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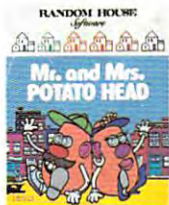
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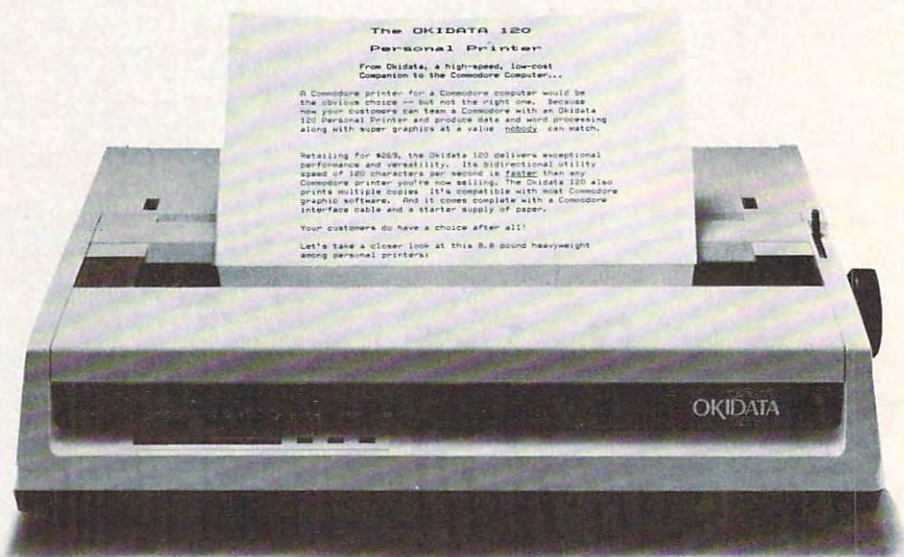
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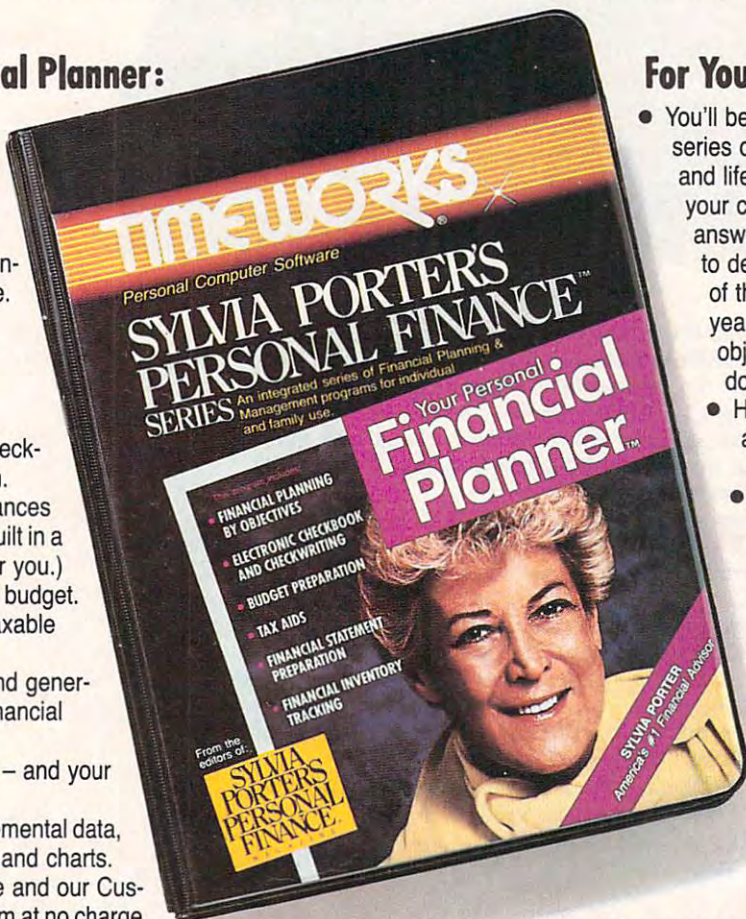
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In this month's guest editorial, Apple Applications Editor and Assistant Book Editor Gregg Keizer takes a poke or two at Senior Editor Richard Mansfield. Is he left with a mouse? You decide.

—Robert Lock, Editor In Chief

Mouseketeer. 1. One who wears large, black ears—usually found in Southern California, Florida, or Tokyo. 2. One who uses a small, hand-controlled device (see mouse) to direct a computer's actions.

Last month's Editor's Notes raised some interesting points concerning the two methods of "talking" to computers currently in vogue. Senior Editor Richard Mansfield argued that entering direct commands through the keyboard—such as DIR (DIRectory) or CLS (CLear Screen)—is more desirable than using a mouse. *Mouseketeers*, he claimed, may have the advantage in learning to use mouse-based software, but in the long run sacrifice power and flexibility.

Not all of us agree. The mouse and its system of pull-down menus, dialog boxes, and pictorial symbols (icons) are here to stay; not only here to stay, but pushing keyboard commands out the window.

Ease of Use. The Macintosh established a new standard in making computers easy to use. And it's no accident that newer machines, like the Atari ST and Commodore Amiga, are adopting similar systems. The reasons are obvious.

There's no doubt that mouse-driven operation is easier than typing in commands. From the first time you turn on the computer, managing an operating system and using applications software are far simpler with a mouse and its environment. *Intuitive* is a key word here. Pointing and pressing a single button, selecting and reading, are intuitive. If a child wants something, he or she points to it. Adults haven't forgotten how to do that.

Probably the best test of ease of use is how fast you can get moving in a new program. I recently began using *PageMaker*, a page-layout and design program for the Macintosh. It's definitely an advanced application. Yet, because I was familiar with mouseketeering, I was able to produce and print a page in less than an hour—without more than

a glance at the thin manual. Everything was intuitive. Rulers and guides were pulled into place, words typed just where they belonged, and graphics taken from files and cropped to the right size. Contrast that with a more traditional program like *WordStar*, the quintessential keyboard-based word processor. For what it does, *WordStar* is just as sophisticated as *PageMaker*. Yet there are commands I have to look up when I'm using *WordStar*, even though I've written thousands of words with it over the last three years. Few of us can remember two or three dozen commands for every program we use.

Know one, know all. If you were simply dealing with the computer's operating system—the way the machine handles such tasks as deleting or renaming files—mouse and keyboard might be more comparable. But most of us don't spend that much time with the operating system. We use the computer to run programs for a specific task. A spreadsheet one time, a word processor the next. With a mouse-driven computer and well-written software, it's as easy to learn and use one program as another. The knowledge base is there. Knowing how to make a menu choice in *Multiplan* means you know how to do the same in *Microsoft Word*. You don't have to spend time learning the basics over and over.

What it does, not how it does it. Given these aspects of mouseketeering, why would anyone want to use keyboard commands? The usual reason is that you can get inside the computer, controlling it more directly. *Power user* is a term that often crops up.

Yet even the IBM PC is succumbing to mouseketeers. Operating environments like *Topview*, *Microsoft Windows*, and *GEM*, all which use Macintosh-like control, are having an impact. One of the bestselling accessories for the IBM PC is a mouse. Popular software like *Sidekick* uses extensive menus.

More people are interested in doing something easily and quickly with the computer than in trying to remember how to do something easily and quickly.

This is a key to pulling more people into computing. Most people won't stand for complex directions on a com-

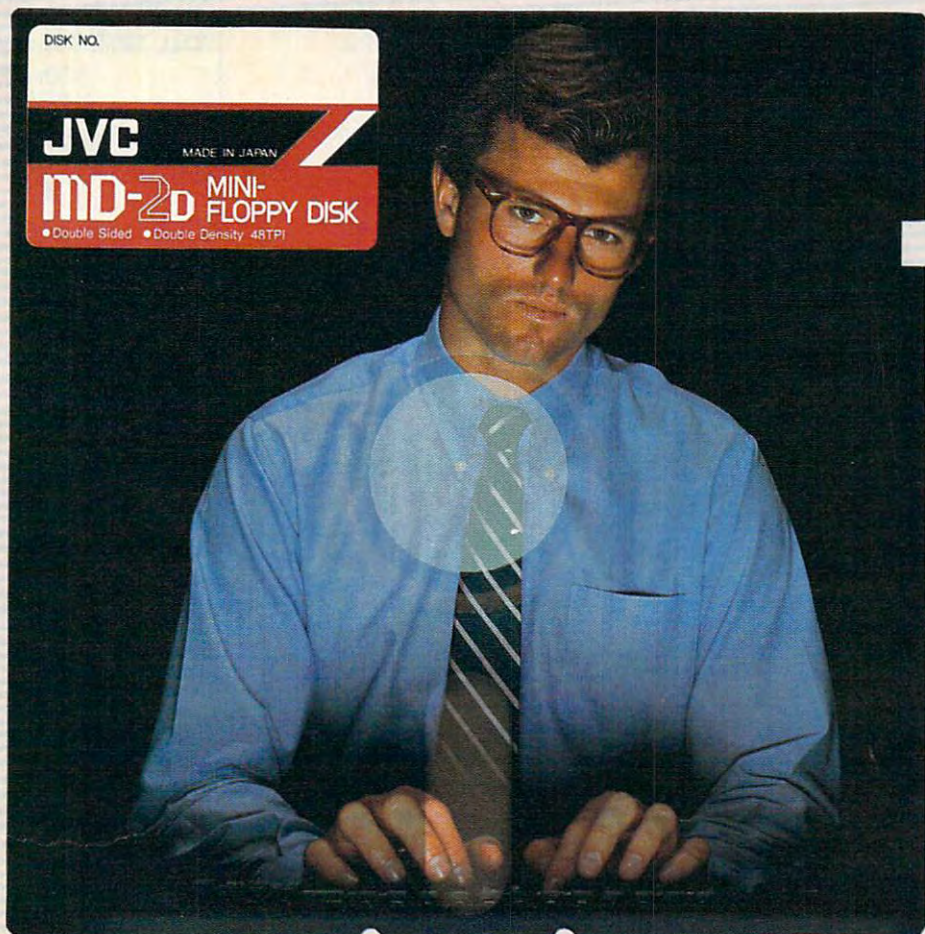
puter any more than they'll tolerate thick manuals for a microwave or VCR. We want to do something with our tools, and we want to do it now, not in three days. That may be instant gratification, but computer manufacturers must realize it's vital to their success.

That's why the introduction of the ST and Amiga, and the continuing sales of the Macintosh, show so much promise for computing. Computer intimidation will be long forgotten once the A> prompt becomes history. Mouseketeering is no Mickey Mouse concept—it's the preferred gateway to a computer.

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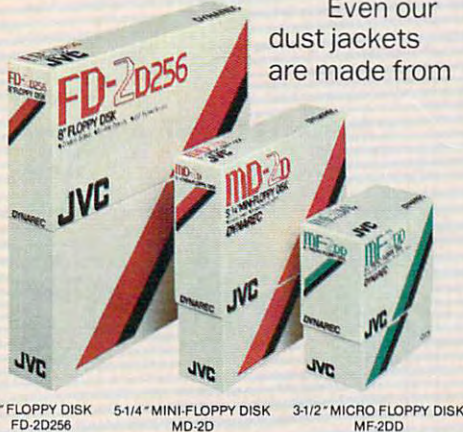
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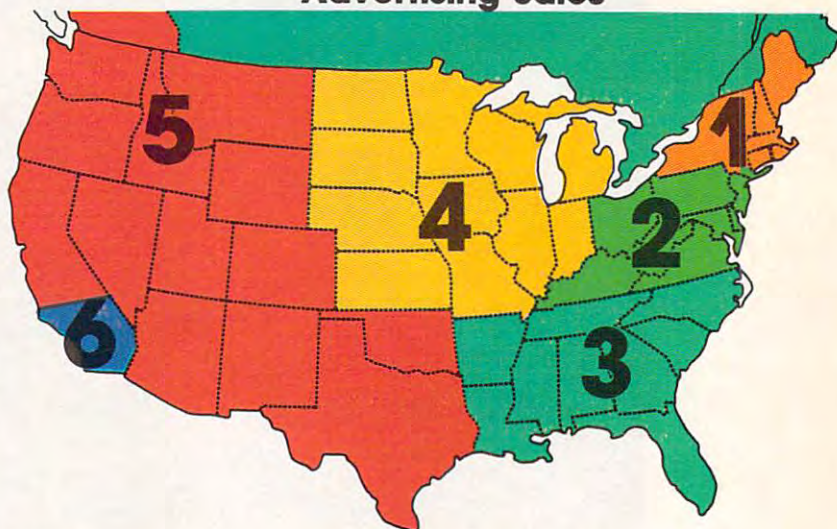
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Readers Feedback

The Editors and Readers of COMPUTE!

If you have any questions, comments, or suggestions you would like to see addressed in this column, write to "Readers' Feedback," COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Due to the volume of mail we receive, we regret that we cannot provide personal answers to technical questions.

Uploading Files

I work in a publications department of a large company that uses IBM PC-compatible computers. I also have a Commodore 64 at home. Is there any way to convert my Commodore word processing files so they can be read by an IBM PC? I have seen programs that convert Apple files to IBM, but not for Commodore. Is it that it cannot be done, or just that no one has done so yet?

Merton Backlund

With the right setup, you can transfer a file between any two computers. We do it almost every day here at COMPUTE!—text files received from outside authors on floppy disk or over the phone lines are uploaded directly into our editorial/type-setting computer system.

In general, the easiest way to transfer files between normally incompatible computers is to link them together over the phone lines with modems. That means each computer must be equipped with its own modem and terminal software (a program that makes the telecommunications link possible). In addition to exchanging word processing files this way, you can also transfer programs—although they'll need to be translated by a programmer before they'll run on the other computer, of course.

If both computers are in the same room, or nearby, sometimes you can avoid the expense of equipping each computer with a modem by using a null modem cable. This is a special cable which links the computers together by connecting to their interface ports (usually the RS-232 serial port). If this is done properly, each computer thinks it is talking to the other via modem, even though no modems are involved. However, null modem cables to fit every possible situation aren't easy to come by. Usually they must be custom-made by a technician familiar with both computers.

In your particular case, modems are the solution, since you want to transfer files over a distance (home to office). If the computer at work will be unattended when you plan to transfer your files, you'll have to equip it with an autoanswer modem that can answer the phone and receive information automatically. Make sure the terminal programs you get allow uploading and downloading (the capability to send and receive files) and are otherwise compatible with the modems.

Before sending a word processing file, delete all special formatting commands from the document, such as those which trigger different printing styles, headers, footers, page numbers, centering, and so on. The other computer's word processor won't understand these formatting commands, and the control codes might interfere with the telecommunications link. The file you're preparing for transfer should be pure text.

One complication in your case is that Commodore and IBM computers use different codes to represent characters, although the codes for both are derivatives of ASCII (American Standard Code for Information Interchange). Though IBM ASCII is nearly identical to standard ASCII, Commodore ASCII is quite different. A good terminal program can convert Commodore ASCII to standard ASCII characters as it sends the file. So if your word processor stores characters as Commodore ASCII codes, you may be able to send the files in their present form. However, many popular word processors for the 64 (including COMPUTE!'s SpeedScript) store characters as screen codes, which are different from ASCII codes. Before sending such a file you must convert each screen code to its ASCII equivalent. Though it's too long to include here, a file converter program was published as part of the article "SpeedScript 3.0: All Machine Language Word Processor for Commodore 64" in COMPUTE!, March 1985. This program converts text files from Commodore screen codes to Commodore ASCII or standard ASCII, and Commodore ASCII files to screen codes.

Your particular situation may require a little additional conversion. On Commodore computers, the code CHR\$(13) performs both a carriage return (moving the cursor back to the left margin) and a line feed (moving the cursor down one

line). In IBM ASCII, these are separate functions: CHR\$(10) performs a line feed and CHR\$(13) does a carriage return. Here's a short IBM program that adds the line feeds:

```
10 ON ERROR GOTO 60 'Add CHR$(10) to each CHR$(13) in text file
20 INPUT "Filename";N$:INPUT "Conversion filename";M$
30 OPEN N$ FOR INPUT AS #1:OPEN M$ FOR OUTPUT AS #2:WHILE EOF(1)=0
40 C$=INPUT$(1,#1):PRINT #2,C$;IF C$=CHR$(13) THEN PRINT #2,CHR$(10);
50 WEND
60 CLOSE 1:CLOSE 2:ON ERROR GOTO 0
```

Apple Mousetext

I own an Apple IIc and have heard it has 32 special "Mousetext" characters built into ROM. How can I access these characters? Can I use them in my BASIC programs?

Murray Hanstead

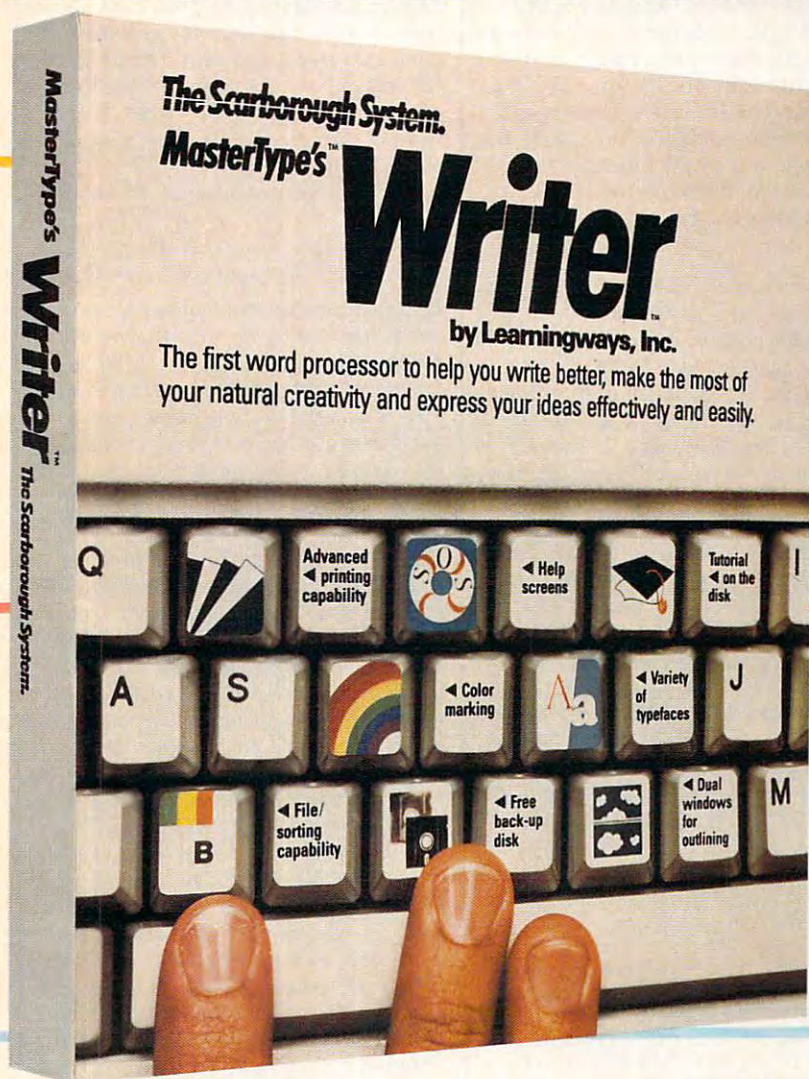
Apple's Mousetext characters are designed especially for mouse-driven (Macintosh-style) software, but they can be used any time you need additional characters. Available on the enhanced IIe as well as the IIc, they include line segments, arrows, open and closed apples, cursors, and more. The Mousetext character set works in 40 or 80 columns and is easy to use from BASIC.

Apple II computers with Mousetext also contain enhanced video firmware, a collection of screen routines in ROM (Read Only Memory) used in place of the original monitor routines. One advantage of the enhanced firmware is that it makes Mousetext much easier to use. When enhanced video is activated, the cursor is an inverse box instead of the normal flashing box. To turn on the firmware on the Apple IIc, press the ESC key, followed by the 4 key for 40 columns or the 8 key for 80 columns. On the extended IIe, type PR#3 and press RETURN (this also works on the IIc). PR#3 puts you in 80-column mode; use ESC-4 and ESC-8 to switch between 40 and 80 columns.

Once the enhanced firmware is on, PRINT CHR\$(27) replaces inverse mode uppercase characters with Mousetext.

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Now the INVERSE command turns Mousetext on and the NORMAL command turns it off. Uppercase characters printed in inverse mode appear as Mousetext, but inverse lowercase characters are still available. PRINT CHR\$(24) restores the normal inverse uppercase characters without affecting Mousetext already on the screen. By using the INVERSE and NORMAL commands and PRINTING CHR\$(27) and CHR\$(24), it's possible to mix Mousetext, inverse uppercase, and normal uppercase on the screen at once. To see all the Mousetext characters, type in and run the following one-line program:

```
10 PRINT CHR$(4); "PR#3":PRINT
   CHR$(27):FOR I=64 TO 95:
   INVERSE:PRINT CHR$(I);:NOR
   MAL:PRINT " ";:NEXT:PRINT
   :FOR I=64 TO 95:PRINT C
   HR$(I);:NEXT
```

Atari Custom Characters

I know how to use CALL CHAR on the TI-99/4A computer to create custom characters, but how is this done on the Atari?

Marc Breaux

Atari BASIC lacks a command such as CALL CHAR to redefine characters in a single step, so you have to build a routine with PEEKs and POKEs instead. There are four steps involved, as demonstrated by the following program, which changes the exclamation point into an alien shape.

First, line 10 lowers the top of memory to reserve a protected area for the new character set. This example lowers the top of memory by 2,048 (8*256) bytes, enough room for a full character set. You must declare a graphics mode after doing this to make the computer relocate screen memory just below the protected area. Next, line 20 copies the part of the original character set you'll need from ROM (Read Only Memory) into the protected memory. The ROM characters start at location 57344. Line 30 then POKEs the data for the new characters into memory. Finally, line 40 tells the computer where to find the new character set by POKEing the high byte of the new character set's address into location 756.

Numerous articles describing these techniques in more detail have appeared in past issues of COMPUTE! and are reprinted in such books as COMPUTE!'s First Book of Atari Graphics and Second Book of Atari Graphics.

```
10 A=PEEK(106)-8:POKE 106
   ,A:GRAPHICS 0:CHBAS=25
   6*A:REM PROTECT 1024 B
   YTES OF MEMORY
20 FOR A=0 TO 2047:POKE C
   HBAS+A,PEEK(57344+A):N
   EXT A:REM COPY NORMAL
   CHARACTER SET TO RAM
```

```
30 FOR A=CHBAS+8 TO CHBAS
   +15:READ B:POKE A,B:NE
   XT A:REM PUT NEW CHA
   RACTER DEFINITION AT EX
   CLAMATION POINT
40 POKE 756,A:REM CHANGE
   CHARACTER POINTER
50 DATA 60,126,90,126,60,
   36,66,129
```

40 IBM Function Keys

I have an IBM PC and have written many BASIC programs. To increase speed and minimize typing errors, I usually reassign all 10 function keys. But sometimes 10 keys is not enough. I have seen programs like *Symphony* that allow as many as 20 function keys. Is there any way I can use the ALT key to assign additional function keys?

Ralph D'Angelo

As you've learned, IBM BASIC supports only 10 soft key assignments. Function keys 1-10 are called soft keys and can be reassigned with a statement like KEY 1, "CLS:FILES" + CHR\$(13) in direct mode or in a program. The KEY() and ON KEY() GOSUB statements make it possible to trap as many as six additional keys (see "Readers' Feedback," September 1985), but that method can't provide a full extra set of function keys. However, you can get four sets of function keys—40 keys in all—by checking for extended scan codes. When you press a single key, it generates a single scan code (a number in the range 0-255). Extended (two-number) scan codes are generated when you press ALT, CTRL, or SHIFT with another key. This program illustrates one keyboard scanning method that works on both the PC and PCjr; it detects F1, ALT-F1, CTRL-F1, and SHIFT-F1, displaying the scan codes for whatever keys you press.

```
0 FOR J=1 TO 10:KEY J,"":NEXT
J
1 DEF FNF1(X)=(X$=CHR$(0))+CHR
  $(59):DEF FNALTF1(X)=(X$=C
  HR$(0)+CHR$(104))
2 DEF FNCTRF1(X)=(X$=CHR$(0)+
  CHR$(94)):DEF FNSHFF1(X)=(X
  $=CHR$(0)+CHR$(84))
3 X$=INKEY$:ON (FNF1(A)*-1)+(
  FNALTF1(A)*-2) GOSUB 6,7
4 ON (FNCTRF1(A)*-1)+(FNSHFF1
  (A)*-2) GOSUB 8,9
5 FOR J=1 TO LEN(X$):PRINT AS
  C(MID$(X$,J,1)):NEXT J:GOTO
  3
6 PRINT "Pressed F1":RETURN
7 PRINT "Pressed Alt-F1":RETU
  RN
8 PRINT "Pressed Ctrl-F1":RET
  URN
9 PRINT "Pressed Shift-F1":RE
  TURN
```

Lines 1-2 define user functions for the key combinations we want to detect. The INKEY\$ statement in line 3 returns the scan codes in X\$; and the ON-GOSUB statements in lines 3-4 transfer control to

appropriate subroutines. Detecting additional key combinations is simply a matter of adding more user functions and appropriate subroutines. Page G-7 of the IBM BASIC Manual and pages G-6-G-7 of the PCjr BASIC Manual list all the extended scan codes; note that certain key combinations don't generate extended codes.

Arabian Atari?

I own an Atari 800 and have been trying to change the movement of the cursor so that I can type from right to left instead of left to right. I have looked at a large number of books without finding any answer. Is this possible in Atari BASIC?

Nour Abdullah Al-Rasheed
P.O. Box 2532
Hofuf, Al-Hassa 31982
Kingdom of Saudi Arabia

Every microcomputer that we've seen expects characters to be arranged in the left-to-right order common to Western languages. However, the arrangement of text is simply a convention, and some languages use different conventions. Arabic, Hebrew, and Japanese are read from right to left, Chinese is read from top to bottom, and so on.

A true solution to your problem in Atari BASIC is next to impossible. To really make it work, you'd have to rewrite (in machine language) every part of BASIC and the operating system (OS) that manipulates text. Since BASIC and the OS are large, complex machine language programs, this project could take an expert programmer weeks or months. Then, to make the change permanent, you'd need to burn the modified BASIC and OS—as well as a new character set—onto PROM (Programmable Read Only Memory) or EPROM (Erasable PROM) chips and replace the machine's original chips. It's not impossible, but it involves far more labor than most people would be willing to expend. Also, there would probably be compatibility problems with commercial software.

If you don't mind a little inconvenience, there is a crude solution. Move your monitor to one side and turn it sideways, then mount a large mirror at an angle where the monitor used to be. Watch the mirror instead of the monitor, and each line appears to be typed from right to left. Once that's done, you need to design a set of backward characters that will appear correct when viewed in the mirror. We have reprinted your address in case any of our foreign readers have a better solution.

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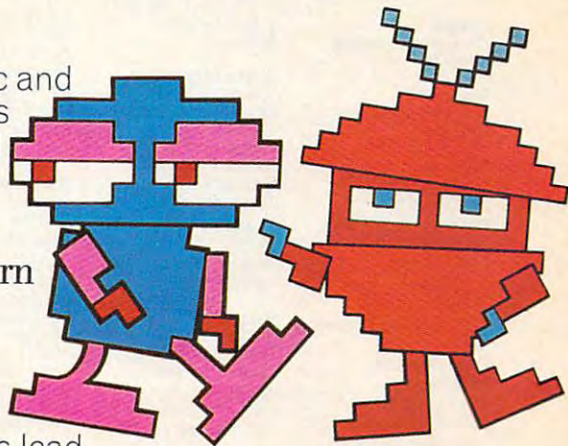
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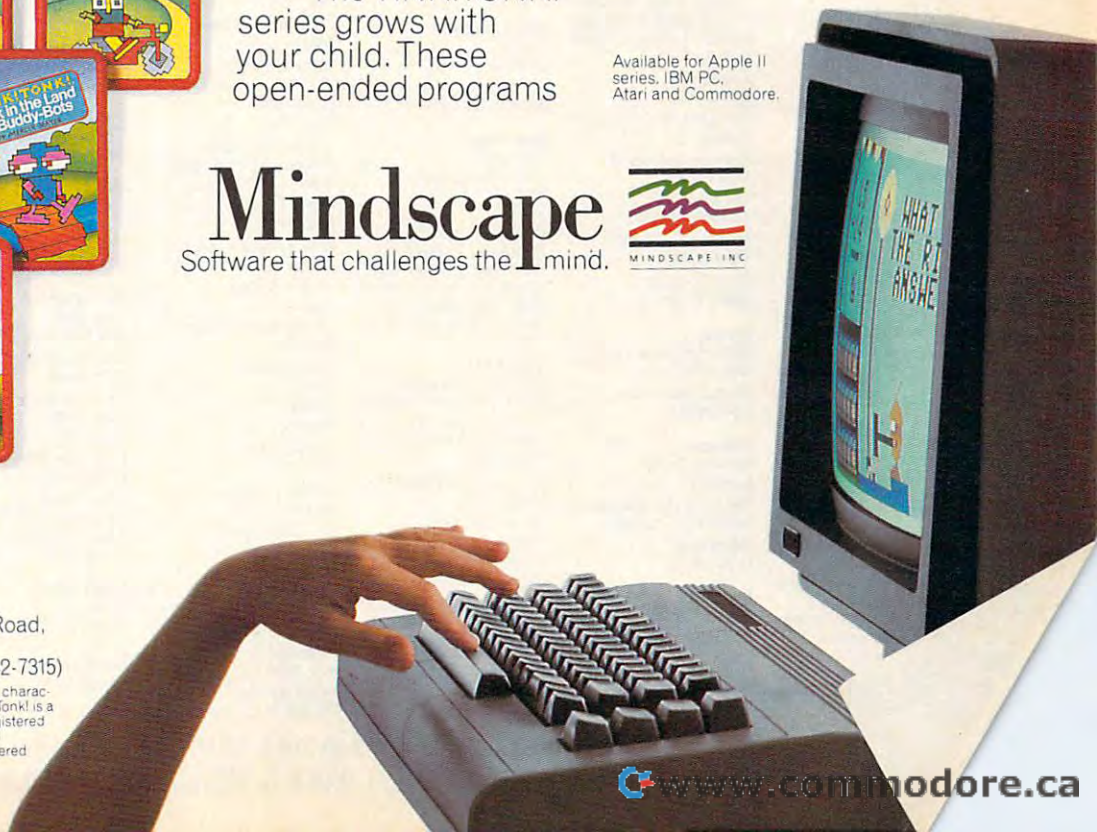
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your "MLX" machine language entry utility. I want something that looks like this:

49152: 169,091,133,170,169,200,092

Darwin Clay

We frequently get letters from readers who want to generate MLX-style listings for their own machine language (ML) programs. However, while it's occasionally useful to convert an ML program into BASIC, there is no practical reason to list it in MLX format. An MLX listing is not a program—the only thing you can do with it is create a machine language program by running MLX and typing in the listing. Since you already have the ML program, that would be a fruitless exercise. What you seem to need is a BASIC loader: a BASIC routine that creates a machine language program by reading values from DATA statements and POKEing them into the correct memory locations. BASIC loaders can be added as subroutines to other BASIC programs.

Here are two short programs that construct loaders, using the dynamic keyboard technique to write the necessary DATA statements. The first program creates a loader from an ML program that's already in memory. Enter the starting and ending addresses of the ML program, followed by the beginning line number for the DATA statements (don't use lines 1-8). When the blinking cursor reappears, your BASIC loader is in memory, ready to be saved. The last line of the loader READs the DATA statements and POKEs the correct values into memory. Be sure to save this program before running it: Lines 1-8 erase themselves after the loader is complete.

Since this method uses string operations, it disrupts the contents of the highest memory addresses used by BASIC (just under location 40960 on the 64). That may cause problems if you're trying to make a loader for an ML program that resides in the same area. The solution is to lower the top of BASIC pointer: To protect a 2K area at the top of BASIC, type the statement POKE 56,PEEK(56)-8:CLR and press RETURN.

```
1 INPUT "START ADDRESS";AD:INPUT
  "END ADDRESS";E:INPUT "FIRST
  LINE NUMBER";L:SA=AD:rem 98
2 PRINT "[CLR]" "L" "DATA":rem 123
3 PRINTMID$(STR$(PEEK(AD)),2);
  :NUM=NUM+1:AD=AD+1:IFAD>ETHE
  N7:rem 216
4 IFNUM<16THENPRINT":":GOTO3
  :rem 99
5 PRINT "[HOME]" {2 DOWN} L="L"
  {LEFT}+1:AD="AD" {LEFT}:E="E"
  {LEFT}:SA="SA" {LEFT}:GOTO2"
  :rem 182
6 POKE198,5:POKE631,19:POKE632
  ,13:POKE633,13:END:rem 59
7 PRINT "[HOME]" {2 DOWN} "L+1" FOR
  J="SA" TO "AD-1" {LEFT}:READQ:P
```

```
OKEJ,Q:NEXT":FORJ=1TO8:PRINT
J:NEXT:rem 100
8 POKE631,19:POKE198,12:FORJ=0
  TO10:POKE632+J,13:NEXT:END
  :rem 160
```

In some cases you may not know the ending address of the ML program, or it may be inconvenient to have the ML in memory while you're making a loader. With only slight modifications, this program can make a loader for an ML program stored on disk. First, in line 7 replace the statement FORJ=1TO8 with FORJ=0TO8. Then replace lines 1, 3, 5, and 8 with the lines shown here. This routine works like the first example, but gets the ML data from disk rather than memory. Again, remember to save the program before running it for the first time.

```
0 INPUT "FILENAME";F$:INPUT "FIR
  ST LINE NUMBER";L:OPEN2,8,2,
  "0:" "F$+",P,R":rem 48
1 GET#2,LO$:GET#2,HI$:SA=ASC(L
  O$+CHR$(0))+ASC(HI$+CHR$(0))
  *256:AD=SA:rem 76
3 GET#2,X$:PRINTMID$(STR$(ASC(
  X$+CHR$(0))),2);:NUM=NUM+1:A
  D=AD+1:IFST<>0THEN7:rem 142
5 PRINT "[HOME]" {2 DOWN} L="L"
  {LEFT}+1:AD="AD" {LEFT}:SA="S
  A" {LEFT}:POKE152,1:GOTO2"
  :rem 50
8 POKE631,19:POKE198,12:FORJ=0
  TO10:POKE632+J,13:NEXT:OPEN1
  5,8,15:CLOSE15:END:rem 126
```

The Absent Printer Dilemma

I am trying to write a commercially salable Commodore program in BASIC and wish to make it as crashproof as possible. My problem is this: If the user selects printer output when the printer is disconnected or turned off, the program stops with a DEVICE NOT PRESENT error. Is there any way to detect this condition before the program crashes?

