. The color option lets you specify the color of the ellipse. The start and end points let you draw a partial ellipse (an arc) between them.

The computer draws ellipses counterclockwise with zero at 3 o'clock. If you use a negative value for either or both end points of an arc, the computer adds a line from the end points to the center of the arc. This is a great help when you draw pie charts.

The aspect option sets the ratio of the Y axis (height) to the X axis (width). If this ratio is greater than 1, the radius lies along the Y axis. If the aspect ratio is less than 1, the radius is along the X axis.

Program Listing 9 (see p. 54) combines many options of the Circle command with the concepts of viewports. Photo 10 illustrates this using four viewports.

The start and end points let you draw a partial ellipse (an arc) between them.

Line 210 of Listing 9 displays the first viewport in the upper-left corner of the screen. From left to right, the aspect ratio changes from 2.5 (line 2010) to 1.3 (line 2020) to 0.4 (line 2030). Notice that in lines 2010–2030, the extra commas hold the places of the omitted start and end points. When you omit these points, the computer draws a complete ellipse rather than an arc. If you do not provide the commas, however, the computer interprets the aspect option as a start or an end point.

The subroutine at lines 3000–3999 draws arcs in the second viewport, which line 310 places in the upper-right part of the screen. From left to right, the start and end points of the arcs are zero and PI/2, PI/2 and 3*PI/2, and 3*PI/2 and PI/2.

The subroutine at lines 4000–4999 draws sections of circles by using negative values for the start and end points. Line 410 places these sections in the third viewport (in the lower-left part of the screen). From left to right, the start and end points are -PI and -3*PI/2, -2*PI and -PI/2, and -PI and -PI/2.

The last subroutine (lines 5000–5999) draws and paints three circles with an aspect ratio of 0.89. This aspect ratio produces a round-looking circle on our display. The Paint command colors the circles. Its form is:

PAINT (X,Y),f,b

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in which (X,Y) designates the point from which the computer is to paint, f designates the fill color, and b designates the boundary color.

You must make sure that point (X,Y) is within the closed area that you specify. If it is not, paint spills all over your drawing. The painted circles are in the fourth viewport in the lower-right part of the screen. From left to right, the computer draws the circles in green, red, and brown. It then paints them brown to the green boundary, green to the red boundary, and red to the brown boundary.

Using Circle

Businesses often use circle graphs (pie charts) to represent percentages or market shares. Our final program draws and labels a simple pie chart.

The graph shows the percentage of market share of three companies as well as a catch-all category that lumps all the other companies in the market together. One company's slice of the market is pulled away from the pie. Table 6 (see p. 49) shows the companies' market shares. Photo 11 shows the pie graph.

Program Listing 10 (see p. 54) sets a real-world coordinate window in lines 100–199. The circumference of a circle equals 2*pi radians. Lines 200–299 calculate the percentages of the circumference necessary for each section of the graph. Lines 300–399 draw and paint the sections.

This block of the program also draws a line from each section to its label. The pie section that is pulled away displaces its center to the left above the center shared by the other sections (line 330). Lines 400–499 print the labels and title using Locate statements to place each label at the appropriate row and column.

Further Exploration

GW-Basic provides such a rich resource of graphics techniques that it is impossible to provide an in-depth discussion in such a short article. Use the information we give in this article as a stepping-off place for further exploration on your own. Experiment with all the graphics commands until you feel comfortable with them.

We have demonstrated only one graphics mode. Try modifying our programs to run in other modes. Try changing palettes and colors. Experiment!■

Don Inman has written two books on IBM PC graphics, one with his son, Kurt. He is also the author of numerous articles on computer graphics. Bob Albrecht has been writing about computers since the early 1960s and is a co-founder of Dr. Dobb's Journal of Software Tools. *Write to them c/o Dragonquest, P.O. Box 7627, Menlo Park, CA 94026.*

Listing 8 continued

```
420 GOSUB 2000                                                  '*  792
430 GOSUB 4000                                                  '*  795
499 '
500 REM - - - THIRD VIEWPORT - - -                              '* 1954
510 VIEW(10,100)-(150,180),0,1                                  '* 1522
520 GOSUB 2000                                                  '*  793
530 GOSUB 5000                                                  '*  797
599 '
600 REM - - - TITLE - - -                                       '* 1290
610 LOCATE 16,24: PRINT "STOCK PRICES"                          '* 2365
620 LOCATE 18,25: PRINT "FOR 8 DAYS"                            '* 2151
630 GOTO 630                                                    '*  683
699 '
2000 REM - - - SUB: DRAW AXES - - -                             '* 1911
2010 LINE(310,20)-(310,180)                                     '* 1365
2020 LINE(20,20)-(310,20)                                       '* 1261
2030 RETURN                                                     '*  709
2999 '
3000 REM - - - SUB: DRAW LINE GRAPH - - -                       '* 2305
3010 FOR N=1 TO 7                                               '*  961
3020   COL = 40*(N-1)+20                                        '* 1176
3030   LINE(COL,CLO(N))-(COL+40,CLO(N+1))                       '* 2326
3040   LINE(COL,17)-(COL,23)                                    '* 1535
3050 NEXT N                                                     '*  661
3060 RETURN                                                     '*  713
3999 '
4000 REM - - - SUB: DRAW HI/LO/CLOSE GRAPH - - -                '* 2778
4010 FOR N=1 TO 8                                               '*  963
4020   COL = 40*(N-1)+20                                        '* 1177
4030   LINE(COL,LO(N))-(COL,HI(N))                              '* 1948
4040   LINE(COL-3,CLO(N))-(COL+3,CLO(N))                        '* 2283
4050   LINE(COL,17)-(COL,23)                                    '* 1537
4060 NEXT N                                                     '*  663
4070 RETURN                                                     '*  715
4999 '
5000 REM - - - SUB: DRAW BAR GRAPH - - -                        '* 2224
5010 FOR N=1 TO 8                                               '*  964
5020   COL = 40*(N-1)+20                                        '* 1178
5030   LINE(COL-8,20)-(COL+8,CLO(N)),,BF                        '* 2234
5040 NEXT N                                                     '*  662
5050 RETURN                                                     '*  714
```

End

Program Listing 9. Demonstration of Circle command options.

```
1 REM - - - VIEWPORTS WITH CIRCLES - - -                        '* 2423
2 REM - - - PROGRAM 9 - - -                                     '* 1429
99 '
100 REM - - - SET SCREEN AND WINDOW - - -                       '* 2362
110 KEY OFF: SCREEN 1,0: COLOR 7,0: CLS                         '* 2341
120 WINDOW (0,0)-(319,199)                                      '* 1394
130 LINE(0,0)-(319,199),1,B                                     '* 1398
140 PI = 3.14159                                                '*  816
199 '
200 REM - - - FIRST VIEWPORT - - -                              '* 1964
210 VIEW (10,10)-(150,90),0,3                                   '* 1457
220 GOSUB 2000                                                  '*  790
299 '
300 REM - - - SECOND VIEWPORT - - -                             '* 2017
310 VIEW(170,10)-(310,90),1,3                                   '* 1480
320 GOSUB 3000                                                  '*  792
399 '
400 REM - - - THIRD VIEWPORT - - -                              '* 1953
410 VIEW(10,100)-(150,180),0,1                                  '* 1521
420 GOSUB 4000                                                  '*  794
499 '
500 REM - - - FOURTH VIEWPORT - - -                             '* 2047
510 VIEW(170,100)-(310,180),0,2                                 '* 1576
```

Listing continued

Listing 9 continued

```
520 GOSUB 5000                                                  '*  796
599 '
600 REM - - - TITLE - - -                                       '* 1290
610 LOCATE 11,7: PRINT "Ellipses"                               '* 2272
620 LOCATE 11,30: PRINT "Arcs"                                  '* 1877
630 LOCATE 22,7: PRINT "Sections"                               '* 2283
640 LOCATE 22,23: PRINT "Painted Circles"                       '* 2940
650 GOTO 650                                                    '*  687
699 '
2000 REM - - - SUB: DRAW ELLIPSES - - -                         '* 2215
2010 CIRCLE (50,100),40,1,,,2.5                                 '* 1582
2020 CIRCLE (160,100),40,2,,,1.3                                '* 1631
2030 CIRCLE (270,100),40,3,,,.4                                 '* 1587
2040 RETURN                                                     '*  710
2999 '
3000 REM - - - SUB: DRAW ARCS - - -                             '* 1904
3010 CIRCLE (50,100),40,2,0,PI/2                                '* 1689
3020 CIRCLE (160,100),40,2,PI/2,3*PI/2                          '* 2035
3030 CIRCLE (270,100),40,3,3*PI/2,PI/2                          '* 2039
3070 RETURN                                                     '*  714
3999 '
4000 REM - - - SUB: DRAW SECTIONS - - -                         '* 2224
4010 CIRCLE (50,100),40,1,-PI,-3*PI/2                           '* 1977
4020 CIRCLE (160,100),40,2,-2*PI,-PI/2                          '* 2028
4030 CIRCLE (270,100),40,3,-PI,-PI/2                            '* 1940
4070 RETURN                                                     '*  715
4999 '
5000 REM - - - SUB: DRAW CIRCLES - - -                          '* 2126
5010 CIRCLE (50,100),40,1,,,.89                                 '* 1595
5020 CIRCLE (160,100),40,2,,,.89                                '* 1647
5030 CIRCLE (270,100),40,3,,,.89                                '* 1651
5040 PAINT(50,100),3,1: PAINT(160,100),1,2: PAINT(270,100),2,3  '* 3332
5050 RETURN                                                     '*  714
```

End

Program Listing 10. Pie chart representation of market share.

```
1 REM - - - PIE GRAPH - - -                                     '* 1427
2 REM - - - PROGRAM 10 - - -                                    '* 1469
99 '
100 REM - - - SET SCREEN - - -                                  '* 1615
110 KEY OFF: SCREEN 1,0: COLOR 7,0: CLS                         '* 2341
120 WINDOW(0,0)-(319,199)                                       '* 1362
130 LINE(0,0)-(319,199),,B                                      '* 1341
199 '
200 REM - - - SET CIRCLE PARAMETERS - - -                       '* 2390
210 PI = 3.14159                                                '*  814
220 A = 2*PI*.24: B = 2*PI*.15+A: C = 2*PI*9.000001E-02+B       '* 2911
299 '
300 REM - - - DRAW AND PAINT CIRCLES - - -                      '* 2407
310 CIRCLE(160,100),80,,-2*PI,-A,.89                            '* 1918
320 CIRCLE(160,100),80,,A,-B,.89                                '* 1695
330 CIRCLE(150,104),80,,-B,-C,.89                               '* 1746
340 CIRCLE(160,100),80,,-C,2*PI,.89                             '* 1878
350 PAINT(170,120),2,3: LINE(235,150)-(215,150)                 '* 2464
360 PAINT(140,120),1,3: LINE(95,160)-(115,160)                  '* 2418
370 PAINT(130,115),3,3: LINE(58,135)-(78,135)                   '* 2387
380 LINE(80,55)-(100,55)                                        '* 1239
399 '
400 REM - - - PRINT LABLES - - -                                '* 1766
410 LOCATE 6,30: PRINT "A Co."                                  '* 1758
420 LOCATE 5,8: PRINT "B Co."                                   '* 1716
430 LOCATE 8,3: PRINT "C Co."                                   '* 1716
440 LOCATE 18,5: PRINT "Others"                                 '* 2074
450 LOCATE 24,15: PRINT "Market Share";                         '* 2694
490 GOTO 490                                                    '*  691
```

End

Illustration by Michael Paraskevas

Payday Made Easy

Run a small business? Our Basic payroll program can save you hours of work—every week.

by G.S. Bradshaw

Payroll programs should save time and allow for easy modification. My Barefoot Basic Payroll program (Listing 1) does just that. It calculates and prints both current and month-to-date payroll reports for most small businesses. I call it Barefoot Basic because of its simplicity. The program calculates and prints, in less than 20 minutes, an accounting firm's payroll that used to take four hours to prepare.

The program has few instructions. I made the user interface a priority. The syntax and command structure is direct, making the program easy to read and modify. I wrote it for a Model 4, but I list changes for the Tandy 1000 later.

You can correct any of the stored variables and print or reprint reports of the corrected data. You can change any of the three types of data stored in the program: basic employee data, current paycheck, and month-to-date payroll. The variables list in the Table shows the records that you need to store data and indicates the precision of the numeric variables. It also gives the names of the variables and the space that the variables require.

While many payroll programs use a question-and-answer format to let the user update variables such as state or federal withholding formulas, this program requires changes to its code. Using Barefoot Basic means that you do not need to know advanced programming techniques to make these changes.

The program retains its tailor-made qualities, and only the formulas that you need are included in it. This improves speed, requires no dedicated keystrokes, and asks no vague questions.

What the Heck Is Barefoot Basic?

Program Listings 2 and 3 show the difference in command structure between Basic and Barefoot Basic. Both listings calculate the federal withholding for gross pay equal to or less than approximately $500 per week. Listing 2 is ingenious Basic. The computer understands it, and it saves code and improves speed. Listing 3 uses Barefoot Basic and works the same as Listing 2, but it is easier to read and modify.

Imagine reading a page of a book on which there are three references: "See paragraph 200," "See paragraph 14," and "See paragraph 300." Flipping back and forth between pages makes difficult reading. In a Basic program the use of Gosub or Goto makes the code hard to read. In a single page of some listings it is necessary to flip back and forth between pages 20 times to follow the program's logic, identify the changes required, and ensure that any additions to the code are inserted at the right points in the sequence.

The rules of Barefoot Basic are simple: Do not be afraid to repeat a command rather than use a Gosub or Goto; when you define a function explain what it does; avoid nonsense strings like PCADSBMX with the INSTR command; and sprinkle the program with remarks. Most of the values that the program needs are included in the code as constants rather than stored as variables that you provide. The program maintains data files, so you can reprint a report after changing payroll data.

The program's "tailor made" qualities keep it simple. For example, the program is written for a weekly payroll. Instead of having to enter changes to accommodate bi-weekly, semi-monthly, or monthly payrolls, just change the program listing.

For a biweekly payroll you would put new values from the *Employer Tax Guide* into the tax tables. The program makes no special provisions for salaried employees, since you can easily include them by using a 40-hour week and the corresponding hourly rate.

For a small business, the trouble of loading, lining up, and test printing paychecks probably outweighs the advantage of a paycheck-writing option. This program doesn't have one, but you could add a short paycheck-writing routine after the paystub-printing code.

The program does not print 941-A, unemployment tax, or W-2 forms, which would require quarter-to-date and year-to-date payroll information. Although you can get the raw data from the Payroll/DAT file that Barefoot Basic Payroll creates, I suggest that you use a separate program

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System Requirements

Model 4
(Tandy 1000 with changes)
Disk Basic
32K RAM
Printer

to transfer the data to a new file, obtain the necessary cumulative totals, and print the reports. You can insert code to call the program from the payroll main menu. An easy way to store and subtotal information on quarter-to-date and year-to-date payrolls is to enter monthly totals into a spreadsheet template.

Using the Program

After you save this program on a system disk as Payroll/BAS, press the caps-lock key, as all entries must be in uppercase. Then, set the maximum number of lines per page (Model 4 users only); while still at TRSDOS Ready, enter the following commands:

```
SET *FF TO FORMS/FLT
FILTER *PR *FF
FORMS (LINES = 60)
```

These commands tell TRSDOS to print four paycheck stubs (60 printed lines) on 8½- by 11-inch paper, then scroll six lines to start a new page. If you enter SYSGEN after these commands, TRSDOS records them on disk; thereafter, your system will boot in uppercase mode with the number of lines per page set to 60.

Finally, while still at TRSDOS Ready, enter:

```
AUTO BASIC PAYROLL/BAS
```

You can now enter the program by rebooting. It requests the name of your company, which it prints on the paycheck stub (see Fig. 1). Entering the name sends you to the menu. At the menu, type A to add employees and enter data as the prompts request. I didn't disable the break key. If you break the program, type and enter CLOSE to ensure that you don't leave the file open.

After you enter all employees, enter P from the menu to calculate a payroll. Do not use the break key or the reset button before you complete the payroll and are back at the menu.

The program lists each employee and provides prompts for hours worked and other information. If, for any reason, you enter the wrong information, continue entering until the prompt says "Press C for changes." Then make corrections.

When the program prints a paycheck stub, it records the data on disk. There is no convenient way to reenter information on a particular employee. Complete the payroll for all employees and, when the program returns to the menu, enter C to change mistakes and print a new paycheck stub. If for any reason you do not complete the payroll, reenter the program from the beginning after copying the Payroll/DAT file from your back-up copy.

The month-to-date payroll that is stored on disk contains cumulative totals not including the last paycheck. If you change month-to-date figures, remember to enter the correct figures based on the month-to-date prior to the current paycheck.

Program Description

The first 250 lines initialize the program. The rest are divided into seven modules. The information that the program needs is initialized beginning with line 30. Lines 40 and 50 define the program's functions after clearing, dimensioning, and defining integers.

Line 40 is required because the Print Using command rounds off the printed value of any specified number, but does not change the value of that number stored in RAM. For example, $12.444 + $12.444 is usually printed as $12.44 + $12.44. With Print Using, however, $24.888 (the total) is printed as $24.89.

Type	Number in array	Variable name	Bytes reserved in record
%	1	employee no.	2
$	2	employee name	19
$	3	street	20
$	4	city, state, zip	20
$	5	Social Security no.	11
$	6	marital status	1
$	7	active (Y or N)	1
%	8	exemptions	2
!	9	hourly pay rate	4
!	10	overtime pay rate	4
!	11	federal withholding dependency deduction	4
!	12	state withholding deductions	4
		(subtotal)	112
$	13	date	12
!	14	regular hours	4
!	15	overtime hours	4
!	16	current gross	4
!	17	tips as wages	4
!	18	current FICA	4
!	19	current federal withholding	4
!	20	current state withholding	4
!	21	other deductions	4
!	22	net pay	4
		(subtotal)	52
#	23	month-to-date gross	8
!	24	month-to-date FICA	4
!	25	month-to-date federal with.	4
!	26	month-to-date state withhold.	4
!	27	month-to-date tips as wages	4
!	28	month-to-date tips	4
#	29	month-to-date net pay	8
			36
		total memory reserved:	200

Working variables

CN$	company name
DA$	date of check
FT	federal taxable wage
FL	flag (paycheck correction)
GP	gross wages
LF	last of file
MT	Missouri taxable wage
MO	state withholding check deductions
MT(X)	company total (month to date)
OP	overtime pay
RP	regular pay
TG	wages plus tips
TP(X)	company total (current)
X	record number

I used several other temporary variables such as I$ and E$, but their use is self-explanatory in the program.

Table. Variables list.

Back Issues

January 1984: Tandy's Model 2000 and an MS-DOS overview; also, an Assembly language tutorial.

February 1984: The Creator—new and improved data base management, also, tabulate and analyze opinion polls.

March 1984: Hinrich's word processor, a III to 4 conversion program, and a Machine-language arcade game.

April 1984: CP/M digest, Model III/4 conversion program, pie and bar chart program, and new Scripsit characters.

May 1984: Telecommunications special, VisiCalc enhancements, Pascal, and a program that eases math anxiety.

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July 1984: Guide to Disk Operating Systems, GW-Basic, and a Machine-language minimizer.

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This looks like a one-cent error to employees. FNR(Y) rounds off calculated values and prevents apparent errors in the paycheck stub.

Line 100 checks to see if the line printer is turned on. If not, it prints "Printer not ready" and returns to the "Enter company name" prompt. This process repeats until you turn on the printer.

Lines (130–250) open the Payroll/DAT file and set up subroutines to define the fields, convert string data in the buffers, and set data in the buffer as required.

Module 1 (lines 1000–1250) stores information concerning each employee. Missouri withholds taxes by deducting the federal tax, a standard deduction and a dependency deduction from gross pay. The program multiplies the remainder by an appropriate factor to determine the withholding tax for the period. You must enter the sum of the standard deduction and the dependency deduction as the employee reported on form MO-W2.

You enter this sum as an annual deduction. The program converts it to a weekly deduction by dividing it by 52. To convert to another pay period, change the divisor to correspond to that period (line 1160). If your state does not require a deduction, change line 1160 to B(12)=0.

Line 1180 calculates a deduction for federal withholding. It is based on a weekly salary. The Internal Revenue Service (IRS) circular E lists the corresponding allowance for other pay periods.

Module 2 begins with line 2000. Lines 2060–2130 check to see if you are entering the first payroll of the month. If you are, they set both current payroll and month-to-date totals to zero. If you are not, they add current payroll to the cumulative totals for the month and zero the current payroll.

This happens whenever you begin a new payroll. It lets you open a file at any time, make corrections, and print a new payroll summary or month-to-date report that reflects those changes. If the program listed an update function on the menu, you could add the current payroll to the month-to-date totals more than once. To prevent this from happening, the program maintains current payroll data until it is time to calculate a new one.

In line 2160, B$(7) determines whether an employee is active. The program skips over inactive employees.

The first part of line 2170 converts the check date to B$(13) and records it as A$(13). The program does not use the date record on the disk. It occupies 12 spaces in the record that the program can use for something else.

Line 2200 asks about tips that employees receive. If none of your employees receive tips, ignore the entry or alter it to show other income (commissions, bonuses, and so on). Be sure to change line 2600 by substituting TG (total gross) for GP (gross pay).

Barefoot Basic can easily convert the annual deduction to the weekly deduction.

For restaurant use, the program calculates tips as wages (the portion of an employee's tips that the employer counts as wages). It uses $3.35 per hour as a minimum wage, and calculates tips as wages as that portion of the tips required to meet the minimum wage. Line 2280 calculates this and rounds the result to dollars and cents.

Line 2290 uses 7.15 percent of gross pay to calculate Federal Insurance Contributions Act (FICA) withholding. Change this value when the tax law changes.

Lines 2300–2440 calculate the federal withholding tax based on the 1987 calendar year. Modify these tables in accordance with IRS circular E for changes in the tax law and for pay periods other than weekly.

Lines 2470–2590 calculate Missouri witholding tax. Since each state has its own tax structure, change this calculation for other states. Some states have simple tax tables, others are complicated. If writing the code for your state is too difficult, replace these lines with: 2590 INPUT "EN-

Program Listing 1. Barefoot Basic Payroll. See p. 132 for information on using checksums in Listing 1–3.

```
10 '          ----------PAYROLL/BAS---------REV. JAN. 1 1987
20 ' ---Written by G. S.Bradshaw, P. O. Box 1112, Branson, MO. 656
   16
30 CLEAR: DIM A$(30), B$(30), B(30): DEFINT J, L, X                    '*  2745
40 DEF FNR(Y)= INT((Y*100)+.5)/100  '---ROUND OFF FUNCTION             '*  1871
50 CLS: PRINT @ (2,25), "P A Y R O L L   P R O G R A M "               '*  2991
60 PRINT @ (4,0),  "DOLLAR figures such as TIPS must be entered in
    the adding machine mode, i.e.400 is entered and the computer r
   eads it as $4.00.  HOURS WORKED must be in the     decimal mode
   , ie. 23-1/4 is entered as 23.25"                                   '* 17642
70 PRINT @ (8,0),  "Data from this program is stored in a disc fil
   e named 'PAYROLL/DAT in drive:0.  Entering <B> from the menu wi
   ll make a backup copy of this data on drive:1"                      '* 14466
80 PRINT: PRINT "Before continuing, check to make sure a formatted
    data disc is in drive one,           the printer is turned on
   , and the paper is lined up"                                        '* 13167
90 PRINT @ (14,15), "ENTER COMPANY NAME FOR THIS PAYROLL:  ";: INP
   UT CN$: IF CN$="" THEN 60                                           '*  5518
100 J=INP(248): IF (J AND 240)<> 48 THEN CLS: PRINT @ (16,25), "PR
    INTER NOT READY": GOTO 80                                          '*  5337
110 GOTO 7010                                                          '*   723
120 '  SUBROUTINES TO FIELD, CONVERT STRING DATA, AND LSET VARIABL
   ES
130 OPEN "R", 1, "PAYROLL/DAT:0",200: LF=LOF(1)                        '*  2696
140 FIELD 1, 2 AS A$(1), 19 AS A$(2), 30 AS A$(3), 30 AS A$(4), 11
     AS A$(5), 1 AS A$(6), 1 AS A$(7), 2 AS A$(8), 4 AS A$(9), 4 A
    S A$(10), 4 AS A$(11), 4 AS A$(12)                                 '*  7837
150 FIELD 1, 112 AS D1$, 12 AS A$(13), 4 AS A$(14), 4 AS A$(15), 4
     AS A$(16), 4 AS A$(17), 4 AS A$(18), 4 AS A$(19), 4 AS A$(20)
    , 4 AS A$(21), 4 AS A$(22), 4 AS A$(23)                            '*  8116
160 FIELD 1, 164 AS D2$, 8 AS A$(24), 4 AS A$(25), 4 AS A$(26), 4
    AS A$(27), 4 AS A$(28), 4 AS A$(29), 8 AS A$(30): RETURN           '*  6175
170 LSET A$(1)=MKI$(B(1)): LSET A$(2)=B$(2): LSET A$(3)=B$(3): LSE
    T A$(4)=B$(4):LSET A$(5)=B$(5): LSET A$(6)=B$(6): LSET A$(7)=B
    $(7): LSET A$(8)=MKI$(B(8)): LSET A$(9)=MKS$(B(9)): LSET A$(10
    )=MKS$(B(10)): LSET A$(11)=MKS$(B(11)): LSET A$(12)=MKS$(B(12)
    S$(B(12))                                                          '* 13800
180 LSET A$(13)=B$(13): LSET A$(14)=MKS$(B(14)): LSET A$(15)=MKS$(
    B(15)): LSET A$(16)=MKS$(B(16)): LSET A$(17)=MKS$(B(17)): LSET
     A$(18)=MKS$(B(18)): LSET A$(19)=MKS$(B(19)): LSET A$(20)=MKS$
    (B(20)): LSET A$(21)= MKS$(B(21)): LSET A$(22)=MKS$(B(22))
    22))                                                               '* 13607
190 LSET A$(23)= MKS$(B(23))                                           '*  1506
200 LSET A$(24)=MKD$(B(24)): LSET A$(25)=MKS$(B(25)): LSET A$(26)=
    MKS$(B(26)): LSET A$(27)=MKS$(B(27)): LSET A$(28)=MKS$(B(28)):
     LSET A$(29) = MKS$(B(29)): LSET A$(30)= MKD$(B(30)): RETURN       '* 10408
220 B(1)=CVI(A$(1)): B$(2)=A$(2): B$(3)=A$(3): B$(4)=A$(4): B$(5)=
    A$(5): B$(6)=A$(6): B$(7)=A$(7): B(8)=CVI(A$(8)): B(9)=CVS(A$(
    9)): B(10)=CVS(A$(10)): B(11)=CVS(A$(11)): B(12)=CVS(A$(12))       '*  9490
230 B$(13)=A$(13): B(14)=CVS(A$(14)): B(15)=CVS(A$(15)): B(16)=CVS
    (A$(16)): B(17)=CVS(A$(17)): B(18)=CVS(A$(18)): B(19)=CVS(A$(1
    9)): B(20)=CVS(A$(20)): B(21)=CVS(A$(21)): B(22)=CVS(A$(22)):
    B(23)=CVS(A$(23))                                                  '* 10815
250 B(24)=CVD(A$(24)): B(25)= CVS(A$(25)): B(26)= CVS(A$(26)): B(2
    7)=CVS(A$(27)): B(28) = CVS(A$(28)): B(29)=CVS(A$(29)): B(30)=
    CVD(A$(30)): RETURN                                                '*  7792
1000 '  ENTER BASIC EMPLOYEE DATA
1010 OPEN "R", 1, "PAYROLL/DAT:0", 200: X=LOF(1)+1                     '*  2808
1020 CLS: PRINT @ 20, " A D D   N E W   E M P L O Y E E S": PRINT      '*  3531
1030 B(1) = X                                                          '*   637
1040 PRINT @(3,5),"NAME: ";TAB(32); STRING$(19,160)+STRING$(5,32);
     TAB(62); "EMPLOYEE NO." B(1);: PRINT @ (3,31),;: LINE INPUT
     B$(2): IF LEN(B$(2))>19 THEN 1040                                 '*  9098
1050 IF B$(2)="" THEN CLOSE: GOTO 7010                                 '*  2143
1060 PRINT @ (5,5), "STREET ADDRESS:  ";TAB(32); STRING$(30,160)+S
```

Listing continued

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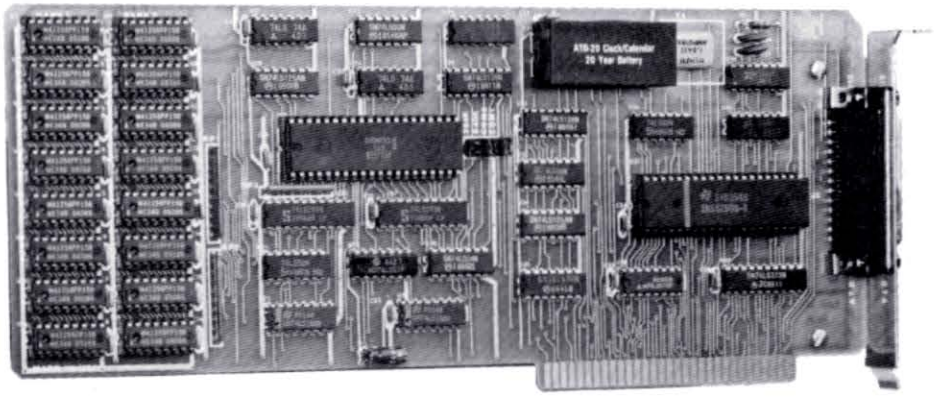

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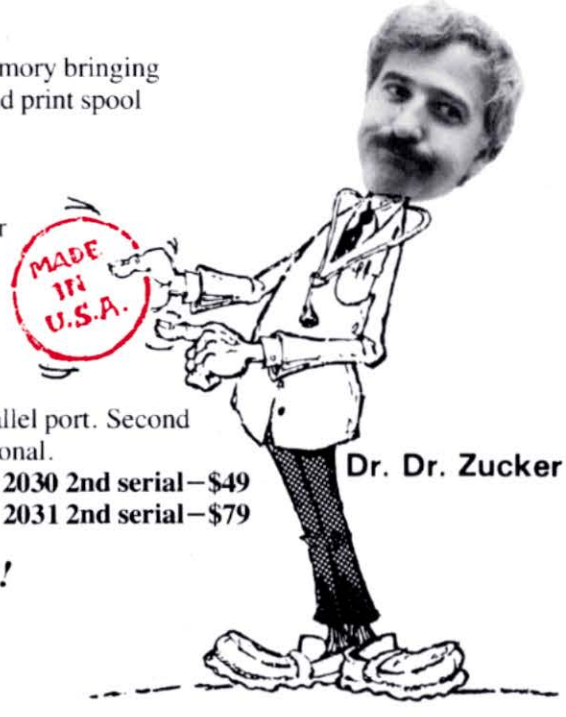
2028 1 serial for Model 1000SX + 1000EX–$99
2029 1 serial for Model 3000HL–$149
2030 2nd serial–$49
2031 2nd serial–$79



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TER STATE TAX FROM TABLES"; B(21).

Lines 2600–2740 complete the calculations, display the results on the screen, and enable you to make any necessary corrections before storing on disk or printing the paycheck information. Line 2790 checks to see if the correction you are entering is for a single paycheck. If so, the menu reappears on screen. If not, the program goes on to calculate a paycheck for the next employee.

Lines 2840 and 2850 set up elongated print on a Radio Shack DMP-120 dot-matrix printer, print the company name on the paycheck stub, and return the printer to normal print. If you are using any other dot-matrix printer, use your own printer codes or delete the codes and leave the printer in normal print.

Lines 2860–2980 print a paycheck stub, automatically suppressing tips as wages if not needed.

The program prints a payroll summary listing current data for each active employee.

Module 3 (lines 3000–3080) prints the employee data record (see Fig. 2) using condensed print to produce about 132 characters per line. If you do not have a DMP 120 or similar 132-column printer, substitute your own printer codes.

Module 4 (lines 4000–4520) provides the correction routines you need to change employee data, current paycheck information, and month-to-date payroll. The first routine can change employee data by changing a line, storing the change on disk, displaying the entire record on screen, and changing additional lines until you enter 11 to exit the routine.

The second routine changes current paycheck information by entering the paycheck calculation module and exiting to the menu after calculating, printing, and saving the new information.

The third routine changes month-to-date information by listing the data that is on the disk on the screen and asking you to supply new information for an employee. You must reenter all the information that does not change for that employee. The routine changes data on the disk when you verify all entries.

Module 5 (lines 5000–5140) prints the payroll summary (a listing of each active employee and the data from his or her current paycheck; see Fig. 3). It also prints a weekly total of all employees. This total is

PAYROLL ASSIGNED

Week ending July 15 1986 Paycheck information for JUNE LOWRY

HOURS - REGULAR	37.50	REGULAR PAY	$ 84.38
HOURS - O.T	4.00	OVERTIME PAY	13.40
WAGES	$ 97.78	WAGES	97.78
TOTAL TIPS	$ 45.00	SOCIAL SECURITY DEDUCTIONS	10.21
TOTAL GROSS	$ 142.78	FEDERAL WITHHOLDING:	6.15
		STATE WITHHOLDING:	1.14
TIPS AS WAGES	$ 41.25	OTHER DEDUCTIONS:	14.69
		NET PAY:	$ 65.68

Fig. 1. Sample pay stub printout.

MONTH TO DATE PAYROLL REPORT DATED 00/00/00

Employee No.	WAGES	TIPS	FICA	FED W/H	ST W/H	NET PAY	TIPS/WAGES
1	286.59	140.00	30.50	18.24	3.39	192.40	120.45
2	108.75	47.00	11.14	17.39	2.29	74.43	16.88
3	129.68	56.00	13.28	18.77	2.95	62.68	22.75
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	197.50	40.00	16.98	15.02	4.02	149.48	0.00
Mo to date	722.52	283.00	71.90	69.42	12.65	478.99	160.08

Fig. 2. Sample month-to-date payroll printout.

WEEKLY PAYROLL FOR 80 Micro REPORT DATED 00/00/00

EMP #	NAME	HOURS	O/T HRS	WAGES	TIPS	FICA	FED W/H	ST. W/H	OTHER DED	NET PAY	TIPS/WAGES
1	JUNE LOWRY	34.50	4.00	91.03	50.00	10.08	5.94	1.11	14.00	59.90	77.95
2	TERESA BLACKBURN	37.50	3.00	108.75	47.00	11.14	17.39	2.29	2.50	74.43	16.88
3	DOROTHY DAVIS	45.50	8.00	129.68	56.00	13.28	18.77	2.95	32.00	62.68	22.75
5	BETTY APPLETREE	35.00	3.00	197.50	40.00	16.98	15.02	4.02	12.00	149.48	0.00
6	WEEKLY TOTAL	152.50	18.00	526.96	193.00	51.48	57.12	10.37	61.50	346.49	77.58

Fig. 3. Sample weekly payroll printout.

```
  1  JUNE LOWRY              H.C.R. 4 BOX 1221          HOLLISTER, MO. 65672        111-22-3333
STATUS M  ACTIVE Y  EXEMPT. 2 P/R 2.25 O/R 3.25 FED W/H DED  41.54  STATE W/H DED  78.85
  2  TERESA BLACKBURN        P.O. BOX 1986              BRANSON, MO. 65616          222-33-4444
STATUS S  ACTIVE Y  EXEMPT. 0 P/R 2.90 O/R 0.00 FED W/H DED   0.00  STATE W/H DED  44.23
  3  DOROTHY DAVIS           H.C.R. 2  BOX 2222         BRANSON, MO. 645616         333-44-5555
STATUS S  ACTIVE Y  EXEMPT. 1 P/R 2.85 O/R 0.00 FED W/H DED  20.77  STATE W/H DED  55.77
  4  PENNY SINGLETON         1221 WESTBROOK DRIVE       HOLLISTER, MO. 65672        444-55-6666
STATUS M  ACTIVE N  EXEMPT. 2 P/R 2.15 O/R 0.00 FED W/H DED  41.54  STATE W/H DED  78.85
  5  BETTY APPLETREE         GENERAL DELIVERY           KIRBYVILLE, MO. 65676       555-66-7777
STATUS M  ACTIVE Y  EXEMPT. 3 P/R 5.00 O/R 7.50 FED W/H DED  62.31  STATE W/H DED  86.54
```

Fig. 4. Sample employee-listing printout.

Listing continued

```
      TRING$(5,32);: PRINT @(5,31),;:LINE INPUT B$(3): IF LEN(B$(3)
      )>30 THEN 1060                                                    '*  8137
1070  PRINT @(7,5),"CITY, STATE,ZIP:  ";TAB(32); STRING$(30,160)+ST
      RING$(5,32);: PRINT @(7,31),;: LINE INPUT B$(4): IF LEN(B$(4)
      )>30 THEN 1070                                                    '*  8153
1080  PRINT @(9,5),"SOCIAL SECURITY # "; TAB(32); STRING$(11,160)+S
      TRING$(5,32);:PRINT @(9,31),;: LINE INPUT B$(5): IF LEN(B$(5)
      )>11  THEN 1080                                                   '*  8214
1090  PRINT @(11,5), "IS EMPLOYEE ACTIVE (Y or N)";:INPUT B$(7): IF
       B$(7)="N" THEN 1210 ELSE IF B$(7)<>"Y" THEN 1090                 '*  6670
1100  PRINT @(13,5), "HOURLY PAY RATE (eg. 335) ";: INPUT B(9): B(9
      )=B(9)/100                                                        '*  4340
1110  PRINT @ (13,42), "OVERTIME PAY RATE (eg. 502) ";: INPUT B(10)
      : B(10)=B(10)/100                                                 '*  4674
1120  PRINT @(15,5), "STATUS (M,S OR <E>xempt)";TAB(36); STRING$(1,
      160)+STRING$(3,32);:PRINT @(15,35),;: INPUT B$(6): IF LEN(B$(
      6))>1 THEN 1120                                                   '*  8413
1130  IF B$(6)="E" THEN 1210 ELSE 1135                                  '*  1965
1135  IF B$(6) <> "M" AND B$(6) <> "S" THEN 1120                        '*  2389
1140  PRINT @(15,44),"EXEMPTIONS:  ";TAB(62);STRING$(1,160)+STRING$
      (5,32);:PRINT @(15,61),;:INPUT B(8): IF B(8)<0 OR B(8)>9 THEN
       1140                                                             '*  7671
1150  PRINT: PRINT "      ENTER ANNUAL MISSOURI W/H ALLOWANCE (STAND
      ARD + DEPENDENCY ALLOWANCE)          SEE EMPLOYERS TAX GUIDE
       FOR STANDARD ALLOWANCE INFORMATION.";                            '* 10610
1160  INPUT MO: MO=MO/5200: B(12)=FNR(MO)  '---MO W/H DED              '*  2393
1180  B(11)=36.54*B(8)  '---FED W/H DED -                               '*  1041
1190  PRINT @(20,5), USING "FEDERAL ALLOWANCE FOR CALCULATING W/H T
      AX IS   $###.##  WEEKLY";  B(11)                                  '*  5810
1200  PRINT @(21,5), USING "STATE ALLOWANCE FOR CALCULATING W/H TAX
       IS     $###.##  WEEKLY"; B(12)                                  '*  5722
1210  PRINT @(22,20),"ARE ALL ENTRIES CORRECT (Y or N)";: INPUT I$:
       IF I$="Y" THEN 1230                                              '*  5201
1220  IF I$="N" THEN 1020 ELSE 1210                                     '*  1839
```

Listing continued

Listing continued

```
1230 GOSUB 140 '-----RECORD ON DISC--                                    '*   795
1240 LSET A$(1)=MKI$(B(1)): LSET A$(2)=B$(2): LSET A$(3)=B$(3): LS
     ET A$(4)=B$(4):LSET A$(5)=B$(5): LSET A$(6)=B$(6): LSET A$(7)
     =B$(7): LSET A$(8)=MKI$(B(8)): LSET A$(9)=MKS$(B(9)): LSET A$
     (10)=MKS$(B(10)): LSET A$(11)=MKS$(B(11)): LSET A$(12)=MKS$(B
     )=MKS$(B(12))                                                       '* 13847
1250 PUT 1, X: CLOSE: GOTO 7010                                          '*  1825
2000 '  INPUT CURRENT PAYROLL
2010 CLS: PRINT @ (2,18), "C A L C U L A T E   C U R R E N T   P A
     Y R O L L"                                                          '*  4072
2020 PRINT @ (4,9), "Check that the printer is set to the top line
      on the paper"                                                      '*  6460
2030 PRINT @ (6,3), "The date can be entered as any letters or num
     bers so long as the space required is not more than 12 charac
     ters - we suggest as an example, July 15 1986"                      '* 14477
2040 PRINT @ (10,10), "Check date:"; TAB(32); STRING$(12,160)+STRI
     NG$(5,32);: PRINT @ (10,31),;:LINE INPUT DA$ : IF LEN(DA$)>12
      THEN 2040                                                          '*  8872
2060 PRINT @ (12,10), "Is this the first paycheck for the month <Y
     > OR <N>";: INPUT I$:  IF I$="Y" THEN 2070 ELSE 2080               '*  8098
2070 PRINT @ (14,0), "This is the first payroll for the month, and
      will set all monthly totals to zero": PRINT @ (16,25), "CONT
     INUE <Y> OR <N>";: INPUT K$: IF K$="N" THEN 2060                   '* 12892
2080 PRINT @ (18,20), "One minute, while I update the records ":GO
     SUB 130: FOR X = 1 TO LF: GET 1,X: GOSUB 230                       '*  7567
2090 IF I$="Y" THEN 2100 ELSE 2110  '-------UPDATE MTD FIGURES-        '*  1856
2100 B(24)=0: B(25)=0: B(26)=0: B(27)=0: B(28)=0: B(29)=0: B(30)=0
     : GOTO 2120                                                        '*  3917
2110 B(24)=B(24)+B(17)-B(16): B(25)=B(25)+B(19): B(26)= B(26)+ B(2
     0): B(27)=B(27)+ B(21): B(28)=B(28)+B(18): B(29)=B(29)+B(16):
      B(30)=B(30)+B(23)                                                 '*  7142
2120 B(14)=0: B(15)=0: B(16)=0: B(17)=0: B(18)=0: B(19)=0: B(20)=0
     : B(21)=0: B(22)=0: B(23)=0                                        '*  4618
2130 GOSUB 180: PUT 1,X: NEXT                                           '*  1760
2140 ' -----INPUT NEW PAYROLL DATA--
2150 FOR X=1 TO LF: GET 1,X: GOSUB 220                                  '*  2247
2160 IF B$(7)="N" THEN 2800 ELSE 2170 '---SKIP IF NOT ACTIVE            '*  1985
2170 B$(13)=DA$: CLS : PRINT @ (5,10),"Payroll for ..." B$(2);: PR
     INT @ (5,50), "Employee #" B(1)                                    '*  5854
2180 PRINT @ (7,10), "Hours worked: (eg. 37.5)";: INPUT B(14): PRI
     NT @ (7,55), "Overtime hrs. :";: INPUT B(15)                       '*  7100
2190 IF B(14)>65 OR B(15)>25 THEN CLS: GOTO 2170                        '*  2697
2200 PRINT @ (9,10), "Total Tips:  (eg.6000) ";: INPUT B(16): B(16
     )=B(16)/100                                                        '*  4497
2210 PRINT @ (11,10), "Other deductions: ";: INPUT B(22): B(22)=B(
     22)/100                                                            '*  4593
2220 RP=B(9)*B(14): OP=B(10)*B(15)                                      '*  1792
2230 RP=FNR(RP)   '---ROUND OFF REG PAY                                 '*   927
2240 OP=FNR(OP):  GP=RP+OP '---ROUND O/T PAY - GET WAGES                '*  1620
2250 TG = GP + B(16) '---GET GROSS (ADD TIPS)                           '*  1021
2260 B(17)=FNR(TG) '---ROUND GROSS                                      '*  1012
2270 IF B(16)=0 OR B(9)=>3.35 THEN B(18)=0: GOTO 2290                   '*  2890
2280 W=(B(14)*3.35-B(9)*B(14)): B(18)=FNR(W) '---CALC & ROUND TIPS
      AS WAGES                                                          '*  2296
2290 W=B(17)*.0715:  B(19)=FNR(W) '---CALC FICA & ROUND                 '*  1763
2300 FT=B(17)-B(11) '---FED TAXABLE INCOME                              '*   985
2310 IF B$(6)="M" THEN 2340                                             '*  1416
2310 IF B$(6)="M" THEN 2340                                             '*  1416
2320 IF B$(6)="S" THEN 2390                                             '*  1460
2330 IF B$(6)="E" THEN B(20)=0: B(21)=0: GOTO 2600                      '*  2643
2340 IF FT<=36 THEN B(20)=0: GOTO 2470 '---MARRIED FED TAX              '*  2149
2350 IF FT<=93 THEN B(20)=(FT-36)*.11: GOTO 2460                        '*  2675
2360 IF FT<=574 THEN B(20)=(FT-93)*.15+6.27: GOTO 2460                  '*  2983
2370 IF FT<=901 THEN B(20)=(FT-574)*.28+78.42: GOTO 2460                '*  3088
2380 IF FT<=1767 THEN B(20)=(FT-901)*.35+169.98: GOTO 2460              '*  3200
2385 IF FT>1767 THEN B(20)=(FT-1767)*.385+473.08: GOTO 2460             '*  3250
2390 IF FT<=12 THEN B(20)=0: GOTO 2470 '---SINGLE FED TAX               '*  2148
2400 IF FT<=47 THEN B(20)=(FT-12)*.11: GOTO 2460                        '*  2664
2410 IF FT<=335 THEN B(20)=(FT-47)*.15+3.85: GOTO 2460                  '*  2974
2420 IF FT<=532 THEN B(20)=(FT-335)*.28+47.05: GOTO 2460                '*  3074
2430 IF FT<=1051 THEN B(20)=(FT-502)*.35+102.21: GOTO 2460              '*  3152
2440 IF FT>1051 THEN B(20)=(FT-1051)*.385+283.86: GOTO 2460             '*  3219
2470 MT=B(17)-B(12)-B(20)  '---CALC MO TAXABLE INCOME                   '*  1291
2480 IF MT<=0 THEN B(21)=0: GOTO 2600 '----CALC MO TAX                  '*  2100
2490 IF MT<20 THEN B(21)=MT*.015: GOTO 2590                             '*  2449
2500 IF MT<40 THEN B(21)=.3+(MT-20)*.02: GOTO 2590                      '*  2755
2510 IF MT<60 THEN B(21)=.7+(MT-40)*.025: GOTO 2590                     '*  2817
2520 IF MT<80 THEN B(21)=1.2+(MT-60)*.03: GOTO 2590                     '*  2814
2530 IF MT<100 THEN B(21)=1.8+(MT-80)*.035: GOTO 2590                   '*  2917
2540 IF MT<120 THEN B(21)=2.5+(MT-100)*.04: GOTO 2590                   '*  2907
2550 IF MT<140 THEN B(21)=3.3+(MT-120)*.045: GOTO 2590                  '*  2964
2560 IF MT<160 THEN B(21)=4.2+(MT-140)*.05: GOTO 2590                   '*  2917
2570 IF MT<=180 THEN B(21)=5.2+(MT-160)*.055: GOTO 2590                 '*  3037
2580 IF MT>180 THEN B(21)=6.3+(MT-180)*.06                              '*  2288
2590 W=B(21): B(21)=FNR(W) '--ROUND OFF MO TX                           '*  1429
2600 B(23)=GP -B(19)-B(20)-B(21)-B(22) '---CALC NET PAY                 '*  1895
2610 '--------SCREENPRINT PAYCHECK------
2620 CLS: PRINT: PRINT "DATE.....";B$(13): PRINT                        '*  2925
2630 PRINT B$(2); TAB(22) "EMP. #"B(1);TAB(34) "STATUS? "B$(6); TA
     B(47) "EXEMPTIONS:"B(8);TAB(63) "RATE:" B(9): PRINT                '*  6669
2640 PRINT USING "HOURS - REGULAR     ##.##";B(14);: PRINT TAB(35);
     : PRINT USING "REGULAR PAY                $###.##"; RP             '*  6712
2650 PRINT USING "HOURS - O/T         ##.##";B(15);: PRINT TAB(35);
     : PRINT USING "OVERTIME PAY               ###.##";OP               '*  6540
2660 PRINT USING "WAGES            $ ###.##";RP+ OP;: PRINT TAB(38)
     ;: PRINT USING "WAGES                     ###.##";RP + OP          '*  6432
2670 PRINT USING "TOTAL TIPS       $ ###.##";B(16);: PRINT TAB(35);
     : PRINT USING "SOCIAL SECURITY DEDUCTIONS    ###.##";B(19)         '*  7256
2680 PRINT USING "TOTAL GROSS      $ ###.##";B(17);: PRINT TAB(35);
     : PRINT USING "FEDERAL WITHHOLDING:          ###.##"; B(20)        '*  7049
```

Listing continued

calculated during the print cycle and is not written to disk. The routine uses condensed print, and then returns the printer to normal.

Module 6 (lines 6000–6120) prints a listing of all employees (active and inactive) as well as month-to-date totals for each employee (see Fig. 4). It keeps running totals in each category for you much as Module 5 does.

Module 7 (lines 7000–7150) is the menu. It begins with the command LPRINT CHR$(6), which resets the printer line counter before each printout. You can also use LPRINT CHR$(12) to automatically advance the paper to the top of a form. The menu is self-explanatory.

The program ends with two system commands. Line 7160 makes a back-up copy of the data file on drive 1, and line 7170 returns to TRSDOS.

Tandy 1000 Changes

Barefoot Basic Payroll will run on the Tandy 1000 with the following changes: First, change all Print@ statements to Locate statements. Remember, though, that Print@ statements start at 0,0 and Locate statements start at 1,1. Therefore, add 1 to each Print@ location. For example:

```
60 CLS:PRINT@(2,25),"Payroll Program"
```

becomes

```
60 CLS:LOCATE 3,26:PRINT"Payroll Program"
```

In this program, however, it makes little difference whether you add to the Print@ values, unless a zero location is used.

Change the PRINT@ 20 in lines 1020 and 4100 to LOCATE 1,20:PRINT. Change the PRINT@ 820 in lines 5010 and 6005 to LOCATE 10,20:PRINT.

The STRING$ command in lines 1040–1140, 2040, and 4370 prints a dotted line for screen input. Change the ASCII value 160 to 45 (or the ASCII value of whatever character you prefer).

Change lines 70 and 80 to:

```
70 LOCATE 8,1:PRINT "Data from this program is stored in a disk file named PAYROLL.DAT"
80 PRINT:PRINT "Before continuing, check to make sure the printer is turned on and the paper is lined up."
```

Change TRSDOS in line 7080 to MS-DOS.

Delete lines 100, 7075, 7145, and 7160. Delete the CLEAR in line 30.

Change PAYROLL/DAT:0,200 to PAYROLL.DAT,200 in lines 130, 1010, and 4010. Change LF = LOF(1) to LF = LOF(1)/200 in lines 130 and 4010. Change X = LOF(1) + 1 to X = (LOF(1)/200) + 1 in line 1010.

Finally, enter Basic with the command BASIC /S:200/I to run the program. ■

G.S. Bradshaw is a retired physicist and mathematician who does consulting work for several small businesses using Model IIIs and 4's. Write him at P.O. Box 1112, Branson, MO 65616.

