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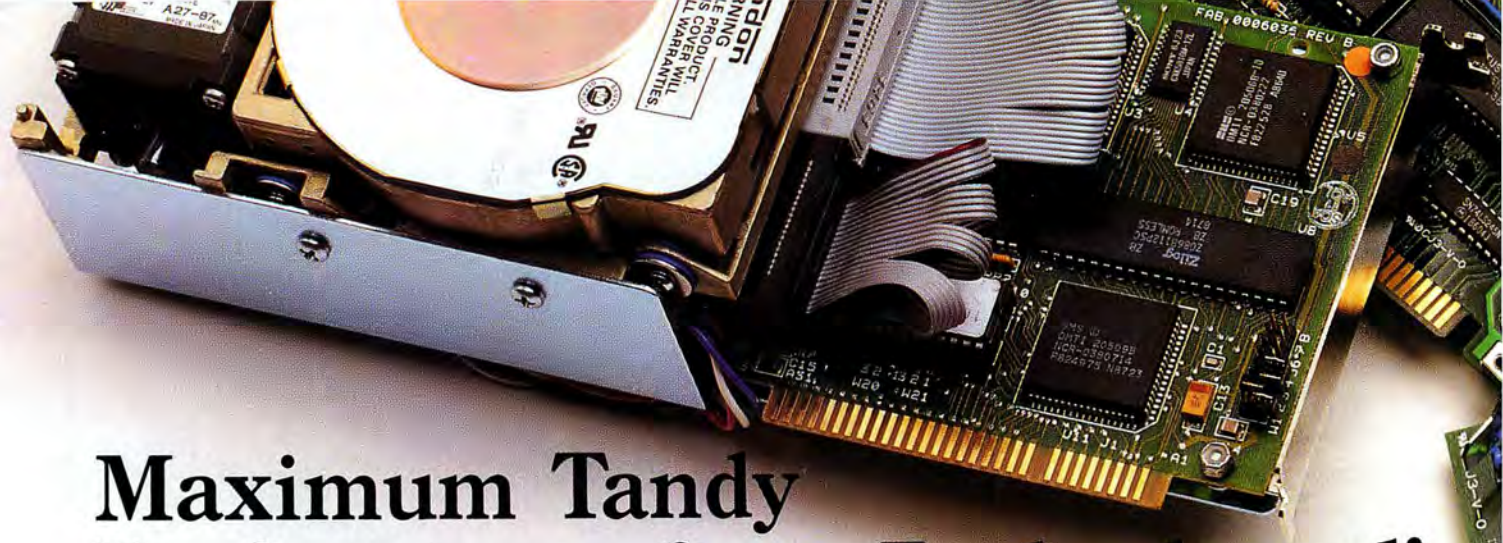

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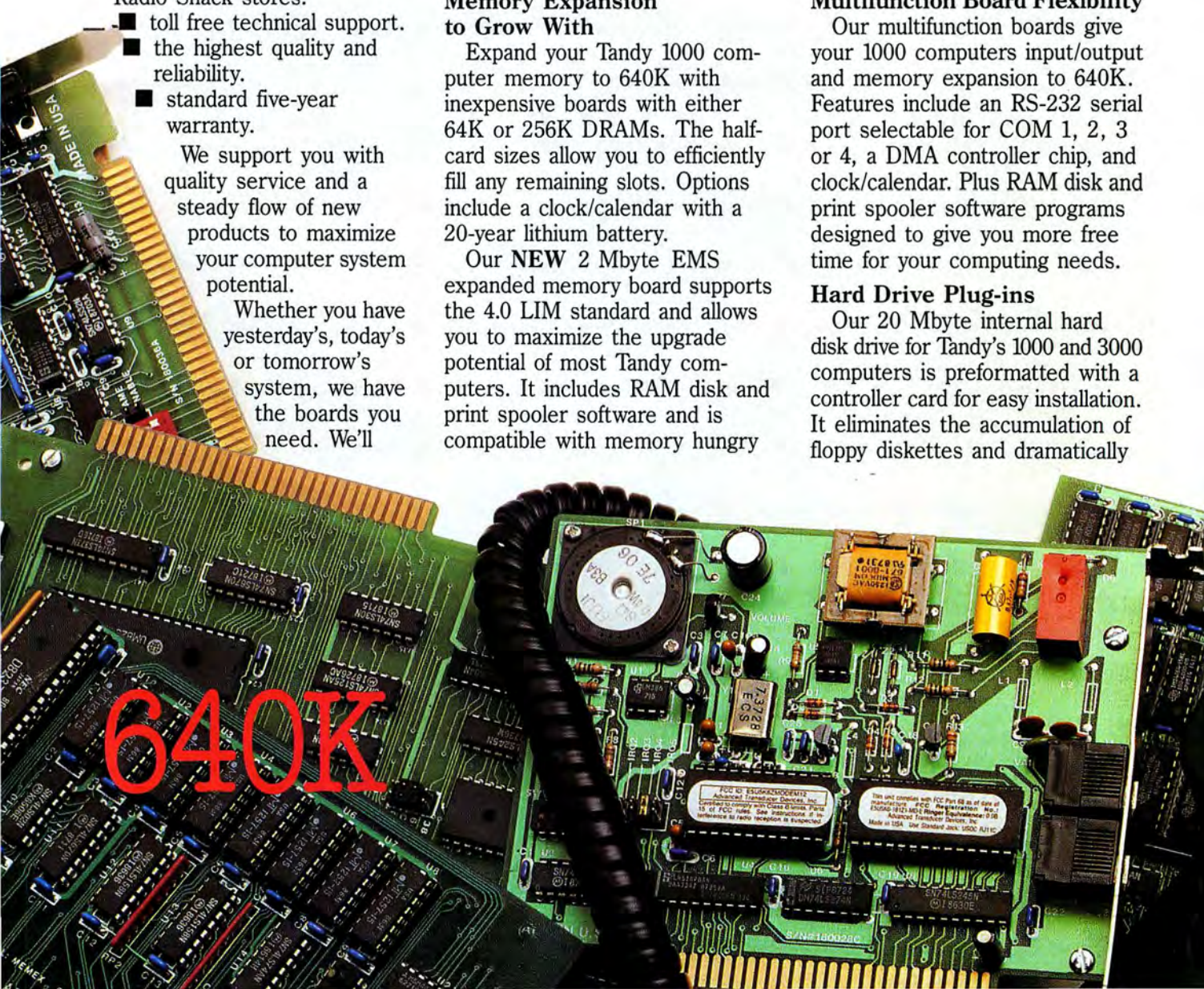

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decreases loading time on larger files. The drive is completely assembled, requires no preventative maintenance, and has low power consumption.

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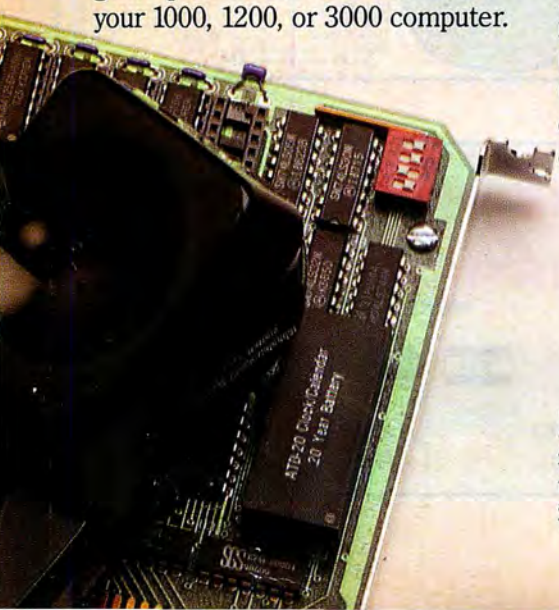

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Your Tandy 1000 can sound like a piano. Read Hardin Brothers' The Next Step column on page 91 to find out how.
Photography by Larry Dunn

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Are 90 Days Enough?

■ by Michael E. Nadeau ■

In case you haven't noticed, computer warranties are getting longer these days. Vendors of PC-compatible systems have found that it pays to build reliable systems, thus reducing after-sale support problems. A one- or two-year computer warranty, versus the once-usual 90 days, is now common as a result.

Tandy, however, still sells its MS-DOS systems with a 90-day warranty. The company reasons that if a computer is going to fail, it will do so within a short period of time. Tandy is also proud of its in-plant quality control, which it feels makes a longer warranty unnecessary.

In a perfect world, I would buy that argument. It's true that Tandy's computers, as well as any other well-made piece of electronics equipment, will show any production flaws early. Looking at it this way, a short warranty would indicate a quality product. In reality, a warranty is seen as a measure of a company's commitment to customer support.

Lee Iacocca understands this. Chrysler Corp. cars come with a seven-year warranty—the longest in the business. Does this mean that Plymouths are better made than Fords? I doubt it. It's more likely that Chrysler is more serious about creating a pro-customer image than its competitors.

Customer support is a big part of Tandy's message to consumers, citing its retail outlets and phone support as proof. The 90-day warranty weakens this message. It provides ammunition for competitors. If I were selling Epsons or Zeniths, I'd certainly use Tandy's warranty to place doubt about its computers in my customers' minds.

The short warranty also reinforces any preconceived notion of Tandy having a schlock image. Customers not yet comfortable with buying a computer at the Shack will look for reasons to stay away. And it happens that these leery customers tend to be the ones Tandy most wants to court—mid- to large-sized businesses.

Ninety days are enough for inexpensive electronics equipment: stereos, VCRs, clock radios, and even low-end computers. But people are starting to expect longer terms for computers bought for business. Perhaps just as important, the computer press expects the same.

Infoworld, a weekly news tabloid about the computer industry, recently compared 27 80386-based computers, including the Tandy 4000. The reviewer rated the 4000 poor on customer support due entirely, it seems, to its 90-day warranty. Only two other systems—the AT&T 6386 and the Generic PC (talk about a no-name clone)—had the same warranty.

Whether or not this rating was fair, or for that matter, whether or not it's fair to judge a computer on its warranty, is not the point. Computer buyers and computer reviewers think that it is fair. Perception is reality in this case, and Tandy should take notice before any long-term damage is done.

The Home Computerist

Last month and this, my other column, The Home Computerist, did not appear in *80 Micro*. Taking on the duties of editor in chief has limited the time I have to write it, and other factors have led me to suspend the column for a while.

A number of you have written to say that you enjoy the column, and I hope to continue it soon. I am looking to change its focus to include home office and small business topics, as well as technical advice and product evaluations.

I'd like to know your thoughts on this. So please drop me a note.

A New Model I/III/4 Publication

I just got a call from Stan Slater, who says he is starting a TRS-80 newsletter to begin publication in late December 1987 or early January 1988. It's called *Computer News 80*. Stan says that it will have a user or application rather than programmer orientation, and its primary focus will be on the Model 4.

Computer News 80 will carry no advertising. It costs $18 for a year's subscription (12 issues) or $2 for a sample copy. The address and phone number are P.O. Box 680, Casper WY 82602, 307-265-6483.

Reader Survey

A couple of months ago, we mailed questionnaires to 1,000 of our subscribers. We almost have the responses—over 500 of them—tabulated. Next month, I'll tell you what you told us, but for now, I can give you some interesting preliminary results.

The popularity of several topics surprised us. For instance, interest in desktop publishing, telecommunications, and games is running quite high. On the other hand, there appears to be less interest than we anticipated in Pascal and Basic tutorials and reviews of video boards, monitors, and books.

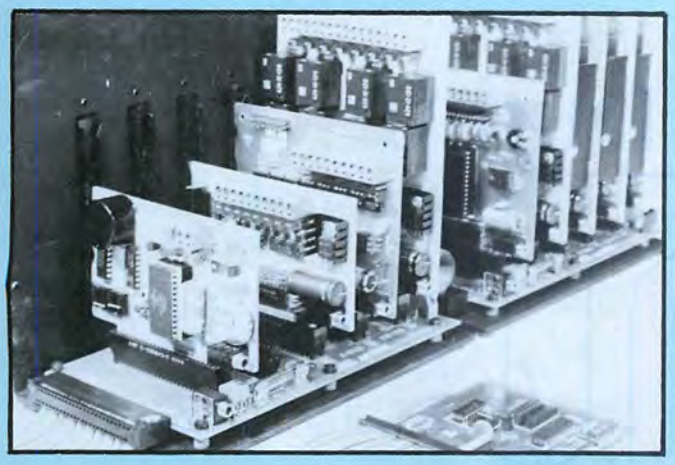
About half of you own more than one computer, and most of you use them at home for business and personal use. And hard drives and multifunction boards are the items respondents most wanted reviewed.

As I said, next month I'll provide more results and give you some final numbers to go along with them. ■

Photograph by Jane Billings

The Amazing A-BUS

NEW



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

Plug into the future

With the A-BUS you can plug your PC (IBM, Apple, TRS-80) into a future of exciting new applications in the fields of control, monitoring, automation, sensing, robotics, etc.

Alpha's modular A-BUS offers a proven method to build your "custom" system today. Tomorrow, when you are ready to take another step, you will be able to add more functions. This is ideal for first time experimenting and teaching.

A-BUS control can be entirely done in simple BASIC or Pascal, and no knowledge of electronics is required!

An A-BUS system consists of the A-BUS adapter plugged into your computer and a cable to connect the Adapter to 1 or 2 A-BUS cards. The same cable will also fit an A-BUS Motherboard for expansion up to 25 cards in any combination.

The A-BUS is backed by Alpha's continuing support (our 11th year, 50000 customers in over 60 countries).

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, 2¼" dia, ¼" shaft, 7.5°/step, 4 phase bidirectional, 300 step/sec, 12V, 36 ohm, bipolar, 5 oz-in torque, same as Airpax K82701-P2.

Current Developments

Intelligent Voice Synthesizer, 14 Bit Analog to Digital converter, 4 Channel Digital to Analog converter, Counter Timer, Voice Recognition.

A-BUS Adapters for:

IBM PC, XT, AT and compatibles. Uses one short slot.	AR-133...$69
Tandy 1000, 1000 EX & SX, 1200, 3000. Uses one short slot.	AR-133...$69
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 3,4,4D. Fits 50 pin bus. (With hard disk, use Y-cable).	AR-132...$49
TRS-80 Model 4P. 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 ROM 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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Cluster Dump

AVOIDING THE LONG AND WINDING ROAD

Q. I'm trying to write a Turbo Pascal program to dump out the cluster chain used by a file. The target system is a Tandy 1000 HD running under MS-DOS 2.11.22. How can I determine the starting cluster of a file, given a path specification, without performing a long and complex search of the root directory and subdirectories? I'm sure this information is kept in memory after a file is opened, but I don't know where to go or how to get there. —*Michael L. Sturgill, Flatwoods, KY*

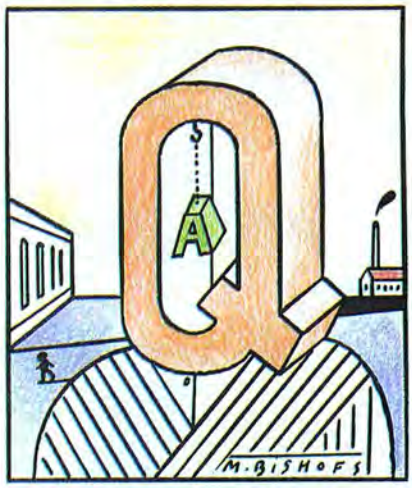
A. I must caution that delving into the disk structure at this level can be dangerous to the hard disk's health. Assuming you have a current backup of your hard disk, the easiest way to access a file's starting cluster is to use a standard MS-DOS function call and read the information from the file's control block (FCB) structure using undocumented locations in the FCB.

You should know the areas of Turbo Pascal that use basic input/output system (BIOS) interrupt and MS-DOS function calls. *The Tandy 1000 MS-DOS Programmer's Reference Manual* will help you understand the function references.

Starting with a complete path name for a file, separate the directory names from the file's actual name and extension by using the Turbo Pascal CHDIR procedure. Change into the directory indicated by the path name. Next, separate the file's name and extension and store them in your working FCB. These fields must be left-justified, and the empty area must be filled with blanks. You will need this structure and another identical one located at the current disk transfer address (DTA), which is set using MS-DOS function 26 (1A hexadecimal [hex]).

The first FCB is used as a search argument to MS-DOS function 17 (11 hex) named "Search for first entry." This function searches the current directory for the first file that matches the search argument, which is contained in the FCB, consisting of the name and extension fields. Either field can contain "?" wild-card characters denoting a match for any character in that position.

If a matching entry is located in the directory, DOS creates an unopened FCB at the address specified for the DTA containing the information pertinent to the



file. The FCB structure created by DOS at the DTA is described in Program Listing 1 by the Turbo Pascal record description with appropriate comments.

The procedure in Program Listing 2 will tell DOS to create such a structure in memory at the DTA. The parameter Fileblock must point to a properly constructed FCB. Findfirstfile returns zero if a matching file was located and non-zero if a match wasn't found in the current directory. DOS returns the actual attribute value for the file, file date and time, starting cluster, and the file's size in bytes that you can use with references to data in a Pascal record structure. (Thanks to John Harrell for the above information.)

NAME THAT CHIP

Q. I have several questions about my Tandy 1000A, which came with an NEC CPU (I assume it's a V20):

- How can I find out which CPU (central processing unit) it is? I think it's a 5-megahertz (MHz) model. The chip is labeled NEC JAPAN D8088D 8433KX.
- Will an 8 or 10MHz model work—and if so, how much improvement in speed can I expect?
- The unit has an 8087 math-chip socket. Should I use a regular 8087, or can I use an 8087-1 or an 8087-2? Also, should the speed of the CPU chip and the math chip be the same?
- Drive B is quiet, but drive A is noisy, and I find the sound annoying. Because I use drive A more often than drive B, I tried switching the two, but the system still reverted to drive A to boot. What can I do?—*Mark A. Danner, Sherman, TX*

A. Your chip is a V20; the speed of your 1000A is 4.77MHz. Its speed is determined by the clock chip, not the CPU. To speed up the computer, replace the clock chip with a board such as the PC Sprint 1000A from Exec-PC Inc., P.O. Box 11268, Shorewood, WI 53211, 414-964-5160 (see review, January 1988, p. 24). The PC Sprint board will speed up your computer to 7.16 or 9.54MHz.

The speed of your computer should determine the speed of the 8087 chip you buy; the chip speed should be equal to or greater than the speed of the computer. The speed of the chip is the highest speed at which the chip is tested to run. It will run at the speed of the computer clock.

In regard to changing your drives, it seems that you just physically changed the location of drives A and B. To change the drives, you must inform the computer of the change by switching cables and changing jumpers and the drive-select line. See *The Technical Reference Manual* (Radio Shack catalog no. 26-1504) for the necessary changes.

I would be nervous having one drive much noisier than the other. I suggest you have the noisy drive checked.

HIGH-PERFORMANCE MATH

Q. I often see computers advertised offering 8087 math coprocessors. What do these processors do? Are they necessary? If so, under what circumstances?—*Arvin Blankers, Lynden, WA*

A. The 8087 math coprocessor, in combination with the CPU, provides high-performance numeric computing by improving accuracy and speed. The 8087 adds 68 numeric processing instructions for extended precision integer, floating point, trigonometric, logarithmic, and exponential functions.

It also adds eight 80-bit registers. It can control rounding as well as underflow and overflow errors in calculations, process up to 18 digits of binary coded decimal (BCD) without rounding errors, and do arithmetic on integers up to 64 bits $+/-10^{18}$.

The math coprocessor performs the functions in hardware, making them much faster than the software routines required by general-purpose processors. Combined with a CPU, a math coprocessor performs math-intensive routines up to 100 times faster than a CPU alone.

Illustration by Maris Bishofs

Using its special instructions, you can program the 8087 in ASM-86, PL/M-86, Fortran-86, and Pascal-86. Some commercial programs take advantage of the math coprocessor if it is present; some math-intensive applications require it.

SUPPORT FOR 1000 EX?

Q. I am disappointed with your September issue. I have a Tandy 1000 EX, but your magazine seems to acknowledge only TRSDOS users and those who own Tandy 1000, 1200, and 3000s. There is almost no support for the 1000 EX, either from your magazine or from other sources, including Tandy. I'm sure many users would like to see more Input, Feedback, reviews, and general information about the 1000 EX.

I want to know if you intend to support the 1000 EX in this magazine and if not, where I can find a support network for users. Also, does anyone make a hard drive for the 1000 EX?—*Karen E. Anderson, George AFB, CA*

A. The 1000 EX is part of the Tandy 1000 family. While the various models differ, they are identical when running the kinds of programs we usually feature. When we refer to the "1000," we are referring to the entire family. When exceptions occur, we point out that the article applies only to a particular model. Any feature article, column, or review you read in *80 Micro* applies to the 1000 EX unless that model is specifically excluded.

Hard Drive Specialist, 16208 Hickory Knoll, Houston, TX 77059, 800-231-6671, offers 20-, 30-, 42-, and 60MB (megabyte) external hard drives for the EX. The 20MB sells for $729; the 60MB, for $1,645. The EX requires a memory/DMA (direct memory access) card for use with a hard drive.

CONVERTING WITH TRSCROSS

Q. I am converting a program from my Model III to my 1000 SX. I converted from Disk Basic to GW-Basic with TRSCROSS. The program works well on screen prints but fails on prints to paper. Disk Basic used CMD"Z", "ON" to print to the printer and the screen and CMD"Z", "OFF" to print only to the printer. The closest equivalent I find in GW-Basic is the control-print key combination. Can I program these two keys into the listing?

My next problem concerns the Poke statements used in Disk Basic to keep the first three lines of the screen from scrolling so that you always have column headings to identify the data as it appears on the screen. I haven't been able to find the equivalent in GW-Basic.—*Ernest J. Clot, Bruno, CA*

A. Try GW-Basic's LCopy command, which copies the screen to the printer. Although the command is not documented in early manuals, it works on my versions 2.02 and 3.02. The command syntax is LCOPY.

To prevent scrolling of the first three lines, replace the Poke commands with a View Print command. VIEW PRINT 4 TO 24 will protect the first three lines, limiting all printing to lines 4 through 24.

SEEKING HELP

► William C. Davis Jr. (Box 913, Wellsboro, PA 16901) has two C. Itoh 8510A printers with serial numbers beginning with "AP." When he called C. Itoh, a technical support representative reportedly advised him that the 8510 printers with serial numbers beginning with "AP" cannot be adapted to run IBM graphics. Is there a hardware or software solution for this problem? ■

"The Ultimate Computer Baseball Simulation"

★★★★+ Four Stars Plus
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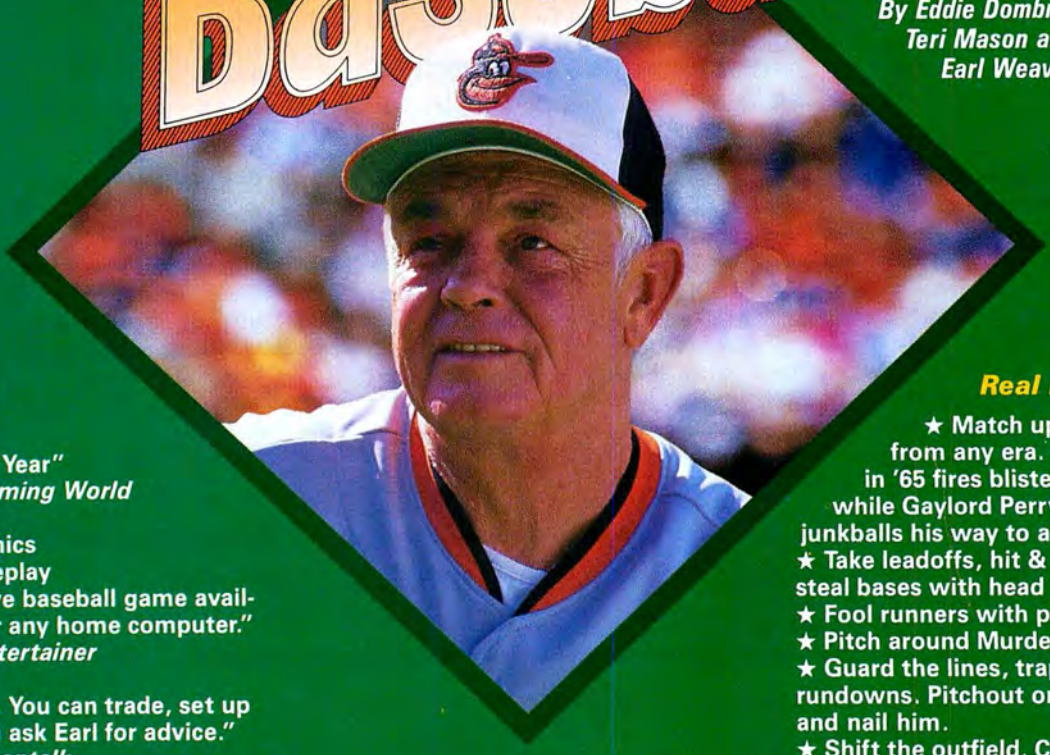

By Eddie Dombrower, Teri Mason and Earl Weaver

The Critics Report . . .

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★ Guard the lines, trap runners in rundowns. Pitchout on Maury Wills and nail him.
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ELECTRONIC ARTS®

Circle 92 on Reader Service card.

Program Listing 1. An FCB structure created by DOS at the disk transfer address (DTA).

```
(*****************************************************************
*  Standard unopened File Control Block type definition.        *
*  DOS returns an unopened File Control Block for the files     *
*  which match the search argument supplied to DirSearchFirst   *
*  ($11) and DirSearchNext ($12). The definition of the FCB     *
*  structure prior to opening it is documented below and can    *
*  not be found in the MS-DOS Programmer's Reference Manual.    *
*  Note that this structure is DIFFERENT from the structure     *
*  of a normal FCB. All references are in hexadecimal.          *
*                                                               *
*    Bytes   Function                                           *
*    -----   ------------------------------------------         *
*    ØØ      Drive number: 1=drive A, 2=drive B. etc.           *
*    Ø1-Ø8   File name, left-justified and padded with blanks   *
*    Ø9-ØB   File extensio, left-justified and padded with      *
*              blanks if necessary.                             *
*    ØC      Actual file attribute.                             *
*    ØD-16   Reserved for system use.                           *
*    17-18   Integer word representing the time of creation or  *
*              last update formatted as follows:                *
*              +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+             *
*              |H|H|H|H|H|M|M|M| |M|M|M|S|S|S|S|S|             *
*              +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+             *
*    19-1A   Integer word representing the date of creation or  *
*              last update formatted as follows:                *
*              +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+             *
*              |Y|Y|Y|Y|Y|Y|Y|M| |M|M|M|D|D|D|D|D|             *
*              +-+-+-+-+-+-+-+-+ +-+-+-+-+-+-+-+-+             *
*    1B-1C   Starting cluster number for the file on the disk.  *
*    1D-2Ø   Long integer value representing the file size in   *
*              bytes, stored with low order word first          *
*****************************************************************)

TYPE
  LongInt = ARRAY[Ø..1] of Integer;
  FileControlBlock =
    RECORD
      Drive              :Byte;
      FileName           :ARRAY[Ø..7] OF Char;
      FileExt            :ARRAY[Ø..2] OF Char;
      Attribute          :Byte;
      Reserved           :ARRAY[13..22] OF Byte;
      FileTime           : Integer;
      FileDate           : Integer;
      StartingCluster    : Integer;
      FileSize           : LongInt;
    END;
```

Program Listing 2. A procedure that tells DOS to create an FCB structure in memory at the DTA.

```
(*****************************************************************
*  FindFirst File searches the CURRENT disk directory for the   *
*  first name that matches the name contained in the FCB. An    *
*  extended file control block can be used with this function   *
*  to search for files which have special attributes.           *
*                                                               *
*   If a file is located, this function constructs an unopened  *
*  FCB in the disk transfer buffer space which can be used to   *
*  access the file and the function returns a zero value.       *
*                                                               *
*  If no matching file is located, the function leaves the      *
*  disk transfer buffer untouched and returns a non-zero value.*
*****************************************************************)

FUNCTION FindFirstFile(VAR FileBlock) : Integer;
BEGIN                              {FindFirstFile}
  WITH Regs DO BEGIN
    AH := DirSearchFirst;          {MS-DOS function Search for First Entry}
    DS := Seg(FileBlock);          {DS:DX points to the search FCB}
    DX := Ofs(FileBlock);
    MsDos(Regs);
    FindFirstFile := AL;           {Set return function value}
  END;
END;                               {FindFirstFile}
```

The Support Security Blanket

CRASH

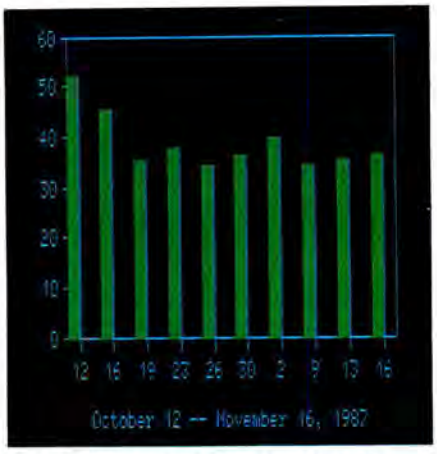
What was everyone so excited about a few months ago? Oh yeah, the stock market crash. Visions of financial Armageddon danced through everyone's heads, and the daily Dow Jones averages were watched as closely as the World Series box scores. Looking back, it's hard to figure out what happened or what the fuss was about. Except for losses taken by people such as retirees about to cash in their stocks, most of the damage was on paper. The crash has had no noticeable effect on the computer industry.

Prices of stocks in computer companies, including Tandy, were affected. Tandy's high last year was 55 in March. On the Friday before the crash, Tandy stock closed at 45½. By the end of trading on Monday, when the panic struck, the stock had fallen to 35½. In the following weeks, the price stayed at about that level.

Stock market prices are one thing; real business is another. Sales of Tandy MS-DOS computers were up 80 percent compared to fall of the previous year, when lack of FCC certification hurt production. On the day of the crash, Tandy announced a 48 percent increase in earnings. Although Tandy executives who have stock-option perks were dealt a paper loss by the crash, for the most part, Tandy's people had more important things on their minds—like the fall Comdex.

Generally, this is the time when computer magazine columnists bore their readers with tales about the fall Comdex show in Las Vegas. You will not have to suffer that here. By the time I tried to get a room in Las Vegas, the best vacancy I could find was in a town 50 miles away. Reportedly, attendance at the show was so great that people from Los Angeles were flying in and out each day because there was no room at the inns.

However, I can tell you that the big hit at the Tandy exhibit was the 1400 LT laptop—particularly its bright back-lit screen. The 1400's success has surprised the folks in Fort Worth. Thousands of the machines are back-ordered. One Radio Shack dealer says he is placing orders with Fort Worth that he really doesn't have because the demand is so great he knows he can sell them before they're ever delivered.



Tandy's closing stock prices from Oct. 12 to Nov. 16, 1987.

Tandy officials modestly admit they didn't think the laptop would be received as well as it was. But then, no one has ever accused Tandy's marketing people of having their fingers on the pulse of the buying public. (Need we say anything more than "2000"?)

Speaking of tapping pulses, columnists are always looking for a hot rumor they can turn into fact before anyone else writes about it. One hot rumor came in third- or fourth-hand: Tandy was going to close all its computer centers and return computer sales exclusively to the normal Radio Shack outlets. Quick—a call to my local Radio Shack informant. Had he heard anything about it? What was the real story? "I'm surprised you're only (now) hearing about it," he said. "I've heard the rumor for years." Tandy executives in Fort Worth said the rumor was groundless. They also told me about another rumor that's been cropping up since 1979. According to this one, Tandy is going to spin off the computer division into a separate company. Also worthless, they said. Being a gossip isn't all it's cracked up to be.

TANDYLAND

They say software sells hardware. Wrong. Warm, snug feelings sell hardware *and* software. No matter how experienced, every computer user begins each morning by wondering, "Is this the day the disk crashes? Is that program going to keep telling me 'Can't find file?' What if the printer breaks down before I get that report done?"

One solution—particularly for the new user—is a service contract with someone who'll take care of repairs and answer questions that software manuals never seem to cover. The only trouble is that service contracts can be expensive, and the computer world, like the stock market, is driven by greed and fear. The more fearful buy IBMs because the name gives users a secure feeling. The greedy buy clones to save bucks.

Tandy would probably object to the idea that price is the main consideration in buying one of its computers, and Tandy would be right. With its network of stores, Tandy provides its users with more snug feelings than other computer makers. If the others don't go out of business leaving the user with an orphan, their dealers often close up or discontinue one line in favor of another. According to a survey by Datamation, Tandy led all microcomputer manufacturers when owners were asked to what extent service and support were factors in their purchases.

Tandy improved its standing when it changed its service contract policy. Previously, Tandy had charged $60 for three months of support. That's not so bad if you're constantly getting into trouble. But what if three months pass without a problem? That's sixty bucks down the drain. And then you must decide whether to gamble another $60 against your own incompetence for the next three months.

The new policy makes more sense, particularly as more users are becoming experienced enough to take care of problems that seemed insurmountable when they were greenhorns. At Tandy, $60 now buys the solutions to six problems, with no time limit.

(continued on page 21)

WHEN YOU MAKE COMPUTERS THIS GOOD, THERE'S ONLY ONE WAY TO IMPROVE THEM

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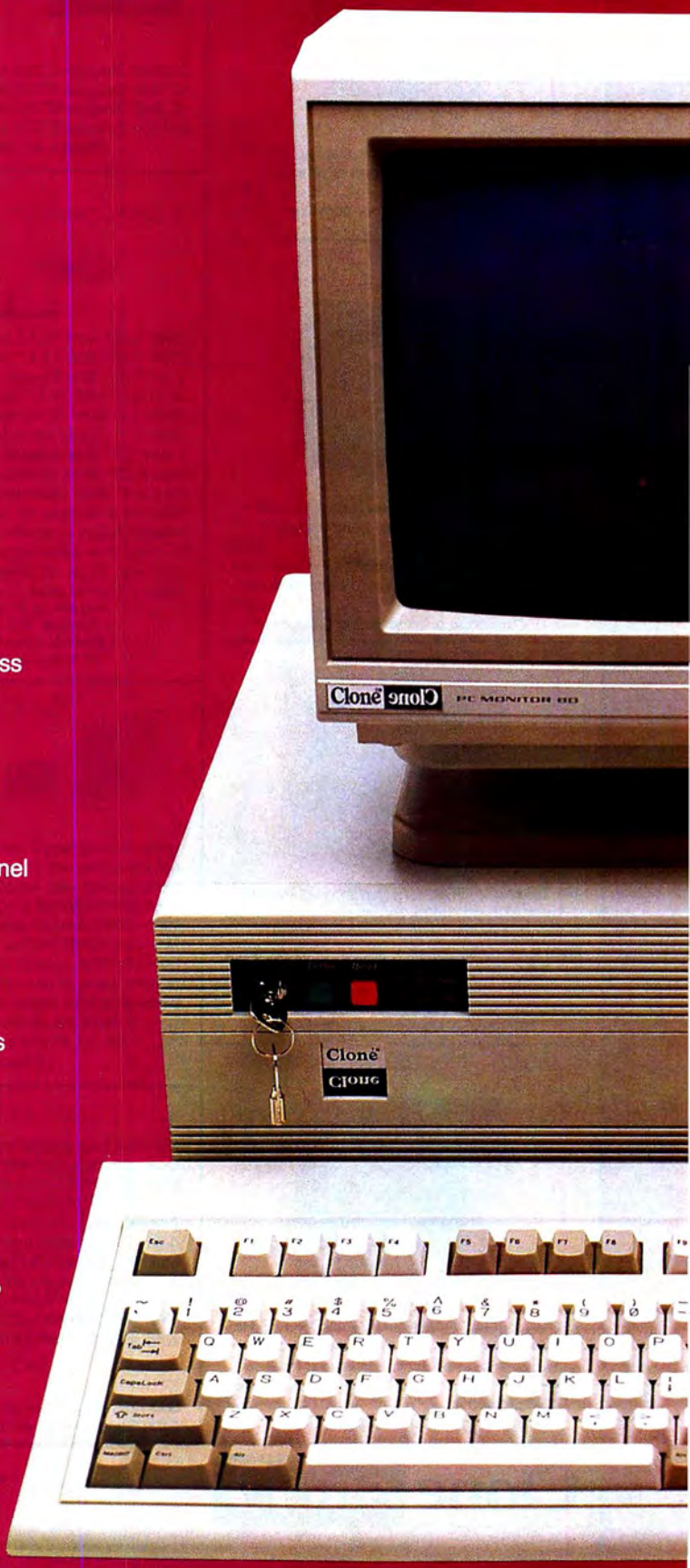

286

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* Requires an AT type controller
† Requires DOS 3.2 or later
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All connections switched. May be used with multiple computers or printers.

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10′ Standard IBM printer cable 12
10″ DB-25 specify M/M or M/F 20
10′ Tandy 1000 printer cable(26-1401) 9
6′ coiled keyboard extender cable 9
6′ DB9 M/F video extender cable 9
6′ Special IBM hooded power/IEC cable 9
Centronics M/M gender changer 9
DB25 gender changer specify M/M or F/F. . . .9

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Clone TM

1-800-527-0347

(continued from page 14)

It doesn't matter how long or how many phone calls it takes to find a solution. One incident will cost only $10. And if you average only one problem per year, six years from now you'll still be entitled to one solution.

A customer with a service contract will usually turn for support to one of the local computer centers. Someone will answer the question or get the answer from Tandy's support personnel in Fort Worth, where 80–90 people handle 50 phone lines.

Free advice is still available from the Fort Worth support center, but you still have to pay for the phone call. Since Fort Worth handles more than 100,000 calls a month, you're likely to have a harder time getting through than you would contacting a local computer center. Of course, a local center is necessary for on-site service.

With more than 7,000 retail outlets and 166 service centers, Tandy has the nation covered for service except for remote parts of Montana and Wyoming, Tandy officials said.

Tandy's approach to customer support is paying off. Third-party support companies regularly make forays at IBM and Compaq customers, but they leave Tandy users alone. "Their prices are very, very aggressive, and they provide pretty good service," said the manager of a third-party maintenance firm, quoted recently in *PC Week* about Tandy's support.

Curiously, considering that Tandy is basically a hardware company, most of the questions directed at its support section pertain to software—usually someone else's, said Ed Juge, director of market planning at Tandy. "It's supposed to be that all the express order software is supported by the publishers. But in point of fact, people call us anyway," Juge said. "That's OK. If people want to come to us, we feel like we ought provide the support."

Often the questions users ask could be answered by a close reading of the manual, Juge said, but he added, "Sometimes it makes better financial sense to call than to read the manual. If you're a busy executive, the time you spend searching through a 400-page manual may be more expensive than a phone call."

With all the emphasis on Tandy's new MS-DOS computers, some owners of the old Tandy machines have been fearful that they would become the owners of orphans. Tandy's announcement that it is offering a new version of the OS-9 development system for the Color Computer 3 gave new hope to its owners—and the response was another surprise to Tandy. (Sometimes it seems Tandy's market analysis is done by a gypsy inspecting chicken entrails.) OS-9 Level Two is an operating system that includes Basic09, high-level file operations, and windowing and multiple operations that can take place simultaneously. (MS-DOS users are still waiting for this in OS/2.) Production problems delayed the release of OS-9, and by the time the system was ready for shipping, response had been so great that it was sold out; another production run had to be ordered. Looks like a lot of people aren't ready to scrap their trusted CoCo's yet. And they're likely to be rewarded with flashy new software that the new development system will let programmers create.

MICRO TRENDS

Want to sit around in your underwear while you get your day's work done? The chances you can do that are increasing, according to a survey of home/office workers conducted by ESU Telework Group of LINK Resources, an electronics consulting firm.

The average annual growth rate of people who work at home—either self-employed or as part of a regular job—is 6.9 percent. In 1987, 20.6 million people fit into that category. Not only is the number of people who work in their homes increasing, but so is the number of hours each works at home compared to the office.

One important factor in the shift, the survey shows, is the computer. Nearly 70 percent of home workers said a computer was "somewhat" to "very" important in influencing their decisions to work at home. More than 65 percent of homeworkers said they were satisfied with the arrangement. About 20 percent said they would prefer not to work at home but either had no other choice or needed tools that weren't available to them in the office.

Nestorwrite almost sounds like it could be "excessware" until you remember the last time a druggist tried to read the prescription your doctor gave you.

An invention of Nestor Inc., the device supposedly converts handwriting into printed text—even if the handwriting looks like an earthworm orgy.

A person uses a special pen to write on a tablet connected to an MS-DOS computer so that Nestorwrite can have some samples of his or her penmanship. When Nestorwrite makes a mistake translating the scrawl into text, the user corrects the mistake, and Nestorwrite learns from the correction. As long as a person who writes atrociously writes atrociously consistently, Nestorwrite will read his or her handwriting.

At press time the $1,600 device was not on the market yet, but Nestor is looking at potential users among stock market brokers, in any business in which people have to fill out forms, and, of course, among doctors. ■

Microsoft Works: If it's

You were going to do the billing this morning. Right after you did the sales forecast. Which you were going to get to when you figured out how to get the labels printed. For the envelopes. For the catalogs. For the mailing.

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Word processing. Memos and form letters and more.

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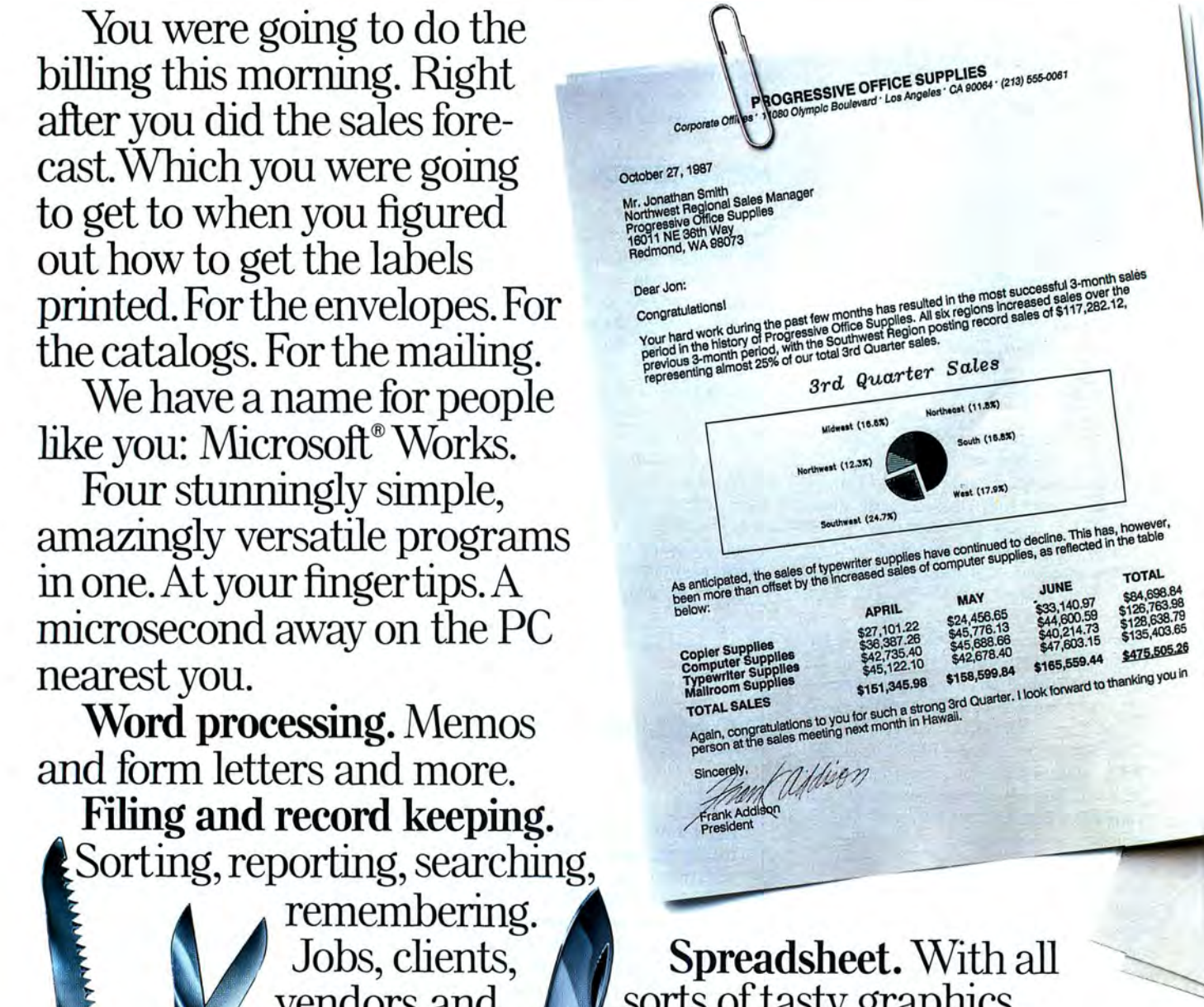
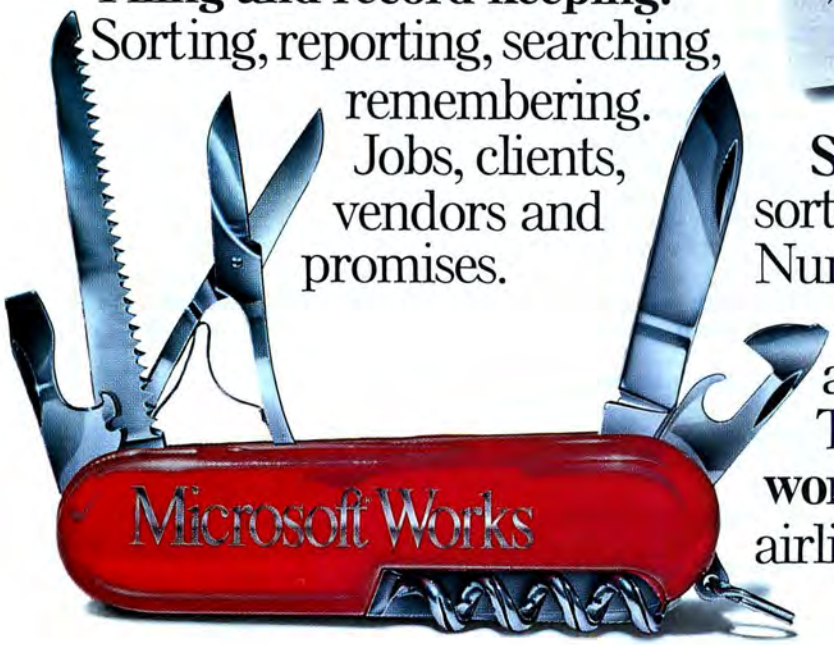
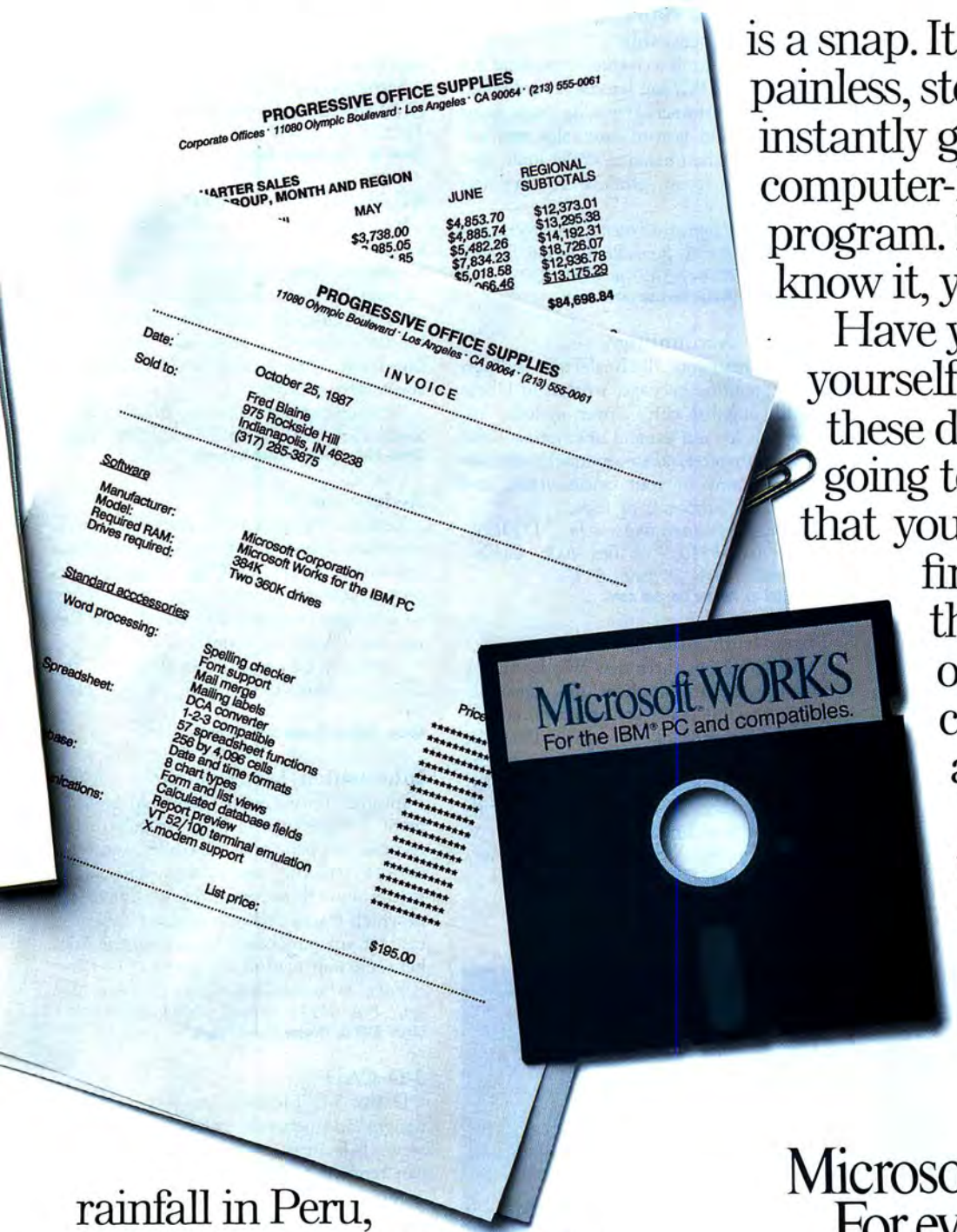




Spreadsheet. With all sorts of tasty graphics. Number crunching and analyzing, interpretation and display.

Talking to the outside world. About stock quotes, airline schedules, the annual

not one thing, it's another.



is a snap. It starts with a painless, step-by-step, instantly gratifying computer-based training program. Before you know it, you know it.