Daniel Henderson

This is a tough problem—so tough that many commercial programs don't even attempt a solution. In BASIC, as you've learned, a CMD or PRINT# command to the printer simply halts program execution with an error message if the device is absent (either turned off or disconnected). The following routine works with Commodore printers which do not require an external interface. Non-Commodore printers are another matter, as we'll explain in a moment.

```
10 DATA32,253,174,32,25,226,32
  ,192,255,162,4,32,201,255,1
  65,144:rem 67
20 DATA41,128,133,252,16,5,169
  ,4,32,195,255,32,204,255,96
  :rem 42
30 SA=828:FORJ=SATOSA+30:READQ
  :POKEJ,Q:NEXT:rem 39
40 SYS SA,4,4,7:IFPEEK(252)=0T
  HEN80:rem 246
```

```
50 PRINT "TURN PRINTER ON, PRES
  S ANY KEY":rem 202
60 GETA$:IFA$="" THEN60:rem 239
70 GOTO40:rem 4
80 PRINT#4,"THIS ROUTINE WORKS
  ":CLOSE4:rem 148
```

Lines 10-30 place a short ML routine in locations 828-858 (the cassette buffer). You can relocate the ML by changing the value of SA in line 30: Replace 828 with the address where you want the routine to start. The SYS statement in line 40 takes the place of the BASIC statement OPEN 4,4,7 (don't forget the comma after SA). When using this routine, the first two numbers after the SYS must always be 4. The third number sets the secondary address and may be changed as needed: SYS SA,4,4,6 does the equivalent of OPEN 4,4,6 in BASIC, and so on. Run the program when your printer is on; the printer should print THIS ROUTINE WORKS. If the printer is not ready, the program prints a warning message and lets you remedy the situation. Location 252 holds a zero when the printer is active, and 128 when it is not.

Unfortunately, this method is limited to Commodore printers. Non-Commodore printers require an external interface between the computer and printer, and most such interfaces draw power whether or not the printer is turned on. Since the interface is always powered up, it responds with an "I am here" signal which convinces the computer that a printer is present—even when the printer is turned off.

Apple, IBM ML Addresses

Can you tell me how to find the beginning and ending addresses of a machine language program for the Apple IIe?

Bill Link

Ever since we told Commodore and Atari readers how to do this, owners of other machines have been asking for equivalent routines. Here are two routines for the Apple II (DOS 3.3 and ProDOS); we've thrown in an IBM PC/PCjr routine for good measure. The Apple II DOS 3.3 routine is listed first.

```
10 INPUT "FILENAME: ";N$
20 P$ = CHR$(4): POKE 42954,
  0
30 PRINT P$;"OPEN ";N$
40 T = PEEK (46530): IF T < >
  132 AND T < > 4 THEN PRIN
  T "ERROR: "N$" IS NOT A BI
  NARY FILE": GOTO 90
50 PRINT P$;"READ ";N$
60 GET A$,B$,C$,D$: PRINT P$
70 PRINT "ADDRESS: "; ASC (A$
  ) + 256 * ASC (B$)
80 PRINT "LENGTH: "; ASC (C$)
  + 256 * ASC (D$)
90 PRINT : PRINT P$;"CLOSE ";
  N$
100 POKE 42954,127
```

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Here is an equivalent routine for
Apple II machines running ProDOS:

```
10 D$ = CHR$(4): INPUT "FILE  
NAME: ";N$  
20 IF LEN(N$) < 15 THEN N$ =  
N$ + " ": GOTO 15  
30 PRINT D$;"PREFIX"  
40 INPUT PN$  
50 PRINT D$;"OPEN ";PN$;"TDI  
R"  
60 PRINT D$;"READ ";PN$  
70 INPUT F$: IF MID$(F$,2,15  
) < > N$ THEN 70  
80 PRINT D$;"CLOSE ";PN$  
90 IF MID$(F$,18,3) < > "BIN  
" THEN PRINT "ERROR: "N$"  
IS NOT A BINARY FILE": END  
100 D = 0:H$ = MID$(F$,76,4)  
: FOR I = 1 TO 4:H = ASC  
(MID$(F$,75 + I,1)):D =  
D * 16 + H - 48 - 7 * (H  
> 57): NEXT  
110 PRINT "ADDRESS: ";D  
120 PRINT "LENGTH: "; MID$(F  
$,67,5)
```

While the ProDOS CATALOG command provides the same information as the second example, this program also demonstrates how to open and read a disk file from BASIC, something that's not immediately apparent to many users. The final example finds starting and ending addresses on the IBM PC/PCjr:

```
10 INPUT "File name";A$  
20 OPEN A$ FOR INPUT AS #1  
30 IF INPUT$(1,1) <> CHR$(253  
) THEN PRINT "Error: "A$"  
is not a binary file":GOTO  
70  
40 PRINT:GOSUB 90:PRINT "Star  
ting segment: ";S  
50 GOSUB 90:PRINT "Starting a  
ddress: ";S  
60 GOSUB 90:PRINT "File lengt  
h: ";S  
70 CLOSE 1  
80 END  
90 S=ASC(INPUT$(1,1))+256*ASC  
(INPUT$(1,1)):RETURN
```

Borrowing ML From BASIC

How does a command like SYS 49152,1000,A\$(1) work? I know the SYS command calls the routine, but how do you make SYS use the number and the string variable after 49152?

Tim Pickett

It's usually done by calling the same routines in ROM (Read Only Memory) that BASIC uses to accept information. Of course, this must be done from within the ML program called by SYS. Here's a short program for the Commodore 64 that shows one way to handle the statement you mentioned. You'll need a machine language assembler to type it in (the comments after the semicolons are optional):

```
JSR $AEFD ; Check for comma.  
JSR $AD8A ; Get numeric expression.  
LDA #$4E ; (Put your  
JSR $FFD2 ; code here.)  
JSR $AEFD ; Check second comma.
```

```
JSR $AD9E ; Get any expression.  
BIT $0D ; Check string/numeric  
BPL ERROR ; flag in $0D.  
LDA #$53 ; (Put your  
JSR $FFD2 ; code here.)  
RTS  
ERROR LDX #$16 ; Output TYPE  
JMP $A437 ; MISMATCH ERROR.
```

If you assemble this program at 49152, it accepts the statement SYS 49152,1000,A\$(1), printing an N when it confirms that the first value is numeric and S when it determines that the second value is a string. (Of course, a working program would do something more useful than print N and S.) As long as you separate the expressions with commas, you can replace the number with any numeric expression (such as a numeric variable) and substitute any string expression for A\$(1). For instance, SYS 49152,X,"HELLO" is also acceptable.

One advantage of using existing routines is that normal error-handling is preserved. This example detects missing or misplaced parameters as well as type mismatch errors (putting a string value where a number is expected or vice versa). The ROM routine at \$AD8A looks for a numeric expression: If it finds a string instead, it automatically prints an error message and returns control to BASIC. \$AD9E is BASIC's all-purpose evaluation routine: It accepts any expression and sets the flag in location \$0D to show whether it's a string (\$0D=\$FF) or a number (\$0D=0). BASIC's general error-handler (\$A437) prints a BASIC error message determined by what value the X register holds when it is called.

Naturally, it's your job to do something useful with the information once it has been passed. The computer's ROM contains a host of other routines that can simplify that task as well. You may find detailed discussions of the ROM routines in the 64 and VIC-20 in Tool Kit: BASIC and Tool Kit: Kernal, both available from COMPUTE! Books. Commented listings for the 64's ROM can be found in Anatomy of the Commodore 64, available from Abacus Software. ©

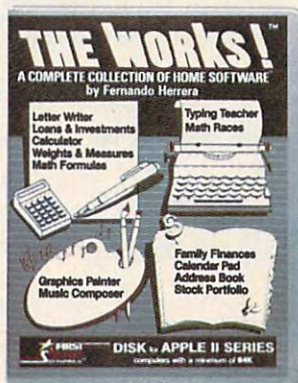
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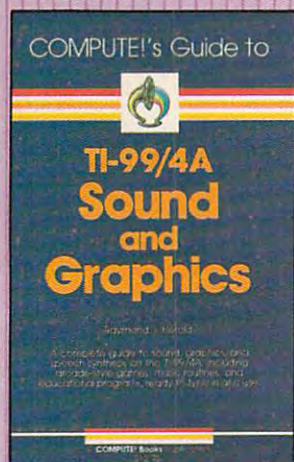
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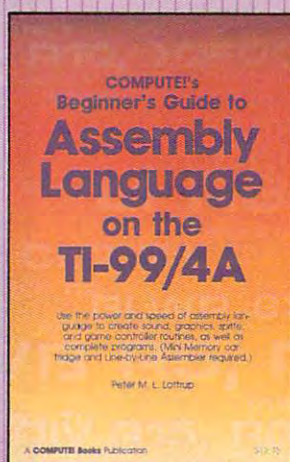
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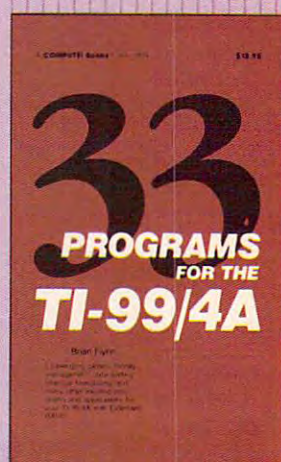
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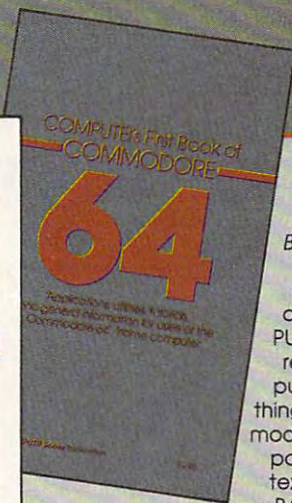
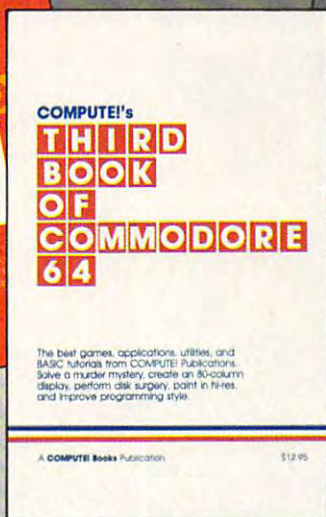
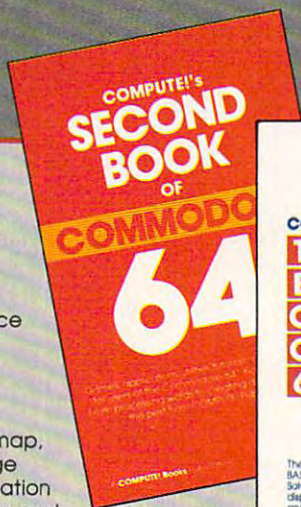
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"I wouldn't want to use the word *easy*. I wouldn't want to tell *anybody* that losing weight is easy. It isn't. That's why people need

strong tools," says Dr. Leighton Read, designer of *The Original Boston Computer Diet*, a weight loss and diet counseling program available for the Commodore 64, Apple II series, and IBM PC/PCjr computers.

Read, an instructor of medicine at Harvard Medical School and a practicing internist, is involved with *decision support technologies*, computer-assisted research on medical decision-making. His medical and computer interests convinced him that a good interactive computer-based diet program could be far more helpful than the hundreds of diet books on the market. He was also concerned about the health consequences of the many fad diets promoted today.

"The computer can do the computations and the bookkeeping, and that's a big help," he says. "It can do the individualization which a diet book can't, and that's a *huge* help. But the real power of this new medium, for the developer, is to capture people's imagination to keep them coming back—because losing weight and keeping it off is a long-term issue."



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in our system. That's because it's "menu-driven," so beginners can simply read the menus (lists of options) that appear on their screens and then type in their selections.

Experts can skip the menus and just type in "GO" followed by the abbreviation for whatever topic they're after.

In case you ever get lost or confused, just type in "H" for help, and we'll immediately cut in with instructions that should save the day.

Besides, you can either ask questions online through our Feedback service or phone our Customer Service Department.

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To access CompuServe, you'll need a CompuServe Subscription Kit, a computer, a modem to connect your computer to your phone, and in some cases, easy-to-use communications software. (Check the information that comes with your modem.)

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Dr. Leighton Read, developer of The Original Boston Computer Diet.

To accomplish all that, Read developed *The Original Boston Computer Diet* with dietician Cris Carlin, psychiatrist Issac Greenberg, and obesity specialist Dr. George Blackburn. Together they used the latest information on dietetics, behavior modification, and obesity research.

In addition to food reporting, meal planning, and other dieting techniques in *The Original Boston Computer Diet*, there are also the counselors—George, Amy, and Shirley. Each has a different personality. You choose the counselor you want, and the character guides you through each session, offering suggestions, warnings, encouragement, and even disapproval.

George, for instance, reacts in a matter-of-fact, straightforward way. He can even be a bit stern when you don't follow your plan. Shirley is breezy and freewheeling, and Amy is the sweet counselor who'll help you, but never hurt your feelings. Each counselor follows the same medical and dietary guidelines, but they give different kinds of psychological responses.

"You need to have a long-term compact with a weight-control program," says Read. "If it's dry and uninteresting and strictly a calculator, people aren't likely to have enough exposure to it. So you cap-

ture their imagination just a little bit, get them engaged, stimulate their curiosity, and give them a sense that there's a reason to come back to the computer."

The 97-page manual includes readings on exercise, junk food, diet drugs, snacking, eating habits, setting goals, and other related topics. A second booklet contains detailed instructions on food reporting and meal planning. A database in the program, containing a large list of foods normally eaten by Americans, has room for you to add up to 300 additional foods as well. Designed for people who want to lose 10 to 40 pounds, the program also tracks and graphs the dieter's progress. Only one person can use the program at a time, but a second set of disks is available for \$10.

Based on the success of *The Original Boston Computer Diet*, Read feels that he and other developers will be creating many more computer packages for self-improvement, including programs for exercising, managing stress, and quitting smoking.

The *Original Boston Computer Diet* is by no means the only program of its kind on the market. There are dozens of other packages available for the more than 80 million Americans who are overweight. They range from nutrition education programs for children to sophisticated trackers for adults on restricted diets.

One of the most popular diet books of the last decade, *The Complete Scarsdale Medical Diet*, has been adapted for the IBM PC and Apple II series. It uses the same Gourmet, International, Vegetarian, Money-Saver, and Basic diets found in the book. A meal-planning calendar helps people schedule their eating patterns. After users choose their menus, the program automatically compiles a shopping list for one or more people. As with the *Boston Diet*, the food directory is expandable. And the *Scarsdale* package also analyzes the caloric and nutritional values of the menus, offers guidance on balancing meals, and shows comparisons among different foods.



A good day on The Boston Computer Diet and this screen figure climbs to the top of the hill.

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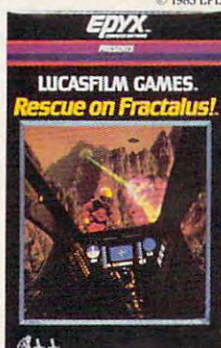
	C64/128	ATARI	APPLE
Rescue on Fractalus!	✓	✓	✓



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Baseball	160-200
Squash	180-240
Tennis, amateur	180-220
Volleyball	180-220

Press ⌘E to exit

A screen from the Scarsdale Medical Diet showing how much exercise it would take to work off a specific amount of food.



"This highly successful diet can be custom-tailored to an individual's lifestyle and fitness goals," says Kenzi Sugihara, director of Bantam Electronic Publishing, which sells *The Complete Scarsdale Medical Diet*. "It's an interactive diet management system that's like having one's own personal diet counselor." Bantam Books also published the paperback version of the book, which is included with the computer program.

Among the attractions of these programs is the custom-tailoring which Sugihara mentions. For example, both programs ask for your current weight, height, frame size, and sex to determine your ideal weight. *The Original Boston Computer Diet* goes even further, asking such questions as how much you eat, what kinds of foods you eat, how fast you eat, and so on, building a profile of your habits. And both programs have help screens or

information windows to guide novice users.

A number of programs are available to teach children the fundamentals of nutrition. The approaches are as varied as the number of packages. For instance, *Nutrition Express*—designed for youngsters nine years or older—uses a game format. Available for the Apple II series, the program guides players through the imaginary land of FodaFoda. The Fodars ask questions about food and teach about the basic food groups.

Published by the Center for Science in the Public Interest, *Nutrition Express* teaches children to think about nutrition as they make everyday decisions about food. Consider this sample question: "Beer and soda ads use slim and healthy actors. Do you think the actors got that way by drinking beer or soda pop?"

Another nutrition program for children is *Snackmonster: A Nibbler's Dilemma*, also for the Apple II series, Commodore 64, and IBM PC/PCjr computers. This educa-

tional game tempts youngsters with snacks. If they choose the ones with the lowest calorie count, they win.

The Minnesota Educational Computing Consortium (MECC) offers *Food Facts* for the Commodore 64 and Apple II series. *Food Facts* lists the refined sugar content of 64 breakfast cereals, the ingredients in common foods, the time it takes to burn off calories in fast foods, and the percentage of the federal government's recommended daily allowances for eight nutrients in 64 common foods.

Taking yet another approach, Wholebody Health Management publishes *Calorie Calculation—Stress*, a package for adults that determines the number of calories you need and also helps uncover sources of stress in hypothetical situations. Available for the Commodore 64 and Apple II series computers, the two modules—dealing with calories and stress—can be purchased together or separately.

Closely related to computer diet programs are exercise and fitness packages. While still outnumbered by the diet programs, this software genre shows a strong potential for growth as the packages become more sophisticated and interactive.

Avant-Garde's *Be Your Own Coach*, for the Commodore 64, Apple II series, and IBM computers, helps joggers keep their own logs, whether it's just a couple of runs a week or training for a marathon. Developed by Robert Lee Smith, a successful marathon runner, triathlete, and coach, the program produces 14 different types of workouts, tailors each workout to your abilities, and prompts you to record mileage, speed, heart rate, weight, and even your feelings after each run. The software also graphs your progress and can forecast pace and mileage progressions.

MECA's *The Running Program*, subtitled "Your Personal Running Coach," tries a similar angle. It was developed by noted runner and writer James Fixx before his death. *The Running Program* evaluates your fitness level, sets personal

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	APPLE	MAC	C64/128
Winter Games	✓	✓	✓



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training goals, creates day-by-day training schedules, records and graphs statistics, and predicts your probable performance at different race distances. It is available for IBM computers.

As with the diet programs, the interactivity of the computer gives a more personalized approach to training and recording your workout efforts. Training schedules can be customized and are easily restructured as circumstances change. Should you injure yourself or find that you're overtraining, it's a simple matter to revise the schedules. In fact, both *Be Your Own Coach* and *The Running Program* offer guidance when such problems occur.

The popularity of aerobics has been captured in a workout program appropriately called *Aerobics*. Published by Spinnaker Software for the Atari and Commodore 64 computers, *Aerobics* is an overall fitness program with a variety of difficulty levels and a choice of musical backgrounds. An onscreen instructor takes you through all the exercises to the accompaniment of music. Different levels and intensities of aerobic exercises are built into the program. You can even choose your own exercises and the order in which you want to do them.

Finally, for the busy executive with an Apple II-series computer, Monument Computer Service publishes *Executive Fitness*. Suggested exercises are shown onscreen, and harried executives can follow along at their own pace.

As computers grow more powerful and software more sophisticated, diet counselors and fitness coaches on disks will become even more helpful, knowledgeable, and interactive. More and more doctors, coaches, and other health professionals are discovering that computers can become amazingly helpful instructors and guides. But no matter what the goal, says Dr. Leighton Read, most of the effort has to come from you. "The critical issue is the motivation, the planning, and building it into your life," says Read. And even the best computers and programs can go only so far to help you reach those goals.

460

Enter an Exercise on Wednesday, November 7, 1984

12:17:52a

You are on day 38 of your program to increase your mileage to 30 miles/week.

You are scheduled to run 2.2 miles today.

Reminder: You have decided to cut down by 500 calories per day.

You have selected the exercise: Running--LSD.

How many miles did you go? 2.50 How long did it take? 0:22:00

Your pace was 08:48 minutes/mile.

You "burned" about 250 calories during this exercise.

Enter comments to be saved with this record:

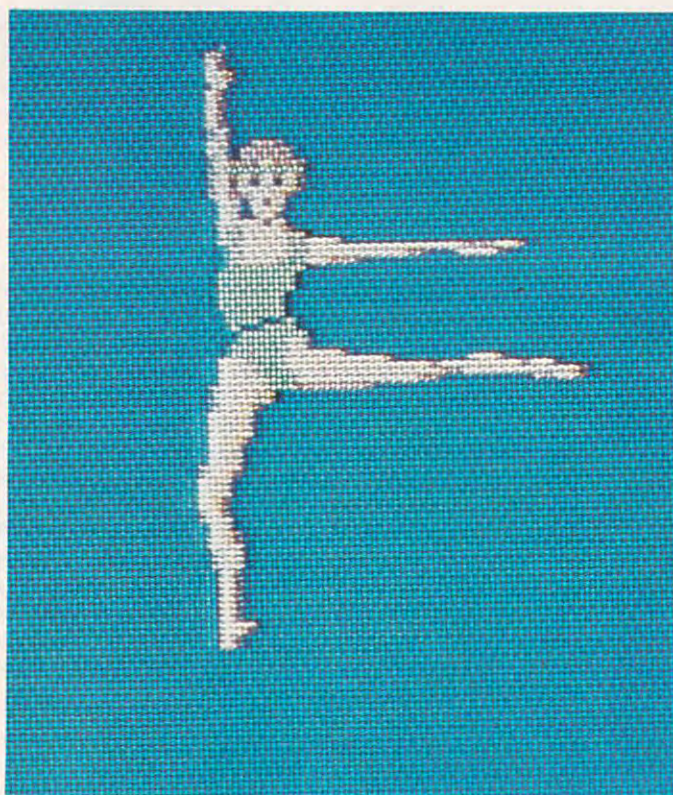
F1 - Add this new record

F3 - Change your recorded weight (presently at 130.0)

F9 - Back up without adding

F10 - Return to the Chapter Directory

A training log from The Running Program, showing the day, the distance, the calories expended, and a diet reminder.

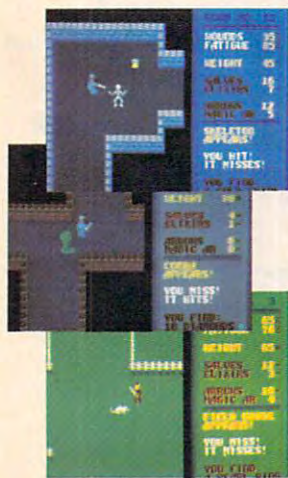


An onscreen instructor guides you through exercises in Spinnaker's Aerobics.

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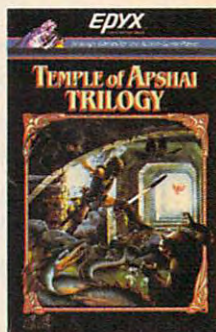
Temple of Apshai Trilogy



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Aerobics
Spinnaker Software Co.
1 Kendall Square
Cambridge, MA 02139
Atari 400/800, XL, XE
Commodore 64
\$34.95

Be Your Own Coach
Avant-Garde
37-B Commercial Blvd.
Novato, CA 94947
Commodore 64, \$39.95
IBM PC/PCjr (128K RAM), \$49.95
Apple II series (64K RAM), \$49.95
Calorie Calculation—Stress
Wholebody Health Management
18653 Ventura Blvd.
Suite 137
Tarzana, CA 91356
Apple II series (48K RAM)
Commodore 64
\$19.95 for Stress disk
\$16 for Calorie Calculation disk
\$25 for both

The Complete Scarsdale Medical Diet
Bantam Electronic Publishing
Bantam Books, Inc.
666 Fifth Avenue
New York, NY 10103
Apple II series (48K RAM)
IBM PC/PCjr (128K RAM)
\$39.95

Executive Fitness
Monument Computer Service
Village Data Center
P.O. Box 603
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Apple II series (48K RAM)
\$19.95

Food Facts
MECC
3490 Lexington Avenue N.
St. Paul, MN 55112
Apple II series (48K RAM)
Commodore 64
\$45

Nutrition Express
Center for Science in the Public Interest
1501 16th St. N.W.
Washington, D.C. 20036
Apple II series (48K RAM)
\$39.95

The Original Boston Computer Diet
Scarborough Systems, Inc.
55 S. Broadway
Tarrytown, NY 10591
Commodore 64, \$49.95
Apple II series (64K RAM), \$79.95
IBM PC/PCjr (128K RAM), \$79.95

The Running Program
MECA
285 Riverside Avenue
Westport, CT 06880
IBM PC (128K RAM), PCjr (256K RAM),
\$79.95

Snackmonster: A Nibbler's Dilemma
The Learning Seed Co.
21250 N. Andover Road
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Apple II series (48K RAM)
IBM PC/PCjr (64K RAM)
Commodore 64
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					Systems				
This Month	Last Month	Title	Publisher	Remarks	Apple	Atari	Commodore	IBM	Macintosh
Entertainment									
1.	3.	<i>Gato</i>	Spectrum Holobyte	Submarine simulation	•			•	
2.	1.	<i>F-15 Strike Eagle</i>	MicroProse	Air combat simulation	•	•	•	•	
3.	4.	<i>Karateka</i>	Brøderbund	Action karate game	•		•		
4.	2.	<i>Flight Simulator II</i>	SubLogic	Aircraft simulation	•	•	•		
5.	5.	<i>Flight Simulator</i>	Microsoft	Aircraft simulation				•	
Education									
1.	2.	<i>Math Blaster!</i>	Davidson	Introductory math program, ages 6-12	•	•	•	•	
2.	1.	<i>Typing Tutor III</i>	Simon & Schuster	Typing instruction program	•		•	•	•
3.	3.	<i>New Improved MasterType</i>	Scarborough	Typing instruction program	•	•	•	•	•
4.	5.	<i>Music Construction Set</i>	Electronic Arts	Music composition program	•	•	•		
5.		<i>Sky Travel</i>	Commodore	Astronomy learning program			•		
Home Management									
1.	1.	<i>Print Shop</i>	Brøderbund	Do-it-yourself print shop	•	•	•		
2.	2.	<i>The Newsroom</i>	Springboard	Do-it-yourself newspaper	•		•	•	
3.		<i>Print Shop Graphics Library II</i>	Brøderbund	Upgraded graphics library	•	•	•		
4.	3.	<i>Print Shop Graphics Library</i>	Brøderbund	100 additional graphics	•	•	•		
5.	4.	<i>Print Master</i>	Unison World	At-home print shop				•	

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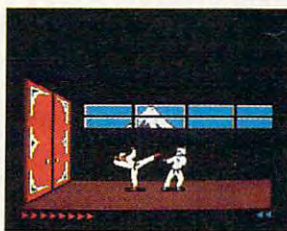
Scale the mighty cliffs that lead to Akuma's fortress. There, you

will encounter the first of many palace guards. Kick! Thrust!

Parry! At every turn you will face yet another warrior, each stronger

than the last.

Finally, Karateka, you will come face-to-face with Akuma himself. Here your fate will be decided. Either eternal happiness or instant death. THE MAKING OF KARATEKA.



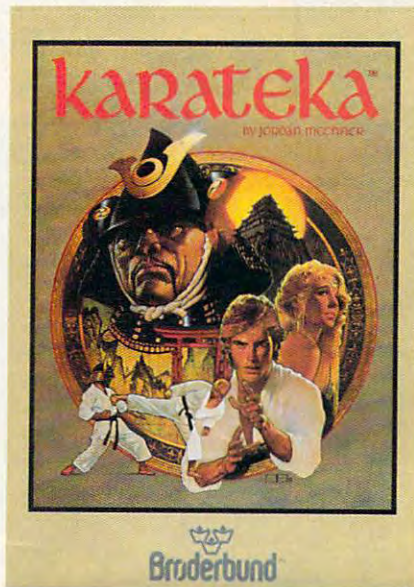
"Karateka" designer Jordan Mechner is a karate enthusiast and a stickler

for realism. He used film clips of karate masters as a guide for the moves used in the game.

The carefully detailed, animated figures perform all the moves of real martial arts combat with stunning realism.

Beautiful scrolling, hi-res backgrounds, an intricate story line and

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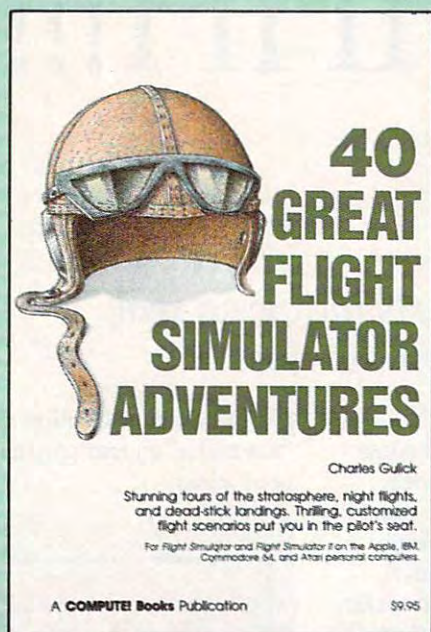

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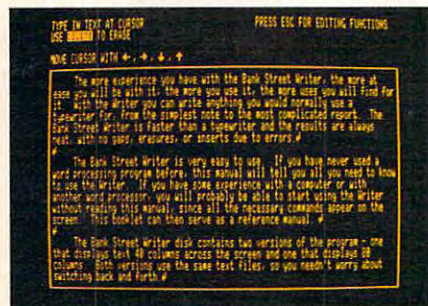
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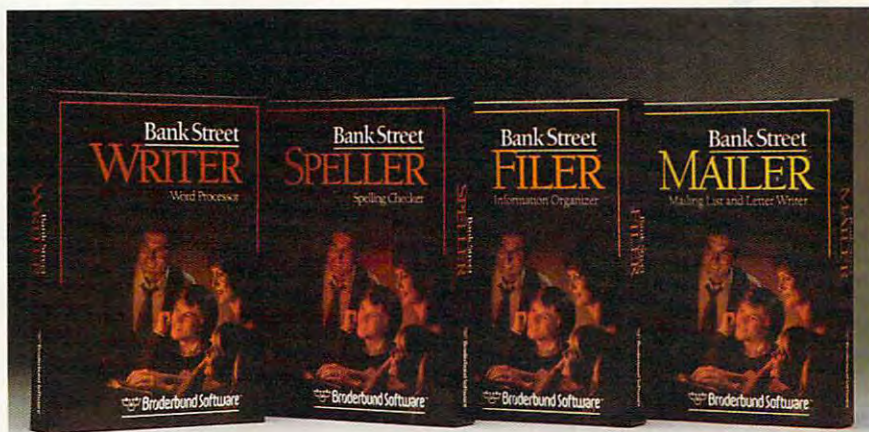
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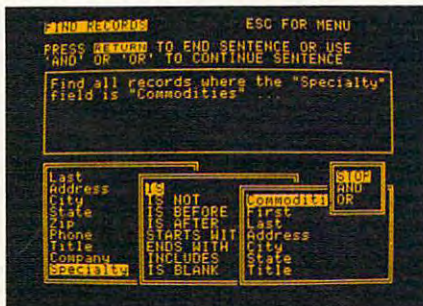
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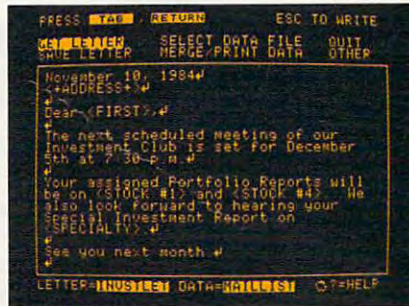
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A Taxing Alternative

Kathy Yakal,
Assistant Features Editor

Americans probably dread no day more than April 15: income tax deadline. For many people, the annual tax filing ritual is a frustrating exercise in organizing hundreds of scattered financial records. Even if you're due a refund, it still means hours of poring over numbers to prove it. However, a growing number of software publishers are offering help via tax-preparation and tax-planning software.

Filing your income taxes seems so easy when you only have a part-time job in high school. You get one form from your employer, write a few figures on the short form, mail it in, and get back a check.

When you first start working full time, it's still pretty simple. The short form suffices for a few years, since you haven't yet reached a tax

bracket that claims very much of your income. But your salary keeps inching upward, and you start to see the percentages shift. Less money for you, more for the government. Unless you buy a house. Or have children. Or invest in tax shelters like Individual Retirement Accounts (IRAs).

Whatever your situation, you've probably found tax preparation more troublesome each year. But there are options. You can buy books prepared by experts to help you legally find as many breaks as possible and streamline the process of filling out the forms. Or you can take all of your shoe boxes and file folders into a tax service and pay them a fee to sort through it all.

Home computer software offers another alternative. Help with tax preparation and planning is available in three different formats. Some personal finance programs

contain a section for entering tax information that can be tallied at the end of the year. Some have companion tax programs that are integrated with the main package. And a few stand-alone products are devoted solely to income tax preparation.

There's no way to completely avoid some fundamental understanding of tax laws. Even if you go to a tax service, you still have to know what information your preparer will need. And all through the year, you'll need to keep track of pertinent paperwork.

A computer, however, offers some significant advantages over traditional tax preparation methods. For example, with a computer you can easily ask *what if?* Let's say that when you sat down to do your taxes last March, you found that you owed \$1,000 on top of what you had been paying in all year.

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Height	<input type="checkbox"/>	LAVEN
	<input type="checkbox"/>	ORAN
Colors	<input checked="" type="checkbox"/>	PINK
	<input type="checkbox"/>	PURP
Timing Time	<input type="checkbox"/>	RED

Part I - Resale Profits (Losses)

From livestock:	\$23,000.00
From other items resold:	\$2,450.00
Livestock and Produce Raised and Other Income	
Animals:	\$1,200.00
Plants:	\$500.00
Other farm income:	\$220.00

Part II - Farm Deductions

Labor, machines, fuel:	\$1,120.00
Taxes, shipping, insurance:	\$500.00
Land/Crop/Animal upkeep:	\$3,000.00
Depreciation:	\$102.00
Other farm expenses:	\$708.00

NET FARM INCOME (LOSS): \$21,940.00

F2 - Use Budget value for cursor item

F3 - Use Budget value for all items

A, B, C, D, E, G, W - Schedules

F9 - Return to Form 1040

F10 - Leave this chapter

Press ESCape for Help

Managing Your Money, designed by financial expert Andrew Tobias, is a very easy-to-use personal finance package. If you enter pertinent financial information regularly, it can help determine the most advantageous way to file your income tax return.

