ProDOS File Converter For Apple *SpeedScript*

Leh-Wen Yau

This program speeds up conversions between ASCII text files and files compatible with the SpeedScript 3.0 *word processor, which was published in the June 1985 issue of* COMPUTE! *and is also available in book form (*SpeedScript: The Word Processor for Apple Personal Computers, *COMPUTE! Books). The new converter program works on all Apple IIe and IIc computers with ProDOS.*

Apple *SpeedScript* 3.0 (COMPUTE!, June 1985) is such a powerful word processor that many people, including myself, rely on it heavily for their word processing needs. I use the ProDOS version because it handles larger documents than the DOS 3.3 version. Written entirely in machine language, *SpeedScript* is efficient and fast.

However, the same cannot be said for the "*SpeedScript* File Converter" program, which lets you convert ASCII text files into *SpeedScript* files and vice versa. It's written in Applesoft BASIC and takes quite a few minutes to convert documents of any substantial size. Fortunately, it's not difficult to speed up the *SpeedScript* File Converter with the help of a short machine language routine. The modified File Converter completes its job within seconds, no matter how large a document is.

To see for yourself, type in and save Program 1 at the end of this article. When you run this program, it writes the machine language routine to disk under the filename SS.CONVERT. (Because Program 1 creates a file named SS.CONVERT, you *must not* use this name for Program 1 itself when you save it to disk.) You don't need to run Program 1 every time you want to use File Converter, just once to write the SS.CONVERT routine for File Converter to use. Then type in Program 2, the complete new version of the File Converter.

If you already have the old File Converter on disk, you can save some typing by modifying it rather than entering Program 2. Just follow these steps:

1. Type in and save Program 1, then run it to create the disk file named SS.CONVERT.
2. Delete lines 150 through 180 from the old File Converter.
3. Delete lines 240 through 260 from the old File Converter.
4. Add the following three lines to the Converter:

```
1 PRINT CHR$(4);"BLOAD
  SS.CONVERT"
150 CALL 768,8192,L-1,1
240 CALL 768,8192,L-1,0
```

5. Save the modified Converter on the same disk as the SS.CONVERT file.

When you run the modified Converter, it BLOADs the machine language routine from disk. It works just the same as the old File Converter in all other respects.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

Program 1: Speed-Up Routine Generator For File Converter

```
8A 10 FOR I = 768 TO I + 145: RE
      AD A: POKE I,A: NEXT
94 20 PRINT CHR$ (4);"BSAVE SS.C
      ONVERT,A$300,L$92"
EE 30 END
31 100 DATA 32,183,0,201,44,208,
       3,32,190,222,32
FB 110 DATA 103,221,32,82,231,16
       5,80,133,250,165,81
3F 120 DATA 133,251,32,190,222,3
       2,103,221,32,82,231
1F 130 DATA 165,80,133,252,165,8
       1,133,253,32,190,222
0A 140 DATA 32,248,230,224,1,208
       ,46,160,0,165,251
81 150 DATA 197,253,208,6,165,25
       0,197,252,240,31,177
09 160 DATA 250,201,60,208,6,169
       ,13,145,250,208,4
D3 170 DATA 41,127,145,250,24,16
       5,250,105,1,133,250
20 180 DATA 165,251,105,0,133,25
       1,208,213,96,224,0
D6 190 DATA 208,251,160,0,165,25
       1,197,253,208,6,165
60 200 DATA 250,197,252,240,237,
       177,250,201,13,208,6
D8 210 DATA 169,60,145,250,208,4
       ,9,128,145,250,24
7B 220 DATA 165,250,105,1,133,25
       0,165,251,105,0,133
A4 230 DATA 251,208,213
```

Program 2: *SpeedScript* File Converter For ProDOS

```
E7  1 PRINT CHR$(4);"BLOAD SS.CON
      VERT
4A 10 HOME
52 20 D$ = CHR$ (4)
25 40 PRINT "DO YOU WANT TO:"
A6 50 PRINT " (1) MAKE A SPEEDSC
      RIPT FILE INTO A TEXT
      FILE"
AE 60 PRINT " (2) MAKE A TEXT FI
      LE INTO A SPEEDSCRIPT
      FILE"
67 70 GET A$:A = VAL (A$)
47 80 IF A < > 1 AND A < > 2 THE
      N 70
65 90 ON A GOTO 100,200
53 100 PRINT "ENTER SPEEDSCRIPT
       FILE NAME": INPUT ":";A$
B9 110 PRINT "ENTER TEXT FILE NA
       ME TO CREATE": INPUT ":";
       B$
7E 120 PRINT D$;"BLOAD ";A$;",A$
       2000"
A4 125 L = PEEK (48859) + PEEK (
       48860) * 256 + 8192
28 150 CALL 768,8192,L - 1,1
C9 190 PRINT D$;"CREATE ";B$;",T
       TXT"
F5 195 PRINT D$;"BSAVE ";B$;",A$
       2000,E";L - 1;",TTXT"
B3 196 END
6D 200 PRINT "ENTER TEXT FILE NA
       ME": INPUT ":";B$
86 210 INPUT "ENTER SPEEDSCRIPT
       FILE NAME TO CREATE   :";
       A$
25 220 PRINT CHR$ (4);"BLOAD ";B
       $;",A$2000,TTXT"
93 230 L = PEEK (48859) + PEEK (
       48860) * 256 + 8192
17 240 CALL 768,8192,L - 1,0
1A 245 IF PEEK (I) = 141 THEN PO
       KE I,60
4A 295 PRINT D$;"BSAVE ";A$;",A8
       192,E";L - 1
B4 296 END
```

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HOTWARE: Software Best Sellers

This Month	Last Month	Title	Publisher	Remarks	Systems: Apple	Atari	Commodore	IBM	Macintosh
Entertainment									
1.	1.	*Ultima IV*	Origin Systems, Inc.	Fantasy game	•	•	•		
2.		*Gato*	Spectrum Holobyte	Submarine simulation	•		•	•	•
3.		*Hardball*	Accolade	Baseball game	•		•		
4.		*Bard's Tale*	Electronic Arts	Fantasy/role-playing game	•		•		
5.		*Flight Simulator*	Microsoft	Aircraft simulation				•	
Education									
1.	2.	*Math Blaster!*	Davidson	Introductory math program, ages 6-12	•	•	•	•	
2.	1.	*Typing Tutor III*	Simon & Schuster	Typing instruction program	•		•	•	•
3.	4.	*New Improved MasterType*	Scarborough	Typing instruction program	•	•	•	•	•
4.	3.	*Music Construction Set*	Electronic Arts	Music composition program	•	•	•		
5.		*Homework Helper: Math Word Problems*	Spinnaker	Math tutorial, high school level	•	•	•	•	
Home Management									
1.	1.	*Print Shop*	Brøderbund	Do-it-yourself print shop	•	•	•		
2.	2.	*The Newsroom*	Springboard	Do-it-yourself newspaper	•		•	•	
3.	5.	*Swiftax*	Timeworks	Tax preparation program	•		•	•	
4.	4.	*Print Shop Graphics Library*	Brøderbund	100 additional graphics	•	•	•		
5.		*Paperback Writer*	Digital Solutions	Word processing program			•		

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More String Arithmetic

We've seen how to slice pieces out of character strings with LEFT$, RIGHT$, and MID$ ("The Beginner's Page," March and April 1986), and even how to use mathematical operators to compare the hidden number values in strings (May 1986). But "string arithmetic" doesn't stop there. BASIC also lets you *add* two or more strings to make an even longer string.

In Microsoft BASIC, this is a snap. (Computers with Microsoft or Microsoft-style BASICs include all Commodores, the Amiga, Apple II series, the Macintosh, IBM PC/PCjr, TRS-80, and Atari ST—but *not* the Atari 400/800, XL, or XE, although Microsoft BASIC is available as an option.) Here's an example:

```
10 A$="UNITED WE STAND; "
20 B$="DIVIDED WE FALL."
30 C$=A$+B$
40 PRINT A$
50 PRINT B$
60 PRINT C$
```

The result is:

```
UNITED WE STAND;
DIVIDED WE FALL.
UNITED WE STAND; DIVIDED WE
  FALL.
```

By adding A$+B$ into a new string variable, C$, we've preserved the original values of A$ and B$. But if this isn't a consideration, you can simply reuse one of the variables:

```
10 A$="UNITED WE STAND; "
20 B$="DIVIDED WE FALL."
30 A$=A$+B$
40 PRINT A$
50 PRINT B$
```

The result is:

```
UNITED WE STAND; DIVIDED WE
  FALL.
DIVIDED WE FALL.
```

As you can see, string addition is virtually identical to regular addition: The sum is the whole of the parts. In computerese, the fancy name for this is *string concatenation*. To impress people, try dropping this term into a conversation at your next user group meeting.

Although TI BASIC and Extended BASIC for the TI-99/4A are different in many respects from the other versions mentioned above, string concatenation is handled in a similar fashion. The only difference is that the concatenation operator is the & symbol instead of the + symbol. Any of the examples above can be used on the TI by substituting & wherever + appears.

The Fine Print

There's only one string attached when it comes to attaching strings: You have to be careful not to exceed the length limit for strings in your particular version of BASIC. You can hit this limit pretty fast because most Microsoft BASICs don't allow strings longer than 255 characters. An exception is Amiga BASIC, which allows strings up to 32,767 characters long.

Atari BASIC for the 400/800, XL, and XE computers also allows strings at least 32,000 characters long. As a matter of fact, on an Atari, you'll most likely run out of memory before you hit the length limit on strings. In effect, Atari BASIC lets you set your own length limits. Before using any string variable in an Atari BASIC program, you have to declare its maximum length with a DIM statement. For instance, DIM A$(100) means that A$ can hold up to 100 characters. Since a DIM statement forces Atari BASIC to immediately set aside the specified amount of memory for the string variable, the memory is protected. Nothing else, not even the BASIC program itself, can overwrite it. Many Atari programs take advantage of this megastring feature to reserve huge blocks of memory for holding data files and the like.

Nothing comes without a price, however, and one price you pay in Atari BASIC is that string concatenation is a little clumsier to write than it is in Microsoft-style BASICs. You can't simply add two strings together with the plus sign. Instead, it requires something like this:

```
10 DIM A$(50),B$(50),C$(100)
20 A$="UNITED WE STAND; "
30 B$="DIVIDED WE FALL."
40 C$(LEN(C$)+1)=A$
50 C$(LEN(C$)+1)=B$
60 PRINT A$
70 PRINT B$
80 PRINT C$
```

The result is:

```
UNITED WE STAND;
DIVIDED WE FALL.
UNITED WE STAND; DIVIDED WE
  FALL.
```

It takes two statements (lines 40 and 50) to accomplish the equivalent of C$=A$+B$ in Microsoft BASIC. Essentially, what these lines do is use the LEN function to say, "Starting at the last character in C$ plus one, append the contents of A$; then, starting at the last character in the new C$ plus one, append the contents of B$." Although not as readable or as easy to use as C$=A$+B$, the result is exactly the same.

If you're not interested in preserving the original contents of A$ and B$, it is possible to concatenate in one line. Substitute this statement and delete lines 50 and 80:

```
40 A$(LEN(A$)+1)=B$
```

The result is:

```
UNITED WE STAND; DIVIDED WE
  FALL.
DIVIDED WE FALL.
```

In either Microsoft or Atari BASIC, there's no such thing as string subtraction, multiplication, or division with the −, *, and / signs. Instead, you have to simulate these operations by slicing up the string with LEFT$, RIGHT$, MID$, and the other methods shown in the past few columns. ©

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Printers For The Amiga

A printer is one of those optional but essential add-ons for your computer. It lets you reap something tangible from your word processor, terminal program, spreadsheet, or drawing program. True, you can use these tools to prepare files which you can transmit via modem directly to other computers. But hardcopy—type on paper—is still the only universally acceptable form of nonverbal communication.

Commodore doesn't sell an offical Amiga printer yet.Instead, you're free to attach practically any serial or parallel printer. The Amiga sports an RS-232 serial port as well as a standard parallel printer port. All it takes is the right cable to link the Amiga with almost any printer.

The commonly available IBM printer cables appear similar to Amiga cables, except the end of the cable that plugs into the IBM is a DB-25 male connector and the Amiga port is also a DB-25 male connector. Since printer cables specifically for the Amiga can be difficult to obtain, you might be tempted to use a "gender-changer" (a box or cable with a male connector on one end and a female connector on the other) to connect the IBM cable to your Amiga. *Don't do this.* Such an arrangement could damage your Amiga or your printer, or both.

The Amiga parallel port does not use exactly the same pin assignments as the IBM port. (Refer to page 7-13 of the *Introduction to Amiga* manual for a pinout chart.) Even more important, pin 23 on the Amiga parallel port is a +5-volt power supply, while pin 23 on an IBM-type printer cable may be connected to voltage ground. If the cable carries this voltage, and if the printer connector has a grounded pin at that position, the power supply in your Amiga may be damaged.

If you have a serial (RS-232) printer connected via the Amiga's serial port instead of the parallel port, a similar caution applies: Pins 14, 21, and 23 on the serial port carry power supply voltages. (Refer to page 7-12 of the *Introduction to Amiga* manual for a pinout chart.) Since these pins are often unused in devices like modems and printers, it *may* be safe to use IBM-type serial printer cables. Check the manual for your printer carefully to be sure that your particular model does not make any connection to these pins. Again, a gender-changer plug will be required to attach an IBM-style cable to the Amiga serial port. It's best to check with your dealer before using a suspect cable.

Printer Drivers

Once you've hooked up the hardware, you need to "attach" the printer to your software. Although every printer manufacturer uses different specifications for software control over printing features, the Amiga is capable of adapting to a variety of popular printers.

What complicates things is that every printer has its own unique set of codes, even for common effects such as underlining or boldfacing. For example, the Epson MX-80 uses the ASCII sequence 27-53 ("ESC-4") to turn on italics mode, and 27-54 ("ESC-5") to turn off italics. On the other hand, the Okimate 20, which is similar in many other ways, uses the sequence 27-37-71 (ESC-%G) to turn on italics, and 27-37-72 (ESC-%H) to turn italics off.

When an Amiga program wants to print italics, it can't just use the code for one printer model, because the program would be incompatible with other printers. Instead of sending the actual code for italics, then, Amiga programs send a symbolic code for italics. If you tell the Amiga which *printer driver* to use, the driver translates these symbolic codes into the actual codes for your printer.

Use Preferences to install your printer driver, following the instructions given in *Introduction to Amiga,* pages 7-6 to 7-11. Printer drivers currently exist for the Alphacom Alphapro 101 (no longer in production), Commodore CBM-MPS 1000, Epson FX-80, RX-80, HP Laserjet/Laserjet Plus, Brother HR-15XL, Diablo Advantage C-150, D25, 630, Qume LetterPro-20, and Okimate-20. If your printer is not on this list, try some of the drivers to see if they work with your printer. For example, the Juki 5510 dot-matrix printer is Epson JX-80–compatible, so you can use the Epson JX-80 printer driver.