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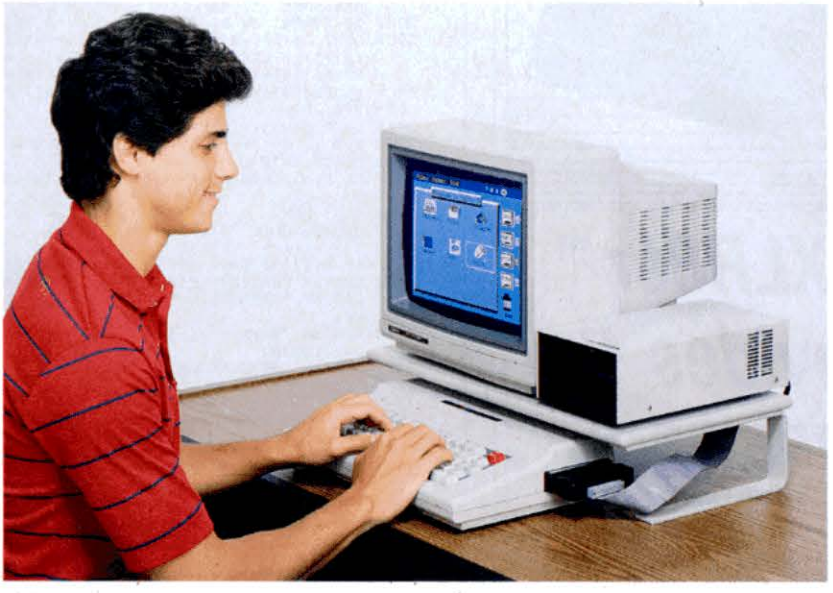

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Listing continued

```
2690 PRINT TAB(35);:  PRINT USING "STATE WITHHOLDING:          ##
     #.##"; B(21)                                             '*  4388
2700 PRINT USING "TIPS AS WAGES   $ ###.##"; B(18);: PRINT TAB(35)
     ;: PRINT USING "OTHER DEDUCTIONS:           ###.##"; B(22)  '*  7006
2710 PRINT TAB(35);: PRINT USING "   NET PAY:                 $#,###
     .##"; B(23): PRINT                                       '*  4424
2720 IF B(18)>B(16) THEN PRINT "NOT ENOUGH TIPS TO MEET MINIMUM WA
     GE.....": PRINT: SOUND 7,2                               '*  5720
2730 PRINT: INPUT "ENTER <C> to make changes----Press <ENTER> to c
     ontinue:  "; E$                                          '*  6011
2740 IF E$="C" OR E$="c" THEN CLS: GOTO 2170                  '*  2501
2750 LSET A$(13)=B$(13): LSET A$(14)=MKS$(B(14)): LSET A$(15)=MKS$
     (B(15)): LSET A$(16)=MKS$(B(16)): LSET A$(17)=MKS$(B(17)): LS
     ET A$(18)=MKS$(B(18)): LSET A$(19)=MKS$(B(19)): LSET A$(20)=M
     KS$(B(20)): LSET A$(21)= MKS$(B(21)): LSET A$(22)=MKS$(B(22))
     $(B(22))                                                 '* 13660
2760 LSET A$(23)= MKS$(B(23))                                 '*  1559
2770 PUT 1, X  '----SAVE CURRENT PAYROLL ON DISC              '*   734
2780 GOSUB 2830                                               '*   862
2790 IF FL=1 THEN FL=0: GOTO 2810  '---BACK TO MENU IF SINGLE CHEC
     K                                                        '*  1933
2800 CLS: NEXT                                                '*   869
2810 CLOSE: GOTO 7010                                         '*  1244
2820 ' -----------PRINT CHECK STUB
2830 IF B(17)=0 THEN 2980 ELSE 2840  'IF GROSS IS ZERO THEN SKIP  '*  1917
2840 LPRINT CHR$(27) CHR$(14)  '---ENLARGED PRINT             '*  1657
2850 LPRINT "PAYROLL..."+CN$:  LPRINT CHR$(27) CHR$(15)  'STD. PRI
     NT                                                       '*  3263
2860 LPRINT "Week ending "B$(13); "  Paycheck information for "B$(
     2): LPRINT                                               '*  5625
2870 LPRINT USING "HOURS - REGULAR     ##.##";B(14);: LPRINT TAB(35
     );: LPRINT USING "REGULAR PAY               $###.##"; RP   '*  6945
2880 LPRINT USING "HOURS - O/T         ##.##";B(15);: LPRINT TAB(35
     );: LPRINT USING "OVERTIME PAY               ###.##";OP    '*  6773
2890 LPRINT USING "WAGES             $ ###.##";RP + OP;: LPRINT TAB(
     38);: LPRINT USING "WAGES                   ###.##";RP + OP '*  6697
2900 LPRINT USING "TOTAL TIPS        $ ###.##";B(16);: LPRINT TAB(35
     );: LPRINT USING "SOCIAL SECURITY DEDUCTIONS  ###.##";B(19)  '*  7480
2910 LPRINT USING "TOTAL GROSS       $ ###.##";B(17);: LPRINT TAB(35
     );:LPRINT USING "FEDERAL WITHHOLDING:        ###.##"; B(20)  '*  7241
2920 LPRINT TAB(35);:LPRINT USING "STATE WITHHOLDING:          ##
     #.##"; B(21)                                             '*  4472
2930 IF B(16)<=0 THEN 2950 ELSE 2940                          '*  1975
2940 LPRINT USING "TIPS AS WAGES   $ ###.##"; B(18);          '*  2928
2950 LPRINT TAB(35);:LPRINT USING "OTHER DEDUCTIONS:           ##
     #.##"; B(22)                                             '*  4430
2960 LPRINT TAB(35);:LPRINT USING "   NET PAY:              $#,##
     #.##"; B(23): LPRINT: LPRINT                             '*  5190
2980 RETURN                                                   '*   723
3000 '  PRINT EMPLOYEE DATA FILE
3010 LPRINT CHR$(27) CHR$(20)  '---CONDENSED PRINT            '*  1644
3020 CLS: GOSUB 130                                           '*  1109
3030 FOR X=1 TO LF: GET 1, X: GOSUB 220                       '*  2277
3040 LPRINT USING " ##   \                   \   \
                 \   \                       \   \
          \"; B(1), A$(2), A$(3), A$(4), A$(5)                '*  6981
3050 LPRINT USING "STATUS  \\  ACTIVE \\  EXEMPT. ##  P/R #.##  O/
     R ##.##  FED W/H DED  ###.##   STATE W/H DED  ###.##"; A$(6),
      A$(7), B(8), B(9), B(10), B(11), B(12)                  '*  8742
3060 NEXT                                                     '*   552
3070 LPRINT CHR$(27) CHR$(19)  '---NORMAL PRINT               '*  1658
3080 CLOSE: GOTO 7010                                         '*  1244
4000 '  CHANGE EMPLOYEE RECORDS
4010 CLS: OPEN "R", 1, "PAYROLL/DAT:0",200: LF=LOF(1)         '*  3061
4020 PRINT @ (5,25), "Enter employee number to change: ";: INPUT X  '*  4931
4030 IF X>LF THEN PRINT @ (5,25), "NO SUCH RECORD EXISTS
       ": FOR T=1 TO 2500: NEXT: CLOSE: GOTO 7010             '*  6371
4040 PRINT @ (7,15),  "C H A N G E   E M P L O Y E E   D A T A
     F I L E"                                                 '*  3711
4050 PRINT @ (9,22), "ENTER <1> TO CHANGE EMPLOYEE DATA "     '*  3404
4060 PRINT @ (10,22), "ENTER <2> TO CHANGE CURRENT PAYCHECK INFORM
     ATION"                                                   '*  4525
4070 PRINT @ (11,22), "ENTER <3> TO CHANGE MTD FIGURES";: INPUT E  '*  3939
4080 CLS: ON E GOTO 4100, 4370, 4400                          '*  1942
4090 ' -----------CHANGE BASIC EMPLOYEE DATA
4100 PRINT @ 20, "  C H A N G E   E M P L O Y E E   D A T A": PRI
     NT                                                       '*  3563
4110 PRINT @ (1,32), "for employee number " X                 '*  3230
4120 FIELD 1, 2 AS A$(1), 19 AS A$(2), 30 AS A$(3), 30 AS A$(4), 1
     1 AS A$(5), 1 AS A$(6), 1 AS A$(7), 2 AS A$(8), 4 AS A$(9), 4
      AS A$(10), 4 AS A$(11), 4 AS A$(12), 88 AS D3$: GET 1,X '*  8969
4130 B(1)=CVI(A$(1)): B$(2)=A$(2): B$(3)=A$(3): B$(4)=A$(4): B$(5)
     =A$(5): B$(6)=A$(6): B$(7)=A$(7): B(8)=CVI(A$(8)): B(9)=CVS(A
     $(9)): B(10)=CVS(A$(10)): B(11)=CVS(A$(11)): B(12)=CVS(A$(12)
4140  PRINT: PRINT "1.  Employee name: " B$(2): PRINT "2.  Address
      " B$(3): PRINT "3.  City, state, zip: "B$(4): PRINT "4.  Soc
     ial Security #: " B$(5): PRINT "5.  Marital status: " B$(6)  '* 12513
4150 PRINT "6.  Active <Y> or <N>:  " B$(7): PRINT "7.  Exemptions
     :  " B(8);: PRINT TAB(35) "Fed W/H dependency deduction:  ";
     B(11): PRINT "8.  Hourly pay rate: " B(9): PRINT "9.  Overtim
     e pay rate :"B(10)                                       '* 14220
4160 PRINT USING "10. State W/H deduction (standard + dependency):
        $####  (Annual) ";B(12)*52                            '*  6759
4170 PRINT: PRINT TAB(15) "IF NO MORE CHANGES  ARE NEEDED, ENTER <
     11>"                                                     '*  4301
4180 PRINT: INPUT "ENTER the number of the item to change from the
      list above: " ; L: IF L= 11 THEN 4350                   '*  7852
4190 IF L<1 OR L>11 THEN 4180                                 '*  1631
4200 PRINT : PRINT "Enter correct information ";              '*  3855
4210 ON L GOTO 4220,4230,4240,4250,4260,4270,4280,4290,4300, 4310  '*  3328
4220 INPUT B$(2): GOTO 4330                                   '*  1534
```

Listing continued

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```
4230 INPUT B$(3): GOTO 4330                                                    '*  1536
4240 LINE INPUT B$(4): GOTO 4330                                               '*  1866
4250 INPUT B$(5): GOTO 4330                                                    '*  1540
4260 INPUT B$(6): GOTO 4330                                                    '*  1542
4270 INPUT B$(7): GOTO 4330                                                    '*  1544
4280 INPUT B(8):B(11)=B(8)*36.54: GOTO 4330                                    '*  2375
4290 INPUT B(9): B(9)=B(9)/100: GOTO 4330                                      '*  2263
4300 INPUT B(10): B(10)=B(10)/100: GOTO 4330                                   '*  2375
4310 INPUT " - Annual deduction (standard + dependency)"; MO                   '*  4810
4320 MO=MO/5200: B(12)=FNR(MO)                                                 '*  1716
4330 LSET A$(1)=MKI$(B(1)): LSET A$(2)=B$(2): LSET A$(3)=B$(3): LS
     ET A$(4)=B$(4):LSET A$(5)=B$(5): LSET A$(6)=B$(6): LSET A$(7)
     =B$(7): LSET A$(8)=MKI$(B(8)): LSET A$(9)=MKS$(B(9)): LSET A$
     (10)=MKS$(B(10)): LSET A$(11)=MKS$(B(11)): LSET A$(12)=MKS$(B
     )=MKS$(B(12))                                                             '* 13850
4340 PUT 1,X: GOTO 4100                                                        '*  1329
4350 CLOSE: GOTO 7010                                                          '*  1245
4360 '------CHANGE CURRENT PAYDATA
4370 PRINT @ (3,10), "Check date:"; TAB(32); STRING$(12,160)+STRIN
     G$(5,32);: PRINT @ (3,31),;:LINE INPUT DA$ : IF LEN(DA$)>12 T
     HEN 4370                                                                  '*  7996
4380 GOSUB 140: GET 1,X: GOSUB 220                                             '*  1985
4390 FL=1: GOTO 2170                                                           '*  1133
4400 '-----CHANGE MTD DATA
4410 GOSUB 160: GET 1, X: GOSUB 250: PRINT: PRINT                              '*  2990
4420 PRINT @ (2,5), "This change procedure requires that each corr
     ect sum be re-entered.  IF ANY TIME   you simply press <ENTER
     >, the current sum will be replaced with a zero
               All sums should be entered without decimal points"
     oints"                                                                    '* 20240
4430 PRINT: PRINT TAB(15) "MO TO DATE";: PRINT TAB(52) "CORRECT":
     PRINT                                                                     '*  4412
4440 PRINT TAB(9) USING "WAGES          ####.##";B(24);: PRINT TAB
     (50);: INPUT B(24): B(24)=B(24)/100                                       '*  5445
4450 PRINT TAB(9) USING "FICA           ####.##";B(25);: PRINT TAB
     (50);: INPUT B(25): B(25)=B(25)/100                                       '*  5382
4460 PRINT TAB(9) USING "FED W/H        ####.##";B(26);: PRINT TAB
     (50);: INPUT B(26): B(26)=B(26)/100                                       '*  5461
4470 PRINT TAB(9) USING "STATE W/H      ####.##";B(27);: PRINT TAB
     (50);: INPUT B(27): B(27)=B(27)/100                                       '*  5580
4480 PRINT TAB(9) USING "TIPS AS WAGES  ####.##";B(28);: PRINT TAB
     (50);: INPUT B(28): B(28)=B(28)/100                                       '*  5741
4490 PRINT TAB(9) USING "TOTAL TIPS     ####.##";B(29);: PRINT TAB
     (50);: INPUT B(29): B(29)=B(29)/100                                       '*  5675
4500 PRINT TAB(9) USING "NET PAY        ####.##";B(30);: PRINT TAB
     (50);: INPUT B(30): B(30)=B(30)/100                                       '*  5488
4510 PRINT: PRINT: INPUT "          ARE ALL ENTRIES CORRECT..."; E
     $:  IF E$="Y" THEN 4520 ELSE 4400                                         '*  5710
4520 GOSUB 200: PUT 1,X :CLOSE: GOTO 7010                                      '*  2448
5000 '  PRINT CURRENT PAYROLL SUMMARY
5010 CLS: PRINT @ 820, "Printing weekly payroll summary"                       '*  4518
5020 LPRINT: LPRINT "WEEKLY PAYROLL FOR "CN$ ;: LPRINT TAB(50) "RE
     PORT DATED " DATE$: LPRINT CHR$(27) CHR$(20)                              '*  6824
5030 LPRINT "EMP #   NAME                    HOURS  O/T HRS     WAGE
     S     TIPS    FICA     FED W/H   ST. W/H  OTHER DED    NET PA
     Y    TIPS/WAGES"                                                          '*  7755
5040 GOSUB 130                                                                 '*   797
5050 FOR X=1 TO LF: GET 1, X: GOSUB 220                                        '*  2281
5060 IF B$(7)="N" THEN 5110                                                    '*  1421
5070 GP=B(17)-B(16)                                                            '*   994
5080 S$= "##   \                \  ####.##   ###.##    ####.##
     ####.##  ####.##   ####.##    ###.##    ###.##     ####.##
       ####.##"                                                                '*  4986
5090 LPRINT USING S$; CVI(A$(1)), A$(2),B(14),B(15),GP, B(16),B(19
     ),B(20),B(21),B(22),B(23), B(18)                                          '*  5114
5100 TP1=TP1+B(14): TP2=TP2+B(15): TP3=TP3+GP: TP4=TP4+B(16): TP5=
     TP5+B(19): TP6=TP6+B(20): TP7=TP7+B(21): TP8=TP8+B(22): TP9=T
     P9+B(23): TP10=TP10+B(18)                                                 '*  8897
5110 NEXT                                                                      '*   550
5120 A$(2)= "  WEEKLY TOTAL": LPRINT USING S$; X , A$(2), TP1, TP2
     , TP3, TP4, TP5, TP6, TP7, TP8, TP9, TP10: TP1=0: TP2=0: TP3=
     0: TP4=0: TP5=0: TP6=0: TP7=0: TP8=0: TP9=0: TP10=0                       '* 10407
```

Listing continued

Listing continued

```
5130 CLOSE: LPRINT CHR$(27) CHR$(19)                                           '*  2121
5140 GOTO 7010                                                                 '*   779
6000 '  PRINT MONTH TO DATE PAYDATA
6005 CLS: PRINT @ 820, "Printing Month to Date Payroll Summary"                '*  4993
6010 LPRINT : LPRINT "MONTH TO DATE PAYROLL";: LPRINT TAB(50) "REP
     ORT DATED "DATE$: LPRINT                                                  '*  5811
6020 LPRINT "Employee No.     WAGES      TIPS     FICA     FED W/H    S
     T W/H    NET PAY TIPS/WAGES"                                              '*  5731
6030 R$=  " #####.##  ####.##  ####.##  ####.##  ####.##  #####.##
       ####.##"                                                                '*  2822
6040 GOSUB 130                                                                 '*   798
6060 FOR X = 1 TO LF: GET 1,X: GOSUB 230                                       '*  2316
6070 B(24)=B(24)+B(17)-B(16): B(25)=B(25)+B(19): B(26)= B(26)+ B(2
     0): B(27)=B(27)+ B(21): B(28)=B(28)+B(18): B(29)=B(29)+B(16):
      B(30)=B(30)+B(23)                                                        '*  7151
6080 LPRINT TAB(3) X;: LPRINT TAB(13) USING R$; B(24), B(29), B(25
     ), B(26), B(27), B(30), B(28)                                             '*  5134
6090 MT1=MT1+B(24): MT2=MT2+B(25): MT3=MT3+B(26): MT4=MT4+B(27): M
     T5=MT5+B(28): MT6=MT6+B(29): MT7=MT7+B(30)                                '*  6244
6100 NEXT                                                                      '*   550
6110 LPRINT "Mo to date  ";: LPRINT USING R$; MT1, MT6,MT2,MT3,MT4
     ,MT7,MT5: MT1=0: MT2=0: MT3=0: MT4=0: MT5=0: MT6=0: MT7=0                 '*  7718
6120 CLOSE: GOTO 7000                                                          '*  1241
7000 '  MENU
7010 CLS: LPRINT CHR$(6);: PRINT @ 266, "P A Y R O L L   P R O G R
      A M"                                                                     '*  3984
7020 PRINT: PRINT: PRINT TAB(24) "ENTER <P> TO CALCULATE CURRENT P
     AYROLL"                                                                   '*  4789
7030 PRINT TAB(30) "<C> TO CHANGE AN EMPLOYEE RECORD"                          '*  3290
7040 PRINT TAB(30) "<A> TO ADD EMPLOYEES"                                      '*  2497
7050 PRINT TAB(30) "<D> PRINT EMPLOYEE DATA FILE"                              '*  3053
7060 PRINT TAB(30) "<S> PRINT SUMMARY OF CURRENT PAYROLL"                      '*  3724
7070 PRINT TAB(30) "<M> PRINT MONTH TO DATE TOTALS"                            '*  3228
7075 PRINT TAB(30) "<B> TO BACKUP DATA TO DRIVE :1"                            '*  3078
7080 PRINT TAB(30) "<X> TO EXIT TO TRSDOS":PRINT:PRINT                         '*  3530
7090 INPUT "Enter choice: ", E$: IF E$="P" OR E$="p"  THEN 2000                '*  3915
7100 IF E$="C" OR E$="c" THEN 4000                                             '*  1829
7110 IF E$="A" OR E$="a" THEN 1000                                             '*  1823
7120 IF E$="D" OR E$="d" THEN 3000                                             '*  1832
7130 IF E$="S" OR E$="s" THEN 5000                                             '*  1865
7140 IF E$="M" OR E$="m" THEN 6000                                             '*  1887
7145 IF E$="B" OR B$="b" THEN 7160                                             '*  1843
7150 IF E$="X" OR E$="x" THEN 7170 ELSE 7010                                   '*  2448
7160 CLOSE: SYSTEM "COPY PAYROLL/DAT:0 :1": GOTO 7010                          '*  3325
7170 CLOSE: SYSTEM                                                             '*  1188  End
```

Program Listing 2. Sample Basic code.

```
10 DEF FNR(X)=1+ABS((X=>36)+(X=>93)+(X=>574))                                  '*  2550
20 INPUT "TAXABLE WAGES "; A: B=FNR(A)                                         '*  2331
30 ON B GOTO 40,50,60,70                                                       '*  1301
40 TX = 0: GOTO 80                                                             '*  1016
50 TX = (A-36)*.11: GOTO 80                                                    '*  1451
60 TX = (A-93)*.15+6.27: GOTO 80                                               '*  1707
70 TX = (A-574)*.28+78.42: GOTO 80                                             '*  1818
80 PRINT "TAX =" TX: END                                                       '*  1472  End
```

Program Listing 3. Sample Barefoot Basic code.

```
10 INPUT "TAXABLE WAGES ";A                                                    '*  1705
20 IF A<=36 THEN TX=0: GOTO 60                                                 '*  1781
30 IF A<93 THEN TX=(A-36)*.11: GOTO 60                                         '*  2158
40 IF A<574 THEN TX=(A-93)*.15+6.27: GOTO 60                                   '*  2466
50 IF A=>574 THEN TX=(A-574)*28+78.42:GOTO 60                                  '*  2562
60 PRINT "TAX = " TX: END                                                      '*  1502  End
```

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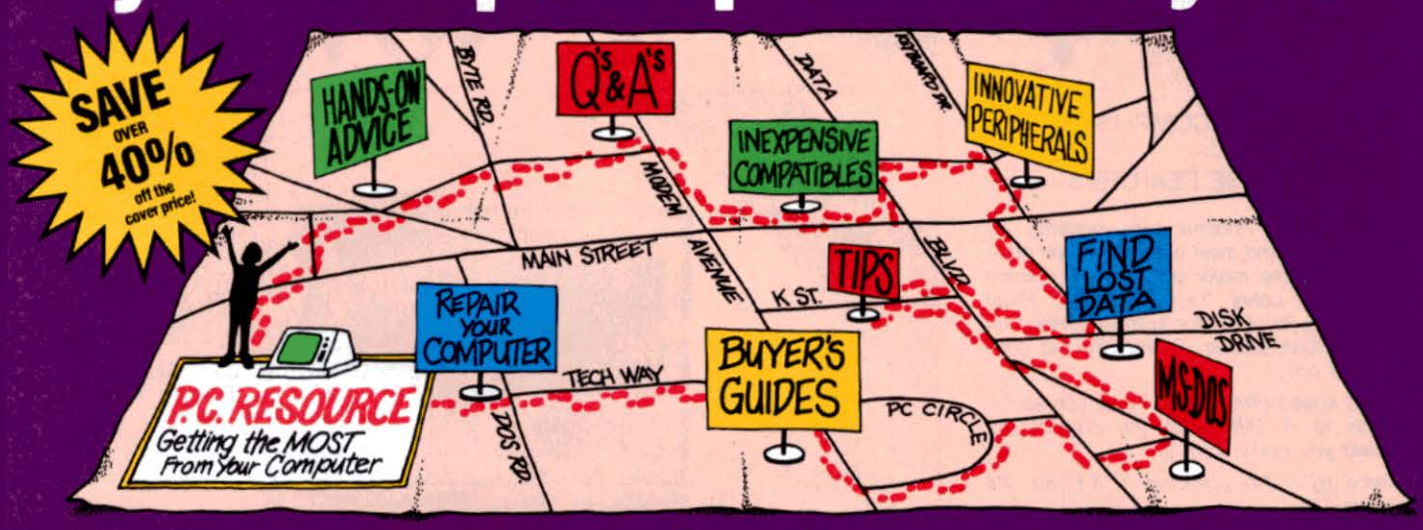

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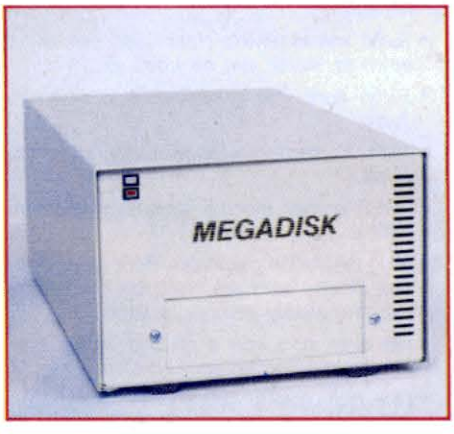

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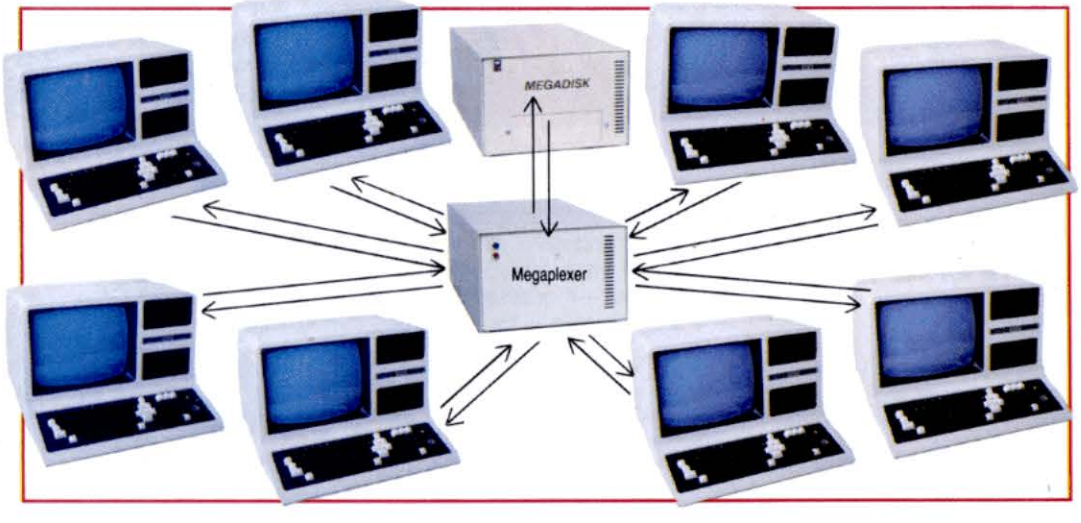

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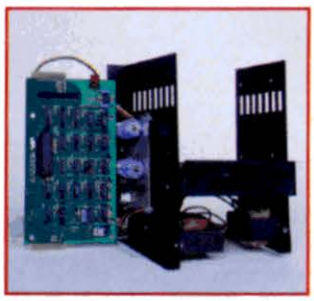

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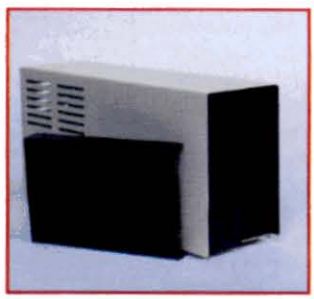

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Not wanting my BBS to be lost in the clutter of a Basic program, I wrote my own RS-232 driver program. With this program, you can put your Model 4 on line and be your own system operator (sysop).

Program Listing 1, BBS Driver, is a machine-language driver similar to Radio Shack's COM/DVR but significantly more advanced. Its features include buffered input/output (I/O), output-character translation, input-character translation (limited), carrier detection, and remote-pause capability. BBS Driver uses just under 3.5K of memory and resides at address F30 hexadecimal (hex). If any filters or drivers are present during installation a "No memory" message appears. You must remove the filters and drivers and install them after setting up BBS Driver.

Assemble the program shown and save it as BBS/DVR. Then type in and save Program Listing 2, a bare-bones BBS program, with the file name Board/BAS. Finally, type the following commands from TRSDOS, entering each one separately:

```
SET *CL BBS/DVR
LINK *KI *CL
LINK *DO *CL
SYSTEM  (SMOOTH = OFF)
SYSTEM  (DATE = OFF)
SYSTEM  (TIME = OFF)
SYSGEN
AUTO BASIC BOARD/BAS
```

LOAD 80

System Requirements

Model 4
64K RAM
Disk Basic
Editor/Assembler
Auto-answer modem

Program Listing 1. BBS Driver.

```
00100 ;OPTION   BIT 0, 1=BLOCK CLS CODES            0=DONT BLOCK CLS
00110 ;         BIT 1, 1=OUTPUT ON                  0=OUTPUT OFF
00120 ;         BIT 2, 1=UPPER & LOWER              0=UPPER CASE ONLY
00130 ;         BIT 3, 1=CR ONLY                    0=CR/LF
00140 ;         BIT 4, 1=ENABLE CONTROL MESSAGES    0=CONTROL MESSAGES OFF
00150 ;         BIT 5, 1=ENABLE CONTROL MESSAGES    0=CONTROL MESSAGES OFF
00160 ;         BIT 6, 1=
00170 ;         BIT 7, 1=
00180 ;STATUS   BIT 0, CONTROL COMMAND FOLLOWS (1=CONTROL COMMAND FOLLOWS)
00190 ;         BIT 1, CONTROL VALUE FOLLOWS (1=FOLLOWS,1ST BYTE)
00200 ;         BIT 2, CONTROL CHARACTER FOLLOWS (1=FOLLOW,2ND BYTE)
00210 ;         BIT 3, PAUSE SWITCH (1=IN PAUSE MODE)
00220 ;         BIT 4,
00230 ;         BIT 5, CARRIER DETECT STATUS BIT (0=CARRIER ON)
00240 ;         BIT 6, CLS BLOCK BIT (2ND CHAR)
00250 ;         BIT 7
00260 ;RSSTAT  RS232 CONTROL REGISTER STATUS (DEFAULT=6FH)
00270 ;CTLVAL  CONTROL KEY VALUE (NEW VALUE)
00280 ;IHEAD   INPUT BUFFER HEAD
00290 ;ITAIL   INPUT BUFFER TAIL
00300 ;OHEAD   OUTPUT BUFFER HEAD
00310 ;OTAIL   OUTPUT BUFFER TAIL
00320 ;INPBUF  INPUT BUFFER (256 BYTES)
00330 ;OUTBUF  OUTPUT BUFFER (2K BYTES)
00340 ;CTLTBL  CONTROL KEY TABLE
00350 ;
00360 ;
00370 DELAY:   EQU     10000           ;(10000/60)/60=3 MIN
00380 USTAT:   EQU     0EAH
00390 UCTRL:   EQU     0EAH
00400 URSET:   EQU     0E8H
00410 MSTAT:   EQU     0E8H
00420 UDATA:   EQU     0EBH
00430 UBAUD:   EQU     0E9H
00440 INTENB:  EQU     0E0H
00450 BR300:   EQU     55H
00460 BR1200:  EQU     77H
00470 BR2400:  EQU     0AAH
00480 VIDCTL:  EQU     84H
00490 FLAGS:   EQU     65H
00500 HIGH:    EQU     64H
00510 DSPLY:   EQU     0AH
00520 ;BBS/DVR - Bulletin Board System Communications Driver
00530          ORG     3000H
00540 INIT:    PUSH    DE              ;Get DCB address
00550          POP     IX
00560          LD      (DCBPTR),DE     ;Save in memory header
00570          LD      HL,CPYRHT       ;Display copyright
00580          PUSH    DE
00590          LD      A,DSPLY
00600          RST     28H
00610          POP     DE
00620          LD      A,FLAGS
00630          RST     28H
00640          BIT     3,(IY+2)        ;Check RUN flag
00650          JP      Z,MSG1          ;Must install via SET
00660          BIT     0,(IY+2)        ;Check if HIGH can be changed
00670          JP      NZ,MSG2         ;No memory!
00680          LD      HL,0            ;Get HIGH memory
00690          LD      B,L
00700          LD      A,HIGH
00710          RST     28H
00720          LD      DE,0FFFFH       ;See if max memory avail.
00730          XOR     A
00740          SBC     HL,DE
00750          JP      C,MSG2          ;No memory!
00760          LD      HL,MAIN-1       ;Set HIGH memory
00770          LD      A,HIGH
00780          LD      B,0
00790          RST     28H
00800          INC     HL
00810          LD      (IX+1),L
00820          LD      (IX+2),H
00830 ;
00840          LD      A,FLAGS
00850          RST     28H
00860          LD      A,(IY+28)       ;Get ICNFG op-code
00870          LD      (ICNFG),A
00880          LD      L,(IY+29)       ;Get ICNFG address
00890          LD      H,(IY+30)
00900          LD      (ICNFG+1),HL
00910          LD      HL,PWRUP
```

Listing 1 continued

Listing 1 continued

```
00920           LD      (IY+29),L
00930           LD      (IY+30),H
00940           LD      A,0C3H
00950           LD      (IY+28),A
00960           LD      BC,14
00970           ADD     IY,BC
00980           LD      (IX+00H),07H    ;NIL/CTL/PUT/GET
00990           LD      (RETINT+1),IY   ;Save port 84H image address
01000           LD      (FLAG1+1),IY
01010 ;
01020           LD      HL,(0038H+1)    ;Patch in interupt routine
01030           LD      (CONTIN+1),HL
01040           LD      A,(0038H)
01050           LD      (CONTIN),A
01060           LD      A,0C3H
01070           LD      HL,INTRPT
01080           DI
01090           LD      (0038H),A       ;Patch out old address
01100           LD      (0038H+1),HL
01110           EI
01120           LD      A,FLAGS
01130           RST     28H
01140           LD      A,(IY+22)       ;Enable RS232 interupts
01150           OR      20H
01160           LD      (IY+22),A
01170           OUT     (INTENB),A
01180 ;
01190 ;Initialize uart now
01200           LD      A,01H
01210           OUT     (URSET),A       ;UART Reset
01220           LD      A,(RSSTAT)      ;Get RS232 status
01230           OUT     (UCTRL),A
01240           LD      A,BR300         ;300 BAUD
01250           OUT     (UBAUD),A
01260 ;
01270           LD      HL,0000H        ;Signal no errors
01280           RET
01290 ;
01300 MSG2:     LD      HL,MEMMSG
01310           JR      MSG
01320 MSG1:     LD      HL,SETMSG
01330 MSG:      LD      A,DSPLY
01340           RST     28H
01350           LD      HL,0FFFFH       ;Signal an error occured
01360           RET
01370 MEMMSG:   DEFM    'No memory space available'
01380           DEFB    0DH
01390 SETMSG:   DEFM    'Must install via SET!'
01400           DEFB    0DH
01410 CPYRHT:   DEFM    'BBS/DVR - BBS Communications Driver'
01420           DEFB    0DH
01430 ;---------------------------------------------------------------------
01440           ORG     0F300H
01450 MAIN:     JR      PSTDCB          ;IX POINTS HERE FOR INDEXING IF NEEDED
01460           DEFW    0FFFFH          ;LAST ADDRESS USED BY MODULE
01470           DEFB    DCBPTR-MAIN-5   ;NUMBER OF CHARS IN MODULE NAME
01480           DEFM    '$BBS'
01490 DCBPTR:   DEFW    0000H
01500           DEFW    0000H
01510 PSTDCB:   JP      MAIN1
01520 ;
01530 RETINT:   LD      A,(0000H)       ;Restore port 84H
01540           OUT     (VIDCTL),A
01550           POP     HL
01560           POP     BC
01570           POP     AF
01580           EI
01590           RETI
01600 INTRPT:   PUSH    AF
01610           PUSH    BC
01620           PUSH    HL
01630 FLAG1:    LD      A,(0000H)
01640           AND     8CH
01650           OR      03H
01660           OUT     (VIDCTL),A
01670           IN      A,(USTAT)       ;Character available in uart?
01680           RLA
01690           JR      NC,OUTCAR       ;No character, go output a char.
01700           LD      HL,DELAY        ;Reset timeout counter
01710           LD      (COUNTR),HL
01720           LD      HL,STATUS       ;Get PAUSE status bit
01730           IN      A,(UDATA)
01740           CP      13H             ;Control S - Pause?
01750           JR      NZ,TSTPAU
01760 RESPAU:   LD      A,(HL)
01770           XOR     08H
01780           LD      (HL),A
01790           JP      CONINT
01800 TSTPAU:   BIT     3,(HL)
01810           JR      NZ,RESPAU
01820           OR      A
01830           JR      Z,PUTCAR
01840           CP      0DH             ;Dont convert 0D
01850           JR      Z,OFLUSH
01860           LD      HL,OPTION       ;Test for convert control chars.
01870           BIT     5,(HL)
01880           JR      Z,PUTCAR        ;Dont convert control chars.
01890           CP      1BH             ;Is it a control key?
01900           JR      NC,PUTCAR       ;Not a control key
01910           CP      08H
01920           JR      C,CONVRT        ;Convert 01-07
01930           CP      0BH
01940           JR      C,PUTCAR        ;Dont 08 thru 0A
01950           CP      18H
01960           JR      Z,PUTCAR        ;Dont 18
```

Listing 1 continued

The Set and Link commands load BBS Driver into memory, protect it, and patch it into the Model 4's keyboard and screen routines (more about that later). The Smooth command supports caller type-ahead (the caller can enter data before the computer actually asks for it). Unfortunately, this slows disk access. Entering the Date and Time commands in this manner prevents TRSDOS from requesting them on initial boot-up and on reset. The Sysgen command saves a copy of the current configuration with BBS Driver installed on disk. After completing and debugging the BBS, you can remove the original program, BBS Driver, to save a little disk space. Finally, the Auto command will run your Basic BBS program, Board/BAS, whenever the system is turned on.

When BBS Driver is installed, it is linked to the Model 4's keyboard and screen routines, effectively expanding them to the caller's terminal. Anything shown on the Model 4's screen is also displayed at the caller's terminal, and everything he types appears as if it had been typed on the Model 4's keyboard. This scheme lets you use simple Input and Print commands to send and recieve data from the caller, and allows you to design and experiment with your BBS from the Model 4's keyboard and screen before going on line. For example, you could use the following Basic program to request caller identification:

```
10 PRINT ("Please enter your ID number")
20 LINE INPUT ID$
```

Drive-In(put)

All I/O to and from the RS-232 port is buffered, which means that BBS Driver stores characters until Basic is ready for them. The input buffer (from the modem) holds up to 256 characters, and the output buffer (to the modem) holds 2,048 characters. Input buffering allows the caller to type ahead and helps Basic keep up with high-speed modems or computer-to-computer transmissions. If data is input from the modem faster than Basic can handle and the buffer fills up, all succeeding characters are lost. Output buffering makes a BBS appear very fast since Basic can access a disk or perform computations while the buffer outputs text. It also provides a way for the caller to rapidly skip past long pages of text by erasing the buffer on command. If the output buffer fills because Basic is sending data too fast, BBS Driver waits until there is more room.

Chain of Command

BBS Driver uses single-character commands to select functions. The ASCII code 01 hex must precede all commands. For example, PRINT CHR$(1)"A" sends the A command. You can chain any number of commands within one command, so a multiple-command statement could be PRINT CH$(1)"ATJ". See the Table for a

Character filtering lets the sysop match the calling terminal's requirements.

list of BBS Driver commands.

The BBS Driver command set breaks down into three catagories: character filtering, driver control, and communications protocol.

The communications protocol commands are A, B, C, V, W, X, and Y. The A, B, and C commands select the system baud rate. Any modem can handle 300 baud, but you must have a special high-speed modem for the higher rates of 1,200 and 2,400 baud. The V and W commands select the number of bits that the computer sends and receives (either 7 or 8). If you select 7-bit word, the most-significant bit of every character becomes zero. The last commands, X and Y, let you choose the desired number of stop bits. Most BBSes use 300 baud, an 8-bit word, and one stop bit. I suggest that you use this protocol for your BBS as well. You can send commands at any time, even during a call. Some modems, however, do not allow such changes.

Character Filtering

Character filtering lets the sysop modify characters being input or output to better match the calling terminal's requirements. The character filter commands are D, I, L, M, P, Q, R, and S. Remember that only the RS-232's characters are filtered, not those typed from the Model 4's keyboard or displayed on its screen.

The D command lets you change the value of control codes that the Model 4 outputs. The syntax for making changes is the command followed by the new key and the old key. For example, suppose a caller's terminal expects a control-P (delete) command instead of a control-H (backspace) to back over and erase a character. To change control-H to control-P, type and enter PRINT CHR$(1)"DPH". The change stays in effect until you reset the system, and any characters outside the range A–Z are ignored.

To prevent a control key from being output, change its value to an at sign (@). Be careful changing control-A, since it is the code that BBS Driver uses to begin a command sequence. Change control-A only when you want BBS Driver to use a different control code to start commands.

You can clear your screen with the Basic CLS command, but the codes that comprise it, ASCII 1C hex and 1F hex, are also sent to the caller and can possibly cause a

Listing 1 continued

```
01970 CONVRT: ADD     A,'@'
01980         LD      (CTLLET),A
01990         LD      BC,CTLMSG
02000         JP      DMPSTR
02010 CTLMSG: DEFB    0DH
02020         DEFB    '^'
02030 CTLLET: DEFB    'A'
02040         DEFW    000DH
02050 OFLUSH: LD      HL,(OHEAD)
02060         LD      (OTAIL),HL
02070 PUTCAR: LD      HL,OPTION
02080         BIT     2,(HL)          ;Lower-case allowed?
02090         JR      NZ,GETBUF
02100         CP      'a'
02110         JR      C,GETBUF
02120         CP      7BH
02130         JR      NC,GETBUF
02140         SUB     20H
02150 GETBUF: LD      HL,(IHEAD)      ;Save character in buffer
02160         LD      (HL),A
02170         INC     L
02180         LD      A,(ITAIL)       ;Test for crash into TAIL
02190         CP      L
02200         JR      NZ,WRIHED
02210         LD      A,(ITAIL+1)
02220         CP      H
02230         JP      Z,RETINT        ;Crashed into TAIL, dont save new HEAD
02240 WRIHED: LD      (IHEAD),HL      ;Write input HEAD down
02250         JP      RETINT
02260 OUTCAR: IN      A,(USTAT)       ;Transmit uart buffer full?
02270         AND     40H
02280         JR      Z,TESTCD        ;Buffer full, go test carrier detect
02290         LD      HL,(OTAIL)
02300         LD      A,(OHEAD)       ;See if buffer is empty
02310         CP      L
02320         JR      NZ,OUTBYT       ;Buffer has data, output it
02330         LD      A,(OHEAD+1)
02340         CP      H
02350         JR      Z,TESTCD        ;Buffer empty, go test carrier detect
02360 OUTBYT: LD      A,(HL)          ;Get character from output buffer
02370         CP      13H             ;Pause code?
02380         LD      A,(STATUS)      ;Get status for testing later
02390         JR      NZ,OUTDAT       ;Not pause, go output data
02400         OR      08H             ;Pause code, turn pause on
02410         LD      (STATUS),A
02420         JR      SKPOUT          ;Dont actually output pause character
02430 OUTDAT: AND     08H             ;In pause mode?
02440         JR      NZ,TESTCD       ;In pause, dont output right now
02450         LD      A,(HL)          ;Output on, get character and send it
02460         OUT     (UDATA),A
02470 SKPOUT: INC     HL              ;Increment TAIL pointer
02480         LD      A,H             ;Force wrap-around within 8k
02490         OR      0F8H
02500         LD      H,A
02510         LD      (OTAIL),HL
02520 CONINT: POP     HL
02530         POP     BC
02540         POP     AF
02550 CONTIN: JP      0000H
02560 TESTCD: LD      A,(OPTION)      ;Should we check carrier?
02570         AND     10H
02580         JR      Z,TIMER         ;Dont bother, go check ring indicator
02590         LD      HL,STATUS
02600         IN      A,(MSTAT)
02610         XOR     (HL)
02620         AND     20H             ;Mask in only carrier bit
02630         JR      Z,TIMER         ;No carrier change, go test RI
02640         AND     (HL)            ;Carrier used to be off?
02650         JR      NZ,DSPCON       ;Carrier was off, go display CONNECT
02660         SET     5,(HL)
02670         LD      BC,CARSTR       ;Carrier was on before
02680 DMPSTR: LD      HL,(IHEAD)      ;Dump string to INPUT buffer
02690         LD      (ITAIL),HL      ;Flush buffer up til message
02700 DMPCAR: LD      A,(BC)          ;Dump message character
02710         INC     BC
02720         LD      (HL),A
02730         INC     L
02740         OR      A
02750         JR      NZ,DMPCAR
02760         DEC     L
02770         LD      (IHEAD),HL      ;Save new input head
02780         JR      CONINT
02790 DSPCON: RES     5,(HL)
02800         LD      BC,CONSTR
02810         JR      DMPSTR
02820 CONSTR: DEFB    0DH
02830         DEFM    'CONNECT'
02840         DEFW    000DH
02850 CARSTR: DEFB    0DH
02860         DEFM    'NO CARRIER'
02870         DEFW    000DH
02880 TIMSTR: DEFB    0DH
02890         DEFM    'TIMEOUT'
02900         DEFW    000DH
02910 TIMER:  IN      A,(MSTAT)
02920         AND     20H
02930         JR      NZ,CLRTIM       ;Clear timer
02940         LD      HL,COUNTR
02950         DEC     (HL)
02960         JP      NZ,CONINT
02970         INC     HL
02980         DEC     (HL)
02990         JP      NZ,CONINT
03000         LD      HL,3600         ;1 MINUTE
```

Listing 1 continued

Listing 1 continued

```
03010           LD      (COUNTR),HL
03020           LD      HL,STATUS       ;Reset pause bit
03030           RES     3,(HL)
03040           LD      BC,TIMSTR
03050           JP      DMPSTR
03060 CLRTIM:   LD      HL,DELAY
03070           LD      (COUNTR),HL
03080           JP      CONINT
03090 ;------------------ End of interupt processing-------------------------
03100 PWRUP:    LD      HL,(0038H+1)    ;Power-up initialization
03110           LD      (CONTIN+1),HL
03120           LD      A,(0038H)
03130           LD      (CONTIN),A
03140           LD      A,0C3H
03150           LD      HL,INTRPT
03160           DI
03170           LD      (0038H),A       ;Patch out old address
03180           LD      (0038H+1),HL
03190           EI
03200           LD      A,FLAGS
03210           RST     28H
03220           LD      A,(IY+22)       ;Enable RS232 interupts
03230           OR      20H
03240           LD      (IY+22),A
03250           OUT     (INTENB),A
03260
03270           LD      A,01H
03280           OUT     (URSET),A       ;UART Reset
03290           LD      A,(RSSTAT)      ;Get RS232 status
03300           OUT     (UCTRL),A
03310           LD      A,BR300         ;300 BAUD
03320           OUT     (UBAUD),A
03330 ICNFG:    JP      0000H
03340 MAIN1:    JP      C,INPUT
03350 OUTPUT:   LD      A,C             ;Get character
03360           LD      HL,STATUS
03370           BIT     1,(HL)          ;Control VALUE next?
03380           JR      NZ,CTLDAT
03390           BIT     2,(HL)          ;Control CHARACTER next?
03400           JR      NZ,CTLCAR
03410           BIT     0,(HL)          ;Control COMMAND next?
03420           JP      NZ,CTLCMD
03430           BIT     6,(HL)          ;Block 2nd cls code?
03440           JR      Z,MAIN2
03450           RES     6,(HL)          ;Here's second char, clear bit regard
03460           CP      1FH             ;Is this the second CLS code?
03470           JP      Z,OUTRET
03480           LD      A,1CH           ;Not second code, resend orginal
03490           CALL    SAVCAR
03500 MAIN2:    LD      A,(CTLTBL)      ;Get value for control 1
03510           CP      C               ;Start of command sequence?
03520           JR      NZ,TSTCAR
03530           SET     0,(HL)          ;Set COMMAND bit
03540           RES     1,(HL)          ;Clear VALUE & CHANGE bits
03550           RES     2,(HL)
03560           JP      OUTRET
03570 CTLDAT:   SUB     '@'
03580           JP      C,OUTRET
03590           CP      20H             ;Dont allow illegal codes
03600           JP      NC,OUTRET
03610           LD      (CTLVAL),A
03620           RES     1,(HL)
03630           SET     2,(HL)
03640           JR      OUTRET
03650 CTLCAR:   RES     2,(HL)
03660           SUB     '@'
03670           JR      C,OUTRET
03680           JR      Z,OUTRET
03690           CP      20H
03700           JR      NC,OUTRET       ;Dont allow illegal codes
03710           LD      HL,CTLTBL
03720 NXTCTL:   DEC     A
03730           JR      Z,SETCTL
03740           INC     HL
03750           JR      NXTCTL
03760 SETCTL:   LD      A,(CTLVAL)
03770           LD      (HL),A
03780           JR      OUTRET
03790 TSTCAR:   LD      HL,OPTION
03800           BIT     1,(HL)          ;OUTPUT allowed?
03810           JR      Z,OUTRET
03820           LD      A,C
03830           OR      A               ;Pass on zero-bytes
03840           JR      Z,SAVCAR
03850           CP      20H             ;Control character?
03860           JR      C,TSTCTL        ;Control, get it's equivalent
03870           BIT     2,(HL)          ;Lower-case allowed?
03880           JR      NZ,SAVCAR       ;Lower allowed, save character
03890           CP      'a'             ;Upper case letter anyway?
03900           JR      C,SAVCAR        ;Upper, go save it
03910           CP      7BH             ;Graphics character anyway?
03920           JR      NC,SAVCAR       ;Graphics, go save it
03930           SUB     20H             ;Bring upper down to lower-case
03940           JR      SAVCAR
03950 TSTCTL:   CP      0DH             ;Carrage return?
03960           JR      NZ,CTLIND       ;Index into control table
03970           BIT     3,(HL)          ;Add line-feed?
03980           JR      NZ,CTLIND
03990           CALL    SAVCAR
04000           LD      A,0AH           ;Now add a line-feed
04010 CTLIND:   LD      HL,CTLTBL       ;Get control table for index
04020 CTLNXT:   DEC     A
04030           JR      Z,GETCTL
04040           INC     HL
```

Continued on p. 140

problem on his terminal. The H and I commands block these codes from being output to the caller by turning on the CLS filter. Only the 1C and 1F hex codes are blocked. Other combinations of either 1C or 1F hex are passed on normally.

Many remote terminals require the host computer to transmit a line feed with every carriage return. The Model 4, however, does not send line feeds automatically. You can use the L and M commands to tell the Model 4 to send a line feed with every carriage return or to send each carriage return by itself. If you enable line feeds, the Model 4 sends a carriage return before a line feed.

Self-Control

TRSDOS Basic only recognizes the H (backspace), I (tab), J (line feed), M (return), and X (erase line) control keys from the Input statement. It ignores the others. This isn't desirable in all applications. You can use the P and Q commands to select an alternative: control-key translation. BBS Driver will then convert a control key to a control string that Basic can recognize. BBS Driver converts control keys to carets (^) followed by the keys' characters. For example, control-C converts to ^C and control-P converts to ^P. Control keys H, I, J, M, X, and S are never translated.

The R and S commands filter out lowercase characters and convert them to uppercase. These commands are useful with terminals that cannot handle lowercase. The R command also filters input characters and changes them to uppercase. You can use this feature to restrict input to uppercase, when entering passwords, for example. These commands do not affect uppercase, control, or graphics characters.

Driver-Control Commands

The driver-control commands (E, F, J, K, N, O, T, U, and Z) control miscellaneous functions of BBS Driver. The E command releases the caller from pause mode so he can continue displaying text on the screen. The F and G commands erase characters from the input and output buffers, respectively. This erases text in the buffer, letting Basic skip by it and display new information to the caller.

Control commands J and K enable or disable output to the caller. This lets you display information on the Model 4's screen without the caller seeing it. You can also use the K command to keep a caller's password from echoing back to his screen where others could see it. If text is in the output buffer when this command is sent, it will output up to the point where the sysop disabled it. All BBS Driver commands work with output disabled.

One of the biggest problems with creating your own BBS is detecting when a caller hangs up. Most large BBSes use intelligent modems that provide response strings. Response strings are message

strings that inform you when certain events occur, displaying, for example, "Connect" when a call comes in or "No carrier" when a caller has disconnected. You can use these modems with BBS Driver, but they are not necessary, since it provides its own message strings. The BBS program must check for this string at every input statement to ensure that the caller is still on the line. The O command turns off carrier detection.

The T and U commands control the RS-232 signals data-terminal ready (DTR) and request to send (RTS) going to the modem. The DTR and RTS signals turn the modem on so that it can answer incoming calls. A BBS can also turn them off to disconnect a caller when he is finished.

The last command, Z, resets all BBS Driver options to their default values; use it at the beginning of the BBS program. The Z command clears and resets the control value of control-A to 01 hex (the begin-command character).

Grind to a Halt

When a caller is displaying text from the Model 4, he can pause the output at any time with control-S. Output immediately halts and resumes when the caller presses any key. You can also include the ASCII code for control-S (13 hex) in output text to pause text automatically at the end of a page. For example:

