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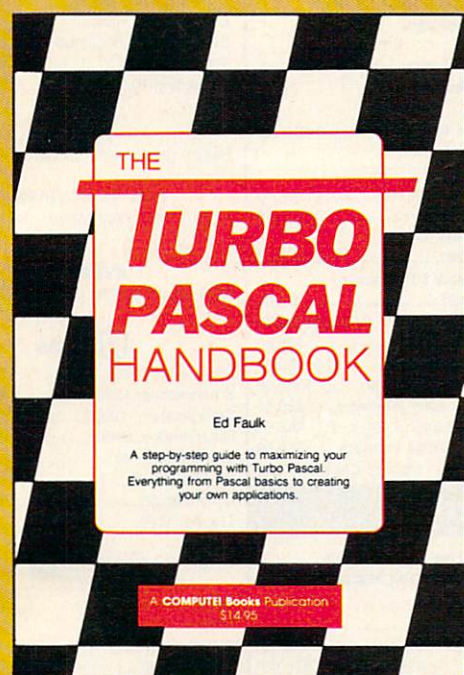
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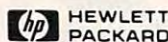
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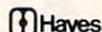
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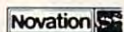
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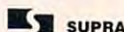
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Editor's Notes

The recent Summer Consumer Electronics Show was both interesting and disappointing. Last year at this time, the industry was reeling from a tremendous downturn in sales growth, and the resulting shakeout had otherwise stable vendors describing those times as the end of the entire personal computer industry. A year later, we're still here, and the doom and gloom forecasters have retrenched. We're a wiser, more mature, and perhaps more stable industry, and the attitude among the exhibitors at the show was much more upbeat. We heard talk of steadily improving sales, enthusiasm for new products, and a better holiday season on the horizon. We also heard a general level of enthusiasm for the hard-charging Atari Corporation, and a more specific level of disappointment at the Commodore showing. Atari had a large and impressive booth, impressive in that it contained dozens of smaller exhibits where independent vendors demonstrated software for the ST series. Visitors thus immediately encountered a tremendous amount of activity encompassed in a group of highly supportive people.

The Commodore appearance evoked a mixture of concern and amazement. Remember, we're talking about a company here with an active, enthusiastic installed base of literally millions of computers. We're talking about a computer series called the 64 that just keeps going, the 128 with a success record that we suspect even impresses Commodore, and the

Amiga. One of the most technologically superior computers on the market, the Amiga continues to suffer at the hands of the superior marketing attack of the Atari-led Tramiels.


Commodore continues to insist that the Amiga is a business machine. One must assume that this is the reason none was present at CES. In the Commodore suite, only 64s and 128s were visible. It was simply amazing. And very quiet when we were there. The seeming lethargy in market positioning that has stricken Commodore since the introduction of the Amiga is one of the most shocking turnabouts we've witnessed in the modern history of this industry. One wonders whether the bankers have begun to call the strategic shots at Commodore.

We think that it is important to this industry as a whole that Commodore is, and continues to be, a viable player. Do not misunderstand. We saw nothing at CES that says it is not a viable company. We simply question the wisdom of its continued refusal to open up the Amiga market. Obviously such a decision is Commodore's, not ours, and obviously we're on the outside, but one can only marvel at the continued growth and success of Atari and the relative demise of the Amiga.

Last summer this time, both the ST and the Amiga were launched from an installed base of zero. Now, as we conclude the first year of product delivery, we find the ST with an installed base of roughly ten times

that of the Amiga. Not a very stirring record. During this one-year period, the ST has grown, evolved, expanded to include the 1040, undergone in Tramiel-like fashion a predictable series of aggressive price cuts, expanded marketing outlets, etc. We've seen it all happen before with the VIC and the 64, but it's still quite impressive when it works.

Contrast with this the concurrent introduction of the Amiga. It was categorized, or defined, as a business machine. Its prices have changed only minimally. It has, to put it politely, withered. As we said, we think this industry needs Commodore, and it needs the vision and direction that a Commodore can help provide. We do not want it to be too late. Maybe if you gentlemen and ladies would just nudge the Amiga a little bit toward the consumer market, you'd be pleasantly surprised. Perhaps a price cut here, a market incursion there. You get the picture. You've got millions of users out here looking to you for technological leadership. Thanks. ©



Robert C. Lock
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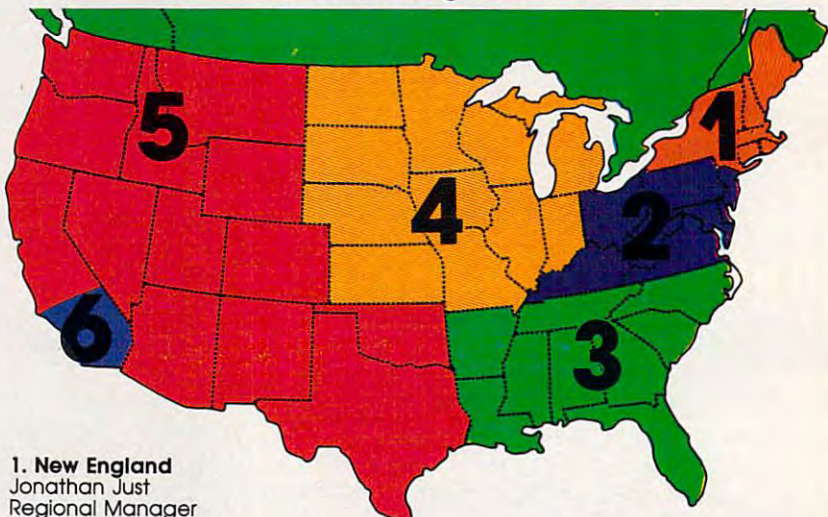
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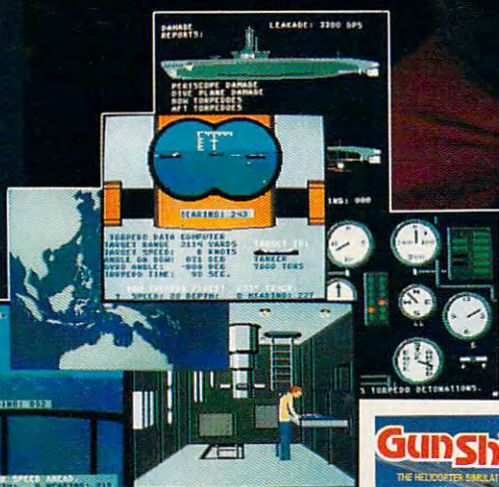
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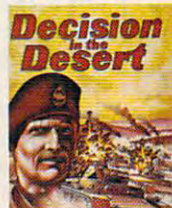
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Assemblers And Monitors

I am a little confused about the difference between an assembler and a machine language monitor. Would you please explain the functions of each?

Adam C. Stuart

Simply put, an assembler is a program designed for one specific purpose—helping you write machine language programs. A monitor can be used for that purpose, too, but can also perform other memory-management tasks. Most programmers use an assembler for writing long ML programs and a monitor for writing short, experimental routines or debugging the code produced by an assembler.

To illustrate the difference, let's say that you have a short machine language program beginning at location 49152 (\$C000) on the Commodore 64. A monitor allows you to examine the contents of any memory location. If you type M C000 C00C from the monitor, the following display might appear:

```
:C000 A9 42 20 06 C0 60 20 D2
:C008 FF 20 D2 FF 60 00 00 00
```

This memory display, like other monitor output, is in hexadecimal (base 16) notation. The numbers in the leftmost column are memory addresses; the numbers to the right show the actual contents of each successive location. Unless you're very familiar with hex notation and the 6502 instruction set, it's difficult to understand the program in this form. As a convenience, the monitor can translate machine language instructions from a series of raw numbers into more descriptive mnemonic labels. This process is called disassembly. Here's how a monitor would disassemble the numbers seen in the display above:

```
:C000 A9 42 LDA #$42
:C002 20 06 C0 JSR $C006
:C005 60 RTS
```

```
:C006 20 D2 FF JSR $FFD2
:C009 20 D2 FF JSR $FFD2
:C00C RTS
```

Each three-letter mnemonic stands for a single ML instruction. In this example, the LDA (Load A) instruction loads the ASCII value for the letter B (hex \$42) into the computer's A register, also called the accumulator. The JSR (Jump to SubRoutine) instruction calls a subroutine, much like GOSUB in BASIC. RTS (ReTurn from SubRoutine) terminates a routine, much like RETURN in BASIC.

The converse of disassembly is assembly, which lets you write a program by typing in mnemonics rather than numbers. To assemble the first line of the above program, for instance, you would type this line into the machine language monitor:

```
A C000 LDA #$42
```

This puts the numbers \$A9 and \$42 into memory locations \$C000 and \$C001, where the computer interprets them as Load A with \$42.

In addition to memory display, disassembly, and assembly, a monitor can perform other general tasks such as moving the contents of one memory area to another area, filling memory with a certain value, saving and loading an area of memory to tape or disk, and so forth. Monitors are so useful, in fact, that several computers, including the Commodore PET, Apple II, and Commodore 128, include one as a built-in feature.

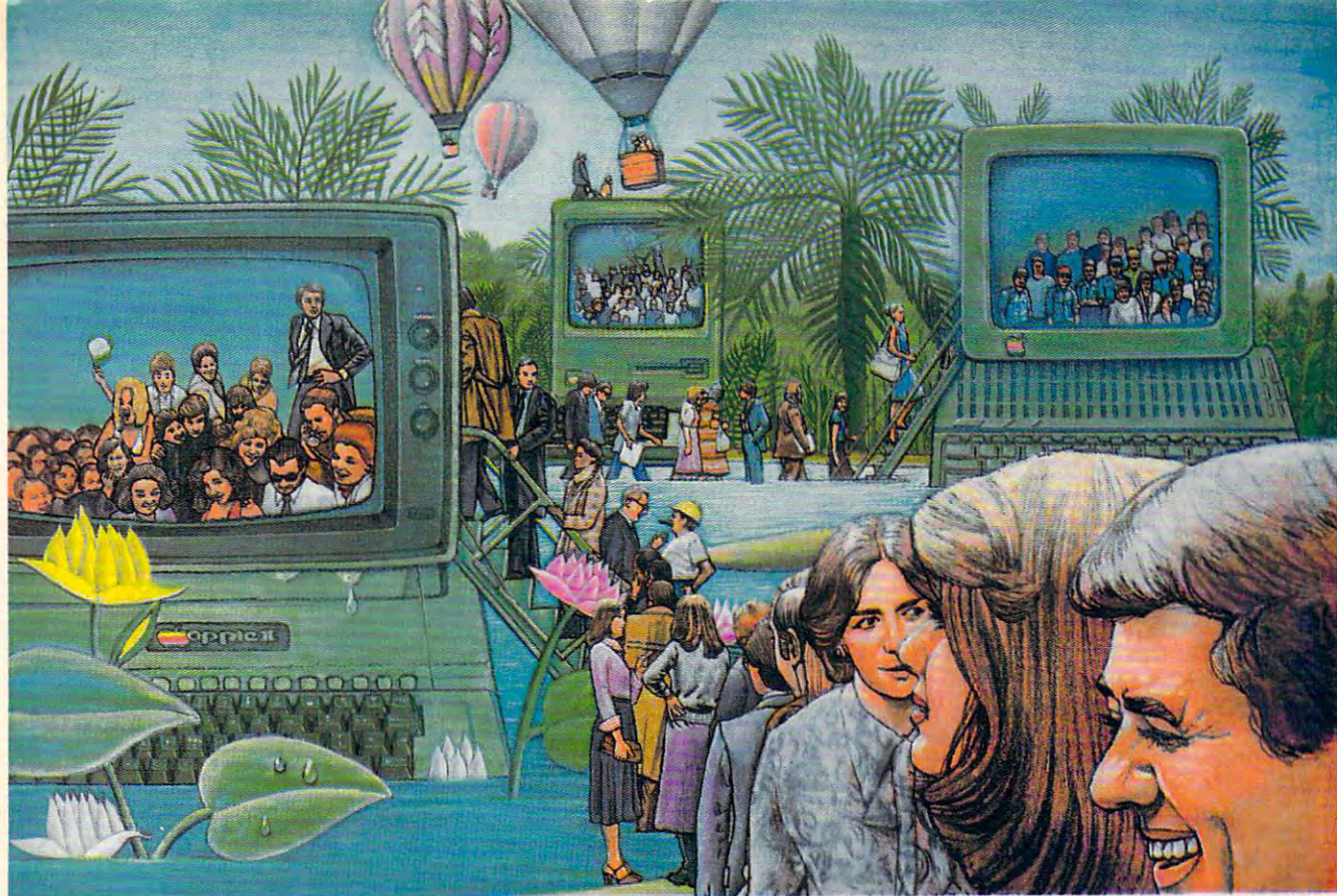
An assembler, as the name implies, is intended to do only one job—assemble an ML program from mnemonics. Since it usually can't disassemble the contents of memory, do memory moves, etc., an assembler is less versatile than a monitor. And programming with an assembler requires two steps instead of one. First you write a text file containing all the program instructions; this file is called the source code. Then you run the assembler, which translates the source code into executable object code. At first, the assembler sounds more cumbersome to use. But except for very short programs, it's considerably more convenient than a monitor. To illustrate, here is what the source code for this program might look like (this example is written in a format for the Commodore 64 PAL assembler; other assemblers are very similar):

```
100 sys 700
110 .opt p4
120 *=49152
130 letter = 66
140 chrout = $ffd2
150 ; print 'b' twice
160 lda #letter
170 jsr print2
180 rts
190 print2 = *
200 jsr $ffd2:jsr $ffd2
210 rts
220 .end
```

This assembler lets you write, save, and reload the ML source code as if it were a BASIC program, using sequentially numbered program lines. (Other assemblers provide similar functions.) Just as in BASIC, you can combine more than one statement on a single line (see line 200). Descriptive names can be given to constants (line 130), variables, ROM routines (140), and memory locations within the program itself (190). Assemblers also permit more flexibility of expression than monitors: Usually, decimal and hexadecimal numbers can be used interchangeably, and the assembler can evaluate strings and complex expressions as well. In this program, for instance, you can replace LDA #LETTER with LDA #\$42, LDA #66, LDA #'B', or even LDA #(6+6*10).

The ability to use labels makes well-written assembler code much more readable than a monitor disassembly. The instruction JSR PRINT2, for instance, is more informative than JSR \$C006. Labels also eliminate the need for tedious address calculations and simplify the process of relocating a program from one area of memory to another. When writing this program for an assembler, you don't need to know where the routine PRINT2 will actually end up in memory; the assembler handles such details for you automatically. With a monitor, on the other hand, you need to calculate the actual address of the subroutine before you can type in the JSR instruction that calls it. To move this program from location 49152 to 24576, you would simply change the origin statement in line 120 to *=24576 and reassemble the code. The assembler automatically adjusts everything to fit the new location.

Even greater flexibility is offered through pseudo-ops (pseudo-operations), which control various assembler functions. For instance, the .OPT pseudo-op



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(line 110) tells the assembler where to send its output. By changing this instruction you can send output to memory, a disk file, the screen, or a printer. Assembling to a printer is particularly useful for making documentation, since the output includes everything you would see in a monitor disassembly (addresses, opcodes, and mnemonics) as well as all the comments and so forth contained in the assembler source file.

Other assembler pseudo-ops let you perform more advanced operations such as a conditional assembly, which can include different segments of code (perhaps specific to various computers) in the assembly only when certain IF tests are satisfied. For long programs, a linked assembly allows you to assemble two or more separate source files into a single object file. The latter method was used to assemble the SpeedScript word processor, since the source code for that program is too long to fit in the computer's memory all at once.

Atari BASIC Errors

Only recently have I become obsessed with home computers. As a novice, I decided to start with an Atari 400 (a 1982 model, I believe) and a cassette recorder. After many hours spent typing in your programs, I was constantly rewarded with error messages. I finally discovered that the BASIC cartridge accompanying the computer had since been revised twice. Not being able to locate the revision C cartridge in Dallas, I wrote Atari. No answer yet. Can you provide any insight? Also, is the 400 capable of using a disk drive, or am I stuck with tape?

Tom Rowan

It's true that Atari BASIC has been revised twice since your Atari was made, but it's unlikely that this is the source of your problems. The two revisions—known as revision B and revision C—mainly fix bugs in the original Atari BASIC cartridge. These bugs, however, don't cause spurious error messages. Usually they either lock up the computer entirely or mangle text strings. Your error messages are almost certainly due to mistakes in the programs, not problems with your BASIC.

You don't say whether the error messages appear when you're typing the programs or running the programs. Atari BASIC is one of the few BASIC languages that has instant syntax checking, so if you get an error immediately after typing a line and pressing RETURN, it usually means that a BASIC command was mistyped, a parenthesis was omitted, or the command is being used improperly. Examine the line carefully for any typos. If you can't find any, refer to the Atari

BASIC Reference Manual to see if the command usage is legal. For example, the statement `A=CHR$(A$)` generates an error because the `CHR$` function is intended for converting a number into a string, and the variable `A$` is already a string.

Error messages encountered while you're trying to run a program are not due to syntax errors. Usually they indicate that the program is asking the computer to do something impossible. For example, the one-line program `10 GOTO 20` generates the message `ERROR 12 AT LINE 10`. If you look up this error number in the Atari BASIC Reference Manual, it means `Line Not Found`. The command `GOTO 20` tells the computer to branch to line 20, but this program has no line 20. (If you're typing in listings from *COMPUTE!*, you can avoid most of these mistakes by using our "Automatic Proofreader" program found in every issue.)

If you'd still like a revision C Atari BASIC cartridge—worth having for only \$15—you can order one from Atari. (Atari Corp., Customer Relations, 390 Caribbean Drive, Sunnyvale, CA 94088.) Be patient, though. It takes quite some time for Atari to fill these orders.

The Atari 400 is quite capable of using a disk drive if it has at least 16K of Random Access Memory (RAM). Early 400s had only 8K RAM. You can find out how much memory your 400 has by plugging in BASIC, typing `NEW`, and entering `PRINT FRE(0)`. A 16K machine should return a number around 13000. However, we recommend at least 32K for use with a disk drive. A drive requires that you load a special program called a Disk Operating System (DOS), and this would consume more than half the available memory on a 16K system, leaving very little room for your BASIC program. The 400 can be upgraded to 48K or 64K, but the memory board installation isn't trivial. Also, for a few dollars more you could probably buy a new 800XL or 65XE.

Commodore 128 Sprites

I really enjoy programming with my new Commodore 128. However, using sprites has left me quite frustrated. The system guide's explanation of sprites doesn't explain how you can have more than eight sprite definitions in memory. Is there any way to do this?

Matt Lindquist

The Commodore 128 has room for only eight sprite shapes in its sprite definition area (memory locations 3584-4095). However, BASIC 7.0 includes a command (`SPRSAY`) which lets you move sprite shapes from strings into the sprite definition area and vice versa. Here is one form of `SPRSAY`:

`SPRSAY 1,A$`

This command moves the definition for sprite 1 into the string `A$`. Now the shape data is stored for later use. Here's the opposite form of `SPRSAY`:

`SPRSAY A$,1`

This command moves the shape data stored in `A$` into the definition area for sprite 1. Of course, you can replace the name `A$` with any legal string variable name.

The following program draws 16 sine waves on the screen, each positioned a little differently, then saves the sprites in the array `A$` using the `SSHAPE` command. After all the shapes have been drawn and saved, sprite 1 is displayed on the screen. `SPRSAY` is then used to flip between the various sprite shapes. The rapid display of shapes makes the sine wave appear to move.

(Note: The underlined up-arrow (↑) in line 30 means to hold down the SHIFT key while pressing the up-arrow key. This will produce the pi (π) symbol.)

```
10 FAST
20 DIM A$(16)
30 FOR V=0 TO ↑*2 STEP ↑/8
40 GRAPHIC 1,1
50 FOR X=0 TO 23 STEP .2:Y=
  INT(11+10*SIN(X/2+V)):DR
  AW 1,X,Y:NEXT
60 SSHAPE A$(SN),0,0,23,20
70 SN=SN+1:NEXT V:GRAPHIC 0
  ,1:SLOW
80 SPRITE 1,1,2,1,1,1,0
90 MOVSPR 1,120,80:MOVSPR 1
  ,90#3
100 FOR A=0 TO 15:SPRSAY A$
  (A),1:FOR T=1 TO 5:NEXT T:NE
  XT A:GOTO 100
```

Apple Double Hi-Res Graphics

I'm having trouble understanding how the double high-resolution graphics mode works on my Apple IIc. How does the computer store the color and dot information? Is it possible to convert a normal hi-res picture to double hi-res format?

Robert Colello

An Apple II that has 128K of Random Access Memory (any Apple IIc, or a IIe with extended 80-column card) can display pictures that have twice as many pixels across as normal hi-res pictures: that's 560 pixels in double hi-res versus the normal 280-pixel resolution. This display mode works in about the same way as 80-column text mode. For every byte of normal display memory, there's another byte with the same address in another bank of memory, called auxiliary RAM. In normal hi-res mode, one byte of display data tells the computer how to draw seven pixels on the screen. In double hi-res, 14 dots can be drawn in the same space on the screen. The first seven dots are read

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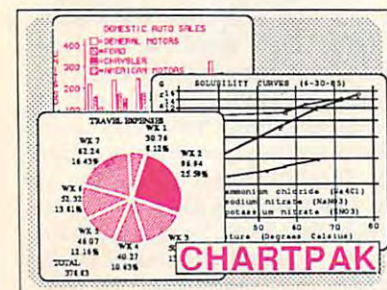


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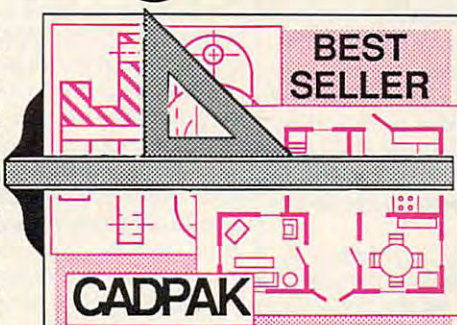
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from auxiliary memory and the second set comes from main RAM.

One double hi-res screen occupies 16K of memory between addresses 8192-16383 (\$2000-\$3FFF) in each bank. Unlike standard hi-res, there's only one double hi-res screen, so it's not practical to create animation with page flipping.

Here are some routines that will help you get started with double hi-res graphics. When run, they create machine language programs called DCONVERT and DHGRSAVE. If you load a normal hi-res picture into hi-res screen 1 (at 8192) then BRUN the DCONVERT program, it converts the picture to double hi-res format and displays it.

To save this or any other double hi-res picture to disk, BRUN the DHGRSAVE program, then enter BSAVE filename ,A\$2000,L\$4000 (replace filename with the name of your choice). The graphics image is saved in the same format used by Dazzle Draw and other double hi-res programs. If you save the image file on a ProDOS disk, you can then load it with Dazzle Draw and modify the picture.

```
80 FOR I = 24576 TO I + 161:
  READ A: POKE I, A: NEXT
90 PRINT CHR$(4); "BSAVE DCON
  VERT, A$6000, L$A2"
100 DATA 141, 126, 192, 173, 94, 1
  92, 173, 87, 192, 173, 82
110 DATA 192, 141, 13, 192, 141, 0
  , 192, 173, 80, 192, 169
120 DATA 0, 133, 254, 169, 32, 133
  , 255, 160, 0, 177, 254
130 DATA 72, 72, 41, 15, 170, 189,
  146, 96, 141, 163, 96
140 DATA 104, 74, 74, 74, 41, 7
  , 170, 189, 146, 96
150 DATA 141, 162, 96, 104, 16, 11
  , 173, 163, 96, 201, 128
160 DATA 173, 162, 96, 42, 144, 27
  , 78, 163, 96, 136, 48
170 DATA 10, 177, 254, 8, 10, 10, 4
  0, 106, 74, 145, 254
180 DATA 200, 173, 162, 96, 44, 59
  , 96, 240, 2, 9, 64
190 DATA 145, 254, 173, 163, 96, 4
  1, 127, 141, 5, 192, 145
200 DATA 254, 141, 4, 192, 200, 19
  2, 40, 208, 168, 165, 254
210 DATA 105, 127, 133, 254, 144,
  2, 230, 255, 165, 255, 201
220 DATA 64, 208, 150, 165, 254, 1
  05, 39, 133, 254, 201, 120
230 DATA 208, 136, 96, 0, 3, 12, 15
  , 48, 51, 60, 63
240 DATA 192, 195, 204, 207, 240,
  243, 252, 255
```

```
80 FOR A = 4096 TO A + 47: RE
  AD I: POKE A, I: NEXT
90 PRINT CHR$(4); "BSAVE DHGR
  SAVE, A$1000, L$30"
100 DATA 160, 0, 132, 252, 132, 25
  4, 169, 32, 133, 253, 169
110 DATA 64, 133, 255, 141, 1, 192
  , 173, 87, 192, 177, 252
120 DATA 145, 254, 141, 85, 192, 1
  77, 252, 141, 84, 192, 145
130 DATA 252, 200, 208, 239, 230,
  253, 230, 255, 165, 253, 201
140 DATA 64, 208, 229, 96
```

Saving PCjr Screens

I have been experiencing trouble with BSAVEing SCREEN 5 on my PCjr. For some reason, the computer loads only half the picture when I try to bring it back into memory.

Marc Ramirez

The PCjr was designed to be as compatible as possible with the IBM PC, but there are several differences, most notably the lack of DMA (Direct Memory Access) hardware that speeds certain operations on the PC. On the other hand, the PCjr has better color graphics than the PC. Its SCREEN 5 mode gives you 320 X 200 resolution with 16 simultaneous screen colors. These don't represent fixed colors as in the PC-compatible modes. Instead, each of the 16 colors can be redefined to use any of the 16 possible colors, making available the advantages of color indirection.

The IBM PC color/graphics card contains 16K of onboard RAM for its own use. Because the RAM is part of the color card, there is no conflict when both the screen and the microprocessor want to access memory at the same time. However, references to addresses \$B8000-\$BC000 are redirected to the color card's memory, which permits the microprocessor to update screen memory and redraw the screen directly.

The PCjr, however, has no memory at \$B8000. Screen memory is taken from the main store of RAM, usually at location \$18000. This explains why the PCjr is slower than its big brother. The graphics chips need to access screen memory constantly while building the screen, and since this memory is on the main address bus, the microprocessor can't get at memory to execute instructions while the graphics chips are using it.

However, IBM realized that many commercial programs try to update the screen by storing values directly into screen memory at \$B8000. To keep the PCjr compatible with these programs, IBM modified the address circuitry to redirect references to \$B8000 to the actual screen memory area. However, only 16K of memory is redirected. Since a SCREEN 5 screen is 32K long, this explains why you're seeing only half of the picture.

When you use the sequence

```
DEF SEG=&HB800:BSAVE "screen",0
,32768!
```

the first 16K of memory is saved from the area at \$18000, but the rest of the picture is saved from \$BD000-\$C0FFF, since this memory range is not relocated. This second half is just whatever random bits are read when this nonexistent memory is saved. Instead, you need to use

```
DEF SEG=&H1800:BSAVE "screen",0
,32768!
```

to save the screen, and

```
DEF SEG=&H1800:BLOAD "screen"
```

to load it back. If you try to load images saved from the original range of \$B8000-\$C0FFF, the second interleaved half of the picture will be garbage. If you use two or more graphics screens, the additional screens are stored behind the first one at lower memory locations. The first SCREEN 5 screen would be at \$18000, the second would be stored at \$10000, and so forth.

TurboDisk With 64 SpeedScript

Now that the commented source code for SpeedScript is available in book form, I have found ways to make the program work in all kinds of situations. Here are a couple of SpeedScript modifications I have found very useful.

Only two POKEs are needed to allow you to use "TurboDisk" (the fast-load utility published in the April 1985 issue of COMPUTE!) with SpeedScript. First, load in your copy of SpeedScript (version 3.0 or higher). Now enter these POKEs in direct mode (without line numbers). Be sure to press RETURN after typing each line:

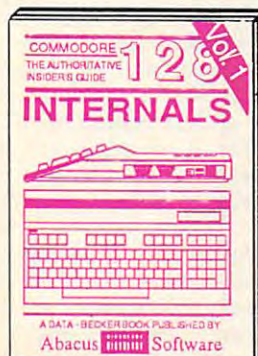
```
POKE 2481,191
POKE 4938,8
```

Now resave the program, using a different filename (perhaps SPEEDSCRIPT.TURB) to differentiate it from the original. To use the modified program, simply activate TurboDisk as usual, then load and run SpeedScript. You'll find that text files are loaded much faster than usual. If you exit SpeedScript, you must reactivate TurboDisk with SYS 49152.

A second useful change has to do with word wrap—SpeedScript's ability to automatically move a word down to the next line when it's too big to fit on the current line. Word wrap is great for making text readable, but creates headaches when you need to align the right margin or line up decimal points past the fortieth column. The following program replaces SpeedScript's Verify command (which I have never used) with a function that toggles word wrap on and off. Type in the following program and save a copy, then run it and follow the prompts (tape users note the line change below).

```
10 FORQ=49152TO49198:READA:
  X=X+A:NEXT:IFX<>6412THEN
    PRINT"ERROR IN DATA":EN
    D
20 RESTORE:FORQ=49152TO4919
  8:READA:POKEQ,A:NEXT
30 PRINT "{CLR}{WHT}LOAD YOU
  R VERSION OF"
40 PRINT "SPEEDSCRIPT 3.0 OR
  HIGHER"
50 PRINT "THEN SYS49152 AND
```


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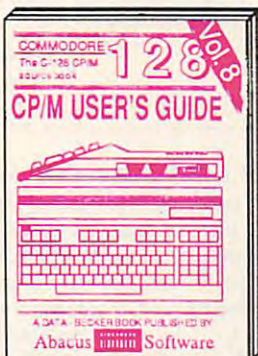
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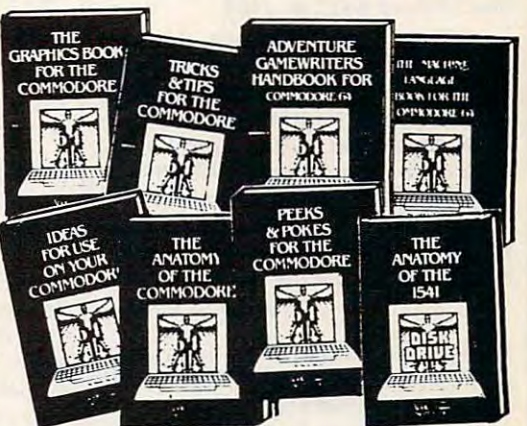
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```
{SPACE}RUN."
49152 DATA 162,35,189,12,19
2
49157 DATA 157,26,20,202,16
49162 DATA 247,96,173,219,8
49167 DATA 201,177,208,17,1
69
49172 DATA 169,141,219,8,16
9
49177 DATA 32,141,220,8,165
49182 DATA 197,201,31,240,2
50
49187 DATA 96,169,177,141,2
19
49192 DATA 8,169,251,141,22
0
49197 DATA 8,96
```

After POKEing a short ML routine into memory, the program instructs you to load *SpeedScript* (3.0 or higher), enter SYS 49152, then run *SpeedScript*. Try toggling word wrap on and off by pressing CTRL-V (ordinarily the Verify function).

If you use tape instead of disk, you may not want to give up the Verify function but can easily afford to live without the Directory command, which is useless with tape anyway. In line 49157 of the program, change the 26 to 98. Then change the checksum value in line 10 from 6412 to 6484.

When you're satisfied that the modification works, exit *SpeedScript*. Disk users should enter POKE 2895,23 to change the Verify command from CTRL-V to CTRL-W (for Word wrap). Tape users should enter POKE 2898,23 to change the Directory command from CTRL-4 to CTRL-W. After that's done, resave *SpeedScript* under a new filename that reflects the change.

Bruce S. Gordon

Thanks for the suggestions. Incidentally, the penalty you pay for turboloading with SpeedScript is that available text memory is reduced from 43,445 characters to 39,299 characters.

Improved Atari Line Delete

Like many BASIC programmers, I usually number my programs with an increment of 10. Often, however, after editing and debugging, there is no longer any pattern to line numbering. This short utility program has a little more versatility than "Line Deleter For Atari," published in the January 1986 issue of *COMPUTE!*. As in the former, LIST the utility to disk or cassette, then load your BASIC program and ENTER this utility. Type GOTO 32700 in direct mode, then input the beginning and end range to be deleted. You can now delete only existing line numbers. When the deletion is finished, press RETURN to remove the utility from your BASIC program.

```
32700 REM BLOCK DELETE EN
TER AND GOTO 32700
32701 TRAP 32713: ? "START
,END": INPUT START,E
N
32702 ? CHR$(125):X=PEEK(
138)+PEEK(139)*256
32703 B=PEEK(136)+PEEK(13
7)*256:X=B:QQ=0:POS
ITION 2,2
32704 LN=PEEK(X)+PEEK(X+1
)*256
32705 IF LN<START THEN X=
X+PEEK(X+2):GOTO 32
704
32706 IF LN=32700 THEN 32
710
32707 ? LN:QQ=QQ+1:IF QQ=
18 THEN 32710
32708 IF LN>=EN THEN 3271
0
32709 X=X+PEEK(X+2):GOTO
32704
32710 TRAP 32713: ? "32700
REM PRESS RETURN T
O REMOVE BLOCK DELE
TER": ? "CONT"
32711 POKE 842,13:POSITIO
N 2,0:STOP
32712 POKE 842,12:GOTO 32
700
32713 ? CHR$(125):POSITIO
N 2,2:FOR SS=32700
TO 32714: ? SS:NEXT
SS: ? "POKE 842,12"
32714 POKE 842,13:POSITIO
N 2,0:STOP
```

Gary Rindosh

Thank you for the program.

Dvorak Keyboard For 64

After 25 years of typing the "qwerty" way, I'd like to take advantage of a Dvorak keyboard toggle included in a *SpeedScript* enhancement program for the Commodore 64. What resources are available to help me learn the Dvorak system? Are keyboard caps for the 64 available so that I can cover up the normal keys with Dvorak caps? It's going to be hard giving up the old system, but everything I've heard about the speed and efficiency of the Dvorak keyboard makes me eager to give it a try.

John Willis

If your enhancement program can emulate the Dvorak keyboard within SpeedScript, then no hardware is required to convert from the conventional typewriter key arrangement—often called qwerty—to the Dvorak scheme. Many office supply stores carry stick-on keycap labels that should suit your needs. We're assuming that you have a diagram which shows the Dvorak keyboard.

The advantage of stick-on labels is that you can still use the computer for other purposes that don't involve a Dvorak keyboard. Most commercial software and virtually all type-in programs in publications like COMPUTE! assume that you have a normal 64 keyboard. If you can find

or fabricate blank stick-on labels, you could divide each label into two segments—indicate the Dvorak key on one half and the normal 64 key on the other. This would allow you to switch from Dvorak to qwerty applications at will.

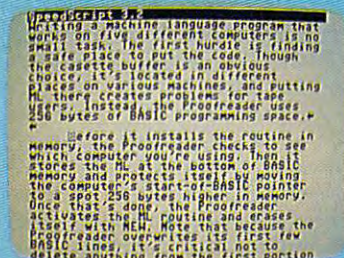
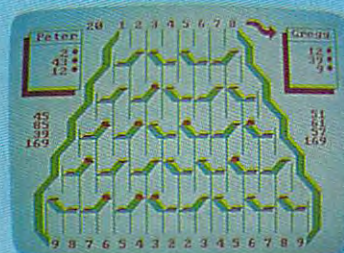
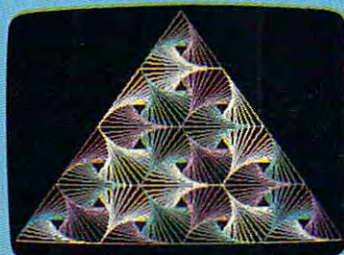
If you don't use the computer for anything other than word processing and decide to convert permanently to the Dvorak scheme, you could rearrange the existing keycaps. This operation doesn't require any special tools or electronics expertise. While you have the old keycaps off, you can take advantage of the opportunity to clean the keyboard, too. However, rearranging the keycaps will void any warranty that may be in effect, since you must open the case of the computer. And though the operation is reversible, you should consider it semipermanent because of the time involved in switching the keycaps.

To rearrange the keycaps, remove the three Phillips screws in the bottom of the computer's case, then gently separate the two halves of the case. Carefully unplug the two sets of wires that join the upper and lower halves, then remove the eight Phillips screws that hold the keyboard assembly to the upper half. The 64's keycaps are held on by friction, so you can lever them off using a thin-bladed screwdriver or similar device. The alphanumeric keycaps are all the same size and can be interchanged freely. Of course, you shouldn't disturb keys such as RESTORE, which serve a special purpose. While the keycaps are off, you may want to clean the area around each keyswitch. In many cases, cleaning is all that's needed to fix keys that stick or bounce (repeat when they shouldn't).

To replace a keycap, press it gently but firmly onto the shaft of the keyswitch. After all the keycaps are back in place, reverse the disassembly procedure: Screw the keyboard assembly back into the upper half of the case, then replace the two sets of wires that join the halves. Finally, rejoin the two halves of the case, turn the computer over, and replace the three screws on the bottom. If you've never performed the operation before, you should plan to spend a couple of hours removing, cleaning, and replacing the keycaps.

*By the way, you might be interested to learn that there is some controversy surrounding the efficiency claims for the Dvorak keyboard. Most of the frequently quoted statistics (like 35-50 percent increase in speed and 90 percent reduction in finger travel) come from August Dvorak's own research. An independent investigation by Donald Olson and Laurie Jasinski, published in the February 1986 issue of *BYTE* magazine, suggests that these figures are inflated. While agreeing that the Dvorak arrangement is somewhat*

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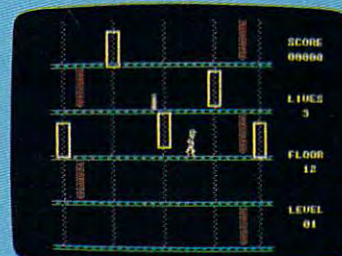
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more efficient, that article reports that the actual reduction in finger travel is less than 30 percent. It also quotes a University of California study which concluded that a speed increase of 5-10 percent was more realistic.

Automatic IBM Screen Printing

Some time ago I created a BASICA program which allows me to create graphics pictures much like a graphics editor. The program uses every graphics function in the manual, and even saves your work. But in order to print my creations on the printer, I have to press Shift-PrtSc. Is there any way to add a Print Screen function to my program?

William Green

Fortunately, it's quite easy to call the ROM BIOS routine that supports screen printing. The following program fragment does the trick by POKEing a tiny machine language program into a reserved space at the top of BASIC's memory area. The ML just executes INT5:RET to call the Print Screen routine and return to BASIC. This program is adapted from COMPUTE!'s Mapping the IBM PC and PCjr, by Russ Davies.

When incorporating this routine into your program, the line with the CLEAR statement must be the first line in your program. Otherwise, any previously defined variables will be erased. Once the machine language is POKEd into memory, your program can execute the statement CALL PRPSC to make a printout.