Tax programs can help you make sure the additional payment is necessary by suggesting alternatives, and by re-figuring the taxes as many ways as are legally possible.

For example, what if you income-average? If your salary took a recent dramatic upswing in the last year but you have no more deductions to claim than you did a year ago, you're likely to be sending a sizeable check in with your return. *Plus* you'll be charged a penalty for underpaying during the year. But if you were to income-average, you could end up getting money back.

How about tax-deductible expenses? Did you move in the last year; have unusually large medical bills; or buy a new car and a new house and pay a lot of interest? Tax software alerts you to any possible deductions.

These programs can also remind you of income that must be claimed for tax purposes, such as capital gains, freelance work, or income tax refunds from the previous year. Again, if you're familiar with tax laws, you'll know these things already. If you're not, you'll learn. And you will be better equipped for the next tax year.

Income tax software cannot prevent the annual tax preparation marathon if you haven't kept good records throughout the year. Many personal finance software packages offer ongoing accounting, making it much simpler to gather the necessary information when it's tax time. *Managing Your Money*, designed by financial expert Andrew Tobias for the Micro Education Corporation of America, has that capability. You can either estimate your annual income and deductions, or pull up actual figures from elsewhere in the program. The program suggests different tax strategies to try—like filing singly instead of jointly—and can figure and refigure your taxes in seconds. It also prints out much of the documentation you'll need to submit to the IRS.

Your Personal Net Worth, from Scarborough Systems, and Timeworks' *Your Personal Financial Planner* (designed in consultation with Sylvia Porter) have similar features. If used regularly to keep track of income and expenses, a few keystrokes will sort out necessary tax information.

Also, some publishers offer companion programs to their per-

sonal finance software, specific tax programs that accept information from the main program to tally taxes. Arrays, Inc./Continental Software publishes *The Home Accountant* for general financial tracking, along with *The Tax Advantage*, for computing tax liability.

Swiftax, from Timeworks, is a stand-alone income tax preparation package. It guides you through the process and tells you which forms must be completed. It automatically checks for tax alternatives, and calculates the lowest possible tax. It supports the most commonly used schedules—A, B, C, D, W, SE, and Form 2441—and plugs this information into your Form 1040, 1040A, or 1040EZ. And when you're finished, the program can print out directly onto tax forms, as well as printing additional necessary information such as amortization schedules. Timeworks issues an annual updated program disk for *Swiftax*, incorporating revised tax law changes and tables.

How you choose to prepare your tax returns probably depends on a number of things. If you have only one source of income, no dependents, and own

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Slip the disk in your computer and suddenly you are Arthur Dent, the dubious hero of *THE HITCHHIKER'S GUIDE TO THE GALAXY*, a side-splitting masterwork of interactive fiction by novelist Douglas Adams and Infocom's Steve Meretzky. And every decision you make will shape the story's outcome. Suppose for instance you decide to linger in the pub. You simply type, in plain English:

>DRINK THE BEER

And the story responds:

YOU GET DRUNK AND HAVE A TERRIFIC TIME FOR TWELVE MINUTES, ARE THE LIFE AND SOUL OF THE PUB, THEY ALL CLAP YOU ON THE BACK

>WRAP THE TOWEL AROUND MY HEAD

And the story responds:

THE RAVENOUS BUGBLATTER BEAST OF TRAAAL IS COMPLETELY BEWILDERED, IT IS SO DIM IT THINKS IF YOU CAN'T SEE IT, IT CAN'T SEE YOU.

AND
TELL YOU
WHAT A GREAT
CHAP YOU ARE AND
THEN THE EARTH GETS

UNEXPECTEDLY DEMOLISHED, YOU WAKE UP WITH A HANGOVER WHICH LASTS FOR ALL ETERNITY. YOU HAVE DIED.

Suppose, on the other hand, you decide to:

>EXIT THE VILLAGE PUB THEN GO NORTH

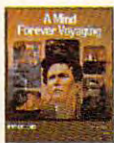
In that case you'll be off on the most mind-bogglingly hilarious adventure any earthling ever had.

You communicate—and the story responds—in full sentences. So at every turn, you have literally thousands of alternatives. If you decide it might be wise, for instance, to wrap a towel around your head, just say so:

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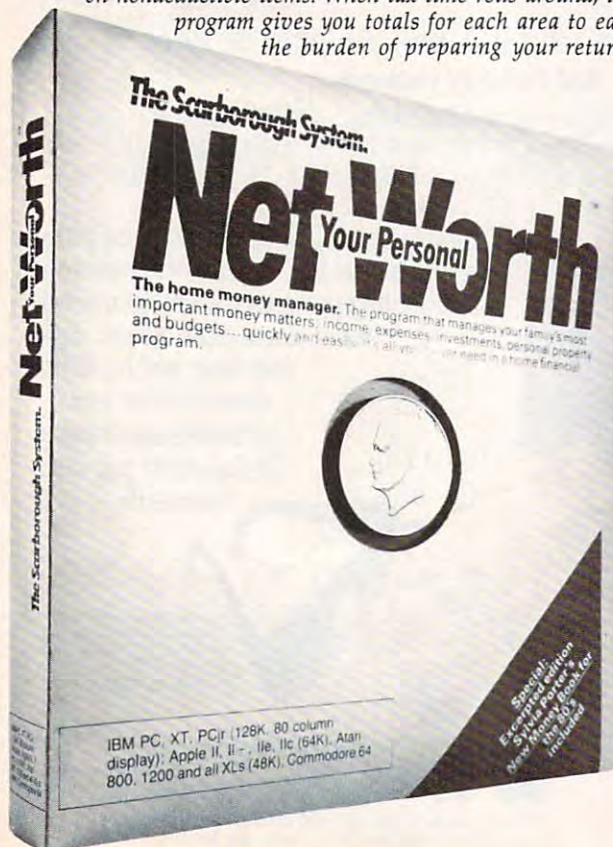
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PC/TaxCut, from Best Programs of Alexandria, Virginia, can be used by individuals, professionals, or small businesses and is capable of handling very sophisticated tax forms. First introduced in 1982, the program has been updated annually. PC TaxCut can be used as a stand-alone tax planning and preparation package or with Best's personal financial management system, PC/Professional Finance Program.

Scarborough Systems' Your Personal Net Worth does not include a fixed set of categories for financial accounts. Instead, it lets you create accounts for your own individual expenses. Each time you make a financial transaction, the program asks if you want a tax record. If you do, it records the relevant parts of the transaction, flagging deductible expenses and interest on loans. Your Personal Net Worth also keeps track of all sales tax paid on nondeductible items. When tax time rolls around, the program gives you totals for each area to ease the burden of preparing your return.



no property or other investments, your tax calculations will not be that difficult. Spending \$100 for software that you will use once may not be money spent wisely.

But if you're at the point where expert help is necessary, here are some things to keep in mind when looking for tax software:

- **Does it contain all the forms you'll need to file?** Most programs have all of the standard, and some nonstandard, schedules. But if the program is missing a crucial one, it may be worthless to you.
- **Can it print directly onto legal tax forms?** Some do, but many just print final figures onto regular paper, requiring you to go back and transfer all the numbers to a form. This may not be terribly important to you, but it's a nice timesaver, and it prevents transcription errors.
- **Can you be reasonably sure that the publisher will supply updates over the next few years?** If using software for your taxes is just an experiment, or a temporary measure to get you through a bad year, this isn't so vital. But if you're looking for a permanent solution, you'll want to ascertain that the software will be kept current as laws change.
- **How extensive are the program's what-if capabilities?** This is key to the usefulness of a tax program. A good program will point out options that will, if possible, lower your tax bill.
- **How thorough and simple is the documentation?** As with any complicated software package, clear, complete instructions are essential. A program with bad documentation may actually add hours to the time it would take you to figure your taxes by hand. Good documentation will reinforce its software by alerting you to tax laws and alternatives.
- **Is it worth the expense?** Bottom line. If you don't expect to find enough hidden refund money to recover more than the cost of the package, it may not be worth it to you (unless you just want to computerize your tax records).

Though these programs can be very helpful to consumers in completing an often complicated annual task, they can be quite a headache for the developers and publishers who must insure their accuracy. After all, these software packages are being used to compile reports made to federal and state governments. Current, legally correct information is essential.

But in the end it's your name on the form. It doesn't matter to the Internal Revenue Service *how* a return is prepared, only that it is correct. "We don't take any position for or against the programs," says Ernest Acosta of the IRS. "Like with anything you do with a computer, the information that goes into it is what determines whether it's going to be successful or not. You should remember that you're the one who signs the tax return. Ultimately, it's your responsibility to make sure it's correct."

"On the whole, they're probably a good idea for people who know how to use them. You still need some tax knowledge to go through and know exactly what you're being asked to input. It's certainly not a substitute for following the instructions and keeping good records and all the other things you would have to do to keep up with your taxes."

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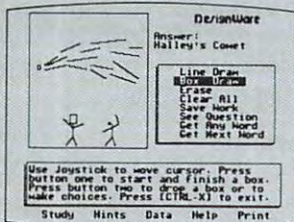


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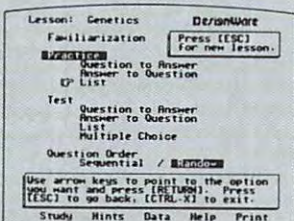
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BALLOON CRAZY

Joseph Russ

Catch as many balloons as you can—but be careful not to fall off your skateboard. This whimsical game was originally written for Atari computers with at least 16K RAM. We've added versions for the Apple II series, Commodore 64, IBM PC (with color/graphics adapter and BASICA), IBM PCjr (with Cartridge BASIC), and TI-99/4A (with Extended BASIC). The 64, IBM, and Atari versions require a joystick. A joystick is optional with the TI version. The Atari and Apple versions can also be played with paddles.

"Balloon Crazy" is a game that children can enjoy, yet its higher levels are a challenge for adults. The goal is simple: You must zip back and forth across the screen on a skateboard while catching falling balloons on top of your head. Since some of the balloons fall very fast, that's not as easy as it sounds. After you've caught enough balloons (six in most versions), you can reach up to pop them, then catch some more. If you miss just one, you lose all the balloons currently in your possession.

Type in Balloon Crazy from the listing for your computer, then save a copy of the program before you try to run it. Every version of the game is similar, so be sure to read the general game rules before referring to the specific notes for your computer.

Oodles Of Balloons

Each game begins by displaying several rows of multicolored balloons at the top of the screen. You are the skateboarder at the bottom. When a balloon begins to fall, move directly under it and catch it on your head. The blue balloons fall slowly, which makes

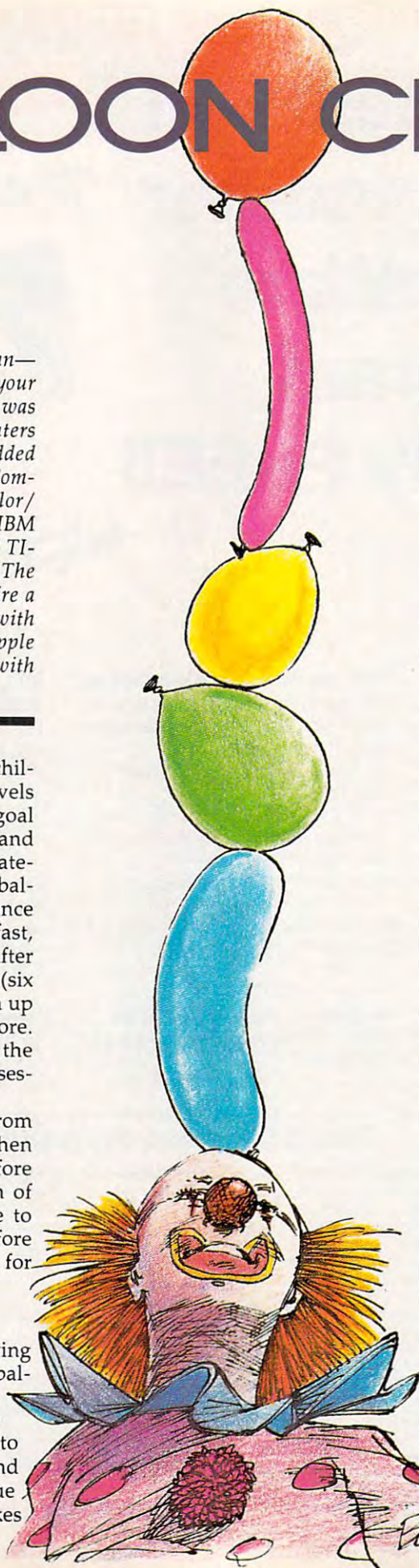
them easy to catch (but worth the fewest points). The green balloons fall faster, but swiftest of all are the red balloons. As soon as you snare a balloon, it joins the pile on top of your head.

Should you miss a balloon, you immediately fall off the skateboard. All the balloons on your head fall and pop. Points are scored only when you have caught the required number of balloons. You have three players to work with in each game: Falling off the skateboard costs you one player. Clearing all the balloons from a screen permits you to advance to the next level—where everything becomes more difficult. Bonuses are awarded at appropriate intervals, and you can earn an extra player by scoring 1,000 points.

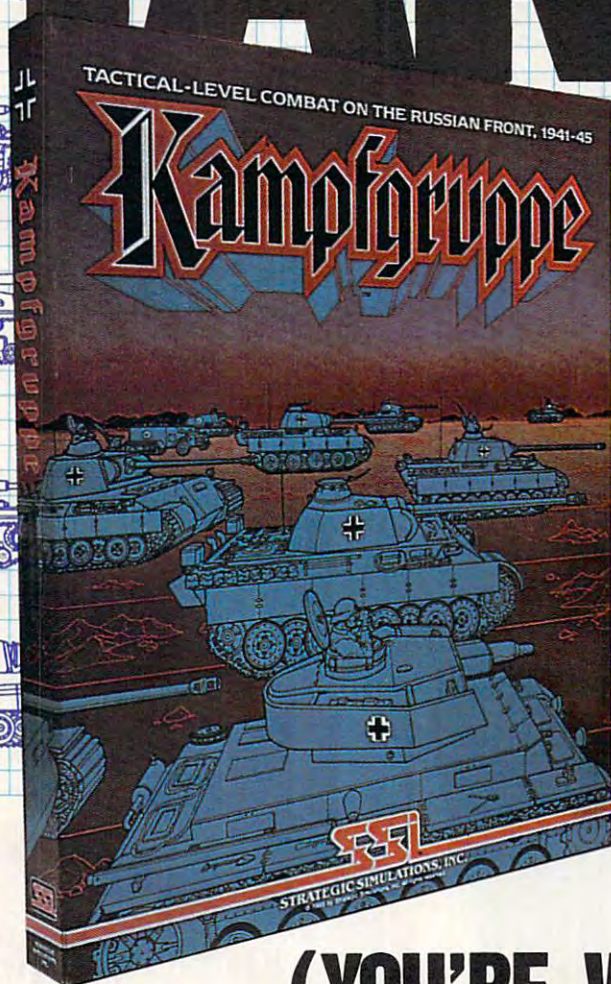
Though the balloons become harder to catch at higher levels, you are never helpless to prevent them from hitting the ground. Should a balloon miss the top of the pile, you can bounce it back into the air by holding down the fire button (or the space bar in some versions) and running into it. The balloon will then float back into the air, and you may try to catch it again.

Atari Version

Balloon Crazy (Program 1) runs on any Atari computer with at least 16K RAM (or 24K for disk). Plug a joystick into port 1 before you run the game, and press START to begin. At the first level, you score 5 points for each green balloon, 10 for blue, and 15 for red. These values are multiplied at higher levels. A bonus player is awarded when you reach 1,000 points and at intervals thereafter. Move left and right with the joystick, and press the fire button when you want to hit a balloon. You must hit



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the balloon with the player's arm. Since the player has a limited reach, be careful not to knock a balloon completely away.

This game requires only horizontal movement, so you might find it easier to use a paddle instead of a joystick. If you have a set of paddle controllers, plug them into port 1 and make the following modification:

```
500 S=STICK(0):PP=255-PAD
   DLE(0):POKE 53248,PP:
   RETURN
1020 IF PTRIG(0)=0 THEN I
   F ABS(BY-178)<3 THEN
   1040
```

Commodore 64 Version

The 64 version of Balloon Crazy (Program 2) is written completely in machine language, and must be typed in with "The New MLX for Commodore 64" machine language entry program found elsewhere in this issue. Be sure to read the instructions for using MLX carefully before you start. You'll need to read the MLX article even if you've used the old version of MLX many times in the past, since this is a completely new version. *No previous version of MLX can be used to enter the data from Program 2.* After you finish entering the game, be sure to save a copy of the game before you play it. Here are the starting and ending addresses required for MLX:

Starting address: C000

Ending address: C81F

Plug a joystick into port 2, then load Balloon Crazy with:

LOAD "name",8,1 for disk

or

LOAD "name",1,1 for tape

(replace *name* with the filename used when you saved the program). Then type SYS 49152 and press RETURN.

You must collect six balloons on your head in order to score points. Blue, green, and red balloons are worth 10, 20, and 30 points, respectively. Use the joystick to move left and right, and press the fire button when you have missed a balloon and wish to bounce it upward. You must hit the balloon with the upper part of the player's body. Note that the player can wrap around from one side of the screen to the other, but the balloons cannot. As a bonus, you are

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We've known for some time that small human-like beings live inside your computer. No news there. What is news is that Activision scientists—the same crack research team that first made contact with the little guys—have now made it possible for Commodore 64/128 and Apple II series owners to meet the inhabitants of their computers.

Yes, the most amazing scientific quest of modern times can now be duplicated in the comfort of your own home, thanks to The Activision Little Computer People Discovery Kit™. But first, for those who've been vacationing on Mars, a little more background.

Little Computer People (LCP), of course, are the ones responsible for that thousand-digit error in your phone bill, for that police officer mistakenly believing you haven't paid your parking tickets, for the syntax errors you get back after you've fed your computer a perfectly good piece of code.

Turns out, the little folk only cause all that mischief because they feel neglected. Treated properly, they're as pleasant and sociable as you or me.

Thanks to the revolutionary "house-on-a-disk" perfected by Activision scientists, LCP can now be lured out of the circuit boards and into the light of day. And fascinating things are being learned.

They seem to have quite a bit to say. They'll tap on the inside of your monitor screen until they get your attention, then pound out messages on their typewriters. They also enjoy playing songs, dancing and playing card games.

Though they share many common traits, the little folk are as individual as Big Regular People (BRP). Consequently, Activision researchers consider it vital that as many computer owners as possible use The Activision Little Computer People Discovery Kit to meet as many LCP as possible. The Discovery Kit includes The Little Computer People™ House-On-A-Disk™ Research Software that is guaranteed to lure out an LCP; the computer owner's guide to the care of, and communication with, Little Computer People; deed of ownership for the House-On-A-Disk; and a special edition of *Modern Computer People* magazine—all the tools needed for observation, interaction, communication and, perhaps, a meaningful relationship.

We recommend that you join the quest immediately. Unless you like being the victim of all those "computer errors".

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awarded an extra player after completing level 5.

Apple Version

Apple II Balloon Crazy (Program 3) runs on Apple II-series computers with either DOS 3.3 or ProDOS. The listing must be entered using COMPUTE!'s "Apple MLX" machine language editor program found elsewhere in this issue. Be sure you understand the instructions for using Apple MLX before entering the data for Balloon Crazy. The MLX starting and ending addresses for the game are:

Starting address: 8000
Ending address: 8D97

After you've entered the game and saved a copy, start the game by entering:

BRUN "name"

where *name* is the filename you used when you saved Balloon Crazy.

You can play the game with a paddle on any Apple II computer: Move the paddle to control the player, and press the paddle button to bounce the balloon upward. Alternatively, keyboard controls can be used on the Apple IIc and Apple IIe: press the open-Apple key to move left, the closed-Apple key to move right, and the space bar to bounce.

Four balloons must be collected to score points. If you miss a balloon completely, all the balloons on your head drift off into space and disappear. There are nine game levels. Red balloons do not appear until the second level, but each higher level contains more red balloons. You may pause the game by pressing RETURN; resume play by pressing the space bar.

IBM PC/PCjr Version

IBM PC/PCjr Balloon Crazy (Program 4) requires a joystick and BASICA (if you have a PC) or Cartridge BASIC (PCjr). You may want to unlock the horizontal axis of the joystick. Before the game begins, you have an opportunity to adjust the joystick if needed: Press Y when prompted and follow the instructions on the screen. In this version, all balloons are red and are worth the same number of points.

The number of balloons you need to catch depends on how many rows of balloons are left on

the screen: Only three are required at first, but this number increases each time you clear an entire row of balloons. When clearing the top row of balloons, you must catch seven balloons to score. There is no way to bounce a missed balloon back into play. After clearing an entire screen of balloons, you may advance to the next screen.

Your final score reflects the number of balloons caught (no bonus is awarded). You may adjust the difficulty of the game by changing the statement $DF=10$ in line 120. The variable DF controls how close you must be to a balloon to catch it. Changing DF to a higher value makes the game easier, and decreasing it makes the game more difficult.

TI-99/4A Version

Balloon Crazy for the TI (Program 5) requires Extended BASIC and is played with either keyboard controls or a joystick. Press the S key to move left and the D key to move right. You cannot bounce a balloon back up after missing it. When you catch a balloon, it turns the same color as the player and immediately increases your score. At higher levels, the balloons fall faster and are worth more points. The game ends when you have lost all three players.

Program 1: Atari Balloon Crazy

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing in Programs" published bimonthly in COMPUTE!.

```

JE 10 GOSUB 4500:GOSUB 5000:
      GOSUB 4000:GRAPHICS 17
      :POKE 756,CHS/256:POKE
      77,0:POKE 559,62:REM
      INITIALIZATION
CH 20 GOSUB 3500:GOSUB 3000
KK 30 GOSUB 2500
LP 40 FOR BY=BL TO 220 STEP
      SL:PM$(P1+BY,D+BY)=B$:
      GOSUB 500:GOSUB 1000:S
      OUND 0,BY,10,8:NEXT BY
      :SOUND 0,0,0,0
FP 50 BAL=BAL-1:GOSUB 1500:L
      F=LF-1:HIT=0:IF LF=0 T
      HEN 4100
IO 60 SOUND 0,0,0,0:PM$(P1+B
      Y,D+BY)=N$:HIT=0:POKE
      PC,1:GOSUB 1005:IF BOH
      =6 OR BAL<1 THEN GOSUB
      2000:BB=169:BOH=0
KF 70 IF BAL<1 THEN GOSUB 30
      10
AE 80 GOTO 30
PF 499 REM MOVEMENT
EC 500 S=STICK(0):PP=PP+((S=
      7)-(S=11)+(PP<65)-(PP
      >200))*3:POKE 53248,P
      P:RETURN
  
```

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```

DB 599 REM POPPING SOUND
GO 600 FOR S=15 TO 0 STEP -1
: SOUND 0,15,0,S: SOUND
1,16,0,S: NEXT S
IG 610 SOUND 0,0,0,0: SOUND 1
,0,0,0: RETURN
IA 999 REM CHECK FOR COLLISI
ON
HK 1000 PEK=PEEK(53261): IF P
EK=0 THEN RETURN
LO 1002 GOTO 1010
NL 1005 FOR I=25 TO 10 STEP
-5: SOUND 0,1,4,8: SOU
ND 1,1+2,2,8: NEXT I:
SOUND 0,0,0,0: SOUND
1,0,0,0: RETURN
LM 1009 REM DID BALLOON HIT
HEAD?
BH 1010 IF BY-BB<3 THEN PM$(
H+BB,P0+BB)=B$: BB=BB
-11: BAL=BAL-1: BOH=BO
H+1: BAL(BOH)=C(I-1,B
R/3): POP: GOTO 60
IL 1019 REM DID ARM HIT BALL
OON?
HJ 1020 IF STRIG(0)=0 THEN I
F ABS(BY-178)<3 THEN
1040
PE 1030 A=A+((A>PP)-(A<PP))
*3: POKE 53249,A: POKE
PC,1: RETURN
NM 1040 P=A: IF HIT THEN P=PP
+((P>PP)-(P<PP))*3
AB 1050 FOR K=BY TO BL STEP
-3: GOSUB 500: SOUND 0
,K,10,8: PM$(P1+K,F+K
)=B$: POKE 53249,P
PE 1060 P=P+((P>PP)-(P<PP))
*(P>65 AND P<200)*
PEEK(53261)=0): POKE
PC,1
OG 1070 NEXT K: SOUND 0,0,0,0
: HIT=1: POP: GOTO 40
GO 1499 REM MAN MISSED BALLO
ON
PN 1500 PM$(P1+BY,P1+BY+100)
=N$
BE 1510 PM$(PM,PB)=P$(1,37):
PM$(P0+190,PB)=MDR$:
POKE 53250,PP-8: FOR
I=200 TO 0 STEP -10:
SOUND 0,1,2,10: NEXT
I
JO 1520 SOUND 0,0,0,0: IF BOH
<1 THEN 1550
PH 1530 FOR I=158 TO BB STEP
-11: FOR J=I TO 175
ED 1540 PM$(P0+J,P0+J+12)=B$
: NEXT J: PM$(P0+J,P0+
J+12)=POB$: GOSUB 600
: FOR K=1 TO 9: NEXT K
: PM$(P0+J,P0+J+12)=N
$: NEXT I
OE 1550 FOR I=1 TO 100: NEXT
I: POKE 53250,0: COLOR
32: PLOT LF,23: SOUND
0,0,0,0
AL 1560 PM$(PT,PB)=P$: POKE 5
3248,PP: BOH=0: BB=169
: PF=120: RETURN
OP 1999 REM POP BALLOONS AND
TALLY POINTS
IG 2000 IF BOH<1 THEN RETURN
OH 2010 FOR I=1 TO BOH: PM$(P
M+1,PD+1)=H$
MM 2020 PM$(P0+158,PM)=POB$:
GOSUB 600: FOR V=1 TO
15: NEXT V: PM$(P0+15
8,PM)=N$: BOH=BOH-1: P
M$(PM,PB)=P$(100,137
)
HF 2030 SC=SC+BAL(I)*5*LVL: P
OSITION 7,0: ? #6; SC:

```



Player/missile graphics animate the player and balloons in the Atari version of "Balloon Crazy."

```

IF SC>BONUS THEN LF=
LF+1: BONUS=BONUS+100
0*LVL: COLOR 72: PLOT
LF,23
JC 2040 IF BOH<1 THEN 2060
EF 2050 FOR K=1 TO BOH: FOR J
=158-K*11 TO 168-K*1
1: PM$(P0+J,P0+J+12)=
B$: NEXT J: NEXT K: NEX
T I
BA 2060 PM$(PT,PM)=N$: RETURN
ES 2499 REM CHOOSE BALLOON T
O FALL
JN 2500 BR=3+INT(RND(0)*6)*3
: FOR I=5 TO 2 STEP -
1: GOSUB 500: LOCATE B
R,I,BT: IF BT=32 THEN
NEXT I: GOTO 2500
GE 2510 POKE 705,PEEK(707+C(
I-1,BR/3)): A=24*(BR/
3+2): BL=32+I*8: POKE
53249,A
IB 2520 PM$(P1+BL,D+BL)=B$: C
OLOR 32: PLOT BR,I
JC 2530 BS=(C(I-1,BR/3)+2)/2
: SL=INT((LVL/3+1)/2+
BS): RETURN
KP 2999 REM DRAW SCREEN
NL 3000 RESTORE 3000: DIM F(3
),C(4,6),BAL(6): FOR
I=1 TO 3: READ A: F(I)
=A: NEXT I: DATA 0,32,
128
NL 3010 PP=120: POKE 53248,PP
: BAL=24: LVL=LVL+1: IF
LVL>10 THEN LVL=10
JN 3020 POSITION 11,23: ? #6;
"LEVEL 3"; LVL: FOR I=1
TO LF: COLOR 72: PLOT
I,23: NEXT I
OL 3030 FOR X=3 TO 18 STEP 3
: FOR Y=2 TO 5: A=INT(
RND(0)*3)+1: COLOR 79
+F(A): C(Y-1,X/3)=A: P
LOT X,Y: NEXT Y: NEXT
X: RETURN
PA 3500 DIM T$(13): T$="BALLO
ON CRASH": POKE 708,1
34: POKE 709,198: POKE
710,86
NF 3510 FOR I=4 TO 16: POSITI
ON 1,I: ? #6; T$(I-3,I
-3): NEXT I
EE 3520 POSITION 1,0: ? #6; "s
core: "; SC
RETURN
KL 3530
EB 3999 REM SET UP VARIABLES
AND STARTING DISPLA
Y
EA 4000 PP=120: BB=169: SC=0: L
VL=0: LF=3: PC=53278: H
=P0-12: PT=P0+69: PB=P
0+206

```

```

BG 4010 PM=PB-38: D=P1+12: F=D
+3: BT=PB-10: PD=PM+23
: BONUS=1000
JN 4020 GRAPHICS 18: POKE 708
,134: POKE 709,198: PO
KE 710,84: POKE 756,C
HS/256
GC 4030 POSITION 3,4: ? #6; "B
ALLON crazy!": POSIT
ION 4,6: ? #6; "PUSH
START"
AD 4040 DIM S$(10): S$="00000
00000": FOR I=0 TO 10
STEP 10: POSITION I,
0: ? #6; S$: POSITION I
,10: ? #6; S$: NEXT I
IA 4050 IF PEEK(53279)<>6 TH
EN 4050
EK 4060 RETURN
FB 4100 POKE 53248,0: POKE 53
249,0: GRAPHICS 17: PO
KE 708,134: POKE 709,
198: POKE 710,84
MI 4110 POSITION 6,4: ? #6; "g
ame over": POSITION 8
,6: ? #6; "SCORE: "
LF 4120 POSITION 9,8: ? #6; SC
: POSITION 5,10: ? #6;
"PRESS START": POSITI
ON 4,12: ? #6; "PRESS
START"
HD 4130 IF PEEK(53279)<>6 TH
EN 4130
HD 4140 CLF: GOTO 10
DA 4499 REM REDEFINE CHARACT
ERS
VB 4500 GRAPHICS 17: POKE 559
,0: DIM C$(2): C$="OH"
KH 4510 CHS=(PEEK(106)-8)*25
6: CHO=57344
ML 4520 IF PEEK(CHS+9)<>0 TH
EN RETURN
BA 4530 FOR I=0 TO 511: POKE
CHS+I,PEEK(CHO+1): NE
XT I
CK 4540 RESTORE 4560: FOR I=1
TO 2: CHP=CHS+(ASC(C
$(I))-32)*8: FOR J=0
TO 7: READ A: POKE CHP
+J,A: NEXT J: NEXT I
PF 4550 FOR I=32 TO 39: POKE
CHS+I,255-PEEK(CHO+I
): NEXT I: RETURN
MC 4560 DATA 28,58,125,125,1
21,62,28,8
CD 4570 DATA 0,16,56,124,56,
60,56,0
CA 4999 REM STE UP P/M
KO 5000 DIM PM$(4096),P$(255
),N$(12),B$(15),POB$
(12),MDL$(16),MDR$(1
6),H$(22)
DB 5010 FOR I=1 TO 12: N$(I)=
CHR$(0): NEXT I
DO 5020 A=ADR(PM$): PMB=INT(A
/2048)*2048: IF PMB<A
THEN PMB=PMB+2048
MA 5030 S=PMB-A: POKE 54279,P
MB/256: POKE 53277,3
EP 5040 PM$(CHR$(0)): PM$(4096
)=CHR$(0): PM$(2)=PM$
: P$=PM$
IP 5050 P0=S+1024: POKE 704,5
4: RESTORE 5070
PO 5060 FOR I=100 TO 137: REA
D A: P$(I)=CHR$(A): NE
XT I: PM$(P0+69,P0+20
6)=P$
FC 5070 DATA 0,16,16,56,56,1
24,124,56,56,60,60,5
6,56,16,16,56,56,124
,124,186,186,185,185
,120,120,40,40,40,40
,40,40

```



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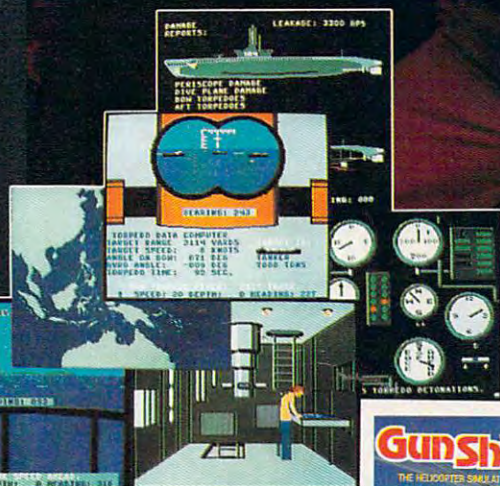
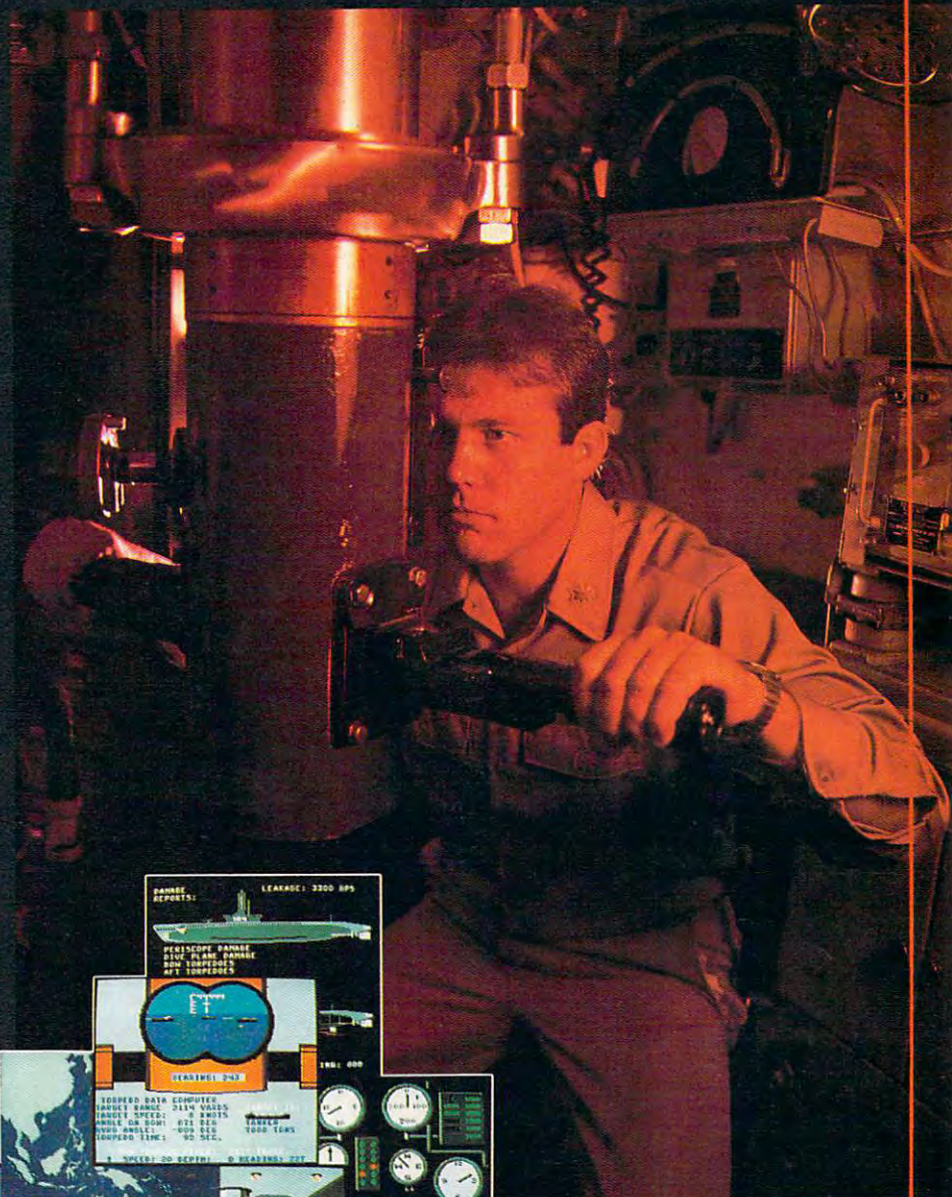
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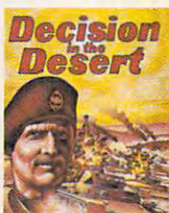
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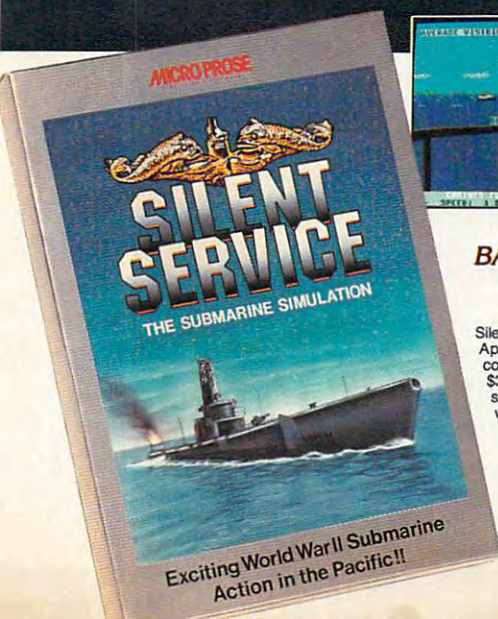
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```

PH 5080 DATA 40,40,255,255,6
6,66,0
JL 5090 P1=P0+256:POKE 705,1
32
LA 5100 FOR I=1 TO 15:READ A
:B$(I)=CHR$(A):NEXT
I:FOR I=1 TO 12:READ
A:POB$(I)=CHR$(A):N
EXT I
DO 5110 DATA 0,0,0,0,28,58,1
25,125,121,62,28,8,0
,0,0
LM 5120 DATA 0,0,0,0,42,0,12
9,16,145,0,66,16
BK 5130 P2=P1+256:POKE 706,7
0
LC 5140 FOR I=1 TO 16:READ A
:MDL$(I)=CHR$(A):NEX
T I:PM$(P2+190,P2+20
6)=MDL$
KL 5150 DATA 0,0,0,0,1,1,0,0
,24,24,36,36,67,67,2
55,255
NK 5160 FOR I=1 TO 16:READ A
:MDR$(I)=CHR$(A):NEX
T I:FOR I=1 TO 22:RE
AD A:H$(I)=CHR$(A):N
EXT I:RETURN
BB 5170 DATA 0,0,132,132,254
,254,32,32,32,32,34,
34,247,247,255,255
CI 5180 DATA 18,18,57,57,125
,125,57,57,61,61,57,
57,17,17,58,58,124,1
24,184,184,184,184