```
10 PRINT "This is a page of text. . .
20 PRINT "Press any key to continue:
   ";CHR$(19);
```

The output pauses after "continue:" and resumes when the caller presses any key. If necessary, Basic can kick him out of pause mode with the E command. If the caller presses a carriage return while text is being displayed, BBS Driver erases all text in the output buffer as if the Basic program had used the G command. A caller can skip long passages of text by repeatedly pressing carriage return.

Time to Go

Time on a BBS is usually precious, but some callers waste it by connecting but not typing anything for long periods of time. BBS Driver detects this by timing every call, and if nothing happens in three minutes, it displays the message "Time-out." Basic can at this point ask a caller if he requires more time or wishes to disconnect. BBS Driver repeats the message every minute thereafter until the caller either types something or disconnects. This feature is active only when a carrier is present and cannot be turned off.

Downloading Do's and Don'ts

Some BBSes allow callers to download software. You must be careful, however, that Basic does not accidently send a control code that BBS Driver interprets as a command. BBS Driver recognizes the following control codes:

01 hex: starts command sequence
0D hex: carriage return/adds line feeds if that option is enabled.
13 hex: pause output.
1C hex and 1F hex: CLS codes (blocked if CLS filter is enabled).

You can change any control key with the D command.

BBS Driver does not filter out the break key (80 hex) or the Model 4 pause key (60 hex). If you do not want break, disable the function with the system command SYSTEM (BREAK = NO) from the TRSDOS Ready prompt. If you select 7-bit word length, no ASCII character greater than 80 hex (including break) can be received.

ODH end command	N carrier detect on
*A 300 baud	*O carrier detect off
B 1,200 baud	P control-key translate on
C 2,400 baud	*Q control-key translate off
D change control code	*R all uppercase only
*E release pause	S upper and lowercase
*F clear input buffer	T modem on (DTR/RTS on)
*G clear output buffer	*U modem off (DTR/RTS off)
H CLS filter off	V 7-bit word
*I CLS filter on	*W 8-bit word
J output enabled	*X 1 stop bit
*K output disabled	Y 2 stop bits
L carriage return only	Z reset all parameters
*M carriage return and line feed	

* = initial boot-up and reset/command-Z defaults

Table. BBS Driver commands.

Board/BAS

The sample Basic BBS program is, as said before, a bare-bones system. Use it to test BBS Driver, or build your own BBS program around it.

Note, however, that the program is set up to access specific text files from disk (lines 500–580). Those files are not included in this article, but you can easily create your own files with any text editor capable of saving in ASCII format.

Security Guards

Although no BBS is completely tamper-proof, every sysop must take certain steps to ensure the integrity of his system. The first and most logical is to disable the break key as shown above. This prevents access to the Basic BBS program. Also, save all programs with the protect option (SAVE"filespec",P), which prevents a user from listing or editing the program.

Some sysops try to prevent a user from breaking into the system by installing a routine that watches for certain keywords from the user that could crash the BBS. These routines check every line entered against a list of "illegal" words. If the routine detects an illegal word, it throws the user off the system. The list includes foul language and words that are harmful to a BBS like new, break, list, kill, remove, system, and debug.

To protect against the possibility of a user defeating the safeguards and entering TRSDOS, remove Debug from the disk. Debug includes commands to read and write directly to the disk, and a caller can use it to obtain passwords to all of the files or completely wipe out the disk. To delete Debug and its extension, type and enter from TRSDOS Ready: REMOVE SYS5/SYS.LSIDOS, then REMOVE SYS9/SYS.LSIDOS.

The next step is to assign owner and user passwords to all files. After you do this, the BBS program must specify the user password whenever it needs access to a file. The owner password gives access to all files; reserve it for yourself. Try to use passwords that are nonsensical and dissimilar. Avoid common passwords such as colors, states, months, or names. Make up your own words like "garyl," "yoms," or "rast."

Use a different password for owner and user, then set the protector level (with the ATTRIB command) as high as possible for each file. Use "read," for instance, for all programs and permanent text files and "update" for system logs and memo files. Use "write" for all other files and avoid any lower access level. Never give full access to a file or use ATTRIB (LOCK) to protect everything. If a prankster discovered the master password, he would have full access to the BBS.

Finally, minimize the damage that could be done if a user defeated all of the security precautions. On two, three, or four-drive systems, place all programs and permanent files on one disk (preferably in the boot drive) and protect it by placing tape over the write-protect notch. For single-drive systems, enable the software write-protect by typing and entering SYSTEM (WP = YES) from TRSDOS Ready. You can turn the software write-protect off in order to write a file with SYSTEM (WP = NO), but remember to turn it back on when you are finished.■

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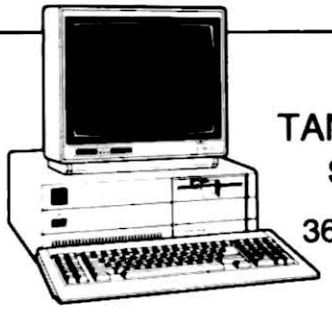

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25-4060 Hard Disk Controller
25-4061 40 Meg Hard Drive Kit
25-4062 20 Meg Hard Drive Kit
25-4103 MS-DOS 3.2/Basic/Deskmate
25-3046 Deluxe Text Display Adapter
25-3047 Deluxe Graphics Display Adapter
26-5111 VM-1 Monochrome Monitor
26-5112 CM-1 Color Monitor
*Monitors not included

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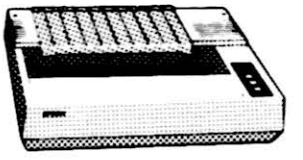

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New for MS-DOS from Hypersoft!

PCXZ 1.0 Cross-Zap Utility for PC/MS-DOS

Now, from the Author that brought you Hypercross, Hyperzap and SuperCross comes an amazing new program for owners of Tandy 1000,1200, 3000 and true PC compatibles. PC Cross-Zap allows you to read all double density TRS-80 type disks on your PC. Not only that, PCXZ offers many of the features that TRS-80 owners have long enjoyed with HyperCross and HyperZap.

PC Cross-Zap is a utility program that runs on your PC or PC-compatible. With it you can copy files to or from TRS-80 disks at will. You can also format a disk, copy disks, explore, read and write sector data, repair bad directories and much more. Long after your TRS-80 is gone you will still be able to read your old disks. Even when you TRS-80 disks are gone you can continue to use PCXZ to read, fix and modify MS-DOS and other disks so your investment will never be lost.

Formats Supported: Model I mixed density: DOS+ 3.4, DoubleDOS, LDOS (SOLE), MultiDOS, NEWDOS 80 V2, TRSDOS 2.7/8. Model I/III Double Density: DOS+ 3.5, LDOS 5.1. Model III: DOS+ 3.4, MultiDOS, NewDOS 80, TRSDOS 1.3 Model 4/4P: MultiDOS, DOS+ 4, TRSDOS 6. Max-80: LDOS 5.1. All formats also supported in double sided, 35, 40 and 80 tracks where appropriate. For 80 track formats you must have an 80 track (720K or 1.2M High Density) drive on your PC.

Main Features: With PCXZ you can format a TRS-80 disk (not the mixed density Model I types). You can copy files from a TRS-80 disk **error free,** without losing any data. Just like **HyperCross 3.0** you can instruct PCXZ to convert your BASIC files on the fly as they are copied. ASCII and word processor text files are converted so they are in the correct format for your PC. Copying can be by file or using wild cards. You can also copy files from PC format back to your TRS-80 disks.

The Disk Zap, fix and copy features are perhaps the most exciting feature in any program ever offered in support of TRS-80 and MS-DOS disk formats. For the first time when you examine a disk the program tells you what you are looking at. For instance if you are inspecting a directory entry you will be told what each byte means as you move your cursor over it. This makes repair and modification a snap because you see the results of the change as you make it. Among the many things you can do are: remove passwords, rename, delete and undelete files. All is easy with the helpful prompts and action keys of **PC Cross-Zap.** The program comes with a manual that, also for the first time in one place, explains TRS-80 and MSDOS disk formats for all the different DOS versions.

Constant improvements and generous upgrade policy. We are constantly improving our programs, adding new features and increasing performance. Ask, we may have already added the feature you need.

System Requirements: PC, XT, AT or compatible, Tandy 1000 or 1000EX (needs DMA), 1000 SX, 12000, 3000 with at least one **360K or 1.2M** drive and **256K minimum memory.** PCXZ can read, write and format 40 or 80 track TRS80 disks on a High Density drive.

An original program from Hypersoft: Get PCXZ ..... **$79.95 ppd.**
Call for special price for registered Hypercross owners.

Also for your PC: XENOCOPY II and MatchPoint

XenoCopy II runs on your PC and lets you read, write and format up to 275 different non TRS-80 formats. Includes many CP/M formats, CoCo, P-System disks and others.
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Matchpoint—PC is the hardware solution to reading and writing Apple disks on your PC. A half-size card plugs in your PC and does the job software alone cannot. Reads **Apple DOS, PRODOS, SOS, CP/M,** also **NorthStar CP/M** and many other CP/M formats. Requires installation. Some disk drives need a minor modification.
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TRS-80 Model I/III/4/4P Programs

HyperCross 3.0 - The Proven Standard in File Transfer.

Using **HYPERCROSS 3** you can **COPY** files between TRS-80 disks and those from many **CP/M** and **IBM-PC** type computers on your own TRS-80 Model I, III, 4/4P or Max-80. If you have access to more than one kind of computer, or you are changing to a new machine then you need HYPERCROSS to transfer your text files, BASIC, FORTRAN PASCAL or C programs, Viscalc files, general ledger and accounting files, data bases and even binary files. You can FORMAT alien disks, read their directories, copy files to and from them, even copy directly from one alien disk to another.

Formats supported: IBM-PC and MS-DOS compatibles include DOS 1.1, 2.0-3.2 Tandy 2000, single and double sided, 3.5 and 5 inch. CP/M from Aardvark to Zorba, including all popular TRS80 formats such as Holmes, Montezuma, and Omikron. TRS-80 Color Computer format also supported.

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 or MSDOS. As you copy, HyperCross automatically converts the Basic file, putting in spaces, changing PRINT @, correcting syntax errors and flagging parts needing manual modification.

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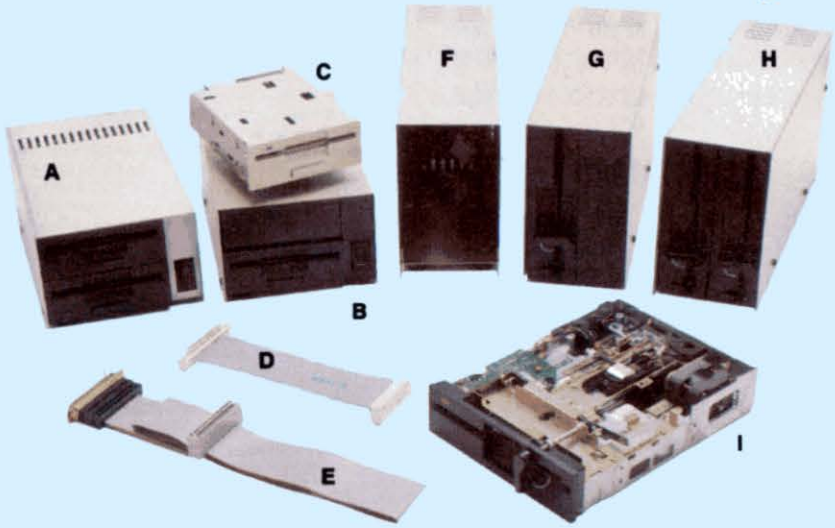

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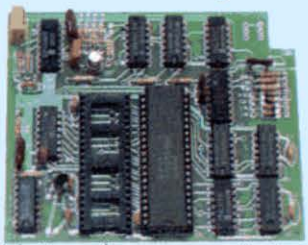

Add double density to your TRS-80 Model I by installing our DDC in your expansion interface. Lets talk about density. The Model I was designed to store data on diskettes in single density. Single density refers to the method used to write data to the disk. Your diskette is organized into tracks and sectors.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

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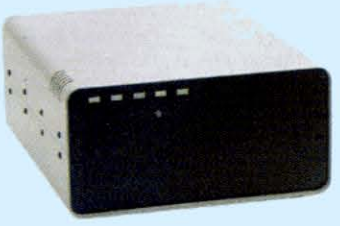

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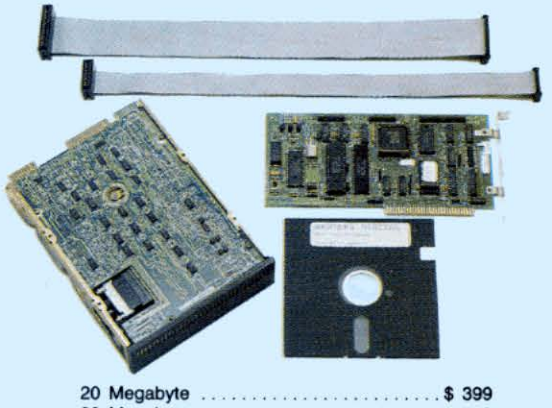

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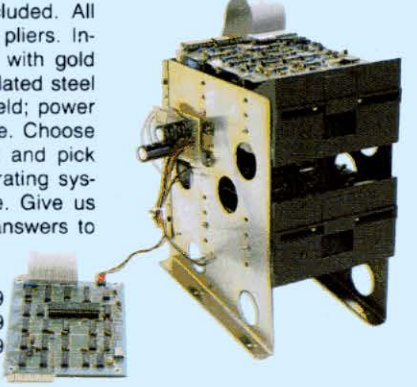

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Designed for High Performance

The Tandy 3000's 16-bit architecture operates at 8 megahertz. It features 512K main memory and a high-capacity 5¼" slimline floppy disk drive. For compatibility, this drive can read 1.2-megabyte and 360K formats for use with IBM PC diskettes.

Or for maximum storage capacity, choose the Tandy 3000 HD. In addition to the floppy drive, the 3000 HD comes with a built-in 20-megabyte or 40-megabyte hard disk drive for fast access to volumes of important data.

The Tandy 3000 has ten expansion slots, including seven PC/AT-compatible slots, two PC/XT-compatible slots and a PC/XT-compatible half-slot for a serial/parallel adapter. A serial/parallel adapter is standard, making Tandy 3000 ready to interface with modems, printers and plotters.

Tandy 3000. 512K RAM. 25-4001 . . . . . 2199.00

When purchased as a system with hard drive and controller:

Tandy 3000 HD 20-Meg. 512K RAM. 3099.00

Tandy 3000 HD 40-Meg. 640K RAM. 25-4011 . . . . 4299.00

MS-DOS™ (3.2)/BASIC/DeskMate II™. 25-4103 . . . . 99.95

XENIX Sys. V Operating System.
25-4201 . . . . . 595.00

XENIX Sys. V Development System.
25-4202 . . . . . 595.00

XENIX Sys. V Text Processing System.
25-4203 . . . . . 175.00

Additional options on Pages 11 and 23.

SPECIFICATIONS. Microprocessor: Intel 80286 processor with 16-bit data path. Clock speed, 8 MHz. Object code compatible with 8086/8088. Real-time clock with battery backup. **Operating System:** Optional Microsoft MS-DOS 3.2 with BASIC. **Memory:** 512K RAM with parity. 25-4011 standard with 640K RAM. By using the expansion slots, memory is expandable to 12 megabytes under XENIX. Includes power-up diagnostics. Sound included. **Keyboard:** 25-4001, 84-key sculptured, including numeric entry keypad. 25-4011, 101-key enhanced keyboard, including separate cursor and numeric pad, 12 function keys. Special keys include ESCape, Num Lock, Alt, Ctrl, Caps Lock, Prt Sc, Sys Req, Scroll Lock, Up, Down, Right and Left arrows. Retractable legs, 6-ft. coiled cable. **Video Display:** Optional high-resolution, non-glare, non-interlaced 12" monochrome (green) or 14" color monitor. 80 or 40 characters per line by 25 lines. **Disk Drives:** Built-in high-density, thin-line 5¼" floppy can read 1.2Mb and 360K formats. Tandy 3000 HD also has built-in 20 or 40-megabyte hard disk drive. Disk storage is expandable to include two floppy disk drives and one hard disk drive, or one floppy disk and two internal hard disk drives. Total internal storage capacity can exceed 80 megabytes. **Internal Expansion:** 10 plug-in card slots, including 7 PC/AT-compatible slots, 2 PC/XT-compatible slots and 1 PC/XT-compatible half-slot for the serial/parallel adapter. Optional 80287 math co-processor can be added. **External Connections:** Standard parallel printer port, RS-232C serial communications port, AC outlet. **Dimensions:** 6½ x 19 x 18". **Weight:** 47 lbs. **Power Requirements:** Input: 120VAC, 60 Hz. Output: 170 Watts. U.L. listed.

AFFORDABLE 286 TECHNOLOGY

1-Disk Tandy 3000 HL

NEW FOR 87

1699.00

Monitor and adapter not included

Commercial Lease Available For Only $65 Per Month (Plus Applicable Use/Sales Tax)

If you're currently using MS-DOS based computers and want to expand with more power for less money, you should consider the Tandy 3000 HL. It beats out the IBM® PC/XT-286 in price, performance and choice of options.

Operating at 8 MHz (vs. 6 MHz for IBM's 286), the Tandy 3000 HL's advanced 16-bit microprocessor delivers up to seven times the speed of a standard PC's microprocessor. That means you can run software faster than ever.

The floppy-based Tandy 3000 HL starts at only $1699. The IBM PC/XT-286 costs $3995†. True, the XT-286 comes with added features, including a 20-meg hard disk. But a comparably equipped Tandy 3000 HL with a 20-megabyte hard disk and other options still costs less than IBM's 286.

Expand Inexpensively

Because we know how quickly your business can grow, we made sure the Tandy 3000 HL has room for fast, low-cost expansion. It comes standard with seven expansion slots; four 8-bit/XT compatible slots and three 16-bit data bus slots. And for better office efficiency, the Tandy 3000 HL features a built-in real-time clock with battery backup for automatic date and time-stamping of all jobs, process control and other time-sensitive applications.

Because networking is quickly becoming one of the biggest concerns for current computer owners, we made the Tandy 3000 HL network compatible with all MS-DOS computers. Now with the Tandy ViaNet local area network, you can connect your existing MS-DOS based computers to the Tandy 3000 HL and continue to communicate with your staff. You can send memos, figures and other important messages via computers, eliminating lost memos, forgotten meetings or incomplete reports.

Tandy 3000 HL. 25-4070 . . . . . 1699.00
When purchased as a system with hard drive and controller:
Tandy 3000 HL with 20-MB Hard Drive. 2599.00
Tandy 3000 HL with 40-MB Hard Drive. 3499.00
Tandy 3000 HL Computer with 5¼" Internal 20-Megabyte Disk Cartridge System. 3199.00
Options priced separately:
20 Megabyte Hard Drive. 25-4062 . . . . . 799.00*
40 Megabyte Hard Disk. 25-4061 . . . . . 1799.00*
5¼" Internal 20-Megabyte Disk Cartridge System. 25-4064 . . . . . 1799.00
16-Bit Hard Drive Controller. 25-4060 . . . . . 399.95
MS-DOS 3.2/BASIC/DeskMate II. 25-4103 . . . . . 99.95

SPECIFICATIONS. Microprocessor: Intel 80286 processor with 16-bit data path. Switchable clock speed, 4/8 MHz. Object code compatible with 8086/8088. Real-time clock with battery backup. **Operating System:** Optional Microsoft MS-DOS 3.2 with BASIC. **Memory:** 512K RAM with parity. By using the expansion slots, memory is expandable to 4 megabytes. Includes power-up diagnostics. Sound included. **Keyboard:** 84-key sculptured, including numeric entry keypad. Special keys include ESCape, Num Lock, Alt, Ctrl, Caps Lock, Prt Sc, Sys Req, Scroll Lock, Up, Down, Right and Left arrows. Ten programmable Special-Function keys. Retractable legs, 6-ft. coiled cable. **Video Display:** Optional high-resolution, non-glare, non interlaced 12" monochrome (green) or 14" color monitor. 80 or 40 characters per line by 25 lines. **Disk Drives:** Built-in thin line 5¼" floppy can read 360K formats. Disk storage is expandable to include two floppy disk drives and one hard disk drive, or one floppy disk and two internal hard disk drives. Total internal storage capacity can exceed 80 megabytes. **Internal Expansion:** Seven plug-in card slots, including three 16-bit slots, four PC/XT-compatible slots. Optional 80287 math co-processor can be added. **External Connections:** Standard parallel printer port. **Dimensions:** 6⅛ x 17 x 15½". **Weight:** 32lbs. **Power Requirements:** Input: 120VAC, 60 HZ. Output: 130 Watts. U.L. listed.

*Requires HD Controller (25-4060). †Manufacturer's suggested retail price. IBM/Registered TM International Business Machines Corp.

HI-PERFORMANCE TANDY 1000 SX

NEW LOW PRICE!

999.00 Less monitor and software

Was $1199.00 in Cat. RSC-17

- **Fifty-Percent Faster Clock Speed Than the IBM® PC**
- **Ready-to-Run—Includes DeskMate II Software**
- **Software Compatible with the IBM PC—Choose From the Most Popular Programs on the Market**
- **Two Built-In 5¼" 360,000-Character Disk Drives**
- **Five PC Compatible Card Slots for Easy Expansion**

Tandy 1000 SX. Our MS-DOS family of computers is growing to meet your needs. Since its introduction, the Tandy 1000 went on to become the hottest IBM PC compatible to hit the market. Now we've made it even better.

High Speed Performance

The 1000 SX is centered around the 8088 microprocessor, ensuring compatibility with industry-standard MS-DOS software. But unlike other "industry-standard" computers, you can run many of your programs faster. This software-switchable speed control lets you finish spreadsheets, sort data bases and display intricate charts and graphs faster than ever.

To complement this new level of sophisticated performance, the 1000 SX comes with 384K RAM, expandable to 640K on the main board, and two built-in disk drives. And with five card slots, it's easy to expand your system. Expansion boards are user-installable, and you can choose from memory expansions, internal modems—even a 20-megabyte hard disk card!

Get Down to Business with DeskMate II

We've improved our popular DeskMate 6-in-1 applications software to take advantage of the Tandy 1000 SX's power. DeskMate II* for the Tandy 1000 SX features six applications on one disk. And with the special task-switching feature, you can exit DeskMate II, enter an applications program, then return to DeskMate II—all with just a few keystrokes. Start computing the first day with Text Processing, Spreadsheet Analysis, Electronic Filing, Calendar/Alarm, Telecommunications and Electronic Mail. Every day you'll be greeted by a menu that displays a calendar, appointment schedule and a list of files stored for every function. Plus, when you use your Tandy 1000 in a local area network, DeskMate II is ready, because it's compatible with ViaNet. And the Tandy 1000 SX is PC compatible, so you can choose from an astounding collection of MS-DOS programs.

Packed with Deluxe Features

With the Tandy 1000 SX, most of the "options" you expect to pay more for are included. Adapters are built in for easy hookup to a monochrome or color monitor. You can even display high-resolution graphics on our lowest-priced monitor. Adapters for a printer, joysticks, or light pen are all standard, as are MS-DOS 3.20 and GW-BASIC.

384K 2-Disk Tandy 1000 SX. 25-1051 . . . . . 999.00
384K 1-Disk Tandy 1000 SX. 25-1052 . . . . . 849.00
5¼" Internal Disk Drive. 25-1063 . . . . . 169.95
3½" Internal Disk Drive. 25-1064 . . . . . 199.95

SPECIFICATIONS: Microprocessor: Intel 8088, Clock Speed: 7.16/4.77 Mhz, software selectable. **Operating System:** Includes Microsoft's MS-DOS 3.2 with GW-BASIC. (Reference Manuals extra). **Memory:** 384K RAM, expandable on main board to 640K. Includes power-up diagnostics. **Keyboard:** 90-key sculptured, including numeric-entry keypad. Special keys include HOLD, ESCape, BREAK, CTRL, CAPS, INSERT, DELETE, and HOME. Twelve programmable Function keys. Retractable legs. 6-ft. coil cable. **Video Display:** Optional high-resolution, non-glare 12" monochrome (green) or 13" RGBI Color Monitor. 80 or 40 characters per line by 25 lines. 256 characters. Reverse video, blank, blink. 16 foreground and 8 background colors. High-resolution monochrome and color graphics (640 x 200 pixels). Displays 8 of 16 colors—black, blue, green, cyan, red, magenta, brown, white, gray, light blue, light green, light cyan, light red, light magenta, yellow, high-intensity white. Higher resolution video support available with optional expansion boards. **Disk Drives:** Two double-sided, double-density, 360K (formatted) thin-line 5 ¼" mini-floppies. 48 tracks per inch. **Internal Expansion:** Five user-accessible IBM PC-compatible card slots (10" maximum length), 8087 Math-Coprocessor. **External Connections:** Standard parallel port, composite video out, line level audio out, light pen port, two joysticks, RGBI Color Monitor. AC outlet. **Wt.:** 31 lbs. **Power:** Input: 120 VAC, 50/60 Hz. Output: 67 Watts. U.L. listed.

*DeskMate II requires 80 column monitor. Telecommunications and E-Mail require optional modem.

ENTRY-LEVEL TANDY 1000 EX

NEW LOW PRICE!

599.00 Less monitor, platform, external disk drive and software.
Was $799.00 in Cat. RSC-17

- **The Lowest-Priced MS-DOS Based Personal Computer**
- **Get PC Compatibility at a Fraction of the Price**
- **Fifty-Percent Faster Clock Speed Than the IBM® PC**
- **Incredibly Easy-to-Use Personal DeskMate Software**
- **Choose from Thousands of Popular Programs**
- **Built-In 360,000-Character Floppy Disk Drive**
- **Ideal for the Home, A Natural for Schools**

Tandy 1000 EX. Now there's no reason to settle for a "game" computer. The new Tandy 1000 EX is a true PC-compatible computer, ready to use the MS-DOS software you bring home from the office, as well as software designed for the home or classroom. Inside the sleek one-piece design resides a 5¼" disk drive and 256,000-character RAM. The integral 90-key keyboard has the same layout as the Tandy 1000 SX, ideal for business programs. You'll find an advanced three-voice sound circuit for sophisticated sound and music generation through the built-in speaker. There's also a headphone jack with volume control—perfect for the classroom.

The Advantages of Personal DeskMate

Every Tandy 1000 EX comes with a new graphics-oriented version of our DeskMate productivity software. Personal DeskMate* is amazingly easy to use, with handy pull-down menus and pop-up boxes for selecting functions. Add an optional Digi-Mouse® or joystick and you'll have the ultimate in convenience.

With TEXT you'll see a simple text entry and editing system that includes cut/copy/paste functions, search and replace, and underlining and boldface. WORKSHEET gives you a simple in-memory spreadsheet application with 99 rows and 99 columns of numeric, text, or calculated cells. It will support selectable column widths, as well as numeric and text cell format options. DESKTOP helps you visually organize and manage program and data files. You can install any combination of applications onto the screen, including CALCULATOR, NOTEPAD, CALENDAR and PHONE DIRECTORY. You can use FILER to keep track of your recipes. With PAINT you'll have a simple graphic picture editor that includes functions for drawing basic shapes (solid or outline), lines and pattern fills. And of course we've included TELECOM, our basic telecommunications package for communicating with information services as well as for up and downloading files.

Ready to Use, Ready to Expand

The one-piece Tandy 1000 EX offers convenient portability—just plug in a monochrome or color monitor, or a TV set with an optional RF modulator. Plug in joysticks, printer or a second disk drive without buying extra-cost adapters. Add the Memory PLUS Expansion Adapter for two additional connectors for more memory, modem telecommunications, Digi-Mouse and classroom networking options. If you've been searching for a computer that's "just right", the Tandy 1000 EX is for you.

Tandy 1000 EX. 25-1050 . . . . . 599.00
Tandy 1000 EX Monitor Platform. 26-210 . . . . . 29.95
MS-DOS/BASIC 3.20 Upgrade. 25-1170 . . . . . 29.95
New! Memory PLUS Expansion Adapter. See description on page 12. 25-1062 . . . . . 129.95

SPECIFICATIONS: Microprocessor: Intel 8088, Clock Speed: 7.16/4.77 Mhz, software selectable. **Operating System:** Includes Microsoft's MS-DOS 2.11 with GW-BASIC. (Reference Manuals extra.) **Memory:** 256K RAM, expandable to 640K. Includes power-up diagnostics. **Keyboard:** Integral 90-key sculptured, including numeric-entry keypad. Special keys include HOLD, ESCape, BREAK, CTRL, CAPS, INSERT, DELETE and HOME. Twelve programmable Function keys. **Video Display:** Optional high-resolution, non-glare 12" monochrome (green) or 13" RGBI Color Monitor. 80 or 40 characters per line by 25 lines. 256 characters. Reverse video, blank, blink. 16 foreground and 8 background colors. High-resolution monochrome and color graphics (640 x 200 pixels). Displays 8 of 16 colors—black, blue, green, cyan, red, magenta, brown, white, gray, light blue, light green, light cyan, light red, light magenta, yellow, high-intensity white. **Disk Drives:** One double-sided, double-density, 360K (formatted) thin-line 5¼" mini-floppy. 48 tracks per inch. **Internal Expansion:** One "PLUS" style expansion board or two "PLUS" style expansion boards when used with Memory PLUS Expansion Adapter (25-1062). **External Connections:** 5¼" 360K or 3½"720K External Disk Drive, standard parallel port, composite video out, ⅛" headphone jack with volume control, two joysticks, RGBI Color Monitor. AC outlet. **Wt.:** 19 lbs. **Power:** Input: 120 VAC, 50/60 Hz. Output: 28 Watts. U.L. listed.

*Personal DeskMate requires 80 column monitor. Telecom requires optional modem.

MONITORS, ADD-ONS AND BOOKS

Complete Your System with the Tandy Display Monitor That's Right for You

New! EGM-1 Enhanced Graphics Monitor. High-resolution monitor (640 x 200 or 640 x 350) displays text and graphics in 16 to 64 colors. 14" screen. 25-4035 . . . . . 699.00

VM-1 Monochrome Monitor. 12" screen displays 80 x 25 text, 640 x 400 graphics. Tilts 5 or 10 degrees for best viewing angle. 26-5111 . . . . . 199.95

VM-3 Monochrome Monitor. 12" screen displays 80 x 25 text, 720 x 348 graphics. 25-3010 . . . . . 219.00

New! VM-4 Monochrome Monitor. 12" screen displays 80 x 25 text, 640 x 200 graphics. 25-1020 . . . . . 129.95

New Low Price! CM-1 Color Monitor. 14" screen displays 80 x 25 text, 640 x 400 graphics. Tilts 5 or 10 degrees for best viewing. Was $599.00 in Cat. RSC-16. 26-5112 . . . . . 529.95

New! CM-5 RGBI Color Monitor. 13" screen displays 80 x 25 text, 320 x 200 graphics. 25-1023 . . . . . 299.95

New! CM-11 RGBI Color Monitor. 13" screen displays 80 x 25 text, 640 x 200 graphics. 25-1024 . . . . . 459.95

Quick-Reference Chart for Tandy Display Monitors

	Video Adapters for Tandy 1200/3000				Tandy 1000	CoCo	100/102/200 Disk Video	Tandy 2000	CoCo 3
	25-3045	25-3046	25-3047	25-4037					
VM-1 (26-5111)		640 x 400 Text Only	640 x 400 Text and Graphics(3)	640 x 350 Mono Text and Graphics				640 x 400 Text and Graphics(4)	
VM-3 (25-3010)	720 x 348 Text and Graphics(1)			720 x 350 Text 640 x 350 Graphics					
VM-4 (25-1020)	640 x 200 Text and Graphics				640 x 200 Text and Graphics		640 x 200 Text Only		
CM-1 (26-5112)		640 x 400 Text Only	640 x 400 Text and Graphics(3)	640 x 350 Enhanced Graphics 640 x 200 CGA/Mono mode				640 x 400 Text and Graphics(5)	
CM-5 (25-1023)	320 x 200 Text and Graphics				320 x 200 Text and Graphics				
CM-8 (26-3512)									640 x 192 80-Column Text and Graphics
CM-11 (25-1024)	640 x 200 Text and Graphics			640 x 200 Text and Graphics	640 x 200 Text and Graphics				
EGM-1 (25-4035)	640 x 200 Text and Graphics			640 x 350 Enhanced Graphics 640 x 200 CGA/Mono mode	640 x 200 Text and Graphics				
Composite Color	320 x 200 40-ColumnText				320 x 200 40-Column Text		320 x 200 40-Column Text		320 x 192 32/40-Column Text and Graphics
TV	320 x 200 40-Column Text(2)				320 x 200 40-Column Text(2)	256 x 192 32-Column Text	320 x 200 40-Column Text(2)		320 x 192 32/40-Column Text and Graphics

Two-Button Digi-Mouse

99.95

Ideal for Use with Graphics Programs

Plugs in for easy cursor movement in graphics programs, as well as other applications. Requires Digi-Mouse/Clock Controller Board (26-5144, 25-1010 or 25-1015). 26-1197 . . 99.95

Deluxe Joystick

29.95

Get Quicker and Easier Cursor Control

Patented stick mechanism for accurate cursor control and quick response. Select "spring-centering" or "free-floating" modes. For Tandy 1000 EX/SX. 25-1080 . . . . . 29.95

Instructional and Reference Books

MS-DOS: The Basics (2nd Ed.). Covers Tandy 1000 EX, SX, 3000 and 3000 HL. 25-1506 . . . . . 7.95

MS-DOS: Advanced Applications (2nd Ed.). Covers Tandy 1000 EX, SX, 3000 and 3000 HL. 25-1507 . . . . . 14.95

Learning BASIC for Tandy Computers. An excellent tutorial for BASIC programming. 25-1500 . . . . . 19.95

The Complete Guide to the Tandy 1000. Covers basic operations, software options, compatibility issues, mastering MS-DOS, hardware, expansions and more. 25-1505 . . . . . 14.95

Tandy 1000 Programmer's Reference Manual. Documents all BIOS subroutines and entry points for use in low-level languages. 25-1503 . . . . . 14.95

New! MS-DOS/GW-BASIC Reference Guides. Includes reference materials for MS-DOS and GW-BASIC 2.11 and 3.20. 25-1508 . . . . . 29.95

Tandy 1000 Technical Reference Manual. 25-1504 . . . . . 29.95

New! Technical Reference for 1000 EX. 25-1510 . . . 34.95

New! Technical Reference for 1000 SX. 25-1511 . . . 34.95

New! Tandy 3000 Technical Reference Manual. 25-4104 . . . . . 89.95

New! Tandy 3000 HL Technical Reference Manual. 25-4105 . . . . . 89.95

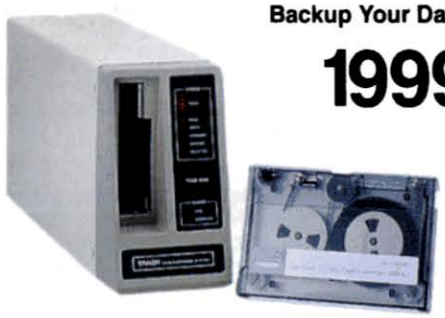
(1) Requires special software. (2) Requires RF modulator. (3) 640 x 200 with standard software. Hi-res modes require special software. (4) Graphics require 26-5140. (5) Requires 26-5140//5141.

POWERFUL EXPANSION OPTIONS

TCS-100 Tape Cartridge System

Backup Your Data on Tape

199.00



Now you can get reliable hard-disk backup on tape (backup 10 megabytes in as little as 6 minutes). Uses standard 1/4" cartridges (one included) for over 48 megabytes of archival storage. Powerful file-by-file backup/restore function. Select single files, groups of files or all files. Select files based on globals, wild cards, files modified since last backup, file creation data, directory structure and more. Features three heads—read, write and erase—for one-pass backup with immediate read-after-write verification. Requires Interface Kit (below) U.L. listed AC. 25-3020 . . . . . 1999.00

Tandy 1000/1200/3000 Interface Kit. Includes software and cables for file-by-file or mirror-image backup. Kit also supports IBM PC and PC-compatible computers. 25-3021 . . . 149.95

1/4" **Data Tape Cartridge.** 26-1391 . . . . . 34.95

20 + 20-Meg Disk Cartridge System

349.00

Use instead of a hard disk for speed, reliability, expandability, security and transportability. Consists of one or two drives and high-performance cartridges. Cartridges are removable for unlimited storage. Easily back up your conventional hard-disk system. Requires Interface Kit (below).

New! 20 + 20-Megabyte DCS. 25-4066 . . . . . 3499.00

New! 20-Megabyte 5 1/4" Internal DCS. 25-4064 . . 1799.00

10-Megabyte DCS. 26-1245 . . . . . 2195.00

Secondary DCS. Add a 10-megabyte disk kit to create a 10 + 10-megabyte system. 26-1246 . . . . . 999.00*

New! Secondary 20-MB DCS. 25-4065 . . . . . 999.00

New! 8" 20-Megabyte Cartridge. 26-220 . . . . . 119.95

New! 5 1/4" 20-Megabyte Cartridge. 26-221 . . . . . 99.95

New Low Price! 10-Megabyte Cartridge. Was $89.95 in Cat. RSC-16. 26-1372 . . . . . 79.95

20-Megabyte Hard Disk Card

NEW FOR 87

799.00

- **An Efficient New Way to Get Hard-Disk Storage**
- **User-Installable Card Saves on Desk Space**

Get 20 megabytes of hard-disk storage on a user-installable card. Mounts in a 10" card slot on the Tandy 1000 or a 13" slot on the Tandy 1200, Tandy 3000 HL, IBM PC or PC compatible. Operates as either first or second hard disk and can run a second hard disk drive. Comes with a thorough installation manual and a diskette with special installation software. It's the easiest way yet to get hard-disk storage power! 25-1029 . . . . . 799.00

External 10-Megabyte Hard Disk Drive

Get 10 Million Characters of Data and Program Storage

699.00

Expand your Tandy 1000's storage affordably. Add two to the Tandy 1000 or one to the Tandy 1000 HD for 20 megabytes of total system storage (Cable Kit and installation required for secondary unit). Requires Hard Disk Controller Board. 25-1025 . . . . . 699.00

User-Installable Tandy 3000 Expansion Boards and Options

1.2-Meg. Floppy Disk Kit. Requires floppy dual speed controller (25-4036) or hard disk controller board (25-4060). 25-4050 . . . . . 299.95

360K Floppy Disk Kit. 25-4051 . . . . . 199.95

New! Dual-Speed Floppy Disk Controller. Upgrade Tandy 3000 HL to support higher speed and capacity of 1.2 MB floppy drive. 25-4036 . . . . . 129.95

New Low Price! Hard Disk Controller. Lets you add an internal 20- and 40-megabyte hard disk. Was $499 in Cat. RSC-16. 25-4060 . . . . . 399.95*

20-Megabyte Hard Disk Kit. Use with Tandy 3000 HD to increase internal storage by 20 meg. Or combine with Controller above to convert a 3000 to a 3000 HD. 25-4062 . . . . . 799.00*

New! 40-Megabyte Hard Disk Kit. Ideal for multiuser or networking. Requires HD controller. 25-4061 . . . . . 1799.00

External Hard Disk Cable Kit. 25-4063 . . . . . 59.95*

New! Memory Expansion Board. Add up to 2 megabytes of memory to Tandy 3000. Comes with 1MB. In MS-DOS, use VDISK to set aside portions of RAM memory that simulate disk storage. 25-4030 . . . . . 499.95

New! 128K RAM Upgrade Kit. Increase Tandy 3000 HL memory from 512K to 640K. 25-4082 . . . . . 49.95

New Low Price! 256K RAM Parity Memory Upgrade Kit. Add 256K to your Tandy 3000 or memory board. Was $129.95 in RSC-17. 25-3062 . . . . . 99.95

New! 4-User Board. Allows Tandy 3000 to support up to four serial devices. For use with the XENIX System V operating system. 25-4031 . . . . . 299.95

80287 Math Co-Processor. Perform one set of functions while the co-processor simultaneously performs highly accurate mathematical calculations. Programs must be specifically written for this option. 25-4033 . . . . . 399.95

Tandy 1000/1200/3000 Serial Parallel Adapter. Add a second serial/parallel adapter to connect a second printer or increase your communications capability with an additional modem. 25-4034 . . . . . 169.95

New! Dual-Port Serial Adapter. 25-4039 . . . . . 99.95

New! 20-Megabyte Disk Cartridge Interface Kit. For Tandy 1000/1200/3000. 25-4081 . . . . . 149.95*

*Installation Recommended. Not Included.

UPGRADE & EXPANSION OPTIONS

Add a Disk Drive to Your System

5¼" 360K External Disk Drive (not shown). Makes backing up diskettes much easier! 25-1060 . . . . . 249.95

3½" 720K External Disk Drive. Gives twice the storage of a 5¼" drive on smaller, more durable diskettes. 25-1061 . . . . . 279.95

3½" Disk Drive Kit. Mounts internally. Installation recommended (not included).
For Tandy 1000 SX and 3000 HL. 25-1064 . . . . . 199.95

5¼" Disk Drive Kit. Mounts internally. Installation recommended (not included).
For Tandy 1000. 25-1005 . . . . . 169.95
For Tandy 1000 SX. 25-1063 . . . . . 169.95

1000/1200/3000 Expansion

New! Memory PLUS Expansion Adapter. Expands your Tandy 1000 EX to 384K and adds DMA circuit to speed up computer operations. Sockets allow you to expand another 256K. Also provides connectors for addition of two PLUS Upgrade Boards. 25-1062 . . . . . 129.95

New Low Price! Memory PLUS Expansion for Tandy 1000. Provides DMA and an additional 256K of memory—bringing your 128K Tandy 1000 to 384K. Add the 256K RAM Kit for a full 640K. PLUS Expansion Boards can be plugged into a special connector, saving a slot for other applications. Was $319.95 in RSC-16. 25-1011 . . . . . 179.95

New Low Price! 256K Parity Memory Kit. Add 256K of memory to your Tandy 1000, 1200 or 3000. Was $129.95 in RSC-17. 25-3062 . . . . . 99.95

New Low Price! Memory Expansion Board. Uses an expansion slot to upgrade a 256K Tandy 1200 to 384K or a 384K Tandy 1000 to 512K. Also provides sockets for an additional 128K. For Tandy 1000/1200/PC/Compatibles. Was $199.95 in RSC-16. 25-1009 . . . . . 129.95

New Low Price! 128K RAM Upgrade Kit. Use to upgrade your Tandy 1000 from 256K to 384K or from 512K to 640K. Was $129.95 in RSC-16. 26-5162 . . . . . 99.95

New! 8087 Math Co-Processor. For Tandy 1000 (25-1000A or 25-1001A only), and 1200. Increase throughput up to 10 times with software that supports a co-processor. Supported by many CAD and spreadsheet programs and many more. 25-1012 . . . . . 229.95

Digi-Mouse Controller/Calendar Board. Dual-purpose board includes controller for Digi-Mouse™ (page 10) and perpetual time/date. Never have to enter time and date again. For Tandy 1000/1200 only. 25-1010 . . . . . 99.95

New Low Price! 1200-Baud PC Modem. An auto-dial/auto-answer modem for the Tandy 1000/1200/3000, IBM PC and PC compatibles. Hayes® compatible. Switchable 1200/300-baud. FCC registered. Was $299.95 in RSC-16. 25-1013 . . 199.95

New! Dual-Port Serial Board. Add two serial ports to your Tandy 1000/1200/3000. Uses DB-9 connectors. 25-4039 . . . . . 99.95

New! Dual Display Graphics Adapter. Combines the function of 3 boards in one. Uses VM-3 and CM-11 monitors. Displays up to 640 x 200 in 16 colors with special software. Features Hercules-compatible graphics mode for use with VM-3 monitor. 25-3045 . . . . . 249.95

Deluxe Text Display Adapter. Allows your Tandy 1000, 1200 or 3000 to display text on the VM-1 Monochrome Monitor or CM-1 Color Monitor. 25-3046 . . . . . 249.95

New Low Price! Deluxe Graphics Display Adapter. Allows your Tandy 1200 or 3000 to display high-resolution graphics (640 x 400) on the CM-1 or VM-1. Was $499.95 in RSC-16. 25-3047 . . . . . 399.95

New! Enhanced Graphics Adapter. Get 640 x 350, 16-color enhanced graphics on our EGM-1 monitor. Also compatible with the CM-1 monitor, color graphic and monochrome displays. Includes 256K video memory. 25-4037 . . . . . 349.95

Hard Disk Controller Board. Allows you to add hard disk drives for up to 70 million characters of storage. Compatible with most Tandy 1000 software. Includes cable for use with our 10, 15 or 35-Megabyte Hard Disks. 25-1007 . . . . . 299.95

Trackstar 128. Lets your Tandy 1000 SX run software designed for the Apple II-series of computers. Supports Apple DOS 3.3, Pro-DOS® and Apple Pascal. 25-1028 . . . . 399.95
TRACKSTAR 128/TM Diamond.

New! Universal Keyboard Adapter. Allows you to use a standard PC, AT or Enhanced Keyboard on your Tandy 1000 or 1000 SX. Also supports KeyTronic Keyboards. Software drivers included. 25-1030 . . . . . 99.95

PLUS Upgrade Boards

These boards are specially designed for use with the Tandy 1000 EX or our Memory PLUS Expansion Board. You can also use them with the Tandy 1000 SX or any other PC compatible with the optional PLUS Upgrade Adapter Board (25-1016). All PLUS Upgrade Boards are user installable.

New Low Price! PLUS RS-232C Option Card. Lets your computer talk with other computers and access national information services, when combined with communications software and external modem. Use with high-speed modems or serial plotters and printers. Was $99.95 in RSC-16. 25-1014 . . . . . 79.95

PLUS Digi-Mouse Controller/Calendar Board. Dual purpose—includes controller for Digi-Mouse™ (page 10) and a perpetual time/date clock. You'll never have to enter time and date again! 25-1015 . . . . . 99.95

New! PLUS 300 Baud PC Modem. Great for use with the DeskMate and on-line services such as Compuserve, Dow-Jones and more! Switchable Tandy/Hayes® compatible modes. FCC registered. Cable included. 25-1017 (Avail. 2/28/87) 99.95

New! PLUS 1200 Baud PC Modem. Hayes™ compatibility lets you run the most popular communications software at higher speeds—reducing the cost of on-line time. FCC registered. 25-1018 . . . . . 199.95

New! PLUS Network 4 Interface. Use the Tandy 1000 EX as a low cost system in an educational network. See network section on page 35 for more information. 25-1019 . . . . . 299.95

PLUS Upgrade Adapter Board. Allows you to use PLUS Upgrade Boards in a standard PC card slot. 25-1016 . . . . . 14.95

1000/1200/2000/3000 SOFTWARE

New! The *pfs* Professional Series

New enhancements to this popular and easy-to-use series include a sophisticated user interface for direct access to the full range of available features in each application. Advanced data interchange capabilities enable each product to work with other software and hardware in the office. User-defined keyboard macros record and playback keystrokes to automate program functions and improve efficiency. Local Area Network support to share data among computers in the office.

*pfs:*Professional File

A complete file management and reporting program to quickly organize, update, retrieve, analyze and report information with professional results. Requires 256K and two disk drives.

Tandy 1000/1200/3000. 25-1171 . . . . . 195.00

*pfs:*Professional Write

A complete word processing program to quickly write, edit, proof and print business reports, proposals, memos, letters and other correspondence with professional results. With built-in spelling checker and thesaurus. Requires 384K and two disk drives.

Tandy 1000/1200/3000. 25-1172 . . . . . 195.00

*pfs:*Professional Plan

An advanced spreadsheet analysis program to quickly develop, analyze, graph and print business plans, budgets, financial statements and other planning models with professional results. Requires 384K and two disk drives.

Tandy 1000/1200/3000. 25-1173 (Avail. 3/15/87) 195.00

***pfs:*report. Tandy 1000.** 25-1141 . . . . . 125.00

***pfs:*graph. Tandy 1000/1200.** 25-1143 . . . . . 140.00

***pfs:*report. Tandy 1200.** 25-3162 . . . . . 125.00

Database Management

Profile 286

An electronic filing system and applications generator based on the popular Profile 16 database manager. You can change or expand a system at any time without having to re-enter data. Using Profile's menu-driven setup procedure, you can create your own menus. Interacts easily with word processors. Includes a data processing language module that eliminates the need for BASIC, COBOL, C and other interfaces. Requires XENIX System V/286 and 1 meg. of memory.

Tandy 3000 HD. 25-4212 (Avail. 3/15/87) 799.00

dBASE III Plus

An ideal data management system for people who don't want to program, or a programming tool for those who prefer to create their own system. With our built-in Assistant, you'll be provided with new easy-to-use pull-down menus for creating, using and modifying databases. Our new Screen Painter lets you create custom screens as your business dictates. The Advanced Query System lets you build complex query requests just by selecting from pull-down menus. Finally, there's a new Applications Generator that creates entire applications programs without programming! A new Data Catalog and more than 50 new commands and functions help streamline applications development. Requires 384K, 2 floppy drives or floppy and hard drive. LAN requires 384K and 3.1 DOS.

Tandy 1200/3000. 25-3191 . . . . . 695.00

OFFIX

Create "file folders" that can be stored and retrieved from "file cabinet drawers", create documents and forms for folders, and produce reports and form letters based on the contents of the folder. Requires 256K.

Tandy 1000/1200 HD/2000. 26-5325 . . . . . 99.95

Spreadsheet Analysis

Microsoft Multiplan

This popular spreadsheet lets you assign plain English names to any column, cell or area, vary individual column widths, center numbers and text within a column or align decimals. Sorting can be performed in alphabetical or numerical order. Cells can be set up individually, by row, column, block—or globally. Displays up to eight windows on the screen. Includes on-line help.

Tandy 1000/1200/2000/3000. 25-1163 . . . . . 195.00

SCO Professional

A Lotus 1-2-3 "work-alike" for XENIX multiuser systems. SCO Professional gives you an integrated program which includes a spreadsheet, database and graphics. Reports can be generated quickly and easily using macros, data management tools and a graphics chart generator. Beyond the standard Lotus 1-2-3 features, SCO Professional has more query fields available for database operations, a larger worksheet space, full preview character-graphics support for any standard terminal and sparse matrix memory management for optimal spreadsheet storage. Requires 1 megabyte of memory and XENIX System V/286.

Tandy 3000 HD. 25-4214 . . . . . 795.00

Integrated Software

DeskMate II

DeskMate II is an easy-to-use, multifunctional software program that uses the same commands throughout. The system uses the computer's control keys, so there are no complicated commands to memorize. Each day you'll be greeted by a menu that displays a calendar, appointment schedule and a list of files stored for every function. Choose from word processing, spreadsheet analysis, electronic filing, telecommunications, electronic mail and calendar/alarm. Telecom and Mail require modem. A task-switching feature allows the user to alternate between DeskMate II and another program.

Tandy 1000 SX. . . . . . Included with CPU

Tandy 1000/2000. 25-1164 (Avail. 2/15/87) 199.95

Tandy 1200/PC Compatibles. 25-3167 . . . . . 199.95

Tandy 3000. . . . . Included with MS-DOS (25-4103, $99.95)

Personal DeskMate

An easy-to-use, graphics-oriented program with pull-down menus and "dialogue boxes" for selecting functions. Includes Text, Worksheet, Filer, Calendar, Telecom and Paint, a graphic picture editor. A Phone Directory, Calculator and Notepad may be accessed any time. TELCOM requires a modem.

Tandy 1000 EX. . . . . . Included with CPU

Tandy 1000/1000 SX. Req. 256K. 25-1165 . . . . . 199.95

Lotus 1-2-3

An easy way to go from spreadsheet to graphics to information management—instantly! Change your spreadsheet data; then graph it in seconds. Search and sort data in your spreadsheet. "Macro" keys let you substitute a single keystroke for a long sequence. One keystroke brings you on-screen help. Features 256 columns and 2048 rows in spreadsheet and 2000 records in database. Requires 256K.

Tandy 2000. Version 1A. 26-5300 . . . . . 495.00

Framework II

This program doesn't just process numbers—it processes ideas. Each operation is placed in a "frame" that separates it from the rest of the program. Each frame is in an outline form, which you can rearrange or modify at any time. Just jot down notes or ideas in one frame, then create sub-frames for databases, spreadsheets, graphics and reports which relate to these ideas. Framework also utilizes a "desktop" format to view several operations at once on the screen. A special "zoom" function lets you instantly expand any frame to fill the entire screen. Requires 384K.

Tandy 1200/3000. 25-3192 . . . . . 695.00

1000/1200/2000/3000 SOFTWARE

Accounting

Quartet

Quartet includes four integrated accounting programs to give you the most up-to-date information on your company's financial health. Track your business records with programs for General Ledger, Accounts Receivable, Accounts Payable and Payroll. Quartet was designed for ease of use, fast data entry and on-line updating of ledger accounts. Features a convenient search function and automatic look-up of records. Quartet provides easy access to invoices, bills, paychecks, expense checks and ledger transactions and can create user-defined reports for customers, vendors, employees and items. Entries are made only once. Any related data is automatically updated to the General Ledger. Since all Quartet functions are integrated, there is no constant disk swapping as on many systems. Best of all, easy-to-read formatted screens look much like the invoices, check registers and payroll registers you're already using. Quartet can be used to print user-formatted financial statements with or without comparisons to previous years. Prints invoices, monthly statements, payroll checks and expense checks. Includes well defined audit trail. Uniformity of functions throughout the program makes Quartet especially easy to learn. Comes with sample data. Requires 256K and two disk drives or hard disk.

Tandy 1000/1200/2000/3000.
25-1146 ..... 399.95

Tandy 3000 XENIX Multiuser Software

Powerful, fully integrated multiuser software. See page 25 for full descriptions.

General Ledger. 25-4301 ..... 599.00
Payroll. 25-4303 (Avail. 3/1/87) 699.00
Accounts Receivable. 25-4304 ..... 599.00
Accounts Payable. 25-4305 ..... 599.00
Order Entry. 25-4307 ..... 599.00
Sales Analysis. 25-4308 ..... 399.00

Personal Accounting Software

Finance Manager

Helps you gain a better understanding and control over your personal and business financial needs. Create net worth statement and budgets, determine net profit, print checks, account for taxes, monitor your income and expenses and analyze investment opportunities.

Tandy 1000/1200/3000.
25-1148 ..... 99.95

Managing Your Money

Andrew Tobias' Managing Your Money is seven programs in one integrated, personal financial management package. Managing Your Money serves as a reminder pad and a complete budget and checkbook program. It helps with tax estimation and can even print out your schedule D. The program evaluates your family's present life insurance needs and suggests how you can improve your coverage. It is a financial calculator which can perform rental property analysis and financial planning. The sophisticated portfolio manager handles as many real or hypothetical stocks, bonds and options as you like, and can also manage collections such as wines, coins or paintings. And it's easy to use. Wherever you are in the program, just press the ESCape key for a HELP message.

Tandy 1000/1200/3000.
25-1159 ..... 199.95

Word Processing

SCRIPSIT®

Includes features of a dedicated word processor. Control-key functions can be displayed on the screen for quick and easy reference. And the built-in spelling corrector and verifier from Houghton-Miffin not only finds misspellings, but corrects them automatically. Allows merging with dBASE files. And of course you get the features you've come to expect with the name SCRIPSIT: global search function, easy editing features, on-screen format reference and more. Extremely easy to learn and use. Requires 256K and two disk drives.

Tandy 1200/3000. 25-3171 ..... 299.95
Tandy 1000/2000. 25-1155 ..... 299.95
Tandy 3000 HD. Requires 640K and XENIX System V/286.
25-4213 ..... 499.00

Microsoft Word 3.0

Add our optional Digi-Mouse and move text and select commands without even using the keyboard! Word displays up to eight windows at once, so you can move text from one document to the other with ease. Text is displayed in boldface, italics, underlines, super and subscripts, small caps—all without any confusing symbols. Requires 256K.

Tandy 1000/1200/3000. 25-1162 ..... 450.00

Microsoft Word

Tandy 2000. Ver. 1.0. Requires graphics.
26-5314 ..... 375.00

HomeWord Plus

HomeWord is so easy to use, adults or children can start word processing almost immediately! An easy-to-follow manual takes you through the basic functions. And the program's identifiable icons make it a snap to print, edit, delete or move copy. Using the built-in spelling dictionary, HomeWord Plus automatically searches for misspelled words. Correct a misspelled word once and HomeWord Plus corrects it throughout the remainder of your text. HomeWord Plus includes 45,000 words, and you can add up to 5000 more.

Tandy 1000. 25-1161 ..... 69.95

New! WordPerfect 4.2

Features full merge capabilities; a phonetic spelling checker with a 120,000-word dictionary; extensive "cut and paste" features, including block highlight; full printer control; and a color-coded template that uses all ten function keys. The color coding corresponds to the color-coded manual. WordPerfect also features expanded footnote and endnote capabilities, date insertion, redline and strike-out printing, table of contents and index generation, and automatic outline and paragraph numbering. Requires 256K. Tandy 1000 requires 384K.