```
100 CLEAR , &HFFF0:PRPSC=&HFFF0
110 DEF SEG:FOR X=0 TO 2:READ
    N:POKE X+PRPSC,N:NEXT
120 DATA &HCD,&H05,&HCB
200 CALL PRPSC
```

Atari DOS 3.0 Vs. 2.5

I have purchased an Atari 1050 disk drive with DOS 3.0. I recently heard that this DOS is no good, and that I should use DOS 2.0 or 2.5. What is so wrong with DOS 3.0, and why shouldn't I use it? Is DOS 2.5 the best one yet for the 1050, and where can I get it?

Gary Cerasoli

Before getting to your questions, let's briefly review the history of Atari disk operating systems:

- DOS 1.0 was introduced with the 400/800 computers and 810 disk drive in 1979. It was workable, but suffered from some bugs and unimplemented features. Also, the entire DOS was always resident in RAM (Random Access Memory). Although this was convenient—the DOS menu appeared instantly when you typed

the DOS command—it consumed too much memory in a period when few people had more than 24K or 32K of RAM.

- DOS 2.0, also known as 2.0S (single-density), replaced DOS 1.0 in late 1980/early 1981. It fixed the bugs in DOS 1.0, added significant new features, and conserved memory by keeping only part of itself in RAM. The disk-resident portion of DOS 2.0 loads into memory only when you type the DOS command.

- DOS 3.0 was introduced with the dual-mode 1050 disk drive in 1983. The 1050 works in the traditional Atari single-density mode (88K of storage per disk) as well as an enhanced-density mode (127K of storage per disk). DOS 3.0 was designed to support the enhanced-density mode and to be easier to use. But most Atari users found DOS 3.0 to be clumsy and inconvenient, especially when swapping disks with other people or when mixing single-density and enhanced-density disks. Although the 1050 drive automatically adjusts itself for either density, DOS 3.0 disks and 2.0 disks are incompatible with each other.

- To solve these problems, DOS 2.5 was introduced in 1985. This numbering scheme sometimes confuses people, since 2.5 was released two years after 3.0, but 2.5 is so named because it is closely related to DOS 2.0. In fact, the 2.5 menu is almost identical to the 2.0 menu, save for one additional option (Format Single). The advantage of 2.5 is that it works with both single- and enhanced-density disks on the 1050 drive as well as single-density disks on the older 810 drives. This makes life easier for people who have both formats in their disk libraries and for those who swap disks with other users.

DOS 2.5 is available free from most Atari dealers and user groups. It comes with utilities for converting 3.0 files to 2.0/2.5 format, for customizing your copy of 2.5, and for automatically booting up a RAM disk on the 130XE computer.

There's a chance that 2.5 may be superseded in the near future by yet another DOS. Atari is thinking about introducing a 3½-inch disk drive for the 400/800/XL/XE line, and the much greater capacity of this format (at least 320K per side) would require a completely new DOS with support for subdirectories and other advanced file-management features. ©

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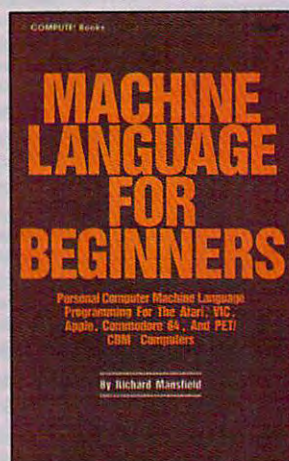
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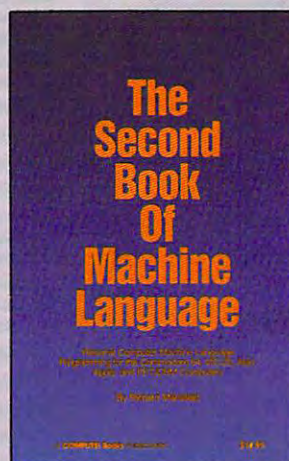
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Report From The Summer Consumer Electronics Show:

An Eight-Bit BONANZA

Selby Bateman, Features Editor

Forget any rumors you've heard about weakening in the 8-bit computer lines. The Summer Consumer Electronics Show revealed plenty of new software and hardware for Commodore, Atari, Apple, and IBM 8-bit machines. Also on display were scores of new software packages for the Atari ST and a growing number for the Commodore Amiga. The happy news is that both Commodore and Atari are making efforts to extend the life of their popular 8-bit computers at the same time that they're pushing the newer 16-bit models.

The 68000-based Amiga, ST, and Macintosh computers may be getting headlines these days, but it's the 8-bit machines which are continuing to provide much of the income for manufacturers and excitement for millions of satisfied users.

Proof of that came at the recent Consumer Electronics Show (CES) in Chicago—a semiannual showcase of all the consumer electronics products you'll be seeing on store shelves this fall and winter. Amid

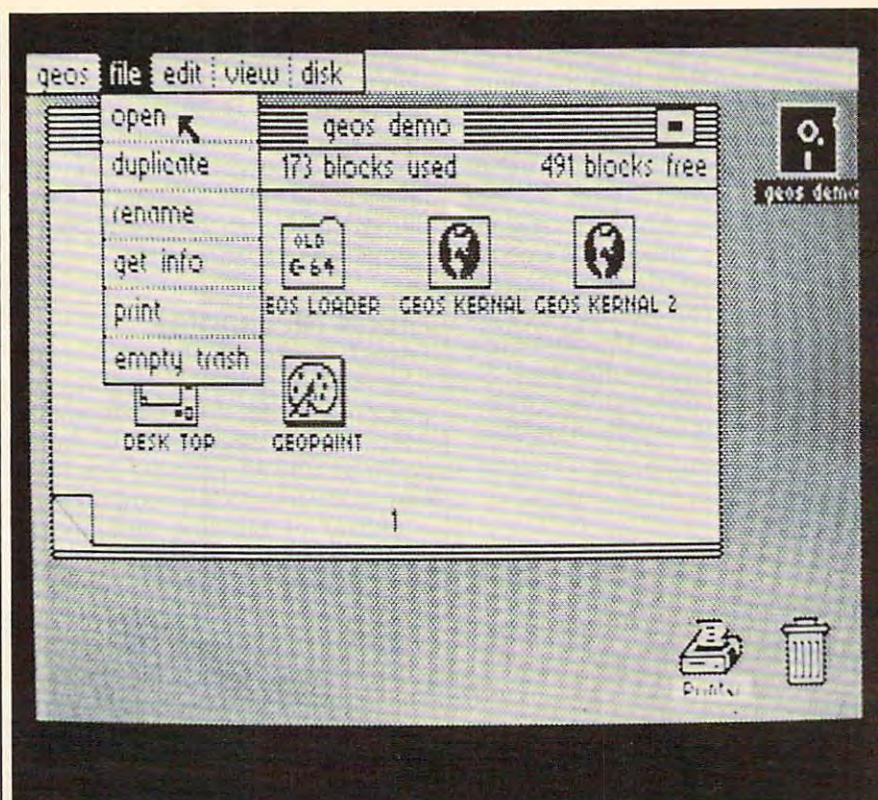
the newest high-tech digital audio players, 3-D televisions, videocassette machines, car stereos, credit-card-sized radios, and satellite dishes, a few dozen computer software companies displayed a wealth of new programs for Commodore, Atari, Apple, and IBM machines.

But what a difference a year can make in the fortunes of individual computer companies. Twelve months ago at CES, Commodore displayed its 64 and 128 machines in a large, heavily traveled booth on the main floor, while Atari was ensconced in a couple of meeting rooms on the mezzanine showing its fledgling Atari ST. Rumors circulated everywhere about the pending introduction of Commodore's Amiga, which was scheduled for a July release.

This year the tables were turned. While Atari occupied a large, crowded booth full of third-party software developers supporting the ST, Commodore occupied the mezzanine rooms showing its newly packaged 64. No mention was made of the Amiga, which Commodore showcased heavily at the Atlanta COMDEX show in late

April, and which it obviously feels should be promoted in business markets. At a time when Atari has seen its efforts with the ST begin to bear financial fruit, Commodore has been racked by heavy financial worries. Layoffs at the West Chester, Pennsylvania, headquarters and at the Los Gatos, California, Commodore/Amiga offices occurred this spring. Sales of the Amiga have been slower than expected, and it's been the enduring strength of the 64 and the newer 128 that has helped the company fight against tremendous quarterly losses.

Even with its current financial problems, no one is counting Commodore out. In fact, the company hopes the rest of 1986 and early 1987 will see a reversal, with a leaner corporate staff, a new look for the unstoppable Commodore 64, new software and heavy sales of the 128 (now more than 600,000 sold), and a slowly rising tide of Amiga sales. Nonetheless, it's clear that the ST's popularity has hurt the Amiga. One rumor at CES, unsubstantiated at this point, is that a new, less expensive version of the Amiga is under development,



GEOS: A new face for an old friend.

which would compete more effectively with the ST.

The 64's New Look

As we reported in last month's "Editor's Notes," Commodore introduced at CES the new 64C, a repackaged Commodore 64 computer that cosmetically resembles the 128. Bundled with it are two disks, the first containing the icon-based GEOS operating system and *geoWrite* and *geoPaint* application programs on one side. On the other side of that disk is a terminal program for use with the Commodore-specific QuantumLink telecommunications network. The second disk contains *Odell Lake*, an educational program from MECC which teaches children about the environment within a lake. Internally, the 64C is identical to the original 64.

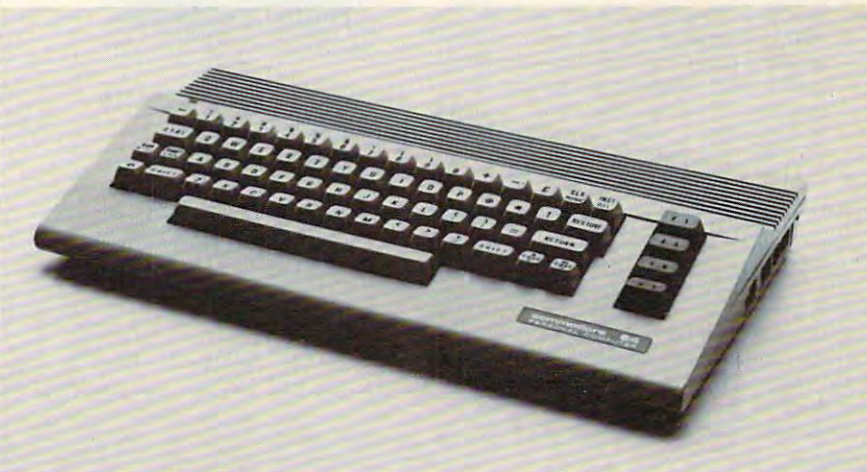
The 64C computer and software combo has a suggested retail price of under \$250, probably around \$225 according to one source. The present generation of 64s retails for about \$150 nationally, but without any software. Once existing stocks of the older unit are depleted, the 64C package will be the only 64 available. The GEOS/QuantumLink disk is also available for current 64 owners for \$59.95.

GEOS (Graphic Environment Operating System) brings to the 64 the type of Macintosh-style, or GEM-style, user interface available on the ST, Amiga, and Macintosh machines. GEOS loads from disk, replacing the 64's ROM-based operating system, and displays a desktop environment with icons, drop-down menus, and windows. You can use your joystick or a mouse to move around the screen. What's more, disk operations are speeded up by a factor of from five to seven times. Menu titles such as

File, Edit, View, and Disk open to reveal additional choices under each heading. Also included on the disk are powerful programs for productivity applications in the home market—word processing, calculation, and graphics design. Although there are still some memory constraints imposed by GEOS on the 64's available RAM (Random Access Memory), Commodore plans to introduce later this year a memory expansion cartridge for the 64 like the unit now available for the 128. (For more information on GEOS, see the CES report in the April 1986 *COMPUTE!*.)

New 128-style cases have also been developed for the 1541 drive (now the 1541C) and the 1702 color monitor (now the 1802). Commodore was also displaying a new color monitor for the 64 and 128, the 1902A, which can handle composite video as well as digital RGB (red-green-blue) signals. There's also a button that gives you a green screen.

Although reactions to GEOS from software companies were mixed, the overall response seems to have been favorable, according to representatives from several companies who attended a GEOS development seminar hosted by Commodore and Berkeley Software. The result, if all goes according to plan, is for third-party software developers to produce programs for the new 64C that operate under the easy-to-use GEOS interface. The procedure is not difficult, says one of the manufacturers, and could provide an entirely new uni-



The new Commodore 64C sports a sleeker look. A disk containing GEOS and Quantum Link terminal software is bundled with the computer.

verse of software for the popular 64.

Commodore also announced that the Commodore 128 has already sold more than 600,000 units. With that installed base of machines, plus the millions of 64s already in use, Commodore feels that the computer can have a life of at least two or three more years. That's a small miracle considering the pace at which computers become obsolete. After all, the 64 is now more than four years old. But, there are more than five million of the machines out there, with a size-

able number of them still in regular use.

In cooperation with the games division at Lucasfilm, Commodore demonstrated a unique new addition to QuantumLink, an online news and information service heavily supported by Commodore. *Habitat* is an interactive online activity, something of a cross between a game and the normal CB-type activity found on QuantumLink. Once you've entered the area online, you are allowed to create a graphic representation of yourself

using a character construction set. Then you can explore the thousands of locales created by the Lucasfilm game staff, interacting with other people as you move around. Commodore expects this feature to be available in late summer or early fall. At press time, the hourly online charge was still uncertain.

Atari's XE Bundles

Though much of the excitement over Atari at the show centered on new products for the ST computers, Atari used a section of its large booth at CES to promote the low-cost 65XE and 130XE computers in a variety of bundled systems. A complete starter package includes the CPU, printer, disk drive, and five software titles: *AtariWriter Plus*, *Home Filing Manager*, *Music Composer*, *Defender*, and *Star Raiders*. The 64XE (64K) starter package retails for \$349.95, and the 130XE (128K) for \$399.

Atari also introduced new software titles and peripherals for the XE line. *Atari Planetarium* is an educational program that simulates a complete observatory. It can show the location of more than 1200 stars, 88 constellations, more than 300 deep-sky objects, and the path of Halley's Comet during its most recent appearance. The program retails for \$24.95. *Star Raiders II* is an arcade-style game, a sequel to the 1981 *Star Raiders*. It retails for \$19.95. Atari's new dot-matrix printer for the XE line, the XMM801, supports Epson medium-resolution graphics. With up to 80 characters per second, the new printer requires no special interface for the Atari XE. It supports both friction and tractor feed, and retails for \$219. The XEP80, a new 80-column adapter compatible with all Atari eight-bit computers, allows for 80-column output to a standard monochrome composite monitor; it will be equipped to let the user connect a standard Centronics parallel printer. No price was available at press time.

Apple Computer, which traditionally does not exhibit at CES, was a strong presence nonetheless, as a variety of new Apple-related products were introduced by third-party software vendors. Many of those software producers were speculating on the soon-to-be-

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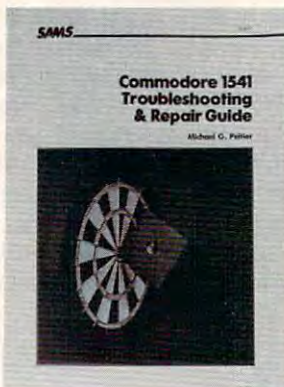
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>WRAP THE TOWEL AROUND MY HEAD

And the story responds:

THE RAVENOUS BUGBLATTER BEAST OF TRAIL 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

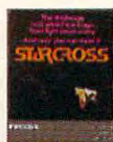
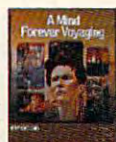
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announced Apple II 16-bit computer.

Another popular topic of industry conversation centered on the swiftly dropping prices of IBM PC work-alikes, called clones, that are expected to be as low as \$300 by the Christmas season. The IBM clones, from Korea, Taiwan, Japan, and even the U.S., are already beginning to sell into consumer markets. And that trend is expected to continue. Heavy sales of the Tandy 1000 and rumors about extremely inexpensive clones have caused some software publishers to consider beefing up their IBM offerings.

Although a complete list of software and hardware showcased at CES is beyond the scope of this article, the following products were among those introduced for Apple, Atari, Commodore, and Atari 8-bit computers. For more product information, see the "News & Products" section in this issue; for information on new products introduced for the 16-bit machines, see Tom Halfhill's story elsewhere in this issue.

Electronic Arts: Electronic Arts continues its major commitment to eight-bit computer owners with a long list of new titles for all machines. Among the new offerings are *Amnesia* (Commodore 64 version, \$39.95; Apple II, \$44.95), by Thomas M. Disch and Cognetics; *Autoduel* (Commodore 64, \$49.95), by Origin Systems; *Bard's Tale II: The Archmage's Tale* (Commodore 64), by Michael Cranford; *Battlefront* (Commodore and Apple versions, \$39.95), by Strategic Studies Group; *Chessmaster 2000* (Commodore, Apple, and Atari versions, \$39.95; IBM, \$44.95), by Software Country; *Scavenger Hunt* (Commodore and Apple II), by Ozark Softscape; *Timothy Leary's Mind Mirror* (Commodore version, \$32.95; Apple II, \$34.95), by Dr. Timothy Leary; *Ultimate Wizard* (Commodore 64, \$29.95), by Sean A. Moore and Steven Luedders; *Age of Adventure* (Apple II and Atari, \$14.95); and *Venture's Business Simulator* (IBM only, \$99.95), by Reality Development. (Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404.)

Abacus Software: In addition to its line of Atari ST and Commodore 128 books, Abacus displayed its *BASIC Compiler for the 128*

(\$59.95) along with the previously released 64 version (\$39.95). Also on display were the 128 versions of its CADPAK computer-aided design program, *Super-C Language Compiler* and *Super Pascal Development System* (\$59.95 each; 64 versions also available). Among a variety of other software packages, Abacus has now added *COBOL-64*, a Commodore version of the popular business programming language. (Abacus Software, P.O. Box 7219, Grand Rapids, MI 49510.)

The Learning Company: Two new products have been added to its collection of well-known educational software. *Writer Rabbit* helps develop the critical process of learning to use words and sentences. It offers several features that were implemented in response to requests made by children, teachers, and parents. The program includes several games, each of which enables the child to explore a different aspect of words and sentences in a fun and supportive setting. The games incorporate graphics and sound, and each game can be tailored to a child's own pace.

Math Rabbit teaches early math skills to children ages 5-7, and also incorporates entertainment to encourage children to participate. Available for Apple II series computers, each program has a suggested retail price of \$39.95. (The Learning Company, 545 Middlefield Rd., Suite 170, Menlo Park, CA 94025.)

Access Software: On the heels of its popular *Leader Board* professional golf simulator, Access introduced *10th Frame* (\$39.95), a professional bowling simulator for the Commodore 64. (Access Software, 2561 South 1560 West, Woods Cross, UT 84087.)

Multibotics: In cooperation with Access Software, this company is introducing a line of home robotics workshops for the Commodore 64 and 128, Atari 400/800/XL/XE, Apple IIe, IBM PC and compatibles, Commodore Amiga, and Atari ST.

The MB230 Workshops consist of an interface that connects the computer to snap-together robotics modules, plus software for controlling the modules. The software enables the computer to function as a

variable-speed motor controller, a voltmeter, an oscilloscope, an infrared controller/detector, and an audio digitizer. Retail prices for the workshops range from \$59.95 to \$199.95. (Access Software, see address above.)

Accolade Software: Accolade is introducing in late summer an arcade-action game called *Deceptor*. As you manipulate your Deceptor through six levels of increasingly difficult play, you can transform the robotic vehicle from ground-based to airborne, and finally into a humanoid shape. The game's responsiveness can be tailored to your liking, and you can practice most of the levels to increase your chances of survival. (Price unannounced.)

Accolade also announced Apple II and IBM versions (\$34.95 each) of its *PSI-5 Trading Company* science fiction adventure game. A Macintosh version (\$44.95) of the *Hardball* baseball game was also announced at CES. (Accolade Software, 20833 Stevens Creek Blvd., Cupertino, CA 95014.)

Springboard Software: The publisher of the bestselling *Newsroom* has introduced two new productivity packages with application in the home, school, and office.

The Newsroom Pro is aimed at the person who wants to take a more professional approach to producing a newsletter. It contains everything the user needs to produce a high-quality newsletter, including banner creation, text entry, graphic production, layout, and high-resolution printing. More than 2,000 pieces of clip art are included. It is available for the IBM-PC for \$129.95.

Certificate Maker provides more than 200 predesigned certificates, awards, diplomas, and licenses in a wide variety of categories such as sports, academic achievement, families, children, religion, and business. Available for Apple (\$49.95), IBM-PC (\$59.95), and Commodore 64 (price not yet determined). (Springboard Software, 7808 CreekrIDGE Cir., Minneapolis, MN 55435.)

Activision: The Activision family of companies continues to expand, with the acquisition of Infocom, a well-known adventure game company. Infocom will maintain its own brand-name imprint under the Activision umbrella. Pre-

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viously acquired companies, such as Creative Software and Gamestar, continue to have an impact on the company's product line as well.

I Am the C-128 is one of the products in Activision's new Personal Choice Software line, which includes the *Writer's Choice* word processor, the *Filer's Choice* database, and *Planner's Choice* spreadsheet for the Apple II family, the Commodore 64/128, and the IBM PC, the Tandy 1000, and other MS-DOS computers. One of Activision's most popular products last year was the mystery adventure game *Hacker*. This year the company will introduce a sequel, *Hacker II: The Doomsday Papers*, which begins where the first program ended. Commodore 64/128 and Apple II versions will sell for \$39.95, while IBM PC/PCjr/Tandy 1000 and Macintosh versions will be priced at \$49.95 each. Activision remains one of the most prolific software publishers, with more titles scheduled for release after September 1. (Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043.)

Simon & Schuster: The software division of this publishing house has released *Webster's New World Writer*, a versatile word processor (IBM-PC with 256K, \$150), and *Webster's New World On-Line Thesaurus*, a 120,000-word thesaurus compatible with more than 30 major word processors and other software packages (IBM-PC with 128K, PCjr with 256K; \$69.95). (Simon & Schuster Software, Gulf & Western Bldg., One Gulf & Western Plaza, New York, NY 10023.)

Avalon Hill: The Microcomputer Games division of Avalon Hill also announced a variety of new titles for Apple, Atari, Commodore, and IBM computers.

Spitfire 40 is a World War II air-war game and flight simulator for the Commodore 64/128 (\$35), with conversions for other machines already under way. The popularity of Avalon Hill's *Super Sunday* football game has encouraged the company to introduce 1985 expansion disks for use with the original game, for Commodore 64/128 and IBM machines (\$20 each).

Macbeth is a graphics-and-text adventure game based on the Shakespearean play, for Commo-

dore 64/128 (\$25). In August, Avalon Hill will introduce *Darkhorn*, a fantasy warfare game, for the Apple II and Commodore computers (\$30). A science fiction arcade-action game, *Mission on Thunderhead*, is now available for Apple II, Atari 800/XL/XE, and Commodore 64/128 computers (\$25). Expansion modules, one for Extended Units and the other for the Campaign Disk, are also available for the previously released *Under Fire!* strategy game. (Avalon Hill, Microcomputer Games Division, 4517 Harford Road, Baltimore, MD 21214.)

Bantam Electronic Publishing: Two new Apple II and Commodore 64 programs scheduled for fall release were displayed by Bantam at CES. The packages feature popular Disney cartoon characters in productivity programs.

Each program will carry a retail price of \$39.95 for Apple II versions, and \$34.95 for Commodore 64/128 versions. (Bantam Electronic Publishing, 666 Fifth Ave., New York, NY 10103.)

Softsync: This company has premiered *The Model Diet* (Commodore 64, \$29.95; Apple II, IBM-PC, \$34.95), a computerized diet and nutrition program; and *Desk Manager* (Commodore 64, 128, Apple II, \$39.95), a desktop accessory that uses windows. (Softsync, Inc., 162 Madison Ave., New York, NY 10016.)

Batteries Included: As noted in last month's "News & Products" (page 117), Batteries Included has introduced an extensive array of new products for a variety of computers. Among the new titles you'll be seeing will be the *PaperClip II* word processor (\$79.95) and the *HomePak* three-in-one telecommunications-word processor-data manager (\$49.95), both for the Commodore 128; the *PaperClip* word processor for the Apple II/II+/IIe/IIc computers (\$59.95); *PaperClip with SpellPak* spelling checker for the Atari 130XE (\$59.95); and five new productivity packages for the IBM PC and compatibles, including the advanced *PaperClip Elite* word processor (\$129.95) and *Degas Elite* graphics program (\$79.95), among others. (Batteries Included, 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5.)

Spinnaker: This software publisher introduced A.C.E., a combat simulator for the Commodore 64. This game combines a flight simulator with arcade-game-style combat. It features multiple weapons systems, an on-board computer, overhead satellite mapping, and 3-D action (\$19.95). (Spinnaker Software, One Kendall Sq., Cambridge, MA 02139.)

Bodylog: Bodylog has developed a new multipurpose peripheral called Bodylink, which plugs into the cartridge slot of a Commodore 64/128 and turns the computer into an exercise machine, stress reduction device, and personal computerized biofeedback loop. Once you've purchased a package that contains the main Bodylink hardware, you can buy add-on software packages for whatever applications you're interested in. Prices for starter kits range from \$139.95 to \$209.95; additional hardware and software packages for a wide variety of applications cost between \$29.95 and \$99.95. (Bodylog, 34 Maple Ave., Armonk, NY 10504.)

Timeworks: Timeworks announced that its Commodore 128-specific programs, *Word Writer 128*, *Swiftcalc 128*, *Data Manager 128*, and *Sylvia Porter's Personal Financial Planner 128*, will continue to be upgraded on a regular basis. The publisher has also added a thesaurus to *Word Writer 128*. (Timeworks, 444 Lake Cook Rd., Deerfield, IL 60015.)

Brøderbund Software: Several new products representing a diverse line of software were introduced by Brøderbund. Among them were *The Toy Shop*, available for the Apple II series and Commodore 64, which lets the user make 20 working mechanical models and toys. Users can customize their toys, print out the designs on paper, and attach them to adhesive cardboard. Wire, wooden dowels, adhesive cardboard, and other necessary supplies are included in the package, along with a comprehensive user manual. Suggested retail price for both versions is \$59.95. (Brøderbund Software, 17 Paul Dr., San Rafael, CA 94903.)

For further information on new products announced at the Summer Consumer Electronics Show, please see the "News & Products" section. ©

16-Bit Explosion!

New Products For The Atari ST And Amiga

Tom R. Halfhill, Editor

As they enter their second year on the market, the Atari ST and Commodore Amiga are building up respectable software libraries spanning all the major categories of personal computing. At the same time, new peripherals and accessories are making the computers themselves even more powerful. Here's a look at the highlights of two recent computer industry trade shows: the Spring COMDEX in Atlanta and the Summer Consumer Electronics Show (CES) in Chicago. Many of these new products will be available this summer.

Atari ST

Atari was a major player at the Spring COMDEX and Summer Consumer Electronics Show (CES), filling its booths at both shows with dozens of cubicles sponsored by independent developers demonstrating their wares. The exhibits attracted thousands of browsers and potential new dealers. Perhaps more importantly, Atari continued to gain credibility—strengthening its image as a revitalized company on firm financial footing which is determined to become a significant force in the personal computer industry.

Atari's biggest announcements for the ST series included:

- An MS-DOS emulator that is supposed to run most of the big-name IBM PC software. (The prototype was running Microsoft's Multiplan.) The emulator is an external box which contains an 8088 microprocessor, a socket for an 8087 math coprocessor, and 512K of random access memory (RAM). When the emulator isn't operating, the ST can use the extra 512K as a RAM disk. Atari still hasn't decided whether to put a 5¼-inch floppy disk drive in the box, so the final price is undetermined. Estimates are \$300 to \$400. Atari plans to begin selling the emulator this fall.

- A CP/M emulator implemented entirely in software. This comes on a 3½-inch disk and lets you run virtually any program written for the CP/M (Control Program/Microcomputers) operating system at 100 percent speed. No extra hardware is required. Already available in Europe, the CP/M emulator should be selling in the U.S. this summer for under \$50.

- A special summer price promotion that allows dealers to sell a 520ST, floppy disk drive, and monochrome monitor for \$599.

- Atari announced immediate availability of its 20-megabyte SH204 hard disk drive for \$799.95 and an Epson-compatible dot-matrix printer, the SMM804, for \$219.95. The printer can make accurate screen dumps of the ST's high-resolution (640 × 400-pixel)

screen mode. It prints at 80 characters per second and offers both friction and tractor feed.

- Atari has acquired rights to market an ST version of Versasoft's *dBMAN*, a high-end relational database manager originally designed for the IBM PC and patterned after Ashton-Tate's *dBASE II* and *dBASE III*. According to Atari, experienced *dBASE* users can use *dBMAN* with no retraining. The suggested retail price is \$149.95, and Atari is encouraging dealers to give free evaluation copies to potential customers. The free copy is fully functional, but allows only 30 records per database.

In addition to these announcements, independent companies exhibited a flood of new software and hardware for the ST series, including some impressive business programs. With even more products due this fall, it's obvious that the ST will have a solid software library by the end of 1987.

So much software is being released that we don't have room here to cover it all; scan the "News & Products" section in this and future issues for further information. Following are some products that particularly caught our attention.

Batteries Included (Irvine, California) is emerging as one of the top software companies supporting the ST. Later this summer it plans

\$10,000.00

Atari ST

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Interested? If so, read these rules:

1. Entries must be your original work, previously unpublished. All those whose programs are accepted will be required to affirm this in writing.
2. You can submit as many entries as you want, but we cannot consider programs which have been entered in other contests or submitted for publication elsewhere at the same time.
3. The deadline is October 1, 1986. All entries must be received at our offices by this date. Programs submitted after this date will still be considered for publication, but will not be entered in the contest.
4. Entries are allowed (and encouraged) in virtually all software categories: home and business applications, education, recreation, telecommunications, graphics, sound and music, utilities, and desk accessories.
5. Entries may be written in any programming language—including BASIC, Logo, C, machine language, Pascal, Modula-2, Forth, FORTRAN, and Prolog—as long as they meet two requirements. First, if you're using a compiled language, the compiled object or run-time code must be a self-standing program that can be run by someone who doesn't own a copy of the language. (Exceptions are ST BASIC and Logo. Since these languages come with the ST, it can be assumed that everyone owns a copy.) Second, we must be able to legally distribute the program without incurring licensing fees or other obligations to the maker of the language. If you're not sure whether a certain language qualifies, contact its maker for clarification.
6. Entries must be submitted on a single- or double-sided 3½-inch ST disk with both the run-time code and source code included.
7. Entries must be accompanied by an article which explains how to use the program, what it does, and so on. If your program employs any new or unusual techniques that you think will be of interest to other ST programmers, you can also describe how the program works.
8. Submissions which do not win a prize and are not accepted for publication will be returned only if accompanied by a self-addressed, stamped mailer.
9. All judging will be handled by the staff of COMPUTE! Publications, Inc. All decisions regarding contest entries and acceptances will be solely at the

discretion of COMPUTE! Publications, Inc., and all decisions are final. This includes decisions regarding creativity, similarity among entries, and so forth.

10. Winners will be announced by COMPUTE! Publications, Inc. in late 1986.

11. This contest is void where prohibited by law. Full-time, part-time & previous employees of COMPUTE! Publications, Inc., and Capital Cities/American Broadcasting Corporation are ineligible for the contest, but may still submit work for publication at standard rates.

Every Contest Entry Must Contain This Form:

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to release a follow-up to its popular *Degas* drawing program: *Degas Elite*. New features include ten levels of magnification; the ability to load a picture created in any resolution into any other screen mode (including monochrome to color and vice versa); the ability to load pictures created with an Atari 400/800/XL/XE and KoalaPad or Atari Touch Tablet; up to eight screens in memory at once, with block-copying between screens; adjustable color cycling for animation effects; automatic color blending across the selected color palette; and the ability to grab any portion of a screen and use it as a paintbrush. *Degas Elite* will sell for \$79.95.

Batteries Included has already started shipping a program called *Thunder!*, a realtime spelling checker. *Thunder!* installs as a desk accessory and loads a 50,000-word dictionary into memory and, using a special compaction technique, takes up only about 80K of RAM. It works in realtime with any program that supports GEM—including word processors, terminal programs, text editors, and notepads. When you type a word that *Thunder!* cannot find in its dictionary, it beeps to let you know. By pressing a key or selecting a menu item, you can pop open a window that displays a number of words that *Thunder!* thinks you were trying to spell. If you find the correct word in the list and click on it with the mouse, *Thunder!* automatically substitutes the correct spelling, closes the window, and lets you resume typing. If you find realtime spell-checking annoying, *Thunder!* also lets you check an entire document after it's created or check documents created with text editors that don't support GEM. Numerous other features allow you to add your own words to the main dictionary, compile supplementary dictionaries on disk, and analyze your text for readability. *Thunder!* sells for \$39.95.

Abacus Software (Grand Rapids, Michigan) announced several new programs: *ST TextPro*, a word processor with mouse and keyboard commands, multicolumn and sideways printing, user-definable function keys, automatic indexing, and table-of-contents generation; *ST Text Designer*, a page-making package for creating layouts from

text files; *ST DataPro*, a database manager that allows up to 64,000 records of unlimited length; *ST Forth/MT*, a multitasking Forth with more than 1500 commands and 32-bit arithmetic; *ST PaintPro*, a GEM-based design program; and *ST AssemPro*, a 68000 macro assembler and debugger with text editor. All these programs sell for \$49.95, except *ST AssemPro*, which sells for \$59.95.

The software company which wrote *1st Word* for Atari—GST of Cambridge, England—is exporting several programs to the U.S., including *1st Word Plus*. Among other things, this enhanced word processor lets you merge *Neochrome* or *Degas* pictures into documents. Current plans call for Atari to market *1st Word Plus*, but GST will be selling its other programs independently. These include *GSTC Compiler*, a GEM development package for the C language; *GST-ASM*, a 68000 macro assembler; *GEM Screen Editor*, a text editor; and *GST Linker*, for compiling runtime code from source libraries. *GEM Screen Editor* and *GST Linker* are included with *GSTC Compiler* and *GST-ASM*. Prices were not available at press time.

Avila Associates (Lafayette, California) is bringing out an animation program called *Make It Move*. By pointing and clicking on icons representing different functions, you can write a script for animating shapes, text, and other graphics. It's compatible with all of the popular drawing programs and offers such functions as zooms, fades, and spins. Price: \$49.95. Another Avila product is *Casino Craps*, a complete craps simulation: \$39.95.

Desk accessories are proving to be as popular on the ST as they are on the Macintosh and IBM. Two of the most complete business-oriented accessories we've seen are from Blue Moon Software (Lenexa, Kansas). *MacroDesk* contains an 18-function calculator with ten memories that works in either algebraic or reverse-Polish notation; an alarm clock/calendar that helps you keep track of events far into the future; a filer with search, print, and phone-dialing functions; and an event log that's somewhat like a diary for jotting down important

contacts and events. *MacroManager* has all the features of *MacroDesk* plus a project-scheduling worksheet and a log for project time recording and analysis. *MacroDesk* sells for \$39.95 and *MacroManager* for \$69.95; both are available now.

Musicians will be interested in new software from Hybrid Arts (Los Angeles). *DX-Droid* and *Oasis* take advantage of the ST's high-resolution graphics and built-in MIDI (Musical Instrument Digital Interface) ports. *DX-Droid* is a multi-featured patch editor which can even generate banks of new sounds on its own (for the Yamaha DX- and TX-series synthesizers). *Oasis* is a full-featured sampling wave-table editor and librarian for the Ensoniq Mirage. *DX-Droid* is available now for \$244.44; *Oasis* should be available soon and will cost about the same as the Atari 130XE version (\$187.87).

MichTron (Pontiac, Michigan) released a number of new products including *ALT*, which permits you to assign strings of up to 60 characters to each of the 36 Alternate-key combinations (\$29.95); *The Animator*, a graphics-animation utility (\$39.95); *BBS 2.0*, a revised version of MichTron's earlier Bulletin Board System (\$79.95); *Cornerman*, a desk accessory with notepad, calculator, address book/dialer, character-code chart, clock, and a game (\$49.95); *Echo*, which lets you plug in X-10 modules for controlling home appliances (\$39.95); *Mighty Mail*, a mailing list manager and phone book (\$49.95); and two arcade-style games, *Major Motion* and *Mission Mouse* (\$39.95 each).

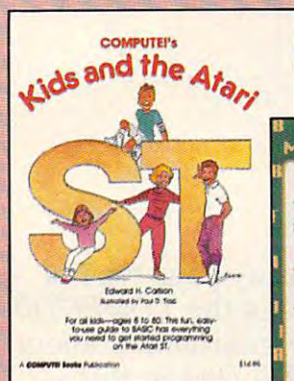
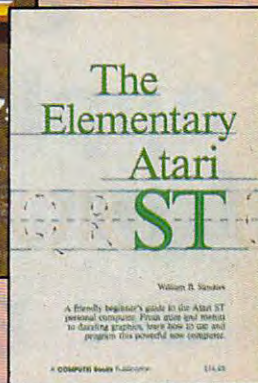
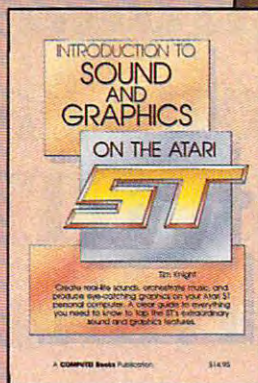
If you like to write your own software and want to go beyond ST BASIC and DR Logo, a few new languages are being released for the ST this summer. Softworks Limited (Chicago) is bringing out *Softworks BASIC*, a compiler that offers advanced features such as data structures like those found in C and Pascal. The XCALL statement can access machine language routines, and the TOOLBOX command lets you call most of the graphics and sound functions built into the ST's operating system. Price: \$79.

Prospero Software Limited (London) is exporting *Pro FORTRAN-77* and *Pro Pascal*, two high-

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level compilers. Both languages have 7- and 16-digit precision floating-point math, four-byte integers, and the ability to access GEM routines. Each costs \$149. (The U.S. distributor is Apex Resources, Brookline, Massachusetts.)

TDI Software (Dallas) has released two new versions of its Modula-2 compiler, including a special developer's version with directory search paths, a symbolic debugger, new modules, an intelligent linker, an enhanced text editor, and improved documentation on GEM. The regular version is \$79.95, and the developer's version is \$149.95. Upgrades for current owners are available at less cost.

Several companies are releasing significant small-business software for the ST. Timeworks (Deerfield, Illinois) is introducing *Word Writer ST*, a word processor with an 85,000-word spelling checker and thesaurus, outlining, macro keys, and GEM interface; *SwiftCalc ST*, a spreadsheet program which can translate data into pie charts, bar charts, scatter diagrams, line graphs, and 3-D staggered bar charts, plus sideways printing for wide spreadsheets; and *Data Manager ST*, a database manager with graphics and functions for generating labels and reports. All three programs are integrated with each other and sell for \$89.95 each.

Sierra On-Line (Mountain View, California) is releasing a small-business accounting package called *ST OneWrite*. It automatically posts ledgers and prints out checks on standard business forms. Price: \$129.95. Oxxi (Long Beach, California) is introducing *dbOne*, a database manager that is compatible with *dBASE II* files. Price: \$99. And Dac Software (Dallas) is translating two of its popular IBM PC packages for the ST: *Dac-Easy Accounting* (\$69.95) and *Dac-Easy Payroll* (\$49.95).

A variety of games are coming out for the ST this summer, and although many are translations from versions previously available on other computers, some are brand-new.

Activision (Mountain View, California) is introducing *Hacker II: The Doomsday Papers*, a sequel to

the popular *Hacker* (\$49.95), and *The Activision Little Computer People Discovery Kit*, which simulates living creatures inside your computer. *Little Computer People* is already available on other machines. Another Activision product—which isn't a game—is *Paintworks*, a graphics-design program. (Originally known as *N-Vision*, *Paintworks* was written for Activision by Audio Light.) One feature that sets *Paintworks* apart from all other drawing programs on the ST is that you can design a picture taller than the screen—as large as an 8½ × 11-inch page, in fact. You can scroll the picture vertically and make a full-size hardcopy with an appropriate color printer, such as the Okimate 20. Price: \$69.95.

The Avalon Hill Game Company (Baltimore) is releasing *Spitfire 40*, an authentic flight simulator that puts you in the cockpit of a Royal Air Force fighter plane during the Battle of Britain. It even recreates the fuel pump problems experienced by Mark I Spitfires while diving. Price: \$35. Avalon Hill also is working on a football simulation due for release later this year.

Cosmi (Wilmington, California) is completely rewriting its *Super Huey Helicopter Flight Simulator* for the ST to take advantage of the computer's enhanced graphics. Price: \$39.95. And Microprose (Hunt Valley, Maryland) is doing likewise with *Silent Service*, its much-praised World War II submarine simulation. Microprose also hinted that two more of its simulations will be rewritten for the ST later this year.

Infocom (Cambridge, Massachusetts), which recently merged with Activision, introduced a few new works of text-only interactive fiction for \$39.95 each. (They're also available for the Amiga and several other machines.) *Trinity* places you in London just as World War III begins. As *The Bomb* begins exploding overhead, you enter a mysterious portal that lets you visit the time and place of every nuclear device ever detonated, including the first Trinity test in New Mexico in 1945. Is there anything you can do to change the future?

Moonmist, Infocom's second entry, is modeled after gothic mys-

tery novels. You're sent on a journey to a castle in England, where you become involved in a search for hidden treasure. Along the way you must deal with local superstitions and ghosts.

Commodore Amiga

After missing the Fall COMDEX and Winter CES—to the distress of its fans—Commodore made a big showing with the Amiga at the Spring COMDEX in Atlanta. However, a few weeks later, Commodore significantly scaled down its appearance at the Summer CES. Instead of going ahead with plans for a large exhibit on the main floor, Commodore switched to a small meeting room on an upper floor—the same meeting room occupied by Atari a year ago. Even more disappointing, the Amiga was nowhere to be seen. Commodore explained that it considers the Amiga to be a high-end personal/business computer, not a consumer computer, and therefore it came to CES with only the Commodore 128 and redesigned 64.

Nevertheless, several other companies introduced Amiga software at CES, and the big news at COMDEX was Commodore's announcement of a new IBM PC emulator—the Sidecar. The Sidecar is a plug-in expansion box, not to be confused with the currently available PC emulator, the *Transformer*. The *Transformer* emulates the PC entirely in software; the only hardware required is a 5¼-inch floppy disk drive. When the *Transformer* was finally released this spring after numerous delays, it became obvious that another solution would have to be found to make the Amiga truly IBM-compatible. The *Transformer* proved to be less compatible than its designers had hoped and was widely criticized for its slow execution speed.

As a result, Commodore decided to take the more conventional hardware approach to emulation. The Sidecar is basically an IBM PC without a keyboard. It's a large box that plugs into the expansion port, and it contains an 8088 microprocessor, an empty socket for an 8087 math coprocessor, 256K of RAM (expandable to 512K), a 5¼-inch disk drive, and three empty slots compatible with PC expansion

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boards. A second floppy drive or 20-megabyte hard disk is optional, and there's also provision for up to two megabytes of Amiga memory expansion.

When the Sidecar is booted, two new icons labeled *PC Mono* and *PC Color* appear on the Amiga's Workbench screen. The Sidecar is designed to emulate the PC's monochrome and color/graphics modes, and clicking on one of these icons selects which mode to use. PC-DOS then opens up as a window on the Amiga Workbench screen. To the Amiga's multitasking operating system, the PC emulator is simply another task—so you can simultaneously run one or more Amiga programs while using the emulator. You can even open more than one PC window at once, if enough memory is available. You can't, however, multitask PC programs, since PC-DOS isn't a multitasking operating system.

Commodore says that this marriage of the PC and Amiga creates some interesting possibilities. For instance, you can plug a hard-disk expansion card into one of the Sidecar's slots and partition the disk for use with AmigaDOS as well as with PC-DOS. Amiga and PC software can run concurrently and exchange data using a common memory area. And although PC graphics are limited to four simultaneous screen colors as on a real IBM, you can select those four colors from the Amiga's much larger palette of 4096 colors.

The technology for the Sidecar originates from the two IBM PC clones which Commodore sells in Europe—the PC-10 and PC-20. (Commodore was going to introduce these machines into the U.S. market at Summer CES, but canceled its plans at the last minute.) Unlike the *Transformer*, the Sidecar is supposed to be nearly 100 percent IBM-compatible and capable of running programs at the full speed of a regular PC. At COMDEX, we saw the Sidecar running Microsoft's *Flight Simulator*, one of the toughest tests for any PC clone.

Scheduled for release this fall, the Sidecar is going to be priced relatively low. Although Commodore has not officially announced a price yet, indications are that it will cost \$300 to \$500.

Another interesting Amiga peripheral shown at COMDEX was the FutureSound digital sound recorder from Applied Visions (Medford, Massachusetts). The package comes with a digitizer, microphone, recording software, and a cable that plugs into the parallel printer port. A phono jack on the digitizer allows you to bypass the microphone for direct recording or to mix two different sound sources. Any sound can be recorded and played back at any speed, and recorded sounds can also be played by your own programs written in C or Amiga BASIC. The sampling rate can be varied from a few samples per second to 28,000 samples per second (the higher the rate, the greater the quality—and the more memory required). Price: \$175.

An Amiga expansion box was announced by The Gemstone Group (Buffalo Grove, Illinois). Current plans call for eight expansion slots, 512K of RAM (expandable to eight megabytes), a hard disk interface, and a realtime clock with battery backup. The Gemstone Group also is considering a CD-ROM interface and MIDI ports as additional standard features. The box is scheduled for release late this summer for \$995. A version with eight megabytes of RAM installed is tentatively priced at \$1,995.

Golden Hawk Technology (Nashua, New Hampshire) announced a MIDI interface with in/out jacks and a synchronization connector for controlling drum machines and other devices. It hooks up to the serial port and is priced at \$79.95.

Amiga musicians will also be interested in *SoundScape Pro*, a MIDI sequencer system from Mimetics Corporation (Palo Alto, California). *SoundScape Pro* uses the Amiga's multitasking operating system to make multiple music programs behave like separate pieces of studio equipment, all tied together through a software patch panel. It provides the equivalent of a MIDI clock generator, a sampling synthesizer, and a digital tape deck. The price is \$149. Mimetics also is releasing the *SoundScape Digital Sampler* for \$99 and a MIDI interface for \$49.

Flow, an idea processor from New Horizons Software (Austin, Texas), is designed to help you create and organize presentations, reports, projects, and events. It takes advantage of the Intuition user interface, but also provides keyboard shortcuts. Price: \$99.95.

Byte by Byte (Austin, Texas) announced two Amiga programs: *InfoMinder*, a hierarchical database manager, and *Write Hand*, a word processor. *InfoMinder* is unique in that it lets you combine text and graphics, and it also can be used to program custom applications. Price: \$89.95. *Write Hand* has online help screens and is designed to make it easy for small businesses to generate form letters. Price: \$50.

Electronic Arts announced several programs to be available this summer, including *Chessmaster 2000* (\$44.95); *DeluxePaint Art & Utility Disk #1*, a supplement to the popular *DeluxePaint* (\$29.95); *DeluxePrint Art Disk #2*, a supplement to *DeluxePrint* (\$29.95); *DeluxeVideo*, the long-awaited presentation graphics program (\$99.95); *Instant Music*, a composition tool for non-musicians (\$49.95); *Marble Madness*, an arcade-style game (\$49.95); and *Ultima III*, an adventure game (\$59.95).

Access Software (Woods Cross, Utah) is introducing its hit golf simulator, *Leader Board*, for the Amiga. As realistic as this program is on the Commodore 64—with 3-D animation, true perspective view, detailed landscapes, and lifelike sounds—it should be even better on the Amiga. The price is \$39.95.

Master Designer Software, in cooperation with Mindscape, (Northbrook, Illinois), is bringing out a series of five new games for the Amiga in late 1986/early 1987 under the Cinemaware label. These games are described as interactive movies that combine classic movie themes with sophisticated computer graphics. All are role-playing games, and the graphics imitate film effects such as 3-D movement, zooms, cuts, pans, close-ups, and changes in perspective. The titles scheduled so far include *Sinbad and the Throne of the Falcon*, *The King of Chicago*, *S.D.I.*, *Defender of the Crown*, and *Star Rush*. They'll also be available on the Atari ST and Apple Macintosh. ©

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TIGHTROPE



Daniel Aven

Stretched high above the circus arena, the tightrope beckons. Can you walk all the way across the rope without falling into the net? This interesting program is both an arcade game and a typing tutor. The original version was written for the Commodore 64 and also works on the Commodore 128 in 64 mode. We've added new versions for the Apple, IBM PC/PCjr, Amiga, and Atari 400, 800, XL, and XE computers. The Commodore 64 version requires a joystick. The IBM PC/PCjr version requires a color/graphics card and BASICA for the PC, and Cartridge BASIC for the PCjr. The Amiga version requires 512K of memory and Amiga BASIC. The Atari version requires at least 32K of memory and a joystick. The Apple version works with either a joystick or game paddles.

Arms outstretched, you venture cautiously onto the tightrope. The rope quivers for a moment, then steadies. Far below, in a packed circus tent, the crowd roars its encouragement. Don't worry, there's a safety net below. But you won't entertain the onlookers—or earn points in this game—by falling into the net. Your first few steps are hesitant, but with practice your progress becomes more sure. After what seems an eternity, you reach the other side. After cheering its approval, the crowd cries out for a repeat performance.

"Tightrope" combines a novel game idea and realistic animation with an educational goal. You can play it either as an arcade game or as a typing tutor. In game mode, the object is to walk all the way across the tightrope without falling into the net. In tutorial mode, you must watch for a letter to appear next to the acrobat's head, and type it on the keyboard before time runs out.

Type in and save a copy of Tightrope, referring to the special instructions for your computer. When you run the program, it asks you to choose between a game of skill and a typing tutorial.

A Delicate Balance

If you choose the game of skill, your goal is simple: Move the animated acrobat all the way across the tightrope without falling into the net. As the acrobat walks along, you'll occasionally begin to fall to one side or the other. But there's always time to recover your balance by pushing the joystick (or keyboard controls in some versions) in the opposite direction of the fall. If you countermove just enough to regain your balance, all is well and the acrobat begins to walk again. If you move too far in the opposite direction, the teetering starts all over again.

It's a delicate balancing act, and it grows more difficult each time you make it across the rope. When you succeed in reaching the opposite side, you advance to the next skill level. At each higher level, it becomes more and more difficult to keep your balance.

If you lose your balance completely, the acrobat falls to the safety net and bounces a few times before coming to rest. At this point you can try again at the same level or return to the main menu to choose a different game.

Your score is based on how far you get before falling. Each successful step is worth a certain number of points, and this value increases at higher levels. In addition, bonus points are awarded for rapid progress; the faster you move across the rope, the higher the bonus.

Typing Tutor

In the tutorial version of Tightrope, the object is the same—move the acrobat across the rope without falling—but different means are used to keep your balance.

When you see a character appear next to the acrobat's head, that's your cue to press the corresponding key on the keyboard. If you type the correct letter, the acrobat straightens up. If you press the wrong key, a buzzer sounds and the acrobat teeters even more.

To remain on the rope, you must continue to type the same letters that appear on the screen. In other respects, the tutorial version of Tightrope is the same as the skill game.

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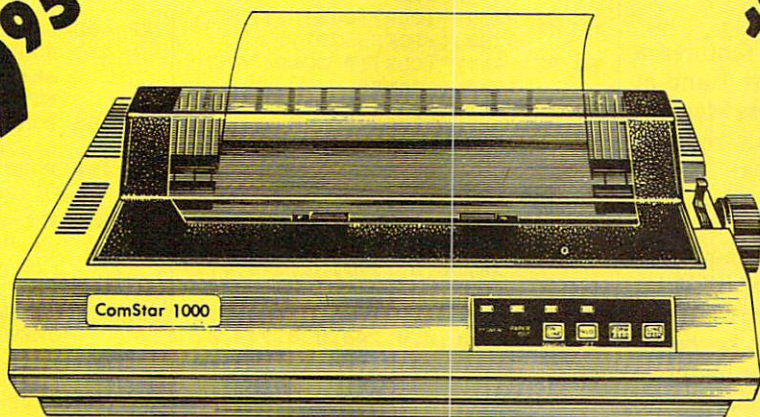
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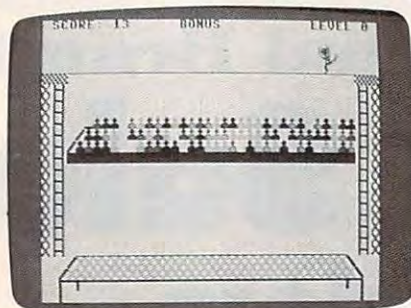
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"Tightrope" for the Commodore 64, an amusing and educational game.

Commodore 64/128 Version

This version of Tightrope requires a joystick plugged into port 2. After you finish walking across the rope, you must repeat the performance while riding a unicycle. At successive skill levels, the acrobat alternates between walking and riding the unicycle.

Atari Version

Tightrope for the Atari requires a joystick plugged into port 1 and at least 32K of Random Access Memory (RAM). Move the joystick right or left to balance the acrobat.

IBM PC/PCjr Version

This version of Tightrope requires a color/graphics card and BASICA for the PC, or Cartridge BASIC for the PCjr. Play the game with keyboard controls: Press the Z key to move left (your left, not the acrobat's), and the slash (/) key to move right.

Amiga Version

Tightrope for the Amiga requires at least 512K of RAM. When typing the program listed below, do not type in the left-arrow symbol at the end of each line; it's there only to show you where the line ends (we deliberately chose a character that's not available from the Amiga's keyboard). Instead, wherever you see a left-arrow in the Amiga listing, press RETURN.

The Amiga game uses the same keyboard controls as the IBM PC/PCjr version: Press Z to move left and the slash (/) key to move right.

Apple II Version

The Apple version of Tightrope works with either a joystick or game paddles and runs on any Apple II-series computer with either ProDOS or DOS 3.3.

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

Program 1: Commodore 64/128 Tightrope