```

Program 2: Commodore 64 Balloon Crazy

Version by Kevin Mykytyn, Editorial
Programmer

For instructions on entering this listing, please
refer to "The New MLX for Commodore 64"
elsewhere in this issue.

```

C000:20 56 C0 20 DE C1 20 5A D9
C008:C1 4C D6 C5 20 DE C1 20 D4
C010:5A C1 A5 A5 0A 85 A7 0A FD
C018:85 A6 C6 03 D0 0A A5 04 0D
C020:38 E5 A7 85 03 20 C8 C0 6F
C028:C6 F9 D0 0D A5 FA 38 E5 E5
C030:A6 A5 F9 20 7A C4 20 3F 0E
C038:C3 AD 8D 02 D0 FB A0 46 D6
C040:88 D0 FD 4C 12 C0 98 48 CB
C048:AA 32 20 B3 EE 88 D0 FA 1C
C050:CA D0 F5 68 A8 60 A9 1B E5
C058:8D 11 D0 A9 7F 8D 0D DC C2
C060:A9 70 8D 14 03 A9 C0 8D 93
C068:15 03 A9 81 8D 1A D0 60 59
C070:A9 01 8D 19 D0 AD 8D 02 A4
C078:D0 3C A4 F8 F0 14 AD 3C 05
C080:03 18 69 05 99 3D 03 AD 7C
C088:46 03 69 00 99 47 03 88 93
C090:D0 EC A0 07 A2 0E A9 00 DA
C098:85 B7 B9 3C 03 9D 00 D0 25
C0A0:B9 50 03 9D 01 D0 B9 46 52
C0A8:03 4A 26 B7 CA CA 88 10 21
C0B0:E9 A5 B7 8D 10 D0 A9 FA 72
C0B8:8D 12 D0 AD 0D DC 29 01 A9
C0C0:F0 03 4C 1C C3 4C BC FE 8E
C0C8:20 C1 C2 A2 00 DC 4A 4A 50
C0D0:4A B0 2F AE 46 03 D0 13 67
C0D8:AE 3C 03 E0 1E D0 0C A9 25
C0E0:3B 8D 3C 03 A9 01 8D 46 CD
C0E8:03 D0 13 48 AD 3C 03 8A 3
C0F0:E9 01 8D 3C 03 AD 46 03 7B
C0F8:E9 00 8D 46 03 68 A2 FF 84
C100:86 05 4A B0 2F AE 46 03 20
C108:F0 13 AE C3 03 E0 3C D0 47
C110:0C A9 1F 8D 3C 03 A9 00 02
C118:8D 46 03 F0 13 48 AD 3C B4
C120:03 18 69 01 8D 3C 03 AD 79
C128:46 03 69 00 8D 46 03 68 B0

```



"Balloon Crazy" for the Commodore 64
uses sprites as well as character
graphics.

```

C130:A2 01 86 05 4A B0 22 AD 6D
C138:1E D0 29 01 F0 1B AD 03 86
C140:D0 C9 D2 90 14 C9 DC B0 34
C148:10 20 9E C2 A5 C4 49 FF AE
C150:18 69 01 85 C4 A5 05 85 FE
C158:C3 60 A9 93 20 D2 FF 20 B0
C160:D6 C1 A9 03 85 FB A9 05 99
C168:85 FC AD 1B D4 29 03 C9 70
C170:03 F0 F7 A8 B9 7D C7 48 D6
C178:A9 03 38 E5 FB 0A 0A 1D
C180:85 02 A9 05 38 E5 FC 18 38
C188:65 02 A8 68 99 1F C8 8D 43
C190:86 02 A9 71 A0 C7 20 1E A6
C198:AB C6 FC 10 CD 20 D6 C1 A2
C1A0:C6 FB 10 C2 A0 03 A9 3F 58
C1A8:99 64 03 88 10 FA A9 00 BA
C1B0:85 F7 85 F8 18 A2 18 A0 51
C1B8:D0 20 F0 FF A9 EA A0 C7 EA
C1C0:20 1E AB 20 31 C5 A9 96 DD
C1C8:8D 3C 03 A9 00 8D 46 03 E2
C1D0:A2 14 20 46 C0 60 A9 8A 78
C1D8:A0 C7 20 1E AB 60 A2 07 AF
C1E0:A0 00 A9 00 85 FB 85 FD 0F
C1E8:A9 38 85 FC A9 D0 85 FE 6A
C1F0:78 A9 33 85 01 B1 FD 91 36
C1F8:FB B9 31 C6 99 C0 3E B9 81
C200:71 C6 99 00 3F 88 D0 ED CE
C208:E6 FC E6 FE CA D0 E6 A9 1E
C210:37 85 01 58 A0 1F B9 11 3E
C218:C6 99 D8 38 88 10 F7 A9 24
C220:1E 8D 18 D0 A9 D8 8D 16 0A
C228:D0 A0 01 8C 25 D0 88 8C 31
C230:21 D0 88 8C 1C D0 8C 15 A6
C238:D0 A9 01 8D 25 D0 A0 07 3E
C240:8C 26 D0 88 8C 27 D0 C8 A3
C248:A9 00 99 50 03 B9 BD C7 1D
C250:99 F8 07 88 10 F2 A9 DC C6
C258:8D 50 03 A9 0A 85 04 85 A7
C260:03 A9 00 85 A3 85 A4 85 2C
C268:A5 A9 03 85 A8 A0 17 A9 83
C270:00 99 00 D4 88 10 FA A9 CD
C278:0F 8D 18 D4 A9 0C 8D 03 D4
C280:D4 A9 05 8D 05 D4 A9 0F 32
C288:8D 01 D4 A9 80 8D 12 D4 7D
C290:8D 0F D4 A9 0A 8D 0C D4 49
C298:A9 08 8D 0A D4 60 20 B2 62
C2A0:C2 AD A7 02 8D A9 02 A9 C8
C2A8:11 8D 0B D4 A9 00 8D AA DB
C2B0:02 60 A9 10 8D 0B D4 EE B6
C2B8:AA 02 A9 00 8D 08 D4 60 DF
C2C0:60 AD 00 DC 29 0F C9 0F D7
C2C8:D0 16 A9 10 8D 04 D4 A9 42
C2D0:00 8D AB 02 8D AC 02 8D FF
C2D8:01 D4 A9 08 8D AD 02 60 51
C2E0:AD AB 02 D0 19 A9 01 8D 74
C2E8:AB 02 A9 10 8D 04 D4 A9 CA
C2F0:0F 8D 05 D4 A9 00 8D 06 BD
C2F8:D4 A9 11 8D 04 D4 18 AD 9F
C300:AC 02 69 23 8D AC 02 AD 8E
C308:AD 02 69 00 8D AD 02 AD E8
C310:AC 02 8D 00 D4 AD AD 02 DA
C318:8D 01 D4 60 AD AA 02 D0 34
C320:12 AD A9 02 F0 10 18 AD 17
C328:A9 02 6D AB 02 8D A9 02 D8

```

```

C330:8D 08 D4 4C 31 EA AD A7 18
C338:02 8D A9 02 4C 31 EA A5 1C
C340:F7 F0 03 4C FD C3 20 9E 03
C348:C2 E6 F7 A9 00 85 C3 A9 CB
C350:FF 8D F9 07 A9 01 85 C4 0C
C358:A9 00 A0 03 19 64 03 88 E1
C360:10 FA C9 00 D0 1B A5 F8 1F
C368:F0 03 20 B4 C4 A5 A5 C9 4A
C370:04 D0 04 E6 A8 D0 02 E6 90
C378:A5 20 5A C1 68 68 4C 12 D1
C380:C0 A0 03 AD 1B D4 29 07 51
C388:C9 06 B0 F7 AA BD C5 C7 AB
C390:39 64 03 D0 05 88 10 F5 9B
C398:30 E7 BD C5 C7 59 64 03 B5
C3A0:99 64 03 BD D3 C7 8D 3D 60
C3A8:03 BD D9 C7 8D 47 03 B9 22
C3B0:DF C7 8D 51 03 98 0A 8A 79
C3B8:0A 85 02 8A 18 65 02 84 6E
C3C0:02 A8 B9 1F C8 29 07 8D 23
C3C8:28 D0 A8 0A 0A 8D A7 02 26
C3D0:B9 83 C7 85 FA 8D A8 02 C8
C3D8:20 9E C2 A4 02 8A 85 02 02
C3E0:0A 0A 18 65 02 18 69 07 93
C3E8:85 02 98 0A 18 69 02 AA 7C
C3F0:A4 02 18 20 F0 FF A9 CB F6
C3F8:A0 C7 4C 1E AB A5 C4 30 DB
C400:0E 18 6D 51 03 8D 51 03 4D
C408:C9 E6 90 1A 4C 6B C5 49 C8
C410:FF 18 69 01 85 02 AD 51 BD
C418:03 38 E5 02 C9 82 B0 01 CD
C420:A5 02 85 C4 D0 03 8D 51 F8
C428:03 A5 C3 30 25 18 6D 3D B9
C430:03 AE 47 03 F0 FF C9 3C 93
C438:90 0B A5 C3 49 FF 18 69 A1
C440:01 85 C3 D0 34 8D 3D 03 86
C448:AD 47 03 69 00 8D 47 03 39
C450:10 27 49 FF 18 69 01 85 C2
C458:02 AD 3D 03 38 E5 02 AE 32
C460:47 03 D0 0A C9 1E B0 06 37
C468:A5 02 85 C3 D0 B0 8D 3D 3D
C470:03 AD 47 03 E9 00 8D 47 B1
C478:03 60 AD 1E D0 29 02 F0 53
C480:32 AD 03 D0 A4 F8 F9 E3 DC
C488:C7 C9 03 90 04 C9 FB 90 A1
C490:22 E6 F8 A4 F8 B9 E3 C7 8C
C498:99 51 03 AD 28 D0 29 07 5C
C4A0:99 28 D0 C6 F7 A9 FF 99 87
C4A8:F9 07 A5 F8 C9 06 D0 03 40
C4B0:20 B4 C4 60 A9 00 85 A9 18
C4B8:A0 00 8C 51 03 A6 A9 D0 10
C4C0:25 A9 FC 8D F8 07 B9 29 40
C4C8:D0 29 07 09 08 A2 FF E8 2A
C4D0:DD 7D C7 D0 FA BD 80 C7 46
C4D8:18 65 A3 85 A5 A5 A4 69 FA
C4E0:00 85 A4 20 31 C5 A9 FE 55
C4E8:99 FA 07 20 F4 C5 A2 05 E9
C4F0:20 46 C0 A9 00 99 52 03 DC
C4F8:A6 A9 D0 05 A9 FD 8D F8 04
C500:07 A2 04 20 46 C0 C0 05 F5
C508:F0 17 C8 84 06 A2 01 BD AD
C510:E3 C7 99 52 03 E8 C8 A4 E9
C518:F8 90 F4 A4 06 C4 F8 D0 33
C520:9C 88 C8 A9 00 99 51 03 DB
C528:C0 07 D0 F6 A9 00 85 F8 B0
C530:60 98 48 A9 94 A0 C7 20 8C
C538:1E AB 18 A2 00 A0 0A 20 A1
C540:F0 FF A5 A4 A6 A3 20 CD 15
C548:BD 18 A2 00 A0 17 20 F0 9F
C550:FF A9 00 A6 A5 E8 20 CD 8F
C558:BD 18 A2 00 A0 24 20 F0 E3
C560:FF A9 00 A6 A8 20 CD BD DF
C568:68 A8 60 CE F9 07 20 F4 6C
C570:C5 C6 F7 A2 04 20 46 C0 A7
C578:A9 00 8D 51 03 A9 FB 8D E3
C580:F8 07 A5 F8 F0 07 A9 01 86
C588:85 A9 20 B8 C4 A2 09 20 B3
C590:46 C0 A9 FD 8D F8 07 C6 A9
C598:AB 20 31 C5 A5 A8 D0 4F C3
C5A0:A9 03 8D 15 D0 A9 FE 8D 7D
C5A8:F9 07 20 81 C3 A9 00 A0 74
C5B0:03 19 64 03 88 10 FA 84 83
C5B8:A2 02 20 46 C0 68 D0 EA B2
C5C0:A9 01 8D 15 D0 68 68 18 75
C5C8:A2 0B A0 0F 20 F0 FF A9 DB
C5D0:04 A0 C8 20 1E AB 18 A2 14

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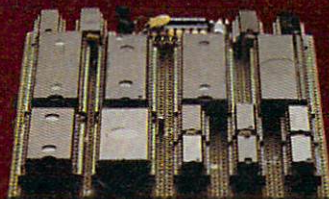
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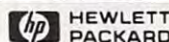
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TEGMAR

```

C5D8:0D A0 0D 20 F0 FF A9 0F A0
C5E0:A0 C8 20 1E AB AD 00 DC C5
C5E8:29 10 D0 F9 4C 0C A9 84
C5F0:00 85 F8 60 20 B2 C2 A9 FD
C5F8:80 8D 04 D4 A9 05 8D 05 77
C600:D4 A9 00 8D 06 D4 A9 0F 21
C608:8D 01 D4 A9 81 8D 04 D4 F0
C610:60 00 00 00 0F 3F FF FF 43
C618:FF 00 00 00 C0 F0 FC DC 46
C620:DC FF FF 3F 3F 0F 03 00 4C
C628:00 DC 7C F0 F0 C0 00 00 16
C630:00 0C 00 30 FF FF FF 01 C4
C638:45 00 01 04 20 02 08 00 E0
C640:02 08 00 02 20 00 02 80 76
C648:00 02 AA 85 02 55 95 02 96
C650:AA 85 00 00 00 00 00 00 94
C658:00 00 00 00 00 00 00 00 E5
C660:00 00 00 00 00 00 00 00 ED
C668:00 00 00 00 00 00 00 00 F5
C670:FE 01 14 00 04 55 00 10 C5
C678:55 00 04 14 00 02 AA 00 CF
C680:00 AA 80 00 AA 10 00 AA 09
C688:04 00 AA 10 00 AA 40 00 99
C690:AA 00 00 82 00 00 82 00 A0
C698:00 82 00 00 82 00 00 82 5D
C6A0:00 00 41 00 01 41 40 FF E3
C6A8:FF FF 0C 00 30 00 00 00 39
C6B0:00 00 14 00 00 55 00 00 16
C6B8:55 00 00 14 00 00 AA 00 87
C6C0:02 AA 80 04 AA 10 10 AA AA
C6C8:04 04 AA 10 01 AA 40 00 E2
C6D0:AA 00 00 82 00 00 82 00 E0
C6D8:00 82 00 00 82 00 00 82 9D
C6E0:00 00 41 00 01 41 40 FF 24
C6E8:FF FF 0C 00 30 00 00 00 79
C6F0:00 00 00 00 00 00 00 00 7E
C6F8:00 00 08 00 00 20 00 00 10
C700:02 08 00 20 80 00 88 00 A9
C708:00 00 88 00 88 00 00 02 0F
C710:00 00 20 20 00 00 80 00 A6
C718:02 00 00 00 00 00 00 00 A8
C720:00 00 00 00 00 00 00 00 AF
C728:00 00 00 00 00 00 00 00 B7
C730:35 00 00 00 00 00 00 00 5A
C738:00 00 0A 80 00 2A A0 00 FA
C740:AA A8 00 AA 98 00 AA 98 AC
C748:00 AA 98 00 AA 68 00 2A B6
C750:A0 00 2A A0 00 3A 80 00 A8
C758:02 00 00 00 00 00 00 00 E8
C760:00 00 00 00 00 00 00 00 EF
C768:00 00 00 00 00 00 00 00 F7
C770:35 5B 5C 11 9D 9D 5D 5E 8A
C778:91 1D 1D 1D 00 0A 0D 0E DD
C780:1E 14 0A 00 00 14 00 00 B5
C788:19 1E 0D 11 20 20 20 20 C0
C790:20 20 20 00 13 1D 1D 1D A0
C798:9E 12 53 43 4F 52 45 1D 06
C7A0:1D 1D 1D 1D 1D 1D 1D 1D 30
C7A8:4C 45 56 45 4C 1D 1D 1D FC
C7B0:1D 1D 1D 1D 1D 4C 49 56 8E
C7B8:45 53 92 9F 00 FD FF FF 04
C7C0:FF FF FF FF 01 02 04 5C
C7C8:08 10 20 20 20 11 9D 9D 84
C7D0:20 20 00 50 78 A0 C8 F0 46
C7D8:19 00 00 00 00 00 01 42 39
C7E0:52 62 72 D8 CC C0 B4 A8 89
C7E8:9C 90 05 42 1C 41 9F 4C 21
C7F0:9C 4C 1E 4F 1F 4F 9E 4E 5C
C7F8:20 05 43 1C 52 9F 41 9C 34
C800:5A 1E 59 00 9E 47 41 4D 53
C808:45 20 4F 56 45 52 00 9E A5
C810:48 49 54 20 46 49 52 45 E5
C818:42 55 54 54 4F 4E 00 00 A3

```

Program 3: Apple Balloon Crazy

Version by Tim Victor, Editorial Programmer

For instructions on entering this listing, please refer to the "Apple MLX" article elsewhere in this issue.

START ADDRESS: 8000
END ADDRESS: 8D77

```

8000: 20 BB 8C 20 0A 8D 20 AF 0A
8008: 88 A9 00 8D 85 8D A9 20 66
8010: 85 E6 20 F2 F3 2C 57 C0 80
8018: 2C 52 C0 2C 54 C0 2C 50 EC
8020: C0 A9 40 85 E6 20 F2 F3 DD
8028: A9 00 8D 93 8D 8D 94 8D 42
8030: A9 20 85 E6 A9 40 8D 74 0B
8038: 8D A9 00 A2 04 9D 51 8E 5C
8040: CA 10 FA A9 01 8D 56 8E 1E
8048: A9 03 8D 86 8D 20 EB 87 45
8050: A9 01 8D 90 8D 20 4B 88 2D
8058: EE 90 8D A9 03 C0 90 8D 3F
8060: B0 F3 A9 14 8D 76 8D A9 38
8068: 00 8D 77 8D A9 00 8D 6A 67
8070: 8D A9 01 8D 69 8D A0 00 5E
8078: AE 56 8E 20 A9 87 DD C8 27
8080: 8A 90 0B DD D1 8A 90 03 07
8088: A9 03 2C A9 02 2C A9 01 54
8090: 99 35 8E C8 C0 18 D0 E0 F2
8098: A9 00 8D 80 8D 8D 81 8D 5B
80A0: A9 02 8D 82 8D A9 40 8D F1
80A8: 7F 8D AC 80 8D 89 35 8E B6
80B0: 8D 7E 8D 20 6A 87 EE 80 9B
80B8: 8D 38 AD 7F 8D E9 12 8D 02
80C0: 7F 8D B0 E6 AD 81 8D 69 61
80C8: 06 C9 07 00 05 E9 07 EE F5
80D0: 82 8D 8D 81 8D AD 82 8D F5
80D8: 18 69 06 8D 82 8D AD 80 FF
80E0: 8D C9 18 D0 C0 A9 00 8D 65
80E8: 87 8D A9 00 8D 80 8D A9 77
80F0: 92 8D 84 8D A9 00 8D 7C EC
80F8: 8D 20 49 87 20 62 89 20 23
8100: CA 86 AD 80 8D F0 03 4C 4A
8108: B9 81 20 49 87 4A 4A 4A 25
8110: 29 07 C9 06 B0 F4 0A 0A 7A
8118: 8D 80 8D A8 B9 35 8E D0 CE
8120: 2E C8 C0 18 D0 02 A0 00 D5
8128: CC 80 8D 00 EF 20 92 84 1A
8130: 20 53 87 20 62 89 20 EE 73
8138: 89 20 EB 87 EE 56 8E A9 95
8140: 09 CD 56 8E B0 03 8D 56 F1
8148: 8E 20 EB 87 4C 76 8D 8D 5B
8150: 7D 8D 98 8D 80 8D 29 03 F0
8158: 0A 8D 7F 8D 0A 0A 0A 6D 86

```



The player is just about to lose a collection of balloons in this game of Apple "Balloon Crazy."

```

8160: 7F 8D A9 FF 38 69 40 8D 25
8168: 7F 8D A9 02 8D 82 8D A9 1F
8170: 00 8D 81 8D AD 80 8D 4A B4
8178: 4A A8 F0 1E AD 81 8D 18 71
8180: 69 06 C9 07 90 05 E9 07 D6
8188: EE 82 8D 8D 81 8D AD 82 4E
8190: 8D 18 69 06 8D 82 8D 88 08
8198: D0 E2 AC 80 8D 89 35 8E A6
81A0: 8D 7E 8D 20 6A 87 A9 00 82
81A8: AC 80 8D 99 35 8E AD 7D 2A
81B0: 8D 8D 8D A9 00 8D 7A A9
81B8: 8D AD 7C 8D F0 44 AD 7F 4A
81C0: 8D C9 58 B0 0B A9 00 8D 9F
81C8: 7C 8D 8D 7A 8D 4C 22 82 2B
81D0: AD 80 8D 0A 49 FF 38 6D 45
81D8: 7F 8D 8D 7F 8D AD 82 8D 5E
81E0: 2C 7C 8D 30 10 AD 81 8D 95
81E8: 38 E9 02 B0 17 CE 82 8D 54
81F0: 69 07 4C 04 82 AD 81 8D 8F
81F8: 18 69 02 C9 07 90 05 EE B2
8200: 82 8D E9 07 8D 81 8D AD 92

```

```

8208: 82 8D C9 26 90 0E A9 FE 5C
8210: 4D 7C 8D 8D 7C 8D 20 EB AB
8218: 8A 4C DD 81 AD 7F 8D 4C 1C
8220: 2C 82 1D AD 80 8D 6D 7F 4E
8228: 8D 8D 7F 8D CD 84 8D B0 6C
8230: 03 4C FB 82 38 AD 76 8D 64
8238: ED 82 8D C9 FC 10 03 4C 9D
8240: 90 82 C9 05 30 03 4C 9D 7B
8248: 82 8D 78 8D 0A 0A 0A 38 9E
8250: ED 78 8D 18 6D 77 8D 38 3A
8258: ED 81 8D 2C 7A 8D 30 50 E3
8260: C9 F6 30 2C C9 09 10 35 98
8268: 20 F3 8A 38 AD 84 8D E9 D3
8270: 0E 8D 84 8D AE 87 8D AD A5
8278: 80 8D 9D 4D 8E E8 8E 87 66
8280: 8D E0 4D 00 08 20 92 84 7C
8288: A9 92 8D 84 8D 4C 3C 83 9A
8290: AE 7A 8D F0 15 2C 7B 8D 2A
8298: 30 5C 4D 78 82 AE 7A 8D 35
82A0: F0 08 2C 7B 8D 10 4F 4C F4
82A8: BC 82 8D 7B 8D 4C F6 82 24
82B0: C9 EB 30 CD C9 16 10 E5 16
82B8: 09 00 10 1C AD 76 8D 18 80
82C0: 69 03 8D 82 8D AC 77 8D 80
82C8: C8 C0 07 D0 05 A0 00 EE E9
82D0: 82 8D 8C 81 8D 4C EF 82 24
82D8: AD 76 8D 38 E9 03 8D 82 80
82E0: 8D AC 77 8D 88 10 05 CE FC
82E8: 82 8D A0 06 8C 81 8D AD 3A
82F0: 82 8D C9 26 B0 18 A9 FF 6F
82F8: 8D 7A 8D AD 7F 8D C9 AE 64
8300: 80 C0 AD 80 8D 8D 7E 8D 4D
8308: 20 6C 87 4C 41 83 AD 80 E3
8310: 8D 09 80 8D 7E 8D 20 6C DF
8318: 87 20 8D 8A 20 8C 85 A9 F6
8320: 92 8D 84 8D A9 00 8D 87 2D
8328: 8D AD 86 8D 8D 90 8D 20 F4
8330: 4B 88 CE 86 8D D0 05 A9 A4
8338: FF 8D 85 8D A9 00 8D 80 15
8340: 8D 20 4A 85 20 53 87 20 35
8348: 62 89 20 EE 89 AD 85 8D 71
8350: F0 03 4C 07 89 AD 00 C0 4E
8358: C9 8D D0 08 2C 10 C0 AD 13
8360: 00 C0 10 FB 2C 6B 8D 10 93
8368: 03 4C 7E 83 2C 61 C0 30 A4
8370: 39 2C 62 C0 30 55 AD 00 A9
8378: C0 30 29 4C F9 80 A2 00 EC
8380: 20 1E FB CC 6C 8D F0 17 FD
8388: AD 6C 8D 8C 6C 8D 8D 78 29
8390: 8D 18 6D 6C 8D 6A CD 78 03
8398: 8D F0 04 B0 5C 90 57 2C 2E
83A0: 61 C0 10 03 4C 45 84 4C 87
83A8: F9 80 A9 FF 8D 69 8D AD DC
83B0: 77 8D 38 E9 06 B0 0E 69 F4
83B8: 07 CE 76 8D 10 07 A9 00 8E
83C0: 8D 76 8D A9 00 8D 77 8D 2B
83C8: 4C F9 80 A9 01 8D 69 8D 8D
83D0: AD 77 8D 18 69 06 C9 07 BD
83D8: 90 05 E9 07 EE 76 8D 8D 11
83E0: 77 8D AC 76 8D C0 25 90 4E
83E8: 07 A0 25 8C 76 8D A9 01 47
83F0: 8D 77 8D 4C F9 80 A2 FF 2A
83F8: 2C A2 01 8E 69 8D 38 E9 A3
8400: 3F B0 02 A9 00 C9 82 90 6C
8408: 02 A9 81 8D 78 8D A9 00 D2
8410: 8D 79 8D 18 A0 04 6D 78 D9
8418: 8D A2 03 6A 6E 79 8D 18 24
8420: CA D0 F8 88 D0 F0 2A 8D 96
8428: 76 8D AD 79 8D 4A 4A 91
8430: 4A 29 0E C9 07 90 08 E9 7B
8438: 07 EE 76 8D 4C 33 84 8D ED
8440: 77 8D 4C F9 80 AD 10 C0 2D
8448: AD 80 8D F0 10 AD 76 8D BA
8450: CD 82 8D B0 03 A9 01 2C 8A
8458: A9 FF 8D 69 8D A9 05 8D 2D
8460: 6A 8D AD 7C 8D D0 28 AD 20
8468: 80 8D F0 23 AD 7F 8D C9 B5
8470: A0 90 1C AD 76 8D 38 ED 94
8478: 82 8D C9 FB 30 11 B0 07 AD
8480: C9 06 10 0B A9 01 2C A9 F5
8488: FF 8D 7C 8D 20 03 8A 4C 4F
8490: F9 80 AE 87 8D D0 01 60 17
8498: 20 4A 85 20 53 87 A2 00 F4
84A0: A0 00 CA D0 FD 88 D0 FA 0F
84A8: 20 62 89 20 EE 89 20 62 CD
84B0: 89 A9 FF 8D 69 8D 20 CA 4E
84B8: 86 20 EB 87 A2 03 AD 4D CC