Have you been telling yourself that one of these days you're going to get organized, that you're going to find out what the excitement of personal computers is all about?

Well, friend, this is one of those days.

rainfall in Peru, anything one computer can tell another computer.

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INFO LINE

compiled by Mark Reynolds

PRODUCT NEWS

BUSINESS AND PROFESSIONAL

Accounts Receivable

The Accounts Receivable, a module for Businessworks PC, can handle an unlimited number of customers, tracking such items as month- and year-to-date sales and adjustments, highest balance, credit limit, and open credits. It can produce invoices and statements.

Manzanita Software Systems, One Sierragate Plaza, Suite 200-A, Roseville, CA 95678, 800-531-3552 (800-447-5700 in CA), $395.
Circle 562 on Reader Service card.

Business Accounting

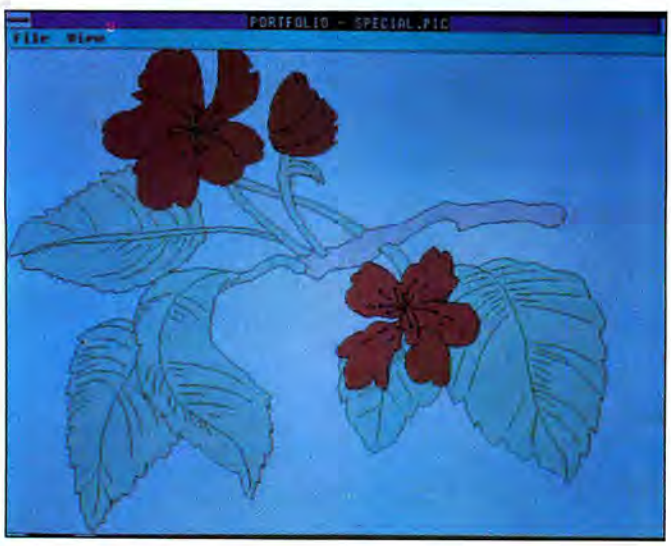
The Champion III Real-Time Edition 1.07 accounting package, written in Dbase III and compiled with Clipper, includes features that let you expand description fields on your invoices, keep separate books for each company in your organization, and prepare job proposals or bids.

Champion Business Systems Inc., 17301 W. Colfax Ave. #250, P.O. Box 4008, Golden, CO 80401, 303-278-8666, $395.
Circle 563 on Reader Service card.

Three from Micrografx

Micrografx has three new Windows-compatible graphics applications. Designer ($695) is a full-color art and technical illustration program. Windows Portfolio ($99.95) lets you select and copy Micrografx's Clipart images to the Windows Clipboard. Holiday Clipart ($49.95) is a library of hundreds of holiday images.

Micrografx Inc., 1820 N. Greenville Ave., Richardson, TX 75081, 800-272-3729.
Circle 570 on Reader Service card.



Holiday Clipart is a library of artwork for major U.S. holidays.

Laserjet Emulation

The Laser Twin software driver lets a Canon laser printer emulate an HP Laserjet Plus so the Canon can run software that supports only the Laserjet.

Metro Software Inc., 2509 N. Campbell Ave., Suite 214, Tucson, AZ 85719, 800-621-1137 or 602-299-7313, $129.
Circle 571 on Reader Service card.

Relational Spreadsheet

Nexview lets you access and manipulate Lotus's 1-2-3 and other spreadsheet data—regardless of how it is organized—without having to write a single programming formula. For example, you can consolidate up to 12 spreadsheets into one or interrelate data entries from one spreadsheet into another.

Windjammer Software Inc., 567 Park Ave., Scotch Plains, NJ 07076, 201-322-6363, $595.
Circle 564 on Reader Service card.

Reduce on PC

Reduce, the interactive system for mathematical, scientific, and engineering computations, is now available for the PC. Its code is portable across a range of machines, so a program running on your PC will also run on a VAX or Cray.

Northwest Computer Algorithms, P.O. Box 1747, Novato, CA 94948, 415-897-1302, $495.
Circle 565 on Reader Service card.

Information Management

Info-XL provides an integrated environment for keeping track of structured data records, free-form text, schedules, and other data. It lets you view a single large information base through various windows, each of which tracks different types of data. You can set up temporary or permanent links between information categories.

Valor Software Corp., 1700 Don Ave., San Jose, CA 95124, 408-978-3044, $150.
Circle 566 on Reader Service card.

3-D CAD

Drafix 3-D Modeler lets you create 3-D designs and generate unlimited perspective views. It features on-screen help screens and can remove obstructed lines from view.

Foresight Resources, 932 Massachusetts, Lawrence, KS 66044, 913-841-1121, $295.
Circle 567 on Reader Service card.

TurboCAD

Milan Systems has dropped the price of its TurboCAD package from $395 to $99. The package offers such features as 256 line thicknesses, 100 line or arrow types, user-definable hatching patterns or grids, almost unlimited zoom, 128 layers, and several

measuring and automatic dimensioning options.

Milan Systems America, 8351 Roswell Road, Suite 185, Atlanta, GA 30350, 404-642-4131, $99.

Circle 568 on Reader Service card.

Draw and Write

WordCAD combines a CAD program with a word processor so you can add text to your drawings to create such things as tech manuals and reports, product flyers, and origin/flow charts.

IAM, P.O. Box 2545, Fair Oaks, CA 95628, 916-961-8082, $99.

Circle 569 on Reader Service card.

WORD PROCESSING

Words from Hercules

Write On! is a Ramfont word processor that makes use of the Ramfont display mode on the Hercules Graphics Card Plus and the Incolor Card. Write On! creates high-speed displays of multiple character sizes in several type styles.

Hercules Computer Technology Inc., 921 Parker St., Berkeley, CA 94710, 415-540-6000 or 800-532-0600, $15.

Circle 579 on Reader Service card.

More Words from Tandy

Varsity Scripsit (catalog no. 25-1174) offers such features as pop-up menus, spell checking, foot- and endnoting, an append-file function for adding files to the current document, on-line context-sensitive help, keywords file generation, and split screens.

Tandy Corp., 1800 One Tandy Center, Fort Worth, TX 76102, $99.95.

Circle 580 on Reader Service card.

Wordstar Upgrade

Wordstar 2000 Plus Release 3 can integrate graphics, images and multiple typestyles to provide more page formatting options. It can interface more effectively with laser printers and access data-base and other program files. The program comes in a Personal Edition ($495) for general office environments and a Legal Edition ($595).

Micropro International Corp., 33 San Pablo Ave., San Rafael, CA 94903, 415-499-1200.

Circle 581 on Reader Service card.

Pop-Up AP Stylebook

The memory-resident Keynotes AP Stylebook gives you instant access to the complete text of *The Associated Press Stylebook and Libel Manual.*

Digital Learning Systems, Four Century Drive, Parsippany, NJ 07054, 201-538-6640, $49.95.

Circle 582 on Reader Service card.

Menu Works presents menus from which you can select programs and functions from your hard disk.

UTILITIES

Hard Disk Menu

Menu Works provides a menu that runs programs or functions stored on your hard disk. Menu Works includes on-line help, password protection, and menu customization. It gives you access to disk directories and a file-locate facility to search for lost files.

PC Dynamics Inc., 31332 Via Colinas, Suite 102, Westlake Village, CA 91362, 818-889-1741, $59.95.

Circle 574 on Reader Service card.

Another Hard-Disk Menu

Menu Express 3.2 provides a menu interface to hard-disk application programs so one keystroke can run your programs. You can set up as many as eight menus, each capable of handling 10 items.

Firstrack Systems Inc., 23611 Chagrin Blvd., Suite 101, Beachwood, OH 44122, 216-292-8677 or 800-258-8787 (800-821-9400 in OH), $49.95.

Circle 575 on Reader Service card.

Backup/Restore

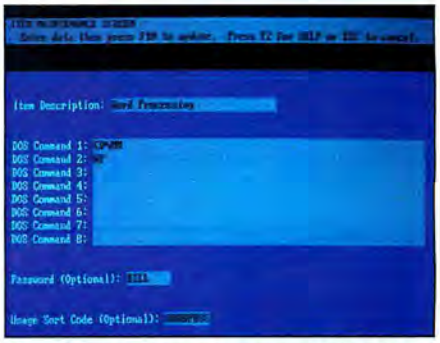
In 15 minutes, Smart Recall can transfer 20MB of data between DOS-recognizable devices (e.g., floppy disks, hard disks, Bernoulli boxes, and tape systems). The copies are DOS compatible and identical to the originals.

IQ Technologies Inc., 11811 N.E. First St., Suite 308, Bellevue, WA 98005, 206-451-0232, $129.

Circle 576 on Reader Service card.

Sideways Documents

Vertigo rotates spreadsheets, flow charts, financials, documents, presentations, and reports 90 degrees and prints them sideways from any printer. You can specify the number of characters and lines per inch and



Menu Express gives you a menu interface to application programs on your hard disk.

select any one of a dozen image-enhancing fonts.

Jewell Technologies, 4740 44th Ave. S.W., #203, Seattle, WA 98116, 206-937-1081 or 800-628-2828, $49.95.

Circle 578 on Reader Service card.

Fastback

Fastback Plus, a high-speed backup utility, uses adaptive data compression to improve backup performance and cut the number of disks required in half.

Fifth Generation Systems Inc., 11200 Industriplex Blvd., Baton Rouge, LA 70809, 504-291-7221, $189.

Circle 577 on Reader Service card.

ENTERTAINMENT

Chopper Combat

Infiltrator II, the sequel to Infiltrator, combines a combat helicopter simulation and three land-based graphic adventures as you strive to defeat the diabolical Mad Leader.

Mindscape Inc., 3444 Dundee Road, Northbrook, IL 60062, 312-480-7667, $34.95.

Circle 583 on Reader Service card.

INFO LINE

FOR THE HOME

3 by 5 Cards

Turbonotes is a memory-resident note pad that can search for, retrieve, and print the notes you've collected.

PC Computing, P.O. Box 4966, Chico, CA 95927, $34.95.

Circle 572 on Reader Service card.

Up the Family Tree

Genealogy Research II is a full-featured genealogy system complete with a pre-defined data base that works with Buttonware's PC-File.

USD Inc., 251 Round Lake Road, Vermontville, MI 49096, 517-726-1155, $75 ($135 with PC-File).

Circle 573 on Reader Service card

FOR THE PROGRAMMER

Basic Support

The Exim Toolkit 3.0 contains over 100 assembler and Basic routines that simplify programming done with Microsoft's Quick Basic or IBM's PC Basic compilers. The routines include multi-user data and index file management and screen, memory, and window managers.

Exim Services of N.A. Inc., P.O. Box 5417, Clinton, NJ 08809, 201-735-7640, $99.95.

Circle 558 on Reader Service card.

Memory-Resident Basic

Popbasic, the memory-resident Basic interpreter, and the Popbasic compiler offer a development system that lets you create memory-resident programs.

Hedge Systems, 511 W. Glenoaks Blvd., Suite 230, Glendale, CA 91202, 818-243-2235, $79.95 (Popbasic), $179.95 (Popbasic and Popbasic compiler).

Circle 559 on Reader Service card.

HARDWARE

Three Monitors

Each of Relisys's three new monitors comes with a tilt/swivel base. The 14-inch Model RM1443 ($219) monochrome monitor offers 800-line resolution and is compatible with MDA and CGA cards.

The 14-inch Model RE5154 ($695) displays 16 colors with a resolution up to 720 dots by 200 lines in CGA mode and 64 colors at 720 dots by 350 lines in EGA mode.

The Model RE5155 ($795) multiscan monitor offers a resolution of 800 dots by 560 lines. Its automatic switching matches it with any scanning frequency from 15.5KHz to 35KHz. The monitor can display 64 colors in TTL mode and the full video spectrum in analog mode.

The Relisys RE5155 multiscan monitor features 800-dot by 560-line resolution.

Relisys, 320 S. Milpitas Blvd., Milpitas, CA 95035, 408-945-1062.

Circle 555 on Reader Service card.

3½-inch External Drives

Radio Shack's Computer Centers, stores, and participating dealers now carry Manzana Microsystems' MDQT host-powered, 720K, 3½-inch external disk drive through Radio Shack's Express Order Computer Hardware Program.

The drive connects to the Tandy 1000/1200/3000 and comes with a Mux Adapter Card, which supports the MDQT without

affecting the existing internal drives, and the 3Five device driver and format program.

Manzana Microsystems Inc., 7334 Hollister Ave., Suite B, Goleta, CA 93117, 805-968-1387, $410 (Radio Shack catalog no. 90-2134).
Circle 550 on Reader Service card.

Video System

The Frame Grabber video camera package adds a video card, a hand-held camera, software, and a cable to your desktop publishing system so you can combine photos and text.

Advanced Transducer Devices Inc., 235 Santa Ana Court, Sunnyvale, CA 94086, 408-720-1938, $595.
Circle 554 on Reader Service card.

Clock Calendar

The PC-Clock Calendar plugs into a ROM IC socket and automatically keeps track of the year, month, day, and time. It adjusts itself for 30-day months and leap years and comes with a socket jumper and program software.

Integrity Technology, 105 Serra Way, Suite 230, Milpitas, CA 95035, 408-262-8640, $33.
Circle 557 on Reader Service card.

640 by 480 EGA

The Multi-EGA by Boca provides 640 by 480 color resolution for multiple-frequency, as well as color and monochrome monitors. It offers automatic mode switching and displays color graphics in various resolutions with 16 simultaneous colors from a palette of 64.

The Multi-EGA by Boca has a light-pen port and feature connector with two RCA video jacks.

Boca Research Inc., 6401 Congress Ave., Boca Raton, FL 33431, 305-997-6227, $299.
Circle 551 on Reader Service card.

LITERATURE

Two Resources From Addison-Wesley

Writing MS-DOS Device Drivers ($24.95) by Robert S. Lai reviews MS-DOS and PC design fundamentals and presents an overview of drivers in their practical functions as controllers, adapters, and interfaces. The book employs instructive models that you can use as templates for customizing device drivers.

Memory Resident Programming on the IBM PC by Thomas Wadlow ($24.95) discusses such factors as good program design, assembler coding techniques, and DOS interrupt vectors. The book includes model programs and utilities and hardware-interrupt tables.

Addison-Wesley Publishing Co., Reading, MA 01876, 617-944-3700.
Circle 584 on Reader Service card.

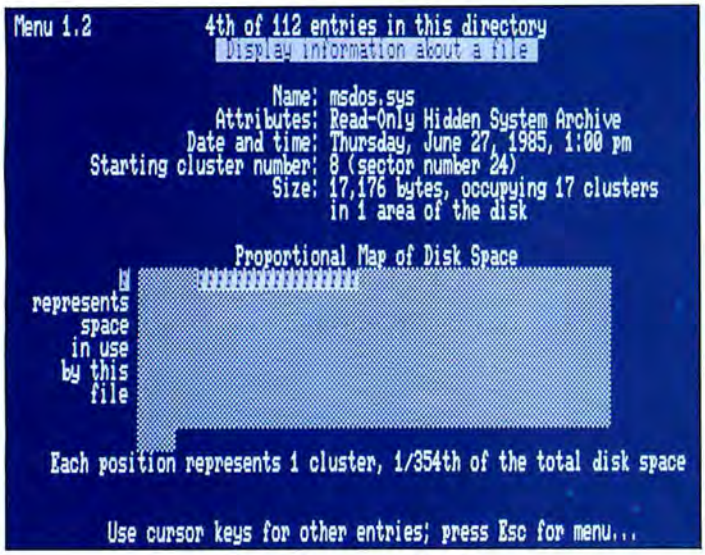
ON LINE

Crosstalk Forum

The Crosstalk Forum, an on-line community for users of Crosstalk communication software, is now open on Compuserve. The command Go Xtalk lets Compuserve members address the forum. Non-members can join by contacting Compuserve at 800-848-8199.

Digital Communications Associates Inc., 1000 Holcomb Woods Parkway, Roswell, GA 30076, 404-998-3998. ■

Tools for Living



Norton Utilities' map of an MSDOS.SYS file.

by Harry Bee

The Norton Utilities are easy to like. The presentation is attractive. The documentation is clear, complete, and better yet, almost pleasant to read. The programs have a quietly professional look and feel, and they perform in the same manner.

A powerful disk editor and maintenance program, the Norton Utility is the centerpiece of The Norton Utilities collection. Surrounding it are 18 or, in the Advanced Edition, 20 more programs, most providing a single function.

The Norton Integrator lets you use all the utilities from a common interface. As with any kit of tools, you'll find some programs more or less useful than others, depending on your hardware and your particular needs. It's a sure bet, though, you'll find enough to justify having the lot of them around.

The Spice of Life

Variety makes the utilities useful from day to day. My favorite is Ask. Like DOS's Pause, Ask halts a batch operation and displays a message. Unlike Pause, Ask lets you define a set of keys to which it will respond, then passes the key you press to the batch job as an Error-level code. You can use the Error levels with conditional statements to write menu-driven batch files.

At the other end of the spectrum is the System Information utility (Blasphemy!). This is the "authority," quoted in every computer review you've ever read, that compares your hardware with an IBM PC/XT. I ran it once on each of my computers and couldn't think of anything else to do with it.

Cute but plump at 5,000 bytes, *Beep* plays melodies. It gets its instructions from the command line for simple riffs or from a disk file for symphonic movements. Its size is a problem, however. Beep's ability to sound a musical motif as an alarm isn't worth the time it takes to start it from floppy disks.

Directory Assistance

The utilities offer several ways to play with directories. Directory Sort is fast, and it lets you sort one or many directories (such as date, extension, size) on several keys at once. In the interactive mode, you sort, resort, and move individual and groups of files. List Directories displays a directory of directories, graphically if you like.

Norton Change Directory (NCD) draws the directory tree, too, and it lets you move a cursor through the directory tree and change, make, and remove directories with single-key commands. NCD in place of DOS's CD, MD, and RD requires only the name of the directory you want instead of the complete path. On floppy disks, however, NCD is slow and seldom worth the keystrokes it saves.

File Attributes lets you hide, protect, and mark files for backup. Volume Label lets you change a volume label or add one. With File Size, you can look at one file or any group of files across all your directories. The program also shows the amount of occupied and free space and the space allocated to files but not used by them. It calculates the total size of a group of files and can determine if another disk has enough room to hold them.

If you use File Info (FI) instead of DOS's DIR, you can list several directories at once. FI scrolls and pages in the same manner as DIR, and it stops scrolling at a keystroke so you can step along a file at a time. You also use FI to attach comments to files, which show up when FI lists the directory. Like Beep and NCD, it's slow on floppy disks, but it's wonderful for organizing hard disks.

The Eraser's Erasers

The Unremove Directory is one of several programs that help you recover from mistaken deletions, damage, and clutter. Sometimes you can lose a file or directory in a tall directory tree, or you can hide it and forget where. If you can remember its

name, Find File will search for a directory or file, hidden or otherwise, through all the directories of all drives. If that fails, and you can remember something the file contained, Text Search will scour both active files and the disk's so-called erased areas.

DOS's Erase, DEL, and RD commands don't erase, delete, or remove anything but the first character of the directory entry. That's why Quick Unerase can bring back a just-deleted file. The program automatically repairs a file's directory entry, locates its starting cluster, and adds consecutive, unallocated clusters until the file returns to its previous size. The longer you wait to recover a file, however, the more DOS is likely to use its space for other files. Also, if the file was badly fragmented over scattered, rather than consecutive, clusters, Quick Unerase might not do the job. You need a bigger hammer.

The Big Hammer

The Norton Utility's integrated functions let you search, inspect, and edit files, directories, and disk sectors and clusters. Special functions help you reconstruct erased and damaged files. Menus and on-line help make the program easy to work with.

One function reports details about a disk and the way it's organized. Another draws a map of used and unused areas. You can also get maps of individual files and directories (see the Photo). Unfortunately, you can't point to a place on a map and go there. You must select areas to explore by naming a file, a directory, or a range of sectors or clusters. If you're looking for something special, the program searches the entire disk for it. You enter the search term either as an ASCII string or as hexadecimal (hex) values.

You have several ways of viewing the disk's contents. The columnar hex display has ASCII translations on the right of the screen, similar to the Debug display. The text display is a character rendering of the sector you're viewing. A special format for directories translates data, such as the date, into readable form. Function keys switch from one format to another.

Regardless of the display format, you edit by typing over what's there. You can edit as much as you want without affecting the disk's contents until you save the changes. A single-key command will undo your changes before you write them.

You can copy files, sectors, and clusters to other files, sectors, and clusters on the same or another disk. This provides a way to collect badly fragmented files and rescue data from a physically damaged disk.

The Unerase function starts like Quick Unerase; it repairs the directory and finds the starting cluster. It assumes nothing, however. If the cluster still contains some of what you're looking for, you mark it. You can then use all the utility's search functions to find more pieces of the puzzle. The program keeps a list of the clusters you mark, which you can rearrange before you copy them to a new file. Once collected, you can make repairs, if necessary, with any appropriate editor.

Advanced Edition

The Advanced Edition does everything that Version 4.0 can do and more. Its expanded version of the Norton Utility has two more display formats to look at the file-allocation table (FAT) and a hard disk's partition table. It lets you edit the FAT, partition table, and directories, which Version 4.0 prevents, and you can use absolute, as well as logical, sector numbers.

The Advanced Edition includes two extra utilities for hard disk systems. You run Format Recover before disaster strikes; it surveys the hard disk and saves information about the current format and contents. After an accidental, ill-advised, or malicious reformatting (if your version of DOS doesn't erase data when it formats), you run Format Recover and, presto, this computer simulation of Pepto Bismol brings fast relief.

The other utility, Speed Disk, reports on the way your disk is organized—or disorganized. It optionally gathers and rewrites fragmented files using consecutive clusters and moves directories to the lowest-numbered tracks, nearest the FAT. The result is faster disk-dependent operations and improved disk caching, if you use it. For safety's sake, the program doesn't move hidden files and directories. It recognizes some copy-protection schemes and leaves these files alone.

Garnish

Six more programs and the Norton Integrator complete both editions. Frankly, the Norton Integrator, which lets you select the utilities from a menu and provides help, is a useless appendage. You would rarely use the utilities in an integrated fashion, and you can't run DOS commands or other programs from it. You can get the help it provides by entering a utility's name with a question mark at the DOS prompt. Now, the better news about the rest of the utilities.

If you suspect damage that might affect your data, or you want to check a disk before you use it, Disk Test goes beyond Format, CHKDSK, and Diskcomp. The test it performs over the entire disk is similar to one the ANSI standard recommends to certify a disk. Time Mark gives you four independent stopwatches to monitor your computer use and test the efficiency of particular operations. It's difficult to use from floppy disks, however.

Screen Attributes provides an easy way to affect both color and character attributes, such as intensity for batch operations and programs that don't set the display themselves. Line Print is more useful than DOS's Print. Finally, Wipefile and Wipedisk go well beyond DOS's Erase (DEL); they, in fact, erase data.

The Complete Set

Unless you're a heavy computer user, having utilities like these on hand isn't as vital as, say, air to breathe. But, like air, they make life more certain and broaden the possibilities. Although you may never need all the programs, this collection has the depth to remain useful even as your needs change. The Norton Utilities are as complete a set of tools as you'll find in a single package, and as finely crafted and reliable. ■

The Norton Utilities 4.0 and Advanced Edition require 192K. Peter Norton Computing Inc., 2210 Wilshire Blvd., Santa Monica, CA 90403, 213-453-2361. Version 4.0, $99.95. Advanced Edition, $150.

Budget Integration: Ability Plus

by John M. Allswang

Integrated software can solve a lot of problems. It promises all the computing power most people need in one package. It uses a consistent command structure and permits easy movement of data from one module to another. It has worked well for some users. Others, however, find at least some of the individual modules less acceptable than their stand-alone competitors.

The earlier version of Ability was an also-ran in the integrated software sweepstakes, but Migent Inc. hopes to succeed with the Plus version's improved features and aggressive pricing. At $199 for word processing, spreadsheet, data-base management, graphics, communications, and presentation modules, Ability Plus is certainly the bargain member of the integration family. It is also a powerful program with lots of attractive features.

Setup and Installation

Ability Plus is easy to install and set up. It comes on five floppy disks (a set of 3½-inch disks is also included) and is not copy-protected. Basically, you just copy the program files to working floppies or a hard

(continued on page 78)

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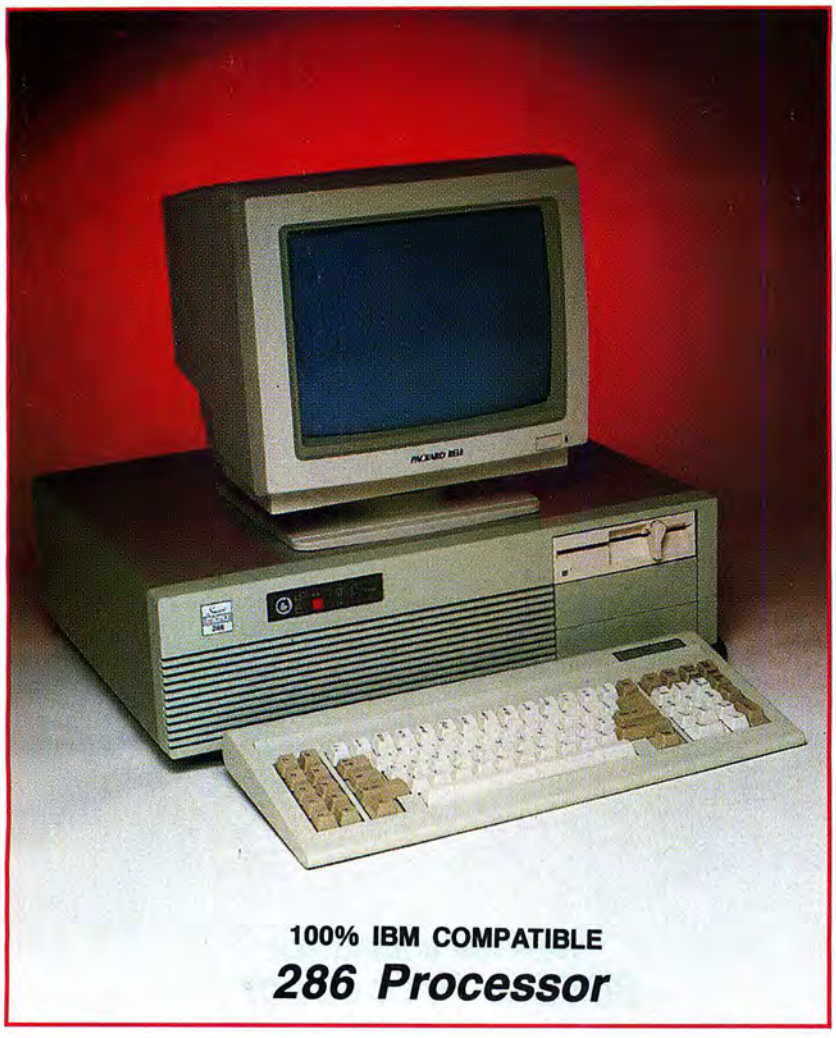

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INSTRUCTIONS

Demystifying Config.SYS

Brief file boosts efficiency, assures compatibility with add-ons.

by Lewis Rosenfelder

Monday morning, 9 a.m.: Determined to get your office organized once and for all, you dictate the following memo to your secretary:

TO: *MS. DOS*
RE: *EFFICIENCY*

1. Please put more in and out baskets on your desk so you won't be running to the file cabinets so often.

2. Activate the extra lines on your phone to handle more calls.

3. Keep a list of visitors and ask them to sign in and out; we need to tighten up security.

4. We've built a bigger storage closet. Please note how it's organized.

5. Please review the instructions for the new dictation machine.

6. Tape a metric conversion chart to your desk. You're accustomed to pounds and ounces, but the specs for some of our new jobs are in kilos and grams.

7. We now have a cart so you can roll the vendor file into your office at the end of each month to speed up the bill paying process.

8. We've put a NO SOLICITORS sign on the front door to minimize interruptions.

9. By the way, the supervisor's office has been moved out of the lobby.

Thanks.

Now consider a disk file with the following nine lines:

```
BUFFERS = 16
FILES = 20
FCBS = 20,10
DEVICE = DMDRVR.BIN
DEVICE = MOUSE.SYS
DEVICE = ANSI.SYS
DEVICE = VDISK.SYS
BREAK = OFF
SHELL = \DOS\COMMAND.COM
```

This file can do the job of that memo. If it is named Config.SYS and it resides in the root directory of a disk used to boot an MS-DOS system, it will have the same effect on MS-DOS as the memo has on the organization of your office. Config.SYS acts as a "memo" to MS-DOS, telling it how to configure itself for more efficient operation and compatibility with special equipment and programs.

You might be running MS-DOS without knowing that you have a Config file or perhaps running without one because you have a plain vanilla setup that doesn't require it. In either case, you may be missing something. If you know how to install and modify a Config file, you can unlock important capabilities: You can speed up your system, expand it, and save hours of head-scratching over a puzzling error message.

Viewing the Config File

If you have a Config.SYS file, it probably isn't as long as my example. To view your file, bring up the C> prompt on a hard-disk system; with a floppy-only system, insert the system disk and go to the A> prompt. Now enter:

```
TYPE \CONFIG.SYS
```

The message "File not found" means you don't have Config.SYS. That's not unusual, because Config.SYS is not provided with MS-DOS. If you do have Config.SYS, it will be listed and will probably consist of just a few lines, like those in my example.

You may be surprised to find that your Config file contains entries you didn't suspect were there. Perhaps your dealer created it or it was modified by an "install" program provided with a software package or a hardware add-on. In practice, your Config file may differ considerably from the one you see here.

A Few Cautions

Before tinkering with Config.SYS, be

Illustration by Scott Gordley

sure to make a copy so you can go back to the original if necessary. Copy it onto a duplicate of your MS-DOS system disk. To print it for reference, type:

```
COPY \CONFIG.SYS PRN
```

It's important to notice if your Config file includes a "device" entry for the hard drive. If your hard disk holds more than 32 megabytes, or if you must boot your hard-disk system from a floppy, this is probably the case. Unfortunately, the wording depends on the vendor and is not always obvious. In the sample, "DEVICE = DMDRVR.BIN" is such an entry; it refers to "Disk Manager Driver." Names with HD or FD, such as "hddriver," should also arouse suspicion.

If such an entry exists, you must preserve it without misspellings in any modified versions of Config.SYS you create. If it is the first or only "device" entry, it should precede any new device entries you add. An error could make your hard disk unusable the next time you boot or when you attempt to write new data to it.

How MS-DOS Uses Config.SYS

The Config.SYS file is used by MS-DOS only once each session—i.e., when you boot. You turn on the power and the hardware does its internal diagnostics. Then MS-DOS loads from the disk in drive A, or on a hard-drive system, from drive C if no disk is in A.

Now MS-DOS looks for Config.SYS in the root directory. If it finds the file, it reads every line. Each "DEVICE =" entry tells MS-DOS to load the file indicated to the right of the equals sign. The program in the file then becomes part of MS-DOS. Other entries override the defaults MS-DOS uses for particular functions, such as organizing memory.

In the final phase of startup, MS-DOS loads Command.COM from the root directory, unless the Config file has a Shell entry that would assign a different location or direct the computer to a file other than Command.COM. The program loaded here, the command processor, controls your interaction with DOS for displaying directories, copying files, executing programs, and so forth.

Command.COM's first action is to look for a file called Autoexec.BAT. If the file is present, the commands it contains are executed, just as if you had entered them from the keyboard. If Command.COM doesn't find the file, it requests the date and time, then displays the normal A> or C> prompt.

Creating or Modifying Config.SYS

Because Config.SYS is such a short file, it is easiest to create it directly from the keyboard with the copy command. First make sure you are logged to the A or C drive used for booting. Then review Config's contents:

```
TYPE \CONFIG.SYS
```

Now you can enter the new version with:

```
COPY CON \CONFIG.SYS
```

Type it line by line, pressing enter after each. The choice of upper- or lowercase is not significant. If you make an error, press control-C to cancel and begin again. If you don't spot any typos, press control-Z or F6 after entering the last line. The new Config.SYS file is ready. Pressing control-alternate-delete or reset reboots the computer, and your changes take effect.

Much like the in and out baskets on a desk, buffers save time-consuming trips back and forth. . . .

You can also create or modify Config.SYS with Edlin, which is supplied with MS-DOS, or with a word processor purchased separately. If you use a word processor, be sure to use its option for saving in ASCII, which is sometimes called "exporting a text or DOS file."

The Buffers Entry

Because disk drives operate mechanically, storage and retrieval of data on disk is slower than storage and retrieval in memory, which is electronic. Buffering sets aside portions of memory for holding data that has been read from or written to a disk. If the program needs that data again, it can retrieve it quickly from memory instead of going back to the disk drive.

A buffer is a temporary holding place. Much like the in and out baskets on a desk, buffers save time-consuming trips back and forth to the file cabinet—i.e., the disk. Of course, there's a disadvantage: More baskets mean less space on the desk for other things. With many baskets to look through, it might be faster to look in the file cabinet, where everything is presumably in its correct place.

A buffer entry in the Config.SYS file tells MS-DOS how many 512-byte holding places to allocate. If, for example, the entry is "BUFFERS = 10", 5,120 bytes are used for buffering. Adding buffers reduces available memory, but in most cases, increases the speed of your system. There's a trade-off, so you decide how many buffers to add.

The degree of speed improvement depends on the applications you run. An application that uses and reuses the same portions of a disk file, such as a spelling checker, might be speeded up significantly. An application in which everything is held in memory, such as a spreadsheet, will show no improvement.

Unfortunately, on most systems the Buffers entry is effective only for hard-disk operations. It doesn't work with floppies.

The Files Entry

Just as your office phone must often handle more than one call at a time, your computer must frequently work with more than one file at a time. When a file is being processed, it is "open." For each open file, MS-DOS must keep track of its current position within the file, the file's current size, whether access to the file is limited to reading only or to reading and writing, as well as a few other items. It needs space in memory to make a table for holding this information. When a file is opened, it is given a number, or "file handle," that refers to its position in the table. When requesting an operation, the active program gives MS-DOS a file handle to indicate which open file is to be used.

If your Config file lacks a files entry, it uses a default value of eight files; of the eight, five special files are always open for internal use by MS-DOS. For example, PRN is always open for output to the printer. Think of it as a phone with eight buttons, of which only three are available for outside calls.

The limit of three files at once is most often a factor in data-base and accounting programs. Three aren't enough, so Config.SYS with a Files entry is required. Because each file takes only 48 bytes, it makes sense to use:

```
FILES = 20
```

The maximum number of files MS-DOS can handle at once in a program is 20, but in cases in which one program calls another, the called program can contain another 20 open files if the entry is "FILES = 40." If a program gives you an error message such as "Too many files," the files entry (or lack of one) in Config.SYS is probably at fault. Increase the number of files and restart the system. (If it is a Basic program, you might also need to start Basic with a different parameter, for example: BASIC /F:15.)

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File Control Blocks

Before I consider device entries, I should discuss a Config.SYS entry, similar to the files entry, that applies only to networked PCs with MS-DOS 3.0 and above. Some programs, especially those written prior to the release of MS-DOS 2.0, use an alternative method of maintaining statistics for open files. They create a file control block, or FCB, for each open file; each FCB is 37 bytes (44 bytes if special attributes such as "read only" or "hidden" apply).

MS-DOS must read the instructions and know how to initialize the new device . . . .

These programs can have as many files open at once as they need, with the number of files unrestricted by the "files" entry in Config.SYS. The only concern arises when the system is part of a local area network. Then MS-DOS must maintain information about which files are "locked," to avoid conflicts among multiple users. If more than four files will be open using FCBs, Config.SYS needs an entry such as the following:

FCBS = 20,10

This entry allows 20 active FCBs. If a 21st file is opened, one of the previously opened files is closed. The "10" prevents MS-DOS from automatically closing any of the first 10 files opened. Each number can be up to 255, but the second number can't be bigger than the first. It's like the list of visitors who have signed in and out; MS-DOS needs a place to make notations about the status of the entire system. In a network, you'll probably have both kinds of entries in Config.SYS: files and FCBs.

Device Entries

Device entries usually relate to hardware you've added to the computer—a hard disk, tape drive, mouse, digitizer, or expanded memory board, for example. Not all hardware add-ons require an entry in Config.SYS. It depends on the design and whether or not it needs to be controlled through MS-DOS.

You can often use hard drives, for example, without anything special in Config.SYS, but because the MS-DOS file allocation scheme is able to handle only 32 megabytes, it must be told how to organize files on larger drives, just as you must tell the secretary where to put things in the new storage closet.

Sometimes a driver program disk is packaged with the add-on device. The file name of such a program will generally end with BIN or SYS, to distinguish it from a normal COM or EXE program. Your job is to copy the driver file to the disk used for booting and add an appropriate entry to Config.SYS. For example:

DEVICE = MOUSE.SYS

If you prefer, you can put the driver file in a subdirectory. If you do, you must specify that you've done so in the configuration file. If Drivers is the subdirectory, it might look like this:

DEVICE = DRIVERS\MOUSE.SYS

Adding a mouse is like giving a secretary a new dictating machine; like the secretary, MS-DOS must read the instructions and know how to initialize the new device, check its status, and read data from it. A driver file contains the program routines needed to do all this.

ANSI.SYS—A Special Device

Some device drivers don't relate to added hardware. Instead, they provide new ways to use hardware that MS-DOS already manages. An example is ANSI.SYS, which extends the video display and keyboard handling capabilities. ANSI.SYS is supplied with MS-DOS as an option that can be implemented by an entry in the configuration file:

DEVICE = ANSI.SYS

ANSI stands for American National Standards Institute. With the ANSI driver, MS-DOS watches for special sequences of characters printed to the screen. Certain sequences control cursor position, screen colors, and the meanings of keys on the keyboard. For example, an escape code (ASCII 27) followed by [5A would move the cursor up five lines. Escape [44m sets a blue background. Escape displays as a left arrow on your screen. All ANSI command sequences start with escape and a left bracket ([ ).

Without ANSI.SYS, MS-DOS can display data only one character after another, line after line. Except for backspacing or tabbing on the current line, it offers programs no way of positioning the cursor or changing colors for elaborate input and output on the screen. Programs that do so must go outside MS-DOS to use basic input/output system (BIOS) calls, commands that are standard only among IBM compatibles. Like the metric system, the ANSI standard is more universal.

If a program doesn't seem to be working correctly—for example, if you see unusual left arrows, brackets, numbers, or letters on your screen, you may need ANSI.SYS. Install it in Config.SYS, reboot, and run.

The Tandy 1200 requires ANSI.SYS for the CLS (clear screen) command to work at the DOS level. Without it, you see only ←[2m.

ANSI is also commonly used in communications. If you call a bulletin board with a modem, it might ask "Do you want graphics?" If you answer yes, it will send codes for color and more elaborate displays.

Some programs add their own ANSI-like drivers to Config.SYS to provide compatibility. One example is Wordperfect Corp.'s Mathplan Spreadsheet. It adds "DEVICE = HERCBW.SYS" if you are using monochrome graphics, or "DEVICE = GSSCGI.SYS" for color graphics. Other drivers are added for other display types. Unfortunately, these special purpose drivers take up space in memory and do nothing to enhance the performance of other programs you may run.

More powerful substitutes for the ANSI driver are also available. An example is Hershey Micro Consulting's Fansi Console, which can be downloaded from many public bulletin boards.

RAM Disk Drivers

Another driver often specified in the Config.SYS file, yet not related to any unusual hardware, is the RAM disk driver or virtual disk.

A RAM disk is an imaginary disk drive that resides in memory. When MS-DOS reads the Config file, it gives the RAM disk the next unused drive letter. You can display its directory and do almost anything else you'd do with a disk drive. The main difference: You must use the Copy command to put files on it when you start a session, and if you want to keep anything afterward, you must copy the files back to real disks before you power down. A RAM disk, however, takes memory away from applications that may need it, and with most RAM disk drivers, you must change the Config file to change the RAM disk's size or remove it.

A RAM disk is many times faster than a hard disk or floppy. Having one is like rolling a file cabinet right up to your desk so you can get to it faster. The entry for a RAM disk might look like this:

DEVICE = VDISK.SYS

Or, with parameters to override the defaults, it may look like this:

DEVICE = VDISK.SYS 256 512 32

Device entries can be followed by param-

eters. Just how they are specified depends on how the driver was designed, so it's necessary to check the instructions. In this case, I'm specifying a 256K RAM disk with sectors of 512 bytes each and a maximum of 32 entries in its directory.

The Break Entry

Your configuration file can also include one of the following entries:

BREAK = ON

or...

BREAK = OFF

Off is the default. When break is on, MS-DOS checks to see if you've pressed control-break or control-C after every character it displays, every disk access it makes, and every other operation it performs. You can interrupt what it is doing more easily. When break is off, operations are faster because it doesn't check as often. Because you can override the break setting later, and because programs can change it automatically, this entry isn't used often.

The Shell Entry

Used in Config.SYS, the Shell command lets you use a command processor other than Command.COM. In other words, you can write a program to replace the normal DIR, Copy, Erase, and other commands to which MS-DOS users are accustomed, perhaps in a different language or oriented to command selection with a mouse.

A RAM disk is an imaginary disk drive that resides in memory.

The Shell entry can also indicate that Command.COM is being used, but is to be found in a location other than the root directory of the system disk. For example:

SHELL = \DOS\COMMAND.COM

In effect, this Shell entry moves the supervisor's office out of the lobby, thereby avoiding clutter in the root directory. Though moving Command.COM out of the root directory can sometimes solve a problem or two, doing this can also cause problems.

If Command.COM can't be found when a program terminates, the system will be halted, and you might need to reboot with a back-up system disk to correct the situation. It's best to leave it alone until you feel comfortable with all the MS-DOS commands.

Feel more comfortable about configuring MS-DOS now? Keep experimenting—but be wise about backup—and you'll find that the new knowledge will pay off in a faster, more powerful system. ■

Lewis Rosenfelder is a software developer, author, and vice president of Tradewind Software, Honolulu, HI. You can reach him at 3026 Edwards Place, Riverside, CA 92503.

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Help Yourself!

Create your own memory-resident pop-up help windows for your Tandy 1000 and save hours of work.

by David Goben

Whether you're a rank amateur or a seasoned pro, you can use Help File Generator (see the Program Listing) to create your own memory-resident pop-up windows that instantly give you help from anywhere you need it. It explains everything in a way that you will comprehend it best—in your own words.

Help File Generator will reduce hours and possibly *days* of work to minutes of keystrokes. Even better, you aren't required to load your help file last, and the help file doesn't require that the ANSI.SYS device driver is installed for proper operation.

ANSI.SYS, developed by the American National Standards Institute, contains code to control console input and output for a standard of compatibility. It is used to position the cursor, to set text colors, and to redefine keys on the keyboard.

You install ANSI.SYS by having the file on your disk and the line DEVICE = ANSI.SYS in the Config.SYS file.

A help file you create with this program can work with or without ANSI.SYS, and it is preferable that you load the help file first, not last. This is because some utilities won't let it function from within them if it is loaded afterward. By loading the COM help file before the other programs, you ensure that its keyboard functions won't be rendered inoperative while inside any application, such as Basic and Deskmate, or utilities, such as Sidekick and Procomm.

Another advantage of a user-created help file is that only the information that's important to you is stored. This bypasses the necessity of trudging through screens of irrelevant information, since the file is made to your specifications and can be as long or short as you want it.

Help File Generator creates a COM file that you can then load from the system prompt or from within an Autoexec batch file. Afterward, you can access the screens by pressing and holding the alternate, left shift, and H keys in sequence.

When you've activated your help file, a 44- by 16-character non-destructive window in your screen's center displays a boxed-in 40 by 11 text field. It is called non-destructive because when you leave it, the previous screen is restored, just like the professional programs.

I chose the odd triple-key sequence to prevent conflicts with other programs and to keep it easy to remember. I felt that the H key was essential since most people associate it with the word "help." I rejected the obvious two-key alternate-H sequence because many utilities, including Basic, use this command (e.g., for "hang up" on communications programs). Also, the three-key sequence is not one that you can easily press accidentally.

Creating Help Files

To create a help file, you need a text processor and HELPGEN.BAS (see the Listing). To create the text portion of the help file, you can use a text processor such as MS-DOS's Edlin to produce ASCII text files (the non-document mode in many word processors), a desktop utility's notepad feature, or a Basic program that sends data to the disk via the Print# statement.

You should remember three rules when creating these files:

- The only control key recognized by Help File Generator is the carriage return (produced by the enter key [ASCII code 13 decimal]). Line feeds (ASCII code 10) are ignored if your processor includes them with each carriage return. ASCII code 26, an end-of-file marker, marks the end of the

System Requirements: 256K, MS-DOS 2.0 or higher, GW-Basic, word processor or Edlin. Available on the January–March 1988 Disk Series, on sale mid-January 1988.

Illustration by Anna Davidian

text data, so make sure you don't embed this code into the text data. If your text processor won't send this code out at the end of the file as Edlin and Basic will, don't worry—Help File Generator will provide it for you. All other control codes are represented by their graphics attribute, as described in the appendix of your computer's user manual. Beware Edlin's tab feature. If you want to use indentation, use spaces instead of tabs.

- Each help screen is 11 lines long. If you want neat formatted screens, you might want to group them in individual screens of 11 lines each. Edlin is handy here, as it continuously displays its line numbers, and you can quickly spot the last line of a screen by the line numbers that are multiples of 11 (e.g., 33, 99, 110, and 121). Also, the final screen need not be 11 lines long. If it were three lines long, the screen format will still be properly set.
- A line can have a maximum of 40 text characters, not counting the required terminating carriage return (and possible line feed). It is therefore suggested that you either set a tab mark at 40 or set your display to the 40-character width mode when you work on your text files, so that you can quickly tell when a line you are working on is approaching this limit.

If you use Edlin in the 40-character mode, you'll notice that the screen looks

Help File Generator will reduce hours and possibly days of work to minutes of keystrokes.

strange, but you'll get used to it. With Edlin, you don't have to worry about lines wrapping around to the next. Just ensure that text does not pass the asterisk (*) that follows the current line number. When the cursor is immediately below the first character typed in the line (one space beyond the asterisk), you've entered 40 characters.

A 40-character line length is only a limit. A line can contain any number of characters equal to or less than 40, including empty lines.

The Figure is a sample session that you can type into Edlin or a text processor to practice creating help files. This session produces a three-page help file to illustrate Help File Generator's capabilities. Don't type in the line numbers or the colon (:) following them. Edlin supplies these automatically. To enter Edlin, type EDLIN TESTHELP.DAT from the MS-DOS level to create a text file called Testhelp.DAT. Proofread the file before exiting.

Once you are satisfied with your Testhelp file, go into Basic and type and save the program in the Listing. Call it HELPGEN.BAS, and run it.

Help File Generator first asks you for the name of the help text file (the file that you just created). For our sample session, type in TESTHELP.DAT, and press the enter key. Help File Generator will check the file for errors, such as lines longer than 40 characters. If it finds a line exceeding this limit, it alerts you, displays the line, and waits for you to press enter to continue.