Tandy 1000/1200/3000. 25-1176 (Avail. 3/15/87) 395.00

Graphics

Micro Illustrator

Draw beautiful pictures and designs on your computer. No programming experience needed—all commands are on the icon-driven menu. Just point to choose shapes, colors, patterns, special effects and brushes. Save your pictures on disk and create your own picture show.

Tandy 1000. 25-1120 ..... 29.95

VersaCAD Entry-Level

A general-purpose design and drafting program that contains much of the power found in software five times the cost. Menu-driven operation and plain-English prompts guide you through the program as you work. Features include 10 built-in primitive objects; ability to quickly group objects for manipulation; interactive editing; total flexibility of color, linestyle, etc. on any drawing level; unlimited zoom; auto-dimensioning; drawing aids, such as center marker and template lines; snap at any time to an object; grid intersection or user-defined spacing increments; output to pen plotter or graphics printer with user-defined plot specifications. Includes written tutorial and introductory audio tape. Requires 256K, two disk drives, graphics monitor and Tandy GT-2000 digitizer.

Tandy 1000/1200/2000. 26-5282 ..... 399.95

Finance Manager/TM Interactive Software. HomeWord Plus/TM Sierra On-Line. Managing Your Money/TM Meca. Micro Illustrator/TM Island Graphics. Microsoft Word/TM Microsoft Corp. Quartet and SCRIPSIT/TM Tandy Corporation. VersaCAD /TM T & W Systems. Word Perfect/TM Word Perfect Corp. Harmony/TM Open Systems, Inc.

TANDY 1000/1200/2000 SOFTWARE

MS-DOS Languages and Communication

Macro Assembler
Assembles symbolic instructions into machine code. Supports an expanded set of conditional directives. 26-5252 . . 99.95

Lattice "C"
Lattice C compiler is a fast, two-phase compiler.
26-5254 . . . . . 499.00

FORTRAN Compiler
From Microsoft. A subset of FORTRAN-77 for scientific and engineering applications. 26-5255 . . . . . 349.95

PASCAL Compiler
From Microsoft. Compatible with the ISO proposed standard. Generates machine code. 26-5256 . . . . . 299.95

COBOL Compiler
Includes an editor, interactive debugger, CRT control and a single-pass compiler. 26-5257 . . . . . 595.00

OmniTerm 2
Communicate with a mainframe or Tandy XENIX host as a VT100 terminal, access information services, communicate with other micros or auto-answer and file transfer in the unattended mode. 25-1160 . . . . . 129.95

Softerm 2000
A communications and terminal-emulation program to access bulletin boards, information services and mainframes. Emulates over 20 character and block-mode terminals. Requires 256K. 26-5261 . . . . . 149.00

T-1000 Protocol Converter
Lets your computer or terminal access IBM host computers using BSC, SNA/SDLC or Channel Attachment Operations. Emulates an IBM 3278-2 via direct type A coax connection. Requires terminal emulation software, such as Softerm 2000 (26-5261). UL listed. 26-1169 . . . . . 995.00

Tandy 2000 Communications

BIS 3780
Allows a Tandy 2000 to communicate with an IBM bisynchronous protocol host with any IBM S/360, S/370, 30XX and 43XX host or non-IBM hosts using standard IBM SNA/SDLC or IBM bisynchronous protocol. Your computer functions as a remote terminal on a Remote Job Entry (RJE) terminal. MS-Assembler (26-5252) may be required if mode reconfiguration is needed. 26-5258 . . . . . 695.00

BIS 3270
Allows a Tandy 2000 to communicate with a mainframe over point-to-point or multi-point telephone lines (via a synchronous modem or modem eliminator) with any IBM S/360, S/370, 30XX and 43XX host or non-IBM hosts using standard IBM SNA/SDLC or IBM bisynchronous protocol. Emulate an IBM 3271/3274/3275/3276 display station and a 3284/3286 printer. 26-5259 . . . . . 695.00

CLEO-3270 Cluster Controller
Emulate a remote IBM 3276-2 cluster controller with an IBM 3287 printer attached (via a synchronous modem or modem eliminator). Your cluster can consist of up to four other computers emulating IBM 3278 display stations. Requires 256K system and serial Expansion Board (26-5164). 26-5262, 980.00

Tandy 2000 Serial Expansion Board
Connect your Tandy 2000 to a mainframe computer, or hook terminals or additional serial devices to the Tandy 2000. Includes four serial channels with connectors.
26-5164 . . . . . 325.00

Tandy 2000 Programmer's Reference Manual
Contains information for assembly language programmers, including entry conditions for MS-DOS. 26-5403 . . . . 19.95

Tandy 2000 Hardware Reference Manual
Introduces schematics and theory of operation for troubleshooting, designing interfaces and more. 26-5404 . . . 24.95

Tandy 1000 Learning Programs

Educational

Robot Odyssey*
A science adventure for sharp teens and adults. Robotropolis is an underground city populated by robots that you must escape from. To unlock the secret exit you must design friendly robots, navigate invisible mazes, solve puzzles and sneak past sentries.
25-1135 . . . . . 34.95

Rocky's Boots*
Hailed as a software classic by the New York Times, the award winning Rocky's Boots helps develop skills in logical problem solving, abstract reasoning, and creative thinking. The concepts of electronic circuitry, circuit design and logic are explored in a motivating environment where players invent machines to solve puzzles and win over 30 different games, including games they design themselves. By experimenting with simulated real-world electronic parts and "electricity," players as young as 9 years old can learn basic computer logic. 25-1139 . . . . . 34.95

Below The Root*
Based on Zilph Snyder's recently published Green-Sky Trilogy. Combines the story-building aspects of a text adventure with hundreds of colorful graphics. It also combines fast-paced excitement with a unique text menu—a first in adventure games. Play as one of five characters—each with different abilities and strengths.
25-1136 . . . . . 29.95

Typing Tutor III*
The fastest, most effective way to learn how to type on your computer. Progressively increases in speed to match your progress—as you get better, it gets faster. Features Letter Invaders™, the arcade game that sharpens your typing skills.
25-1126 . . . . . 49.95

Mastering the SAT*
Comprehensive and self-paced, the program places emphasis on the principles involved in each question and its solution, as well as test-taking strategies.
25-1127 . . . . . 99.95

The FUNdamentals
An exciting and simple introduction to computers, computer vocabulary and computer concepts. FUNdamentals uses tutorials, games and graphics to explain hardware, software, DOS, DeskMate, communications and more. It's the FUN way for everyone—young and old—to become familiar with the Tandy 1000 computer.
Tandy 1000. 25-1124 . . . . . 29.95
Tandy 1000 SX. 25-1166 . . . . . 29.95
Tandy 1000 EX. 25-1167 . . . . . 29.95

*Also runs on PC compatibles. The FUNdamentals/TM Digital Learning System. Mastering the SAT/TM CBS Software. Robot Odyssey and Rocky's Boots/TM The Learning Co. Typing Tutor III/TM Simon & Schuster. BIS 3270 and BIS 3780/TM Micro Integration. CLEO-3270 Cluster Controller/TM Phone I Inc. Fortran Compiler, PASCAL Compiler and Macro Assembler/TM Microsoft Corp. Softerm 2000/TM Softronics. T-1000 Protocol Converter/TM Avatar Tech. Below the Root/TM Windham Classics.

TANDY 1000 HOME SOFTWARE

Star Flight*
Explore strange new worlds and new civilizations. Boldly go where no man has gone before—then figure out how to communicate with the aliens you find there. A state-of-the-art role-playing adventure set in outer space. Develop and play six characters: Captain, Science Officer, Navigator, Medical Officer, Communications Officer, and Chief Engineer. Explore over 20 unique star systems, each displayed in stunning graphic detail. 25-1137 . . . . . 49.95

Rogue*
A college classic, Rogue is so full of unpredictable monsters, ever-changing magic and hidden dangers that it's never the same game twice. 25-1134 . . . . . 29.95

Black Cauldron*
A Walt Disney 3-D animated adventure game. You must find the Black Cauldron and defeat the forces of the wicked Horned King by destroying the cauldron's magical powers.
25-1133 . . . . . 34.95

Winnie The Pooh*
Walt Disney's Winnie the Pooh and his friends will capture your children's imagination while developing necessary skills and building knowledge. A different game is presented each time it is played assuring an endless challenge for any child. Be aware however—it's easy to get lost in the ever-changing Hundred Acre Wood. Improves map skills, reading ability, and logical thinking. 25-1132 . . . . . 34.95

One-on-One
Basketball superstars Larry Bird and Julius "Dr. J." Erving helped design this exciting simulation game. Try 360-degree slam dunks, turn-around jump shots, rebounding for tip-ins and more. For one or two players. 25-1111 . . . . . 34.95

Pinball Construction Set
Comes with five built-in pinball machines, or choose from 32 game parts to build your own. 25-1112 . . . . . 34.95

Lode Runner
To find the stolen treasure, you, the Galactic Commando, must run, jump, drill special passages and outsmart the Bungeling guards if you're to succeed. More than 150 game screens!
25-1113 . . . . . 29.95

New! Mickey's Space Adventure*
Join Mickey and Pluto on a journey through our solar system, in their quest to help some friendly aliens recover lost pieces of valuable memory crystal. Stunning graphics, delightful characters, and challenging activities capture your child's imagination while developing skills and knowledge. Your child will be motivated to learn all about the solar system: the name of each planet, its relative size and position in the solar system, surface temperatures, atmospheric and planet composition and much more. 25-1130 . . . . . 34.95

New! Donald Duck's Playground*
Donald's mischievous nephews, Huey, Dewey and Louie, would love to have a playground of their own. You can help Uncle Donald build them one. Compelling and challenging activities motivate your child to grasp the concepts involved. Your child will enjoy working at four different, entertaining jobs along with Donald, earning the money needed to buy playground equipment. Whether working at the produce stand, stocking toy store shelves, or sorting cargo at McDuck Airlines, your child will be challenged to recognize and match shapes, colors and letters. With each purchase of equipment, your child will develop a better understanding of money-handling. 25-1131 . . . . . 34.95

Flight Simulator*
A real-time flight simulation program. The simulation considers 35 important aircraft characteristics and includes an out-the-window three-dimensional dynamic flight display and extensive flight controls.
26-5379 . . . . . 49.95

F-15 Strike Eagle*
A challenging and exciting air combat from the modern electronic cockpit! You'll fly combat missions, engage enemy aircraft, and destroy enemy ground targets.
25-1125 . . . . . 34.95

Ghostbusters*
Based on the hit movie. Program features the bouncy theme song from the hit movie, voice synthesis and the ever-present danger of The Marshmallow Man.
25-1138 . . . . . 34.95

Infocom Sampler
The Sampler is the perfect way to introduce yourself to the addictive pleasures of Infocom. It contains portions of four different types of stories: Zork I, The Witness, Planetfall and Infidel. 25-1129 . . . . . 7.95

King's Quest II—Romancing the Throne*
Enter a strange and wonderful adventure world as you guide King Graham on his quest to free his queen-to-be from a jealous enchantress. Different mysteries and obstacles await you each time you play. 25-1128 . . . . . 39.95

New! Space Quest*
Experience the ultimate in 3-D space adventure as you travel to worlds beyond imagination inhabited by strange alien beings. The space lab Arcadia is under siege by the dreaded Sariens. Your life is in danger as they are out to capture the powerful Star Generator. Travel to the planet Kerona where you will come in contact with even more undesirable aliens. Or confront the evil Sariens face to face within the bowels of the Deltaur . . . if you're lucky enough to make it that far.
25-1150 . . . . . 49.95

New! Where in the World is Carmen Sandiego?*
The metropolis awakens to find the Statue of Liberty's torch stolen! The citizens are outraged, the Mayor is up in arms and you've been assigned to the case! At the scene of the crime you learn that the thief was seen heading for the airport. You're off on a whirlwind international chase through the great capitals of the world—London, Rome, Moscow and Katmandu. Decipher clues along the way by looking up facts in The World Almanac. When you finally catch up with your suspect, you had better be right—if you make your move and you're wrong, you may be pulled off the case. If you get it right, you're on your way to a promotion and a chance to solve new and tougher cases. 25-1151 . . . . . 39.95

New! Term Paper Writer*
A "must" for every high school and college student. Term Paper Writer gives you the fast and easy way to make the grade. A fantastic tool for organizing and writing term papers, it simplifies every step of the process of term paper writing—note taking, organizing ideas, outlining information, footnoting and compiling bibliographies. Uses Turabian, APA or MLA styles. 25-1154 . . . . . 59.95

Kindercomp
A series of games for pre-schoolers. Kids create colorful drawings, identify number sequences, create repeating word patterns, match letters and numbers and more.
25-1102 . . . . . 29.95

Fraction Fever
Helps children develop an understanding of fractions. Kids hop an animated "pogo stick" to match the correct picture with the fraction shown on the screen.
25-1103 . . . . . 29.95

*Also runs on PC compatibles. Fraction Fever and Kindercomp/TM Spinnaker. King's Quest II and Space Quest/TM Sierra On-Line. Infocom Sampler/TM Infocom. Flight Simulator/TM Microsoft Corp. Lode Runner, Where in the World is Carmen Sandiego?/TM Broderbund. Star Flight, One-on-One and Pinball Construction Set/TM Electronic Arts. Rogue/TM Epyx. Ghostbusters/TM Columbia Pictures. F-15 Strike Eagle/TM Microprose. Term Paper Writer/TM Personal Choice Software.

MODEMS & VIDEOTEX SOFTWARE

Communications Modems

Use with any RS-232C-equipped computer. Full duplex, originate/answer, 300 bps. Bell 103 compatible. FCC registered. U.L. listed.

Acoustic Coupler

Ⓐ **AC-4.** Accommodates round or square handsets—ideal for use in hotel rooms where direct connection may not be possible. Also half duplex.
26-1179 . . . . . 119.95

New! Intelligent Modem

Ⓑ **DCM 7.** Switch selectable between Hayes® and Tandy command sets. Easy-to-use auto-dial/auto-answer. Connects directly to modular phone jack.
26-1394 . . . . . 99.95

Direct-Connect Modem

Ⓒ **DCM 6.** Our lowest priced modem! Plugs directly into modular phone jack. Works with either DB25 or 8-pin connector (for acoustic cups). Includes a modular phone cable. 26-1393 . . . . . 59.95

High-Speed & Intelligent

199.95

DCM 212. This auto-dial/auto-answer modem is switch selectable between Hayes® and Tandy command sets. Easy-to-use menu-driven operation automatically selects 300 or 1200 bps rate. Bell 212A compatible.
26-1385 . . . . . 199.95

Integrated Phone and Modem Gives You 2 Devices in 1

Modemfone™ 100. Get the extraordinary convenience of a telephone and modem in one affordable unit. Telephone features switchable Touch-Tone/pulse dialing, adjustable ringer volume and one-button touch redial. Hearing aid compatible. Modem features full duplex, originate/answer, 300 bps. Standard RS-232C computer connection. Bell 103 compatible. FCC registered. U.L. listed AC adapter.
26-1386 . . . . . 99.95

RS-232C Selector Switch

149.95

SW-303. Connect three RS-232C devices to your computer. One configurable port for communications. U.L. listed. Cables not included. 26-1499 . . 149.95

Access Information by Phone

CompuServe Information Service

Get "on line" with this exciting information service—and the first hour is free! CompuServe offers local, national and international news (read headlines before they've gone to press!), weather and sports from major newspapers like *The New York Times* and *The Washington Post*, plus the full newswire service of the Associated Press. Get historical information and updates on over 32,000 stocks, bonds and securities. There's also a home and educational reference service and computer games. Send and receive "electronic mail". Get 16K of RAM workspace and 128K of disk storage. All this available at a low hourly rate (additional charges for some services).

Dow Jones News/Retrieval

A "direct line" to Wall Street—and the first hour is free! Dow Jones News/Retrieval gives you current market quotes (subject only to the mandatory 15-minute delay) on all stocks, bonds and options traded on the major exchanges—plus selected U.S. Treasury issues. Detailed financial statistics compiled by Media General Financial Services are available for all NYSE and AMEX traded companies. There's also "electronic editions" of *The Wall Street Journal*, *Barron's* and the Dow Jones "Broadtape"—as recent as 90 seconds and as far back as 90 days.

Low-Cost Videotex Packages

Videotex software packages allow access to national information networks and data bases using your computer and an optional-extra telephone interface. Simply dial a phone number (usually local), press a few keys and the desired information appears on your screen. Includes a Videotex software manual, CompuServe manual, ID number and password, and a Dow Jones manual and password. You also get one FREE hour on both the CompuServe and Dow Jones! After that, you'll be billed at their low hourly rates.

Color Computer Package. 26-2222 . . . . . 29.95

Universal Sign-Up Kit. Includes information kit for CompuServe and Dow Jones. Requires software or terminal emulation. 26-2224 . . . . . 19.95

Videotex Plus

A powerful and sophisticated communications package for your disk system. Videotex Plus lets you communicate with any computer information service (with the same communications protocol as Videotex), such as CompuServe and Dow Jones News/Retreival. It's simple to use, yet loaded with features to help you minimize connection time. Requires modem.

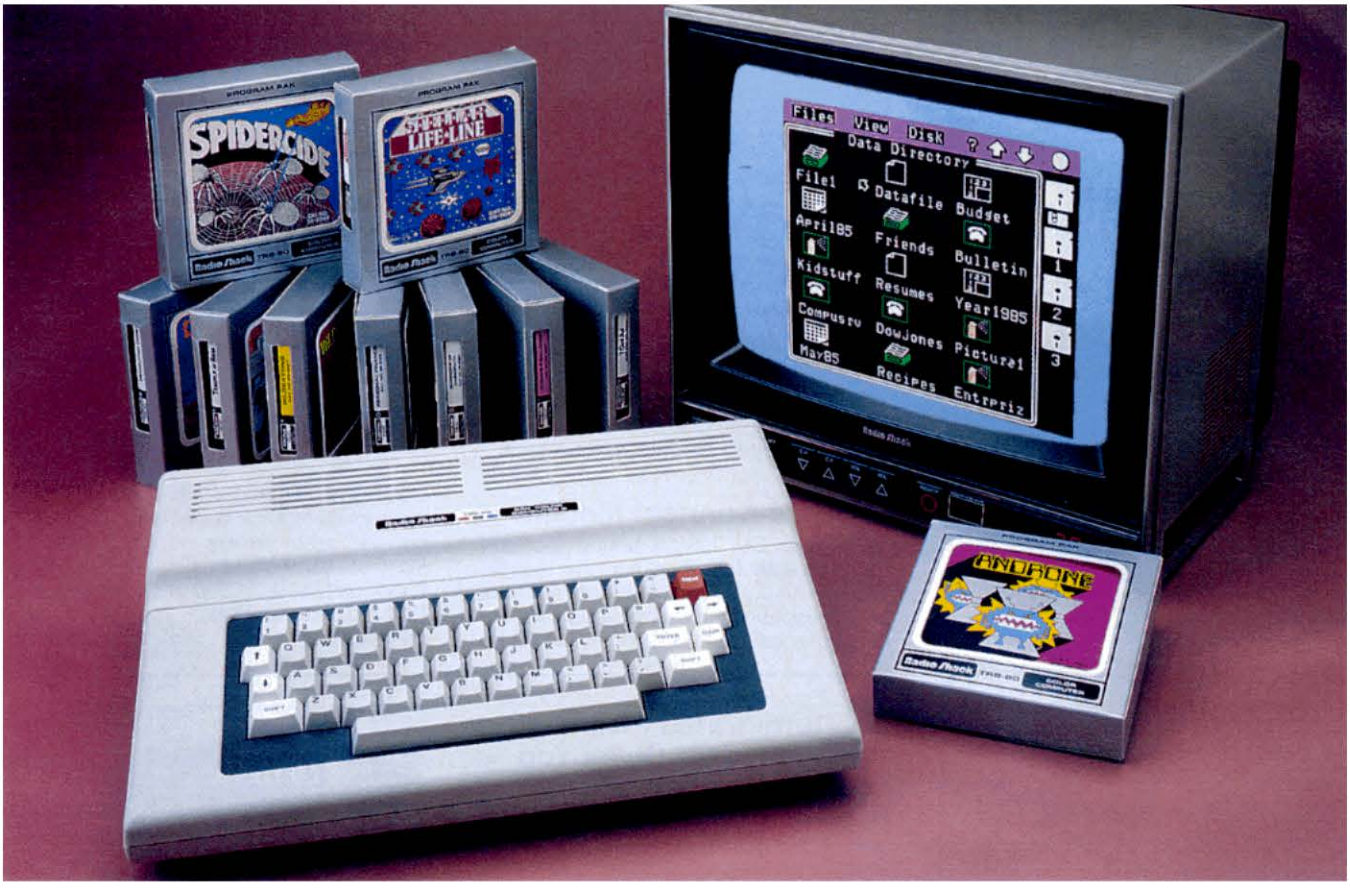
Model I/III Package. 26-1588 . . . . . 49.95

Model 4 Package. Same as above. 26-1598 . . . . . 49.95

Tandy 2000 Package. Same as above. 26-5260 . . . . 49.95

Use Modems only with Bell-compatible equipment. Direct-connect modems are not for multiline use without optional-extra controller. Hayes/TM Hayes Microcomputer Products, Inc. Modemfone/TM Tandy Corp. CompuServe/TM CompuServe, Inc. Dow Jones News/Retrieval/TM Dow Jones & Co., Inc.

POPULAR COLOR COMPUTER 2®



A True Family Computer

NEW LOW PRICE!

99.95 Was $159.95 in Cat. RSC-17

Less TV and Program Paks

- **Write Sophisticated Programs & Create Color Graphics**
- **Access 32,000 Characters of Memory With Built-In Extended BASIC Language**
- **Add a Color Disk Drive and OS-9 Operating System to Access the Full 64K**

64K Extended BASIC Color Computer 2. Learn to program or use ready-to-run software. Ideal for a variety of small business and professional uses, too. Simple, one-line commands make detailed color graphics easy to create. Perfect for drawings, designs, charts, engineering applications—even animation! Features 256 x 192 screen resolution (49,152 pixels); multicharacter variable names; string arrays up to 255 characters; full-featured editing; tracing; floating point 9-digit accuracy; trigonometric functions; user-definable keys; specific error messages; and more. Software is available for personal and household tasks, education and entertainment. Easy to expand. Attaches to any TV. Includes tutorial manuals. UL listed. 26-3127 . . . . . 99.95

Increase Data Storage

299.95 **156,672 Characters of User Storage Per Diskette**

FD-501 Color Thinline Disk #0. Turn any Color Computer with Extended BASIC into a complete disk system and store over 156,000 characters of data. Write your own programs or use ready-to-run software. Includes 5¼" double-density, 35-track floppy disk drive; Program Pak cartridge containing the Disk Operating System; cable; blank diskette; manual and operator's instructions. UL listed. 26-3131 . . . . . 299.95

Second Drive for FD-501. Adds 156K of storage. Requires installation (not included). 26-3132 . . . . . 179.95

Save When You Buy DeskMate™ and a Disk Drive

Complete package includes the FD-501 Floppy Disk Drive and DeskMate 6-in-1 Program. Reg. separate items $399.90.

For the Color Computer 2.
26-3131/26-3259 . . . . . 329.95

For the Color Computer 3.
26-3131/26-3262 . . . . . 329.95

Color Computer 2 Upgrade Kits

16K RAM Upgrade Kit. Converts a 4K Color Computer to 16K to use larger, more sophisticated programs.
26-3015 . . . . . 29.95*

Low-Profile Keyboard Kit. Upgrades old keyboard to our newer version. 26-3016 . . . . . 24.95*

64K RAM Upgrade Kit. Converts a 4K, 16K or 32K Color Computer to the same memory used in 26-3127.
26-3017 . . . . . 59.95*

Extended BASIC ROM Kit. Allows advanced graphics or disk drive capability. Requires 16K RAM. 26-3018 . . . . . 39.95*

*Installation required (not included). Some installations may require additional-cost hardware.

POWERFUL COLOR COMPUTER 3

Superb Graphics Resolution and Uncompromising Performance at An Incredible Price

NEW FOR 87

219.95 Less Monitor

- **Choose From a Palette of 64 Brilliant Colors**
- **Produce Sharp, Crisp Graphs and Illustrations**
- **Display 32 × 16, 40 × 24 or 80 × 24 Text**
- **160 × 192, 320 × 192 or 640 × 192 Resolution**
- **Use With a High-Resolution Monitor or Your Own TV**
- **Expands Easily As Skills and Needs Grow**

128K Extended BASIC Color Computer 3. Introducing Radio Shack's newest version of our famous Color Computer. The Color Computer 3 can be used in a variety of applications such as graphics, programming, budgets, word processing, database management, spreadsheet analysis and many others. The Color Computer 3 comes with 128K memory (expandable to 512K), and gives you the advantage of greater programming and data processing power, as well as higher resolution graphics. Simply connect the Color Computer 3 to a high-resolution monitor—like the new CM-8 monitor (sold separately, at right)—and you can create incredibly detailed charts, graphs and engineering drawings in vivid colors. The special higher graphics mode lets you paint 160 × 192- or 320 × 192-resolution graphics using 16 out of the 64 total colors. Or produce razor-sharp 640 × 192-resolution in 4 colors. The 21 new commands featured in the Color Computer 3's Extended BASIC language allow you to switch between screens, colors and backgrounds at a higher resolution and in a greater variety of colors than any previous Color Computer. When connected to a TV, the Color Computer 3 will display text in a 32-character by 16-line format. Get a 40-character by 24-line or 80-character by 24-line display with a monitor. Best of all, the new Color Computer 3 is compatible with software and accessories designed for the Color Computer 2 (in the Color Computer 2 mode). Expands easily with disk drives, printer, telephone modem and more. UL listed AC. 26-3334 ..... 219.95

Color Computer 3 512K Upgrade Kit. Installation required (not included). 26-3335 ..... 149.95

New! High-Resolution Color Monitor

CM-8 RGB Analog Color Monitor. Designed for use with the Color Computer 3. Displays up to 80 × 24 text and 640 × 192 graphics. It is the perfect complement to the superb graphics capabilities of the Color Computer 3. The CM-8 features a 13" diagonal screen and a built-in speaker with volume control. Includes cable. UL listed AC.
26-3215 ..... 299.95

SPECIFICATIONS FOR COLOR COMPUTER 3. Microprocessor. 68B09E 8-bit. **Clock Speed:** 0.894 MHz or 1.788 MHz. **Keyboard:** 57 keys, including Control, Alternate, F1 and F2. **Video Display:** 16 lines of 32 characters (uppercase only) to 24 lines of 80 characters (uppercase/lowercase). Color graphics capabilities range from 64 × 32 (8 colors) to 640 × 192 (4 colors and background color) with 6 intermediate display formats. High-resolution graphics in the same range available through machine language, Extended BASIC or Program Paks. **Memory:** 128K RAM—internally expandable to 512K. Twenty-one commands in enhanced Extended BASIC. **Input/Output:** 1500-baud cassette (recorder optional). Two joystick ports. RS-232C serial port (4-pin only). Standard TV (300 ohms), composite monitor and RGB Analog Monitor outputs. **Dimensions:** 3 × 10 3/8 × 14 3/4". **Power:** 120VAC, 60 Hz.

SPECIFICATIONS FOR COLOR COMPUTER 2. Microprocessor: 6809E, 8-bit. **Clock Speed:** 0.894 MegaHertz. **Keyboard:** 53 keys. **Video Diplay:** 16 lines of 32 characters (upper case only). Color graphics capabilities range from 64 × 32 (8 colors) to 256 × 192 (1 color and background color) with three intermediate formats. **Memory:** 16K ROM and 64K RAM. **Input/Output:** 1500-baud cassette (recorder optional). Two joystick ports. RS-232C serial port (4-pin only). Standard TV (300 ohms) output. **Dimensions:** 3 × 10 3/8 × 14 3/4". **Power:** 120VAC, 60 Hz.

COLOR COMPUTER ACCESSORIES

A Color Mouse. Adds speed and ease to games and graphics creation. Simply "roll" the mouse across tabletop (or any flat surface) to accurately position cursor. You can use it alone or with a joystick.
26-3025 . . . . . 49.95

B Joysticks. Our lowest-priced joystick. Now two players can experience the fun and excitement of games at the same time. Fast 360° movement! Single-shot button.
26-3008 . . . . . Pair/19.95

C Deluxe Joystick. Our best! Patented stick mechanism gives you more accurate cursor control and quicker response. Dual-axis trim controls adjust to your touch—allowing you to "fine tune" joystick to your game, business and graphics software. Select "spring-centering" or "free-floating" operation. 26-3012 . . . . . Each 29.95

A Multi-Pak Interface. Connects up to four Program Pak™ cartridges to your Color Computer at once! No more plugging in and unplugging cartridges. Connect disk drives and other accessories, too. Change between slots with selector switch or under program control. U.L. listed.
26-3124 . . . . . 99.95

B DC Modem Program Pak. RS-232 interface and 300-baud, originate/answer modem. Transfer/receive ASCII files or access information services by phone.
26-2228 . . . . . 89.95

C Deluxe RS-232 Program Pak. Frees serial port for optional printer while you communicate with major information services and with other computers over telephone lines. Software is built in. Requires modem.
26-2226 . . . . . 79.95

A Sound/Speech Cartridge. Adds sound, three voices and noise to your BASIC programs. 26-3144 . . . . . 79.95

B Hard Disk Interface. Use your Color Computer with Primary Drives. Requires 64K, Multi-Pak Interface, floppy disk with controller and OS-9 (2.0 or later). 26-3145 . . . . . 129.95

C Orchestra-90 CC. Create highly sophisticated electronic music and sound effects with your computer and listen to it on your home stereo. Both musicians and non-musicians can compose in six octave ranges in up to five voices. Simulate various instruments and percussion. 26-3143 . . . . . 79.95

D Appliance/Light Controller. Connect lights and appliances to Plug 'n Power™ remote control modules (sold separately), attach the controller to your Color Computer, then program times and events. U.L. listed. 26-3142 . . . . . 99.95

Electronic Book Makes Learning Fun

24.95 **Four Fun Programs Available Separately**

Electronic Book. Your kids will spend hours learning the fun way! Each of the software packages (sold separately, below) contains "pages" which compose the Electronic Book. Different areas of the book's touch-sensitive surface are pressed to make selections. Interactive routines make learning a game. Safe for kids to use, too—plugs into joystick port. Requires 16K Extended BASIC and cassette recorder. 26-3141, 24.95

Maze Master. 26-2541 . . . . . 19.95
Shape Maker. 26-2542 . . . . . 19.95
The Number Factory. 26-2543 . . . . . 19.95
Word Wizard. 26-2544 . . . . . 19.95

Orchestra-90/TM Software Affair.

COLOR DISK SOFTWARE

Childpace
Track your child's early development from 3 months to 5 years old. Evaluates dexterity, language, personal and social skills. 26-3248 ..... 39.95

D.L. LOGO
Programming language designed to run under OS-9. Includes "MUSIC" to play songs with up to 4 voices, "SAY" for support of Speech/Sound cartridge, and joystick support. 26-3033 ..... 99.95

OS-9 Disk Operating System
Accesses the entire memory of our 64K Color Computer. Includes editor/assembler. 26-3030 ..... 69.95

New! OS-9 Level II
Similar to OS-9 (above), but with enhancements for Level II to support 512K RAM and dual speed. Includes standard I/O drivers and BASIC-09. 26-3031 ..... 79.95

OS-9 Development System
Complete editor/assembler with full-screen editing and specialty I/O drivers for Color Computer 3. Requires OS-9 Level II. 26-3032 ..... 99.95

Multi-Vue
User-friendly graphics interface for OS-9 Level II programs. "Window" multiple applications on your Color Computer 3. 26-3035 ..... 49.95

PASCAL-09
A complete implementation of this structured programming language. Requires OS-9 DOS. 26-3034 ..... 99.95

BASIC-09
An enhanced version of standard BASIC written for the 6809 microprocessor. Includes advanced features derived from PASCAL. Requires OS-9 DOS. 26-3036 ..... 99.95

C Compiler
A high-level language that produces assembly language source code for the 6809 microprocessor. Requires OS-9 DOS and 2 disk drives. 26-3038 ..... 99.95

OS-9 Screen Print
Print high-res Color Computer graphics. Requires CGP-220 for four-color printouts or dot-matrix printer with bit-image mode for B&W. Requires OS-9 DOS. 26-3221 ..... 14.95

OS-9 Profile
A personalized electronic filing system. Requires 64K and OS-9 operating system. 26-3274 ..... 49.95

New! Phantomgraph
Graph data from database or user input. 26-3276 (Avail. 1/15/87) 49.95

TRSCOPY
Allows transfer of text files between "OS-9" disks and "Color Computer Disk Basic" disks. 26-3263 ..... 24.95

COOKBOOK
Two programs in one—an all-purpose menu planner and recipe index file. 26-3257 ..... 39.95

TSEDIT
A high-resolution screen editor that allows upper and lower case in lines from 32-80 columns. 26-3264 ..... 34.95

TSWORD
A format program that forms a powerful OS-9 word processing package when combined with TSEDIT. Illustrated menus. Requires 64K. 26-3267 ..... 34.95

New! TSSpell
A spelling checker/corrector designed to run under OS-9 in conjunction with TSWORD. 26-3266 ..... 39.95

Investograph
Charts stocks and trends. Features high-resolution graphics. 26-3258 ..... 49.95

Cash Budget Management
A sophisticated personal or small business bookkeeping program. 26-3261 ..... 49.95

DYNACALC
A powerful electronic spreadsheet. Features 256 columns and 256 rows. Requires 64K. 26-3275 ..... 99.95

Mickey's Space Adventure
Children will learn problem-solving skills while operating a spacecraft. 26-3247 ..... 29.95

Biosphere
An ecological simulation game that teaches children to create a workable ecology. Requires 64K. 26-3280 ..... 29.95

Robot Odyssey I
Logical problem solving, abstract reasoning and creative thinking. Requires 64K. 26-3284 ..... 34.95

Rocky's Boots
Players invent machines to solve puzzles, including games they design. Requires 64K. 26-3283 ..... 34.95

PAN
Write your own songs! Includes everything you need to compose music in three-part harmony. 26-3279 ..... 29.95

New! Zone Runner
Transport various items between the outposts of the galaxy while avoiding the patrols, pirates, escorts and mines. 26-3286 ..... 29.95

New! The Color Computer Artist
A user-friendly picture editor for the Color Computer 3 using OS-9 Level II. Select paint, spray, draw, zoom, stamp and more from menu icons. 26-3277 ..... 29.95

Pitfall II
Help Pitfall Harry on a treacherous journey to recover the magnificent Raj diamond. Requires 64K RAM and joystick. 26-3287 ..... 29.95

One-on-One
Dr. J (Julius Erving) and Larry Bird play basketball, one on one style. Control either player and try to win. 26-3288 .. 34.95

Flight Simulator I
Learn the basics in manual control of ailerons (pitch and roll), compass readings, take-off and landing and more. Requires 64K and joystick. 26-3108 ..... 24.95

Varloc
Chess pieces must wage a battle for victory of each square. You control one side, the computer the other. 26-3291 ..... 29.95

Desert Rider
How long do you think you can survive this treacherous, grueling motorcross track? Joystick required. 26-3292 ..... 29.95

Ghana Bwana
You're in an outrigger trying to reach an island. Obtain the treasure and win. Joystick required. 26-3293 ..... 29.95

New! Rogue
Rogue is so full of unpredictable monsters, ever-changing magic and hidden dangers that it's never the same game twice. 26-3297 ..... 29.95

The Interbank Incident
Find the thieves who have stolen a code book from the Interbank Corporation. Requires 64K. 26-3296 ..... 29.95

OS-9 and BASIC-09/TM Microware and Motorola. DYNACALC/TM Computer Systems Center. Robot Odyssey I and Rocky's Boots/TM The Learning Co. Pitfall II/TM Activision. One-on-One/TM Electronic Arts. Rogue/TM Epyx, Inc.

COLOR COMPUTER SOFTWARE

DeskMate

An integrated package of seven commonly used personal productivity applications on one disk: Text, Ledger, Index Cards, Paint, Telecom, Calendar and Calculator. DeskMate is very user friendly. You can easily select an application (identified by name and icon) with your mouse, joystick or keyboard arrow keys.

TEXT—A general-purpose text entry and editing program that performs search and replace; file merge; and block select, copy and delete. It's ideal for writing correction-free letters, memos and short reports.

LEDGER—A simple spreadsheet which includes an easy-to-use menu and automatic column formatting. You can use Ledger to do budgeting, sales forecasting, profit and loss projections and other "What if . . . ?" calculations.

INDEX CARDS—A personal filing system. You can enter and edit data and perform simple sorts and searches. It's ideal for keeping track of names and addresses.

PAINT—A four-color picture editor to create graphics screens. You can easily create lines, shapes, patterns, fill in areas with color and enter text. Using Paint, you can create colorful charts, graphs, designs, even "doodles" on your screen, then print a copy on a dot-matrix or ink-jet printer.

TELECOM—A communications program to access national information services, plus transmit and receive ASCII files from other computers by phone (requires modem). Telecom makes it easy to access computer bulletin boards.

CALENDAR—A simple monthly calendar that displays "to do's" for any date. An easy way to organize your day.

CALCULATOR—A four-function calculator available within any application.

Color Computer Deskmate. 26-3259 . . . . . 99.95

DeskMate 3. Designed exclusively for the power of the Color Computer 3. Same features as DeskMate (above), but with a 40/80-column switchable display for Text, Ledger and Telecom. 26-3262 (Avail. 3/15/87) 99.95

New! Color File II

With Color File II you can easily and quickly store, retrieve and use various types of important data, such as addresses, warranties and personal records. You can easily alphabetize, select, examine, print, change and save your information. 26-3110 (Avail. 2/15/87) 24.95

Spectaculator

Do your planning, forecasting and problem-solving with this "electronic spreadsheet." Just enter numbers and formulas, and Spectaculator will calculate and display the results on command, saving you time and effort. Up to 99 rows and columns. 26-3104 . . . . . 29.95

Personal Finance II

Easy-to-use household budget program. Keeps track of 9 bank accounts and 26 budget categories. Balance your checkbook and keep accurate records of your expenditures in each budget category. Review your expenditures on a monthly or yearly basis. 26-3106 . . . . . 29.95

New! Color SCRIPSIT II

Color SCRIPSIT II is a word processing system that includes an editor to enter and edit text and text formatting commands. The view mode allows the user the ability to change the format control information while viewing the page. 26-3109 (Avail. 2/15/87) 29.95

Color Screen Print Utility

(2) Provides multi-color printouts of color graphics scenes produced from any graphics program. For use with color ink-jet printer (26-1268)/dot-matrix printer. Requires 16K. 26-3121 . . . . . 9.95

Editor/Assembler

Develop 6809 software programs or subroutines. You get trial assembly of object code and execution of your program in-memory before final assembly to tape, an editor that enables you to change your program and reassemble, and Z-Bug for quick and easy testing. Requires 16K. 26-3250 . . . . . 39.95

Atom

(1) Teaches the names of elements, their atomic numbers, configurations and main properties. Includes beautiful wall poster. 26-3149 . . . . . 19.95

Vocabulary Tutor

Match words with their definitions and place words in the appropriate sentences. For grades 3-5.

Vocabulary Tutor 1. (2) 26-2568 . . . . . 8.95

Vocabulary Tutor 2. (2) 26-2569 . . . . . 8.95

Color Computer Learning Lab

(2) Self-teaching course in standard Color BASIC. 26-3153 . . . . . 49.95

Color Math

Math skills for ages 6-14. Includes problems in addition and subtraction. 26-3201 . . . . . 19.95

New! Winnie the Pooh

It's easy to get lost in the Hundred Acre Wood, so be careful. Improves map skills, reading ability, and logical thinking. 26-3244 (Avail. 3/15/87) 34.95

New! Donald Duck's Playground

Whether working at the produce stand, stocking toy store shelves or sorting cargo. Learn to recognize and match shapes, color and letters. 26-3245 (Avail. 3/15/87) . . . 34.95

New! Cave Walker

Do you have what it takes to find the fabulous Treasure of the Ancients? Watch out for the steam vents, fireballs, bullets, and the Great White Bat. 26-3246 . . . . . 24.95

New! Koronis Rift

Take part in a daring raid to claim the Ancient's exotic technologies. 26-3298 (Avail. 2/15/87) 29.95

New! Rescue on Fractalus

As a member of the elite Rescue Squadron, your mission is to rescue downed pilots. 26-3299 (Avail. 2/15/87) 29.95

Program Pak Games

Dragonfire

(1) You must dodge fireballs tossed by the dragon to get to the treasure room. 26-3098 . . . . . 29.95

Downland

(1) Alone in a secret cave, you jump and climb from chamber to chamber, collecting keys, gold and diamonds. Each chamber is different—so watch out! 26-3046 . . . . . 19.95

Dungeons of Daggorath

You're pitted against a succession of awesome beasts. Each victory brings you closer to your ultimate opponent—the evil wizard. 26-3093 . . . . . 29.95

Baseball

(1) Plays just like the real game! You control pitching, running and defense. 26-3095 . . . . . 19.95

Androne

(1) Your computer has been invaded by Data Bugs. Call on Androne, a user-controlled robot to hunt through your memory banks and "de-bug" them. 26-3096 . . . . . 19.95

Cassette Tape Game

Pyramid

(2) Perilous adventure game! Explore the ancient pyramid's unknown passages for treasures! 26-3310 . . . . . 14.95

Rescue on Fractalus and Koronis Rift/TM Lucasfilm Ltd.

(1) Joysticks required. (2) Cassette recorder required. (3) Joysticks and cassette recorder required.

HANDY POCKET COMPUTERS

PC-6 Pocket Scientific Computer

119.95

- **65 Built-In Scientific Functions**
- **Programs in BASIC and Assembly Language**

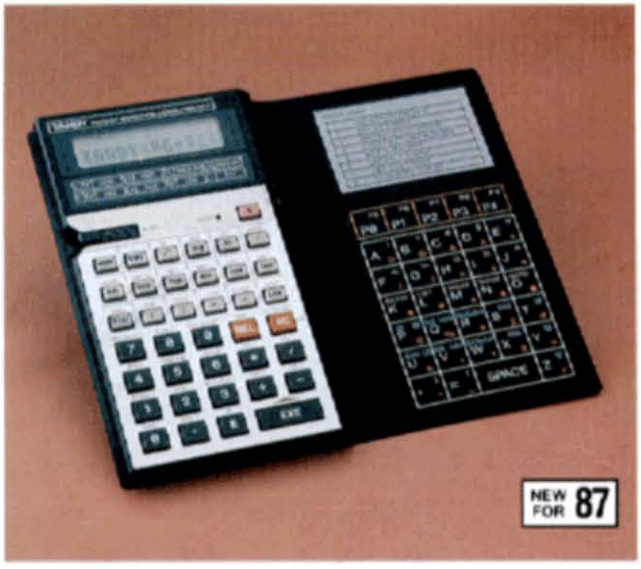
Pocket Scientific Computer PC-6. An ideal tool for engineers and students, the PC-6 combines the best features of a powerful scientific calculator and a pocket computer. Performs up to 65 scientific calculations—or write your own programs in BASIC or assembly language. Retains programs and data even when power is off. A built-in Note and Address File keeps important telephone numbers or engineering data and formulas handy. Features an easy-to-read, 24-character LCD. Uses PC-4 Cassette Interface and Printer with PC-5/6 Cable (all sold separately). 8K RAM. Folds up to only $^{3}/_{4} \times 1^{13}/_{16} \times 5^{5}/_{8}$". Includes battery. 26-3672 ..... 119.95

8K RAM Module. 26-3674 ..... 19.95

PC-4/5/6 Cassette Interface. See PC-4. 26-3651 .... 39.95

PC-4/5/6 Printer. See PC-4. 26-3652 ..... 79.95

PC-5/6 Cable. 26-3671 ..... 14.95

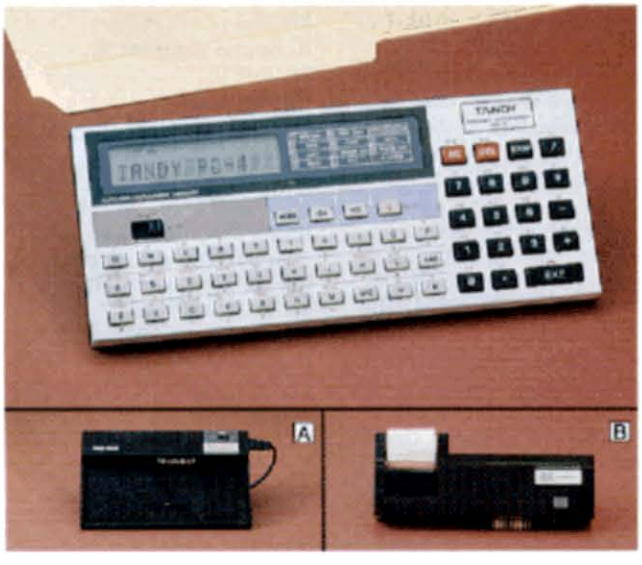


PC-7 Pocket Scientific Computer

69.95

- **With 72 Scientific and 17 Statistical Calculations**
- **Features 2K RAM**
- **Programs in BASIC**

Pocket Scientific Computer PC-7. Keep track of important data and calculations wherever you go with our new PC-7 Pocket Computer. This incredible, compact unit performs up to 72 scientific calculations and 17 statistical calculations. This makes it perfect for engineers, students and professionals who need exact mathematical data rapidly. Mathematical functions include trigonometric, logarithmic/exponential, absolute value, permutations, standard deviation, linear regression and many others. The PC-7 features 2K random access memory and 35 commands in BASIC including: CLEAR, END, INPUT, DATA, READ AND STAT. You can even write your own programs in BASIC! Keyboard composed of 72 keys. Measures $^{13}/_{32} \times 5^{1}/_{2} \times 7^{3}/_{32}$".
26-3673 ..... 69.95



Low-Cost PC-4 Pocket Computer

59.95

- **Measures $^{3}/_{8} \times 6^{1}/_{2} \times 2^{3}/_{4}$"**
- **544-Character Memory**

Pocket Computer Model PC-4. Lets you keep up to 10 short programs in memory or combine the programming area for longer programs. BASIC language includes 23 commands, 15 functions and 10-digit numeric accuracy. Use just two keystrokes to enter up to 16 common commands. Edit and Debug modes make the PC-4 easier to program than a programmable calculator. Typewriter-style keyboard includes 53 alphabetic keys and a 10-key numeric datapad. A big 12-character LCD scrolls to 62 characters. With batteries and manual. 26-3650 ..... 59.95

A **PC-4/5/6 Cassette Interface.** Store and load programs on cassette tapes using an optional cassette recorder. Requires two "AA" alkaline batteries. 26-3651 ..... 39.95

B **PC-4/5/6 Printer.** Prints at 20 characters per line (60 lpm) in an electro-thermal 5 × 7 dot matrix. Includes rechargeable batteries and U.L. listed AC adapter/charger. 26-3652, 79.95

PC-4/5/6 Thermal Paper. 65-711 ..... Pkg. of 5/1.99

TANDY PORTABLE COMPUTERS

Our Popular Tandy 200

799.00

- **Multiplan Built In**
- **24,000-Character Memory**

Tandy 200. A powerful problem solver. For complex spreadsheet analysis and calculations, we put popular Multiplan software into the Tandy 200's permanent memory. Do sales forecasts, profit-and-loss projections, budgeting, pricing, engineering calculations and more. An improved version of the Model 100's easy-to-use word processing program makes Tandy 200 especially useful for memos, reports and correspondence. Four other "instant-on" programs are a personal appointment calendar, address and phone directory, and telephone auto-dialer. You can even create your own programs in BASIC. The Tandy 200's high-contrast flip-up liquid crystal display has 240 x 128 resolution for big, clear graphics, or 16-line by 40-character text. Includes parallel printer, RS-232C, cassette and bar code reader interfaces. 26-3860 . . 799.00

SPECIFICATIONS. Microprocessor: 8-bit 80C85 CMOS. **Clock Speed:** 2.4 MHz. **Memory:** 72K ROM, expandable to 104K; 24K RAM, expandable to 72K in banks of 24K. **Keyboard:** Full-sized 56-key typewriter style with embedded data pad, plus 8 programmable function keys, 4 command keys and 4 cursor control keys. **Display:** 16 x 40 liquid crystal display, upper and lower case ASCII characters, 240 x 128 dot-matrix graphics. **Modem:** Built-in 300-baud direct-connect modem with auto-dialer. FCC registered. Originate and answer modes. Tone dialing signals. **Input/Output:** Parallel printer interface. RS-232C serial communications interface programmable up to 19,200 baud. Cassette tape interface loads at 1500 baud. Standard bar-code reader interface. **Dimensions:** 2 3/16 x 11 3/4 x 8 1/2". **Weight:** 4.5 lbs. **Power Supply:** Operations—Up to 16 hours on 4 "AA" alkaline batteries, and can use nickel-cadmium rechargeable batteries with minor additional-cost modification. Optional U.L. listed AC/DC charger/adapter available. Memory—Internal rechargeable nickel-cadmium batteries.

Slimmer, Lighter Tandy 102

499.00

- **24K Memory ■ 40 x 8 Display**
- **Five Built-In Management Programs**
- **Direct-Connect Telephone Modem**

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SPECIFICATIONS. Microprocessor: 8-bit 80C85 CMOS. **Clock Speed:** 2.4 MHz. **Memory:** 32K ROM; 24K RAM, expandable to 32K. **Keyboard:** Full-size 56-key typewriter style with embedded 10-key datapad, plus 8 programmable function keys, 4 command keys and 4 cursor control keys. **Display:** 8 x 40 Liquid Crystal Display, upper and lower case ASCII characters. 240 x 64 dot-matrix graphics. **Modem:** Built-in FCC-registered direct-connect modem with auto-dialer. 300 baud. Originate and answer. **Input/Output:** Parallel printer interface. RS-232C serial communications interface programmable up to 19,200 baud. Cassette tape interface loads at 1500 baud. Standard bar-code reader interface. **Dimensions:** 1 1/2 x 11 7/8 x 8 1/2". **Weight:** 3 lbs. **Power Supply:** Operations—Up to 20 hours on 4 "AA" alkaline batteries or optional U.L. listed AC power supply. Memory—Internal rechargeable nickel-cadmium batteries will maintain memory intact for up to 30 days with power off (depending on the amount of RAM installed) and are automatically recharged from "AA" batteries or AC power.

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26-3901 ..... 1599.00

SPECIFICATIONS: Microprocessor: 16 bit 80C88 CMOS. **Clock Speed:** 3.07 MHz. **Memory:** 160K ROM; 32K RAM, expandable to 224K RAM. **Keyboard:** Full-size 73-key typewriter style with embedded 10-key datapad. **Display:** 80 x 16 Liquid Crystal Display, upper and lower case ASCII characters. 480 x 128 dot-matrix graphics. **Modem:** Built-in FCC-registered direct-connect modem with auto-dialer. 300 baud. Originate and answer. **Input/Output:** Parallel printer interface. RS-232C serial communications interface programmable up to 19,200 baud. **Dimensions:** 2 3/4 x 12 x 13" **Weight:** 9.5 lbs. unit, 11 lbs. with AC adapter. **Power Supply:** Operations—Up to 8 hours with 1 hour disk access on built-in rechargable batteries. U.L. listed AC adapter.

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SPECIFICATIONS. Print Density: 10, 12, 17.1 (standard); 10 and 12 (correspondence); proportional and compressed proportional. **Print Speed:** Standard 10 cpi—380 cps. Correspondence 10 cpi—90 cps. Proportional—77-180 cps. **Character Set:** 95 ASCII, 31 graphics and special characters. IBM Character Set 1 and 2. **Horizontal Dot Resolution:** 60-240 dots/inch, 1632-3916 dot columns/line. **Dimensions:** 4 3/4 x 22 1/2 x 16 7/8″. **Weight:** 39 3/4 lbs. **Power:** 120VAC 60 Hz 200W

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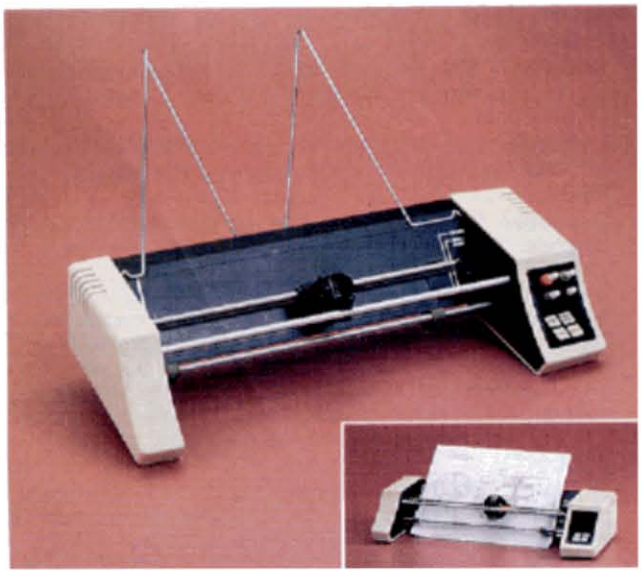
26-2810 ..... 1295.00

SPECIFICATIONS. Print Density: 10, 12 and 16.7 cpi, plus proportionally spaced and elongated. **Print Speed:** Standard 10 cpi—121 lpm/80 column, 84 lpm/132 column. Correspondence 10 cpi—33 lpm/132 column. **Character Set:** 96 ASCII, 31 international and 31 graphics characters. **Font Matrix:** DP mode—10 cpi and 16.7 cpi: 24 x (13 + 5), 12 cpi: 24 x (13 + 2). WP mode—10 cpi: 24 x 36, 12 cpi: 24 x 30, Proportional: 24 x n. **Horizontal Dot Resolution:** 360 dots/inch, 4896 dots/line. **Paper:** Up to 15″ wide. Friction feed. Prints original, plus two copies. **Dimensions:** 5 7/8 x 21 11/16 x 15″. **Weight:** 42 lbs. **Power:** 120VAC, 60 Hz.



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26-1277 ..... 699.00

SPECIFICATIONS. Print Density: 10, 12, 16.7 cpi, plus elongated. **Print Speed:** 10 cpi—43 lpm/80 col. **Character Set:** 96 ASCII, 64 special and 30 block graphics characters. **Horizontal Dot Resolution:** 480-800 dots per line. **Vertical Spacing:** 12, 6, 8 lines per inch. **Line Feed:** 1/6, 1/8, 1/12, n/72". **Dimensions:** 3 1/16 x 15 3/8 x 9 7/16". **Weight:** 8 3/4 lbs. **Power:** 120VAC, 60 Hz.

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26-1280 ..... 349.95

SPECIFICATIONS: Print Density: Draft Quality—10, 12 and 17 cpi (standard and italic cursive). Correspondence Quality—10 and 12 cpi (standard and italic cursive). **Speed:** 50 to 100 cps (draft), 20 to 24 cps (correspondence). **Character Set:** 96 ASCII, plus Tandy or IBM special characters. **Bit Image:** 480 to 1920 dot columns/line. **Dimensions:** 4 3/4 x 15 3/8 x 10 1/2". **Weight:** 10 3/4 lbs. **Power:** 120VAC, 60 Hz, 33W.

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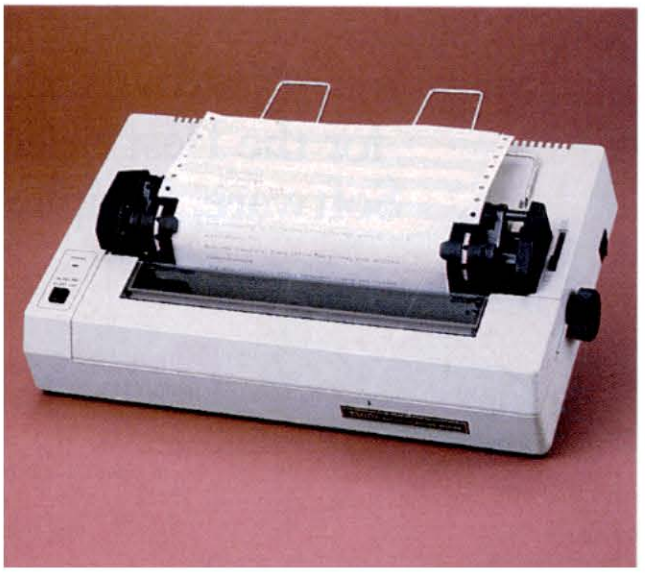

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26-1276 ..... 199.95

SPECIFICATIONS. Print Density: 10, 12, 16.7 cpi, plus elongated. **Print Speed:** 10 cpi—43 lpm/80 col. **Character Set:** 96 ASCII, 64 special and 30 block graphics characters. **Horizontal Dot Resolution:** 480-800 dots per line. **Vertical Spacing:** 12, 6, 8 lines per inch. **Line Feed:** 1/6, 1/8, 1/12, n/72". **Dimensions:** 3 1/16 x 15 3/8 x 9 7/16". **Weight:** 8 3/4 lbs. **Power:** 120VAC, 60 Hz.

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26-2801 ..... 149.95

SPECIFICATIONS. Print Speed: 19.5 lpm at 10 cpi, 132 column. **Carriage Motion:** Unidirectional, optimal motion seeking. **Character Set:** 96 ASCII, plus special and international, 21 control codes. **Paper:** Up to 16" wide. Original, plus 5 copies. Friction feed. **Interface:** Parallel. **Dimensions:** 8 x 24 1/2 x 15 1/2". **Weight:** 28 lbs. **Power:** 120VAC, 60 Hz, 141 Watts.

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26-2812 ..... 399.95

DWP 230 Bi-Directional Tractor. 26-2813 ..... 99.95

SPECIFICATIONS. Carriage Motion: Bi-directional, optimal motion seeking. **Character Set:** 96 (modified ASCII, plus special international), 18 control codes. **Paper:** Up to 16" wide. Original, plus 3 copies. Friction feed. **Interface:** Color Computer-compatible serial and parallel. **Dimensions:** 6 5/8 x 24 3/8 x 13 3/8". **Weight:** 26 lbs. **Power:** 120VAC, 60 Hz, 60 Watts.

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by David A. Williams

Basic and Assembly: Together Again

Combine the speed of assembly language with the ease of Basic.

Basic has never been known for its speed. The interpreted versions are handicapped by the need to convert Basic statements and functions to machine code as the program executes. Screen handling is especially slow compared to what you can achieve with an assembly-language routine that writes directly to the display buffer.

Fortunately, you can get assembly speed for critical routines while retaining Basic's convenience and ease of use. I'll describe how to call assembly routines from interpreted Basic programs and then from programs compiled with Microsoft's Quick Basic compiler. Quick Print (Program Listing 1), an assembly print routine, illustrates the method. When used in place of the Print statement, Quick Print puts snap in your screen displays.

The Basic/Assembly Interface

Basic communicates with an assembly routine in two ways: the user-service routine (USR) function and the Call statement. The former is provided mainly for compatibility with older versions of Basic. The Call statement is the preferred method for new programs. The syntax is:

CALL variable name (argument list)

The variable name gives the offset into the current segment where the routine is located. The current segment may be the default Basic data segment, or as defined by a DEF SEG statement as in Quick Print. The arguments, separated by commas, are variables that the program uses to pass data from the main program to the routine and back again. Your subroutine can change the variables' values, but not their type or, in the case of string variables, their length.

When Basic executes a Call, it places a 2-byte pointer on the stack to each variable in the Call statement, followed by the return offset and return segment addresses. The Figure shows the stack after the called routine has pushed the base pointer (BP) register. The uses to which Quick Print puts the arguments are shown in parentheses. At this point the subroutine should transfer the contents of the stack pointer (SP) register to the BP register for use in extracting the parameter addresses from the stack.

Your subroutine is also responsible for cleaning up the stack before returning to the main program. You can most easily do this with a RET n instruction, where n is twice the number of arguments in the Call statement. RET n instructions move the SP register back to the starting point, skipping over the variable pointers and the return address.

When the subroutine is entered, the registers for the data segment (DS), extra segment (ES), and stack segment (SS) are set to the address of Basic's data segment. The code segment (CS) register contains the segment address of the subroutine. Your routine must preserve the values that are in all segment registers and in the BP register.

There are several ways to load assembly routines into memory. The calling program can poke short ones into memory. The easiest method for longer programs is using the BLoad statement. Unless you are pinched for memory, and few are these days, the best place to locate the routine is just above the Basic data segment. The calling program can easily determine where this is, so that the entire routine is independent of DOS and any memory-resident programs. This is one way to construct Basic programs larger than the usual 64K limit.

The assembly routine must be a memory image which you have saved with the BSave command, or else it must contain a header containing the information that BLoad requires. I use the latter approach.

Quick Print

Now I'll put theory into practice. Listing 1 is the source code for Quick Print. The Head segment creates a header to fool the BLoad statement in the calling program into thinking that the file was saved using BSave. The BP register, with the offsets shown in the Figure, is used to extract the variable pointers from the stack and these, when placed in the base register (BX), are used to access the variables themselves.

System Requirements

Tandy 1000
Basic
Assembly Language
Quick Basic optional
Editor/assembler optional

Program Listing 1. Quick Print.