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84C0:	8E 18 7D 51 8E 9D 51 8E F7	8778:	8D AD 82 8D 8D 72 8D AD E1	8A30:	02 E6 1F AE 75 8D DE 93 02
84C8:	C9 0A 90 12 E9 0A 9D 51 70	8780:	81 8D 8D 73 8D A9 2B 85 8B	8A38:	8D D0 BB 60 A0 00 A9 00 1E
84D0:	8E CA 30 0A FE 51 8E BD 92	8788:	FC A9 8C 85 FD A9 0D 8D AB	8A40:	48 B1 FC AA 68 1D 00 61 49
84D8:	51 8E C9 0A 80 EE 20 EB 75	8790:	6E 8D A9 02 8D 6D 8D A9 76	8A48:	4D 70 8D 51 FE 91 FE BD E0
84E0:	87 AD 4D 8E 09 80 8D 4D 5E	8798:	00 8D 70 8D AD 7E 8D 29 9D	8A50:	00 69 C8 CC 6F ED D0 EB E1
84E8:	8E 8D 4D 8E 20 4A 85 A9 0E	87A0:	7F F0 47 C9 02 90 17 D0 82	8A58:	4D 70 8D 51 FE 91 FE 60 93
84F0:	16 85 FC A9 8C 85 FD A9 C0	87A8:	10 AC 73 8D C8 C0 07 D0 5A	8A60:	AD 71 8D 29 3F AB 89 89 96
84F8:	00 8D 6D 8D A9 15 8D 6E 17	87B0:	05 A0 00 EE 72 8D 8C 73 AF	8A68:	8A 0D 74 8D 85 FF AD 71 66
8500:	8D AD 76 8D 8D 72 8D AD E3	87B8:	8D A9 80 8D 70 8D 2C 7E 72	8A70:	8D 29 08 F0 02 A9 80 18 76
8508:	77 8D 8D 73 8D A9 9C 8D F4	87C0:	8D 10 10 A9 52 85 FC A9 83	8A78:	2C 71 8D 70 04 10 04 69 8A
8510:	71 8D A9 00 8D 70 8D 20 D5	87C8:	8C 85 FD CE 71 8D A9 0F 50	8A80:	28 69 28 6D 72 8D 85 FE B3
8518:	7F 89 20 53 87 20 DB 8A 7D	87D0:	8D 6E 8D 2C 83 8D 10 03 2C	8A88:	60 00 04 08 0C 10 14 18 AF
8520:	A2 00 A0 00 CA D0 FD 88 AE	87D8:	4C 7F 89 20 BF 89 AD 74 15	8A90:	1C 00 04 08 0C 10 14 18 95
8528:	D0 FA A2 00 8D 4E 8E 9D 90	87E0:	8D 49 60 8D 74 8D C5 E6 3A	8A98:	1C 01 05 09 0D 11 15 19 1D
8530:	4D 8E 8E EC 87 8D D0 F4 7A	87E8:	F0 89 60 A9 00 8D 8F 8D 5C	8AA0:	1D 01 05 09 0D 11 15 19 A5
8538:	CE 87 8D 20 62 89 20 EE AB	87F0:	AE 8F 8D 8D 51 8E 0A 8D 2F	8AA8:	1D 02 06 0A 0E 12 16 1A 2D
8540:	89 20 62 89 20 CA 86 4C 82	87F8:	78 8D 0A 18 6D 78 8D 69 3C	8AB0:	1E 02 06 0A 0E 12 16 1A B5
8548:	92 84 A9 92 8D 89 8D A2 6C	8800:	7F 85 FC A9 8C 85 FD 90 73	8AB8:	1E 03 07 0B 0F 13 17 1B 3D
8550:	00 8E 88 8D AE 88 8D EC 88	8808:	02 E6 FD A9 00 8D 6D 8D CC	8AC0:	1F 03 07 0B 0F 13 17 1B C5
8558:	87 8D F0 2F 8D 4D 8E 8D 69	8810:	8D 71 8D 8D 70 8D 8D 73 17	8AC8:	1F B0 90 70 60 50 40 30 A7
8560:	7E 8D AD 76 8D 8D 72 8D 40	8818:	8D A9 06 8D 6E 8D E0 05 64	8AD0:	10 01 FF F7 D8 C6 B4 A2 98
8568:	AD 77 8D 8D 73 8D AD 89 69	8820:	D0 04 A9 0E D0 04 8A 18 74	8AD8:	90 80 60 A9 FF 8D 19 8B F0
8570:	8D 8D 71 8D A9 80 8D 83 9A	8828:	69 07 8D 72 8D 20 BF 89 7E	8AE0:	4C FB 8A A9 70 8D 19 8B 7E
8578:	8D 20 85 87 AD 89 8D 38 62	8830:	AD 74 8D 49 60 8D 74 8D 2B	8AE8:	4C FB 8A A9 71 8D 19 8B 8E
8580:	E9 0E 8D 89 8D EE 88 8D 15	8838:	C5 E6 F0 84 AE 8F 8D E8 07	8AF0:	4C FB 8A A9 72 8D 19 8B 9E
8588:	4C 54 85 60 AD 87 8D D0 FC	8840:	E0 06 F0 06 8E 8F 8D 4C DB	8AF8:	4C FB 8A A9 01 8D 53 8B 9F
8590:	01 60 A9 08 8D 8B 8D A9 49	8848:	F0 87 60 A9 02 8D 92 8D 53	8B00:	A0 00 A9 E0 8D 2C 8B A9 88
8598:	60 8D 8A 8D AD 8B 8D C9 88	8850:	A9 14 8D 91 8D A9 00 8D A6	8B08:	FF 8D 36 8D AD 36 8B 8D EC
85A0:	76 8D 90 0A D0 26 AD 8A 02	8858:	70 8D AD 90 8D 0A 0A 0A 76	8B10:	55 8B 4E 53 8B 90 0C B9 24
85A8:	8D CD 77 8D 8D 1E AD 8A 99	8860:	0A 6D 92 8D C9 07 90 07 8F	8B18:	00 70 C8 8D 54 8B A9 80 E1
85B0:	8D 69 06 C9 07 90 05 E9 AB	8868:	EE 91 8D E9 07 80 F5 8D 1A	8B20:	8D 53 8B 4E 54 8B 90 03 1E
85B8:	07 EE 8B 8D 8D 8A 8D AD AC	8870:	92 8D A9 07 8D 6E 8D A9 BE	8B28:	AD 30 C0 A2 FF EB D0 FD A7
85C0:	8B 8D 18 69 06 8D 8B 8D 99	8878:	02 8D 6D 8D AD 91 8D 8D D0	8B30:	90 03 AD 30 C0 A2 FF EB 82
85C8:	C9 24 D0 D0 AD 8A 8D 38 D3	8880:	72 8D AD 92 8D 8D 73 8D 24	8B38:	D0 FD EE 55 8B D0 D3 18 C9
85D0:	E9 03 B0 05 69 07 CE 8B 88	8888:	A9 00 8D 71 8D A9 56 85 7C	8B40:	AD 36 8B E9 01 8D 36 8B 02
85D8:	8D 8D 8A 8D AD 8B 8D 38 27	8890:	FC A9 8B 85 FD 20 BF 89 CD	8B48:	AD 2C 8B 69 01 8D 2C 8B 6B
85E0:	E9 03 8D 8B 8D 38 ED 76 AB	8898:	AD 74 8D 49 60 8D 74 8D 93	8B50:	90 BA 60 20 2E 20 80 8E 1E
85E8:	8D 8D 78 8D 0A 0A 0A 38 CA	88A0:	C5 E6 F0 CE 60 AD 54 C0 7C	8B58:	80 80 FF 81 80 AF 80 8E 2C
85F0:	ED 78 8D 18 6D 8A 8D ED E2	88A8:	AD 51 C0 20 58 FC 60 22 9F	8B60:	E7 80 80 FB 80 80 8D 80 5D
85F8:	77 8D 8D 8C 8D 10 05 49 9D	88B0:	A5 8B A9 08 85 25 20 20 86	8B68:	80 8E 80 A0 D5 80 80 81 71
8600:	FF 38 69 00 18 69 51 8D DE	88B8:	FC A9 06 85 24 A2 00 BD 35	8B70:	81 9C E4 81 8E D1 83 86 6D
8608:	8D 8D A9 90 8D 8E 8D A9 E8	88C0:	EC 8B 20 ED FD E8 E0 1B BD	8B78:	C4 83 86 91 87 86 84 87 A3
8610:	00 8D 88 8D AD 8E 8D 8D BA	88C8:	D0 F5 AD 10 C0 AD E0 C0 F3	8B80:	8E 91 8E CC AA C0 D0 AA B5
8618:	89 8D AE 88 8D EC 87 8D 68	88D0:	C9 D0 F0 12 C9 F0 F0 0E 3C	8B88:	98 C0 AA C0 C0 A2 81 C0 CD
8620:	D0 03 4C AA 86 8D 4D 8E DE	88D8:	C9 CB F0 04 C9 EB D0 ED AD	8B90:	82 85 C0 82 85 D0 A0 81 BC
8628:	8D 7E 8D AD 76 8D 8D 72 9F	88E0:	A9 00 8D 6B 8D 60 A9 FF 70	8B98:	D0 A0 81 D0 A0 81 F0 E3 4E
8630:	8D AD 77 8D 8D 73 8D AD 3A	88E8:	8D 6B 8D 60 C9 CE D0 D5 54	8BA0:	87 FC FF 9F F0 80 87 F0 3E
8638:	89 8D C9 52 90 35 AD 8D 0E	88F0:	D4 BA A0 AB D0 A9 C1 C4 2F	8BA8:	80 87 C0 8F 80 F0 9F 80 7A
8640:	8D 38 ED 89 8D 90 38 AE 46	88F8:	C4 CC C5 AC A0 AB CB A9 0C	8BB0:	C0 9E 80 E0 9C 80 E0 9B 32
8648:	8C 8D F0 33 10 05 49 FF 77	8900:	C5 D9 C2 CF C1 D2 C4 A2 47	8BB8:	80 C0 97 80 80 8E 80 A0 1B
8650:	38 69 00 18 6D 73 8D 30 D9	8908:	00 A0 00 88 D0 FD CA D0 B0	8BC0:	D5 80 B0 D1 83 F0 84 87 86
8658:	0C C9 07 90 10 E9 07 EE EC	8910:	F8 20 A5 8B A9 08 85 25 82	8BC8:	88 91 8E 8B 84 8C 9C 91 1F
8660:	72 8D 4C 59 86 18 69 07 97	8918:	20 22 FC A9 08 85 24 A2 3F	8BD0:	8C 9C 84 8C 8E 91 8E C6 4D
8668:	CE 72 8D 90 F9 8D 73 8D AE	8920:	00 8D 4B 89 20 ED FD E8 42	8BD8:	AA 86 C3 AA 81 C0 AA 80 EE
8670:	4C 7F 86 AD 8B 8D 8D 72 4F	8928:	E0 17 D0 F5 AD 10 C0 AD C7	8BE0:	D0 A8 80 94 AB 80 94 AB FC
8678:	8D AD 8A 8D 8D 73 8D AD E4	8930:	00 C0 C9 D9 F0 12 C9 F9 A7	8BE8:	80 D0 A0 81 D0 A0 81 D0 7D
8680:	89 8D C9 0A 80 0A AE 88 23	8938:	F0 0E C9 CE F0 04 C9 EE 87	8BF0:	A0 81 FC F8 81 FF FF 87 7B
8688:	8D CA 8E 87 8D 4C AA 86 D2	8940:	D0 ED AD 10 C0 4C D0 03 C9	8BF8:	9C E0 81 9C E0 81 00 20 BD
8690:	8D 71 8D A9 80 8D 83 8D DB	8948:	4C 09 80 D0 CC C1 D9 A0 A2	8C00:	15 00 20 1F 00 20 01 00 1C
8698:	20 85 87 AD 89 8D 38 E9 BF	8950:	C1 C7 C1 C9 CE BF A0 AB 6A	8C08:	60 07 55 00 00 5F 00 00 3B
86A0:	0E 8D 89 8D EE 88 8D 4C 23	8958:	D9 A9 C5 D3 AC A0 AB CE C0	8C10:	50 00 00 7C 00 00 06 0E 33
86A8:	1A 86 AD 8E 8D 38 E9 02 26	8960:	A9 CF AD 74 8D C9 20 D0 D0	8C18:	06 83 07 07 07 03 07 0E C6
86B0:	8D 8E 8D C9 0A 90 12 20 4D	8968:	08 A9 95 A0 8D A2 00 F0 8E	8C20:	1C 18 40 70 38 38 1C 1C 53
86B8:	53 87 20 62 89 20 EE 8F AF	8970:	06 A9 E5 A0 8D A2 01 8E 3F	8C28:	0E 06 C3 0A 8A 80 D0 AF 47
86C0:	20 62 89 20 CA 86 4C 00 C1	8978:	75 8D 85 1E 84 1F 60 A0 3E	8C30:	81 F4 AB 85 F4 AA 85 D4 DE
86C8:	86 60 AD 76 8D 8D 72 8D 63	8980:	00 AD 71 8D 91 1E C8 AD 4A	8C38:	AA 85 DC AA 85 D4 AA 85 AB
86D0:	AD 77 8D 8D 73 8D 2C 69 B0	8988:	72 8D 91 1E C8 AD 73 8D BD	8C40:	D4 AA 85 D0 AA 81 D0 BA E3
86D8:	8D 10 0B A9 AA 85 FC A9 BB	8990:	91 1E C8 A5 FC 91 1E C8 9A	8C48:	81 C0 AA 80 C0 AA 80 80 8E 1
86E0:	8B 85 FD 4C EE 86 A9 56 D4	8998:	A5 FD 91 1E C8 AD 6E 8D 79	8C50:	8A 80 C0 80 80 D0 80 80 87
86E8:	85 FC A9 8B 85 FD A9 02 5F	89A0:	91 1E C8 AD 6D 8D 91 1E DA	8C58:	D4 A0 81 F4 F0 85 D4 AB 73
86F0:	8D 6D 8D A9 1C 8D 6E 8D ED	89A8:	C8 AD 70 8D 91 1E A5 1E E0	8C60:	95 DC AC 8D D4 AB 95 94 F2
86F8:	A9 A0 8D 71 8D A9 00 8D 6C	89B0:	18 69 08 85 1E 90 02 E6 A1	8C68:	A8 85 80 80 85 80 AA 80 53
8700:	70 8D 20 7F 89 AD 6A 8D 0C	89B8:	1F AE 75 8D FE 93 8D AD 9D	8C70:	C0 AA 81 C0 AA 81 C0 BA 68
8708:	F0 3E CE 6A 8D AD 76 8D 3D	89C0:	73 8D 09 60 8D 47 8A 09 BF	8C78:	80 C0 AA 80 80 8A 80 8C 48
8710:	8D 72 8D AD 77 8D 8D 73 8F	89C8:	08 8D 51 8A AC 6D 8D C8 15	8C80:	E6 F6 EE E6 BC 98 9C 98 31
8718:	8D 2C 69 8D 10 0B A9 0A 09	89D0:	8C 6F 8D 20 60 8A 20 3C 63	8C88:	98 98 BC BC E6 B0 8C E6 71
8720:	85 FC A9 8C 85 FD 4C 31 1D	89D8:	8A EE 71 8D 85 AC FC 38 6D F2	8C90:	FE BC E6 B0 E0 E6 BC B0 0D
8728:	87 A9 FE 85 FC A9 8B 85 C8	89E0:	6D 8D 85 FC 70 02 E6 FD E6	8C98:	8B 84 FE B0 E0 FE 86 BE 73
8730:	FD A9 02 8D 6D 8D A9 04 BA	89E8:	CE 6E 8D D0 E6 60 AE 75 49	8CA0:	E0 E6 BC BC 86 BE E6 E6 2B
8738:	8D 6E 8D A9 85 8D 71 8D 4A	89F0:	8D BD 93 8D F0 45 A0 00 63	8CA8:	BC FE E0 B0 98 8C 8C BC D3
8740:	A9 00 8D 70 8D 20 7F 89 52	89F8:	B1 1E 8D 71 8D C8 B1 1E 46	8CB0:	E6 BC E6 E6 BC BC E6 E6 45
8748:	60 A5 4E 0A 0A 38 65 4E A5	8A00:	8D 72 8D C8 B1 1E 8D 73 4B	8CB8:	FC B0 98 A9 0D 85 EC 85 9F
8750:	85 4E 0A AD 74 8D C9 40 4A	8A08:	8D C8 B1 1E 85 FC C8 B1 91	8CC0:	EE A9 60 85 ED A9 68 85 8C
8758:	A9 00 2A AA BD 54 C0 AD 9A	8A10:	1E 85 FD C8 B1 1E 8D 6E 71	8CC8:	EF A0 00 8C 73 8D A9 00 EF
8760:	74 8D 85 E6 49 60 8D 74 87	8A18:	8D C8 B1 1E 8D 6D 8D C8 44	8CD0:	85 1E 98 8D 70 8D 0A AE 9C
8768:	8D 60 18 24 38 A9 00 6A 6E	8A20:	B1 1E 8D 70 8D 20 BF 89 44	8CD8:	73 8D F0 06 0A 26 1E CA 7D
8770:	8D 83 8D AD 7F 8D 8D 71 72	8A28:	A5 1E 18 69 08 85 1E 90 54	8CE0:	D0 FA 2C 70 8D 10 02 38 96

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8CE8: 24 18 6A 91 EC A5 1E 2C E6
8CF0: 70 8D 10 02 09 80 91 EE 24
8CF8: C8 D0 D3 E6 ED E6 EF EE 6D
8D00: 73 8D AE 73 8D 07 D0 14
8D08: C5 60 A0 00 A9 80 99 00 B4
8D10: 70 99 01 70 99 00 71 99 3A
8D18: 01 71 99 04 71 99 05 71 F0
8D20: A9 00 99 02 70 99 03 70 C3
8D28: 99 04 70 99 05 70 99 06 DB
8D30: 70 99 07 70 99 02 71 99 23
8D38: 03 71 99 06 71 99 07 71 36
8D40: 98 18 69 08 A8 90 C5 A0 0F
8D48: 00 A9 80 99 00 72 A9 08 9C
8D50: 99 01 72 A9 00 99 02 72 3E
8D58: 99 03 72 99 04 72 99 05 0B
8D60: 72 98 18 69 06 A8 90 E1 4A
8D68: 60 20 20 20 20 20 4F 20 02
8D70: 04 20 20 20 23 20 7F 20 54
8D78: 20 20 20 20 58 41 20 20 60
8D80: 20 45 20 20 20 20 20 20 E4
8D88: 4C 2E 58 52 00 20 20 00 46
8D90: 20 52 42 20 41 45 4D 4F A3

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Program 4: IBM PC/PCjr Balloon Crazy

Version by Charles Brannon,
Program Editor

For instructions on entering this listing, please
refer to "COMPUTE!'s Guide to Typing In
Programs" published bimonthly in COMPUTE!.

```

KL 100 'Balloon Crazy for IBM PC
/PCjr requires BASICA, Co
lor Graphics adapter, and
one joystick
OK 110 DEFINT A-Z:RANDOMIZE TIME
R:DIM BP$(3),MOBJ(452),X(
49),Y(49)
DF 120 DF=10: 'change df to a sm
aller number for a grea
r challenge
ID 130 SCREEN 1:COLOR 9,0:KEY OF
F:STRIG ON::PLAY "mf":CLS
AD 140 GOSUB 280:X=100:HP=164:EY
=Y+22
IG 150 TX=3:LX=134:SKEW!=2.27:SP
!=4:LIVES=4
BE 160 GOSUB 740:PRINT"BALLOON C
R A Z Y !":LOCATE 9,10:P
RINT"/":LOCATE 8,11:PRINT
"Do you need":LOCATE 9,11
:PRINT"to adjust":LOCATE
10,11:PRINT"your joystick
?":WHILE INKEY$<>:WEND
EI 170 A$=INKEY$:IF A$="" AND ST
RIG(1)=0 THEN 170 ELSE IF
(ASC(A$+CHR$(0)) OR 32)=
121 THEN GOSUB 600
KE 180 CLS:PRINT"BALLOON C R A Z
Y !":LOCATE 1,25:PRINT"S
core:";SC!
BA 190 FOR I=158 TO 174 STEP 8:P
UT(I,0),TINY:NEXT:GOSUB 3
50
KE 200 FOR ROW=20 TO 80 STEP 20:
FOR COL=45 TO 255 STEP 15
:PUT (COL,ROW),BALL:NEXT
COL,ROW
QJ 210 PUT(X,Y),MAN:GET (X,Y)-(X
+21,EY),MOBJ
CN 220 IF BP<0 THEN GOSUB 380:GO
TO 180 ELSE BY=BP*20+20:T
$=BP$(BP):PTR=.5+RND(1)*L
EN(T$):BX=(ASC(MID$(T$,PTR
))-64)*15+30:T$=LEFT$(T$,
PTR-1)+MID$(T$,PTR+1):BP
$(BP)=T$:IF T$="" THEN BP
=BP-1
JG 230 PUT(BX,BY),BALL:BY=BY+SP!
:PUT(BX,BY),BALL:IF BY>18
0 THEN 440
KI 240 IF ABS(BY-HP)<SP! THEN IF
ABS((BX-7)-X)<DF THEN Y=
Y-13:PUT(BX,BY),BALL:PUT(

```



The main character in IBM PC/PCjr
"Balloon Crazy" is a humorous clown.

```

X+7,Y),BALL,PSET:SOUND 30
000,1:GET(X,Y)-(X+21,EY),
MOBJ:HP=HP-13:FLOATERS=FL
OATERS+1:SP!=SP!+.5:IF FL
OATERS=7-BP THEN GOSUB 38
0:GOTO 210 ELSE 220
FD 250 PUT(X,Y),MOBJ:NX=(STICK(0
)-TX)*SKEW!:X=NX:IF NX<0
THEN X=0 ELSE IF NX>297 T
HEN X=297
HE 260 PUT(X,Y),MOBJ
OG 270 GOTO 230
PD 280 READ XS,YS:E=(4+INT((XS+7
)/8)*YS)/2:DIM MAN(E):MAN
(0)=XS:MAN(1)=YS:FOR I=2
TO E:READ MAN(I):NEXT:Y=2
00-YS:MY=Y
HF 290 READ XS,YS:E=(4+INT((XS+7
)/8)*YS)/2:DIM POP(E):POP
(0)=XS:POP(1)=YS:FOR I=2
TO E:READ POP(I):NEXT
HO 300 READ XS,YS:E=(4+INT((XS+7
)/8)*YS)/2:DIM FALL(E):FA
LL(0)=XS:FALL(1)=YS:FOR I
=2 TO E:READ FALL(I):NEXT
HE 310 READ XS,YS:E=(4+INT((XS+7
)/8)*YS)/2:DIM BALL(E):BA
LL(0)=XS:BALL(1)=YS:FOR I
=2 TO E:READ BALL(I):NEXT
KE 320 READ XS,YS:E=(4+INT((XS+7
)/8)*YS)/2:DIM XBALL(E):X
BALL(0)=XS:XBALL(1)=YS:FO
R I=2 TO E:READ XBALL(I):
NEXT
CL 330 READ XS,YS:E=(4+INT((XS+7
)/8)*YS)/2:DIM TINY(E):TI
NY(0)=XS:TINY(1)=YS:FOR I
=2 TO E:READ TINY(I):NEXT
MF 340 RETURN
LG 350 BP=3:FOR I=0 TO BP:BP$(I
)="ABCDEFGHIJKLMNO":NEXT
NJ 360 RETURN
JH 370 GOSUB 380:GOTO 220
LE 380 FOR I=1 TO FLOATERS
LK 390 PUT(X,MY),POP,PSET:PUT(X+
7,MY-13),BALL:PUT(X+7,MY-
18),XBALL:FOR J=0 TO 5:SO
UND 100+J,.5:NEXT:PUT(X+7
,MY-18),XBALL
OD 400 IF I<FLOATERS THEN PUT(X+
7,Y),BALL:PUT(X+7,MY-13),
BALL
FL 410 PUT(X,MY),MAN,PSET:FOR W=
1 TO 5:NEXT:SC!=SC!+10:LO
CATE 1,31:PRINT SC!:Y=Y+1
3:NEXT
OH 420 Y=MY:GET(X,Y)-(X+21,EY),
MOBJ:PUT(X,Y),MAN
PO 430 SP!=4:HP=164:FLOATERS=0:R
ETURN
FD 440 PUT(BX,BY),BALL:PUT(BX,BY
-5),XBALL:FOR J=0 TO 5:SO
UND 105-J,.5:NEXT:PUT(BX,
BY-5),XBALL
EH 450 PUT(X,MY),MAN:PUT(X,MY),F
ALL
CC 460 IF FLOATERS=0 THEN 510
LD 470 FOR I=1 TO FLOATERS
OI 480 PUT(X+7,MY-13),BALL:PUT(X
+7,MY-18),XBALL:FOR J=0 T
O 5:SOUND 105-J,.5:NEXT:P
UT(X+7,MY-18),XBALL
PF 490 IF I<FLOATERS THEN PUT(X+
7,Y),BALL:PUT(X+7,MY-13),
BALL
JM 500 FOR W=1 TO 5:NEXT:Y=Y+13:
NEXT
FL 510 NY=MY:S=-6:FOR I=X+5 TO 2
91 STEP 5:PUT(I-5,NY),FAL
L:NY=NY+S:IF NY<MY-18 OR
NY>MY THEN NY=NY-S:S=-S
QJ 520 PUT(I,NY),FALL:SOUND 100+
NY,.5:NEXT
HO 530 NX=I-5:FOR I=NY-16 TO 0 S
TEP-16:PUT(NX,I+16),FALL:
PUT(NX,I),FALL:SOUND 5000
-I*5,.1:NEXT
LD 540 PUT(NX,I+16),FALL
JM 550 LIVES=LIVES-1:PUT(150+LIV
ES*8,0),TINY:IF LIVES>0 T
HEN PUT(X,MY),MAN:GOSUB 4
20:GOTO 210
OH 560 CLS:FOR I=0 TO 49:X(I)=4+
15*INT(20*RND(1)):Y(I)=18
*INT(10*RND(1)):PUT(X(I),
Y(I)),BALL,PSET:NEXT
JA 570 FOR I=0 TO 49:PUT(X(I)-4
,Y(I)),XBALL,PSET:SOUND 1
00+5*RND(1),.2:SOUND 3000
0,.2:PUT(X(I)-4,Y(I)),XB
ALL:NEXT
LL 580 LOCATE 12,16:PRINT"GAME O
VER":LOCATE 13,17-LEN(STR
$(SC!))/2:PRINT"Score:";S
C!:LOCATE 14,15:PRINT"Pre
ss Button"
OJ 590 A$=INKEY$:IF INKEY$="" AN
D STRIG(1)=0 THEN 590 ELS
E RUN
KP 600 GOSUB 740
JN 610 LOCATE 9,10:PRINT"/":LOCA
TE 8,11:PRINT"Move stick
to":LOCATE 9,11:PRINT"far
left,";LOCATE 10,11:PRIN
T"press button!"
JI 620 TX=STICK(0):IF STRIG(1)<>
0 THEN 640
JI 630 FOR I=10 TO 0 STEP-1:C=-C
*(C<3)+1:LINE(30+I,40)-(
I,70),C:LINE-(30+I,100),C
:NEXT:GOTO 620
QJ 640 PUT(50,63),POP,PSET:PUT(5
7,45),XBALL,PSET:FOR J=1
TO 15:SOUND 100+J,.5:NEXT
BG 650 CLS:PUT(50,63),MAN:LOCAT
E 9,10:PRINT"/":LOCATE 8,
11:PRINT"Gimme another":L
OCATE 9,11:PRINT"balloon!"
CJ 660 FOR J=1 TO 2000:NEXT
KH 670 PUT(57,0),BALL:FOR I=2 TO
50 STEP 2:WAIT &H3DA,8:P
UT(57,I-2),BALL:WAIT &H3
DA,8:PUT(57,I),BALL:NEXT
CE 680 LOCATE 8,11:PRINT"Move st
ick to":LOCATE 9,11:PRIN
T"far right,";LOCATE 10,1
1:PRINT"press button!"
OB 690 LX=STICK(0):IF STRIG(1)<>
0 THEN 710
BP 700 FOR I=10 TO 0 STEP-1:C=-C
*(C<3)+1:LINE(289-I,40)-(
319-I,70),C:LINE-(289-I,
100),C:NEXT:GOTO 690
MK 710 FOR I=1 TO 5:PUT(57,45),
XBALL,PSET:PUT(50,63),POP
,PSET:FOR J=1 TO 4:SOUND
100+J,.5:NEXT:PUT(57,50),

```

```

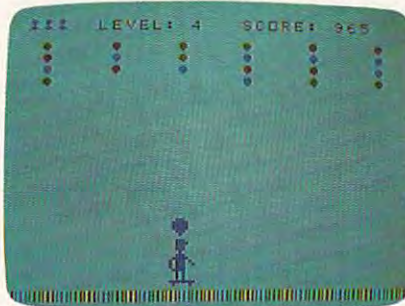
BALL, PSET: PUT (50, 63), MAN,
PSET: FOR J=1 TO 100: NEXT:
NEXT
NA 720 SKEW:=297/ABS(LX-TX)
MH 730 RETURN
PC 740 CLS: PUT (0, 63), MAN: PUT (57,
0), BALL: FOR I=2 TO 50 STEP
2: PUT (57, I-2), BALL: PUT
(57, I), BALL: PUT (I-2, 63),
MAN: PUT (I, 63), MAN, PSET:
NEXT: RETURN
HA 750 DATA &H2C, &H17, &H0, &H5, &H
0, &H0, &H4015, &H0
FD 760 DATA &H0, &H5055, &H0, &H0, &
H30CF, &H0, &H30CF, &HCC3
JJ 770 DATA &H0, &H300, &HACAA, &H0
, &H0, &H40A0, &H0, &H0
BF 780 DATA &H802A, &H0, &H0, &HF, &
H0, &HE00, &HEEE, &HC0
EA 790 DATA &HFB00, &HBBB, &HB0, &
HC003, &HE0EE, &H3C, &HF, &H0
03B
OM 800 DATA &HF, &HFF, &HC02E, &HF0
0F, &H0, &H4015, &H0, &H0
GJ 810 DATA &H0AA, &H0, &H0, &H0AA
A, &H0, &H200, &HABA0, &H0
FJ 820 DATA &H200, &HABA0, &H0, &H0
00, &H2A80, &H0, &HA37, &H2A8
0
AB 830 DATA &HC00D, &HDADD, &H3AC0
, &H7077, &H7737, &H1D40, &HC
0DD, &HAB00
GP 840 DATA &H2C, &H17, &HB00, &H5,
&H0, &H4000, &H4015, &H0
IG 850 DATA &HB003, &H5055, &H0, &H
C003, &HC3, &H0, &H30F, &H3CC
F
KH 860 DATA &H0, &H30F, &HACAA, &H0
, &HC003, &H40A0, &H0, &HF003
KI 870 DATA &HB02A, &H0, &HFC00, &H
F, &H0, &H2E00, &HEEE, &HC0
CN 880 DATA &HB00, &HBBB, &HBC, &H
0, &HE0EE, &HFF, &H0, &HB03B
EG 890 DATA &HF, &H0, &HC02E, &HC00
3, &H0, &H4015, &HC003, &H0
GC 900 DATA &H0AA, &HC000, &H0, &H
0AA, &H0, &H200, &HABA0, &H0
FI 910 DATA &H200, &HABA0, &H0, &H0
00, &H2A80, &H0, &HA37, &H2A8
0
AA 920 DATA &HC00D, &HDADD, &H3AC0
, &H7077, &H7737, &H1D40, &HC
0DD, &HAB00
PM 930 DATA &H3B, &H16, &H0, &H0, &H
0, &H0, &H0, &H0
EG 940 DATA &H0, &H0, &H1400, &H0, &
H0, &H0, &H55, &H0
OB 950 DATA &H0, &H55F1, &H4F, &H0,
&HF303, &HCF3C, &HC0, &HF00
HN 960 DATA &HF30C, &HF0F0, &H0, &H
F3C, &HF0F0, &H3C, &H3C00, &H
B20E
HN 970 DATA &H3CB0, &H0, &H23F, &HB
02B, &HFC, &HF00, &HFFC0, &HF
003
BL 980 DATA &H0, &HFB03, &HBBB, &H
0, &H0, &HEEE, &HEC, &H0
OJ 990 DATA &H300, &HB0BB, &H0, &H0
, &HEE00, &H0, &H7700, &H0
PB 1000 DATA &HBB, &HDD00, &HC01D,
&H5500, &H300, &H774, &HA24
0, &HBAAA
LG 1010 DATA &HD001, &HE201, &HAAA
A, &HBBAA, &H40, &HAA7A, &HAA
AAA, &HAD
DG 1020 DATA &H1A00, &HB20A, &HA4A
0, &H0, &H4, &H0, &H10, &HA00
2
MJ 1030 DATA &H14, &HD, &HB002, &H2
A00, &HB0BE, &HAFAA, &HAAA0
, &HA0AF
MM 1040 DATA &HAFAA, &HAAA0, &HA0A
F, &HAE2A, &H2A80, &HB0AA, &
HAA0A, &H200

```

```

MH 1050 DATA &HAB, &HA000, &H0, &H4
0, &H1, &H200, &HAB
OF 1060 DATA &H26, &H12, &H2020, &H
20, &H0, &H2B00, &H0, &H0
NF 1070 DATA &H2B2B, &HB00, &H202B
, &HAB, &H2A00, &HA002, &H2B
, &HB202
OF 1080 DATA &H2080, &H202, &HAB0,
&H2000, &H0, &H8, &HA000, &H
A08B
OB 1090 DATA &H8, &HB02B, &H2B80, &
H0, &HB8A2, &HAA0, &H200, &H
B08A
FB 1100 DATA &HA000, &H2B00, &H0, &
H2000, &H0, &H200, &HB000, &
H0
NN 1110 DATA &HB0A, &HA0, &H400, &H
2000, &H0, &H10, &H0, &H0
JE 1120 DATA &HE, &HA, &H1, &HC00F,
&HC00E, &H3, &HB03B, &HCCCE
ED 1130 DATA &H1, &HB00A, &HA02B, &
H1450, &H30CF

```



"Balloon Crazy" for the TI-99/4A can be played with the keyboard or a joystick.