Program Listing. Help File Generator. See page 76 for information on using checksums.

```
     | 10 'HELPGEN.BAS by David Goben
     | 20 '-------------------------------------------------------------
     | 30 'Select FOREGROUND and BACKGROUND Color values as defined in the
     | 40 ' COLOR/text section of your BASIC Reference Manual.
     | 45 'Modify lines 50 and 60 as needed.
 437 | 50 FG=15 'Default High Intensity White FOREGROUND (range 0-15)
 380 | 60 BG=0  'Default Black BACKGROUND (range 0-7)
     | 70 '-------------------------------------------------------------
3091 | 80 XX$=HEX$(FG+BG*16):IF LEN(XX$)=1 THEN XX$="0"+XX$
4845 | 90 WIDTH 40:CLS:PRINT STRING$(42,"-")" MEMORY RESIDENT  HELP FILE CREATO
     |    R --"
4563 | 100 PRINT"WRITTEN 1987 FOR 80 MICRO BY DAVID GOBEN":PRINT STRING$(40,"-"
     |     )
3252 | 110 LOCATE 6,1:LINE INPUT"HELP TEXT FILENAME: ";SF$
2623 | 120 IF SF$=""THEN 110 ELSE ON ERROR GOTO 140
5140 | 130 OPEN"I",1,SF$:LN=0:ON ERROR GOTO 0:PRINT:PRINT"SCANNING "SF$:PRINT:G
     |     OTO 150
2125 | 140 PRINT SF$" WAS NOT FOUND!":END
3030 | 150 IF EOF(1)THEN 180 ELSE LINE INPUT#1,A$:LN=LN+1
4516 | 160 IF LEN(A$)<41 THEN 150 ELSE PRINT"LINE"LN"IS TOO LONG:":PRINT A$:ER=
     |     1
3628 | 170 INPUT" --- PRESS [ENTER] TO CONTINUE --->";A$:GOTO 150
3745 | 180 CLOSE 1:IF ER THEN END ELSE OPEN"R",1,SF$,1:FIELD 1,1 AS C$
2748 | 190 LINE INPUT"DESTINATION FILENAME: ";DF$
1145 | 200 IF DF$=""THEN 190
2432 | 210 IF INSTR(DF$,".")=0 THEN DF$=DF$+".COM"
3664 | 220 PRINT"--- CREATING "DF$" ---":OPEN"R",2,DF$,1:FIELD 2,1 AS B$
3872 | 230 LOCATE,,1:PRINT"BUILDING MAIN DRIVER...":LN=430:GOSUB 310
2677 | 240 PRINT"BUILDING SCREEN-SAVE BUFFER..."
4305 | 250 LSET B$=CHR$(0):FOR X=1 TO 1408:PUT 2:NEXT X:LSET B$=CHR$(13):PUT 2
1597 | 260 PRINT"MERGING "SF$"..."
3380 | 270 FOR X=1 TO LOF(1):GET 1:LSET B$=C$:PUT 2:NEXT X:C=1
4500 | 280 PRINT"APPENDING INITIALIZATION ROUTINE...":CS=0:LN=780:GOSUB 310
4463 | 290 RESTORE:READ A$:GOSUB 370:LSET B$=V$:PUT 2,2:LSET B$=CHR$(D):PUT 2,3
3764 | 300 CLOSE 1,2:LOCATE,,0:PRINT DF$" CREATION COMPLETE...":END
4229 | 310 GOSUB 320:IF A$<>"END"THEN LSET B$=V$:PUT 2:GOTO 310 ELSE RETURN
 942 | 320 IF B THEN 360
2247 | 330 GOSUB 390:IF A$="END"THEN RETURN
3062 | 340 IF C=1 AND A$="BA"THEN B=2:RETURN ELSE RETURN
4337 | 350 A=VAL("&H"+A$):V$=CHR$(A):IF E THEN E=0:RETURN ELSE CS=CS+A:RETURN
2623 | 360 B=B-1:IF B=0 THEN A=D:V$=CHR$(A):RETURN
4724 | 370 GOSUB 390:T=A:D=A+LOF(1):GOSUB 390:IF A=0 THEN D=A:A=T:V$=CHR$(A):RE
     |     TURN
3065 | 380 A=A*256+D:D=A\256:A=A MOD 256:V$=CHR$(A):RETURN
4613 | 390 READ A$:IF LEFT$(A$,1)<>"-"THEN IF A$="XX"THEN E=1:A$=XX$:GOTO 350 E
     |     LSE 350
3124 | 400 IF CS=VAL(MID$(A$,2))THEN CS=0:LN=LN+10:GOTO 390
4160 | 410 PRINT"DATA CHECKSUM ERROR IN LINE"LN:CLOSE 1,2:LOCATE,,0:END
     | 420 '*** PART 1 OF HELP FILE COM DATA ***
3040 | 430 DATA E9,7B,07,58,EA,00,00,00,00,48,45,80,FC,01,75,-1324
3108 | 440 DATA F4,FB,50,2E,A0,02,01,0A,C0,74,E9,1E,53,B8,40,-1696
3090 | 450 DATA 00,8E,D8,8B,1E,1A,00,A1,1C,00,3B,C3,75,04,5B,-1208
3113 | 460 DATA 1F,EB,D3,8B,07,80,FC,23,75,F5,A0,17,00,24,0E,-1633
3051 | 470 DATA 3C,0A,75,EC,A0,49,00,3C,07,74,08,3C,03,74,04,-1030
3088 | 480 DATA 3C,02,75,DD,8C,C8,8E,D8,B0,00,A2,02,01,51,52,-1602
3151 | 490 DATA 56,57,06,FC,B8,00,B8,8E,D8,BE,44,03,56,8C,C8,-1844
3083 | 500 DATA 8E,C0,BF,FC,01,81,C7,00,01,B9,10,00,51,56,B9,-1660
3109 | 510 DATA 2C,00,F3,A5,5E,81,C6,A0,00,59,E2,F1,5B,53,B0,-1939
3123 | 520 DATA C9,E8,41,01,E8,47,01,B0,BB,E8,39,01,5B,B9,0E,-1746
3031 | 530 DATA 00,81,C3,A0,00,53,E8,2B,01,83,C3,54,E8,25,01,-1523
3116 | 540 DATA 5B,E2,EF,81,C3,A0,00,B0,C8,E8,1B,01,E8,21,01,-1942
3162 | 550 DATA B0,BC,E8,13,01,8C,C8,8E,D8,E8,FC,00,B9,88,04,-2123
3030 | 560 DATA B4,0B,8B,1E,00,01,51,8A,07,3C,1A,74,46,43,3C,-986
3127 | 570 DATA 0D,74,09,3C,0A,74,F1,E8,04,01,EB,EC,59,81,C1,-1684
3126 | 580 DATA A0,00,FE,CC,75,E2,8A,07,3C,1A,74,2A,BA,04,01,-1541
3048 | 590 DATA EB,28,20,2A,20,45,4E,44,20,4F,46,20,48,45,4C,-1026
2979 | 600 DATA 50,20,2A,20,24,20,2A,2A,2A,2A,20,4D,4F,52,45,-761
3043 | 610 DATA 21,20,2A,2A,2A,2A,20,24,59,BA,F2,00,53,81,C2,-1224
3092 | 620 DATA 00,01,8B,DA,B9,1E,0C,8A,07,43,3C,24,74,05,E8,-1246
3142 | 630 DATA B2,00,EB,F4,5B,B4,00,CD,16,80,FC,49,74,2E,80,-1898
3088 | 640 DATA FC,29,74,29,80,FC,48,74,24,80,FC,51,74,12,80,-1777
3161 | 650 DATA FC,4A,74,0D,80,FC,50,74,08,80,FC,01,75,D9,EB,-1989
3115 | 660 DATA 2D,90,8A,07,3C,1A,74,D0,89,1E,00,01,E9,55,FF,-1485
3097 | 670 DATA A1,00,01,BA,7D,07,81,C2,00,01,3B,C2,74,BB,8B,-1499
3172 | 680 DATA D8,B9,0C,00,4B,8A,07,3C,0D,75,F9,E2,F7,43,EB,-1847
3158 | 690 DATA DA,8E,FC,01,81,C6,00,01,B8,00,B8,8E,C0,BF,44,-1950
3074 | 700 DATA 03,B9,10,00,51,57,B9,2C,00,F3,A5,5F,81,C7,A0,-1592
3084 | 710 DATA 00,59,E2,F1,E8,46,00,B0,FF,2E,A2,02,01,07,5F,-1602
3143 | 720 DATA 5E,5A,59,5B,1F,58,E9,4F,FE,B8,00,06,B9,13,06,-1449
     | 725 ' XX values OK
3259 | 730 DATA BA,3C,13,B7,XX,CD,10,C3,B0,BA,50,B4,XX,89,07,-1630
3202 | 740 DATA 43,43,58,C3,B9,2A,00,B0,CD,E8,EF,FF,E2,FB,C3,-2423
3247 | 750 DATA 1E,53,BB,00,B8,8E,DB,8B,D9,E8,E0,FF,8B,CB,5B,-2345
3067 | 760 DATA 1F,C3,B4,01,CD,16,74,04,B4,00,EB,F6,C3,-1610,END
     | 770 '*** PART 2 OF HELP FILE COM DATA ***
1196 | 780 DATA 1A,B8,7D,-335
2964 | 790 DATA 07,05,00,01,A3,00,01,BA,0F,08,81,C2,00,01,B4,-890
3034 | 800 DATA 09,CD,21,B8,40,00,8E,D8,A0,10,00,24,30,3C,00,-1173
3078 | 810 DATA BA,D2,08,74,37,3C,30,75,0E,B0,B0,2E,A2,60,01,-1471
3111 | 820 DATA 2E,A2,90,02,2E,A2,E4,02,33,C0,8E,D8,BB,58,00,-1668
3146 | 830 DATA 8B,0F,43,43,8B,07,8C,CB,8E,DB,89,0E,05,01,A3,-1458
3073 | 840 DATA 07,01,8E,D8,A1,09,01,3D,48,45,75,14,BA,7A,08,-1192
3121 | 850 DATA 81,C2,00,01,8C,C8,8E,D8,B4,09,CD,21,B8,00,4C,-1709
3127 | 860 DATA CD,21,BA,0B,00,81,C2,00,01,8C,C8,8E,D8,B8,16,-1663
3125 | 870 DATA 25,CD,21,BA,AE,08,81,C2,00,01,B4,09,CD,21,BA,-1580
3096 | 880 DATA 7E,07,81,C2,00,01,CD,27,0D,0A,4D,53,2D,44,4F,-1076
2991 | 890 DATA 53,20,55,73,65,72,2D,43,72,65,61,74,65,64,20,-1303
3032 | 900 DATA 48,45,4C,50,20,46,69,6C,65,20,49,6E,73,74,61,-1256
3086 | 910 DATA 6C,6C,61,74,69,6F,6E,20,50,72,6F,67,72,61,6D,-1515
3059 | 920 DATA 0D,0A,57,69,6E,64,6F,77,20,44,72,69,76,65,72,-1307
3018 | 930 DATA 20,77,72,69,74,74,65,6E,20,66,6F,72,20,38,30,-1308
3021 | 940 DATA 20,4D,69,63,72,6F,20,62,79,20,44,61,76,69,64,-1309
3006 | 950 DATA 20,47,6F,62,65,6E,0D,0A,0A,24,41,20,48,45,4C,-906
3005 | 960 DATA 50,20,46,69,6C,65,20,68,61,73,20,41,4C,52,45,-1168
3034 | 970 DATA 41,44,59,20,62,65,65,6E,20,49,6E,73,74,61,6C,-1315
3043 | 980 DATA 6C,65,64,21,20,41,62,6F,72,74,69,6E,67,21,0D,-1242
3021 | 990 DATA 0A,24,48,45,4C,50,20,46,69,6C,65,20,53,75,63,-1090
3093 | 1000 DATA 63,65,73,73,66,75,6C,6C,79,20,49,6E,73,74,61,-1529
3136 | 1010 DATA 6C,6C,65,64,2E,0D,0A,24,43,61,6E,6E,6F,74,20,-1165
3102 | 1020 DATA 69,6E,73,74,61,6C,6C,20,6F,6E,20,34,30,20,78,-1296
3029 | 1030 DATA 20,32,35,20,76,69,64,65,6F,20,63,61,72,64,21,-1177
2994 | 1040 DATA 20,41,62,6F,72,74,69,6E,67,21,0D,0A,24,-946,END
```

After it scans the file completely, the program stops without creating an executable help file if it detects errors.

If all went well, you are prompted for the destination file name. This should be a file with a COM extension. If you don't enter an extension, Help File Generator provides one. For our sample session, enter TESTHELP.COM. Now Help File Generator creates the file. This involves four steps that the program performs automatically. The first step creates the actual driver portion of the program consisting of the first section of Data statements in the listing. The second step creates the screen-save buffer, which consists of 1,408 zero bytes sent to the file. The third step merges that data in your text file to the program. The final step writes the second section of Data codes to the file, which consists of the program initialization routines. This four-step process usually requires two to three minutes, so be patient if the disk drive is inactive for several seconds. If it reports any checksum errors, edit the line listed against that provided in the magazine, correct it, and try again.

Once it finishes creating the file, Help File Generator returns you to Basic. You can return to MS-DOS by typing SYSTEM.

Using a Help File

From the MS-DOS prompt, enter the file name of the desired help file. In this sample session, type TESTHELP. The file loads and a sign-on message and a diagnostic (telling you it was successfully installed) is displayed.

Once the file is loaded, you can activate it at any time by pressing the alternate-left shift-H key sequence. The center of the text screen is instantly replaced by a box and filled with up to 11 lines of information. A line at the bottom of the box reports either "More!" or "End of text." More indicates that more text pages follow. You can use the page-down or down-arrow key to page down to the end of the file or page-up or up-arrow key to page to the beginning. Holding a key down for more than a half a second lets you skip through pages rapidly. Use the escape key to exit the help mode. When left, the screen will be restored to its original format before displaying your file.

Program Limitations

As presented, the help file only works on the 80 by 25 non-graphic text-mode screens for color or monochrome adapters (the program automatically adjusts for the proper screen addresses). While in the 40 by 25 mode or any of the graphics modes, the help file disables itself for as long as you are in these modes, as its screen format is not compatible with these formats. Also, only one help file can exist in memory at a time. Any attempt to load another file results in a diagnostic report stating that a help file has been loaded. Finally, if you have a 40 by 25 video card, the file refuses to load and will tell you so.

Figure. Sample session using Edlin to create a help file.

```
 1: This is page 1 of a sample help file.
 2:    I indented this line using spaces and
 3: ended the line at the "d" in "and" at 40
 4: characters.
 5:    Special characters can be included in
 6: the file by holding the ALT key down and
 7: typing the desired ASCII code on the
 8: keypad.
 9:
10:    Blank lines are produced by
11: pressing the enter key.
12:    This is the start of the second page.
13: Using Edlin, all page bottoms can be
14: figured by the line number being an even
15: multiple of 11.
16:    Here are some editing tips:
17: <1> Never use tab unless it is converted
18:     to spaces.
19: <2> Figure screens ahead of time to be
20:     11 lines in length.
21: <3> Do not exceed 40-character lines.
22: Line 22 is the bottom of page two
23:     This is third and final page. It
24: would normally end on line 33, but we
25: do not have to worry about it and can
26: stop beforehand, as HELPGEN will take
27: care of its proper formatting.
28:     Help has never been so easy.
```

Adding Color

By default, Help File Generator creates the window display of white characters on a black background. If you want your help files to have color, you can modify the variables FG (foreground) and BG (background) in lines 50 and 60 to the values provided in the color/text section of your *GW-Basic Reference Manual*. For example, use "1" for blue, "2" for green, or "4" for red. Notice that the foreground color is limited to the color range zero–15 and the background color to zero–7.

Conclusion

With a text processor and Help File Generator, you can quickly create customized help windows that allow you to access any of your important information. The programs remain resident in memory at all times, are not overwritten by subsequent programs, and can be accessed from any environment that is in the 80 by 25 text modes by using the alternate-left shift-H key sequence. Built-in automatic modifications for non-Tandy 1000 compatibles that use a monochrome adapter are provided, and you can add color foreground and background by modifying the values in lines 50 and 60 of the Listing. With a help window, the information you need is no more than a moment away. ■

David Goben is a programming consultant and an associate editor of 80 Micro. *Write to him at 67 Highland Road, Mansfield, CT 06250.*


DeskMate
FEB 1987
Events for today:
Make appointment with accountant
Mom's birthday -- call florist
Write confirmation letter to Wilson
05:30a Shop at fish and produce wholesale markets
07:30a Meet Bill at gym
08:30a Prepare food for Davis luncheon
11:45a Luncheon at Riverdale Country Club
02/25/87 03:30pm
Text
Worksheet
Filer
Telcom
Chart
Mail
ADDRESS
LETTER
LHEAD
MEMO
PROPOSAL
BUDGET
JANSALES
MKTGROWT
CLIENTS
MAIL
PHONE
PHOTOS
CSERVE
DOWJNS
SOURCE
AGENDA
MARCH
LAURA
MESSAGES
[F1] Date
[F2] Name
[F3] Free
[F4] Alarm
[F5] Host
[F6] Passwd
[F7] Select
[F8] Copy
[F9] Delete
[F10] Swap
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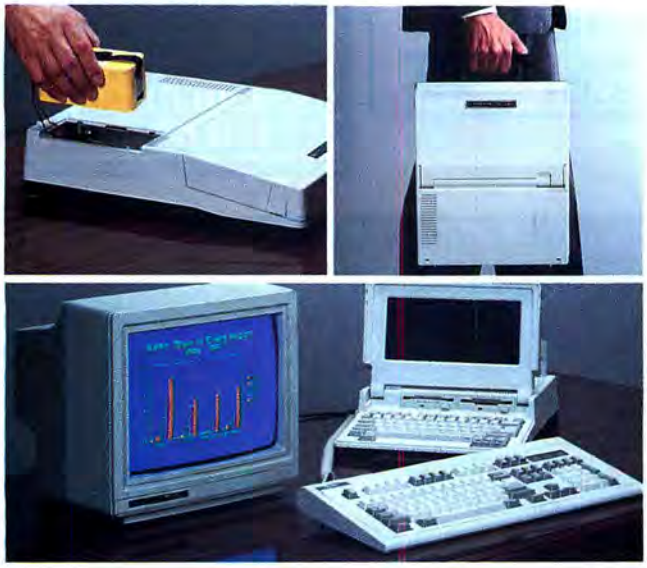

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The Amazing Shrinking Program

Makeover lets you compress or *expand your Basic listing as needed.*

Illustration by Mary Ann Smith

by Robert W. Gipson

I find expanded programs easier to read, understand, and modify. Unfortunately, they are also slower and require more memory and disk space. On the other hand, compressed programs run faster and require less memory and disk space, but they can be difficult to understand and modify.

I wrote Makeover (see the Program Listing) in an attempt to enjoy the best of both worlds. Makeover is a Basic utility that lets you modify another Basic program either by expanding the program into the maximum number of program lines or by compressing it into as few lines as possible. In compress mode, you can optionally remove unnecessary spaces or remarks.

When I write Basic programs, I almost always use the Auto command to automatically generate line numbers. I usually write one statement per line, press the enter key, and go on to the next line. Debugging the program is simple since each line is short and easily edited. I can enter additional statements by adding new program lines.

When I finish the program, I save it in ASCII format (SAVE "file name", A) and then compress it with Makeover. I then load the shorter ASCII program produced by Makeover into Basic, renumber the program lines, and save this program in tokenized format for permanent storage and use.

Expanding a normal Basic program requires the reverse procedure. I load the program into Basic, renumber the program lines in the desired increment (for example, RENUM 50,,50), save the program in ASCII format, and expand it with Makeover. Finally, I load the program produced by Makeover and edit or modify the program as I need to.

To use Makeover, your disk must contain sufficient free space to hold a new program. To be safe, allow plenty of room. When expanding a program, the new program will require approximately one and one half times the disk space the original program occupies. When compressing a program, allow the same amount of space for the new program that the original program requires.

Running Makeover

Makeover's opening menu gives you four choices:

- expand a program
- compress a program
- go to the Basic prompt
- go to the DOS prompt

When you select either of the first two

System Requirements: Basic, one or more disk drives, 128K (256K recommended), color or monochrome monitor. Available on the January–March Disk Series, on sale mid-January 1988.

options, you are prompted to enter the names of the original program and the new program that Makeover will create.

You cannot assign identical program names for input and output files in the same directory or subdirectory. However, identical program names in different directories or on different disk drives are permitted. In such cases, you must enter full path and disk-drive information.

For example, entering MYFILE.BAS as the original program name and Myfile.BAS as the new program name results in a warning message and tone and a prompt for new program names. You can enter C:MYFILE.BAS as the original program name and A:MYFILE.BAS as the new program name because the two programs will reside on different drives. Entering \BASFILES\MYFILE.BAS as the original program name and path, and \DOS\ MYFILE.BAS as the new program name and path is also permitted because the programs will reside in different directories.

Makeover also checks that the original program is stored in ASCII format. If not, you'll hear the warning tone, and a message reminds you that the input program must be an ASCII file. If the program you specify as the input file is not found in the current or specified path, you are prompted for another program name.

Makeover performs only a minimal amount of error checking. Any errors other than those mentioned above terminate the program and display a "Critical error" message on the screen. If this happens, you can identify the type of error by typing PRINT ERR. Type PRINT ERL to get the line number in which the error occurred. Refer to your *Basic Reference Manual* for an explanation of the error code.

If you elect to expand a program, the process occurs automatically. When compressing a program, however, you need to indicate whether you want to remove unneeded spaces or remark statements from the program lines. You can choose neither, one, or both of these options. The compress mode is slower than the expand mode. Removing either remark statements or spaces slows the process. Removing both requires the most time of all.

When Makeover has done its work, the new program is saved to disk and the original program remains unchanged. At that point you are asked if you want to load the new program. A positive response loads the program and reminds you to renumber the program lines. A negative response returns you to the opening menu.

How the Program Works

The program logic in Makeover is easy to follow. Put simply, Makeover expands Basic programs by separating lines at colons and adding new line numbers as needed. It compresses programs by combining lines, removing unneeded line numbers, and inserting colons as required.

Basic programs consist of lines of code, each beginning with a line number and containing one or more program statements. In a single line of code, several statements can be combined by placing a colon after each statement. A complete and acceptable line of code containing a single statement is 10 PRINT. An acceptable line of code containing three individual statements that are separated by colons is 10 PRINT:PRINT:PRINT A$.

Normally, Basic itself imposes the only limit to the number of statements possible in a single line; it limits line length to 255 characters. Makeover imposes its own upper limit to the length of a line in a compressed program. Line 4240 sets the limit

Basic as Fast as It Can

by Harry Bee

One side tells you to document your programs with remarks and descriptive variable names; make them clear with indented subsections, short lines, and whatnot, "Or you'll be sorry," they warn.

The other side tells you, "Get rid of that dead weight. It slows things down." What's a Basic programmer to do?

Both sides of this ongoing debate are correct. You're well advised to document your programs extensively, and almost everything you do toward that end causes them to operate more slowly. To help you sit comfortably twixt the horns of the dilemma, here's what you should know about making Basic faster. Let your conscience guide you.

Remarkable

First type in the following timing loop. Don't take my word for anything; test it.

```
100 TIME$ = "00:00:00
200 FOR L = 1 TO 5000
300 NEXT L
400 PRINT"Elapsed Time: "TIME$
999 END
```

Run this Program Listing for time. (You just reset your system's clock. Sorry.) Add an empty remark (such as 210 ') and run it again. That adds a second or two. Add a dozen words to the remark and run it a third time. It's slower yet.

Remarks waste Basic's time, and the more information they contain, the greater the delay. It doesn't matter that a remark isn't functional. If Basic encounters one, it reads every byte.

Excess Baggage

Basic works in a stubbornly linear fashion. It reads from the beginning of each line to the end and from the first line to the last, unless you branch it elsewhere. Every unnecessary character you put in its way takes time to process.

Put some arithmetic into the loop (210 X = X + 1). Time it, insert 30 spaces in front of the arithmetic, and run it again. Leading spaces aren't the only excess characters you can drop, but they comprise most of them.

Line Up

Long lines can be hard to read, but every time Basic starts a new line it "stutters." You can clearly read assignments (A = 12), calculations, and direct statements when you string them together to the extent a single line allows, and it's faster. What's slow (*and* difficult to read) is a long line tied in knots of convoluted logic.

A linear progression of lines also quickens a program's pace. Move the arithmetic you put in line 210 of the timing loop to line 1000, add a Return, put a Gosub to 1000 in 210, and run the program. When it has to branch, Basic takes time to get its bearings before making the leap.

Basic's critics love Gosub and hate Goto. Both are valid when you need them; both take time to execute. Don't use Goto to avoid moving a group of lines to where they belong, and don't use Gosub just to impress the nay-sayers. Functions (DEF FNX =), Gosubs in disguise, also take more time to execute than code that's immediately available to the interpreter.

Proper Names

Descriptive variable names will surely bog down your programs. Since every character in a name in GW-Basic counts, Basic must look at more characters to distinguish one from another. Compounding the felony, long names make the variable lookup table (where Basic looks up variables) longer and give the interpreter more to look through. Basic always stores two characters for each variable; more than two pays a penalty in speed.

Look Up

Each new variable makes the variable lookup table longer. Once you put a simple variable into the table, you cannot get rid of it. The

at 240 characters. You can change this number to any value lower than 255.

Expand Mode

Expanding programs has fewer pitfalls than compressing them. It takes place in three stages. First, line numbers in the original program are standardized to five digits. Line 1850 repeatedly calls the subroutine at lines 840–920 to accomplish this task.

This step ensures that the program lines for the new program will be sorted in proper order. The sort routine (lines 2210–2400) views the entire program line as a string of text. The ASCII value of one line is compared to that of another during the sort. Since the 1 in the text string 51 has a greater ASCII value than does the zero in the text string 501, in the sorted list 501 would come before 51.

The same would be true for lines beginning with similar numbers. For line numbers to sort properly, they are padded with leading zeros; 51 becomes 00051 and 510 becomes 00510. When Basic loads the new program, it ignores the leading zeros, and the lines assume their proper numbers.

The second stage of the expand mode checks each program line for multiple statements. The INSTR function in line 2020 searches for a colon (CHR$(58)). If none is found, the line does not contain multiple statements and cannot be expanded. The next line is then checked. If a colon is found, the line is examined more thoroughly to see whether it can be safely expanded.

Compressed programs run faster and require less memory and disk space.

The code beginning at line 1990 searches the line for opening and closing quotation marks. If the colon is within quotes, it is not a Basic statement separator. Line 2010 makes sure every quote is closed. If not, the line is not expanded. Line 2070 examines the line for an If statement. If the colon is not within quotes and comes before the If statement, the line can be safely expanded. If the colon comes after the If statement, expansion is risky, and Makeover goes on to the next line.

When expansion occurs, the portion of the line to the left of the colon retains the original line number. The variable LL in line 1950 is assigned the value of the line number. LL is then incremented by one, and the subroutine at line 2700 assigns this new line number (standardized to five digits) to the portion of the line to the right of the colon. The process repeats until no additional colons are found. The third and final stage of expansion combines the new and original program lines to form the new output program.

Some words of caution are appropriate at this point. First, the entire expansion process, heavily dependent upon string manipulation, is carried out in memory. With long programs, string space is at a premium. Line 970 establishes an array (LIN$(500)) to hold 500 program lines. On a Tandy

longer the table, the longer Basic takes to search it. It is important to remember you do not need to create a new variable for each new function when you already have an old one that's not busy.

The opposite is true of array variables. When you no longer need an array, erase it. Also, as you define array elements with the DIM statement, the table gets longer. Use exactly as many array elements as you need.

Order, Please

When Basic needs a variable's value, it characteristically starts searching from the beginning of the lookup table. You can take advantage of this to accelerate your programs by placing the most frequently used variables first in the table where Basic will find them more quickly.

Put X=X+1 back in line 210. Time it. Now add line 10 where you set a dozen variables to zero (10 A=0:B=0:C. . .:L=0). When you run the program, A through L go into the table first. X, which you don't use until line 210, is last. Every cycle, Basic has to search to the end of the table to find X. Now insert X=0 into line 10 before A, B, C, and the rest. That brings X to the beginning of the table and the program back to speed.

Precision Machinery

Make X an integer (10 DEFINT X). When you run the program you'll see it's 16 percent faster. Make L, the looping variable, an integer, too (10 DEFINT X,L). That gains another 10 percent. Make X a double-precision variable (10 DEFDBL X) and the program slows to a crawl. The moral: Use integers whenever you can; use double-precision variables only under threat of mayhem.

Oh, Diogenes

When you use If. . .Then. . .Else. . .If. . .Then. . .Else. . .If. . .Then, Basic takes each condition in order. If the first is false, it goes to the next and the next until it finds truth or reaches the end of the line. The earlier it finds truth, the quicker it can continue with the rest of the program. You often know which conditions are more likely to be true. Put the most likely ones up front and the least likely at the end.

Change line 210 to read:

210 IF X=1 THEN X=1 ELSE IF X=2 THEN X=2 ELSE IF X=3 THEN X=3.

Change line 10 to read 10 X=1. Run it. Then run it again for X=2 in line 10, and again for X=3.

Bringing Basic up to speed requires two things: Don't burden the interpreter with things that do nothing. (Why not put remarks at the end of the program where they're not in the way?) And build your program to work with the interpreter rather than against it. You'll never make Basic lightning fast. That's not what it's for. But you don't have to settle for turtle slow either.

More Tips

The techniques I just discussed make the most dramatic difference in how fast your programs run; you might consider the following useful items to further eliminate unnecessary programming.

Besides leading spaces, you can also drop the spaces after punctuation, around operators (such as +, /, =, or <), and after any command when the next character is a double quote, left parenthesis, comma, semicolon, or colon.

After Then and Else, Goto is as unnecessary as Let. The semicolons that separate items in a complex Print statement are just for show. You need only the final one to hold the cursor.

Speaking of printing, cram as much as possible into one Print statement, instead of using many separate Prints. Tab, when you can use it, is quicker than Locate.

Use numeric constants whenever you can, instead of variables that Basic must look up. Don't chain programs when you have the room to keep all the possible code you'll need at hand. In fact, limit all kinds of disk accesses. The drive motor takes time to get up to speed. Do as much as possible in a continuous read or write operation.

Use GW-Basic's video pages to avoid completely rewriting screens that repeat.

Don't use graphics screens unless they're absolutely necessary. A slug, no matter how pretty, is unimpressive.

Whenever you're tempted to use an empty loop to slow a program down, think of something productive for the program to do instead, such as multiplying a matrix in background. ■

Harry Bee is a free-lance writer, puzzle creator, programmer, and dreamer. Contact him at P.O. Box 567, Cornish, ME 04020.

SHRINKING PROGRAM

1000 with minimum memory, a 500-line array might be too large. If you encounter an "Out of string space" error (code 14), you need to work with fewer lines and shorter programs. Another problem can arise if the increment between line numbers in the original program is too small. In some program lines, particularly those assigning values to a large number of variables, a single line might contain 15 or more individual statements.

Assume this to be the case in line 10 of a program with lines numbered in increments of 10. When Makeover expands line 10, the first statement retains 10 as its line number. Each additional line number increases by one. Line 24 is the last line formed in this expansion. However, the next line in the original program is line 20. When the expansion of line 10 is complete, two lines in the array will have the same number. To avoid this problem, be certain that the increment between line numbers in the original program is large. I suggest an increment of 50 (RENUM 50,,50) to be safe.

Compress Mode

When you compress a program, you don't need to worry about the increment between line numbers in the original program. However, Makeover needs to keep track of line numbers that the new program must retain. These reserved line numbers are the targets of Then, Goto, Else, Gosub, Resume, and Run statements. Since the compress mode functions by combining lines and eliminating line numbers, if you eliminate one of these reserved lines, the new program will crash or run with unpredictable results. Identifying these reserved lines is the first stage in compressing a program.

Beginning at line 3350, the program builds a list of reserved line numbers. Makeover seeks out each of the key words listed above in turn. If it finds a key word, line 3550 uses the VAL function to determine whether it is immediately followed by a number. If the value of THISREF is zero, the program searches for the next occurrence of a key word.

If the value of THISREF is not equal to zero, then Makeover has discovered a reserved line number. It then checks the new number against the reserved list and adds it if not found. This process continues until all lines of the original program have been checked for reserved line numbers. When the list is complete, lines 3690–3880 sort the reserved line numbers into decreasing numeric order.

Stage two in the compress mode involves the actual compressing of the original program. Both the original and the new programs are opened as sequential files. Lines are read from the original program and, after compression occurs, printed to the new program.

If you opt to remove remark statements, lines 3940–3970 search for lines that begin with REM or an apostrophe. Makeover does not print these lines to the new program, and immediately reads another line from the old program. If you choose not to delete remark statements, these lines are immediately printed to the new program without compression. Lines 3980–4070 strip the apostrophe and remarks from the end of lines where they follow one or more program statements.

As a program line is read from the original program, lines 4180–4200 check the line number against the reserved list. If the number is found, it is not safe to join the line in any combination with other lines. Instead, it is written directly to the new program. If the line number is not found, lines 4230–4250 append the line to the previous program line. First, Makeover strips off the line number and trailing space. Then it adds a colon to the end of the previous line and attaches the remainder of this line following the colon.

If, Data, Return, and REM all cause problems in compressing program lines. When Makeover discovers these key words in a line from the original program, it immediately prints the line to the new program without compression.

If you opt to remove unneeded spaces, the task is performed on each line before it is written to the new program. The subroutine at line 590–820 removes excess spaces. It does not remove spaces within quotes. Lines 690 and 760 scrutinize all other spaces. If the character preceding or following a space is a colon, semicolon, another space, or a numeric operator, the space is removed. All other spaces are retained.

Changes for Monochrome Monitors

As written, Makeover runs on a Tandy 1000 with a color monitor. If you have a monochrome monitor, you might want to shorten the program by eliminating all Color statements. In most cases, I used longer descriptive variable labels to make the program logic easier to follow. If you want the program to operate at maximum speed and use as little memory and disk space as possible, replace the long labels with shorter ones. My machine requires the Beep Off statement in line 950 to turn on sound. This may not be true of all models. If in doubt, try it both ways. The goal is to have sound. ■

Robert W. Gipson is a United Methodist minister who has used Radio Shack and Tandy computers for business and pleasure for the past five years. Write to him at 2549 Dixie Highway, Lakeside Park, KY 41017.

Program Listing. Makeover. See page 76 for information on using checksums.

```
    10 ' ************************* MAKEOVER.BAS *************************
    20 ' ****************** WRITTEN BY ROBERT W. GIPSON ******************
    30 ' ********** 2549 DIXIE HIGHWAY, LAKESIDE PARK, KY 41017 **********
634 40 GOTO 940
    50 ' ========== SUB-ROUTINES (TARGETS OF GOSUBS) BEGIN HERE ==========
    60 ' CENTER TEXT ON SCREEN
2376 70 PRINT TAB(40-LEN(CENTER$)/2)CENTER$
 616 80 RETURN
    90 ' HANDLE ERRORS IN PROGRAM
1766 100 IF ERR=53 THEN RESUME 170
 404 110 CLS
3377 120 CENTER$="CRITICAL ERROR * * * PROGRAM TERMINATED"
 846 130 LOCATE 14,1
 700 140 GOSUB 70
 849 150 LOCATE 24,1
 398 160 END
 410 170 CLS
2419 180 CENTER$=FILE$+" PROGRAM NOT FOUND"
 852 190 LOCATE 14,1
 692 200 COLOR 12
 698 210 GOSUB 70
 577 220 PRINT
 578 230 PRINT
 698 240 COLOR 14
1806 250 IF CHOICE=1 THEN GOTO 1510
1821 260 IF CHOICE=2 THEN GOTO 2990
    270 ' REJECT DUPLICATE FILE NAMES FOR INPUT AND OUTPUT FILES
 860 280 SOUND 800,5
 413 290 CLS
3993 300 CENTER$="ORIGINAL FILE AND NEW FILE CANNOT HAVE SAME NAME"
 695 310 COLOR 31
 700 320 GOSUB 70
2562 330 CENTER$="PRESS ANY KEY TO CONTINUE"
 846 340 LOCATE 20,1
 700 350 COLOR 14
 704 360 GOSUB 70
 850 370 EN$=INKEY$
1195 380 IF EN$="" THEN 370
 414 390 CLS
 846 400 LOCATE 14,1
 661 410 RETURN
    420 ' REJECT FILES NOT SAVED IN ASCII FORMAT
 557 430 CLOSE
 858 440 SOUND 800,5
 411 450 CLS
 701 460 COLOR 31
3028 470 CENTER$="**** "+FILE$+" IS NOT AN ASCII FILE ****"
 707 480 GOSUB 70
 705 490 COLOR 14
2561 500 CENTER$="PRESS ANY KEY TO CONTINUE"
 845 510 LOCATE 20,1
 702 520 GOSUB 70
 848 530 EN$=INKEY$
1191 540 IF EN$="" THEN 530
 412 550 CLS
 853 560 LOCATE 14,1
 668 570 RETURN
    580 ' REMOVE EXECSS SPACES
1469 590 START=INSTR(C$," ")+1
1777 600 SPACE=INSTR(START,C$," ")
1461 610 IF SPACE=NO THEN 820
2228 620 STARTQUOTE=INSTR(START,C$,Q$)
1790 630 IF STARTQUOTE=0 THEN 680
2537 640 ENDQUOTE=INSTR(STARTQUOTE+1,C$,Q$)
1605 650 IF ENDQUOTE=0 THEN 820
2108 660 IF SPACE<STARTQUOTE THEN 680
3485 670 IF SPACE<ENDQUOTE THEN START=ENDQUOTE+1:GOTO 600
1755 680 BEFORE$=MID$(C$,SPACE-1,1)
2527 690 IF INSTR("+-=></:; ",BEFORE$)=0 THEN 730
2812 700 C$=MID$(C$,1,SPACE-1)+MID$(C$,SPACE+1,LEN(C$))
 931 710 GONE=GONE+1
2560 720 IF SPACE-1<START THEN START=SPACE-1
1781 730 SPACE=INSTR(START,C$," ")
1529 740 IF SPACE = NO THEN 820
1686 750 AFTER$=MID$(C$,SPACE+1,1)
2466 760 IF INSTR("+-=></:; ",AFTER$)=0 THEN 790
2819 770 C$=MID$(C$,1,SPACE-1)+MID$(C$,SPACE+1,LEN(C$))
 938 780 GONE=GONE+1
3475 790 IF GONE<>0 THEN START=SPACE+1-GONE:GONE=0:GOTO 600
1099 800 START=SPACE+1
 680 810 GOTO 600
 666 820 RETURN
    830 ' STANDARDIZE LINE NUMBERS TO FIVE DIGITS
1655 840 SPACE=INSTR(LIN$(I)," ")
1861 850 NUM$=LEFT$(LIN$(I),SPACE-1)
1106 860 NUM$="0000"+NUM$
1243 870 Z=INSTR(NUM$," ")
2571 880 IF Z<>0 THEN MID$(NUM$,Z,1)="0":GOTO 870
1402 890 NUM$=RIGHT$(NUM$,5)
2284 900 IF SHORT=1 THEN SHORT=0:RETURN
3143 910 LIN$(I)=NUM$+" "+MID$(LIN$(I),SPACE+1,LEN(LIN$(I)))
 667 920 RETURN
    930 ' INITIALIZE SCREEN FORMAT AND LAYOUT
1294 940 ON ERROR GOTO 100
 725 950 BEEP OFF
1113 960 DEFINT B-K,S-Z
1861 970 DIM LIN$(500),REFERENCE(200)
 544 980 YES=1
 460 990 NO=0
 844 1000 Q$=CHR$(34)
2529 1010 TOP$=CHR$(201)+STRING$(78,205)+CHR$(187)
2756 1020 BOTTOM$=CHR$(200)+STRING$(78,205)+CHR$(188)
1115 1030 SIDE$=CHR$(186)
 881 1040 COLOR 3,1,1
 714 1050 KEY OFF
1385 1060 VIEW PRINT 1 TO 24
 458 1070 CLS
 850 1080 LOCATE 4,1
1710 1090 CENTER$="MAKEOVER.BAS"
 740 1100 COLOR 12
 746 1110 GOSUB 70
3236 1120 CENTER$="AN EXPANDING / COMPRESSING UTILITY"
 745 1130 COLOR 14
 749 1140 GOSUB 70
3581 1150 CENTER$="FOR BASIC PROGRAMS SAVED IN ASCII FORMAT"
 746 1160 COLOR 12
 752 1170 GOSUB 70
 747 1180 COLOR 11
 850 1190 LOCATE 2,1
 935 1200 PRINT TOP$
 958 1210 FOR I=3 TO 7
 867 1220 LOCATE I,1
1047 1230 PRINT SIDE$;
 924 1240 LOCATE I,80
 990 1250 PRINT SIDE$
 657 1260 NEXT I
1168 1270 PRINT BOTTOM$
 751 1280 COLOR 14
1438 1290 VIEW PRINT 10 TO 24
 454 1300 CLS
3680 1310 PRINT TAB(10)"DO YOU WISH TO        1 )  EXPAND A PROGRAM"
 627 1320 PRINT
3329 1330 PRINT TAB(10)"                      2 )  COMPRESS A PROGRAM"
 629 1340 PRINT
3622 1350 PRINT TAB(10)"                      3 )  RETURN TO BASIC PROMPT"
 631 1360 PRINT
3501 1370 PRINT TAB(10)"                      4 )  RETURN TO DOS PROMPT"
 900 1380 EN$=INKEY$
1295 1390 IF EN$="" THEN 1380
 928 1400 EN=VAL(EN$)
 865 1410 CHOICE=EN
1718 1420 IF EN<0 OR EN>4 THEN 1380
1519 1430 IF EN=4 THEN SYSTEM
1301 1440 IF EN<>3 THEN 1490
 896 1450 COLOR 7,8,0
1390 1460 VIEW PRINT 1 TO 25
 462 1470 CLS
 452 1480 END
1594 1490 IF EN=2 THEN GOTO 2980
 456 1500 CLS
4302 1510 INPUT"ENTER NAME OF PROGRAM YOU WISH TO HAVE EXPANDED";FILE$
 629 1520 PRINT
 746 1530 COLOR 11
4496 1540 INPUT"ENTER NAME OF NEW FILE TO HOLD EXPANDED PROGRAM";NEWFILE$
2332 1550 IF FILE$<>NEWFILE$ THEN GOTO 1580
 806 1560 GOSUB 280 ' REJECT DUPLICATE FILE NAMES
 781 1570 GOTO 1510
 464 1580 CLS
 905 1590 LOCATE 14,1
 747 1600 COLOR 14
1640 1610 PS=INT(LEN(FILE$)+13)/2
1158 1620 LOCATE 14,40-PS
1634 1630 PRINT"NOW LOADING: ";
 748 1640 COLOR 11
 989 1650 PRINT FILE$
1145 1660 OPEN"I",1,FILE$
1108 1670 FOR I=1 TO 5000
1679 1680 IF EOF(1) THEN GOTO 1750
 701 1690 NL=NL+1
1505 1700 LINE INPUT#1,LIN$(I)
1922 1710 IF ASC(LIN$(I))<=58 THEN 1740
 801 1720 GOSUB 430 ' REJECT NON-ASCII FILES
 779 1730 GOTO 1510
 660 1740 NEXT I
 611 1750 CLOSE
 464 1760 CLS
3740 1770 CENTER$="STANDARDIZING LINE NUMBERS TO FIVE DIGITS"
 906 1780 LOCATE 14,1
 760 1790 GOSUB 70
1630 1800 CENTER$="PLEASE WAIT"
 902 1810 LOCATE 16,1
 754 1820 GOSUB 70
    1830 ' STANDARDIZE LINE NUMBERS TO FIVE DIGITS
1064 1840 FOR I=1 TO NL
 810 1850 GOSUB 840
 663 1860 NEXT I
    1870 ' EXPAND LINES OF SELECTED PROGRAM
 615 1880 SL=NL
 570 1890 INC=1
 460 1900 CLS
 955 1910 LOCATE 14,16
2649 1920 PRINT"NOW PROCESSING LINE NUMBER: "
 753 1930 COLOR 14
1065 1940 FOR I=1 TO NL
1177 1950 LL=VAL(LIN$(I))
 962 1960 LOCATE 14,45
 757 1970 COLOR 14
 823 1980 PRINT LL
2159 1990 STARTQUOTE=INSTR(LIN$(I),Q$)
2891 2000 ENDQUOTE=INSTR(STARTQUOTE+1,LIN$(I),Q$)
3280 2010 IF STARTQUOTE<>0 AND ENDQUOTE=0 THEN GOTO 2180
1752 2020 J=INSTR(LIN$(I),CHR$(58))
1876 2030 IF STARTQUOTE=0 THEN 2060
1902 2040 IF J<STARTQUOTE THEN 2060
3793 2050 IF J<ENDQUOTE THEN J=INSTR(ENDQUOTE+1,LIN$(I),CHR$(58))
2028 2060 IF J=0 AND CH=0 THEN GOTO 2180
2716 2070 F=INSTR(LIN$(I),CHR$(73)+CHR$(70)+CHR$(32))
2566 2080 IF F<>0 AND F<J AND CH=0 THEN GOTO 2180
3312 2090 IF F<>0 AND F<J AND CH<>0 THEN GOSUB 2890:GOTO 2170
2023 2100 IF J=0 AND CH=0 THEN GOTO 2180
2760 2110 IF J=0 AND CH<>0 THEN GOSUB 2800:GOTO 2170
1632 2120 IF J<>0 THEN GOSUB 2700
2086 2130 IF J=0 AND CH<>0 THEN GOTO 2170
2436 2140 LIN$(I)=MID$(LIN$(I),J+1,LEN(LIN$(I)))
2088 2150 IF J=0 AND CH<>0 THEN GOTO 2170
 789 2160 GOTO 1990
1991 2170 IF CH<>0 THEN LIN$(I)=FIRST$
 483 2180 CH=0
 660 2190 NEXT I
 526 2200 N=SL
    2210 ' SORT ROUTINE FOR PROGRAM LINES BEGINS HERE
 456 2220 CLS
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Listing continued

Listing continued

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2640  223Ø CENTER$="REARRANGING PROGRAM LINES"
 898  224Ø LOCATE 14,1
 752  225Ø GOSUB 7Ø
 749  226Ø SORTØ=N
1049  227Ø SORT1=SORTØ
1193  228Ø SORT1=SORT1\2
1809  229Ø IF SORT1=Ø THEN GOTO 241Ø
1466  23ØØ SORT2=SORTØ-SORT1
1587  231Ø FOR SORT3=1 TO SORT2
1051  232Ø SORT4=SORT3
1474  233Ø SORT5=SORT4+SORT1
2895  234Ø IF LIN$(SORT4)<=LIN$(SORT5) THEN GOTO 238Ø
2074  235Ø SWAP LIN$(SORT4),LIN$(SORT5)
1478  236Ø SORT4=SORT4-SORT1
1813  237Ø IF SORT4>Ø THEN GOTO 233Ø
 967  238Ø NEXT SORT3
 787  239Ø GOTO 228Ø
      24ØØ ' SORT ROUTINE FOR PROGRAM LINES ENDS HERE
 457  241Ø CLS
 898  242Ø LOCATE 14,1
1874  243Ø PS=INT(LEN(NEWFILE$)+12)/2
1159  244Ø LOCATE 14,4Ø-PS
1581  245Ø PRINT"NOW SAVING: ";
 749  246Ø COLOR 11
1224  247Ø PRINT NEWFILE$
1386  248Ø OPEN"O",1,NEWFILE$
1071  249Ø FOR I=1 TO SL
1205  25ØØ PRINT #1,LIN$(I)
 656  251Ø NEXT I
 607  252Ø CLOSE
 460  253Ø CLS
2949  254Ø CENTER$="DO YOU WANT TO LOAD "+NEWFILE$+"?"
 902  255Ø LOCATE 14,1
 756  256Ø GOSUB 7Ø
 902  257Ø EN$=INKEY$
1299  258Ø IF EN$="" THEN 257Ø
2271  259Ø IF INSTR("yYNn",EN$)=Ø THEN 257Ø
2114  26ØØ IF INSTR("yY",EN$)=Ø THEN RUN
 459  261Ø CLS
 944  262Ø LOCATE 14,1,
3472  263Ø CENTER$="AT BASIC PROMPT, TYPE "+Q$+"RENUM 5Ø,,5Ø"+Q$
 755  264Ø GOSUB 7Ø
1392  265Ø VIEW PRINT 1 TO 25
 901  266Ø LOCATE 2Ø,1
1117  267Ø LOAD NEWFILE$
 455  268Ø END
      269Ø ' CODE TO EXPAND PROGRAM LINES BEGINS HERE
 664  27ØØ CH=CH+1
3604  271Ø IF CH=1 THEN LL$=MID$(LIN$(I),1,J-1):FIRST$=LL$:RETURN
 861  272Ø LL=LL+INC
1091  273Ø NUM$=STR$(LL)
 747  274Ø SHORT=1
 812  275Ø GOSUB 86Ø ' STANDARDIZE LINE NUMBERS TO FIVE DIGITS
2007  276Ø LL$=NUM$+" "+MID$(LIN$(I),1,J-1)
 711  277Ø SL=SL+1
 993  278Ø LIN$(SL)=LL$
 722  279Ø RETURN
 665  28ØØ CH=CH+1
 861  281Ø LL=LL+INC
1091  282Ø NUM$=STR$(LL)
 747  283Ø SHORT=1
 812  284Ø GOSUB 86Ø ' STANDARDIZE LINE NUMBERS TO FIVE DIGITS
1367  285Ø LL$=NUM$+" "+LIN$(I)
 711  286Ø SL=SL+1
 993  287Ø LIN$(SL)=LL$
 722  288Ø RETURN
 869  289Ø LL=LL+INC
1Ø9Ø  29ØØ NUM$=STR$(LL)
 746  291Ø SHORT=1
 811  292Ø GOSUB 86Ø ' STANDARDIZE LINE NUMBERS TO FIVE DIGITS
1366  293Ø LL$=NUM$+" "+LIN$(I)
 71Ø  294Ø SL=SL+1
 992  295Ø LIN$(SL)=LL$
 721  296Ø RETURN
      297Ø ' CODE TO COMPRESS PROGRAM LINES BEGINS HERE
 469  298Ø CLS
4437  299Ø LINE INPUT"ENTER NAME OF THE PROGRAM TO BE COMPRESSED  : ";FILE$
 624  3ØØØ PRINT
 741  3Ø1Ø COLOR 11
4738  3Ø2Ø LINE INPUT"ENTER NAME FOR THE FINAL COMPRESSED PROGRAM : ";NEWFILE$
2322  3Ø3Ø IF FILE$<>NEWFILE$ THEN GOTO 3Ø6Ø
 801  3Ø4Ø GOSUB 28Ø ' REJECT DUPLICATE FILE NAMES
 789  3Ø5Ø GOTO 299Ø
 459  3Ø6Ø CLS
 9ØØ  3Ø7Ø LOCATE 14,1
3710  3Ø8Ø CENTER$="DO YOU WISH TO DELETE UNNCECSSARY SPACES?"
 755  3Ø9Ø GOSUB 7Ø
 892  31ØØ EN$=INKEY$
1279  311Ø IF EN$="" THEN 31ØØ
2251  312Ø IF INSTR("yYnN",EN$)=Ø THEN 31ØØ
3662  313Ø IF INSTR("Yy",EN$) THEN DOSPACE=YES ELSE DOSPACE=NO
 629  314Ø PRINT
3641  315Ø CENTER$="DO YOU WISH TO DELETE REMARK STATEMENTS?"
 753  316Ø GOSUB 7Ø
 899  317Ø EN$=INKEY$
1293  318Ø IF EN$="" THEN 317Ø
2265  319Ø IF INSTR("yYnN",EN$)=Ø THEN 317Ø
3832  32ØØ IF INSTR("Yy",EN$) THEN DOREMARK=YES ELSE DOREMARK=NO
 456  321Ø CLS
 747  322Ø COLOR 14
 898  323Ø LOCATE 14,1
2866  324Ø CENTER$="MAKING LIST OF RESERVED LINES"
 753  325Ø GOSUB 7Ø
1632  326Ø CENTER$="PLEASE WAIT"
 904  327Ø LOCATE 16,1
 756  328Ø GOSUB 7Ø
1178  329Ø OPEN "I",1,FILE$
1329  33ØØ IF EOF(1) THEN 368Ø
1220  331Ø LINE INPUT #1,A$
1949  332Ø IF ASC(A$)<=58 THEN GOTO 335Ø
 8ØØ  333Ø GOSUB 43Ø ' REJECT NON-ASCII FILES
 791  334Ø GOTO 299Ø
 792  335Ø START1=1
 794  336Ø START2=1
 796  337Ø START3=1
 798  338Ø START4=1
 8ØØ  339Ø START5=1
 793  34ØØ START6=1
 938  341Ø STANDARD=4
2162  342Ø FOUND=INSTR(START1,A$,"THEN")
3288  343Ø IF FOUND THEN START1=FOUND+STANDARD:GOTO 355Ø
2175  344Ø FOUND=INSTR(START2,A$,"GOTO")
3291  345Ø IF FOUND THEN START2=FOUND+STANDARD:GOTO 355Ø
2162  346Ø FOUND=INSTR(START3,A$,"ELSE")
3294  347Ø IF FOUND THEN START3=FOUND+STANDARD:GOTO 355Ø
2252  348Ø FOUND=INSTR(START4,A$,"GOSUB")
4Ø62  349Ø IF FOUND THEN STANDARD=5:START4=FOUND+STANDARD:GOTO 355Ø
2327  35ØØ FOUND=INSTR(START5,A$,"RESUME")
4Ø57  351Ø IF FOUND THEN STANDARD=6:START5=FOUND+STANDARD:GOTO 355Ø
211Ø  352Ø FOUND=INSTR(START6,A$,"RUN")
4Ø57  353Ø IF FOUND THEN STANDARD=3:START6=FOUND+STANDARD:GOTO 355Ø
 779  354Ø GOTO 33ØØ
2635  355Ø THISREF=VAL(MID$(A$,FOUND+STANDARD))
1967  356Ø IF THISREF=Ø THEN GOTO 341Ø
1798  357Ø FOR CHECK=1 TO TOTALREF
3787  358Ø IF REFERENCE(CHECK)<>THISREF THEN NEXT CHECK ELSE 361Ø
1612  359Ø TOTALREF=TOTALREF+1
2172  36ØØ REFERENCE(TOTALREF)=THISREF
1691  361Ø FOUND=FOUND+STANDARD
 938  362Ø STANDARD=1
1888  363Ø FOUND1=INSTR(FOUND,A$,",")
1904  364Ø FOUND2=INSTR(FOUND,A$,";")
1526  365Ø IF FOUND1=Ø THEN 367Ø
4Ø23  366Ø IF (FOUND2=Ø OR FOUND1<FOUND2) THEN FOUND=FOUND1:GOTO 355Ø
 785  367Ø GOTO 341Ø
 615  368Ø CLOSE
      369Ø ' SORT ROUTINE FOR RESERVED LINE NUMBERS BEGINS HERE
 46Ø  37ØØ CLS
2939  371Ø CENTER$="SORTING RESERVED LINE NUMBERS"
 9Ø2  372Ø LOCATE 14,1
 756  373Ø GOSUB 7Ø
1284  374Ø SORTØ=TOTALREF
1Ø53  375Ø SORT1=SORTØ
1197  376Ø SORT1=SORT1\2
1826  377Ø IF SORT1=Ø THEN GOTO 389Ø
1479  378Ø SORT2=SORTØ-SORT1
16ØØ  379Ø FOR SORT3=1 TO SORT2
1Ø55  38ØØ SORT4=SORT3
1478  381Ø SORT5=SORT4+SORT1
3628  382Ø IF REFERENCE(SORT4)>REFERENCE(SORT5) THEN GOTO 386Ø
2862  383Ø SWAP REFERENCE(SORT4),REFERENCE(SORT5)
1482  384Ø SORT4=SORT4-SORT1
1821  385Ø IF SORT4>Ø THEN GOTO 381Ø
 971  386Ø NEXT SORT3
 795  387Ø GOTO 376Ø
      388Ø ' SORT ROUTINE FOR RESERVED LINES ENDS HERE
1184  389Ø OPEN "I",1,FILE$
1417  39ØØ OPEN "O",2,NEWFILE$
 463  391Ø CLS
1327  392Ø IF EOF(1) THEN 43ØØ
1228  393Ø LINE INPUT #1,A$
1801  394Ø IF DOREMARK=NO THEN 4ØØØ
1975  395Ø IF INSTR(A$," REM ") THEN 392Ø
1785  396Ø FIRSTSPACE=INSTR(A$," ")
2588  397Ø IF MID$(A$,FIRSTSPACE+1,1)="'" THEN 392Ø
 68Ø  398Ø SPOT=1
2215  399Ø STARTQUOTE=INSTR(SPOT,A$,Q$)
1986  4ØØØ IF STARTQUOTE=Ø THEN 4Ø3Ø
2578  4Ø1Ø ENDQUOTE=INSTR(STARTQUOTE+1,A$,Q$)
1698  4Ø2Ø IF ENDQUOTE=Ø THEN 4Ø8Ø
1548  4Ø3Ø AP=INSTR(SPOT,A$,"'")
1232  4Ø4Ø IF AP=Ø THEN 4Ø8Ø
1883  4Ø5Ø IF STARTQUOTE=Ø THEN 4Ø7Ø
4588  4Ø6Ø IF STARTQUOTE<AP AND ENDQUOTE>AP THEN SPOT=ENDQUOTE+1:GOTO 399Ø
12Ø9  4Ø7Ø A$=MID$(A$,1,AP-1)
2362  4Ø8Ø FOR CHECK=INSTR(A$," ") TO LEN(A$)-1
2656  4Ø9Ø IF MID$(A$,CHECK+1,1)=" " THEN NEXT CHECK
 876  41ØØ CUT=CHECK
 854  411Ø LN=VAL(A$)
 947  412Ø LOCATE 14,21
 745  413Ø COLOR 11
2Ø85  414Ø PRINT"NOW PROCESSING LINE NUMBER: ";
 748  415Ø COLOR 12
 818  416Ø PRINT LN
1884  417Ø IF C$="" THEN C$=A$:GOTO 392Ø
1696  418Ø IF TOTALREF=Ø THEN 421Ø
4328  419Ø IF LN=REFERENCE(TOTALREF) THEN TOTALREF=TOTALREF-1:GOTO 426Ø
4314  42ØØ IF LN>REFERENCE(TOTALREF) THEN TOTALREF=TOTALREF-1:GOTO 418Ø
3356  421Ø IF INSTR(C$,"RETURN") OR INSTR(C$,"DATA") THEN 426Ø
3385  422Ø IF INSTR(C$,"IF ") OR INSTR(C$,"REM ") OR INSTR(C$,"'")THEN 426Ø
1746  423Ø V$=RIGHT$(A$,LEN(A$)-CUT)
3373  424Ø IF LEN(C$)+LEN(V$)<24Ø THEN C$=C$+":"+V$ ELSE GOTO 426Ø
 786  425Ø GOTO 392Ø
2165  426Ø IF DOSPACE=YES THEN GOSUB 59Ø ' REMOVE EXCESS SPACES
 898  427Ø PRINT #2,C$
 5Ø3  428Ø C$=A$
 79Ø  429Ø GOTO 392Ø
2168  43ØØ IF DOSPACE=YES THEN GOSUB 59Ø ' REMOVE EXCESS SPACES
 893  431Ø PRINT #2,C$
 6Ø7  432Ø CLOSE
 46Ø  433Ø CLS
2958  434Ø CENTER$="DO YOU WISH TO LOAD "+NEWFILE$+"?"
 9Ø2  435Ø LOCATE 14,1
 756  436Ø GOSUB 7Ø
 9Ø2  437Ø EN$=INKEY$
1299  438Ø IF EN$="" THEN 257Ø
2271  439Ø IF INSTR("yYNn",EN$)=Ø THEN 257Ø
2114  44ØØ IF INSTR("yY",EN$)=Ø THEN RUN
 459  441Ø CLS
 9ØØ  442Ø LOCATE 14,1
3472  443Ø CENTER$="AT BASIC PROMPT, TYPE "+Q$+"RENUM 5Ø,,5Ø"+Q$
 755  444Ø GOSUB 7Ø
1392  445Ø VIEW PRINT 1 TO 25
 9Ø1  446Ø LOCATE 2Ø,1
1117  447Ø LOAD NEWFILE$
 455  448Ø END
```
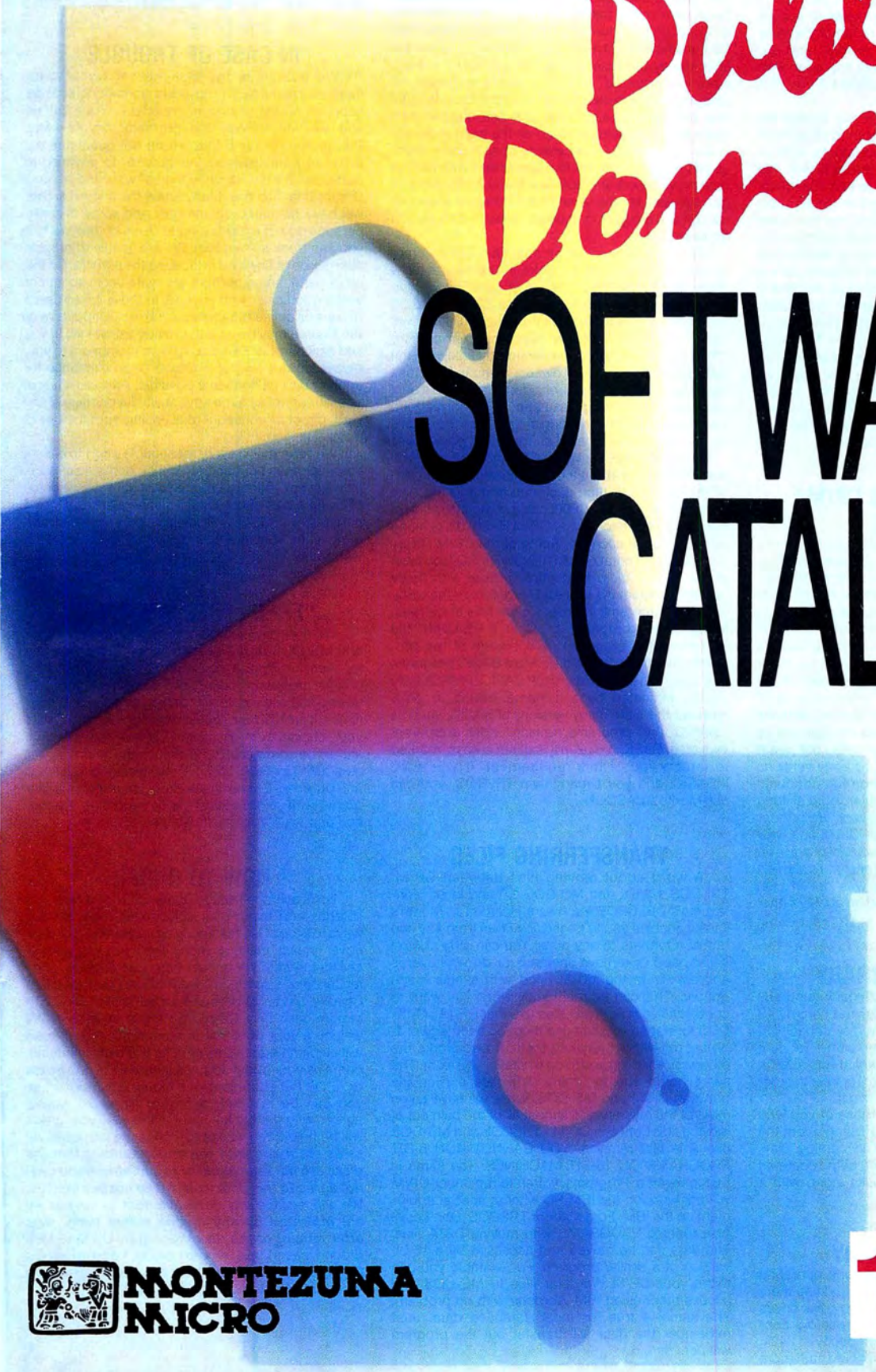