If none of the drivers work, select the Custom printer driver. If you have the version 1.1 operating system upgrade, by default the Custom selection looks for a printer driver named Generic. The Generic driver works with any properly cabled printer by ignoring all special printer codes. If your printer won't respond to the codes used by any of the printers on the list, you can at least get a plain-vanilla text printout with the Generic driver.

Unfortunately, the Generic driver won't let you use any special printing effects such as underlining, boldface, italics, or bit-image graphics. You need a printer driver created especially for your brand of printer. Many people are working on drivers for unsupported printers, including one company that has developed a printer-driver builder that a nonprogrammer can use to design a new custom driver. Nevertheless, if you are looking for a printer for your Amiga, it's best to buy one that is compatible with one of the above printers.

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IBM Personal Computing

Donald B. Trivette

Softstripping

What avid reader of COMPUTE! hasn't wished for a magic way to get the program listings off the pages of the magazine and into the computer?

The device in the photograph, called a Softstrip Reader by Cauzin Systems, does just that—almost. It can't read English, or even BASIC, but it can read any program, text, or data that has been encoded in the Softstrip format—a kind of universal product code Cauzin has developed for computers. The black-and-white strip you see here, which looks like something you rub with a coin to find out you've lost a contest, is in fact Lincoln's Gettysburg Address. All 276 words of it are contained in the six-inch strip.

The Softstrip system consists of both hardware and software. The hardware is a reader the size of a giant rolling pin that plugs into the computer's serial port just like a modem. It gets power from a small transformer that plugs into a wall outlet. A truck inside the D-shaped plastic case moves the read-head down the strip when the reader is activated.

The software is a program called *Cauzcomm*. On the IBM, you can run *Cauzcomm* by typing its name at the DOS prompt, or by installing it as a resident program which is called up at any time by pressing the Alt-R keys. Once running, *Cauzcomm* displays a simple four-item menu: Read, Help, Options, Quit. To read a Softstrip, you align the reader over the strip, using the black dot and the heavy line as guides, then select Read from the menu. In less than 20 seconds, *Cauzcomm* reads the text of the Gettysburg Address into a disk file named GETTY.TXT. It couldn't be easier or more straightforward.

Make Your Own, Too

Examine the strip and you'll see the header markings at the top. The header indicates the filename and whether the strip is intended for an Apple or an IBM computer. It also tells the number of characters (bytes) in a horizontal line (typically four), the height of each line (typically 12/1000 inch), and the paper-to-ink contrast level. You'll see markings called the *checkerboard* running vertically down the left edge of a strip, and along the right edge, the *rack*. These denote each horizontal line and send alignment information to the reader. There's a parity mark at the end of each line for error detection.

Cauzin System's Softstrip Reader is a new type of bar code reader that speeds up the entry of published program listings.

Cauzin sells an optional program that lets you make your own Softstrips with a dot-matrix printer. Or, for about $20, you can have Cauzin make a denser negative—up to 5,500 characters in a nine-inch strip—suitable for publication. Strips may be printed on almost any kind of paper, although lower densities are recommended for porous grades of paper. The strips can even be photocopied.

The reader comes with a booklet of 48 BASIC programs, and Cauzin plans to attract buyers by publishing programs in its advertisements in many computer magazines. The reader costs $200 and is available for the IBM PC/PCjr, the Apple II series, and the Macintosh. For more information, write to Cauzin Systems, 835 South Main Street, Waterbury, CT 06706.

Will Softstrips ever become a standard part of published program listings? Right now, it's a chicken-and-egg situation: Magazines and books may not print Softstrips until a sizeable number of their readers own the devices, while people interested in Softstrips may hold off buying a reader until Softstripped listings become more common. If you want to express an opinion on this topic, write to COMPUTE!, P.O. Box 5406, Greensboro, NC 27403.©

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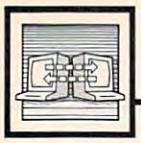

Telecomputing Today

Arlan R. Levitan

The Price Of Telecomputing

Folks, I've got a confession to make. This page came very close to being blank this month. I was far beyond my habitual fashionably late, two-weeks-behind-deadline mode of operation. Even Bill Wilkinson had sent in his column for this month, an event usually reserved for coinciding lunar and solar eclipses occurring on February 29. What was wrong?

I was, dear friends, becalmed in the telecomputing doldrums. Me, of all people, contemplating the light-emitting diodes of my collection of modems for hours on end, at a loss for words! What was the cause of this strange malaise? After all, I had been using three new commercial information services over the last month. And a rundown on one alone is usually fodder enough for a good column.

Both General Electric's Genie and ViewTron's ViewData are being heavily promoted as the latest and greatest information services for computer hobbyists. I'll be glad to give credit where it is due—both GE and ViewTron have created relatively smooth systems with decent user interfaces. But I find that both are lacking in originality. Both services stick to what is by now the standard formula of special interest groups (SIGs), online conferencing and magazines, public domain libraries for downloading, shopping services, and games.

Then there's BIX (BYTE Information eXchange). BIX makes no pretenses about being everything to everybody. It is first and foremost a message-based conferencing system. While BIX's scope may be limited and its ease of use leaves something to be desired, the quality of its user base is the big attraction. BIX users tend to be technophiles. If you're having trouble debugging a LISP program or want to add an RS-232-controlled Veg-A-Matic to your system, you can probably find help on BIX.

Time Is Money

So why am I grousing? I'm becoming concerned with the pricing of time on the commercial services intended for home users.

I was one of the early users of the online services and I remember what we paid for nonprime time way back when: Two and a half bucks an hour was the going rate for 300 bps speed, and if you waited until the wee tiny hours of the morning, you could even run 1200 bps for under five bills. Most early users also recall the promises of even lower rates once the user base was expanded. Instead, the hourly access charges for nonprime time use have steadily risen.

Yes, it's true that the rates for daytime access have fallen. And it's true that many more functions have been added to the various services. And, yes, the cost of staffing has risen over time. However, the cost of computing power and data storage has dramatically fallen during the same period.

In the late 1970s, Scott Adams of Adventure International was once asked how he priced his popular series of adventure games. Adams replied that he used the first-run movie method of pricing. His basic premise was that consumers should get some hours of use from any software purchase and should pay no more for that use than the hourly cost of attending a first-run movie. That works out to about two to three bucks an hour at today's prices.

If you accept that formula, it's not hard to come to the conclusion that most of today's information services (even the "bargain" services) are expensive—especially when compared to today's hardware prices. The owner of a $130 Atari 130XE or Commodore 64 can easily fork out $40 to $80 a month for using an information service a couple of hours a week.

Drinking From The Well

One hopeful glimmer of sunshine is The Well, a project of Stewart Brand and his cadre of Whole Earth Software Catalog counterculture techno-renegades. The Well is a low-cost ($2/hour) conferencing system for the San Francisco Bay area. The system runs on a VAX minicomputer with a capacity of 40 phone ports at the offices of the Whole Earth Catalog and Whole Earth Review in Sausalito. The service was codeveloped with NETI (Network Technologies, International) of Ann Arbor, Michigan.

I've accessed The Well via PC Pursuit and have found it to be a conferencing system of extremely high quality. The Well's biggest problem is the relatively low number of users the system can support at one time.

Let's hope we'll see a proliferation of systems like The Well in the future. If Brand and his cohorts are willing to share the system software with other groups of like-minded enthusiasts, that may indeed come to pass. Since The Well's software is Unix-based, it can likely be ported to a Unix-capable mainframe computer 10 to 20 times the size of The Well's VAX. Such systems could support 300 to 400 users at a crack and are readily available on the used market at bargain prices.

I predict that someone out there will make it happen within the next two years. Keep your eyes and ears open and the bucket ready...you may be dipping into a Well soon. ©

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INSIGHT: ST

Bill Wilkinson

ST System Software, Inside Out

Okay, you've got your shiny new ST computer plugged in and running. You can use the mouse to select programs, copy files, and format disks. It's fun, and it certainly is easier to learn than figuring out what

```
COPY B:\SYSTEM\MSGS.TXT/A=A:
  SPCL*.MS?
```

is supposed to mean. (That's a real and possible IBM PC command.) But how did this system get built? Glad you asked.

Collectively, the software built into the Atari is called TOS (Tramiel Operating System). When the 520ST was first shipped, TOS was delivered on a disk. If you're still using the disk-based TOS, stop now. Go out and buy the ROM (Read Only Memory) version of TOS. It should cost no more than $25 or so. Installation is not too difficult, though if you have as many left thumbs as I do, you might be advised to find a dealer or service center to install the chips for you (maybe $20 to $30 extra).

TOS in ROM is actually composed of six separate pieces. Usually, we lump these pieces into two groups of three: the graphics processing section and the underlying operating system. As we shall see, that operating system—a derivative of CP/M-68K—is very similar to MS-DOS and PC-DOS, which are both derivatives of CP/M.

BIOS, XBIOS, And GEMDOS

In one sense, we can say that the lowest level of the ST's operating system is the *BIOS* (Basic Input/Output System), a holdover from the earliest days of CP/M. At this level, we find routines for such basic tasks as sending a single character to a device, reading a disk sector (by sector number—a *very* dangerous practice), and so on. In CP/M, there was only one legitimate reason to call the BIOS directly: speed. With TOS, though, only the BIOS provides some of the facilities which even a moderately sophisticated program will need (admittedly, often because of bugs in the upper levels of the operating system).

On the ST, a BIOS call is implemented as a TRAP instruction in 68000 machine language. All the necessary parameters, including the BIOS call number, are passed onto the stack. If you aren't quite sure what we're talking about, don't worry about it. Virtually every programming language for the ST has some way to use these routines which mask the mechanics of TOS calls. It's a good thing, too, since some of those mechanics can get pretty hairy.

The next higher component of TOS is the *XBIOS* (eXtended BIOS). XBIOS supplies the Atari-unique routines needed to do such things as access the sound registers, screen hardware, and so on.

The third component of the operating system is called *GEMDOS* Graphics Environment Manager/Disk Operating System). Actually, this is a misnomer. The GEMDOS routines have nothing whatsoever to do with graphics. GEMDOS is essentially an MS-DOS or PC-DOS emulator. Want to open a file? Read a block of bytes? Get a character from the keyboard? Given the differences between the 68000 of the ST and the 8088 of the IBM PC, the similarities between GEMDOS calls and MS-DOS calls are almost scary.

GEM, VDI, And AES

Okay, enough about the underlying operating system. Let's take a look at the graphics systems which comprise GEM. The most familiar part is the *GEM desktop* which appears when you turn on your ST. But the desktop is not really a special program at all; it simply calls the lower-level routines. Again, there are three levels of graphics routines.

The lowest-level graphics, not officially part of GEM but merely one means of implementing it, are those called the *Line-A Routines.* This sounds cryptic, but it simply refers to the fact that certain machine instructions of the 68000 (including those of the form $A*xxx* hex—hence "line-A") are reserved and cause a special hardware trap into the OS. As you might expect, routines implemented in this fashion are of the most fundamental type: draw a line, plot a point, and so forth. Most are very fast.

The next level up in graphics is the *VDI* (Virtual Device Interface). In theory, VDI is capable of supporting several types of graphics devices in a uniform fashion. For example, you might use the same set of calls to draw a curve on a plotter or on the screen. Unfortunately, no such drivers are yet available (or, as far as I can tell, even in the works) for the ST. Still, the possibility exists.

VDI does all the actual graphics work on the ST. It draws simple rectangles, bordered ovals, and text in various styles, sizes, and colors. Someone who learns nothing on the ST except how to call VDI could still do some remarkable graphics work.

Finally, at the highest level, is *AES* (Applications Environment System). AES is what GEM uses to present you with that nice, pretty desktop, complete with menus, dialog boxes, alert boxes, windows, and icons. Perhaps more important to programmers, though, is the fact that AES allows us to use all the features of GEM in a relatively consistent, properly desktop-compatible manner. It is through this mechanism that even a lowly spreadsheet program can have drop-down menus, mouse-controlled windows, and all the rest of those impressive features. ©

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Printers And Computers

Printer technology has advanced on so many fronts at once that it's hard to keep up to date. On one extreme is the continued push to ever-lower prices. The lowest-cost printers incorporate dot matrix mechanisms that either hammer ink onto paper through a ribbon, or that use thermal energy to transfer ink or induce color changes in special papers. These technologies have become so inexpensive that I recently saw a computer-controlled electronic typewriter that retailed for under $70.

Printers Smarter Than Their Computers

At the other extreme are the laser printers that combine xerographic copier technology with a computer-controlled laser beam to build up images on a photosensitive drum. The developed image is then transferred to a piece of paper at a resolution of 300 dots per inch. These printers are available at prices ranging from about $3,000 to $6,000 or so, and they often contain dedicated computers that can outperform the computer that is sending information to be printed. For example, the Apple LaserWriter (that I have connected to my Apple II as well as to my Macintosh) contains a 68000-based computer that can be programmed by the user through a Forth-like language called PostScript. The images created by this printer are exceptional in their quality.

It is interesting to note that, at both ends of the price spectrum, printers build images from an array of dots. The main difference between the extremes is in resolution, speed, and image quality. The market for various printers is sufficiently large that all kinds and prices of printers are enjoying a brisk business.

Considering the major impact that dot-matrix printer technologies have had on the personal computer industry, one wonders what will happen to the traditional printer that uses a daisy wheel or other mechanism to produce letter-quality type. These printers are still considered essential by most businesses, where low-resolution dot-matrix images are considered unacceptable. But letter-quality printers are comparatively expensive (at least the rugged ones are), and their price falls in the middle of the printer spectrum.

My concern for this technology is that it is being eroded from both ends. The low-cost printers are producing higher and higher quality images, and the laser printers are getting cheaper. Within the next few years the high-quality impact printer may become little more than a curiosity—used by people who, like me, prefer a fountain pen to a felt tip.

The difference between the dot-matrix and daisy-wheel printers is more than quality and price. The daisy-wheel printer is limited to printing text. Dot-matrix printers, on the other hand, can be used to prepare text or graphics, since both words and pictures can be formed from patterns of dots. This creative freedom of dot-matrix printers has other consequences. For example, if the resolution is high enough, text can be created in numerous styles (roman, italic, bold), type sizes, and fonts (character shapes).