Program 5: TI-99/4A Balloon Crazy

Version by Patrick Parrish,
Programming Supervisor

```

90 REM REQUIRES EXTENDED
BASIC
100 GOTO 140
110 CALL DELSPRITE(#2)::
CALL MOTION(#1,0,0,#3
,0,0):: RETURN
120 CALL KEY(0,K,ST):: IF
ST=0 THEN CALL JOYST
(1,H,V):: H=SGN(H)ELS
E H=(K=83)-(K=68)
130 CALL MOTION(#1,0,60*H
):: RETURN
140 DIM DROP(2),KOLOR(2):
RANDOMIZE:: CALL M
AGNIFY(4)
150 CALL CHAR(136,"030303
030103070B0B0B0702020
20F0480C0B0B0B0B0C0A0
90B0B0B0B0B0F020")::
REM SKATEBOARD MAN
160 FOR I=96 TO 112 STEP
8:: CALL CHAR(I,"003
B7C7C7C381000"):: NEX
T I:: LEVEL,SC,SC2=0
:: MEN=3:: ROW=41::
: KHAR=100
170 CALL CLEAR:: CALL SC
REEN(16):: A$=RPT$(" "
hp",9):: FOR I=1 TO 2
4 STEP 23:: DISPLAY

```

```

AT(I,1):A$:: NEXT I
180 DISPLAY AT(10,8):"B A
L L O O N":: DISPLA
Y AT(13,9):"C R A Z Y
!":: A=3:: B=5::
C=7
190 FOR I=1 TO 50:: CALL
COLOR(9,A,1,10,B,1,1
1,C,1):: TEMP=A:: A=
B:: B=C:: C=TEMP::
IF I=30 THEN CALL SP
RITE(#1,136,14,150,1,
0,31)
200 NEXT I:: CALL DELSPR
ITE(#1):: CALL CLEAR
:: GOSUB 490
210 DROP(0)=15:: DROP(1)
=20:: DROP(2)=25
220 CALL CLEAR:: LEVEL=L
EVEL+1:: BALL=24::
GOSUB 570
230 DISPLAY AT(1,6):"LEVE
L:";LEVEL:: DISPLAY
AT(1,17):"SCORE:";SC
240 FOR R=3 TO 6:: FOR C
=4 TO 29 STEP 5:: CA
LL HCHAR(R,C,96+INT(R
ND*3)*8):: NEXT C::
NEXT R
250 CALL HCHAR(24,1,122,3
2):: CALL SPRITE(#1,1
36,14,150,115,0,H)
260 BALL=BALL-1:: IF BAL
L<0 THEN 410
270 BR=6:: BC=4+INT(RND*
6)*5
280 GOSUB 120:: CALL GCH
AR(BR,BC,BT):: IF BT=
32 THEN BR=BR-1:: IF
BR=2 THEN 270 ELSE 2
80
290 POINT=(BT-96)/8:: CA
LL HCHAR(BR,BC,32)::
CALL SPRITE(#2,KHAR,K
OLOR(POINT),ROW-(6-BR
)*8,8*(BC-2)-2,DROP(P
OINT),0)
300 GOSUB 120:: CALL COI
NC(#1,#2,15,C):: IF C
THEN 340
310 CALL POSITION(#2,BROW
,BCOL):: IF BROW<155
THEN 300
320 CALL POSITION(#1,MROW
,MCOL):: IF (BCOL-MCO
L<16)*(BCOL-MCOL)>-8)T
HEN C=1:: GOTO 340
330 GOSUB 110:: MEN=MEN-
1:: CALL DELSPRITE(#
3):: GOSUB 560:: IF
MEN=0 THEN 430 ELSE 4
00
340 GOSUB 110:: SC2=SC2+
(POINT+1)*LEVEL*5::
SC=SC+(POINT+1)*LEVEL
*5
350 IF SC2>=1000 THEN MEN
=MEN+1+(MEN=3):: SC2=
0:: GOSUB 570
360 IF C=0 THEN 400
370 CALL POSITION(#1,MROW
,MCOL):: CALL SPRITE(
#3,100,14,118,MCOL)
380 FOR I=1 TO 50:: NEXT
I:: CALL SPRITE(#1,
140,14,MROW,MCOL)
390 CALL SPRITE(#3,124,14
400 CALL HCHAR(1,3+MEN,32
):: DISPLAY AT(1,12):
LEVEL:: DISPLAY AT(1
,23):SC:: GOTO 260
410 FOR G=300 TO 1200 STE

```

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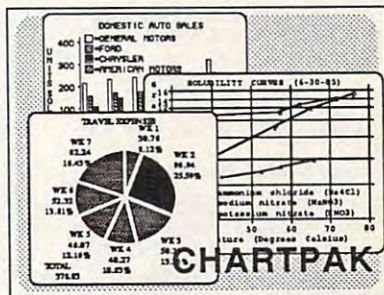


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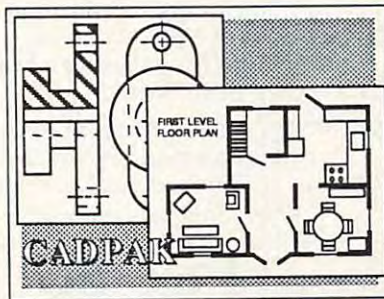
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```
P 100 :: CALL SOUND(8
0,G,1):: NEXT G :: FO
R I=0 TO 2 :: DROP(I)
=DROP(I)+2 :: NEXT I
420 CALL DELSPRITE(ALL)::
GOTO 220
430 CALL SCREEN(11):: IF
SC>HS THEN HS=SC
440 CALL DELSPRITE(#1)::
CALL CLEAR :: DISPLAY
AT(8,5):"YOUR SCORE:
";SC :: DISPLAY AT(1
1,5):"HIGH SCORE: ";H
S
450 DISPLAY AT(16,5):"PLA
Y AGAIN (Y/N)? " :: A
CCEPT AT(16,24)BEEP V
ALIDATE ("Nyn")SIZE(1
):REP$
460 IF REP$="N" THEN STOP
470 CALL SCREEN(16):: MEN
=3 :: LEVEL,SC,SC2=0
:: GOTO 210
480 REM SET COLORS
490 CALL COLOR(9,5,1,10,3
,1,11,7,1,12,13,1,13,
14,1)
500 FOR J=0 TO 2 :: READ
KOLOR(J):: NEXT J
510 DATA 5,3,7
520 CALL CHAR(100,"000000
0000000000000000000000
30707070
3010000000000000000000
0080C0C0C0800000")::
REM BALLOON
530 CALL CHAR(124,"000000
0000000000001000401040
0010000000000000000000
000040004000000000")::
REM BALLOON POPPING
540 CALL CHAR(140,"030303
030103070B0B0B0702020
20F0490D0909010A0C080
8080808080F20"):: R
EM MAN POPPING BALLOO
N
550 CALL CHAR(128,"383C38
3810387CBA",122,"4949
4949494949"):: RETU
RN
560 FOR F=0 TO 25 STEP 5
:: CALL SOUND(-200,-5
,F):: NEXT F :: RETU
RN
570 CALL HCHAR(1,3,128,ME
N):: RETURN ©
```

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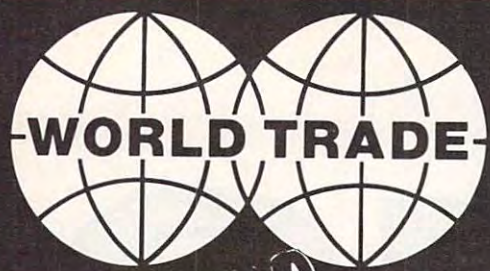
The program always shows the correct day of the week when you enter a date, and you need to enter the year only once—the very first time you run the program. After that (for the next 99 years, anyway)

Memo Diary keeps track of the year for you. Each time you run the program, it automatically shows all due and overdue events on the screen or printer, and erases one-time events from the calendar after they're displayed.

You can enter temporary or recurring new events and erase existing events whenever you wish. You can also examine all events from the current date forward, or search the entire calendar for events matching a given starting pattern. Finally, Memo Diary saves your calendar either on disk or tape.

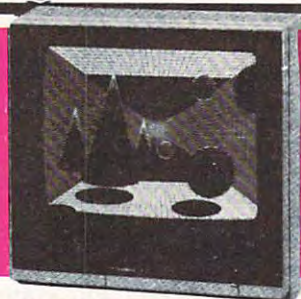
Typing The Program

We've listed Memo Diary in the form of one main program that contains common routines (Program 1), followed by line changes for each different computer. No matter which computer you're using, you'll need to type in Program 1 plus the modifications for your machine. However, before typing anything, cross out every line in Program 1 that has the same line number as a line in the listing for your specific computer. The idea is to eliminate duplicate lines from the main program; they're replaced



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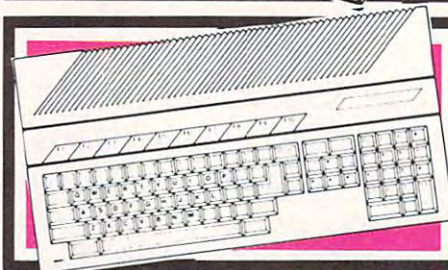
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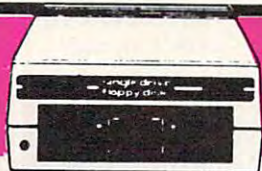


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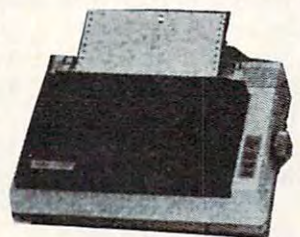
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by lines from the version for your computer. For example, if you're using an Atari, you would cross out line 150 in Program 1, because there's already a line 150 in the Atari listing (Program 3).

After crossing out duplicate lines in Program 1, type in the listing for your computer. Once that's done, type in every line of the Program 1 that's *not* crossed out. Be sure to save a copy of the program and read the instructions before running it.

The first time you run Memo Diary is special. *Do not start the program by entering RUN.* For every version except Atari you should type RUN 100 and press RETURN (or ENTER on the TI and IBM). Atari users should type CLR: GOTO 100 and press RETURN. *If you don't do this, the program will not work correctly.* When you start the program at line 100, Memo Diary lets you enter the correct year without looking for a previous file of events. Thereafter, start the program with RUN in the usual way.

On the first run you'll probably want to enter fixed holidays such as New Year's Day as well as birthdays and anniversaries. These are permanent events that you won't need to enter year after year. A holiday like Thanksgiving should be entered as a one-time event since it falls on a different date each year.

When Memo Diary asks you to enter today's date, you can type in the name of the month (such as OCTOBER) or its number (such as 10). In either case, be careful to enter it correctly. Memo Diary lets you enter any day of the month from 1 to 31, so it won't mind if you specify the date as February 30. Mistakes like these may confuse the calendar file. For instance, if you use the program on July 4 and the next day mistakenly give the date as June 5, the computer thinks you've let almost a whole year go by. To warn you of this, Memo Diary displays HAPPY NEW YEAR. If you see this message when a new year hasn't arrived, stop the program and start over, entering the correct date.

A Memory Jogger

Except for the very first run, Memo Diary always begins by reporting

all due and overdue events ("You just missed your anniversary"). Take careful note of these events, since they'll soon be erased from the calendar (if they're temporary events) or moved ahead to next year (if they're permanent). To help jog your memory, Memo Diary also lets you make a copy of the list of events on your printer.

After disposing of due and overdue events, Memo Diary displays five options: You can see future events, add a new event, cancel an event, search for an event, or quit the program. You'll ordinarily want to look ahead to see what's coming in the next week or two. To do this, choose Option 1 (see future events) and supply an appropriate future date when requested. If you enter the current date when looking at future events, Memo Diary assumes you mean the same date *next year* and gives you everything on file.

When you want to make a new entry, select Option 2 (add new event). First Memo Diary asks whether the new event is one-time or permanent. Then it lets you enter the date and details. Again, the current date is understood as one year from today (it's assumed you don't need to record an event that's happening the same day).

To cancel an event (Option 3), you must know its date. When an event is entered, you're shown every item scheduled for that date, each with its own code number. To cancel an event, type in its code number when prompted.

Option 4 (search for event) lets you search for an event based on the first few letters of the entry. You may find many events in the course of a search. For instance, if the calendar file contains the events CLUB MEETING, CLUB CONFERENCE, and CLUB ELECTION, searching for CLUB displays all three events. In this case you would *not* see the entry CANADIAN CLUB, since CLUB is spotted only if it's in the first word of the entry. Thus, if you plan to search for certain keywords (BIRTHDAY, CHURCH, SOFTBALL, or whatever) keep them at the front of each calendar entry.

After you've finished an option, Memo Diary always returns you to the main menu. Sooner or later you'll be ready to use Option 5

(quit). The program knows when it's time to update the calendar file. If you've erased past and overdue events, added or deleted items, Memo Diary will—with your permission—proceed to update the data file on disk or tape.

The Time Pivot

A program that handles dates can encounter some subtle paradoxes. Does August come before April, or after it? The correct answer is *both*. Memo Diary could resolve this difficulty by adding a year designation to every event, but that complicates the handling of permanent events, which don't belong to a specific year. This is not a trivial problem: If you schedule a new event for August, the program must decide whether to add the event to the calendar ahead of an existing April event, or after it. Without a year designation, how can anyone tell?

The problem is solved by using a *pivot date*, usually the same as the current date. If today is July 4, August does indeed come before April. On the other hand, if today is November 11, April comes before August. Since the calendar always looks one year into the future, everything is kept in order.

However, there's one case in which the pivot date can't be the current date. Each time the program begins, it must measure the time lapse since its last use. For example, say that you last used the program on August 20, 1985 and next use it on September 4, 1985. On the first run (August 20) Memo Diary uses August 20 as the pivot. That way an event dated September 1 is seen ahead of another item dated in October.

On the second run (September 4) the September 1 event is reported as past due and either erased from the calendar (if it's temporary) or moved ahead to September 1 of next year (if it's permanent). Once this is done, the pivot date moves forward to September 4, meaning that a September 1 event now belongs *after* an item dated in October. Don't worry if this sounds confusing: It works out more simply in practice than in theory.

The day of the week is worked out with a simple formula. If you haven't seen it before, here's a hint on how it works. The calendar is

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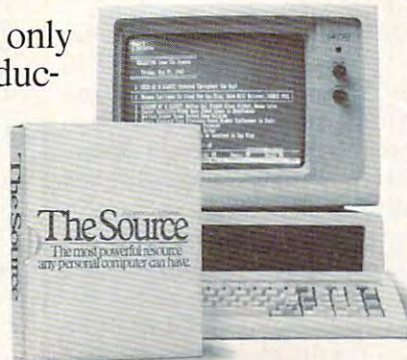
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modified to make March 1 the first day of the "adjusted year." This way, leap year with its extra February 29 date doesn't break up the sequence of days: The extra leap day just gets pasted onto the year's end. Though the math is a bit convoluted, you may find it interesting to trace the logic of this routine (it starts at line 2150).

Expanding The Calendar

Memo Diary can keep track of a maximum of 100 events. In practice it's wise to limit the number to 80 or 90 to leave room for permanent events that move automatically from the front to the back of the list. If you need more than 100 events, change the L\$ value in the DIM statement. Line 150 contains the value L\$(100). You can increase the 100 to whatever number you like, but don't get carried away. Since Memo Diary (except the Atari version) uses string arrays, a very large value may cause garbage collection delays. There's no particular limit to the number of events allowed for a particular date.

Program Notes

Let's take a look at the program's major features. Line 90 prepares Memo Diary to read a file. The variable F is a *Boolean* (logical) variable that's defined as *true* here, to let you read the calendar file on a normal run. When you enter at line 100 on the first run, F is *false* (like every other undefined variable) and no file is read.

DATA statements in lines 110-140 hold the names of the months of the year and days of the week; the names are read into the arrays M\$ and W\$. Line 150 dimensions the L\$ array for 100 items. Lines 230-250 call for a reading of the calendar file if appropriate. This is done in the subroutine at line 3010. When Memo Diary reads this file, it detects and reports the last date the file was used. Line 260 asks for today's date; the subroutine at line 1670 asks for and accepts the date.

Now it's time to search for due and overdue events. Using the previous date as a pivot, the subroutine at line 1960 scans for all events up to today's date. The program reports these events, erases them, or moves them ahead as needed, and

proceeds to the main menu. Line 680 begins a main activity loop: It prompts with the menu, asks for a choice, then goes to the appropriate subroutine. Line 850 lets you see future events. Since the pivot date is now today, the program scans to the requested future date to see how many events fall into the today-to-future-date range.

Line 940 lets you add a new event. After asking ANNUAL OR ONE-TIME? the program requests the event's date and then asks for details. After adding a year designation to the date of one-time events, the new event is inserted into the proper sequence. Line 1210 lets you cancel an event. Memo Diary asks for a date and then lists all events that match that date. At line 1350, the program asks which event to delete. Note that the number you supply must be in the correct range.

Line 1450 begins the search-for-an-event routine. After it receives a search string (P\$), the program looks for a match. When it scans through the calendar, it must look in different places depending on whether the event is one-time or permanent. That's because one-time events carry a year designation, making their dates three characters longer.

A Horrible Mistake?

Line 1570 handles the quit option; the flag F9 registers activity. If you haven't changed any of the data, there's no need to update the calendar file. Before scratching the old file and writing the new one, the program asks whether you're ready. That way, if you made some horrible mistake, you can cancel the file update.

The main loop ends at line 1580 and is followed by several subroutines. The routine starting at line 1590 writes a new calendar file when appropriate, and line 1670 begins the date input routine. The date is formed into a string (D8\$) to allow for easy searches or entry. The subroutine at line 1930 reads the calendar file. The first item in the file is always the most recent date of use; the remaining data is events.

The subroutine at line 1960 scans all events to see which have dates between the pivot date (D9\$)

and a second date (D8\$). There are three dates involved: event, pivot, and the second date, which makes the comparison a bit messy. Boolean variables keep everything in order. Eventually, the variable F0 indicates the date is in range, and the variable L0 indicates when the last event is found within the date range.

The routine starting at line 4020 displays the information, on the printer if desired. (TI users should change line 4070 to match their printer configuration.) The date is given complete with the day of the week, and events falling on the same day are grouped together. The weekday calculation begins at line 2150. The weekday variable, W, ranges from 0 to 6, so 0 means Sunday. As written, this routine is good for years ranging from 85 (1985) to 84 (2084). If you want to plan more than 99 years in advance, you'll need to modify the routine.

Program 1: Memo Diary Main Program

Please refer to instructions in the article before entering this listing.

```

90 F=(1=1)
100 GOSUB 2250
110 DATA JAN,FEB,MAR,APR,MAY,J
    UN
120 DATA JUL,AUG,SEP,OCT,NOV,D
    EC
130 DATA SUNDAY,MONDAY,TUESDAY
    ,WEDNESDAY
140 DATA THURSDAY,FRIDAY,SATUR
    DAY
150 DIM M$(12),W$(6),L$(100)
160 FOR J=1 TO 12
170 READ M$(J)
180 NEXT J
190 FOR J=0 TO 6
200 READ W$(J)
210 NEXT J
220 PRINT "EVENT CALENDAR"
230 IF F=0 THEN 260
240 C=1
250 GOSUB 3010
260 PRINT "TODAY'S DATE:"
270 Y8=Y9
280 GOSUB 1670
290 M8=M
300 D8=D
310 IF M8>=M9 THEN 330
320 Y8=Y9+1
330 IF M8<>M9 OR D8>=D9 THEN 3
    50
340 Y8=Y9+1
350 IF Y8<=Y9 THEN 370
360 PRINT "HAPPY NEW YEAR"
370 IF F THEN 400
380 PRINT "YEAR";
390 INPUT Y8
400 D9$=RIGHT$(STR$(100+M9),2)
    +"/"
410 D9$=D9$+RIGHT$(STR$(100+D9
    ),2)

```

```

420 IF F THEN 440
430 D9$=D8$
440 F=(1=1)
450 GOSUB 1960
460 PRINT "PAST EVENTS: ";
470 IF L0=>0 THEN 500
480 PRINT "NONE"
490 GOTO 650
500 PRINT L0+1
510 GOSUB 4010
520 F9=-1
530 FOR J=0 TO L0
540 IF MID$(L$(J),6,1)="/" THEN
  N 570
550 L$(L9)=L$(J)
560 L9=L9+1
570 NEXT J
580 L8=L0+1
590 FOR J=L8 TO L9-1
600 L$(J-L8)=L$(J)
610 NEXT J
620 L9=L9-L8
630 L8=0
640 L=L9
650 F=0
660 F9=0
670 D9$=D8$
680 L=L9-L8
690 IF L<>0 THEN 710
700 PRINT "NO FUTURE EVENTS"
710 IF L=0 THEN 730
720 PRINT L;" FUTURE EVENTS"
730 PRINT
740 PRINT "1. SEE FUTURE EVENT
  S"
750 PRINT "2. ADD NEW EVENT"
760 PRINT "3. CANCEL EVENT"
770 PRINT "4. SEARCH FOR EVENT
  "
780 PRINT "5. QUIT"
790 PRINT
800 PRINT "...YOUR CHOICE (1-5
  )";
810 INPUT A
820 PRINT
830 ON A GOTO 850,940,1210,145
  0,1570
840 GOTO 730
850 PRINT "AHEAD TO DATE:"
855 FL=1
860 GOSUB 1670
865 FL=0
870 GOSUB 1960
875 IF D8$=D9$ THEN L0=L9-1
880 IF L0<>-1 THEN 910
890 PRINT "NO EVENTS"
900 GOTO 920
910 GOSUB 4010
920 PRINT L9-L0-1;" OTHER FUTU
  RE EVENTS"
930 GOTO 730
940 PRINT "ANNUAL OR ONE-TIME
  {SPACE}(A/O)";
950 INPUT P$
960 A=0
970 P$=LEFT$(P$,1)
980 IF P$="O" THEN 1010
990 A=1
1000 IF P$<>"A" THEN 730
1010 GOSUB 1670
1020 Y$="/" + RIGHT$(STR$(101+Y8
  ),2)
1050 IF A<>1 THEN 1070
1060 Y$=""
1070 GOSUB 1960
1080 IF L9-1<L0+1 THEN 1120
1090 FOR J=L9-1 TO L0+1 STEP -
  1
1100 L$(J+1)=L$(J)
1110 NEXT J
1120 PRINT "DETAIL";
1130 INPUT LL$
1140 D8$=D8$+Y$

```

```

1150 D8$=D8$+" "
1160 L$(L0+1)=D8$+LL$
1170 L9=L9+1
1180 L=L9
1190 F9=-1
1200 GOTO 680
1210 PRINT "CHANGE WHICH DATE:
  "
1220 GOSUB 1670
1230 L0=-1
1240 FOR J=L8 TO L9-1
1250 IF D8$<>LEFT$(L$(J),5) TH
  EN 1300
1260 L1=J
1270 IF L0<>-1 THEN 1290
1280 L0=J
1290 PRINT J;" : ";L$(J)
1300 NEXT J
1310 IF L0<>-1 THEN 1340
1320 PRINT "NO EVENTS"
1330 GOTO 730
1340 PRINT
1350 PRINT " DELETE WHICH EVEN
  T ABOVE";
1360 INPUT A
1370 IF A<L0 OR A>L1 THEN 730
1380 FOR J=A TO L9-1
1390 L$(J)=L$(J+1)
1400 NEXT J
1410 L9=L9-1
1420 F9=-1
1430 PRINT "... DELETED"
1440 GOTO 680
1450 PRINT "SEARCH FOR";
1460 INPUT P$
1470 P=LEN(P$)
1480 FOR J=0 TO L9-1
1490 A=7
1500 IF MID$(L$(J),6,1)<>"/" T
  HEN 1520
1510 A=10
1520 IF A+P-1>LEN(L$(J)) OR P$
  <>MID$(L$(J),A,P) THEN 15
  40
1530 PRINT L$(J)
1540 NEXT J
1550 PRINT "{4 SPACES}END OF S
  EARCH"
1560 GOTO 730
1570 IF F9<>0 THEN 1590
1580 END
1590 PRINT "READY TO WRITE NEW
  EVENTS FILE (Y/N)";
1600 INPUT P$
1610 IF LEFT$(P$,1)="Y" THEN 1
  630
1620 STOP
1630 D9$=D9$+ "/"
1640 D9$=D9$+RIGHT$(STR$(Y8+10
  0),2)
1650 C=2
1660 GOTO 3010
1670 M=0
1680 PRINT "MONTH";
1690 INPUT MM$
1700 M=VAL(MM$)
1710 MM$=LEFT$(MM$+"XX",3)
1720 IF M=0 THEN 1760
1730 IF M<1 OR M>12 THEN 1670
1740 PRINT M$(M)
1750 GOTO 1810
1760 FOR J=1 TO 12
1770 IF MM$<>M$(J) THEN 1790
1780 M=J
1790 NEXT J
1800 IF M<1 OR M>12 THEN 1670
1810 PRINT "DAY";
1820 INPUT D
1830 IF D<1 OR D>31 THEN 1670
1840 D8$=RIGHT$(STR$(100+M),2)
  + "/"
1850 D8$=D8$+RIGHT$(STR$(100+D
  ),2)

```

```

1860 Y=Y8
1865 IF D8$=D9$ AND FL=1 THEN 1880
1870 IF D8$>LEFT$(D9$,5) THEN
  1890
1880 Y=Y8+1
1890 GOSUB 2150
1900 IF LEN(LL$)<=0 THEN 1920
1910 PRINT "(";W$(W);")"
1920 RETURN
1930 C=1
1940 GOSUB 3010
1950 RETURN
1960 LL$=CHR$(255)
1970 L0=-1
1980 IF L<>0 THEN 2000
1990 RETURN
2000 V$=D8$+LL$
2010 WW$=D9$
2030 WW$=D9$+LL$
2040 F1=(WW$>V$)
2050 FOR J=L8 TO L9-1
2060 F2=(L$(J)>WW$)
2070 F3=(V$>L$(J))
2080 F0=F2 AND F3
2090 IF F1=0 THEN 2110
2100 F0=F2 OR F3
2110 IF F0=0 THEN 2130
2120 L0=J
2130 NEXT J
2140 RETURN
2150 IF Y>=85 THEN 2170
2160 Y=Y+100
2170 M1=M+1
2180 M2=INT(1/M1+.7)
2190 M3=Y-M2
2200 M4=M1+12*M2
2210 N=INT(M4*30.6001)+INT(M3*
  365.25)+D
2220 M6=INT(N/7)
2230 W=N-7*M6
2240 RETURN
2250 PRINT CHR$(147)
2260 RETURN
3000 REM INPUT/OUTPUT ROUTINE
4000 REM PRINT ROUTINE

```

Program 2: Modifications For Commodore

For instructions on entering this listing please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

255 IF E=0 THEN 260 :rem 164
256 F=0 :rem 80
1575 IF THENCLOSE15 :rem 187
3010 F$="EVENTS" :rem 132
3020 PRINT "DISK OR CASSETTE (D
  /C)?" :rem 4
3030 GETA$:IF (A$<>"C") AND (A$<
  >"D")) OR A$="" THEN 3030
:rem 227
3040 IFA$="D" THEN 3060 :rem 120
3050 D1=0:G$="" :GOTO 3070
:rem 13
3060 F$="@0:" + F$:D1=1 :rem 16
3070 IFC=2 THEN 3160 :rem 4
3080 IF D1=1 THEN G$="S,R"
:rem 85
3090 OPEN 1,1+7*D1,8*D1,F$+G$:G
  OSUB 3220:IF THENCLOSE1:GO
  TO 3150 :rem 93
3100 INPUT#1,LL$:D9$=LL$:IF LE
  N(LL$)<>8 THEN PRINT LL$;
  "?":GOTO 3140 :rem 60
3110 M=VAL(LEFT$(LL$,2)):D=VAL
  (MID$(LL$,4,2)):Y0=VAL(MI
  D$(LL$,7,2)) :rem 245
3120 M9=M:D9=D:Y9=Y0:L=0:PRINT
  "LAST ACCESS: ";LL$
:rem 181
3130 INPUT#1,L$(L):L=L+1:IF ST

```

```

=0 THEN 3130 :rem 34
3140 CLOSE1:GOSUB3220 :rem 240
3150 L8=L9:L9=L:RETURN :rem 28
3160 IFD1=1THENG$="S,W"
:rem 89
3170 OPEN1,1+7*D1,8*D1,F$+G$:G
OSUB3220:IFETHENCLOSE1:CL
OSE15:END :rem 71
3180 PRINT#1,D9$:CHR$(13);
:rem 166
3190 FORJ=0TOL9-1:PRINT#1,L$(J
);CHR$(13);:NEXTJ :rem 50
3200 GOSUB3220:CLOSE1:GOSUB322
0:IFOTHENCLOSE15 :rem 145
3210 END :rem 157
3220 IFD1=0THENRETURN :rem 71
3230 IFO=0THENOPEN15,8,15:O=1
:rem 199
3240 INPUT#15,E,B$:IFETHENPRIN
TBS:CLOSE15:O=0 :rem 33
3250 RETURN :rem 170
4010 D$="":P=3 :rem 168
4020 INPUT "WANT EVENTS ON PRI
NTER (Y/N)";P$ :rem 64
4030 IF LEFT$(P$,1)<>"Y" THEN
{SPACE}4050 :rem 214
4040 P=4 :rem 137
4050 OPEN 3,P :rem 170
4060 FOR J=L8 TO L0 :rem 219
4070 IF D$=LEFT$(L$(J),5) THEN
4150 :rem 4
4080 D$=LEFT$(L$(J),5):rem 125
4090 M=VAL(LEFT$(D$,2))
:rem 241
4100 D=VAL(MID$(D$,4,2))
:rem 239
4110 Y=Y8:IF D$<=D9$ THEN Y=Y8
+1 :rem 234
4120 GOSUB 2150 :rem 15
4130 PRINT#3,W$(W); " ";
:rem 180
4140 PRINT#3,M$(M);D :rem 102
4150 PRINT#3,"{3 SPACES}";MID$(
L$(J),6) :rem 20
4160 NEXT J :rem 84
4170 CLOSE 3 :rem 117
4180 RETURN :rem 173

```

Program 3: Modifications for Atari

For instructions on entering this listing please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!

```

FB 150 DIM A$(10),D8$(9),D9$(
9),M$(36),W$(63),L$(
100*30),LL$(30),TE$(4
),MM$(10),P$(30),Y$(1
0),V$(30),WW$(10)
EG 155 DIM D$(30),DE$(3),FN$(
15):W$="":W$(63)=W$
:W$(2)=W$:L$="":L$(3
000)=L$:L$(2)=L$
DM 170 READ A$:M$(J-1)*3+1,
J*3)=A$
EK 200 READ A$:W$(J*9+1,(J+1
)*9)=A$
CP 400 TE$="":TE$=STR$(100+M
9):D9$(1,2)=TE$(LEN(T
E$)-1,LEN(TE$)):D9$(3
)="/"
BO 410 TE$="":TE$=STR$(100+D
9):D9$(4,5)=TE$(LEN(T
E$)-1,LEN(TE$))
AA 540 IF L$(J*30+6,J*30+6)=
"/" THEN 570
JF 550 L$(L9*30+1,(L9+1)*30)
=L$(J*30+1,(J+1)*30)
MO 600 L$((J-L8)*30+1,(J-L8+
1)*30)=L$(J*30+1,(J+1
)*30)
KE 970 P$=P$(1,1)

```

```

CI 1020 Y$="/":TE$=STR$(101+
Y8):Y$(2,3)=TE$(LEN(
TE$)-1,LEN(TE$))
AI 1040 Y$(1,1)="/":TE$=STR$(
100+Y8):Y$(2,3)=TE$(
LEN(TE$)-1,LEN(TE$)
)
KG 1060 Y$(1,3)="(3 SPACES)"
PF 1100 L$((J+1)*30+1,(J+2)*
30)=L$(J*30+1,(J+1)*
30)
FK 1130 INPUT LL$:IF LEN(LL$
)>20 THEN LL$=LL$(1,
20)
HG 1135 IF LEN(LL$)<20 THEN
LL$(LEN(LL$)+1,20)="
(20 SPACES)"
AL 1140 D8$(6,8)=Y$
HC 1150 D8$(9)="Y"
GM 1160 L$((L0+1)*30+1,(L0+1
)*30+9)=D8$:L$((L0+1
)*30+10,(L0+1)*30+29
)=LL$
LL 1250 IF D8$<>L$(J*30+1,J*
30+5) THEN 1300
DL 1290 PRINT J;": ";L$(J*30
+1,(J+1)*30)
AA 1390 L$(J*30+1,(J+1)*30)=
L$((J+1)*30+1,(J+2)*
30)
LC 1490 REM
KK 1500 REM
IK 1520 IF P$<>L$(J*30+A,J*3
0+A+P-1) THEN 1540
PK 1530 PRINT L$(J*30+1,(J+1
)*30)
GL 1610 IF P$(1,1)="Y" OR P$
(1,1)="Y" THEN 1630
PC 1630 D9$(LEN(D9$)+1,LEN(D
9$)+1)="/"
QA 1640 P$=STR$(Y8+100):P=LE
N(P$):P$=P$(P-1,P):D
9$(LEN(D9$)+1,LEN(D9
$)+2)=P$
JO 1710 MM$(LEN(MM$)+1,LEN(M
M$)+2)="XX":MM$=MM$(
1,3)
KG 1740 PRINT M$((M-1)*3+1,M
*3)
CP 1770 IF MM$<>M$(J*3,J*3+2
) THEN 1790
MA 1840 D8$=STR$(100+M):D8$=
D8$(LEN(D8$)-1,LEN(D
8$)):D8$(3,3)="/"
HB 1850 P$=STR$(100+D):D8$(L
EN(D8$)+1,LEN(D8$)+2
)=P$(LEN(P$)-1,LEN(P
$))
PP 1870 IF D8$>D9$(1,5) THE
N 1890
BM 1910 PRINT "(":W$(W*9+1,(
W+1)*9);")"
AK 2000 V$=D8$:V$(LEN(V$)+1,
LEN(V$)+LEN(LL$))=LL
$
GO 2030 WW$=D9$:WW$(LEN(WW$
)+1,LEN(WW$)+LEN(LL$
))=LL$
IC 2060 F2=(L$(J*30+1,(J+1)*
30)>WW$)
CM 2070 F3=(V$>L$(J*30+1,(J+
1)*30))
EB 2800 PRINT CHR$(125)
FC 3010 POKE 195,0:PRINT "
(CLEAR)ENTER DEVICE
AND FILENAME":PRINT
"(i.e., D:EVENTS.DAT)
":INPUT FN$
DI 3020 TRAP 3070:IF C=2 THE
N 3050
NG 3030 OPEN #1,4,0,FN$:INPU
T #1;LL$:D9$=LL$:M=V
AL(LL$(1,2)):D=VAL(L

```

```

L$(4,5)):Y0=VAL(LL$(
7,8))
LG 3040 M9=M:D9=D:Y9=Y0:L=0:
PRINT "LAST ACCESS:
";LL$
OP 3042 INPUT #1;NE:IF NE TH
EN FOR L=0 TO NE-1:I
NPUT #1;LL$:L$(L*30+
1,(L+1)*30)=LL$:NEXT
L
IH 3044 TRAP 4000:CLOSE #1:
L8=0:L9=L:RETURN
GB 3050 NE=L9:OPEN #1,8,0,FN
$:PRINT #1;D9$:PRINT
#1;NE
OF 3060 IF NE THEN FOR A=0 T
O NE-1:PRINT #1;L$(A
*30+1,(A+1)*30):NEXT
A
KJ 3065 CLOSE #1:END
KC 3070 POKE 849,1:CLOSE #1:
TRAP 4000:IF PEEK(1
95)=0 THEN 3010
DL 3080 PRINT :PRINT CHR$(25
3);"* ERROR ";PEEK(1
95);":*":CLOSE #1
EI 3090 IF PEEK(764)<255 THE
N POKE 764,255:GOTO
3010
MJ 3100 GOTO 3090
JF 4010 D$="":DE$="E:"
MJ 4020 PRINT "WANT EVENTS O
N PRINTER (Y/N)";
HL 4030 INPUT P$
LK 4040 IF P$(1,1)<>"Y" THEN
4060
IB 4050 DE$="P:"
OJ 4060 OPEN #1,8,0,DE$
NM 4070 FOR J=L8 TO L0
FA 4080 IF D$=L$(J*30+1,J*30
+5) THEN 4150
MJ 4090 D$=L$(J*30+1,J*30+5)
NI 4095 M=VAL(D$(1,2))
MI 4100 D=VAL(D$(4,5))
OK 4110 Y=Y8:IF D$<=D9$ THEN
Y=Y8+1
AP 4120 GOSUB 2150
BD 4130 PRINT #1;W$(W*9+1,(W
+1)*9);": ";
DA 4140 PRINT #1;M$((M-1)*3+
1,M*3);": ";D
AO 4150 PRINT #1;":
(3 SPACES)";L$(J*30+
6,(J+1)*30)
FE 4160 NEXT J
JB 4170 CLOSE #1
KN 4180 RETURN

```

Program 4: Modifications For Apple

For instructions on entering this listing please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!

```

BA 105 DD$ = CHR$(4):I$ = CHR$(
9)
SI 2250 HOME
JA 3010 F$ = "EVENTS"
76 3020 PRINT DD$:"OPEN ";F$
FB 3030 IF C = 2 THEN 3080
3C 3040 PRINT DD$:"READ ";F$: IN
PUT LL$:D9$ = LL$: IF LE
N(LL$) < > 8 THEN PRINT
LL$;"?": GOTO 3080
FA 3050 M = VAL ( LEFT$ (LL$,2) )
: D = VAL ( MID$ (LL$,4,2
) ):Y0 = VAL ( MID$ (LL$,
7,2) ):M9 = M:D9 = D:Y9 =
Y0:L = 0: PRINT "LAST A
CCESS: ";LL$
DA 3060 INPUT L$(L): IF L$(L) <
> "EOF" THEN L = L + 1:

```

```

GOTO 3060
76 3070 L$(L) = "":L8 = 0:L9 = L
: GOTO 3090
42 3080 PRINT DD$;"WRITE ";F$: P
RINT D9$: FOR J = 0 TO L
9 - 1: PRINT L$(J): NEXT
J: PRINT "EOF"
6A 3090 PRINT DD$;"CLOSE ";F$: I
F C = 2 THEN END
D5 3100 RETURN
F8 4010 PRINT :D$ = "": INPUT "W
ANT EVENTS ON PRINTER (Y
/N) ";P$: IF LEFT$(P$,1)
< > "Y" THEN 4030
E4 4020 PRINT DD$;"PR#1": PRINT
I$;"00N"
60 4030 FOR J = L8 TO L0: IF D$
= LEFT$(L$(J),5) THEN 4
060
8A 4040 D$ = LEFT$(L$(J),5):M =
VAL ( LEFT$( D$,2)):D =
VAL ( MID$( D$,4,2)):Y
= Y8: IF D$ <= D9$ THEN
Y = Y8 + 1
8A 4050 GOSUB 2150: PRINT W$(W);
" ";M$(M);" ";D
89 4060 PRINT " "; MID$( L$(J)
,6): NEXT J
D6 4070 PRINT : IF LEFT$( P$,1)
= "Y" THEN PRINT DD$;"PR
#0"
F4 4080 RETURN