```
HEAD    SEGMENT     PARA PUBLIC 'CODE'   ;Header
        DB          0FDH                 ; for
        DW          0,0                  ; file
        DW          LAST - FIRST         ;
HEAD    ENDS                             ;

CODE    SEGMENT     BYTE PUBLIC 'CODE'
        ASSUME      CS:CODE
        PUBLIC      QP
FIRST   EQU         $
QP      PROC        FAR
        PUSH        BP                   ;Save BP
        MOV         BP,SP                ;Get stack address
        PUSH        ES                   ;Save ES
        MOV         BX,[BP+06]           ;Get addr of Col variable
        MOV         DI,[BX]              ;Put Col number in DI
        DEC         DI                   ;Change Col # to 0 - 79
        MOV         BX,[BP+08]           ;Get addr of Row variable
        MOV         AX,[BX]              ;Put Row # in AX
        DEC         AX                   ;Change to 0 - 25
        MOV         BX,[BP+0AH]          ;Get addr of string pointer
        XOR         CH,CH                ;Clear CH
        MOV         CL,[BX]              ;Put string length in CL
        CMP         CL,00                ;Is it zero?
        JZ          QUIT                 ;Yes, quit
;Use 02 instead of 01 in following line for use with QuickBASIC
        MOV         SI,[BX+01]           ;Put string start addr in SI
        MOV         DX,0050H             ;Num of char per row
        MUL         DX                   ;# rows times 80
        ADD         DI,AX                ;Add column number
        SHL         DI,1                 ;Multiply by 2
        MOV         AH,0FH               ;Read video mode
```

Listing continued

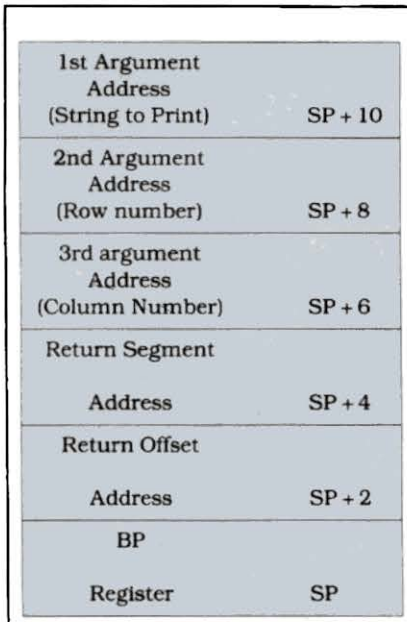

Figure. Condition of the stack after the called program pushes BP register. At this point, the SP register is moved into the BP register, and offsets from this value are used to access the variable pointers.

Recall that the SS and DS registers, the segment references for the BP and BX registers respectively, both point to the Basic data segment. The string pointer points to a 3-byte descriptor. The first byte is the string's length, which the routine puts into register CL, and the next 2 bytes contain the address of the first character, which the routine puts into the Source Index (SI). The routine uses the row and column numbers to calculate an offset into the display buffer, which it places in the destination index (DI).

The remainder of the routine copies the string to the buffer starting at the calculated position. INT 10H determines which type of display is in use, and the routine uses separate sections of code for monochrome and color displays. The code for color displays eliminates snow on the screen by writing only during the horizontal-retrace period.

If you have an assembler, assemble the routine, link it, convert the resulting EXE file to a COM file with EXE2BIN, and, finally, rename the file to change the extention to BIN. If you don't have an assembler, the Basic program in Listing 2 creates the necessary file. In either case, put the file in the same directory as the Basic program that calls it.

Using Quick Print

Listing 3 is a Basic program that demonstrates Quick Print. Line 30 locates the top of the Basic data segment and line 40 loads the routine at that location. The variable QP gives the offset from the seg-

Listing continued

```
            INT     10H
            CMP     AL,7                ;Is it mono?
            JNE     COLOR
            MOV     AX,0B000H           ;Video buffer addr, mono
            MOV     ES,AX               ;Put it in ES
CYCLE:      MOVSB                       ;Send 1 byte to buffer
            INC     DI                  ;Skip attribute byte
            LOOP    CYCLE               ;Loop until done
            JMP     QUIT
COLOR:      MOV     AX,0B800H           ;Video buffer addr, color
            MOV     ES,AX               ;Put it is ES
            MOV     DX,03DAH            ;Video port address
TST:        IN      AL,DX               ;Read port
            CMP     AL,0FFH
            JZ      WAIT
            TEST     AL,1               ;Test bit zero
            JNZ     TST                 ;Wait until it's reset
WAIT:       IN      AL,DX               ;Read port again
            TEST    AL,1                ;Test bit zero
            JZ      WAIT                ;Wait until it's set
            MOVSB                       ;Send 1 byte to buffer
            INC     DI                  ;Skip attribute byte
            LOOP    TST                 ;Loop until done
QUIT:       POP     ES                  ;Restore ES
            POP     BP                  ;Restore BP
            RET     6                   ;Clean stack and return
QP          ENDP
LAST        EQU     $
CODE        ENDS
            END
```

End

Program Listing 2. Basic program that creates the Quick Print QP.BIN file.

```
5 'QPgen.bas                                                    '*   53
10 OPEN "R",1,"QP.BIN",1                                        '*  1339
20 FIELD #1, 1 AS A$                                            '*  1040
30 FOR I = 1 TO 98                                              '*   981
40  READ J                                                      '*   554
50  LSET A$ = CHR$(J)                                           '*  1147
60  PUT #1                                                      '*   531
70 NEXT                                                         '*   454
80 CLOSE : END                                                  '*   847
90   DATA 253,80,89,80,80,91,80,85                              '*  1672
95   DATA 139,236,06,139,94,06,139,63                           '*  1872
100  DATA 79,139,94,08,139,07,72,139                            '*  1835
105  DATA 94,10,50,237,138,15,128,249                           '*  1871
110  DATA 80,116,58,139,119,01,186,80                           '*  1861
115  DATA 80,247,226,03,248,209,231,180                         '*  1959
120  DATA 15,205,16,60,07,117,12,184                            '*  1803
125  DATA 80,176,142,192,164,71,226,252                         '*  1965
130  DATA 235,27,144,184,80,184,142,192                         '*  1963
135  DATA 186,218,03,236,60,255,116,04                          '*  1917
140  DATA 168,01,117,247,236,168,01,116                         '*  1964
145  DATA 251,164,71,226,238,07,93,202,06,00                    '*  2287
```

End

Program Listing 3. Quick Print demonstration program.

```
10   'Sample Program      DEMO.BAS    9/28/86
20   CLS : CLEAR : DEFINT A-Z : DIM P$(15)                      '*  2336
25   'Lines 30 and 40 are for use with interpreter only
30   DEF SEG = 0 : N = PEEK(&H510) + 256*PEEK(&H511) + &H1001   '*  3109
40   DEF SEG = N : QP = 0 : BLOAD "QP.BIN",QP                   '*  2490
50   R=1 : C=23 : P$="QUICK PRINT DEMO PROGRAM" : CALL QP(P$,R,C)'*  3811
60   P$(8)  = "Without Quick Print          1"                  '*  2867
70   P$(9)  = "The way Quickprint does it   2"                  '*  3260
80   P$(10) = "Quickprint again             3"                  '*  2732
90   P$(11) = "Quit                         4"                  '*  1928
100  P$(14) = "Make a Selection"                                '*  2145
110  C=20 : FOR R=8 TO 14 : CALL QP(P$(R),R,C) : NEXT           '*  2953
120  LOCATE 14,38,1                                             '*   996
130  I$=INKEY$ : IF I$="" THEN 130                              '*  1820
140  ON VAL(I$) GOTO 150,230,250,360 : GOTO 130                 '*  2514
150  CLS : P$ = STRING$(79,"A")                                 '*  1648
160  FOR I = 1 TO 22                                           '*  1020
170    PRINT P$                                                 '*   793
180  NEXT                                                       '*   584
190  PRINT : LOCATE 24,22,0 : PRINT "Hit any key to continue  "; '*  4431
200  I$=INKEY$ : IF I$="" THEN 200                              '*  1816
210  CLS                                                        '*   405
220  GOTO 50                                                    '*   626
230  P$ = STRING$(79,"B")                                      '*  1300
240  GOTO 260                                                   '*   679
250  P$ = STRING$(79,"C")                                      '*  1303
260  CLS : C=1                                                  '*   709
270  FOR R=1 TO 22                                             '*   967
280    CALL QP(P$,R,C)                                          '*  1161
290  NEXT                                                       '*   586
300  R=24 : C=22 : P$ = "Hit any key to continue  "             '*  3443
310  CALL QP(P$,R,C)                                            '*  1091
320  LOCATE 24,47,0                                             '*   998
330  I$=INKEY$ : IF I$="" THEN 330                              '*  1824
340  CLS                                                        '*   409
350  GOTO 50                                                    '*   638
360  END                                                        '*   400
```

End

Only minor changes are necessary to use Quick Print with the Quick Basic compiler.

ment address, defined by N, where the assembly program, QP.BIN, will load.

You can load additional assembly routines above the first by specifying the appropriate offsets in other variables. The file name does not have to be the same as the offset-address variable, but making it so helps avoid confusion.

Further examination of Listing 3 reveals that the QP routine is called when you would otherwise use a Print statement. The row and column coordinates, numbered 1–24 and 1–80, respectively, identify the location where the first character of the string will be displayed. You must define R and C, the row and column variables, as integers. The string variable can be an array element as shown in line 110. Note that you must use the Locate statement to move the cursor.

I designed Quick Print to display only string variables. You can use the Print statement to display numbers if you don't have a lot of them, but be sure to locate the cursor first. Alternatively, you can convert numeric variables to strings with the STR$ function.

Using Quick Print With Quick Basic

Only minor changes are necessary to use Quick Print with the Quick Basic compiler. Delete lines 30 and 40 from the sample program. The name in the Call statement is the name given to the procedure in the assembly source listing, also QP in this case.

You can delete the Head segment from the source listing, but it isn't necessary. Since Quick Basic allows strings up to 32,000 characters long, 2 bytes are needed to specify the string length. This requires a different offset to locate the string starting address as indicated in the listing.

Compile your Basic program using Quick Basic's OBJ (BRUN.LIB) option. Then assemble the subroutine and link the resulting object file (QP.OBJ) with your program object file.■

David A. Williams is a staff engineer with a major aerospace firm and has 25 years experience with computers. Send your comments and questions to him at 2452 Chase Circle, Clearwater, FL 33546.

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In Search of Lost Superscripsit Files

Reconstruct crashed Superscripsit files with a minimum of fuss.

Superscripsit file crashes happen in a couple of ways: Bad disk media can cause a sector to become unreadable, or you can exit the program in the midst of writing a file, causing an end-of-file error when you try to reload it. You can recover these files, but first you must understand how they are set up.

Unlike most word processors, Superscripsit saves files as blocks of text. Each text block consists of four disk sectors. Superscripsit places data pointers within the first sector of each block, allowing the block to hold almost 1K of data. A single file can hold a maximum of 255 blocks, numbered zero–254, four of which are reserved for header and footer information. Six additonal sectors provide the file header. A Superscipsit file, therefore, has a maximum length of 1,026 sectors, or about 256.5K of disk space.

The first file-header sector contains general information about the text such as the author's comments, the file's printer driver, line-spacing defaults, which blocks contain the header and footer information, and all other information that is displayed when you open the text file. The first byte of this sector is E0 hexadecimal (hex), indicating that it is a Superscripsit file.

The next five sectors house the file's index. Superscripsit adds one to the value of the first byte of the first sector of the index area to determine how many blocks the file contains. Five-byte clusters of block information follow.

The cluster's first byte gives the block name. The program multiplies this value by four and increases the result by six to determine which relative sector within the block begins the file.

You can recover a lost document by using the index information to rebuild the file order.

Adding seven to the next byte, which is equal to the first byte in the first sector of the corresponding block, gives you the relative-byte address within the block of the last sector containing data relevant to the text.

The next byte, which corresponds to the second byte in the first sector of the corresponding block, tells the system how many of the four possible sectors the file occupies. The four sectors are numbered zero–3. The next byte tells the system how many lines of text are in the block. The last byte is a system flag. The list terminates with block FF hex.

Header and footer indexing works somewhat differently. Block names are only reserved for odd-footer, odd-header, even-footer, and even-header sequences that start at relative byte 72 hex in the first file sector. If the first byte in the first sector of a block is zero, it is a header or footer block. Its second byte is always three, and FF hex always terminates its text.

You can recover a lost document either by using the index information to rebuild the file in order (blocks are not always grouped sequentially, which is the reason for the index), or if the index sectors are defective, by creating a sequential listing

LOAD 80

System Requirements

Model I/III/4
32K RAM
Basic
One disk drive
Superscripsit

Program Listing 1. Recover.

```
10 CLS:PRINT"--------------------------------"                          '*  2273
20 PRINT"- SuperSCRIPSIT File Recovery -"                               '*  3196
30 PRINT"- Written by:      David Goben -"                              '*  2979
40 PRINT"-       67 Highland Road       -"                              '*  2465
50 PRINT"- Mansfield Center, CT  06250 -"                               '*  2851
60 IF PEEK(5)=0 THEN CLEAR ELSE CLEAR 500                               '*  2472
70 PRINT"--------------------------------":PRINT                        '*  2450
80 DEFINT A-Z:MD=1:IF PEEK(5)<>0 THEN IF PEEK(293)<>73 THEN MD=0        '*  3876
90 GOTO 140                                                             '*   631
100 IF RB=256 THEN 120 ELSE IF RB<>BR OR RS<>SR THEN D=PEEK(PT+RB)
    :D$=CHR$(D):RB=RB+1:RETURN                                          '*  5762
110 RS=0:RB=0:GOSUB 130:IF (RG>LG AND CR=1) OR LP>LG THEN 340 ELSE
     GET 1,RG*4+7:ET=0:GOSUB 100:IF D=0 THEN 110 ELSE BR=D+7:GOSUB
     100:SR=D:RB=7:GOTO 100                                             '*  9201
120 RB=0:IF RS=SR THEN 110 ELSE RS=RS+1:GET 1,RS+RG*4+7:GOTO 100        '*  3925
130 IF CR THEN RG=RG+1:RETURN ELSE LP=LP+1:RG=ASC(MID$(LO$,LP,1)):
    RETURN                                                              '*  4619
140 FS$="":LINE INPUT"Type in the FILESPEC of the File to RECOVER:
     ";FS$:IF FS$=""THEN 140 ELSE ON ERROR GOTO 150:OPEN"I",1,FS$:
    CLOSE:GOTO 160                                                      '*  9490
150 PRINT FS$" cannot be found!":PRINT:RESUME 140                       '*  3538
160 FD$="":LINE INPUT"Type in the FILESPEC of the OUTPUT File    :
     ";FD$:IF FD$=""THEN 160 ELSE D$="":F$=FS$:X=INSTR(F$,":"):IF
    X THEN F$=LEFT$(F$,X-1):D$=MID$(FS$,X+1)                            '* 10539
170 D1$="":F1$=FD$:X=INSTR(F1$,":"):IF X THEN F1$=LEFT$(F1$,X-1):D
    1$=MID$(FD$,X+1)                                                    '*  4633
180 IF F$<>F1$ OR (F$=F1$ AND D$<>D1$ AND D$<>"" AND D1$<>"")THEN
    190 ELSE PRINT"DUPLICATE FILE NAMES! ILLEGAL!":GOTO 240             '*  7075
190 ON ERROR GOTO 200:OPEN"O",2,FD$:GOTO 210                            '*  2665
200 PRINT FD$" is Illegal!":PRINT:RESUME 160                            '*  3025
210 ON ERROR GOTO 430:OPEN"R",1,FS$:FIELD 1,1 AS D$:P!=PEEK(VARPTR
    (D$)+1)+256*PEEK(VARPTR(D$)+2):IF P!>32767 THEN PT=P!-65536! E
    LSE PT=P!                                                           '*  8189
```

Listing continued

of the file and then correcting the discrepancies in the text.

Recover

I wrote Recover (Program Listing 1), which operates under Model I/III/4 Disk Basic, to reconstruct Superscripsit files using whichever method yields the best results. It asks you for the filespec of the defective file and then asks for the output filespec, which is an ASCII conversion of the file. Once Recover receives this data, it tries to build a reconstruction table from the information in the index area of the defective file. If it accomplishes this, Recover rebuilds the file in its proper order. If any of the used index sectors are defective, Recover tries to reconstruct the file sequentially.

To reconstruct files, Recover uses whichever method yields the best results.

If the index sectors are unreadable, you can still use Recover to gather enough information about each block to reconstruct the file. Success depends on your knowing the following facts.

- Each block is four sectors long.
- By adding seven to the first byte of each block you can tell where, in the last used sector of the block, the text data ends.
- The value of the second byte of each block is one less than the number of sectors the block occupies.
- The values of the first and second bytes of each block are the same as those of the second and third bytes in the index cluster that references the block.
- Text does not begin until after the seventh byte of the first sector of a block.
- If a block begins with byte value zero (does not give an offset value for the end of data in its final occupied sector), it is a header or footer block. You should ignore such blocks during recovery.
- If blocks are not stored in sequential order, you must move the text into proper sequence after recovery.
- If a sector is unreadable, Recover tries to read it four times before reporting the problem and proceeding to the next sector.

When the program recovers a file, it stores the data in a destination file in ASCII format. Convert the data back to Superscripsit format as follows.

- Create a new Superscripsit file with a different name.
- Arrange the file's framework (such as line spacing and margins).
- Select the ASCII conversion option at Superscripsit's main menu.
- Answer the prompt asking from which format you want to convert with "A" for ASCII.
- Answer the Superscripsit file-name prompt with the new Superscripsit file's name.
- Answer the ASCII file-name prompt with the recovered file's name.

When the conversion is complete, edit the new file and insert any special features, such as centering and underlining, that Recover deleted.

Listing continued

```
220 ON ERROR GOTO 450:GET 1,1:IF PEEK(PT)=&HE0 THEN 250 ELSE PRINT
    "The SOURCE File is NOT a SuperSCRIPSIT File!"                    '*  7641
230 CLOSE:KILL FD$                                                    '*  1119
240 ON ERROR GOTO 0:END                                               '*  1463
250 CR=0:LP=0:ON ERROR GOTO 460:PRINT:PRINT"Picking up File Block
    Clusters...":HD$=CHR$(254)+CHR$(253)+CHR$(239)+CHR$(247)+CHR$(
    248)+CHR$(245)+CHR$(242):LO$="":GET 1,2:LG=PEEK(PT):RS=-5:RB=1
    :SR=7:RG=0:BR=257                                                 '* 13275
260 X=LG*5+1:Y=X/256:X=X-Y*256:GET 1,Y+2:D=PEEK(PT+X):GET 1,2:IF D
    <>255 THEN PRINT"Index Data Confused. End of File Mixup caused
     here. Correcting..."                                             '* 10827
270 GOSUB 100:IF D<255 THEN LO$=LO$+CHR$(D):FOR Y=1 TO 4:GOSUB 100
    :NEXT Y:GOTO 270 ELSE LG=LEN(LO$):IF LG=0 THEN PRINT"Text File
     is Null":GOTO 240                                                '*  9464
280 IF ASC(MID$(LO$,LG,1))*4+7>LOF(1)THEN LG=LG-1:IF LG THEN 280 E
    LSE PRINT"File Totally Unreadable! Aborting":GOTO 240             '*  8231
290 PRINT:ET=0:ON ERROR GOTO 440:BR=255:SR=BR:RG=-1                   '*  3295
300 GOSUB 130:RS=0:RB=0:GET 1,RG*4+7:ET=0:GOSUB 100:IF D=0 THEN 30
    0 ELSE BR=D+7:GOSUB 100:SR=D:RB=12                                '*  6078
310 GOSUB 100                                                         '*   741
320 IF INSTR(HD$,D$) THEN ON INSTR(HD$,D$) GOTO 110,350,370,380,39
    0,410,420                                                         '*  4225
330 IF D<32 OR D>127 THEN 310 ELSE PRINT#2,D$;:PRINT D$;:GOTO 310     '*  3861
340 PRINT#2,CHR$(0);:CLOSE:PRINT:PRINT:GOTO 240                       '*  3049
350 PRINT#2,CHR$(13);:PRINT CHR$(140)                                 '*  2181
360 GOSUB 100:IF D<>239 THEN 360 ELSE 320                             '*  2357
370 GOSUB 100:IF D=255 THEN 340 ELSE 320                              '*  2293
380 PRINT#2,"  ";:PRINT"  ";:GOTO 310                                  '*  2101
390 PRINT#2," ";:PRINT                                                '*  1328
400 IF MD THEN OUT 244,1:GOTO 310 ELSE POKE 14305,1:GOTO 310          '*  3538
410 GOSUB 100:GOTO 310                                                '*  1293
420 PRINT#2,CHR$(9);:PRINT CHR$(9);:GOTO 310                          '*  2654
430 PRINT"There is a problem OPENing "FS$". Check your files befor
    e trying again.":RESUME 230                                       '*  7531
440 ET=ET+1:IF ET<4 THEN RESUME ELSE ET=0:PRINT:PRINT:PRINT"*****
    FOUND A BAD DATA SECTOR. NOW SKIPPING SOME DATA *****":PRINT:I
    F RS=0 THEN SR=3:BR=255:RESUME 120 ELSE RESUME 120                '* 11388
450 PRINT"The 1st sector of "FS$" is bombed. Assuming SuperSCRIPSI
    T file.....":RESUME 250                                           '*  6905
460 PRINT"Information in the Index Clusters is CRASHED!":PRINT"Now
     calculating data by PREDICTING pointers.....":PRINT"NOTE tha
    t some editing may be required by YOU after":PRINT"the file is
     converted back to SuperSCRIPSIT format....."                     '* 19839
470 INPUT"Press <ENTER> to continue";D$::CR=1:LG=(LOF(1)-6)/4:RESU
    ME 290                                                            '*  5024
```

End

Program Listing 2. Convert.

```
10 'SUPERSCRIPSIT DOCUMENT CONVERSION -- MODEL I/III TO MODEL 4
20 'WRITTEN BY : DAVID GOBEN
30 '
40 CLEAR:DEFINT A-Z:CLS                                               '*  1507
50 PRINT"SuperSCRIPSIT Document Conversion -- Model I/III to Mod
   el 4":PRINT                                                        '*  6056
60 AN$="":LINE INPUT"Type in the FILESPEC for the file to conver
   t: ";AN$                                                           '*  5481
70 IF AN$=""THEN 60 ELSE ON ERROR GOTO 80:OPEN"I",1,AN$:CLOSE:GO
   TO 90                                                              '*  4241
80 PRINT ERRS$:GOTO 70                                                '*  1423
90 OPEN"R",1,AN$:FIELD 1,255 AS A$:B$=CHR$(&H84):G$=CHR$(&H5F)        '*  3491
100 ON ERROR GOTO 0:GET 1,1:C$=A$                                     '*  1964
110 X=INSTR(C$,B$):IF X THEN MID$(C$,X,1)=G$:GOTO 110                 '*  3125
120 LSET A$=C$:PUT 1,1:CLOSE 1:END                                    '*  2055
```

End

Program Listing 2, Convert, is a bonus. It converts Model I or III Superscripsit files to run under Model 4 Superscripsit. The files are not normally compatible because Models I and III use small blocks in the first sectors of their files as line markers, and the Model 4 uses underscores. Convert changes the small blocks to underscores. You can reverse the process (allow Models I and III to read Model 4 files) by switching the values of variables B$ and G$ at the end of line 90.■

David Goben is a programming consultant and frequent contributor to 80 Micro. Address questions and comments to him at 67 Highland Road, Mansfield Center, CT 06250.

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Some of this is software you promised yourself a long time ago and just never got around to treating yourself to. Some of what we list below we only have a few of, so first requests only will be honored. Most is fun stuff for your kids, so go for it!! Some is very good stuff that has had little exposure.

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Geography Explorer Series		
Mid-East	Disk	Mod 1 & 3 32K dd
Europe	Disk	Mod 1 & 3 16K
Europe	Tape	Mod 1 & 3 16K
USA	Disk	*w/converter
Domes of Kilgar	Tape	Mod 1 & 3 16K
Business Analysis	Tape	Mod 1 & 3 Level 2 16K
Business Analysis	Disk	Mod 1 & 3 32K
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Cosmic Patrol	Disk	Mod 1 Level 2
Cosmic Patrol	Tape	Mod 1 & 3 (PMC)
Investors Paradise	Tape	Mod 1 & 3 Level 2 16K
Gomuku & 3D Tic Tac Toe	Tape	Mod 1 & 3 Level 2 16K
House of Thirty Gables	Tape	Mod 3 Level 2
Omni Converter	Tape	Mod 3 Level 2
Archemedes Apprentice		Mod 1 & 3 Level 3
Renum/Compress	Tape	Level 2 16K
Terminal Program	Tape	Mod 1 & 3 Level 2 16K
Programmers Converter	Tape	Mod 1 & 3 Level 2 16K
Programmers Primer	Tape	Level 2
Compression Utility Pack	Tape	Level 2
Airmail Pilot	Tape	Mod 1 & 3 Level 2 16K
Music Master	Tape	Mod 1 & 3 Level 2
Adventure	Tape	Mod 1 & 3 16K
Little Red Riding Hood	Tape	Mod 1 & 3 16K
Everyday Russian	Tape	Level 2 16K
Interactive Fiction	Disk	Mod 1 Only 32K
Savage Island	Disk	Mod 1 Only 32K
Domes of Kilgari	Disk	Mod 1 & 3 2 Drives
Advanced Basic Editor	Disk	Mod 1
Galactic Saga	Disk	Mod 1 only
Interactive Fiction	Disk	Mod 1 only
Startrek 3.5	Disk	Mod 1 only
Startrek 3.5	Tape	Mod 1 & 3..16K
Dynamic Device Drivers	Disk	Mod 1 Level 2 16K
Dynamic Device Drivers	Tape	Level 2 16K
QSL Manager	Disk	Level 2 32K
Disk Scope (Fileloc;CDisk;Password)	Disk	Level 2 16K
Teachers Aid	Disk	Level 2 32K
Typing Teacher	Tape	Color Computer
Typing Teacher	Tape	Mod 1 & 3 Level 2 16K (PMC ok)
Weather Watch	Disk	Mod 1 & 3 Level 2 16K
The Wordslinger	Tape	Mod 1 Level 2 16K(PMC)
Disk Based Labeling Disassembler		Mod 1 Level 2 16K
TRS-80 Utility II	Tape	Level 2 16K
Russian	Disk	Mod 3 Level 2 32K
Life	Tape	Level 2 16K
Disk Editor 1.3	Disk	Level 2 32K
Night Flight	Tape	Level 2 16K
The Flying Circus	Disk	Mod 1 Level 2 16K
The Elements	Tape	Mod 1 & 3 Level 2 16K
Enhanced Basic	Tape	Mod 1 Level 2
Disk-Tape Exchanger	Disk	Level 2 2 Drives 16K
Surveyors Apprentice	Tape	Level 2 16K
Energy Audit	Tape	Level 2 16K
Astrology	Tape	Mod 1 & 3 Level 2 16K
The Communicator		Level 2 16-32-48K
Scriptr	Disk	Mod 1 & 3 32-48K (needs Scripsit)
Santa Paravia &	Tape	Color Mod 1 & 3 Level 2
Cassette Scope	Tape	TRS-80
Master Reversi	Tape	Mod 1 & 3 16K
Mystery Fun House	Disk	32K
The All Stars	Disk	Mod 1 & 3 Level 2 16K
Omni Calculator	Disk	Mod 1 & 3 Level 2 16K
Mountain Pilot	Tape	Color Computer Extended Basic 16K
Phaser Blast	Disk	Mod 1 & 3 16K 1 DD
Energy Audit	Disk	32K
The Count (Adventure)	Tape	Mod 1 & 3 16K
Basic Programming Assistant	Tape	Level 2 16-32-48K
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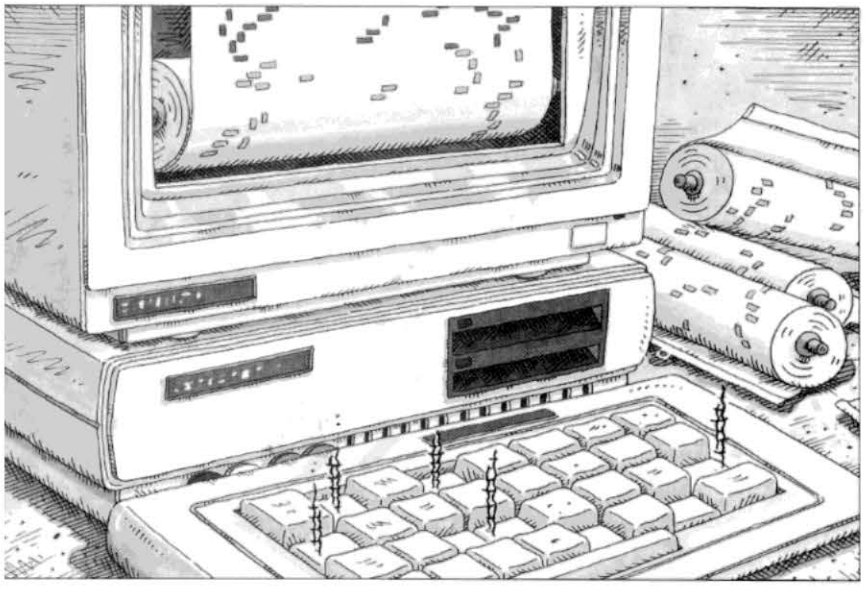
Making the Most of Batch Files



Welcome to my first MS-DOS Column. I hope to follow the trends that Dave set, and I have many ideas to share. I am dedicating this month's column to improving your system's performance with batch files and other tidbits.

First, I recommend that you set up a Config.SYS file with a Buffers statement. I use a BUFFERS = 20 statement to allow MS-DOS a reasonable amount of freedom in buffering disk files. Depending on your available memory, you can use fewer buffers. You should use at least eight, however. This is a vital parameter on a unit with a hard disk, because it allows for faster disk input/output (I/O).

One method of speeding your work is to automate your system with batch files. Even on a floppy-disk system, using batch files can be much faster than typing numerous MS-DOS commands repetitively. On a hard disk, a few batch files can make an even greater improvement.

Among the most severe limitations of system speed is MS-DOS's inability to ask you a question, get an answer, and then act on it. This also limits the effectiveness of batch files, but there is a way around this. The Debug script in Fig. 1 is a short example of a query program with a twist. Follow the instructions in Fig. 1 to create Query.COM. I included comments with many of the machine-language statements, so make sure you do not type any of the information between the semicolon (;) and the end of each line.

Type QUERY at the DOS prompt. Follow it with the question string to which you want a yes or no answer. Query will type out the question string (everything on the command line except for QUERY) and follow it with a "(Y/N)?" prompt. Y and N are the only characters that the program accepts as responses.

You must then use the DOS If statement to test for an Errorlevel condition. DOS provides the ability for a program to return a 1-byte error code on termination. This code can be read by by an Errorlevel batch command. Query reports error conditions of zero for yes and 1 for no. Figure 2 contains my Autoexec batch file, in which I use Query to decide whether to load Microsoft Windows or Wordperfect Corp.'s Library Menu shell.

You can easily extend this short program to request a menu selection from a number of options. To do this, you must make the error condition correspond to the proper selection. The DOS If conditional statement is really a greater-than or equal-to test, so you must test these conditions in reverse numerical order. I'll discuss this further in a future column.

We Interrupt This Batch File

Have you ever wanted to suspend execution of a batch file? Ever wanted to execute another batch file as a procedure and return to the original batch? You can easily do both of these tasks by using the DOS command interpreter. It has several parameters that are not documented in the releases prior to DOS 3.x. Only some of these new command line parameters work in the older DOS versions.

Figure 3 shows an example of a batch file that suspends execution. I use it from Library's Shell menu to set up the environment for my C compiler. After it has initialized all of the environment variables, it changes the directory into the C source directory. Then the batch file executes Command.COM, suspending all batch processing with the new environment intact. The computer enters the DOS command mode so you can use the C compiler.

When you are finished with the C compiler, type EXIT at the DOS prompt

Fig. 1. Debug script for creating Query.COM. You create this script with Edlin or any other text processor that can write an ASCII character file. Do not write the comments to the right of the semicolon (;). Save the script file as Query.SCR and then create Query.COM using the Debug command: DEBUG <QUERY.SCR.

```
a 0100
   MOV  SI,0080                ;Offset for command line char count
   MOV  BL,[SI]                ;Pointer to command tail string
   CMP  BL,00
   JZ   0118                   ;No command tail is present
   XOR  BH,BH
   MOV  Byte Ptr [BX+0081],24  ;Terminate string with '$'
   MOV  AH,09
   MOV  DX,0081                ;Point to character string in tail
   INT  21                     ;MS-DOS Write string function
   MOV  AH,09
   MOV  DX,0141                ;Yes/No prompt
   INT  21                     ;Write out string
   MOV  AH,07                  ;Read character with no echo
   INT  21
```

Figure 1 continued

Figure 1 continued

```
        AND  AL,DF                      ;Strip out lowercase bit
        CMP  AL,59                      ;Test for 'Y'es response
        JZ   0132
        CMP  AL,4E                      ;Test for 'N'o response
        JNZ  011F                       ;Get another character
        MOV  AL,01                      ;Error status for response
        JMP  0134
        NOP
        XOR  AL,AL                      ;Error status for Yes response
        PUSH AX
        MOV  AH,09                      ;Terminate line with a
        MOV  DX,014A                    ; .. CR/LF
        INT   21
        POP   AX                        ;Get return value
        MOV   AH,4C                     ;Set terminate function code
        INT   21
        DB    ' (Y/N)? $'
        DB    0D,0A,'$'
                                        ;Extra return is required here
n QUERY.COM                             ;Set program name
rcx
004D                                    ;Length of program goes to CX reg
w                                       ;Write it out
q                                       ;Quit Debug and return to DOS
```

Fig. 2. Autoexec.BAT with sample use of Query.

```
echo off
copy command.com d:
set comspec=d:\command.com
path d:\;c:\dos;c:\dos\util;c:\dos\norton;c:\dos\masm;c:\wptools
prompt $e[7m [$t$h$h$h] $e[0;1m $p$g$e[0m
kbfix /t1 /kt0 /ktd5 /d0 /s1
:whatnow
cls
query Do you want to run Microsoft Windows
if errorlevel 1 goto shell
cd windows
win
cd\
goto whatnow
:shell
query Do you want to run WordPerfect's Shell
if errorlevel 1 goto exit
shell
cd\
goto whatnow
:exit
```

Fig. 3. Example of batch file with extension.

```
echo off
set dummy=
set dummy1=
set path=C:\MSC;%PATH%
set prompt=$e[m [Microsoft C Version 4.0]$_%PROMPT%
set lib=c:\msc\lib
set include=c:\msc\include
set tmp=c:\
cd \msc\source
command
cd \
```

Fig. 4. Sample batch files with subroutine.

```
echo off
cls
echo This is batch file number 1 which sets the environment
echo variable TESTVAR to the string 'Test String from batch #1'
echo and links to batch file #2.
echo .
echo Batch file #2 will attempt to reset TESTVAR and them will
echo return to this batch file.  TESTVAR will be displayed on
echo return.
echo .
pause
prompt
set testvar=Test String from batch #1
echo The string was set to %TESTVAR%
command /c batch2
echo .
echo The environment string is now %TESTVAR%
echo .
echo This completes the demo.