Text Is Graphics

Text documents, as typesetters have known for centuries, are *graphics* documents as well. This realization is especially evident in laser printers, where the high resolution lets anyone do their own typesetting. Computer users who used to concern themselves with only spelling and grammar are now talking about *leading* (rhymes with *bedding* and refers to the blank space between lines of text), *points* (units of measurement equal to 1/72 of an inch), *intercharacter justification* (aligning columns of type), *kerning* (adjusting the spacing between two characters to be closer), *ligatures* (twin characters of type), and other terms that were rarely heard outside the walls of typesetting companies.

The most exciting aspect of low-priced laser printers is that small companies (and fortunate individuals) can be their own publishers. The economic justification for desktop publishing is easy to see. Suppose you are a software publisher who wants to create nice-looking manuals. The typesetting, proofreading, and editing of a 100-page manual can cost several thousand dollars and take several weeks. For a similar investment you can purchase a laser printer and, using documents written with your word processor, typeset the manual yourself in a day or two. The investment can pay for itself with the very first job.

You may think of the printer as a simple extension of the computer. It is far more than that—it is a tool that lets your creativity reach beyond the computer to touch others. Not a bad accomplishment for a mechanical contraption.

Dr. Thornburg's most recent product is Calliope, *a nonlinear idea processor for the Apple IIe, IIc, and Macintosh computers. He welcomes letters from readers and can be reached in care of* COMPUTE!. *He has just published* Unlocking Personal Creativity, *a book on creative problem-solving that he wrote and typeset himself using the Apple LaserWriter.* ©

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The World Inside the Computer

Fred D'Ignazio, Associate Editor

A Multimedia Workstation For Teachers

One of the most exciting trends in low-cost computing is linking computers with other devices that record, edit, and play electronic media. For example:

- A MIDI (Musical Instrument Digital Interface) box lets you plug your computer into a variety of keyboard synthesizers, drum machines, guitars, and other instruments.
- A video camera lets you shoot images from the screen of your computer to use in your video presentations.
- A video digitizer allows you to shoot video images with your camcorder or video camera and transfer them to your computer.
- A SMPTE (Society of Motion Picture and Television Engineers) interface lets you synchronize your own music and sound effects with your videotapes.
- Scanners, graphics tablets, and graphics printers let you copy graphs, maps, diagrams, and artwork into your computer so they can be manipulated, labeled, and printed on paper or transparencies for overhead projector presentations.
- Graphics-design and animation programs can be used to create artwork and titles that can be copied with your video camera and edited into video presentations.

Ideal For Schools

All these devices can be assembled into a single multimedia workstation for under $3,000. This is a sum that most schools can afford, especially since only one or two workstations would satisfy a school's needs for the immediate future.

Who would use this workstation? Teachers often feel they've been overlooked by the computer revolution because most of the software and applications are intended for their students. A multimedia workstation would be different. Its primary purpose would be to help teachers prepare audiovisual materials for their classrooms. Student use might come later, but it would stem naturally out of the teachers' enthusiasm for using the workstation and their desire to share its capabilities with students.

Until the last year or two, only a TV station or a rich corporation or an ad agency or a major rock star could afford to create multimedia programming. The rest of us had to be content with doing all our communicating live, or via the printed page or audio tape.

Now, suddenly, things are changing. Machines, software, and techniques which once cost tens of thousands of dollars are becoming available for home and school computers. We now have the opportunity to communicate in several new mediums—and combinations of mediums—including videotape, graphics, music, sound effects, and professional-looking publications.

But a big question remains: Will we make the switch? Most of us are too accustomed to being media consumers rather than producers. Also, we may have great confidence in our ability to stand up in front of a group of youngsters and communicate with them verbally or with the printed word, but we are intimidated by the thought of creating our own movie, slideshow, or graphics presentation.

You Are Steven Spielberg

It's time we started learning. Electronic media is the wave of the future. We are surrounded with powerful electronic programming produced by people who want to sell us things: perfume, a new car, records, a new political candidate. It's time that teachers generated their own programming that communicates their special passions, enthusiasms, and pet subjects.

But most of us are novices in this area. How do we get started? A good way to begin learning how to be a media producer is to become a more critical media consumer. Switch on your TV, your record player, or your cassette player, and look and listen very carefully. Try to focus just on the sound—and on your reaction to the sound. Then turn off the sound and concentrate on the picture. What kinds of camera shots and special effects is a program using? Two good sources for quick courses in media production are commercials (slick and short) and MTV (unpolished and experimental).

Now it's your turn. I would like you to tell me what you'd most like to do. Pretend for a moment that you are Steven Spielberg, and you still have a fifth-grade class to teach in Little Rock, Arkansas, or Halifax, Nova Scotia. What ideas or subjects thrill you but have been difficult to get across in traditional ways? What areas in your curriculum are crucial for children to learn but for which you lack adequate materials? What are the special pet areas that *you* love to learn or teach that you'd like to share with your kids?

Please write me (care of COMPUTE!) and tell me what you'd like to teach using a multimedia workstation and how you would present it (with videotape, music, mixture of live-action shots, computer graphics, field trips—whatever!). And don't hold back. Be imaginative, creative, even far out. I want as many ideas as possible, since I'll be publishing them in an upcoming COMPUTE! column. ©

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Programming the TI

C. Regena

Printing A Schedule Of Events

The first peripheral I got for my TI was a printer. At first I used it mainly for program listings. Later, I discovered that adding a printer significantly increased the possible applications for the computer. All kinds of reports could be generated, lists sorted, and charts and graphs plotted. For some reason, if something was printed using a computer it looked more "official." Of course, a report is really only as good as whatever the programmer or computer user enters, but using your TI and a printer, you can make very impressive reports.

On the other hand, if you don't want something to look computer-generated, you can use a letter-quality printer. When the TI-99/4 first came out, only one printer was available for it (remember the TI thermal printer?). Next came a peripheral system that required the RS-232 interface which could be used with several different brands of printers. Now there are many more printers available and several kinds of interfaces or special cables, so there is no one standard way of using a printer. There are also several word processing programs available.

Printing In BASIC

In TI BASIC programming, the most common way to print something is to use the PRINT # statement (pronounced *print file*), which means print to a file or device. First, use OPEN # (*open file*) to define the printer for the computer. The manual for the interface or printer you use should have sample OPEN statements for your particular printer. When you're finished printing, use CLOSE # (*close file*). For example, here's what I need for my TI printer:

```
100 OPEN #1:"RS232.BA=600"
```

To print a message, for example:

```
110 PRINT #1:"HELLO"
```

Then, when finished, use:

```
900 CLOSE #1
```

The critical statement is the OPEN # statement, which must be tailored to your own printer configuration. The PRINT # and CLOSE # statements can be the same for any type of printer.

This month's program illustrates the use of a printer for creating a simple schedule of events or calendar of happenings. This program just gives the basic idea of how you can sort events by date and time. For example, you could use this program to list your activities for the summer. With my large family, I need to keep a written list of what's going on. To customize this program, add your own title and change the printing to fit your needs. The program as is simply lists the dates, times, and events in single spacing, but all kinds of special formats are possible, including a full, graphic calendar.

How It Works

The events are listed in DATA statements. For examples, I have used several events in lines 1240–1480. The last DATA statement should use 9999 for the date. The data for each event consists of the date, the time, and a description of the event. The date is a four-digit string. The first two numbers range from 01 to 12, representing the month. The last two numbers are the day of the month (01–31). The time is also a four-digit string. This is a number expressed as 24-hour time without a colon between the hours and minutes. Thus, 0800 is eight o'clock in the morning, and 1200 is twelve o'clock noon. Eight o'clock in the evening expressed in 24-hour time is 2000. For no specified time, use 0000.

This format helps in the sorting procedure. You may prefer to enter the data in a different way, then let the program convert to numbers for sorting. The numbers are converted to months, days, hours, and minutes during the printing procedure.

Lines 110–120 dimension variables DT$ (date and time) and EVENT$ for 50 events starting with base 1. M$ is dimensioned and will hold the names of the 12 months. Lines 200–240 define these month names in the M$ array.

The variable E is the number of an event. Line 270 READs from the data the date, time, and event. Line 280 checks to see whether all the data has been read. Line 300 increments E; then line 310 makes sure E is less than 51 for the subscript.

Lines 330–640 sort the events by date and time. I call this type of sort "maximum-minimum" because the first pass through the data finds the maximum and minimum items in the array and places them at the end points. Successive passes through the items move the ends inward and place the maximums and minimums at those positions.

Lines 740–1190 print the events in date order. Remember to put your own printer configuration in the OPEN statement in line 760. The variable DT$ is divided back into DATE$ and TIME$. The date is then separated so that a month name is printed with the day. The time is converted to the usual written format of hour:minute, and A.M., NOON, or P.M. is added.

If you don't have a printer, you can simply print the schedule on the screen. To control scrolling, PR is used as a variable to count how many lines have been printed on the screen. When the printing stops, press the space bar to continue the list. At the end of the list, press the space bar to get back to the menu screen.

If you wish to save typing effort, you can receive a copy of this program ("TI Calendar") by sending

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a blank cassette or disk, a stamped, self-addressed mailer, and $3 to:

C. Regena
P.O. Box 1502
Cedar City, UT 84720

TI Calendar

```
100 REM  CALENDAR
110 OPTION BASE 1
120 DIM DT$(50),EVENT$(50)
130 DIM M$(12)
140 CALL CLEAR
150 PRINT TAB(6);"** CALEND
    AR **"
160 PRINT :::"ENTER DATES A
    ND EVENTS IN"
170 PRINT :"DATA STATEMENTS
    ."
180 PRINT ::"YOU MAY PRINT
    THE CALENDAR"
190 PRINT ::"ON THE SCREEN
    OR PRINTER.":::
200 FOR M=1 TO 12
210 READ M$(M)
220 NEXT M
230 DATA JAN,FEB,MAR,APR,MA
    Y,JUN
240 DATA JUL,AUG,SEP,OCT,NO
    V,DEC
250 PRINT "...READING DATA.
    .."
260 E=1
270 READ DATE$,TIME$,EVENT$
    (E)
280 IF DATE$="9999" THEN 32
    0
290 DT$(E)=DATE$&TIME$
300 E=E+1
310 IF E<51 THEN 270
320 E=E-1
330 PRINT :"...SORTING..."
340 N=E
350 S=1
360 MN$=DT$(S)
370 IMIN=S
380 MX$=MN$
390 IMAX=S
400 FOR I=S TO N
410 IF DT$(I)<=MX$ THEN 440
420 MX$=DT$(I)
430 IMAX=I
440 IF DT$(I)>=MN$ THEN 470
450 MN$=DT$(I)
460 IMIN=I
470 NEXT I
480 IF IMIN<>N THEN 500
490 IMIN=IMAX
500 AA$=DT$(N)
510 BB$=EVENT$(N)
520 DT$(N)=DT$(IMAX)
530 EVENT$(N)=EVENT$(IMAX)
540 DT$(IMAX)=AA$
550 EVENT$(IMAX)=BB$
560 N=N-1
570 AA$=DT$(S)
580 BB$=EVENT$(S)
590 DT$(S)=DT$(IMIN)
600 EVENT$(S)=EVENT$(IMIN)
610 DT$(IMIN)=AA$
620 EVENT$(IMIN)=BB$
630 S=S+1
640 IF N>S THEN 360
650 PRINT :::"CHOOSE:"
660 PRINT :"1 PRINT ON SCRE
    EN"
670 PRINT :"2 PRINT ON PRIN
    TER"
680 PRINT :"3 END PROGRAM"
690 CALL KEY(0,K,S)
700 K=K-48
710 IF (K<1)+(K>3)THEN 690
720 CALL CLEAR
730 ON K GOTO 770,760,1490
740 REM  PRINTING
750 REM  PUT PRINTER CONFIG
    URATION HERE
760 OPEN #1:"RS232.BA=600"
770 FOR T=1 TO E
780 DATE$=SEG$(DT$(T),1,4)
790 M=VAL(SEG$(DATE$,1,2))
800 MON$=M$(M)
810 DAY$=MON$&" "&SEG$(DATE
    $,3,2)
820 TIME$=SEG$(DT$(T),5,4)
830 IF TIME$<>"0000" THEN 8
    70
840 TIME$="      "
850 T$="    "
860 GOTO 1000
870 H=VAL(SEG$(TIME$,1,2))
880 IF H>=12 THEN 910
890 T$="A.M."
900 GOTO 970
910 IF H<>12 THEN 950
920 IF SEG$(TIME$,3,2)<>"00
    " THEN 960
930 T$="NOON"
940 GOTO 970
950 H=H-12
960 T$="P.M."
970 TIME$=STR$(H)&":"&SEG$(
    TIME$,3,2)
980 IF LEN(TIME$)>4 THEN 10
    00
990 TIME$=" "&TIME$
1000 TT$=TIME$&" "&T$
1010 IF K=2 THEN 1110
1020 PRINT :DAY$;"   ";TT$
1030 PRINT "  ";EVENT$(T)
1040 PR=PR+3
1050 IF PR<24 THEN 1120
1060 IF T=E THEN 1120
1070 CALL KEY(0,K,S)
1080 IF S<1 THEN 1070
1090 PR=0
1100 GOTO 1120
1110 PRINT #1:DAY$;"  ";TT$
     ;"    ";EVENT$(T)
1120 NEXT T
1130 PR=0
1140 IF K<>2 THEN 1170
1150 CLOSE #1
1160 GOTO 650
1170 CALL KEY(0,K,S)
1180 IF S<1 THEN 1170
1190 GOTO 650
1200 REM  DATA FOR EVENTS
1210 REM  DATE,TIME,EVENT
1220 REM  DATE IS MMDD
1230 REM  TIME IS HHMM
1240 DATA 0415,0000,CINDY'S
     BIRTHDAY
1250 DATA 0415,1700,MAIL IN
     COME TAX
1260 DATA 0509,0000,RICHARD
     'S BIRTHDAY
1270 DATA 0510,0000,BOB'S B
     IRTHDAY
1280 DATA 0611,0000,CHAN'S
     BIRTHDAY
1290 DATA 0304,1200,SUSC VS
     BYU BASEBALL
1300 DATA 0305,1200,SUSC VS
     BYU BASEBALL
1310 DATA 0314,1300,SUSC VS
     UTAH BASEBALL
1320 DATA 0315,1300,SUSC VS
     UTAH BASEBALL
1330 DATA 0328,1300,SUSC VS
     MESA BASEBALL
1340 DATA 0329,1230,SUSC VS
     MESA BASEBALL
1350 DATA 0429,1300,SUSC BA
     SEBALL
1360 DATA 0430,1300,SUSC BA
     SEBALL
1370 DATA 0314,0715,SKI CLU
     B--RICK
1380 DATA 0225,0000,CINDY S
     KIING
1390 DATA 0328,1500,CHERY P
     ARTY
1400 DATA 0222,1930,SUSC BA
     SKETBALL
1410 DATA 0303,2000,SYMPHON
     Y
1420 DATA 0330,0000,EASTER
1430 DATA 0526,0000,MEMORIA
     L DAY
1440 DATA 0607,0000,COMMENC
     EMENT
1450 DATA 0704,0000,INDEPEN
     DENCE DAY
1460 DATA 0724,0000,PIONEER
     DAY
1470 DATA 0710,1000,SHAKESP
     EARE FESTIVAL
1480 DATA 9999,0000,ZZZ
1490 END                    ©
```

Attention Programmers

COMPUTE! magazine is currently looking for quality articles on Commodore, Atari, Apple, and IBM computers (including the Commodore Amiga and Atari ST). If you have an interesting home application, educational program, programming utility, or game, submit it to COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Or write for a copy of our "Writer's Guidelines."