```
RM 10 U1=54296:U2=54277:U3=542
78:U4=54276:U5=54273:U6=
54272
CQ 20 ML$="I"+CHR$(8)+"X"<
+CHR$(3)+"2XJ"+CHR$(16
)+CHR$(248)+"L[B]T":PO
KE835,0
MJ 30 POKE836,208:POKE830,0:PO
KE831,216:POKE828,0:POKE
829,64:POKE56334,0
GK 40 POKE1,51:ML$=ML$:SYS(PEE
K(51)+256*PEEK(52)):POKE
1,55:POKE56334,1
MJ 50 POKE53272,30:FORA=14336T
O14343:READB:POKEA,B:NEX
T:FORA=0TO6:READC(A):NEX
T
PH 60 GOTO80:DATA24,60,60,24,1
26,255,255,255,7,0,1,3,5
,2,4
MR 70 FORA=1TOX:POKE646,C(RND(
1)*7):PRINT"@":NEXT:PRI
NT:RETURN
QE 80 PRINT"{CLR}{PUR}":POKE5
3280,4:POKE53281,1
FB 90 PRINT"{CLR}{9 DOWN}"SPC(
15)"1- GAME"
KS 100 PRINT"[2 DOWN]"SPC(15)"
2- TYPING"
AP 110 GETA$:IFA$<>"1"ANDA$<>"
2"THEN110
SM 120 W=VAL(A$)
PA 130 DATA0,0,0,0,0,0,0,56,0,
0,92,0,0,252,0,0,92,0,1
28,56,8,127,255,240,0,1
68
PH 140 DATA0,0,216,0,0,248,0,0
,136,0,0,248,0,0,248,0,
0,248,0,0,240,0,1,192,0
XG 150 DATA0,224,0,0,176,0,0,1
52,0,1,176,0
SB 160 DATA1,240,0,3,176,0,1,2
08,0,0,112
RS 170 DATA0,0,48,0,0,48,0,0,9
6,0
HS 180 DATA1,240,0,1,240,0,3,1
76,0,3,48,0,1,176,0,0,1
52,0,1,176,0
FG 190 PRINT"[3 DOWN]
[5 SPACES]ENTER LEVEL O
F DIFFICULTY 0-9
CS 200 GETA$:IFA$="THEN200
DH 210 IFA$<"0"ORA$>"9"THEN200
QX 220 B=VAL(A$):D=B:B=10-B
SF 230 P1=206:Y2=69:PX=201:PZ=
205
RA 240 IFW=2THENB=B*8
PB 250 PRINT"{CLR}{RED}
[5 DOWN][3 +][BLK]
[34 T][RED][3 +]"
ER 260 FORX=1TO15:PRINT"[GRN]V
[BLU][Q][W]"SPC(34)"
[BLU][Q][W][GRN]V":NEX
TX
GC 270 PRINT"[DOWN][2 UP]
[4 RIGHT][BLK][32 @]"
RH 280 PRINT"[3 RIGHT]N[YEL]VV
VVVVVVVVVVVVVVVVVVVVVV
VVVVVVVV[BLK]M"
EG 290 PRINT"[2 RIGHT]N[YEL]VV
VVVVVVVVVVVVVVVVVVVVVV
VVVVVVVV[BLK]M"
GJ 300 PRINT"[2 RIGHT]O[Y]O
```

```
[31 Y]OP[DOWN][LEFT][N]
[UP]"
CB 310 PRINT"[2 RIGHT][H][UP]
BM 320 PRINT"[HOME][9 DOWN]
[5 RIGHT][P][8]";X=31:
GOSUB70
HQ 330 PRINT"[UP][4 RIGHT]
[BLK]N";X=32:GOSUB70
XR 340 PRINT"[3 RIGHT][BLK]N";
X=33:GOSUB70
BQ 350 PRINT"[UP][3 RIGHT]
[BLK][RVS][34 SPACES]
[BLU]":IFE=1THEN510
JD 360 V=53248:IFE=0THENPRINT"
[HOME][DOWN][10 RIGHT]P
LEASE WAIT A MOMENT"
HX 370 S1=12288:S2=12352:S3=12
416:S4=12480:S5=12544
AQ 380 FORX=0TO41
DJ 390 READQ1:POKES1+X,Q1:POKE
S2+X,Q1:POKES3+X,Q1:POK
ES4+X,Q1:POKES5+X,Q1
RG 400 NEXTX
KF 410 FORS1=12330TO12350:READ
Q1:POKES1,Q1:NEXT
EH 420 FORS2=12394TO12414:READ
Q1:POKES2,Q1:NEXT
SG 430 FORS3=12458TO12478:READ
Q1:POKES3,Q1:NEXT
AE 440 FORS4=12522TO12542:READ
Q1:POKES4,Q1:NEXT
CH 450 FORS5=12586TO13182:READ
Q1:POKES5,Q1:NEXT
XF 460 S6=13183:S7=13247
HQ 470 FORX=0TO45:READQ1:POKE
S6+X,Q1:POKES7+X,Q1:N
EXT
PE 480 FORS6=13229TO13246:READ
Q1:POKES6,Q1:NEXT
HM 490 FORS7=13293TO13311:READ
Q1:POKES7,Q1:NEXT
EM 500 IFE=0THENPRINT"[HOME]
[DOWN][10 RIGHT]
[20 SPACES]"
HE 510 T2=TI/60:POKE2040,192
BH 520 POKEV+39,4:POKEV+40,0:P
OKEV,65:POKEV+2,65:POKE
V+1,Y2:POKEV+3,69:POKEV
+16,3
CX 530 IFDA=0THENR9=9:POKEV+21
,1
ER 540 IFDA=1THENR9=6:POKEV+21
,3
BA 550 P=192
SA 560 FORX=321TO355STEP-3
KB 570 IFW=2ANDD=8THENB=22
RB 580 IFW=2ANDD=9THENB=21
KC 590 C=(C+1)+D
GP 600 GOSUB1330
HC 610 PRINT"[HOME][RIGHT]SCOR
E:"C"[LEFT][4 SPACES]"T
AB(16)"BONUS"TAB(16)"LEVEL"
FB 620 IFX<256THENPOKEV+16,0:P
OKEV,X:POKEV+2,X
EF 630 IFX>255THENPOKEV+16,3:P
OKEV,X-256:POKEV+2,X-25
6
KE 640 F=0:IFX<295ANDX>50THENG
OSUB840
RM 650 IF F=1 THEN1120
KB 660 P1=P1+1:IFP1>207THENP1=
206
KG 670 POKE2041,P1
BR 680 POKE2040,P
JD 690 P=P+1:IFP>196THENP=192
DE 700 GETA$:IFA$=" THENGOSUB
1640
RG 710 JV=PEEK(56320)
HP 720 JV=15-(JVAND15)
RA 730 IFJV=4THENGOSUB870
JX 740 IFJV=8THENGOSUB990
```



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GR 750 IF F=1 THEN1120
FR 760 NEXTX
CB 770 C=C+T:T=0
JK 780 IFDA=1THENDA=0:Y2=69:GO
TO800
JS 790 DA=1:Y2=62
FC 800 IFD<9THENB=B-1:D=D+1
XF 810 IFW=2ANDD<9THENB=B-7
AS 820 IFD=9THENPX=200:PZ=204
FG 830 GOTO510
QR 840 R=INT(R9*RND(1))+1
EJ 850 IFR>2THENRETURN
GE 860 IFR=1THEN990
CC 870 P=197:POKE2040,P
BS 880 IFW=1THENGOSUB1930
DX 890 IFW=2THENGOSUB1730
KA 900 IFM1=1THENJV=4
RR 910 IFM1=2THENJV=4
SQ 920 IFJV=8THENP=P-1:POKE2040
0,P:IFP<197THENRETURN
FB 930 IFJV=8THEN880
PE 940 P=P+1:POKE2040,P
PB 950 GOSUB1330
DH 960 PRINT "{HOME}"TAB(21)T
RS 970 IFP>196ANDP<PXTHEN880
BR 980 F=1:RETURN
GB 990 P=201:POKE2040,P
EK 1000 IFW=1THENGOSUB1930
MX 1010 IFW=2THENGOSUB1730
CS 1020 IFM1=1THENJV=4
AA 1030 IFM1=2THENJV=4
MH 1040 IFJV=4THENP=P-1
QG 1050 GOSUB1330
BH 1060 PRINT "{HOME}"TAB(21)T
MQ 1070 IFP<201THENP=196:RETUR
N
BD 1080 IFJV=4THENPOKE2040,P:G
OTO1000
FX 1090 P=P+1:POKE2040,P
QQ 1100 IFP>200ANDP<PZTHEN1000
JS 1110 F=1:RETURN
HD 1120 Z2=69:P=205:U7=200
DF 1130 POKEU1,15:POKEU2,0:POK
EU3,247:POKEU4,17
PJ 1140 FORZ=Z2TO207STEP8
QR 1150 U7=U7-8
RQ 1160 POKEU5,U7
BJ 1170 POKEV+1,Z
CA 1180 POKE2040,P:NEXTZ
PX 1190 Z2=Z2+30
JJ 1200 FORX=207TOZ2STEP-8
SX 1210 U7=U7+8
EB 1220 POKEU5,U7
RJ 1230 POKEV+1,X:POKE2040,P:N
EXTX
BC 1240 IFZ2<236THEN1140
PF 1250 POKE54276,16
BF 1260 POKE53269,0:PRINT "
{DOWN}{7 RIGHT}{YEL}PR
ESS {RVS}RETURN{OFF} T
O PLAY AGAIN"
FS 1270 PRINT "{DOWN}"PRESS SPA
CE BAR OR FIREBUTTON F
OR MENU"
SS 1280 GETA$:JV=PEEK(56320):F
R=JVAND16
GH 1290 IF(A$=" "OR(A$<>" "AND
A$<>CHR$(13)))ANDFR<>0T
HEN1280
SA 1300 C=0:M1=0:AV=0:PX=201:P
Z=205:E=1
CF 1310 IFA$=CHR$(13)THEN250
BA 1320 DA=0:GOTO800
XA 1330 T3=3*INT(TI/60-T2):T=1
000-T3:IFT<0THENT=0
QF 1340 RETURN
RS 1350 DATA0,240,0,1,240,0,3,
176,0,3,48,0,3,48,0,2,
24,0,12,8,0
PG 1360 DATA0,120,0,0,248,0,1,
216,0,1,140,0,1,134,0,
0,131,0,3,130,0,0

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```

JC 1370 DATA0,0,0,0,0,0,0,28,0
,64,46,0,48,126,0,28,4
6,0,7,24,0,1,254,0,0,8
7,128
AH 1380 DATA0,108,224,0,124,56
,0,68,4,0,124,0,0,124,
0,0,248,0,1,216,0,3,24
,0
CP 1390 DATA6,24,0,28,24,0,0,2
4,0,0,48,0,0
PC 1400 DATA0,0,0,0,0,0,32,24,
0,16,44,0,8,124,0,4,44
,0,3,16,0,1,252,0,0,17
4,0
AS 1410 DATA0,219,0,0,248,128,
0,136,64,0,248,32,0,24
8,0,1,240,0,7,48,0,28,
48,0
SD 1420 DATA112,48,0,128,48,0,
0,48,0,0,96,0,0
AQ 1430 DATA0,32,0,0,64,0,0,15
6,0,1,46,0,1,126,0,1,4
4,0,1,152,0,1,25,0,0,1
74,0
QK 1440 DATA0,219,0,0,184,128,
1,208,64,1,224,32,131,
240,0,255,240,0,0,48,0
GC 1450 DATA0,48,0,0,48,0,0,48
,0,0,48,0,0,96,0,0
GJ 1460 DATA0,8,0,0,16,0,0,39,
16,0,75,160,0,95,192,0
,75,128,0,127,128,64,5
4,0,96
CR 1470 DATA46,0,56,92,0,15,23
2,0,1,252,0,0,60,0,0,6
0,0,0,56,0,0,56,0,0,48
,0,0,48
GE 1480 DATA0,0,16,0,0,24,0,0,
48,0,0
DM 1490 DATA0,0,0,0,0,0,0,112,
0,0,184,8,1,248,48,0,1
84,192,0,0,115,0,1,252,0
,6,168,0
ME 1500 DATA24,216,0,96,248,0,
128,136,0,0,248,0,0,24
8,0,0,248,0,0,216,0,0,
204,0
KG 1510 DATA0,198,0,0,195,0,0,
193,192,3,128,0,0
GK 1520 DATA0,0,0,0,0,0,16,0,112
,32,0,184,64,1,248,128
,0,185,0,0,114,0
AJ 1530 DATA1,252,0,2,168,0,4,
216,0,8,248,0,16,36,0,
96,248,0,0,248,0,0,248
,0
FC 1540 DATA0,204,0,0,198,0,0,
195,0,0,193,224,0,192,
192,3,128,0,0
DK 1550 DATA0,8,0,0,4,0,0,226,
0,1,113,0,3,241,0,1,11
3,0,0,226,0,1,252,0
CF 1560 DATA3,80,0,7,176,0,13,
240,0,8,144,0,16,240,0
,96,248,0,0,252,8
PB 1570 DATA0,207,240,0,192,0,
0,192,0,0,192,0,0,192,
0,1,128,0,0
EX 1580 DATA0,64,0,16,32,0,39,
176,0,37,208,0,47,208,
0,47,208,0,37,208,64
CA 1590 DATA19,144,48,8,240,32
,7,208,96,3,176,192,0,
243,128,0,158,0,0,252,
0
HB 1600 DATA0,240,0,1,128,0,1,
128,0,1,128,0,0,192,0,
0,192,0,1,0,0,0
JE 1610 DATA0,0,128,0,0,136,4,
1,152,4,67,48,4,67,96,
4,71,96,4,199,96
BA 1620 DATA36,135,96,123,135,
96,181,135,96,255,255,

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```

224,119,247,224,3,255,
192
AG 1630 DATA0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0
CC 1640 T4=INT(TI/60)
CS 1650 GETA$:IFA$=" "THEN1650
CA 1660 T5=INT(TI/60)
KB 1670 T2=T2+T5-T4:RETURN
QE 1680 DATA0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0
CD 1690 DATA2,2,0,1,4,0,0,248,
0,0,32,0,0,32,0,0,32,0
,0,32,0
DA 1700 DATA0,32,0,0,32,0,0,24
8,0,1,36,0,2,34,0,3,25
4,0,2,34,0,1,36,0
DQ 1710 DATA0,248,0
CX 1720 DATA1,140,0,2,82,0,2,3
4,0,2,82,0,1,140,0,0,2
48,0,0
RK 1730 R1=INT(26*RND(1))+1
RS 1740 X9=INT(X/8)-4
KS 1750 R2=R1+64
JS 1760 A=0
KF 1770 PRINT "{HOME}"2 DOWN}"T
AB(X9)CHR$(R2)
HC 1780 GETA$:A=A+1
PB 1790 IFA=BTHENM1=2:GOSUB190
0:GOTO1830
FD 1800 IFA$=" "THEN1780
SF 1810 IFA$=CHR$(R2)THENM1=1:
GOSUB1870:GOTO1830
SB 1820 M1=2:GOSUB1840
QC 1830 PRINT "{HOME}"2 DOWN}"T
AB(X9)" ":RETURN
SJ 1840 POKEU1,15:POKEU2,45:PO
KEU3,165:POKEU4,33
AB 1850 POKEU5,6:POKEU6,5
XJ 1860 FORT=1TO200:NEXT:POKEU
4,32:POKEU5,0:POKEU6,0
:RETURN
QE 1870 POKEU1,15:POKEU2,0:POK
EU3,247:POKEU4,17
CX 1880 POKEU5,40:POKEU6,0
KF 1890 FORT=1TO100:NEXT:POKEU
4,16:RETURN
ME 1900 POKEU1,15:POKEU4,33:PO
KEU2,15
EH 1910 FORT=50TO5STEP-2:POKEU
5,16:POKEU6,T:NEXT
BB 1920 POKEU4,0:RETURN
SB 1930 JV=PEEK(56320)
SE 1940 GETA$:IFA$<" "THEN1940
XS 1950 JV=15-(JVAND15)
SJ 1960 IFJV=4ORJV=8THENAV=0:R
ETURN
AF 1970 AV=AV+1:IFAV=BTHENAV=0
:RETURN
GD 1980 GOTO1930

```

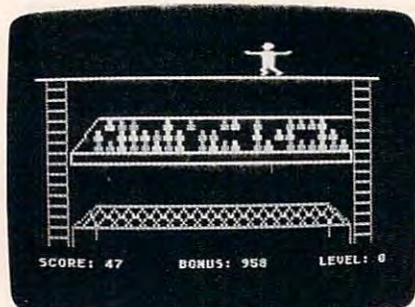
Program 2: Atari Tightrope

Version by Kevin Mykytyn, Editorial Programmer

```

CI 10 POKE 106,96:GRAPHICS 7
:C=0:GRAPHICS 0:POKE 7
52,1:POSITION 14,10:PR
INT "PLEASE WAIT"
OP 20 FOR A=30720 TO 31841:R
EAD B:C=C+B:POKE A,B:N
EXT A:IF C<>70649 THEN
PRINT "DATA ERROR":ST
OP
AP 30 DIM P*(32),K*(1),A*(1)
:OPEN #4,4,4,"K:"
BM 40 GRAPHICS 0:POKE 752,1:
POKE 710,15:POKE 709,0
:POSITION 14,9:PRINT "
(1) GAME":POSITION 14,
11:PRINT "(2) TYPING"
ID 50 GET #4,K:K=CHR$(K):IF

```

"Tightrope" for Atari 400, 800, XL, and XE computers.

```

K$<>"1" AND K$<>"2" T
HEN 50
JN 60 W=VAL(K$)
PE 70 PRINT "(3 DOWN)
(3 SPACES)ENTER LEVEL
OF DIFFICULTY (0-9)"
JJ 80 GET #4,K:K$=CHR$(K)
HJ 90 IF K$<"0" OR K$>"9" TH
EN 80
DL 100 B=VAL(K$):D=B:B=12-B
DF 110 IF W=2 THEN B=B*4
EC 120 P$="0110011011111110
220022022222222":GRAP
HICS 7:DL=PEEK(560)+2
56*PEEK(561):POKE DL+
6,2
MI 130 SETCOLOR 0,5,5:SETCOL
OR 1,13,12:POKE 710,0
:SCREEN=PEEK(88)+256*
PEEK(89)+40
KP 140 COLOR 1:FOR A=8 TO 14
4 STEP 136:FOR Q=0 TO
8 STEP 8:PLOT A+Q,16
:DRAWTO A+Q,80:NEXT Q
:POKE 752,1
JN 150 FOR C=16 TO 80 STEP 4
:PLOT A,C:DRAWTO A+8,
C:NEXT C:NEXT A
NL 160 POKE 54279,112:POKE 5
3277,3:POKE 559,62:PO
KE 623,1:FOR A=704 TO
706:POKE A,78:NEXT A
KG 170 COLOR 2:PLOT 4,16:DRA
WTO 156,16:COLOR 1:PL
OT 18,72:DRAWTO 142,7
2:DRAWTO 132,64:DRAWTO
0 28,64:DRAWTO 18,72
NJ 180 COLOR 2:FOR A=30 TO 1
32 STEP 6:PLOT A,65:D
RAWTO A-7,71:PLOT A,6
5:DRAWTO A+7,71:NEXT
A
ME 190 PLOT 26,67:DRAWTO 28,
71:PLOT 135,68:DRAWTO
132,71
AE 200 COLOR 1:PLOT 18,73:DR
AWTO 18,80:PLOT 142,7
3:DRAWTO 142,80:PLOT
28,73:DRAWTO 28,76:PL
OT 132,73:DRAWTO 132,
76
HB 210 COLOR 2:PLOT 18,44:DR
AWTO 143,44:DRAWTO 14
3,48:DRAWTO 18,48:DRA
WTO 18,44:DRAWTO 30,3
1:DRAWTO 143,31
OD 220 C=0:FOR Y=40 TO 32 ST
EP -4:FOR X=23+5*C TO
142 STEP 5:GOSUB 240
:NEXT X:C=C+1:NEXT Y
AE 230 PX=6:PZ=11:Y2=44:P1=1
3:GOTO 260
LL 240 Q=INT(RND(1)*3):IF Q=
2 THEN RETURN
CN 250 FOR A=0 TO 3:POSITION
X,Y+A:PRINT #6;P*(Q*
16+A*4+1,Q*16+A*4+4):

```

```

NEXT A:RETURN
AL 260 GOSUB 1120:T2=TI/60
P6 270 POKE 205,0:P=0:POKE 2
06,205:POKE 207,Y2:PO
KE 209,116:A=USR(3072
0)
FN 280 FOR X=185 TO 48 STEP
-1
IO 290 IF W=2 AND D=8 THEN B
=22
IG 300 IF W=2 AND D=9 THEN B
=21
CC 310 C=C+1+D
OG 320 GOSUB 1120:T3=3*(INT(
TI/60-T2)):T=1000-T3
NF 330 IF T<0 THEN T=0
DB 340 POKE 656,1:POKE 657,1
:PRINT "SCORE: ";C;:P
OKE 657,16:PRINT "BON
US: ";T;:POKE 657
,32:PRINT "LEVEL: ";D
FP 350 POKE 205,P:POKE 206,X
EH 360 P=P+1:IF P>2 THEN P=0
HB 370 IF X<175 AND X>50 THE
N GOSUB 460
CN 380 IF PEEK(764)=33 THEN
GOSUB 910
OK 390 IF STICK(0)=7 THEN GO
SUB 490
AJ 400 IF STICK(0)=11 THEN G
OSUB 630
CK 410 NEXT X
ND 420 C=C+T:T=0
II 430 IF D<9 THEN B=B-1:D=D
+1
NJ 440 IF W=2 AND D<9 THEN B
=B-3
BK 450 GOTO 260
LM 460 R=INT(29*RND(1))+1
PL 470 IF R>2 THEN RETURN
LD 480 IF R=1 THEN 630
NJ 490 P=3:POKE 205,P
BB 500 IF W=1 THEN GOSUB 108
0
DI 510 IF W=2 THEN GOSUB 950
JA 520 IF M1=1 THEN JV=11
FH 530 IF M1=2 THEN JV=7
OE 540 IF JV=11 THEN P=P-1:P
OKE 205,P:IF P<3 THEN
RETURN
CM 550 IF JV=11 THEN 500
FA 560 P=P+1:POKE 205,P
JN 570 GOSUB 1120:T3=3*INT(T
I/60-T2):T=1000-T3
NN 580 IF T<1 THEN T=0
AA 590 POKE 656,1:POKE 657,2
2:PRINT " ";T
LA 600 IF P>2 AND P<PX THEN
500
ED 610 POKE 205,12:GOSUB 760
HI 620 RETURN
NK 630 P=8:POKE 205,P
BB 640 IF W=1 THEN GOSUB 108
0
DN 650 IF W=2 THEN GOSUB 950
FK 660 IF M1=1 THEN JV=7
IH 670 IF M1=2 THEN JV=11
KL 680 IF JV=7 THEN P=P-1
PA 690 GOSUB 1120:T3=3*(INT(
TI/60-T2)):T=1000-T3
NH 700 IF T<1 THEN T=0
PK 710 POKE 656,1:POKE 657,2
2:PRINT " ";T
PE 720 IF P<8 THEN P=2:RETUR
N
LL 730 IF JV=7 THEN POKE 205
,P:GOTO 640
FA 740 P=P+1:POKE 205,P
LN 750 IF P>2 AND P<PZ THEN
640
IN 760 Z2=44:P=12:U7=200
FI 770 FOR Z=22 TO 158 STEP
3
PO 780 SOUND 1,Z,10,15

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DN 790 POKE 205,P:POKE 207,Z
:NEXT Z
HL 800 Z2=Z2+30
HO 810 FOR X=158 TO Z2 STEP
-3
PH 820 SOUND 1,X,10,15
DE 830 POKE 207,X:POKE 205,P
:NEXT X
FF 840 IF Z2<140 THEN 770
MC 850 SOUND 1,0,0,0:POKE 65
6,2:POKE 657,5:PRINT
" PRESS RETURN TO PL
AY AGAIN":POKE 764,25
5
DH 860 PRINT "PRESS SPACE BA
R OR FIREBUTTON FOR M
ENU";
GL 870 IF PEEK(764)=12 THEN
POKE 206,0:E=1:AV=0:M
1=0:C=0:PX=201:PZ=205
:PRINT "{CLEAR}":GOTO
230
HL 880 IF PEEK(764)<>33 AND
STRIG(0)<>0 THEN 870
GI 890 POKE 206,0:E=1:C=0:M1
=0:AV=0:PX=201:PZ=205
GOTO 40
BN 910 POKE 764,255:GOSUB 11
20:T4=INT(TI/60)
DP 920 GET #4,A
EO 930 GOSUB 1120:T5=INT(TI/
60)
GJ 940 T2=T2+T5-T4:RETURN
OO 950 R1=INT(26*RND(1))+1
EO 960 X9=INT((X-48)/4)
HE 970 R2=R1+32
EP 980 A=0
CN 990 POKE 764,255:K=255:PO
KE SCREEN+X9,R2
PJ 1000 IF PEEK(764)<>255 TH
EN GET #4,K:K=K-32
DM 1010 A=A+1:IF A=B THEN M1
=2:GOSUB 1060:GOTO 1
050
GG 1020 IF K=255 THEN 1000
DF 1030 IF K=R2 THEN M1=1:GO
SUB 1070:GOTO 1050
DD 1040 M1=2:GOSUB 1060
OH 1050 POKE SCREEN+X9,0:RET
URN
LO 1060 FOR V=15 TO 0 STEP -
1:SOUND 1,200,10,V:N
EXT V:RETURN
JD 1070 FOR V=15 TO 0 STEP -
1:SOUND 1,60,10,V:NE
XT V:RETURN
KF 1080 JV=STICK(0)
JK 1090 IF JV=7 OR JV=11 THE
N AV=0:RETURN
LF 1100 AV=AV+1:IF AV=B THEN
AV=0:RETURN
MF 1110 GOTO 1080
JP 1120 TI=PEEK(18)*65536+PE
EK(19)*256+PEEK(20):
RETURN
CK 1130 DATA 169,0,133,186,1
65,209,133,187,162,3
,160,0,152,145,186,2
00,208,251,230,187,2
02,16,246,160,34,162
DATA 120,169,7,32,92
,228,104,96,216,169,
0,133,77,32,45,120,7
6,98,228,165,206,141
,0,208,24,105
HN 1150 DATA 8,141,1,208,24
,105,8,141,2,208,165
,205,133,203,169,0,13
3,204,162,6,6,203,38
,204,202,240
HM 1160 DATA 17,224,3,208,24
5,165,203,141,184,12
0,165,204,141,185,12
0,76,72,120,165,203
,24,109,184,120,133,2

```



```

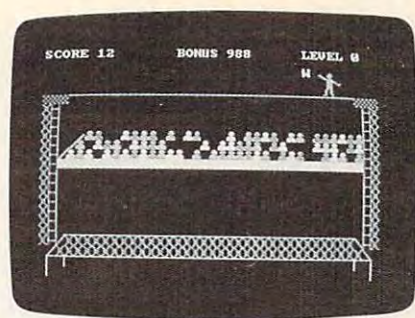
03
GN 1170 DATA 165,204,109,185
,120,133,204,165,203
,24,105,186,141,146,
120,165,204,105,120,
141,147,120,165,209,
133,204
FD 1180 DATA 169,3,133,208,1
69,0,133,203,164,207
,145,203,200,162,0,1
89,255,255,145,203,2
00,232,224,24,208,24
5
HF 1190 DATA 169,0,145,203,1
73,146,120,24,105,24
,141,146,120,173,147
,120,105,0,141,147,1
20,230,204,198,208,2
08
CN 1200 DATA 207,96,0,0,0,0,
0,0,0,0,96,63,0,0,0,
0,0,0,0,0,0,0,1,1,1,
1
EC 1210 DATA 1,3,56,60,124,5
6,48,0,124,255,254,1
24,124,124,124,124,1
24,124,124,204,134,1
34,131,131,129,3
NN 1220 DATA 0,0,0,0,0,0,12,
248,0,0,0,0,0,0,0,0,
0,0
OP 1230 DATA 0,0,0,0,128,0,0
,0,0,0,0,0,96,63,0,0
,0,0,0,0,0,0,0,0,0,0
NF 1240 DATA 0,0,0,0,0,56,60,1
24,56,48,0,124,255,2
54,124,124,124,124,1
24,124,124,124,108,1
08,198,195,97
JN 1250 DATA 96,193,0,0,0,0,
0,0,12,248,0,0,0,0,
0,0,0,0,0,0,0,0,128
,192,128
PI 1260 DATA 0,0,0,0,0,0,96,
63,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,56,60
HI 1270 DATA 124,56,48,0,124
,255,254,124,124,124
,124,124,124,124,124
,108,120,120,60,54,2
8,48,0,0,0,0
LC 1280 DATA 0,0,12,248,0,0,
0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
KO 1290 DATA 0,96,63,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
,0,56,60,124,56,48,0
,127,254
OK 1300 DATA 252,124,124,124
,124,124,124,124,124
,108,108,198,195,97,
97,227,0,0,0,0,0,12,
248,0,0,0
JC 1310 DATA 0,0,0,0,0,0,0,0,
0,0,0,128,128,0,0,0
,0,0,0,0,0,0,1,15,56
,96
HH 1320 DATA 0,0,0,0,0,0,0,0,
0,0,0,0,56,60,124,5
6,48,1
CB 1330 DATA 127,254,252,124
,124,124,124,124,124
,124,124,108,108,198
,195,97,99,192,0,0,0
,12,120,192,0,0
HN 1340 DATA 0,0,0,0,0,0,0,0,
0,0,0,0,0,128,0,0,0
,0,0,0,0,0,0,0,1,3
EB 1350 DATA 6,12,56,0,0,0,0,
0,0,0,0,0,0,56,60,
124,56,48,1,127,254
,252,124,124,124
FK 1360 DATA 124,124,124,124
,124,108,108,204,198
,99,102,192,0,28,48,

```

```

96,192,128,0,0,0,0,0,0
,0,0,0
MC 1370 DATA 0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0
,1,15,56,96,0,0,0,0,
EB 1380 DATA 0,0,0,0,0,0,0,0,
56,60,124,56,48,1,1
27,254,252,124,124,1
24,124,124,124,124,1
24,108
EN 1390 DATA 108,198,195,97,
99,192,0,0,0,12,120,
192,0,0,0,0,0,0,0,0,
0,0,0,0,0,0
DO 1400 DATA 0,128,0,0,0,0,0,0
,0,0,0,96,63,0,0,0,0,
0,0,0,0,0,0,0,0,0,0
HA 1410 DATA 0,0,56,60,124,5
6,48,0,124,255,254,1
24,124,124,124,124,1
24,124,124,108,108,1
98,195,97,96,193
MO 1420 DATA 0,0,0,0,0,0,0,12,
248,0,0,0,0,0,0,0,0,
0,0
MI 1430 DATA 0,0,0,128,192,1
28,0,0,0,0,0,96,63,0
,0,0,0,0,0,0,0,0,0,0
,0,0
MP 1440 DATA 0,0,0,0,56,60,1
24,56,48,0,248,252,1
27,124,124,124,124,1
24,124,124,124,108,1
08,198,198,99
GB 1450 DATA 67,199,0,0,0,0,
0,0,0,12,248,0,0,0,0,
0,0,0,0,0,0,0,0,0,0
,0
DE 1460 DATA 0,0,0,96,56,14,
3,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,56,6
0
ON 1470 DATA 124,56,48,0,248
,252,127,125,124,124
,124,124,124,124,124
,108,108,204,198,102
,195,6,0,0,0,0
FL 1480 DATA 0,0,0,0,0,224,5
6,12,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,24,12,6
,3
DO 1490 DATA 1,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,1,0,0
,56,60,124,56,48,0,2
48,254
GI 1500 DATA 127,125,124,124
,124,124,124,124,124
,108,108,204,108,198
,6,14,0,0,0,0,0,0,0,
0,0,128
BA 1510 DATA 192,96,48,0,0,0,
0,0,0,0,0,0,0,0,6,6
,6,3,3,3,1,0,0,0,0,0
II 1520 DATA 0,0,0,0,0,0,1,1
,1,1,1,3,56,60,124,5
7,49,1
KL 1530 DATA 255,254,254,124
,124,124,124,124,124
,124,124,204,140,140
,134,134,134,14,192,
192,192,128,128,128,
0,0
CI 1540 DATA 0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0
,3,7,3,1,0,1,3,6
CK 1550 DATA 28,0,32,48,159,
192,127,0,0,0,0,0,0,
0,0,0,128,192,192,0,
96,240,248,124,60,60
LN 1560 DATA 60,60,252,124,2
48,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0
,0,0
FD 1570 DATA 0,0,0,0,0,0,0,0,
0,0,0

```



IBM PC/PCjr version of "Tightrope."

Program 3: IBM PC/PCjr Tightrope

Version by Patrick Parrish,
Programming Supervisor

```

HG 10 GOTO 120
ND 20 PUT (X,Y),W3,PSET:RETURN
MA 30 PUT (X,Y),W2,PSET:RETURN
LC 40 PUT (X,Y),W1,PSET:RETURN
CJ 50 PUT (X,Y),L1,PSET:RETURN
DJ 60 PUT (X,Y),L2,PSET:RETURN
EJ 70 PUT (X,Y),L3,PSET:RETURN
HA 80 PUT (X,Y),R1,PSET:RETURN
IA 90 PUT (X,Y),R2,PSET:RETURN
LB 100 PUT (X,Y),R3,PSET:RETURN
BO 110 PUT (X,Y),W4,PSET:RETURN
QE 120 KEY OFF:WIDTH 40:DEF SEG=
0:Poke 1047,PEEK(1047) OR
64:SCREEN 1:COLOR ,0:CLS
:LOCATE 12,15:PRINT "PL
EASE WAIT":GOSUB 1030:GOT
O 240
BP 130 JV=0:A$=INKEY$:IF A$=CHR$
(47) THEN JV=1:AV=0:RETUR
N ELSE IF A$=CHR$(90) THE
N JV=2:AV=0:RETURN
LN 140 AV=AV+1:IF AV=B*2 THEN AV
=0:RETURN
CH 150 GOTO 130
KO 160 R1=INT(26*RND(1))+1:X9=IN
T(X/8):R2=R1+64:A=0:LOCAT
E 3,X9:PRINT CHR$(R2)
HH 170 A$=INKEY$:A=A+1:IF A=B TH
EN M1=2:GOSUB 1010:GOTO 2
10
HL 180 IF A$="" THEN 170
FF 190 IF A$=CHR$(R2) THEN M1=1:
GOSUB 1000:GOTO 210
CD 200 M1=2:GOSUB 990
CN 210 LOCATE 3,X9:PRINT " ":RET
URN
FD 220 T3=3*INT(TIMER-T2):T=1000
-T3:IF T<0 THEN T=0
MC 230 RETURN
OH 240 RANDOMIZE TIMER:CLS:LOCAT
E 11,15:PRINT "1- GAME":L
OCATE 13,15:PRINT "2- TYP
ING"
EO 250 A$=INKEY$:IF A$="" THEN 2
50
IB 260 W=VAL(A$):IF W<1 OR W>2 T
HEN 250
KK 270 LOCATE 17,5:PRINT "ENTER
LEVEL OF DIFFICULTY (0-9)
"
DB 280 A$=INKEY$:IF A$="" OR (A$
<"0" OR A$>"9") THEN 280
ELSE B=VAL(A$)
HK 290 D=B:B=10-B:IF W=1 THEN B=
B*2
DH 300 IF W=2 THEN B=B*25
KN 310 CLS:FOR X=0 TO 36 STEP 36
:FOR J=0 TO 2:PUT (X*B+J*
8,40),S14:NEXT J,X:LINE (
24,40)-(287,40),3
LP 320 FOR J=0 TO 38 STEP 38:FOR
I=1 TO 15:PUT (J*B,I*B+4
0),S15:PUT (J*B+8+(J-38)*
16,I*B+40),S16:NEXT I,J

```



```

FC 330 'LINE (40,74)-(8*37-1,74)
:LINE (39,75)-(8*37-1,75)
BF 340 FOR R=1 TO 3:FOR C=6-R TO
36:X=RDND(1):ROW=64+8*R:C
OL=C*8:IF X<.3 THEN PUT(C
OL,ROW),S17:GOTO 380
IF 350 IF X>=.3 AND X<.6 THEN PU
T(COL,ROW),S18:GOTO 380
BP 360 IF X>=.6 AND X<.9 THEN PU
T(COL,ROW),S19:GOTO 380
DK 370 LOCATE ROW/8,COL/8:PRINT
" "
GJ 380 NEXT C,R
HN 390 LINE (39,75)-(17,96):LINE
(38,75)-(16,96):FOR I=96
TO 96+7:LINE (16,I)-(8*3
7-1,I):NEXT I
FN 400 LINE (23,20*8-1)-(36*8,20
*8-1):LINE (7,22*8)-(38*8
,22*8):LINE (23,20*8)-(7,
22*8):LINE (36*8,20*8-1)-
(38*8,22*8)
KG 410 FOR R=0 TO 1:FOR C=3-R TO
35+R:PUT (C*8,(R+20)*8),
S15:NEXT C,R
IC 420 LINE (7,22*8)-(7,24*8):LI
NE (38*8,22*8)-(38*8,24*8
):LINE (23,22*8)-(23,23*8
):LINE (36*8,22*8)-(36*8,
23*8)
LN 430 Y=19:PX=7:PZ=10:C=0
DJ 440 T2=TIMER
CB 450 IF W=2 AND D=8 THEN B=60
ELSE IF W=2 AND D=9 THEN
B=45
DL 460 P=0:GOSUB 1020:FOR X=288
TO 4 STEP -3
NL 470 C=C+D+1:GOSUB 220
FK 480 LOCATE 1,1:PRINT "SCORE"C
" "TAB(16)"BONUS"TAB(16)"T
AB(31)"LEVEL"D
MC 490 F=0:IF X<268 AND X>24 THE
N GOSUB 620
BF 500 IF F=1 THEN 840
BD 510 P=P+1:IF P=5 THEN P=1
LE 520 ON P GOSUB 20,30,40,30
IF 530 JV=0:A$=INKEY$:IF A$=" "
THEN GOSUB 960 ELSE IF A$
=CHR$(47) THEN JV=1:GOSUB
640
HH 540 IF A$=CHR$(90) THEN JV=2:
GOSUB 730
CP 550 IF F=1 THEN 840
GG 560 NEXT X:X=X+3:GOSUB 1020:G
OSUB 110
MN 570 C=C+T:T=0
KJ 580 IF D<9 THEN B=B-2:D=D+1
OP 590 IF W=2 AND D<9 THEN B=B-2
5
KG 600 IF D=9 THEN PX=6:PZ=9
FN 610 GOTO 440
JC 620 R=INT(9*RDND(1))+1:IF R>2
THEN RETURN
GJ 630 IF R=1 THEN 730
BI 640 P=4:PUT (X,Y),L1,PSET
FF 650 IF W=1 THEN GOSUB 130 ELSE
IF W=2 THEN GOSUB 160
QL 660 IF M1=1 THEN JV=2 ELSE IF
M1=2 THEN JV=1
BI 670 IF JV=2 THEN P=P-1:ON P G
OSUB ,,40,50,60,70:IF P<4
THEN RETURN ELSE 650
II 680 P=P+1:ON P GOSUB ,,50,60
,70
GC 690 GOSUB 220
HK 700 LOCATE 1,21:PRINT T
PO 710 IF P>3 AND P<PX THEN 650
EI 720 F=1:RETURN
JO 730 P=7:PUT (X,Y),R1,PSET
FE 740 IF W=1 THEN GOSUB 130 ELS
E IF W=2 THEN GOSUB 160
BB 750 IF M1=1 THEN JV=1 ELSE IF
M1=2 THEN JV=2
IE 760 IF JV=1 THEN P=P-1
GP 770 GOSUB 220

```

```

IK 780 LOCATE 1,21:PRINT T
MB 790 IF P<7 THEN P=3:RETURN
DJ 800 IF JV=1 THEN ON P GOSUB ,
,,,80,90,100:GOTO 740
BH 810 P=P+1:ON P GOSUB ,,,,80
,90,100
DE 820 IF P>6 AND P<PZ THEN 740
EL 830 F=1:RETURN
MN 840 P=10:PUT (X,Y),W4,PSET:RE
M FALLING MAN
KF 850 Z=23:FOR Z=22 TO 150 STE
P 6:IF Z>22 THEN PUT (X,Z
-6),S12
MO 860 PUT (X,Z),S12:SOUND (Z+15
)*2,.08
PC 870 NEXT Z:PUT (X,Z-6),S12:Y=
Y+50
NA 880 FOR Z=150 TO Y STEP -6:IF
Z<150 THEN PUT (X,Z+6),S
13
BC 890 PUT (X,Z),S13:SOUND (Z+15
)*2,1:NEXT Z:PUT (X,Z+6),
S13
EA 900 FOR Z=Y TO 150 STEP 6:IF
Z>Y THEN PUT (X,Z-6),S13
LD 910 PUT (X,Z),S13:SOUND (Z+15
)*2,1:NEXT Z:PUT (X,Z-6),
S13:Y=Y+30:IF Y<150 THEN
880
DM 920 PUT (X,Z-6),S13:LOCATE 3,
6:PRINT "PRESS <RETURN> T
O PLAY AGAIN":LOCATE 4,7:
PRINT "PRESS <SPACE BAR>
FOR MENU"
NP 930 A$=INKEY$:IF A$<>" " AND
A$<>CHR$(13) THEN 930
LC 940 C=0:M1=0:AV=0:IF A$=CHR$(
13) THEN 310
EE 950 GOTO 240
AB 960 T4=INT(TIMER)
FA 970 A$=INKEY$:IF A$=" " THEN 9
70
BB 980 T5=INT(TIMER):T2=T2+T5-T4
:RETURN
HK 990 SOUND 37,1:RETURN
LG 1000 SOUND 440,1:RETURN
OL 1010 SOUND 2300,1:RETURN
BL 1020 FOR DE=1 TO 400:NEXT:RET
URN
EN 1030 REM define shapes
FE 1040 DEFINT E,L,R,S,W
HD 1050 RESTORE 1240:READ X,Y:E=
(4+INT((X+7)/8))*Y/2:DIM
W1(E):W1(0)=X:W1(1)=Y:F
OR I=2 TO E:READ A$:W1(I
)=VAL("&H"+A$):NEXT
FB 1060 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM W2(E):W2(0)=
X:W2(1)=Y:FOR I=2 TO E:R
EAD A$:W2(I)=VAL("&H"+A$
):NEXT
EE 1070 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM W3(E):W3(0)=
X:W3(1)=Y:FOR I=2 TO E:R
EAD A$:W3(I)=VAL("&H"+A$
):NEXT
NP 1080 E=(4+INT((42+7)/8))*21/2
:DIM W4(E):W4(0)=42:W4(1
)=21:FOR I=2 TO E:W4(I)=
0:NEXT
PB 1090 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM R1(E):R1(0)=
X:R1(1)=Y:FOR I=2 TO E:R
EAD A$:R1(I)=VAL("&H"+A$
):NEXT
ND 1100 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM R2(E):R2(0)=
X:R2(1)=Y:FOR I=2 TO E:R
EAD A$:R2(I)=VAL("&H"+A$
):NEXT
LB 1110 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM R3(E):R3(0)=
X:R3(1)=Y:FOR I=2 TO E:R
EAD A$:R3(I)=VAL("&H"+A$
):NEXT