   Second batch file: store as BATCH2.BAT
echo off
echo I am in batch file number 2 now.  After setting TESTVAR,
echo it will be displayed and then this batch file will exit.
echo .
set testvar=Test String in batch #2
echo TESTVAR is set to %TESTVAR%
echo .
pause
```

and press the enter key. This terminates the current command processor, and the batch file resumes execution. After restoring the root directory as the current directory, the batch file terminates and control automatically returns to the shell menu.

This batch file has several other interesting features. You can change the current prompt and path with the DOS Set command. I used to have all my batch files establish the path and prompt to suit their own tasks. I would change one of the subdirectories in the path and, invariably, forget one of the batch files, leaving an invalid subdirectory in the path.

The technique I use here (SET PATH = C:\MSC;%PATH%) references the string currently stored in the path environment variable. This command prepends the string \C:MSC to the beginning of the current path and stores it in the working environment. A word of caution: DOS 2.x requires all capitals in the path. Also note that these changes are temporary and affect only the current environment. If you are operating under a shell of any kind, these changes will not affect the master environment.

Figure 4 shows another technique that allows one batch file to call another. The method uses one of the undocumented command-line parameters from the earlier DOS 2.x releases. This is precisely how menu shells and other programs that allow you to use DOS without exiting work.

Batch file 1 calls batch file 2, which executes a few commands and terminates. Control returns immediately to the preceding batch file. Batch file 1 loads Command.COM, creating a copy of batch file 1's environment for the new version of DOS's command processor. Any changes batch file 2 makes in the environment affect this copy only (not the parent environment from batch file 1). The only way control returns to the first batch file is throught the use of the /c (child process) command.

Wrap-Up

Batch files are valuable tools that can make your computer use more efficient. I hope you enjoy these techniques and profit from them.

I encourage you to send me your questions and thoughts regarding the column's content. I welcome any questions about MS-DOS and Tandy computers. ■

John B. Harrell III is a naval electronic warfare systems analyst. He has written for 80 Micro *for five years and programs in Pascal, C, and Assembly Language. You can reach him c/o* 80 Micro *or via Easyplex on Compuserve. His CIS number is 73016,1326.*

DEBUG

Remarkable Bug

My Tidbit #40 on p. 94 of the January 1987 issue has a bug. You deleted line 15100, a remark line, from the listing, but neglected to correct the subroutine calls in lines 160 and 170 to 15110:

```
160 IF MID$(UP$,I,1)<"0" THEN GOSUB
    15110:GOTO 120
170 IF MID$(UP$,I,1)>"9" THEN GOSUB
    15110:GOTO 120
```

Curtis E. Stevens
Walnutport, PA

We apologize for our oversight.

—Eds.

Address Debug correspondence to Debug Editor, c/o 80 Micro, 80 Elm St., Peterborough, NH 03458.

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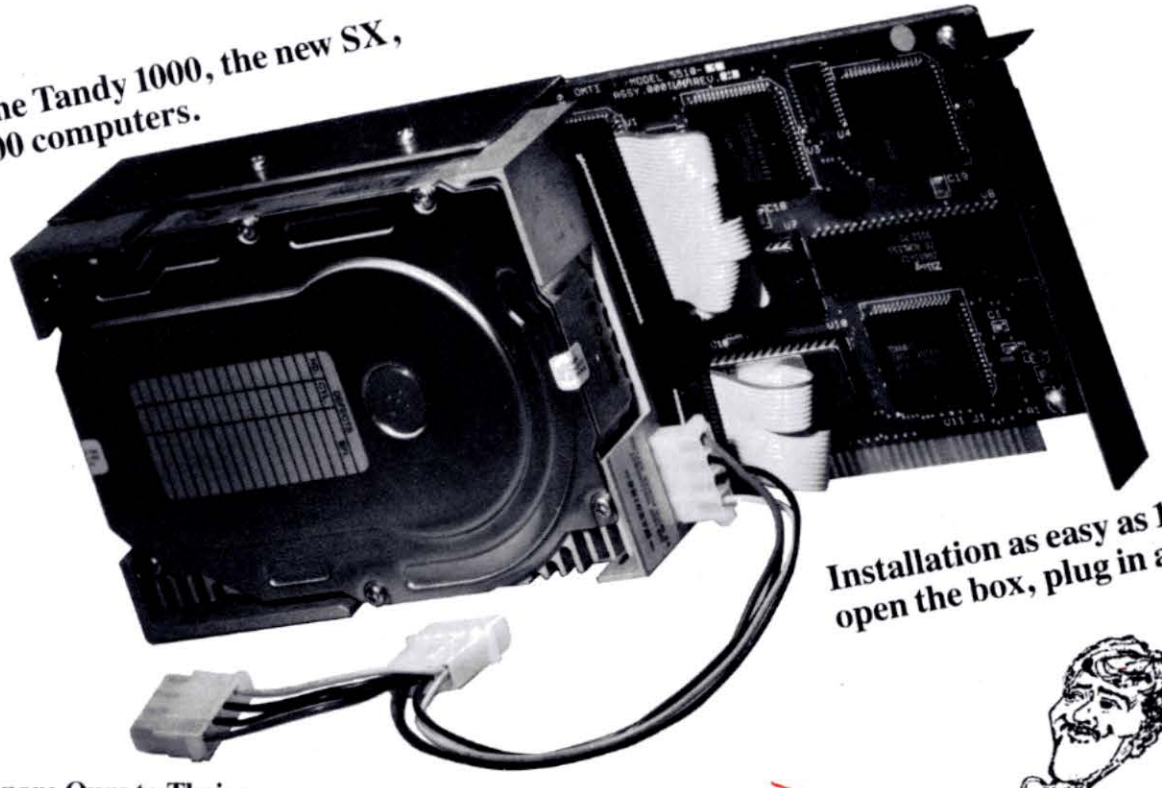

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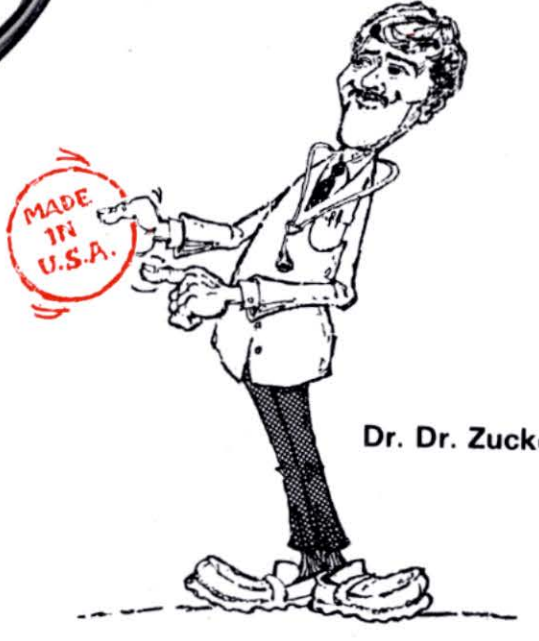

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Shopping at the PD Library

The search for public-domain (PD) software isn't limited to scanning bulletin-board systems (BBSes) or commercial data bases. For a few dollars and a couple of stamps, you can receive hundreds of PD programs in the mail. Dozens of clubs and companies sell PD and user-supported software individually or packaged as libraries.

Unfortunately, (or fortunately, depending on which computer you have) most of sources listed in the Table emphasize the IBM PC and compatibles. The Table is by no means complete and includes only those who responded to a letter of inquiry.

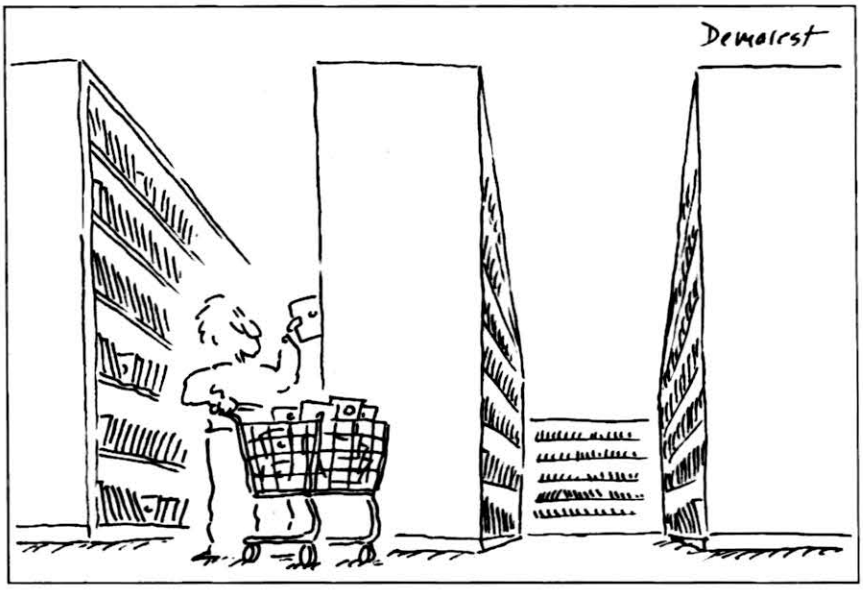
Most of the small companies emphasize that they keep their software up to date, and they urge their customers to make donations to the authors of those programs designated as user-supported (more on user-supported software later). They seem genuinely interested in spreading the wealth of PD software to their customers.

I also heard from a couple of companies that had old versions of some programs. One small company sent me a three-year-old version of a program that has been updated three or four times since. On the other hand, another sent me two current and desirable programs that I had heard about but hadn't been able to find.

PD Biggies

The two major sources of MS-DOS software are the PC-SIG and PC-Blue PD libraries. PC-SIG is by far the largest with over 700 disks chock full of free and user-supported software, and it's growing every day. This amounts to many thousands of programs. PC-SIG is a for-profit organization that distributes software for a minimum charge. Like the other major sources of PD software, PC-SIG keeps the software up to date, replacing older versions of a program with newer ones as they become available.

PC-Blue is the oldest PD software library and has over 200 disks cataloged. PC-Blue is a collaborative effort of two non-profit organizations, the New York Amateur Computer Club and the Amateur Computing Group of New Jersey. Other non-profit organizations that are major sources of PD programs are the Capital-PC Software Exchange, the Long Island Computer Association, New York Personal Computer, and the Houston Area League (HAL) of PC Users. HAL programs are distributed through The Public (Software) Library.



Keeping Current

Keeping current PD software is not easy. The largest distributors like PC-SIG have full-time staffs to do this task. Non-profit groups rely on volunteers and a few paid persons to maintain the libraries and send out software.

Large distributors get most of their software from the programs' authors and users. As they receive updates to programs, they must replace older versions and note changes in their catalogs. Major distributors usually offer both catalog disks and printed catalogs. The advantage of a catalog disk from a company like PC-SIG is that you can search for programs using keywords.

It is impossible to keep large, printed catalogs as current as disk catalogs due to the time lag for printing. PC-SIG, for example, has disks that catalog up to 700 program disks and their contents. Its latest printed catalog supplement only includes information about 454 program disks. Newsletters take up the void in describing its latest programs.

The majority of the smaller PD distributors purchase their libraries from PC-SIG, PC-Blue, HAL, Capital PC, and other large PD software sources. This allows the small outfits to stay current with their selections with little effort. Since they don't have the overhead of the large distributors, the small libraries can offer program disks at a lower cost. Some small companies simply rent disks purchased from large sources for you to copy and return.

Generally, though, you get what you pay for. You might not get the most up-to-date software from some smaller organizations, but often if you make a donation to the program's author, you get the current version and printed documentation in return. Other small distributors specialize in the most popular programs, and some such as PC Arcade emphasize games and leisure.

While the large outfits do not wish to restrict the distribution of PD software, they do take exception when someone redistributes exact copies of their program disks. They copyright the disks' presentation and cataloging system. Most of the smaller companies comply with this and formulate their own software data-base methods, weeding out the chaff.

Of Special Interest To Tandy Users

I was disappointed to find that few of the PD libraries offered non-MS-DOS, Tandy-specific software. Most of the best PD software written in the last two or three years is MS-DOS.

Illustration by Chris Demarest

Circle 90 on Reader Service card.

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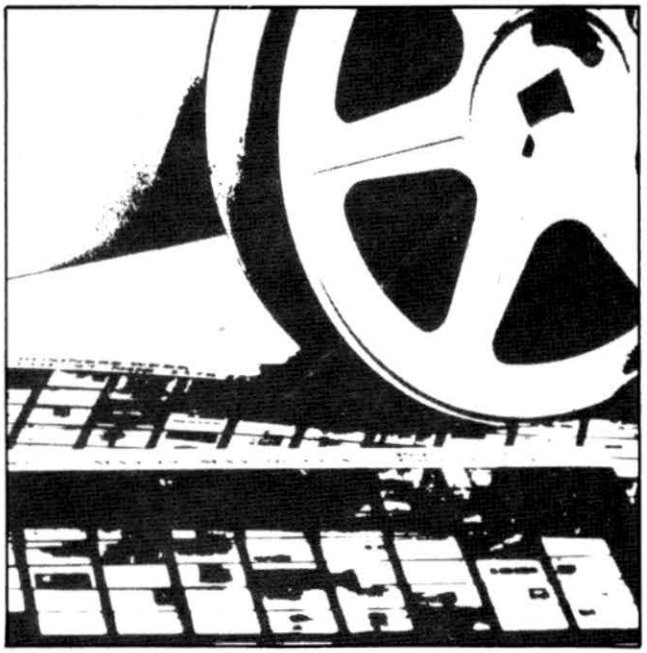

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Of special note to Tandy users are the Boston Computer Society, The Alternate Source, Elliam Associates, Montezuma Micro, Club 100, and the Danville Tigers Club. With the exception of Elliam Associates, these groups focus on the Tandy line of computers.

Elliam Associates is a major source of CP/M PD software, but the company also has some MS-DOS software. Its library includes collections from other main sources of CP/M PD software, including the CP/M Users Group (1651 Third Ave., New York, NY 10028) and the SIG/M Users Group (P.O. Box 97, Iselin, NJ 08830).

Montezuma Micro has a good CP/M software library, as well. This company also sells CP/M 2.2, a commercial version the CP/M operating system exclusively for the Model 4. Montezuma has recently added MS-DOS PD programs to its library.

The Boston Computer Society is primarily a users' group that also offers PD programs for the Models I/III/4, CP/M, and MS-DOS. They also have a Model 100 special-interest group, but I'm not sure it distributes PD software. The Alternate Source has been around for a long time and once published a magazine, *The Alternate Source*, for the TRS-80 line. Now the company sponsors a newsletter called *Northern Bytes* and offers, in addition to commercial software, PD programs for the Models I/III/4, CP/M, and Tandy 1000.

Model 100/102/200 users have promise of things to come with the expanding activities of Club 100 and the Danville Tigers Club. Both of these San Francisco-area groups offer the same PD software in their small libraries of five disks with 15 programs on each disk. They work closely together, though as separate entities.

Many of Club 100's 400 active members have written much of the prominent public-domain software for these computers and are considered to be the programming and hardware gurus for the Model 100.

As I said last month, by all means become at least a level 1 member of Club 100 if you own a Model 100. It is free and puts you on the club's mailing list, which keeps you up to date on its PD offerings and allows you to direct questions their way through the mail. See last month's Public Works for more information on Club 100 and the Danville Tigers Club.

User-Supported Software

You will often see me refer to user-supported software in this column. Other terms you might hear at times are shareware or freeware. All mean the same thing: You are free to use the program and give copies to your friends with the understanding that, if you find it useful, you send a donation to the author. This encourages the author to improve on the program or write others.

The amounts authors request for donations are small, ranging from $5–$45, though some have been higher. Usually the programs with the higher requests give you something of value in return for your donation, such as commercially printed and bound documentation, bet-

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MS-DOS

The Blue Circle Group Inc.
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Minneapolis, MN 55423
MS-DOS

Boston Computer Society
80-Boston-PDL
c/o Kenyon F. Karl
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North Andover, MA 01845
MS-DOS, CP/M, TRSDOS

Capital PC Software Exchange
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MS-DOS
Publishes newsletter

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MS-DOS
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Gordonsville, VA 22942
MS-DOS

Danville Tigers Club
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Model 100
Works with Club 100

Disk-O-Mania
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Lake Charles, LA 70606
MS-DOS
Same owner as Sizzleware

Elliam Associates
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Woodland Hills, CA 91367
MS-DOS, CP/M
Also sells commercial software; mostly CP/M

Futuresystems
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MS-DOS

Graphcom
1633 Babcock #190
San Antonio, TX 78229
MS-DOS
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MS-DOS, CP/M
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Table. List of PD software distributors.

Table continued.

Can we talk? CP/M vs TRSDOS

By moving to CP/M on your Model 4 you achieve two things. First you open the door to a wealth of existing software. More 8-bit software runs under CP/M than any other operating system. This includes virtually all of the "big name" programs which have set the standards by which all others are measured. Programs like **WordStar, dBASE II, and Turbo Pascal** are available for CP/M, but not TRSDOS. Public domain software, almost unknown under TRSDOS, fills hundreds of megabytes of disk space. Valuable public domain programs like the **Small C Compiler** are just a toll-free phone call away. Most importantly, hundreds of applications programs are available from a multitude of vendors. Many include the source code. Wouldn't you like to be able to choose from scores of Accounts Receivable or General Ledger programs, instead of the meager selection you now have? Circle our special Reader Service number 600 on the Reader Service Card to receive our comprehensive **free listing of suppliers of application programs that run under CP/M.**

What about the future?

When the time comes to move up to another computer it will almost certainly use MS-DOS. That's when CP/M users get a pleasant surprise. Since MS-DOS was a derivative of CP/M it operates in almost the same manner. Even better, most of the same software packages are available in 16-bit form and they operate in virtually the same way that they did under CP/M.

Is it easy to use?

Montezuma Micro's CP/M has been carefully crafted to present a maximum of features while taking a minimum of memory. It supports all of the standard features of the Model 4/4P/4D computers, as well as most of the optional ones. Our CP/M has been consistently been awarded the highest ratings in industry magazines. It is version 2.2, the most popular and reliable of all the versions of CP/M produced. Our CP/M has been made as easy to use as possible. All customer-selected features are chosen from simple menus in our CONFIG utility. This includes the ability to configure a disk drive to run like that of scores of other CP/M computers for maximum ease of software portability. Using the unique DBLCROSS program in our Monte's Toolkit utility package you can move files back and forth between CP/M, TRSDOS (1.3 and 6.x), and MS-DOS.

Why use Montezuma CP/M?

We have already told you why our CP/M is the best for the Radio Shack Model 4 computer. The only question left to answer is "Why buy CP/M at all?" Radio Shack has abandoned TRSDOS — all of their new machines use MS-DOS. Most of the software producers have followed, leaving no new software development and saddling the TRSDOS user with whatever software "leftovers" he can find. Which DOS do you want to head into the future with: the one originally written for the Model I or the one that served as the basis for MS-DOS? Make the right choice right now for just $169.

If I need support?

We don't forget you after the sale. If you have a problem you will find our phones are answered by people, not answering machines or hold buttons. Our philosophy is very simple — we want you to be happy and satisfied with your purchase. If you have a problem then we have a problem, and we'll do whatever we can to resolve it.

Cost to update?

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Can I use a hard disk drive?

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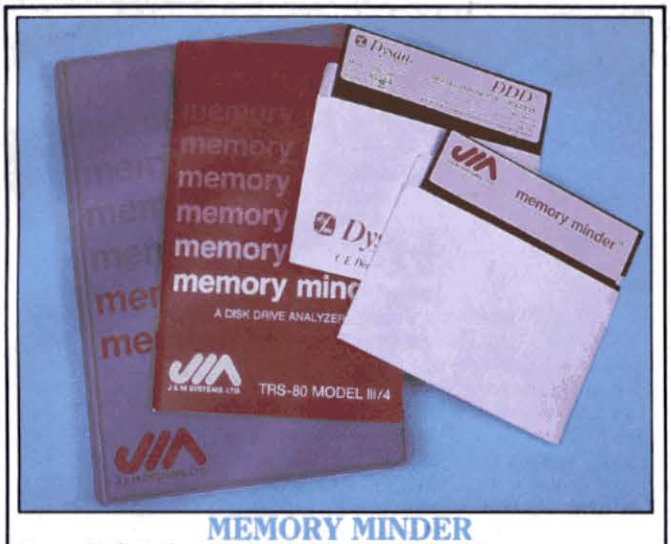

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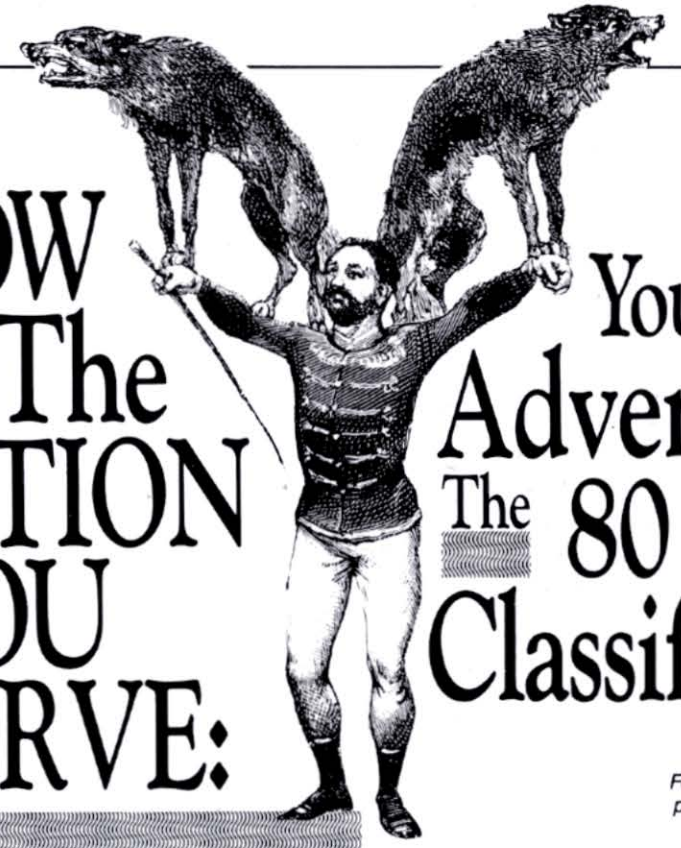

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For more information, put down the wolves and turn to the Classified page in this issue.

ter and more expanded documentation than you get off the disk, the next upgrade of the program, or a specified level of telephone support.

The cost is much less than buying a similar commercial program, and the quality of most user-supported software is as good or better than many commercial programs.

Tax Alert

With taxes due soon, you might be interested in PD tax programs. In the Washington, DC, area Roger A. Stanley Accounting Ltd. has set up the Tax Assistance BBS as a public service to answer your tax questions. Roger says that he started the BBS to thank those who helped him with his computer.

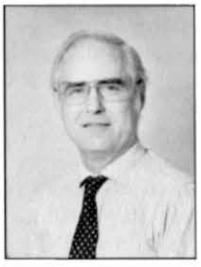
There is no charge for using Roger's BBS, and he assumes no liability for the advice given. The phone number is 703-237-8430 (300/1,200/2,400 baud, 8-bit words, no parity, 1 stop bit). Turnaround time for answers is 24 hours, but responses will slow down around tax time since Roger must take care of his paying clients first.

There are a few good PD MS-DOS programs to help you with your taxes. W4.ARC, by Roger A. Stanley, helps you fill out the W-4 withholding form. Roger has also written a Basic program called Rascom.BAS to estimate the effects of the new tax law by comparing your 1986, 1987, and 1988 taxes using the information you provide. Fedtax86.ARC is a 1-2-3, version 1 or 2, spreadsheet template that helps you fill out your tax form and make the necessary computations. Amtax86.ARC is a program that does the same task. These all are user-supported programs.

If you get these programs from somewhere other than the *80 Micro* BBS, be sure to get Fedtax86.Bug if the Fedtax86 program is dated around Nov. 22, 1986. The ARC extension means that these programs are compressed (archived) in a file. You need ARC.EXE (latest version ARC512.EXE) and ARC.DOC to uncompress these files. These are also on the *80 Micro* BBS.

Next Month

Next month I'll talk about PD and user-supported word-processing and text-editing software. I'll also include other programs to make your writing chores easier.■



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

Table continued.

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MS-DOS
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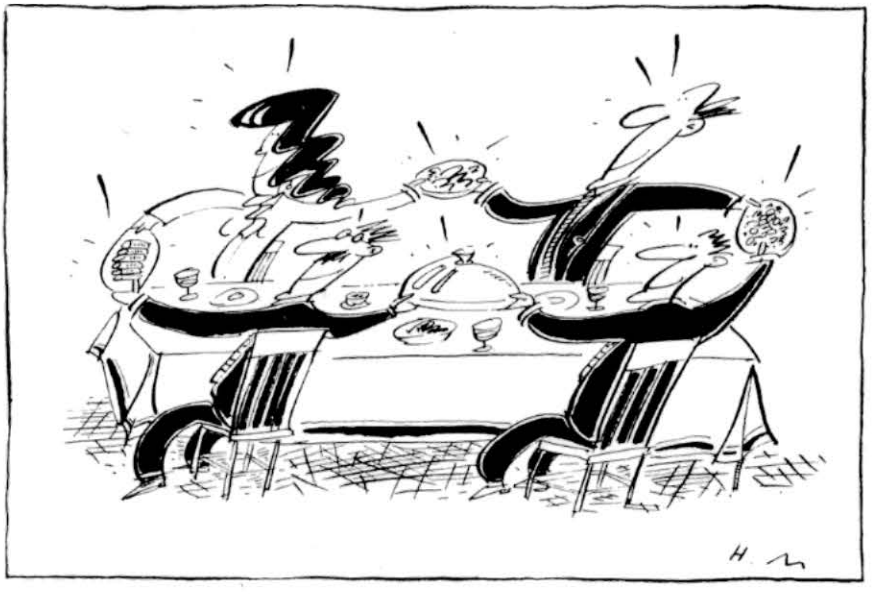
Photo by Richard Quindry

Parse the Parameters



A lot happens when you type a program's name from the TRSDOS Ready prompt. The operating system searches through the disk drives looking for the appropriate CMD file, checks the file's passwords, opens the file, and begins to read it.

One of TRSDOS's last actions before it passes control to a program is setting the BC and HL registers to the TRSDOS command buffer, which still contains the command line that you (or a JCL file) typed. The BC register contains the address of the beginning of the buffer so that a program can determine its own name. The HL register points to the first non-blank character after the program name. If nothing follows the program name, the HL register points to the carriage return, which ends your command.

If a program expects you to add information on the command line—for example, a file name, a drive number, or a list of parameters—it usually starts searching at the address contained in HL when the program starts execution.

Most operating systems provide a program with access to the command line. However, TRSDOS 6.x (and LS-DOS 6.3) go much further. If a TRSDOS program expects a list of parameters, it can request the @PARAM supervisory call (SVC) to parse those parameters for it. This SVC makes a normally tedious programming task almost trivial. It parses the parameters that you have entered, places appropriate values inside the program, and reports the types of parameters used to the program.

TRSDOS recognizes three kinds of parameters. The simplest is a "flag" parameter that you can designate as "on," "off," "Y," "N," "yes," or "no." It assumes that if the parameter name is given without any parameter, you mean "on," and if the name is followed by an equals sign (=) but no other information, you mean "off."

TRSDOS also understands value and string parameters. A value parameter can use either decimal or hexadecimal (hex) numbers and must be a value that can be represented in 2 bytes. A string parameter can be as long as space on the command line allows and must be enclosed in quotation marks.

To correctly parse the parameter list, TRSDOS makes three requirements of you: The list must begin with a left parenthesis (the closing parenthesis is optional), commas must separate parameters, and no extraneous spaces can be in the parameter list.

With the @PARAM SVC, it is almost easier to use parameters in a program than to enter them on the command line. On entrance to @PARAM, TRSDOS expects the HL register to point to the opening parenthesis or to a space before it. It also expects the DE register to contain the address of a parameter table inside your program.

TRSDOS accepts the parameter table in either of two forms: an older format compatible with LDOS 5.1.3 and a newer form unique to TRSDOS/LS-DOS 6. The latter is more flexible and is used by all the DOS library routines and utilities. It is also the form I used in this month's demonstration program.

The first byte of the TRSDOS-format parameter table must be 80 hex, and the last byte must be a zero. In between is an entry for each possible parameter. The first byte of this entry contains 4 type bits plus the length of the parameter name.

If bit 7 of this byte is set, @PARAM expects a numeric value for the parameter. Bit 6 signals an expected flag value for the parameter, and bit 5 represents an expected string value. Unfortunately, @PARAM doesn't seem to use these type bits, but rather accepts any type of parameter value that you enter.

If bit 4 is set in the type byte, @PARAM accepts the first letter of the parameter name as an abbreviation. If you want to accept abbreviations, you must be certain that each parameter name begins with a different letter. Finally, the lower nibble of the type byte, bits zero–3, contains the length of the parameter name (no parameter name can be longer than 15 characters).

The next bytes of the table entry contain the actual parameter name in uppercase letters. A response byte follows the name. The @PARAM SVC uses this byte to report whether the parameter was entered; what type of value was given for the parameter; and, if a string was entered as a value, the length of that string. The last 2 bytes of a parameter-table entry point to the address in the program where TRSDOS should store the parameter

LOAD 80

Systems Requirements

Model 4, 4P, 4D
Assembly language
Editor/assembler
(Pro-Create 4.3a or MRAS)

Illustration by Hal Mayforth

Program Listing 1. Code that directly manipulates the MOD flag.

```
00100 ;-----------------------------------------------------------
00110 ;       Model 4 Mod-Flag Modifier.
00120 ;         Assemble as MODFLAG/CMD
00130 ;         Invoke: MODFLAG :d (parm1,parm2,...)
00140 ;
00150 ;         Parameters:
00160 ;            INV         Specifies whether invisible files should
00170 ;                        be included.  Default INV=OFF.
00180 ;
00190 ;            SYS         Specifies whether system files should be
00200 ;                        included.  Default  SYS=OFF
00210 ;
00220 ;            MOD         Specifies whether files with the Mod flag
00230 ;                        set should be included.  Default  MOD=ON
00240 ;
00250 ;            UNMOD       Specifies whether files with the Mod flag
00260 ;                        reset should be included.  Default UNMOD=ON
00270 ;
00280 ;            QUERY       Specifies whether user should be asked before
00290 ;                        each mod-flag change.  Default  QUERY=YES
00300 ;
00310 ;       Abbreviations: I=INV, S=SYS, M=MOD, U=UNMOD, Q=QUERY
00320 ;
00330 ;       Assembled with Pro-Create 4.3a.  See Listing 2 for necessary
00340 ;       macro commands from MACLIB/ASM.
00350 ;-----------------------------------------------------------
00360 ;
00370 *LIST OFF
00380 *GET    MACLIB/ASM
00390 *LIST ON
00400 ;
00410 CR      EQU     0DH
00420 LF      EQU     0AH
00430 ETX     EQU     03H
00440 ;
00450 ;----------------
00460 ;  Sign on
00470 ;----------------
00480         ORG     3000H
00490 START   @@DSPLY HELLO           ;Print sign-on message
00500         @@CKBRKC                ;Does user want out?
00510         JR      Z,START1        ;Begin if no <Break> key
00520         @@EXIT  -1              ;Else return error code to TRSDOS
00530 ;
00540 START1  CALL    PARSE           ;Parse command line
00550         CALL    GET_INFO        ;Get drive info
00560         CALL    MODIFY          ;Toggle mod flags
00570 EXIT    @@EXIT  0               ;And leave
00580 ;
00590 ;----------------
00600 ;  Parse the command line
00610 ;----------------
00620 PARSE   LD      A,(HL)          ;Get 1st non-blank char.
00630         IFNE_JR ':',BAD_DRIVE   ;Go if not a colon
00640         INC     HL              ;Point to drive number
00650         LD      A,(HL)          ;Get number
00660         SUB     '0'             ;ASCII to hex
00670         IFLT_JR 0,BAD_DRIVE     ;Go if too small
00680         IFGE_JR 8,BAD_DRIVE     ;Go if too large
00690         LD      (DRIVE),A       ;Drive okay -- save
00700         INC     HL              ;Move past drive #
00710         @@PARAM PARM_TBL        ;Parse parameters
00720         RET
00730 ;
00740 BAD_DRIVE:
00750         @@DSPLY DRIVE_BAD       ;Display error message
00760         @@EXIT  -1              ;And leave
00770 ;
00780 ;----------------
00790 ;  Get drive info
00800 ;----------------
00810 GET_INFO:
00820         @@CKDRV (DRIVE)         ;Does drive exist?
00830         @@GTDCT                 ;Yes -- IY ==> drv. code table
00840         LD      A,(IY+9)        ;Get directory cylinder
00850         LD      (DIRCYL),A      ;And save it
00860         LD      E,3             ;Read sector 3
00870         CALL    READ_SEC        ;Move sector to buffer
00880         LD      A,(IX+20)       ;Get sector count
00890         DEC     A               ;Offset from 0
00900         LD      (SECTOR),A      ;Save it
00910         RET
00920 ;
00930 ;----------------
00940 ;  Toggle Modify Flags
00950 ;     Outer loop -- repeat for each sector
00960 ;----------------
00970 MODIFY  LD      A,(SECTOR)      ;Get highest unmodified sector
00980         CP      1               ;Ignore GAT & HIT sectors
00990         RET     Z               ;Return if done
01000         LD      E,A             ;Select this sector
01010         CALL    READ_SEC        ;Move sector to buffer
01020 ;----------------
01030 ;  Inner loop -- repeat 8 times for
01040 ;    8 entries per sector
01050 ;----------------
01060         LD      B,8             ;Setup for loop
01070 MOD2    PUSH    BC              ;Save loop counter
```

Listing 1 continued

value or, in the case of a string parameter, a pointer to the parameter.

MOD Flag Program

Whenever a program writes to a TRSDOS file, a special bit in the directory is set to show that the file has been modified. The only way to turn off that MOD flag is to use Backup to copy the file to another disk or drive. The Backup, DIR, and CAT commands can all use the MOD flag as one of their parameters.

This month's program lets you directly manipulate the MOD flag. It demonstrates one method of using the @PARAM SVC and how to directly access directory entries in assembly language. Listing 1 is the source code for the program, and Listing 2 contains the macro commands necessary for the program to run correctly.

The program begins by displaying a sign-on message and then checking whether you have pressed the break key. If you have, the program exits with an error code so that the break also stops any currently running JCL program.

The program then makes three subroutine calls. The first subroutine parses the command line, the second gets information about the requested disk drive, and the third manipulates the MOD flags. After the third routine returns, the program returns to TRSDOS and reports that no error has occurred.

The parse subroutine (lines 620–760) begins by assuming that the HL register is pointing at either a carriage return or the first non-blank character on the command line following the program name. If that character is a colon, you are probably specifying a drive number. If not, the program aborts with an error message.

Next, the subroutine checks the character following the colon to be sure that it is a legal drive number between zero and 7. The parse routine then ends by calling the @PARAM SVC to read any of the five possible parameters that you might have entered.

Since all five parameters are flags, the program does no checking of the parameter types that you actually entered. This might seem dangerous, but it means that any parameter entry other than "no," "off," or "=" is the same as simply entering the parameter name: The parameter will be turned on.

The second major subroutine, Get_Info, is short but does a lot of work. It begins by asking TRSDOS to log in the requested disk drive. If you have changed disks since the last time the drive was accessed, TRSDOS's tables are updated. If no disk is in the drive or the drive doesn't exist, the program aborts with a TRSDOS error message.

The program then asks TRSDOS for

the address of the drive code table (DCT) for this drive (see The Next Step, June 1986, p 106, for a discussion of the DCT). The DCT contains one vital piece of information for this program: the cylinder on the drive that contains the directory.

Finally, Get_Info reads the directory's third sector (counting from zero), assumes that the first entry on that sector of the directory is for DIR/SYS (the directory itself), and extracts the length of the directory from the disk.

The program can make this assumption because of the structure of a TRSDOS 6 disk directory. The first sector (zero) always contains the granule-allocation table (GAT), the next sector always contains the hash index table (HIT), and the rest of the directory contains individual entries. The first entry on sector 2 must be for Boot/SYS, and the first entry on sector 3 must be for DIR/SYS.

The Modify routine and the subroutines that it calls do the real work of this program. Modify is composed of two loops: The outer loop reads each sector of the directory into a memory buffer by calling a subroutine named Read_SEC. That subroutine also positions IX to point to the beginning of the memory buffer. The inner loop of the Modify routine looks at each of the eight possible directory entries in each sector. When the inner loop terminates, the sector is written back to disk and then returns to the outer loop to get the next sector.

Each time the IX register pair points to a new possible directory entry, the routine One_File is called to determine the characteristics of that entry. The first 2 bytes of a directory entry contain several status flags that this program tests. If bit 4 of the first byte is zero, the directory entry is not in use and the routine ends immediately. If bit 7 is set, this is not a primary directory entry, so the routine ends immediately.

Finally, the program must check other status bits and compare them to parameter values—either those you entered or those the program uses as defaults. The Test_PARM macro command (see Listing 2) loads a parameter value into the DE register, tests whether that value is zero, and sets the Z flag accordingly. Inside the macro is a label for storing a parameter value.

Expanded, the instructions for the first call of Test_PARM look like this:

```
        PUSH    DE
        LD      DE,0000
SYS$    EQU     $-2
        LD      A,D
        OR      E
        POP     DE
```

The label SYS$ refers to the value 0000 that is loaded into the DE register pair. If you turned on the SYS parameter (and

Listing 1 continued

```
01080           CALL    ONE_FILE        ;Work with one entry
01090           @@CKBRKC                ;Does user want out?
01100           JR      Z,MOD3          ;No -- go
01110           @@EXIT  -1              ;Else leave
01120 MOD3      LD      BC,20H          ;Offset to next entry
01130           ADD     IX,BC           ;Point to next entry
01140           POP     BC              ;Recover counter
01150           DJNZ    MOD2            ;Repeat for all entries
01160 ;---------------
01170 ;  End inner loop -- terminate
01180 ;    outer loop
01190 ;---------------
01200           LD      A,(SECTOR)      ;Get current sector
01210           PUSH    AF              ;Save sector number
01220           LD      E,A             ;Select this sector
01230           CALL    WRITE_SEC       ;Put it back on disk
01240           POP     AF              ;Recover number
01250           DEC     A               ;Move down one
01260           LD      (SECTOR),A      ;Save next sector
01270           JR      MODIFY          ;Repeat until done
01280 ;
01290 ;---------------
01300 ;  Handle one directory entry
01310 ;---------------
01320 ONE_FILE:
01330           BIT     4,(IX)          ;File in use?
01340           RET     Z               ;No -- return
01350           BIT     7,(IX)          ;FPDE?
01360           RET     NZ              ;No -- return
01370           BIT     6,(IX)          ;SYStem file?
01380           JR      Z,CHK_INV       ;No -- go
01390           TEST_PARM SYS$,0        ;Test SYS$ parameter
01400           RET     Z               ;If SYS$ off, give up
01410           JR      CHK_MOD         ;Else check current MOD status
01420 ;
01430 CHK_INV   BIT     3,(IX)          ;Invisible file?
01440           JR      Z,CHK_MOD       ;No -- go
01450           TEST_PARM INV$,0        ;Test INV$ parameter
01460           RET     Z               ;If INV off, give up
01470 ;
01480 CHK_MOD   BIT     6,(IX+1)        ;Check MOD flag
01490           JR      Z,NO_MOD        ;Flag is off -- go
01500           TEST_PARM MOD$,-1       ;Test MOD$ parameter
01510           RET     Z               ;Go if parameter is off
01520           JR      DO_THIS         ;Else do this file
01530 ;
01540 NO_MOD    TEST_PARM UNMOD$,-1     ;Test UNMOD$ parameter
01550           RET     Z               ;Go if parameter off
01560 ;
01570 ;---------------
01580 ;  Toggle MOD flag of
01590 ;  this file
01600 ;---------------
01610 DO_THIS   CALL    SHOW_NAME       ;Display file name & status
01620           TEST_PARM QUERY$,-1     ;Ask to toggle?
01630           CALL    NZ,ASK          ;Yes -- prompt for change
01640           RET     NZ              ;Go if no toggle
01650           LD      A,(IX+1)        ;Get MOD flag
01660           XOR     @1000000B       ;Toggle MOD flag
01670           LD      (IX+1),A        ;Save new status
01680           CALL    TOG_RPT         ;Report change
01690           RET                     ;Done with this file
01700 ;
01710 ;---------------
01720 ;  Read Directory Sector
01730 ;  On entry, sector number in E
01740 ;  Return with IX==> sector buffer
01750 ;---------------
01760 READ_SEC:
01770           RPUSH   HL,DE,BC        ;Save registers
01780           LD      HL,SEC_BUF      ;HL==> sector buffer
01790           LD      A,(DIRCYL)      ;Get directory cylinder
01800           LD      D,A             ;Set cylinder to read
01810           LD      A,(DRIVE)       ;Get drive number
01820           LD      C,A             ;Drive number to C
01830           @@RDSSC                 ;Read the sector
01840           PUSH    HL              ;Transfer buffer addr
01850           POP     IX              ;To IX
01860           RPOP    BC,DE,HL        ;Restore registers
01870           RET
01880 ;
01890 ;---------------
01900 ;  Write director sector
01910 ;  On entry, E = sector to write
01920 ;---------------
01930 WRITE_SEC:
01940           RPUSH   HL,DE,BC        ;Save registers
01950           LD      HL,SEC_BUF      ;HL==> sector buffer
01960           LD      A,(DIRCYL)      ;Get directory cylinder
01970           LD      D,A             ;Cylinder to D
01980           LD      A,(DRIVE)       ;Get drive number
01990           LD      C,A             ;Drive number to C
02000           @@WRSSC                 ;Put sector back in directory
02010           RPOP    BC,DE,HL        ;Restore registers
02020           RET
02030 ;
02040 ;---------------
02050 ;  Show filename and status
02060 ;  of this directory entry
02070 ;---------------
```

Listing 1 continued

therefore want to manipulate the MOD flags of SYS files), the @PARAM SVC places a value of −1, or OFFFF hex, into that location instead of 0000. If you did not specify the SYS parameter, the @PARAM SVC doesn't change the value at the label SYS$, and 0000 is the default.

If I wanted to specify that the SYS parameter defaults to "on," I would have placed a value of −1 in that location instead of zero and let you turn off that parameter by entering (SYS = NO) as part of the parameters.

If the program finds bit 6 of the first byte of the directory turned on, it knows that it is looking at an entry for a SYS file. Next, it checks the SYS$ parameter to find out whether it should include such files in the MOD flag manipulations. If not, the routine returns so that the next file can be examined. If so, it jumps to the tests for the MOD and UNMOD parameters. Essentially the same test is performed if the program finds bit 3 set, indicating an "invisible" file.

Normally, the program lets you manipulate the MOD flags of all files, whether the current MOD flag is set or not. However, you might decide to skip either those files that already have the MOD flag set or those that do not have the MOD flag set. The second two tests, CHK_MOD and NO_MOD, perform those tests, again by using the Test_PARM macro command. In both of these cases, the parameter is set to default to −1, or "on."

Once a directory entry passes all tests, the routine Do_This prints the file's name on the screen and then tests the last parameter, Query. If this parameter is on (the default), the subroutine Ask lets you specify whether the MOD flag should be flipped. If this parameter is off, the question is never asked, and the program simply changes the MOD flag and reports that change.

The remainder of the program is a series of support subroutines for Modify. Read_SEC and Write_SEC are unusual only in that they use the @RDSSC and @WRSSC SVCs to read and write system (directory) sectors from the disk, which TRSDOS can distinguish from standard data sectors.

The Show_Name routine displays a file name by reading it, one character at a time, from the directory entry, skipping spaces, and inserting the slash (/) separator at the correct place in the name. It also reports whether the MOD flag is currently set to "on" or "off" by checking bit 6 of the second byte of the directory entry.

In the Show_Name routine, the HL register is used as a pointer to the file name and is manipulated by adding values to L; it never checks to see if such an addition should also change the value of H. Normally, this is poor programming and will cause apparently random bugs to occur while a program is running.

In this case, however, the sector buffer is placed on a memory "page," which means that it uses space from address nn00 hex to nnFF hex. It makes no difference what value is used for nn in those addresses, but the program relies on being able to point to any address in the page by manipulating the value in the L register and assuming that the

Listing 1 continued

```
02080 SHOW_NAME:
02090         PUSH    IX              ;Copy entry pointer
02100         POP     HL              ;  to HL
02110         LD      A,5             ;Offset to file name
02120         ADD     A,L             ;Add to pointer
02130         LD      L,A             ;HL ==> file name
02140         LD      B,8             ;8 characters in name
02150 SHOW1   LD      A,(HL)          ;Get character
02160         IFEQ_JR ' ',SHOW2       ;Skip if a space
02170         @@DSP   A               ;Else display it
02180 SHOW2   INC     HL              ;Point to next character
02190         DJNZ    SHOW1           ;Repeat for full name
02200         @@DSP   '/'             ;Print extent separator
02210         LD      B,3             ;3 characters in extent
02220 SHOW3   LD      A,(HL)          ;Get character
02230         IFEQ_JR ' ',SHOW4       ;Skip if a space
02240         @@DSP   A               ;Else display it
02250 SHOW4   INC     HL              ;Point to next
02260         DJNZ    SHOW3           ;Repeat for full extent
02270         @@DSPLY STAT            ;"Mod flag is "
02280         BIT     6,(IX+1)        ;Test mod flag
02290         JR      Z,SHOWOFF       ;Go if off
02300         @@DSPLY ON$             ;"ON "
02310         RET
02320 SHOWOFF @@DSPLY OFF$            ;"OFF "
02330         RET
02340 ;
02350 ;----------------
02360 ;  Ask to Toggle Mod flag
02370 ;  Return Z to toggle,
02380 ;    NZ to leave unchanged
02390 ;----------------
02400 ASK     @@DSPLY QUESTION        ;"Change flag (Y/N/Q) ? "
02410 ASK1    @@KEY                   ;Wait for reply
02420         AND     0DFH            ;Force to upper case
02430         IFNE_JR 'Q',ASK2        ;Not 'Q' -- go
02440         @@DSP   'Q'             ;Show response
02450         CALL    WRITE_SEC       ;Else save previous changes
02460         @@EXIT  0               ;And end program
02470 ASK2    IFNE_JR 'N',ASK3        ;Not 'N' -- go
02480         @@DSP   'N'             ;Show response
02490         @@DSP   CR              ;Move to next line
02500         XOR     A               ;A = 0
02510         INC     A               ;Set NZ
02520         RET                     ;And go
02530 ASK3    IFNE_JR 'Y',ASK1        ;Go if illegal entry
02540         @@DSP   'Y'             ;Show response
02550         XOR     A               ;Set Z flag
02560         RET
02570 ;
02580 ;----------------
02590 ;  After toggle, report
02600 ;  new MOD flag status
02610 ;----------------
02620 TOG_RPT @@DSPLY SET$            ;General message
02630         BIT     6,(IX+1)        ;Test mod flag
02640         JR      Z,TOGOFF        ;Go if off
02650         @@DSPLY ON$             ;"ON "
02660         @@DSP   CR              ;Move to next line
02670         RET
02680 TOGOFF  @@DSPLY OFF$            ;"OFF "
02690         @@DSP   CR              ;Move to next line
02700         RET
02710 ;
02720 ;----------------
02730 ;  Data area & messages
02740 ;----------------
02750 HELLO   DB      'MOD Flag Modifier',LF
02760         DB      'Written by Hardin Brothers',LF,CR
02770 DRIVE_BAD DB    'Illegal drive specified on command line',LF,CR
02780 STAT    DB      '   flag is ',ETX
02790 ON$     DB      'ON ',ETX
02800 OFF$    DB      'OFF ',ETX
02810 QUESTION DB     ' Change (Y/N/Q) ?',ETX
02820 SET$    DB      '   MOD flag set ',ETX
02830 ;
02840 DRIVE   DB      0
02850 SECTOR  DB      0
02860 DIRCYL  DB      0
02870 ;
02880 PARM_TBL DB     80H
02890         IRP     XX,<SYS,INV,MOD,UNMOD,QUERY>
02900         PFLG_ENTRY      XX
02910         ENDM
02920         DB      00              ;Mark end of table
02930 ;
02940 SEC_BUF EQU     $+255&0FF00H    ;Put buffer on page boundary
02950 ;
02960         END     START
```

End

How to Use *80 Micro* Program Listings

Basic program listings in *80 Micro* include a checksum value at the end of each line. This value is the sum of the ASCII values of all characters and spaces in the line, excluding remarks. You can use these values to test the accuracy of your typing after you copy listings from the magazine.

To check your typing, follow these steps:

- Type in program code *exactly* as listed, omitting the indentations (when program lines continue to a second or third magazine line). The '* characters and checksum values, and comments may be omitted.
- Save the program in ASCII format with the command SAVE "file name",A.
- Load and run Checksum (see Program Listing). The program will prompt you for the name of the file to be verified and give you the option of sending the line numbers and checksum values to the printer or to the screen. Enter P for printer, S for screen.

When printing to the screen, Checksum lists 20 lines and then waits for you to press the enter key.

- Compare the displayed line numbers and checksum values with the checksums shown in the listing. Find and correct errors in lines having checksum values that don't match.

—Beverly Woodbury
Technical Editor

Program Listing. Checksum.

```
10 CLEAR 1000:CLS:PRINT@140,"VERIFY CHECKSUMS ON PROGRAM"                '*  3713
20 PRINT:PRINT:INPUT "Enter Name of File to verify";F$                   '*  4245
30 PRINT:PRINT:PRINT "List Checksums to:"                                '*  3233
40 PRINT TAB(20) "<P>rinter";PRINT TAB(20) "<S>creen"                    '*  3628
50 PRINT:PRINT:PRINT TAB(30);"? ";                                       '*  2148
60 K$=INKEY$                                                             '*   726
70 IF K$="P" OR K$="p" OR K$="S" OR K$="s" THEN 80 ELSE 60               '*  3269
80 PRINT K$:IF K$="P" OR K$="p" THEN LP=1                                '*  2439
90 OPEN "I",1,F$:B$=CHR$(34)                                             '*  1521
100 IF EOF(1) THEN CLOSE:GOTO 390                                        '*  2000
110 LINE INPUT#1,L$:L=VAL(LEFT$(L$,6))                                   '*  2275
120 IF Z=2 AND L=0 THEN 100 ELSE Z=2                                     '*  2089
130 A=VARPTR(L$):GOSUB 270:Q=PEEK(A)                                     '*  2244
140 LS=PEEK(A+1):MS=PEEK(A+2):A=MS*256+LS:GOSUB 270                      '*  3115
150 IF INSTR(L$,"'") THEN GOSUB 280                                      '*  2038
160 IF RIGHT$(L$,1)=" " THEN IQ=Q:GOSUB 370                              '*  2514
170 FOR K=1 TO Q:P=PEEK(A):CS=CS+P:A=A+1:NEXT K                          '*  2945
180 IF CS=0 THEN 100                                                     '*  1131
190 IF CS<100000! THEN D$="-"                                            '*  1538
200 IF CS<10000 THEN D$="- "                                             '*  1481
210 IF CS<1000 THEN D$="-  "                                             '*  1466
220 IF CS<100 THEN D$="-   "                                             '*  1451
230 IF LP=1 THEN LPRINT "Line";L;D$;CS,:CS=0:GOTO 100                    '*  3370
240 PRINT "Line";L;D$;CS:CS=0:X=X+1                                      '*  2282
250 IF X=20 THEN X=0:PRINT TAB(30) "Press <ENTER> to continue."
    ELSE 100                                                             '*  4924
260 K$=INKEY$:IF K$<>CHR$(13) THEN 260 ELSE 100                          '*  2705
270 IF A>32767 THEN A=(65536!-A)*-1:RETURN:ELSE RETURN                   '*  3275
280 I=INSTR(L$,"'"):IQ=I-1                                               '*  1504
290 IF LEN(L$)=INSTR(L$,"'") THEN 100                                    '*  2095
300 LQ$=STR$(L):LQ=LEN(LQ$):IF LQ+2=>I THEN 100                          '*  2839
310 Q1=INSTR(L$,B$):IF Q1>I OR Q1=0 THEN 370                             '*  2593
320 Q2=INSTR(Q1+1,L$,B$):IF Q2>I THEN I=INSTR(Q2,L$,"'")                 '*  3297
330 IF I=0 THEN RETURN                                                   '*  1386
340 Q3=INSTR(Q2+1,L$,B$):IF Q3>I OR Q3=0 THEN 370                        '*  2869
350 Q4=INSTR(Q3+1,L$,B$):IF Q4>I THEN I=INSTR(Q4,L$,"'")                 '*  3308
360 IF I=0 THEN RETURN                                                   '*  1389
370 FOR I=IQ TO 1 STEP-1:C=ASC(MID$(L$,I,1)):IF C<33 THEN NEXT I         '*  3847
380 RL$=LEFT$(L$,I):Q=LEN(RL$):RETURN                                    '*  2323
390 PRINT:PRINT"CHECKSUM/BAS now in Memory"                              '*  3248
400 PRINT "Reload the PROGRAM that you are working on? (Y/N)";           '*  4890
410 INPUT Q$:IF Q$="Y" OR Q$="y" THEN CLS:LOAD F$                        '*  2967
```

End

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value in H never changes.

The Ask subroutine prints a prompt, waits for your response, converts that response to uppercase, and takes appropriate action. If you want to quit, the current sector buffer is written back to disk and the program ends. Otherwise, the routine sets the Z flag to indicate whether you want to change the MOD flag of the current file and then returns. If you enter anything other than "Q," "Y," or "N," the program waits for a correct keystroke.

The TOG_RPT routine examines the file after the MOD bit has been changed and reports on the new status of that bit. This gives you a final check to guarantee that the bit has been set correctly.

Most of the data area at the end of the program is self-explanatory. Most of the message strings end with the ETX character, instead of a carriage return, to leave the cursor on the same line after the string is printed.

The first byte of a TRSDOS-style parameter table must be 80 hex. Instead of following that byte with several lines for each of the five parameters, I've used two macro commands to create the body of the parameter table. The first is one of the in-line repeating macros, IRP. That command repeats everything up to the ENDM in line 2910 for each of the strings shown between angle brackets in line 2890. Each time it does so, it replaces the XX on 2900 with a string from the list.

Inside the repeating macro, I've used another macro, PFLG_Entry, to create the actual entry for a flag parameter. That second macro is defined in line 2080 of Listing 2. It begins by setting the type and length byte by using the macro operator represented by a percentage sign (%), which returns the length of a parameter string. Next, it creates the bytes of the macro name and inserts the response byte. Finally, it adds a dollar sign ($) to the end of the macro name to create the label of the address at which the macro should be stored.

If I again use the SYS parameter as an example, this macro expands to these assembler instructions:

```
DB   0101000B+3    ;Flag parameter, accept
                   ;abbreviations, name is 3
                   ;characters long
DB   'SYS'         ;Parameter name
DB   0             ;Response byte
DW   SYS$          ;Location for value
```

The entire parameter table, after all macros have been expanded, ends with a final byte of zero to tell TRSDOS that there are no more parameters.

At the end of Listing 1, the sector buffer must be placed at a page boundary. The easiest way to do so is to manipulate the assembler's location counter, $. In line 2940, the program adds 255 to the location counter (enough to move to the first unused page), then Ands this value with 0FF00 hex to set the last two digits of the new address to zero. The result is that the location of SEC_BUF will be the beginning of the first page of memory after the rest of the program.

The program relies heavily on a separate file of macro commands, which are part of the macro library I've discussed during the last several months. Listing 2 shows the macros that are used in this month's programs. Most of them have been described here before, but a couple are new. If you are building a library of macro commands, you will need to compare the macros already in that library with those shown in Listing 2 and add the new ones to your library. They will greatly simplify the logic of your own programs, as well as keep the length of your source code to a minimum. ■

Program Listing 2. Macro commands required by Listing 1.