End

Public Domain SOFTWARE CATALOG



MONTEZUMA MICRO

1988

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 MS-DOS® and CP/M® 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 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.

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.

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 the following 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 the authors. On the other hand, some authors are quite vocal about not wishing to speak with anyone. In those cases user's 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. Shareware authors should submit programs with explicit instructions regarding distribution and we will follow those instructions exactly.

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.

MS-DOS® PUBLIC DOMAIN LIBRARY

MS-DOS DS 360K Disk Format

Requires MS-DOS 2.0 or later

- ☐ **M000 CATALOG DISK - DESCRIBES ALL PROGRAMS**
- ☐ **M001** Games in BASIC; Print spoolers/utilities; Structured BASIC translator
- ☐ **M002** Database; Modem program; Financial programs in BASIC; DOS Help system
- ☐ **M003** Various financial programs in BASIC
- ☐ **M004** BASIC listing utility; BASIC cross-reference utility; Math tutor package
- ☐ **M005** Games; Utilities; Cheap Assembler (8086 assembler in BASIC)
- ☐ **M006** Disk speedup utility; Demo games in BASIC; Sound programs in BASIC
- ☐ **M007** StarTrek game; Drawing program; Bar graphs in BASIC; Word processor demo
- ☐ **M008** Games, some in color & using joysticks
- ☐ **M009** IQ builder series; Drawing programs; Music; Disk I/O for IBM Pascal
- ☐ **M010** Games; Package for bowling league secretary
- ☐ **M011** Games; Book indexing system in Pascal; Directory utility; File squeezer
- ☐ **M012** Graphic demo of sort; Disk Zap in BASIC; Text file formatter & utilities
- ☐ **M013** Assorted utilities: Directory, Batch file manager, Screen
- ☐ **M014** Games; Drawing program; Keyboard utilities; Mini word processor
- ☐ **M015** Assorted Pascal utilities; Programmer's calculator; Batch language processor.
- ☐ **M016** Poor man's Flight Simulator; Stock market analysis; Communication utilities
- ☐ **M017** Kermit Communications system - Disk 1 of 2: Program & source code
- ☐ **M018** Kermit Communication System - Disk 2 of 2: Documentation
- ☐ **M019** Various games in BASIC; Children's word processing system
- ☐ **M020** Games; various programs in BASIC; Hebrew character set system (color req)
- ☐ **M021** RUNOFF text formatter (in C); Many small utilities
- ☐ **M022** Many games & utilities; XMODEM communications program (ASM)
- ☐ **M023** Games; Text file utility; BASIC variable lister; History education program
- ☐ **M024** Text processing tools: Sort, Find, Change, Compare, etc.
- ☐ **M025** Print utilities; Keyboard template maker; Non-linear growth projection
- ☐ **M026** DESKTOP - A Lotus 1-2-3 worksheet implements some functions of a desktop
- ☐ **M027** Assorted games and utilities
- ☐ **M028** WordFlex Word processor V 1.34; DiskCat - a disk cataloging system
- ☐ **M029** Color graphics editing program; Games; PC Professor (BASIC tutorial)
- ☐ **M030** Three dimensional graphics; Modem communications program
- ☐ **M031** Pascal utilities demo
- ☐ **M032** Forms manager demo; Graphics; Printer art; Games & music
- ☐ **M034** Assorted utilities; Communications programs; PC music software
- ☐ **M035** Batch file utilities; Games; Screen & Epson printer utilities
- ☐ **M036** Assorted utilities in C and BASIC; VisiCalc templates for taxes, etc.
- ☐ **M038** Assorted utilities; Adventure & other games
- ☐ **M040** Music & picture programs; Disassembler for 8086; BASIC conversion aids
- ☐ **M041** Ladybug game in a form of Logo; Form letters for business use
- ☐ **M042** Information and instructions for The Source; Assorted financial programs
- ☐ **M043** Source & CompuServe access numbers; Info about CompuServe IBM SIG
- ☐ **M044** Games with music & graphics; Diskette cataloging system
- ☐ **M045** dBASE II Ad agency accounting package; Home financial package
- ☐ **M046** CompuServe sampler - Instructions & information about various services
- ☐ **M047** APL programs (IBM APL req.); Assembler utilities, macros; Assorted stuff
- ☐ **M048** Utilities: Filters, printer setup, filing, text, memory, calculator
- ☐ **M050** Screen management; File compare; Keyboard redefinition; Assembly lang. tutorial
- ☐ **M051** Utilities - keyboard & file compress; Pictures; ABC database system
- ☐ **M052** MicroGourmet - a dBASE II system dealing with foods
- ☐ **M053** DOS Menu & security package; Financial programs
- ☐ **M054** PC-Chess game; PC-DIAL modem communications program
- ☐ **M055** LETUS A-B-C Disk #1: PC-FILE III database of magazine articles
- ☐ **M056** LETUS A-B-C Disk #2: PC-FILE III database of magazine articles
- ☐ **M057** LETUS A-B-C Disk #3: PC-FILE III database of magazine articles
- ☐ **M058** HOST-III Public bulletin board package to set up your PC as a BBS
- ☐ **M059** dBASE II form letters, mailing labels, library, utilities; Easywrite WP
- ☐ **M060** Pascal tools Disk 1 of 3 - Adapted from "Software tools in Pascal"
- ☐ **M061** Pascal tools Disk 2 of 3 - Adapted from "Software tools in Pascal"
- ☐ **M062** Pascal tools Disk 3 of 3 - Adapted from "Software tools in Pascal"
- ☐ **M063** Essential utilities - Unerase, Disk Zap, Disk format
- ☐ **M064** Lisp interpreter; Find utility; 8087 macros; Library utility
- ☐ **M065** PC-Picture color graphics package; Extensive HANGMAN game
- ☐ **M066** Screen editor in C; C utilities with source; Keyboard utilities
- ☐ **M067** Assorted utilities (some exotic); 8087 software; file squeeze/unsqueeze
- ☐ **M068** Utilities for screen, dialing; Budget-Taskplan-Loan package
- ☐ **M069** Utilities - BASIC programming aid, DOS functions in BASIC
- ☐ **M070** Utilities - File compare, etc.; Program to maintain list of references
- ☐ **M071** Assorted file squeeze programs; Complete bulletin board system
- ☐ **M072** Simple Database System; C program to generate dBASE II screens
- ☐ **M073** XLisp interpreter written in C, with source; Math & statistics (BASIC)
- ☐ **M074** Finance manager; Printer art
- ☐ **M076** IBM Users Group newsletter #1; Personal Finance Manager package
- ☐ **M077** IBM Users Group Newsletter #2; IBM Macro Assembler tutorial
- ☐ **M078** IBM Users Group Newsletter #3; Assorted C utilities with source
- ☐ **M079** PC Firing Line & PC Underground #1 - Newsletters with some programs
- ☐ **M080** PC Firing Line Issue 2 Volume 1 - ADA reviews, DOS tutorial
- ☐ **M081** PC Firing Line Issue 2 Volume 2 - Forth compiler (Doc in Volume 1)
- ☐ **M082** Structured BASIC preprocessor; Personal General Ledger
- ☐ **M083** Music & Educational programs; Mailing list; dBASE III household inventory
- ☐ **M084** Spreadsheets: FREECALC V 1.00, PC-PAD V 1.3, MINICALC
- ☐ **M085** Assorted games and a few utilities
- ☐ **M086** Mixed bag of games: Civil War, Adventure, Baseball, Robot fight
- ☐ **M087** Arcade games, chess, StarTrek, etc; Diskette utilities
- ☐ **M088** Pizza recipes; Check register system; Simple file manager systems
- ☐ **M089** Assorted DOS utilities, sorted directory, file squeeze/unsqueeze
- ☐ **M090** Data communications software & files; WordStar print for Epson FX
- ☐ **M091** Text editors; Pharmacist's program for IV electrolytes; Will program for CA
- ☐ **M092** Editor; Graphics software; WordStar convert; Financial software
- ☐ **M093** Health & risk appraisal program converted from Center for Disease Control
- ☐ **M094** ROFF Text processor (C); Integral calc (C & Pascal); Graph & sketch
- ☐ **M095** Utilities: Directory compare, rename, copy, delete; StarTrek w/ graphics
- ☐ **M096** Adventure game; RAM disk; Communications programs from MIT
- ☐ **M097** PC-CALC spreadsheet by the author of PC-FILE
- ☐ **M098** IBM Users Group Newsletter #4; Copy & delete utilities in Pascal
- ☐ **M099** Scott Adams Adventure; Games; Various DOS utilities
- ☐ **M100** BASIC programming aids; Sort; File compare; Lotus 1-2-3 templates/tools
- ☐ **M101** Games: Arcade & adventure; Address manager
- ☐ **M102** Speed reading demo; Adventure game compiler system
- ☐ **M103** Complete RBBS bulletin board system - more files on disk #191
- ☐ **M104** Database of Steel Volume 1 of 4: Spreadsheet, database, expert system
- ☐ **M105** Database of Steel Volume 2 of 4: Others on M140 & M141
- ☐ **M106** Directory lister; File dump; Turbo Pascal utilities; Screen print
- ☐ **M107** MapMaker: Program & data for Florida; PC-Font - Print special characters
- ☐ **M108** Utilities package for Prowriter printer; Improved disk copy utility
- ☐ **M109** NEC 8023A Utilities; Assorted games
- ☐ **M110** Utility programs with ASM and Pascal source; PC-CALC - small spreadsheet
- ☐ **M111** Games: Funnels & Buckets, Air Traffic Control; Printer utilities
- ☐ **M112** Data encryption system; Mini word processor; Math functions
- ☐ **M113** Fully interactive statistics package: Enter, manage, analyze data
- ☐ **M114** Database system; Stock charting system
- ☐ **M115** Parts inventory control; BASIC development system for IBM, Compaq BASIC
- ☐ **M116** Complete General Ledger system for the PC
- ☐ **M117** Sprite generation; Unprotect info; Slide generation software
- ☐ **M118** Extensive genealogy system; Math complex function & others for Pascal
- ☐ **M119** Educational games; Data communications software
- ☐ **M120** Commodities trading system; A collection of the better utility programs
- ☐ **M122** Ulta-Utility & Ultra-Mind (Intelligent database); Tax record keeping
- ☐ **M123** Complete business database system
- ☐ **M124** Educational programs for Math, Science, Finance
- ☐ **M125** Menu driven directory; Checkbook manager; Printer control; File finder
- ☐ **M127** Menu driven label producer; Program to determine phase, position of moon
- ☐ **M129** Assorted utilities; EAMON - fantasy, role-playing game
- ☐ **M130** Assorted utilities; Very good trivia game
- ☐ **M132** A fine D & D type adventure game written in C
- ☐ **M133** Extensive game disk, many in BASIC
- ☐ **M134** Personal date book; Mailing list; File management
- ☐ **M135** Golf score analysis program; Trivia and other games in BASIC
- ☐ **M136** Laxon & Perry Forth: Disk 1 of 2
- ☐ **M137** Laxon & Perry Forth: Disk 2 of 2
- ☐ **M138** Mixed graphic & printer utilities; Utilities for EAMON game on disk #129
- ☐ **M139** Data from National Assessment of Education Prog. Int. Ret. system
- ☐ **M140** Database of Steel Volume 3 of 4: Spreadsheet, database, expert system
- ☐ **M141** Database of Steel Volume 4 of 4: Others on M104 & M105
- ☐ **M142** Collection of files and routines written in Turbo Pascal for the IBM-PC
- ☐ **M143** SpaceWar game for color or Hercules graphics & other games
- ☐ **M144** A collection of some of the better games in the Public Domain
- ☐ **M145** PC Check manager; Printer and font control; BASIC subroutine package
- ☐ **M146** List files on printer in columnar format
- ☐ **M147** File finder utility; Batch file extensions; Block print
- ☐ **M148** Pianoman - Playing, recording, editing music with many songs included
- ☐ **M149** Bibliography of various PC magazines
- ☐ **M150** Bibliography of 1800 recipes in women's magazines. Lotus 1-2-3 or dBASE
- ☐ **M151** Checkbook distribution program; Forecast/analyze costs of home ownership
- ☐ **M152** Utilities for file manipulation; Golf scorecard system
- ☐ **M153** Utilities: Label maker, Disk Zap and others
- ☐ **M154** High speed routines for screen I/O in BASIC
- ☐ **M155** Emulator which makes PC function like VT102 or VT100 terminal
- ☐ **M157** AdventureWare: Five text adventure games from mystery to horror film
- ☐ **M158** A prime collection of colorful arcade games
- ☐ **M159** EDIT V1.11 - A general purpose text editor and word processing program
- ☐ **M160** Pascal simulations; Adventure game in BASIC; Utilities for hackers
- ☐ **M161** Simple utilities; StarTrek game; Assorted tidbits
- ☐ **M162** Operating hints, tech notes, utilities, and templates for use with 1-2-3
- ☐ **M163** Assorted worksheets for use with 1-2-3: Amortization, depreciation, etc.
- ☐ **M164** Lotus 1-2-3 demo, tech notes, and worksheets
- ☐ **M165** Lotus 1-2-3 macro library and worksheets
- ☐ **M166** Symphony worksheets: Name & address notebook, appointment calendar, etc.
- ☐ **M167** Symphony worksheets; PC-STOCK finance program; PC-GL double entry accounting
- ☐ **M168** Assembly language mystery disk - good for learning more about ASM
- ☐ **M169** Assembly language mysteries — mixed programs, try to figure them out
- ☐ **M171** Database of nearly 2,000 movies on videotape; Assorted BASIC games
- ☐ **M172** Program to design display screens to be called from BASIC, ASM, etc.
- ☐ **M173** Assorted business programs: Depreciation, calculator, project manager, more
- ☐ **M174** Source programs in C: GREP, LUMP, XENIX Disk I/O
- ☐ **M175** Assorted C subroutines; Pascal programs for scientists & engineers
- ☐ **M176** Popular communications utilities; The Creator, a database management system
- ☐ **M177** Database programs: labels, schedules, etc.; Loan amortization & prospect list
- ☐ **M178** dBASE II programs: examples & collection of utilities (dBASE II required)
- ☐ **M179** Utilities: Find files, DOS shells, disk catalog, and much more
- ☐ **M180** Tutorial on IBM PC keyboard and a typewriter program
- ☐ **M181** Home applications: Currency exchange, Alarm clock, Area code finder, more
- ☐ **M182** Music utility in BASIC; Turbo Pascal graphic and window routines
- ☐ **M183** Programs for stock tracking and analysis
- ☐ **M184** Turbo Pascal programs: Hi-res graphics, calculator, tools, more
- ☐ **M185** Programs for PC user logging, timekeeping, job starting and ending
- ☐ **M186** Assorted Epson printer utilities
- ☐ **M187** UnifForth sampler: Assembler, editor, floating point, Forth-83 standard
- ☐ **M188** General ledger, check register, and two mailing list programs
- ☐ **M189** Kinetics Linear Programming System V 1.9
- ☐ **M190** The renowned FIDO Bulletin Board System
- ☐ **M191** Disk 2 of the RBBS system — first disk is #103
- ☐ **M192** ABC Design Disk 1 of 2: Design character graphics and edit color images
- ☐ **M193** ABC Design Disk 2 of 2: Documentation for disk #192
- ☐ **M194** Menu driven communications package
- ☐ **M195** Forms driven database management system with mailmerge capabilities
- ☐ **M196** Programs and subroutines in C; Database of PC articles from 2nd qtr '84

- ☐ **M197** Programs for screen drawing, graphics printing, and slide show capability
- ☐ **M198** Demo files for disk #197
- ☐ **M199** Complete paint program for medium resolution graphics, need CGA
- ☐ **M200** PC-FOIL: Generate & edit displays that combine words with diagrams
- ☐ **M201** LETUS A-B-C #4: Database of magazine articles about PC from 1st qtr '84
- ☐ **M202** LETUS A-B-C #5: Database of articles from 2nd qtr. '84 about PC
- ☐ **M203** Turbo tools: A collection of handy tools for use with Turbo Pascal
- ☐ **M204** Forth interpreters: Three different versions for beginner or hacker
- ☐ **M205** Assorted Pascal programs for use with Turbo Pascal
- ☐ **M206** Games for PC Jr.
- ☐ **M207** PC-ZAP: Dump, verify, replace file data;NMR spectroscopy & statistics
- ☐ **M208** Replacement for IBM PC console software — faster screen I/O, ANSI codes
- ☐ **M209** BASIC cross reference utility
- ☐ **M210** Stock portfolio system demo; File conversion, copy, delete utilities
- ☐ **M211** Family history tracking system in BASIC
- ☐ **M212** Terminal simulation package — makes PC look like H-P terminal to Unix
- ☐ **M213** PC-INPUT: Screen generation program for use with BASIC
- ☐ **M214** Incomplete set of "Software Tools in Pascal" for Turbo Pascal
- ☐ **M215** Collection of Turbo Pascal routines: Asynch communication, Lister, etc.
- ☐ **M216** Basic programming aid: Structure & documentation aids, POKEs, PEEKs, more
- ☐ **M217** A collection of handy DOS programs and utilities to improve your system
- ☐ **M218** Turbo Pascal utilities: Very large collection
- ☐ **M220** Collection of printer utilities for some of the popular printers
- ☐ **M221** Word processing utilities: Screen editor, spelling checker, word count
- ☐ **M222** A collection of patches and utilities for the WordStar user
- ☐ **M224** BASIC aids: Useful programmer's utilities and tiny BASIC programs
- ☐ **M226** Text file condensation utility: Removes blanks, blank lines, etc.
- ☐ **M227** Phrase guessing game somewhat like "Wheel of Fortune" on TV
- ☐ **M228** Banner printing program that makes long, large-letter banners on printer
- ☐ **M229** Keep in Touch: Networking tool; Printer utilities for popular models
- ☐ **M230** Home budget template for Lotus 1-2-3
- ☐ **M231** Good selection of Educational, Adventure, and Arcade games
- ☐ **M232** Library of compiled Pascal routines for use with IBM Pascal
- ☐ **M233** Checkbook management system: Very complete, essentially a check register
- ☐ **M234** Home inventory system; Tektronix 4010 terminal emulator (text/graphics)
- ☐ **M235** PDS*BASE Hierarchical database system: Series of BASIC program generators
- ☐ **M236** Checkbook system: Programs for maintenance of bank account records
- ☐ **M237** Expert System Inference Engine: Artificial Intelligence shell
- ☐ **M238** A User-friendly personal and/or business address book program
- ☐ **M239** PC Cross assembler for IBM 370: Assemble and run 370 programs on PC
- ☐ **M240** An educational package: Tutorials on use of IBM PC and DOS
- ☐ **M241** EZ-FORMS: Form generating program
- ☐ **M243** A variety of BASIC financial programs and 1-2-3 worksheet templates
- ☐ **M244** An educational game for teaching secondary school chemical valences
- ☐ **M246** SNOCREST BASIC: A BASIC interpreter made for multiusers
- ☐ **M247** Printer utilities: Banners, Sideways, Spoolers, Graphic dumps, etc.
- ☐ **M248** Desk-top utilities, similar to SideKick; Recipe filing, dBASE II Rolodex
- ☐ **M249** DOS Utilities to enhance and simplify MS/PC-DOS system command structure
- ☐ **M250** A gold mine of information about running copy-protected s/w on hard disk
- ☐ **M251** A small, easy to use editor for letters, word processing preview
- ☐ **M252** ROFF text processing system in C with source code
- ☐ **M253** PROLOG V1.7: Artificial intelligence system
- ☐ **M254** PC-GRAPH: Create plots from database and report files from PC-FILE
- ☐ **M255** Public domain version of QPARSER: limited parsing rules, no sample tables
- ☐ **M256** Assorted file handling utilities, some new, some old
- ☐ **M257** A collection of DOS tools and aids
- ☐ **M259** Complete Project Management system using Critical Path Method
- ☐ **M260** P-Code compiler for an extended subset of Pascal, written in Turbo Pascal
- ☐ **M261** Turbo Pascal routines: Joystick & mouse I/O, Communications, Menus
- ☐ **M262** Turbo Pascal routines: String manipulation, Music, Directory, etc.
- ☐ **M263** A collection of C language routines to help a programmer learn C
- ☐ **M264** Complete spreadsheet/database/graphics/word processor - Disk 1 of 3
- ☐ **M265** Complete spreadsheet/database/graphics/word processor - Disk 2 of 3
- ☐ **M266** Complete spreadsheet/database/graphics/word processor - Disk 3 of 3
- ☐ **M267** Kermit communications system with ASM modules - Disk 1 of 2
- ☐ **M268** Kermit communications system with ASM modules - Disk 2 of 2
- ☐ **M269** Turbo Pascal routines for statistics, trig, and utilities
- ☐ **M270** Ham Radio Disk 1 of 2: Morse code, antenna design, find satellites, etc.
- ☐ **M271** Ham Radio Disk 2 of 2: Coil inductance, satellite tracking, etc.
- ☐ **M272** Communication programs: Xmodem protocol, terminal emulation, etc.
- ☐ **M273** Mixture of BASIC & Pascal programs: Amortization, Restaurant billing
- ☐ **M274** A tutorial on structured programming concepts & tool for program design
- ☐ **M275** T-scores educational grading system
- ☐ **M276** PC Calculator; Function key redefine; Menu; Alarm clock
- ☐ **M277** Willy the Worm and other games; Various utilities
- ☐ **M278** Zork tools and adventure games
- ☐ **M279** Aid for pilots in plotting flight plan data; Locate stars & planets
- ☐ **M280** Assorted games, medium to high quality, most require color graphics
- ☐ **M283** BASIC program lister; Epson utilities; Rational BASIC (RATBAS); Adventure
- ☐ **M284** Assorted BASIC games, many requiring color graphics board
- ☐ **M285** 8087 demo programs; Miscellaneous BASIC programs, many utilities
- ☐ **M286** Various applications: Critical path, Mail list, Program compression, music
- ☐ **M287** Various BASIC utilities; IBM Keyboard drill system
- ☐ **M288** Modem7 modem program; Utilities; REMarks compression
- ☐ **M289** Editor; Simple word processor.; Educational drills
- ☐ **M290** Galaxy Trek game; RAM Disk; Sort directory
- ☐ **M291** Order entry/inventory system - requires dBASE II
- ☐ **M293** Asynchronous communications; PC-FILE III Database program
- ☐ **M294** Utilities: Software encipherment; Screen control; Graphics; Sorted DIR
- ☐ **M295** Portfolio valuation system; Graphics; Hi-res screen print; Print spooler
- ☐ **M296** FreeCalc — a public domain spreadsheet program
- ☐ **M297** Utilities: Keyboard, Screen, Printer, TYPE, Sideways print, Big print
- ☐ **M298** PC-Dial modem program
- ☐ **M299** FIG-Forth Disk 1 of 2
- ☐ **M300** FIG Forth Disk 2 of 2
- ☐ **M301** Utilities package for use with Lotus 1-2-3
- ☐ **M302** Ultra-Utility; File library system; Squeeze and Unsqueeze files
- ☐ **M304** EPISTAT V3.0 statistical package
- ☐ **M305** Assorted games in BASIC
- ☐ **M306** BATCH utility; Vol name change; VT100 emulator; POKE/PEEK data for IBM
- ☐ **M307** Assorted Lotus 1-2-3 templates; Programmer's calculator; Typing practice
- ☐ **M308** Home finances; Text editor; Program optimizer for BASIC; DOS Utilities
- ☐ **M309** Micro Accounting; Mailmen programs; Task planning program; Reminder
- ☐ **M310** Utilities: Area code; Banner; Keyboard; Word count; Find subdirectories
- ☐ **M311** File manager; General ledger for small business; COMFAX justify program
- ☐ **M312** DOS Menu program; Disassembler; Utilities
- ☐ **M313** Virtual Teaching Language interpreter
- ☐ **M314** Disk file cataloging system
- ☐ **M315** Encipherment system for use with PC-DOS
- ☐ **M316** Encipherment system for use with MS-DOS
- ☐ **M317** A large package of tips, notes, and techniques for using the IBM PC
- ☐ **M318** Property management system — requires dBASE II
- ☐ **M319** Modem7 modem program in FORTRAN
- ☐ **M320** Multi-function utility; Experimental LISP; Text analysis
- ☐ **M321** Utilities: Library Update; Poor man's mouse; Talking PC; DOS Help
- ☐ **M323** Finance manager system; Personal datebook
- ☐ **M324** An extensive set of power worksheets for the Lotus 1-2-3 user
- ☐ **M325** GLUDRAW — an extensive line drawing system with pictures
- ☐ **M326** Mail merge package for MultiMate; Check balancing system
- ☐ **M327** Family tree utility; Banner printing utility
- ☐ **M328** Disk copy utility; Small spreadsheet; Global PATH; Directory utility
- ☐ **M329** Super-Trek: StarTrek converted from 370 Disk 1 of 3
- ☐ **M330** Super-Trek: StarTrek converted from 370 Disk 2 of 3
- ☐ **M331** Super-Trek: StarTrek converted from 370 Disk 3 of 3
- ☐ **M332** Utilities: Programmer's calculator; DOS 2 Help; dBASE II Mailing list
- ☐ **M333** Word processor for kids; Checkbook ledger; File listing utility
- ☐ **M334** FIDO Bulletin Board System V10.0 Disk 1 of 2
- ☐ **M335** FIDO Bulletin Board System V10.0 Disk 2 of 2
- ☐ **M336** U.S. Census Utility County and City Databook Disk 1 of 2
- ☐ **M337** U.S. Census Utility County and City Databook Disk 2 of 2
- ☐ **M338** Assorted games — color graphics may be required for some
- ☐ **M339** Games in Pascal; 3D graphics system
- ☐ **M340** Assorted utilities: Backup; Library update; Pop-up window; RAM disk
- ☐ **M341** Assorted utilities: Disk utility; Unix terminal; Library utilities; dBASE
- ☐ **M342** Utilities: Extended DIR; dBASE phone directory; Time keeping; BATCH language
- ☐ **M343** Utilities: ASCII to 1-2-3; File attribute; DOS Help; Turbo Pascal Help
- ☐ **M344** Utilities: Amortization; BASIC Menu; Function keys; Clock pop-up
- ☐ **M345** Time & Money V1.1B: A financial management system
- ☐ **M346** Screenwriter formatting program; PC Calculator V1.0
- ☐ **M347** Programs: Genealogy; Church (dBASE); Checkbook (dBASE)
- ☐ **M348** Key utility; System reset; Kermit communications package V2.27 (LBR)
- ☐ **M349** Investment record system; Checkbook reconciliation; Menu generator
- ☐ **M350** Symphony applications: Medical worksheets; Banking worksheets
- ☐ **M351** Lotus graphics printer library; Symphony insurance worksheet library
- ☐ **M352** Lotus 1-2-3 macro worksheets; Macro conversion aid
- ☐ **M353** 3x5 Information
- ☐ Management system — a database organized like 3x5 cards
- ☐ **M354** File Express V2.95 Information management Disk 1 of 2
- ☐ **M355** File Express V2.95 Information management Disk 2 of 2
- ☐ **M356** PC-DBMS V1.0: Database management system
- ☐ **M357** Origami - the art of Japanese paper folding (Programs in BASIC)
- ☐ **M358** PC Personal Management Systems: Deskmate V1.0, Partner V1.1
- ☐ **M360** PC Magazine's Laboratory Benchmark Series #1 — Benchmark programs
- ☐ **M361** PAMCHECK: Personal Accounts Manager V1.1 Disk 1 of 2
- ☐ **M362** PAMCHECK: Personal Accounts Manager V1.1 Disk 2 of 2
- ☐ **M363** Utilities: Archive; File encryption; File management; Disk cataloging; More
- ☐ **M364** PC-TALK III v2.6; Terminal emulator; Modem program
- ☐ **M365** Utilities: Scientific calculator; File encryption; Clock/calendar; More
- ☐ **M366** Hints, Tips, & Notes: Lotus 1-2-3; dBASE III; Macro ASM; Multimate; Turbo
- ☐ **M367** Experimental LISP (XLISP) V1.5
- ☐ **M368** A potpourri of games, some with graphics, some without
- ☐ **M369** Potomac Pacific Engineering Spreadsheet/database/expert system Disk 1 of 2
- ☐ **M370** Potomac Pacific Engineering Spreadsheet/database/expert system Disk 2 of 2
- ☐ **M371** Flow System organizer; Interpretive & interactive Pascal
- ☐ **M372** Confidant V2.0 file encryption system; Symphony macro conversion aid
- ☐ **M373** A collection of graphic and non-graphic games
- ☐ **M374** Small Database (SDB) V2.0; Ron Cain's Small C:PC V1.1
- ☐ **M375** Remote Bulletin Board System V12.5b (Requires ARC archive utility)
- ☐ **M376** AnalytiCalc integrated spreadsheet Disk 1 of 2
- ☐ **M377** AnalytiCalc integrated spreadsheet Disk 2 of 2
- ☐ **M378** Genealogy on Display V3.1 by Melvin Duke
- ☐ **M379** FANSI-CONSOLE V1.11/1.13: A Fast ANSI console driver for the IBM PC
- ☐ **M380** Text editor; DOS help system; Personal typing instructor; Memory display
- ☐ **M381** Program for simple algebra (Requires 8087 math processor)
- ☐ **M382** PC-Write word processor V2.55
- ☐ **M383** pBASE V1.02 database management system; PC recipe filing system
- ☐ **M384** LEARN V0.6: creates CAI courses; MAILMAN V2.0 mailing list management
- ☐ **M385** PIBTERM V3.0 modem communications program
- ☐ **M386** ESCREE'IS: Utility for easy creation of interactive color graphic screens
- ☐ **M387** Utilities: Fast format; dBASE II screen generator; Color paint; File handler
- ☐ **M388** Multi-font printer support package: Epson, Okidata, C. Itoh
- ☐ **M389** The EXPERT Knowledge Based System; Church Management System
- ☐ **M390** Letter writer V2.0 address book; Multi-tasking DOS facility; Disk repair
- ☐ **M391** Cavequest - a D & D type game; Naval War Simulator
- ☐ **M392** PC Magazine's Laboratory Benchmark Series #2 - Benchmark programs
- ☐ **M394** Freeword word processor; Cut & Paste utility; Resident notepad
- ☐ **M395** Public Domain PROLOG system V1.8 with samples
- ☐ **M396** Z80 CP/M 2.2 Emulation package
- ☐ **M398** QMODEM, great modem program, works with Hayes, Xmodem protocol, windows
- ☐ **M399** Utilities from PC Magazine; Still River Shell: Easy DOS Interface
- ☐ **M400** 1986 Income Tax software
- ☐ **M401** One hour adventure games; Othello game; RPN calculator program
- ☐ **M402** Bible trivia game with questions from the Scriptures
- ☐ **M403** PC-Calc, the well-known spreadsheet program
- ☐ **M404** DANAL, an analysis tool for mathematically plotting various data
- ☐ **M405** Disk 1 of 2, Corbin Handbook of Bullet Swaging, for gun buffs
- ☐ **M406** Disk 2 of 2, Corbin Handbook of Bullet Swaging, for gun buffs

- ☐ **M407** Foreign language tutorial for Fr., Span., Ger., Ital., & Hebrew
- ☐ **M408** BlackBeard, a text editor suited for programmer's code editing
- ☐ **M409** Assortment of text utilities
- ☐ **M410** Polymath, a language similar to Forth
- ☐ **M411** Disk 1 of 5, DREAM, a relational database program from PC-System
- ☐ **M412** Disk 2 of 5, DREAM, a relational database system from PC-Systems
- ☐ **M413** Disk 3 of 5, DREAM, a relational database system from PC-Systems
- ☐ **M414** Disk 4 of 5, DREAM, a relational database system from PC-Systems
- ☐ **M415** Disk 5 of 5, DREAM, a relational database system, from PC-System
- ☐ **M416** Introduction to BASIC programming plus some BASIC games
- ☐ **M417** TSHELL, a visual DOS shell for the PC
- ☐ **M418** Nuclear Magnetic Resonance analysis program
- ☐ **M419** Turbo Pascal tools for windows & more
- ☐ **M420** Lotus Symphony worksheets for banking, insurance, & medical app.
- ☐ **M421** Tips on using Lotus SYMPHONY, macros, & more
- ☐ **M422** Assorted worksheets for Lotus 123
- ☐ **M423** The Whiterock Alternative, user-friendly front end for Lotus 123
- ☐ **M424** Wordworker: Cross-reference for the New Testament, Disk 1 of 2
- ☐ **M425** Wordworker: Cross-reference for the New Testament, Disk 2 of 2
- ☐ **M426** Disk 1 of 2, Pascal tutorial
- ☐ **M427** Disk 2 of 2, Pascal tutorial
- ☐ **M428** Disk 1 of 2, C language tutorial
- ☐ **M429** Disk 2 of 2, C language tutorial
- ☐ **M430** XASM, a macro configured cross-assembler for various 8 bit chips
- ☐ **M431** Utilities, some in Pascal, with source code
- ☐ **M432** PC-CODE3 & 4, an analysis program for checking & encoding files
- ☐ **M433** Various utilities for use with Lotus 1-2-3 (ARC)
- ☐ **M434** DND, a fantasy role game in the spirit of Dungeons & Dragons
- ☐ **M435** A comprehensive surveying package with full documentation
- ☐ **M436** PC-Payroll, a complete menu-driven payroll system
- ☐ **M437** PC-HAM, various Amateur Radio database programs
- ☐ **M438** Disk 1 of 2, PC-Accounting, general purpose business program
- ☐ **M439** Disk 2 of 2. PC-Accounting, general purpose business system
- ☐ **M440** Pinball, a selection of three games for the addict
- ☐ **M441** A collection of FORTRAN and Assembly programs
- ☐ **M442** Disk 1 of 2, Linear equation package in FORTRAN source code
- ☐ **M443** Disk 2 of 2, Linear equation package in FORTRAN source code
- ☐ **M444** An assortment of mathematical FORTRAN sub-programs
- ☐ **M445** PC-SELL, a retail store point-of-sale program, requires BASRUN.EXE
- ☐ **M446** Assorted utilities, some neat ones here
- ☐ **M447** Hints & Tools for various commercial adventure games
- ☐ **M448** A collection of astronomy programs
- ☐ **M449** DBS-KAT, disk cataloging program for hard-disk users
- ☐ **M450** An assortment of useful utility programs, with source code
- ☐ **M451** Disk 1 of 2, a collection of powerful utilities
- ☐ **M452** Disk 2 of 2, a collection of powerful utilities
- ☐ **M453** PDS*Quote, prepares quotations based on user prepared databases
- ☐ **M454** Alan's Editor and Calc, a nice text editor and a spreadsheet
- ☐ **M455** FreeWord, menu-driven word processor with lots of features
- ☐ **M456** Disk 1 of 2, sophisticated word processing package
- ☐ **M457** Disk 2 of 2, sophisticated word processing package
- ☐ **M458** B-Window, BASIC windowing, and C-Window, windows for the C programmer
- ☐ **M459** WSMX80, utility to enhance the use of Epson printers with WordStar
- ☐ **M460** Disk 1 of 2, ExpressCalc, easy-to-use spreadsheet program
- ☐ **M461** Disk 2 of 2, ExpressCalc, easy-to-use spreadsheet program
- ☐ **M462** SIDEWRITER, will output to printer sideways on paper
- ☐ **M463** Instant Recall, memory-resident database program
- ☐ **M464** FREEFILE, relational database system with on-line help
- ☐ **M465** Disk 1 of 2, BUDGETRAK, an encumbrance accounting package
- ☐ **M466** Disk 2 of 2, BUDGETRAK, an encumbrance accounting package
- ☐ **M467** Expert System, an artificial intelligence type program
- ☐ **M468** IMAGEPRINT, makes high quality characters on Epson/IBM printers
- ☐ **M469** Disk 1 of 2, Draftsman, produces graphs, etc. from data files
- ☐ **M470** Disk 2 of 2, Draftsman, produces graphs, etc. from data files
- ☐ **M471** BMenu, a menu development program for building command menus
- ☐ **M472** Programs, etc. from the book "The Complete Turbo Pascal"
- ☐ **M473** Turbo Sprites, series of prgms. for animation in Turbo Pascal
- ☐ **M474** Visible-Pascal, a Pascal compiler for teaching and learning
- ☐ **M475** Disk 1 of 2, PC-SIZE and PC-MULTI, statistical tools
- ☐ **M476** Disk 2 of 2, STAT-SAK and PC-PITMAN, statistical tools
- ☐ **M477** PC-SPRINT, instructions on how to build speed-up for IBM XT/AT
- ☐ **M478** PC-STYLE, analyzes text files for style and readability
- ☐ **M479** Assorted utilities, maillist, file examination, memory partition
- ☐ **M480** Reliance Mailing List, great for small businesses, churches, etc
- ☐ **M481** Disk 1 of 2, SALESEYE, sales lead processor, with tutorial
- ☐ **M482** Disk 2 of 2, SALESEYE, sales lead processor, with tutorial
- ☐ **M483** SOFT-TOUCH, memory resident utility for programming keys
- ☐ **M484** ProComm, communications program with several terminal emulations
- ☐ **M485** DOSamatic, utility to allow task switching between several programs
- ☐ **M486** NUTRIENT, BASIC program to analyze nutritional value of diet
- ☐ **M487** CRYPTANANALSIS, decodes ciphers and secretly coded messages
- ☐ **M488** PC-OUTLINE, allows re-arrangement of items in an outline
- ☐ **M489** ENCODE/DECODE, maintains integrity of files sent by electronic mail
- ☐ **M490** MAIL MONSTER, well documented mailing label manager
- ☐ **M491** Graphics Font Design, makes fonts to be loaded into Turbo Pascal
- ☐ **M492** Icon Maker & FX Matrix, makes your own characters for Epson printer
- ☐ **M493** TELISOLAR, an energy analysis program for the average homeowner
- ☐ **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
- ☐ **M504** Disk 1 of 2, MR. BILL, generates invoices & bills, very flexible
- ☐ **M505** Disk 2 of 2, MR. BILL, generates invoices & bills, very flexible
- ☐ **M506** Disk 1 of 3, CPA-LEDGER, accounting softwar, 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 frivolity
- ☐ **M519** AUTOMENU, easy menu system, & DISK SPOOL, spools printer to disk
- ☐ **M520** PACKDISK, NEW YORK ADVENTURE, and MANAGING MONEY WITH IBM PC
- ☐ **M521** ORACLE, for Tarot & I-Ching cards, plus MakeMyDay, time management
- ☐ **M522** HOTBOOT & INSULTS, practical joke programs, plus PC-DIAL for PC-jr
- ☐ **M523** PC-ART, color drawing program, plus HDMII, a DOS shell
- ☐ **M524** DISK TOOL, file utility program, plus LANDING PARTY,adventure game
- ☐ **M525** VCR Base, HOROSCOPE, COMPUTER DATA SECURITY, and JESUS SAYS
- ☐ **M526** PC-MONEY, personal financial program, plus Polyglot & Letterfall
- ☐ **M527** MAX, powerful text editor like EMACS
- ☐ **M528** PC-PROMPT, DOS extension program, plus Building Life Cost program
- ☐ **M529** PC-STOCK, stock tracking program, plus PC-TICKLE, appointment program
- ☐ **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
- ☐ **M535** PC Games: Backgammon, Spanish Hangman, Wheel of Fortune
- ☐ **M536** KALENDAR! - An appointment system for small business and others
- ☐ **M537** GRAFCOMM, MEDIATOR, PC-CRYPT2, DMASTER, and INSTACAL
- ☐ **M538** NAMEPAL, a complete automatic address book
- ☐ **M539** Games for kids 2 to 12, must have color graphics board
- ☐ **M540** DANCAD3D, a 3D CAD program, need 640K and CGA card (Disk 1 of 4)
- ☐ **M541** DANCAD3D, a 3D CAD program, need 640K and CGA card (Disk 2 of 4)
- ☐ **M542** DANCAD3D, a 3D CAD program, need 640K and CGA card (Disk 3 of 4)
- ☐ **M543** DANCAD3D, a 3D CAD program, need 640K and CGA card (Disk 4 of 4)
- ☐ **M544** MEALMATE, a program for preparing controlled diet meals
- ☐ **M545** THE FRONT OFFICE, a complete control system, need HD,Disk 1 of 3
- ☐ **M546** THE FRONT OFFICE, a complete control system, need HD,Disk 2 of 3
- ☐ **M547** THE FRONT OFFICE, a complete control system, need HD,Disk 3 of 3
- ☐ **M548** PC-PAYROLL, a complete, menu driven payroll system
- ☐ **M549** QUBECALC, an advanced spreadsheet, and MAZEMASTER, a maze game
- ☐ **M550** EZ-SPREAD, a nice worksheet for budgets, loan calculations, etc.
- ☐ **M551** SLEUTH, a fun crime solving game, will work on mono monitor
- ☐ **M552** ACECALC, an astronomical calculation program, Disk 1 of 2
- ☐ **M553** ACECALC, an astronomical calculation program, Disk 2 of 2
- ☐ **M554** BESTPLAN, a linear programming planning system, Disk 1 of 2
- ☐ **M555** BESTPLAN, a linear programming planning system, Disk 2 of 2
- ☐ **M556** IN-CONTROL, a powerful database with all info online,Disk 1 of 3
- ☐ **M557** IN-CONTROL, a powerful database with all info online,Disk 2 of 3
- ☐ **M558** IN-CONTROL, a powerful database with all info online,Disk 3 of 3
- ☐ **M559** HELPDOS, a menu-driven help/reference program for MS/PC-DOS
- ☐ **M560** New FIG FORTH, with documentation
- ☐ **M561** PAGEONE, an easy to use single page document processor
- ☐ **M562** FORGE, a forms generator for TURBO Pascal and dBASE III users
- ☐ **M563** IT, VT-100 & 52 terminal emulation, also 2 Button adventures
- ☐ **M564** WOMBAT, a very good text adventure game, need CGA card
- ☐ **M565** The Enable Reader, for the visually impaired, Disk 1 of 4
- ☐ **M566** The Enable Reader, for the visually impaired, Disk 2 of 4
- ☐ **M567** The Enable Reader, for the visually impaired, Disk 3 of 4
- ☐ **M568** The Enable Reader, for the visually impaired, Disk 4 of 4
- ☐ **M569** GRAPHTIME II, a business presentation graphics program, Disk 1 of 2
- ☐ **M570** GRAPHTIME II, a business presentation graphics program, Disk 2 of 2
- ☐ **M571** WORLD, statistics & demographics for nations of the world
- ☐ **M572** Writer's Utilities, various tools for processing text files
- ☐ **M573** PC-DEMO, for making presentations and demonstrations on computer
- ☐ **M574** SCHOOL Utilites, student/teacher assorted programs
- ☐ **M575** DATABOSS, a nifty database w/report generator, Disk 1 of 2
- ☐ **M576** DATABOSS, a nifty database w/report generation, Disk 2 of 2
- ☐ **M577** SPL, structured program language & RESICALC, pop-up calculator
- ☐ **M578** Employee Management, to test employees & Marooned Again, adventure game
- ☐ **M579** Church Contribution, a pledge maintenance program for churches
- ☐ **M580** ZURI, a nice text editor (works only on monochrome adapter card)
- ☐ **M581** Turbo Calc & AsEasyAs, speadsheets, plus some Dos utilities
- ☐ **M582** RES, a complete system for the real estate office
- ☐ **M583** KWIKSTAT, a graphic scientific statistical analysis, Disk 1 of 2
- ☐ **M584** KWIKSTAT, a graphic scientific statistical analysis, Disk 2 of 2
- ☐ **M585** HI-RES RAINBOW, a full-featured paint package w/icons & windows
- ☐ **M586** ' PR FLASH, Æational Publicity Database, a demo disk
- ☐ **M587** WALMYR, a potpourri of programs for instructors, Disk 1 of 2
- ☐ **M588** WALMYR, a potpourri of programs for teachers, Disk 2 of 2
- ☐ **M589** AMY'S 1ST PRIMER, some educational children's games
- ☐ **M590** The Stock Trader, for tracking stock performance and trends
- ☐ **M591** TASM, a cross-assembler for the 8048, 8051, & 6502 chips
- ☐ **M592** MENU-MASTER, a general purpose menu utility and DOS shell
- ☐ **M593** LIST, a document formatter, and MAHJONG, an Oriental card game
- ☐ **M594** SUPERSTAT, market survey statistical analysis pkg., Disk 1 of 2
- ☐ **M595** SUPERSTAT, market survey statistical analysis pkg., Disk 2 of 2
- ☐ **M596** UNCLE, income tax strategy analysis, with 4 on-screen 1040's
- ☐ **M597** MUSES, for authors to maintain their works, Disk 1 of 2
- ☐ **M598** MUSES, for authors to maintain their works, Disk 2 of 2
- ☐ **M599** MASTER KEY, disk maintenance program, allows sector modification
- ☐ **M600** BIBLE, Text files of the King James version, Disk 1 of 7
- ☐ **M601** BIBLE, Text files of the King James version, Disk 2 of 7
- ☐ **M602** BIBLE, Text files of the King James version, Disk 3 of 7
- ☐ **M603** BIBLE, Text files of the King James version, Disk 4 of 7
- ☐ **M604** BIBLE, Text files of the King James version, Disk 5 of 7
- ☐ **M605** BIBLE, Text files of the King James version, Disk 6 of 7
- ☐ **M606** BIBLE, Text files of the King James version, Disk 7 of 7
- ☐ **M607** GALAXY, a fast, easy-to-learn memory resident word processor
- ☐ **M608** COMPASS, an integrated package (database, word processing,etc.)
- ☐ **M609** Finger Paint, a nice paint program, requires color graphics
- ☐ **M610** Image-3D, a three-dimensional wire-frame modeling program
- ☐ **M611** IMP Shell, an expert system development environment
- ☐ **M612** MINIGEN, screen code generator for Turbo Pascal
- ☐ **M613** Writers Heaven, use with PC-Write, and French Verb Conjugator
- ☐ **M614** MEMOIRS, a diary w/encryption, plus Spanish Verb conjugator
- ☐ **M615** CANTONESE Tutor, a menu-driven program to teach spoken Cantonese
- ☐ **M616** UVESTOR, an investment transaction tracking program
- ☐ **M617** Squeeze Print, will print ASCII files w/o blank lines or f/f
- ☐ **M618** BRAIN, for unattended downloading, Squeeze Print
- ☐ **M618** BRAIN, for unattended downloading, plus AsEasyAs, a spreadsheet
- ☐ **M619** Label Master, for maintaining, sorting, & printing mailing lists
- ☐ **M620** QUANTOIDS, SPACE RESCUE, & LOTTERY FUN, Games
- ☐ **M621** Directory Assistant, for organizing name and address information
- ☐ **M622** Baseball Statistics Program and Football Fun Game