≡CAPUTE!≡

IBM Variable Snapshot

In line 1760 of this utility from the April issue (p. 81), the = before the value 65536! should instead be −.

Apple Switchbox

The + symbol in line 346 of this game from the March issue (p. 47) should instead be =. ©

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INSIGHT: Atari

Bill Wilkinson

Atari Printer Trivia

This month's COMPUTE! is a printer issue, so I decided to break with (my) tradition and write a column on printers. Before we start, though, an erratum: My April column listed a program designed to "unify" a machine language file on disk. But when I sent the column to COMPUTE!, I accidentally included a couple of older versions of the program on the same disk. Guess which version got published? Anyway, COMPUTE! listed a corrected version in the article entitled "Custom Characters for Atari *SpeedScript*" in the May issue. (By coincidence, it happens that my program is needed to unify the COMPUTE! DISK version of *SpeedScript* before installing a custom character set.) On to the printers.

Number, Please

John Skruch at Atari gets credit for revealing this first tidbit. You are all aware that disk drives can be assigned device numbers (from D1: to D8:, though Atari drives can only go to D4:), but did you know that printers can have numbers, also? If you have an 800XL, 65XE, or 130XE, you may connect two or more printers at the same time and direct output to one or the other. From BASIC, for example, it's as simple as typing

```
LIST "P2:"
```

or

```
LIST "P5:"
```

Two major drawbacks: all printers still respond as P1:, so using P1: or just P: when two printers are attached leads to humorous and/or disastrous results. Since many programs always address printers as P:, this trick may be useful only in your own programs. Also, only the following printers have these secondary numbers:

Printer	Secondary Number
850	P2:
1025	P3:
1020	P4:
1027	P5:
1029	P6:

(The 850 refers to *any* printer attached via an 850 Interface Module. The 1029 printer is rare in the U.S.)

The fact that the 850 can handle different printer numbers indicates that provision for this feature was included as far back as 1979 (when the 850 was first made). Do you wonder why nothing was said sooner? Why don't the 400, 800, and 1200XL work with multiple printers? Do any other interface modules (from third-party vendors) have secondary device numbers? A prize for the best answer.

The Nine-Minute Nap

If you have a 1027 printer which is not lucky enough to be hooked up to an XE computer, you've probably experienced the infamous sleeping printer bug. Sometimes the 1027 just suddenly stops printing. Many people believe they need to reboot their system to wake the printer up. Actually, after about nine minutes, the printer just as suddenly springs to life again. The reasons for this are too strange and lengthy to go into here. Suffice it to say that the problem has existed since the first Atari computer was built and is related to the (also infamous) sleeping disk drive phenomenon—though the drive only sleeps about five seconds. You'll be pleased to know that Atari's newest operating system ROMs in the XE computers finally fix the problem.

If you do have a 1027, but don't have an XE, and still want to fix this problem, type in, save, and run the accompanying program. It automatically seeks out the LOMEM value for your system and then creates an AUTORUN.SYS file to patch the timeout problem. The AUTORUN.SYS file will load at that LOMEM point and then move LOMEM above itself. Since it reads the current LOMEM, be sure to create the AUTORUN.SYS file on the same disk, *booted in the same fashion*, that you later want to use. This means, for example, that any special drivers (RAM disk, RS-232, and so on) must be installed before you run this BASIC program.

For a more specific example, let's say you intend to use the 850's R: driver with *AtariWriter* and the 1027. You must start by booting the 850's AUTORUN.SYS file to install the R: driver in memory, *then* run the program below.

Also, if you have true double-density drives (not "enhanced density" 1050s), boot with double-density disks inserted. This patch should work with almost any DOS, such as DOS XL, SpartaDOS, DOS 2.5, or whatever—but I wasn't able to test them all.

Two final points: If an AUTORUN.SYS file already exists on the disk when this program is run, the 1027 patch is appended to that file. Again, using the 850 as an example, this means you'll have a single file which serves two purposes: It boots the R: driver and makes the 1027 patch. Finally, line 170 of the listing is a REMark; if you delete the REM to enable this line, it reserves two pages (512 bytes) of extra memory. If you have any trouble running this patch, try deleting the REM. For instance, if your system has more than one disk drive, you might want to make this change.

Obviously, I did not develop this program by arbitrarily typing in funny numbers for my DATA statements. I started with a program written by Joe Miller (formerly of Atari), then fixed it so that it survives SYSTEM RESET, is relocatable, moves LOMEM if appropriate, and does not install itself twice. If you're interested in studying the source code for this

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program, you can download it from CompuServe. Look in the Atari eight-bit SIG's DL (DownLoad) section under utilities. The filename is P1027.FIX, and it's a document (ASCII) file.

1027 Printer Timeout Fixer

```
DD 140 REM first, find where
       LOMEM is now
KA 150 LOPAGE=PEEK(744)
BM 160 IF PEEK(743)<>0 THEN
       LOPAGE=LOPAGE+1
NJ 170 REM (see text) LOPAGE
       =LOPAGE+2
DB 180 MODE=8:TRAP 200
PM 190 OPEN #3,4,0,"D:AUTORU
       N.SYS":MODE=9
FO 200 CLOSE #3
GB 210 OPEN #3,MODE,0,"D2:AU
       TOTEST"
FE 220 IF MODE=8 THEN PUT #3
       ,255:PUT #3,255
DO 230 READ BYTE:IF BYTE<-1
       THEN 300
EM 240 IF BYTE=-1 THEN BYTE=
       LOPAGE
EO 250 PUT #3,BYTE:GOTO 230
BK 290 REM (all data in file
       )
FP 300 CLOSE #3
GL 310 END
JD 890 DATA 0,-1,80,-1
CC 900 DATA 165,49,208,19,10
       4,133,49,140
HD 910 DATA 81,-1,160,1,24,1
       77,50,101
FD 920 DATA 49,105,0,72,172,
       81,-1,76
DJ 930 DATA 80,-1,8,120,162,
       0,160,-1
BG 940 DATA 236,12,2,208,5,2
       04,13,2
HF 950 DATA 240,18,173,12,2,
       141,24,-1
HD 960 DATA 173,13,2,141,25,
       -1,142,12
NK 970 DATA 2,140,13,2,40,32
       ,80,-1
KH 980 DATA 160,-1,204,232,2
       ,144,9,200
HM 990 DATA 140,232,2,169,0,
       141,231,2
EK 1000 DATA 96
NA 1005 DATA 0,64,35,64
AL 1010 DATA 169,-1,205,232,
       2,144,28,208
HD 1020 DATA 5,173,231,2,208
       ,21,32,26
ML 1030 DATA -1,165,12,141,6
       2,-1,165,13
BC 1040 DATA 141,63,-1,169,2
       6,133,12,169
CM 1050 DATA -1,133,13,96
PA 1060 DATA 226,2,227,2,0,6
       4
PD 1070 DATA -9999
```

©

News & Products

New Electronic Arts Software

Electronic Arts has announced distribution of three new personal computer software packages.

Mind Mirror is a mental awareness program designed by Dr. Timothy Leary that lets you test your stereotypes by responding to various situations through the eyes of your chosen subject. You can rate any subject you like and react to various situations based on your preconceptions about the subject. This philosopher-on-a-disk is designed to let you learn about other people as well as yourself. *Mind Mirror* is available for the IBM PC, PCjr, and compatibles, the Apple II, and the Commodore 64. Suggested retail price for the IBM version is $34.95. Prices for the other versions will be available by the time you read this.

A new conquer-the-world strategy game, *Lords of Conquest*, is based on the board game *Risk*. The object of this game is to protect your holdings while trying to conquer territories belonging to your opponents. There are four levels of game complexity and an unlimited variety of game maps. *Lords of Conquest* is available for the Commodore 64 and 128 and Atari XL series for $32.95 each.

Super BoulderDash consists of the original popular arcade-style game, *BoulderDash*, and its sequel *BoulderDash II*. Both are strategic action games in which you must maneuver the hero, Rockford, through a series of caves to collect diamonds while avoiding fireflies, butterflies, and falling boulders. *BoulderDash II* adds sixteen new caves, each with five play levels. Versions are available for the Atari 400/800 and Commodore 64/128 at a suggested retail price of $22.95, and $29.95 for the Apple II and IBM PC and PCjr versions.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404.

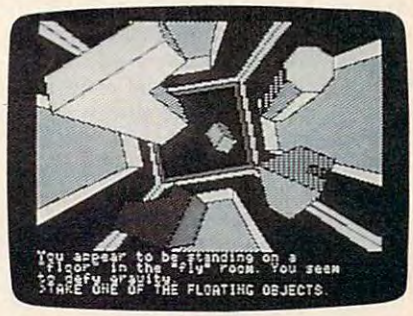
Circle Reader Service Number 200.

Commodore 64 Power Supply

The Commodore 64 Power Plus from Computer Specialties is a single AC-switched power supply with built-in surge protection. It has one on/off control and three grounded outlets to control your disk drive, monitor, and printer. It offers protection for DC power short circuits, over-current, over-temperature, surge, AC fuse, and over-voltage situations. Suggested retail price is $59.95.

Computer Specialties, Inc., P.O. Box 1718, Melbourne, FL 32902-1718.

Circle Reader Service Number 201.



Oo-Topos *from Penguin Software, a new graphics-and-text adventure game.*

Space Adventures

Your mission is to intercept a power transfusion waste spill before it destroys the earth. However, first you must escape your captors and the planetoid, Oo-Topos. That's the plot of the new adventure game *Oo-Topos* from Polarware. It's available for the Apple II and Commodore 64/128 computers at a suggested retail price of $34.95, and on the Atari ST, Macintosh, Amiga, and IBM PC and compatibles for $39.95.

Polarware, Penguin Software, 2600 Keslinger Rd., P.O. Box 311, Geneva, IL 60134.

Circle Reader Service Number 202.

www.commodore.ca

Commodore Machine Language Programming

The Machine Shop is a machine language development system for the Commodore 64/128, an upgraded version of French Silk's *Develop-64* (version 4.6). It includes an integrated macro assembler, a full-screen editor, a symbolic decoder, and a debugger. All are in memory simultaneously. The system is reportedly three times faster than the popular *PAL* assembler, according to the manufacturer.

The Machine Shop from FS! Software costs $39.95, which includes an instruction manual and a free subscription to *Machine Code*, a machine language programmer's journal.

FS! Software, P.O. Box 635, Faribault, MN 55021.

Circle Reader Service Number 203.

Win A Trip To Australia

Mindscape is offering a trip to Australia for the 1987 America's Cup race as the grand prize in *The American Challenge: A Sailing Simulation* software competition. Eight finalists will each win a modem, and then compete against each other to win a trip to Perth, Australia.

The American Challenge: A Sailing Simulation is a new skill game from Mindscape that puts you onboard a racing sailboat to sail seven increasingly challenging courses until you reach the eighth course, the America's Cup race. You control sail, rudder, and centerboard while the instrument panel monitors wind speed, wind direction, and boat heading. For rookie sailors, a recorded sailing tutorial is included.

The American Challenge: A Sailing Simulation is availble for Apple II and IBM PC computers at a suggested retail price of $39.95.

Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062.

Circle Reader Service Number 204.

Amiga Users Group

The North American Amiga Users Group (NAAUG) is a national user organization for Amiga owners. Membership includes a subscription to the newsletter *AmigaHelp*, a helpline for free one-to-one computer advice, one free disk of public domain software, and full access to the group's public domain library, participation in the *NAAUG* co-op, and free classified ads to other members. The organization is also working toward an online Special Interest Group (SIG).

The annual membership fee is $25.

North American Amiga Users Group, Box 376, Lemont, PA 16851.

Circle Reader Service Number 205.

IBM Computer Golf

Mean 18 is a one-to-four player golf simulator game for the IBM PC/XT/AT or PCjr with 256K memory, DOS 2.1 or higher, and a color graphics adapter. It includes four graphically detailed courses, 72 different holes, a golf course architect set, and a variety of strategy and play options. The player can choose among practice tee, practice green, practice hole, and begin game options to perfect his game-playing abilities. A joystick controller is not required, although a mouse or joystick may be used.

Suggested retail price is $49.95.

Accolade, 20863 Stevens Creek Blvd., Cupertino, CA 95014.

Circle Reader Service Number 206.

New *Mastertype* Programs

Scarborough Systems has introduced Amiga and enhanced IBM versions of *Mastertype*, educational software that teaches users typing and keyboard skills. The Amiga version includes lessons on numbers, symbols, the numeric keypad, a skill test, rhythm instruction, sentence typing practice, finger positioning charts, and the *Mastertype* game. The IBM version has been upgraded to include all the features of the new Amiga version.

The Amiga and IBM versions are available for $39.95 each.

Scarborough Systems, 55 S. Broadway, Tarrytown, New York 10591.

Circle Reader Service Number 207.

Atari ST Drawing Progam

Easy-Draw from Migraph is an object-oriented drawing program for the Atari ST with a monochrome or color monitor system and the operating system in ROM. It can be used to create business graphics, presentation materials, line drawings, multiple-layer illustrations and to move objects. The program uses the GEM interface, includes standard GEM onscreen proportional text fonts, and uses high-resolution output for printing.

Suggested retial price is $149.95.

Migraph, Inc., 720 S. 333rd St., Suite 201, Federal Way, WA 98003.

Circle Reader Service Number 208.

64/128 Musical Sight Reading

MasterSoft has released *Singing Master*, a program in the company's Mastery in Music series for the Commodore 64 and 128 computers. *Singing Master* helps you learn to sight read through individualized exercises in pitch and interval awareness, notes, rhythm, and basic music facts. The program includes scales, thirds, and intervals in every major key, as well as chord analysis. There is a printer option as well.

Suggested retail price is $49.95.

MasterSoft, P.O. Box 1027, Bend, OR 97709.

Circle Reader Service Number 209.

Mystery And *Intrigue!*

Kinemation has announced a new computer mystery game, *Intrigue!*, for the Apple II and Commodore 64 computers. The action takes place in Washington, D.C., where you talk with an assortment of characters to determine who is telling the truth and who can be trusted as well as who is guilty. There are more than 2000 possible solutions and three experience levels for ages 12 to adult.