```
00100 ;-------------------------------------------------------------
00110 ;  Sections of MACLIB/ASM needed for MODPLAGS/ASM (Listing 1)
00120 ;  Save this file as MACLIB/ASM or add new macros to your
00130 ;  present MACLIB/ASM library.
00140 ;-------------------------------------------------------------
00150 ;
00160 ;-----------------------------------------
00170 ;     Invoke a TRSDOS 6 SVC
00180 ;     If "check" is specified, take exit
00190 ;     through @ERROR when NZ flag is returned
00200 ;     from TRSDOS.
00210 ;-----------------------------------------
00220 SVC     MACRO   #NUM,#CHECK
00230         LD      A,#NUM          ;;A = SVC number
00240         RST     28H             ;;Perform SVC
00250         IFGT    %%,1            ;;More than one argument?
00260           JR      Z,$1?         ;;Go if no error
00270           LD      C,A           ;;Put error code in C
00280           LD      A,1AH         ;;@ERROR SVC number
00290           RST     28H           ;;Exit through @ERROR
00300 $1?       EQU     $             ;;Here if no error
00310         ENDIF
00320         ENDM
00330 ;
00340 ;-----------------------------------------
00350 ;   DEFINE -- Define a label unless it
00360 ;       is already defined.
00370 ;-----------------------------------------
00380 DEFINE  MACRO   #LABEL,#VALUE
00390         IFNDEF  #LABEL
00400 #LABEL  EQU     #VALUE
00410         ENDIF
00420         ENDM
00430 ;
00440 ;-----------------------------------------
00450 ;  @@CKBRKC -- Check & clear <Break> bit
00460 ;-----------------------------------------
00470 @@CKBRKC  MACRO
00480         DEFINE  @CKBRKC,6AH
00490         SVC     @CKBRKC
00500         ENDM
00510 ;
00520 ;-----------------------------------------
00530 ;   @@CKDRV -- Check (and log) drive.
00540 ;   If drive number not specified, defaults
00550 ;   to value in C
00560 ;-----------------------------------------
00570 @@CKDRV MACRO   #DRIVE
00580         DEFINE  @CKDRV,21H
00590         IFEQ    %%,1
00600           LD      A,#DRIVE
00610           LD      C,A
00620         ENDIF
00630         SVC     @CKDRV,CHECK
00640         ENDM
00650 ;
00660 ;-----------------------------------------
00670 ;  @@DSP -- Display one character on the screen
00680 ;      #char defaults to value in C register
00690 ;-----------------------------------------
00700 @@DSP   MACRO   #CHAR
00710         DEFINE  @DSP,02H
00720         PUSH    DE
00730         IFEQ    %%,1
00740           LD      A,#CHAR
00750           LD      C,A
00760         ENDIF
00770         SVC     @DSP,CHECK
00780         POP     DE
00790         ENDM
00800 ;
00810 ;-----------------------------------------
```

Listing 2 continued

Write Hardin Brothers at 280 N. Campus Ave., Upland, CA 91786. Enclose a stamped, self-addressed envelope for a reply. You can also contact Hardin on Compuserve's WESIG (PCS-117).

Listing 2 continued

```
00820 ;   @@DSPLY -- Displays line of text
00830 ;   LINE defaults to value in HL
00840 ;-----------------------------------------
00850 @@DSPLY MACRO   #LINE
00860         DEFINE  @DSPLY,0AH
00870         IFEQ    %%,1
00880           RPUSH   DE,HL
00890           LD      HL,#LINE
00900           SVC     @DSPLY,CHECK
00910           RPOP    HL,DE
00920         ELSE
00930           PUSH    DE
00940           SVC     @DSPLY,CHECK
00950           POP     DE
00960         ENDIF
00970         ENDM
00980 ;
00990 ;-----------------------------------------
01000 ;  @@EXIT -- Exits program
01010 ;  #RETCOD defaults to 0 (no error)
01020 ;-----------------------------------------
01030 @@EXIT  MACRO   #RETCOD
01040         DEFINE  @EXIT,16H
01050         IFEQ    %%,1
01060           LD      HL,#RETCOD
01070         ELSE
01080           LD      HL,0
01090         ENDIF
01100         SVC     @EXIT
01110         ENDM
01120 ;
01130 ;-----------------------------------------
01140 ;  @@GTDCT -- Loads IY with address of drive's DC
01150 ;     #Drive defaults to value in C
01160 ;-----------------------------------------
01170 @@GTDCT MACRO   #DRIVE
01180         DEFINE  @GTDCT,51H
01190         IFEQ    %%,1
01200           PUSH    BC
01210           LD      A,#DRIVE
01220           LD      C,A
01230         ENDIF
01240         SVC     @GTDCT
01250         IFEQ    %%,1
01260           POP     BC
01270         ENDIF
01280         ENDM
01290 ;
01300 ;-----------------------------------------
01310 ;  @@KEY -- Waits for key at *KI device
01320 ;          keystroke returned in A
01330 ;-----------------------------------------
01340 @@KEY   MACRO
01350         DEFINE  @KEY,01H
01360         PUSH    DE
01370         SVC     @KEY,CHECK
01380         POP     DE
01390         ENDM
01400 ;
01410 ;-----------------------------------------
01420 ;  @@PARAM -- Uses TRSDOS to parse parameter string
01430 ;    If #Table not specified, uses value in DE
01440 ;    Assumes HL ==> command line
01450 ;-----------------------------------------
01460 @@PARAM MACRO   #TABLE
01470         DEFINE  @PARAM,11H
01480         IFEQ    %%,1
01490           LD      DE,#TABLE
01500         ENDIF
01510         SVC     @PARAM,CHECK
01520         ENDM
01530 ;
01540 ;-----------------------------------------
01550 ;  @@RDSSC -- Read directory sector
01560 ;  Assumes that all registers are set up
01570 ;-----------------------------------------
01580 @@RDSSC MACRO
01590         DEFINE  @RDSSC,55H
01600         SVC     @RDSSC,CHECK
01610         ENDM
01620 ;
01630 ;-----------------------------------------
01640 ;  @@WRSSC -- Write directory sector
01650 ;  Assumes that all registers are set up
01660 ;-----------------------------------------
01670 @@WRSSC MACRO
01680         DEFINE  @WRSSC,36H
01690         SVC     @WRSSC,CHECK
01700         ENDM
01710 ;
01720 ;-----------------------------------------
01730 ;  IFEQ_JR -- Performs a JR if A = #Value
01740 ;-----------------------------------------
01750 IFEQ_JR MACRO   #VALUE,#JUMP
01760         CP      #VALUE
01770         JR      Z,#JUMP
01780         ENDM
01790 ;
01800 ;-----------------------------------------
01810 ;  IFGE_JR -- Performs a JR if A >= #Value
01820 ;-----------------------------------------
01830 IFGE_JR MACRO   #VALUE,#JUMP
01840         CP      #VALUE
01850         JR      NC,#JUMP
01860         ENDM
01870 ;
01880 ;-----------------------------------------
01890 ;  IFLT_JR -- Performs a JR if A < #Value
01900 ;-----------------------------------------
01910 IFLT_JR MACRO   #VALUE,#JUMP
01920         CP      #VALUE
01930         JR      C,#JUMP
01940         ENDM
01950 ;
01960 ;-----------------------------------------
01970 ;  IFNE_JR -- Performs a JR if A <> #Value
01980 ;-----------------------------------------
01990 IFNE_JR MACRO   #VALUE,#JUMP
02000         CP      #VALUE
02010         JR      NZ,#JUMP
02020         ENDM
02030 ;
02040 ;-----------------------------------------
02050 ;  PFLG_ENTRY -- Creates parameter-table
02060 ;   entry for flag parameter.
02070 ;-----------------------------------------
02080 PFLG_ENTRY MACRO  #PARAM
02090         DB      01010000B+%%PARAM
02100         DB      '#PARAM'
02110         DB      0
02120         DW      #PARAM%&$
02130         ENDM
02140 ;
02150 ;-----------------------------------------
02160 ;   RPUSH -- Version 2
02170 ;     Pushes 0 to 6 registers onto the stack
02180 ;     Example:  RPUSH   BC,DE,HL,IX
02190 ;-----------------------------------------
02200 RPUSH   MACRO   #R1,#R2,#R3,#R4,#R5,#R6
02210         IFGT    %%,0
02220           PUSH    #R1
02230         ENDIF
02240         IFGT    %%,1
02250           PUSH    #R2
02260         ENDIF
02270         IFGT    %%,2
02280           PUSH    #R3
02290         ENDIF
02300         IFGT    %%,3
02310           PUSH    #R4
02320         ENDIF
02330         IFGT    %%,4
02340           PUSH    #R5
02350         ENDIF
02360         IFGT    %%,5
02370           PUSH    #R6
02380         ENDIF
02390         ENDM
02400 ;
02410 ;-----------------------------------------
02420 ;   RPOP -- Version 2
02430 ;     Pops 0 to 6 registers from the stack
02440 ;     Example:  RPOP   BC,DE,HL,IX
02450 ;-----------------------------------------
02460 RPOP    MACRO   #R1,#R2,#R3,#R4,#R5,#R6
02470         IFGT    %%,0
02480           POP     #R1
02490         ENDIF
02500         IFGT    %%,1
02510           POP     #R2
02520         ENDIF
02530         IFGT    %%,2
02540           POP     #R3
02550         ENDIF
02560         IFGT    %%,3
02570           POP     #R4
02580         ENDIF
02590         IFGT    %%,4
02600           POP     #R5
02610         ENDIF
02620         IFGT    %%,5
02630           POP     #R6
02640         ENDIF
02650         ENDM
02660 ;
02670 ;-----------------------------------------
02680 ;  TEST_PARM -- Tests a On/Off command-line
02690 ;    parameter.  Results: Z/NZ for Off/On.
02700 ;    Note: parameter storage held inside this code
02710 ;       #DEFAULT should be 0 or -1
02720 ;    Changes A & flags
02730 ;-----------------------------------------
02740 TEST_PARM MACRO #PARAM,#DEFAULT
02750         PUSH    DE              ;;Save register
02760         LD      DE,#DEFAULT
02770 #PARAM  EQU     $-2
02780         LD      A,D
02790         OR      E
02800         POP     DE
02810         ENDM
02820 ;
```

End

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Continued from p. 39

You can compile and link subroutines into the main program once you have debugged them.

will be shown as they change. You can also separately compile and link subroutines into the main program once you have completely debugged them.

VP-Info makes a distinction between procedures and subroutines. A procedure is a sequence of commands that is wholly contained within a program file. A subroutine is a separate command file that you can call from within a program. The reason for this distinction is the manner in which the program compiler works. Procedures are compiled only once, before the main program is compiled. Subroutines, however, are separately compiled each time you call them. This makes no difference in the actual program operation in the immediate mode, but if programs are compiled and saved in the compiled form, those with multiple calls to subroutines contain redundant code.

VP-Info differs from Dbase in the manner in which it processes commands. Dbase, like Basic, is an interpreted language. Each line of code of Dbase is translated into "tokens," which are then translated into machine instructions. VP-Info compiles, or changes into machine instructions, the entire program file prior to running it. This results in a tremendous increase in the program's execution speed.

Translation

Program lines are translated only once, when they are compiled. In an interpreted language, each line is translated every time that it is used in the program. The difference in speed is most noticeable when you are doing repeated screen access.

One application, a docket-control program for a law firm, uses multiple linked screens to create a menu-controlled program. Running under Dbase, this program has a noticeable pause while it creates each screen. With the screens converted to work with VP-Info, each screen seems to appear instantly.

VP-Info, when running in the immediate mode or when running very small programs, is only slightly faster than Dbase III. Reading in 3,549 99-byte comma-delimited records took two minutes, 11 seconds with Dbase III and one minute, 50 seconds with VP-Info. Sorting the same file on a 20-character field took Dbase three minutes, 40 seconds and VP-Info three minutes, 18 seconds. Compiling the commands for the sort made no difference in the sort time.

Compiled programs still use the VP-Info program during execution. Unlike many compiled programs, VP-Info does not have a run-time module to allow the application independence from the original program. Thus, like templates for spreadsheet programs, any applications will require that the user have a copy of VP-Info.

Bugs

VP-Info is not bug free. When you give the modify-structure command, a message requiring confirmation is supposed to appear. In actuality, the program briefly flashes the message and immediately enters the modify screen. If, while modifying a file structure, you leave the cursor anywhere within the structure definition when the file is saved, the last field in the definition is lost.

VP-Info also has some problems in the execution of commands. When you give a command to sort to a full disk, the error message, "Disk full or error in writing data to disk," appears. The program then freezes, requiring resetting the computer. Even more aggravating, the copy-protection often prevents the program from starting. It was occasionally necessary to issue as many as six tries to get VP-Info to run. VP-Info's error handling leaves something to be desired. Any disk error, including having a write-protect tab on a floppy disk, usually causes the program to stop and return to DOS.

Conclusion

VP-Info is a fast and powerful data-base management program that has several valuable features not found in Dbase. Among these are some that are only convenient, such as recalling previously typed commands by pressing the up-arrow key; others are of great utility, such as using windows within programs.

VP-Info is somewhat compatible with Dbase files and can read and write to both Dbase II and III format. Dbase does not always recognize files created with VP-Info, returning the message, "not a Dbase file." VP-Info never failed to read a Dbase II file. Although the program is not completely bug free, the bugs I encountered, with one exception, were minor annoyances. Considering its low price, networking capability, and programming features for application developers, VP-Info rates a "must buy."■

Norton Commander
★★★★

The Norton Commander 1.0 runs on the Tandy 1000/1200/3000 (128K) and requires one disk drive. Peter Norton Computing, 2210 Wilshire Blvd., Santa Monica, CA 90403. 213-453-2361. $75.

If you want to be polite, you can say that the name Peter Norton guarantees quality in MS-DOS accessories; if you want to be cynical, you can say that Mr. Utilities' name is The Norton Commander's main advantage in the glutted hard-disk-manager market.

Both statements apply: The Commander is a smooth combination of a directory navigator (like Bourbaki's 1Dir) and an application menu (like Delta Technology's Direct Access). It has several fine features for the shy user or someone who sets up systems for novice operators, but those who survive without a DOS shell needn't sacrifice 100K for The Commander.

Those who survive without a DOS shell needn't sacrifice 100K for The Commander.

To be fair, you only need 100K if you want The Commander on deck instantly as you exit an application; if you don't mind waiting for your hard disk, you can cut memory overhead to 14K by having The Commander unload and reload itself between programs. Either way, it supplements the DOS prompt with a deluxe control panel—built, like other shells', around a directory listing that lets you run a program or change to another directory by moving the cursor and pressing the enter key.

You can also "point and shoot" to open a data file, once you've set up an ASCII file that pairs extensions with programs (such as WK1 for Lotus's 1-2-3). Microsoft Windows fans can left-click and double-click through the menus with a mouse.

The function keys create directories or copy, delete, or rename a selected file or files. The insert key toggles individual entries, and the keypad plus and minus select and unselect groups of files with wild cards. You can view a file's contents or create or change text files with a built-in ASCII editor. The DOS prompt's still there, with control-E and -X to scroll through a Superkey-style stack of commands executed since start-up.

The Commander has the handy trick of moving files from one directory to another by renaming them, instead of copying and then deleting the originals. And it juggles files on two on-screen displays, letting you use the tab key to flip between DOS and Dbase or whatever—viewing two directories at once for file swaps, turning one directory panel off, or turning it into a CHKDSK-style status display of free memory and disk space.

For still more convenience, the F2 key pops up a customized menu of normal, control, or function keys and descriptions. Instead of in bulky batch files, menu choices are kept in an ASCII file in the current or root directory. (Between one or more menus and an optional summary in each directory, you can fill a bit of disk space with Commander ASCII files.)

The menus, like the other functions, work nicely, at the risk of making The Commander seem a little schizophrenic in trying to appeal to all users. Let the timid novice wander away from the one-keystroke menu and he or she'll be in the middle of an F7 MKDIR or F6 RENMOV, looking at the *.* prompt box.

That ambiguous target audience is my only real complaint with The Commander. The package promises "A control program for power users from Peter Norton;" the truth is that it's not really from Peter Norton ("created independently by John Socha," shout the help screens) and that power users don't use DOS shells.

They might like the ASCII editor but won't want to unload The Commander to change Path and Set variables or load and unload RAM-resident programs. They might admire the Rename/Move trick but can type file names and wild cards even faster than The Commander's quick highlighting. The Norton Commander is a first-class file manager for moderate use, but I'm more excited about my upgrade to DOS 3.2 and the XCopy command.

—Eric Grevstad

Lunar Explorer
★★★

Lunar Explorer runs on the Tandy 1000/1200/3000 and requires two disk drives. Electric Transit, 501 Marin St., Suite 116, Thousand Oaks, CA 91360. (805) 373-1960. $39.95.

Wilderness
★★★★

Wilderness runs on the Tandy 1000/1200/3000 and requires two disk drives. Electric Transit. $49.95.

Lunar Explorer is a space-flight simulation game in the tradition of Micro-

soft's Flight Simulator, although on a lesser scale. You view everything from the cockpit of a lunar landing vehicle that shows your instrumented data, including an optional radar display at the bottom and scenes of the lunar surface.

Color graphics are good and provide a three-dimensional perspective. Control can be either by keyboard or joystick. You have five play options. Three of them start you off in situations that are best to use for the training exercises. All choices also give you your preference for flying the lunar explorer in solo excursions.

Only about one-third of the 90-page manual is devoted to instruction on using the game. The rest is full of facts about a space-colonization project, including diagrams and charts of lunar orbits, the Dakota space habitat, its lunar mining facility, and other believable information on the space shuttle and other equipment. The information on habitats and lunar exploration is based on facts in publications from The National Aeronautics and Space Administration. One chapter is devoted to using Lunar Explorer in the classroom to study astronomy, physics, and space sciences.

Lunar Explorer lives up to its claim that you can gain insight into the dynamics of space flight and some of the scientific principles and concepts involved in space exploration and colonization. For example, the concepts of inertial forces become evident as you try to slow down the lunar lander or change direction.

Of my two resident game experts, one preferred Lunar Explorer to Wilderness. He thought Lunar Explorer was fun and interesting, although slow: "sort of like watching the grass grow." My other son preferred Wilderness.

Wilderness is a survival-adventure simulation based on information provided by experts in the fields of toxic wild plants, human physiology, navigation, wilderness lore, thermal models, wildlife habitats, meteorology, and terrain models. The game establishes a detailed wilderness environment based on the training manual used by the United States Air Force Survival School; it is essentially an expert system. The degree of randomness with which the computer responds to your choices is based on traditional probabilities from real-life situations.

Wilderness provides three-dimensional color-graphics generation that gives you a 90-degree slice of a complete 360-degree panoramic view. You can turn to the right or left and pan through the entire circle to see where you are. Graphics are somewhat grainy and coarse with vertical lines on my red-green-blue (RGB) color monitor. Otherwise, they are detailed, with terrain including trees, mountains, and an occasional animal that might threaten your survival. You can also select a topological map to further determine your location.

Like Lunar Explorer's, Wilderness' manual provides much detailed information: over 100 pages of charts, graphs, and diagrams on survival. A chapter on classroom use is also included.

Solving the adventure is not a one-shot deal. Experienced survivalists can create and select new conditions and describe such information as gender, height, weight, body frame, age, heart pulse rate, time of year, and frequency of weather conditions. All these factors can affect your chances of survival. You can save adventures to disk and resume the game later.

Wilderness is more intellectually stimulating than Lunar Explorer. One of the main complaints that my sons had about both games was that you have to read a lengthy manual. Although you can play both games without reading the manual, you lose many of the educational benefits. In my estimation, you cannot play Wilderness properly without thorough study, as you lose much of your ability to deal effectively with game situations and you nullify the educational benefits that the manual provides.

Both games are thoughtfully and professionally prepared, and both are excellent interactive simulations. They create a learning experience by using factual information as a basis for their models, and they are fun. Wilderness might provide good training toward a Scout badge. Depending on your interests, one of these games is well worth the price.

—Thomas L. Quindry

BasicA Science And Graphics

★★★

The BasicA Science and Graphics Handbook runs on the Tandy 1000/1200/3000 and requires one disk drive. Simplication Unlimited, P.O. Box 654, Menlo Park, CA 94026. 415-859-4244. $79 (plus $2 postage and handling).

One of the largest voids in software is personal graphics applications. Most of the time, you have to write your own or contract someone else to do it for you. I've recently found a package that helps fill this void.

BasicA Science and Graphics has a 165-page manual with a data disk containing graphics routines. You must already have Basic.

The software tries to cover a wide range of graphics applications. It is bro-

This package is not designed as a tutorial. You need some prior knowledge. . .

ken up into four main categories: graphics techniques, imaging and transforms, probability and statistics, and matrix operations. Each category contains 10 to 12 different routines.

BasicA Science and Graphics contains about 50 routines in all, and each one is written in Basic. The manual contains a description of what each one does, along with the source code and a sample picture of possible results. All graphs use a maximum of four colors to retain IBM compatibility.

You select the routine suitable for your application and then insert it into a Basic program as a subroutine. The manual lists all the necessary variables you have to manipulate to get the graphics function you require. All you do is assign values to the variables and perform a subroutine call.

If you are not sure whether the routine is the right one, you can load and run it without any support programs. All required variables either have default values or request that you assign values by answering input prompts.

This package was not designed as a tutorial. You might need some prior knowledge in graphics techniques. References in the manual at the end of each routine let you do more research. Be aware that the techniques might not be the same as those described in some of the references.

Since all the routines are in Basic, I found some of them slow. The speed depends on the routine's complexity. If this is a problem for you, a Basic compiler can speed up the routines.

I checked each routine as a standalone program, and they all appeared to work. This type of software package might be attractive to only a small group of users. If you fall into this group, I recommend BasicA Science and Graphics.

—David Engelhardt

Jumpstart

★★★★

Jumpstart 1.0 runs on the Tandy 1000/1200/3000 (256K); requires one disk drive; and supports Hayes 1200 and 2400 and Hayes-compatible modems, and Popcom C100 and X100 modems. Ascent Inc., 190 Sobrante Way, Suite 201, Sunnyvale, CA 94086. 408-720-9200. $66.

It's hard to know from appearances that Jumpstart is communications software. The manual's cover touts ease of use: "Productivity from day one." Inside, the introduction describes "a business software program which combines comprehensive telecommunications with an address book, appointment book, text editor, financial calculator, and file utilities." Given that description, those who use Tandy's MS-DOS computers can think only of Deskmate.

However, the comparison doesn't hold. Although the two programs share some functions, Deskmate is entry-level software that includes telecommunications, while Jumpstart is a potentially powerful terminal package with some nifty extras.

As advertised, the program is exceptionally easy to use. You move among its functions and make decisions from menus or by function key. Message lines explain each menu item; a help line identifies currently active function keys. When the program needs information, you see a clear prompt or a neatly organized data-entry screen. Often, you can choose your response from a submenu. Context-sensitive help screens are abundant, and 300 pages of patient documentation provide walk-throughs of every operation and more troubleshooting information than most people will use.

If you don't have a modem that the program supports directly, ". . .you can still use Jumpstart—Chapter 3 tells you how." Chapter 3 tells you to refer to your modem's manual. It's the one place where Jumpstart's ease of use fails. If you have neither the right modem nor experience with the one you have, you're in for a rough time.

If you get by that pitfall, Jumpstart is impressive. Its broad range of terminal configurations includes support for x-on/x-off, full or half duplex, and high-bit and line-feed filters. A debugging tool can make control characters visible or, alternately, display characters in hexadecimal. In addition to ASCII file transfer, Jumpstart supports x-modem error-checking protocol. You can set up a disk file for data capture. A keystroke toggles it on and off. Similarly, you can send data to a printer at the touch of a key.

Using Jumpstart, I had no trouble with either commercial information services or private BBSes, even over noisy rural phone lines. The program operated efficiently and did everything I asked, whether I was using a properly Hayes-compatible modem or an unsupported device.

What sets this program apart and gives it unusual power are its macros. I can think of no telecommunications operation you couldn't automate with Jumpstart. And they are delightfully easy to use.

The program makes you break up an operation into a series of small steps. Then you create a single-task macro for each step. Some tasks are predefined. For example, Waitnn effects a pause of nn seconds. Jumpstart treats other tasks by type. To set up an exchange of data, for instance, you select Transfer File from a menu; name the macro; select the type of transfer, direction, and protocol; and name the file. The macro is then stored in a special file.

To automate an entire operation, you construct a script by assembling macros in the order you want them performed. Once assembled, each script becomes a macro that you can use within another more complex script.

Jumpstart's other functions are meant to enhance your telecommunicating environment. The address and appointment books emulate their paper counterparts. Each page in the address book has room for a name, company name, address, three phone numbers, and comments. Appointment slips have places for name, date, time, duration, three phone numbers, and a note.

In spite of its limitations, the appointment book has some slick features. The calendar-month display indicates which days are busy. Highlight a date, and the daily display maps your schedule for 24 hours. By pointing to a time, you can look at an appointment, change it, or add another. The program prints your calendar by the year, month, week, or day, in useful formats with room for notes.

Because I started by thinking of Deskmate, the financial calculator surprised me. It is neither a calculator in the usual sense, nor a modified spreadsheet. Instead, it does 19 interrelated calculations of interest, investments, loans, and depreciation.

Although the text editor is a barebones affair with no provision for margins or pagination, it has a good selection of editing functions. Most of all, it's available at a keystroke from anywhere in the program and is especially useful for to-do lists, notes, and quick replies to on-line messages.

Jumpstart is telecommunications software worth anyone's consideration. Its ability to automate complex procedures makes it equal to your most demanding needs; its ease of use makes it fully accessible regardless of your level of experience.

—Harry Bee

Continued from p. 77

```
04050           JR      CTLNXT
04060 GETCTL:   LD      A,(HL)
04070           OR      A               ;Dont allow zero'd characters
04080           JR      Z,OUTRET
04090           CP      1CH
04100           JR      NZ,SAVCAR
04110           LD      HL,OPTION       ;Block CLS codes  1C 1F ?
04120           BIT     0,(HL)
04130           JR      Z,SAVCAR        ;Dont block cls codes
04140           LD      HL,STATUS       ;Flag 1st char of CLS
04150           SET     6,(HL)
04160           JR      OUTRET
04170 SAVCAR:   LD      HL,(OHEAD)
04180           LD      (HL),A          ;Store character in buffer
04190           INC     HL
04200           LD      A,H             ;Force into range of 8k
04210           OR      0F8H
04220           LD      H,A
04230 BUFFUL:   LD      A,(OTAIL)       ;Test for buffer full
04240           CP      L
04250           JR      NZ,BUFEMP       ;TAIL doesnt match HEAD, must be empty
04260           LD      A,(OTAIL+1)
04270           CP      H
04280           JR      Z,BUFFUL        ;TAIL = HEAD, wait for not full
04290 BUFEMP:   LD      (OHEAD),HL
04300 OUTRET:   LD      A,C
04310           CP      A
04320           RET
04330 SETURT:   LD      A,(HL)          ;Set uart control register & return
04340           OUT     (UCTRL),A
04350           JR      OUTRET
04360                                   ;HL=STATUS at this entry
04370 CTLCMD:   CP      0DH             ;End command?
04380           JR      NZ,BAUD3
04390           RES     0,(HL)
04400           JR      OUTRET
04410 BAUD3:    SUB     'A'             ;A
04420           JR      C,OUTRET
04430           JR      NZ,BAUD12
04440           LD      A,BR300
04450           OUT     (UBAUD),A
04460           JR      OUTRET
04470 BAUD12:   DEC     A               ;B
04480           JR      NZ,BAUD24
04490           LD      A,BR1200
04500           OUT     (UBAUD),A
04510           JR      OUTRET
04520 BAUD24:   DEC     A               ;C
04530           JR      NZ,CTLCNG
04540           LD      A,BR2400
04550           OUT     (UBAUD),A
04560           JR      OUTRET
04570 CTLCNG:   DEC     A               ;D
04580           JR      NZ,FPAUSE
04590           SET     1,(HL)
04600           JR      OUTRET
04610 FPAUSE:   DEC     A               ;E
04620           JR      NZ,FLUSHI
04630           RES     3,(HL)
04640           JR      OUTRET
04650 FLUSHI:   DEC     A               ;F
04660           JR      NZ,FLUSHO
04670           LD      HL,(IHEAD)
04680           LD      (ITAIL),HL
04690           JR      OUTRET
04700 FLUSHO:   DEC     A               ;G
04710           JR      NZ,BLKCLS
04720           LD      HL,(OHEAD)      ;Flush output buffer
04730           LD      (OTAIL),HL
04740           LD      HL,STATUS
04750           RES     3,(HL)          ;Clear pause bit
04760           JR      OUTRET
04770 BLKCLS:   LD      HL,OPTION       ;HL now points to OPTION
04780           DEC     A               ;H
04790           JR      NZ,UNBCLS
04800           SET     0,(HL)
04810           JR      OUTRET
```

Listing 1 continued

Listing 1 continued

```
04820 UNBCLS:   DEC     A               ;I
04830           JR      NZ,OUTON
04840           RES     0,(HL)
04850           JR      OUTRET
04860 OUTON:    DEC     A               ;J
04870           JR      NZ,OUTOFF
04880           SET     1,(HL)
04890           JR      OUTRET
04900 OUTOFF:   DEC     A               ;K
04910           JR      NZ,CRONLY
04920           RES     1,(HL)
04930           JR      OUTRET
04940 CRONLY:   DEC     A               ;L
04950           JR      NZ,CRLF
04960           SET     3,(HL)
04970           JR      OUTRET
04980 CRLF:     DEC     A               ;M
04990           JR      NZ,ENBRNG
05000           RES     3,(HL)
05010           JP      OUTRET
05020 ENBRNG:   DEC     A               ;N
05030           JR      NZ,DISRNG
05040           SET     4,(HL)
05050           JP      OUTRET
05060 DISRNG:   DEC     A               ;O
05070           JR      NZ,ENBCTL
05080           RES     4,(HL)
05090           JP      OUTRET
05100 ENBCTL:   DEC     A               ;P
05110           JR      NZ,DISCTL
05120           SET     5,(HL)
05130           JP      OUTRET
05140 DISCTL:   DEC     A               ;Q
05150           JR      NZ,UPONLY
05160           RES     5,(HL)
05170           JP      OUTRET
05180 UPONLY:   DEC     A               ;R
05190           JR      NZ,UPLOWR
05200           RES     2,(HL)
05210           JP      OUTRET
05220 UPLOWR:   DEC     A               ;S
05230           JR      NZ,DTRON
05240           SET     2,(HL)
05250           JP      OUTRET
05260 DTRON:    LD      HL,RSSTAT       ;HL now equals RSSTAT
05270           DEC     A               ;T
05280           JR      NZ,DTROFF
05290           RES     1,(HL)
05300           RES     0,(HL)
05310           JP      SETURT
05320 DTROFF:   DEC     A               ;U
05330           JR      NZ,WORD7
05340           SET     1,(HL)
05350           SET     0,(HL)
05360           JP      SETURT
05370 WORD7:    DEC     A               ;V
05380           JR      NZ,WORD8
05390           RES     6,(HL)
05400           SET     5,(HL)
05410           JP      SETURT
05420 WORD8:    DEC     A               ;W
05430           JR      NZ,STOP1
05440           SET     6,(HL)
05450           SET     5,(HL)
05460           JP      SETURT
05470 STOP1:    DEC     A               ;X
05480           JR      NZ,STOP2
05490           RES     4,(HL)
05500           JP      SETURT
05510 STOP2:    DEC     A               ;Y
05520           JR      NZ,RESET
05530           SET     4,(HL)
05540           JP      SETURT
05550 RESET:    DEC     A               ;Z
05560           JP      NZ,OUTRET
05570           LD      (OPTION),A      ;Zero out all options
05580           INC     A               ;Load a 01H
```

Listing 1 continued

Listing 1 continued

```
05590           OUT     (URSET),A       ;Uart Reset
05600           LD      (CTLTBL),A
05610           LD      A,21H
05620           LD      (STATUS),A
05630           LD      HL,INPBUF       ;Reset input buffer
05640           LD      (IHEAD),HL
05650           LD      (ITAIL),HL
05660           LD      HL,OUTBUF       ;Reset output buffer
05670           LD      (OHEAD),HL
05680           LD      (OTAIL),HL
05690           LD      A,BR300
05700           OUT     (UBAUD),A
05710           LD      A,0EFH          ;Set uart control to default
05720           LD      HL,RSSTAT
05730           LD      (HL),A
05740           JP      SETURT
05750 INPUT:    LD      HL,(ITAIL)      ;Input character and save in buffer
05760           LD      A,(IHEAD)
05770           CP      L
05780           JR      NZ,INPCAR
05790           LD      A,(IHEAD+1)
05800           CP      H
05810           JR      Z,INPDON
05820 INPCAR:   LD      A,(HL)
05830           INC     L
05840           LD      (ITAIL),HL
05850           CP      A
05860           RET
05870 INPDON:   OR      1
05880           LD      A,0
05890           RET
05900 ;----------CONTROL KEY TABLE-----------------------------
05910 CTLTBL:   DEFB    1               ;01
05920           DEFB    02H             ;02
05930           DEFB    03H             ;03
05940           DEFB    04H             ;04
05950           DEFB    05H             ;05
05960           DEFB    06H             ;06
05970           DEFB    07H             ;07
05980           DEFB    08H             ;08
05990           DEFB    09H             ;09
06000           DEFB    0AH             ;0A
06010           DEFB    0BH             ;0B
06020           DEFB    0CH             ;0C
06030           DEFB    0DH             ;0D
06040           DEFB    0EH             ;0E
06050           DEFB    0FH             ;0F
06060           DEFB    10H             ;10
06070           DEFB    11H             ;11
06080           DEFB    12H             ;12
06090           DEFB    13H             ;13
06100           DEFB    14H             ;14
06110           DEFB    15H             ;15
06120           DEFB    16H             ;16
06130           DEFB    17H             ;17     40 CHARS PER LINE
06140           DEFB    18H             ;18     BACKSPACE AND ERASE
06150           DEFB    19H             ;19     ADVANCE CURSOR
06160           DEFB    1AH             ;1A     CURSOR UP
06170           DEFB    1BH             ;1B     CURSOR DOWN
06180           DEFB    1CH             ;1C     HOME CURSOR  CLS1
06190           DEFB    1DH             ;1D     ERASE LINE/CARRAGE RETURN
06200           DEFB    1EH             ;1E     ERASE LINE
06210           DEFB    1FH             ;1F     CLEAR TO END OF SCREEN CLS2
06220 RSSTAT:   DEFB    0EFH            ;EVEN,8 BIT,1 STOP,NO PARITY
06230 CTLVAL:   DEFB    00H
06240 OPTION:   DEFB    00H
06250 STATUS:   DEFB    20H
06260 COUNTR:   DEFW    DELAY
06270 OHEAD:    DEFW    OUTBUF
06280 OTAIL:    DEFW    OUTBUF
06290 IHEAD:    DEFW    INPBUF
06300 ITAIL:    DEFW    INPBUF
06310 ;
06320           ORG     0F700H
06330 INPBUF:   DEFS    256
06340 OUTBUF:   DEFS    0800H
06350 ;
06360           END     INIT
```

End

Program Listing 2. Sample Basic BBS program.