```

```

HE 1120 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM L1(E):L1(0)=
X:L1(1)=Y:FOR I=2 TO E:R
EAD A$:L1(I)=VAL("&H"+A$
):NEXT
GC 1130 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM L2(E):L2(0)=
X:L2(1)=Y:FOR I=2 TO E:R
EAD A$:L2(I)=VAL("&H"+A$
):NEXT
FA 1140 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM L3(E):L3(0)=
X:L3(1)=Y:FOR I=2 TO E:R
EAD A$:L3(I)=VAL("&H"+A$
):NEXT
DC 1150 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S12(E):S12(0
)=X:S12(1)=Y:FOR I=2 TO
E:READ A$:S12(I)=VAL("&H
"+A$):NEXT
DK 1160 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S13(E):S13(0
)=X:S13(1)=Y:FOR I=2 TO
E:READ A$:S13(I)=VAL("&H
"+A$):NEXT
CC 1170 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S14(E):S14(0
)=X:S14(1)=Y:FOR I=2 TO
E:READ A$:S14(I)=VAL("&H
"+A$):NEXT
CK 1180 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S15(E):S15(0
)=X:S15(1)=Y:FOR I=2 TO
E:READ A$:S15(I)=VAL("&H
"+A$):NEXT
BC 1190 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S16(E):S16(0
)=X:S16(1)=Y:FOR I=2 TO
E:READ A$:S16(I)=VAL("&H
"+A$):NEXT
PD 1200 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S17(E):S17(0
)=X:S17(1)=Y:FOR I=2 TO
E:READ A$:S17(I)=VAL("&H
"+A$):NEXT
OG 1210 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S18(E):S18(0
)=X:S18(1)=Y:FOR I=2 TO
E:READ A$:S18(I)=VAL("&H
"+A$):NEXT
OI 1220 READ X,Y:E=(4+INT((X+7)/
8))*Y/2:DIM S19(E):S19(0
)=X:S19(1)=Y:FOR I=2 TO
E:READ A$:S19(I)=VAL("&H
"+A$):NEXT:RETURN
GG 1230 REM W1
PB 1240 DATA 48,21,0,A,0,0,8022,
0
HK 1250 DATA 0,80AA,0,20,2A,8000
,A0,A
BH 1260 DATA 8002,8,802A,8,AA02,
AAAA,A0,0
LB 1270 DATA 80AA,0,0,80AA,0,0,8
0AA,0
NE 1280 DATA 0,80AA,0,0,80AA,0,0
,80AA
GJ 1290 DATA 0,0,80A2,0,0,80A2,0
,0
HD 1300 DATA 80A2,0,0,802A,0,0,8
00A,0
FJ 1310 DATA 0,A002,0,0,8002,0,0
,802A
KF 1320 DATA 0,0
HD 1330 REM W2
PD 1340 DATA 48,21,0,A,0,0,8022,
0
HH 1350 DATA 0,80AA,0,20,2A,8000
,A0,A
BO 1360 DATA 8002,8,802A,8,AA02,
AAAA,A0,0
LD 1370 DATA 80AA,0,0,80AA,0,0,8
0AA,0
NG 1380 DATA 0,80AA,0,0,80AA,0,0
,80AA
KK 1390 DATA 0,0,80A2,0,200,8082

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```

,0,A00
LB 1400 DATA 8002,0,A00,8002,0,A
00,8002,0
CL 1410 DATA 200,A000,0,200,2800
,0,A00,A000
KH 1420 DATA 0,0
IA 1430 REM W3
PF 1440 DATA 48,21,0,A,0,0,8022,
0
HD 1450 DATA 0,80AA,0,20,2A,8000
,A0,A
BA 1460 DATA 8002,8,802A,8,AA02,
AAAA,A0,0
LF 1470 DATA 80AA,0,0,80AA,0,0,8
0AA,0
OI 1480 DATA 0,80AA,0,0,80AA,0,0
,80AA
FM 1490 DATA 0,0,80A2,0,200,A080
,0,A00
JC 1500 DATA 2800,0,2800,A00,0,2
800,200,80
BL 1510 DATA 2800,0,A0,2800,0,A0
,A002,200
KN 1520 DATA 80,0
QD 1530 REM L1
DD 1540 DATA 48,21,0,A,0,0,8022,
2
EJ 1550 DATA 0,80AA,8002,0,2A,2A
,0,20A
PD 1560 DATA A0,0,AA2A,0,200,A0A
A,0,2A00
GC 1570 DATA 80AA,0,A002,80AA,0,
AA,80AA,0
OC 1580 DATA 20,80AA,0,0,80AA,0,
0,80AA
KO 1590 DATA 0,0,80A2,0,200,8082
,0,A00
FA 1600 DATA 8002,0,A00,A000,0,A
00,2800,0
AH 1610 DATA 200,2880,0,200,A080
,0,A00,0
LL 1620 DATA 0,0
BL 1630 REM L2
PL 1640 DATA 48,21,0,A,800A,0,80
22,28
OK 1650 DATA 0,80AA,A0,0,22A,80,
0,A0A
EG 1660 DATA 0,0,AB2A,0,200,A0AA
,0,A00
NJ 1670 DATA 80AA,0,2800,80AA,0,
A000,80AA,0
LL 1680 DATA 8002,80AA,0,A,80AA,
0,AB,80AA
KA 1690 DATA 0,0,80A2,0,200,8082
,0,A00
GK 1700 DATA 8002,0,A00,A000,0,A
00,2A00,A0
FL 1710 DATA 200,80,A0,200,80,20
,A00,0
LN 1720 DATA 0,0
CI 1730 REM L3
EF 1740 DATA 42,21,8002,28,0,A0A
,A,0
GO 1750 DATA 2228,8082,20,AAA0,8
082,20,2AA0,8002
BB 1760 DATA A0,A28,20A,A0,AA0A,
AAB,0,AA02
HA 1770 DATA 28A0,0,AA00,A080,0,
AA00,8082,0
DL 1780 DATA AA00,8A,0,AA00,AB,0
,AA00,A0
HA 1790 DATA 0,A000,0,0,A000,0,0
,A000
BE 1800 DATA 0,0,A000,0,0,A000,0
,0
PA 1810 DATA A000,0,0,A000,0,0,A
00A,0
LP 1820 DATA 0,0
EA 1830 REM R1
QP 1840 DATA 48,21,0,A,0,20,8022
,0
IC 1850 DATA AB,80AA,0,800A,2A,0
,AB00,A
BO 1860 DATA 0,A00,80AA,0,0,A0AA
,0,0

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CF 1870 DATA AAAA,0,0,82AA,A0,0,
80AA,802A
AE 1880 DATA 0,80AA,2,0,80AA,0,0
,80AA
KE 1890 DATA 0,0,80A2,0,200,8082
,0,A00
NA 1900 DATA 8002,0,A00,8002,0,A
00,8002,0
JD 1910 DATA A00,A000,0,AA00,200
0,0,0,A000
LB 1920 DATA 0,0
FM 1930 REM R2
CI 1940 DATA 44,21,AB,28,0,A,8A,
0
BA 1950 DATA 8202,AA,0,A000,AB,0
,2800,28
NI 1960 DATA 0,A00,AA,0,200,80AA
,0,200
MD 1970 DATA A0AA,0,200,28AA,0,2
00,AAA,0
KH 1980 DATA 200,2AA,80,200,AA,A
B,200,AA
KL 1990 DATA 20,200,8A,0,A00,A,0
,2800
AA 2000 DATA A,0,2800,A,0,2800,A
,0
NE 2010 DATA A002,8002,0,0,8000,
0,0,8002
KA 2020 DATA 0,0
EH 2030 REM R3
CC 2040 DATA 42,21,0,AA0,0,200,8
282,80
LL 2050 DATA A80,A008,A0,2880,A0
2A,A0,28A0,800A
HC 2060 DATA A0,AAB,8202,80,20A,
AAAA,0,8002
JF 2070 DATA ABAA,0,A000,A02A,0,
2800,A02A,0
BB 2080 DATA A00,A02A,0,200,A0AA
,0,0,A0AA
CA 2090 DATA 0,0,A000,0,0,A000,0
,0
MA 2100 DATA A000,0,0,A000,0,0,A
000,0
HN 2110 DATA 0,A000,0,0,A000,0,0
,A000
KC 2120 DATA 0,0
HD 2130 REM fig 12
MP 2140 DATA 32,21,AA0,AA0,8A0,A
20,A28,28A0
BD 2150 DATA 80A,A020,8202,8082,
AA00,AB,2A00,AB
IO 2160 DATA 2A00,AB,2A00,AB,2A0
0,AB,2A00,AB
FB 2170 DATA 2A00,AB,2A00,AB,280
0,28,A000,A
FE 2180 DATA 8002,8002,8002,8002
,8002,8002,8002,8002
MD 2190 DATA 8002,8002,802A,AB02
,0
IL 2200 REM fig 13
HB 2210 DATA 32,18,0,2A,0,802A,0
,802A
HN 2220 DATA 0,800A,0,0,0,A002,8
002,AB0A
CB 2230 DATA A002,AA2A,2800,AAA0
,200,AAB0,20,AA00
CP 2240 DATA 2A28,AA00,AA08,AA80
,828A,AAAA,82,AA2A
AF 2250 DATA A0,AA00,AAAA,AAAA,A
A2A,ABAA,0
IM 2260 REM block
PK 2270 DATA 16,8,5050,5050,505,
505,5050,5050
BD 2280 DATA 505,505,0
BB 2290 REM cross
QD 2300 DATA 16,8,550,1414,5005,
5005,5005,5005
MA 2310 DATA 1414,550,0
EA 2320 REM ladder
DH 2330 DATA 16,8,280,280,280,28
0,AAAA,280
AA 2340 DATA 280,280,0
DF 2350 REM purple head
OL 2360 DATA 16,8,A002,AB0A,AB0A

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,A002,AB2A,AAAA
JB 2370 DATA AAAA,AAAA,0
ND 2380 REM white head
KJ 2390 DATA 16,8,F003,FC0F,FC0F
,F003,FC3F,FFFF
NG 2400 DATA FFFF,FFFF,0
KK 2410 REM blue head
ND 2420 DATA 16,8,5001,5405,5405
,5001,5415,5555
OH 2430 DATA 5555,5555,0

```

Program 4: Amiga Tightrope

Version by Patrick Parrish,
Programming Supervisor

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

```

0 GOSUB setup:GOTO 704
1 PUT (X,Y),w3,PSET:RETURN4
2 PUT (X,Y),w2,PSET:RETURN4
3 PUT (X,Y),w1,PSET:RETURN4
4 PUT (X,Y),l1,PSET:RETURN4
5 PUT (X,Y),l2,PSET:RETURN4
6 PUT (X,Y),l3,PSET:RETURN4
7 PUT (X,Y),r1,PSET:RETURN4
8 PUT (X,Y),r2,PSET:RETURN4
9 PUT (X,Y),r3,PSET:RETURN4
10 PUT (X,Y),w4,PSET:RETURN4
20 JV=0:a$=UCASE$(INKEY$)4
IF a$=CHR$(47) THEN 4
JV=1:AV=0:RETURN4
END IF4
IF a$=CHR$(90) THEN4
JV=2:AV=0:RETURN4
END IF4
21 AV=AV+14
IF AV=b*4 THEN AV=0:RETURN4
22 GOTO 204
23 r1=INT(26*RND(1))+14
X9=INT(X/8):r2=r1+644
a=0:LOCATE 3,X9:PRINT CHR$(r2)4
24 a$=UCASE$(INKEY$):a=a+14
IF a=b THEN4
M1=24
GOSUB 1770:GOTO 304
END IF4
25 IF a$="" THEN 244
26 IF a$=CHR$(r2) THEN4
M1=14
GOSUB 1740:GOTO 304
END IF4
27 M1=2:GOSUB 17704
30 LOCATE 3,X9:PRINT " "4
RETURN4
31 T3=3*INT(TIMER-T2)4
T=1000-T3:IF T<0 THEN T=04
32 RETURN4
70 CLS:FOR X=0 TO 36 STEP 364
FOR J=0 TO 24
PUT (X*8+J*8,40),s14:NEXT J,X4
LINE (24,40)-(287,40),34
75 FOR J=0 TO 38 STEP 384
FOR I=1 TO 154
PUT (J*8,I*8+40),s154
PUT (J*8+8+(J=38)*16,I*8+40),s16
4
NEXT I,J4
80 FOR r=1 TO 3:FOR c=6-r TO 364
X=RND(1):ROW=64+8*r:COL=c*84
IF X<.3 THEN4
PUT(COL,ROW),s17:GOTO 1004
END IF4
85 IF X>=.3 AND X<.6 THEN4
PUT(COL,ROW),s18:GOTO 1004
END IF4
90 IF X>=.6 AND X<.9 THEN4
PUT(COL,ROW),s19:GOTO 1004
END IF4
95 LOCATE ROW/8,COL/8:PRINT " "4
100 NEXT c,r4
105 LINE (39,75)-(17,96)4
LINE (38,75)-(16,96)4
FOR I=96 TO 96+74
LINE (16,I)-(8*37-1,I):NEXT I4

```



```

107 LINE (23,20*8-1)-(36*8,20*8-1)
LINE (7,22*8)-(38*8,22*8)
LINE (23,20*8)-(7,22*8)
LINE (36*8,20*8-1)-(38*8,22*8)
108 FOR r=0 TO 14
FOR c=3-r TO 35+r
PUT (c*8,(r+20)*8),s15
NEXT c,r
109 LINE (7,22*8)-(7,24*8)
LINE (38*8,22*8)-(38*8,24*8)
LINE (23,22*8)-(23,23*8)
LINE (36*8,22*8)-(36*8,23*8)
160 Y=19:PX=7:PZ=10:c=0
440 T2=TIMER
500 IF w=2 AND d=8 THEN
b=100
END IF
IF w=2 AND d=9 THEN
b=65
END IF
510 P=0:GOSUB 3000
FOR X=288 TO 4 STEP -3
520 c=c+d+1:GOSUB 31
550 LOCATE 1,1
PRINT "SCORE" c "TAB(16)" "BONUS"
PRINT TAB(31)"LEVEL"d
600 f=0:IF X<268 AND X>24 THEN G
OSUB 780
605 IF f=1 THEN 1080
630 P=P+1:IF P=5 THEN P=1
640 ON P GOSUB 1,2,3,2
655 JV=0:a$=UCASE$(INKEY$):IF a$
=" " THEN GOSUB 1510
IF a$=CHR$(47) THEN JV=1:GOSUB 8
104
660 IF a$=CHR$(90) THEN JV=2:GOS
UB 950
665 IF f=1 THEN 1080
670 NEXT X:X=X+3
GOSUB 3000:GOSUB 104
710 c=c+T:T=0
720 IF d<9 THEN b=b-2:d=d+1
750 IF w=2 AND d<9 THEN b=b-25
760 IF d=9 THEN PX=6:PZ=9
770 GOTO 440
780 r=INT(9*RND(1))+1
IF r>2 THEN RETURN
800 IF r=1 THEN 950
810 P=4:PUT (X,Y),11,PSET
820 IF w=1 THEN GOSUB 204
IF w=2 THEN GOSUB 234
840 IF M1=1 THEN JV=2
IF M1=2 THEN JV=1
860 IF JV=2 THEN
P=P-1
ON P GOSUB ,3,4,5,6
IF P<4 THEN RETURN ELSE 820
END IF
880 P=P+1:ON P GOSUB ,4,5,6
890 GOSUB 314
910 LOCATE 1,21:PRINT T
920 IF P>3 AND P<PX THEN 820
930 f=1:RETURN
950 P=7:PUT (X,Y),r1,PSET
960 IF w=1 THEN GOSUB 204
IF w=2 THEN GOSUB 234
980 IF M1=1 THEN JV=1
IF M1=2 THEN JV=2
990 IF JV=1 THEN P=P-1
1010 GOSUB 314
1030 LOCATE 1,21:PRINT T
1040 IF P<7 THEN P=3:RETURN
1050 IF JV=1 THEN
ON P GOSUB ,7,8,9
GOTO 960
END IF
1060 P=P+1
ON P GOSUB ,7,8,9
1070 IF P>6 AND P<PZ THEN 960
1075 f=1:RETURN
1080 P=10
PUT (X,Y),w4,PSET

```

```

'FALLING MAN
1090 Z=23
FOR Z=22 TO 150 STEP 6
IF Z>22 THEN PUT (X,Z-6),s12
1100 PUT (X,Z),s12
SOUND (Z+15)*2,.08
1110 NEXT Z
PUT (X,Z-6),s12:Y=Y+50
1120 FOR Z=150 TO Y STEP -6
IF Z<150 THEN PUT (X,Z+6),s13
1125 PUT (X,Z),s13
SOUND (Z+15)*2,1:NEXT Z
PUT (X,Z+6),s13
1130 FOR Z=Y TO 150 STEP 6
IF Z>Y THEN PUT (X,Z-6),s13
1135 PUT (X,Z),s13
SOUND (Z+15)*2,1:NEXT Z
PUT (X,Z-6),s13:Y=Y+30
IF Y<150 THEN 1120
1160 PUT (X,Z-6),s13:LOCATE 3,6
PRINT "Press <RETURN> to play ag
ain"
LOCATE 4,7
PRINT "Press <SPACE BAR> for men
u"
1170 a$=INKEY$
IF a$<>" " AND a$<>CHR$(13) THEN
1170
1180 c=0:M1=0:AV=0
IF a$=CHR$(13) THEN 70
GOSUB again:GOTO 70
1510 T4=INT(TIMER)
1520 a$=INKEY$
IF a$=" " THEN 1520
1530 T5=INT(TIMER):T2=T2+T5-T4
RETURN
1740 SOUND 440,1:RETURN
1770 SOUND 2300,1:RETURN
3000 FOR DE=1 TO 400:NEXT:RETURN
4
setup:
DEFINT L,r,s,w
SCREEN 1,320,200,2,1
' OPEN WINDOW 3 WITH NO GADGETS
OR
' title BAR
WINDOW 1,"", (0,0)-(311,25),16,1
WINDOW 3,"", (0,0)-(311,185),16,1
4
WINDOW OUTPUT 3
PALETTE 0,0,0,0
PALETTE 1,.5,1,1
PALETTE 2,1,0,0
PALETTE 3,1,1,.1
WIDTH 40
CLS
DIM voice$(8),w4$(200)
GET (0,0)-(25,20),w4$
RESTORE VOICEDATA
FOR J=0 TO 8
READ voice$(J)
NEXT
' Speech will be synchronous
VOICEDATA:
DATA 110,0,170,0,22200,64,10,1,0
4
talk$="Welcome to Tightrope"
LOCATE 12,11
PRINT talk$
GOSUB talk
L=87:DIM w1$(L)
FOR I=0 TO L:READ a$:w1$(I)=VAL(
"&h"+a$):NEXT
shapedata:
DATA 18,15,2,30,0,58,0,58,0,58
DATA 0,4070,800,C030,1800,2078,2
000,1FFF
DATA C000,F8,0,F8,0,F8,0,F8,0,F8
DATA 0,F8,0,F8,0,D8,0,D8
DATA 0,D8,0,78,0,38,0,1C
DATA 0,18,0,78,0,30,0,78
DATA 0,F8,0,4070,800,C030,1800,2
078
DATA 2000,1FFF,C000,F8,0,F8,0,F8
4
DATA 0,F8,0,F8,0,F8,0,D8
DATA 0,198,0,318,0,318,0,318
DATA 0,18C,0,186,0,30C,0,0
L=87:DIM w3$(L)
FOR I=0 TO L:READ a$:w3$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,0,58,0,58
DATA 0,4070,800,C030,1800,2078,2
000,1FFF
DATA C000,F8,0,F8,0,F8,0,F8,0,F8
DATA 0,F8,0,F8,0,D8,0,18C
DATA 0,306,0,603,0,601,8000,600
DATA C000,600,C000,1E01,8000,30,
0,78
DATA 0,F8,0,4070,800,C030,1800,2
078
DATA 2000,1FFF,C000,F8,0,F8,0,F8
4
DATA 0,F8,0,F8,0,F8,0,D8
DATA 0,18C,0,306,0,603,0,601
DATA 8000,600,C000,600,C000,1E01
,8000,0
L=87:DIM r1$(L)
FOR I=0 TO L:READ a$:r1$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,0,58,1000,F8
DATA 1800,70,7000,31,C000,7F,0,1
FC
DATA 0,7F8,0,1CF8,0,F0F8,0,40F8
DATA 0,F8,0,F8,0,D8,0,198
DATA 0,318,0,30C,0,306,0,186
DATA 0,18C,0,300,0,30,0,78
DATA 1000,F8,1800,70,7000,31,C00
0,7F
DATA 0,1FC,0,7F8,0,1CF8,0,F0F8
DATA 0,40F8,0,F8,0,F8,0,D8
DATA 0,198,0,318,0,30C,0,306
DATA 0,186,0,18C,0,300,0,0
L=87:DIM r2$(L)
FOR I=0 TO L:READ a$:r2$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,3800,58,6000,F8
DATA C000,71,8000,33,0,7E,0,1FC
DATA 0,3F8,0,6F8,0,CF8,0,18F8
DATA 0,30F8,0,E0F8,0,D8,0,198
DATA 0,318,0,30C,0,307,C000,180
DATA C000,180,4000,300,0,30,3800
,78
DATA 6000,F8,C000,71,8000,33,0,7
E
DATA 0,1FC,0,3F8,0,6F8,0,CF8
DATA 0,18F8,0,30F8,0,E0F8,0,D8
DATA 0,198,0,318,0,30C,0,307
DATA C000,180,C000,180,4000,300,
0,0
L=87:DIM r3$(L)
FOR I=0 TO L:READ a$:r3$(I)=VAL(
"&h"+a$):NEXT
DATA 15,15,2,1860,798,3330,330,6
598
DATA 47C2,CF98,478C,C718,C7B0,63
31,C7C0,3FE3
DATA 400,1FC6,400,F8C,400,F98,79
8,FB0
DATA 330,FE0,7C2,FC0,78C,C00,7B0
,C00

```

```

DATA 2000,1FFF,C000,F8,0,F8,0,F8
4
DATA 0,F8,0,F8,0,F8,0,D8
DATA 0,D8,0,D8,0,78,0,38
DATA 0,1C,0,18,0,78,0,0
L=87:DIM w2$(L)
FOR I=0 TO L:READ a$:w2$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,0,58,0,58
DATA 0,4070,800,C030,1800,2078,2
000,1FFF
DATA C000,F8,0,F8,0,F8,0,F8,0,F8
DATA 0,F8,0,F8,0,D8,0,198
DATA 0,318,0,318,0,318,0,18C
DATA 0,186,0,30C,0,30,0,78
DATA 0,F8,0,4070,800,C030,1800,2
078
DATA 2000,1FFF,C000,F8,0,F8,0,F8
4
DATA 0,F8,0,F8,0,F8,0,D8
DATA 0,198,0,318,0,318,0,318
DATA 0,18C,0,186,0,30C,0,0
L=87:DIM w3$(L)
FOR I=0 TO L:READ a$:w3$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,0,58,0,58
DATA 0,4070,800,C030,1800,2078,2
000,1FFF
DATA C000,F8,0,F8,0,F8,0,F8,0,F8
DATA 0,F8,0,F8,0,D8,0,18C
DATA 0,306,0,603,0,601,8000,600
DATA C000,600,C000,1E01,8000,30,
0,78
DATA 0,F8,0,4070,800,C030,1800,2
078
DATA 2000,1FFF,C000,F8,0,F8,0,F8
4
DATA 0,F8,0,F8,0,F8,0,D8
DATA 0,18C,0,306,0,603,0,601
DATA 8000,600,C000,600,C000,1E01
,8000,0
L=87:DIM r1$(L)
FOR I=0 TO L:READ a$:r1$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,0,58,1000,F8
DATA 1800,70,7000,31,C000,7F,0,1
FC
DATA 0,7F8,0,1CF8,0,F0F8,0,40F8
DATA 0,F8,0,F8,0,D8,0,198
DATA 0,318,0,30C,0,306,0,186
DATA 0,18C,0,300,0,30,0,78
DATA 1000,F8,1800,70,7000,31,C00
0,7F
DATA 0,1FC,0,7F8,0,1CF8,0,F0F8
DATA 0,40F8,0,F8,0,F8,0,D8
DATA 0,198,0,318,0,30C,0,306
DATA 0,186,0,18C,0,300,0,0
L=87:DIM r2$(L)
FOR I=0 TO L:READ a$:r2$(I)=VAL(
"&h"+a$):NEXT
DATA 18,15,2,30,3800,58,6000,F8
DATA C000,71,8000,33,0,7E,0,1FC
DATA 0,3F8,0,6F8,0,CF8,0,18F8
DATA 0,30F8,0,E0F8,0,D8,0,198
DATA 0,318,0,30C,0,307,C000,180
DATA C000,180,4000,300,0,30,3800
,78
DATA 6000,F8,C000,71,8000,33,0,7
E
DATA 0,1FC,0,3F8,0,6F8,0,CF8
DATA 0,18F8,0,30F8,0,E0F8,0,D8
DATA 0,198,0,318,0,30C,0,307
DATA C000,180,C000,180,4000,300,
0,0
L=87:DIM r3$(L)
FOR I=0 TO L:READ a$:r3$(I)=VAL(
"&h"+a$):NEXT
DATA 15,15,2,1860,798,3330,330,6
598
DATA 47C2,CF98,478C,C718,C7B0,63
31,C7C0,3FE3
DATA 400,1FC6,400,F8C,400,F98,79
8,FB0
DATA 330,FE0,7C2,FC0,78C,C00,7B0
,C00

```



```

DATA 7C0,C00,400,C00,400,C00,400
,C004
DATA 400,C00,400,3C00,0,1860,0,3
3304
DATA 0,6798,4000,CF98,4000,C718,
C000,63314
DATA C000,3FE3,0,1FC6,0,F8C,0,F9
84
DATA 0,FB0,0,FE0,0,FC0,0,C004
DATA 0,C00,0,C00,0,C00,0,C004
DATA 0,C00,0,C00,0,3C00,0,04
L= 87 :DIM s11%(L)4
FOR I=0 TO L:READ a$:s11%(I)=VAL(
"&h"+a$):NEXT4
DATA 18,15,2,0,98,30,30,40584
DATA C2,E0F8,8C,3870,B0,E30,C0,3
F84
DATA 0,FC,0,FF,0,F9,C098,F84
DATA 7830,F8,10C2,F8,8C,D8,B0,19
84
DATA C0,318,0,318,0,318,0,30C4
DATA 0,F04,0,C,0,0,0,304
DATA 0,4078,0,E0F8,0,3870,0,E304
DATA 0,3F8,0,FC,0,FF,0,F94
DATA C000,F8,7800,F8,1000,F8,0,D
84
DATA 0,198,0,318,0,318,0,3184
DATA 0,30C,0,F04,0,C,0,0,4
L= 87 :DIM s12%(L)4
FOR I=0 TO L:READ a$:s12%(I)=VAL(
"&h"+a$):NEXT4
DATA 16,15,2,0,98,E060,30,30B04
DATA C2,19F0,8C,CE0,B0,660,C0,3F
04
DATA 0,1F8,0,1FC,0,1F6,98,1F34
DATA 30,1F1,80C2,1F0,E08C,1B0,40
B0,3304
DATA C0,630,0,630,0,630,0,6184
DATA 0,1E00,0,18,0,0,0,E0604
DATA 0,30F0,0,19F0,0,CE0,0,6604
DATA 0,3F0,0,1F8,0,1FC,0,1F64
DATA 0,1F3,0,1F1,8000,1F0,E000,1
B04
DATA 4000,330,0,630,0,630,0,6304
DATA 0,618,0,1E00,0,18,0,04
L= 87 :DIM s13%(L)4
FOR I=0 TO L:READ a$:s13%(I)=VAL(
"&h"+a$):NEXT4
DATA 14,15,2,C3,98,199,8030,832C
4
DATA C0C2,867C,C08C,C638,C0B0,E3
19,80C0,31FF4
DATA 0,18FE,0,C7C,0,67C,98,37C4
DATA 30,1FC,C2,FC,8C,C,B0,C4
DATA C0,C,0,C,0,C,0,C4
DATA 0,C,0,F,0,C3,0,1994
DATA 8000,833C,C000,867C,C000,C6
38,C000,E3194
DATA 8000,31FF,0,18FE,0,C7C,0,67
C4
DATA 0,37C,0,1FC,0,FC,0,C4
DATA 0,C,0,C,0,C,0,C4
DATA 0,C,0,C,0,F,0,04
L= 87 :DIM s14%(L)4
FOR I=0 TO L:READ a$:s14%(I)=VAL(
"&h"+a$):NEXT4
DATA 13,15,2,C3C3,98,C243,30,63C
64
DATA C2,324C,8C,1998,B0,FF0,C0,7
E04
DATA 0,7E0,0,7E0,0,7E0,98,7E04
DATA 30,7E0,C2,7E0,8C,660,B0,C30
4
DATA C0,1818,0,1818,0,1818,0,181
84
DATA 0,1818,0,781E,0,C3C3,0,C3C3
4
DATA 0,63C6,0,324C,0,1998,0,FF04
DATA 0,7E0,0,7E0,0,7E0,0,7E04
DATA 0,7E0,0,7E0,0,7E0,0,6604
DATA 0,C30,0,1818,0,1818,0,18184
DATA 0,1818,0,1818,0,781E,0,04
L= 39 :DIM s15%(L)4
FOR I=0 TO L:READ a$:s15%(I)=VAL(
"&h"+a$):NEXT4

```

```

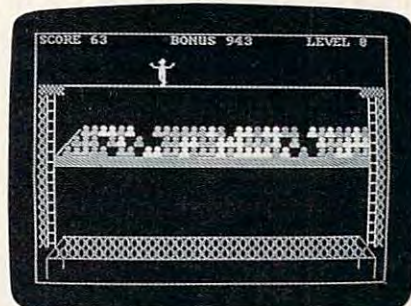
DATA 10,12,2,70,78,78,38,04
DATA 1C,183E,1C7F,6CF,18F,400F,6
70F,2F8F4
DATA B9FF,907F,C00F,FFFF,7FFE,70
,78,784
DATA 38,0,1C,183E,1C7F,6CF,18F,4
00F4
DATA 670F,2F8F,B9FF,907F,C00F,FF
FF,7FFE,18184
L= 19 :DIM s16%(L)4
FOR I=0 TO L:READ a$:s16%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,1C00,3E00,3E00,1C00,7
E004
DATA FF00,FF00,FF00,0,0,0,0,04
DATA 80,80,80,04
L= 19 :DIM s17%(L)4
FOR I=0 TO L:READ a$:s17%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,0,0,0,0,04
DATA 0,0,0,1C00,3E00,3E00,1C00,7
E004
DATA FF00,FF00,FF00,04
L= 19 :DIM s18%(L)4
FOR I=0 TO L:READ a$:s18%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,1C00,3E00,3E00,1C00,7
E004
DATA FF00,FF00,FF00,04
L= 19 :DIM s19%(L)4
FOR I=0 TO L:READ a$:s19%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,1C00,3E00,3E00,1C00,7
E004
DATA FF00,FF00,FF00,1C00,3E00,3E
00,1C00,7E004
DATA FF00,FF00,FF00,04
L= 19 :DIM s15%(L)4
FOR I=0 TO L:READ a$:s15%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,C300,6600,3C00,3C00,3
C004
DATA 3C00,6600,C300,0,0,0,0,04
DATA 0,0,0,04
L= 19 :DIM s16%(L)4
FOR I=0 TO L:READ a$:s16%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,8100,8100,8100,8100,F
F004
DATA 8100,8100,8100,8100,8100,81
00,8100,FF004
DATA 8100,8100,8100,04
L= 19 :DIM s14%(L)4
FOR I=0 TO L:READ a$:s14%(I)=VAL(
"&h"+a$):NEXT4
DATA 8,8,2,70,78,78,38,04
DATA 1C,3E,7F,CCCF,CC8F,330F,330
F,CC8F4
DATA CCFF,337F,330F,FFFF4
again:4
RANDOMIZE TIMER4
CLS4
GOSUB title4
RETURN4
announce:4
talk$=c$4
talk:4
IF talkflag=0 THEN SAY TRANSLATE
$(talk$),voice%4
RETURN4
title:4
talk$="press 1 for game, 2 for t
yping"4
GOSUB talk4
WINDOW 4," Press 1 or 2", (6
5,70)-(250,110),16,14
PRINT:PRINT " 1- Game"4
PRINT:PRINT " 2- Typing"4
grabkey:4
a$=INKEY$:IF a$="" THEN grabkey4
w=VAL(a$)4
IF w<1 OR w>2 THEN grabkey4
talk$="Press 0 through 9 to choo
se difficulty level."4
GOSUB talk4
WINDOW 4,"Press 0-9 for difficul

```

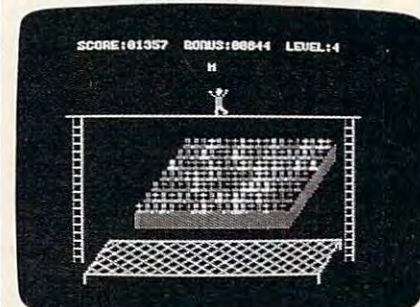
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ty", (65,70)-(255,110),16,14
PRINT:PRINT:PRINT " Enter lev
el (0-9)"4
grabkey1:4
a$=INKEY$:IF a$="" OR (a$<"0" OR
a$>"9") THEN grabkey14
b=VAL(a$)4
d=b: b=10-b: IF w=1 THEN b=b*24
IF w=2 THEN b=b*404
WINDOW CLOSE 44
temp$="typing"4
IF w=1 THEN temp$="game" 4
talk$=temp$+" "+"level"+STR
$(d)4
GOSUB talk4
RETURN4
getout:4
WINDOW CLOSE 34
SCREEN CLOSE 14
WINDOW 1,"Tightrope",31,-14
WINDOW OUTPUT 14
END4

```



Amiga "Tightrope" requires 512K of memory and uses keyboard controls.



This version of "Tightrope" runs on all Apple II computers using either a joystick or game paddles.

Program 5: Apple Tightrope

Version by Tim Victor, Editorial Programmer

```

25 10 HOME : VTAB 6: HTAB 8: PRI
NT "READING DATA, PLEASE W
AIT": GOSUB 770
E4 20 TEXT : HOME : VTAB 12: HTA
B 15: PRINT "(1) GAME": HT
AB 15: PRINT "(2) TYPING":
GET A$:GM = VAL (A$): IF
GM < 1 OR GM > 2 THEN 20
97 30 HOME : VTAB 12: HTAB 10: P
RINT "DIFFICULTY(0-9) ":
GET L$: IF L$ < "0" OR L$
> "9" THEN 30
52 40 GOSUB 590
CE 50 CALL 32771
58 60 LV = VAL (L$):SC = 0
C9 70 BO = 1000: GOSUB 520:I = 2
58

```



```

CB 80 FOR S = 1 TO 3: CALL 32768
  ,S,I - S * 2,32: FOR J = 1
  TO 200: NEXT : NEXT
7C 90 I = I - 6: IF I > 228 THEN
  80
EE 100 DF = 225 / (LV + 1.5):C =
  0
2E 110 FOR J = 1 TO 1000: NEXT
E2 120 IF RND (1) > .08 * (10 -
  LV) THEN GOSUB 320
B9 130 IF C = 1 THEN 280
FA 140 IF GM = 2 THEN 170
A6 150 IF PDL (0) < 90 THEN A =
  4: GOSUB 330: GOTO 130
19 160 IF PDL (0) > 156 THEN A =
  8: GOSUB 330: GOTO 130
1B 170 FOR S = 1 TO 3: CALL 3276
  8,S,I - S * 2,32
23 180 BO = BO - 3: IF BO < 0 TH
  EN BO = 0
15 190 SC = SC + LV + 1: GOSUB 5
  20
78 200 FOR J = 1 TO 150: NEXT
88 210 NEXT : I = I - 6: IF I > 1
  8 THEN 120
F1 220 LV = LV + 1: IF LV > 9 TH
  EN LV = 9
92 230 SC = SC + BO: GOSUB 520:
  FOR J = 1 TO 400: NEXT
16 240 FOR S = 1 TO 3: CALL 3276
  8,S,I - S * 2,32
56 250 FOR J = 1 TO 300: NEXT :
  NEXT
3F 260 I = I - 6: IF I > 0 THEN
  240
3B 270 GOTO 70
CD 280 VTAB 2: HTAB 7: PRINT "PR
  ESS RETURN TO PLAY AGAIN"
  : HTAB 8: PRINT "PRESS SP
  ACE BAR FOR MENU"
6C 290 POKE 49168,0: GET A$: IF
  A$ = CHR$ (32) THEN 20
80 300 IF A$ = CHR$ (13) THEN VT
  AB 2: PRINT SPC (80): GOT
  O 60
8A 310 HOME : TEXT : END
8D 320 A = (RND (1) > .5) * 4 +
  4
73 330 CALL 32768,A,I,32
9A 340 IF GM = 1 THEN 400
74 350 C$ = CHR$ (65 + 26 * RND
  (1)): VTAB 3: HTAB INT (I
  / 7) + 1: PRINT C$
75 360 POKE 49168,0:CT = DF
95 370 K = PEEK (49152): IF K <
  128 THEN CT = CT - 1: IF
  CT > 0 THEN 370
77 380 IF K > 127 AND K - 128 =
  ASC (C$) THEN 500
4B 390 PRINT CHR$ (7): GOTO 440
AD 400 CT = DF / 6
DB 410 IF PDL (0) > 89 AND PDL (
  0) < 157 THEN CT = CT - 1
  : IF CT > 0 THEN 410
39 420 IF PDL (0) < 90 AND A > 7
  OR PDL (0) > 156 AND A <
  8 THEN 500
74 430 FOR J = 1 TO CT: NEXT
6D 440 A = A + 1:BO = BO - 3: IF
  A = 8 THEN A = 12
34 450 IF A < 12 THEN 330
9E 460 FOR T = 0 TO 40:Y = 142 -
  110 * EXP ( - T / 10) *
  ABS ( COS (T / 2))
19 470 CALL 32768,12,I,Y
33 480 FOR CT = 1 TO 12: NEXT :
  NEXT
A4 490 C = 1: VTAB 3: HTAB INT (
  I / 7) + 1: PRINT " ": RE
  TURN
C5 500 A = A - 1: IF A < > 3 AND
  A < > 7 THEN 330
78 510 VTAB 3: HTAB INT (I / 7)
  + 1: PRINT " ":C = 0: RET
  URN

```

```

D0 520 A = FRE (0): VTAB 1: HTAB
  3: PRINT "SCORE:": HTAB
  16: PRINT "BONUS:": HTA
  B 29: PRINT "LEVEL:":
AF 530 HTAB 9:NL = 5:NN = SC: GO
  SUB 560
73 540 HTAB 22:NL = 5:NN = BO: G
  OSUB 560
63 550 HTAB 35:NL = 1:NN = LV
F2 560 NS$ = RIGHT$ (STR$ (NN),
  NL)
11 570 IF LEN (NS$) < NL THEN NS
  $ = "0" + NS$: GOTO 570
74 580 PRINT NS$: RETURN
AB 590 HGR2 : HCOLOR = 7
4F 600 HCOLOR = 6: FOR X = 1 TO 1
  2: HPLLOT 62,126 + X TO 19
  8,126 + X TO 240,76 + X:
  NEXT
26 610 VTAB 10: FOR V = 1 TO 7:
  HTAB 17 - V: FOR H = 1 TO
  19: PRINT CHR$ (60 + INT
  (4 * RND (1))): NEXT :
  PRINT : NEXT
34 620 HCOLOR = 7: FOR X = 160 TO
  60 STEP - 6: HPLLOT 10,X
  TO 17,X: HPLLOT 250,X TO 2
  57,X: NEXT
3E 630 FOR X = 0 TO 240 STEP 240
  : FOR Y = 0 TO 7 STEP 7:
  HPLLOT 10 + X + Y,164 TO 1
  0 + X + Y,56: NEXT : NEXT
B1 640 HPLLOT 4,56 TO 263,56
85 650 HCOLOR = 5: HPLLOT 40,148 T
  O 245,148 TO 225,173 TO 2
  0,173 TO 40,148
E7 660 FOR X = - 12 TO 223 STEP
  12: SX = X: SY = 173: EX = X
  + 50: EY = 148
94 670 IF SX < 20 THEN SX = 30 -
  2 * X / 3: SY = 173 - SX
  / 2 + X / 2
37 680 IF EX > 245 THEN EX = 376
  - 2 * X / 3: EY = 173 - E
  X / 2 + X / 2
6E 690 HPLLOT SX,SY TO EX,EY: NEX
  T
D5 700 FOR X = 20 TO 295 STEP 14
  : SX = X: SY = 173: EX = X -
  50: EY = 148
34 710 IF EX < 40 THEN EX = 15 +
  2 * X / 7: EY = 173 + EX
  / 2 - X / 2
AA 720 IF SX > 225 THEN SX = 161
  + 2 * X / 7: SY = 173 + S
  X / 2 - X / 2
63 730 HPLLOT SX,SY TO EX,EY: NEX
  T
9C 740 HPLLOT 19,173 TO 19,180: H
  PLOT 225,173 TO 225,180:
  HPLLOT 245,148 TO 245,155
21 750 RETURN
FC 760 PRINT "DATA ERROR": END
4E 770 FOR A = 768 TO A + 87: RE
  AD D: POKE A,D: NEXT
94 780 READ D: IF D < > - 1 THEN
  760
88 790 FOR A = 32768 TO A + 502:
  READ D: POKE A,D: NEXT
85 800 READ D: IF D < > - 1 THEN
  760
7C 810 FOR A = 33620 TO A + 863:
  READ D: POKE A,D: NEXT
89 820 READ D: IF D < > - 1 THEN
  760
7A 830 FOR A = 36096 TO A + 7: P
  OKE A,128: NEXT
7E 840 FOR A = 36200 TO A + 367:
  READ D: POKE A,D: NEXT
8F 850 READ D: IF D < > - 1 THEN
  760
63 860 IF PEEK (190 * 256) = 76
  THEN PRINT CHR$ (4): "PR#A
  768": GOTO 880
C7 870 POKE 54,0: POKE 55,3: CAL

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L 1002
58 880 POKE 6,0: POKE 7,141: POK
  E 230,64
2A 890 RETURN
79 900 DATA 216,120,133,69,134,7
  0,132,71,166,7,10
9D 910 DATA 10,176,4,16,62,48,4,
  16,1,232,232
AE 920 DATA 10,134,27,24,101,6,1
  33,26,144,2,230
FC 930 DATA 27,165,40,133,8,165,
  41,41,3,5,230
98 940 DATA 133,9,162,8,160,0,17
  7,26,36,50,48
CB 950 DATA 2,73,127,164,36,145,
  8,230,26,208,2
74 960 DATA 230,27,165,9,24,105,
  4,133,9,202,208
E7 970 DATA 226,165,69,166,70,16
  4,71,88,76,240,253
C3 980 DATA -1
D8 990 DATA 76,6,128,76,71,128,1
  73,9,130,240,3
69 1000 DATA 32,77,128,32,141,12
  8,176,57,32,140,129
IF 1010 DATA 176,52,32,227,129,1
  76,47,173,249,129,133
33 1020 DATA 252,141,7,130,173,2
  50,129,133,253,141,8
59 1030 DATA 130,173,255,129,141
  ,4,130,173,2,130,141
1C 1040 DATA 5,130,173,3,130,141
  ,6,130,169,255,141
55 1050 DATA 9,130,76,102,128,16
  9,0,141,9,130,96
CE 1060 DATA 173,7,130,133,252,1
  73,8,130,133,253,173
83 1070 DATA 4,130,141,255,129,1
  73,5,130,141,2,130
51 1080 DATA 173,6,130,169,2,141
  ,251,129,169,24,141
6E 1090 DATA 252,129,32,36,129,3
  2,205,128,32,22,129
68 1100 DATA 238,255,129,165,252
  ,24,105,3,133,252,144
E8 1110 DATA 2,230,253,206,252,1
  29,208,228,96,169,12
BB 1120 DATA 141,249,129,169,131
  ,141,250,129,32,236,129
07 1130 DATA 201,21,144,1,96,141
  ,247,129,169,0,141
FE 1140 DATA 248,129,160,3,32,17
  4,128,160,3,173,247
91 1150 DATA 129,10,46,248,129,1
  36,208,249,141,247,129
A7 1160 DATA 24,109,249,129,141,
  249,129,173,250,129,109
B2 1170 DATA 248,129,141,250,129
  ,24,96,172,251,129,200
F1 1180 DATA 140,253,129,169,0,1
  53,12,130,136,177,252
6A 1190 DATA 153,12,130,136,16,2
  48,173,12,130,9,127
3C 1200 DATA 141,254,129,172,3,1
  30,240,21,162,0,14
BB 1210 DATA 12,130,189,12,130,1
  0,62,13,130,232,236
FB 1220 DATA 253,129,208,243,136
  ,208,235,172,253,129,185
37 1230 DATA 12,130,9,128,45,254
  ,129,153,12,130,136
66 1240 DATA 16,242,96,172,253,1
  29,185,12,130,81,254
C4 1250 DATA 145,254,136,16,246,
  96,173,255,129,41,63
EB 1260 DATA 168,185,76,129,5,23
  0,133,255,173,255,129
AB 1270 DATA 41,8,240,2,169,128,
  24,44,255,129,112
18 1280 DATA 4,16,4,105,40,105,4
  0,109,2,130,133
71 1290 DATA 254,96,0,4,8,12,16,
  20,24,28,0
99 1300 DATA 4,8,12,16,20,24,28,
  1,5,9,13

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EA 1310 DATA 17,21,25,29,1,5,9,1
3,17,21,25

35 1320 DATA 29,2,6,10,14,18,22,
26,30,2,6

81 1330 DATA 10,14,18,22,26,30,3
7,11,15,19

6A 1340 DATA 23,27,31,3,7,11,15,
19,23,27,31

IF 1350 DATA 32,236,129,140,0,13
0,141,158,129,169,0

IF 1360 DATA 141,1,130,24,160,4,
105,216,162,3,106

6A 1370 DATA 110,1,130,24,202,20
8,248,136,208,241,141

4B 1380 DATA 2,130,173,1,130,42,
42,42,42,41,7

27 1390 DATA 201,7,208,5,238,2,1
30,169,0,141,3

DF 1400 DATA 130,173,0,130,240,2
3,24,173,3,130,105

EE 1410 DATA 4,201,7,144,2,169,0
141,3,130,173

54 1420 DATA 2,130,105,36,141,2,
130,201,40,96,32

89 1430 DATA 236,129,141,255,129
201,192,96,32,177,0

E2 1440 DATA 32,5,225,165,161,16
4,160,96

23 1450 DATA -1

5B 1460 DATA 0,0,0,0,0,0,0,28,0,
0,60

59 1470 DATA 0,0,62,0,0,28,0,0,1
2,0,6

43 1480 DATA 0,48,84,42,21,0,42,
0,0,42,0

CD 1490 DATA 0,42,0,0,42,0,0,42,
0,0,42

BB 1500 DATA 0,0,62,0,0,62,0,0,5
1,0,64

FA 1510 DATA 97,0,64,97,0,64,65,
1,64,65,1

71 1520 DATA 64,1,3,96,64,1,0,0,
0,0,0

7C 1530 DATA 0,0,28,0,0,60,0,0,6
2,0,0

E7 1540 DATA 28,0,0,12,0,6,0,48,
84,42,21

BF 1550 DATA 0,42,0,0,42,0,0,42,
0,0,42

F7 1560 DATA 0,0,42,0,0,42,0,0,6
2,0,0

B3 1570 DATA 62,0,0,54,0,0,54,0,
0,99,0

5D 1580 DATA 0,67,1,0,6,3,0,70,1
0,3

0C 1590 DATA 0,0,0,0,0,0,0,28,0,
0,0

92 1600 DATA 60,0,0,62,0,0,28,0,
0,12,0

3A 1610 DATA 6,0,48,84,42,21,0,4
2,0,0,42

E1 1620 DATA 0,0,42,0,0,42,0,0,4
2,0,0

9F 1630 DATA 42,0,0,62,0,0,62,0,
0,54,0

BB 1640 DATA 0,30,0,0,30,0,0,60,
0,0,108

0E 1650 DATA 0,0,56,0,0,12,0,0,0
0,0

D7 1660 DATA 0,0,0,28,0,0,60,0,0
62,0

68 1670 DATA 0,28,0,0,12,48,0,0,
21,6,42

CA 1680 DATA 0,84,42,0,0,42,0,0,
42,0,0

D5 1690 DATA 42,0,0,42,0,0,42,0,
0,62,0

58 1700 DATA 0,62,0,0,54,0,0,54,
0,0,99

FC 1710 DATA 0,0,67,1,0,6,3,0,70
1,0

35 1720 DATA 3,0,0,0,0,0,0,0,2
8,0

B3 1730 DATA 0,60,0,0,62,24,0,28
8,0,12

99 1740 DATA 4,0,0,1,0,42,0,64,4
2,0,16

66 1750 DATA 42,0,8,42,0,12,42,0
0,42,0

5B 1760 DATA 0,42,0,0,62,0,0,62,
0,0,54

A2 1770 DATA 0,0,102,0,0,67,1,0,
3,6,0

CF 1780 DATA 6,3,0,6,0,0,3,0,0,0
0

FD 1790 DATA 0,0,0,0,28,0,0,60,4
8,0,62

FB 1800 DATA 16,0,28,4,0,12,4,0,
0,1,2

64 1810 DATA 42,0,86,42,0,0,42,0
0,42,0

BA 1820 DATA 0,42,0,0,42,0,0,42,
0,0,62

4F 1830 DATA 0,0,62,0,0,102,0,0,
70,1,0

0D 1840 DATA 3,3,0,3,6,0,6,3,0,6
0

0E 1850 DATA 0,3,0,0,0,0,0,0,0,0
0

DC 1860 DATA 0,0,0,0,28,0,0,60
12,12

0B 1870 DATA 62,4,8,28,4,16,12,1
64,0,1

D1 1880 DATA 0,42,0,0,42,0,0,42,
0,0,42

02 1890 DATA 0,0,42,0,0,42,0,0,4
2,0,0

D6 1900 DATA 62,0,0,126,0,0,102,
1,0,3,7

D6 1910 DATA 0,3,12,0,6,7,0,3,0,
0,0

73 1920 DATA 0,0,0,0,28,0,0,60
0,0

C9 1930 DATA 62,0,6,28,0,4,12,0,
80,0,0

D8 1940 DATA 0,42,0,0,42,5,0,42,
48,0,42

F3 1950 DATA 0,0,42,0,0,42,0,0,4
2,0,0

D4 1960 DATA 62,0,0,62,0,0,54,0,
0,124,0

61 1970 DATA 0,124,1,0,12,3,0,10
8,1,0,16

21 1980 DATA 0,0,12,0,0,0,0,0,0,
0,0

86 1990 DATA 28,0,0,60,0,12,62,0
8,28,0

D9 2000 DATA 16,12,0,64,0,0,0,42
0,0,42

68 2010 DATA 1,0,42,4,0,42,48,0,
42,0,0

2F 2020 DATA 42,0,0,42,0,0,62,0,
0,62,0

BD 2030 DATA 0,60,0,0,124,0,0,76
7,0,12

52 2040 DATA 6,0,12,3,0,16,0,0,1
2,0,0

A7 2050 DATA 0,0,0,0,0,0,28,0,6,
60,0

9C 2060 DATA 4,62,0,16,28,0,16,1
2,0,64,0

38 2070 DATA 0,0,42,32,0,42,53,0
42,0,0

86 2080 DATA 42,0,0,42,0,0,42,0,
0,42,0

DD 2090 DATA 0,62,0,0,60,0,0,120
0,0,24

DE 2100 DATA 7,0,24,12,0,24,6,0,
24,0,0

0C 2110 DATA 24,0,0,12,0,0,0,0,0
0,0

6F 2120 DATA 0,0,0,0,0,0,28,0,
24,60

BD 2130 DATA 0,16,62,24,16,28,8,
64,12,4,64

68 2140 DATA 0,1,0,42,0,0,42,0,0
42,0

BB 2150 DATA 0,42,0,0,42,0,0,42,
0,0,42

9C 2160 DATA 0,0,62,0,0,60,0,0,1
20,1,0

0B 2170 DATA 24,6,0,24,3,0,48,0,
0,28,0

01 2180 DATA 0,0,0,0,0,0,0,0,0,0
0

72 2190 DATA 0,0,0,0,0,0,0,0,28,
0,24

6D 2200 DATA 60,12,16,62,4,16,28
4,64,12,1

35 2210 DATA 64,0,1,0,42,0,0,42,
0,4,46

89 2220 DATA 0,4,46,0,12,46,0,24
46,0,48

D2 2230 DATA 58,0,96,63,0,64,127
0,0,119,0

2D 2240 DATA 0,0,0,0,0,0

28 2250 DATA -1

A5 2260 DATA 128,128,128,128,190
128,128,128,128,128

B2 2270 DATA 190,128,190,128,128
128,188,230,176,152,128

5E 2280 DATA 152,128,128,188,230
246,238,230,188,128,128

49 2290 DATA 152,156,152,152,152
188,128,128,188,230,176

99 2300 DATA 140,230,254,128,128
188,230,176,224,230,188

DB 2310 DATA 128,128,176,184,180
254,176,176,128,128,254

1A 2320 DATA 134,190,224,230,188
128,128,188,134,190,230

5A 2330 DATA 230,188,128,128,254
224,176,152,140,140,128

D6 2340 DATA 128,188,230,188,230
230,188,128,128,188,230

23 2350 DATA 230,252,176,152,128
128,128,152,152,128,152

0E 2360 DATA 152,128,128,190,190
190,190,190,190,128,128

7F 2370 DATA 148,148,148,128,148
213,213,0,20,20,20

59 2380 DATA 0,20,85,85,128,136,
170,136,128,136,170

1D 2390 DATA 170,0,8,42,8,0,8,42
42,128,128

34 2400 DATA 152,188,188,152,128
128,128,252,230,230,254

EB 2410 DATA 230,230,128,128,190
230,230,190,230,254,128

3E 2420 DATA 128,188,230,134,134
230,190,128,128,190,230

5B 2430 DATA 230,230,230,190,128
128,254,134,134,190,134

2A 2440 DATA 254,128,128,254,134
134,190,134,134,128,128

69 2450 DATA 188,230,134,246,230
190,128,128,230,230,230

2A 2460 DATA 254,230,230,128,128
152,152,152,152,152,152

46 2470 DATA 128,128,224,224,224
224,230,188,128,128,230

1F 2480 DATA 230,182,158,230,230
128,128,134,134,134,134

BB 2490 DATA 134,254,128,128,194
230,254,230,230,230,128

2D 2500 DATA 128,190,230,230,230
230,230,128,128,188,230

2E 2510 DATA 230,230,230,188,128
128,190,230,230,190,134

BE 2520 DATA 134,128,128,188,230
230,230,182,236,128,128

BE 2530 DATA 190,230,230,190,230
230,128,128,188,230,140

CA 2540 DATA 176,230,190,128,128
254,152,152,152,152,152

88 2550 DATA 128,128,230,230,230
230,230,190,128,128,230


44 2560 DATA 230,230,230,230,152
128,128,230,230,230,254

92 2570 DATA 230,194,128,128,230
230,164,152,164,230,128

4F 2580 DATA 128,230,230,230,188
152,152,128,128,254,176

57 2590 DATA 152,140,134,254,128
14,2600 DATA -1

SOFTBALL STATISTICS FOR ATARI ST



Roger Felton

What's the worst position on a softball team? Catchers have to squat in an uncomfortable stance for an hour or more and duck hazardous foul balls. Pitchers have to duel with mighty sluggers and dodge powerful line drives. First basemen have to stretch their bodies like rubber bands to nab wayward throws from their teammates while keeping at least one toe on the base bag. And outfielders have to scoop up bouncing grounders with the knowledge that no one is backing them up except the outfield fence.