Retail price is $39.95.

Kinemation, Four Winds Rd., P.O. Box 3076, Peterborough, NH 03458-3076.

Circle Reader Service Number 210.

Scrabble En Francais

Gessler Educational Software has developed a new software program which helps you learn French while having fun. *French Micro Scrabble* is based on the board game *Scrabble* and contains a built-in vocabulary of 20,000 French words. Up to four people can play, or you can play against the computer. There are four different skill levels.

French Micro Scrabble is available for the Commodore 64/128 and Apple II+, IIe, and IIc computers for $39.95.

Gessler Educational Software, 900 Broadway, New York, NY 10003.

Circle Reader Service Number 211.

Utility Program For The Commodore 64

Disk Assistant from Spectrum 1 Network is a Commodore 64 utility program that simplifies disk commands with fifteen menu-driven disk options. Among those included are disk format, validate, erase, and rename. Other features include a help file, flexibility in accessing dual drives, copying on single as well as dual drives, and sequential data file copying.

Disk Assistant sells for $11.95.

Spectrum 1 Network, 9161 Beachy Ave., Arleta, CA 91331.

Circle Reader Service Number 212.

More Games From Mindscape

Mindscape has released three more software packages for the Commodore 64 and 128. In *Infiltrator*, your mission

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is to fly through hostile enemy airspace and reach strategic targets designed to destroy the Mad Leader's military force. This adventure game combines helicopter flight simulation and military ground action.

In order to win *Spell of Destruction*, you must enter the Castle of Illusions, find the Prime Elemental, and destroy it with a single spell. This game features over 70 locations with scrolling 3-D graphics and music.

Three separate games—*Brian Bloodaxe*, *Revelation*, and *QuoVadis*—are combined on one disk. With *Brian Bloodaxe* you can invade Britain and seek the crown jewels. In *Revelation* you battle the Monster of the Apocalypse, or you can fight the Dark Lord in *QuoVadis*. All three are combination strategy-arcade games.

The suggested retail price for *Infiltrator* and *Spell of Destruction* is $29.95 each. The price for the three-game disk is $14.95.

Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062.

Circle Reader Service Number 213.

ST Mind Game

Brøderbund has released an Atari ST version of Synapse's *Mindwheel*, a science fiction text adventure game that features a vocabulary of 1,200 to 1,500 words. The game is a time journey through the minds of four people—a peace activist rock star, a monstrous dictator, a heroic poet, and a gifted scientist. The action takes place in real time, and the goal is to retrieve the Wheel of Wisdom.

Mindwheel is available for the Atari 520ST for $44.95. Versions are also available for the IBM PC/PCjr, Apple II, and Macintosh computers for $44.95 each, and for the Commodore 64/128 and Atari 400/800/XL/XE computers for $39.95.

Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903-2101.

Circle Reader Service Number 214.

Educational Software From MECC

Minnesota Educational Computing Corporation (MECC) has announced two new learning programs. In *Number Munchers*, students move a number muncher around to devour number expressions that match a value displayed on the screen, while avoiding the predatory "troggles". There are five different versions of this game on the disk. For grades four to eight.

MECC Dataquest: The Fifty States teaches students to form questions about the fifty states, look for answers in a database with a menu-driven search program, and formulate hypotheses by using the search results. For grades five to eleven.

Both packages are designed for Apple II computers with at least 64K memory, and are priced at $49 each.

Minnesota Educational Computing Corporation, 3490 Lexington Ave. N., Saint Paul, MN 55126-8097.

Circle Reader Service Number 215.

Computer Baseball

With *Monday Morning Manager, The Baseball Game* you can play any major league baseball team against any other team. The 1986 revised version includes 64 major league teams from 1905 through the 1985 playoff teams with over 1,500 players and pitchers. The results of each play are based upon the actual statistics of the players, and each play is graphically displayed on your screen.

Monday Morning Manager is available on the Atari 800 and Commodore 64 for $39.95, on the Apple II for $44.95, and on the Atari 520ST and IBM PC for $50.

TK Computer Products, P.O. Box 9617, Downers Grove, IL 60515; distributed by Computer Software Service, 495A Busse Rd., Elk Grove Village, IL 60007.

Circle Reader Service Number 216.

Atari ST Backgammon

Hippopotamus Software has introduced *HippoBackgammon*, a programmable backgammon game which teaches artificial intelligence theory. *HippoBackgammon* allows users to modify the artificial intelligence of the game's built-in opponents to test strategies and playing styles. The strategy is based on statistics which predict the probability of winning with certain moves. There are three levels for novice, intermediate, or expert play. The game works on the Atari ST with either color or black and white monitor.

Retail price is $39.95.

Hippopotamus Software, Inc., 985 University Ave., Suite #12, Los Gatos, CA 95030.

Circle Reader Service Number 217.

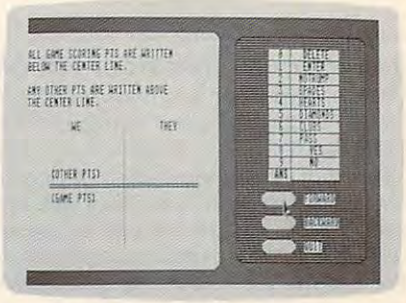
Graphics Strategy Game

Infocom has released *Fooblitzky*, a multiplayer, computer graphics strategy game. The object of the game is to find the four secret items in the city of Fooblitzky. The challenge is that you are a *cool canine* and the four secret objects change every time you play the game. Each package contains a disk, four workboards, four markers, and two sets of rules.

Fooblitzky is available for the Atari XL/XE computers with 48K RAM and 810 or 1050 disk drive, the Apple II series with 128K, or the IBM PC with 128K and graphics card. Each version retails for $39.95, and can be used with joystick or keyboard.

Infocom, Inc., 125 CambridgePark Dr., Cambridge, MA 02140.

Circle Reader Service Number 218.



Compubridge, *a bridge tutorial for the Atari 520ST and 1040ST from Artworx.*

Bridge Tutorial For ST Computers

Artworx has begun shipping *Compubridge* for the Atari 520 and 1040 ST.

Based on the bridge text, *Contract Bridge, Five-Card Major Approach*, by Silverman, Jais and Lebel, the program consists of ten chapters covering all aspects of the game from the basics to the game's more sophisticated points. Eight of the chapters close with brief quizzes that test your knowledge. Each quiz is randomly generated, which may be especially helpful for the advanced player interested in fine-tuning his or her game. All user input is through the ST's mouse; no keyboard entry is required.

Suggested retail price of *Compubridge* is $29.95.

Artworx Software Company, Inc., 150 N. Main St., Fairport, NY 14450.

Circle Reader Service Number 219.

Commodore, Apple II Educational Software

Balance! is an interactive program that teaches students about solving equations. By working with graphically displayed linear equations on a "balance beam," students can literally see the equation-solving process, and better understand it. It's aimed at beginning algebra students, advanced students who want to review the basics, and parents and teachers looking for more effective ways of teaching basic math concepts.

Developed at the New York Institute of Technology, the program strives

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to teach what an equation is and how it works; understand that a solution is a unique value which, when inserted in the equation, causes its two sides to be equal; and to develop a strategy, or algorithm, for solving equations and to understand how and why the algorithm works.

Available for Apple II and Commodore 64, *Balance!* retails for $49.

HRM Software, 175 Tompkins Ave., Pleasantville, NY 10570.

Circle Reader Service Number 220.

SpeedScript Enhancer For 64

Upstart Publishing has released *SpeedMate*, a customization program for COMPUTE! Publications' *SpeedScript 3.0–3.2* for the Commodore 64. *SpeedMate* lets you control the way text appears on the screen while editing. It also customizes the control commands for *Preview 80*, an 80-column *SpeedScript* page preview program. (*SpeedScript* and *Preview 80* are not included with *SpeedMate*, but are available from COMPUTE! Publications.) *SpeedMate* also includes an optional print preview routine which displays 80 columns of text with no horizontal scrolling.

SpeedMate is available for $15.

Upstart Publishing, Dept. NPMC, P.O. Box 22022, Greensboro, NC 27420.

Circle Reader Service Number 221.

IBM Graphics Software For Daisywheel Printers

Daisyfont, from Einstein's Automation Profiles is a program that provides dot-matrix design and print capabilities for all daisywheel printers and spinwriters with IBM PC computers. No hardware modifications are necessary.

Daisyfont resides in memory, and can be called up from within any other application software. The program lets you design and print logos, letterheads, report headlines, borders, special fonts, and custom character sets. Suggested retail price is $69.95.

Einstein's Automation Profiles, Inc., 184 2nd Ave., #1B, New York, NY 10003.

Circle Reader Service Number 222.

Commodore, Apple II Integrated Software

Software Resource Group has begun shipping *Brown Bag Software*, an inexpensive integrated word processor/database manager for the Commodore 64 and Apple II (both versions are on flip sides of the same disk). This program lets you incorporate information from your databases into letters and reports easily and quickly. Up to 20 of these merges can be done within any one document.

Editing features of the word processor include global search and replace, headers, trailers, footers, and delete by character, word, line, and paragraph. The database manager allows you to create your own templates or use the ones provided.

Brown Bag Software retails for $59.95.

Software Resource Group, Inc., 15100 El Camino Grande, Saratoga, CA 95070.

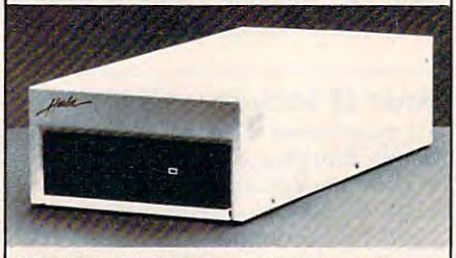
Circle Reader Service Number 223.

Accelerating The Apple

A new high-speed replacement coprocessor from Titan Technologies can triple the speed of your Apple II, IIe, or II+. Called the Accelerator IIe, it has its own 6502 processor and plugs into any slot. It can be used to increase the speed of *AppleWorks, Apple Writer, FlashCalc, Multiplan*, and other business applications. If you need to run a program at normal speed, you can slow the Accelerator IIe down with your preboot disk. Suggested retail price, $319.

Titan Technologies, Inc., 310 West Ann St., Ann Arbor, MI 48104-1337.

Circle Reader Service Number 224.



The HabaDisk ten-megabyte hard disk drive for the Atari ST sells for $699.95

Haba Hard Drive For ST

Haba/Arrays has announced an external ten-megabyte hard disk drive for the Atari ST, priced at $699.95. The HabaDisk is a plug-in disk and stores the equivalent of more than twelve dual-sided 800K disks. Transfer rate is five megabytes a second.

The drive is self-powered, and an Atari interface cable is included.

Haba/Arrays, Inc., 6711 Valjean Ave., Van Nuys, CA 91406.

Circle Reader Service Number 225.

Mac Digitized Images On A Disk

RealArt, from Electronic Cottage Industries, is a disk for the Macintosh that contains just under 400K of digitized artwork. You can preview the artwork by running the public domain slide show, and then look more closely at your favorites. Then shrink, move, cut, or copy and print out the desired images for use in letterhead stationery, note paper, drawing education, or framed display.

RealArt retails for $29.95.

Electronic Cottage Industries, P.O. Box 217, Spooner, WI 54801.

Circle Reader Service Number 226.

Vietnam Strategy Game

MicroProse Software has introduced *Conflict In Vietnam*, a strategic simulation of the crucial battles of the Vietnam War, available for the Commodore 64 and 128, Atari XL/XE series, Apple II family, and IBM PCjr computers.

Five separate games are included in the program, with scenarios ranging from the end of French rule at Dien Bien Phu in 1954 to the North Vietnamese assault on Quang Tri in 1972. The three battles in between illustrate various stages of American involvement: Ia Drang (1965), Khe Sanh (1968), and Cambodia (1970). The scenarios can be played independently or in historical order. Commands can be entered by joystick or from the keyboard.

A 110-page manual is included, with quick-start instructions, detailed information for advanced play, extensive historical background, design notes, play tips, maps, and charts. Two people can play each other, or one person can play against the computer. There is an option to take command of the North Vietnamese side and play against the computer-controlled American forces.

The suggested retail price is $39.95 for each version.

Microprose Software, Inc., 120 Lakefront Dr., Hunt Valley, MD 21030.

Circle Reader Service Number 227.

ST Database

Mirage Concepts has introduced *H & D Base*, a relational database management language for the Atari ST computers. The program is a *dBase II* work-alike with almost 300 commands available for the manipulation of data. In addition to regular data storage and retrieval, *H & D Base* can be used for the creation of systems for handling inventories, accounts payable and receivable, client lists, and more.

The suggested retail price is $99.95, and the program is not copy protected.

Mirage Concepts, Inc., 4055 W. Shaw #108, Fresno, CA 93711.

Circle Reader Service Number 228.

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COMPUTE!'s Guide To Typing In Programs

Computers are precise—type the program *exactly* as listed, including necessary punctuation and symbols, except for special characters noted below. We have provided a special listing convention as well as a program to check your typing—"The Automatic Proofreader."

Programs for the IBM, TI-99/4A, and Atari ST models should be typed exactly as listed; no special characters are used. Programs for Commodore, Apple, and Atari 400/800/XL/XE computers may contain some hard-to-read special characters, so we have a listing system that indicates these control characters. You will find these Commodore and Atari characters in curly braces; *do not type the braces.* For example, {CLEAR} or {CLR} instructs you to insert the symbol which clears the screen on the Atari or Commodore machines. A complete list of these symbols is shown in the tables below. For Commodore, Apple, and Atari, a single symbol by itself within curly braces is usually a control key or graphics key. If you see {A}, hold down the CONTROL key and press A. This will produce a reverse video character on the Commodore (in quote mode), a graphics character on the Atari, and an invisible control character on the Apple.