```
10 CLS:PRINT CHR$(1)"Z"                                                 '*  1587
20 PRINT "Press any key to set system time/date "                        '*  4161
30 FOR A=1 TO 1200:A$=INKEY$:IF A$="" THEN NEXT:GOTO 60                 '*  3285
40 LINE INPUT "Time (HH:MM:SS): ";A$:IF A$<>"" THEN A$="TIME="+A
   $:SYSTEM A$                                                          '*  4607
50 LINE INPUT "Date (MM/DD/YY): ";A$:IF A$<>"" THEN A$="DATE="+A
   $:SYSTEM A$                                                          '*  4556
60 'Set up desired options, hang up for a second, then turn modem back on
                                                                        '*   102
70 PRINT CHR$(1)"Z":FOR A=1 TO 1500:NEXT:PRINT CHR$(1)"HNPT"            '*  3663
80 'Wait for incoming call. Clear screen to avoid burning image on CRT
                                                                        '*   104
90 CLS:LINE INPUT A$:IF A$<>"CONNECT" THEN 90                           '*  2800
100 'Call came in, tell SYSOP. Enable output and send a couple of returns
                                                                        '*   145
110 PRINT "NOTICE TO SYSOP - INCOMING CALL!":SOUND 7,0                  '*  3450
120 PRINT CHR$(1)"J":PRINT:FOR A=1 TO 1500:NEXT:PRINT                   '*  3345
130 PRINT,"Welcome to InfoNet":PRINT                                    '*  2842
140 LINE INPUT "Can your terminal handle lower-case (Y/N)? ";A$          '*  4946
150 IF A$="NO CARRIER" THEN 70                                          '*  1766
160 IF INSTR("YESyes",A$)=0 THEN 180                                    '*  2259
170 PRINT CHR$(1)"S"                                                    '*  1151
180 'Test caller's terminal for needing line-feed with carriage return, by
                                                                        '*   153
190 ' sending two asterisks separated by carriage return. If the caller only
                                                                        '*   154
200 ' sees one of them, his terminal did not line-feed and must be sent one.
                                                                        '*   146
210 PRINT CHR$(1)"L":PRINT "*":PRINT "*":PRINT CHR$(1)"M"               '*  3352
220 PRINT:LINE INPUT "How many asterisks do you see, 1 or 2? ";A
   $                                                                    '*  4943
230 IF A$="NO CARRIER" THEN 70                                          '*  1765
240 'Terminal already line-feeds and doesn't need them, shut line-feeds off
                                                                        '*   150
250 IF A$="2" THEN PRINT CHR$(1)"L"                                     '*  1965
260 PRINT "Thank you."                                                  '*  1610
270 PRINT:PRINT "Press control S to pause, any key to continue."        '*  5382
280 PRINT "Press control X to exit InfoNet and disconnect."             '*  5068
290 PRINT "Press control T for the current time."                       '*  4150
300 PRINT "Press <RETURN> to skip past text."                           '*  3568
310 PRINT STRING$(5,13):PRINT STRING$(33,"*");" InfoNet ";STRING
   $(33,"*"):PRINT                                                     '*  4965
320 PRINT "1 - Winning Lottery numbers",,:PRINT "6 - TV Listings
   "                                                                    '*  5002
330 PRINT "2 - News of the day",,:PRINT "7 - Top news story"             '*  4399
340 PRINT "3 - Top 10 Music this week",,:PRINT "8 - Top Movies t
   his week"                                                            '*  5459
350 PRINT "4 - Stock Report",,:PRINT "9 - Weather Forecast"              '*  4410
360 PRINT "5 - Info on InfoNet",,:PRINT "0 - Help"                      '*  3409
370 PRINT:LINE INPUT "Enter your selection (0-9): ";A$:PRINT            '*  4440
380 IF A$="NO CARRIER" THEN 70                                          '*  1771
390 IF A$="^X" THEN PRINT CHR$(1)"G":PRINT "Thank you for callin
   g, ";:GOTO 430                                                       '*  5345
400 IF A$="^T" THEN 450                                                 '*  1283
410 ON INSTR(" 0123456789",A$) GOTO 370,270,500,510,520,530,540,
   550,560,570,580                                                      '*  4122
420 PRINT "Invalid entry, try again. Enter '0' for help.":GOTO 370      '*  3589
430 PRINT "please call again.":FOR A=1 TO 2500:NEXT:GOTO 70             '*  4153
440 'Display the current time in one spot on the screen, wait for any key...
                                                                        '*   152
450 PRINT:PRINT,,                                                       '*  1125
460 IF A$<>TIME$ THEN A$=TIME$:PRINT STRING$(8,8);:PRINT TIME$;         '*  3966
470 B$=INKEY$:IF B$="" THEN 460 ELSE 310                                '*  2264
480 'These are standard text files that can be created with most text editors
                                                                        '*   156
490 ' or the TRSDOS BUILD command ie. "BUILD LOTTERY/TXT"               '*   157
500 SYSTEM "LIST LOTTERY/TXT":GOTO 590                                  '*  2541
510 SYSTEM "LIST DAYNEWS/TXT":GOTO 590                                  '*  2518
520 SYSTEM "LIST TOPMUSIC/TXT":GOTO 590                                 '*  2688
530 SYSTEM "LIST STOCKS/TXT":GOTO 590                                   '*  2452
540 SYSTEM "LIST INFONET/TXT":GOTO 590                                  '*  2513
550 SYSTEM "LIST TVLIST/TXT":GOTO 590                                   '*  2469
560 SYSTEM "LIST TOPNEWS/TXT":GOTO 590                                  '*  2544
570 SYSTEM "LIST MOVIES/TXT":GOTO 590                                   '*  2452
580 SYSTEM "LIST FORECAST/TXT":GOTO 590                                 '*  2585
590 PRINT:PRINT "Press any key for main menu... ";:A$=INPUT$(1):
   GOTO 310                                                             '*  5235
```

End

If the space program had advanced as fast as the computer industry, this might be the view from your office.

And space stations, Martian colonies, and interstellar probes might already be commonplace. Does that sound outlandish? Then bear these facts in mind:

In 1946 ENIAC was the scientific marvel of the day. This computer weighed 30 tons, stood two stories high, covered 15,000 square feet, and cost $486,840.22 in 1946 dollars. Today a $2,000 kneetop portable can add and subtract more than 20 times faster. And, by 1990, the average digital watch will have as much computing power as ENIAC.

The collective brainpower of the computers sold in the next two years will equal that of all the computers sold from the beginning to now. Four years from now it will have doubled again.

It's hard to remember that this is science fact, not fiction. How do people keep pace with change like this? That's where we come in. We're CW Communications, Inc.—the world's largest publisher of computer-related newspapers and magazines.

Every month, over 9,000,000 people read one or more of our publications

Nobody reaches more computer-involved people around the world than we do. And nobody covers as many markets. In the United States we publish three computer/business journals. *Micro Marketworld*, for businesses selling small computers and software. *On Communications*, the monthly publication covering the evolving communications scene. And *Computerworld*, the newsweekly for the computer community, is the largest specialized business publication of any kind in this country.

We also offer seven personal computer publications. *InfoWorld*, the personal computer weekly, is a general interest magazine for all personal computer users.

The other six are monthly magazines that concentrate on specific microcomputer systems. *PC World*, the comprehensive guide to IBM personal computers and compatibles. *inCider*, the Apple II journal. *Macworld*, the Macintosh magazine. *80 Micro*, the magazine for TRS-80 users. *HOT CoCo*, the magazine for TRS-80 Color Computer and MC-10 users. And *RUN*, the Commodore 64 & VIC-20 magazine.

And we have similar publications in every major computer market in the world. Our network of more than 55 periodicals serves 25 countries. Argentina, Australia, Brazil, Canada, Chile, Denmark, Finland, France, Greece, India, Italy, Japan, Korea, Mexico, The Netherlands, Norway, People's Republic of China, Saudi Arabia, Southeast Asia, South Africa, Spain, Sweden, United Kingdom, United States, and West Germany.

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MS-DOS

The Natural Sound

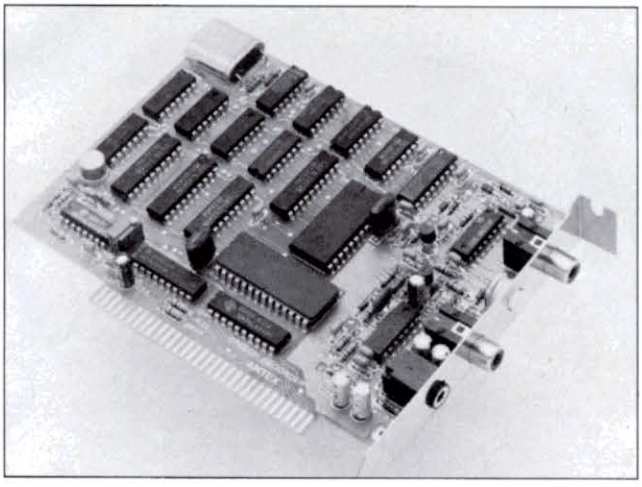
The solid-state Model VP600 Voice Processor encodes sound digitally and records it on computer disk for superior fidelity and random playback. The single-channel unit is a half-size board, and its accompanying menu-driven software lets you select the sequences for playback in whatever order you want.

The board adjusts standard Electret microphone levels or 1 VRMS cassette levels for analog-to-digital conversion and adaptive differential pulse-code modulation digital encoding, which it then feeds through a buffer, memory, and a second buffer to the bus for disk storage. The Voice Processor reverses the process for playback and feeds the digital code to a digital-to-analog converter.

The 20-Hz to 3.5-kHz unit has a dynamic range of 48 dB and sampling rates of 4 or 8 kHz. One hour of recording at the 4-kHz sampling rate requires 7.2 megabytes (MB) of disk space. Eighty minutes requires 10MB.

The Voice Processor sells for $345 from Antex Electronics Corp., 16100 South Figueroa St., Gardena, CA 90248, 213-532-30992.

Circle 558 on Reader Service card.



The Voice Processor digitally encodes sound and records it on computer disk.

CAD Class

New Riders Publishing has introduced three books to help you learn to use the Autocad drafting and design program. The updated edition of *Inside Autocad*, by D. Raker and H. Rice, teaches you how to use the program's more powerful features. New chapters cover advanced editing and three-dimensional drawing. The 320-page *Inside Autocad* is spiral-bound, contains over 325 illustrations, and sells for $34.95.

Mark Merickel's *Stepping into CAD* is a curriculum workbook for use as a companion to *Inside Autocad*. It offers students and teachers a step-by-step approach to computer-aided design. This illustrated, 265-page book is spiral-bound and sells for $24.95.

Martha Lubow's *Working Out with Autocad* is also a companion workbook to *Inside Autocad*. It was written to give the professional CAD user an understanding of CAD drawing strategies and increase his or her operational efficiency. *Working Out with Autocad* is spiral-bound and contains 300 illustrations and 280 pages and sells for $27.95.

Contact New Riders Publishing, P.O. Box 4846, Thousand Oaks, CA 91360, 818-991-5392.

Circle 557 on Reader Service card.

Desktop Publishing

The Cybertype Typesetting System offers advanced text manipulation and printing abilities for desktop publishing systems. The program operates from within Microsoft Word to provide sophisticated text-processing functions that let you integrate different typefaces and styles and lay out page formats. Features include multicolumn formatting, proportionally spaced text, centered columns, automatic spelling check, automatic hyphenation, index and table-of-contents extraction, and storing complex formats for future use.

Cybertype uses any of the fonts available for Postscript printers and typesetters and offers many variations of each font. It also prints on Linotronic typesetters with up to 2,540 dots per square inch for true typeset quality. The program can print all graphics and text in any gray level, including white on black (or shaded), and it can scale all text and graphics to print them at any resolution.

The three Cybermerge software packages integrate graphics or halftone images from other software into documents prepared with Cybertype. Cybermerge-Targa uses 512- by 400-pixel images with 256 gray levels captured with a video camera or extracted from other video sources with the AT&T Targa system. Cybermerge-Scanner does the same with images up to 3,300 by 5,100 pixels captured with Datacopy scanners. Cybermerge-HIP inserts graphics from other software into Cybertype text. It translates graphics from any software that drives the Houston Instruments Plotters.

Cybermerge lets you insert up to 10 halftone images and 10 graphic drawings of any size, shape, or rotation on each page of a Cybertype document. You can adjust the contrast, brightness, and number of dots per inch and scale the horizontal and vertical axes to produce pictures of any size or aspect ratio.

The Cybertype and Cybermerge packages are $495 each. Cybertype requires an IBM PC/XT/AT (or total compatible) with 384K, DOS 2.0 or higher, a Hercules (or compatible) monochrome graphics adapter, at least two floppy drives, and a Postscript-compatible laser printer or typesetter.

Contact Cyber Research Inc., 5 Science Park Center, P.O. Box 9565, New Haven, CT 06536, 203-786-5151.

Circle 553 on Reader Service card.

Printer Enhancement

AMTwindows is a device driver that translates all text and graphics output from Microsoft Windows software applications into the AMT Office Printer's native text and graphics languages.

AMTwindows provides near-letter-quality, letter-, and draft-quality text; font flexibility; and black-and-white and full-color graphics at resolutions from 60 by 60 to 240 by 240 dots per inch. The driver supports all Windows text attributes, graphic modes, fonts, colors, linesm, fills, and patterns. It's available for $15 from Advanced Matrix Technology Inc., 1157 Tourmaline Drive, Newbury Park, CA 91320, 805-499-8741.

Circle 550 on Reader Service card.

Menumate Update

Menumate generates source code for use with Dbase III Plus or the Clipper compiler. You can choose from a full range of colors and specify whether you want menus consisting of boxed menu choices or Sidekick-style menus.

Enhancements to the newest version, 3.0, let you pop menus onto the screen and add password protection to any menu. It comes with the assembly object modules for flipping video pages, saving and restoring screens in RAM memory, and hiding the cursor. The documentation includes examples of each function.

Menumate requires 384K and sells for $39. There are no application royalty charges or copy-protection schemes. A free demonstration version is available; it is identical to the production version, but it will not write any new code to disk.

Contact Victory Computer Systems, P.O. Box 62227, Sunnyvale, CA 94088, 408-730-0384.

Circle 561 on Reader Service card.

Time Keeper

Computer Communications Specialists' (CCS) Time and Attendance System is a programmable time clock with menu-driven software.

The software lets your computer collect all employee time-clock transactions and, at the end of the pay period, automatically analyze and summarize each employee's record. This creates an accurate audit trail for each employee's time spent on the job, and the records can be reformatted and transmitted directly to a host-resident payroll system.

The CCS Time and Attendance System can generate work schedules based on customer-defined variables. Supervisors can add factors such as vacation eligibility, job premiums, and sick leave. The system monitors work hours and compares them against scheduled hours, charges departmental transfers to the proper departments, and tracks company and union pay policies to make sure they are both met and applied.

The CCS 700 Terminal reads bar-coded badges, which you can print on most graphics/dot-matrix printers. It includes a lithium back-up battery that maintains data for up to five years of discontinued power. A sealed, lead-acid battery lets the CCS 700 operate up to 2½ hours after power loss.

The Time and Attendance System sells for $5,995. Contact Computer Communications Specialists Inc., Peachtree Corners Business Park, 6683 Jimmy Carter Blvd., Norcross, GA 30071, 404-441-3114.

Circle 552 on Reader Service card.

Checks from Lotus

Checks and Balances runs from within Lotus's 1-2-3 to let you pay bills and write checks. It remembers bills you pay regularly and automatically prints the check for you to sign.

Checks and Balances records your checks in a 1-2-3 file and automatically updates them and balances your checkbook. It also organizes your expenses by type and totals tax deductions. You can arrange your own data tables and calculate special information. Personalized checks are also available.

Checks and Balances costs $49.95. Contact Rational Designs, 22704 Ventura Blvd., Suite 500, Woodland Hills CA 91364, 401-683-5886.

Circle 560 on Reader Service card.

Strategy in Space

Star Fleet I is a space-battle simulation in which players begin as rookie cadets in the Star Fleet Officers' Academy and work their way up through the ranks. After graduating from the Academy, players take command of a galactic heavy cruiser and prepare to defend the Alliance. They must rescue captured starbases, capture enemy vessels, lay mine fields, search for intruders, and repair damaged systems.

Star Fleet 1 sells for $49.95 from Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404, 415-571-7991.
Circle 555 on Reader Service card.

Pop Goes The Desk Utility

Pop-Up Desket Plus is a set of RAM-resident productivity utilities that you can call up on your screen any time, even while you're working on another program.

Pop-Up Telecommunications lets you connect to a data service while you're within another application and feed text directly from a service to an application program, then return to the application program and remain logged on.

Pop-Up Word with Address Book and Appointment Scheduler is a full-function word processor that lets you cut and paste within or between applications. It also alerts you to a scheduled appointment.

Datablocks' stackable hardware control blocks connected via the Altair II to PC Link add-on card.

Standard and Financial Calculators provides you with interest, annuity, and statistical calculations that you can print out. It then feeds the results to an application program.

PopDOS and Pop-Anything DOS Utilities lets you run a program while within another.

Pop-Up Calendar displays or prints from one to three months at a time and cycles and lists a total of 200 messages.

Pop-Up Alarm Clock sets alarms and displays messages and automatically starts a designated program at a specific time.

Pop-Up Voice automatically dials phone numbers from your address book.

Pop-Up Desket Plus sells for $129.95 and requires one disk drive and 128K. It consumes from 16K to 183K. The Telecommunications utility requires a Hayes or compatible modem.

Contact Popular Programs Inc., 135 Lake St., Suite 210, Kirkland, WA 98033, 206-822-7065.
Circle 559 on Reader Service card.

Increase Your I/O Ports

The Altair II to PC Link is an add-on card that provides control of real-world devices through Datablocks stackable hardware control blocks. The system adds a single Datablocks PC Expansion Board into the computer and connects to the Altair II Interface Block by cable. You then plug the interface block into other Altair II selected stackable hardware control modules.

A PC Expansion Board supports 256 Altair II input/out-

Circle 534 on Reader Service card.

Circle 485 on Reader Service card.

Circle 434 on Reader Service card.

Circle 152 on Reader Service card.

Public Domain SOFTWARE CATALOG

MONTEZUMA MICRO

1987

WHAT IS PUBLIC DOMAIN SOFTWARE?

Public domain software is defined as programs whose authors have released the copyrights to their work so their programs may enjoy the broadest possible distribution to the public. Another form of "public domain" software is called shareware. Shareware, or "user supported" software, is a form of restricted public domain software. The author hopes many people will use the software and he makes an appeal for them to send a "contribution" to him if they like the program. The cost is usually modest and the author will usually, in return, supply the user with complete documentation and support from that point on.

Public domain software is usually written by those far-sighted individuals who wish to share their discoveries with their fellow computerists without pay. That's right, public domain software is free. We charge for the labor of love that goes into collecting, compiling, maintaining and copying the disks. Public domain software can be copied by anyone and freely exchanged without the fear of being labeled a pirate. That's what the original authors had in mind when they released their copyrights to the software. Some truly beneficial and exciting software has become a virtual standard by being placed in the public domain. You will find software of almost every classification and description listed on the following pages. Some are first class works worthy of distribution in retail stores and yet others may take quite a bit of work just to run without crashing. From simple games to a Small C compiler, such is the lot of public domain software. As the old saying goes, " You pays your money and you takes your chances."

OUR CP/M® and MS-DOS® LIBRARIES

Montezuma's collection of public domain software is made up of programs from the very simple to the very complex that we have found eligible for inclusion in our library. Both CP/M and MS-DOS libraries are offered. The libraries consist of hundreds of disks filled with thousands of programs. These libraries have been compiled from many sources and have been reviewed for the most part by our crack team at our plush offices deep in the heart of our luxurious headquarters. We have removed a lot of programs that exist in other public domain libraries for the sole purpose of increasing the number of disks that are available. For example, our team decided not to include the numerous early versions of modem programs that took up enormous amounts of disk space yet were of no particular value as long as the latest version is available. There are a lot of programs duplicated in the various CP/M and MS-DOS collections and we have pruned our library in an attempt to eliminate duplications and multiple versions of the same program. This was done in an attempt to provide selections based on quality rather than quantity.

THE CP/M LIBRARY

In the beginning there was only one operating system and it was CP/M. Also in the beginning there were only eight inch single density floppy disk drives that had 75 data tracks each with 26 sectors containing 128 bytes of data for a total capacity of 243k. Then somebody figured out that you could stuff more data in the same space using double density and both sides of the diskette. As if the situation wasn't confusing enough, five and one-quarter inch drives were introduced and they slowly choked out their bigger brothers. That was great because the new drives took a lot less space and had lower and simpler power requirements. However, there was a catch. As each manufacturer introduced the new drives to their equipment, they also introduced their own disk format. On one hand it was kind of stupid because it made the interchange of data between different manufacturer's drives almost impossible. On the other hand it allowed people like us to make a little money because we figured out how the disks were constructed and then wrote software to exchange data between the different formats. Still one problem remains. Five and one-quarter inch diskettes don't hold as much as the eight inch diskettes. This makes it necessary to split some disks up into volumes. You will find some disks with 180k of data on volume 1 and 60k on volume 2. You have to get two disks but they aren't full. Somehow seems as though you are getting cheated, doesn't it? So much for being fair.

Now to the point of all this. Our CP/M library consists of hundreds of disks in the Montezuma Micro Single Side 40tk 220K Super Data Format. You must have Montezuma Micro CP/M 2.2 version 2.30 or later in order to read this high capacity disk format. Those of you who already own Montezuma Micro CP/M can obtain the latest version by following the instructions listed in your owners manual. For those who want a copy of the public domain software on a non-standard format please specify the format and add the appropriate handling charge. See the details on the order blank located on the inside back cover.

A catalog disk is available for those of you who wish more detail about the specific contents of each CP/M library disk than is offered in our listing. The catalog disk, number C000, has a complete listing of the contents of each of the CP/M library disks along with the size of each file. Some of the CP/M library disks have the notation LBR (library) or SQ (squeeze) at the end of their descriptions. Disks with these notations require the LU/NULU program or the USQ/NSWEEP programs in order for the files to be read. Many disks contain a .DOC or a README file describing the programs or operation of the programs contained on the disk. Most BASIC programs that require the use of Microsoft BASIC (MBASIC) are usually indicated by a filename ending in .BAS however there are many versions of BASIC, such as CBASIC, and programs running under a different version of BASIC are usually, but not always, marked to inform you of this requirement. If you need MBASIC, and you already own TRSDOS, you can use Monte's BASCON.

TRANSFERRING FILES

A word about moving files between CP/M, TRSDOS 1.3/6.x and MS-DOS 1.0 and later. Montezuma's DBLCROSS software included in Monte's Toolkit enables you to freely move files from any one of these formats to any other. You can strip control codes, add or remove linefeeds or do whatever is appropriate to the job at hand with simple menu options. This can be real handy when you want to convert all your Scripsit® files to either CP/M or MS-DOS format so you can use them on another word-processor without retyping them. It also works the other way enabling you to do whatever you want. The same holds true for many data files particularly between CP/M and MS-DOS. While we have taken most of the mystery and almost all of the pain out of moving files between CP/M - TRSDOS and MS-DOS one little fact remains. YOU CANNOT RUN 8-BIT PROGRAMS ON 16-BIT MACHINES. The same is true in reverse. Programs written to run under CP/M will not work on the IBM PC without special equipment on the IBM. Forget about TRSDOS. Don't confuse running PROGRAMS with moving DATA files. The data can be moved and accessed by a 16-bit version of a similar program. For example you can move your CP/M Wordstar files to MS-DOS and access them using IBM Wordstar with no problem. The same is true for most database data. Just remember the data will transfer but the program will not.

THE MS-DOS LIBRARY

The MS-DOS library consists of many hundreds of disks in double-side 360K format. MS-DOS started out life as version 1.0 with a disk capacity of 320K. Thank goodness someone came to their senses and released version 2.0 which has a 360K capacity. You must have MS-DOS 2.0 or later in order to read this MS-DOS library disk format.

A catalog disk is available for those of you who wish more detail than offered in our listing about the specific contents of each disk. The catalog disk, number M000, has a complete listing of the contents of each of the MS-DOS library disks along with a description of each file.

USING THE SOFTWARE

Follow the instructions in your DOS for listing the contents of the .DOC, READ.ME, etc. files on your screen or printer. For example, to list the contents of the file GOODTIME.DOC type this example from your keyboard. TYPE GOODTIME.DOC and press the return/enter key. If you would like to print the file on your printer, press the Control key and the P key just before you press the return/enter key. The file will list on the screen as well as on your printer.

IN CASE OF TROUBLE

We guarantee the disk we send you to be machine readable. In the event something strange happens and your disk is imperfect please call us and we will remedy the problem straight-away. Please keep in mind that we do not guarantee the software contained on the disk to do anything in particular. We did not write the software and are only distributing it to you. Many times the original author will have his name on the disk and some of these persons do not mind talking to users of their work if you can track them down. We are unable to provide assistance of any kind in locating these people. On the other hand, some of them are quite vocal about not wishing to speak with anyone. In those cases user groups or online databases such as Compuserve or the Source may be able to provide assistance. If you find disk number XXX is a big disappointment to you, please do not ask for a refund or an exchange for another disk as neither is possible. All sales are final and we cannot assume any liability for damage of any kind, direct or consequential arising from the use of disks supplied.

We have made every reasonable effort to ensure these libraries contain only public domain software. In the event your copyrighted software is suspected of being a part of our library please write us with full particulars and we will investigate the matter and remove the software from the library if such action is warranted.

"FREE" FREE SOFTWARE

We always welcome new additions to the CP/M and MS-DOS public domain libraries. We even pay for them, in kind. If you want to place one of your original programs in the public domain just send it to us and enclose a note authorizing its release. We will review it and if it is accepted we will send you a disk of your choice from the same library. Your program should be commented and include the source as well as a .DOC or READ.ME file explaining its operation and purpose.

HOW TO ORDER

Look over the listings of the CP/M and MS-DOS libraries and make your selections. There are two ways to order. Use the handy order blank on the back cover (please make as many copies as you wish) or call us toll-free. We accept American Express, MasterCard and Visa credit cards. We welcome Cashier's Checks, Money Orders and we will ship COD. COD's require cash or a Cashier's Check on delivery. We welcome your personal or company check and we will ship immediately as long as it is bank imprinted, contains your street address (sorry but no PO Boxes or APO/FPO addresses), a telephone number where you can be reached, and your signature exactly agrees with the bank imprint. Otherwise your check will be held three weeks for clearance purposes. ***All sales are made with the understanding that the disks are not returnable or refundable. If you cannot agree to this policy please do not buy from us. We will replace any defective item as long as we are informed by any means within thirty days after receipt of the disk.*** We ship by US Mail, UPS ground, second day air, next day air, Federal Express (billed to customer's account only) or most any way you want. We do not ship COD's via air.

CP/M® PUBLIC DOMAIN LIBRARY

Montezuma Micro SS 220K Super Data Format

Requires Montezuma Micro CP/M version 2.30 or later

- ☐ **C000** CATALOG DISK - DESCRIBES ALL PROGRAMS IN LIBRARY
- ☐ **C001** The original ADVENTURE game. Vol. 1 of 2 Database files
- ☐ **C002** The original ADVENTURE game. Vol. 2 of 2 FORTRAN source
- ☐ **C003** Overflow from disk #C002
- ☐ **C004** Utilities: Print allocation map; Sorted DIR; Bad block lockout
- ☐ **C005** Overflow from disk #C004
- ☐ **C006** 6502 Simulator system from Dr. Dobbs October 1980
- ☐ **C007** Overflow from disk #C006
- ☐ **C008** Public domain version of the UCSD Pascal interpreter system
- ☐ **C009** Overflow from disk #C008
- ☐ **C010** Utilities: Sorted DIR; File search; Vol. sector diplay/update
- ☐ **C011** Overflow from disk #C010
- ☐ **C012** Assorted BASIC games, may need modification; RESOURCE disassembler
- ☐ **C013** Overflow from disk #C012
- ☐ **C014** An expanded version of the original ADVENTURE game — Data & subroutines
- ☐ **C015** Overflow from disk #C014
- ☐ **C016** Utilities: File encode/decode; Memory test; Sort variable length records
- ☐ **C017** Overflow from disk #C016
- ☐ **C018** The Yale catalog of bright stars: Vol. 1 of 8
- ☐ **C019** Overflow from disk #C018
- ☐ **C020** The Yale catalog of bright stars: Vol. 2 of 8
- ☐ **C021** Overflow from disk #C020
- ☐ **C022** The Yale catalog of bright stars: Vol. 3 of 8
- ☐ **C023** Overflow from disk #C022
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- ☐ **C033** Extensive language analyzer in PL/I with doc & examples
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- ☐ **C035** Original PDP-11 code for DUNGEON Vol. 1 of 3
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- ☐ **C050** RESOURCE disassembler V7.3; Small FORTH; FINDBAD volume flaw utility
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- ☐ **C052** Full screen editor in C — originally developed for H19
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- ☐ **C054** ZCPR V1.6: A Z80 replacement for the CP/M CCP (SQ)
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- ☐ **C056** Benchmarks in C, Fortran, BASIC; Shell sort; CBASIC2 game
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- ☐ **C058** A complete database system in PL/I-80
- ☐ **C059** Overflow from disk #C058
- ☐ **C060** In Context Editor in PL/I-80; Typing Tutor in BASIC (both for ADM-31)
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- ☐ **C062** Remote Bulletin Board System in BASIC and ASM
- ☐ **C063** Overflow from disk #C062
- ☐ **C064** The FED: CBASIC2 program used by Fed Reserve to test money supply policy
- ☐ **C065** Overflow from disk #C064
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- ☐ **C085** ZCPR2: Improved CP/M command processor Vol. 5 of 10
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- ☐ **C089** ZCPR2: Improved CP/M command processor Vol. 7 of 10
- ☐ **C090** Overflow from disk #C089
- ☐ **C091** ZCPR2: Improved CP/M command processor Vol. 8 of 10
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- ☐ **C097** Simple word processor program in ASM with doc & source
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- ☐ **C119** Mini Bulletin Board System in BASIC (SQ) from Australia
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- ☐ **C121** A complete order and inventory system in dBASE II (LBR)
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- ☐ **C123** SIGNON: A system of programs for running an RCP/M bulletin board
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- ☐ **C125** Software Tools of Australia Vol. 17 - Programs in C, BAS, ASM
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- ☐ **C127** California Energy Commission Building Energy Design Analysis Vol. 1 of 2
- ☐ **C128** Overflow from disk #C127
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- ☐ **C131** 68000 Cross Assembler from Dr. Dobbs Journal 6800 Cross Assembler
- ☐ **C132** Overflow from disk #C131
- ☐ **C133** BASIC games extracted from Software Tools of Australia
- ☐ **C134** Overflow from disk #C133
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- ☐ **C155** Regular Expression Compiler (REC) in ASM Vol. 2 of 4
- ☐ **C156** Overflow from disk #C155
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- ☐ **C167** C programs: File archiver; Brace matcher; Calls for Aztec C; More (LBR)
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- ☐ **C169** Utilities: Forth to CP/M screen - file xfer; Synonyms for COM files (LBR)
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- ☐ **C172** Overflow from disk #C171
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- ☐ **C187** ZCPR3: Z80 repl. for CP/M command processor Vol. 9 of 9
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- ☐ **C196** Utilities: FIND files; Squeeze/unsqueeze (SQ)
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- ☐ **C198** A complete property management package using dBASE II Volume 1 of 2
- ☐ **C199** Overflow from disk #C198
- ☐ **C200** A complete property management package using dBASE II Volume 2 of 2
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- ☐ **C202** Utilities for ZCPR3: DIR sort/pack; Vol. zap; File utility; More (SQ)
- ☐ **C203** Overflow from disk #C202
- ☐ **C204** Source code for ZCPR3 utilities (SQ)
- ☐ **C205** Overflow from disk #C204
- ☐ **C206** ZCPR3 macro library for video screen manipulation; Cryptography (LBR)
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- ☐ **C214** Utilities: ERAse improved; NSWP file handler; improved TYPE (LBR)
- ☐ **C215** Overflow from disk #C214
- ☐ **C216** Regular Expression Compiler with floating point (LBR)
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- ☐ **C218** Regular Expression Compiler without floating point (LBR)
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- ☐ **C220** MEX V1.12 modem communications program (SQ)
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- ☐ **C222** Assorted overlays for use in constructing MEX system (SQ)
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- ☐ **C224** Assorted overlays for use in constructing MEX system (SQ)
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- ☐ **M105** Database of Steel Volume 2 of 4: Others on M140 & M141
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- ☐ **M494** Reflex Point, BASIC freedom fighter against evil invaders game.
- ☐ **M495** LIGHTYEAR, designed to assist in optimizing & improving business
- ☐ **M496** Utility assortment of particular use to the hard drive owner.
- ☐ **M497** Three word programs that are a lot of fun.
- ☐ **M498** A great selection of seven games, all time favorites.
- ☐ **M499** Monopoly P.C. (game) & Trivia Tune (plays music, you guess title)
- ☐ **M500** Disk 1 of 2, Trivia Towers, a trivia type game for 2 to 4 people
- ☐ **M501** Disk 2 of 2, Trivia Towers, a trivia type game for 2 to 4 people
- ☐ **M502** Business Bookkeeping program, with documentation.
- ☐ **M503** PRESENT, a slide presentation program for your computer.
- ☐ **M505** Disk 2 of 2, MR. BILL, generates invoices & bills, very flexible
- ☐ **M506** Disk 1 of 3, CPA-LEDGER, accounting software in BASIC.
- ☐ **M507** Disk 2 of 3, CPA-LEDGER, accounting software in BASIC.
- ☐ **M508** Disk 3 of 3, CPA-LEDGER, accounting software in BASIC.
- ☐ **M509** FAMILY TIES, a genealogy program for organizing your roots.
- ☐ **M510** pBASE, a programable relational database management system.
- ☐ **M511** Disk 1 of 2, CK SYSTEM, a program to track income and expenses.
- ☐ **M512** Disk 2 of 2, CK SYSTEM, a program to track income and expenses.
- ☐ **M513** Farm Management tools in BASIC.
- ☐ **M514** Disk 1 of 2, Agricultural programs for the farmer.
- ☐ **M515** Disk 2 of 2, Agricultural programs for the farmer.
- ☐ **M516** GAMES, a collection of very good arcade type computer games.
- ☐ **M517** Another selection of GAMES for the game addicts out there.
- ☐ **M518** Eight more GAMES for hours of fun and frivioloty
- ☐ **M519** AUTOMENU, easy menu system, & DISK SPOOL, spools ptr. to disk
- ☐ **M520** PACKDISK, NEW YORK ADVENTURE, and MANAGING MONEY WITH IBM PC
- ☐ **M521** ORACLE, for Tarot & I-Ching cards, plus MakeMyDay, time managmnt
- ☐ **M522** HOTBOOT & INSULTS, practical joke prgms., plus PC-DIAL for PC-jr
- ☐ **M523** PC-ART, color drawing prgm., plus HDMII, a DOS shell.
- ☐ **M524** DISK TOOL, file utility prgm., plus LANDING PARTY, adventure game
- ☐ **M525** VCR Base, HOROSCOPE, COMPUTER DATA SECURITY, and JESUS SAYS
- ☐ **M526** PC-MONEY, personal financial prgm., plus Polyglot & Letterfall.
- ☐ **M527** MAX, powerful text editor like EMACS
- ☐ **M528** PC-PROMPT, DOS extension prgm., plus Building Life Cost prgm.
- ☐ **M529** PC-STOCK, stock tracking prgm., plus PC-TICKLE, appointment prgm
- ☐ **M530** PC-TYPE wordprocessor, plus PC-LOG and WAGNER UTILITIES
- ☐ **M531** CAPITAL MASTER Disk 1 of 4: A Business Accounting Evaluation Demo.
- ☐ **M532** CAPITAL MASTER Disk 2 of 4: A Business Accounting Evaluation Demo.
- ☐ **M533** CAPITAL MASTER Disk 3 of 4: A Business Accounting Evaluation Demo.
- ☐ **M534** CAPITAL MASTER Disk 4 of 4: A Business Accounting Evaluation Demo.

NON-STANDARD CP/M DISK FORMATS

SS = Single Side — DS = Double Side — SD = Single Density — DD = Double Density — Add $2 per disk

- ☐ Access Matrix (40T, SS, DD, 171K)
- ☐ Access Matrix (40T, DS, DD, 350K)
- ☐ Acorn (80T, SS, SD, 392K)
- ☐ Adler Textriter Series III (40T, SS, DD, 160K)
- ☐ Altertext Diskreader (40T, SS, DD, 144K)
- ☐ Ampro Little Board (40T, SS, DD, 190K)
- ☐ Ampro Little Board (40T, DS, DD, 390K)
- ☐ AOS/VT Basic 4 S-10 (80T, DS, DD, 626K)
- ☐ Archives Model III (80T, DS, DD, 790K)
- ☐ ATR-8000 512 byte sector (40T, SS, DD, 190K)
- ☐ ATR-8000 1024 byte sector (40T, SS, DD, 190K)
- ☐ Aust. Comp. & Telecomm. (40T, SS, DD, 171K)
- ☐ AVATAR TC1 Terminal Converter (40T, SS, DD, 184K)
- ☐ AVATAR TC1 Terminal Converter (40T, DS, DD, 384K)
- ☐ BMC if800/20 (40T, DS, DD, 384K)
- ☐ California Computer Systems (40T, DS, DD, 332K)
- ☐ Cifer 2683 (40T, DS, DD, 384K)
- ☐ Compustar Model 30 (35T, DS, DD, 340K)
- ☐ Computer Operation NCHQ (40T, SS, SD, 82K)
- ☐ Cromemco Z-2 (40T, SS, SD, 82K)
- ☐ Cromemco Z-2 (40T, SS, DD, 190K)
- ☐ DEC Rainbow 100¢ (80T, SS, DD, 390K)
- ☐ DEC RX50K (80T, SS, DD, 390K)
- ☐ DEC VT-180 (40T, SS, DD, 171K)
- ☐ Digital Research 8" CP/M Standard (77T, SS, SD, 243K)
- ☐ Digital Research 8" CP/M Standard (77T, DS, DD, 988K)
- ☐ Eagle (80T, SS, DD, 195K)
- ☐ Eagle (80T, DS, DD, 790K)
- ☐ ECB Bus (80T, DS, DD, 760K)
- ☐ Epson QX-10 (40T, DS, DD, 380K)
- ☐ Epson QX-10 MF (40T, DS, DD, 280K)
- ☐ Hewlett-Packard HP-125 (40T, DS, DD, 252K)
- ☐ Hewlett-Packard HP-87XM (35T, DS, DD, 244K)
- ☐ Holmes Engineering VID80 (40T, SS, DD, 195K)
- ☐ Hurricane Labs Inc. Compactor I & II (40T, SS, DD, 190K)
- ☐ IBM PC using CP/M 86 (40T, SS, DD, 156K)
- ☐ IBM PC using CP/M 86 (40T, DS, DD, 316K)
- ☐ Intertec Superbrain (35T, SS, DD, 164K)
- ☐ Intertec Superbrain (35T, DS, DD, 340K)
- ☐ Kaypro 2 (40T, SS, DD, 195K)
- ☐ Kaypro 2X, 4, & 10 (40T, DS, DD, 392K)
- ☐ Lifeboat TRS-80 Mod 1 (40T, SS, SD, 72K)
- ☐ LNW Research LNW80 (40T, SS, DD, 166K)
- ☐ Lobo MAX-80 (40T, SS, DD, 166K)
- ☐ Lobo MAX-80 (40T, DS, DD, 346K)
- ☐ Lobo MAX-80 CP/M 3.0 (40T, SS, DD, 185K)
- ☐ Lobo MAX-80 CP/M 3.0 (40T, DS, DD, 384K)
- ☐ Memory Merchant Shuffle Board (40T, SS, DD, 190K)
- ☐ Micro-Abacus (80T, DS, DD, 624K)
- ☐ Monroe OC 8820 (40T, DS, DD, 308K)
- ☐ Monroe OC 8820 (80T, SS, DD, 308K)
- ☐ Morrow Micro Decision (40T, SS, DD, 190K)
- ☐ Morrow Micro Decision MD3 (40T, DS, DD, 390K)
- ☐ NCR Decision Mate V (40T, DS, DD, 308K)
- ☐ NEC PC-8001A (40T, SS, DD, 148K)
- ☐ Octagon 8/16 CP/M-86 (40T, SS, DD, 156K)
- ☐ Octagon 8/16 CP/M-86 (40T, DS, DD, 316K)
- ☐ Omikron Mapper I, Model 1 & 3 (40T, SS, SD, 83K)
- ☐ Omikron Mapper II (40T, SS, DD, 134K)
- ☐ Omikron Mapper III (40T, SS, DD, 190K)
- ☐ Osborne 1 (40T, SS, SD, 90K)
- ☐ Osborne Executive (40T, SS, DD, 185K)
- ☐ Otrona 816A (40T, DS, DD, 364K)
- ☐ Otrona 816A (80T, DS, DD, 774K)
- ☐ Radio Shack TRS-80 Model 4 CP/M Plus (40T, SS, DD, 156K)
- ☐ Sanyo (40T, DS, DD, 312K)
- ☐ Sanyo MBC-1200/1250 (80T, DS, DD, 624K)
- ☐ Sperry UTS-30 (80T, DS, DD, 710K)
- ☐ Tecron TEF System 10 (80T, DS, DD, 790K)
- ☐ Tektronics 4170 CP/M 86 (40T, DS, DD, 316K)
- ☐ Teletek Systemaster (80T, SS, SD, 72K)
- ☐ Teletek Systemaster (40T, SS, DD, 144K)
- ☐ Televideo 802 (40T, DS, DD, 342K)
- ☐ Toshiba T-100 (40T, DS, DD, 256K)
- ☐ Video Genie III (80T, DS, DD, 692K)
- ☐ Visual 1050 (80T, SS, DD, 390K)
- ☐ Xerox 820-1 (40T, SS, SD, 82K)
- ☐ Xerox 820-2 (40T, SS, DD, 157K)
- ☐ XOR S100-4 (40T, SS, DD, 185K)
- ☐ Zenith H89 (40T, SS, SD, 94K)
- ☐ Zenith H89/H90 (40T, SS, DD, 152K)
- ☐ Zenith H90 (80T, DS, DD, 632K)
- ☐ Zenith Z100 (40T, SS, DD, 152K)
- ☐ Zenith Z100 (40T, DS, DD, 312K)
- ☐ Zorba GC200 (40T, DS, DD, 390K)

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output (I/O) ports, and the Link address decoder recognizes up to eight separate expansion cards. This expands the addressable I/O space to let you use Link with other expansion devices without address interference.

The Altair II to PC Link operates with all PC software that allows control of the PC I/O ports. It sells for $187 from Datablocks Inc., P.O. Box 579, Snowhill Road, Glenwood, GA 30428, 912-568-7101.

Circle 554 on Reader Service card.

3½-Inch Floppy Drives

The Manzana MDQ host-powered, external, 3½-inch floppy-disk-drive system lets you tie several different brands of MS-DOS computer together and read and write to most 3½-inch MS-DOS formats. The system gives you access to the new 720K, 3½-inch technology. For computers without an external drive port, Manzana provides a multiplexor adapter card that intercepts the signal and power from the controller drive card and sends it to the MDQ drive.

The MDQ sells for $395 with the multiplexor adapter or $355 without it. Contact Manzana Microsystems Inc., 7334 Hollister Ave., Suite B, Goleta, CA 93117, 805-968-1387.

Circle 556 on Reader Service card.

Real Estate Investment Help

BNA Software, a division of the Bureau of National Affairs, has released version 86.1 of the BNA Real Estate Investment Spreadsheet, which incorporates all related provisions of the Tax Reform Act of 1986. The program can help you decide whether to buy, sell, or hold real estate investments, stocks, bonds, and small businesses. It can analyze alternative financing arrangements, income streams, or methods of depreciation.

The BNA Real Estate Investment Spreadsheet automatically handles the important new tax calculations such as the passive loss and credit limitations, 27.5-year and 31.5-year depreciation, and the special gains and losses under the alternative minimum tax.

The BNA Real Estate Investment Spreadsheet sells for $595, which includes six months of free updates, toll-free technical assistance, a quarterly newsletter, and a comprehensive manual and tutorial. Contact BNA Software, 2300 M St. NW, Suite 660, Washington, DC 20037, 202-452-4453.

Circle 551 on Reader Service card.

TRS-80

LDOS Upgrade

The LDOS 5.3 Upgrade Kit makes your Model III or 4 (in III mode) more compatible with LS-DOS 6.3. LDOS 5.3 now supports dates through 1999 for time stamping of files and adds 117 on-line help screens for DOS and Basic, a full-screen text editor, and Forms and Setcom commands for changing printer-filter and RS-232-driver parameters. The improved Basic supports an Input@ for screen-fielded input as well as single-line Copy and Move editing operations.

New features also include paged displays for List, DOS commands from LCOMM, directory display of terminate and stay-resident modules for Memory, and a flexible drive-swap facility for System.

The Upgrade Kit comes with a new system disk and documentation of the new features. It sells for $24.95 from Misosys Inc., 1 Tyler Lane, P.O. Box 239, Sterling, VA 22170-0239, 703-450-4181.

Circle 563 on Reader Service card.

Two for Education

Gamco Industries Inc. has released two programs for the Model III and 4 that should help in the classroom. Test Generator lets teachers enter up to 500 questions and then use them to design tests. Questions can be fill in the blank, matching, multiple choice, true/false, and short answer/essay. You can enter them according to classifica-

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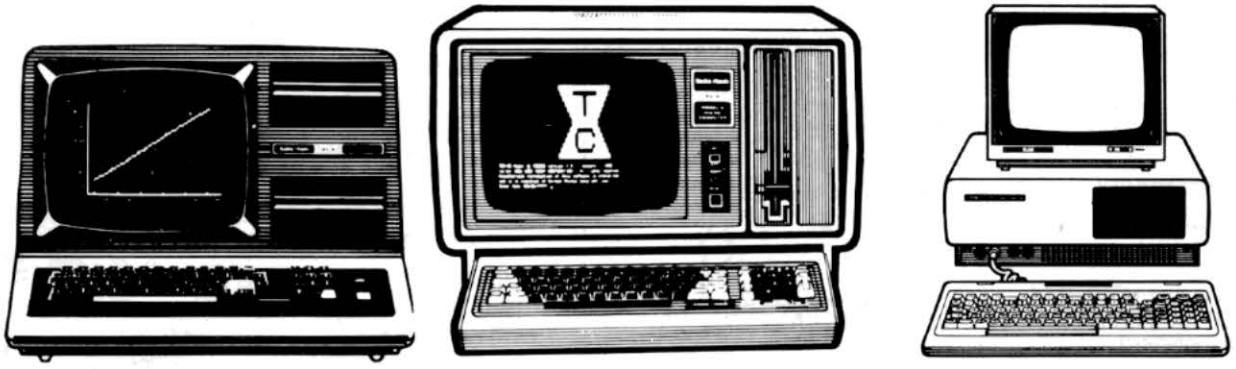

256K MOD 1000 EX 1 DR	529.00	10 MEG HARD DISK	499.00
384K MOD 1000 SX 2 DR	779.00	10 MEG BACK UP	1529.00
512K MOD 3000 HL 1 DR	1139.00	20 + 20 MEG B/U	2339.00
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512K MOD 3000 20 MEG 1 DR	2479.00	35 MEG HD PRIMARY	2049.00
640K MOD 3000 40 MEG 1 DR	2929.00	35 MEG HD SECOND	1829.00
512K MOD 6000 15 MEG 1 DR	2629.00	70 MEG HD PRIMARY	2679.00
24K MOD 102 PORTABLE	369.00	70 MEG HD SECOND	2239.00
24K MOD 200 PORTABLE	599.00	3½ DRIVE MOD 102	149.00
32K MOD 600 PORTABLE	1149.00	3½ DRIVE MOD 1000	225.00
64K MOD 4D 2 DR	839.00	5½ DRIVE MOD 1000	170.00
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tions such as chapter, skill, or subject.

To design a test, you can choose specific questions or ask the computer to randomly select them. You can mix question types and classifications, and you can edit and print tests and questions.

Test Generator sells for $49.95, or $64.95 with back-up disk.

Main Idea Gold Rush is a two-player adventure game that provides drill in determining the main idea of a paragraph. It simulates a journey west during the Gold Rush; players move by correctly identifying the main idea of a paragraph they are given to read. The first player to reach San Francisco wins.

The program also includes a student-management system that records student names, raw scores, and the percentage correct. The system holds up to 200 student files in alphabetical order.

There are two versions of the game: one written at the third- and fourth-grade level, and one for the fifth- and sixth-grades. Either version sells for $39.95, or $54.95 with back-up disk. A class pack or Network III/4 version costs $164.95.

Contact Gamco Industries Inc., Box 1911, Big Spring, TX 79721, 800-351-1404 (in Texas, call 915-267-6327 collect).

Circle 562 on Reader Service card.

The Gobbling Box

The Gobbling Box is a fast-paced pursuit game with sound effects. It plays on the Model I, III, or 4/4P/4D and features two skill levels and three playing screens. You control the action from the keyboard or with an Alpha Products joystick.

The Gobbling Box sells for $14.95 ($2 postage) from Misosys Inc., P.O. Box 239, Sterling, VA 22170-0239, 703-450-4181.

Circle 564 on Reader Service card.

ZXR+ provides bidirectional power protection.

Etc.

ZXR+ Goes Both Ways

The ZXR+ provides surge/spike and noise protection either at the output port from the host computer or multiplexor or at the input port of any RS-232 serial device. Putting a ZXR+ at either end of a data line gives bidirectional protection for the entire line.

The unit uses 11 high-capacity metal-oxide varistors, providing protection for each of the 11 most frequently used data transmission lines (lines 1, 2, 3, 4, 5, 6, 7, 8, 11, 20, and 22). The circuit design also protects the other lines in a 25-pin RS-232 configuration.

The ZXR+ sells for $89 from Sutton Designs Inc., 300 N. Tioga, Ithaca, NY 14850, 607-277-4301.

Circle 568 on Reader Service card.

Word-Processor Translator

R-Doc/X converts document files between different word-processing programs on MS-DOS or CP/M machines. It also translates most print- and format-control codes, so you don't need to touch up the converted document. It translates multiple files in a single operation.

R-Doc-X 3.1 translates between 17 program formats, including Wordperfect, Displaywrite-3, Wordstar, Multi-

Circle 444 on Reader Service card.

Tandy 1000 Memory Card

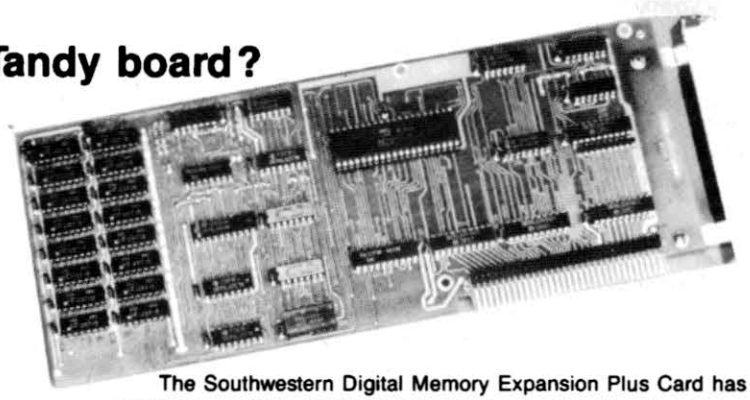
another high quality product from Southwestern Digital

Why spend a bundle on a Tandy board? Our Board is only

$135.

Features:

- 512K of Memory
- DMA
- Expansion Port
- Gold Edge Cards
- Easy Installation
- 30 Day Satisfaction Guarantee Policy



The Southwestern Digital Memory Expansion Plus Card has all the features of the Radio Shack Board but the price; you save almost $400. Features include 512K installed, burned in, and tested to give you a total of 640K, a DMA circut that is fully tested for hard drive operation, and an expansion port that will work with any of the Radio Shack Memory Plus Expansion Card options. High quality manufacturing, and features such as gold plated card edges make this the logical choice in upgrading your memory.

Tandy 1000 Add on Boards Serial, Clock, or Both

The Southwestern Digital new Add-On boards were developed for use with the Plus Card Port, (a piggy-back type, add on port established by Tandy to eliminate the need for an additional card slot). These cards are fully compatible with the Memory Expansion Plus Card from Southwestern Digital and the Memory Expansion Plus Board from Tandy.

RS232C PLUS Option Board

Mounts on a PLUS expansion board, and features selectivity between COM Port 1 and COM Port 2. The RS232C output connector is the standard Tandy female DB25, and is fully compatible with the Tandy output. $85.

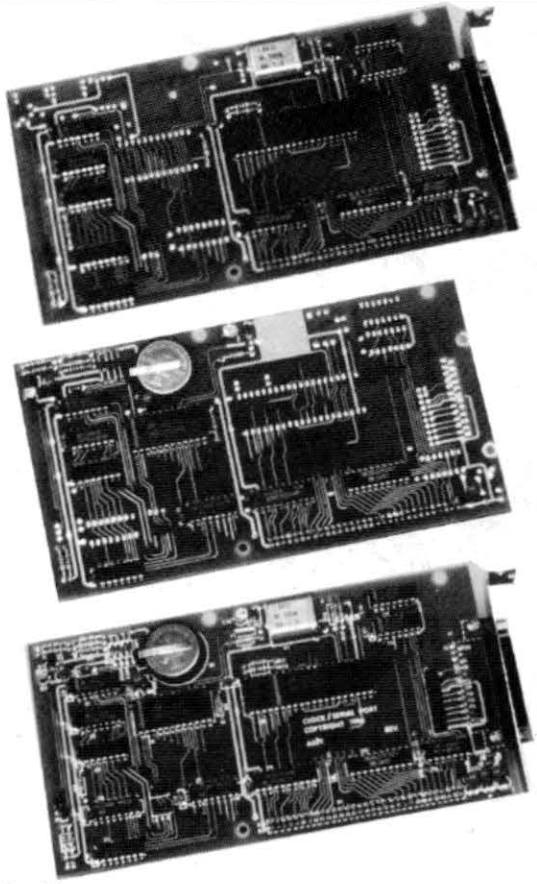
Clock/Calendar PLUS Option Board

Mounts on a Plus expansion board, and features selectivity between two ports so that you can run two clocks at one time. The Clock Calendar Board gives you perpetual time/date so that you don't have to re-input time and date into your application programs as part of your power up routine. $85.

RS232C-Clock/Calendar PLUS Option Board

Features options of both of the above boards on just one board. $170.

Save on the Combination
512K, RS232C-Serial Port, and Clock ..... **$245.**
(Includes RAM DISK and PRINTER SPOOLER)



NEW!

20 Megabyte Tandy 1000 HARD DRIVE ..... **$550.**
(for use with 1 or 2 Disk Drives)

Tandy 1000 Computer System

Tandy 1000 with 640K, RS232 Serial Port, Clock/Calender, and a 20 Meg Hard Drive ..... **$1450.**

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Call us or mail your order in. We accept Visa, Mastercard, and Certified Funds for quickest shipment. Personal checks are held for clearance. Add $5. for ground shipment, or $10 for UPS 2nd day air service. All products carry a 30 day satisfaction guarantee, and are warrantied for a full year.

mate, Microsoft Word, Officewriter, Spellbinder, PFS: Write, Xywrite, Leading Edge WP, Volkswriter Deluxe, IBM Writing Assistant, PC-Write, IBM DCA/RFT, and standard ASCII. This menu-driven program is not copy-protected, and you can run it from a hard disk.

R-Doc/X costs $149, which includes support for all 17 formats. It requires one floppy-disk drive and 128K for MS-DOS machines, or 56K on CP/M.

For more information contact Advanced Computer Innovations, 1227 Goler House, Rochester NY 14620, 716-454-3188.

Circle 565 on Reader Service card.

Ready, Maestro?

The Music Theory Training Tool (MT3) helps beginning and intermediate musicians learn harmonic theory notation. Training can focus on one or all key signatures. During testing, you are given a chord for which you must provide the harmonic notation, or vice versa. The program supports diatonic and chromatic chords.

MT3 is available for the Models I/III/4, Color Computer, Tandy 1000/1200/3000, and CP/M machines. It sells for $49.95.

Chordlord transposes music into any one of the 12 standard keys and presents it in a music language even those who don't read music can follow. All you need to know is the chord positions on your instrument. (You don't need an instrument to use the program.)

Chordlord is designed for harmonic chord progressions that comprise a pattern. You can call each pattern into memory by the title you give it.

You can print a chord chart for the pattern in any of 12 keys, or you can print a Roman-numeral chart according to the rules of traditional harmonic theory.

Chordlord is available for the Models I/III/4, Tandy 1000/1200/3000, and CP/M machines. It sells for $99 (when ordering, specify the machine you are using). For more information on either program, contact The Alternate Source, 704 North Pennsylvania Ave., Lansing, MI 48906, 517-482-8270.

Circle 566 on Reader Service card.

Cleanup Duty

The Networx Head & Screen Maintenance Kit helps you clean your CRT screen and 5¼-inch disk-drive heads. It includes a bottle of head-cleaning fluid, a head-cleaning disk that cleans both single- and double-sided drives, and 10 wet and 10 dry screen-cleaning pads.

The Head & Screen Maintenance Kit sells for $29.95 from Networx, 203 Harrison Place, Brooklyn, NY 11237-1587, 718-821-7555.

Circle 567 on Reader Service card.

The Head & Screen Maintenance Kit lets you clean your CRT screen and disk-drive heads.

NEW PRODUCTS

New Products Index

MS-DOS

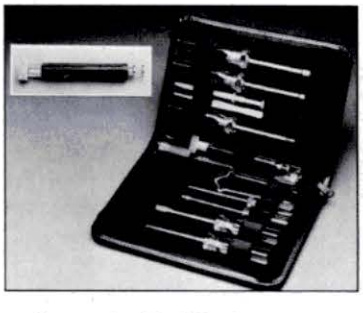
TRS-80

Etc.

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

DIFFERENT TRACK

Tooling Around



Computer Tool Kit features a special chip extractor.

The Computer Tool Kit for upgrades and minor repairs includes two Phillips and two slotted screwdrivers, two nut drivers, one Torx screwdriver, one three-claw parts holder, one chip inserter with pin straightener, and one chip extractor. The tools are demagnetized and come in a zippered, vinyl case.

The kit costs $29.95 from Curtis Manufacturing Co. Inc., 305 Union St., Peterborough, NH 03458, 603-924-3823.

Circle 569 on Reader Service card.

THE CLASSIFIED 80micro

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PERSONAL COMPUTER OWNERS CAN EARN $1000 to $5000 monthly selling simple services performed by their computer. Work at home in spare time. Get free list of 100 best services to offer, Write: A.I.M.A.G., P.O. Box 60369, San Diego, CA 92106-8369.

SOFTWARE

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Between the Lines

"I didn't know that could be done until I started working on it." In the comments I get from readers, that's the sentiment expressed most often. It sums up the spirit of Fine Lines. You are exploring Basic and programming, and discovering often surprising possibilities.

Diverse Solutions

Before I tell you what you taught me this month, let's recap the puzzle for anyone who has joined us since January. I started with line zero, which stated the program's constants

```
0 A$="SEASON'S GREETINGS":Z$=CHR$(13)
```

and line 3, which displayed the program's results:

```
3 PRINT A$;Z$;B;Z$;C$;Z$;D$;Z$;E$;Z$;F$;Z$;G$;Z$;H$;Z$;I$;Z$;J$
```

The output (the variable names are for reference) looked like:

SEASON'S GREETINGS	(A$)
1220	(B)
SEASONSGREETINGS	(C$)
132121141	(D$)
AEGINORST	(E$)
SANG	(F$)
SEA SON TIN	(G$)
SGNITEERGSNOSAES	(H$)
SREEAESTOINNSGGS	(I$)
Season's Greetings	(J$)

The object of the game was to reconstruct the missing lines, 1 and 2, that produced 3's result from zero's beginning.

Once again, you proved that there are as many ways to solve a problem as grains of sand on the beach. Well, maybe I exaggerate a little, but there were more different solutions than I have room to even mention. Bumper stickers are on the way to everyone who, within the rules, sent us a program that did the job.

After you recognized that H$ is C$ backwards, I$ is C$ cut in two and interleaved, E$ and D$ are the letters in A$ and their frequency, respectively, and B is the sum of the ASCII values in C$, you still had to get it all into two lines. Like a cook preparing a meal, you had to do several things at once. You also had to overcome the tendency to do things in alphabetical order.

David Talmage (Denver, CO) and Don Lindsley (Wheaton, IL) sent the fastest and shortest solutions, which took a more direct route to F$ and G$ than I had in mind. Good for them! Charlie Boswell (Farmers Branch, TX) poked data for D$ and E$ into Model I video memory, which gave me something interesting to watch. On a CoCo, Richard McCray (Huntington Beach, CA) showed me that, when turning a single-digit value into a string, HEX$, unlike STR$, doesn't have a leading space to get rid of. Clever!

You showed me two general ways to get F$ and G$. In Program Listing 1, Gordon Drews (Stoneville, NC) used a digital approach—the tack I favored. He built the strings by formulating progressions 1, 3, 6, 10. . .(applied to A$) and 1, 4, 12. . .(applied to C$). Julius Nadas (Chicago, IL) went analog in Program Listing 2.

I was surprised to learn that F$ "contains the first letter and every letter that precedes a subsequent occurrence of the first letter," and that G$ contains "the first three letters and every subsequent group of three adjacent letters whose first letter is at least as great as the first letter of the previous group." I'm impressed.

To look at either solution more closely, expand them over more than two lines (which you must do anyhow to type line 2 into a Model 4). Replace the MOD functions if you have to.

Weather Report

As I write this, I'm looking at 4 feet of snow on the ground. From my front window, I can't see the road that goes by my house any more. The thermometer outside the kitchen window reads 4 degrees below Fahrenheit's zero.

These days every TV meteorologist boasts a computer, and there are many interesting possibilities for weather-related programs.

Calculating the wind-chill factor comes to mind for obvious reasons. I also remember, from when I lived in balmier climes, a way to predict moisture and salt loss from heat and humidity. On the coasts, weather reports always mention the tides, which are related to the Moon's rising and setting. Every weatherperson seems compelled to note the times of sunrise and sunset for those of us who live too fast and loose to appreciate them.

That ought be enough to get you thinking. Keep your programs to two lines of Basic so I can fit the winners on a T-shirt. Meanwhile, I'll load up the woodstove and wait for spring.

The Rules:

1. Write your solution(s) in any TRS or Tandy Basic, except Pocket Computer Basic.
2. This month's entries must reach us by April 15, 1987. This doesn't give everyone the same amount of time, we know, and we apologize to our overseas readers especially.
3. This month's winners will appear in the July 1987 issue.
4. Employees of CW Communications are not eligible.
5. Send your entry to: *80 Micro*, Fine Lines, 80 Elm St., Peterborough, NH 03458. We cannot return entries.
6. Specify your T-shirt size. Bumper size not required.■

Harry Bee is a free-lance writer, puzzle creator, programmer, and dreamer. Contact him at P.O. Box 567, Cornish, ME 04020.

Program Listing 1. Gordon Drews' digital solution for the Model 4.

```
1 DIM N(26),I$(22):L=32:A=LEN(A$):FOR K=1 TO A:X=ASC(MID$(A$,K,1)):P=-(X>64 AND
X<91):R=-(L=32):J$=J$+CHR$(X+32*(P AND NOT R)):L=X:C=C+P:B=B+X*P:C$=C$+STRING$(P
,X):H$=STRING$(P,X)+H$:T=P*( X-64):N(T)=N(T)+1:V=K*(K+1)/2:W=-(V<15):F$=F$+MID$(
A$,V,W):NEXT
2 FOR K=1 TO C:I$(((2*K-3)MOD(C-1))+2)=MID$(C$,K,1):D#=K*2^(K-1):E=D#-(INT(D#/C)
)*C:G$=G$+MID$(C$,-E*(E>0)-(E<=0),-3*(E<>0))+" ":NEXT:FOR K=1 TO 26:U=-(N(K)>0):
D$=D$+STRING$(U,RIGHT$(STR$(N(K)),1)):E$=E$+STRING$(U,64+K):NEXT:FOR K=1 TO A:I$
=I$+I$(K):NEXT
```

Program Listing 2. Julius Nadas's analog Model 4/1000 solution.

```
1 DEFINT A-Z:DIM D(255):FOR N=1 TO LEN(A$):X$=MID$(A$,N,1):X=ASC(X$):IF X<65 THE
N J$=J$+X$:J=(1+(X=32))*32 ELSE B=B+X:C$=C$+X$:J$=J$+CHR$(X OR J):J=32:H$=X$+H$:
D(X)=D(X)+1:IF X>=Y AND MID$(A$,N+1,1)<>" " THEN G$=G$+MID$(A$,N,3)+" ":Y=X
2 NEXT N:FOR N=65 TO 90:D$=D$+LEFT$(CHR$(D(N)+48),D(N)):E$=E$+LEFT$(CHR$(N),D(N)
):NEXT N:C=LEN(C$):X=ASC(C$):F$=CHR$(X):FOR N=1 TO C:I$=I$+MID$(C$,INT((N+1)/2)+
C*(1-(N MOD 2))/2,1):F$=F$+MID$(C$,N,-(ASC(MID$(C$+" ",N+1))=X)):NEXT N
```

End

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