- ☐ **C125** Software Tools of Australia Vol. 17 - Programs in C, BAS, ASM
- ☐ **C126** Overflow from disk #C125
- ☐ **C127** California Energy Comm. Bldg. Energy Design Analysis Vol. 1 of 2
- ☐ **C128** Overflow from disk #C127
- ☐ **C129** California Energy Comm. Bldg. Energy Design Analysis Vol. 2 of 2
- ☐ **C130** Overflow from disk #C129
- ☐ **C131** 68000 Cross Assembler from Dr. Dobbs; 6800 Cross Assembler
- ☐ **C132** Overflow from disk #C131
- ☐ **C133** BASIC games extracted from Software Tools of Australia
- ☐ **C134** Overflow from disk #C133
- ☐ **C135** Depreciation in BASIC; WordStar indexing program in Pascal
- ☐ **C136** Overflow from disk #C135
- ☐ **C137** Graphing ASM subroutines for MX80; Intel to Zilog source translator
- ☐ **C138** Overflow from disk #C137
- ☐ **C139** Utilities: Text display; Super DIR; VFILER - Screen-oriented file util.
- ☐ **C140** Overflow from disk #C139
- ☐ **C141** CITADEL: A complete bulletin board system in C
- ☐ **C142** Overflow from disk #C141
- ☐ **C143** FORTH-83: Editor, assembler, & documentation
- ☐ **C144** Overflow from disk #C143
- ☐ **C145** Atlanta Database User Group: Member records & banking systems
- ☐ **C146** Overflow from disk #C145
- ☐ **C147** Utilities: Extended ERAse; Cross reference from .PRN files (LBR)
- ☐ **C148** Overflow from disk #C147
- ☐ **C149** Compilers: Concurrent Pascal-S; PL/0 — written in Pascal (not Turbo)
- ☐ **C150** Overflow from disk #C149
- ☐ **C151** CBASIC Users Group: Assorted programs in CBASIC
- ☐ **C152** Overflow from disk #C151
- ☐ **C153** Regular Expression Compiler (REC) in ASM Vol. 1 of 4
- ☐ **C154** Overflow from disk #C153
- ☐ **C155** Regular Expression Compiler (REC) in ASM Vol. 2 of 4
- ☐ **C156** Overflow from disk #C155
- ☐ **C157** Regular Expression Compiler (REC) in ASM Vol. 3 of 4
- ☐ **C158** Overflow from disk #C157
- ☐ **C159** Regular Expression Compiler (REC) in ASM Vol. 4 of 4
- ☐ **C160** Overflow from disk #C159
- ☐ **C161** 8080 to 8086 conversion utilities
- ☐ **C162** Overflow from disk #C161
- ☐ **C163** Accts. Recv. template for SuperCalc; Bulk ERAse of .BAK, .HEX, etc.
- ☐ **C164** Overflow from disk #C163
- ☐ **C165** Programs for BDS C: Functions in ASM; Bulletin Board; CRT I/O (LBR)
- ☐ **C166** Overflow from disk #C165
- ☐ **C167** C programs: File archiver; Brace matcher; Calls for Aztec C; More (LBR)
- ☐ **C168** Overflow from disk #C167
- ☐ **C169** Utilities: Forth to CP/M screen - file xfer; Synonyms for COM files (LBR)
- ☐ **C170** Overflow from disk #C169
- ☐ **C171** ZCPR3: Z80 replacement for CP/M command processor Vol. 1 of 9
- ☐ **C172** Overflow from disk #C171
- ☐ **C173** ZCPR3: Z80 replacement for CP/M command processor Vol. 2 of 9
- ☐ **C174** Overflow from disk #C173
- ☐ **C175** ZCPR3: Z80 replacement for CP/M command processor Vol. 3 of 9
- ☐ **C176** Overflow from disk #C175
- ☐ **C177** ZCPR3: Z80 replacement for CP/M command processor Vol. 4 of 9
- ☐ **C178** Overflow from disk #C177
- ☐ **C179** ZCPR3: Z80 replacement for CP/M command processor Vol. 5 of 9
- ☐ **C180** Overflow from disk #C179
- ☐ **C181** ZCPR3: Z80 replacement for CP/M command processor Vol. 6 of 9
- ☐ **C182** Overflow from disk #C181
- ☐ **C183** ZCPR3: Z80 replacement for CP/M command processor Vol. 7 of 9
- ☐ **C184** Overflow from disk #C183
- ☐ **C185** ZCPR3: Z80 replacement for CP/M command processor Vol. 8 of 9
- ☐ **C186** Overflow from disk #C185
- ☐ **C187** ZCPR3: Z80 replacement for CP/M command processor Vol. 9 of 9
- ☐ **C188** Utilities: Paged file list; MX80; Passwords; Z80 debugger (LBR)
- ☐ **C189** Overflow from disk #C188
- ☐ **C190** Dot-matrix printer plotting package for C. Itoh, Epson, Okidata
- ☐ **C191** Overflow from disk #C190
- ☐ **C192** Fluff minimax algorithm Dr. Dobbs 7/84; Simplex algorithm Byte 5/84 (LBR)
- ☐ **C193** Overflow from disk #C192
- ☐ **C194** Utilities: LBR extract; SUBMIT replacement; Super DIR; DDT improved
- ☐ **C195** Overflow from disk #C194
- ☐ **C196** Utilities: FIND files; Squeeze/unsqueeze (SQ)
- ☐ **C197** Overflow from disk #C196
- ☐ **C198** A complete property management package using dBASE II Vol. 1 of 2
- ☐ **C199** Overflow from disk #C198
- ☐ **C200** A complete property management package using dBASE II Vol. 2 of 2
- ☐ **C201** Overflow from disk #C200
- ☐ **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)
- ☐ **C207** Overflow from disk #C206
- ☐ **C208** CP/M-80 to CP/M-86 Xlate; FIND with cross reference capability
- ☐ **C209** Overflow from disk #C208
- ☐ **C210** Forth 83 system with example, documentation, & utilities
- ☐ **C211** Overflow from disk #C210
- ☐ **C212** Utilities: Columnar listings; Sort files; TYPE command improved (LBR)
- ☐ **C213** Overflow from disk #C212
- ☐ **C214** Utilities: ERAse improved; NSWP file handler; improved TYPE (LBR)
- ☐ **C215** Overflow from disk #C214
- ☐ **C216** Regular Expression Compiler with floating point (LBR)
- ☐ **C217** Overflow from disk #C216
- ☐ **C218** Regular Expression Compiler without floating point (LBR)
- ☐ **C219** Overflow from disk #C218
- ☐ **C220** MEX V1.12 modem communications program (SQ)
- ☐ **C221** Overflow from disk #C220
- ☐ **C222** Assorted overlays for use in constructing MEX system (SQ)
- ☐ **C223** Overflow from disk #C222
- ☐ **C224** Assorted overlays for use in constructing MEX system (SQ)
- ☐ **C225** Overflow from disk #C224
- ☐ **C226** Inventory system for dBASE II (LBR)
- ☐ **C227** Overflow from disk #C226
- ☐ **C228** dBASE patches; Area code lookup; 8080 disassembler; DIR repair
- ☐ **C229** Overflow from disk #C228
- ☐ **C230** Ron Cain's Small C compiler with floating point math package (LBR)
- ☐ **C231** Overflow from disk #C230
- ☐ **C232** Extra character set for WordStar & FX-80; Scientific font for MX-80
- ☐ **C233** Overflow from disk #C232
- ☐ **C234** dBASE II programs: Checkbook; Church management; Genealogy
- ☐ **C235** Overflow from disk #C234
- ☐ **C236** C programs: File append; Flow listing; Editor; FIND; Split files
- ☐ **C237** Overflow from disk #C236
- ☐ **C238** Databases: Article retrieval; Reference books; Reference material (LBR)
- ☐ **C239** Overflow from disk #C238
- ☐ **C240** Kermit communications V3.9; Updated 8080 to Z80 source translator
- ☐ **C241** Overflow from disk #C240
- ☐ **C242** Utilities: C cross ref; Super DIR V7.7; Print utility in C (LBR)
- ☐ **C243** Overflow from disk #C242
- ☐ **C244** Pilot system in Pascal/Z; Deductive reasoning helps (LBR)
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- ☐ **C246** Full screen Z80 debugger. Lots of features, documentation (SQ)
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- ☐ **C250** Z80 small Prolog with documentation; Z80 screen file manager (LBR)
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- ☐ **C255** CNVRT programming language with example to solve mazes (LBR)
- ☐ **C256** Overflow from disk #C255
- ☐ **C257** CNVRT Runtime library, compiler, and help files
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- ☐ **C259** Source programs in ASM for a variety of CP/M functions
- ☐ **C260** A complete General Ledger system in BASIC
- ☐ **C261** PILOT language interpreter with ASM source & example program
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- ☐ **C263** Z80 assemblers, with source; Simple editor
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- ☐ **C265** Assorted BASIC games: Biorhythm; Chess; Maze; StarTrek; More rhythm
- ☐ **C266** Overflow from disk #C265
- ☐ **C267** CP/M STOIC: A threaded interpretive language like Forth
- ☐ **C268** Overflow from disk #C267
- ☐ **C269** Games in BASIC: Baseball; Civil war; Craps; Swarms; Etc.
- ☐ **C270** Overflow from disk #C269
- ☐ **C271** More BASIC games: Drag race; Football; Hangman; Mastermind; More
- ☐ **C272** Overflow from disk #C271
- ☐ **C273** Simple database system; ALGOLM compiler, a subset of the ALGOL language
- ☐ **C274** Search & Rescue programs in BASIC
- ☐ **C275** Educational programs in CBASIC
- ☐ **C276** Overflow from disk #C275
- ☐ **C277** Utilities: Quick SUBMIT; Vol. catalog; File compare; Checksum
- ☐ **C278** Overflow from disk #C277
- ☐ **C279** Assorted programs for Ham radio in BASIC
- ☐ **C280** Overflow from disk #C279
- ☐ **C281** The Osborne Accounts Receivable & Accounts Payable systems in BASIC
- ☐ **C282** Overflow from disk #C281
- ☐ **C283** The Osborne General Ledger system in BASIC
- ☐ **C284** The Osborne Payroll system in BASIC
- ☐ **C285** Overflow from disk #C284
- ☐ **C286** A complete adventure game in BDS C
- ☐ **C287** Overflow from disk #C286
- ☐ **C288** Another collection of games in BASIC
- ☐ **C289** Overflow from disk #C288
- ☐ **C290** Math package for Microsoft muMATH
- ☐ **C291** Overflow from disk #C290
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- ☐ **C293** Overflow from disk #C292
- ☐ **C294** BusinessMaster II accounting package Vol. 2 of 5 — Initial, Startup
- ☐ **C295** Overflow from disk #C294
- ☐ **C296** BusinessMaster II accounting package Vol. 3 of 5 — Sample files, Payroll
- ☐ **C297** Overflow from disk #C296
- ☐ **C298** BusinessMaster II accounting package Vol. 4 of 5 — PO/AP, Order entry/AR
- ☐ **C299** BusinessMaster II accounting package Vol. 5 of 5 — General ledger
- ☐ **C300** Utilities: Vol. catalog & cross ref; ERAse/UNERAse; Vol. ZAP (SQ)
- ☐ **C301** Overflow from disk #C300
- ☐ **C302** More than 50 games in Microsoft BASIC
- ☐ **C303** Overflow from disk #C302
- ☐ **C304** Financial planning in CBASIC; AP & AR in CBASIC; Many BASIC games
- ☐ **C305** Overflow from disk #C304
- ☐ **C306** Original ADVENTURE and other games in BASIC (SQ)
- ☐ **C307** BASIC benchmark; Bibliography in BASIC; Many BASIC games
- ☐ **C308** Cross assemblers for the 6800 and 1802
- ☐ **C309** Utilities: File archive; Bad sector lockout; Help system; More
- ☐ **C310** Overflow from disk #C309
- ☐ **C311** Functions for BDS C: Floating point; Console I/O; Redirected I/O
- ☐ **C312** Assorted programs, functions for BDS C
- ☐ **C313** BDS C programs: Higher math functions; File directory; Floating point
- ☐ **C314** BDS C programs: DIR, Program list; File compression; Word Count
- ☐ **C315** Overflow from disk #C314
- ☐ **C316** BDS C programs: File concatenation; File compare; Text processor
- ☐ **C317** Overflow from disk #C316
- ☐ **C318** BDS C programs: Benchmark; Curly brace matcher; Modem program
- ☐ **C319** Overflow from disk #C318
- ☐ **C320** BDS C programs: File squeeze/unsqueeze; TYPE for squeezed files
- ☐ **C321** Overflow from disk #C320
- ☐ **C322** Software Tools in RATFOR: Complete package in FORTRAN
- ☐ **C323** BDS C programs: File conversion; Text formatter; Software tools
- ☐ **C324** A large collection of games in BDS C
- ☐ **C325** Overflow from disk #C324
- ☐ **C326** Utilities: Bad sector lockout; Sorted DIR; Z80 disassembler (LBR)
- ☐ **C327** Utilities: Catalog; Simple vol. ZAP; Editor; File printer; BASIC Xref
- ☐ **C328** Games in BASIC: Wizard's Castle; Eliza; Lost Gold; Zodiac (SQ)
- ☐ **C329** Games in Z80 code, written for Kaypro; Z80 Chess
- ☐ **C330** Printer art: Assorted pictures to print on your printer (SQ)
- ☐ **C331** Games and programs in BASIC — a mixed bag
- ☐ **C332** BASIC games: DC10; Fireman; Kolossus; Rental property program
- ☐ **C333** Utilities: Fast SUBMIT; File FIND; File FIX; Password
- ☐ **C334** MYSTERY — a large ADVENTURE type game (LBR)
- ☐ **C335** Utilities: A collection for creation/maintenance of libraries (LBR)
- ☐ **C336** ALGOLM compiler; FORTH interpreter; Ham programs; Key utility (LBR)
- ☐ **C337** Printer Spool & De-spool (LBR)
- ☐ **C338** Utilities: Library; Help system; Super DIR; Improved TYPE (LBR)
- ☐ **C339** Ron Cain's Small C; A collection of WordStar notes & utilities (LBR)
- ☐ **C340** Extensive Help system (LBR)
- ☐ **C341** Games developed for the Kaypro 2 — some video functions may not work
- ☐ **C342** Games developed for the Kaypro 2 — some video functions may not work
- ☐ **C343** Original ADVENTURE as implemented for the Kaypro 2
- ☐ **C344** Utilities: Super DIR V8.8; TYPEL V3.1 (LBR)
- ☐ **C345** Utilities: Lower to upper case; CP/M POWER; Memory to vol. (LBR)
- ☐ **C346** Z80 assembler system (LBR)
- ☐ **C347** Utilities: String replacement in file; Turbo Pascal cross reference (LBR)
- ☐ **C348** Extensive graphic plotting package for Epson MX-80 (LBR)
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- ☐ **C350** Another comprehensive Help system (LBR)
- ☐ **C351** Utilities: MX-80 setup; Gothic letter banner; Word* PS on Prowriter (LBR)
- ☐ **C352** HANDY V2.0: A collection of desktop tools in CBASIC (LBR)
- ☐ **C353** Turbo Pascal: Source code from 2 books, Montezuma cursor control (LBR)
- ☐ **C354** MODEM7 version 4: Program, source code, & utilities

- ☐ **C900** Monte's SELECT disk of essential CP/M utilities
- ☐ **C901** MEX — The Modem Executive

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)
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- ☐ NCR Decision Mate V (40T, DS, DD, 308K)
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- ☐ 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)
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REMOVE HERE
Perforated for easy removal

Ready, Aim, Fire!

Delete those unwanted files in an orderly fashion.

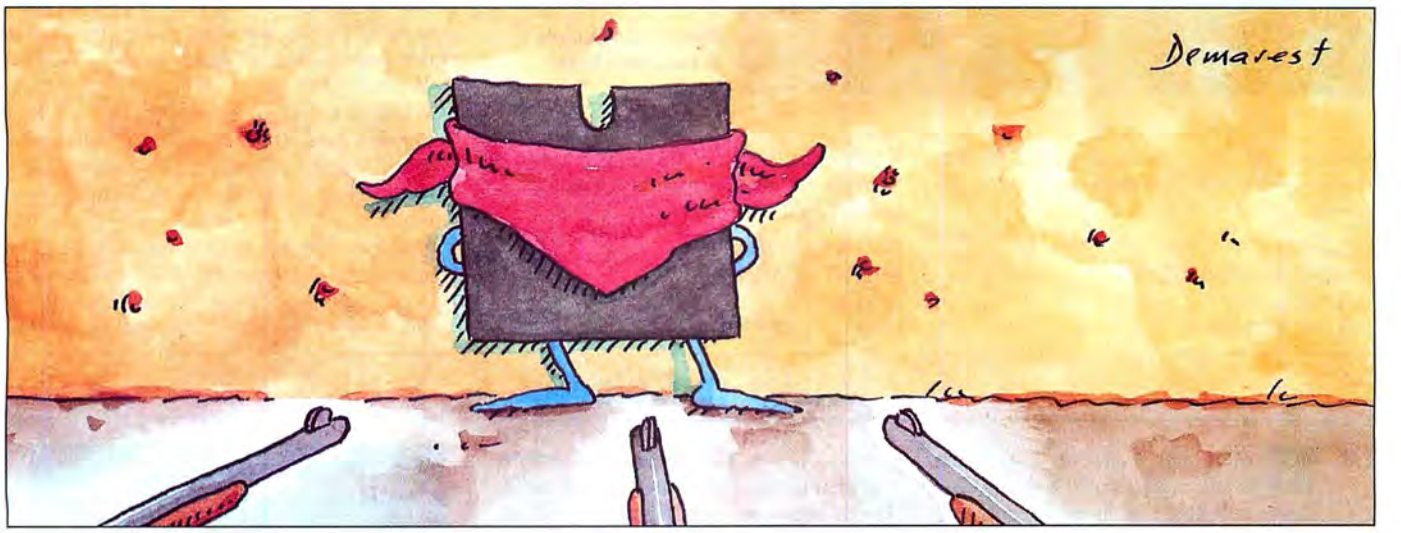

Illustration by Chris Demarest

by Dale Rogerson

Answer the following questions *honestly* about how you organize your files on your disk:

- Does your disk contain files you don't want?
- Do these unwanted files have the same extension and other similarities as wanted files, making it difficult to use wild cards?
- Do the necessary files have names similar to the unnecessary ones, making the deletion of programs that just prompt yes and no at each file name risky?
- Do you often delete programs from a disk so you can fit new ones on it?
- Would you like a directory program that can list 60 files on the screen at once with up to 10 screen pages?
- Would you like this program to show you how much space each program takes?
- Are you interested in experimenting with ANSI graphics?

If you answer yes to any of the above questions, then Delete/Point (DELPNT), the point and delete directory program, can help.

What Is It?

Delete/Point (see Program Listing 1) is an assembly-language program that uses ANSI graphics to format its output. You can type it into your word processor and then assemble it with an assembler such as Microsoft's Macro Assembler. Delete/Point displays the file names in the directory. See Photo 1 for an example of the screen.

You can move among the file names and mark them for deletion. As you mark the files, the amount of memory the files occupied is added so you can determine if you have room to move other files to your disk after deleting.

Delete/Point displays file names in three columns with up to 60 file names per screen. It holds up to 10 pages of 60 file names each, for a total of 600 possible files. The size of each file is also displayed. The top of the screen displays the number of files in the directory, the number of marked files, the amount of free disk space, how much memory the files require, and the current page number.

How to Use It

Initially, Delete/Point works like a normal directory (DIR) command. Supply it with the directory you'll work with at the command line. Delete/Point accepts almost any path name that DIR accepts. It doesn't accept the '.' or '..' anonymous directory

System Requirements: Microsoft's Macro Assembler, Turbo Pascal. Available on the January–March 1988 Disk Series, on sale mid-January 1988.

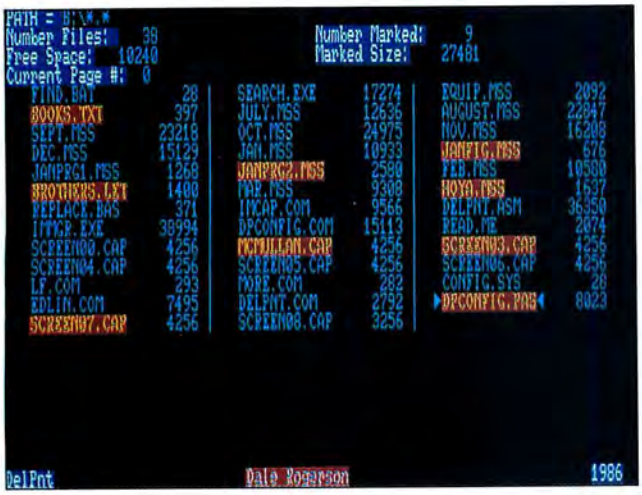

Photo 1. An example of the Delete/Point screen.

names in the path name. If you're in the directory C:\WIN\PIF, these are valid commands:

```
DELPNT C:\WIN\PIF
DELPNT C:\WIN\PIF\*.*
DELPNT
DELPNT \WIN\PIF
```

If you're in the C:\WIN directory, the following commands will get you to the C:\WIN\PIF directory:

```
DELPNT C:\WIN\PIF
DELPNT C:\WIN\PIF\*.*
DELPNT PIF
DELPNT \WIN\PIF
```

If you want only a directory of current files, you can use wild card characters as follows:

```
DELPNT *.EXE
```

This command displays the EXE files in the current directory. If you have a directory with an extension, end the path name with a backslash.

Command Keys and What They Do

The cursor keys move the cursor among the file names on the screen, just as you'd expect. Page-up and page-down keys change the page being displayed if the displayed directory has more than 60 file names. When you use the spacebar to mark and unmark files, the file name changes color as it's marked. The number of marked files is displayed with the total memory they require.

The escape key lets you exit the program at any time without deleting any files. This makes it easy to use Delete/Point as a directory. The enter key deletes all the

Make It Colorful

Because not everyone knows the ANSI commands for making things colorful, I included a configuration program (Program Listing 2). This program is useful for several reasons:

- It demonstrates ANSI graphics without the confusion of assembly language.
- It illustrates the use of ANSI graphics from Turbo Pascal.
- It allows the configuration of Delete/Point without knowledge of ANSI color commands.
- It lets you change the colors without reassembling.
- It lets you see what the colors look like without wasting time.

Listing 2 creates DPConfig (see Photo 2), a Delete/Point configuration program. You can run it from the Turbo environment or as a compiled COM file. DPConfig has two requirements. It must be in the same directory as Delete/Point, and you must tell it the complete name you call Delete/Point (feel free to rename it to a shorter file name). You can supply the name as a command line parameter or answer the prompt for it.

The DPConfig screen has three sections. A sample of the Delete/Point screen at the top of the display lets you preview the final product. The middle part of the screen contains the color table, which contains all the valid colors you can use, numbered from zero to 127. This same section also includes the monochrome table, with attributes numbered from 128 to 131. They control the attributes for a monochrome monitor. Enter the colors you want at the bottom of the screen.

DPConfig prompts you for each color. The prompts are displayed in the different colors. These colors are the same as the area that the prompts ask to change; if marked files are red on black, the prompt that asks you the color for marked files is also red on black.

Answer each prompt with the color you want. If you want to leave the color as it is, press enter. After you answer these four prompts, you have five choices of action. Entering "S" saves the current colors and exits DPConfig. Entering "E" exits the program without changing any colors. Entering "U" updates the screen and changes the sample Delete/Point screen to use, giving you a preview of the new colors. It reprompts you for the colors. Press enter for each prompt you don't want to change. Entering "O" changes the colors back to those currently defined in the Delete/Point program and updates the screen.

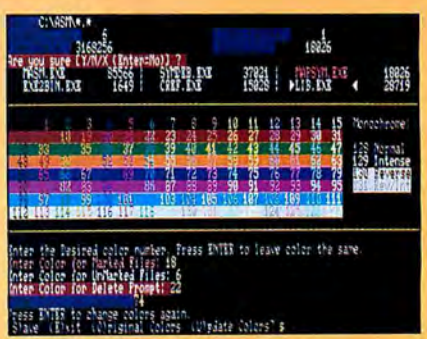

Photo 2. DPConfig. You can run this from the Turbo environment or as a compiled COM file.

DPConfig works by reading the ANSI color strings from the Delete/Point file. It changes the colors by writing them back to the same locations. Therefore, if you change Delete/Point, verify that the colors are at the same offset from the beginning of the file or change the DPConfig program. I suggest the colors in the Table.

Table. Color suggestions for DPConfig.

	Color (Default)	Monochrome	Windows (CGA)
Marked	9	129	130
Unmarked	15	128	128
Delete Prompt	31	129	128
Labels	76	130	130

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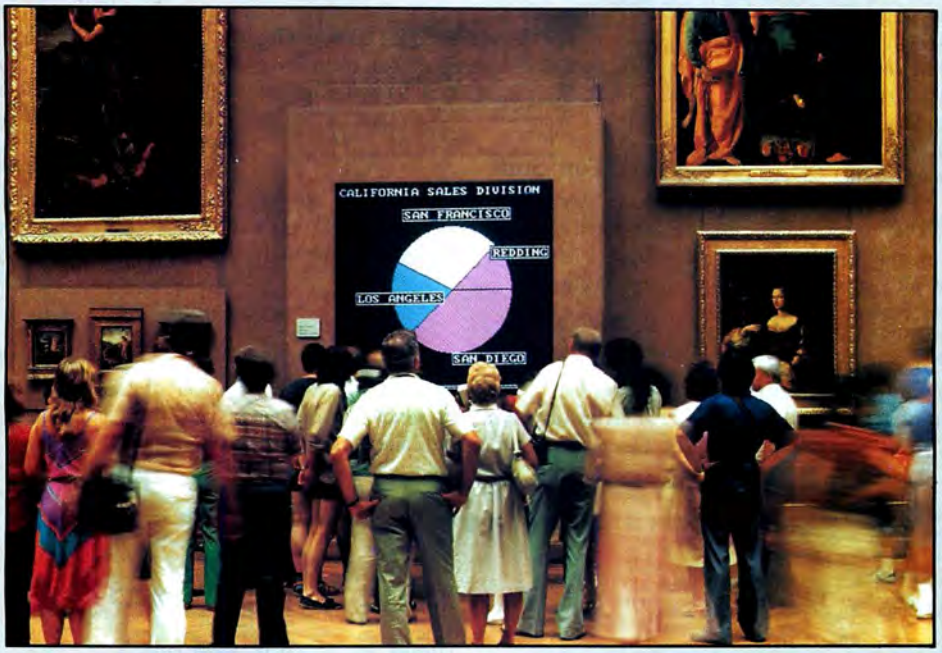

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marked files. Before deleting any files, the program asks "Are you sure [Y/N/X (Enter = No)]?" on the line where the page number is printed. Pressing "Y" deletes all the marked files. Pressing "N" doesn't delete any of the files but lets you mark or unmark the files again. Pressing "X" exits the program without deleting any of the marked files. As Delete/Point deletes each file, the number of marked files decreases.

Changing the Colors

Delete/Point is a colorful program that uses four colors to display various prompts. You can find the ones I chose at the beginning of Listing 1. The labels that represent the colors are Prompts, Highlite, Inv, and Normal. Prompts controls the color of the prompts at the top of the screen. Highlite selects the color of the prompt that verifies that you want to delete the marked files. Inv (Inverse) chooses the color of the marked files. Normal determines the color of everything else.

Delete/Point uses the ANSI.SYS device driver to control the screen. You must have ANSI.SYS in your Config.SYS file to use it.

Other Fun Stuff

Using ANSI graphics has several advantages. First, you can redirect Delete/Point's output to a file. Try the following with Delete/Point:

1. DELPNT > Test
2. Press escape
3. Type test

This series of commands sends the output of Delete/Point to a file called Test. The file contains all the cursor-moving and color-displaying abilities of the original program because the ANSI codes were redirected with the other text.

Second, Delete/Point runs under Microsoft's Windows. It runs in a window just like any other Windows application. One disadvantage of using ANSI graphics is the slow speed of the screen. To avoid this problem, I suggest you look for a public domain, shareware, or commercial ANSI.SYS replacement. These speed up almost anything. ■

Dale Rogerson is an electrical engineering student at Georgia Institute of Technology. You can reach him at 473 Mill Stream Road, Lexington, SC 29072.

Program Listing 1. Delete/Point is an assembly program that uses ANSI graphics to format its output.

```
code    Segment  byte    public   'CODE'
        ASSUME   cs:code,ds:code,ss:code,es:code

        org      100h
start:  jmp      LeadSpc
;----Data---

ESC     equ      1bh
prompts db       ESC,'[44;1;34m$          '              ;  9 Spaces
HighLite db      ESC,'[41;1;37m$          '              ;  9 Spaces
INV     db       ESC,'[31m$               '              ; 14 Spaces
Normal  db       ESC,'[0m',ESC,'[1m$                     ; 11 Spaces
DelPnt  db       ESC,'[25;1HDelPnt$'
Me      db       ESC,'[25;31HDale Rogerson$'
Date    db       ESC,'[25;75H1986$'

All     db       '*.*',0              ;Wildcards to add if none specified
Path    db       80 Dup(?)            ;Storage for pathname
MemSize equ      6                    ;Size of Memory Allocated
DTA     equ      80h                  ;Location of DTA
FCB     equ      5Ch                  ;Location of FCB
Attr_Mask dw     0                    ;Hold attribute types to search for
NumFiles  dw     0                    ;Holds number of files in Directory
NumPrinted db    0                    ;number of files printed on screen
MSize   dd       0                    ;Sizes of all files added together
CurDrv  db       0                    ;Stores current drive number
EndPath dw       0                    ;Stores PTR to End of Pathname
                                      ; before the filename
PageStart dw     11 Dup(0)            ;Storage for the beginning of each page
                                      ;Can hold up to ten pages
PageNum db       0                    ;holds page # of files on screen (even)
                                      ;This number is a mutiple of 2
                                      ;points to current page in REDISPLAY
                                      ;Points to next page in Keys section

NumPrint    dw     0
CursorType  dw     0
TheMaxNumFiles     EQU          600 ;Max files that can be read in.
MaxFiles    dw     0

Names   struc                        ;Data mask for directory
        Attrib  db      0
        TimeOF  dw      0
        DayOF   dw      0
        FSize   dd      0
        File    db      '              ',0          ;12 Spaces
Names   ends
DirLength equ    22
crlf    db       13,10,'$'
MarkedNum dw     0
Ypos    db       0
Xpos    db       0
Ymax    db       0
Xmax    db       0
PutCur  db       ESC, '[24;1H$'
CurDown db       ESC, '[1D' ,ESC, '[1B$'        ;Back then Down
CurUp   db       ESC, '[1D' ,ESC, '[1A$'        ;Back then up
CurRight db      ESC, '[25C$'
CurLeft db       ESC, '[27D$'
Back    db       ESC, '[1D$'
Cursor  db       16,ESC,'[s',ESC,'[12C',17,ESC,'[u$'
ClrCur  db       ESC,'[1D ',ESC,'[s',ESC,'[12C ',ESC,'[u$' ;Clear the Cursor
                                      ;back then space then get right cursor
ClearPage db     ESC,'[5;1H',ESC,'[0J$'
PlaceCur  db     ESC,'[4;1H$'
StartPos  db     ESC,'[5;3H$'
StoreMoveCur  db ESC,'s',ESC,'[3C','$'        ;Store Cursor & Move 3 right
StoreCur  db     ESC,'s$'                     ;Store Cursor
RestoreCur db    ESC,'u$'
SkipName  db     ESC,'16C$'
Seperator db     32,179,'$'
FSize$Tmp db     8 Dup(?)
          db     '$'
ErrMess   db     '*** Error   ***','$'
ErrMess3  db     '*** Path Not Found ***','$'
ErrMess2  db     '*** File Not Found ***','$'
ErrMess5  db     '*** Access Denied Cannot Delete ***$'
ErrMess7  db     '*** Memory Management Error : Blocks Destroyed ***$'
ErrMess9  db     '*** Memory Management Error : Invalid Block ***$'
ErrMess15 db     '*** Invalid Drive ***$'
ErrMess18 db     '*** No More Files ***','$'
CLS     db       ESC,'[2J$'
Path$   db       'PATH = $'
FileNum$  db     13,10,'Number Files: $'
DiskSpc$  db     13,10,'Free Space: $'
SpcLoc  db       ESC,'[3;12H$'
NumMark$  db     ESC,'[2;40H' , 'Number Marked:$'
NumMarkCont$ db  '     0$'                          ;5 Spaces
MSize$  db       ESC,'[3;40H','Marked Size:$'
MsizeCont$ db    '       0$'                        ;8 Spaces
MarkLoc db       ESC,'[2;55H$'
SizeLoc db       ESC,'[3;53H$'
AskLoc  db       ESC,'[4;1H',ESC,'[K$'
Spc$    db       '                                                $' ; 36 Spaces
Ask     db       'Are you sure [Y/N/X (Enter=No)] ? $'
InpBuf  db       2,0,0,0,0
Page$   db       'Current Page #: $';
PageLoc$  db     ESC,'[4;16H$'
;=============================================
;                  Macros                    |
;=============================================
Exit    macro    ReturnCode           ;End the program
        mov      al,ReturnCode
        mov      ah,4ch
        int      21h
        endm
;----
Dis_Str Macro    string               ;Display a string that ends with $
        mov      dx,OFFSET string
        mov      ah,09h
        int      21h
        endm
;---
SetCurType macro                      ;Set Cursor Type
        mov      ah,1
        int      10h
        endm
;----
GetCurPos macro  page      ;dh = row, dl = column, cx = cursor type
        mov      ah,3
        int      10h
        endm
;----
FindFirst macro  PathName,Attribute   ;DS already set because of ASSUME
        mov      dx,offset PathName
        mov      cx,Attribute
        mov      ah,4eh
        int      21h
        endm
;---
FindNext  macro
        mov      ah,4fh
        int      21h
        endm
;=============================================
;                Procedures                  |
;=============================================
;----Get the Directory of the disk
dir     Proc     Near
        mov      bp,OFFSET MaxFiles
        FindFirst Path,Attr_Mask      ;Get First File
        jc       Dir_Err              ;Go if No Files or Error

        mov      di,OFFSET DirArea    ;Move Directory Info to DIRAREA
MoveIt: dec      WORD PTR [bp]
        cmp      WORD PTR [bp],0
        jz       pFinUp
        mov      si,21 + OFFSET DTA
        mov      cx,DirLength
        REP      movsb

        FindNext                      ;Get Next File
        jnc      Moveit
        cmp      ax,18                ;Just End of Files or worse?
        jnz      Dir_Err
pFinUp: mov      BYTE PTR [di],0ffh   ;Mark end of files
        clc                           ;No Error Clear Carry
```

Listing 1 continued

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TRS-80 Model 1/3/4/4D/4P: One disk drive and 48K memory.

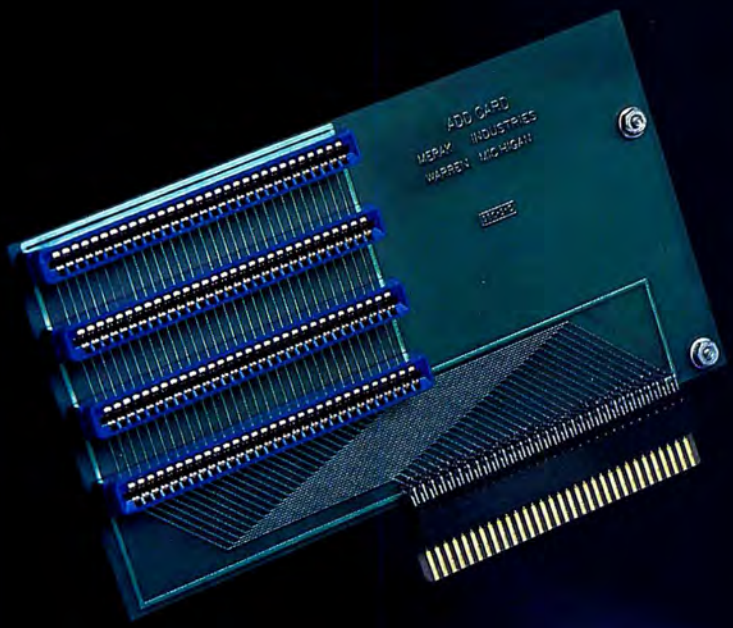
Listing 1 continued

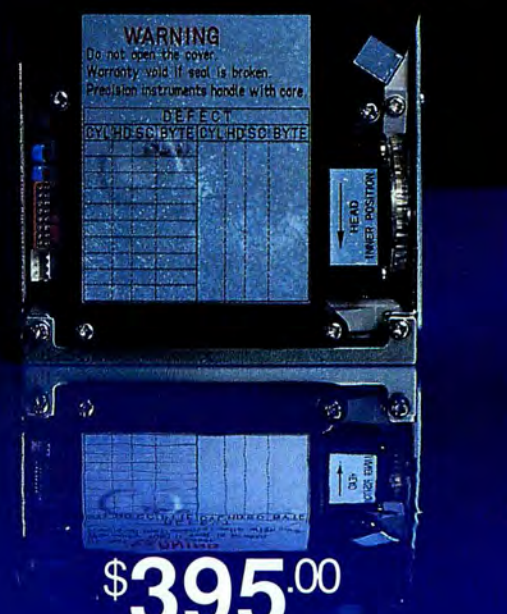
```
        ret

Dir_Err:  stc                           ;Set Carry to Signal Error
        ret
Dir     EndP
;----Display an ASCIIZ string
DispASCIIZ  Proc    Near
        mov     ah,2                    ;Dos Function Ø2h, Display Char
        push    di
        push    dx
        mov     di,dx
pLoop:  mov     dl,[di]
        or      dl,dl                   ;dl = Ø ?
        jnz     pDisp
        pop     di
        pop     dx
        ret                             ;Loop for next character.
pDisp:  int     21h                     ;Do Function.
        inc     di
        jmp     pLoop
DispASCIIZ EndP
;----Find the Drive
GetDrive  Proc      Near
        cmp     Byte PTR [SI+1],':' ;Is drive letter supplied?
        jz      movedrv             ;Yes so get it off command line
        mov     ah,19h              ;No so Get Current Disk Drive
        int     21h
        inc     al
        mov     [CurDrv],al         ;Save Drive
        add     al,'A'-1            ;Insert drive letter into path name
        mov     [di],al
        inc     di
        mov     BYTE PTR [di],':'
        inc     di
        ret
MoveDrv:  mov     al,[si]           ;Get drive letter off command line
        mov     [di],al
        and     al,223              ;make it upper case
        sub     al,'A'-1
        mov     [CurDrv],al
        inc     di
        inc     si
        mov     al,[si]
        mov     [di],al
        inc     di
        inc     si
        dec     cx
        dec     cx
        ret
GetDrive  Endp
;----Get path off command line
GetPath   Proc      Near      ;exec GetDrive First
        mov     bl,'\'
        cmp     [SI],bl             ;path start a root
        jz      pLeave
        mov     [di],bl
        inc     di
        push    si                  ;Save Source
        mov     si,di               ;Get Ready to Get Path
        mov     ah,47h              ;Dos Function to Get Path
        mov     dl,[CurDrv]
        int     21h
        jnc     pNoErr
pLeave:   ret
pNoErr:   cmp     Byte PTR [SI],Ø
        jz      pFinish
        inc     si
        jmp     pNoErr
pFinish:  cmp     [si-1],bl
        jz      pEndSlash
        mov     [si],bl
        inc     si
pEndSlash: mov      di,si
        pop     si
        clc
        ret
GetPath   endp
;----Get the Free Space on the drive
FreeSpc   Proc      Near
        mov     ah,36h          ;Get Free Space Dos Function
        mov     dl,[CurDrv]
        int     21h
        cmp     ax,Øffffh
        jnz     DrvExt
        mov     ax,15
        stc
        ret
DrvExt:   xor     dx,dx
        mul     bx
        mul     cx
        mov     di,OFFSET FSize$Tmp
        call    Conv_DW
        Dis_str   SpcLoc
        Dis_Str   FSize$Tmp
        clc
        ret
FreeSpc   EndP
;----Clear the time field of each file
ClearTime Proc      Near      ;make Time bytes of each file =ØØØØ & count Files
        mov     bp,OFFSET DirArea
        mov     cx,DirLength
        mov     bx,OFFSET NumFiles
pNext:  mov     al,[bp].Attrib
        cmp     al,Øffh
        jnz     pMore
        ret
pMore:  mov     WORD PTR [bp].timeOF , Ø
        add     bp,cx
        inc     WORD PTR [BX]
        jmp     pNext
ClearTime endp
;---Calculate the maximum row and column number
CalcRows  Proc      Near
        mov     al,[NumPrinted]
        dec     al
        xor     ah,ah
        mov     bl,3
        div     bl
        mov     [Ymax],al
        mov     [Xmax],ah
        ret

CalcRows  endp
;----Delete all the marked filenames
DeleteEM  Proc      Near
        Dis_Str   StoreCur          ;Store Cursor Position
        mov     cx,[CursorType]     ;Turn Cursor On
        SetCurType
pRep:   Dis_Str   AskLoc            ;Move Cursor
        Dis_Str   HighLite          ;Color Question
        Dis_Str   ASk
        Dis_Str   Normal
        mov     dx,OFFSET InpBuf    ;dx ==> input buffer for characters
        mov     ah,Øah              ;ConStringInput Function
        int     21h
        mov     bx,dx               ;bx = dx
        cmp     BYTE PTR [bx+1],Ø   ;No characters Entered?
        jnz     pD1
        jmp     pNo                 ;If none means NO
pD1:    mov     al,[bx+2]           ;Get Character entered
        and     al,223              ;Make it Upper case
        cmp     al,'N'              ;User doesn't want to delete
        jnz     pD2
        jmp     pNo
pD2:    cmp     al,'X'              ;User Wants to quit program
        jz      pEndof
        cmp     al,'Y'
        jnz     pRep                ;Incorrect letter Ask again
pDEL:   ;---- Now we try to delete
        mov     di,OFFSET DirArea   ;DI ==> File Information
        xor     bx,bx               ;bx = Offset to correct File
        mov     cx,DirLength        ;cx = Distance to next File
pNextFile:
        cmp     BYTE PTR [DI][bx].Attrib,Øffh ;Last File?
        jz      pEndof
        cmp     WORD PTR [DI][bx].TimeOF,1    ;Is it marked?
        jnz     pGetNext                      ;Not Marked get next file
        Push    bx
        mov     si,[EndPath]                  ;SI ==> End of PathName
pNextChar:
        mov     al,BYTE PTR [DI][bx].file     ;Get char in filename
        mov     BYTE PTR [SI],al              ;Move it (including Ø)
        or      al,al                         ;is it the end (Ø)
        jz      pDelIt                        ;If so delete file
        inc     si                            ;Next position
        inc     bx                            ;next char
        jmp     pNextChar                     ;Move next char
pDelit: pop     bx                            ;Get offset back
        mov     dx,OFFSET Path                ;DX ==> Pathname/Filename
        mov     ah,41h                        ;Unlink/Delete
        int     21h
        jc      pExit
        mov     ax,[MarkedNum]
        dec     ax
        mov     [MarkedNum],ax
        call    DispNumMark
pGetNext: add     bx,cx                       ;Move offset to next file
        jmp     pNextFile
pEndOF: xor     ax,ax                         ;no error so clear ax
pExit:
        stc                                   ;Set Carry to signal Exit
        ret                                   ;go back
pNo:
        mov     ch,16                         ;Get rid of cursor
        SetCurType
        Dis_Str   Spc$
        Dis_Str   AskLoc
        Dis_Str   Prompts
        Dis_Str   Page$
        Dis_Str   Normal
        call    DispPageNum
        Dis_Str   RestoreCur                  ;Reset Cursor position
        clc                                   ;Clear carry to signal CONT
        ret
DeleteEm  endp
;----Handle all the Errors
Error   Proc      Near
        Push    ax
        Dis_Str   crlf
        Dis_Str   INV
        pop     ax
pErr7:  cmp     ax,7
        jnz     pErr9
        mov     dx,OFFSET ErrMess7
        jmp     SHORT pDisErr
pErr9:  cmp     ax,9
        jnz     pErr5
        mov     dx,OFFSET ErrMess9
        jmp     SHORT pDisErr
pErr5:  cmp     ax,5
        jnz     pErr3
        mov     dx,OFFSET ErrMess5
        jmp     SHORT pDisErr
pErr3:  cmp     ax,3
        jnz     pErr15
        mov     dx,OFFSET ErrMess3
        jmp     SHORT pDisErr
pErr15: cmp     ax,15
        jnz     pErr18
        mov     dx,OFFSET ErrMess15
        jmp     SHORT pDisErr
pErr18: cmp     ax,18
        jnz     pErr2
        mov     dx,OFFSET ErrMess18
        jmp     SHORT pDisErr
pErr2:  cmp     ax,2
        jnz     pAnyErr
        mov     dx,OFFSET ErrMess2
        jmp     SHORT pDisErr
pAnyErr: mov     dx,OFFSET ErrMess
        add     ax,'Ø'
        mov     [ErrMess+1Ø],al
pDisErr:
        mov     ah,9            ;Display the message
        int     21h
        Dis_Str   Normal
        Dis_Str   crlf
        mov     cx,[CursorType]
        SetCurType
        exit    1
Error   EndP
;----Calculate the index of the file
CalcFileNum PROC    Near
```