But as demanding as all these positions are, there's another that could be worse—that of team statistician. Keeping track of your teammates' performance is often a laborious, thankless job. Sometimes the statistician is a reserve player or friend of the team who doesn't even get to play. Caged in the dugout, the statistician is supposed to document every hit, run, and walk, and boost team morale by contributing lively chatter. After the game, the statistician has to spend hours punching numbers into a calculator to figure out everyone else's batting average.

"Softball Statistics" makes that job much easier. After each game, the program prompts you to enter

"Softball Statistics" makes it easy to keep track of all the individual and team results for your favorite team. You can enter data for each player's times at bat, hits, runs, and so on. The program automatically computes batting averages, stores cumulative results on disk as the season progresses, generates formatted printouts with sorted rankings for all players, and more. The program was originally written for the eight-bit Atari and adapted for several other computers in the July 1985 issue of COMPUTE!. This new version runs in medium- or high-resolution modes on any Atari ST with the TOS operating in ROM. An 80-column printer is optional but recommended.

vital stats for each player. Then it automatically calculates the batting averages and prints sorted rankings on the screen or printer. It can also print sorted rankings for hits, runs, and runs batted in. These game statistics can then be merged with data

for all previous games, and updated season results can be sorted by category and printed. Finally, the program lets you store the cumulative statistics on disk.

If you're a fan of professional or Little League baseball, you can use Softball Statistics to follow the fortunes of your favorite team. And with modifications, it could be adapted to a wide variety of sports.

Preparing The Program

Be extra careful when typing Softball Statistics because a mistyped line could yield inaccurate results even if the program runs without errors. Save a copy on disk for safekeeping before running it the first time.

Before using the program, you have to prepare it by entering your team's roster. Softball Statistics can handle a team with up to 20 players and stores this information in DATA statements as part of the program itself. If you're keeping stats for more than one team, you'll have to keep a separate copy of the program for each team.

The DATA statements for player information begin at line 2300. The statements must conform to a predefined format: a two-digit jersey number followed by a space, then the player's first or last name.

Precede one-digit jersey numbers with a zero, such as 08 for 8. Names can be any length, but only the first seven characters appear on the printouts. Each entry is separated by a comma. Example:

2300 DATA 23 LEE,17 JACKSON,33
JOHNSTON,10 LONGSTREET,04
PICKETT

(In the output, JOHNSTON and LONGSTREET would appear as JOHNSTO and LONGSTR.)

The programs are listed with dummy entries in the DATA statements, such as 44 Jim and 10 PLAYERX. Substitute your own team members for these entries. If your team has fewer than 20 players, leave the remaining dummy entries in the DATA statements but substitute the name PLAYERX; the program must have 20 entries to function, and it ignores the PLAYERX entries.

Finally, put your own team's name in the TM\$ string statement at line 190. Softball Statistics is now ready to run.

Important note: You should avoid tinkering with the player name DATA statements once you've started using the program. Otherwise, there will be problems when it attempts to compute cumulative season totals. If you drop a player from the roster and replace him with another player, the new player's totals will contain the old player's results as well. To drop a player, substitute a PLAYERX dummy entry at that position in the DATA statement. Of course, this means the dropped player's results will no longer be included in the team totals for the season. If you wish to retain a dropped player's results in the team totals, leave the player's name in the DATA statement and enter 999 in response to all input prompts for that player's stats following subsequent games (see below).

Compiling Statistics

Once the roster is entered, you can run the program. It begins by asking for statistics for individual games. The first prompt asks:

Who did you play?

Respond with the opposing team's name—such as Ham's Diner—and press RETURN. The next prompt reads:

Figure 1: Printout of Team Game Stats

ROSTER IS SORTED BY BATTING AVERAGE

#	PLAYER	AB	RUNS	HITS	RBI	2B	3B	HR	BB	AVG
09	MARTY	6	2	5	3	2	1	1	0	0.833
03	JOHN	5	2	4	2	2	0	1	1	0.800
55	MIKE	4	1	3	1	1	0	1	0	0.750
44	JIM	5	4	3	1	2	0	0	0	0.600
08	KEN	4	1	2	1	1	1	0	0	0.500
08	BOB	6	3	3	2	2	0	0	2	0.500
22	PETE	5	1	2	2	0	0	0	0	0.400
07	BILL	5	1	2	0	1	0	0	0	0.400
06	BARRY	6	2	2	0	1	0	0	3	0.333
TOTALS		46	17	26	12	12	2	3	6	0.565

Enter your score and their score
(separated by a comma):

For instance, if your team lost by a score of 9 to 5, you'd type 5,9 and press RETURN.

The program now begins asking for individual player statistics. If the first player name on your roster is Kevin, the program prints

Kevin's statistics for this game:

and then prompts you, one by one, to enter the number of times at bat, runs scored, hits, runs batted in (RBIs), doubles, triples, home runs, and walks. At each prompt, type the appropriate number and press RETURN. After the last prompt, the program asks:

Is everything OK (Y/N)?

If you made any mistakes while entering the current player's stats, press N. You'll be given a chance to reenter the numbers.

When all the player's statistics

are correct, press Y at the prompt. The program continues to the next player on the roster and repeats the cycle.

If a certain player missed a game, type 999 at the first prompt. This automatically enters zeros for all his stats and skips to the next player. In fact, entering 999 at any prompt inputs zeros for all of a player's remaining game stats.

Individual Printouts

After you type the last statistic for the last player, the program prints the message WORKING while it sorts all the data. (The WORKING message appears at other points in the program during sorts, since the sort routine is written in BASIC and is not particularly fast.) In a few moments, the program says:

Do you want a printout of the game's stats (Y/N)?

Type Y for yes or N for no. If

Figure 2: Printout of Slugging Stats

HITS SORT:		RBIS SORT:		RUNS SORT:	
#	PLAYER	HITS	#	PLAYER	RBIS
09	MARTY	5	09	MARTY	3
03	JOHN	4	03	JOHN	2
55	MIKE	3	22	PETE	2
44	JIM	3	08	BOB	2
08	BOB	3	44	JIM	1
06	BARRY	2	55	MIKE	1
08	KEN	2	08	KEN	1
22	PETE	2	07	BILL	0
07	BILL	2	06	BARRY	0
TOTAL HITS		26	TOTAL RBIS		12
#	PLAYER	RUNS	#	PLAYER	RBIS
44	JIM	4	09	MARTY	3
08	BOB	3	03	JOHN	2
03	JOHN	2	06	BARRY	2
06	BARRY	2	09	MARTY	2
09	MARTY	2	55	MIKE	1
55	MIKE	1	08	KEN	1
08	KEN	1	22	PETE	1
22	PETE	1	07	BILL	1
07	BILL	1	TOTAL RUNS		17

you press N, the program asks if you want to input data for another game. If you press Y, it asks:

To screen or printer (S/P)?

Type S or P. Softball Statistics then prints the individual stats for all team members for that game, sorted in descending order by batting averages (see Figure 1). To pause the printout, press the left mouse button. You can resume after pausing by pressing the space bar.

Next, the program asks:

Do you want a sorted printout of hits, RBIs, and run leaders (Y/N)?

Again, type Y for yes or N for no. If you type N, the program asks if you want to input stats for another game. If you answer Y, it asks again if you want the output directed to the screen or printer, and then prints sorted rankings for the various slugging categories for that game (see Figure 2). As before, you can stop the output by pressing the left mouse button and restart it by pressing the space bar.

Finally, the program asks:

Do you want to input stats from another game (Y/N)?

Usually you type N at this prompt unless you're entering results of more than one game. If you type Y, the program repeats the entire process described above.

Season Totals

Softball Statistics makes it easy for you to tabulate running totals for the entire season by storing game results on disk. After you've entered and viewed the stats for the most recent game, the program asks:

Would you like to merge in data for the year (Y/N)?

The first time you run Softball Statistics, of course, you won't have any previous data on disk, so you'd answer N, skipping to the next prompt. During subsequent runs, you'd answer Y to merge in data for the year. The program then requests a filename for the disk data file and merges these existing stats with the results you've entered for the latest game or games.

Season totals are then computed automatically, and the program asks:

Do you want a printout of the year's stats (Y/N)?

Figure 3: Printout of Season Totals

STATISTICS FOR THE YEAR:

RECORD FOR THE YEAR: WINS:2 LOSSES:1

ROSTER IS SORTED BY BATTING AVERAGE

#	PLAYER	AB	RUNS	HITS	RBI	2B	3B	HR	BB	AVG
03	JOHN	16	10	11	11	5	4	2	3	0.688
06	BARRY	18	12	11	8	4	1	4	5	0.611
07	BILL	17	10	10	7	3	3	3	2	0.588
55	MIKE	18	10	10	10	5	3	1	4	0.556
44	JIM	18	9	9	7	5	2	1	2	0.500
08	BOB	17	12	8	7	4	1	2	1	0.471
09	MARTY	17	10	8	10	4	2	3	4	0.471
22	PETE	17	7	6	4	3	1	1	3	0.353
08	KEN	17	6	6	7	3	1	2	4	0.353
TOTALS		155	86	79	71	36	18	19	28	0.510

If you answer Y, the program asks if you want output directed to the screen or printer, and then prints season totals for all players. This printout includes the team's win-loss record and sorts players in descending order by batting averages (see Figure 3).

Afterward, the program asks if you want sorted printouts for hits, RBIs, and runs—again, based on season totals (these charts resemble those in Figure 2). Finally, the program gives you the opportunity to save the updated data file on disk until the next game.

If you typed N after the previous prompt, the program asks:

Do you want to save the data (Y/N)?

If you answer Y, the program asks for a filename for the updated data file, saves the file, and then ends.

Softball Computing

If you're interested in programming, you can learn a lot by studying Softball Statistics because it's written in straight BASIC with no machine language. In fact, the input and output routines beginning at lines 2350 and 2470 are general enough to be adapted to your own programs.

You don't have to be a programmer, though, to appreciate Softball Statistics. If you're a softball statistician, no longer do you have the worst position on the team. Maybe it's the shortstop....

Softball Statistics For Atari ST

Version By George Miller, Assistant Technical Editor

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

```

10  TITLE$=" Softball Statist
    ics "+CHR$(0)
20  LPS=SPACES(2)+"# PLAYER"+
    SPACES(4)+"AB"+SPACES(3)
30  LPS=LPS+"RUNS"+SPACES(2)+"
    HITS"+SPACES(3)+"RBI"+SPA
    CES(3)
40  LPS=LPS+"2B"+SPACES(4)+"3
    B"+SPACES(4)+"HR"+SPACES(4)
    +"BB"+SPACES(4)+"AVG"
50  GOSUB CLEARIT
60  IF PEEK(SYSTAB+0) <> 4 TH
    EN 140
70  PRINT " 'SOFTBALL STATIST
    ICS'"
80  PRINT " REQUIRES A MEDIUM
    OR HI RESOLUTION"
90  PRINT " SCREEN.":PRINT
100 PRINT " PLEASE USE THE CO
    NTROL PANEL"
110 PRINT " TO RESET RESOLUTI
    ON BEFORE"
120 PRINT " CONTINUING."
130 END
140 GOSUB CLEARIT:GOSUB TITLE
    BAR
150 D5=5
160 D6=2
170 PL=20
180 DIM B(9),CC(20),IN(21),ST
    (8),RT(20,8),TT(20,8),F$(8
    ),NAS(20),RS(21)
190 TMS$="Sundogs"
200 CS$="0000"
210 FOR I=1 TO 8
220 READ F$(I)
230 NEXT I
240 FOR J=1 TO PL
250 READ NAS(J)
260 NAS(J)=MID$(NAS(J),1,10)
270 NEXT J
280 FOR J=1 TO PL
290 RS(J)=MID$(NAS(J),1,LEN(N
    AS(J))+SPACES(10-LEN(NAS(
    J)))
300 FOR I=1 TO 8
310 TT(I,1)=0
320 ST(I)=0

```



```

330 NEXT I
340 NEXT J
350 GOSUB CLEARIT:GOTOXY 5,10
:PRINT "Do you want to:":P
RINT
360 PRINT SPACE$(20);"1) Enter
new statistics."
365 PRINT SPACE$(20);"2) Review
disk file"
370 A = INP(2)
380 IF A = ASC("1") THEN 410
390 IF A = ASC("2") THEN 3530

400 GOTO 370
410 GOSUB CLEARIT:PRINT "GAME
STATISTICS"
420 PRINT:PRINT "Who did you
play"
430 INPUT OT$
440 PRINT:PRINT "Enter your s
core and their score (sepa
rated by a comma)"
450 INPUT YS,TS
460 W=W+ABS(YS>TS)
470 L=L+ABS(TS>YS)
480 FOR J=1 TO PL
490 IF MID$(NAS(J),4,7)<>"PLA
YERX" THEN 520
500 RS(J)=RS(J)+".00000000000000
00000000000000000000.000"

510 GOTO 730
520 GOSUB CLEARIT
530 PRINT MID$(NAS(J),4,LEN(N
AS(J)));"s statistics for
this game:"
540 FOR I=1 TO 8
550 B(I)=0
560 PRINT F$(I);TAB(14);
570 INPUT B(I)
580 IF LEN(STR$(B(I)))>D5 TH
EN 550
590 IF B(I)<>999 THEN 640
600 FOR K=1 TO 8
610 B(K)=0
620 NEXT K
630 I=8
640 NEXT I
650 PRINT:PRINT "Is everything
OK (Y/N) ?"
660 AS = CHR$(INP(2))
670 IF AS = "N" OR AS = "n" T
HEN 520
680 GOSUB BUILD
690 FOR I=1 TO 8
700 RT(J,I)=RT(J,I)+B(I)
710 TT(J,I)=TT(J,I)+B(I)
720 NEXT I
730 NEXT J
740 GOSUB WORKING
750 MM=0
760 FOR I=1 TO 8
770 FOR J=1 TO PL
780 ST(I)=ST(I)+TT(J,I)
790 NEXT J
800 B(I)=ST(I)
810 NEXT I
820 RS(J)=" "
830 GOSUB BUILD
840 TT$=RS(J)
850 GOSUB AVERAGE:GOSUB CLEAR
IT
860 PRINT "Do you want to inp
ut statistics from another
game (Y/N)?"
870 GOSUB GETKEY
880 IF AS = "Y" OR AS = "y" T
HEN 280
890 GOSUB CLEARIT
900 PRINT "Would you like to
merge in data for the year
(Y/N)?"
910 GOSUB GETKEY
920 IF AS = "N" OR AS = "n" T
HEN 960
930 GOSUB CHECKFILE
940 W=SW+W

950 L=SL+L
960 GOSUB WORKING
970 FOR J=1 TO PL
980 FOR I=1 TO 8
990 IF AS="N" OR AS="n" OR MI
D$(NAS(J),4,7)="PLAYERX" T
HEN 1040
1000 B(I)=VAL(MID$(RS(J),11+(I
-1)*4,4))
1010 B(I)=RT(J,I)+B(I)
1020 RT(J,I)=B(I)
1030 GOTO 1050
1040 B(I)=RT(J,I)
1050 ST(I)=0
1060 NEXT I
1070 RS(J)=MID$(RS(J),1,10)
1080 GOSUB BUILD
1090 NEXT J
1100 MM=1
1110 FOR I=1 TO 8
1120 FOR J=1 TO PL
1130 ST(I)=ST(I)+RT(J,I)
1140 NEXT J
1150 B(I)=ST(I)
1160 NEXT I
1170 RS(J)=" "
1180 GOSUB BUILD
1190 TT$=RS(J)
1200 GOSUB CLEARIT
1210 PRINT "Do you want a prin
tout of the year's statist
ics (Y/N)?"
1220 GOSUB GETKEY
1230 IF AS = "N" OR AS = "n" T
HEN 1260
1240 GOSUB WORKING
1250 GOSUB AVERAGE:GOSUB CLEAR
IT
1260 PRINT "Do you want to SAV
E the data (Y/N)?"
1270 GOSUB GETKEY
1280 IF AS = "Y" OR AS = "y" T
HEN 1300
1290 END
1300 GOTO WRITEFILE
1310 '
1320 SHELL:
1330 FOR J=1 TO PL
1340 IN(J)=J
1350 CC(J)=VAL(MID$(RS(J),BB,E
))
1360 NEXT J
1370 FOR J=PL-1 TO 1 STEP -1
1380 FOR I=1 TO J
1390 IF CC(IN(I))>CC(IN(I+1))
THEN 1430
1400 TE=IN(I)
1410 IN(I)=IN(I+1)
1420 IN(I+1)=TE
1430 NEXT I
1440 NEXT J
1450 RETURN
1460 '
1470 BUILD:
1480 IF B(I)=0 THEN 1510
1490 IF B(3)=0 THEN 1510
1500 GOTO 1540
1510 B(9)=0
1520 AV$="0.000"
1530 GOTO 1550
1540 B(9)=INT(B(3)/B(1)*1000+.
5)/1000+.0001
1550 FOR I=1 TO 8
1560 BS=STR$(B(I))
1570 BS=MID$(BS,1,D5-LEN(BS))+
MID$(BS,D6,LEN(BS))
1580 RS(J)=RS(J)+BS
1590 NEXT I
1600 IF B(9)=0 THEN 1660
1610 AV$=STR$(B(9))
1620 IF MID$(AV$,1,1)<>" " THE
N 1640
1630 AV$=MID$(AV$,2,6)
1640 IF MID$(AV$,1,1)<>" " THE
N 1660
1650 AV$="0"+AV$
1660 RS(J)=RS(J)+MID$(AV$,1,5)

1670 RETURN
1680 '
1690 AVERAGE:
1700 BB=43
1710 E=5
1720 GOSUB SHELL
1730 IF MM=1 THEN 1770
1740 GOSUB CLEARIT
1750 PRINT "Do you want a prin
tout of the game's statist
ics (Y/N)?"
1760 GOSUB GETKEY
1770 IF AS = "N" OR AS = "n" T
HEN 1810
1780 GOSUB PRINTOPT
1790 IF DE = 1 THEN GOSUB SCRE
ENPRINT:GOTO 1810
1800 IF DE = 2 THEN GOTO LINEP
RNT
1810 RETURN
1820 '
1830 WORKING:
1840 PRINT
1850 PRINT "WORKING..."
1860 RETURN
1870 '
1880 PRINT
1890 PRINT "Do you want sorted
printouts of hits, RBI's,
and run leaders (Y/N)?"
1900 GOSUB GETKEY
1910 IF AS = "N" OR AS = "n" T
HEN 1940
1920 GOSUB PRINTOPT
1930 GOTO 1950
1940 RETURN
1950 GOSUB WORKING
1960 BB=19
1970 E=4
1980 GOSUB SHELL
1990 I=3
2000 IF DE = 1 THEN GOSUB TOSC
REEN ELSE GOSUB TOLINEPTR
2010 BB=23
2020 GOSUB SHELL
2030 I=4
2040 IF DE = 1 THEN GOSUB TOSC
REEN ELSE GOSUB TOLINEPTR
2050 BB=15
2060 GOSUB SHELL
2070 I=2
2080 IF DE = 1 THEN GOSUB TOSC
REEN ELSE GOSUB TOLINEPTR
2090 RETURN
2100 '
2110 GETKEY:
2120 AS = CHR$(INP(2))
2130 IF AS = "N" OR AS = "n" O
R AS = "Y" OR AS = "y" THE
N RETURN ELSE 2120
2140 RETURN
2150 '
2160 PRINTOPT:
2170 PRINT
2180 PRINT "To screen or print
er (S/P)?"
2190 AS = CHR$(INP(2))
2200 IF AS = "S" OR AS = "s" T
HEN DE = 1:GOTO 2220
2210 IF AS = "P" OR AS = "p" T
HEN DE = 2 ELSE 2190
2220 RETURN
2230 '
2240 CLEARIT:
2250 CLEARW 2:FULLW 2:GOTOXY 0
,0
2260 RETURN
2270 '
2280 DATA Times at Bat,Runs,Hi
ts,RBI's,Doubles,Triples,H
ome Runs,Walks
2290 REM LIST PLAYERS BY NUMBE
R & NAME
2300 DATA 01 Kevin,02 Tom,03 P
atrick,04 Eddie,05 Gregg
2310 DATA 06 George,07 David H
.,08 David F.,09 Selby,10

```



```

Mark
2320 DATA 11 Neal,12 Byron,13
      Paul,14 John,15 Leon
2330 DATA 16 David K,17 Mike,1
      8 PLAYERX,19 PLAYERX,20 PL
      AYERX
2340 '
2350 REM INPUT ROUTINE
2360 CHECKFILE:
2370 ON ERROR GOTO 2600
2380 GOSUB CLEARIT
2390 PRINT "Name for data file"
      : INPUT FF$
2400 OPEN "I",#1,FF$
2410 INPUT #1,SW,SL
2420 FOR J=1 TO PL
2430 INPUT #1,R$(J)
2440 R$(J)=MID$(N$(J),1,LEN(N
      A$(J)))+SPACES(10-LEN(N$(J)
      ))+R$(J)
2450 NEXT J:CLOSE #1:RETURN
2460 '
2470 WRITEFILE:
2480 GOSUB CLEARIT:
2490 PRINT "Name of data file t
      o write": INPUT FF$
2500 OPEN "O",#1,FF$
2510 PRINT #1,W
2520 PRINT #1,L
2530 FOR J = 1 TO PL
2540 PRINT #1, MID$(R$(J),11,3
      2)
2550 NEXT J
2560 CLOSE #1
2570 END
2580 '
2590 CHECKERROR:
2600 IF ERR = 53 THEN 2620
2610 PRINT "Error Number ";ERR
      : " at line ";ERL:END
2620 PRINT "File not found on
      dfsk drive specified."
2630 CLOSE 1
2640 RESUME 2390
2650 '
2660 SCREENPRNT:
2670 GOSUB CLEARIT:PRINT:IF MM
      =1 THEN TS="THE YEAR":GOTO
      2690
2680 TS="THIS GAME"
2690 PRINT "STATISTICS FOR "TS
      ":":IF MM=1 THEN GOTO 2710
2700 PRINT TM$ VS "OT$" Sc
      ore:"YS"-TS:GOTO 2720
2710 PRINT "RECORD FOR THE YEA
      R: Wins:"W" Losses:"L
2720 PRINT:PRINT "Roster is s
      orted by batting average":
      PRINT
2730 PRINT LP$
2740 FOR J=1 TO PL:GOSUB PAUSE
2750 IF MID$(R$(IN(J)),4,7)="P
      LAYERX" THEN 2830
2760 PRINT SPACES(1);MID$(R$(I
      N(J)),1,10);SPACES(1);
2770 FOR I= 1 TO 8:Q=0:FOR K=0
      TO 3
2780 IF MID$(R$(IN(J)),11+(I-1
      )*4+K,1) <> "0" THEN Q=1
2790 IF MID$(R$(IN(J)),11+(I-1
      )*4+K,1)="0" AND Q=0 AND K
      =3 THEN PRINT "0":GOTO 28
      20
2800 IF MID$(R$(IN(J)),11+(I-1
      )*4+K,1)="0" AND Q=0 THEN
      PRINT " ":GOTO 2820
2810 PRINT MID$(R$(IN(J)),11+(I
      -1)*4+K,1);
2820 NEXT K:PRINT SPACES(2);N
      EXT I:PRINT SPACES(1);MID$
      (R$(IN(J)),43,5)
2830 NEXT J:PRINT:PRINT " TOT
      ALS":SPACES(5);
2840 FOR I=1 TO 8
2850 Q=0:FOR K=1 TO 4:IF MID$(

```

```

      TT$(I-1)*4+K,1) <> "0" TH
      EN Q=1
2860 IF MID$(TT$(I-1)*4+K,1)=
      "0" AND Q=0 AND K=4 THEN P
      RINT "0":GOTO 2890
2870 IF MID$(TT$(I-1)*4+K,1)=
      "0" AND Q=0 THEN PRINT SPA
      CES(1):GOTO 2890
2880 PRINT MID$(TT$(I-1)*4+K,
      1);
2890 NEXT K:PRINT SPACES(2);N
      EXT I:PRINT SPACES(1);MID$
      (TT$,33,5)
2900 PRINT :GOTO 1880
2910 '
2920 TOSCREEN:
2930 PRINT :T=0:PRINT :PRINT F
      $(1) SORT:"":PRINT
2940 PRINT "## PLAYER":space$(
      6);F$(1):FOR J=1 TO PL:GOS
      UB PAUSE
2950 IF MID$(R$(IN(J)),4,7)="P
      LAYERX" THEN 3020
2960 PRINT MID$(R$(IN(J)),1,10
      );SPACES(4);
2970 Q=0:FOR K=0 TO 3:IF MID$(
      R$(IN(J)),BB+K,1) <> "0" T
      HEN Q=1
2980 IF MID$(R$(IN(J)),BB+K,1)
      ="0" AND Q=0 AND K=3 THEN
      PRINT "0":GOTO 3010
2990 IF MID$(R$(IN(J)),BB+K,1)
      ="0" AND Q=0 THEN PRINT SP
      ACES(1):GOTO 3010
3000 PRINT MID$(R$(IN(J)),BB+K
      ,1):IF K=3 THEN PRINT
3010 NEXT K:T=T+VAL(MID$(R$(IN
      (J)),BB,E))
3020 NEXT J:PRINT:PRINT "TOTA
      L ";F$(1);SPACES(5);T
      PRINT: RETURN
3030 '
3040 '
3050 LINEPRNT:
3060 LPRINT:IF MM=1 THEN TS="TH
      E YEAR":GOTO 3080
3070 TS="THIS GAME"
3080 LPRINT "STATISTICS FOR "T
      $":":IF MM=1 THEN GOTO 310
      0
3090 LPRINT TM$ VS "OT$" S
      CORE:"YS"-TS:GOTO 3110
3100 LPRINT "Record for the ye
      ar: Wins:"W" Losses:"L
3110 LPRINT:LPRINT "Roster is
      sorted by Batting Average
      ":LPRINT
3120 LPRINT LP$
3130 FOR J=1 TO PL:GOSUB PAUSE
3140 IF MID$(R$(IN(J)),4,7)="P
      LAYERX" THEN 3220
3150 LPRINT SPACES(1);MID$(R$(
      IN(J)),1,10);SPACES(1);
3160 FOR I=1 TO 8:Q=0:FOR K=0
      TO 3
3170 IF MID$(R$(IN(J)),11+(I-1
      )*4+K,1) <> "0" THEN Q=1
3180 IF MID$(R$(IN(J)),11+(I-1
      )*4+K,1)="0" AND Q=0 AND K
      =3 THEN LPRINT "0":GOTO 3
      210
3190 IF MID$(R$(IN(J)),11+(I-1
      )*4+K,1)="0" AND Q=0 THEN
      LPRINT " ":GOTO 3210
3200 LPRINT MID$(R$(IN(J)),11+
      (I-1)*4+K,1);
3210 NEXT K:LPRINT SPACES(2);:
      NEXT I:LPRINT SPACES(1);MI
      D$(R$(IN(J)),43,5)
3220 NEXT J:LPRINT:LPRINT " TO
      TALS":SPACES(5);
3230 FOR I=1 TO 8
3240 Q=0:FOR K=1 TO 4:IF MID$(
      TT$(I-1)*4+K,1) <> "0" TH
      EN Q=1
3250 IF MID$(TT$(I-1)*4+K,1)=
      "0" AND Q=0 AND K=4 THEN L

```

```

      PRINT "0":GOTO 3280
3260 IF MID$(TT$(I-1)*4+K,1)=
      "0" AND Q=0 THEN LPRINT SP
      ACES(1):GOTO 3280
3270 LPRINT MID$(TT$(I-1)*4+K
      ,1);
3280 NEXT K:LPRINT SPACES(2);:
      NEXT I:LPRINT SPACES(1);MI
      D$(TT$,33,5)
3290 LPRINT:GOTO 1880
3300 '
3310 TOLINEPTR:
3320 LPRINT:T=0:LPRINT:LPRIN
      T F$(1) SORT:"":LPRINT
3330 LPRINT "##+SPACES(2)+PLA
      YER"+SPACES(6);F$(1):FOR J
      =1 TO PL:GOSUB PAUSE
3340 IF MID$(R$(IN(J)),4,7)="P
      LAYERX" THEN 3410
3350 LPRINT MID$(R$(IN(J)),1,1
      0)SPACES(4);
3360 Q=0:FOR K=0 TO 3:IF MID$(
      R$(IN(J)),BB+K,1) <> "0" T
      HEN Q=1
3370 IF MID$(R$(IN(J)),BB+K,1)
      ="0" AND Q=0 AND K=3 THEN
      LPRINT "0":GOTO 3400
3380 IF MID$(R$(IN(J)),BB+K,1)
      ="0" AND Q=0 THEN LPRINT S
      PACE$(1):GOTO 3400
3390 LPRINT MID$(R$(IN(J)),BB+
      K,1):IF K=3 THEN LPRINT
3400 NEXT K:T=T+VAL(MID$(R$(IN
      (J)),BB,E))
3410 NEXT J:LPRINT:LPRINT "TO
      TAL ";F$(1);SPACES(5);T
      LPRINT:RETURN
3420 '
3430 '
3440 PAUSE:
3450 IF PEEK(&HFFFC02) > 0 THE
      N 3450 ELSE RETURN
3460 '
3470 TITLEBAR:
3480 A$ = GB : GINTIN = PEEK(A
      #+8)
3490 POKE GINTIN+0,PEEK(SYSTAB
      +8) : POKE GINTIN+2,2
3500 S$ = GINTIN+4 : TITLES =
      TITLES + CHR$(0)
3510 POKE S$,VARPTR(TITLES) :
      GEMSYS(105)
3520 RETURN
3530 REVIEW:
3540 GOSUB CHECKFILE
3550 W=SW+W
3560 L=SL+L
3570 GOSUB WORKING
3580 FOR J=1 TO PL
3590 FOR I=1 TO 8
3600 IF A$="N" OR A$="n" OR MI
      D$(N$(J),4,7)="PLAYERX" T
      HEN 3620
3610 B(I)=VAL(MID$(R$(J),11+(I
      -1)*4,4))
3620 B(I)=RT(J,I)+B(I)
3630 RT(J,I)=B(I)
3640 GOTO 3660
3650 B(I)=RT(J,I)
3660 ST(I)=0
3670 NEXT I
3680 R$(J)=MID$(R$(J),1,10)
3690 GOSUB BUILD
3700 NEXT J
3710 MM=1
3720 FOR I=1 TO 8
3730 FOR J=1 TO PL
3740 ST(I)=ST(I)+RT(J,I)
3750 NEXT J
3760 B(I)=ST(I)
3770 NEXT I
3780 R$(J)="
3790 GOSUB BUILD
3800 TT$=R$(J)
3810 GOSUB CLEARIT
3820 GOSUB WORKING
3830 GOSUB AVERAGE:GOSUB CLEAR
      IT
3840 END

```


Toshiba P321 Printer

Tim Victor, Editorial Programmer



Requirements: Any compatible computer with the appropriate interface.

A few years ago it was easy to spend a lot of money for a computer printer and still not get top-of-the-line quality. Unless you were satisfied with a 40-column thermal printer, you generally had to lay out several hundred dollars just to get a relatively crude dot-matrix printer, and a good daisy wheel printer cost over \$1,000.

Today, many good dot-matrix and daisy wheel printers are available for a couple of hundred dollars. But both technologies have their particular strengths, and which one you ultimately choose should depend on the applications you have in mind. Daisy wheel printers necessarily have limited graphics capabilities, though they offer letter-quality type. Inexpensive dot-matrix printers can produce decent graphics, but are restricted in print quality by their nine-pin printheads, which gener-

ally don't produce letter-quality type or crisp graphics (though some have very respectable near-letter-quality modes).

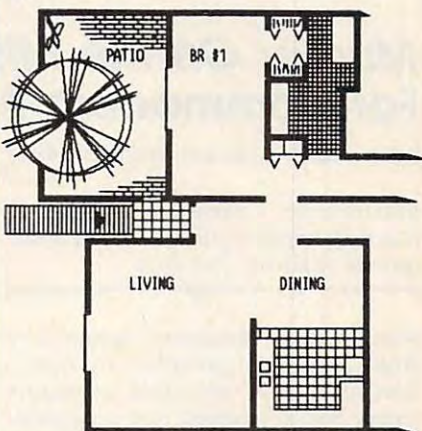
Dot-matrix printers that use a 24-pin printhead are capable of far superior graphics and text, but have in the past been relatively expensive. Toshiba has introduced the P321, also called the 3-in-1 Printer, a 24-pin printhead dot-matrix printer that retails for \$699. The nickname 3-in-1 refers to the printer's combination of speed, letter quality type, and graphics. The quality of its output approaches that of laser printers which cost at least three times as much.

More Typeset Than Typewritten

Three different typefaces are built into the printer: Courier, Elite, and draft-quality. It can also hold two more typefaces in a cartridge and download one more from the computer, so its output is very flexible.

Draft mode is quite readable and

extremely fast. The manufacturer claims 216 characters per second at 12 characters per inch and 180 cps at 10 cpi in this mode; letter quality runs at 72 cps. For listing computer programs or making quick dumps of a large amount of data, this printer performs extremely well. The Toshiba P321 can also produce proportionally spaced printing—allowing more space for wide letters like *w* than for narrow ones like *i*. When this feature is used, the printed output appears even and smooth, looking more like typeset-quality print than typewritten text.



This illustrates the graphics capabilities of the Toshiba P321.

```
;DRAW:CALL FROM BASIC, 3 PARM
S
;INCLUDED: # OF SHAPE,
;HPOS(PIXELS), VPOS(PIXELS)
;
DRAW LDA #2 :ORG0
STA NUMBYTES
;
LDA #24 :ORG1
STA ROWCOUNT
;
JSR ADDSHAPE ;WHICH SHAPE?
BCS ERROR
JSR GETHPOS ;WHERE?
BCS ERROR
JSR GETVPOS
BCS ERROR
;
LDA THISHAPE ;COPY ADDR TO Z
P
STA PATTERN
LDA THISHAPE+1
STA PATTERN+1
;
DRAWLOOP JSR CALC ;SCRN ADDR
```

Draft mode on the P321.

The P321 can plot graphics with a resolution of 180 by 180 dots per inch. Although dots can be positioned with a horizontal resolution of 1/360 inch, two dots can't occupy adjacent positions. Unfortunately, it can't emulate Epson graphics. Epson was one of the first companies to offer an inexpensive printer that could produce graphics, and its graphics command set has since become an unofficial industry standard. While some newer software can produce graphics output for the P321, nearly every program that prints graphics can drive an Epson. If this feature had been included, Toshiba users would have enjoyed compatibility with a wider range of programs.

The Noise Factor

Laser printers are promoted as being quiet as a whisper. Naturally, the P321 isn't nearly that quiet. The noise level probably won't be offensive. But if you work in a quiet office, or if you compute at home and keep late hours, you might

find the noise somewhat disturbing. It's not the loudest dot-matrix printer we've heard, but it might be loud enough to cause problems in some situations.

If you've previously been unsatisfied with near-letter-quality dot-matrix printers, the Toshiba P321 deserves consideration. The characters it produces look a little heavier than those made by a typewriter or a daisy wheel printer, but certainly better than the majority of dot-matrix printers we've seen. And when the Toshiba uses proportional spacing, its output looks better than what a typewriter could produce.

Toshiba P321 Printer
Toshiba America, Inc.
Information Systems Division
2441 Michelle Drive
Tustin, CA 92680
\$699 (parallel only)
\$749 (parallel and serial)
IBM Emulation Kit \$49
Downloadable Type Font Kit \$99

Murder On The Mississippi For Commodore And Apple

Kathy Yakal, Assistant Features Editor

Requirements: Commodore 64 or Apple II-series computer with at least 64K RAM. Joystick required. Disk only.

Murder On The Mississippi, designed by Adam Bellin and published by Activision, is a rich, enjoyable adventure game. You're plunged into a convincing, complex world—a riverboat traveling down the Mississippi sometime in the 19th century. Though there is a lot to explore within that setting, it's not so huge and meandering that you get lost every time you make a move or have to keep retracing your steps. A cast of charming, eccentric characters makes you feel welcome in this imaginary world, and you *cannot* get killed five minutes into the game. In these and other ways, *Murder On The Mississippi* is free of the disagreeable aspects which reduce the fun of some other adventure games.

If you've ever played a poorly designed adventure game, the experience may have been frustrating enough to put you off the whole genre entirely. It seems that there are three areas in which many text-only or text-and-graphics adventures can miss the mark. First, some of them create a rather small world, or at least make it appear that way. As hard as you try, you can't get more than about ten minutes into the

game without having to give up because you keep going around in circles. Second, some games have the nasty habit of allowing you to get into situations where you are easily killed, forcing you to start all over again. Finally, even if a game is playable, it may not have the feel of a real world. It's extremely difficult to create an environment and a set of characters with which you can easily and believably interact. And that is key to a good adventure game.

Trouble On The Delta Princess

On the other hand, a dedicated hardcore player of more traditional adventure games like Infocom's all-text *Zork* series may not find *Murder On The Mississippi* much of a challenge. Some people prefer to imagine what a game's world looks like, and aren't bothered by the hours it can take just to figure out how to move around and interact without getting killed. But for those who enjoy solving a murder mystery without bumping around in the dark, *Murder On The Mississippi* provides an entertaining, interactive environment in which to do just that.

As the player, you portray Sir Charles Foxworth, a famous British sleuth who is taking a three-day cruise

down the Mississippi River on the *Delta Princess*. You are accompanied by your constant companion, Regis Phelps. While exploring the rooms on the ship, you come across a dead body and must enlist the help of passengers and crew members to find out who is the murderer. You have three days to solve the crime.

The game is entirely joystick-controlled; no keyboard commands are necessary. To move around the decks, to climb up and down stairs, and to enter rooms, you control the character by moving the joystick up, down, right, and left. It may take a few tries to maneuver your character into the exact spot that will make the door open, but it's not too tough.

The cabins themselves are not very big, so movement within them is rather restricted. If you're trying to get Sir Charles and Regis and a passenger to leave a room together, you sometimes get something of a Three Stooges effect—you keep bumping into each other as well as furniture and doors. But this tends to be amusing rather than irritating.

A Unique Interface

Adam Bellin has designed a unique user interface to allow interaction with the passengers. After you've entered a room, the character who resides there introduces himself or herself in response to your greeting. Pushing the joystick button will give you a menu: You can *Walk around*, *Inspect*, *Examine evidence*, *Talk to* (passenger's name), or return to the main menu. A small hand icon on the right side of the screen points to the selection highlighted, and pressing the joystick button activates that command.

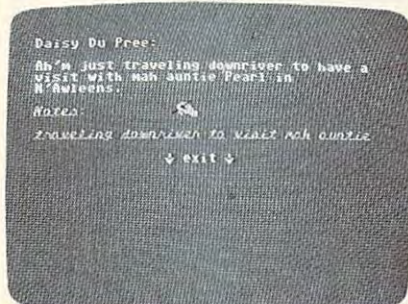
If you choose to talk to the passenger, you're given another menu: *Tell me about*, *What do you know about this evidence?*, *Please follow me*, *Share notes with*, *Accuse*, or *Previous menu*. Information gathering is essential to solving the crime, so each passenger should be questioned, even if it leads nowhere. You can ask passengers to talk about themselves and about the victim.

After receiving information, Regis will ask if you'd like the notebook to take notes. If you think the information is important, you can choose to save certain key words from the passenger's speech. You're only allowed one line from each speech (generally 5-10 words), so choose carefully. Quite often, that's not enough, so you may want to take supplementary notes on paper. That's a good idea in the beginning, anyway, as it will help you keep track of who's staying in which room.

As you select highlighted words to



Walk around
Inspect
Examine evidence
Talk to Daisy Du Free
Main menu



be added to the notebook, an onscreen hand writes out the words in Sir Charles's handwriting. That's a nice touch, the kind of thing that surprises and delights a seasoned computer game player and makes computer games appealing to new users. *Murder On The Mississippi* contains many such thoughtful elements. Though the characters don't require a lot of depth in a game like this to make the game engaging, each is carefully drawn through the use of background, dialogue, and even accents. And Regis is an endearing fellow from the start—he's always following right on the heels of Foxworth, who appears to stand about two feet taller than his devoted sidekick.

Four Endings

In your early exploration of the ship, you'll discover that several of the rooms are locked. Finding out how to enter them merely takes some common sense, as does deciding what kind of evidence to pick up and keep for later examination. Getting to the point where you can actually start to draw some conclusions about the case will take some time and thought.

If you don't solve the mystery in one sitting (and you probably won't), you can save the game and later pick up where you left off. And there are four possible endings, so once you've solved the game, you can start over again and work your way through a new set of clues.

Murder On The Mississippi
Activision, Inc.
2350 Bayshore Frontage Road
Mountain View, CA 94043
\$34.95 (Commodore)
\$39.95 (Apple)

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Three Fantasy Games For Commodore And Apple

James V. Trunzo

Requirements: Commodore 64 or 128 (in 64 mode), or an Apple II-series computer with at least 64K RAM. Disk only.