```

Program 5: Modifications For IBM PC/PCjr

For instructions on entering this listing please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!

```

KL 105 WIDTH 80:KEY OFF:DEF SEG=
0:POKE 1047,PEEK(1047) OR
64
ND 2250 CLS
FD 3010 ON ERROR GOTO 3100
MA 3020 F$="EVENTS":INPUT "ENTER
DRIVE # (IE., A): ";FF$
:F$=FF$+":":F$
EE 3030 IF C=2 THEN 3080
OK 3040 OPEN F$ FOR INPUT AS #1:
INPUT #1,LL$:D9$=LL$:IF
LEN(LL$)<>8 THEN PRINT L
L$;"?":GOTO 3070
GE 3050 M=VAL(LEFT$(LL$,2)):D=VA
L(MID$(LL$,4,2)):Y0=VAL(
MID$(LL$,7,2)):M9=M:D9=D
:Y9=Y0:L=0:PRINT "LAST A
CCESS: ";LL$
FN 3060 INPUT #1,L$(L):L=L+1:IF
EOF(1)=0 THEN 3060
PA 3070 CLOSE #1:ON ERROR GOTO 0
:L8=0:L9=L:RETURN
CG 3080 OPEN F$ FOR OUTPUT AS #1
:PRINT #1,D9$:FOR J=0 TO
L9-1:PRINT #1,L$(J)
NB 3090 NEXT J:CLOSE #1:ON ERROR
GOTO 0:END
EC 3100 CLOSE #1:PRINT "DISK ERR
OR #";ERR;"OCCURRED.":PR
INT "TRY AGAIN."
HH 3110 PRINT:PRINT "HIT A KEY T
O CONTINUE"
FK 3120 A$=INKEY$:IF A$="" THEN
3120
JA 3130 RESUME 3020
CJ 4010 ON ERROR GOTO 4090
BA 4020 D$="":INPUT "WANT EVENTS
ON PRINTER (Y/N)";P$
PD 4030 IF LEFT$(P$,1)="Y" THEN
OPEN "LPT1:" FOR OUTPUT
AS #1 ELSE OPEN "SCRN:"
FOR OUTPUT AS #1

```

```

CH 4040 FOR J=L8 TO L0:IF D$=LEF
T$(L$(J),5) THEN 4080
BP 4050 D$=LEFT$(L$(J),5):M=VAL(
LEFT$(D$,2)):D=VAL(MID$(
D$,4,2))
JJ 4060 Y=Y8:IF D$<=D9$ THEN Y=Y
8+1
GL 4070 GOSUB 2150:PRINT #1,W$(W
);" ";PRINT #1,M$(M);D
PL 4080 PRINT #1," ";MID$(L$(J)
,6):NEXT J:CLOSE #1:ON
ERROR GOTO 0:RETURN
IC 4090 CLOSE #1:PRINT "PRINTER
ERROR #";ERR;"OCCURRED."
:PRINT "TRY AGAIN."
HF 4100 PRINT:PRINT "HIT A KEY T
O CONTINUE"
EG 4110 A$=INKEY$:IF A$="" THEN
4110
KL 4120 RESUME 4020

```

Program 6: Modifications For TI-99/4A

```

330 IF (M8<>M9)+(D8>=D9) THE
N 350
400 TE$=STR$(100+M9)
405 D9$=SEG$(TE$,LEN(TE$)-1
,2)&"/"
410 TE$=STR$(100+D9)
415 D9$=D9$&SEG$(TE$,LEN(TE
$)-1,2)
540 IF SEG$(L$(J),6,1)="/"
THEN 570
875 IF D8<>D9$ THEN 880
876 L0=L9-1
970 P$=SEG$(P$,1,1)
1020 TE$=STR$(101+Y8)
1025 Y$="/"&SEG$(TE$,LEN(TE
$)-1,2)
1040 TE$=STR$(100+Y8)
1045 Y$="/"&SEG$(TE$,LEN(TE
$)-1,2)
1140 D8$=D8$&Y$
1150 D8$=D8$&" "
1160 L$(L0+1)=D8$&LL$
1250 IF D8$<>SEG$(L$(J),1,5)
) THEN 1300
1370 IF (A<L0)+(A>L1) THEN 7
30
1500 IF SEG$(L$(J),6,1)<>"/
" THEN 1520
1520 IF (A+P-1>LEN(L$(J)))+(
P$<>SEG$(L$(J),A,P)) T
HEN 1540
1610 IF SEG$(P$,1,1)="Y" TH
EN 1630
1630 D9$=D9$&"/"
1640 TE$=STR$(Y8+100)
1645 D9$=D9$&SEG$(TE$,LEN(T
E$)-1,2)
1710 MM$=SEG$(MM$&"XX",1,3)
1730 IF (M<1)+(M>12) THEN 16
70
1800 IF (M<1)+(M>12) THEN 16
70
1830 IF (D<1)+(D>31) THEN 16
70
1840 TE$=STR$(100+M)
1845 D8$=SEG$(TE$,LEN(TE$)-
1,2)&"/"
1850 TE$=STR$(100+D)
1855 D8$=D8$&SEG$(TE$,LEN(T
E$)-1,2)
1865 IF (D8$=D9$)&(FL=1) THE
N 1880
1870 IF .D8$>=SEG$(D9$,1,5) T
HEN 1890
1960 LL$=CHR$(127)
2000 V$=D8$&LL$

```

```

2030 WW$=D9$&LL$
2080 F0=F2&F3
2100 F0=F2&F3
2250 CALL CLEAR
3010 F$="EVENTS"
3020 PRINT "DISK OR CASSETT
E (D/C)?"
3030 CALL KEY(0,K,S)
3040 IF S=0 THEN 3030
3050 A$=CHR$(K)
3060 IF (A$<>"C")&(A$<>"D")
THEN 3030
3070 IF A$="D" THEN 3100
3080 D$="CS1"
3090 GOTO 3110
3100 D$="DSK1."&F$
3110 IF C=2 THEN 3320
3120 OPEN #1:D$,INTERNAL,IN
PUT,FIXED
3130 INPUT #1:LL$
3135 D9$=LL$
3140 IF LEN(LL$)=8 THEN 317
0
3150 PRINT LL$;"?"
3160 GOTO 3280
3170 M=VAL(SEG$(LL$,1,2))
3180 D=VAL(SEG$(LL$,4,2))
3190 Y0=VAL(SEG$(LL$,7,2))
3200 M9=M
3210 D9=D
3220 Y9=Y0
3230 L=0
3240 PRINT "LAST ACCESS: ";
LL$
3250 INPUT #1:L$(L)
3260 IF L$(L)="EOF" THEN 32
75
3270 L=L+1
3272 GOTO 3250
3275 L$(L)=""
3277 L=L-1
3280 CLOSE #1
3290 L8=0
3300 L9=L
3310 RETURN
3320 OPEN #1:D$,INTERNAL,OU
TPUT,FIXED
3330 PRINT #1:D9$
3340 FOR J=0 TO L9-1
3350 PRINT #1:L$(J)
3360 NEXT J
3365 PRINT #1:"EOF"
3370 CLOSE #1
3380 END
4010 D$=""
4020 DE=1
4030 INPUT "WANT EVENTS ON
PRINTER (Y/N) ";P$
4040 IF SEG$(P$,1,1)<>"N" T
HEN 4070
4050 DE=0
4060 GOTO 4080
4070 OPEN #1:"RS232/2.BA=96
00.DA=8.PA=N"
4080 FOR J=L8 TO L0
4090 IF D$=SEG$(L$(J),1,5) T
HEN 4190
4100 D$=SEG$(L$(J),1,5)
4110 M=VAL(SEG$(D$,1,2))
4120 D=VAL(SEG$(D$,4,2))
4130 Y=Y8
4140 IF D$>D9$ THEN 4160
4150 Y=Y8+1
4160 GOSUB 2150
4170 PRINT #DE:W$(W);" ";
4180 PRINT #DE:M$(M);D
4190 PRINT #DE:"{3 SPACES}"
;SEG$(L$(J),6,LEN(L$(J)
))
4200 NEXT J
4210 IF DE=0 THEN 4230
4220 CLOSE #DE
4230 RETURN

```

The New MLX

Enhanced Machine Language Editor For The Commodore 64

Ottis R. Cowper, Technical Editor

This significantly improved version of COMPUTE!'s "MLX" utility will help you enter machine language program listings without typos. It's more fool-proof than the old MLX and is easier to use, too—especially for beginners. The new MLX is required to enter all machine language programs published in COMPUTE! for the Commodore 64, starting with "Balloon Crazy" in this issue.

Since its initial publication in the December 1983 issue of COMPUTE!, our "MLX" machine language editor has helped thousands of readers type in dozens of ML programs with a minimum of problems. MLX detects most common typing mistakes as they're made. However, your growing appetite for high-quality programs is leading us to publish longer and longer listings. Such programs demand a more efficient entry system, so this month we're introducing a new MLX with important enhancements:

- A much more compact format. With each line of a new MLX listing, you enter eight bytes of data with 18 keystrokes, as opposed to only six bytes of data in 21 keystrokes when using the original MLX. This means you can enter machine language programs with 40 percent less typing.

- A more sophisticated check-

sum scheme. Transposition errors that could slip past the original MLX are caught by this version. Typing mistakes are now virtually impossible.

- A buffer (reserved area of memory) that holds the data you enter instead of direct storage in memory. This means that you'll never again have to worry with those bothersome POKES that were sometimes necessary to reconfigure memory before using the old MLX.

Hexadecimal Checksums

Type in and save a copy of the new MLX. You'll need it for all future machine language programs in COMPUTE!, as well as ML programs in our companion magazine, COMPUTE!'s GAZETTE, and COMPUTE! books.

When you're ready to enter an ML program, load and run the new MLX. It asks you for a starting address and 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—in-

cludes 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 the new MLX.

After you enter the starting and ending addresses, MLX offers 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.

It's not necessary to know more about this option to use MLX, but here's an explanation if you're interested: When you first run MLX, the workspace area contains random values. Clearing the workspace fills it with zeros. This makes it easier to find where you left off if you enter the listing in multiple sittings. However, clearing the workspace is useful only before you first begin entering a listing; there's no need to clear it before you reload to continue entering a partially typed listing. When you save your work with the new MLX, it stores the entire contents of the data buffer. If you clear the workspace before starting, the incomplete portion of the listing is filled with zeros when saved and thus refilled with zeros when reloaded. If you don't clear the workspace when first starting, the incomplete portion of the listing is filled with random

data. Whether or not you clear the workspace before you reload, this random data will refill the unfinished part of the listing when you load your previous work. The rule, then, is to use the clear workspace feature before you begin entering data from a listing, and not bother with it afterward.

At this point, MLX presents a menu of commands:

Enter data
Display data
Load data
Save file
Quit

You no longer have to remember SHIFT command keys as in the original MLX. Instead, just press the letter of a menu option. These commands are available only while the menu is displayed. You can get back to the menu from most options by pressing RETURN with no other input.

Entering A Listing

To begin entering data, press E. You'll be asked for the address at which you wish to begin entering data. (If you pressed E by mistake, you can return to the command menu by pressing RETURN.) When you begin typing a listing, you should enter the starting address here. If you're typing in a long listing in multiple sittings, you should enter the address 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 MLX listing. Otherwise, you'll be unable to enter the data correctly.

After you enter the address, you'll see that address appear as a prompt with a nonblinking cursor. Now you're ready to enter data.

To help prevent typing mistakes, only a few keys are active while you're entering data, so you may have to unlearn some habits. The new MLX listings consist of nine columns of two-digit numbers—eight bytes of data and a checksum:

```
C000:A9 0C 8D 15 D0 A9 FF 8D 17
C008:3B 63 8D 3C 63 A9 01 8D C6
C010:01 58 A9 00 8D 33 63 20 7D
C018:0B C5 20 C1 CB A9 FF 8D 43
```

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. The only keys you need for data entry are 0-9 and A-F. Pressing most of the other keys generates a warning buzz.

To correct typing mistakes before finishing a line, 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 also is 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, the new 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.

Beep Or Buzz?

After you type the last digit in a line, MLX calculates a checksum of the line number and the first eight columns of data, then compares it with the value in the ninth column. The formula (found in lines 370-390 of the MLX program) catches almost every conceivable typing error, including the transposition of entire numbers that the original MLX could miss. If the values match, you'll hear a pleasant beep, the data is added to the workspace area, and the prompt for the next line of data appears (unless the line just entered was the last line of the listing—in which case you'll automatically advance to the Save option). But if MLX detects a typing error, you'll hear a low buzz and see an error message. Then MLX redisplay the line for editing.

To edit a line, move the cursor left and right using 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.

To make corrections in a mistyped line, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key.

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.

Other MLX Functions

The Display data option lets you review your work. Unlike the original MLX, the new MLX calculates and displays checksums for each line. Thus, a quick way to check your typing is to compare the reverse video checksums on the screen with the data in the rightmost column of the printed listing. If the values match, you can be confident that the line is entered correctly.

When you select D, you'll be asked for a starting address. (As with the other menu options, pressing RETURN at this point takes you back to the command menu.) When entering an address, make sure it corresponds to the address of a line from the listing. Otherwise, the checksums will be meaningless. You can pause the scrolling display by pressing the space bar. (MLX finishes printing the current line before halting.) To resume scrolling, press the space bar again. The display continues to scroll until the ending address is reached, then the menu reappears. To break out of the display and return to the menu before the ending address is reached, press RETURN.

The Save and Load menu options are straightforward. First, MLX asks for a filename. (Again, pressing RETURN at this prompt without entering anything returns you to the command menu.) Next, MLX asks you to press either T or D for tape or disk. If you notice the disk drive starting and stopping several times during a load or save, don't panic; MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands, so this behavior is normal. 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 @ with 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.

Error Alert

MLX reports any errors detected during the save or load. Tape users should bear in mind that the Commodore 64 is never able to detect errors when saving to tape. The new MLX also has three special load error messages:

- **INCORRECT STARTING ADDRESS.** This means the file you're trying to load does not have the starting address you specified when you ran MLX. If you feel certain you're trying to load the right file, exit and rerun MLX, being careful to enter the correct starting address.

- **LOAD ENDED AT address.** This means the file you're trying to load ends before the ending address you specified when you started MLX. If you feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct ending address.

- **TRUNCATED AT ENDING ADDRESS.** This means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct ending address.

The Quit menu option has the obvious effect—it stops MLX and enters BASIC at a READY prompt. Since the RUN/STOP key is disabled, Q lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) If you choose this option, MLX asks 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 with-

out losing your data, as long as you don't use the clear workspace option.

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. Unlike the original MLX, this version keeps the data in a temporary holding area rather than in its final resting place in memory, so you must always save the finished program with MLX and then reload it from BASIC with a standard LOAD command.

The instructions for loading the finished product varies from program to program. Some 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.

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.

The New MLX For Commodore 64

For instructions on entering this listing, please refer to "COMPUTE!s Guide to Typing In Programs" published bimonthly in COMPUTE!

```

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$(L3):L$="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 ADDRESS
    S[43]":GOSUB300:SA=AD:GOSU
    B1040:IF F THEN180:rem 113
190 PRINT"[BLK]{2 SPACES}ENDIN
    G ADDRESS[43]":GOSUB300:EA
    =AD:GOSUB1030:IF F THEN190
    :rem 173
200 INPUT"[3 DOWN]{BLK}CLEAR W
    ORKSPACE [Y/N][43]":A$:IF L
    EFT$(A$,1)<>"Y"THEN220
    :rem 9
210 PRINT"[2 DOWN]{BLU}WORKING
    ...":FORI=BS TO BS+EA-SA+
    7:POKE I,0:NEXT:PRINT"DONE
    ":rem 139
220 PRINTTAB(10)"[2 DOWN]{BLK}
    {RVS} MLX COMMAND MENU
    {DOWN}[43]":PRINT T$"{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
    $("EDLSQ",I,1)THEN A=I:I=5
    :rem 42
270 NEXT:ON A GOTO420,610,690,
    700,280:GOSUB1060:GOTO250
    :rem 97
280 PRINT"[RVS] QUIT ":INPUT"
    {DOWN}[43]ARE YOU SURE [Y/N
    ]":A$:IF LEFT$(A$,1)<>"Y"TH
    EN220: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=A-
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$;:IF I<24 T
HEN PRINT"[OFF]";:rem 15
470 GET A$:IF A$=N$ THEN470
:rem 135
480 IF(A$>"/"AND A$<"")OR(A$>"
@"AND A$<"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}")AND F THENP
RINT B$:GOTO540:rem 107
520 IF A$<>L$ AND A$<>D$ OR((I
=0)AND(J=1))THEN GOSUB1060
:GOTO470 :rem 232
530 A$=L$+S$+L$:PRINT B$:J=
2-J:IF J THEN PRINT L$;: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$):IF ST AND
(I<>B)THEN F=2:AD=I+1=B
:rem 180
840 NEXT:IF ST<>64 THEN F=3
:rem 20
850 CLOSE1:CLOSE15:ON ABS(F>0)
+1 GOTO960,970 :rem 12
860 INPUT#15,A,A$: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
":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]
[4]":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

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Wishbringer

James V. Trunzo

Requirements: Commodore 64; Apple II-series computer with at least 48K RAM; Atari 400/800, XL, or XE with at least 48K RAM; IBM PC with at least 48K RAM; Expanded Model PCjr; Amiga; Atari 520ST; Macintosh; Kaypro CP/M; or a TRS-80 Model III. All versions require a disk drive. The Commodore 64 version was reviewed.

The latest entry from Infocom, the software industry's most prolific producer of text adventures, is a novel mystery/adventure entitled *Wishbringer*. It's billed as an introductory-level adventure, but veteran gamers should not be put off by the label. When Infocom calls a game "introductory," it simply means you might need only 20 or 30 hours to solve the adventure instead of 60 or 70 hours.

Actually, *Wishbringer* offers several very challenging puzzles, starting at the very beginning of the game when you have to map your way over the mountain leading to the Majick Shoppe. What makes *Wishbringer* slightly easier than a more advanced Infocom game is that some of the mapping is done for you, the scope of the storyline is not as broad, and the puzzles are slightly less devious. However, this should not be construed to mean that the game is child's play—far from it.

As the accompanying storybook says, you're in the role of an ordinary postal clerk in an "ordinary little town, and you've been performing your ordinary mail clerk's duties in an altogether ordinary way. But there's something quite extraordinary about today's mail." From that point your adventure begins, and nothing is the same any more.

A Piece Of The Rock

The adventure is twofold: First, you must seek out and obtain a magic stone known as the Wishbringer. To keep track of your location in the game's imaginary world, you should compile a map as you go along, even though a

general map is included. If you find the Wishbringer, your second job is to use the powers of the stone (which are awesome in some ways, yet limited in others) to save your town—a town that no longer resembles what it was at the start of the adventure. Now it's filled with trolls, vultures, and other evil creatures.

Wishbringer conforms to the usual Infocom style. That is, it employs no graphics, relying on detailed descriptions and the player's imagination to provide the "pictures." The sophisticated parser, an Infocom trademark, lets you type in compound sentences rather than just primitive verb-noun commands. Other features let you save games in progress and send text to a printer. And as always with an Infocom package, *Wishbringer* is attractively designed. It includes a beautifully illustrated storybook, "The Legend of Wishbringer," and even a plastic Wishbringer stone that glows in the dark.

Starting with a simple premise—one that may seem almost childish at first—*Wishbringer* quickly becomes an enjoyable, playable adventure for all but the most hardened veterans of adventure games.

Wishbringer
Infocom
125 Cambridge Park Drive
Cambridge, MA 02140
\$39.95

Remember!

Karen McCullough

Requirements: Commodore 64; Apple II-series computer with at least 64K RAM; IBM PC with at least 128K RAM and color/graphics adapter; or an Expanded Model IBM PCjr. All versions also require a disk drive. Joystick and printer optional.

Remember! bills itself as a "powerful, yet simple tool designed to help students from junior high through college master difficult subjects and improve memory skills." The claim is not exaggerated. This program presents an effective study system that teaches how

to organize and memorize facts. It also helps you practice and test yourself on those techniques.

Two fundamental design principles give *Remember!* its power: You enter the facts you want to memorize only once, and the program then presents them to you in a variety of ways; and the program helps you build associations with the facts you're learning.

You begin by using the Create or Edit Lesson section to enter the facts you want to memorize into question and answer blocks. Once the lesson is entered, you can add hints to help you memorize the information. These hints can be in any of three formats: pictorial, musical, or written. Only one hint is allowed per question, and all hints for a given lesson must be in the same format. Editing functions allow you to make changes in the questions, answers, or hints at any time.

Entering hints is not quite as simple as entering the questions and answers. Although the program is generally flexible, drawing pictures or entering musical notation is not as intuitive as typing in questions. Both take some practice to master. One irritating aspect of entering pictorial or musical hints is that they are not automatically saved when you choose the Get Next Word option. This is the only time you must tell the program to save something, and it's easy to forget. (*Remember!* will remind you, however.)

Foreign Language Characters

Once the facts are entered, you have the option of reviewing them or testing yourself in various ways. The Familiarization option displays both questions and answers for review and study. When you feel thoroughly familiar with the material, you can choose the Practice option. In this mode, *Remember!* displays either the question or answer (your option), and you supply the missing part. If you can't remember the answer, pressing RETURN or Enter displays a hint (if you supplied one), and pressing the key again calls up the correct response. Finally, you can evaluate your progress with the Test option, which is similar to Practice mode.

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The program comes with a 64-page manual divided into four sections. The "User's Guide" section has extensive and reasonably clear directions for all program functions; "Learning How You Learn" covers theories of memory and how they relate to the way the program works; "Tips On Making Databases" gives practical suggestions on how to organize lessons in specific subject areas; and finally, there's a set of appendices and a bibliography. The package also includes a reference card for the special characters and an extra disk for storing lessons.

The few weaknesses of *Remember!* are minor. Disk error messages are not helpful, stating only that there is a

problem with the disk; and as mentioned above, entering hints with pictures and music is awkward. But overall, versatility and attention to detail give *Remember!* the power to turn a home computer into an effective and powerful study aid.

Remember!
DesignWare Inc.
185 Berry Street
San Francisco, CA 94107
\$79.95

Mudpies For Atari 520ST

Gregg Keizer, Assistant Book Editor

Requirements: Atari 520ST system with a color monitor. Joystick optional.

SPLAT! In your face, clown. He waddles away and another takes his place. There are enough clowns in this circus to fill ten of those tiny cars, and you need some breathing room. Welcome to *Mudpies*.

Mudpies is the first arcade-style game we've seen for the Atari 520ST. It turns you into Arnold, a fairly nasty kid who likes to disrupt the circus by

throwing pies at clowns. Not that he's without provocation, for the clowns crowd him at every opportunity, sending him to the First Aid tent at the slightest touch. And the clowns throw things back at Arnold—those Indian clubs used by jugglers. Get beamed with one of those, and you guessed it—another trip to the First Aid tent. Three trips to First Aid and the game's over (although you can withstand additional trips for each 10,000 points scored).

Reminiscent of *Robotron*, *Mudpies* is a fast-action, grip-the-joystick (or mouse) kind of game. Six rooms in each level are littered with mudpies you can pick up and fling in the direction you're moving. The clowns, like robots really, swarm toward you. They're not very bright, and they can be avoided with a little fancy footwork. But there are enough of them, with more waiting in the wings, to make it interesting. Also, they bear more than a passing resemblance to Ronald McDonald.

Arnold has other things on his mind besides clowns, however. His energy level depends on the fast food he finds, and if he doesn't eat enough hamburgers, fries, and shakes, he'll slow down terribly. Eat too much, though, and the people watching you play will shout "You're getting fat!" Overeating slows down Arnold, too.

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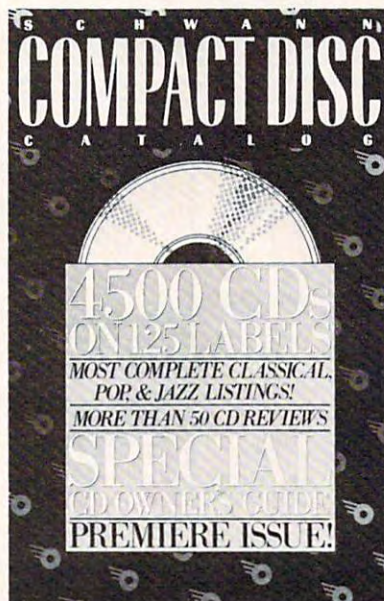


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Programed by Jim Drew

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Hitchhiker's Guide to the Galaxy	?	70 sec.	70 sec.*	N.G.**	68 sec.
On-Field Football	?	149 sec.	66 sec.	63 sec.	56 sec.
EASY FINANCE I	?	58 sec.	13 sec.	13 sec.	11 sec.

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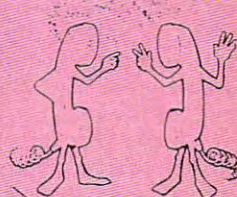
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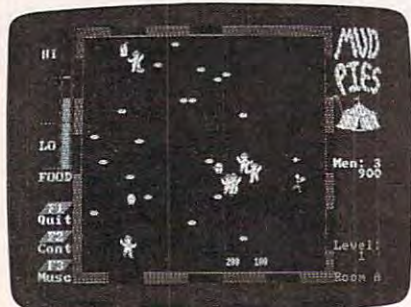


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One or two people can play *Mudpies*, with two players alternating turns. The graphics are entertaining, as is the music (up to a point, when you might prefer to turn it off with a press of a function key). Looking like an IBM PC game more than anything else, down to the typeface of the display, *Mudpies* doesn't take full advantage of the ST. No menus, no icons, and you can't return to the GEM desktop without re-booting—but the game is still a tent full of fun.



Pesky clowns swarm toward Arnold as he defends himself by flinging mudpies.

Mouse Or Joystick?

The only way to score points is to splat clowns. Advancing to the next room or level changes neither the scoring nor the speed or intelligence of the clowns. It makes for a repetitive game, and you can get good at it in a short time. One interesting feature is something called the Mudslinging Round, where the clowns don't chase you and don't throw things. You've got 30 seconds to mudpie as many of the purple-wigged clowns as you can, racking up bonus points left and right. It's great revenge.

Though you can control Arnold with the mouse, try a joystick instead. Mouse controllers may be great for manipulating Macintosh-style graphics, but for anyone who's arcade-trained, a joystick will probably feel more natural. In a fast game like *Mudpies*, you need every edge you can get.

If you rack up one of the highest scores, you can type your name on a vanity screen. However, the screen is not saved on disk. Unfortunate, for the game is addicting enough to make you want to beat whatever score was last posted. Function keys let you pause the game and turn off the music (though not the sound effects).

A few bugs cropped up while playing *Mudpies*. Several times the game paused on its own, the music suddenly turned itself on, and once the game stopped altogether and flipped back to the title screen. MichTech attributes all

these bugs to the 520ST's operating system, saying that erratic control codes are being read from the joystick. The bugs are irritating, but not disastrous.

Keep an eye on this computer—its wide selection of colors, large memory, and speed make it a potentially great game machine. *Mudpies*, first out of the blocks, is a good beginning.

Mudpies
MichTron
567 S. Telegraph
Pontiac MI 48053
\$29.95

BASIC XE For Atari XL & XE

Robert L. Riggs

Requirements: Atari XL or XE computer with at least 64K RAM. Disk drive recommended.

About two years ago, Optimized Systems Software brought out an extended BASIC cartridge for Atari computers. As a sequel to OSS's disk-based BASIC A+ introduced back in 1981, the BASIC XL cartridge was fantastic. It added 45 new commands and wrapped up Atari BASIC, BASIC A+, and Microsoft BASIC in one neat package. Furthermore, BASIC XL was made upwardly compatible with Atari BASIC, so it would run existing Atari BASIC programs. I discovered that games previously typed in from magazines—and abandoned because of their sluggish pace—ran at near-arcade speeds with BASIC XL. And it still offered Microsoft-style string handling, auto line numbering, block line deletions, and a host of other features.

When Atari introduced its 130XE this year, OSS upgraded BASIC XL for the new 128K machine. The result, BASIC XE, runs on all the XL computers but also adds commands to take advantage of the 130XE's expanded memory. The most important new command is XTEND. After you've typed or loaded a program into memory on the 130XE, you can use this command to move the program into the alternate 64K bank. At that point, your program and data space are separate—the former occupying the alternate 64K, and the latter occupying the main 48K (leaving about 35K free for data and strings). An optional third parameter for PEEK and POKE statements gives you access to any section of the 130XE's memory—the four extended banks of 16K or the main 48K RAM.

Of course, the XTEND command works only on the 130XE, not on the XL computers. Also, if you save a BASIC XE program which has been XTENDED, you can't load it back with either BASIC XL or Atari BASIC.

Like its predecessor, BASIC XE offers several additions to the Atari BASIC vocabulary, including ELSE, WHILE, ENDIF, ENDWHILE, PRINT USING, TAB, and TRACE/TRACEOFF. Atari's player/missile graphics are made easier to use via commands like MISSILE, BUMP, HITCLR, PMCOLOR, PMGRAPHICS, PMMOVE, PMWIDTH, and PMCOLOR.

Another extremely powerful instruction is SET. It lets you exercise control over a variety of system-level functions. You can quickly and easily disable or enable the BREAK key, change tab stop settings for the comma in PRINT statements, alter the prompt character for INPUT, automatically DIMENSION strings, and instruct the LIST formatter to indent structured statements. BASIC XE also has DOS commands, including DIR (directory), ERASE, PROTECT, UNPROTECT, and RENAME.

Memory Magic

There's much more. You get commands like DPEEK/DPOKE (for PEEKing and POKEing double-byte values), ERR (for reporting errors), FIND (a search command), HSTICK/VSTICK (for the joysticks), and SYS (for jumping directly to a memory address). And unlike Atari BASIC, BASIC XE lets you type your programs in lowercase or reverse characters. No more hitting the CAPS or reverse key after an annoying syntax error!

Normally you'd expect such a powerful BASIC to consume much more memory than standard 8K Atari BASIC. But the 16K BASIC XE cartridge cleverly bank-selects its ROM so that it displaces only 8K of RAM. Also, some of the commands (such as most of those for player/missile graphics) are stored on a disk that comes with the cartridge. Although you don't absolutely need a disk drive to use the BASIC XE cartridge, you won't be able to use these extra commands without one.

Among the extended commands on disk are a SORT statement that accepts numeric arrays as well as string arrays; a FAST command that tells BASIC XE to precompile the program currently in memory, so programs run several times faster than with Atari BASIC; RENUM, for renumbering BASIC programs; LVAR, to list variable names; RGET and RPUT, for reading or writing whole records with devices; and MOVE, a block memory transfer.

The manual thoroughly explains BASIC XE and is carefully indexed. The more you use BASIC XE, the more you realize it should have been built into the 130XE in the first place. If you intend to do much BASIC programming, especially on the 130XE, BASIC XE is a must.

BASIC XE
Optimized Systems Software
1221B Kentwood Avenue
San Jose, CA 95129
\$79

Rescue Raiders For Apple

James V. Trunzo

Requirements: Apple II-series computer with at least 48K RAM, a disk drive, and a joystick.

Rescue Raiders is more than a little reminiscent of Brøderbund Software's popular *Choplifter*, yet easily stands on its own as an arcade game. It offers sufficient varieties of play and objectives to challenge even skilled arcade enthusiasts.

The theme is rather mundane, but the implementation contains a number of innovative elements. It seems that futuristic terrorists have time-warped sophisticated weapons into the middle of World War II and into the hands of the Germans. Fortunately, you, too, possess several of these "ultimate" weapons, and if you have the skill to use them, you can prevent history from being changed.

Controlling a command helicopter equipped with the latest in weaponry and radar technology, you can attack the enemy, observe the battlefield, transport troops, and attempt to destroy the enemy's helicopter—a clone of your own craft. The game demands solid arcade skills to manipulate your chopper and carry out these missions.

To add an element of strategy, you must win battles as economically as possible and learn how to employ your troops to their best advantage. *Rescue Raiders* definitely places more emphasis on arcade action than on strategy, however; except for a few prehistoric se-
em blast-em games, nearly every arcade game has at least some element of strategy. A few factors do set *Rescue Raiders* apart, though. Economics enter the picture when you decide how to purchase men and equipment with funds earned by time spent in battle. Your score is partly determined by the

amount of money you've spent and the number of lives lost in combat.

Other nice touches include excellent graphics and animation, plus capsule histories of European cities involved in World War II. (The histories appear after you win one of eight increasingly difficult battles in the game.) However, the game is almost totally devoid of sound effects. The omission is so noticeable that I first assumed the program disk was defective.

Overall, *Rescue Raiders* is a good, very challenging arcade game that could be even better with a frill here and there.

Rescue Raiders
Sir-Tech Software, Inc.
96 Main Street
Ogdenburg, NY 13669
\$34.95

Field Of Fire For Atari & 64

James V. Trunzo

Requirements: Commodore 64 or an Atari 400/800, XL, or XE computer with at least 48K RAM. Both versions also require a disk drive and a joystick. The Atari version was reviewed.

Sarge, Freda, Billings, and Wild Bill are pinned down behind the seawall. The English Channel is at their backs and the buildings in front of them are full of Germans. Angry Germans. It's June 6, 1944—Omaha Beach—and the enemy machine gun and artillery fire is intense. Casualties mount. Finally Sarge, a veteran from the 1st Division's days in North Africa, remembers something he once heard. "What do you guys want, to live forever?" he shouts, and leads his rifle team over the wall.

The rest is history, or in the case of this World War II simulation, just part of the game. *Field Of Fire*, written by Roger Damon, the creator of Brøderbund's *Operation Whirlwind*, is an enthralling game of computer combat. Eight separate scenarios, ranging from the 1942 campaign in Tunisia to the spring 1945 crossing of the Roer River, and every major battle in between, puts you in command of Easy Company, part of the 1st Infantry Division, the Big Red One.

As the company commander, you give orders to the six-man teams armed with rifles, machine guns, bazookas, or mortars. Each team's abilities, such as weapon range and firepower, are based on true-life factors, and managing the

various teams is a large part of a successful battle.

Separate game phases let you observe the battlefield, lay down fire, move, and assault nearby positions. All commands are selected by manipulating the joystick controller or pressing one of three keys on the keyboard. Three levels of difficulty, the eight scenarios, and an extended Campaign Game make *Field Of Fire* a game you'll play more than once.

Stealth Makes Health

As in actual World War II battles, winning at *Field Of Fire* requires attention to detail and a bit of luck. Maneuvering and firing—a phase in which some of your men move from one place of cover to another while others fire at suspected or known enemy positions—is a vital tactic to master. Charging blindly only brings immediate enemy response, pinning down your men. A few minutes of this could disintegrate your company. You have to make use of woods, ridges, hedgerows, streams, buildings, and roads. To be caught in the open is to risk annihilation.

Efficient use of your weapons teams is also important. Machine guns wreak havoc with enemy infantry, but against armor they'll merely force the tanks to "button up," just slightly restricting their movements. You must keep a few bazooka teams ready when the German panzers make an appearance. And your forward observers (when attached to your company) must be protected from all danger—placed at the tops of hills, their ability to call down artillery fire can turn the tide.

Field Of Fire is quite good. You quickly get the flavor of combat and command. Some problems do crop up, however. Compared to the Germans in most scenarios, your men are just *too* good. Close assaults, in which your teams toss grenades and overrun a neighboring position, almost always result in a victory. Also, games sometimes seem to end abruptly. In one scenario, "Forever Road," you're supposed to move your company off the top of the map. But if you eliminate all the enemy units beforehand, the game ends with a less than acceptable victory level.

The bottom line is that *Field Of Fire* is a sweaty palms kind of game. You won't smell the cordite or see the destruction, but your imagination fills that in quite sufficiently. Try it—but keep your eyes on that next treeline.

Field of Fire
Strategic Simulations, Inc.
883 Stierlin Road, Building A-200
Mountain View, CA 94043
\$39.95

NEC PC-8401A Portable Computer

Gregg Keizer, Assistant Book Editor

Lap-sized portable computers are everywhere. You see them under the arms of business people, students, journalists, lawyers, and writers. It's almost impossible to board a jetliner without seeing one or hearing the clack of its keys. No wonder, for a lap portable lets you take your work virtually anywhere. And with the internal modems built into most lap portables, it's simple to communicate with other computers thousands of miles away.

The NEC PC-8401A portable computer is no exception to all of this. With four programs permanently stored in Read Only Memory (ROM), the NEC offers word processing, personal filing, spreadsheet analysis, and telecommunications—anywhere, anytime.

Like most lap portables, the NEC contains internal nickel-cadmium batteries which continuously trickle current to the Random Access Memory (RAM) chips, thus maintaining your data even when the power switch is turned off. The NiCad batteries, in turn, are continuously recharged by either four C batteries or an optional AC adapter. A low battery indicator warns when you're down to your last 30 to 60 minutes of power. The C batteries last three to eight hours, depending on their type. Even if the batteries fail and an external power supply isn't connected, the NEC retains saved files for up to five days.

The NEC has a full-stroke key-

board and a larger screen than most lap portables—80 columns by 16 lines. It has a total of 64K RAM and 96K ROM, plus a built-in operating system, CP/M (Control Program/Microcomputers). The package includes a phone cable for the modem and a cassette recorder cable for storing files on tape.

Onboard Software

Wordstar-to-Go, the word processing program, is a truncated version of the popular *Wordstar*. If you already know *Wordstar*, moving to the NEC's smaller version is a snap. Most of the commands are retained, and the ones that aren't, such as soft hyphenation and on-screen file directories, aren't really missed. Writing on the NEC is a pleasure. The keyboard has a solid feel and the screen is fast enough to keep pace with your typing.

Calc-to-Go is the NEC's spreadsheet program. You can create up to 64 columns and 256 rows, though the window on your screen is only 80 characters wide by 14 rows (a status line takes up the other two rows). The program has most standard spreadsheet features, such as entering data and formulas, arithmetic and logical functions, and editing or deleting data, rows, and columns.

Personal Filer lets you design cards and files which contain information such as addresses, phone numbers, and client notes. You can search and sort these cards, even use them to automatically dial phone numbers. Modifying,

viewing, and entering new cards is fairly simple.

The fourth program included in the NEC is a telecommunications package called *Telecom*. Using the internal 300 bits-per-second modem (an external 1200 bps modem is optional), you can access information services, electronic bulletin boards, and almost any other computer connected to a modem. *Telecom* can upload and download files, dial numbers, and automatically log on to services. You can set up directory files and build log-on sequences. Both no protocol and Modem7 protocol are supported, and *Wordstar-to-Go* files can be converted to straight ASCII for uploading to other computers.

Documentation for these programs is extensive. Three manuals plus a general *User's Guide* come with the computer. Examples are easy to follow, for the most part, and cover almost all commands and features.

NEC offers a wide range of accessories, including an external 3½-inch disk drive (320K), a battery-powered 32K RAM cartridge, and cables for parallel printers, monochrome monitors, and RGB color monitors.

For the price, the NEC has much to offer. Word processing, spreadsheet management, filing, and telecommunications—all at your fingertips.

NEC PC-8401A
NEC Home Electronics (USA) Inc.
1401 Estes Avenue
Elk Grove Village, IL 60007
\$999

MouseWrite For Apple IIe And IIC

Gregg Keizer, Assistant Book Editor

Requirements: Apple IIe with extended memory 80-column card and a disk drive or an Apple IIC. Mouse recommended.

Pull-down menus, overlapping windows, mouse-driven commands, and clipboards—seems like they're everywhere. The Macintosh, Amiga, Atari 520ST, and even the IBM PC with the GEM operating system take advantage of these tools, offering programs easy to learn and use. Word processing programs such as *MacWrite* and Microsoft's *Word* on the Macintosh, for instance, are built around this type of user interface. Now, with a program called

MouseWrite, you can point and click your way through your prose on an Apple IIC or enhanced Apple IIe.

MouseWrite is a full-featured word processor, complete with all the standard text entry, editing, and formatting functions people have come to expect. What makes it different is not so much what it does, but how it does it. If you're able to point and click a button, you can delete text, change margins, do boldfacing or underlining, justify, and search and replace.

The program looks and works somewhat like a Macintosh application. The AppleMouse—though not required—is used to move the cursor, display menus, and select options. If you're not using a mouse, keyboard commands are available. A bar at the top of the screen contains eight menus, ranging from Windows and Page to Edit and File. Everything is within easy reach. A ruler showing margins and tabs can be displayed or hidden. Two

windows can be open at the same time, letting you cut and paste sections of text from one version of a document to another. Printers can be selected and text formatted with a click.

Familiarity Breeds Content

If you've used a Macintosh word processor such as *MacWrite*, acclimation to *MouseWrite* is simple. Its operation is so comfortable that you can be up and writing within a few minutes of loading the program. Since the menus and commands are all just a click away, there's little need to pore over the manual. If you're unfamiliar with Macintosh-like programs, the documentation quickly gets you started, though many of *MouseWrite's* features and commands will seem intuitive. Choosing the Find menu, for instance, leads you to three choices: Find Next, Replace Then Find, and Replace All. The text you want to find and replace is simply typed in. Even file and disk management, such as

formatting disks, and opening, closing, and deleting files, is done with only a simple command or two.

Other MouseWrite features include automatic page numbering, headers, footers (both of which can display the current time and date), an optional on-screen clock (which unfortunately must be reset each time the program is boot-ed), centering and justifying text, and three spacing options. Scroll bars let you move quickly through a long document, and windows can be resized by moving the mouse pointer.

MouseWrite makes writing what it should be—fun. With virtually no commands to memorize (at least when you use the mouse), you can concentrate on the words, not how the words get into the computer.

MouseWrite
Roger Wagner Publishing
P.O. Box 582
Santee, CA 92071
\$125

Phantasie For Apple & 64

James V. Trunzo

Requirements: Apple II-series computer with at least 48K RAM and a disk drive; or a Commodore 64 with a disk drive. The Apple version was reviewed.

I have a strong predilection toward fantasy role-playing games, and when one comes along that seduces me into hour after hour of play, it's hard to keep from sounding overenthusiastic. But such a game has come along. *Phantasie*, from Strategic Simulations, may be the best fantasy role-playing game to come down the silicon pike since Sir-Tech conjured up *Wizardry*. As a matter of fact—at the risk of sounding blasphemous—in some ways *Phantasie* surpasses *Wizardry*.

Phantasie contains all the typical ingredients that go into a top-notch role-playing game: multiple characters derived from various races, standard professions (such as wizards, warriors, thieves, and so on), magic, monsters, and mayhem. However, the ways in which *Phantasie* combines these elements sets it apart from typical adventure games.

First, *Phantasie* employs a vertical split screen, the left side showing the area in which the party of adventurers is traveling and the right showing the party itself. During combat (a frequent occurrence in *Phantasie*), the enemy appears in front of the adventurers on the left, and the fight evolves into a

semianimated affair. Spells hurl up and down the screen, striking each opponent. Swords, stingers, fangs, and claws are thrust in the direction of the enemy, with appropriate sound effects accompanying hits and misses. Of course, combat isn't always a must: You can greet an enemy, flee, accept a surrender, or attempt a bribe. Strategy is vital, especially early in the game when the adventurers are weak.

Phantasie keeps you in the dark, never showing you what's ahead until you explore the area. However, once you've explored the territory or dungeon (there are ten, all large and dangerous), the program "remembers" and displays the area when you reenter it later. There are 16 screens of territory in *Phantasie's* land of Gelnor, so this eliminates the drudgery of painstakingly mapping a large area on paper, while retaining the game's mystery. In addition to saving lots of time, this feature emphasizes one of *Phantasie's* major strengths: It is exceedingly playable, yet exceptionally challenging.

An Unfolding Story

Phantasie is aided tremendously by a strong story line that actually develops as you play. With help from 20 scrolls scattered throughout Gelnor, the party of adventurers is guided in its quest to defeat the Black Knights and their sorcerer master, Nikademus. These scrolls, hard-earned for the most part, contain hints that are necessary to emerge victorious. And don't be surprised if you notice a resemblance to J.R.R. Tolkien's *Lord of the Rings*.

The program allows a tremendous amount of interaction between characters and, even more importantly, between the player(s) and the game itself. It asks you to make choices often enough to involve you in the action without slowing up play, and the choices directly affect the course of the game. Too often in games of this sort, the choices are gratuitous, negating their value.

It's easy to go on about *Phantasie* because there are a tremendous number of facets to this program. Eighty different monsters, more than 50 spells, 100 pieces of equipment, plus potions, scrolls, rings, and other details make the game fascinating to play. Whether you're visiting a town or a dungeon, fighting a troll or a swarm of killer bees, or hiking through the mountains or the deserts, your persona will be challenged both physically and mentally throughout a game of *Phantasie*.

Phantasie
Strategic Simulations, Inc.
883 Stierlin Road, Building A-200
Mountain View, CA 94043
\$39.95



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SpeedScript 3.0

REVISITED

Charles Brannon, Program Editor

Since its publication in the March, April, May, and June 1985 issues of *COMPUTE!*, response to the SpeedScript 3.0 word processor for the Commodore 64, VIC-20, Atari, and Apple computers has been tremendous. Hundreds of readers have written to comment on SpeedScript, ask questions, and report minor bugs. This article shows how to fix a few bugs confirmed in the Commodore and Apple versions, including the versions on the March, April, and June *COMPUTE!* Disks.

Considering its size and the constraints under which it was developed and distributed, *SpeedScript* 3.0 is remarkably bug-free. We made every effort to fully test *SpeedScript*; however, any sophisticated program is bound to have a few nooks and crannies where problems lurk. Even if you haven't encountered any of these bugs, you may want to make the following corrections to ensure that you have the most reliable word processor possible.

Corrections are much harder to make with an all-machine-language program like *SpeedScript* than with

a BASIC program. You can't just insert or delete a line of machine language. You wouldn't want to type in *SpeedScript* all over again, either. Instead, corrections to machine language programs are usually in the form of a *patch*—a section of new code which replaces some existing code. Programming a patch properly is no small feat, especially if you need to add additional code. The patch must be merged with the original program to create a new, debugged program. Check the notes below for your computer to see how to enter the corrections.

If you have an Atari, you'll notice there aren't any corrections listed for your version of *SpeedScript*. The Atari version does have the same bug that afflicts the other versions: an odd character is printed whenever the underline toggle command is used. Fortunately, this odd character is a null (CHR\$(0)) on the Atari, so nothing is printed, and no harm is done. Therefore, there's no need to make a correction.

Commodore 64 And VIC-20

These are known bugs in Commodore 64 and VIC-20 *SpeedScript* 3.0 that these corrections fix:

The buffer should be preserved after an Erase All, but a change to one program module caused the buffer to be cleared with the rest of the text. The fix causes the Erase All routine to skip past the buffer clearing routine.

Sometimes the cursor does not appear when you first run *SpeedScript*, but this problem is also easily fixed with the changes below. Also fixed is a bug that prevents owners of dual disk drives (such as the MSD) from accessing drive 1 for loads and saves. (These bugs were first noted and corrected in the May 1985 "CAPUTE!" section of *COMPUTE!*.)

Recently confirmed and fixed is the underline bug, which prints an extraneous character whenever the **u** format command (CTRL-**u**, **u**) is used.

The RUN/STOP key behaves strangely when you use it to stop printing. Sometimes it works fine. Other times RUN/STOP does stop printing, but when you return to edit mode, it starts inserting five-space tabs. The printer handler is supposed to wait for you to release RUN/STOP before returning to edit mode. At worst, this bug causes your printer to continuously eject paper until you stop it.

Follow these steps to make corrections for all these bugs:

1. Load *SpeedScript*, but do not run it.

2. When you see the READY prompt, enter the following POKES for your version of *SpeedScript*. Be extremely careful when typing these lines. If you enter any of these numbers incorrectly you may create new bugs that will be difficult to find and fix. Enter the POKES without line numbers and press RETURN after typing each line: Commodore 64:

```
POKE 2547,96:POKE 4316,200:POKE
4946,234:POKE 4947,234:POKE 7716,50
POKE 5785,234:POKE 5786,234:POKE
5787,234:POKE 7581,11:POKE 7590,76
POKE 7591,86:POKE 7592,29:POKE
7593,201:POKE 7594,35:POKE
7595,208:POKE 7596,23
```

VIC-20:

```
POKE 4625,1:POKE 5095,96:POKE
7370,234:POKE 7371,234:POKE 10054,50
POKE 8145,234:POKE 8146,234:POKE
8147,234:POKE 9937,11:POKE 9946,76
POKE 9947,138:POKE 9948,38:POKE
9949,201:POKE 9950,35:POKE
9951,208:POKE 9952,15
```

3. Save the modified *SpeedScript* by entering SAVE"filename" for tape or SAVE"0:filename",8 for disk. Be sure to use a different filename than the original *SpeedScript*.

Interface Confusion

Many Commodore *SpeedScript* users have reported problems that are not really the fault of the program at all. Instead, printer interfaces are to blame. The interfaces used to connect Commodore's serial peripheral bus to non-Commodore parallel printers are usually small computers in themselves. They have their own microprocessors, RAM, and ROM. Unfortunately, this intelligence sometimes makes the interfaces too smart for their own good.

For example, many readers complain of bizarre output when a printed line contains an odd number of quote marks ("). This is not the result of anything *SpeedScript* does; rather, your interface counts the occurrences of quotes in the line and turns on its own interpretation of Commodore's infamous quote mode when the count is odd. Other than the bugs described and cor-

rected above, most of the other complaints about *SpeedScript* are actually the result of interface problems.

However, there is a way to get around this. Most printer interfaces have a setting called *transparent mode*, in which they pass all codes along to the printer unaltered. If your interface has such a setting, switch to that mode before printing. This may require changing your formatting commands—for example, when printing in transparent mode you may have to add the a (CTRL- \bar{a} , a) command to change the output to true ASCII.

Apple II+, IIe, IIC

Apple *SpeedScript* 3.0 has two bugs: the underline bug, which prints garbage characters whenever the underline toggle (CTRL-V, U) is used; and the header bug, which shifts the first header on a page to the right of its proper position. Also, Apple *SpeedScript* assumes a variation of the normal SHIFT key modification on the Apple II and II+ (this is the same variation used by *Apple Writer*). If you're having SHIFT key problems with *SpeedScript* on a II or II+, you'll either have to rewire the SHIFT key modification or make the program changes below: See your dealer for help on installing or changing a SHIFT key modification.

These corrections apply only to the DOS 3.3 version of *SpeedScript*. If you want to use this corrected *SpeedScript* with ProDOS, you must use the ProDOS Converter (COMPUTE!, July 1985).

The following program fragments should be typed in with "Apple MLX." Before you can load Apple MLX, you must reconfigure memory with the following POKES. These POKES prevent memory conflicts between MLX and *SpeedScript*:
POKE 104,32:POKE 8192,0:NEW

These are the same POKES used to type in *SpeedScript* with Apple MLX, and must be used every time you wish to edit *SpeedScript* with Apple MLX.

After typing these POKES and running Apple MLX, enter the following starting and ending addresses in response to the prompts:

```
STARTING ADDRESS? 0800
ENDING ADDRESS? 1E45
```

Next, press L to select (L)OAD FILE from the menu, and give the filename of the original *SpeedScript* file.

To make the first correction, press E to Enter Data, and enter 1C58 for the address. Type in these seven lines:

```
1C58: D0 10 38 AD D7 1E ED 53 45
1C60: 1E 38 ED D6 1E A8 A9 A0 68
1C68: D0 E0 C9 55 D0 0A AD EC C6
1C70: 1E 49 01 8D EC 1E 10 B1 B4
1C78: C9 63 D0 11 8C E5 1E AE 80
1C80: DD 1E AD DE 1E 20 24 ED 7A
1C88: AC E5 1E D0 9D AE E6 1E F4
```

When you've finished this block, press RETURN on the next line to get back to the menu. Press E to select Enter Data, then enter 1DE0 and type in this last line:

```
1DE0: D4 C9 CE C7 AE AE 8D 00 99
```

Press RETURN on the next line, then press S for (S)ave Data to save your modified copy of *SpeedScript*. Use a different filename than that of the original *SpeedScript*.

If you need to modify your version of *SpeedScript* for the Apple II/II+ SHIFT key problem described above, make the following corrections before saving to disk. (Do not make these corrections if you aren't having SHIFT key problems or if you have an Apple IIe/IIc.) The following ten lines of corrections must be made one line at a time. In other words, for each line, you must select option E (Enter Data) from the main menu, type the memory address preceding the colon, enter the numbers, and then press RETURN on the next line to return to the main menu. Then repeat the process for the next line of corrections. When you're done, save the corrected program to disk.

```
0A08: AD 61 C0 0D 44 1E 0D 63 4C
0CD8: 0D 44 1E 0D 63 C0 10 55 B0
0CE8: 0C AD 61 C0 0D 44 1E 0D 6D
0D98: 0D 44 1E 0D 63 C0 30 03 60
0E08: 0C AD 61 C0 0D 44 1E 0D 90
1068: 0D 44 1E 0D 63 C0 30 03 36
11E8: 0D 44 1E 0D 63 C0 10 03 7B
1688: 1E 0D 63 C0 10 03 4C D5 7A
1AB8: C0 0D 44 1E 0D 63 C0 30 A2
1B60: 0D 44 1E 0D 63 C0 30 23 64
```

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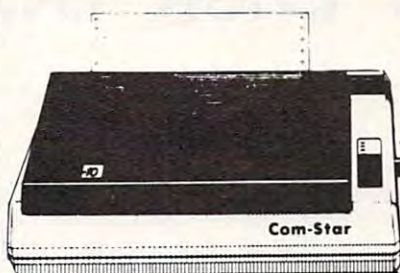
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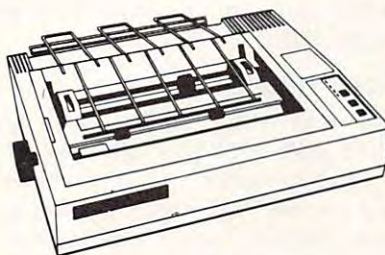
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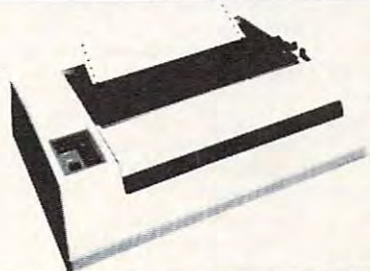
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Apple Disk Booster

D.W. Hoover

This unusual program increases the amount of storage space on Apple disks in DOS 3.3. It runs on any Apple II-series computer with a disk drive.

If you use a disk drive, you know that disk space is a precious commodity. One way to increase disk storage is to buy special hardware. But that's a costly proposition. "Apple Disk Booster" offers a simple, inexpensive alternative. It lets you format new disks with up to five extra tracks, creating more than 21,000 bytes of extra storage space per disk.

Type in Apple Disk Booster and save a copy before you run it. The program is written entirely in Applesoft BASIC. First the program prompts you to insert a blank disk in drive 1, and then it initializes the disk. Because different drives allow a different number of extra tracks, Apple Disk Booster will format only as many extra tracks as your drive can reliably use. The program automatically reads and verifies each extra track. If a track cannot be used, restart the initialization using the next lower track value. When it finishes the initialization, the program displays the number of tracks formatted on that disk.

Since Disk Booster is now the HELLO program on the disk, delete it by typing DELETE DISK BOOSTER,D1 and pressing RETURN. (This prevents you from accidentally running it again.) The disk is now ready for normal use.

As noted above, different drives may not be able to use the same number of extra tracks. If you want to use your modified disk on a different drive, it's a good idea to

determine beforehand whether the drive can access the extra tracks. To do this, simply run Apple Disk Booster on the second drive and note the number of tracks displayed when the program ends. Once you know the number of tracks that both drives can access, substitute that number for 40 in line 60 of the program, and run it again as needed.

If you later need to transfer files to a normal disk, use the DOS FILEM utility on the Apple System Master disk.

Extra Tracks

Squeezing extra tracks onto an Apple disk is surprisingly easy to do. This program modifies values used by the DOS routines that initialize the disk and create its Volume Table Of Contents (VTOC). Apple disks are normally formatted with 35 tracks. The first POKE in line 130 forces DOS to format more

tracks by substituting a larger number-of-tracks value.

The remaining POKEs in that line adjust the VTOC and bitmap accordingly. The bitmap is a portion of the VTOC that shows where free sectors are located on the disk. Each track has four bytes in the bitmap (two bytes are never used), and each bit represents a corresponding sector in the track. If a bit is off (set to 0), the sector is already allocated. If a bit is on (1), the sector is free. Here is the general format of the VTOC and bitmap.

To ensure that the VTOC and bitmap accommodate the extra tracks, the last two POKE statements in line 130 set new values for the number of tracks on the disk and the size of the bitmap. If 40 tracks are formatted, the bitmap is 160 (40 × 4) bytes in size. Of course, it's important to be sure the disk drive can use the extra tracks reliably. Lines 440-510 of Disk Booster contain data for a machine language routine that checks the new tracks. It reads a random sector from each extra track and checks for read-back errors. If an error occurs, we assume the track cannot be accessed and reinitialize the disk without that track.

Apple Disk Booster

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

Byte	Description
00	Not used
01	Track of first catalog sector
02	Sector of first catalog sector
03	DOS release number (3.3, etc.)
04-05	Not used
06	Volume number
07-26	Not used
27	Max number of track/sector pairs
28-2F	Not used
30	Last allocated track
31	Direction of allocation
32-33	Not used
34	Number of tracks per disk
35	Number of sectors per track
36-37	Number of bytes per sector
38-3B	Bit map of track 0
3C-3F	Bit map of track 1
40-43	Bit map of track 2
...	...
BC-BF	Bit map of track 33
C0-C3	Bit map of track 34
C4-FF	Bit maps of additional tracks (if desired)

```
#5 100 TRACKS = 40: REM # OF TR
    ACKS VALUE
F5 110 BITMAPSZ = TRACKS * 4: RE
    M BIT MAP SIZE
53 120 FOR ML = 768 TO 829: REM
    LOC OF ML ROUTINE
58 130 READ BYTE: POKE ML, BYTE: C
    HKSUM = CHKSUM + BYTE
#1 140 NEXT
```

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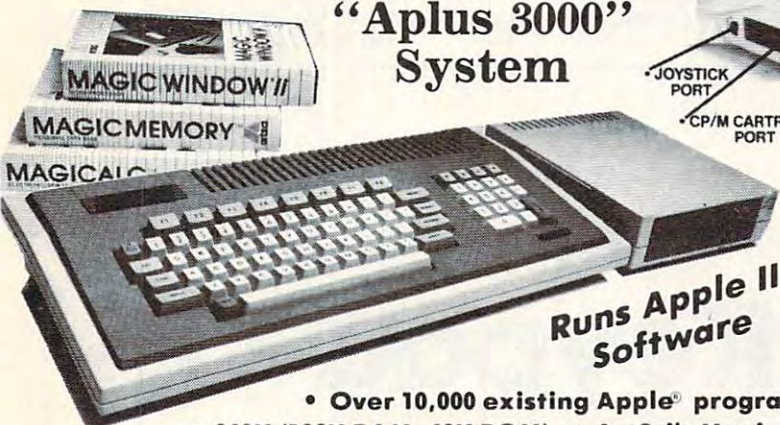
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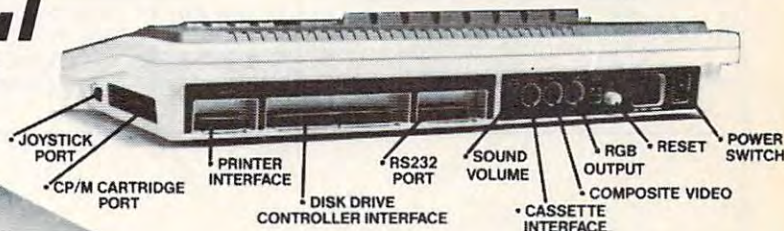
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- Character set with normal, inverse and flashing capabilities.

• GRAPHICS

- 280H X 192V 6 colors — Black, White, Violet, Green, Blue, Orange.
- 280H X 192V 8 colors bit image — Black, White, Red, Green, Blue, Cyan, Magenta, Yellow.
- 560H X 192V 6 colors — Black, White, Violet, Green, Blue, Orange. (High resolution color monitor required)

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Features	Aplus 3000	Apple IIE	Commodore C-128
RAM	192K	64K	128K
Runs Apple II Software	Yes	Yes	No
Function Keys	24	None	16
4 Voice, 6 Octave Sound	Yes	No	Yes
Composite Video	Yes	Yes	Yes
Disk Drive	included	Extra Cost	Extra Cost
Numeric Keypad	included	Extra Cost	Included
Video Cable	included	Extra Cost	Extra Cost
RGB Color Card	included	Extra Cost	Included
80 Column Card	included	Extra Cost	Included
Centronics Printer Interface	included	Extra Cost	Extra Cost
Drive Controller	included	Extra Cost	Included
\$150 Wordprocessor (Magic Window)	included	Extra Cost	Extra Cost
\$150 Spreadsheet (MagiCalc)	included	Extra Cost	Extra Cost
\$60 Database prg. (Magic Memory)	included	Extra Cost	Extra Cost
Your Cost	\$499.00	\$1745.00	\$1117.90

ACCESSORIES

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2nd Disk Drive	\$299.95	\$149.95
2 professional analog joysticks	\$ 39.95	\$ 24.95
Z-80 cart. allows CP/M use	\$ 99.95	\$ 59.95
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80 column Hi-Res RGB Monitor	\$399.00	\$259.00

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61 150 IF CHKSUM < > 9911 THEN HOME : PRINT "ERROR IN DATA STATEMENTS": GOTO 260	76 260 END	25 390 GOTO 260
68 160 POKE 216,0: ONERR GOTO 270: REM RESET ONERR FLAG	78 270 A = PEEK (222): REM ERROR CODE	E2 400 REM **ERROR CODES FOR APPLE DOS 3.3**
A1 170 POKE 48894,TRACKS: POKE 46063,TRACKS: POKE 44725,BITMAPSZ	76 280 ERRL = PEEK (218) + PEEK (219) * 256: REM ERROR LINE	87 410 REM
E8 180 HOME : PRINT "FORMATTING";TRACKS;" TRACKS..."	F5 290 IF A < > 8 THEN GOTO 350	79 420 REM ERROR #4 = WRITE PROTECTED DISK (REMOVE PROTECT TAB)
F7 190 PRINT CHR\$ (4);"INIT DISK BOOSTER,D1"	84 300 HOME : PRINT "ERROR DETECTED..."	AE 430 REM ERROR #11= SYNTAX ERROR (CORRECT TYPOS)
C9 200 CALL 768: REM CALL VERIFY TRACKS ML ROUTINE AT \$0300	78 310 PRINT "RESETTING NEW TRACK VALUE"	AF 440 DATA 169,0,141,235,183,141,240,183
58 210 PRINT "FORMATTING COMPLETE...";TRACKS;" TRACKS WRITTEN"	EA 320 PRINT "PRESS <RETURN> TO CONTINUE"	AD 450 DATA 169,1,141,244,183,169,16,141
E5 220 PRINT	88 330 INPUT " ";IN\$: IF IN\$ < > "" THEN GOTO 330	0C 460 DATA 241,183,133,209,173,254,190
8A 230 PRINT "DON'T FORGET TO LABEL"	31 340 TRACKS = TRACKS - 1:BITMAPSZ = TRACKS * 4: GOTO 160	5E 470 DATA 141,236,183,56,233,35,144,22,133
88 240 PRINT "YOUR NEW DISK WITH"	E3 350 PRINT "ERROR NUMBER ";A;" DETECTED IN LINE ";ERRL	94 480 DATA 210,169,183,160,232,32,181
9F 250 PRINT "THE NUMBER OF TRACKS INITIALIZED!"	83 360 PRINT "CHECK DOS PROGRAMMERS MANUAL"	1B 490 DATA 183,176,12,206,236,183,198
	65 370 PRINT "FOR ERROR TYPE"	3F 500 DATA 210,208,240,198,209,208,224
	95 380 PRINT "AND CORRECT IT ACCORDINGLY"	8A 510 DATA 96,169,8,141,92,170,76,213,166

©

Atari Keypad

R. Alan Belke

Here's an alternative to buying an add-on numeric keypad—simply emulate one in software. This machine language utility redefines part of your existing keyboard as a numeric keypad which you can turn on and off at will. It works on all Atari 400/800, XL, and XE computers with a disk drive.

Because I type in lots of programs from magazine listings, I'm constantly looking for shortcuts. Some of the toughest programs to type are those which consist of hundreds of numbers—data for machine language routines or character sets. Although you can buy a plug-in numeric keypad, there is a more economical alternative.

The solution came to me when I first saw a TRS-80 Model 100 computer. Pressing the NUM key on that portable lap computer turns part of the keyboard (keys M, J-K-L, and U-I-O) into number keys (0, 1-

2-3, and 4-5-6, respectively). Since keys 7-8-9 lie right above U-I-O, this lets you enter numbers 0-9 and press RETURN using only the fingers on your right hand. The makeshift keypad is a little slanted, but it's easy to adapt to. Also, notice that the D, A, and T keys are unaffected. You can type DATA statements all day without having to switch off the keypad to type the keyword DATA.

"Atari Keypad" duplicates the Model 100's arrangement on Atari computers. The program works by intercepting the keyboard interrupt routine and redirecting it to a new routine. You can toggle the keypad on and off by simultaneously pressing SHIFT-CTRL-N.

There was one major problem with carrying out this idea. Since Atari Keypad is most useful when entering BASIC programs—or when used in combination with other programs—it has to sit somewhere in memory without interfering with

anything else. My original version of Atari Keypad locates itself in the upper half of page 6, a fairly safe section of memory which starts at location 1536 (hex \$600). This protects it from the meanderings of Atari BASIC. But realizing that page 6 is used by a host of other programs and routines, including COMPUTE!'s "Automatic Proofreader," I've provided another version that hides in low memory. One version or the other should cover most situations.

Automatic Keypad

Program 1 creates an AUTORUN.SYS file on disk that loads Atari Keypad into page 6 when you boot the system. Program 2 creates an AUTORUN.SYS file that loads Atari Keypad into low memory when you boot. Since the exact location of MEMLO, the low-memory pointer, can vary, the version of Atari Keypad created by Program 2 automatically modifies itself for

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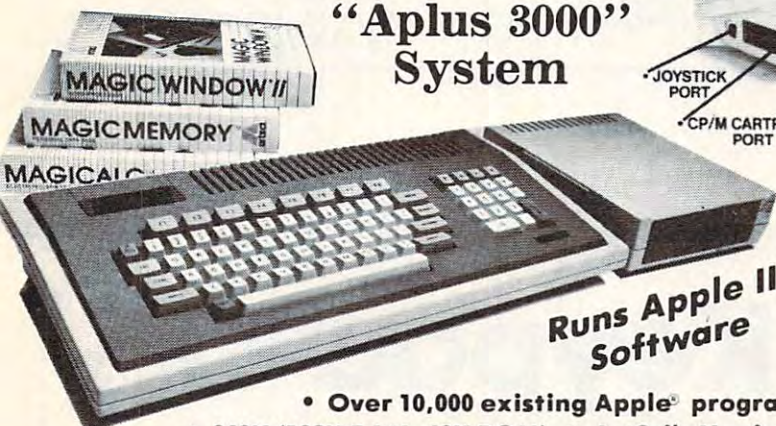
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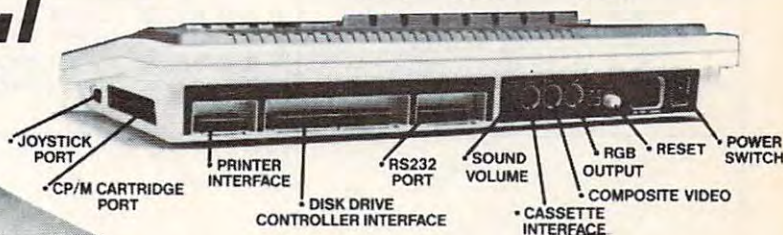
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- RGB (80 columns in color) and composite included

SPECIFICATIONS

A plus 3000 is a complete, self-contained computer based on the popular 6502A microprocessor and can tap into the tremendous software library of Apple II. Features include 192K Bytes RAM, 32KB Enhanced Microsoft BASIC, 80 column text, 560H X 192V color graphic display, 81 key sculptured keyboard and high efficiency switching power supply. Also included as standard are Centronics bus printer interface, Cassette interface, 4 channel sound generator, and 5 1/4" Apple Compatible Disk Drive.

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 - Upper and lower case characters.
 - One of Eight colors for characters/graphics and background, Red, Green, Blue, Cyan, Magenta, Yellow, Black and White.
 - Character set with normal, inverse and flashing capabilities.
- **GRAPHICS**
 - 280H X 192V 6 colors — Black, White, Violet, Green, Blue, Orange.
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