Graphics characters entered with the Commodore logo key are enclosed in a special bracket: [<A>]. In this case, you would hold down the Commodore logo key as you type A. Our Commodore listings are in uppercase, so shifted symbols are underlined. A graphics heart symbol (SHIFT-S) would be listed as S. One exception is {SHIFT-SPACE}. When you see this, hold down SHIFT and press the space bar. If a number precedes a symbol, such as {5 RIGHT}, {6 S}, or [<8 Q>], you would enter five cursor rights, six shifted S's, or eight Commodore-Q's. On the Atari, inverse characters (white on black) should be entered with the inverse video

Atari 400/800/XL/XE

When you see	Type	See
{CLEAR}	ESC SHIFT <	Clear Screen
{UP}	ESC CTRL -	Cursor Up
{DOWN}	ESC CTRL =	Cursor Down
{LEFT}	ESC CTRL +	Cursor Left
{RIGHT}	ESC CTRL *	Cursor Right
{BACK S}	ESC DELETE	Backspace
{DELETE}	ESC CTRL DELETE	Delete character
{INSERT}	ESC CTRL INSERT	Insert character
{DEL LINE}	ESC SHIFT DELETE	Delete line
{INS LINE}	ESC SHIFT INSERT	Insert line
{TAB}	ESC TAB	TAB key
{CLR TAB}	ESC CTRL TAB	Clear tab
{SET TAB}	ESC SHIFT TAB	Set tab stop
{BELL}	ESC CTRL 2	Ring buzzer
{ESC}	ESC ESC	ESCape key

Commodore PET/CBM/VIC/64/128/16/+4

When You Read:	Press:	See:
{CLR}	SHIFT + CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT + ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT + ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL 9	
{OFF}	CTRL 0	
{BLK}	CTRL 1	
{WHT}	CTRL 2	
{RED}	CTRL 3	
{CYN}	CTRL 4	
{PUR}	CTRL 5	
{GRN}	CTRL 6	
{BLU}	CTRL 7	
{YEL}	CTRL 8	

When You Read:	Press:	See:
[<1>]	COMMODORE 1	
[<2>]	COMMODORE 2	
[<3>]	COMMODORE 3	
[<4>]	COMMODORE 4	
[<5>]	COMMODORE 5	
[<6>]	COMMODORE 6	
[<7>]	COMMODORE 7	
[<8>]	COMMODORE 8	
{ F1 }	f1	
{ F2 }	SHIFT f1	
{ F3 }	f3	
{ F4 }	SHIFT f3	
{ F5 }	f5	
{ F6 }	SHIFT f5	
{ F7 }	f7	
{ F8 }	SHIFT f7	
←	←	

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key (Atari logo key on 400/800 models).

Whenever more than two spaces appear in a row, they are listed in a special format. For example, {6 SPACES} means press the space bar six times. Our Commodore listings never leave a single space at the end of a line, instead moving it to the next printed line as {SPACE}.

Amiga program listings contain only one special character, the left arrow (←) symbol. This character marks the end of each program line. Wherever you see a left arrow, press RETURN or move the cursor off the line to enter that line into memory. Don't try to type in the left arrow symbol; it's there only as a marker to indicate where each program line ends.

The Automatic Proofreader

Type in the appropriate program listed below, then save it for future use. The Commodore Proofreader works on the Commodore 128, 64, Plus/4, 16, and VIC-20. Don't omit any lines, even if they contain unfamiliar commands or you think they don't apply to your computer. When you run the program, it installs a machine language program in memory and erases its BASIC portion automatically (so be sure to save several copies before running the program for the first time). If you're using a Commodore 128, Plus/4 or 16, do *not* use any GRAPHIC commands while the Proofreader is active. You should disable the Commodore Proofreader before running any other program. To do this, either turn the computer off and on or enter SYS 64738 (for the 64), SYS 65341 (128), SYS 64802 (VIC-20), or SYS 65526 (Plus/4 or 16). To reenable the Proofreader, reload the program and run it as usual. Unlike the original VIC/64 Proofreader, this version works the same with disk or tape.

On the Atari, run the Proofreader to activate it (the Proofreader remains active in memory as a machine language program); you must then enter NEW to erase the BASIC loader. Pressing SYSTEM RESET deactivates the Atari Proofreader; enter PRINT USR(1536) to reenable it.

The Apple Proofreader erases the BASIC portion of itself after you run it, leaving only the machine language portion in memory. It works with either DOS 3.3 or ProDOS. Disable the Apple Proofreader by pressing CTRL-RESET before running another BASIC program.

The IBM Proofreader is a BASIC program that simulates the IBM BASIC line editor, letting you enter, edit, list, save, and load programs that you type. Type RUN to activate. Be sure to leave Caps Lock on, except when typing lowercase characters.

Once the Proofreader is active, try typing in a line. As soon as you press RETURN, either a hexadecimal number (on the Apple) or a pair of letters (on the Commodore, Atari, or IBM) appears. The number or pair of letters is called a *checksum*.

Compare the value displayed on the screen by the Proofreader with the checksum printed in the program listing in the magazine. The checksum is given to the left of each line number. Just type in the program a line at a time (without the printed checksum), press RETURN or Enter, and compare the checksums. If they match, go on to the next line. If not, check your typing; you've made a mistake. Because of the checksum method used, do not type abbreviations, such as ? for PRINT. On the Atari and Apple Proofreaders, spaces are not counted as part of the checksum, so be sure you type the right number of spaces between quote marks. The Atari Proofreader does not check to see that you've typed the characters in the right order, so if characters are transposed, the checksum still matches the listing. The Commodore Proofreader catches transposition errors and ignores spaces unless they're enclosed in quotation marks. The IBM Proofreader detects errors in spacing and transposition.

IBM Proofreader Commands

Since the IBM Proofreader replaces the computer's normal BASIC line editor, it has to include many of the direct-mode IBM BASIC commands. The syntax is identical to IBM BASIC. Commands simulated are LIST, LLIST, NEW, FILES, SAVE, and LOAD. When listing your program, press any key (except Ctrl-Break) to stop the listing. If you enter NEW, the Proofreader prompts you to press Y to be especially sure you mean yes.

Two new commands are BASIC and CHECK. BASIC exits the Proofreader back to IBM BASIC, leaving the Proofreader in memory. CHECK works just like LIST, but shows the checksums along with the listing. After you have typed in a program, save it to disk. Then exit the Proofreader with the BASIC command, and load the program as usual (this replaces the Proofreader in memory). You can now run the program, but you may want to resave it to disk. This will shorten it on disk and make it load faster, but it can no longer be edited with the Proofreader. If you want to convert an existing BASIC program to Proofreader format, save it to disk with SAVE *"filename"*,A.

Program 1: Atari Proofreader

By Charles Brannon, Program Editor

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:REA
    D A:POKE I,A:CK=CK+A:N
    EXT I
120 IF CK<>19072 THEN ? "E
    rror in DATA Statement
    s.  Check Typing.":END

130 A=USR(1536)
140 ? :? "Automatic Proofr
    eader Now Activated."
150 END
160 DATA 104,160,0,185,26,
    3,201,69,240,7
170 DATA 200,200,192,34,20
    8,243,96,200,169,74
180 DATA 153,26,3,200,169,
    6,153,26,3,162
190 DATA 0,189,0,228,157,7
    4,6,232,224,16
200 DATA 208,245,169,93,14
    1,78,6,169,6,141
210 DATA 79,6,24,173,4,228
    ,105,1,141,95
220 DATA 6,173,5,228,105,0
    ,141,96,6,169
230 DATA 0,133,203,96,247,
    238,125,241,93,6
240 DATA 244,241,115,241,1
    24,241,76,205,238
250 DATA 0,0,0,0,0,32,62,2
    46,8,201
260 DATA 155,240,13,201,32
    ,240,7,72,24,101
270 DATA 203,133,203,104,4
    0,96,72,152,72,138
280 DATA 72,160,0,169,128,
    145,88,200,192,40
290 DATA 208,249,165,203,7
    4,74,74,74,24,105
300 DATA 161,160,3,145,88,
    165,203,41,15,24
310 DATA 105,161,200,145,8
    8,169,0,133,203,104
320 DATA 170,104,168,104,4
    0,96
```

Program 2: IBM Proofreader

By Charles Brannon, Program Editor

```
10 'Automatic Proofreader Vers
   ion 3.0 (Lines 205,206 adde
   d/190 deleted/470,490 chang
   ed from V2.0)
100 DIM L$(500),LNUM(500):COLO
    R 0,7,7:KEY OFF:CLS:MAX=0:
    LNUM(0)=65536!
110 ON ERROR GOTO 120:KEY 15,C
    HR$(4)+CHR$(70):ON KEY(15)
     GOSUB 640:KEY (15) ON:GOT
    O 130
120 RESUME 130
130 DEF SEG=&H40:W=PEEK(&H4A)
140 ON ERROR GOTO 650:PRINT:PR
    INT"Proofreader Ready."
150 LINE INPUT L$:Y=CSRLIN-INT
    (LEN(L$)/W)-1:LOCATE Y,1
160 DEF SEG=0:POKE 1050,30:POK
    E 1052,34:POKE 1054,0:POKE
     1055,79:POKE 1056,13:POKE
     1057,28:LINE INPUT L$:DEF
     SEG:IF L$="" THEN 150
170 IF LEFT$(L$,1)=" " THEN L$
    =MID$(L$,2):GOTO 170
```


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```
180 IF VAL(LEFT$(L$,2))=0 AND
    MID$(L$,3,1)=" " THEN L$=M
    ID$(L$,4)
200 IF ASC(L$)>57 THEN 260 'no
     line number, therefore co
    mmand
205 BL=INSTR(L$," "):IF BL=0 T
    HEN BL$=L$:GOTO 206 ELSE B
    L$=LEFT$(L$,BL-1)
206 LNUM=VAL(BL$):TEXT$=MID$(L
    $,LEN(STR$(LNUM))+1)
210 IF TEXT$="" THEN GOSUB 540
    :IF LNUM=LNUM(P) THEN GOSU
    B 560:GOTO 150 ELSE 150
220 CKSUM=0:FOR I=1 TO LEN(L$)
    :CKSUM=(CKSUM+ASC(MID$(L$,
    I))*I) AND 255:NEXT:LOCATE
     Y,1:PRINT CHR$(65+CKSUM/1
    6)+CHR$(65+(CKSUM AND 15))
    +" "+L$
230 GOSUB 540:IF LNUM(P)=LNUM
    THEN L$(P)=TEXT$:GOTO 150
    'replace line
240 GOSUB 580:GOTO 150 'insert
     the line
260 TEXT$="":FOR I=1 TO LEN(L$
    ):A=ASC(MID$(L$,I)):TEXT$=
    TEXT$+CHR$(A+32*(A>96 AND
    A<123)):NEXT
270 DELIMITER=INSTR(TEXT$," ")
    :COMMAND$=TEXT$:ARG$="":IF
     DELIMITER THEN COMMAND$=L
    EFT$(TEXT$,DELIMITER-1):AR
    G$=MID$(TEXT$,DELIMITER+1)
     ELSE DELIMITER=INSTR(TEXT
    $,CHR$(34)):IF DELIMITER T
    HEN COMMAND$=LEFT$(TEXT$,D
    ELIMITER-1):ARG$=MID$(TEXT
    $,DELIMITER)
280 IF COMMAND$<>"LIST" THEN 4
    10
290 OPEN "scrn:" FOR OUTPUT AS
     #1
300 IF ARG$="" THEN FIRST=0:P=
    MAX-1:GOTO 340
310 DELIMITER=INSTR(ARG$,"-"):
    IF DELIMITER=0 THEN LNUM=V
    AL(ARG$):GOSUB 540:FIRST=P
    :GOTO 340
320 FIRST=VAL(LEFT$(ARG$,DELIM
    ITER)):LAST=VAL(MID$(ARG$,
    DELIMITER+1))
330 LNUM=FIRST:GOSUB 540:FIRST
    =P:LNUM=LAST:GOSUB 540:IF
    P=0 THEN P=MAX-1
340 FOR X=FIRST TO P:N$=MID$(S
    TR$(LNUM(X)),2)+" "
350 IF CKFLAG=0 THEN A$="":GOT
    O 370
360 CKSUM=0:A$=N$+L$(X):FOR I=
    1 TO LEN(A$):CKSUM=(CKSUM+
    ASC(MID$(A$,I))*I) AND 255
    :NEXT:A$=CHR$(65+CKSUM/16)
    +CHR$(65+(CKSUM AND 15))+"
     "
370 PRINT #1,A$+N$+L$(X)
380 IF INKEY$<>"" THEN X=P
390 NEXT :CLOSE #1:CKFLAG=0
400 GOTO 130
410 IF COMMAND$="LLIST" THEN O
    PEN "lpt1:" FOR OUTPUT AS
    #1:GOTO 300
420 IF COMMAND$="CHECK" THEN C
    KFLAG=1:GOTO 290
430 IF COMMAND$<>"SAVE" THEN 4
    50
440 GOSUB 600:OPEN ARG$ FOR OU
    TPUT AS #1:ARG$="":GOTO 30
    0
450 IF COMMAND$<>"LOAD" THEN 4
    90
460 GOSUB 600:OPEN ARG$ FOR IN
    PUT AS #1:MAX=0:P=0
470 WHILE NOT EOF(1):LINE INPU
    T #1,L$:BL=INSTR(L$," "):B
    L$=LEFT$(L$,BL-1):LNUM(P)=
    VAL(BL$):L$(P)=MID$(L$,LEN
    (STR$(VAL(BL$)))+1):P=P+1:
    WEND
480 MAX=P:CLOSE #1:GOTO 130
490 IF COMMAND$="NEW" THEN INP
    UT "Erase program - Are yo
    u sure";L$:IF LEFT$(L$,1)=
    "y" OR LEFT$(L$,1)="Y" THE
    N MAX=0:LNUM(0)=65536!:GOT
    O 130:ELSE 130
500 IF COMMAND$="BASIC" THEN C
    OLOR 7,0,0:ON ERROR GOTO 0
    :CLS:END
510 IF COMMAND$<>"FILES" THEN
    520
515 IF ARG$="" THEN ARG$="A:"
    ELSE SEL=1:GOSUB 600
517 FILES ARG$:GOTO 130
520 PRINT"Syntax error":GOTO 1
    30
540 P=0:WHILE LNUM>LNUM(P) AND
     P<MAX:P=P+1:WEND:RETURN
560 MAX=MAX-1:FOR X=P TO MAX:L
    NUM(X)=LNUM(X+1):L$(X)=L$(
    X+1):NEXT:RETURN
580 MAX=MAX+1:FOR X=MAX TO P+1
     STEP -1:LNUM(X)=LNUM(X-1)
    :L$(X)=L$(X-1):NEXT:L$(P)=
    TEXT$:LNUM(P)=LNUM:RETURN
600 IF LEFT$(ARG$,1)<>CHR$(34)
     THEN 520 ELSE ARG$=MID$(A
    RG$,2)
610 IF RIGHT$(ARG$,1)=CHR$(34)
     THEN ARG$=LEFT$(ARG$,LEN(
    ARG$)-1)
620 IF SEL=0 AND INSTR(ARG$,".
    ")=0 THEN ARG$=ARG$+".BAS"
630 SEL=0:RETURN
640 CLOSE #1:CKFLAG=0:PRINT"St
    opped.":RETURN 150
650 PRINT "Error #";ERR:RESUME
     150
```