The old axiom that good things come in threes certainly applies to a trio of new entertainment programs from Strategic Simulations, Inc. The wizards at SSI have conjured up three new fantasy titles that are sure to please all the would-be warriors who sit by their computers, anxious to explore another dungeon, slay another dragon, or banish another demon. And while on the surface it might appear to be unsound business strategy for a company to release three new monster and magic programs simultaneously, SSI succeeds because each game is unique in its approach and play. The three games, *Rings of Zilfin*, *Phantasie II*, and *Wizard's Crown*, will provide fantasy lovers with enough challenges to last the entire summer.

The first game, *Rings of Zilfin*, differs from other games of its kind by offering a nearly perfect hybrid of arcade action, role playing, and animation. The player controls a single character who has a variety of combat skills as well as latent magical ability. This ability must be developed during the course of the adventure in order to survive and complete your quest: You must reclaim the Rings of Zilfin and the fabulous Treasure of Fulgarsh.

Pay Attention To The Plants

The entire game is animated. Your keyboard-controlled character marches step by step across a huge mapped area. When he enters towns, dungeons, and so on, the program uses windowing to display the interiors and the options permitted. There's arcade-style combat as well.

But your character is not the typical warrior-hero. *Rings of Zilfin* requires a thorough understanding of strategy, economics, and diplomacy. You need to pay special attention to mushrooms and plants because these items can offer important assistance. And, in addition to monsters, your persona will encounter elves, dwarfs, kings, beggars, witches, and wizards. Some are helpful, others deadly. Reading and rereading the well-written manual is a must; it contains necessary information as well as hidden clues.

This is a rich simulation. The realm of Batiniq contains three nations, 27

towns, two dungeons and more; there are over 100 inhabitants with whom to converse, and dozens of plants, magical pools, and monsters with which to contend—and all phases of the game are animated. The game has a flavor all its own. If you are a fantasy buff and you're looking for something a little different, *Rings of Zilfin* might be the game for you.

If you would enjoy something a little more traditional (and if you are one of the many who became addicted to the award-winning *Phantasie* game), you'll certainly want to get your hands on *Phantasie II*. The sequel does not require you to have played *Phantasie*, but if you have conquered the first *Phantasie* game, you can transfer your battle-trained characters to the new adventure.

Phantasie II has all the same features of its predecessor. Assembling a party of up to six characters, you must explore a vast wilderness, dungeons, Astral Planes and—new this time around—two levels of the Netherworld. Your group, made up of any mixture of fantasy types, must battle over 80 different monsters, gather treasure and magical artifacts, and improve its abilities as it attempts to defeat, once again, the arch-sorcerer Nikademus.

The Hidden Undead

Phantasie II employs full screen graphics, animated combat, maze-like dungeons (which are mapped by the computer, incidentally), and a wide variety of terrains.

If you've played the original *Phantasie*, you can look forward to new features like molten lava, which is extremely dangerous; mist, which shrouds areas and hides such enemies as the undead and swarms of insects; and dark voids, which hold unknown horrors that must be faced by your group.

Also, a new wrinkle has been added to the combat phase of *Phantasie II*. Characters can now choose to toss rocks at enemies in any rank, with accuracy and damage determined by the appropriate skill level of the character.

A Most Unusual Game

The third game, *Wizard's Crown*, is the most difficult of the three and probably the most unusual fantasy game to hit the market in some time. Requiring 50 to 100 hours of playing time, *Wizard's Crown* comes very close in flavor to the

actual *Dungeons and Dragons* role-playing game which started the fantasy craze. One reason for this is that each member of the party of adventurers can be controlled separately.

Also, the combat can be tactical in nature. Each character can select from 10 to 20 combat options, more than one in a given turn in most cases. For example, a warrior could improve his accuracy by aiming at an enemy prior to attacking. Characters can dodge and zigzag, attack defensively, stand on guard, load a bow or crossbow, move in any direction, or ready a new weapon—to name only a few of the options.

This control over individual movement allows the players to form a wide variety of defensive formations when in combat and also to take advantage of the battleground terrain. Because of the large number of combat variables that come into play—rear and flank attacks, for example—the combat is far closer to a typical war game than is usual in fantasy games.

Combat fought in the above manner can take anywhere from 10 to 20 minutes to complete, and all combat maneuvers are animated by highly detailed character icons. But if you're in a hurry, *Wizard's Crown* offers a quick combat option, too.

Especially Lifelike

Characters in *Wizard's Crown* have many more characteristics and skills than are usual in a game of this type. Combat awareness, ability to track, skill at administering first aid, knowing how to read ancient writings, and ability to use alchemy are some of the more esoteric ratings given characters in *Wizard's Crown*. These are in addition to the typical skills of a thief, wizard, or warrior. The various combination of skills add greatly to the personality and individuality of the characters, making them seem especially lifelike.

Your quest, to recover the coveted *Wizard's Crown*, takes your group of adventurers through streets, buildings, dense wilderness, and, of course, dungeons. During the course of your adventure, you will encounter dozens of monsters, find merchants with whom you can trade or sell your loot, bribe innkeepers for rumors and clues that will help you complete your quest, and acquire an almost limitless variety of magical items like lightning swords and rings of invisibility.

Wizard's Crown also includes five levels of difficulty, two kinds of combat, and works with one or two disk drives. Add this to all the other options, plus the excellent animation and graphics, and you have a game that will excite and challenge even the most seasoned

veteran of fantasy warfare.

SSI has created a triad of adventure games that offer something for everyone. Each program has its own special challenges and each requires a different strategy. One of them is sure to suit your taste; which one is up to you. You can't make a bad choice, though, because all three games are winners.

Rings of Zilfin
Phantasie II
Wizard's Crown
Strategic Simulations, Inc.
883 Stierlin Road
Mountain View, CA 94043
\$39.95 each

Brattaccus

Charles Brannon, Program Editor

Requirements: Atari ST with color monitor, Commodore Amiga, or Apple Macintosh.

We've come a long way from the days of the original Adventure game. There are many variations in the genre of interactive fiction: text only, text and graphics, and graphics only. The text-only adventure games, best known by Infocom's *Zork* series and other interactive fiction such as *The Hitchhiker's Guide to the Galaxy*, depend on detailed prose and a sophisticated parser which decodes the typed commands you give to your invisible alter ego. To explore the adventure world, you type commands like GO WEST or TAKE ME TO YOUR LEADER. The game responds by changing the scene, giving you a new page of text to read, or responding with a message like CAN'T GO IN THAT DIRECTION, or CAN'T TAKE THE 'ME'. The latter kind of message reveals the limitations of a command parser. The parser thinks you are trying to TAKE (pick up) the object ME.

This kind of adventure game can sometimes be frustrating, since only a limited number of actions make sense in any one scene. You are basically solving a series of linked or nested puzzles. For instance, you may start by trying to find a scroll that reveals the location of a magic key, which in turn opens the locked door that leads to the treasure you'll need to bribe a gatekeeper. In addition to a bribe, the gatekeeper may insist that you solve a knotty riddle before passing into the domain of a wizard who holds the ultimate object of your quest. Until you solve the gatekeeper's riddle, you can't enter that portion of the adventure world.

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you're reading a complex novel in which you are the main character. You help "write" the story by making decisions at various branching points. However, there isn't enough room on the screen or in computer memory for both elaborate text and detailed color illustrations.

Adventure games that use both text and graphics rely on full-screen pictures to tell much of the story. While text-only games like *Zork* must describe a room, a graphics adventure like Sierra On-Line's *King's Quest* shows you the room itself, including whatever objects it contains. You still use keyboard commands to control the action, but the pictorial approach is one step closer to a real-life simulation.

Onscreen Alter Ego

Brattaccus is part of a new trend in adventure games in which you control a realistic image of a human or some other character. Instead of typing GO WEST, you move a mouse or a joystick, making your onscreen character walk around, open and close doors, pick up and put down objects, and even fight when necessary. In *Brattaccus*, the action takes place on a high-resolution stage of platforms, elevators, cantinas, police headquarters, and the criminal underworld. *Brattaccus* provides much of the interaction of text-only adventure games, but gives you direct, real-time control.

It takes some time to learn to control your character, a genetic engineer named Kyne. In addition to four basic directions, you can modify these four movements to get many more. In the Atari ST and Amiga versions, for example, you can push the mouse to the left, or push to the left with the right mouse button down, or even with both buttons pressed. Usually, your character behaves in a predictable fashion, but it can be frustrating to see him run and crash into a wall when you were merely trying to rotate to face a door.

In the game, Kyne has developed a new genetic technique for creating superhuman beings. The government, however, won't allow such a powerful, destabilizing technology to run rampant (at least, unless it controls the technology, with a race of supersoldiers foremost in mind). As Kyne, you have been falsely charged with selling your secrets to the underworld and are on the run, seeking out the seedy mining asteroid *Brattaccus*, where you believe you can find evidence to clear your name. The criminal underworld of *Brattaccus* is not unaware of the potential of your discoveries, so they too are hunting you. Fortunately, you are traveling under an alias, but there is a bartender

who can blow your cover.

This would make for a great science-fiction film, and you become the star of the show. You walk Kyne's character around the maze of the asteroid's structure, wandering in and out of bars, floating up and down in elevators, moving from room to room, sometimes talking or fighting with other characters. Some characters let you know they are *going to the bar for a drink*, a cue for you to follow them for a private talk. These semi-autonomous characters roam throughout *Brattaccus* in rather aimless fashion. There are several classes of characters, from planetoid personnel and police to the henchmen of the criminal mastermind Kol Worpt.

Once in the bar, the characters ask if you'd like any information, usually in exchange for money or goods which are littered about the planetoid, ready to be plucked up by you or others. You respond to a character's prompt by choosing one of several responses that appear in a thought bubble above Kyne's head. Your choice affects the future of the game.

Realistic Swordplay

At times, you need to draw your sword to defend yourself against attackers. You can duck, parry, and lunge with your sword, but don't walk around with it drawn, since many characters take such behavior as a provocation. Characters whom you kill do not merely disappear, but instead lie on the ground for the rest of the game as a gruesome reminder. The game's graphics are realistic, and some players may object to this violent aspect.

Since many characters in *Brattaccus*—especially the police and henchmen—are excellent swordsmen, you'll find that games don't last long if you get carried away with swordplay. Swords, incidentally, are the only permissible weapons on *Brattaccus*, since other weapons could rupture the air bubble that keeps everyone alive on this desolate asteroid.

The world of *Brattaccus* is complex and difficult to map. In it you'll find security cameras that scan key corridors; you don't want to be caught fighting on camera. On/off switches let you control the operation of elevators, video screens, and more, but using them is a crime. Some rooms contain tannoy (loudspeakers) that periodically announce special police bulletins. Video screens display special news alerts. There are times where you'll be arrested and dragged off to jail, or captured by thugs and hauled away to an audience with the evil Kol Worpt. You must balance chit-chat, bribery, and measured doses of swordplay to keep

things under control.

I don't know if *Brattaccus* is solvable. Although I've played it for weeks, it's still very hard to grasp all the elements needed to solve the puzzle and find the evidence. In this manner, *Brattaccus* is no different from other adventure games, which may take months to complete. For many people, this indicates good value, since the game still poses an interesting challenge even after considerable use.

Unrealized Potential

The only negative factors arise not from the game concept, but from its implementation. *Brattaccus* was first designed on the Atari 520ST, and the program's routines for moving the large objects representing characters can get bogged down when there are many characters on the screen at once. When *Brattaccus* was translated for the Amiga and Macintosh, apparently it was not rewritten to take advantage of these computers' features.

For instance, the Amiga's blitter chip, which could significantly speed up the animation, does not seem to be utilized to its potential. The game graphics are absolutely identical on both machines. And curiously, though the Amiga works with the same type of joystick as the ST, joystick control is absent from the Amiga version. Also, the Amiga version makes no use of the Amiga's integral speech synthesis.

The Macintosh version's graphics are somewhat disappointing, too. The designers converted the ST color graphics without taking advantage of the greater vertical resolution on the Mac. As a result, the Macintosh version has only 200 lines of vertical resolution and looks squashed compared to the original.

Nevertheless, *Brattaccus* shows the possibilities for gameplay on powerful 68000-based computers such as the ST, Amiga, and Macintosh. As designers continue to learn more about these machines, we can expect new waves of entertainment software which take advantage of the powerful CPU, large-capacity disks, digital sound, and elaborate screen graphics that make these computers so attractive.

Brattaccus
Mindscape, Inc.
3444 Dundee Road
Northbrook, IL 60062
\$49.95

©

SPRITE 32

For Commodore 64

Jeremy Zullo

This sophisticated utility allows the Commodore 64 to display as many as 32 sprites on the screen at the same time. (It also works on the Commodore 128 in 64 mode.) The "Sprite BASIC" enhancement program adds several new sprite commands to BASIC 2.0. For machine language programmers, the "Sprite Kernal" utility offers the same capabilities for ML programming. Demonstration programs show how to use the technique in both BASIC and machine language. A disk drive is required.

You probably know that the Commodore 64 is designed to display a maximum of eight sprites on the screen at one time. That's enough for most purposes, but there are many situations, particularly in game programming, where extra sprites would be useful. The programs accompanying this article let you display as many as 32 sprites on the screen at once. Though the programs are written in machine language, you can use them without being a machine language expert.

"Sprite 32" is the first program you'll need; it handles the mechanics of displaying the extra sprites. The second utility, a BASIC enhancement called "Sprite BASIC," adds nine new sprite commands to the 64's BASIC 2.0. The third ML program, called "Sprite Kernal," offers a convenient way for machine language programmers to access all of the Sprite 32 functions.

Getting Started

Begin by entering Programs 1, 2, and 3. Because these programs are written in machine language, you must enter them with the "MLX" machine language entry program listed elsewhere in this issue. Before you type in the programs, read the information below about which file-

names to use when saving them. If you don't intend to program in machine language, you need not type in Program 3; however, you may want to enter it anyway to view the machine language demonstration (see below). Here are the addresses you need to enter each program with MLX:

Program 1

Starting address: C000

Ending address: C4C7

Program 2

Starting address: C600

Ending address: C997

Program 3

Starting address: C600

Ending address: C80F

If you wish to use the demo programs included with this article, you must save Programs 1, 2, and 3 with the exact filenames listed here:

Program 1: **SPRITE 32**

Program 2: **SPRITE BASIC**

Program 3: **SPRITE KERNAL**

After you've saved Programs 1-3, you may want to enter Program 4, the BASIC demonstration. Before entering this program, however, you must activate Sprite BASIC. Load the program with the command `LOAD "SPRITE BASIC",8,1`. When the load is finished, enter `NEW` to reset the computer's memory pointers, then type `SYS 50688` and press `RETURN` to install Sprite BASIC. *It is very important that you install Sprite BASIC before typing in Program 4.* If you omit this step, the program will not work correctly.

After Sprite BASIC is installed, enter Program 4. Don't worry about the unfamiliar commands; they'll be explained in the next section. Save a copy of the program, then run it. After loading Sprite 32 and Sprite BASIC, the program displays 32 sprites on the screen, `LISTs` itself, and returns to ready mode.

Note that Sprite 32 works com-

pletely in the background: The sprites remain stable even after the `READY` prompt and blinking cursor reappear. You can `LIST` the program, edit it, and with one exception (see below) use BASIC in the normal way.

BASIC Demo

Let's examine some Sprite BASIC commands. With 32 sprites still on the screen, type this statement and press `RETURN`:

SPRITE 0

All of the sprites disappear. Now enter the command `SPRITE 1`: All of the sprites instantly reappear.

The `SPRITE` command turns the Sprite 32 utility on and off. This command is important because *you must always disable Sprite 32 before using the disk or tape drive*. If you try to save or load a program while Sprite 32 is still active, you may crash the system (no harm is done to the computer, but you might lose whatever program is in memory).

Here are some additional commands to try. Type in each of the lines listed here, pressing `RETURN` at the end of each line:

```
FOR J=0 TO 7:DISABLE 3,J:NEXT  
ENABLE 3,0
```

```
FOR J=1 TO 7:ENABLE 3,J:NEXT
```

The `ENABLE` and `DISABLE` commands let you turn individual sprites on and off. The first number after the command indicates the sprite's group number. There are four sprite groups, numbered 0-3. Each group contains eight sprites, and group 0 is always located at the top of the screen. Within each group, sprites are numbered from 0-7; in this demo, sprite 0 is at the leftmost screen position.

The second parameter in the `ENABLE` and `DISABLE` commands identifies which sprite within the group you wish to affect. Thus, `DISABLE 3,0` turns off sprite 0 in

group 3 (the bottom group). **ENABLE 2,7** turns on the rightmost sprite in group 2, and so on.

Horizontal Zones

Sprite 32 divides the screen horizontally into four separate zones, one for each group of eight sprites. When all 32 sprites are on the screen, each group is confined to its own horizontal zone. For example, you cannot move a group 3 sprite into the zone for group 2. However, by sacrificing sprites from other zones, you can allow a sprite to move freely through two or more zones. The basic method is to **DISABLE** the corresponding sprite in the next higher-numbered zone.

For instance, if you disable sprite 0 in group 3, then sprite 0 in group 2 can move anywhere within zones 2 and 3. By sacrificing three corresponding sprites, you can allow a sprite from group 0 to go anywhere on the screen. To illustrate, enter these lines, pressing **RETURN** at the end of each line:

```
FOR J=1 TO 3:DISABLE J,0:NEXT J
FOR J=60 TO 250:PLACE 0,0,30,J:NEXT J
FOR J=250 TO 60 STEP -1:PLACE 0,0,30,J:NEXT J
```

Sprite 0 from group 0 moves all the way down through zones 1, 2, and 3, then returns to its original position. While this method reduces the total number of sprites you can display, it does permit you to have some sprites that aren't confined to particular screen areas.

One word of warning: Do not disable any of the sprites in group 0, or you may get unpredictable results.

Sprite BASIC Commands

Here is a list of all the Sprite BASIC commands:

DISABLE *sprite group, sprite number* Turn off a sprite. The *sprite group* parameter can range from 0-3 and identifies which of four groups the sprite belongs to. The *sprite number* can range from 0-7 and identifies an individual sprite within the group (see above).

ENABLE *sprite group, sprite number* Turn on the sprite specified by *sprite group* and *sprite number* (see above).

KILL Deactivate Sprite BASIC. After you perform **KILL**, Sprite

BASIC is disabled and the 64's BASIC works exactly as usual. This is not the same as a **SPRITE 0** statement (see below), which disables the Sprite 32 utility but does not affect Sprite BASIC.

OFF *sprite group, sprite number* Make the designated sprite invisible. Use the **PUTS** command (see below) to make a sprite visible again. Note the difference between **OFF** and **DISABLE**: An **OFF** statement makes the sprite disappear from the screen but has no effect on the ability of other sprites to venture into that sprite's zone. A **DISABLE** statement allows another sprite to move through the disabled sprite's territory and also makes the sprite disappear.

PLACE *sprite group, sprite number, X coord, Y coord* Place the designated sprite at the screen coordinates indicated by *X coord* and *Y coord*. The horizontal coordinate *X coord* can be any value from 0-512, but only coordinates from 24-343 are visible on the screen. The vertical coordinate *Y coord* can be any value from 0-255, but only coordinates from 50-249 are visible on the screen. (No special tricks are required to move sprites past the "seam" into horizontal positions greater than 255; Sprite 32 automatically handles the most significant bit for horizontal positioning.)

PUTS *sprite group, sprite number* The opposite of **OFF**, this statement makes a sprite visible.

RASTL *boundary number, new raster* The **RASTL** (RASTer Line) statement lets you change the boundary between two sprite zones; since the zones are contiguous, this also changes the size of those zones. The first parameter, *boundary number*, identifies which zone boundary you wish to change. There are three boundaries, numbered 0-2, which separate the four sprite zones. Boundary 0 separates zones 0 and 1; boundary 1 separates zones 1 and 2; and boundary 2 separates zones 2 and 3.

The second parameter, *new raster*, specifies the raster line where the specified boundary should be located. The visible screen contains 200 raster lines, numbered 50-249, with line 50 at the very top of the screen. The de-

fault position for boundary 0 is raster line 99. To move this boundary 20 lines higher on the screen (to line 79), use the statement **RASTL 0,79**. Now the lower portion of zone 0 ends at screen line 79 and the upper portion of zone 1 begins at line 80.

SET *sprite group, sprite number, shape, color* **SET** defines the shape and color of the individual sprite specified by *sprite group* and *sprite number*. The *shape* parameter tells the 64 where to find the shape data for the sprite. This is the same value you would **POKE** into one of the shape pointer locations from 2040-2047 under normal circumstances. The *color* value can range from 0-15 and corresponds to the usual 64 color numbers (color 0 is black, and so forth). Your user's manual contains more information about colors and sprite shape pointers.

SPRITE toggle Turn Sprite 32 on or off. Because Sprite 32 interferes with disk and tape operations (including saving and loading programs), you must *always* turn it off before using disk or tape. Use **SPRITE 0** to deactivate Sprite 32, and **SPRITE 1** to activate it. This statement does not affect Sprite BASIC, which must always be active in order to use a program that contains Sprite BASIC commands. For instance, after loading Sprite BASIC into memory, Program 4 activates it with **SYS 50688** before performing any Sprite BASIC commands.

Programming Tips

When placing sprites on the screen, keep in mind that no part of the sprite can cross the boundaries of its zone unless you have **DISABLED** other sprites to permit multizone movement.

For example, the default location for zone 0 is from raster lines 0-99. Since a sprite can be as many as 21 lines high, you should not attempt to **PLACE** a group 0 sprite using a vertical coordinate greater than 78 (99-21=78). Similarly, zone 1 stretches from lines 100-149, so a zone 1 sprite can move between lines 100-128 (149-21=128). If you try to position a sprite outside its permitted zone, it may flicker or disappear completely. Within its horizontal

zone, a sprite can have any horizontal location.

There are certain aspects of sprite behavior which Sprite 32 doesn't affect at all. For instance, sprite-to-sprite display priorities are exactly the same as usual: When two or more sprites overlap, lower-numbered sprites always appear in front of higher-numbered ones.

You may change the sprite-to-background priority of a sprite in the usual way, but the change affects every sprite of the same number. That is, if you change the sprite/background priority for sprite 0, it is changed for sprite 0 in every sprite group.

The same is true of horizontal or vertical expansion. Expansion affects every like-numbered sprite on the screen.

Machine Language Demo

For machine language programming, BASIC commands are not particularly convenient. Program 3, the Sprite Kernal, provides all the features of Sprite 32 to machine language programmers. Even if you don't understand machine language, you may want to enter and run the remaining programs to see an impressive demonstration. Program 5 illustrates the power of machine language by moving 17 sprites on the screen simultaneously. This program must be entered with MLX, using these addresses:

Starting address: 6000
Ending address: 62B7

If you have been using Sprite 32 or Sprite BASIC, turn the computer off and on before you load and run MLX. Be sure to save Program 5 with the filename ML DEMO.

Next, type in and save Program 6 (you do not have to install Sprite BASIC before typing this program). This is a short BASIC loader that installs the necessary ML programs in memory, then starts ML DEMO with the statement SYS 24576.

When you run Program 6, the screen fills immediately with 17 bouncing sprites. Note that several of the sprites move through more than one sprite zone; one of them, the light blue sprite, is able to move anywhere on the screen. As explained earlier, it is necessary to



"Sprite 32" allows the Commodore 64 to display as many as 32 sprites on the screen simultaneously.

sacrifice a certain number of sprites to achieve this effect.

Press RUN/STOP-RESTORE to stop the program. To restart it, enter SYS 24576.

The Sprite Kernal

Like Sprite BASIC, the Sprite Kernal also requires that Sprite 32 be in memory. Here are the starting addresses for each Sprite Kernal routine:

Routine	JSR address
SPRITE	\$C612/50706
PLACE	\$C615/50709
SET	\$C618/50712
OFF	\$C61B/50715
PUTS	\$C61E/50718
DISABLE	\$C621/50721
ENABLE	\$C624/50724
RASTL	\$C627/50727

The Sprite Kernal routines perform the same functions as their Sprite BASIC equivalents. However, a different procedure is used to pass each routine the information it needs. The basic method is to store the parameters in memory locations beginning at 50688 (\$C600), then call the Sprite Kernal routine with JSR. For an explanation of the parameters required by each routine, see "Sprite BASIC Commands" above.

Since the SPRITE routine takes only one parameter (1 or 0), you need to supply only one value before calling it. For example, to perform the equivalent of the Sprite BASIC statement `SPRITE 1`, you would execute `LDA #1:STA $C600:JSR $C612`. To do the equivalent of `SPRITE 0`, use `LDA #0:STA $C600:JSR $C612`. All of the remaining Sprite Kernal routines require two or more parameters. Here is an outline of how to call them:

PLACE (\$C615/50709) Store the

sprite group value in \$C600/50688 and the *sprite number* value in \$C601/50689. Locations \$C602-\$C603/50690-50691 hold the low byte and high byte of the sprite's horizontal (X) position. Store the sprite's vertical (Y) position in location \$C604/50692.

SET (\$C617/50712) Store the *sprite group* value in \$C600/50688 and the *sprite number* value in \$C601/50689. Store the *shape* pointer value in \$C602/50690 and the *color* value in \$C603/50691.

OFF (\$C61B/50715) Only two values are required. Store the *sprite group* value in \$C600/50688 and the *sprite number* value in \$C601/50689.

PUTS (\$C61E/50718) The converse of OFF. Store the *sprite group* value in \$C600/50688 and the *sprite number* value in \$C601/50689.

DISABLE (\$C621/50721) Only two values are required. Store the *sprite group* value in \$C600/50688 and the *sprite number* value in \$C601/50689.

ENABLE (\$C624/50724) The converse of DISABLE. Store the *sprite group* value in \$C600/50688 and the *sprite number* value in \$C601/50689.

RASTL (\$C627/50727) Store the *boundary number* value in \$C600/50688 and the *new raster* value in \$C601/50689.

Here is a short example of how to use Sprite Kernal routines. This program displays sprite 4 in group 2. You will need a machine language assembler to create the object code for this routine. The comments following the semicolons are optional and need not be included.

```
LDA #01;turn on
STA $C600;Sprite 32
JSR $C612
LDA #04;sprite number
STA $C600
LDA #02;sprite group
STA $C601
LDA #A0;low and high
STA $C602;bytes of the
LDA #00;sprite's
STA $C603;X coordinate
LDA #60
STA $C604;Y coordinate
JSR $C615;PLACE
RTS
```

When Sprite 32 is active, the 64's IRQ vector is diverted from its normal address to the custom routines used to display extra sprites. If

you activate another interrupt-driven routine at the same time, the conflict may produce unexpected results.

Program 1: Sprite 32

Please refer to the "MLX" article in this issue before entering the following listing.

```
C000:4C A7 C0 00 00 00 00 00 A9
C008:00 00 00 00 45 45 45 45 98
C010:45 45 45 45 00 01 02 03 8D
C018:04 05 06 07 00 01 02 03 19
C020:04 05 06 07 00 00 00 00 16
C028:00 00 00 00 00 77 77 77 ED
C030:77 77 77 77 00 01 02 71
C038:03 04 05 06 07 00 01 02 79
C040:03 04 05 06 07 00 00 00 7D
C048:00 00 00 00 00 00 A9 A9 C6
C050:A9 A9 A9 A9 A9 00 01 D5
C058:02 03 04 05 06 07 00 01 B9
C060:02 03 04 05 06 07 00 00 C0
C068:00 00 00 00 00 00 DB C5
C070:DB DB DB DB DB DB DB 00 16
C078:01 02 03 04 05 06 07 00 E9
C080:01 02 03 04 05 06 07 01 F2
C088:01 01 01 01 01 01 01 01 0A
C090:01 01 01 01 01 01 01 01 12
C098:01 01 01 01 01 01 FF 19
C0A0:FF FF FF 64 96 C8 FA 78 AE
C0A8:A9 1B 8D 11 D0 A9 81 8D 46
C0B0:1A D0 A9 C3 8D 14 03 A9 51
C0B8:C0 8D 15 03 A9 7F 8D 0D 44
C0C0:DC 58 06 A9 01 8D 19 D0 AE
C0C8:AD 12 D0 CD A3 C0 90 03 E0
C0D0:4C A8 C1 AD 0B C0 8D 10 3C
C0D8:D0 AD 9F C0 8D 15 D0 AD 3E
C0E0:03 C0 8D 00 D0 AD 0C C0 DB
C0E8:8D 01 D0 AD 14 C0 8D 27 4C
C0F0:D0 AD 1C C0 8D F8 07 AD E1
C0F8:04 C0 8D 02 D0 AD 0D C0 96
C100:8D 03 D0 AD 15 C0 8D 28 EE
C108:D0 AD 1D C0 8D F9 07 AD 1F
C110:05 C0 8D 04 D0 AD 0E C0 52
C118:8D 05 D0 AD 16 C0 8D 29 90
C120:D0 AD 1E C0 8D FA 07 AD 5B
C128:06 C0 8D 06 D0 AD 0F C0 0D
C130:8D 07 D0 AD 17 C0 8D 2A 32
C138:D0 AD 1F C0 8D FB 07 AD 97
C140:07 C0 8D 08 D0 AD 10 C0 C7
C148:8D 09 D0 AD 18 C0 8D 2B D3
C150:D0 AD 20 C0 8D FC 07 AD D3
C158:08 C0 8D 0A D0 AD 11 C0 82
C160:8D 0B D0 AD 19 C0 8D 2C 75
C168:D0 AD 21 C0 8D FD 07 AD 10
C170:09 C0 8D 0C D0 AD 12 C0 3D
C178:8D 0D D0 AD 1A C0 8D 2D 17
C180:D0 AD 22 C0 8D FE 07 AD 4C
C188:0A C0 8D 0E D0 AD 13 C0 F7
C190:8D 0F D0 AD 1B C0 8D 2E B8
C198:D0 AD 23 C0 8D FF 07 AD 88
C1A0:A3 C0 8D 12 D0 4C B6 C4 E2
C1A8:CD A4 C0 90 03 4C AD C2 C4
C1B0:AD 2C C0 8D 10 D0 AD A0 C6
C1B8:C0 8D 15 D0 AD 87 C0 F0 AD
C1C0:18 AD 24 C0 8D 00 D0 AD 08
C1C8:2D C0 8D 01 D0 AD 35 C0 3D
C1D0:8D 27 D0 AD 3D C0 8D F8 DA
C1D8:07 AD 88 C0 F0 18 AD 25 D0
C1E0:C0 8D 02 D0 AD 2E C0 8D AA
C1E8:03 D0 AD 36 C0 8D 28 D0 98
C1F0:AD 3E C0 8D F9 07 AD 89 9C
C1F8:C0 F0 18 AD 26 C0 8D 04 4A
C200:D0 AD 2F C0 8D 05 D0 AD 1B
C208:37 C0 8D 29 D0 AD 3F C0 1A
C210:8D FA 07 AD 8A C0 F0 18 28
C218:AD 27 C0 8D 06 D0 AD 30 2E
C220:C0 8D 07 D0 AD 38 C0 8D B4
C228:2A D0 AD 40 C0 8D FB 07 EB
C230:AD 8B C0 F0 18 AD 28 C0 1F
```

```
C238:8D 08 D0 AD 31 C0 8D 09 2C
C240:D0 AD 39 C0 8D 2B D0 AD 35
C248:41 C0 8D FC 07 AD 8C C0 E8
C250:F0 18 AD 29 C0 8D 0A D0 BD
C258:AD 32 C0 8D 0B D0 AD 3A 63
C260:C0 8D 2C D0 AD 42 C0 8D C1
C268:FD 07 AD 8D C0 F0 18 AD E4
C270:2A C0 8D 0C D0 AD 33 C0 12
C278:8D 0D D0 AD 3B C0 8D 2D 22
C280:D0 AD 43 C0 8D FE 07 AD 72
C288:8E C0 F0 18 AD 2B C0 8D 4E
C290:0E D0 AD 34 C0 8D 0F D0 75
C298:AD 3C C0 8D 2E D0 AD 44 49
C2A0:C0 8D FF 07 AD A4 C0 8D 69
C2A8:12 D0 4C B6 C4 CD A5 C0 C9
C2B0:90 03 4C B2 C3 AD 4D C0 24
C2B8:8D 10 D0 AD A1 C0 8D 15 3E
C2C0:D0 AD 8F C0 F0 18 AD 45 A0
C2C8:C0 8D 00 D0 AD 4E C0 8D D4
C2D0:01 D0 AD 56 C0 8D 27 D0 81
C2D8:AD 5E C0 8D F8 07 AD 90 8D
C2E0:C0 F0 18 AD 46 C0 8D 02 33
C2E8:D0 AD 4F C0 8D 03 D0 AD FF
C2F0:57 C0 8D 28 D0 AD 5F C0 43
C2F8:8D F9 07 AD 91 C0 F0 18 09
C300:AD 47 C0 8D 04 D0 AD 50 30
C308:C0 8D 05 D0 AD 58 C0 8D DE
C310:29 D0 AD 60 C0 8D FA 07 55
C318:AD 92 C0 F0 18 AD 48 C0 0B
C320:8D 06 D0 AD 51 C0 8D 07 94
C328:D0 AD 59 C0 8D 2A D0 AD 1F
C330:61 C0 8D FB 07 AD 93 C0 E0
C338:F0 18 AD 49 C0 8D 08 D0 A5
C340:AD 52 C0 8D 09 D0 AD 5A 65
C348:C0 8D 2B D0 AD 62 C0 8D 0C
C350:FC 07 AD 94 C0 F0 18 AD BE
C358:4A C0 8D 0A D0 AD 53 C0 2C
C360:8D 0B D0 AD 5B C0 8D 2C 8B
C368:D0 AD 63 C0 8D FD 07 AD 5C
C370:95 C0 F0 18 AD 4B C0 8D 3C
C378:0C D0 AD 54 C0 8D 0D D0 5C
C380:AD 5C C0 8D 2D D0 AD 64 53
C388:C0 8D FE 07 AD 96 C0 F0 5E
C390:18 AD 4C C0 8D 0E D0 AD 19
C398:55 C0 8D 0F D0 AD 5D C0 56
C3A0:8D 2E D0 AD 65 C0 8D FF B8
C3A8:07 AD A5 C0 8D 12 D0 4C 82
C3B0:B6 C4 CD A6 C0 90 03 4C 83
C3B8:B1 C4 AD 6E C0 8D 10 D0 14
C3C0:AD A2 C0 8D 15 D0 AD 97 97
C3C8:C0 F0 18 AD 66 C0 8D 00 1C
C3D0:D0 AD 6F C0 8D 01 D0 AD E5
C3D8:77 C0 8D 27 D0 AD 7F C0 6D
C3E0:8D F8 07 AD 98 C0 F0 18 EA
C3E8:AD 67 C0 8D 02 D0 AD 70 31
C3F0:C0 8D 03 D0 AD 78 C0 8D 08
C3F8:28 D0 AD 80 C0 8D F9 07 BD
C400:AD 99 C0 F0 18 AD 68 C0 F6
C408:8D 04 D0 AD 71 C0 8D 05 FC
C410:D0 AD 79 C0 8D 29 D0 AD 09
C418:81 C0 8D FA 07 AD 9A C0 D8
C420:F0 18 AD 69 C0 8D 06 D0 8D
C428:AD 72 C0 8D 07 D0 AD 7A 67
C430:C0 8D 2A D0 AD 82 C0 8D 56
C438:FB 07 AD 9B C0 F0 18 AD 98
C440:6A C0 8D 08 D0 AD 73 C0 46
C448:8D 09 D0 AD 7B C0 8D 2B F4
C450:D0 AD 83 C0 8D FC 07 AD 46
C458:9C C0 F0 18 AD 6B C0 8D 2A
C460:0A D0 AD 74 C0 8D 0B D0 43
C468:AD 7C C0 8D 2C D0 AD 84 5D
C470:C0 8D FD 07 AD 9D C0 F0 44
C478:18 AD 6C C0 8D 0C D0 AD FE
C480:75 C0 8D 0D D0 AD 7D C0 70
C488:8D 2D D0 AD 85 C0 8D FE 62
C490:07 AD 9E C0 F0 18 AD 6D 99
C498:C0 8D 0E D0 AD 76 C0 8D 0B
C4A0:0F D0 AD 7E C0 8D 2E D0 EC
C4A8:AD 86 C0 8D FF 07 4C B1 02
C4B0:C4 A9 00 8D 12 D0 AD 0D 1C
C4B8:DC 29 01 F0 03 4C 31 EA C0
C4C0:4C BC FE 00 00 00 00 00 7F
```

Program 2: Sprite BASIC

Please refer to the "MLX" article in this issue before entering the following listing.

```
C600:A2 07 BD 04 03 9D A7 02 78
C608:BD 12 C6 9D 04 03 CA 10 7D
C610:F1 60 5F C6 E3 C6 18 C7 39
C618:3A C7 4B 49 4C CC 53 45 34
C620:D4 4F 46 46 D3 50 55 54 F7
C628:D3 44 49 53 41 42 4C C5 80
C630:45 4E 41 42 4C C5 50 4C A6
C638:41 43 C5 52 41 53 54 CC E1
C640:53 50 52 49 54 C5 4C 4F 0C
C648:4F CB 00 8C C7 83 C8 BD D4
C650:C8 E7 C8 0E C9 32 C9 A7 88
C658:C7 56 C9 6C C9 6C C7 20 0F
C660:7C A5 A2 00 0A 04 84 0F 17
C668:BD 00 02 85 08 C9 22 F0 0A
C670:4F 24 0F 70 26 C9 41 90 03
C678:22 C9 5B B0 1E 84 71 A0 86
C680:4C 84 0B A0 FF 86 7A CA 9A
C688:C8 E8 BD 00 02 38 F9 1A 6B
C690:C6 F0 F5 C9 80 D0 30 05 C5
C698:0B A4 71 E8 C8 99 FB 01 37
C6A0:B9 FB 01 F0 36 38 E9 3A D9
C6A8:F0 04 C9 49 D0 02 85 0F 26
C6B0:38 E9 55 D0 B3 85 08 BD 0E
C6B8:00 02 F0 DF C5 08 F0 DB EE
C6C0:C8 99 FB 01 E8 D0 F0 A6 BB
C6C8:7A E6 0B C8 B9 19 C6 10 0B
C6D0:FA B9 1A C6 D0 B4 BD 00 CE
C6D8:02 10 BE 99 FD 01 A9 FF 24
C6E0:85 7A 60 10 2A C9 FF F0 46
C6E8:26 24 0F 30 22 C9 CC 90 D9
C6F0:24 38 E9 CB AA 84 49 A0 33
C6F8:FF CA F0 08 C8 B9 1A C6 FF
C700:10 FA 30 F5 C8 B9 1A C6 E3
C708:30 08 20 47 AB D0 F5 4C 03
C710:F3 A6 4C EF A6 4C 1A A7 0E
C718:20 73 00 C9 CC 90 15 20 24
C720:25 C7 4C AE A7 E9 CC 0A 31
C728:A8 B9 4C C6 48 B9 4B C6 F6
C730:48 4C 73 00 20 79 00 4C 98
C738:E7 A7 A9 00 85 D0 20 73 EE
C740:00 C9 FF F0 21 C9 D5 90 BD
C748:1D 38 E9 D5 0A 48 20 73 34
C750:00 20 F1 AE 68 A8 B9 5D C7
C758:C6 85 55 AD 5E C6 85 56 A1
C760:20 54 00 4C 8D AD 20 79 B6
C768:00 4C 8D AE A5 15 48 A5 5F
C770:14 48 20 F7 B7 A0 00 B1 9F
C778:14 85 63 C8 B1 14 85 62 B7
C780:68 85 14 68 85 15 A2 90 05
C788:38 20 49 BC 60 A2 07 BD 8A
C790:A7 02 9D 04 03 CA 10 F7 C3
C798:60 00 00 00 00 00 00 58
C7A0:01 02 04 08 10 20 40 80 34
C7A8:20 8A AD 20 F7 B7 A5 14 A0
C7B0:8D 9A C7 20 F1 B7 8E 99 CD
C7B8:C7 20 FD AE 20 EB B7 A5 A4
C7C0:14 8D 9B C7 A5 15 8D 9C E6
C7C8:C7 8E 9D C7 AD 9A C7 18 8F
C7D0:0A 0A 0A 0A 6D 9A C7 CC
C7D8:6D 99 C7 AA 8E 9E C7 AD 55
C7E0:9B C7 9D 03 C0 AD 9E C7 D5
C7E8:38 ED 99 C7 AA AC 90 C7 C2
C7F0:AD 9C C7 F0 41 B9 A0 C7 80
C7F8:8D 9F C7 BD 0B C0 19 A0 3A
C800:C7 9D 0B C0 8A 18 69 21 F2
C808:AA AD 9A C7 18 0A 0A 1A 31
C810:6D 99 C7 A8 E0 84 B0 1B D7
C818:B9 87 C0 D0 16 BD 0B C0 0C
C820:0D 9F C7 9D 0B C0 8A 18 7B
C828:69 21 AA 98 18 69 08 A8 B4
C830:4C 14 C8 4C 7A C8 AC 99 B4
C838:C7 A9 FF 38 F9 A0 C7 8D 0B
C840:9F C7 BD 0B C0 2D 9F C7 BD
C848:9D 0B C0 8A 18 69 21 AA 7F
C850:AD 9A C7 18 0A 0A 0A 6D D3
C858:99 C7 A8 E0 84 B0 1B B9 A2
C860:87 C0 D0 16 BD 0B C0 2D 2A
C868:9F C7 9D 0B C0 8A 18 69 E9
```



```

C870:21 AA 98 18 69 08 A8 4C DA
C878:5B C8 AE 9E C7 AD 9D C7 A1
C880:9D 0C C0 60 20 8A AD 20 A8
C888:F7 B7 A5 14 8D 9A C7 20 80
C890:F1 B7 8E 99 C7 20 F1 B7 CE
C898:8E 9B C7 20 F1 B7 8E 9C 7B
C8A0:C7 AD 9A C7 18 0A 0A 0A 58
C8A8:0A 0A 6D 9A C7 6D 99 C7 08
C8B0:AA AD 9B C7 9D 1C C0 AD 7F
C8B8:9C C7 9D 14 C0 60 20 8A D1
C8C0:AD 20 F7 B7 A5 14 8D 9A DE
C8C8:C7 20 F1 B7 8E 99 C7 AC 17
C8D0:99 C7 A9 FF 38 F9 A0 C7 09
C8D8:8D 9B C7 AC 9A C7 B9 9F E2
C8E0:C0 2D 9B C7 99 9F C0 60 3B
C8E8:20 8A AD 20 F7 B7 A5 14 E2
C8F0:8D 9A C7 20 F1 B7 8E 99 10
C8F8:C7 AC 99 C7 B9 A0 C7 8D B6
C900:9B C7 AC 9A C7 B9 9F C0 B7
C908:0D 9B C7 99 9F C0 60 20 7C
C910:8A AD 20 F7 B7 A5 14 A8 FC
C918:88 8C AD 20 F7 20 F1 B7 8E A9
C920:99 C7 AD 9A C7 18 0A 0A 8E
C928:0A 6D 99 C7 A8 A9 00 99 51
C930:87 C0 60 20 8A AD 20 F7 09
C938:B7 A4 14 88 8C 9A C7 20 5A
C940:F1 B7 8E 99 C7 AD 9A C7 18
C948:18 0A 0A 0A 6D 99 C7 A8 56
C950:A9 01 99 87 C0 60 00 20 4C
C958:8A AD 20 F7 B7 A4 14 8C 25
C960:56 C9 20 F1 B7 8A AC 56 4C
C968:C9 99 A3 C0 60 20 8A AD 0E
C970:20 F7 B7 A5 14 C9 00 F0 1C
C978:03 4C 00 C0 78 A9 31 8D 07
C980:14 03 A9 EA 8D 15 03 A9 33
C988:FF 8D DC A9 80 8D 1A 73
C990:D0 58 A9 00 8D 15 D0 60 9A

```

Program 3: Sprite Kernal

Please refer to the "MLX" article in this issue before entering the following listing.

```

C600:00 00 00 00 00 00 00 00 8D
C608:00 00 01 02 04 08 10 20 56
C610:40 80 4C 2A C6 4C 60 C6 F8
C618:4C 2A C7 4C 59 C7 4C 84 1B
C620:C7 4C AC C7 4C CF C7 4C 34
C628:F2 C7 8D 07 C6 8E 08 C6 8A
C630:8C 09 C6 AD 00 C6 F0 03 F9
C638:4C 00 C0 78 A9 31 8D 14 CC
C640:03 A9 EA 8D 15 03 A9 FF F7
C648:8D 0D DC A9 80 8D 1A D0 55
C650:58 A9 00 8D 15 D0 AD 07 9B
C658:C6 AE 08 C6 AC 09 C6 60 D9
C660:8D 07 C6 8E 08 C6 8C 09 B5
C668:C6 AD 01 C6 18 0A 0A 0A 58
C670:0A 0A 6D 01 C6 6D 00 C6 F5
C678:AA 8E 05 C6 AD 02 C6 9D AC
C680:03 C0 AD 05 C6 38 ED 00 B8
C688:C6 AA AC 00 C6 AD 03 C6 73
C690:F0 41 B9 0A C6 8D 06 C6 FD
C698:BD 0B C0 19 0A C6 9D 0B 23
C6A0:C0 8A 18 69 21 AA AD 01 DA
C6A8:C6 18 0A 0A 6D 00 C6 4E
C6B0:A8 E0 84 B0 1B B9 87 C0 F5
C6B8:D0 16 BD 0B C0 0D 06 C6 A9
C6C0:9D 0B C0 8A 18 69 21 AA F3
C6C8:98 18 69 08 A8 4C B1 C6 F6
C6D0:4C 17 C7 AC 00 C6 A9 FF 7C
C6D8:38 F9 0A C6 8D 06 C6 BD 7E
C6E0:0B C0 2D 06 C6 9D 0B C0 AD
C6E8:8A 18 69 21 AA AD 01 C6 D5
C6F0:18 0A 0A 6D 00 C6 A8 90
C6F8:E0 84 B0 1B B9 87 C0 D0 1E
C700:16 BD 0B C0 2D 06 C6 9D 24
C708:0B C0 8A 18 69 21 AA 98 DD
C710:18 69 08 A8 4C F8 C6 AE 14
C718:05 C6 AD 04 C6 9D 0C C0 57
C720:AD 07 C6 AE 08 C6 AC 09 C9
C728:C6 60 8D 07 C6 8E 08 C6 9C
C730:8C 09 C6 AD 01 C6 18 0A 59
C738:0A 0A 0A 6D 01 C6 6D 9B