Listing 1 continued

Two for your Tandy

This year, give your Tandy *Power* and *Performance*





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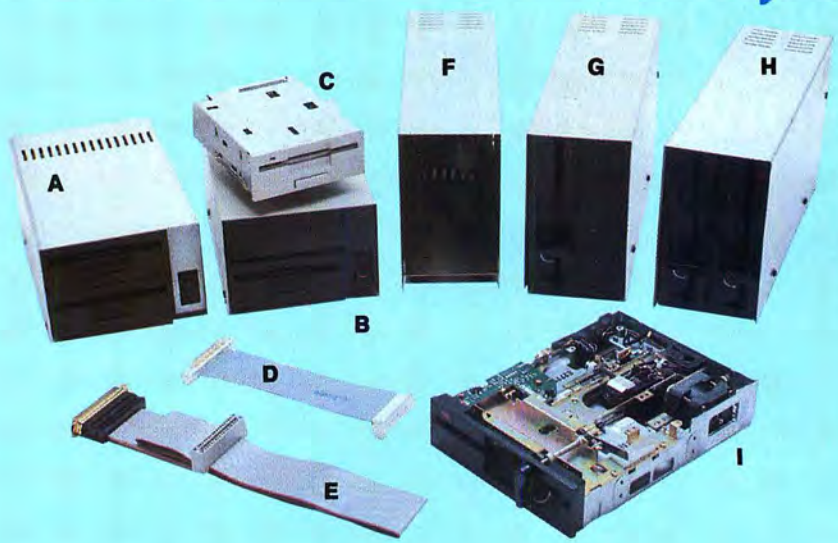

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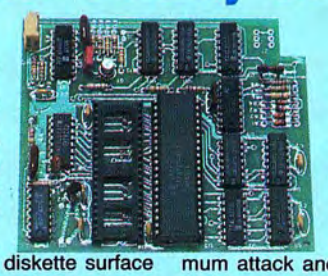

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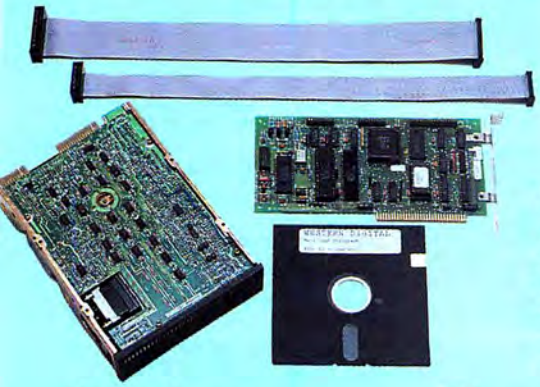

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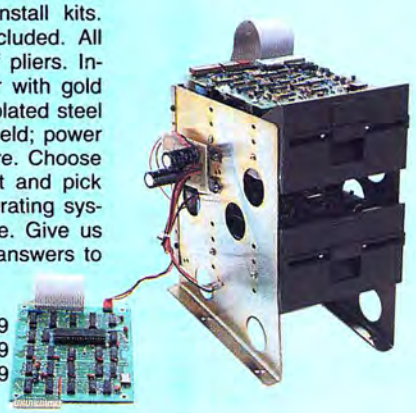

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Listing 1 continued

```
        mov     al,[Ypos]           ;Get Y position
        mov     bl,3                ;Three files per row
        mul     bl                  ;Ypos*3
        mov     bl,[Xpos]           ;Get Xpos
        xor     bh,bh
        add     ax,bx               ;now Ypos*3+Xpos
        ret
CalcFileNum endp
;----Update the Number of files Marked
DispNumMark Proc    Near
        push    dx
        push    di
        xor     dx,dx
        mov     di,OFFSET FSize$Tmp
        call    conv_Dw
        Dis_Str MarkLoc
        Dis_Str FSize$Tmp[3]
        pop     di
        pop     dx
        ret
DispNumMark Endp
;----Mark the filename the cursor is on
Mark    Proc    Near        ;DI ==> Dir DATA Area
                            ;bp ==> MSize
                            ;si ==> MarkedNum
                            ;bx = Offset to File area inside Data Area
        push    bp
        push    si
        mov     bl,[PageNum]        ;Get Next Page Number
        dec     bl
        dec     bl                  ;make it this page number
        xor     bh,bh               ;Zero upper byte of page number
        mov     DI,PageStart[bx]    ;Get ptr to begining of Dir DATA for
                                    ;this page
        mov     si,OFFSET MarkedNum
        mov     bp,OFFSET MSize
        call    CalcFileNum
        mov     bx,DirLength
        mul     bx                  ;calc offset to file to mark
        mov     bx,ax
        mov     ax,WORD PTR [DI][bx].TimeOF
        or      ax,ax
        jz      markit
        mov     WORD PTR [DI][bx].TimeOF,0
        dec     WORD PTR [si]

        mov     ax,WORD PTR [DI][bx].FSize ;32 bit subtract
        sub     [bp],ax
        mov     ax,WORD PTR [DI][bx].FSize[2]
        sbb     [bp+2],ax
        Dis_Str Normal
        jmp     pDisFile
Markit: mov     WORD PTR [DI][bx].TimeOF,1
        inc     WORD PTR [si]

        mov     ax,WORD PTR [DI][bx].FSize ;32 bit add
        add     [bp],ax
        mov     ax,WORD PTR [DI][bx].FSize[2]
        adc     [bp+2],ax
        Dis_Str Inv
pDisFile: Dis_Str   StoreCur
        mov     dx,bx
        add     dx,DI
        add     dx,File
        Call    DispASCIIZ
        Dis_Str Normal              ;DI =/=> Dirarea any more

        mov     ax,[si]
        call    DispNumMark

        Dis_Str SizeLoc
        mov     ax,[bp]                         ;Set up to print
        mov     dx,[bp+2]
        mov     di,OFFSET FSize$Tmp
        call    Conv_DW
        Dis_Str FSize$Tmp

        Dis_Str RestoreCur
        pop     si
        pop     bp
        ret
Mark    endp
;----Move the cursor right
GoRight Proc    Near
        mov     bx,OFFSET Xpos
        mov     al,[Ypos]
        cmp     al,[Ymax]
        mov     al,2
        jnz     pNotLast
        mov     al,[Xmax]
pNotLast: cmp   al,[bx]
        jnz     pOkayR
        Dis_Str Back
        ret
pOkayR: inc     BYTE PTR [bx]
        Dis_Str ClrCur
        Dis_Str CurRight
        ret
GoRight Endp
;----Move the cursor left
GoLeft  Proc    Near
        mov     bx,OFFSET Xpos
        mov     al,0
        cmp     al,[bx]
        jnz     pOkayL
        Dis_Str Back
        ret
pOkayL: dec     BYTE PTR [bx]
        DIs_Str ClrCur
        Dis_Str CurLeft
        ret
GoLeft  Endp
;----Move the cursor down
GoDown  Proc    Near
        mov     al,[Ypos]           ;Get Y position
        inc     al                  ;What is the next position
        cmp     al,[Ymax]           ;Get Max Y value
        jc      pOkayD              ;Go if Y+1 < Ymax
        jnz     pTooFar             ;go if Y+1 > Ymax
        mov     ah,[Xpos]           ;Y+1 = Ymax check Xpos
        cmp     ah,[Xmax]
        jbe     pOkayD
pTooFar: Dis_Str    Back
        ret
pOkayD: mov     [Ypos],al
        Dis_Str ClrCur

        Dis_Str CurDown
        ret
GoDown  endp
;----Move the cursor up
GoUp    Proc    Near
        mov     bx,OFFSET Ypos
        mov     al,0
        cmp     al,[bx]
        jnz     pOkayU
        Dis_Str Back
        ret
pOkayU: dec     BYTE PTR [bx]
        Dis_Str ClrCur
        Dis_Str CurUp
        ret
GoUp    endp
;----Move Down to the next page
PageDN  Proc    Near
        mov     bl,[PageNum]
        xor     bh,bh
        mov     ax,PageStart[BX]
        cmp     ax,0ffffh
        jnz     pMorePages
        stc
        ret
pMorePages:
        clc
        ret
PageDN  Endp
;----Move Up to the previous page
PageUp  Proc    Near
        mov     bl,[PageNum]
        dec     bl
        dec     bl
        jnz     pNotStart
        stc
        ret
pNotStart: dec  bl
        dec     bl
        mov     [PageNum],bl
        xor     bh,bh
        clc
        ret
PageUp  Endp
;----Convert a double word to an ASCIIZ string
Conv_DW PROC    Near        ;Convert DW to ASCIIZ string
        ;Entry:  DX:AX ==> # to Convert
        ;        DS:DI ==> Destination
        push    bp
        push    bx
        push    cx
        push    di
        push    ax                  ;Save Part of Number to Convert
        mov     cx,8                ;We must clear destination string
        mov     al,' '              ;with 8 spaces
        rep     stosb               ;Clear it
        dec     di                  ;DI now points to One's place
        pop     ax                  ;Get back ax

        xchg    bp,dx               ;save high word
        mov     bx,0ah              ;divisor
        mov     cl,30h              ;conversion for ascii
rpt1:
        cmp     bp,0                ;are we done with high words
        jz      rpt2                ;yes
        xchg    ax,bp               ;no-get high word
        xor     dx,dx               ;clear dx
        div     bx
        xchg    bp,ax               ;this will be the new high word
        div     bx                  ;divide low word + remainder
        or      dl,cl               ;convert hex value to ascii
        mov     [di],dl             ;quotient into storage
        dec     di                  ;step back one byte
        jmp     rpt1                ;go again
rpt2:
        xor     dx,dx               ;clear dx
        div     bx
        or      dl,cl               ;convert hex value to ascii
        mov     [di],dl             ;quotient into storage
        dec     di                  ;step back one byte
        cmp     ax,0                ;are we done?
        jnz     rpt2                ;no

        pop     di
        pop     cx
        pop     bx
        pop     bp
        ret                         ;yes
Conv_DW  endp
;----Display the current page number
DispPageNum Proc    Near
        Dis_Str PageLoc$
        mov     al,[PageNum]
        shr     al,1                ;Divide by 2
        xor     ah,ah
        xor     dx,dx
        mov     di,OFFSET FSize$Tmp
        call    Conv_DW
        Dis_Str FSize$Tmp[5]
        ret
DispPageNum Endp
;=============================================
;             Program Codes                  |
;=============================================
First_Letter:                       ;More the Parameter to [Path]
        ;source already in si
        mov     di,OFFSET Path      ;dest
        call    GetDrive            ;Get the drive letter or current drv
        call    GetPath             ;Get the pathname
        jnc     MovCmdLn            ;No Error?
        jmp     Error
MovCmdLn: REP   Movsb               ;Move the Parameter
        mov     al,':'              ;Does it End in ':'?
        cmp     al,[di - 1]
        jnz     pSkip               ;Skip if it doesn't
```

Listing 1 continued

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Listing 1 continued

```
        jmp     No_Paral            ;Go Add the *.*
pSkip:  mov     al,'\'              ;Does it end in '\'
        cmp     al,[di-1]
        jnz     pSkip2              ;If no skip next jmp
        jmp     No_Paral            ;Go Add the *.*
pSkip2: mov     si,di               ;si ==> End of Pathname
FindBkSlash:                        ;Find last backslash
        mov     al,'\'              ;al = \
pFLoop: cmp     al,[si-1]           ;SI ==> character before the backslash
        jz      pEndlp              ;Found it?
        dec     si                  ;back up one character
        jmp     pFloop              ;Check again
pEndLp:
        mov     [EndPath],si        ;Save this position
        mov     Byte Ptr [di],Ø     ;make ASCIIZ (DI pts to end entire str)
        push    di                  ;Save PTR (Not necessary)
        mov     di, OFFSET FCB      ;now DI ==> FCB
        mov     al,1                ;AL = Parse Contrl
        mov     ah,29h              ;PARSE the command line
        int     21h
        cmp     al,1
        jz      pFileName
        cmp     WORD PTR [di + 9],'  '      ; 2 Spaces
        jz      NoWildCard
pFileName: pop   di
        jmp     cont                ;Its a Filename
NoWildCard: pop  di
        mov     cx,1Øh              ;Search for SubDir
        mov     dx,OFFSET Path
        mov     ah,4eh
        int     21h                 ;Search for it
        jnc     CheckAtt
        mov     ax,3
        jmp     Error
CheckAtt: mov   al,1Øh
        cmp     al,DS:[DTA+21]
        jz      itsaPath
        jmp     cont
ItsaPath: mov   BYTE PTR [di],'\'
        inc     di
        jmp     No_Paral
;=============================================
;            Main Section                   |
;=============================================
LeadSpc:
        push    ax                  ;AX tells if CmdLin Drv Okay
        GetCurPos Ø                 ;Get Cursor Type
        mov     [CursorType],cx     ;Save Current Type
        mov     ch,16               ;Turn Cursor Off
        SetCurType                  ;Set Cursor
        pop     ax                  ;Get Saved AX
        or      al,al               ;Al = Ø?
        jz      pDrvOkay            ;If al=Ø Drive is okay
        mov     ax,15               ;Invalid Drive Error
        jmp     error               ;Exit because of Error
pDrvOkay:
        mov     ax,DS:[MemSize]
        sub     ax,OFFSET DirArea
        xor     dx,dx
        mov     cx,22
        div     cx
        cmp     ax,6ØØ
        jb      Not2Much
        mov     bx,(OFFSET Dirarea) + ( TheMaxNumFiles * 22) + 1ØØh
                                                ;1ØØ is for stack
        mov     sp,bx                           ;move stack ptr
        add     bx,15
        mov     cl,4
        shr     bx,cl
        mov     ah,49h          ;Deallocate Memory Dos Function
        int     21h
        jnc     pMemFreed
        jmp     Error
pMemFreed: mov   ax,TheMaxNumFiles
Not2Much: mov   [MaxFiles],ax
        xor     ch,ch               ;Zero Upper byte of count
        mov     cl,DS:[DTA]         ;Get Length of Parameter
        or      cl,cl               ;Is Length Zero?
        jz      No_Para             ;If so then No_para given
        mov     si,DTA+1            ;Remove Spaces
RemoveSpc:                          ;si => Paramter
        cmp     BYTE PTR [si],' '   ;Is it a space?
        jz      pNoLet
        jmp     First_Letter        ;Go if Not
pNolet: inc     si                  ;SI points to next charater
        LOOP    RemoveSpc           ;Loop until no more Charaters

No_Para:                            ;No Parameters make it *.*
        mov     di,OFFSET Path      ;dest
        mov     si,dta
        mov     WORD PTR [si],Ø     ;make sure no ':' or '\'
        mov     WORD PTR [si+2],Ø
        call    GetDrive            ;Get Drive, Cur if not exists
        call    GetPath             ;Get Path
        jnc     No_Paral
        jmp     Error
No_Paral:
        mov     [EndPath],di        ;Store End of PathName
                                    ;includes ending \
        mov     si,OFFSET All       ;source
        mov     cx,4                ;number
        REP     movsb               ;move it
Cont:   call    Dir                 ;Get the Directory
        jnc     NoError             ;Go if Error
        jmp     Error
;=============================================
;          Set up the Display               |
;=============================================
NoError: call   ClearTime           ;count # of files/set time=Ø
        mov     bx,offset PageStart ;Set up page table
        mov     [bx],OFFSET DirArea ;1st page starts at DirArea
Display:
        Dis_Str Normal
        Dis_Str CLS                 ;Clear Screen
        Dis_Str Prompts             ;Color prompts
        Dis_Str Path$               ;Display 'Path = '
        Dis_Str Normal              ;Normal color
        mov     dx,OFFSET Path      ;Print the Pathname
        Call    DispASCIIZ

        dis_str Prompts             ;color again
        dis_str FileNum$            ;Print 'Number Files:'
        dis_str Normal
        xor     dx,dx               ;Convert Number to ASCII
        mov     ax,NumFiles
        mov     di,OFFSET FSize$Tmp ;Just get last 5 digets
        call    conv_DW             ;Convert it
        Dis_Str FSize$Tmp[3]        ;Now print the Number

        Dis_Str Prompts         ;Print Disk Free Space
        Dis_Str DiskSpc$
        Dis_Str Normal
        calT    FreeSpc
        jnc     pMorDisp
        jmp     Error
pMorDisp: Dis_Str Prompts           ;Number marked first
        Dis_Str NumMark$
        Dis_Str Normal
        Dis_Str NumMarkCont$

        Dis_Str Prompts             ;Marked Size
        Dis_Str MSize$
        Dis_Str Normal
        Dis_Str MSizeCont$
        Dis_Str AskLoc
        Dis_Str Prompts
        Dis_Str Page$
        Dis_Str Normal

ReDisplay:
        xor     al,al               ;Set up Varibles for Re-running
        mov     [Ypos],al
        mov     [Xpos],al
        call    DispPageNum
;=============================================
;       Display filenames and their sizes     |
;=============================================
; Display filenames and their sizes
pCont:  Dis_Str ClearPage           ;clear bot of screen
        Dis_Str Prompts
        Dis_Str DelPnt
        Dis_Str Date
        Dis_Str HighLite
        Dis_Str Me
        Dis_Str Normal
        Dis_Str PlaceCur
        mov     bl,BYTE PTR [PageNum]   ;get current page number
        xor     bh,bh               ;zero upper byte of page num
        mov     bp,PageStart[bx]    ;BP ==> Directory Information
        mov     ch,2Ø+1             ;Number of Lines+1 to Print
        mov     si,OFFSET NumPrinted ;SI ==> Number Printed
        mov     Byte Ptr [si],bh    ;[SI] = Ø

NuLine: dec     ch                  ;Printed all Line?
        jnz     pContNln            ;then Page is Finished
        mov     al,[Bp].Attrib
        cmp     al,Øffh
        jnz     finpage
        mov     bp,Øffffh
        jmp     FinPage
pContNln: mov   cl,3                ;Three Filenames per line
        Dis_Str crlf                ;Goio Next Line
exist:  mov     al,[bp].Attrib      ;Get Filename Attribute
        cmp     al,Øffh             ;ØFFh marks end of Directory
        jnz     pPrint              ;Go to Mark/Delete Section
        mov     ah,al
        mov     bp,ax               ;bp =ØFFFFh to mark last page
FinPage: inc    bx
        inc     bx
        mov     [PageNum],bl
        mov     PageStart[Bx],bp
        call    CalcRows            ;Compute max X & Y positions
        jmp     Mov_Cur

pPrint: Dis_Str StoreMoveCur        ;Save Cursor before printing
                                    ;..Variable length Filename
        cmp     BYTE PTR [Bp].TimeOF,1  ;Is it marked?
        jnz     pNoMark
        Dis_Str INV
pNoMark: mov    dx,bp               ;move ptr to Filename to dx
        add     dx,file
        call    DispASCIIZ          ;Print an ASCIIZ string
        cmp     BYTE PTR [Bp].TimeOF,1  ;Is it marked?
        jnz     pNormal
        Dis_Str Normal
pNormal: Dis_Str RestoreCur         ;Get Cursor Position
        Dis_Str SkipName            ;Move cursor past filename

        mov     ax,WORD PTR [bp].FSize
        mov     dx,WORD PTR [bp].FSize[2]
        mov     di,OFFSET Fsize$Tmp
        call    Conv_DW
        Dis_Str FSize$Tmp
        inc     BYTE PTR [si]       ;Printed one more file
        add     bp,DirLength        ;BP ==> Next Filename Record
        dec     cl                  ;Printed One more on line
        jnz     NoNu                ;Have we print 3 names?
        jmp     Nuline

NoNu:   Dis_Str Seperator           ;If not print Separator
        jmp     exist               ;Go Print Another
;=============================================
;            KeyBoard Loop                  |
;=============================================
Mov_Cur:
        Dis_Str StartPos
Show_Cur: Dis_Str Cursor
Keys:   xor     ah,ah
        int     16h
chkEnt: cmp     al,Ødh
        jnz     chkPgUp
pEnt:   call    DeleteEm
        jnc     Keys
        or      ax,ax
        jz      pOut
        jmp     Error
chkpgup: cmp    ax,49ØØh
        jnz     chkpgdn
        call    PageUp
        jc      Keys
        jmp     ReDisplay
chkPgDN: cmp    ax,51ØØh
```

Listing 1 continued

Hypersoft bridges the TRS-80 - PC Gap.

Programs for PCs and Compatibles.

PC-Four - A TRS-80 Emulator.

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

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

Runs on PCs or compatibles with at least 384K of memory. Put it on your lap-top, now you can carry your TRS-80 in your briefcase, wherever you go!. Also runs on IBM PS/2s.

Prices: Order #PC4 $79.95 alone, #PC4H $104.95 with Hypercross SX3PCM4, #PC4Z $119.95 with PCXZ. Send $3 for PC4/PCXZ demo disk - refundable on order. **PC-Four is also available on 3.5" disk format for lap-top machines, Tandy 1000TX, IBM PS/2s etc.**

PCXZ reads TRS80 disks on your PC

PC Cross-Zap (PCXZ) is a utility that runs on your PC or PC-compatible. With it you can **copy** files **to** or **from** TRS-80 disks at will. Suitable for all types of files, BASIC, ASCII and Binary. **Converts BASIC and text files automatically** as you copy. You can also format a disk, copy disks, explore, read and write sector data, repair bad directories and much more. Long after your TRS-80 is gone you will still be able to read your old disks. **Formats Supported:** Model I mixed density: DOS+ 3.4, DoubleDOS, LDOS (SOLE), MultiDOS, NEWDOS 80 V2, TRSDOS 2.7/8; Model I/III Double Density: DOS+ 3.5, LDOS 5.x. Model III: DOS+ 3.4, MultiDOS, NewDOS 80, TRSDOS 1.3; Model 4/4P: MultiDOS, DOS+ 4, TRSDOS 6., LSDOS 6.3; Max-80: LDOS 5.1. PCXZ supports single or double sided, 35, 40 and 80 track formats. **Requires:** PC, XT, AT or compatible, Tandy 1000 (1000EX needs DMA), 1200, 3000. **You must have at least one 5-1/4" 360K, 720K or 1.2M drive and 256K memory.** An original program by Hypersoft.
Not for PS/2s: Order # PCXZ $79.95

Also may we recommend for your PC:

XenoCopy II runs on your PC and lets you read, write and format approx. 300 different CP/M, CoCo, P-System and other formats.
Order # Xeno $81.95

Uniform-PC runs on your PC and lets you read, write and format approx. 200 different CP/M and MS-DOS formats. Supports Matchpoint, and Compaticard (see below). **Order # UFPC** $69.95

Matchpoint-PC reads Apple-II Disks on your PC. Includes a half-size card that plugs in your PC plus software. Reads **Apple DOS, PRODOS, SOS, CP/M,** and over 200 CP/M formats including hard sectored types like NorthStar. Includes Uniform-PC. **Order # MPPC** $195.00

Matchmaker - reads MACINTOSH disks! a half size card plugs in your PC and, together with the supplied software, reads, writes and initializes MAC disks. Requires an external MAC drive.
Order # PCMAC $149.00

COMPATICARD disk controller card lets you attach 3.5" (720K or 1.44 Meg), 5.25" (360K, 720K or 1.2 Meg), and 8" disk drives to your PC, XT or AT. Control up to 16 drives with 4 Compaticards. May require Uniform-PC. **Order #** CCRD $175.00

UniDOS Z-80 CP/M card installs in your PC and lets you run CP/M programs on its built in 8 MHz Z80. Includes a free copy of Uniform-PC to transfer your old CP/M programs. **Order # UZ80** $175.00

TRS-80 Corner.

HyperCross reads CP/M and PC-DOS on TRS-80s

Using **HYPERCROSS** 3.0 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 files. You can FORMAT alien disks, read their directories, copy files to and from them, even copy directly from one alien disk to another.
Formats supported: IBM-PC and MS-DOS including DOS 1.1, 2.0-3.2 Tandy 2000, single and double sided, 3.5 and 5 inch. CP/M from Aardvark to Zorba, including all popular TRS80 CP/M formats such as Holmes, Montezuma, and Omikron. Also supports CoCo format.
HyperCross converts Basic files! HyperCross will automatically convert tokenized Basic file to MSDOS or CP/M as it copies them.
Tried and Tested in 1000s of installations world wide, by Industry, Universities, Government Institutions and nice TRS-80 owners everywhere. Prices include disk and 40 page manual.
HyperCross 2.0 CoCo reads CoCo format (No Basic convert) **Order SX2CCM1, SX2CCM3 or SX2CCM4** $49.95
HyperCross 3.0 PC reads popular MSDOS 1.1-3.2 formats **Order SX3PCM1, SX3PCM3 or SX3PCM4** $49.95
HyperCross XT/3.0 reads 90 different CP/M and PC formats **Order SX3XTM1, SX3XTM3 or SX3XTM4** $89.95
HyperCross XT/3.0-Plus. Reads over 220 formats inc CoCo **Order SX3XTM1+, SX3XTM3+ or SX3XTM4+** $129.95
Specify TRS-80 Model I (needs doubler), III, 4/4P or MAX-80. Dual model versions e.g. Mod 3/4 on one disk add $10 extra.

Amazing HYPERZAP 3.2G Disk Magic!

Do you want to back up your precious copy of Copycat 3, or SU. Do you want to fix or modify a disk - if so then **you need HYPERZAP!**. More than just another disk copying program - it is **the** program for analyzing, copying, repairing, creating floppy disks of all kinds. It works with TRS-80 formats as well as many others such as CP/M, PC, CoCo etc. Designed to handle mixed density sectors on any track in any sequence. Many features for reading, writing, editing track and sector data. **Hyperzap** is **the tool** that lets you be in charge. **Make your own self booting disks.** Take your own CMD file and turn it into a dual booting Mod 1/III/IV disk. **Autopilot mode** learns, saves and repeats procedures. Disk comes with fascinating examples. Use Hyperzap as a learning tool, find out how things are done!.
HYPERZAP 3.2G - nothing else even comes close! **Order # HZ32** - one version runs on all Model I/III/4/4Ps $49.95

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Listing 1 continued

```
            jnz     chkSpace
            call    PageDN
            jc      Keys
            jmp     ReDisplay
chkSpace:   cmp     ax,3920h
            jnz     chkUp
            call    Mark
            jmp     Keys
chkUp:      cmp     ax,4800h
            jnz     chkDown
            call    GoUp
            jmp     Show_Cur
chkDown:    cmp     ax,5000h
            jnz     chkLeft
            call    GoDown
            jmp     Show_Cur
chkLeft:    cmp     ax,4b00h
            jnz     chkRight
            call    GoLeft
            jmp     Show_Cur
chkRight:   cmp     ax,4d00h
            jnz     chkEsc
            call    GoRight
            jmp     Show_Cur
chkEsc:     cmp     ax,011bh
            jnz     keys
pOut:       dis_str PutCur
            mov     cx,[CursorType]
            SetCurType
            exit    0
DirArea     Equ     $
Code        ENDS
            END     Start
```

End

Program Listing 2. DPConfig. A demonstration of a color configuration program that uses ANSI.SYS.

```
(*              Point and Delete Color Config Program
                        Dale Rogerson
                          June 1987
*)

($P512)  (* Route the output to the ANSI.SYS driver. *)

PROGRAM DelPntConfig(input,output);
CONST
     ESC = #$1b;
     Erase  = '[K';      (* Erase to End of Line *)
TYPE
    str         = string[3];
    StrLong     = string[25];          (* Holds ANSI color strings *)
    DosString   = string[66];
    ColorArr    = Array[0..140] of StrLong;
    ComFile     = File of Byte;

VAR
   (* This array contains all the possible color strings *)
   Color   : ColorArr;
   Ch      : Char;
   Name    : ComFile;                 (* File Variable *)
   NameStr : DosString;               (* Holds Name of program *)
   Normal, Prompts, HighLite, Inv,  (* Holds color strings *)
   OldNormal, OldPro, OldHigh, OldInv (* Hold Color Strings Read from file. *)
           : StrLong;

(--------------------)

PROCEDURE ColorTable;      (* Print the table of colors. *)
var
   AnsiStr : StrLong;      (* Holds each color string. *)
   st2,                    (* Holds Background color. *)
   st3,                    (* Holds High or Low Intensity. *)
   st1     : str;          (* Foreground Color. *)
   j, count,k,
   i       : integer;

Begin
     Write(ESC,'[9;1H');   (* Move cursor to line 9 *)
     count := 0;                    (* Start at color Zero. *)
     for j := 40 to 47  do begin    (* Do Background Colors. *)
         str(j:2,st2);
         for k := 0 to 1 do begin  (* Intensities *)
            str(k:1,st3);
            for i := 30 to 37      (* Foreground Colores. *)
               do begin
                  str(i:2,st1);
                  (* Make the color string out of its parts. *)
                  AnsiStr := ESC + '[' +st3+ ';' + st1+';'+st2+ 'm';
                  Color[Count] := AnsiStr;     (* Put color into Array. *)
                  write(Ansistr,Count:4);      (* Display color and count. *)
                  count := count +1;           (* Increment the Count. *)
               end;  ( i )
            end;     ( k )
         writeln(ESC,'[0m');    (* Change color back to black. *)
      end;  ( j )
      Write(ESC,'[17;H');
      For i := 1 to 80 do   (* Put the line on the screen. *)
          Write(' ');
end; (* Color Table *)

(------------------------)

PROCEDURE Monochrome;  (* Display monochrome options *)
Begin
     Write(ESC,'[9;67H','Monochrome:');
     Color[128] := ESC + '[0m';
     Write(ESC,'[11;67H',Color[128],'128 Normal');
     Color[129] := ESC + '[1m';
     Write(ESC,'[12;67H',Color[129],'129 Intense',ESC,'[0m');
     Color[130] := ESC + '[7m';
     Write(ESC,'[13;67H',Color[130],'130 Reverse',ESC,'[0m');
     Color[131] := ESC + '[7;1m';
     Write(ESC,'[14;67H',Color[131],'131 Rev/Int');
     Write(ESC,'[0m');
END;
(------------------------)
```

Listing 2 continued

Listing 2 continued

```
Procedure DrawScreen;   (* Draw the simulated program screen. *)
var i    : integer;
    strl : str;
Begin
     Write(Normal);
     For i := 1 to 6 do Begin
         str(i:1,Strl);
         Write(ESC,'[',Strl,';H',ESC,Erase);
     end; (* For *)
     Write(Prompts,ESC,'[1;1HPath: ',Normal,'C:\ASM\*.*');
     Write(Prompts,ESC,'[2;1HNumber Files: ',Normal,'     6');
     Write(Prompts,ESC,'[2;40HNumber Marked: ',Normal,'      1');
     Write(Prompts,ESC,'[3;40HMarked Size:',Normal,'      18026');
     Write(Prompts,ESC,'[3;1HFree Space: ',Normal,' 3168256');
     Write(HighLite,ESC,'[4;1HAre you sure [Y/N/X (Enter=No)] ? ',Normal);
     Write(ESC,'[5;H');
     Write('   MASM.EXE       85566 |   SYMDEB.EXE      37021 |   ');
     Write(Inv,'MAPSYM.EXE',Normal,'       18026');
     Write(ESC,'[6;H   ');
     Write('EXE2BIN.EXE      1649 |   CREF.EXE        15028 |  ');
     Write(Chr(16),'LIB.EXE    ',Chr(17),'     28719');
     Write(ESC,'[7;H',ESC,'[0m');
     For i := 1 to 80 do
         Write('_');

end;

{----------------------}

FUNCTION Exist(FileName : DosString): Boolean;
var Fil : file;

Begin
     Assign(Fil, FileName);
     {$I-}
     Reset(Fil);
     {$I+}
     Exist := (IOresult = 0)
end;

{----------------------}

PROCEDURE WriteColor(Var Col : StrLong;  (* Write Colors back to disk. *)
                         N : Integer);
var temp : byte;
    i    : integer;
Begin
     seek(Name,N);                      (* Move to correct byte. *)
     For i := 1 to Length(Col) do begin (* Write the Bytes. *)
         temp := ord(Col[i]);
         Write(Name,temp);
         end;
     temp := 36;
     write(Name,temp);
end;

{----------------------}

PROCEDURE ChangeColor(Var Str : StrLong); (* Read the numbers from keyboard *)

var Num : Byte;
Begin
     Num := 255;
     Read(Num);
     If Num < 132 then  (* Don't change to illegal value. *)
        Str := Color[Num];
end;

{----------------------}

PROCEDURE ReadColor(Var Col : StrLong; (* Read Colors from the Disk. *)
                        N   : Integer);
var
  temp : Byte;
Begin
  seek(Name,N);         (* Move to correct disk. *)
  Col := '';            (* Read colors from the disk. *)
  repeat
    read(Name,temp);
    if temp <> 36 then       (* Read up to dollar sign. *)
       Col := Col + Chr(temp);
  until temp = 36;
end;

{----------------------}

PROCEDURE ReadFile;      (* Read all the colors form the drive. *)

Begin
     ReadColor(Prompts,3);
     OldPro := Prompts;          (* Save the original. *)
     ReadColor(HighLite,23);
     OldHigh := Highlite;
     ReadColor(Inv,43);
     OldInv := Inv;
     ReadColor(Normal,63);
     OldNormal := Normal;
end;

{--------Main---------------}

BEGIN
 IF ParamCount <=0 THEN begin   (* Is there a Command Line Parameter? *)
    WriteLn('Enter Filename to the Delete and Point program. ');
    WriteLn('The program must be in the current directory. ');
    Read(NameStr);
    end
 ELSE                          (* Get the Command Line Parameter. *)
     NameStr := ParamStr(1);

 IF Exist(NameStr) THEN begin  (* Does file exist *)
     Assign(Name,NameStr);     (* Read from the file. *)
     Reset(Name);
     ReadFile;
     Close(Name);

     Write(ESC,'[0m');

     ClrScr;
     DrawScreen;                    (* Setup screen *)
     ColorTable;
     Monochrome;

     Write(ESC,'[19;HEnter the Desired color number. ');
     Write('Press ENTER to leave color the same.');

     REPEAT

       Write(ESC,'[20;H',Inv,'Enter Color for Marked Files: ');
       ChangeColor(INV);
       Write(ESC,'[21;H',Normal,'Enter Color for UnMarked Files: ');
       ChangeColor(Normal);
       Write(ESC,'[22;H',HighLite,'Enter Color for Delete Prompt: ');
       ChangeColor(HighLite);
       Write(ESC,'[23;H',Prompts,'Enter Color for Labels: ');
       ChangeColor(Prompts);
       Write(ESC,'[0m');
       Write(ESC,'[24;HPress ENTER to change colors again.');
       Write(ESC,'[25;H(S)ave  (E)xit  (O)riginal Colors  (U)pdate Colors? ');

       Read(Ch);
       Ch := UpCase(Ch);
       Case Ch of
          'S' : begin  (* Save the colors onto the disk file. *)
                Write(ESC,'[25;H',ESC,'[KSaving...');
                Reset(Name);
                WriteColor(Prompts,3);
                WriteColor(HighLite,23);
                WriteColor(Inv,43);
                WriteColor(Normal,63);
                Close(Name);
                end;         (* Save *)

          'O' : begin  (* Change back to the original colors. *)
                  Normal   := OldNormal;
                  Prompts  := OldPro;
                  Inv      := OldInv;
                  HighLite := OldHigh;
                  DrawScreen;
                end;         (* Original Colors *)

          'U' : DrawScreen;  (* Update screen *)

       end;     (* Case *)
     UNTIL (Ch = 'E') OR (Ch = 'S');
     Close(Name);
     end (* IF exist *)
 ELSE
     Write('*** File does not exist. ***');
END.
```

End

How to Use 80 Micro Program Listings

Basic program listings in *80 Micro* include a checksum value at the beginning of each line. This value is the sum of the ASCII values of all characters and spaces in the line. If a line is made up exclusively of remarks, with an apostrophe as the first character after the line number, no checksum is calculated. If a remark is at the end of a line of code, it is not included in the checksum. By using this Checksum program to enter Basic programs found in *80 Micro*, you can test the accuracy of your typing a line at a time as you enter the program.

When you are ready to enter a program found in *80 Micro*, load and run Checksum. The program will prompt you with the message "Checksum program ready." Enter the first line of the new program without the checksum number and bar at the beginning of the line. Type in the program code exactly as listed, omitting the indentations (when program lines continue to a second or third magazine line). Do *not* type in comments at the end of a line. Press enter. The line will be redisplayed with a checksum at the front of the line before the line number. Compare this number with the one found in *80 Micro*. If they are the same, you have typed the line correctly and can go on to the next line. If they are not the same, you made an error in your typing.

When you find the error, use the cursor control keys to move the cursor to the first space of the line just typed. Press the delete key seven times to delete the checksum on the line. Move the cursor to the part of the line that is in error, and correct it by typing over the error with the right information or use the insert and delete keys to add or delete information. Press enter and recheck the checksum number. If you prefer, you can retype the entire line. The new line will replace the old line. To delete an entire line, just type the line number.

After you enter the entire program and check each line, you need to save the program to disk with the Save command.

Because the Checksum program replaces the computer's Basic line editor, it has to include many of Basic's commands. Checksum simulates List, LList, Load, Save, Files, and New commands. These are used in the same format and perform as they would in Basic. Checksum has three new commands: Basic, Check, and LCheck. The Basic command exits the Checksum program back to Basic, leaving Checksum in memory. Check and LCheck work like List and LList, except they show the checksums along with the listing.

After you type in a program and save it to disk, you can exit the check-

sum program with the Basic command. This takes you back to the Basic editor. You can now load your new program as usual and run it. You may want to save the new program to disk again because Checksum saves the new program as an ASCII file. By saving the program again with Basic, you shorten it on disk and make it load faster, but you can no longer edit it with the Checksum program unless you convert it back to an ASCII file. You can do this with the Basic editor by using the SAVE"file name", A command. You can prepare any Basic program in this way to be used with the Checksum program, not just ones found in *80 Micro*.

When using the List, LList, Check, or LCheck commands, you can stop the listing by pressing any key (except control-break). If you enter New, the program prompts you to press "Y" to confirm that you want to erase the program that is currently in memory.

The Checksum program is well worth the time it takes to type it in and get it up and running. It will save you hours in looking for typing errors, and you will know your programs will run right the first time. ■

Program Listing. Checksum.

```
    | 10 'Automatic Checksum Program Version 1.0 by Randall D. Hamilton
 4440 | 20 DIM L$(500),LNUM(500):COLOR 13,1,1:KEY OFF:CLS:MAX=0:LNUM(0)=65536!:C
        LS
 1671 | 30 DEF SEG=&H40:W=PEEK(&H4A)
 4380 | 40 ON ERROR GOTO 620:PRINT:PRINT"Checksum Program Ready."
 3389 | 50 LINE INPUT L$:Y=CSRLIN-INT(LEN(L$)/W)-1:LOCATE Y,1
 7499 | 60 DEF SEG=0:POKE 1050,30:POKE 1052,34:POKE 1054,0:POKE 1055,79:POKE 105
        6,13:POKE 1057,28:LINE INPUT L$:DEF SEG:IF L$="" THEN 50
 2679 | 70 IF LEFT$(L$,1)=" " THEN L$=MID$(L$,2):GOTO 70
 2204 | 80 IF ASC(L$)>57 OR ASC(L$)<48 THEN 210
 4235 | 90 BL=INSTR(L$," "):IF BL=0 THEN BL$=L$:GOTO 100 ELSE BL$=LEFT$(L$,BL-1)
 3089 | 100 LNUM=VAL(BL$):TEXT$=MID$(L$,LEN(STR$(LNUM))+1)
 4974 | 110 IF LNUM>65529! THEN PRINT"Line number greater than 65529":GOTO 30
 4770 | 120 IF TEXT$="" THEN GOSUB 540:IF LNUM=LNUM(P) THEN GOSUB 550:GOTO 50 EL
        SE 50
  961 | 130 WORK$=TEXT$
 3512 | 140 IF LEFT$(WORK$,1)=" " THEN WORK$=MID$(WORK$,2):GOTO 140
 3482 | 150 IF LEFT$(WORK$,1)="'" THEN A$="          ":LOCATE Y,1:GOTO 180
 4711 | 160 CKSUM=0:FOR I=1 TO LEN(L$):CKSUM=CKSUM+ASC(MID$(L$,I)):NEXT:LOCATE Y
        ,1
12314 | 170 IF CKSUM<10 THEN A$="    "+STR$(CKSUM)+" " ELSE IF CKSUM<100 THEN A$
        ="   "+STR$(CKSUM)+" " ELSE IF CKSUM<10000 THEN A$=" "+STR$(CKSUM)+"
         " ELSE IF CKSUM<100000 THEN A$=" "+STR$(CKSUM)+" " ELSE A$=STR$(CKSU
        M)+" "
  870 | 180 PRINT A$+L$
 3408 | 190 GOSUB 540:IF LNUM(P)=LNUM THEN L$(P)=TEXT$:GOTO 50 'replace line
 1253 | 200 GOSUB 560:GOTO 50 'insert the line
 5579 | 210 TEXT$="":FOR I=1 TO LEN(L$):A=ASC(MID$(L$,I)):TEXT$=TEXT$+CHR$(A+32*
        (A>96 AND A<123)):NEXT
 3366 | 220 DELIMITER=INSTR(TEXT$," "):COMMAND$=TEXT$:ARG$=""
13137 | 225 IF DELIMITER THEN COMMAND$=LEFT$(TEXT$,DELIMITER-1):ARG$=MID$(TEXT$,
        DELIMITER+1) ELSE DELIMITER=INSTR(TEXT$,CHR$(34)):IF DELIMITER THEN
        COMMAND$=LEFT$(TEXT$,DELIMITER-1):ARG$=MID$(TEXT$,DELIMITER)
 2210 | 230 IF COMMAND$="LIST" THEN GOTO 330
 4283 | 240 IF COMMAND$="LLIST" THEN OPEN "lpt1:" FOR OUTPUT AS #1:GOTO 340
 4910 | 250 IF COMMAND$="LCHECK" THEN CKFLAG=1:OPEN "lpt1:" FOR OUTPUT AS #1:GOT
        O 340
 2839 | 260 IF COMMAND$="CHECK" THEN CKFLAG=1:GOTO 330
 5011 | 270 IF COMMAND$="SAVE" THEN GOSUB 570:OPEN ARG$ FOR OUTPUT AS #1:ARG$=""
        :GOTO 340
 2194 | 280 IF COMMAND$="LOAD" THEN GOTO 490
 9685 | 290 IF COMMAND$="NEW" THEN INPUT "Errase program - Are you sure";L$:IF L
        EFT$(L$,1)="y" OR LEFT$(L$,1)="Y" THEN MAX=0:LNUM(0)=65536!:GOTO 30:
        ELSE 30
 4028 | 300 IF COMMAND$="BASIC" THEN COLOR 7,0,0:ON ERROR GOTO 0:CLS:END
 2265 | 310 IF COMMAND$="FILES" THEN GOTO 520
 2381 | 320 PRINT"Syntax error":GOTO 30
 2172 | 330 OPEN "scrn:" FOR OUTPUT AS #1
 2690 | 340 IF ARG$="" THEN FIRST=0:P=MAX-1:GOTO 380
 5903 | 350 DELIMITER=INSTR(ARG$,"-"):IF DELIMITER=0 THEN LNUM=VAL(ARG$):GOSUB 5
        40:FIRST=P:GOTO 380
 4462 | 360 FIRST=VAL(LEFT$(ARG$,DELIMITER)):LAST=VAL(MID$(ARG$,DELIMITER+1))
 4797 | 370 LNUM=FIRST:GOSUB 540:FIRST=P:LNUM=LAST:GOSUB 540:IF P=0 THEN P=MAX-1
 2954 | 380 FOR X=FIRST TO P:N$=MID$(STR$(LNUM(X)),2)+" "
 2049 | 390 IF CKFLAG=0 THEN A$="":GOTO 450
  881 | 400 WORK$=L$(X)
 3512 | 410 IF LEFT$(WORK$,1)=" " THEN WORK$=MID$(WORK$,2):GOTO 410
 2770 | 420 IF LEFT$(WORK$,1)="'" THEN A$="          ":GOTO 450
 4635 | 430 CKSUM=0:A$=N$+L$(X):FOR I=1 TO LEN(A$):CKSUM=CKSUM+ASC(MID$(A$,I)):N
        EXT
12314 | 440 IF CKSUM<10 THEN A$="    "+STR$(CKSUM)+" " ELSE IF CKSUM<100 THEN A$
        ="   "+STR$(CKSUM)+" " ELSE IF CKSUM<10000 THEN A$=" "+STR$(CKSUM)+"
         " ELSE IF CKSUM<100000 THEN A$=" "+STR$(CKSUM)+" " ELSE A$=STR$(CKSU
        M)+" "
 1324 | 450 PRINT #1,A$+N$+L$(X)
 1567 | 460 IF INKEY$<>"" THEN X=P
 1677 | 470 NEXT :CLOSE #1:CKFLAG=0
  632 | 480 GOTO 30
 3046 | 490 GOSUB 570:OPEN ARG$ FOR INPUT AS #1:MAX=0:P=0
 8316 | 500 WHILE NOT EOF(1):LINE INPUT #1,L$:BL=INSTR(L$," "):BL$=LEFT$(L$,BL-1
        ):LNUM(P)=VAL(BL$):L$(P)=MID$(L$,LEN(STR$(VAL(BL$)))+1):P=P+1:WEND
 1603 | 510 MAX=P:CLOSE #1:GOTO 30
 2911 | 520 IF ARG$="" THEN ARG$="A:"ELSE SEL=1:GOSUB 570
 1343 | 530 FILES ARG$:GOTO 30
 3610 | 540 P=0:WHILE LNUM>LNUM(P) AND P<MAX:P=P+1:WEND:RETURN
 4677 | 550 MAX=MAX-1:FOR X=P TO MAX:LNUM(X)=LNUM(X+1):L$(X)=L$(X+1):NEXT:RETURN
 6911 | 560 MAX=MAX+1:FOR X=MAX TO P+1 STEP -1:LNUM(X)=LNUM(X-1):L$(X)=L$(X-1):N
        EXT:L$(P)=TEXT$:LNUM(P)=LNUM:RETURN
 3211 | 570 IF LEFT$(ARG$,1)=" " THEN ARG$=MID$(ARG$,2):GOTO 570
 3565 | 580 IF LEFT$(ARG$,1)<>CHR$(34) THEN 320 ELSE ARG$=MID$(ARG$,2)
 3761 | 590 IF RIGHT$(ARG$,1)=CHR$(34) THEN ARG$=LEFT$(ARG$,LEN(ARG$)-1)
 3278 | 600 IF SEL=0 AND INSTR(ARG$,".")=0 THEN ARG$=ARG$+".BAS"
 1058 | 610 SEL=0:RETURN
 2218 | 620 PRINT "Error #";ERR:RESUME 50
```

(continued from page 29)

disk, type ABILITY, and you're off.

Ability Plus supports monochrome, Hercules, and color-graphics displays, although monochrome text displays don't show graphics on screen. The program adjusts automatically to the display it finds; you don't need to do anything. Ability knows 38 printers and three plotters, and it has a separate program that lets you define your own printer or plotter driver, so you can use any output device. I switched back and forth between a Citizen (Epson-compatible) dot-matrix and an HP Laserjet Series II laser printer with no problems.

The program comes with a 400-page wire-bound manual that is nicely printed, well-organized, and indexed. The disk-based tutorial is more a demonstration than a real teaching tool, but the manual offers helpful advice to beginners. Migent also offers free technical support to registered users.

The Library Screen

The Library Screen (see the Photo) is the program's central focus from which you do everything else. It is easy to use and understand—preferable, for example, to Framework's desktop approach. The function keys control primary commands, and secondary ones follow the common Lotus format. In this format, you can move the cursor or just type the first letter of the command you want. Submenus offer more choices that you can select in the same way. Overall, the user interface is very nice.

The Library Screen provides several other functions. This is where you choose your printer and plotter, for example, create simple macros, or manage your files. Ability Plus can quickly import files from and export to Lotus, PFS, Dbase II and III, Enable, Peach Tree, and Multimate, as well as ASCII text. It does not work with Wordstar format files.

The Modules

An integrated program is only as good as its individual modules, and none of Ability's modules outshines all its competitors. If, however, you don't demand the ultimate in sophistication from any one module, you'll probably find the package quite satisfactory.

Ability Plus's word processor is fairly full-featured, albeit inelegant. My major complaint is that it works only in the typeover, rather than the insert, mode. You can use the insert key to insert text, but the remainder of the line drops down when you do so. It's a frustrating way to edit text.

The module does have most of the features that business or home word processing requires. These include a search-and-replace function, a pretty good spelling checker, superscript and subscript, and regular and decimal tabs. Multiline headers and footers are available, as is indentation—but only from the left. And this is complicated by another major weakness: You can only set margins for the entire file. You cannot vary them inside the document.

The real attraction of Ability Plus's word processing is its integration capability. You can easily include all or part (even a single cell) of a spreadsheet or a graph from another module. Then, whenever you change the spreadsheet or graph, the changes occur in the word-processing document as well.

Indeed, they are linked in both directions, so a change in either one will affect the other. Moreover, you can include links in your word-processing document to any number of other Ability documents—up to whatever memory can hold.

The Ability Plus spreadsheet is pretty standard, working rather like Lotus's 1-2-3. It can hold 9,999 rows and 702 columns, and has 46 built-in functions. It is quite easy to use and readily links to other documents, including graphs. It should be adequate for most small-business and professional users.

The data-base module is similarly simple and straightforward, a flat rather than relational data-base management system. It works like the popular PFS: File in its form generation. You design a blank form on the screen and then for each record fill in a copy of that form with the required data. It is easy to set up, to enter data, and to search and sort.

Speed is not a strong point—a sort on a 220-record file took almost two minutes. As with other Ability Plus functions, the more you have in memory, the slower it is, particularly if one of the documents in memory has a graph, since it will be constantly redrawn.

All fields are fixed-length, so, unlike PFS: File, you can't have one for free-form text entry. But you can have calculated fields (logical and Boolean expressions are supported) and can even include a linked spreadsheet cell as a field in the data base. You can join two data bases, so that any entries in one also go into common fields in the other; Ability creates a new master form that controls data entry and reporting in both.