Program 3: Commodore Proofreader

By Philip Nelson, Assistant Editor

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREADE
   R FOR ";:IF VEC=42364 THEN
   {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
   C-20"
40 IF VEC=35158 THEN GRAPHIC C
   LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
   46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
   6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
   E ADR,BYT:ADR=ADR+1:CHK=CHK
   +BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*
    ERROR* CHECK TYPING IN DATA
    STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
   RS=SA+RF:HB=INT(RS/256):LB=
   RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
   F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
   *ERROR* RELOAD PROGRAM AND
   {SPACE}CHECK FINAL LINE":EN
   D
120 POKE SA+149,PEEK(772):POKE
    SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
   14,22:POKE SA+18,23:POKESA+
   29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
   PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
   EEK(LO)+256*PEEK(HI))-1,0:N
   EW
160 DATA 120,169,73,141,4,3,16
   9,3,141,5,3
170 DATA 88,96,165,20,133,167,
   165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
   1,199,157,227,3
190 DATA 202,16,248,169,19,32,
   210,255,169,18,32
200 DATA 210,255,160,0,132,180
   ,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
   1,34,208,8,72
220 DATA 165,176,73,255,133,17
   6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
   08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
   3,167,165,168,105
250 DATA 0,133,168,202,208,239
   ,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
   211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
   85,211,3,32,210
280 DATA 255,162,31,189,227,3,
   149,199,202,16,248
290 DATA 169,146,32,210,255,76
   ,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
   77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
   116,117,151,128,129,167,136
   ,137
```

Program 4: Apple Proofreader

By Tim Victor, Editorial Programmer

```
10 C = 0: FOR I = 768 TO 768 +
   68: READ A:C = C + A: POKE I
   ,A: NEXT
20 IF C < > 7258 THEN PRINT "ER
   ROR IN PROOFREADER DATA STAT
   EMENTS": END
30 IF PEEK (190 * 256) < > 76 T
   HEN POKE 56,0: POKE 57,3: CA
   LL 1002: GOTO 50
40 PRINT CHR$ (4);"IN#A$300"
50 POKE 34,0: HOME : POKE 34,1:
    VTAB 2: PRINT "PROOFREADER
   INSTALLED"
60 NEW
100 DATA 216,32,27,253,201,141
110 DATA 208,60,138,72,169,0
120 DATA 72,189,255,1,201,160
130 DATA 240,8,104,10,125,255
140 DATA 1,105,0,72,202,208
150 DATA 238,104,170,41,15,9
160 DATA 48,201,58,144,2,233
170 DATA 57,141,1,4,138,74
180 DATA 74,74,74,41,15,9
190 DATA 48,201,58,144,2,233
200 DATA 57,141,0,4,104,170
210 DATA 169,141,96
```

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MLX Machine Language Entry Program For Commodore 64 and Apple

Ottis Cowper, Technical Editor and Tim Victor, Editorial Programmer

"MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs. The Apple version runs on the II, II+, IIe, and IIc, with either DOS 3.3 or ProDOS.

"MLX" is a new way to enter long machine language (ML) programs without a lot of fuss. MLX lets you enter the numbers from a special list that looks similar to BASIC DATA statements. It checks your typing on a line-by-line basis. It won't let you enter invalid characters or let you continue if there's a mistake in a line. It won't even let you enter a line or digit out of sequence. For the Commodore 64, this new version of MLX was first introduced in the December 1985 issue. No version of 64 MLX published before that date can be used to enter the MLX-format listings in this issue.

Using MLX

Type in and save some copies of whichever version of MLX is appropriate for your computer (you'll want to use it to enter future ML programs from COMPUTE!). Program 1 is for the Commodore 64, and Program 2 is for the Apple. For Apple MLX, it doesn't matter whether you save the program on a disk formatted for DOS 3.3 or ProDOS. Programs entered with Apple MLX, however, must be saved to a disk formatted with the same operating system as MLX itself. If you have an Apple IIe or IIc, make sure that the key marked *Caps Lock* is in the down position.

When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing. If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0–9 and the letters A–F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, the 64 version will offer you the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session. In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. In the 64 version, if you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" machine language listings you may be accustomed to, the extra checksum number on the end allows MLX to check your typing. (Apple users *can* enter the data from an MLX listing using the built-in monitor if the rightmost column of data is omitted, but we recommend against it. It's much easier to let MLX do the proofreading and error checking for you.)

When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, the data is added to the workspace area, and the prompt for the next line of data appears (the 64 version gives a pleasant beep to indicate that the line was entered correctly). But if MLX detects a typing error, you'll be notified of the mistake. The 64 version will sound a low buzz and display an error message, then redisplay the line for editing. Apple MLX sounds a beep to alert you of the error and then erases the incorrect line and prompts you to reenter it correctly.

After you have entered the last number on the last line of the listing, the Apple version will return to the command menu. At this point you should immediately choose the option S to save your data. The 64 version automatically moves to the Save option after the last number is entered.

Invalid Characters Banned

In 64 MLX, only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; the new MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; the new MLX automatically enters and checks the line after you type the last digit.

Apple MLX is fairly flexible about how you type in the numbers. You can put extra spaces between numbers or leave the spaces out entirely, compressing a line into 18 keypresses. But be careful not to put a space between two digits in the middle of a number. MLX will read two single-digit numbers instead of one two-digit number (F 6 means F *and* 6, not F6). You must press RETURN to enter the line.

Only the numerals 0–9 and the letters A–F can be typed in. If you press any other key (with some exceptions noted below), nothing happens (the 64 version gives a warning buzz to indicate an invalid keypress). Even better, MLX checks for transposed characters. If you're supposed to type in *A0* and instead enter *0A*, MLX will catch your mistake.

Editing Features

To correct typing mistakes before finishing a line in the 64 version, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when correcting lines in which 64 MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the

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screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Apple MLX also includes some editing features. The left- and right-arrow keys allow you to back up and go forward on the line you're entering so that you can retype data. Pressing the CONTROL (CTRL) and D keys at the same time (*delete*) removes the character under the cursor, shortening the line by one character. Pressing CONTROL-I (*insert*) puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither CONTROL-D nor CONTROL-I has any effect. To leave Enter mode, press the RETURN key when MLX prompts you with a new line address.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redisplayed. With Apple MLX, you can stop the display and return to the menu by pressing any key. The 64 version allows you to stop the display and get back to the menu by pressing RETURN, or to pause the display by pressing the space bar (press space again to restart the display).

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE (SAVE DATA in the 64 version) and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. The 64 version will follow this by asking you to press either D or T to select disk or tape.

Those using the 64 version will notice the disk drive starting and stopping several times during a load or save. Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750), so this should *not* be included when entering the name. (This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name.)

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports any errors detected during the save or load. For the 64 version, the standard disk or tape error messages will be displayed. (Tape users should bear in mind that the Commodore 64 is never able to detect errors when saving to tape.) The 64 version also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The Apple version simply displays the message DISK ERROR if a problem is detected during a Save or Load. If you're not sure why a disk error has occurred, check the drive. Make sure there's a formatted disk in the drive and that it was formatted by the same operating system you're using for MLX (ProDOS or DOS 3.3). If you're trying to save a file and see an error message, the disk might be full. Either save the file on another disk or quit MLX (by pressing the Q key), delete an old file or two, then run MLX again. Your typing should still be safe in memory. If the error message appears during a Load, you may have specified a filename that doesn't exist on the disk.

The Quit menu option has the obvious effect—it stops MLX and enters BASIC. In the 64 version the RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP–RESTORE for the 64 or CONTROL-RESET for the Apple also gets you out.) The 64 version will ask for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option in 64 MLX.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some Commodore 64 ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD *"filename"*,8 for disk or LOAD *"filename"* for tape, and then RUN. (Such programs usually have 0801 as their MLX starting address.) Others must be reloaded to specific addresses with a command such as LOAD *"filename"*,8,1 for disk or LOAD *"filename"*,1,1 for tape, then started with a SYS to a particular memory address. (On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000.) In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program. For the Apple, you need to BRUN the program, or you may BLOAD and start the program with a CALL. Again, refer to the article accompanying the machine language program for instructions.

An Ounce Of Prevention

By the time you finish typing in the data for a long ML program, you'll have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to ensure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

In the Apple version, line 100 traps all errors to line 610. If MLX is typed in correctly, then only disk errors should normally be encountered. A disk error

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message when you're not trying to access the drive—for example, when you first start entering data—indicates a typing error in the MLX program itself. If this occurs, hit CONTROL-RESET to break out of MLX and carefully compare your entry against the printed listing.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

Program 1: MLX For Commodore 64

Version by Ottis Cowper, Technical Editor