```

```

C740:00 C6 AA AD 02 C6 9D 1C 34
C748:C0 AD 03 C6 9D 14 C0 AD DC
C750:07 C6 AE 08 C6 AC 09 C6 2D
C758:60 8D 07 C6 8E 08 C6 8C 77
C760:09 C6 AC 00 C6 A9 FF 38 D0
C768:F9 0A C6 8D 02 C6 AC 01 AE
C770:C6 B9 9F C0 2D 02 C6 99 6A
C778:9F C0 AD 07 C6 AE 08 C6 F5
C780:AC 09 C6 60 8D 07 C6 8E 2C
C788:08 C6 8C 09 C6 AC 00 C6 9F
C790:B9 0A C6 8D 02 C6 AC 01 B6
C798:C6 B9 9F C0 0D 02 C6 99 91
C7A0:9F C0 AD 07 C6 AE 08 C6 1E
C7A8:AC 09 C6 60 8D 07 C6 8E 54
C7B0:08 C6 8C 09 C6 AD 01 C6 CD
C7B8:18 0A 0A 6D 00 C6 A8 5A
C7C0:A9 00 99 87 C0 AD 07 C6 62
C7C8:AE 08 C6 AC 09 C6 60 8D 07
C7D0:07 C6 8E 08 C6 8C 09 C6 29
C7D8:AD 01 C6 18 0A 0A 6D D3
C7E0:00 C6 A8 A9 01 99 87 C0 10
C7E8:AD 07 C6 AE 08 C6 AC 09 92
C7F0:C6 60 8D 07 C6 8E 08 C6 65
C7F8:8C 09 C6 AC 00 C6 AD 01 2C
C800:C6 99 A3 C0 AD 07 C6 AE A1
C808:08 C6 AC 09 C6 60 00 00 2D

```

Program 4: Sprite BASIC Demo

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

```

HC 10 IF Z=2 THEN 40
BB 20 IF Z=0 THEN Z=1:PRINT "
{CLR}{WHT}{DOWN}LOADING
{SPACE}SPRITE 32":LOAD "
SPRITE 32",8,1
JP 30 IF Z=1 THEN Z=2:PRINT "L
OADING SPRITE BASIC":LOA
D"SPRITE BASIC",8,1
SQ 40 SYS 50688:POKE 53281,6
QA 50 FOR T=255*64 TO T+62:POK
E T,255:NEXT
XE 60 FOR L=0 TO 2:RASTL L,(L+
1)*50+50:NEXT
XK 70 SPRITE 1
GS 80 FOR ROW=0 TO 3:FOR S=0 T
O 7
DD 90 PLACE RO,S,30+S*40,60+50
*ROW
AX 100 IF RO>0 THEN:ENABLE RO,
S
CH 110 SET RO,S,255,7+S*RO
MJ 120 NEXT:NEXT:LIST

```

Program 5: ML Demo

Please refer to the "MLX" article in this issue before entering the following listing.

```

6000:A2 00 BD 10 60 9D C0 3F 05
6008:E8 E0 3F D0 F5 4C 4F 60 4A
6010:00 00 00 00 00 00 00 00 D0
6018:00 00 00 00 00 00 78 00 1B
6020:FE 00 03 FF 00 07 FF 80 5D
6028:07 FF 80 0F FF C0 0F FF 8E
6030:C0 0F FF C0 07 FF 80 07 61
6038:FF 80 03 FF 00 01 FE 00 7B
6040:00 78 00 00 00 00 00 00 1F
6048:00 00 00 00 00 00 00 A9 B2
6050:00 8D 21 D0 8D 20 D0 A9 DD
6058:93 20 D2 FF A9 01 8D 00 B1
6060:C6 20 12 C6 A9 00 8D 01 A4
6068:C6 A9 41 8D 04 C6 A0 74
6070:A2 32 A9 00 8D 00 C6 8E CC
6078:02 C6 8C 03 C6 20 15 C6 55
6080:A9 FF 8D 02 C6 8C E4 60 7A
6088:8A 6D E4 60 8D 03 C6 20 B2
6090:18 C6 AD 01 C6 C9 03 B0 E8
6098:03 20 24 C6 18 8A 69 23 B4
60A0:AA 90 01 C8 EE 00 C6 AD 3A

```

```

60A8:00 C6 C9 08 D0 C9 18 AD 60
60B0:04 C6 69 32 8D 04 C6 EE 6E
60B8:01 C6 AD 01 C6 C9 04 D0 A7
60C0:AD 4C E6 60 00 01 02 04 5A
60C8:06 00 01 03 04 07 00 02 1B
60D0:03 04 06 08 00 00 00 00 55
60D8:00 01 01 01 01 01 02 02 1C
60E0:02 02 02 08 00 00 A2 00 29
60E8:BD D4 60 C9 08 F0 10 8D 18
60F0:01 C6 BD C4 60 8D 00 C6 E7
60F8:20 21 C6 E8 4C E8 60 4C 8C
6100:E2 61 32 55 78 9B BE E1 B9
6108:0A 2D 00 00 00 9B 00 E1 6B
6110:00 2D 00 00 78 00 00 E1 C3
6118:0A 00 00 55 00 00 00 E1 17
6120:00 2D 00 00 00 00 00 00 2E
6128:01 01 00 00 00 00 00 00 AB
6130:00 01 00 00 00 00 00 00 33
6138:01 00 00 00 00 00 00 00 7B
6140:00 01 3C 3C 3C 3C 3C 3C 16
6148:3C 3C 00 00 00 6E 00 6E 60
6150:00 6E 00 00 A0 00 00 A0 54
6158:A0 00 00 D2 00 00 00 D2 6B
6160:00 D2 E8 B2 80 4F E8 4F 82
6168:80 4F 00 00 00 E8 00 80 63
6170:00 B2 00 00 E8 00 00 B2 D9
6178:E8 00 00 E8 00 00 00 E8 27
6180:00 E8 2F 2F 2F 2F 2F 2F 1A
6188:2F 2F 00 00 00 69 00 69 BD
6190:00 69 00 00 9B 00 9B 26
6198:9B 00 00 CD 00 00 00 CD D3
61A0:00 CD 01 01 00 01 00 01 0C
61A8:01 00 01 01 00 01 00 01 21
61B0:01 01 00 00 01 00 00 00 3C
61B8:00 00 00 00 00 00 00 00 7B
61C0:00 01 FF FF 01 FF 01 01 CE
61C8:FF FF 00 00 00 01 00 01 90
61D0:00 01 00 00 01 00 00 FF DB
61D8:01 00 00 01 00 00 00 01 2D
61E0:00 FF A0 00 84 FB A2 00 11
61E8:8E E4 60 8E E5 60 AE E4 14
61F0:60 8E 00 C6 AE E5 60 8C 4E
61F8:01 C6 BD 02 61 8D 02 C6 D1
6200:BD 22 61 8D 03 C6 BD 42 22
6208:61 8D 04 C6 D0 03 4C 86 7F
6210:62 20 15 C6 18 BD 42 61 BA
6218:7D C2 61 9D 42 61 BD 42 A7
6220:61 DD 82 61 D0 08 A9 01 6E
6228:9D C2 61 4C 38 62 DD 62 C6
6230:61 D0 05 A9 FF 9D C2 61 72
6238:BD A2 61 C9 01 D0 14 18 D8
6240:BD 02 61 69 01 9D 02 61 0B
6248:BD 22 61 69 00 9D 22 61 53
6250:4C 64 62 38 BD 02 61 E9 C6
6258:01 9D 02 61 BD 22 61 E9 7E
6260:00 9D 22 61 BD 22 61 C9 E9
6268:01 D0 0F A9 46 D0 02 61 6D
6270:D0 14 A9 00 9D A2 61 4C 5E
6278:86 62 A9 14 DD 02 61 D0 1A
6280:05 A9 01 9D A2 61 A9 01 1B
6288:85 FC C6 FC A5 FC D0 FA B5
6290:EE E4 60 EE E5 60 AD E4 F1
6298:60 C9 08 90 14 A2 00 8E C3
62A0:E4 60 C8 C0 04 90 0A A0 2C
62A8:00 A2 00 8E E4 60 8E E5 AA
62B0:60 4C EE 61 00 00 00 00 AC

```

Program 6: ML Demo Boot

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

```

RS 10 IF Z=3 THEN SYS 24576
ER 20 IF Z=0 THEN Z=1:PRINT "
{CLR}{5}LOADING SPRITE 3
2":LOAD "SPRITE 32",8,1
CJ 30 IF Z=1 THEN Z=2:PRINT "L
OADING SPRITE KERNAL":LO
AD "SPRITE KERNAL",8,1
GS 40 IF Z=2 THEN Z=3:PRINT "L
OADING ML DEMO":LOAD "ML
DEMO",8,1

```


MODified Shapes For Atari ST

Robert G. Geiger

This fresh adaptation of a popular COMPUTE! program creates pleasing graphics and also contains valuable information about using GEMSYS and VDISYS in ST BASIC. With the techniques explained here, you can draw on a full-screen graphics area (without BASIC's usual window borders), manipulate dialog boxes, and monitor mouse events.

Paul Carlson's article "MODified Shapes For IBM" (COMPUTE!, May 1986) is interesting both as a tutorial on the MOD operator and for its outstanding graphics. Since ST BASIC also has the MOD operator, the logic used in the IBM program works equally well on the Atari ST. But the ST is capable of doing much more. With the aid of GEMSYS and VDISYS, you can not only replicate the original program, but also add distinctive ST features such as dialog boxes and mouse input.

Type in "MODified Shapes For ST" below and save a copy before you run it. When typing the program, you'll notice that several lines (those containing VDISYS or GEMSYS calls) are more than 80 characters long. This is done so that all the information for each GEM call is on one program line. The ST BASIC editor allows you to enter lines up to 255 characters in length, provided that the first character in the second screen line is a space.

If you have a 520ST with 512K RAM and the TOS operating system on disk instead of in ROM (Read Only Memory), you must turn off buffered graphics before you run the program. If your ST has more than 512K of memory or TOS in ROM, you should have enough memory to run the program without taking this step.

The program runs in any screen resolution—low or medium resolution on a color monitor, or high resolution on a monochrome monitor. However, low resolution is truest to the four-color IBM screen used in the original program. In medium or high resolution, the design occupies only part of the screen.

From PC To ST

If you have any familiarity with IBM BASIC, you may find it instructive to compare the original program with the ST version. Some statements in the PC/PCjr program, such as KEY OFF, are unnecessary in ST BASIC and can be omitted. Most of the program logic, which simply manipulates variables, works on the ST with no modification at all.

However, other operations require different commands. For instance, at the conclusion of the IBM program, the INKEY\$ statement is used to make the program pause until you press a key. ST BASIC lacks INKEY\$, but you can substitute the INP(2) function. And

though the LINEF command in ST BASIC differs a bit in syntax, it can draw lines much like the IBM version. The IBM clears the screen with CLS, but the ST uses CLEARW 2, and so on.

It's possible to translate most of the IBM program by making BASIC substitutions, but if you confine yourself to ordinary BASIC commands, you'll end up with a translation that's almost, but not quite, satisfactory. One major problem involves the ST BASIC output window. When you open the window to full screen size with FULLW 2: CLEARW 2, part of the visible screen area is taken up by the window border, title line, and menu bar. In low resolution, the usable screen area is less than 40 characters wide, and you can print only 17 lines of text before the window's contents begin to scroll upward.

Because screen space is taken up by the window borders, it appears impossible to duplicate the IBM's 320 × 200 pixel screen exactly. Even worse, while IBM BASIC defines the upper-left corner of the screen as coordinate (0,0), ST BASIC considers coordinate (0,0) to be the upper-left point inside the output window. As a result, any graphics designed to occupy the entire IBM screen will be clipped in the ST BASIC output window.

Full Screens In ST BASIC

The solution is to use system calls for screen output. GEM (Graphics

Environment Manager) allows you to draw anywhere on the screen, including the areas normally occupied by the BASIC windows themselves. Two of the more important parts of GEM are the VDI (Virtual Device Interface), which handles low-level mouse input and graphics display, and the AES (Applications Environment Services), which handles more complex routines such as managing windows, drop-down menus, icons, and dialog boxes.

The basic method of calling a VDI routine is to store the information it requires into reserved memory locations which are defined by the reserved variables CONTRL, PTSIN, and INTIN. These memory locations are known as *parameter blocks*. Every VDI routine requires different information, and some VDI routines don't need information in all three parameter blocks. Once this preliminary work is done, you call the VDI routine with the statement VDISYS(0). The 0 is a dummy parameter and can be any numeric value. You can learn more about VDISYS routines in a two-article series entitled "Adding System Power To ST BASIC" in the April and May 1986 issues of COMPUTE!

The procedure for calling an AES routine is similar—first you store the information it requires in memory, then you call the routine with a GEMSYS statement—but different information must be passed to the routine, and the number inside the parentheses is significant. For instance, GEMSYS(52) calls AES routine 52 (see below). This program uses VDISYS to create graphics, and GEMSYS to handle user input.

Dialog Boxes

Some of the most useful AES functions involve various forms of the *dialog box*—a box that appears on top of the current screen display whenever it's time for you to select an option, respond with a yes or no answer, and so forth. When the interaction is over, GEM restores the screen and lets you continue where you left off. Dialog boxes are a powerful way of creating a friendly atmosphere in your programs. The full capabilities of the dialog box are beyond the scope of BASIC (un-

less you have the *Resource Construction Set* utility from the *ST Development System*), but two forms of the dialog box—the *alert box* and the *error box*—are available.

When you run MODified Shapes, it begins by displaying a dialog box with three options labeled EX1, EX2, and EX3. Depending on which option you click on, the program will create example screen 1, 2, or 3. After you make a choice, the box disappears, the screen is redrawn, and the program proceeds. This dialog box is created with AES routine 52, known as *FORM_ALERT*, which both creates a dialog box and tells GEM to get input from it. To use *FORM_ALERT*, you must store two items of information in memory, then call the routine with GEMSYS(52). After the interaction is finished, *FORM_ALERT* passes one item of information back to you.

Most of the information needed by *FORM_ALERT* can be passed in the form of a BASIC string. First the string is defined, then you POKE the address of the beginning of the string in a reserved variable area known as ADDRIN (Address IN). This tells GEM where the string is located.

The *FORM_ALERT* string begins with a code number indicating which sort of icon you want the box to contain. You may choose a stop sign icon, an exclamation point, or a question mark. These icons appear frequently during GEM desktop operations and are familiar to every ST user. After the icon number comes the text which you want to print inside the box. If an icon is also used, the box has enough room for up to five lines of text.

Buttons In A Box

The next portion of the string contains the text you want to appear inside the *buttons*. Don't confuse this sort of button with the physical button on the ST mouse device. In this context, a button is a smaller boxed-in area within the dialog box. You point to the dialog button with the mouse, then click the left mouse button to select that option.

Up to three dialog buttons may be included in a single dialog box. If you include only one button, its box may contain up to 20 characters of

text. It is also possible to outline one of the buttons with a heavier line to indicate that it can be selected by pressing RETURN as well as clicking with the mouse.

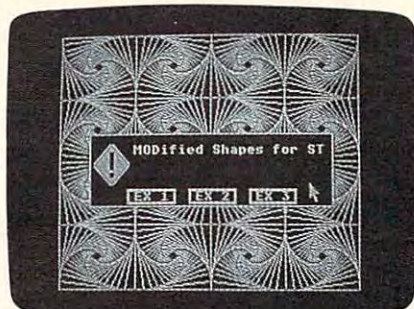
Line 70 of the program creates a typical *FORM_ALERT* string. Notice that each component of the string is enclosed in a set of square brackets in the sequence [icon code] [message text] [button text]. Notice that new lines within the message text and button text are separated by the logical OR character (|). This character is obtained by pressing the backslash key (\) while holding down SHIFT.

After creating a string and POKEing its location into memory, you must POKE a value into the location defined as GINTIN to indicate which button is to be chosen by pressing RETURN. POKE a zero into this location to indicate that RETURN should be ignored. POKE GINTIN with a 1, 2, or 3 to indicate the first, second, or third button, respectively.

When the *FORM_ALERT* dialog is over, you need some way to learn what choice was made. This output is returned in the location defined as GINTOUT, which you can PEEK from BASIC. When GINTOUT equals 1, the first dialog button was clicked. Values of 2 and 3 indicate that the second and third dialog buttons were clicked. Again, keep in mind that these are buttons within the dialog box on the screen, not physical buttons on the mouse.

Reading Mouse Events

MODified Shapes uses another AES routine—number 21, known as *MOUSE_EVENT*—to pause until you press both mouse buttons. The *MOUSE_EVENT* routine requires three inputs which are passed in locations beginning at GINTIN. The first value to be passed indicates the number of clicks to be detected, the second value indicates the mouse button to be read, and the third indicates the button condition you wish to look for. The number of clicks should be either 1 or 2. For the second value, use the value 1 to indicate the left button, 2 to indicate the right button, and 3 to indicate both buttons. The third value determines which condition—being pressed or not



"MODified Shapes For Atari ST" demonstrates how to draw graphics on the entire screen surface, including areas normally occupied by BASIC's window borders.

pressed—the routine checks for. In most cases this value will be 1, indicating that you want to know when the indicated button is pressed. If you supply a 0, the routine tells you whether the button is not pressed.

By calling GEM and AES routines, we can not only mimic the IBM's graphics, but also add the ST's own signature to the program in the form of dialog boxes and mouse input. The accompanying table shows summaries of the various VDI and AES routines used in this program, along with the program lines in which each routine is called.



With the aid of GEMSYS, you can call system routines from BASIC to create dialog boxes like the one shown here.

MODified Shapes For ST

```

10  A#=GB:CONTROL=PEEK(A#):GL
    OBAL=PEEK(A#+4):GINTIN=PEE
    K(A#+8):GINTOUT=PEEK(A#+12
    ):ADDRIN=PEEK(A#+16)
20  POKE CONTRL,14:POKE CONTR
    L+2,0:POKE CONTRL+6,4:POKE
    INTIN,0:POKE INTIN+2,0:PO
    KE INTIN+4,0:POKE INTIN+6,
    0:VDISYS(0)
30  POKE CONTRL,14:POKE CONTR
    L+2,0:POKE CONTRL+6,4:POKE
    INTIN,1:POKE INTIN+2,1000
    :POKE INTIN+4,1000:POKE IN
    TIN+6,1000:VDISYS(0)
40  POKE CONTRL,3:POKE CONTRL
    +2,0:POKE CONTRL+6,0:VDISY
    S(0)
50  MAINMENU: POKE CONTRL,122
    :POKE CONTRL+2,0:POKE CONTR
    L+6,1:POKE INTIN,0:VDISYS
    (0)
60  N#=ADDRIN:POKE GINTIN,0:'
    FORM_ALERT
70  MENU$="[11]:MODified Shap
    es for ST:][EX 1:EX 2:EX 3
    ]"+CHR$(0)+CHR$(0)
80  POKE N#,VARPTR(MENU$):GEM
    SYS(52)
90  C=PEEK(GINTOUT):POKE CONTR
    L,123:POKE CONTRL+2,0:POK
    E CONTRL+6,0:VDISYS(0)
100 IF C=3 THEN GOTO EX3 ELSE
    IF C=2 THEN GOTO EX2 ELSE
    GOTO EX1
110 EXITBOX: POKE CONTRL,122:
    POKE CONTRL+2,0:POKE CONTR
    L+6,1:POKE INTIN,0:VDISYS(
    0)
120 M#=ADDRIN:POKE GINTIN,1:'
    FORM_ALERT box
130 TEXT$="[3]:[Finished?][YE
    S:NO]"+CHR$(0)+CHR$(0)
140 POKE M#,VARPTR(TEXT$):GEM
    SYS(52):C=PEEK(GINTOUT)
150 IF C=2 THEN GOTO MAINMENU
    ELSE GOTO BYE
160 EX1: SU=.1:RU=1-SU:II=1:C
    =1
170 POKE CONTRL,3:POKE CONTRL
    +2,0:POKE CONTRL+6,0:VDISY
    S(0)
180 FOR J=0 TO 3:II=-II:JJ=1:
    FOR I=0 TO 6:JJ=-JJ:IF I<J
    OR I>6-J THEN 280
190 IF J<2 OR I>2 THEN C=C M
    OD 3+1
200 IF J=3 THEN C=C MOD 3+1
210 X(1)=0:X(2)=39:X(3)=78:Y(
    1)=0:Y(3)=0:IF II=JJ THEN
    Y(2)=48 ELSE Y(2)=-48
220 FOR N=1 TO 11:X1=3+X(3)+I
    *39:Y1=175-Y(3)-J*48+I*JJ
    *24
230 FOR M=1 TO 3:X2=3+X(M)+I*
    39:Y2=175-Y(M)-J*48+I*JJ*
    24:C=C MOD 3+1
240 COLOR 1,1,C:POKE CONTRL,6
    :POKE CONTRL+2,2:POKE CONTR
    L+6,0:POKE PTSIN,X1:POKE
    PTSIN+2,Y1:POKE PTSIN+4,X2
    :POKE PTSIN+6,Y2:VDISYS(0)
250 X1=X2:Y1=Y2:NJ=M MOD 3+1

```

Set_Color Representation (lines 20, 30, 570, 580)

Input Parameters

POKE CONTRL,14	opcode
POKE CONTRL+2,0	number of vertices
POKE CONTRL+6,4	number of attributes
POKE INTIN,0-15	number of pen color
POKE INTIN+2,0-1000	red intensity
POKE INTIN+4,0-1000	green intensity
POKE INTIN+6,0-1000	blue intensity

Clear_Workstation (lines 40, 170, 310, 440)

Input Parameters

POKE CONTRL,3	opcode
POKE CONTRL+2,0	number of vertices
POKE CONTRL+6,0	number of attributes

Show_Cursor (lines 50 and 110)

Input Parameters

POKE CONTRL,122	opcode
POKE CONTRL+2,0	number of vertices
POKE CONTRL+6,1	number of attributes
POKE INTIN,0	reset flag

(NOTE: The VDI normally makes note internally of how often the HIDE CURSOR call is used; to disable this function, set the reset flag to 0.)

Form_Alert (Lines 60-80,120-140)

Input Parameters

POKE GINTIN,0	button simulated by pressing RETURN
X#=ADDRIN	ADDRIN is addressed as a double-precision variable
POKE X#,VARPTR(Message\$)	

Output Parameters

KEY=PEEK(GINTOUT)	value of the button clicked
-------------------	-----------------------------

Hide_Cursor (line 90)

Input Parameters

POKE CONTRL,123	opcode
POKE CONTRL+2,0	number of vertices
POKE CONTRL+6,0	number of attributes

Polyline (lines 240, 380, 510)

Input Parameters

POKE CONTRL,6	opcode
POKE CONTRL+2,2	number of vertices one line
POKE CONTRL+6,0	number of attributes
POKE PTSIN,X1	X coordinate of first point
POKE PTSIN+2,Y1	Y coordinate of first point
POKE PTSIN+4,X2	X coordinate of second point
POKE PTSIN+6,Y2	Y coordinate of second point

Evt_Button (lines 290, 420, 560)

Input Parameters

POKE GINTIN,1-2	number of clicks for action
POKE GINTIN+2,1-3	mouse button(s) to be read
POKE GINTIN+4,1	button condition to detect

Batch Files With IBM BASIC

Lawrence H. Bannister

```

260 XD(M)=RU*X(M)+SU*X(NJ):YD
(M)=RU*Y(M)+SU*Y(NJ):NEXT
M
270 FOR P=1 to 3:X(P)=XD(P):Y
(P)=YD(P):NEXT P,N
280 NEXT I,J
290 POKE GINTIN,1:POKE GINTIN
+2,1:POKE GINTIN+4,1:GEMSY
S(21):GOTO EXITBOX
300 EX2: SU=.12:RU=1-SU
310 POKE CONTRL,3:POKE CONTRL
+2,0:POKE CONTRL+6,0:VDISY
S(0)
320 FOR I=0 to 3:FOR J=0 to 3
:IF I MOD 2=J MOD 2 THEN 3
40
330 Y(1)=49:Y(2)=0:Y(3)=0:Y(4
)=49:GOTO 350
340 Y(1)=0:Y(2)=49:Y(3)=49:Y(
4)=0
350 X(1)=20:X(2)=20:X(3)=89:X
(4)=89
360 FOR N=0 to 18:X1=X(4)+I*6
9:Y1=Y(4)+J*49
370 FOR M=1 to 4:X2=X(M)+I*69
:Y2=Y(M)+J*49
380 COLOR 1,0,M MOD 2+1:POKE
CONTRL,6:POKE CONTRL+2,2:P
OKE CONTRL+6,0:POKE PTSIN,
X1:POKE PTSIN+2,Y1:POKE PT
SIN+4,X2:POKE PTSIN+6,Y2:V
DISYS(0)
390 X1=X2:Y1=Y2:NJ=M MOD 4+1
400 XD(M)=RU*X(M)+SU*X(NJ):YD
(M)=RU*Y(M)+SU*Y(NJ):NEXT
M
410 FOR P=1 to 8:X(P)=XD(P):Y
(P)=YD(P):NEXT P,N,J,I
420 POKE GINTIN,1:POKE GINTIN
+2,1:POKE GINTIN+4,1:GEMSY
S(21):GOTO EXITBOX
430 EX3: SU=.2:RU=1-SU
440 POKE CONTRL,3:POKE CONTRL
+2,0:POKE CONTRL+6,0:VDISY
S(0)
450 FOR J=0 to 2:FOR I=0 to 2
:IF J=0 AND I<>1 THEN 550
460 IF I=1 THEN E=31 ELSE E=0
470 X(1)=0:X(2)=25:X(3)=75:X(
4)=100:X(5)=75:X(6)=25
480 Y(1)=31:Y(2)=0:Y(3)=0:Y(4
)=31:Y(5)=62:Y(6)=62
490 FOR N=0 to 20:X1=35+X(6)+
I*75:Y1=223-Y(6)-J*62-E
500 FOR M=1 to 6:X2=35+X(M)+I
*75:Y2=223-Y(M)-J*62-E
510 COLOR 1,0,M MOD 3+1:POKE
CONTRL,6:POKE CONTRL+2,2:P
OKE CONTRL+6,0:POKE PTSIN,
X1:POKE PTSIN+2,Y1:POKE PT
SIN+4,X2:POKE PTSIN+6,Y2:V
DISYS(0)
520 X1=X2:Y1=Y2:NJ=M MOD 6+1
530 XD(M)=RU*X(M)+SU*X(NJ):YD
(M)=RU*Y(M)+SU*Y(NJ):NEXT
M
540 FOR P=1 to 6:X(P)=XD(P):Y
(P)=YD(P):NEXT P,N
550 NEXT I,J
560 POKE GINTIN,1:POKE GINTIN
+2,1:POKE GINTIN+4,1:GEMSY
S(21):GOTO EXITBOX
570 BYE: POKE CONTRL,14:POKE
CONTRL+2,0:POKE CONTRL+6,4
:POKE INTIN,0:POKE INTIN+2
,1000:POKE INTIN+4,1000:PO
KE INTIN+6,1000:VDISYS(0)
580 POKE CONTRL,14:POKE CONTR
L+2,0:POKE CONTRL+6,4:POKE
INTIN,1:POKE INTIN+2,0:PO
KE INTIN+4,0:POKE INTIN+6,
0:VDISYS(0):END

```

Anything that a PC-DOS batch file can do, a BASIC program can do better. By calling DOS from BASIC, you can perform many functions that cannot be done with the limited language of batch commands. The demo program below works on any IBM PC with BASICA and DOS 2.1 or later.

Most IBM users already know that you can save a lot of time by using the batch commands of PC-DOS to perform a sequence of DOS commands automatically. But the austere language of DOS provides only three variations of one simple IF statement and has no practical way at all of manipulating strings or performing arithmetic. It's very difficult to write a batch file that creates neat screen displays, makes logical branches, allows user input, and traps errors.

A more flexible technique is to call DOS commands or even batch files from within a BASIC program. This frees you from the limitations of batch files and takes advantage of the string and arithmetic functions of BASIC.

You can call DOS from BASIC as often as you wish by using the SHELL command found in IBM BASICA. Although it is not documented, this command is implemented in version 2.1 or higher of PC-DOS. Aside from a few small problems to be avoided, its possibilities are limited only by your imagination.

(Note: SHELL is also found in

PCjr Cartridge BASIC, but does not seem to work reliably due to memory conflicts. Therefore, these techniques aren't recommended for use on the PCjr.)

The SHELL Game

To demonstrate some of these possibilities, Program 1 below is a BASIC program that displays two menus of options, interprets the user's responses, and then calls a variety of DOS routines in several different ways. Program 2 is a short batch file that is required as part of this demonstration.

When you run the BASIC program, it shows a menu offering four choices:

MENU A:

1. Show system date
2. Show system time
3. Show system date and time
4. None of the above

Enter your choice:

When the user presses a key, the program checks to see if the keypress was 1, 2, 3, or 4, and if so, uses the SHELL command to call the appropriate DOS function: DATE, TIME, or a batch file (Program 2) that calls both DATE and TIME.

When DOS returns control to BASIC, Program 1 displays a second menu:

MENU B:

1. Run Checkdisk
2. Show Disk Directory
3. None of the above

Enter your choice:

This is similar to the first menu, except this time the program

calls a DOS function that requires a parameter to be passed to the DOS command line. The BASIC program asks the user for the necessary information, then concatenates the appropriate command-line string.

Notice that the SHELL command can pass either a literal string, as done in the first menu, or a string variable, as in the response to the second menu.

No Recursion Allowed

There are two considerations to keep in mind when using this technique. First, make sure your system has enough memory. Although DOS, BASICA, and your BASIC program can be loaded into a machine with as little as 64K of Random Access Memory (RAM), you won't have much memory left over to do anything very useful. At least 92K RAM is desirable, because DOS and BASICA together use about 90K if that much is available. You need still more memory if you also want to run a batch file that calls a lengthy program like EDLIN.

Second, be sure not to create a sequence that is *reentrant* or *recursive*. For example, the result will be unpredictable if your BASIC program calls a batch file that, in turn, calls BASIC. Reentrant sequences of this nature are apt to cause a system crash that can be remedied only by turning off the power.

A minor aggravation is that DOS scrolls 25 lines on the screen while BASIC scrolls only 24 lines due to the function key display on the 25th line. Furthermore, BASIC and DOS each maintain an independent pointer to the screen position of the cursor. These differences can cause BASIC PRINT statements to overwrite something that DOS has just printed.

To avoid this problem, always start the BASIC program with the KEY OFF command to turn off BASIC's function key display. Then use a CLS (clear screen) command each time that DOS returns control to BASIC, or, as shown in the sequence following the second menu in Program 1, surround the SHELL commands with LOCATE 24,1 statements and two blank PRINT lines to ensure that both DOS and BASIC always start scrolling from the bottom of their own screens.

Program 1: BASIC Batch Demo

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

```

ND 1000 'PROCEDURE DESCRIPTION
BD 1010 ' clear screen and display a menu offering four choices
OD 1020 ' wait for user response
EN 1030 ' if user response is not valid
AE 1040 ' then : display error message and repeat the menu
KI 1050 ' else :
BF 1060 ' invoke the selected DOS function or Batch file
NL 1070 ' clear screen and display a second menu
PA 1080 ' wait for user response
FO 1090 ' if user response is not valid
QK 1100 ' then : display error message and repeat the menu
JO 1110 ' else :
AH 1120 ' invoke the selected DOS function or program
HG 1130 '
IJ 1140 '
EN 1150 KEY OFF : CLS
KP 1160 GOTO 1210
IC 1170 '
PD 1180 PRINT
      'error message
EB 1190 PRINT "***** ILL
      EGAL RESPONSE ^ REDO"
HF 1200 '
BM 1210 PRINT : PRINT "MENU A : "
      'display menu
DF 1220 PRINT : PRINT "
      1. Show system date"
FN 1230 PRINT : PRINT "
      2. Show system time"
PB 1240 PRINT : PRINT "
      3. Show system date and time"
FK 1250 PRINT : PRINT "
      4. None of the above"
NC 1260 PRINT:PRINT: INPUT "Enter your choice : ", A$
IE 1270 '
EN 1280 IF A$ = "" THEN 1180
      'check response
OF 1290 IF ASC(A$) < 49 THEN 1180
HF 1300 IF ASC(A$) > 52 THEN 1180
HE 1310 '
CE 1320 IF A$ = "1" THEN SHELL "
      DATE"
      'if valid :
FB 1330 IF A$ = "2" THEN SHELL "
      TIME"
FK 1340 IF A$ = "3" THEN SHELL "
      PROG2"
IA 1350 '
FN 1360 CLS
      'clear screen
ND 1370 GOTO 1410
JJ 1380 '
DN 1390 PRINT "***** ILL
      EGAL RESPONSE ^ REDO"
      'error message
HD 1400 '
DK 1410 PRINT : PRINT "MENU B : "
      'display menu
IN 1420 PRINT : PRINT "

```

1. Run Checkdisk"

```

NJ 1430 PRINT : PRINT "
      2. Show Disk Directory"
DN 1440 PRINT : PRINT "
      3. None of the above"
NM 1450 PRINT:PRINT: INPUT "Enter your choice : ", A$
AH 1460 PRINT
JI 1470 '
JB 1480 IF A$ = "" THEN 1390
      'check response
EO 1490 IF ASC(A$) < 49 THEN 1390
MK 1500 IF ASC(A$) > 51 THEN 1390
II 1510 '
FA 1520 IF A$ = "3" THEN 1630
      'if valid :
LL 1530 IF A$ = "1" THEN B$ = "CHKDSK "
OC 1540 IF A$ = "2" THEN B$ = "DIR "
KA 1550 INPUT "Enter drive letter : ", C$
NC 1560 IF C$ = "" THEN 1550
NP 1565 X=ASC(C$+CHR$(0)):IF X<65 OR X>66 THEN 1550
JF 1570 D$ = B$ + LEFT$(C$,1) + ": "
MK 1580 LOCATE 24,1
IC 1590 IF A$ = "1" THEN GOSUB 1710
KH 1600 SHELL D$
JI 1610 PRINT : PRINT
IN 1620 '
ID 1630 PRINT "End of BASICA program, returning to SYSTEM M"
AF 1640 PRINT
DN 1650 PRINT TAB(20) "Normally would return to SYSTEM here,"
DD 1660 PRINT TAB(20) "but for debug and demo purposes the"
MO 1670 PRINT TAB(20) "program will restart after a delay"
HM 1680 FOR I = 1 TO 5000 : NEXT I : RUN
JC 1690 '
IJ 1700 '
NO 1710 PRINT
      'sub
      to show warning
DF 1720 PRINT "WARNING : You will get error message 'Bad command ...'"
CA 1730 PRINT " if the called program is not on "
JL 1740 PRINT " the disk in the default drive"
KI 1750 RETURN

```

Program 2: Batch File For Demo

Note: This batch program must be entered with a text editor such as EDLIN or a word processor that can save files in ASCII format.

```

ECHO OFF
ECHO .
REM Display the system date
DATE
ECHO .
REM Display the system time
TIME
:ENDPROG2

```

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Guardian Angel

For Apple DOS 3.3

Boris Troyanovsky

This program lets you protect Apple DOS 3.3 disks against unauthorized use or copying. Once a disk is protected, it cannot be copied with ordinary copy programs—including advanced nybble copiers, unless the would-be copier knows the proper parameters. It works on all Apple II-series computers with DOS 3.3 and a disk drive. If you're using ProDOS and want similar protection, see "Apple ProDOS Protector" elsewhere in this issue.

Would you like the ability to protect your personal disks against unauthorized copying? No matter where you stand on the copy protection controversy, nearly every computer user has disks that he or she doesn't want others to duplicate. "Guardian Angel" lets you protect any DOS 3.3 disk against unauthorized copying, yet allows you access to the disk with a simple, four-digit code.

To use Guardian Angel, you must enter and save five programs. The first four are very short machine language files which can be entered directly from the Apple II's built-in machine language monitor. To enter the monitor, type CALL -151 and press RETURN. Then type in the lines shown here:

```
0300: A9 03 A0 10 20 D9 03 60
0310: 01 60 01 00 01 09 30 03
0318: 00 20 00 00 01 F0 FE 60
0330: 00 01 EF D8
1B58: 20 00 03 EE 19 03 CE 15
1B60: 03 F0 03 4C 58 1B 20 00
1B68: 03 60
B78D: A8 B6 2B 4C DF BC AD E5
BCDF: C9 05 90 08 CB A9 D9 A2
BCE7: DA 4C EE BC A9 D5 AA 8D
BCEF: 53 B8 8D E7 B8 8E 7A BC
BCF7: 8E 55 B9 84 2A 98 4C A4
BCFF: B9
```

When you finish entering these lines, press CONTROL-RESET to exit the monitor and return

to BASIC.

Now you must BSAVE each file to disk. Because these files are loaded under program control, you must save them using the exact filenames shown here. Enter these lines in direct mode (without line numbers) to BSAVE the four machine language files:

```
BSAVE IOB, A$300, L$33
BSAVE HTR.OBJ, A$BCDF, L$21
BSAVE HPREM.OBJ, A$B78D, L$0C
BSAVE COPY.OBJ, A$1B58, L$E6
```

Next, type in and save the Guardian Angel program following this article. This program is in Applesoft BASIC and may be saved under any filename.

Protecting Disks

To protect a disk, load and run Guardian Angel. It automatically loads the four machine language files into memory, then displays a menu on the screen. Press C to select the copy protection option.

The program then asks you to enter a unique, four-digit combination lock for that disk. Each digit can be a number from 0-9; press the ESC key if you make a mistake. Be sure to write down the combination and store it in a safe place. If you forget the combination, you may not be able to gain access to the protected disk yourself.

After you have entered the combination, the program prompts you to put the disk you want to protect into drive 1. To be on the safe side, you may want to write-protect this disk by covering its notch with tape. Insert the disk and press RETURN. The program considers this disk the *original*, which serves as a model for the new, copy-protected *destination* disk.

Next, you are prompted when it is time to insert the destination

disk. Since the destination disk will be completely erased prior to being copied, be sure that it doesn't contain any valuable information. The program will continue to give you instructions as it completes the protection process. Simply follow the onscreen prompts until you see the message DONE.

At this point the original disk is unchanged, and the destination disk contains a copy-protected version of the original. The new disk will boot normally and behave normally, except that it is protected from unauthorized access and copying.

Restricted Access

Although Guardian Angel protects the disk, you are responsible for seeing that nobody using the disk has an opportunity to examine its contents. If you intend to let others use the disk, no program should give control of the system back to the user. That is, the program must not let the user exit to Applesoft BASIC or the machine language monitor. To prevent exit to BASIC, add the following lines to any Applesoft program:

```
0 ONERR GOTO 63999: POKE 1011,0
63999 RESUME
```

These lines protect an Applesoft program from being interrupted by CTRL-C or RESET.

To protect a machine language program the same way, include these two commands at the beginning of the program:

```
LDA #$00
STA $03F3
```

If you take these precautions, the disk cannot be copied and the programs on it can't be LISTed by anyone except you. However, since the disk will boot normally, other people can still use the programs it contains.

Denying All Access

In some cases you may want to prevent others from using anything on a protected disk. To accomplish this, save the following program on your original disk using the filename HELLO. When typing this program, replace XXXX with the four-digit combination you intend to use for that disk, and replace MYPROG with the filename of the program you wish to run.

```
0 ONERR GOTO 63999:POKE 1011,0
10 INPUT A$
20 IF A$ <> "XXXX" THEN PRINT
  "WRONG ACCESS CODE": PR#6
30 PRINT "CORRECT ACCESS CODE"
40 PRINT CHR$(4); "RUN MYPROG"
63999 RESUME
```

After saving the special HELLO program, copy-protect the disk as described above. When you boot the protected disk, it immediately prints a question mark, which is the signal to enter the secret combination. No one can proceed any further until the right combination is entered.

Reopening The Lock

There may be times when you need to access a disk after protecting it. To do this, run Guardian Angel and choose the A option from the main menu, then enter the combination for that disk when prompted. If the combination is correct, Guardian Angel returns you to Applesoft BASIC. Now you can use all the DOS commands (CATALOG, SAVE, LOAD, etc.) which were previously denied.

If you respond with the wrong combination, the computer will report an I/O ERROR every time you try to access the disk.

Guardian Angel

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

```
67 10 HIMEM: 6999:D$ = CHR$ (4)
DB 20 PRINT D$;"BLOAD IOB"
DF 30 PRINT D$;"BLOAD HTR.OBJ"
50 40 PRINT D$;"BLOAD HPREM.OBJ"
60 50 PRINT D$;"BLOAD COPY.OBJ"
52 60 TEXT : HOME : HTAB 14: PRI
  NT "GUARDIAN ANGEL"
55 70 HTAB 7: PRINT "DISK COPY P
  ROTECTION SYSTEM": NORMAL
33 80 VTAB 8: HTAB 5: PRINT "DO
  YOU WISH TO:": PRINT : HTA
  B 5: PRINT "A)ACCESS A COPY
  -PROTECTED DISK": HTAB 10:
  PRINT "OR": HTAB 5: PRINT
  "C)COPY-PROTECT A DISK"
10 90 VTAB 8: HTAB 20: GET A$
90 100 IF A$ = "A" THEN GOTO 130
```

```
08 110 IF A$ = "C" THEN GOTO 290
31 120 GOTO 90
C9 130 TEXT : HOME : INVERSE : H
  TAB 10: PRINT "ACCESS PRO
  TECTED DISK": VTAB 23: HT
  AB 3: NORMAL : PRINT "ESC
  C] TO GO BACK TO THE MAIN
  MENU"
34 140 VTAB 10: HTAB 12: PRINT "
  COMBINATION LOCKS": PRINT
  : PRINT " #1 #2
  #3 #4"
28 150 PRINT " ( ) ( )
  ( ) ( )"
66 160 FOR NL = 1 TO 4: VTAB 13:
  HTAB 8 * NL - 1: GET A$
D7 170 IF A$ = CHR$ (27) THEN RU
  N
82 180 IF VAL (A$) > 9 THEN NL =
  NL - 1: NEXT NL
60 190 IF VAL (A$) = 0 AND A$ <
  > "0" THEN NL = NL - 1: N
  EXT NL
17 200 CL(NL) = VAL (A$): PRINT
  CL(NL): NEXT NL
86 210 V1 = CL(1) * 10 + CL(2):V
  2 = CL(3) * 10 + CL(4)
AA 220 IF V1 = 31 THEN V1 = 121
84 230 IF V1 = 63 OR V1 = 64 THE
  N V1 = V1 + 50
6F 240 IF V2 = 31 THEN V2 = 121
2B 250 IF V2 = 63 OR V2 = 64 THE
  N V2 = V2 + 50
57 260 POKE 47520,76: POKE 47521
  ,141: POKE 47522,183
85 270 POKE 48357,V1 + 129: POKE
  48359,V2 + 129
A0 280 VTAB 21: PRINT "----DONE--
  --": GET B$: HOME : END
65 290 HOME : INVERSE : HTAB 12:
  PRINT "COPY PROTECT DISK
  ": VTAB 23: HTAB 3: NORMA
  L : PRINT "ESC] TO GO BA
  CK TO THE MAIN MENU"
2E 300 VTAB 10: HTAB 12: PRINT "
  COMBINATION LOCKS": PRINT
  : PRINT " #1 #
  2 #3 #4"
22 310 PRINT " ( ) ( )
  ( ) ( )"
60 320 FOR NL = 1 TO 4: VTAB 13:
  HTAB 8 * NL - 1: GET A$
D1 330 IF A$ = CHR$ (27) THEN RU
  N
AC 340 IF VAL (A$) > 9 THEN NL =
  NL - 1: NEXT NL
67 350 IF VAL (A$) = 0 AND A$ <
  > "0" THEN NL = NL - 1: N
  EXT NL
24 360 CL(NL) = VAL (A$): PRINT
  CL(NL): NEXT NL
D0 370 POKE 34,19
9D 380 VTAB 20: PRINT " INSERT
  SOURCE DISK INTO DRIVE 1
  ": HTAB 4: PRINT "PRESS [
  RETURN] TO BEGIN PROCESS"
56 390 VTAB 24: HTAB 20: GET A$
CC 400 IF A$ = CHR$ (27) THEN RU
  N
87 410 IF A$ < > CHR$ (13) THEN
  GOTO 390
D5 420 POKE 47520,134: POKE 4752
  1,43: POKE 47522,133: POK
  E 47187,213: POKE 47335,2
  13: POKE 48250,213: POKE
  47445,213:SS = 9:SE = 9:O
  P = 1:BU = 8192:TR = 1: G
  OSUB 710
95 430 A$ = "": FOR A = 117 TO 1
  54:A$ = A$ + CHR$ ( PEEK
  (8192 + A)): NEXT A
55 440 POKE 47520,76: POKE 47521
  ,141: POKE 47522,183
98 450 V1 = CL(1) * 10 + CL(2):V
  2 = CL(3) * 10 + CL(4)
```

```
BA 460 IF V1 = 31 THEN V1 = 121
8E 470 IF V1 = 63 OR V1 = 64 THE
  N V1 = V1 + 50
79 480 IF V2 = 31 THEN V2 = 121
35 490 IF V2 = 63 OR V2 = 64 THE
  N V2 = V2 + 50
7A 500 POKE 48357,V1 + 129: POKE
  48359,V2 + 129
22 510 HOME : VTAB 24: HTAB 2: P
  RINT "INSERT DESTINATION
  DISK INTO DRIVE 1": HTAB
  12: PRINT "AND PRESS A KE
  Y": HTAB 20: GET B$
69 520 HOME : HTAB 5: FLASH : PR
  INT "INITIALIZING": NORM
  AL : PRINT " DESTINATION
  DISK"
4E 530 PRINT : PRINT CHR$ (4); "I
  NIT ";A$;"D1"
6C 540 HOME : HTAB 4: PRINT "INS
  ERT ORIGINAL DISK INTO DR
  IVE 1": HTAB 12: PRINT "A
  ND PRESS A KEY": HTAB 20:
  GET B$
48 550 TC = 0:BF = 8192: FOR TK
  = 3 TO 34:TC = TC + 1: VT
  AB 6: HTAB 16: PRINT "TRA
  CK: ";TK: HOME : HTAB 7:
  PRINT "READING FROM ORIGI
  NAL DISK":BF = BF + 4096
48 560 POKE 796,1: POKE 788,TK:
  POKE 789,15: POKE 792,0:
  POKE 793, INT (BF / 256)
65 570 POKE 47520,134: POKE 4752
  1,43: POKE 47522,133: POK
  E 47187,213: POKE 47335,2
  13: POKE 48250,213: POKE
  47445,213
A1 580 CALL 7000
9D 590 IF TK = 7 OR TK = 12 OR T
  K = 17 OR TK = 22 OR TK =
  27 OR TK = 32 THEN GOTO
  610
34 600 NEXT TK
7D 610 HOME : HTAB 2: PRINT "INS
  ERT DESTINATION DISK INTO
  DRIVE 1": HTAB 12: PRINT
  "AND PRESS A KEY": HTAB
  20: GET A$
88 620 IF TK = 35 THEN TK = 34
CF 630 BF = 8192: FOR TA = TK -
  TC + 1 TO TK: VTAB 6: HTA
  B 16: PRINT "TRACK: ";TA;
  " ": HOME : HTAB 7: PRINT
  "WRITING TO DESTINATION
  DISK":BF = BF + 4096
C2 640 POKE 796,2: POKE 788,TA:
  POKE 789,15: POKE 792,0:
  POKE 793, INT (BF / 256)
70 650 POKE 47520,76: POKE 47521
  ,141: POKE 47522,183: POK
  E 48357,V1 + 129: POKE 48
  359,V2 + 129
9E 660 CALL 7000
38 670 NEXT TA
81 680 IF TA = 35 THEN HOME : PR
  INT "----DONE----": GET B$:
  RUN
2A 690 HOME : HTAB 3: PRINT "INS
  ERT ORIGINAL DISK INTO DR
  IVE 1": HTAB 12: PRINT "A
  ND PRESS A KEY": HTAB 20:
  GET B$:BF = 8192:TC = 0:
  NEXT TK
8F 700 END
5E 710 REM ***DISK ACCESS***
87 720 FOR SA = SS TO SE
F9 730 POKE 788,TR: POKE 789,SA:
  POKE 796,OP
C9 740 HB = INT (BU / 256):LB =
  BU - (HB * 256)
70 750 POKE 792,LB: POKE 793,HB
29 760 CALL 768:BU = BU + 256: N
  EXT SA
25 770 RETURN
```


Directory Plus For Commodore

Thomas C. Carlson

This utility program prints a comprehensive disk directory on the screen or a printer, giving you extra information about the files on your disks. The program requires a 1541 or 1571 disk drive and runs on the Commodore 64, 128, Plus/4, 16, and VIC-20 (with at least 8K expansion). A printer is optional.