Reports are easy to produce in either form view (one form per page) or in columns. However, you don't have great control over formats such as the placement and width of columns or their titles.

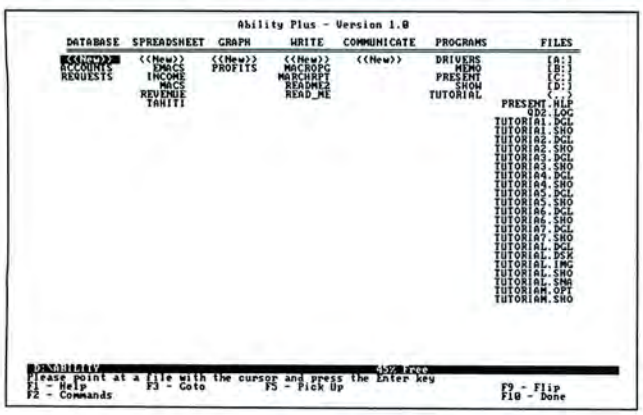
The graphing module is also easy, whether you are bringing in data from a spreadsheet or just entering it manually. Bar, stacked bar, line, x,y, pie, and exploded pie charts are available. You can mix two types (superimpose them) on the same graph and enter x- and y-axis labels, plus a title and subtitle. Strangely, however, if you are using more than one series, you can't enter labels for each series. Thus, the reader can have trouble understanding what each bar pattern in a graph actually represents.

You do have reasonable control over where a graph is printed on the page, but less control over its size. You can rotate graphs 90 degrees, however, which is a nice touch. Overall, the program is useful for simple business or personal graphing, but it isn't too powerful.

The communications module lets you create a separate file or document (with the correct modem settings, phone number, and so on) for every computer or information service you want to call. You can include scripts with your password, account number, and other required information for automatic log-on.

The module supports several types of file transfer—standard text, x-modem, and Ability's own, which permits sending multiple files with one command when both computers are running Ability. It has VT 52 and VT 100 emulation to facilitate connecting to mainframe computers and should be adequate for all but the most demanding telecommunications applications.

The Presentation module, which is unique to Ability Plus, permits "slide shows" of Ability screens. You can take "snapshots" of any Ability screens, link them in a snapshot library, and use Presentation to present them on the screen—in the sequence and timing you want, with a few other bells and whistles, as well.



Ability Plus's Library Screen is the doorway to each module.

It is a nice feature for business presentations, especially for users who have clients coming to their offices, or have a portable computer and want to make presentations on-site. It would also be nice in educational environments.

The Trade-Offs

Ability Plus has a number of features that can recommend it to numerous users. Foremost among them is its effective integration. Because the program uses the same keystrokes and command structure from module to module, it is easy to move and integrate data between the modules.

Generally, Ability Plus is a very easy program to set up, get into, and master; to a great degree it's easier than any other integrated program. The individual modules vary from okay (the word processor and data base) to a good deal better than that (the communications module and spreadsheet). For many users, all the modules are quite satisfactory; none, certainly, is weak, and the price is impressive.

There are trade-offs, to be sure. Some of the modules might not have the features you need, and the program can be slow, as in the spelling checker or when there are two documents in memory. These trade-offs are justified, however, by what you get for the price. Many business and professional people, home computerists, and students might well find this all the software they need. ■

Ability Plus requires 512K and DOS 2.x. Migent Inc., 865 Tahoe Blvd.,P.O.Box 6062, Incline Village, NV 89450, 702-832-3700. $199.

A Smart Money Manager

```
***** MONTHLY BUDGET for CHECKS & BALANCES Version 4.0 Sample File      *****
Category code "A   " = Advertising Expenses
   Category type "E" = Expense Account
                  BUDGET   -   ACTUAL  = DIFFERENCE       STATUS
              ------------   ----------   ----------   ------------
    January       1000.00      4872.00     -3872.00     387% OVER
   February       1000.00      5332.00     -4332.00     433% OVER
      March       1000.00      2982.35     -1982.35     198% OVER
      April       1000.00         0.00      1000.00
        May       1000.63         0.00      1000.00
       June       1000.00         0.00      1000.00
       July       1000.00         0.00      1000.00
     August       1000.00         0.00      1000.00
  September       1000.00       670.00       330.00      33% under
    October       1000.00         0.00      1000.00
   November       1000.00         0.00      1000.00
   December       1000.00         0.00      1000.00
              ============   ==========   ==========
               9000.00      13857.95     -4857.95 Total through this month
              12000.00      13857.95     -1857.95 Total through year end
Through this month, this category is approximately       53% OVER budget.
09/11/87  Period covers March                                    -- All --
File=C:A:DEMO   NameFile=DEMONAME  TRUE $    1778.20 BANK $     279.04
UP and DOWN keys to view more, F7=Print, RETURN=Menu, HOME=Edit
```

Checks & Balances can produce monthly budget reports.

by Wynne Keller

Checks & Balances 4.1 is a command-driven program that helps you manage your personal or small-business financial records. This type of program lets you select operations by typing a command, instead of using a menu. Because of this, it will take a little longer to learn Checks & Balances and to uncover all of its useful features. But your reward will be a lot of power for the money and a surprisingly flexible program.

The Balancing Act

To activate a command, such as Show, Print, Enter, or Sort, you type the command name (or its two-character abbreviation) on the command line at the bottom of the screen. If you can't remember the command names, press enter to call them into display. For what it is, the system is simple and elegant.

You begin by selecting a file name for your checkbook data. CDE Software suggests a new file for each year. You can also specify a fiscal year. You can then define 128 accounts, or categories, for your expenses, income, savings, credit cards, assets or liabilities, payables, and receivables. Each account can have a tax status, and later you can print only those accounts that you need for tax purposes.

Once you have established the accounts, you enter transactions. These can be of several types: Check, Deposit, Cash, Charge, Bill, Miscellaneous, and Other. A Check, Deposit, or Other transaction affects the checkbook balance. The rest are designed for special purposes such as moving money between accounts, making a cash purchase, and keeping track of money owed.

To allocate a transaction to an account, type in the four-character code for that account, a memo if needed, and the dollar amount. You can allocate a transaction to a maximum of four accounts by entering the four-character code for each account. The screen will then display the remaining dollars to allocate. If you need more accounts, you must create a second transaction as a continuation of the first.

Try to write easy-to-remember codes to speed up allocation. If you forget a code, however, the program displays the complete list in several pages at the top of the screen. If you type an account code that is not in the file, you are warned about it but permitted to continue. Later, you can go back and define the new account.

Editing is simple but could still use more streamlining. Often, I wished for the ability to jump the cursor to the left or to the right edges of the screen. The program does provide keys to move to the beginning and end of a field and to erase a field. You can edit at any time, even if you are in the Show mode looking at transactions.

Deleting transactions is a bit awkward; you must type DELETE or enter a new transaction over the old. If you use the word "delete," you must sort the file before the program actually deletes the transaction.

The Pluses

The flexibility of the Show command is one of the real joys of Checks & Balances. In this command, the program lets you customize your data displays in various ways: by date, amount, check number, account code, payee, or a word in the memo field. For example, typing SHOW INV, where "inv" is the code for the inventory account, displays all the inventory transactions. Typing SHOW J.C. PENNEY displays all the items made out to J.C. Penney. You could further refine either of these by setting the search to a specific month, quarter, or dollar amount.

The bill-paying feature is equally convenient. As bills arrive, you enter them using "bill" as the code. Then, you allocate them to accounts, and code the date as the due date. To pay bills, just type BILLS on the command line, and the program will display all your bills. You then can erase the code "bill" and replace it with a check number to pay the bill.

Checks & Balances prints your checks, too. You can use one of the built-in forms or design your own. The program supplies a name-and-address file to address the printed checks. You can also use the file to print mailing labels and Rolodex or index cards.

Various extra features are worth noting. For example, you can press function keys to duplicate a previous entry. You can save a snapshot of a screen, recall the snapshot, and do a screen print (unlike the DOS screen-print function, you can print two screens per page). You can also create batch files to operate the program automatically.

Checks & Balances produces reports for the balance sheet, profit and loss, and cash

flow, among others. It also provides detailed annual reports broken down by account, a useful feature not often found in business-accounting programs, which usually post transactions at the end of the month. You can merge up to nine checkbook files into the grand totals for printing year-end reports.

The Minuses

Business users will encounter some difficulties. The Bills function, at first, appears to handle payables easily. However, none of the transactions you list as Bills shows up on the Net Worth statement as Accounts Payable. Thus, to use Bills, you must also have a separate accounts payable, which essentially duplicates the Bills function.

The program does not provide a function similar to Bills for receivables. The manual suggests you use a Miscellaneous-type transaction to enter amounts due in accounts receivable. Then, you change the account code to a dummy account when you receive the money—in other words, remove the amount from the account receivable.

You would need a separate transaction to make the actual deposit and allocate the type of income. With this system, you can print each account receivable by company and mail that as a statement. This is cumbersome, but it works if the number of accounts receivable is small.

To use accounts payable and receivable, you must first experiment and pay close attention to the totals in your accounts. Some types of accounts treat breakdowns differently if they are on the first line (the key breakdown) instead of on a later line, and it is easy, if you forget this, to allocate too much or too little. The manual does offer a lot of typical transactions, which helps considerably.

The Bottom Line

Checks & Balances is powerful and fun to use. For home use, it earns my unequivocal endorsement. For business use, it can do the job if the business is small. Either way, you must experiment to learn how to use it properly and check your work as you go to be sure the totals are accumulating correctly. Because the program is so flexible, the potential for making mistakes is considerable. The reward, however, is a fine management system you can use. ■

Checks & Balances requires 256K. CDE Software, 948 Tularose Drive, Los Angeles, CA 90026, 213-661-2031, $75.

The Right Connection

by Eric Grevstad

Many of us would like a sleek new 1000 TX or HX or an MS-DOS laptop like a 1400 LT, but few of us want to spend hundreds of dollars for an external 5¼-inch drive to move our existing software to the new 3½-inch disk format. Lap-Link is a superior alternative—a 59K utility that lets computers swap files quickly and easily. Compared to x-modem downloads or awkward mating rituals with regular communications programs, it's like flying the Concorde instead of rowing a boat.

Lap-Link works on any two MS-DOS machines joined by a null-modem cable; the package includes a null-modem cable with female DB-9 and DB-25 connectors at both ends to fit most serial ports (I had to borrow a gender changer for the female RS-232C card in my 1000). The program comes on both 5¼- and 3½-inch disks, is not copy-protected, and uses no device drivers or Config.SYS modifications; starting up is as easy as typing LL on each keyboard.

Lap-Link normally uses each computer's COM1 port at 115,200 baud. You can switch either or both to COM2, set a slower speed if necessary, or shift into turbo mode, copying files in several-kilobyte chunks instead of 128-byte blocks, for even faster transfer.

Each computer shows a side-by-side display of its own (local) and the other (remote) directory. You have bidirectional control from both keyboards, logging onto different directories (typing a path or choosing from a tree diagram), using either machine as a copy source or destination.

You can assign both windows to the local machine for file housekeeping between directories on a hard disk; you can sort the display by name, extension, size, date, or order on disk, using the last choice with Lap-Link's "show hidden files" option to copy bootable system disks.

Lap-Link can create subdirectories, rename and delete files, scroll a text file, or temporarily disappear while you give DOS commands, but its main job is copying files. It's a cinch to select the individual files or wild-card groups you want, along with details relating to duplicate file names —whether to ask for confirmation before overwriting, overwrite only older versions, and so on. (Fancy options like these are the only reasons most users should have to read the well-organized manual.)

The only problem with Lap-Link is that it won't give you time to go for coffee while it works. I filled a 360K floppy disk with 15 files, ranging from a 69-byte batch file to a 170K word processor. DOS, using the COPY *.* command, copied the files from one drive of my 1000 to the other in 1 minute and 41 seconds. Lap-Link, using turbo mode, copied them from the 1000 to the 3½-inch disk of my Toshiba laptop in 1 minute and 40 seconds, error-free and ready for use. You can't ask for better than that.

Compared to multifunction utilities with lower prices, Lap-Link's $130 list seems a little steep. Compared to additional disk drives, though, Lap-Link is a bargain—easy, fast, and indispensable. Don't buy another computer without it. ■

Lap-Link 2.05 requires 192K and MS-DOS 2.x. Traveling Software Inc., 19310 N. Creek Parkway, Bothell, WA 98011, 206-483-8088. $129.95.

Keep on Ticking

by Harry Bee

Smartwatch isn't a new idea, but it's a good one. It's a programmable clock/calendar chip, and the lithium battery to power it, built into the base of an in-line integrated circuit socket. You install it, in most cases, under one of the ROM chips on your computer's main printed circuit board. The package comes with thorough installation instructions and software to operate the device. If the expansion boards you're adding to your system don't happen to include a clock, here's a way to have a continuously operating timepiece without having to buy an extra board.

If I can install Smartwatch, anyone can. For my Tandy 1000 the job required sliding open the computer's case, removing a ROM (which I managed with a small, flat-bladed screwdriver), plugging Smartwatch into the empty socket, and plugging the ROM into Smartwatch.

It's easy enough to locate the correct socket; the documentation includes photographs, complete with circles and arrows, of the innards of each computer with which the device will work. On some computers with hard disks you may have to move a drive out of the way. In contrast, on the Tandy 1200 you don't even have to pry

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out a ROM. Smartwatch uses an empty socket.

Once you've managed the physical installation, the software installation is equally uncomplicated. The Smartwatch utility program has three functions. After setting your computer correctly with the MS-DOS Date and Time commands, you use the utility to set Smartwatch for the first and last time—barring earthquakes or high water. You then copy the program to the disk or disks you use to boot your system, include the Smartwatch command in your Autoexec.BAT file, and say goodbye to DOS's date and time prompts forever. Whenever you start your machine, the program reads the device and sets your computer for you.

You can also query Smartwatch from the DOS prompt. The single command, instead of DOS's two, shows you both the date and time, and doesn't ask you to respond. The date includes the day of the week, handy for folks like me who tend to lose track of such things.

In the interest of programmers, Tandy was thoughtful enough to include the source code for the utility program, as well as an object file.

Tandy promises Smartwatch will be accurate to within a minute a month, and that its battery will last 10 years or more. The warranty period is 90 days. ■

Smartwatch requires 128K. Tandy Corp., One Tandy Center, Fort Worth, TX 76102. 817-390-3700. $39.95.

Far Out

by Harry Bee

T/Master is odd. It's the descendant of T/Maker, which pioneered the idea of integrated software back when 64K was all the memory there was. I can imagine how impressive a word processor, data base, and spreadsheet in one package must have been under CP/M or TRSDOS. T/Master in the world of MS-DOS, however, is less than thrilling.

T/Master's free-form workspace is supposed to represent a large chalkboard. Indeed, the program has all the charm of a blank surface, all the appeal of chalk, and it's difficult to learn, too. The most boring documentation I've ever read obscures its ruggedly individual way of doing things. On-line help is scanty, and the Quick Reference is a 30-page booklet.

Integrated software is notorious for its piecemeal approach, and T/Master's pieces spread across two floppy disks. Its size wouldn't be an issue if it were commensurate with its usefulness. But while T/Master has attractive features, some of which you'll not find in mainstream software, they're not attractive enough.

T/Master's data base might have been its best feature. Its sort and search functions are fast. It has as powerful a report generator as I've seen, interesting computational possibilities, and limited relational capabilities. But to use it effectively, you have to master a programming language that looks like Pascal mated with Lisp. Its best features aren't worth that much effort.

The manual proudly claims that T/Master does away with the cells of an ordinary spreadsheet. What it does away with in fact are cell designations: Data still resides at the intersections of rows and columns. The difference in point of view is crucial, however. Lacking cell references, its arithmetic is linear across rows and down columns. Typical spreadsheet models aren't possible. Although what's possible instead is tantalizing, its usefulness is limited.

All of T/Master's applications use its word processor's editing and navigational commands, which, true to form, are unconventional. The end key, for instance, moves the cursor to the next word. A spelling checker with enviable features is as curious as the rest of the program.

The editor's "chalkboard" is indeed large, vertically and horizontally, and you can type anything anywhere. You can even use the workspace as a calculator just by typing the arithmetic. You format the printed page with a variety of print commands embedded in the text. A novel approach to constructing your own printer drivers promises power printing. Still, it all feels nailed together, somehow, and most recently nailed on are a communications module and some graphics capabilities.

T/Master is full of good ideas, but no great ones. If you have special computing requirements, it might be able to do for you what no other software in one package can, and it might be worth the effort. But for the rest of us, T/Master exists in its own world, so far from convention that it's irrelevant. ■

T/Master requires 256K and two disk drives. T/Maker Co., 2115 Landings Drive, Mountain View, CA 94043, 415-962-0195. $295.

Layered Look

by Harry Bee

The convenience of memory-resident programs is exceeded only by the inevitable conflicts among them and the amount of memory they require. To take advantage of the benefits pop-up utilities offer, a program to supervise and control them is a practical necessity. While Popdrop may be the least flashy memory-management program you could choose, it's far from the least effective.

Popdrop's lack of distracting flash and sparkle is what I like best about it. It stays out of your way. It's not memory-resident, so it doesn't represent a potential conflict with your other programs, nor does it demand gobs of memory for itself. You can use it effectively in batch files.

Popdrop works by dividing memory into layers. Each layer can contain one or more resident programs. After you load DOS and any utilities you want to reside permanently, you run Popdrop to establish a base. The program manages everything loaded afterward. You build your resident programs up from the base, running Popdrop each time you want to divide one utility or group of them from another. The base and dividers use 160 bytes each.

You put the most permanent utilities at the bottom of the stack, the least at the top. As your needs change, you can remove one layer at a time, or several at once, from the top down. You can also clear all memory down to the base with one command. Another command removes all the layers and Popdrop, too. If that's not enough removing for you, Popdrop will reboot your computer (intentionally, from a batch file) so that you can automate the process of reconfiguring your system.

You don't have to remove utilities except to make room for others or to give a large application all the memory you can spare. When one resident program conflicts with another, or with an application, Popdrop lets you render any layer inactive, temporarily, and reactivate it again when it's safe.

To help you decide which programs to remove or deactivate, Popdrop delivers two reports. One shows you how much memory each program is using and which ones are active. The second lists all the interrupt vectors, or hooks, each utility uses. The report points out the hooks used by more than one program, a good indication of which programs to turn off when you're having trouble.

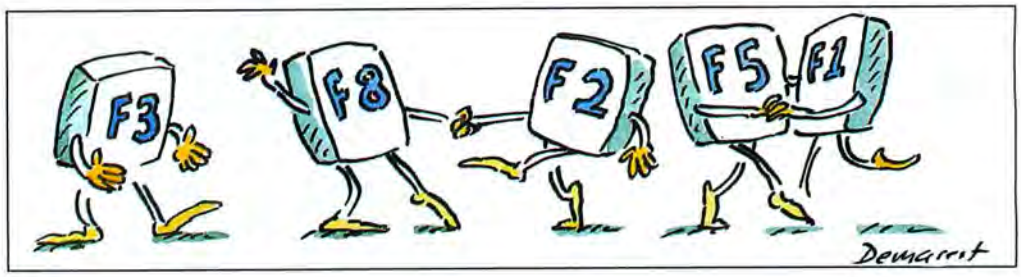
Popdrop works quietly, dependably, and admirably well. The extra help its reports provide in troubleshooting, and its minimal demands on your precious memory, make it particularly attractive. ■

Popdrop. Infostructures, P.O. Box 32617, Tucson, AZ 85751, 602-299-5962. $49.95.

READER FORUM

edited by Mare-Anne Jarvela

Function Key Mania



■I have a Tandy 1000 with two drives and MS-DOS 2.11.22. While I appreciate the whole-screen editing in Basic, I miss the editing that was available on my old Model III.

After I got tired of entering program lines with the List ###-### manually, I assigned CHR$(24) to one of the function keys and CHR$(25) to another key (see Program Listing 1, lines 130 and 140). This lets you scroll up and down through a Basic listing except from line zero. A word of caution: while it is a joy to use these keys, you have to be careful or you'll lose part of a program line.

Though line zero will not scroll, pressing the assigned function key while any other line number is under the cursor will scroll one program line up or down, depending upon which key you pressed.

When scrolling up (from high number to low), it is best to have the cursor at the home location. If you start with the cursor in the middle, your screen will be somewhat cluttered.

When scrolling down (from low number to high), it doesn't really matter where you start on the screen, as long as a complete line is visible. If the line you scroll is not completely visible, then the part not visible will be lost. Don't press the enter key while the cursor is next to a partial line.

Listing 1 also illustrates other functions you can assign to the function keys.

Replace lines 30, 40, 110, and 120 in Listing 1 with the lines in the Figure if you want to use the function keys for editing jobs.

E. E. Dorsey
Fort Worth, TX

Program Listing 1. A program that lets you scroll through a Basic listing.
See page 76 for information on using checksums.

```
 803 | 10 DEFINT A-Z
2796 | 20 SCREEN 0,1,0:LOCATE 1,1,1,0,7:COLOR 0,7,1:CLS
2671 | 30 KEY 1,CHR$(12)+"FILES "+CHR$(34)+"A: "+CHR$(13)  'Directory A
2674 | 40 KEY 2,CHR$(12)+"FILES "+CHR$(34)+"B: "+CHR$(13)  'Directory B
 929 | 50 KEY 3,CHR$(20)                  'Toggles HELP line 25
1321 | 60 KEY 4,"RUN "+CHR$(13)
 891 | 70 KEY 5,"EDIT "                   'Prints EDIT and awaits a line #
 915 | 80 KEY 6,"LIST "                   'Prints LIST and awaits a line #
1461 | 90 KEY 7,"SHELL "+CHR$(34)
1439 | 100 KEY 8,"LIST "+CHR$(13)
 981 | 110 KEY 9,CHR$(12)                 'Home and clears the screen
1027 | 120 KEY 10,CHR$(26)                'Erase from cursor to bottom of screen
1027 | 130 KEY 11,CHR$(24)                'Displays previous program line
1030 | 140 KEY 12,CHR$(25)                'Displays next program line
 681 | 150 CLS:END
```

Figure. Line changes for Listing 1 that let you use the function keys for editing.

```
30 KEY 1,CHR$(6)                'Tabs one word
40 KEY 2,CHR$(2)                'Backspaces one word
110 KEY 9,CHR$(18)+""           'Inserts data between quotation marks
120 KEY 10,CHR$(28)+CHR$(8)     'Use in conjunction with Inserts. Add
125                             'enough CHR$(28)s (moves cursor) and CHR$(8)s
126                             '(deletes character) to do the job.
```

Program Listing 2. Demo.BAS lets you avoid the Basic Input command.

```
1987 | 6    KEY OFF :KEY 10,"" :DEFINT I-K
2125 | 7    INFO=7 :BACK=1:BOAR =4 :PROT =2
1293 | 10   COLOR ,BACK, BOAR
     | 1000 ' update members name, phone and balance
1726 | 1005 RESTORE 9800 :GOSUB 9000
4455 | 1010 MNAME$="George Blankinship": PHONE#=5551212! :BALANCE#=125.33
3812 | 1011 LOCATE 3,9: PRINT USING "\                              \"
     |      ;MNAME$;
2638 | 1012 LOCATE 4,9: PRINT USING "#######";PHONE#;
2768 | 1013 LOCATE 4,30:PRINT USING "####.##";BALANCE#;
1633 | 1014 LOCATE I,J : GOSUB 9100
2337 | 1025 I=3:J=9:K=40 :GOSUB 9200: MNAME$=N$
2306 | 1030 I=4:J=9:K=10 :GOSUB 9200: PHONE#=N
2421 | 1035 I=4:J=30:K=9 :GOSUB 9200: BALANCE#=N
5366 | 1040 IF BALANCE#<100 THEN LOCATE 20,1:PRINT "balance too low ":I=4:J=30:
     |      GOTO 1014
3348 | 1050 LOCATE 16,1 : PRINT MNAME$ :PRINT PHONE#,BALANCE#
 557 | 1150 STOP
     | 9000 ' display the field descriptions
2045 | 9001 COLOR PROT :CLS :READ I,J,N$
3355 | 9004 WHILE N$<>"":LOCATE I,J:PRINT N$:READ I,J,N$:WEND
2311 | 9008 COLOR INFO: LOCATE I,J : RETURN
     | 9100 'control and display operator input
2253 | 9101 N$=INKEY$: IF N$="" THEN GOTO 9101
3655 | 9102 K=ASC(N$) :IF LEN(N$)=1 THEN K2=0 ELSE K2=ASC(MID$(N$,2,1))
2158 | 9104 IF K2=68 THEN RETURN                    :'F10  update info
2176 | 9105 IF K2=72 THEN I=I-1 :J=J-1              :'up arrow
2174 | 9106 IF K2=80 THEN I=I+1 :J=J-1              :'down arrow
2469 | 9108 IF K2=75 THEN J=J-2 :IF J<0 THEN J=0 :'left arrow
2099 | 9109 IF K=13  THEN I=I+1 :J=0               :'enter =crlf
2190 | 9115 IF K2=0 AND K<>13 THEN PRINT N$;
 544 | 9118 J=J+1
1591 | 9120 IF J>80 THEN I=I+1 :J=1
1613 | 9128 IF I>24 OR I<1 THEN I=1
2925 | 9130 IF SCREEN(I,J,1) MOD 16=PROT THEN GOTO 9118
 937 | 9135 LOCATE  I,J
 786 | 9140 GOTO 9101
     | 9200 'edit the screen
 724 | 9201 N$="":N=0
 567 | 9204 K=K+J
3090 | 9206 WHILE J<K :N$=N$+CHR$(SCREEN(I,J)):J=J+1 :WEND
1874 | 9208 IF LEN(N$)>0 THEN N=VAL(N$)
 716 | 9210 RETURN
10959 | 9800 DATA 1,1," Member Name ,Phone and Balance Input Screen   use F10 ke
     |      y to update",3,1,"Name   :                    ",4,1,"Phone  :
     |       ",4,21,"Balance:          ",3,9,""
```

Screen Input—Basically Speaking

■Anyone who has had information scroll off the top of the screen because of "? REDO FROM START" or has pressed enter, only to realize that the information sent is incorrect, will probably agree that displaying, modifying, and updating information using the Basic Input command can be somewhat frustrating. Demo.BAS (see Program Listing 2) shows three subroutines (starting at lines 9000, 9100, and 9200) that may provide some relief.

Though Demo.BAS updates three fields, the maximum number of fields allowed is limited only by the amount of space available on the screen. All the display fields are in one Data statement (see line 9800). Several could be used. Line 1010 assigns values to MName$, Phone#, and Balance#. Normally your program would retreive this information from your data base with a Get, Read, or Input# routine. Starting with line 9100, "special keys" are trapped. Other keys could be defined to perform edit functions such as tab next field, insert, or delete. Suppose, for example, that you require a minimum balance of $100.00. The statement in line 1040 alerts the operator, positions the cursor, and enters Edit mode so the problem can be fixed.

While running the program you will notice that you cannot enter any protected area. When you enter the last position of a field, the program moves the cursor to the next field automatically. String fields will be justified exactly as you enter them. You can justify numeric fields, however, left, right, or not at all.

You can enter whole numbers such as 100.00 with or without the decimal or trailing zeros. If you don't have a color monitor, assign Prot, Info, Boar, and Back different values in line 7. Lines 1050 and 1150 of Demo.BAS print the updated values and end the program. Your program would continue and process or store the information with Put, Print#, or Write. So there you have it—three subroutines that give your programs that professional look and give Input the boot.

George Blankinship
Rochester, MI

Illustration by Chris Demarest

Cubism

■ by Harry Bee ■

The first of November's puzzles asked: Can you find the cube root of a number by taking the sum of its digits? You can, wrote Merlin Walters (Fairfax, VA), but you won't often find the right one. In fact, in addition to the examples I gave—512, the cube of 5+1+2=8, and 4,913, the cube of 17—only five other numbers work that way, if you include zero and one. (Anyone who wants to exclude one and/or zero on philosophical grounds may do so.)

Looking Before Leaping

I said it before; I'll say it again. Whenever you approach a problem you intend to solve with a computer program, it's wise to take a good look at any assumptions you've made, especially the ones that come easiest.

For example, you don't have to play with computers long before you discover that binary machines are poor at decimal arithmetic. What method will you use to cube a number? You can raise it to a power, N^3, which is the natural choice, or you can multiply N*N*N. Does it make any difference?

I bring this up not only to illustrate something that's worth a second look, but also to demonstrate one of the factors to consider when you want to translate a program from one dialect of Basic to another. Sooner or later you'll do that.

If you still use a TRS-80, as I do regularly, or another 8-bit computer, you may have found exponentiation (^) as unreliable as division. Well, you can trust exponentiation in GW-Basic, but multiplication is faster—not much, but enough to measure. Taking the issue a step further in this age of affordable compilers, I found that although Turbo Basic's exponentiation worked fine, it multiplied outlandishly. For instance, for N=50 it returned −6,072. I'm sure that's not right.

Another kind of questionable assumption can result from the way a problem is stated. When I posed the cubes puzzle, I suggested that you investigate numbers up to a million "at least." Some of you interpreted that to mean the first million roots but recognized the limits of both time and the precision of Basic's variables and stopped at either 5,000 or 1,000 cubed. Most of you decided I meant roots up to 100. A few looked deeper and realized that my million was arbitrary.

I confess. I enjoyed your various proofs of the upper limit of this puzzle. The majority of them used formulas based on log functions decorated with Greek letters and arcane symbols. Among these, the analytical proof sent in by James Hawes (New Orleans, LA) was a masterpiece. Fortunately, you don't need a background in obscure mathematics to ferret out the practical limit of this problem or, indeed, of most programs you want to write. A little applied common sense usually does the job, as the Table, built by Curtis Stevens (Walnutport, PA), demonstrates. You don't have to study the table for long to see that the largest root that can possibly work is 54. A couple of you came to the same conclusion intuitively, which is good enough.

Another decision you had to make was how to add the digits in a number. You showed me two distinctly different approaches. The mathematically inclined among you resorted to variations on dividing by powers of 10:

```
S=0
FOR P=5 TO 0 STEP -1
  D=INT(N/10^P)
  S=S+D
  N=N-D*10^P
NEXT P
```

It works (for values up to 999,999), but it's a long way to go for a little addition.

Basic lets you treat numbers as the quantities they represent and as the string of characters we use to write them. For my money, the best way to add a number's digits is the simplest: Treat it as a string, but remember that the first character of a string made by the STR$ function is the sign, and you can skip it.

Joe Pellerito's (Troy, MI) solution (Program Listing 1) puts everything together into a simple, clear expression. I like it.

Functionality

In November, I also described five functions and asked you to define them. The idea of FNFract was to take a number and return its fractional (decimal) component, if any, retaining the sign. Most of you decided to subtract the integer part of the number from the original. The trick was to get the right integer.

Three Basic functions, CINT, INT and Fix, return an integer associated with the value you give it. But the three work differently—or why have three? The one-liner in Program Listing 2 lets you compare them. CINT rounds numbers up or down the way rounding is commonly understood. CINT won't work for FNFract. INT rounds down to the next lower integer. INT(−2.1) gives you back −3. A few of you forced INT to work in FNFract. Fix, which cuts a number off at the decimal point, works equally well for both positive and negative values and makes the function simple:

```
FNFract(N)=N-FIX(N).
```

Used as illustrated, Except. . .Fix frequently gives you what Gene Kent (San Antonio, TX) calls "representational errors." For a value such as 2.123, it can return something like .1229999. The truth is that .1229999 is as close as Basic's binary kind of representation gets to .123. If you were to use the N−FIX(N) device for calculation, you'd lose nothing significant. However, neatness counts. So Gene turned to string surgery to eliminate most of the representational surprises:

```
FnFract(N)=VAL(LEFT$(STR$(N),1)
 +MID$(STR$(N),INSTR(STR$(N)+".0","."))).
```

It returned the decimal parts of a hundred values, without corrupting them, in all but two cases.

I don't know of a way to get better results, but Thomas Scheck (Spencer, OH) found a way to get the same results more directly. You'll find Tom's neat solution in line 100 of Program Listing 3.

FNGreat and FNLess, as I described them, were to return the greater and lesser of two values, respectively. Overwhelmingly, you favored logical comparisons to make these functions work. I did too. So

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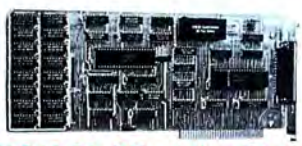

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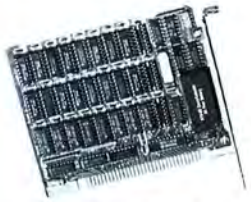

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Table. Curtis Stevens' demonstration of upper limits.

Source	Cubed Value	Max Sum
0–2	0–8	9
3–4	27–64	18
5–9	125–729	27
10–21	1000–9261	36
22–46	10648–97336	45
47–99	103823–970299	54
100–215	1000000–9938375	63

I was intrigued by an approach a few of you sent that uses nothing more than third grade arithmetic. It takes the sum and difference of the two values, adds or subtracts them (depending on what you're after), and halves the result. Here's the way Mary Phelan (Albuquerque, NM) wrote it:

FnGreat(A,B) = (A + B + ABS(A – B))/2.

To make FNLess, change the second plus (+) to a minus (–).

Using one logical comparison, Steve MacGregor (Scottsdale, AZ) made something equally nice:

FnGreat(A,B) = A + (A – B)*(B<A).

To make the complementary function out of this one, point the relational operator in the other direction.

Either of these might have written the final word on FNGreat and FNLess, as far as I'm concerned. They're both pretty. But testing them uncovered the same sort of misrepresentation that spoils FNFract—variations the strictly logical approach doesn't introduce.

With one outstanding exception, all of the solutions that depended on Boolean arithmetic varied not enough to make a difference. I'll give it to you the way I had it:

FnGreat(A,B) = – A*(A>=B) – B*(B>A).

To make FNLess out of this one, turn both relational pointers around. The variations were mostly a matter of order, though some of you treated equality in a third element.

One of the things I like about writing this column is that no one learns more from it than I do. No matter how well I think I've done solving the puzzles, someone always shows me a new angle or a notable refinement. Take a look at what Mike Metras (Aurora, IL) did in lines 200 and 300 of Program Listing 3. (Notice I renamed FNGreat, FNMore.) Mike's functions don't work any better than the ones I and others wrote, but Mike's use of ABS to get rid of the confusing minus signs makes them easier to read, and they work in a less obscure manner.

Once you've worked out FNGreat and FNLess, it's tempting to stretch the technique you used in order to find the greatest, FNMost, and least, FNLeast, of three values. Falling into that trap leads to convoluted expressions, as the number of cases you have to cover increases geometrically. The definitions in lines 400 and 500 of Listing 3 show an easier way. Nested functions can make short work of complicated business. How deeply can you nest them, I wonder? From how long a list can you extract the maximum and minimum values?

Program Listing 1. Joe Pellerito's curious cube finder.

```
 891 | 10 DEFINT A,C,D
 899 | 20 FOR A=0 TO 54
1457 | 30  D=0:B=A*A*A:B$=STR$(B)
1238 | 40  FOR C=2 TO LEN(B$)
1386 | 50   D=VAL(MID$(B$,C,1))+D
 584 | 60  NEXT C
5783 | 70  IF D=A THEN PRINT"The cube root of";B;"and the sum of its digits is"
     |     ;A
 552 | 80 NEXT A
```

Program Listing 2. Integration, so to speak.

```
5875 | 10 INPUT"A number";N:PRINT"Int =";INT(N),"Cint =";CINT(N),"Fix =";FIX(N)
     |    :PRINT:GOTO 10
```

Program Listing 3. A function sampler.

```
2339 | 100 DEF FNFRACT(N)=VAL(STR$(N))-FIX(N)
2482 | 200 DEF FNMORE(A,B)=ABS(A>=B)*A+ABS(A<B)*B
2487 | 300 DEF FNLESS(A,B)=ABS(A<=B)*A+ABS(A>B)*B
2676 | 400 DEF FNMOST(A,B,C)=FNMORE(FNMORE(A,B),C)
2739 | 500 DEF FNLEAST(A,B,C)=FNLESS(FNLESS(A,B),C)
     | 599 '
3428 | 600 CLS:INPUT"Three Numbers";N(0),N(1),N(2):PRINT
3114 | 620 PRINT,:FOR L=0 TO 2:PRINT N(L),:NEXT L:PRINT
4969 | 630 PRINT"FnFract:",:FOR L=0 TO 2:PRINT FNFRACT(N(L)),:NEXT L:PRINT:PRIN
     |     T
7930 | 640 PRINT"FnMore:":FOR L=0 TO 2:PRINT"of ";N(L)TAB(14)"and ";N((L+1)*-(L
     |     <2))TAB(28)"-- ";FNMORE(N(L),N((L+1)*-(L<2))):NEXT L:PRINT
7939 | 650 PRINT"FnLess:":FOR L=0 TO 2:PRINT"of ";N(L)TAB(14)"and ";N((L+1)*-(L
     |     <2))TAB(28)"-- ";FNLESS(N(L),N((L+1)*-(L<2))):NEXT L:PRINT
2697 | 660 PRINT"FnMost:  ";FNMOST(N(0),N(1),N(2))
2806 | 670 PRINT"FnLeast: ";FNLEAST(N(0),N(1),N(2))
5027 | 680 PRINT:PRINT"Press any key to continue; <Enter> to quit."
3504 | 690 I$=INKEY$:IF I$="" THEN 690 ELSE IF I$=CHR$(13) THEN END
 678 | 700 GOTO 600
```

Random Events

Listings 2 and 3 let you test the various functions they contain. They rely on your input to supply the test values. But asking for user input—yours, mine or anyone else's—is a clumsy, tedious, and ineffective way to test anything.

This month's challenge ought to produce something everyone can use. Write a routine to generate test values. You need to be able to define a range of values for the routine, as well as a maximum precision. For example, if you use –100.000 and 50.000 as bounds, you expect values ranging from –100 to 50, some of them integers, some with one, two, or three digits to the right of the decimal point, and others between –1 and 1. Or if you use 2 and 12, you want only integers in that range. In addition, while the sequence of values appears random, the routine should be capable of repeating a sequence on demand.

The Rules:

1. Write your program(s) or routine(s) in Basic.
2. Your solution(s) to this month's poser(s) must reach us by February 15, 1988, to be considered for the May 1988 issue and a T-shirt if we use it.
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Harry Bee is a free-lance writer, programmer, puzzle creator, and dreamer. You can contact him at P.O. Box 567, Cornish, ME 04020, or on Compuserve (74076,3461).

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Sounding Off on the 1000: Encore

■ by Hardin Brothers ■

Last month I explored the special sound chip in the Tandy 1000 computer. The final program, which played tones and chords, could only generously be described as musical. If you ran last month's programs, you might have concluded that the sound chip has somewhat fewer capabilities than a toy synthesizer. If you read last month's column, you should understand how to send commands to the sound chip, so I won't repeat that information. Instead, I'll look at ways to make the sound chip sound less mechanical and a technique for transcribing written music that you can produce on your Tandy 1000.

Real Music

Each dot of written music represents a pitch and a duration. Other markings on the page indicate approximate volume levels. However, if you use an oscilloscope to view the sounds produced by even a simple musical instrument, you see that "real" music is much more than a combination of pitch, volume, and duration. Every instrument has a unique timbre or sound quality. No acoustic (non-electric) musical instrument ever produces a single, pure tone. Instead, it creates a base tone (which you perceive as pitch) and many secondary overtones. Your subconscious perception of those overtones lets you distinguish between an oboe and a flute, for example.

Every musical instrument has unique attack and decay characteristics. A note doesn't start at full volume and end suddenly. Instead, it builds up and fades away. The attack is sudden in percussive instruments such as the piano and gradual in a large pipe organ. However, a note on the organ generally maintains its volume until you release the key. The same note played on a piano begins to fade almost immediately.

When played by a good musician, most instruments produce constant variations around the desired pitch, not just a single pitch. Nor does a musician play the exact notes printed on a page, but instead varies the duration and volume of each note slightly to produce "phrasing." You perceive these variations in pitch, volume, and note duration as the difference between an accomplished musician and a competent beginner who has less control over the instrument and the music.

Variations on the Chip

A high-quality synthesizer attempts to mimic these variations: overtones, attack and decay, and pitch and volume vibrato. How close it comes to duplicating an acoustic instrument depends on the speed and complexity of its electronic circuits. The special tonal qualities that it creates for each note are often loosely referred to as the note's "envelope." You determine a note's pitch and duration by how long you hold down a certain key. The remainder of the note's characteristics are created electronically.

Neither the sound chip in the Tandy 1000 nor the computer itself is designed to match the capabilities of a synthesizer. The sound chip can produce only square-wave tones. The only overtones present are artifacts of the speaker and the computer's plastic case. A programmer can control the pitch, duration, and volume of a note, but not the shape of its sound.

It might be possible to approximate a simple instrument by using the three sound channels together. One could be assigned to the base pitch and the other two could create overtones. You could also create vibrato by programming constant, small changes in the pitches.

Unfortunately, the computer and the sound chip are too slow to produce high-quality synthesized music. The sound chip requires nine instructions to set or change the pitch and volume of the three sound channels. If you wrote a program in assembly language to do that, you could send every instruction to the sound chip with this pair of commands:

```
mov   al,nnnn
out   0c0h,al
```

Those two instructions require 14 processor clock ticks to operate. But the sound chip, which takes a comparatively long time to read its instructions from the data bus, adds approximately 42 wait states every time you access it. Therefore, sending nine instructions to the sound chip requires at least 504 clock beats ($9 \times [14 + 42]$). Add to that the time required for normal program flow (reading data, looping, and branching), servicing the real-time clock interrupts, and refreshing memory, and you soon have a system that can't manipulate sound as quickly as a trained musician.

Even if you could optimize a machine-language program specifically to run the sound chip, turn off the real-time clock interrupts, and dedicate your computer to producing sound, the sound chip would let you down; after all, it can produce only square waves and has limited tonal and volume ranges. If you dedicate all three sound channels to producing the variations in a single voice, you need at least three computers linked together to produce a chord.

In other words, if you want high-quality synthesized music, you can either buy a synthesizer and perhaps a musical instrument digital interface (MIDI) for your computer (but don't expect the computer and sound chip to meet your requirements), or you can improve on last month's programming techniques. By manipulating the volume of each sound channel, you can synthesize a variety of attack and decay rates. The result, which this month's programs demonstrate, is quite acceptable even if it doesn't match up to a high-quality synthesizer.

The Tandy Music System

Although the term envelope means much more to synthesizer players than the attack and decay rates you can control on the Tandy 1000, it's a useful concept for understanding how a program manipulates sound. Instead of looking at a single note as a combination of pitch, duration, and volume, you can look at it as combining pitch, duration, and an envelope. Inside that envelope, you can perform many fine adjustments to the volume.

For example, assume that a whole note, which lasts for four metronome beats in a music piece, has a duration of 400 "song

System Requirements: C compiler. Available on the January–March 1988 Disk Series, on sale mid-January 1988.

Photograph by Greg Newman

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104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
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pulses." You could define an envelope for that note that specifies it will use 20 pulses to go from zero to full volume gradually, 200 pulses staying at full volume, 80 pulses fading from full to zero volume, and 100 pulses at zero volume defining the time gap between notes. In fact, you could take this as a paradigm and tell a program that for every note played, you want 5 percent of the time spent in attack, 50 percent in sustain, 20 percent in decay, and 25 percent in quiet. If you vary those numbers, the sound chip can approximate different instruments. A guitar would have a quick attack, short sustain, and long decay. An organ would have a slower attack but a longer sustain period and a fast decay. Program Listing 1 produces such definitions, but it won't make much sense until you understand the logic behind the first three program listings.

I wanted to write a series of programs that would simplify the process of entering and playing music through the 1000's sound chip. Last month's final program was difficult to write, not because of the programming concepts, but because I had to make the translations laboriously from printed music to the data statements in the program. I also wanted to experiment with note envelopes, music tempos, and harmonic relationships. I wanted to play a few pieces on the computer that I can't play on the piano, because of my limited musical skills.

I wrote three programs: Listing 1 prompts for envelope characteristics and creates a file of envelope profiles; Program Listing 2 reads an ASCII representation of music and creates from it the tonal definitions that should be sent to the sound chip; Program Listing 3 reads the envelope and tonal files into memory and coordinates the process of actually manipulating the sound chip.

I could have combined these functions into a single program, but deadline considerations that force me to program efficiently convinced me to write them separately so I could debug and test them individually. Before I could write any code for the programs, I had to define more precisely what I meant by playing music. For example, I had to base the envelope generator on the kinds of notes that the system could use, since it would create a separate envelope for each note type.