```
100 POKE 56,50:CLR:DIM IN$,I,J
    ,A,B,A$,B$,A(7),N$ :rem 34
110 C4=48:C6=16:C7=7:Z2=2:Z4=2
    54:Z5=255:Z6=256:Z7=127
                       :rem 238
120 FA=PEEK(45)+Z6*PEEK(46):BS
    =PEEK(55)+Z6*PEEK(56):H$="
    0123456789ABCDEF" :rem 118
130 R$=CHR$(13):L$="{LEFT}":S$
    =" ":D$=CHR$(20):Z$=CHR$(0
    ):T$="{13 RIGHT}" :rem 173
140 SD=54272:FOR I=SD TO SD+23
    :POKE I,0:NEXT:POKE SD+24,
    15:POKE 788,52     :rem 194
150 PRINT"{CLR}"CHR$(142)CHR$(
    8):POKE 53280,15:POKE 5328
    1,15               :rem 104
160 PRINT T$" {RED}{RVS}
    {2 SPACES}{8 @}{2 SPACES}"
    SPC(28)"{2 SPACES}{OFF}
    {BLU} MLX II {RED}{RVS}
    {2 SPACES}"SPC(28)"
    {12 SPACES}{BLU}" :rem 121
170 PRINT"{3 DOWN}{3 SPACES}CO
    MPUTE!'S MACHINE LANGUAGE
    {SPACE}EDITOR{3 DOWN}"
                       :rem 135
180 PRINT"{BLK}STARTING ADDRES
    S{4}";:GOSUB300:SA=AD:GOSU
    B1040:IF F THEN180:rem 113
190 PRINT"{BLK}{2 SPACES}ENDIN
    G ADDRESS{4}";:GOSUB300:EA
    =AD:GOSUB1030:IF F THEN190
                       :rem 173
200 INPUT"{3 DOWN}{BLK}CLEAR W
    ORKSPACE [Y/N]{4}";A$:IF L
    EFT$(A$,1)<>"Y"THEN220
                        :rem 9
210 PRINT"{2 DOWN}{BLU}WORKING
    ...";:FORI=BS TO BS+EA-SA+
    7:POKE I,0:NEXT:PRINT"DONE
    "                  :rem 139
220 PRINTTAB(10)"{2 DOWN}{BLK}
    {RVS} MLX COMMAND MENU
    {DOWN}{4}":PRINT T$"{RVS}E
    {OFF}NTER DATA"    :rem 62
230 PRINT T$"{RVS}D{OFF}ISPLAY
     DATA":PRINT T$"{RVS}L
    {OFF}OAD DATA"     :rem 19
240 PRINT T$"{RVS}S{OFF}AVE FI
    LE":PRINT T$"{RVS}Q{OFF}UI
    T{2 DOWN}{BLK}"    :rem 238
250 GET A$:IF A$=N$ THEN250
                       :rem 127
260 A=0:FOR I=1 TO 5:IF A$=MID
    $("EDLSQ",I,1)THEN A=I:I=5
                       :rem 42
270 NEXT:ON A GOTO420,610,690,
    700,280:GOSUB1060:GOTO250
                       :rem 97
280 PRINT"{RVS} QUIT ":INPUT"
    {DOWN}{4}ARE YOU SURE [Y/N
    ]";A$:IF LEFT$(A$,1)<>"Y"T
    HEN220             :rem 189
290 POKE SD+24,0:END   :rem 95
300 IN$=N$:AD=0:INPUTIN$:IFLEN
    (IN$)<>4THENRETURN :rem 31
310 B$=IN$:GOSUB320:AD=A:B$=MI
    D$(IN$,3):GOSUB320:AD=AD*2
    56+A:RETURN        :rem 225
320 A=0:FOR J=1 TO 2:A$=MID$(B
    $,J,1):B=ASC(A$)-C4+(A$>"@
    ")*C7:A=A*C6+B     :rem 143
330 IF B<0 OR B>15 THEN AD=0:A
    =-1:J=2            :rem 132
340 NEXT:RETURN        :rem 240
350 B=INT(A/C6):PRINT MID$(H$,
    B+1,1);:B=A-B*C6:PRINT MID
    $(H$,B+1,1);:RETURN:rem 42
360 A=INT(AD/Z6):GOSUB350:A=AD
    -A*Z6:GOSUB350:PRINT":";
                       :rem 32
370 CK=INT(AD/Z6):CK=AD-Z4*CK+
    Z5*(CK>Z7):GOTO390:rem 131
380 CK=CK*Z2+Z5*(CK>Z7)+A
                       :rem 168
390 CK=CK+Z5*(CK>Z5):RETURN
                       :rem 159
400 PRINT"{DOWN}STARTING AT{4}
    ";:GOSUB300:IF IN$<>N$ THE
    N GOSUB1030:IF F THEN400
                       :rem 75
410 RETURN             :rem 117
420 PRINT"{RVS} ENTER DATA ":G
    OSUB400:IF IN$=N$ THEN220
                       :rem 85
430 OPEN3,3:PRINT      :rem 34
440 POKE198,0:GOSUB360:IF F TH
    EN PRINT IN$:PRINT"{UP}
    {5 RIGHT}";        :rem 6
450 FOR I=0 TO 24 STEP 3:B$=S$
    :FOR J=1 TO 2:IF F THEN B$
    =MID$(IN$,I+J,1)   :rem 226
460 PRINT"{RVS}"B$L$;:IF I<24T
    HEN PRINT"{OFF}";  :rem 15
470 GET A$:IF A$=N$ THEN470
                       :rem 135
480 IF(A$>"/"ANDA$<":")OR(A$>"
    @"ANDA$<"G")THEN540
                       :rem 100
490 IF A$=R$ AND((I=0)AND(J=1)
    OR F)THEN PRINT B$;:J=2:NE
    XT:I=24:GOTO550    :rem 46
500 IF A$="{HOME}" THEN PRINT
    {SPACE}B$:J=2:NEXT:I=24:NE
    XT:F=0:GOTO440     :rem 66
510 IF(A$="{RIGHT}")ANDF THENP
    RINT B$L$;:GOTO540:rem 107
520 IF A$<>L$ AND A$<>D$ OR((I
    =0)AND(J=1))THEN GOSUB1060
    :GOTO470           :rem 232
530 A$=L$+S$+L$:PRINT B$L$;:J=
    2-J:IF J THEN PRINT L$;:I=
    I-3                :rem 12
540 PRINT A$;:NEXT J:PRINT S$;
                       :rem 2
550 NEXT I:PRINT:PRINT"{UP}
    {5 RIGHT}";:INPUT#3,IN$:IF
     IN$=N$ THEN CLOSE3:GOTO22
    0                  :rem 106
560 FOR I=1 TO 25 STEP3:B$=MID
    $(IN$,I):GOSUB320:IF I<25
    {SPACE}THEN GOSUB380:A(I/3
    )=A                :rem 81
570 NEXT:IF A<>CK THEN GOSUB10
    60:PRINT"{BLK}{RVS} ERROR:
     REENTER LINE {4}":F=1:GOT
    O440               :rem 161
580 GOSUB1080:B=BS+AD-SA:FOR I
    =0 TO 7:POKE B+I,A(I):NEXT
                       :rem 245
590 AD=AD+8:IF AD>EA THEN CLOS
    E3:PRINT"{DOWN}{BLU}** END
     OF ENTRY **{BLK}{2 DOWN}"
    :GOTO700           :rem 207
600 F=0:GOTO440        :rem 84
610 PRINT"{CLR}{DOWN}{RVS} DIS
    PLAY DATA ":GOSUB400:IF IN
    $=N$ THEN220       :rem 146
620 PRINT"{DOWN}{BLU}PRESS:
    {RVS}SPACE{OFF} TO PAUSE,
    {SPACE}{RVS}RETURN{OFF} TO
     BREAK{4}{DOWN}"   :rem 241
630 GOSUB360:B=BS+AD-SA:FORI=B
    TO B+7:A=PEEK(I):GOSUB350:
    GOSUB380:PRINT S$; :rem 56
640 NEXT:PRINT"{RVS}";:A=CK:GO
    SUB350:PRINT       :rem 144
650 F=1:AD=AD+8:IF AD>EA THENP
    RINT"{DOWN}{BLU}** END OF
    {SPACE}DATA **":GOTO220
                       :rem 170
660 GET A$:IF A$=R$ THEN GOSUB
    1080:GOTO220       :rem 65
670 IF A$=S$ THEN F=F+1:GOSUB1
    080                :rem 28
680 ONFGOTO630,660,630:rem 224
690 PRINT"{DOWN}{RVS} LOAD DAT
    A ":OP=1:GOTO710   :rem 31
700 PRINT"{DOWN}{RVS} SAVE FIL
    E ":OP=0           :rem 32
710 IN$=N$:INPUT"{DOWN}FILENAM
    E{4}";IN$:IF IN$=N$ THEN22
    0                  :rem 229
720 F=0:PRINT"{DOWN}{BLK}{RVS}
    T{OFF}APE OR {RVS}D{OFF}IS
    K: {4}";           :rem 66
730 GET A$:IF A$="T"THEN PRINT
    "T{DOWN}":GOTO880  :rem 90
740 IF A$<>"D"THEN730  :rem 90
750 PRINT"D{DOWN}":OPEN15,8,15
    ,"I0:":B=EA-SA:IN$="0:"+IN
    $:IF OP THEN810    :rem 163
760 OPEN 1,8,8,IN$+",P,W":GOSU
    B860:IF A THEN220  :rem 66
770 AH=INT(SA/256):AL=SA-(AH*2
    56):PRINT#1,CHR$(AL);CHR$(
    AH);               :rem 221
780 FOR I=0 TO B:PRINT#1,CHR$(
    PEEK(BS+I));:IF ST THEN800
                       :rem 171
790 NEXT:CLOSE1:CLOSE15:GOTO94
    0                  :rem 230
800 GOSUB1060:PRINT"{DOWN}
    {BLK}ERROR DURING SAVE:{4}
    ":GOSUB860:GOTO220 :rem 61
810 OPEN 1,8,8,IN$+",P,R":GOSU
    B860:IF A THEN220  :rem 57
820 GET#1,A$,B$:AD=ASC(A$+Z$)+
    256*ASC(B$+Z$):IF AD<>SA T
    HEN F=1:GOTO850    :rem 155
830 FOR I=0 TO B:GET#1,A$:POKE
     BS+I,ASC(A$+Z$):IF ST AND
    (I<>B)THEN F=2:AD=I:I=B
                       :rem 180
840 NEXT:IF ST<>64 THEN F=3
                       :rem 20
850 CLOSE1:CLOSE15:ON ABS(F>0)
    +1 GOTO960,970     :rem 12
860 INPUT#15,A,A$:IF A THEN CL
    OSE1:CLOSE15:GOSUB1060:PRI
    NT"{RVS}ERROR: "A$:rem 114
870 RETURN             :rem 127
880 POKE183,PEEK(FA+2):POKE187
    ,PEEK(FA+3):POKE188,PEEK(F
    A+4):IFOP=0THEN920:rem 178
890 SYS 63466:IF(PEEK(783)AND1
    )THEN GOSUB1060:PRINT"
    {DOWN}{RVS} FILE NOT FOUND
```


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```
    ":GOTO690            :rem 34
900 AD=PEEK(829)+256*PEEK(830)
    :IF AD<>SA THEN F=1:GOTO97
    0                    :rem 201
910 A=PEEK(831)+256*PEEK(832)-
    1:F=F-2*(A<EA)-3*(A>EA):AD
    =A-AD:GOTO930        :rem 75
920 A=SA:B=EA+1:GOSUB1010:POKE
    780,3:SYS 63338      :rem 107
930 A=BS:B=BS+(EA-SA)+1:GOSUB1
    010:ON OP GOTO950:SYS 6359
    1                    :rem 38
940 GOSUB1080:PRINT"{BLU}** SA
    VE COMPLETED **":GOTO220
                         :rem 139
950 POKE147,0:SYS 63562:IF ST<
    >64 THEN970          :rem 39
960 GOSUB1080:PRINT"{BLU}** LO
    AD COMPLETED **":GOTO220
                         :rem 126
970 GOSUB1060:PRINT"{BLK}{RVS}
    ERROR DURING LOAD:{DOWN}
    {43}":ON F GOSUB980,990,100
    0:GOTO220            :rem 233
980 PRINT"INCORRECT STARTING A
    DDRESS (";:GOSUB360:PRINT"
    )":RETURN            :rem 145
990 PRINT"LOAD ENDED AT ";:AD=
    SA+AD:GOSUB360:PRINT D$:RE
    TURN                 :rem 159
1000 PRINT"TRUNCATED AT ENDING
     ADDRESS":RETURN :rem 166
1010 AH=INT(A/256):AL=A-(AH*25
     6):POKE193,AL:POKE194,AH
                         :rem 95
1020 AH=INT(B/256):AL=B-(AH*25
     6):POKE174,AL:POKE175,AH:
     RETURN              :rem 122
1030 IF AD<SA OR AD>EA THEN105
     0                   :rem 135
1040 IF(AD>511 AND AD<40960)OR
     (AD>49151 AND AD<53248)TH
     EN GOSUB1080:F=0:RETURN
                         :rem 104
1050 GOSUB1060:PRINT"{RVS} INV
     ALID ADDRESS {DOWN}{BLK}"
     :F=1:RETURN         :rem 224
1060 POKE SD+5,31:POKE SD+6,20
     8:POKE SD,240:POKE SD+1,4
     :POKE SD+4,33       :rem 19
1070 FOR S=1 TO 100:NEXT:GOTO1
     090                 :rem 90
1080 POKE SD+5,8:POKE SD+6,240
     :POKE SD,0:POKE SD+1,90:P
     OKE SD+4,17         :rem 182
1090 FOR S=1 TO 100:NEXT:POKE
     {SPACE}SD+4,0:POKE SD,0:P
     OKE SD+1,0:RETURN   :rem 8
```

Program 2: MLX For Apple

Version by Tim Victor, Editorial Programmer

```
100 N = 9: HOME : NORMAL : PRIN
    T "APPLE MLX": POKE 34,2: O
    NERR  GOTO 610
110 VTAB 1: HTAB 20: PRINT "STA
    RT ADDRESS";: GOSUB 530: IF
     A = 0 THEN  PRINT  CHR$ (7
    ): GOTO 110
120 S = A
130 VTAB 2: HTAB 20: PRINT "END
     ADDRESS  ";: GOSUB 530: IF
     S >  = A OR A = 0 THEN  PR
    INT  CHR$ (7): GOTO 130
140 E = A
150 PRINT : PRINT "CHOOSE: (E)NT
    ER DATA";: HTAB 22: PRINT "
    (D)ISPLAY DATA": HTAB 8: PR
    INT "(L)OAD FILE  (S)AVE FI
    LE  (Q)UIT": PRINT
160 GET A$: FOR I = 1 TO 5: IF
    A$ < > MID$ ("EDLSQ",I,1) T
    HEN  NEXT : GOTO 160
170 ON I GOTO 270,220,180,200:
    POKE 34,0: END
180 INPUT "FILENAME: ";A$: IF A
    $ <  > "" THEN  PRINT  CHR$
     (4);"BLOAD";A$;",A";S
190 GOTO 150
200 INPUT "FILENAME: ";A$: IF A
    $ <  > "" THEN  PRINT  CHR$
     (4);"BSAVE";A$;",A";S;",L"
    ;E - S
210 GOTO 150
220 GOSUB 590: IF B = 0 THEN 15
    0
230 FOR B = B TO E STEP 8:L = 4
    :A = B: GOSUB 580: PRINT A$
    ;": ";:L = 2
240 FOR F = 0 TO 7:V(F + 1) = P
    EEK (B + F): NEXT : GOSUB 5
    60:V(9) = C
250 FOR F = 1 TO N:A = V(F): GO
    SUB 580: PRINT A$" ";: NEXT
     : PRINT : IF  PEEK (49152)
     < 128 THEN  NEXT
260 POKE 49168,0: GOTO 150
270 GOSUB 590: IF B = 0 THEN 15
    0
280 FOR B = B TO E STEP 8
290 HTAB 1:A = B:L = 4: GOSUB 5
    80: PRINT A$;": ";: CALL 64
    668:A$ = "":P = 0: GOSUB 33
    0: IF L = 0 THEN 150
300 GOSUB 470: IF F < > N THEN
    PRINT CHR$ (7);: GOTO 290
310 IF N = 9 THEN GOSUB 560: IF
     C < > V(9) THEN PRINT CHR$
     (7);: GOTO 290
320 FOR F = 1 TO 8: POKE B + F
    - 1,V(F): NEXT : PRINT : NE
    XT : GOTO 150
330 IF LEN (A$) = 33 THEN A$ =
    O$:P = O: PRINT CHR$ (7);
340 L = LEN (A$):O$ = A$:O = P:
    L$ = "": IF P > 0 THEN L$ =
     LEFT$ (A$,P)
350 R$ = "": IF P < L - 1 THEN
    R$ =  RIGHT$ (A$,L - P - 1)
360 HTAB 7: PRINT L$;: FLASH :
    IF P < L THEN PRINT MID$ (A
    $,P + 1,1);: NORMAL : PRINT
     R$;
370 PRINT " ";: NORMAL
380 K = PEEK (49152): IF K < 12
    8 THEN 380
390 POKE 49168,0:K = K - 128
400 IF K = 13 THEN HTAB 7: PRIN
    T A$;" ";: RETURN
410 IF K = 32 OR K > 47 AND K <
     58 OR K > 64 AND K < 71 TH
    EN A$ = L$ + CHR$ (K) + R$:
    P = P + 1
420 IF K = 4 THEN A$ = L$ + R$
430 IF K = 9 THEN A$ = L$ + " "
     +  MID$ (A$,P + 1,1) + R$
440 IF K = 8 THEN P = P - (P >
    0)
450 IF K = 21 THEN P = P + (P <
    L)
460 GOTO 330
470 F = 1:D = 0: FOR P = 1 TO L
    EN (A$):C$ = MID$ (A$,P,1):
     IF F > N AND C$ < > " " TH
    EN  RETURN
480 IF C$ < > " " THEN  GOSUB 5
    20:V(F) = J + 16 * (D = 1)
    * V(F):D = D + 1
490 IF D > 0 AND C$ = " " OR D
    = 2 THEN D = 0:F = F + 1
500 NEXT : IF D = 0 THEN F = F
    - 1
510 RETURN
520 J = ASC (C$):J = J - 48 - 7
    * (J > 64): RETURN
530 A = 0: INPUT A$:A$ = LEFT$
    (A$,4): IF LEN (A$) = 0 THE
    N RETURN
540 FOR P = 1 TO LEN (A$):C$ =
    MID$ (A$,P,1): IF C$ < "0"
    OR C$ > "9" AND C$ < "A" OR
     C$ > "Z" THEN A = 0: RETUR
    N
550 GOSUB 520:A = A * 16 + J: N
    EXT : RETURN
560 C = INT (B / 256):C = B - 2
    54 * C - 255 * (C > 127):C
    = C - 255 * (C > 255)
570 FOR F = 1 TO 8:C = C * 2 -
    255 * (C > 127) + V(F):C =
    C - 255 * (C > 255): NEXT :
     RETURN
580 I = FRE (0):A$ = "": FOR I
    = 1 TO L:T =  INT (A / 16):
    A$ =  MID$ ("0123456789ABCD
    EF",A - 16 * T + 1,1) + A$:
    A = T: NEXT : RETURN
590 PRINT "FROM ADDRESS ";: GOS
    UB 530: IF S > A OR E < A O
    R A = 0 THEN B = 0: RETURN
600 B = S + 8 * INT ((A - S) /
    8): RETURN
610 PRINT "DISK ERROR": GOTO 15
    0
```

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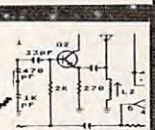

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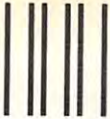

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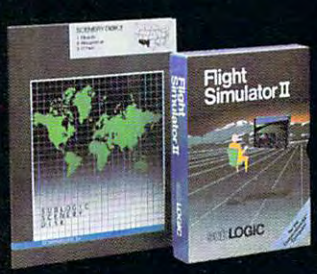

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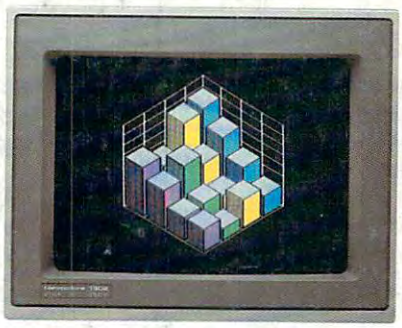

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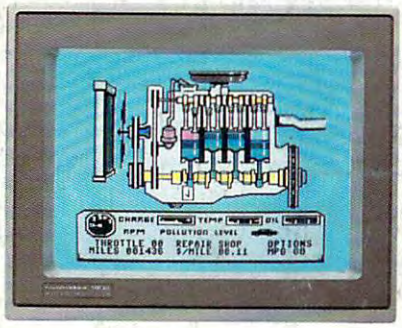

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