After examining several pieces of sheet music, I decided I needed to include six note types: whole, half, quarter, eighth, sixteenth, and thirty-second. Each note

Program Listing 1. A disk file of envelope definitions for the Play program. Compile this as MAKEENV.EXE.

```
#include <stdio.h>                              /* Standard definitions*/

int note_len[3][6] = {
   { 384, 192,  96, 48, 24, 12 },               /* 'Plain' notes      */
   { 576, 288, 144, 72, 36, 18 },               /* 'Dotted' notes     */
   { 256, 128,  64, 32, 16,  8 },               /* Triplet notes      */
     };

#define LONGEST 576                             /* Longest note       */
#define OFF 0x0F                                /* No volume          */
#define MAXLEN 255                              /* Maximum Byte value */
#define LEVELS (OFF-loud)                       /* Volume steps       */

typedef unsigned char BYTE;                     /* Define a byte      */

typedef struct {                               /* Define pulse structure*/
   BYTE count;                                  /* Repetition count   */
   BYTE volume;                                 /* and volume level   */
   } PULSE;                                     /* Structure name     */


FILE *fp;                                       /* We'll need 1 file  */
PULSE pulse;                                    /* And one structure  */

double attack, decay, quiet;                    /* Real variables     */
int loud;                                       /*  and one integer   */

main()
{
   int i, j, k,                                 /* Declare integers   */
      d1, d2,d3, d4,
      this, last;
   double incr;                                 /* And real number    */

   set_up();                                    /* Call set_up()      */

   write_record(0,0);                           /* Write opening rec. */
   write_record(LONGEST,OFF);                   /* and Rest envelope  */

   for (i = 0; i < 3; i++)                      /* For each note type */
      for (j = 0; j < 6; j++)                   /*   For each note    */
         {
         write_record(0,0);                     /* Write separator    */
         d4 = (int) (note_len[i][j] * quiet);   /* d4=Pulses of quiet */
         d2 = note_len[i][j] - d4;
         d1 = (int) (attack * d2);              /* d1=attack pulses   */
         d3 = (int) (decay * d2);               /* d3=decay pulses    */
         d2 -= (d1 + d3);                       /* d2=sustain pulses  */
         if (d1)                                /* If any attack p's  */
            if (LEVELS >= d1)                   /* If steps > pulses  */
               {
               incr = LEVELS / (double) d1;     /* find steps/pulse   */
               for (k = 1; k <= d1; k++)        /* For each pulse...  */
                  write_record(1,(int) (OFF - (k * incr)) ); /* write rec. */
               }
            else                                /* If pulses > steps  */
               {
               incr = (double) d1 / LEVELS;     /* finds pulses/step  */
               last = 0;                        /* last = pulse count */
               for (k = 1; k <= LEVELS; k++)    /* For each step      */
                  {
                  this = (int) (k * incr);      /* Find # of pulses   */
                  write_record(this-last,OFF-k); /* Write to file     */
                  last = this;                  /* Pulses so far      */
                  }
               if (last < d1)                   /* If roundoff error  */
                  write_record(d1-last, loud);  /* Finish attack      */
               }
         write_record(d2,loud);                 /* Now write sustain  */
         if (d3)                                /* If any decay pulses*/
            if (LEVELS >= d3)                   /* If steps > pulses  */
               {
               incr = LEVELS / (double) d3;     /* Find steps/pulse   */
               for (k = d3; k >= 1; k--)        /* For each pulse     */
                  write_record(1,(int) (OFF - (k * incr)) ); /* write rec. */
               }
            else                                /* If pulses > steps  */
               {
               incr = (double) d3 / LEVELS;     /* Find pulses/step   */
               last = 0;                        /* last = pulse count */
               for (k = 1; k <= LEVELS; k++)    /* For each step ...  */
                  {
                  this = (int) (k * incr);      /* Find # of pulses   */
                  write_record(this-last, loud+k); /* Write to file   */
                  last = this;                  /* Pulses so far      */
                  }
               if (last < d3)                   /* If roundoff error  */
                  write_record(d3-last, OFF);   /* Finish decay       */
               }
         write_record(d4,OFF);                  /* Write quiet pulses */
         }
   fclose(fp);                                  /* Close the file     */
   exit(0);                                     /* Back to DOS        */
}

set_up()                    /* Get information from user & open file */
{
   char buf[81];                                /* For user responses */

   printf("\nName of output file: ");           /* Ask for file name  */
   gets(buf);                                   /* Get response       */
   if ((fp = fopen(buf,"wb")) == NULL)          /* Try to open file   */
      abend("Can't open output file");          /* else error         */

   do {
      printf("Maximum volume 0 (loud) to 14 :  ");  /* Ask for max. vol. */
      gets(buf);                                /* Get response       */
      loud = atoi(buf);                         /* Change to integer  */
      } while (loud < 0 || loud > 14);          /* Until no error     */

   do {
      do {
         printf("Percentage of note silent:    ");  /* Ask for quiet %  */
         gets(buf);                             /* Get response       */
         quiet = atoi(buf)/100.0;               /* Change to 0.nn     */
         } while(quiet < 0 || quiet > .99);     /* Until no error     */

      do {
         printf("Percentage of note in attack: ");  /* Ask for attack % */
         gets(buf);                             /* Get response       */
         attack = atoi(buf)/100.0;              /* Change to 0.nn     */
         } while(attack < 0 || attack > .99);   /* Until no error     */

      do {
         printf("Percentage of note in decay:  ");  /* Ask for decay %  */
         gets(buf);                             /* Get response       */
         decay = atoi(buf)/100.0;               /* Change to 0.nn     */
         } while(decay < 0 || decay > .99);     /* Until no error     */
      } while (attack + decay + quiet > .99);   /* Verify numbers     */
}


write_record(n,vol)         /* Write pulses & volume to output file   */
int n,vol;                                      /* Receiving variables*/
{
   int i;                                       /* We need 1 more var.*/
   PULSE p;                                     /* and structure var. */

   p.volume = vol;                              /* Set the volume     */
   do {
      p.count = (n < 255) ? n : 255;            /* Set 255 pulses or n */
      if (1 > fwrite((char *)&p,sizeof(p),1,fp))  /* Write to file     */
         abend("Error writing to file");        /* Check for error    */
      n -= p.count;                             /* Subtract # from n  */
      } while (n > 0);                          /* Repeat if needed   */
}                                               /* End of write_record*/


abend(s)                    /* Exit if error (abnormal end of program) */
char *s;                                        /* Receive message    */
{
   fcloseall();                                 /* Close all files    */
   printf("\nProgram error: %s",s);             /* Print error msg.   */
   abort();                                     /* Exit to DOS        */
}
```

End

Program Listing 2. A compiler that reads an ASCII song file and translates it into a tone file that the Play program can use. Compile this as Maketone.EXE.

```
#include <stdio.h>                  /* Standard compiler header files */
#include <io.h>
#include <string.h>

typedef unsigned char BYTE;         /* Define a new data type, BYTE  */

typedef struct {                    /* and a complex data type       */
   unsigned note_length;            /* pulses in a note              */
   BYTE byte_one;                   /* first frequency byte          */
   BYTE byte_two;                   /* second frequency byte         */
   int env;                         /* envelope number for this note */
   } NOTE;                          /* "NOTE" is a structure of this type */

int v_addr[3] = { 0x80,0xA0,0xC0 }; /* address nibbles of tone generators */

int note_len[3][6] = {
   { 384, 192,  96, 48, 24, 12 },   /* 'Plain' notes  */
   { 576, 288, 144, 72, 36, 18 },   /* 'Dotted' notes */
   { 256, 128,  64, 32, 16,  8 },   /* Triplet notes  */
     };

char  note_type[] = "whqest",       /* whole, half, quarter, etc. */
      note_name[] = "A BC D EF GR", /* normal names + R = rest    */
      flat_set[]  = "BEADGCF",      /* order of flatted notes     */
      sharp_set[] = "FCGDAEB",      /* order of sharped notes     */
      type_set[]  = ".3",           /* note modifiers             */
      accidental[]= "n#b",          /* accidental markings        */
      now_sharp[8],                 /* space for current sharps   */
      now_flat[8],                  /* space for current flats    */
      *filename[3] = {
         "voice1.tmp",
         "voice2.tmp",
         "voice3.tmp" },            /* Temporary voice file names */
      cur_line[83],                 /* Hold one line from input   */
      *cur_pos,                     /* Current location in line   */
      *end_pos;                     /* End of the line            */

FILE  *fp[3],*infp,*outfp;          /* We'll need five files. You */
                                    /* may have to specify FILES=8 */
                                    /* in your Config.sys file    */

int note_val[72] = {                /* generated with last month's
                                       Listing 3                  */
    1017, 960, 906, 855, 807, 762, 719, 679, 641, 605, 571, 539,
     508, 480, 453, 428, 404, 381, 360, 339, 320, 302, 285, 269,
     254, 240, 226, 214, 202, 190, 180, 170, 160, 151, 143, 135,
     127, 120, 113, 107, 101,  95,  90,  85,  80,  76,  71,  67,
      64,  60,  57,  53,  50,  48,  45,  42,  40,  38,  36,  34,
      32,  30,  28,  27,  25,  24,  22,  21,  20,  19,  18,  17,
      };

unsigned voice_note[3],             /* note counters for each voice */
         voice_pulse[3];            /* pulse counters for each    */


main()
{
   char buf[80];                        /* Buffer for user responses  */
   int i;                               /* Loop counter               */
   NOTE note;                           /* One NOTE structure         */

   printf("\nName of ASCII song file: "); /* Prompt for file name   */
   gets(buf);

   if((infp = fopen(buf,"r")) == NULL) /* and try to open input file */
      abend("Cannot open input file"); /* Error message if can't open*/

   note.note_length = 0;                /* Clear the note structure   */
   note.byte_one = 0;
   note.byte_two = 0;
   note.env = 0;


   for(i = 0; i < 3; i++)                           /* Loop for 3 voices  */
      {
      if((fp[i] = fopen(filename[i],"w+b")) == NULL)  /* Open temporary file*/
         abend("Cannot open temporary note file");

      if(1 > fwrite((char *)&note,sizeof(NOTE),1,fp[i])) /* Write structure */
         abend("Error writing to note file");         /* to each file    */
      voice_note[i] = 1;                              /* Counts as one   */
      voice_pulse[i] = 0;                             /* item, no pulses */
      }                                               /* End of loop     */

   printf("\nReading and processing input file");     /* What's happening?  */

   fgets(cur_line,81,infp);                         /* Read input line    */
   while (!feof(infp))                              /* until end of file  */
      {
      cur_pos = cur_line;                           /* Start at beginning */
      end_pos = cur_pos + strlen(cur_line) - 1;     /* Find end of line   */
      skip_white();                                 /* Pass white space   */
      if (cur_pos < end_pos)                        /* While more to      */
         switch(cur_pos[0])                         /* process in line... */
            {
            case 'K' :     set_key();     break;    /* Setting the key?   */
            case 'V' :     read_voice();  break;    /* Notes for a voice? */
            case 'R' :                    break;    /* Or comments?       */
            default  :     line_error();            /* Else error         */
            }
      fgets(cur_line,81,infp);                      /* Now get next line  */
      }

   fclose(infp);                                    /* Close input file   */
   if(voice_note[0]+voice_note[1]+voice_note[2] == 3) /* Any notes parsed? */
      abend("There are no notes in the file");      /* Error if not       */

   printf("\nName of output tone file: ");         /* Prompt for filename*/
   gets(buf);                                       /* Get response       */
   if((outfp = fopen(buf,"wb")) == NULL)            /* Open output file   */
      abend("Cannot open output file");             /* else error         */

   write_tone();                                    /* Call function to   */
                                                    /* write final file   */
   fcloseall();                                     /* Close all files    */
   printf("\nTone file successfully generated");    /* Report success     */
   exit(0);                                         /* Back to DOS        */
}


abend(s)                    /* Function to handle errors (abnormal end)  */
char *s;                    /* Receives a string pointer from caller     */
{
   fcloseall();                                     /* Close all files    */
   printf("\nProgram error:\n%s",s);                /* Print out message  */
   abort();                                         /* Back to DOS        */
}

skip_white()                /* Move cur_pos past tabs, spaces, and '|'   */
{

   while (cur_pos[0] == '\t' ||                     /* If cur_pos -->     */
          cur_pos[0] == ' '  ||                     /* white space, or    */
          cur_pos[0] == '|')                        /* bar,               */
      cur_pos++;                                    /* increment pointer  */
}


line_error()                /* Display illegal line in ASCII file        */
{
   printf("\nInput line error:");                   /* Print message      */
   printf("\n%s",cur_line);                         /* Display bad line   */
   fcloseall();                                     /* Close files        */
   abort();                                         /* Back to DOS        */
}

set_key()                   /* Parse a 'K:' line and set sharps or flats */
{
   int flats,sharps;                                /* Declare counters   */

   if(*(++cur_pos) != ':')                          /* Must have ':' after*/
      line_error();                                 /* 'K' else error     */
   ++cur_pos;                                       /* Increment pointer  */
   skip_white();                                    /* Skip white space   */
   flats = sharps = 0;                              /* Initialize counters*/
   while(cur_pos < end_pos)                         /* Stop at end of line*/
      {
      if(cur_pos[0] == 'b') flats++;                /* Count flat         */
      if(cur_pos[0] == '#') sharps++;               /*   and/or sharp     */
      cur_pos++;                                    /* Increment pointer  */
      }
   if(sharps && flats)                              /* Can't have both    */
      line_error();                                 /* Error if we do     */

   now_sharp[0] = now_flat[0] = '\0';               /* Set strings null   */
   if(sharps)                                       /* If we have sharps  */
      strncat(now_sharp,sharp_set,sharps);          /*  set sharp string  */
   if(flats)                                        /* If we have flats   */
      strncat(now_flat,flat_set,flats);             /*  set flats string  */
}                                                   /* End of function    */

read_voice()                /* Parse a 'Vn' line, write to temporary file */
{
   int v,                                           /* Declare v=voice#   */
      d_col,d_row,                                  /* Indices to duration*/
      tone,                                         /* Tone number        */
      offset,                                       /* Accidental offset  */
      octave,                                       /* Octave number      */
      aflag,                                        /* Accidental flag    */
      i;                                            /* Loop counter       */
   NOTE note;                                       /* NOTE structure     */

   v = *(++cur_pos) - '1';                          /* Get voice number   */
   if(v < 0 || v > 2)                               /* Check range        */
      line_error();                                 /* Error if bad voice#*/
   if(*(++cur_pos) != ':')                          /* Get colon          */
      line_error();                                 /* Else error         */
   cur_pos++;                                       /* Increment pointer  */
   do                                               /* Start loop ...     */
      {
      skip_white();                                 /* Skip white space   */
      d_col = 0;                                    /* Assume plain note  */
      if(d_row = strindex(note_type,cur_pos[0]))    /* Find note type     */
         cur_pos++;                                 /* and increment ptr  */
      else
         line_error();                              /* Error if bad type  */

      if(d_col = strindex(type_set,cur_pos[0]))     /* If '.' or '3'      */
         cur_pos++;                                 /* increment pointer  */
      note.note_length = note_len[d_col][d_row-1];  /* Set note length    */
      note.env = d_col * 6 + d_row;                 /*   and env. number  */

      offset = 0;                                   /* Init. sharp/flat   */
      aflag  = 0;                                   /* and natural        */
      while (strindex(accidental,cur_pos[0]))       /* Read accidentals   */
         {
         switch(cur_pos[0]) {
            case 'b':     offset--;     break;      /* Count flats        */
            case '#':     offset++;     break;      /*  and sharps        */
            case 'n':     aflag = 1;    break;      /* and/or naturals    */
            }
         cur_pos++;                                 /* Increment pointer  */
         }
      if (cur_pos[0] == 'R')                        /* A rest?            */
         {
         note.byte_one = v_addr[v];                 /* Yes -- set tone 0  */
         note.byte_two = 0;                         /* for this voice     */
```

Listing 2 continued

Listing 2 continued

```
      note.env = Ø;                          /* and envelope Ø     */
      cur_pos++;                             /* Increment pointer  */
      }
   else                                      /* Must be a note     */
      {
      i = strindex(note_name,cur_pos[Ø]);     /* Find note number   */
      if(i==Ø)                               /* If none            */
         line_error();                       /* We have an error   */
      i--;                                   /* Else adjust number */
      if(offset == Ø && aflag == Ø)          /* If no accidentals  */
         {
         if(strindex(now_sharp,cur_pos[Ø]))  /* Sharp in this key? */
            offset++;                        /* Yes -- incr. offset*/
         if(strindex(now_flat,cur_pos[Ø]))   /* Flat in this key?  */
            offset--;                        /* Yes -- decr. offset*/
         }

      i += offset;                           /* Add offset to note */
      cur_pos++;                             /* Increment pointer  */
      octave = Ø;                            /* Initialize octave  */
      while(cur_pos[Ø] == '\'')              /* Count octave marks */
         {                                   /* For each one ...   */
         octave++;                           /* Increment octave   */
         cur_pos++;                          /*  and the pointer   */
         }
      i += octave * 12;                      /* Add octave to note */
      tone = note_val[i];                    /* Now find the tone  */

      note.byte_one = v_addr[v] | (tone & ØxØf);  /* Set tone bytes in  */
      note.byte_two = tone >> 4;             /* note structure     */
      }

   voice_note[v]++;                          /* Count the note ... */
   voice_pulse[v] += note.note_length;       /* and its pulses     */
                                             /* Write structure to */
   if(1 > fwrite((char *)&note,sizeof(NOTE),1,fp[v]))  /* temp. file     */
      abend("Error writing note to file");   /* Check for error    */

   skip_white();                             /* Skip next spaces   */
      } while (cur_pos < end_pos);           /* Repeat to end of line */
}                                            /* End of read_voice()   */


strindex(s,ch)              /* Find the position of character ch in   */
char *s;                    /*  string s                              */
int ch;
{
   int i,retval;                                 /* Declare variables  */

   i = retval = Ø;                               /* Initialize them    */
   while(retval == Ø && i < strlen(s))           /* While we haven't   */
      {                                          /*   found a match    */
      if (s[i] == ch)                            /* If a match, set    */
         retval = i+1;                           /* return value       */
      i++;                                       /* Increment index    */
      }
   return(retval);                               /* Return Ø or match  */
}                                                /* End of strindex()  */


write_tone()                /* Collect information in temporary files */
{                           /* and write output file                  */
   int num_of_voices, i;                         /* Declare variables  */
   unsigned pulses,items;
   NOTE note;                                    /* and note structure */

   num_of_voices = 3;                            /* Write 3 voices?    */
   for (i = 2; i >= Ø; i--)                      /* Look at all 3      */
      if(voice_note[i] == 1)                     /* If 1 item/voice    */
         num_of_voices--;                        /*   skip that voice  */

   if(num_of_voices == Ø)                        /* If no voices       */
      abend("No voices were defined");           /* End with error     */

   pulses = voice_pulse[Ø];                      /* All the same length?*/
   if( (num_of_voices > 1 && voice_pulse[1] != pulses)
      ||                                         /* If not ...         */
      (num_of_voices == 3 && voice_pulse[2] != pulses))
      abend("Pulse counts are inconsistent");    /*   end with error   */

   for(i = Ø; i < 3; i++)                        /* Rewind temp. files */
      rewind(fp[i]);

   fwrite((char *)&pulses,sizeof(pulses),1,outfp);    /* Write # of pulses & */
   fwrite((char *)&num_of_voices,sizeof(int),1,outfp);/* voices to output   */

   for (i = Ø; i < num_of_voices; i++)           /* For each voice ... */
      {                                          /*   write # of notes */
      fwrite((char *)&voice_note[i],sizeof(voice_note[i]),1,outfp);
      for(items = Ø; items < voice_note[i]; items++)  /* For each note ...  */
         {
         fread((char *)&note,sizeof(NOTE),1,fp[i]);   /* Read note from temp*/
         fwrite((char *)&note,sizeof(NOTE),1,outfp);  /* Write it to output */
         }
      }
   if (ferror(outfp))                            /* If a write error...*/
      abend("Error writing to output file");     /*   end with error   */

   fcloseall();                                  /* Close all files    */
   for (i = Ø; i < 3; i++)                       /* For all 3 voices...*/
      remove(filename[i]);                       /*  erase temp. file  */
}                                                /* End of write_tone()*/
```

End

type had to be available in its regular form, as part of a triplet, and in dotted form. (If you can't read music, you might want to find someone to explain these terms to you. I don't have room.) That meant I had to create envelopes for 18 note lengths, plus an all-purpose rest envelope. I also needed a reference standard, and after a little experimentation, I adopted a standard program pulse on which to base all the notes in an envelope set. Starting with eight pulses for the shortest note, a triplet thirty-second, I adopted the pulses shown in the Table. A pulse is an arbitrary unit of time used within the programs. The values were selected to ensure that all notes would have integer pulse values and that each note has enough pulses to allow the formation of a volume envelope.

Each note envelope is a series of volume levels associated with a specific number of pulses. Because the sound chip recognizes only volume numbers ranging from zero (loud) to 15 (off), the volume numbers can be stored in single bytes. I stored the pulse counts in single bytes, and separated each envelope from the others in memory with a pair of zero bytes.

Then I designed a method of transcribing music from its normal notation into something a program can understand. I looked briefly at Basic's Play notation, but it seemed too mechanical and unmusical for my tastes. I adopted a free-form notation (see "Transcription Syntax," p. 98) that's easy to parse inside a program and reasonably easy to type with a text editor or word processor (in non-document or ASCII mode).

My standards for program input were set; it was time to start writing the programs. My last decision was what language and compiler to use. I wrote the programs in C for several reasons. First, interpreted Basic was too slow for what I had in mind. My programs would obviously be manipulating an unknown quantity of complex data in memory. C, with its organization of pointers, dynamically allocated arrays of complex structures, and its ability to view integers as signed (−32768 to 32767) or unsigned (zero to 65535), seemed more suitable than compiled Basic or Pascal.

Quick Basic and Turbo Basic can handle dynamic arrays without trouble but use only arrays of fundamental data types (integers, strings, and real numbers). Turbo Basic's long integers are a good substitute for the unsigned integers I needed. Pascal can handle complex data types, but it's clumsy at handling dynamic arrays and (at least Turbo Pascal) can't handle unsigned integers.

Another reason for using C is that I prefer writing in it, especially Microsoft C with the Codeview debugger. I will try to explain this month's programs in enough detail so that you can rewrite them in the compiled language of your choice, although you will have to modify the data handling techniques to meet the requirements of

Table. Notes and their pulse values.

Note Name	"Plain" Pulse Value	"Dotted" Pulse Value	"Triplet" Pulse Value
Whole	384	576	256
Half	192	288	128
Quarter	96	144	64
Eight	48	72	32
Sixteenth	24	36	16
Thirty-second	12	18	8

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your chosen language.

Making Envelopes

The least complicated of the three programs is Listing 1, which creates a disk file of envelope definitions. The program begins by defining a 3 by 6 array of note lengths in pulses, a standard used throughout all three programs. Each row of the array defines lengths for whole notes through thirty-second notes. The first row defines standard note lengths, the second row is for dotted notes, and the third row is for triplets.

Next, the program defines four macro constants. Every line of a C program that begins with a pound symbol (#) is a command to the C preprocessor, which can make changes to a program before it is passed to the compiler. The preprocessor substitutes all the text on each line for the first word, wherever that word appears in the program. C is a case-sensitive language, which means that uppercase words are distinct from those written in lower- or mixed-case, so it would be possible to use "LONGEST," "longest," and "Longest" as three distinct words in a C program. By convention, you type constants and macros in uppercase in C programs.

The Typedef command defines two new types of variables. The first merely defines "BYTE" as a synonym of "unsigned character." The second Typedef command defines a structure, or combination of simpler data types, which consists of 2 bytes. I'll call this structure a pulse throughout the remainder of the program.

I used declarations to allocate memory for a file pointer: "*fp" (which is similar to a Basic file buffer number), one pulse structure, three floating point numbers, and an integer. Because these definitions are made outside any program function, these data elements are accessible throughout the program.

C programs are organized as a series of functions, which are similar to subroutines except that data values can be optionally passed to or received from them. Every C program begins with a function called "main( )," which can be anywhere inside the program. Most C programmers put main( ) at the beginning of a listing or follow Pascal's lead and put it at the end.

Much of Listing 1's work is done inside the main( ) function. First, local variables, which are accessible only inside the function in which they are declared, are defined. Then the set_up( ) function is called to get information from the user and initialize some of the global data elements.

Before you continue with main( ), look at the set_up( ) function directly below it. It begins by getting an output file name from you, then values for the maximum volume of notes in the envelope, and the portion of each note that should be spent in attack, decay, and silence. The set_up( ) function opens the output file, ensures the open operation was successful, and does minimal checking on the values you enter.

When set_up( ) is done, control returns to the main( ) function, which next calls the write_record( ) function to save two pulse structures in the disk file. The first structure has values of zero for both bytes to signify that a real envelope follows it. The second structure defines the envelope for a rest, which is up to 576 pulses of no volume at all.

The main routine then enters a loop that takes every note length in turn, calculates the number of pulses to spend at each volume level, and then sends the results to write_record( ), where they are stored in the disk file. If you are unfamiliar with C, the two For loops might look strange. In Basic, the first would read "For I = 0 to 2." The first part of a For loop in C defines the starting condition. The second expression inside the parentheses is a test—if the test is true, the loop continues. The last section inside the parentheses is the action to be taken after every loop and before the test. In this case, C's "++" increment

operator is applied to the variable "i", much as Basic's implied "Step 1" is used in a For loop.

Most of the code inside the double loop would look much the same in Basic, with one exception. The words (int) and (double) are "type casts", which change the expression that follows from one data type to another much as Basic's CINT( ) and CDBL( ) functions do.

Of the two short functions at the bottom of Listing 1, the first, write_record( ), receives two values that it places in a pulse structure and writes to disk. If the first value it receives is too large to fit in a single byte, it writes more than one structure to the file, each with 255 pulses or less at a single volume.

The final function is used in case of a disk or user error. It receives a message in a string, which it prints, and then uses the compiler's Abort( ) function to end the program and return to DOS. The result of Listing 1 is a file with a collection of envelope definitions. Each definition contains one or more pulse structures indicating how many pulses should be played at each volume level. Records of 0,0, which indicate that one envelope is finished and the next is about to begin, separate the envelopes.

Making the Tone File

Listing 2, the most difficult program, converts an ASCII representation of a piece of music into a tone file that you can play. Essentially, it's a compiler that converts letters and other symbols into a collection of numbers. The program begins by loading three of the compiler's definition files, defining a "Byte," and then defining a complex data structure called a "Note." This structure includes an integer that contains the number of pulses in a note, the 2 bytes that must be sent to the sound chip to produce the note's pitch, and an integer indicating the envelope that should be used with the note. Listing 3 uses the same structure to play each note.

Next, Listing 2 defines the nibbles that must be used to address each of the tone generators in the sound chip. It also defines a large number of global strings (or character arrays) that are used throughout the program, pointers for opening five files, the tone values for six octaves of notes, and two counter arrays.

The main( ) function in Listing 2 begins by opening an ASCII input file and three temporary output files to hold notes for each possible voice. Because the final program works best if each voice begins with a note definition of all zeros, Listing 2 writes one null note structure to each file and counts it as a note for each voice.

Next, the program reads each line of the input file, skips any leading white space, and then decides if the line is a remark, a key definition, or a note for a voice. It calls separate functions to parse key and voice lines. Finally, the program checks to see if any notes were defined at all. If so, it opens an output file and calls the write tone( ) function to read each of the temporary files and write the necessary information to the final output file.

The skip_white( ) function moves a pointer past any white space in a line. According to the allowable syntax of the ASCII file, white space is any space, tab, or bar (|) character. The double bars in the skip_white function are C's equivalent to Basic's Or operator.

The set_key( ) function parses a line that defines the default sharps or flats in a piece of music. It moves along the line and counts the number of sharps or flats that it finds. No musical key signature can have both sharps and flats in it, so this function ensures that the key-signature line doesn't contain both. It ends by setting one of two strings, now_sharp or now_flat, to hold the names of the notes that normally have a sharp or flat assigned to them.

The read_voice( ) function, which parses a note-definition line, is the longest function in Listing 2. It begins by finding which of three possible voices the notes will be assigned to. Then it slowly moves through the line, collecting the note type, any accidental marks, the note name, and the octave marks for each note. It ends by collecting all of that information into a note structure and then writing the structure to the appropriate temporary file. It also updates two counters. The first tracks the number of notes assigned to a voice; the second counts the number of pulses

Transcription Syntax

The Maketone.EXE program expects a standard ASCII file that meets the following syntax requirements. You can create a transcription file with any text editor or word processor in non-document (ASCII) mode.

- No line may be more than 80 characters long. You must terminate every line with a hard carriage return. Don't depend on a word processor's word wrap abilities to form lines.
- You can use space, tab, and bar characters at the beginning of a line, end of a line, or between notes. Such characters are ignored.
- Use blank lines as you wish. They are also ignored.
- A line beginning with "R:" (no quotation marks) is taken as a remark and is ignored.
- A line beginning with "K:" sets a key signature. You can set the key as many times as desired. If no other marks on a key signature line exist, the key of C (no sharps or flats) is set. Otherwise, you can specify up to seven sharp characters (#) or seven flat characters (b) on the key signature line. Key signatures are interpreted as in standard musical notation. For example, K: ### sets the key of A (three sharps).
- A line beginning "V1:," "V2:," or "V3:" begins a line of notes assigned to the sound chip's first, second, or third note generator. If you want only a single voice, use V1. For two voices, use V1 and V2. You can omit V3 or V2 and V3 entirely, but any voice you use must have a combination of notes and rests that matches those used for V1. All three voices have the same range of possible notes.

Following the colon, a voice line can have one or more note definitions and zero or more space, tab or vertical-line characters between notes.

- A note definition can have five fields, two of which are required.

The first field, which is required, specifies a note's length. It must be one of the following lowercase letters: w, h, q, e, s, or t, which represent a whole, half, quarter, eighth, sixteenth, or thirty-second note.

The second field, which is optional, must be either a period or a "3." A period signifies a dotted note; a "3" represents a triple.

The third field, which is optional, is an accidental mark. It can be a sharp (#), double sharp (##), natural (n), flat (b), or double flat (bb). Accidentals override default values set by the key signature for one note. Unlike standard musical notation, an accidental does not affect the notes that follow it in a measure.

The fourth field, which is required, is the note name. It can be an uppercase A, B, C, D, E, F, or G, or an R, which indicates a rest.

The final field, which is optional, specifies an octave. It consists of one to five apostrophes. Each apostrophe raises the note one octave. Octaves range from A to G#, not from C to B. For example, q.R is a dotted half-note rest. An e3#C" represents a triplet eighth-note C-sharp in the third octave, and qnD"' is a quarter-note natural D in the fourth octave. Notes can be followed or preceded by any number of spaces, tabs, and/or vertical bars. ■

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that the voice needs to play the piece of music.

Strindex( ), a comparatively simple function, receives a string and a character and returns the position of the first occurrence of the character in the string. It is similar to Basic's INSTR function, except you can only use it to find a single character inside of a string.

Finally, the write_tone( ) function performs error checking and writes the final output file. First, it saves the total number of pulses in the piece of music and the number of voices that have notes assigned to them. Then it reads each temporary file, one note at a time, and sends the note to the output file. It closes all files and erases the temporary files from the disk.

Facing the Music

After you create an envelope set and a tone file, you can hear the results of your work. Listing 3 uses those two files to send the necessary information to the sound chip to play a piece of music.

Like the other two programs, it begins by defining several variables. Notice that the structures used in the two previous listings are again defined here, but with a difference. Each is given two names: The first is the structure itself and the second is a pointer to (or address of) the structure. One of the C's strongest features is its ability to handle pointers, arrays of pointers, and pointers to pointers (ad infinitum). The closest Basic analogy to the pointer arrays in Listing 3, such as envelope[ ], would be an array holding index values into another array.

The main( ) function of Listing 3 calls a set_up( ) function and enters a loop. Inside that loop, it calls play_note( ) for each active voice, then a function called pause( ), and finally counts one pulse. The loop repeats until the total number of pulses for the piece is reached, at which time all three sound chip voices are turned off and the program ends.

The play_note( ) function begins by determining whether it is at the end of a note. If so, it adds a pointer to the next note in memory, sends the tone definitions from that note to the sound chip, and sets up the envelope pointer for that note.

Next, it checks to see if it is time to move the envelope pointer. If so, a new volume level is sent to the sound chip and a counter is set to determine when the volume should change.

After you create an envelope set and a tone file, you can hear the results . . . .

The last part of the play_note( ) function updates the pulse counter that controls the envelope volume. Control returns to the main( ) function. The pause( ) function is an empty loop that counts to the delay value that you specified and then returns to the main( ) loop. Since pause( ) is so simple, I could include it in the main( ) function instead of writing it separately, but that would be dangerous. Some newer compilers are smart enough to optimize empty loops out of existence entirely. If you have such a compiler, you might want to put pause( ) in a separate module and disable optimization when you compile it.

Listing 3's set_up( ) function is complex. It begins by opening an envelope file, determining the length of the file, and then requesting space in memory to store that file. Assuming there is enough space, the program then reads the entire envelope file into memory at once. Next, it does the same thing with the tone file, reading each voice into a separately allocated block of memory. Finally, it scans through the envelope file in memory, setting the pointers to each envelope at each 0,0 pulse record.

Writing a Music File

You should now have enough information to copy and play a piece of music on your Tandy 1000. Program Listing 4 is the first eight measures of the gavotte from Bach's French Suite No. 5. It should give you a feeling for the capabilities of the sound programs, a chance to experiment with different envelopes, and an idea of what a music transcription looks like. *80 Micro*'s first 1988 MS-DOS quarterly disk includes working EXE files for the three programs, the complete gavotte, and two

Program Listing 3. Play a piece of music on the 1000 using the sound chip. This program reads an envelope file and tone file that was prepared with the MAKEENV and Maketone programs and prompts for a tempo value. Compile this as Play.EXE.

```
#include <stdio.h>              /* load the input/output definitions */

#define PORT 0xC0               /* Address of sound chip         */
#define OFF  0x0F               /* Volume off value              */


typedef unsigned char BYTE;     /* Some definitions to make life easier */

typedef struct {
   BYTE count;                  /* Repetition for a volume value */
   BYTE volume;                 /* A volume level (0 - 0F hex)   */
   } PULSE, *PULSEPTR;          /* PULSEPTR is a pointer to a
                                   2-byte structure */


typedef struct {
   unsigned note_length;        /* pulses in a note              */
   BYTE byte_one;               /* first frequency byte          */
   BYTE byte_two;               /* second frequency byte         */
   int env;                     /* envelope number for this note */
   } NOTE, *NOTEPTR;            /* NOTEPTR is a pointer to a
                                   structure of this type */

FILE *env_fp, *song_fp;         /* Pointers for reading two files*/


unsigned total_count;           /* Total pulses so far in song   */
unsigned end_count;             /* End-of-song value             */
unsigned note_end[3] =
     {0,0,0};                   /* End pulse register for each voice */
BYTE pulse_count[3];            /* Pulse counter for each voice  */

PULSEPTR envelope[19];          /* Envelope definitions          */
PULSEPTR pulse_ptr[3];          /* Pulse pointer for each voice  */
NOTEPTR note_ptr[3];            /* Note pointer for each voice   */
unsigned delay;                 /* Tempo or delay value for song */

BYTE vol_addr[3] =              /* Addresses nibble of           */
      { 0x90, 0xB0, 0xD0 };     /*   the volume registers        */

int num_of_voices;              /* Number of voices in this song */


main()                          /* Main program control          */
{
   int i;                       /* Declare one var.   */

   set_up();                                        /* Call set_up routine*/
   while (total_count < end_count)                  /* Until end of song  */
      {
      for (i=0; i<num_of_voices; i++)               /* For each note ...  */
         play_note(i);                              /*   call play routine*/
      pause();                                      /* Then pause         */
      total_count++;                                /* Incr. pulse counter*/
      }                                             /* The song is over.. */
   for (i=0; i<3; i++)                              /* For each voice ... */
      outp(PORT,vol_addr[i] | OFF);                 /* Be sure vol. is off*/
   exit(0);                                         /* Back to DOS        */
}                               /* End of main() function       */
play_note(v)                    /* Call for each voice during each pulse */
int v;                                              /* Receive voice #    */
{
   if (note_end[v] == total_count)                  /* If at end of note..*/
      {
      note_ptr[v]++;                                /* Point to next note */
      outp(PORT,note_ptr[v]->byte_one);             /* Send out tone bytes*/
      outp(PORT,note_ptr[v]->byte_two);             /*   to sound chip    */
                                                    /* Calculate next end */
      note_end[v] = total_count + note_ptr[v]->note_length; /* pulse...    */
      pulse_count[v] = 0;                           /* Set env. counter   */
      pulse_ptr[v] = envelope[note_ptr[v]->env];    /* Point to next env. */
      }

   if (pulse_count[v] == 0)                         /* If end of env. sect*/
      {
      pulse_ptr[v]++;                               /* Point to next. sect*/
      outp(PORT,pulse_ptr[v]->volume | vol_addr[v]); /* Output new volume */
      pulse_count[v] = pulse_ptr[v]->count;         /* Set env. counter   */
      }
   pulse_count[v]--;                                /* Decr. env. counter */
}                                                   /* End of voice func. */


pause()                         /* Delay during each pulse */
{
   unsigned i;                                      /* Declare counter    */

   for(i = 0; i < delay; i++)                       /* Empty For loop     */
      ;
}                                                   /* End of pause() func*/
```

Listing 3 continued

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THE NEXT STEP

Listing 3 continued

```
set_up()                        /* Get information from user, read files */
{                               /* and setup pointers                    */
   char buf[81];                                    /* For user responses */
   unsigned i, items;                               /* 2 counters         */
   PULSEPTR j;                                      /* Structure pointer  */
   long len;                                        /* For file length    */

   printf("\nName of envelope file: ");             /* Get name of env.   */
   gets(buf);                                       /* file from user     */

   if ((env_fp = fopen(buf,"rb")) == NULL)          /* Open envelope file */
      abend("Cannot open envelope file");           /* End if error       */

   len = filelength(fileno(env_fp));                /* Get file length    */
   envelope[0] = (PULSEPTR) malloc(len);            /* Allocate memory for*/
   if (envelope[0] == NULL)                         /* envelopes ...      */
      abend("No memory available for envelope array");/* Error if not enough*/

   if (len > fread((char *)envelope[0],1,(int) len,env_fp)) /* Read file  */
      abend("Error reading envelope file");         /* End if read error  */

   fclose(env_fp);                                  /* Close env. file    */

   printf("Name of tone file: ");                   /* Get name of tone   */
   gets(buf);                                       /*  file from user    */

   if ((song_fp = fopen(buf,"rb")) == NULL)         /* Open file          */
      abend("Cannot open song file");               /* or end with error  */
                                                    /* Get total pulses   */
   if (1 > fread((char *)&end_count,sizeof(end_count),1,song_fp))
      abend("Error reading song file");             /* or report error    */
                                                    /* Get # of voices    */
   if (1 > fread((char *)&num_of_voices,sizeof(num_of_voices),1,song_fp))
      abend("Error reading song file");             /* or report error    */

   for (i = 0; i < num_of_voices; i++)              /* For each voice     */
      {                                             /* Get number of notes*/
      if (1 > fread((char *)&items,sizeof(items),1,song_fp))
         abend("Error reading song file");          /* or report error    */
                                                    /* Get memory for     */
      note_ptr[i] = (NOTEPTR) malloc(items * sizeof(NOTE)); /* the notes   */
      if (note_ptr[i] == NULL)                      /* If not enough mem. */
         abend("Insufficient memory for note array"); /*  report error    */
                                                    /* Read the notes     */
      if (items > fread((char *)note_ptr[i],sizeof(NOTE),items,song_fp))
         abend("Error reading song file");          /* check for error    */
      }
   fclose(song_fp);                                 /* Then close file    */

   printf("Enter tempo count: ");                   /* Get delay count    */
   gets(buf);                                       /* from user          */
   delay = atol(buf);                               /* Change to integer  */
   if (delay == 0)                                  /* Don't accept '0'   */
      abend("Illegal tempo entry");

   j = envelope[0];                                 /* Copy 1st env. ptr. */
   for (i = 1; i < 19; i++)                         /* For other ptrs.    */
      {
      j++;                                          /* Move to next env.  */
      while (j->count != 0)                         /* Look for separator */
         j++;
      envelope[i] = j;                              /* Set each env. ptr  */
      }

   total_count = 0;                                 /* Init. starting count*/
   for (i = 0; i < num_of_voices; i++)              /* For each voice...  */
      note_end[i] = 0;                              /* Init. end count    */
}                                                   /* End of set_up()    */


abend(s)                /* Error exit (abnormal end)    */
char *s;                                            /* Receive message    */
{
   fcloseall();                                     /* Close files        */
   printf("\nProgram error: %s",s);                 /* Print error msg    */
   abort();                                         /* Return to DOS      */
}
```

End

Program Listing 4. A transcription file. Bach's gavotte from French Suite No. 5.

```
R: Gavotte from French Suite No. 5 by J.S. Bach
R:    (First 8 bars only)
R: Notice that lines which begin 'R:'  are remarks
R:                               'K:'  set key signature
R:                               'Vn:' define notes for voices 1-3

K:#

V1: qB''' qG'''  | qD''' eE''' eF''' qG''' qE'''  | hB'''    qE''' qC''' |
V2: qD'''  qB''' | hA'''          qB''' qG''     | hF''     qG''  qA''' |
V3: qG'    qG''  | qF''  qF'      qE'   qE''     | qD'' qD' qE'  qE''  |

V1: qA''' eB''' eC''' eD''' eB''' eC''' eA''' |
V2: qF''  qR          qA'''         qR        |
V3: qD''  qA''        qF'           qD'       |

V1: eC''' eB''' eA''' eG''  qB'''' qG'''  | qE'''  eE'''  eF''' qG''' qE''' |
V2: qG''         qR          qD'''  qB'''  | q#C''' e#C''' eD''' qE''' q#C''' |
V3: qG'          qD'         eG eD' eE' eF' | eG' eA'' eG' eF' eE' eD' eE' eF' |

V1: q#C'''   eD''' eE''' eF''' eD''' eG''' eE''' |
V2: wA'''                                        |
V3: eG' eA'' eB''  e#C'' qD''         q#C''      |

V1: eF''' eD''' qA''''   eG''' eF''' eE''' eF''' | hD''' |
V2: qA'''        hD'''           q#C'''          | hR    |
V3: qD''         eF'' eG' qA''   qA'              | hD'   |

R: End of Gavotte, measure 8
```

End

envelope files. One sounds like a piano or harpsichord; the other sounds like an organ.

Normally, I use an ASC extension on the transcription files, a TON extension on the compiled tone files, and an ENV extension on envelope files. You should adopt a similar method to avoid confusing the various files you need. Because the programs use unsigned integers to hold pulse counts, the longest piece of music they can handle is 65,535 pulses long, the equivalent of 682 quarter notes or 170 whole notes per voice. You would probably classify anything longer as a full symphony, which would likely require more than the three voices available in the sound chip.

When you first play a song, enter a tempo value of 50 or so. The actual speed of the piece depends on how much optimizing your compiler does, as well as on the types of notes used in the piece. Longer values produce a slower piece. If you want to see how fast your computer can play notes, enter a tempo value of 1.

When you create an envelope file with MAKEENV.EXE, try specifying a maximum volume of 6 or 8. If you use the full volume of the sound chip (volume zero), you will probably create distortion in the speaker when you play the music. If you use the audio output of the 1000, you are on your own, since the final volume depends on the amplifier and speakers you use.

I hope to make changes to the three programs in the future, if I have time. First, I would like to expand the number of envelopes to allow a dynamic range or even changes in instrumentation in the middle of a piece. This would require adding to the syntax of the ASCII transcription file. Second, I find the transcription method used here much easier to use than Basic's Play statement, but the apostrophes get in the way. In a future version, I'll probably find another method of indicating octaves.

Finally, octaves are defined in the tone charts as running from A to A. It would feel more natural to have them run from C to C, which would require some changes in the large tone array in Listing 2.

Bach's French Suite No. 5. . . should give you a feeling for the capabilities of the sound programs.

THE NEXT STEP

Next Month

The sound chip has more capabilities; for example, you can use the noise generator to create effects that sound like a snare drum. But I doubt I'll write about the chip for some time.

Next month, I'll return to Basic (or compiled Basic) and look at algorithms you can use to find the shortest airline routes from Boise to Charleston or Peterborough to Portland. Perhaps your computer can earn its keep by planning the ideal vacation for you. ■

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Continued from p. 108

are no more intuitive than any other program's, but even if they were, that's no excuse for carrying over a useless on-line help system which, in the MS-DOS context, is plain awful.

Ease of use is PFS:Professional Write, for instance, and else-wise in the eye of the beholder. I never criticized the program for not being easy to use. My objection—disappointment, actually—was that Anitek moved the program from the Z80 world to the 8088 world without rewriting it to take advantage of the new environment. Because of that, the program's front end in the areas I detailed (editing, file handling, speed, and so on) no longer balances with a wonderful printing engine. I sincerely hope that Anitek will bring LeScript up to date in future releases. I'd like to see more people benefit from the outstanding user support with which Mr. Shanafelt is so pleased.

I used version 1.70. The automatic hyphenation feature works (or fails to) as I described. Finally, the end-of-sentence character is certainly superfluous no matter what one puts between sentences, because another double-space character (it's been awhile; I don't remember what it's called) works better and is easier to use. Neither would be necessary if the program weren't so obsessive about compressing spaces. This is a throwback, I believe, to the need to conserve space in the 64K, 8-bit environment and a function of a poor approach to screen formatting and reformatting in general. —Harry Bee.

Alternative to the Universal Keyboard Adapter

■ I recently bought a Tandy 1000 SX. I read your review of it in the August 1987 issue (see Reviews, p. 33). I use Wordperfect and Lotus's 1-2-3 and know that the non-standard keyboard precludes the use of IBM templates provided with some major software packages.

Instead of getting a Universal Keyboard Adapter as you mentioned in the article, Second Byte (3721 Falling Green Road, P.O. Box 562, Olney, MD 20832) has templates specifically designed for the 1000. —*Leslie M. Shenkler, Hohokus, NJ*

Oops

■ Thank you for mentioning Recreational Mathemagical Software and Bridge-80 in your October 1987 Feedback Loop column (p. 12).

Bridge-80 for TRS-80 is the old name for PC-Bridge, available for PCs as well. The current price is $24.95, not $18.95 as you reported. —*Michael W. Ecker, President, Recreational Mathemagical Software, 129 Carol Drive, Clarks Summit, PA 18411*

Desperately Seeking 80286 Upgrade

■ I eagerly read the September article on the new Tandy machines (see "Tandy's Two New 1000s," p. 60). I own a Tandy 1000 SX, but I use an IBM System 2/Model 30 at work (not my decision), and when I go home to my Tandy, its slowness, even at 7.16 megahertz, irritates me. I am holding my breath waiting for an 80286 upgrade kit for the 1000 SX. Would this chip fit in the 1000 SX? What about an expansion card to give 1000 SX owners the 128K of video RAM? Wouldn't this bring the RAM up to 640K instead of 593K?

Could you do an article on all the latest features, EGA cards, and some of the VGA cards that work with the 1000? Would buying the base motherboard for the new 1000 TX and installing it in the 1000 SX work?

It sure is hard (and expensive) to keep up with the changing technology. —*Walter D. Brady, Cairo, GA*

By the time you read this, Tandy should have its own 80286 upgrade available. Its price will be about $400. We recognize our readers' need for information on hardware compatibility; expect articles on this topic in upcoming issues.—Eds.

Get Back (to the Basics)

■ I don't mind it from my peers, but when a young whippersnapper like Eric Maloney (see Side Tracks, September 1987, p. 9) calls me a "dummy," that's the pits.

Just kidding. Many "dummies" use computers without enduring the rigamarole of getting a program to run. That's why we buy computers.

If I must enter many commands before I even load a program, I'll rarely use it. To me, that defeats the purpose of the computer.

I'm the secretary of a user group and half of our members never see the inside of a computer, or a program; they don't want to. We don't like remembering endless Pokes, JCLs, and patch, utility, and disk commands to load a "Maybe It'll Run If I Didn't Forget Something/BAS" program. That's dumb!

I couldn't run Scripsit and Superscripsit using my Okidata printer without entering lots of patches. Instead, I use Visicalc to write letters. I did this for four years until I got LeScript. I use it all the time, now that I've figured out the commands.

I think the Tandy 1000 HX has a place in the computer spectrum, and I guess Tandy thinks so, too. I know the world has passed TRSDOS by, but it might have happened sooner if MS-DOS were less complicated. It seems to use an outdated command structure under the guise of progress. Shades of CP/M! Now that Tandy has a computer that eliminates some of the hassle, it might have a winner.

About half of our members are not computer hackers and never will be, as long as the computers and programs run properly. When it gets too complicated, most of us get frustrated and move to something else.

I have an idea. Let's invent a machine to keep records, do math, write letters, and balance checkbooks; let it perform quickly and without much user effort. We'll call it a *computer*. —*D.E. Golden, Dunwoody, GA*

***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.**

FROM THE PUBLISHER

The start of a new year is always a good time for taking a fresh look at where you've been and where you're going. This principle applies to magazines as well as individuals.

1987 was an important year for Tandy, as it sold its one millionth MS-DOS computer and emerged as a power to be reckoned with. From all indications, 1988 holds even greater promise for Tandy.

The past year was also full of healthy changes at *80 Micro*: a new focus, a new editor in chief, a new publisher, and, as it's said, a new broom sweeps clean.

I've been a Tandy aficionado for some years, and I'm a user of Tandy computers both here at the office and at home. I'm a satisfied customer, and I often recommend Tandy to people shopping for a new computer.

Within the past few weeks *80 Micro* has received a number of letters from subscribers who have protested the magazine's December editorial by Eric Maloney. Generally speaking, readers who wrote to us were dismayed at Eric's "invective against Tandy" and believed his editorial was "not in good taste." I agree with these readers.

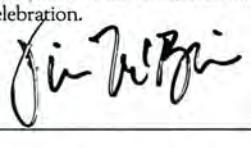
My belief is that a primary function—and duty—of this magazine is to add value to your Tandy computer. We will do this by taking a professional approach to Tandy and its products. We will look at Tandy with a fair, critical eye, just as we will continue to review the products and services of the third-party support vendors responsibly. Our editors will, as always, give you product information you can trust.

During 1988, our mission at *80 Micro* will be to assist you in getting the most from your Tandy computer. We will also continue to place great value on your opinion as the foremost force in shaping what we do.

I'm excited about the opportunity to be a part of *80 Micro* and the Tandy community, and I look forward to a long and enjoyable relationship with you. For all of us, 1988 will be a year of celebration.

Best regards,

Jim McBrian
Publisher



Making New (Side) Tracks

Good Riddance

■ Is the staff of *80 Micro* as happy as I am about Eric Maloney's departure (see "Farewells," December 1987, p. 9) for *PC Resource*? His egotism blinded him to the fact that the people purchasing your magazine already own Tandy computers and want to learn to use them more productively and with pleasure.

We are not interested in the activities of Tandy management. If we don't like Tandy's computers, we won't buy them. Sadly, I also subscribe to *PC Resource*, so I still must look at him in one publication —maybe I can tear *that* page out first.

I cannot agree with Peter Hutchinson on Mr. Maloney's virtues (see "Changing of the Guard," December 1987, p. 109); Maloney's farewell editorial was not in good taste.—*Matt Carlisle, Pratt, KS*

Horseshoes for the Dead Horse

■ I've faithfully read Mr. Maloney's Side Tracks column in every issue I've received. Many times he gave his readers interesting information in that column, but his last column was unprofessional in the bitterness he showed. What good is it to buy horseshoes from a third party if you skewer the horse they're supposed to fit?

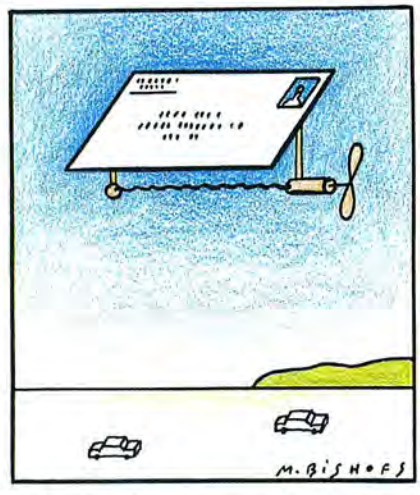
I've been reading *80 Micro* and *PC Resource* and wondering which subscription I should keep. Maloney's last column is partly responsible for resolving my decision. When the appropriate time comes, I will stick with *80 Micro*. Goodbye, Mr. Maloney, and good luck.—*David L. Kuzminski, Petersburg, VA*

Change in Address

■ Your December 1987 Resource Guide contained errors about our user group and BBS. The correct address of the Chicago Area Computer Hobbyists' Exchange (CACHE) is 1718 N. Long Ave., Chicago, IL 60639. As of Nov. 7, 1987, we had 50 members. The correct phone number of the Chicago Syslink is 312-622-4442. We have a 200-file library for all computers, with a library of 2,000 available from a nationwide network of Syslinks.—*George Matyaszek, Chicago, IL*

In the Year 2525, or Much Sooner?

■ Although I never owned a TRSDOS machine, I can imagine how those who own one must feel about changing to MS-DOS, which would certainly involve a large



cash outlay, learning new procedures, and acquiring new software.

After reading that *80 Micro* will no longer cover TRSDOS, I can't help but think that as newer technologies are developed and the world moves ahead, one day MS-DOS will be replaced by a newer system. Life goes on.—*David A. Shoemaker, Nederland, TX*

It's Better to Give

■ I'm appealing to my fellow longtime Model III and 4 users to donate their computers to nonprofit organizations when they move on to newer models. At the Nonprofit Educational Research Corp. (NERC), we've written Basic programs to assist community service organizations in accounting and program planning. We organized a regional distribution system to combine computers, software, and support to new nonprofit users; now we need older computers to run the software.—*Gregory C. Fearon, NERC, 872 Carr Ave., Santa Rosa, CA 95405, 707-546-5771.*

Nondisclosure Chill

■ Once again, I am amazed that "brother" Tandy succeeds so well with its tactics and antics (see Side Tracks, September 1987, p. 9).

First, Tandy makes the magazines promise nondisclosure and a cover in return for a sneak preview of its new toys; then it convinces the magazines that they need not go to press without Tandy data. Doesn't anyone realize that if all the magazines balked, Tandy would be forced to leak the information, much as Washington, *D.C., leaks* top secrets? Tandy couldn't afford to wait 90 days for their much-needed publicity.

Next time, call Tandy's bluff, and tell us why you didn't have the new data. Most of us will understand. Will Tandy? —*E. M. Pinkerton, Elmwood, NE*

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

Info into Column-Row Fix

■ In my Basic user functions that you published in your November 1987 issue (see "Functions Defined," p. 72), Program Listings 13 and 14 are incorrect. The variable "C" should be removed from the argument list. Change "C" in the function definition to an "R." Line 10 should read as follows:

```
10 DEF FNTABLE(E,R,W) = ((E - 1) MOD R)*80 + ((E - 1)\R)*W
```

—*Steve S. Troxell, Brooks AFB, TX*

Different Interpretations of LeScript

■ I agree with Harry Bee that LeScript is great with TRSDOS (see "TRSDOS, Yes; MS-DOS, No," September 1987, p. 31), but I'm not sure it compares unfavorably with other MS-DOS word processors. Harry might mention the MS-DOS programs he compares LeScript with, because a big difference in functions and price exists between Word Perfect and Bank Street Writer.

Harry misses what I consider LeScript's two greatest features: exceptional ease of use and outstanding user support. I never use the LeScript help file that he dislikes because most of the commands are logical enough to memorize after a session or two. I don't know of any other software company that not only corrects bugs in a program within two weeks without charging extra, but will even customize it for a nominal fee.

I disagree with Harry's "nits." The end-of-sentence character is not superfluous if you use two spaces between sentences, and the hyphenation problem is corrected in version 1.70. —*Gary W. Shanafelt, Abilene, TX*

In addition to its slowness (which I criticize only in the program's MS-DOS incarnation), I cited its archaic, clumsy, and less-than-complete set of editing tools. I also cited its failure to take advantage of DOS's file-handling services—odd, since it does so well in that area in its TRS-80 versions. LeScript's commands

(continued on page 107)

Illustration by Maris Bishofs

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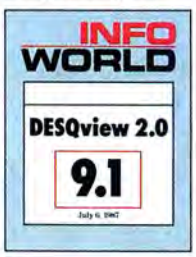

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