Virtually every Commodore disk drive owner knows how to get a listing of a disk directory. The statement `LOAD"$0",8` loads the directory into memory, and `LIST` displays it on the screen. To print the directory on a printer, type `OPEN 4,4` before you load the directory, and `PRINT#4:CLOSE 4` after the listing is complete. The normal directory listing—which includes the filename of each file, its file type, and number of blocks—is fine for everyday use, but inadequate for more advanced purposes. In many programming situations it is necessary to know the load address of a file or the actual track and sector where it begins. When many files are involved, discovering such information can be a tedious process.

"Directory Plus" solves this by automatically printing an expanded disk directory on the screen or printer. In addition to the usual information, the expanded directory includes the disk track and sector where the file begins, and the load address of the file (the address where the file usually loads into the computer's memory). The accompanying figure illustrates a Directory Plus printout for a typical `COMPUTE! DISK`.

Directory Plus Printout

CI	MAY-JULY 1986	MJ	2A	FR	SEC	206
FILENAME	TYP	TR	SC	BLK	START	
MENU	PRG	17	0	1	812	
128 BOOKS	PRG	17	1	20	2049	
128.BOOT	PRG	6	3	6	2049	
64 BOOKS	PRG	19	0	32	2049	
64 CONTENTS	SEQ	14	0	5		
ALL ABOUT THE 64	PRG	21	2	83	2049	
AUTOBOOTER	PRG	14	4	12	2049	
COMPUTE!	PRG	16	0	2	2049	
COMPUTECOLOR	PRG	16	1	4	55296	
COMPUTESCREEN	PRG	16	3	4	1024	
CUBE1	PRG	6	6	1	2049	
CUBE	PRG	29	5	1	2049	
FLEET LIST.BOOT	PRG	30	10	1	2049	
FLEET LIST	PRG	13	0	4	49152	
GAZETTE	PRG	16	5	19	2049	
HEX WAR/128	PRG	8	0	35	16385	
HEX WAR/64.BOOT	PRG	29	4	1	16385	
HEX WAR/64	PRG	26	0	37	16385	
HICKORY DICKORY	PRG	13	1	28	2049	
LG	PRG	12	1	7	49152	
LOOK GLASS.BOOT	PRG	30	9	1	2049	
LOOKINGGLASSDEMO	PRG	12	9	12	2049	
MANDELBROT 1	PRG	28	5	12	2049	
MANDELBROT 2	PRG	7	9	2	2049	
MANDELBROT 3	PRG	29	0	3	2049	
MANDELBROT 4	PRG	29	2	2	2049	
MANDELBROT.BOOT	PRG	30	11	4	2049	
MIAMI ICE/128	PRG	10	0	47	7169	
MIAMI ICE/64	PRG	11	2	12	2049	
ML DIVISION.BOOT	PRG	30	16	4	2049	
ML DIVISION	PRG	29	15	2	2049	
MLX	PRG	20	7	17	2049	
MM	PRG	13	0	8	2049	
NT	PRG	14	1	3	2049	
PROOFREADER	PRG	15	1	6	7169	
RAM REPORT	PRG	6	1	3	2049	
SCR HANDLER DEMO	PRG	28	1	3	2049	
SCR HANDLER.BOOT	PRG	30	15	1	2049	
SCREEN HANDLER	PRG	28	3	4	49152	
SEQ FILE CONVERT	PRG	6	0	3	2049	
SQUARE1	PRG	6	7	1	2049	
SQUARE	PRG	29	8	1	2049	
UPSTART	PRG	6	12	4	2049	

Directory Plus works without modification on the Commodore 64, 128 (40- or 80-column screens), Plus/4, 16, and VIC-20 (with at least 8K expansion). Since the VIC-20 screen has only 22 columns, its directory display is less neatly formatted than the others; however,

the printer output is exactly the same for all versions.

Program Setup

After you have entered and saved a copy of Directory Plus, run the program. It begins by asking whether you want to display the directory on the screen or a printer. Press `S` for screen output or `P` for printer output.

If you're using a printer, be sure it is connected properly and turned on before proceeding any further. Directory Plus is designed to work with the following Commodore printers: MPS-801, MPS-802, MPS-803, 1525, and 1526. As listed below, the program is set up to work with the MPS-802 and 1526 printers. If you have an MPS-801, MPS-803 or 1525 printer, remove the keyword `REM` from the beginning of line 20 (but leave the rest of the line intact).

The program also works as is with non-Commodore printers, but only if your printer/interface combination can emulate Commodore graphics mode exactly. In this case, you should probably remove the `REM` in line 20 to activate the Commodore graphics mode; however, some interfaces for non-Commodore printers may require that you send additional codes to the interface to put it in Commodore graphics mode. It may also be necessary to add a secondary address to the `OPEN` statement in line 790. Consult the manuals for your printer and interface if you are in any doubt about the capabilities of your system.

The program can easily be modified to work with printers that

do not support Commodore graphics as well. Simply replace the graphics characters in lines 800-910 with spaces, or use dashes, asterisks, or any other characters you wish.

If you select the printer option when displaying the directory, a second prompt will appear asking you to select the printing width. Press S for a single-width (normal) printout, or D for a double-width printout. Many printer interfaces that support Commodore graphics do not support the graphics characters in double-width mode, so you may not be able to use the D option if you have a non-Commodore printer.

Load Addresses

At this stage the program prompts you to insert the disk whose directory you wish to view. Press any key when the disk is in place. After a pause while the computer reads the disk directory, the program asks whether you want to see the load addresses of any files. To display the directory without any address information, press the 3 key. If you want to see the load address for every file on the disk, press the 1 key. To view load addresses for only selected files, press 2. When this option is selected, the program displays each filename in turn, allowing you to choose whether you want to see its load address; press Y to display the load address of the current file, or N to skip to the next file. Note that some files (data files, for instance) don't contain a meaningful load address. In such cases, no address is displayed.

If you choose to display load addresses, the disk drive spins for a few moments while it retrieves this extra information for each file. You should not continue past this stage until the drive is finished working (when using the 1541 drive, wait until the motor stops spinning; on the 1571, wait until the drive's busy light goes off).

After every prompt has been answered and the drive is at rest, the directory display begins. To slow the scrolling of screen output, hold down the CTRL key on the VIC or 64, the Commodore key on the Plus/4 or 16, or CTRL-S on the 128.

After the directory has been printed on the screen or printer, Directory Plus gives you the option of viewing the same directory again, or of changing disks and printing a directory for the new disk.

Directory Plus does not display information about deleted (DEL) type files. DEL files are rarely of interest; however, if you wish to view them, delete line 870 from the program. Another possible modification involves the drive number. Although the 1541 and 1571 drives are always addressed as drive 0, some Commodore-compatible dual drives include drive 1 as well as drive 0. To access drive 1 in a dual drive system, change the 0 to a 1 in lines 170, 180, and 640.

In general, Directory Plus works by opening the directory as a sequential file and bringing in the contents one character at a time with the GET statement. The manual that came with your disk drive contains additional information about the structure of the directory. For those interested in writing similar programs, here is a brief outline of the major segments in Directory Plus:

Lines	Function
10-160	Initialization
170-230	Read header information
240-480	Read file information
490-700	Read load addresses
710-930	Print directory listing
940-1010	Repeat options
1020-1050	Check error channel

Directory Plus

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

```

DP 10 ND$=""
AK 20 REM ND$=CHR$(8):REM REMO
VE REM FOR 1525 OR MPS-8
01 PRINTERS
DM 30 DIM FT$(5):FORI=0TO5:REA
D A$:FT$(I)=A$:NEXT
XB 40 DATA DEL,SEQ,PRG,USR,REL
,DEL
BA 50 DIM F$(144,5)
XE 60 FE=664
DC 70 PRINTCHR$(147);CHR$(30);
CHR$(17);"OUTPUT TO SCRE
EN OR PRINTER (S/P) ?"
BH 80 GETA$:IFA$=""GOTO80
KJ 90 DV=3:IFA$="P"THENDV=4
QQ 100 IFA$="S"THENGOTO140
KF 110 PRINTCHR$(17)"SINGLE OR
DOUBLE WIDTH (S/D) ?"
KD 120 GETA$:IFA$=""GOTO120
AG 130 BG$=CHR$(15):IFA$="D"TH
ENBG$=CHR$(14)
AS 140 PRINTCHR$(17)"INSERT DI
SK AND PRESS ANY KEY"
RE 150 GET A$:IF A$="" THEN150

```

```

DX 160 PRINTCHR$(145)"PLEASE W
AIT...{15 SPACES}"
EC 170 OPEN15,8,15:PRINT#15,"I
0":GOSUB1020
RS 180 OPEN8,8,8,"$0,S,R"
SX 190 GOSUB1020
CR 200 FORI=1TO142:GET#8,A$:NE
XT
AB 210 FORI=143TO160:GET#8,A$:
N$=N$+A$:NEXT
FG 220 FORI=161TO162:GET#8,A$:
ID$=ID$+A$:NEXT
CP 230 GET#8,A$:FORI=164TO165:
GET#8,A$:OS$=OS$+A$:NEX
T
EH 240 FORI=166TO254:GET#8,A$:
NEXT
PQ 250 CT=8
SF 260 NM=NM+1
PX 270 IFCT=8THENCT=1:GOTO300
RH 280 CT=CT+1:GET#8,A$:A$:FL=
ST
GP 290 IFFL<>0GOTO480
EG 300 GET#8,A$:IFA$=""THENA$=
CHR$(133)
XA 310 FL=ST:IFFL<>0GOTO480
MX 320 TY$=FT$((ASC(A$)AND191)
-128)
GD 330 GET#8,A$:IFA$=""THENA$=
CHR$(0)
ME 340 TR$=RIGHT$("{2 SPACES}"
+STR$(ASC(A$)),2)
SB 350 GET#8,A$:IFA$=""THENA$=
CHR$(0)
BB 360 SC$=RIGHT$("{2 SPACES}"
+STR$(ASC(A$)),2)
DM 370 FL$=""FORI=3TO18:GET#8
,A$:FL$=FL$+A$:NEXT
SF 380 FORI=19TO27:GET#8,A$:NE
XT
SC 390 GET#8,LB$,HB$
AE 400 BL=ASC(LB$+CHR$(0))+256
*ASC(HB$+CHR$(0))
MS 410 IFTY$<>"DEL"THENFE=FE-B
L
FC 420 BL$=RIGHT$("{5 SPACES}"
+STR$(BL),3)
HC 430 IFTR$=""0GOTO480
DB 440 F$(NM,0)=FL$:F$(NM,1)=T
Y$:F$(NM,2)=TR$:F$(NM,3)
)=SC$:F$(NM,4)=BL$
DK 450 F$(NM,5)="{5 SPACES}"
PH 460 IFTY$="PRG"THENF$(NM,5)
="-----"
KC 470 GOTO260
GR 480 CLOSE8
XA 490 GOSUB1020
HR 500 IFF$(NM,0)=""THENNM=NM-
1:GOTO500
SK 510 FE$=RIGHT$("{4 SPACES}"
+STR$(FE),3)
XQ 520 PRINTCHR$(145);"START A
DDRESS :":PRINTCHR$(17)
;" 1) ALL"
MJ 530 PRINT" 2) SOME":PRINT"
{SPACE}3) NONE"
EK 540 GETA$:IFVAL(A$)=0THENG0
TO540
DS 550 IFVAL(A$)>2GOTO770
MD 560 PRINT"{CLR}":IFA$="1"TH
ENPRINT"JUST A MOMENT..
."
BQ 570 FORI=1TONM
MQ 580 IFF$(I,1)<>"PRG"GOTO700
XK 590 IFA$="1"GOTO630
BS 600 PRINTF$(I,0);"(Y/N)"
PX 610 GETA$:IFA$=""GOTO610
RB 620 IFA$<>"Y"THENPRINT"{UP}
";:GOTO700
QJ 630 SA$=F$(I,0)
EK 640 OPEN 8,8,8,"0:"+SA$+",P
,R"

```


$Y=Y-(X=10)$. Subtracting -1 is the same as adding 1.

Both of the above statements mean the same thing and will accomplish the same function: Y is incremented only if $X=10$. In the second example, IF-THEN is replaced by a logical evaluation. If X does not equal 10, then the statement ($X=10$) has an assigned value of 0, and 0 is added to Y —leaving the value of Y unchanged. Only when X does equal 10 will the statement have a value of 1, causing the value of Y to be incremented.

Not only is the second example shorter, but notice the way it is constructed—the program will not skip to the next line if X does not equal 10, but instead can continue on to read further statements in the same program line. In fact, several IF-THEN statements in effect can be combined into one line, as the following two examples demonstrate.

Instead of this:

```
10 X=X+1:IF X=255 THEN Y=Y+1:
  X=0
20 IF Y=255 THEN Z=Z+1:Y=0
30 IF Z=255 THEN PRINT "DONE"
:END
40 GOTO 10
```

Try this:

```
10 X=X+1:Y=Y+(X=255):X=X-255*
  (X=255):Z=Z+(Y=255):Y=Y-255*
  (Y=255):IF Z<255 THEN 10
20 PRINT "DONE":END
```

(Remember, if you're using a BASIC that assigns -1 to true statements, reverse the signs in the latter example, except for the statement $X=X+1$.)

Again, both of the above examples do the same things. They increment Y by 1 every time the value of X reaches 255 (and also reset X to 0), increment the value of Z every time the value of Y reaches 255 (and reset Y to 0), and then when the value of Z reaches 255, print the message DONE.

In the second example, where logic is used, the statement ($X=255$) is multiplied by 255 and subtracted from X . As long as X does not equal 255, the value of the statement will be zero. Since 255 times 0 is 0, then 0 is what is subtracted from X , leaving the value of X unchanged. But when X equals 255 and the equation is true, then we have 255 times 1 (or -1 , depend-

ing on your computer), which is 255. If X equals 255, then subtracting this value from X changes the value of X to 0. (If you're using a BASIC that assigns -1 to true statements and have changed the signs in the above statements as noted, then -255 will be added to X when X equals 255. Adding a negative number is the same as subtracting.)

The same is true for the statement $Y=Y-255*(Y=255)$. In effect, four conditional statements have been combined into one line.

Logical Branching

As mentioned earlier, Atari BASIC allows calculated GOTOs, GOSUBs, and RESTOREs. When logical statements are used in these calculations, it is possible to branch to any line in the program depending upon which logical statement is true. This can save substantial amounts of memory. Consider the following program:

```
10 OPEN #2,4,0,"K:"
20 ? "Type S, L, or P":GET #2,N:IF
  N=83 THEN 60
30 IF N=76 THEN 70
40 IF N=80 THEN 80
50 GOTO 20
60 ? "This could be a save to tape or disk
  routine.":GOTO 20
70 ? "This could be a load from tape or
  disk routine.":GOTO 20
80 ? "This could be an output to printer
  routine.":GOTO 20
```

If we use logic, the program can be substantially shortened. Delete lines 30, 40, and 50, and replace line 20 with this:

```
20 ? "Type S, L, or P":GET #2,N:GOTO
  20+40*(N=83)+50*(N=76)+60*
  (N=80)
```

The program works exactly the same as before.

Timing Tradeoffs

Substituting logical statements for IF-THEN statements usually slows down an Atari BASIC program, though normally the difference is too slight to matter, especially when the line is executed only once or just a few times. But the difference is measurable when the statements are enclosed in loops.

To demonstrate, following is a short program that counts words in a long text string. (Actually it counts spaces, an easy way to get a fairly accurate word count.) It gen-

erates a long string of text, then uses two of the Atari's internal clock registers to time the two methods for counting. First the words are counted using a conventional IF-THEN construction, and then they're counted using logic.

```
10 DIM TEXT$(2362)
20 TEXT$="Welcome to the
  Overlook Hotel. All wo
  rk and no play makes J
  ack a dull boy."
30 TEXT$(2318)=TEXT$(31):
  TEXT$(75)=TEXT$(31):?
  TEXT$
40 ? :? "Counting...":WOR
  DCOUNT=0:POKE 19,0:POK
  E 20,0
50 FOR X=1 TO LEN(TEXT$)
60 IF ASC(TEXT$(X))=32 TH
  EN WORDCOUNT=WORDCOUNT
  +1
70 NEXT X: ? WORDCOUNT; " w
  ords counted using IF-
  THEN in ";PEEK(19)*256
  +PEEK(20); " jiffies (i
  nternal timer). "
80 ? :? "Counting...":WOR
  DCOUNT=0:POKE 19,0:POK
  E 20,0
90 FOR X=1 TO LEN(TEXT$)
100 WORDCOUNT=WORDCOUNT+(
  ASC(TEXT$(X))=32)
110 NEXT X: ? WORDCOUNT; "
  words counted using l
  ogic in ";PEEK(19)*25
  6+PEEK(20); " jiffies
  (internal timer). "
```

When you type in and run this program, it displays for you the word counts and the time required for each count measured in *jiffies*, which are equal to 1/60 second. In this case, the IF-THEN routine (line 60) runs a little faster than the logical statement equivalent (line 100).

Now that you know how logical statements work, you may take a shine to the kind of programming techniques they make available. They certainly provide a logical alternative. ©

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Commodore SpeedScript To BASIC

Frank Colosimo
Mike Kozakiewicz

This utility program provides a convenient way to convert text in a SpeedScript word processing file into BASIC PRINT or DATA statements. The result is a BASIC program which you can load and run as a stand-alone program or add to existing programs of your own. The utility program requires a Commodore 64 or 128 (in 64 mode), a copy of Commodore 64 SpeedScript, and a disk drive. SpeedScript was published in the March 1985 issue of COMPUTE! and also is available in SpeedScript: The Word Processor for the Commodore 64 and VIC-20 from COMPUTE! Books.

One of the first commands a BASIC programmer learns to use is PRINT, yet no matter how advanced you become, formatting a text display with PRINT can involve a lot of trial and error. If you PRINT past the right edge of the screen, words may break in the middle rather than wrapping completely around to the next line. And changing just one PRINT statement can affect the appearance of an entire screen.

"SpeedScript to BASIC" provides an answer for anyone who wants an easy way to format text neatly on the screen. It takes a text file created with Commodore 64 SpeedScript and converts it into PRINT or DATA statements ready to be merged with your own program. Some uses for SpeedScript to BASIC include creating instruction screens for BASIC programs, preparing self-contained educational

or advertising programs, or converting word processing files into BASIC programs that can be read without the use of a word processor.

If you're a nonprogrammer, you may find it particularly useful for turning word processing files into BASIC programs. The programs it automatically generates are completely self-contained and display the text onscreen without use of the word processor itself.

Format Without Frustration

Type in the program listing below, then save a copy to disk. Before you can use the program, you must create a text file for it to process. Load and run SpeedScript, then type in as much text as you wish. When that's done, save the SpeedScript document as usual, then exit the word processor and load and run this program.

The program begins by asking you whether you want its output in the form of DATA statements or PRINT statements. The answer depends on your goal. The PRINT option is most useful if you intend to add the resulting display routine to an existing program of your own. If you want a stand-alone program, choose the DATA option; this creates an independent program that will display formatted text, one screen at a time, as you press a key.

After choosing the output type, you are asked for the name of the input file. Enter the filename of your previously prepared SpeedScript file, then press RETURN. If you're not sure of the exact file-

name, you can enter a dollar sign (\$) to view the disk directory. If you ask for a file that does not exist, the program lets you try again. Enter Q at this prompt if you want to end the program.

The program now reads your word processing file and constructs a series of new BASIC statements in a large buffer area within memory. The file conversion routine is written in machine language for maximum speed. To keep you updated, the program increments the counter display each time it processes another 256 characters of text.

Once the work is done, the program asks you to insert an output disk in the drive. You then enter a name for the output program file to be created. If the file already exists on your output disk, you are asked if you want to erase the existing file. If you choose not to erase, you are asked to enter a new filename. You may also end the program by entering Q at this prompt. The output file is then saved to disk, and you are given the opportunity to save a copy to another disk.

Accurate Reproduction

The result is a set of BASIC program lines which accurately recreate the original text display. Just as in SpeedScript, the program wraps words instead of splitting them at the right edge of the screen. It also ignores SpeedScript formatting codes, which are relevant only when printing a document on paper. All other characters are faithfully reproduced, except for

quotation marks. Since the PRINT command itself requires the use of double quotes, the program substitutes a single quote wherever a double quote appears in the original text.

Once you learn how easy it is to use, you'll probably find more and more uses for this program. To simplify the job of adding the new program lines to existing programs, the line numbers start at line 10000 and use increments of 10. A 21-block word processing file takes about 38 seconds to be processed into a 26-block BASIC program (not counting the time you spend answering the prompts).

If you're interested in examining the machine language routine that makes this utility work, you can find it at locations 49152 and above.

SpeedScript To BASIC

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

```
DF 10 IFPEEK(49152)=76THENGOTO
40
KD 20 PRINT "{CLR}{2 SPACES}PLE
ASE WAIT, STORING DATA..
."
HX 30 FOR M = 49152 TO 50153:
{SPACE}READ A:POKEM,A:NE
XT
JM 40 POKE53281,15:POKE53280,0
GK 50 POKE56,PEEK(46)+2:CLR
RG 60 BS="{40 SPACES}"
AS 70 PRINT "{CLR}{BLK}{RVS}{N}
{3 SPACES}*****
{2 SPACES}SPEEDSCRIPT TO
BASIC{2 SPACES}*****
{3 SPACES}"
FD 80 LD%=2:GOSUB500:INPUT"DAT
A OR PRINT STATEMENTS (D
/P){3 SPACES}D{3 LEFT}";
TYPE$
QH 90 TYPE$=LEFT$(TYPE$,1):IF(
TYPE$<>"D") AND (TYPE$<>
"P") THEN GOTO80
JD 100 ADDR=49152:IF TYPE$="P"
THEN ADDR=49155
KA 110 CLOSE15:OPEN15,8,15,"I0
"
SM 120 LD%=2:GOSUB500
KR 130 PRINT "{DOWN}INPUT FILEN
AME, $ (DIR), OR Q (QUI
T)"
AP 140 INPUT "{3 SPACES}Q
{3 LEFT}";IN$:PRINT"
{CLR}"
CJ 150 IF IN$<>"$ANDIN$<>"Q"
{SPACE}THEN PRINT "{CLR}
{DOWN}{12 RIGHT}READING
FILE..."
XQ 160 IFIN$=""THEN120
BG 170 IF IN$=""$THENSYS49994:
GOTO130
QF 180 IF IN$="Q"THEN GOTO480
MX 190 LD%=2:GOSUB500
HK 200 CLOSE1:OPEN1,8,3,IN$:IN
```

```
PUT#15,EN,EM$:F$=IN$:IF
EN=0THEN220
JS 210 GOSUB550:GOTO120
CE 220 SYS(ADDR):CLOSE1:SYS654
84
QM 230 PRINT "{CLR}":LD%=11:GOS
UB500:PRINT "{10 SPACES}
{RVS}INSERT OUTPUT DISK
{OFF}"
BJ 240 GOSUB520:ADDR=49158
CD 250 LD%=2:GOSUB500
JH 260 PRINT "{DOWN}OUTPUT FILE
NAME, $ (DIR), OR Q (Q
UIT)"
PC 270 INPUT "{2 SPACES}Q
{3 LEFT}";OUT$:PRINT"
{CLR}"
BC 280 IF OUT$="Q"THEN GOTO480
KG 290 IFOUT$=""$THENSYS49994:
GOTO260
PG 300 LD%=4:GOSUB500
FJ 310 IF IN$<>"$ANDIN$<>"Q"
{SPACE}THEN PRINT "{CLR}
{DOWN}{13 RIGHT}WRITING
FILE..."
QE 320 CLOSE9:OPEN9,8,4,"0:"+O
UT$:INPUT#15,EN,EM$:F$=
OUT$:CLOSE9
BX 330 IFEN=0THEN360
RA 340 IFEN<>62THEN GOSUB550:G
OTO230
RJ 350 GOTO400
BB 360 LD%=6:GOSUB500:PRINTOUT
$;" EXISTS... REPLACE?
{SPACE}{RVS}Y{OFF}/
{RVS}N{OFF}:"
RG 370 GETAS:IFA$<>"Y"ANDA$<>"
N"THEN370
PA 380 IFA$="N"THEN230
SD 390 PRINT#15,"S0:"+OUT$
QS 400 LD%=15:GOSUB500
RM 410 T1=8+LEN(OUT$):B1$=LEFT
$(B$, (20-(T1/2))):PRINT
"{CLR}"B1$;"{RVS}SAVING
: ";OUT$;"{OFF}"
GS 420 GOTO440
EJ 430 PRINT "{CLR}"
RE 440 SYS(ADDR),OUT$:SYS65484
:PRINT"DONE
DJ 450 INPUT"MAKE ANOTHER COPY
{3 SPACES}N{3 LEFT}";AN
$
GM 460 AN$=LEFT$(AN$,1):IF(AN$
<>"Y")AND(AN$<>"N")THEN
450
KJ 470 IF AN$="Y"THEN GOTO230
JQ 480 POKE56,160
FE 490 FORI=1TO15:CLOSEI:NEXT:
CLR:PRINT "{CLR}":END
MB 500 SYS49161,LD%
GP 510 PRINT "{HOME}":FORJ=1TOL
D%-1:PRINT:NEXT:RETURN
RD 520 PRINT "{DOWN}{8 SPACES}
{RVS}PRESS A KEY TO CON
TINUE"
FC 530 GETAN$:IFAN$=""THEN530
QJ 540 RETURN
CH 550 PRINT "{DOWN}DISK ERROR
{SPACE}FOR ";F$:PRINTEM
$:GOSUB520:RETURN
CD 560 DATA 76,12,192,76,34,19
2,76,239,194,76,246,194
FS 570 DATA 169,32,141,197,193
,169,218,141,198,193,16
9,193
CQ 580 DATA 141,199,193,169,13
1,141,242,192,208,15,16
2,2
SC 590 DATA 169,234,157,197,19
3,202,16,250,169,153,14
```

```
1,242
QE 600 DATA 192,32,168,193,238
,68,192,208,13,32,164,1
94
BD 610 DATA 162,1,32,198,255,7
6,70,192,255,0,32,152
FS 620 DATA 193,133,2,32,183,2
55,41,64,240,3,76,0
JM 630 DATA 193,32,91,192,76,5
2,192,165,2,48,31,32
KM 640 DATA 68,193,201,13,208,
4,32,98,193,96,201,32
MG 650 DATA 208,4,32,123,193,9
6,32,127,192,165,20,201
CB 660 DATA 39,208,3,32,98,193
,96,164,20,153,135,192
KA 670 DATA 230,20,96,0,0,0,0,
0,0,0,0,0
GQ 680 DATA 0,0,0,0,0,0,0,0,0,
0,0,0
CX 690 DATA 0,0,0,0,0,0,0,0,0,
0,0,0
RA 700 DATA 0,0,0,0,0,0,32,156
,193,230,21,96
MS 710 DATA 166,20,240,17,162,
0,189,135,192,32,174,19
2
AF 720 DATA 232,228,20,208,245
,162,0,134,20,96,32,212
GG 730 DATA 193,32,216,192,32,
180,192,96,169,0,133,20
PC 740 DATA 169,10,32,156,193,
32,156,193,24,101,158,1
33
ES 750 DATA 158,144,2,230,159,
32,156,193,165,159,32,1
56
MG 760 DATA 193,169,131,32,156
,193,169,34,32,156,193,
169
CD 770 DATA 0,133,21,96,32,91,
192,32,98,193,169,29
RB 780 DATA 32,156,193,169,157
,32,156,193,32,212,193,
32
HM 790 DATA 212,193,32,212,193
,96,169,2,162,8,160,1
RR 800 DATA 32,186,255,32,253,
174,32,158,173,160,0,17
7
BS 810 DATA 71,72,200,177,71,1
70,200,177,71,168,104,3
2
XS 820 DATA 189,255,169,55,164
,196,166,195,32,216,255
,96
GJ 830 DATA 41,64,10,5,2,41,19
1,133,2,41,32,73
CJ 840 DATA 32,10,5,2,201,95,2
08,3,169,13,96,201
QE 850 DATA 34,208,2,169,39,96
,165,20,24,101,21,201
RD 860 DATA 39,176,10,32,180,1
92,32,212,193,32,212,19
2
JR 870 DATA 96,32,202,192,76,1
07,193,24,165,20,101,21
FS 880 DATA 201,39,240,7,176,9
,165,2,32,127,192,32
CH 890 DATA 180,192,96,165,2,3
2,127,192,32,202,192,96
FE 900 DATA 32,207,255,96,160,
0,145,195,230,195,208,2
JF 910 DATA 230,196,96,96,162,
1,32,198,255,165,55,133
GD 920 DATA 195,165,56,133,196
,169,0,141,238,194,169,
255
XD 930 DATA 141,68,192,32,152,
193,32,152,193,32,218,1
93
```


XB 940 DATA 169,6,133,158,169,39,133,159,32,212,192,96
BE 950 DATA 169,0,32,156,193,96,169,246,133,253,169,193
HR 960 DATA 133,254,160,0,177,253,201,255,208,1,96,32
FQ 970 DATA 156,193,230,253,208,240,230,254,208,236,39,8
ED 980 DATA 10,0,153,34,147,144,34,59,58,151,53,51
XS 990 DATA 50,56,49,44,49,53,58,151,53,51,50,56
XE 1000 DATA 48,44,48,58,153,199,40,49,52,41,59,0
KJ 1010 DATA 51,8,20,0,129,73,178,49,164,50,51,0
MA 1020 DATA 59,8,30,0,135,65,36,0,78,8,40,0
EP 1030 DATA 139,65,36,178,34,29,157,34,167,141,56,48
GP 1040 DATA 58,128,0,86,8,50,0,153,65,36,0,92
SE 1050 DATA 8,60,0,130,0,104,8,70,0,141,56,48
PD 1060 DATA 58,137,50,48,0,144,8,80,0,153,166,48
SD 1070 DATA 56,41,34,17,32,18,80,82,69,83,83,32
RE 1080 DATA 65,32,75,69,89,32,84,79,32,67,79,78
BK 1090 DATA 84,73,78,85,69,146,34,59,0,162,8,90
SS 1100 DATA 0,161,66,36,58,139,66,36,178,34,34,167
CH 1110 DATA 57,48,0,174,8,100

JR 1120 DATA 0,153,34,147,34,59
DATA 58,142,0,255,32,204,255,173,196,194,73,128
MF 1130 DATA 141,196,194,162,18,160,8,24,32,240,255,162
XQ 1140 DATA 0,189,196,194,240,26,32,210,255,232,208,245
AA 1150 DATA 18,80,82,79,67,69,83,83,73,78,71,32
AQ 1160 DATA 66,76,79,67,75,35,32,0,238,238,194,169
CM 1170 DATA 0,174,238,194,32,205,189,169,46,32,210,255
AS 1180 DATA 169,146,32,210,255,96,0,32,26,193,32,204
DQ 1190 DATA 255,96,32,253,174,32,158,173,160,0,177,71
JE 1200 DATA 72,200,177,71,170,104,142,12,195,76,13,195
EG 1210 DATA 0,174,12,195,160,0,24,32,240,255,173,12
PG 1220 DATA 195,160,0,162,40,201,24,208,2,200,202,169
XS 1230 DATA 32,32,210,255,202,208,248,136,240,5,238,12
HG 1240 DATA 195,208,227,162,0,160,0,24,32,240,255,162
HC 1250 DATA 0,181,217,9,128,149,217,232,224,24,208,245

AG 1260 DATA 96,6,169,1,32,195,255,169,36,141,215,195
GQ 1270 DATA 169,48,141,216,195,169,1,162,8,160,0,32
KD 1280 DATA 186,255,169,2,162,215,160,195,32,189,255,32
CQ 1290 DATA 192,255,169,64,32,144,255,162,1,32,198,255
EJ 1300 DATA 32,144,255,32,207,255,32,207,255,32,207
RF 1310 DATA 32,207,255,201,0,240,67,32,204,255,32,228
PS 1320 DATA 255,201,32,208,6,32,217,195,76,161,195,201
GD 1330 DATA 13,208,2,240,45,162,1,32,198,255,32,207
PB 1340 DATA 255,168,32,207,255,72,152,170,104,32,205,189
JC 1350 DATA 169,32,32,210,255,32,207,255,201,0,208,8
SR 1360 DATA 169,13,32,210,255,76,129,195,32,210,255,76
SJ 1370 DATA 185,195,169,1,32,195,255,32,204,255,96,36
DQ 1380 DATA 48,32,228,255,201,32,208,1,96,201,13,208
SE 1390 DATA 244,104,104,76,206,195

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Apple ProDOS Protector

Jason Coleman

These programs protect your Apple II ProDOS disks against unauthorized use by other people. If you're using DOS 3.3, see the "Guardian Angel" article elsewhere in this issue for a similar protection method.

"Apple ProDOS Protector" lets you protect any ProDOS disk from unauthorized use by others. Three files are required to make this system work. Before getting started, type in and save Programs 1-3 listed below, which are all written in Applesoft BASIC.

To begin the protection process, select the disk you want to protect, then load and run Program 1, "File Creator." The program asks you to enter a unique access code for the soon-to-be-protected disk. The access code can be any length and can contain any combination of letters, numbers, and symbols except for the comma and colon. Be sure to write the access code down for later reference—you may find it difficult or impossible to use the disk without it.

The program then creates a machine language file on disk named START.END.ML. You don't need a copy of Program 1 on the disk to be protected, only a copy of the START.END.ML file created by Program 1.

Next, you are asked to enter the name you wish to use for this disk's startup file. Make a note of this filename as well.

When Program 1 is finished, load Program 2 and save it on the disk to be protected, using the filename you selected for the startup file. Then load Program 3 and save it on the disk to be protected, too, using the filename ENDUP. The disk should now contain these three files:

1. START.END.ML, the machine language file created by Program 1.
2. Program 2, saved with the filename you selected for the startup file using Program 1.
3. Program 3, saved with the filename ENDUP.

This disk is now protected against most users. Only programmers proficient at working with the ProDOS machine language interface (MLI) can gain access without knowing the access code.

Using Protected Disks

When a protected disk is booted, the user is asked to enter the correct access code. If the access code is correct, the user is not allowed to use the disk. Anyone who doesn't know the code will not be able to break out of the program by pressing CTRL-C or CTRL-RESET.

When you are finished using a protected disk, load and run the ENDUP program (Program 3) to disable the CATALOG command so other users can't see what's on your disk.

Of course, no protection scheme is foolproof. But you should find this method sufficient to deter most casual users from accessing your ProDOS disks.

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

Program 1: File Creator

```

11 100 HGR : HGR2 : TEXT : HOME
12 110 FOR I = 8192 TO 8225: REA
13 120 D J: POKE I, J: NEXT I
14 130 DATA 32,0,191,128,28,32,1
15 140 76,249,173,37,64,240,1,96
16 150 169,22,141,37,64,32,0,19
17 160 1,129,28,32,176,249,96,3,
18 170 96,0,64,2,0
19 180 F4 125 POKE 8200,96: CALL 8192:A
20 190 = PEEK (16421): POKE 820
21 200 0,173: POKE 8207,A
22 210 41 130 INPUT "ENTER THE ACCESS C
23 220 ODE WHICH YOU WILL USE TO
24 230 ENTER YOUR DISK:";AC$

```

```

25 240 14 POKE 8226, LEN (AC$): FOR
26 250 I = 8227 TO 8226 + LEN (
27 260 AC$): POKE I, ASC ( MID$
28 270 (AC$, I - 8226)): NEXT I
29 280 75 150 PRINT CHR$ (4) "BSAVE STAR
30 290 T.END.ML,A$2000,E";I
31 300 AE 160 HOME : PRINT "ENTER A FIL
32 310 ENAME FOR YOUR STARTUP FI
33 320 LE (NO LONGER THAN SEVEN
34 330 LETTERS)": INPUT SF$: IF
35 340 LEN (SF$) > 7 THEN 160
36 350 84 170 PRINT CHR$ (4) "BLOAD BASI
37 360 C.SYSTEM,TSYS,A$2000"
38 370 50 175 IF PEEK (8192) = 76 THEN
39 380 185
40 390 DC 180 POKE 8677, LEN (SF$): FOR
41 400 I = 8678 TO 8677 + LEN (
42 410 SF$): POKE I, ASC ( MID$
43 420 (SF$, I - 8677)): NEXT
44 430 B3 184 GOTO 190
45 440 42 185 POKE 8198, LEN (SF$): FOR
46 450 I = 8199 TO 8198 + LEN (
47 460 SF$): POKE I, ASC ( MID$
48 470 (SF$, I - 8198)): NEXT
49 480 B1 190 PRINT CHR$ (4) "UNLOCK BAS
50 490 IC.SYSTEM"
51 500 95 200 PRINT CHR$ (4) "BSAVE BASI
52 510 C.SYSTEM,TSYS,A$2000"
53 520 B0 210 PRINT CHR$ (4) "LOCK BASIC
54 530 .SYSTEM"
55 540 AB 220 NEW

```

Program 2: BOOTUP

```

56 550 07 100 ONERR GOTO 1000
57 560 75 102 RS = PEEK (1012): POKE 10
58 570 12,RS + 10
59 580 25 105 HGR2 : TEXT : HOME
60 590 98 110 PRINT CHR$ (4) "BLOAD STAR
61 600 T.END.ML"
62 610 BC 120 L = PEEK (8226)
63 620 C1 130 FOR I = 1 TO L:CD$ = CD$
64 630 + CHR$ ( PEEK (8226 + I))
65 640 : NEXT
66 650 F2 140 INPUT "ACCESS CODE:";AC$
67 660 C3 150 IF AC$ < > CD$ THEN PR# 6
68 670 15 160 POKE 1012,RS
69 680 BD 165 A = PEEK (48944): POKE 82
70 690 21,A
71 700 18 170 CALL 8192: HOME : NEW
72 710 7A 1000 RESUME

```

Program 3: ENDUP

```

73 720 11 100 HGR : HGR2 : TEXT : HOME
74 730 98 110 PRINT CHR$ (4) "BLOAD STAR
75 740 T.END.ML"
76 750 B3 115 A = PEEK (48944): POKE 82
77 760 21,A
78 770 37 120 POKE 8200,96: CALL 8192
79 780 10 130 A = PEEK (16421): POKE 82
80 790 07,A: POKE 8200,173
81 800 30 140 PRINT CHR$ (4) "BSAVE STAR
82 810 T.END.ML"
83 820 0E 150 POKE 8207,0
84 830 34 160 CALL 8206
85 840 B1 170 NEW

```

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HOTWARE: Software Best Sellers

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3.		<i>Jet</i>	SubLogic	Jet simulation				•		
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5.		<i>Temple of Apshai Trilogy</i>	Epyx	Fantasy/role-playing game			•	•		
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1.	2.	<i>Math Blaster!</i>	Davidson	Introductory math program, ages 6-12		•	•	•	•	
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3.		<i>Better Working Spreadsheet</i>	Spinnaker	Spreadsheet		•		•		
4.	1.	<i>The Newsroom</i>	Springboard	Do-it-yourself newspaper		•		•	•	•
5.		<i>The Newsroom: Clip Art Collection, Vol. 1</i>	Springboard	Additional graphics		•		•	•	•

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Commodore 128 Machine Language

Part 1

Jim Butterfield, Associate Editor

This article launches a new series on machine language programming for the Commodore 128. In this installment, we'll examine some basic architectural features of the 128, including memory banking, and look at a program that passes information between BASIC and ML.

The Commodore 128 is truly three computers in one—a Commodore 128 when in 128 mode, a Commodore 64 when in 64 mode, and a Z80-based CP/M computer when in CP/M mode. This series of articles discusses programming the computer in machine language in 128 mode.

When in this mode, the 128's 8502 microprocessor can execute the same instructions as the Commodore 64's 6510 microprocessor, and many of the programming techniques used on the 64 work exactly the same on the 128. These articles are directed especially at programmers who need to make the transition from 64 machine language to 128 ML programming. Of course, if you're familiar with 6502/6510 programming, but the 128 is your first Commodore computer, you can still benefit from the information presented here.

Ground Rules

Here are two simple ground rules to keep you out of trouble on the 128:

First, it's important to stay in bank 15 when writing programs with the computer's built-in machine language monitor (we'll explain what a bank is in a moment). This rule is necessary because of the 128's memory architecture, which can be confusing to a beginner. If you choose a bank number lower than 12, you may end up in a machine configuration which has no Read Only Memory (ROM), making it impossible for your program to call any of the computer's built-in ROM routines.

Second, stay away from areas of Random Access Memory (RAM) which are usually safe on the 64. On the 64, for instance, the cassette buffer located at 828-1019 (\$033C-\$03FB) is a good place to put short ML programs, and the free RAM block from 49152-53247 (\$C000-\$CFFF) is ideal for longer programs. Both areas are unusable on the 128, as you'll quickly learn if you try to put ML code there. The lower area contains critical system vectors and subroutines; if you change their contents, the system will crash. The higher area is covered by Kernal ROM; you can't easily put an ML program there and still have access to ROM routines.

Instead, the 128 has safe areas

from 2816-3071 (\$0B00-\$0BFF) and 4864-7167 (\$1300-\$1BFF). The first area is the 128's cassette buffer, and the second area is currently unused by the system. In later articles, we'll provide more details on these rules as well as some exceptions to them.

Why Bank 15?

The 128 is capable of seeing its memory as 16 different banks numbered 0-15. The term *banks* is somewhat misleading, since a bank does not represent a separate 64K block of memory. Instead, each bank represents a different configuration or arrangement of the various available RAM and ROM elements. The bank number determines what the 128 sees within various areas. In some banks, the 128 sees nothing but RAM; in others it sees a combination of RAM and ROM; still other configurations include RAM, ROM, and input/output (I/O) addresses, and so on.

In fact, there are 256 possible memory configurations. Most of these, however, are of little or no use. For example, though you can configure the computer to see only half of its BASIC ROM and none of its Kernal ROM, it's hard to imagine any use for such an arrangement. Commodore has chosen 16 configurations which seem most useful, named the different configurations *banks*, and identified them with numbers from 0-15.

Figure 1 shows the configuration for bank 15. From locations \$0002-\$3FFF there is RAM. The 128 in the computer's name means that the computer has a total of 128K of RAM, which is arranged in two 64K blocks called *RAM 0* and *RAM 1*. Don't confuse these blocks with banks—some RAM from one or both of these blocks appears in every bank, but the amount varies.

The RAM in bank 15 is from RAM 0, the block that holds BASIC program text along with various buffers, vectors, and system variables and subroutines. More about the rest later. For the moment, it's important to notice that a BASIC program's working values—variables, arrays, and strings—are *not* contained in the same bank as the program text itself.

As shown by Figure 1, most addresses above 16384 (\$4000) are seen as ROM. The BASIC interpreter alone occupies a hefty 28K, all the way up to 45055 (\$AFFF). Above that, we have the machine language monitor and operating system (Kernal) interspersed with some I/O addresses and a tiny area earmarked for the memory management unit (MMU).

In the I/O section, from 53248-57343 (\$D000-\$DFFF), all the chips from the Commodore 64 appear in the same addresses. Thus, your favorite 64 POKES to make sound effects and so forth work exactly the same in 128 mode. There are numerous extra I/O locations to do new jobs, such as controlling the 80-column video chip and reading the extra keys on the 128's keyboard.

At this point, we won't worry about the machinations of the MMU; it's enough to learn that bank 15 provides access to all the I/O chips as well as the Kernal ROM.

When you put a machine language program in RAM 0, you might be tempted to issue a BANK 0 statement from BASIC before you start the program with SYS. After all, bank 0 gives you access to all the memory in RAM 0. Don't do this: It's better to stay in bank 15.

Figure 2 shows the bank 0 configuration. Putting the computer in this configuration will certainly allow it to see your ML program in RAM 0. But the computer can't see

its I/O chips or Kernal ROM. The computer has lots of memory, but no way to communicate with the outside world.

What's the lesson? Stay in bank 15. You are limited to 16K of RAM, but that's plenty for most applications. Later in this series, we'll discuss access to other configurations.

If you don't specify a bank, the computer defaults to bank 15. However, it's prudent to execute a BANK 15 statement just before any SYS from BASIC. This ensures that your program will work even if some other program has left the machine configured for a different bank. As a courtesy to other programmers (and users in general), programs that use other configura-

tions should end by returning the machine to the default bank.

Memory Use In RAM 0

Figure 3 illustrates typical memory usage in the first 16K of RAM 0. Note that there are several unused memory areas available for program storage. Unless you're using a graphics mode, BASIC program space begins at 7168 (\$1C00). (While programming in ML, you might want to avoid using an otherwise handy program known as the DOS Shell; it moves the start of BASIC up to \$5B01 and occupies memory above \$1A00—memory you may want to use for your own purposes.)

Figure 3 also reveals other unused or little-used memory zones. If you don't need to use a tape drive,

Figure 1: Bank 15

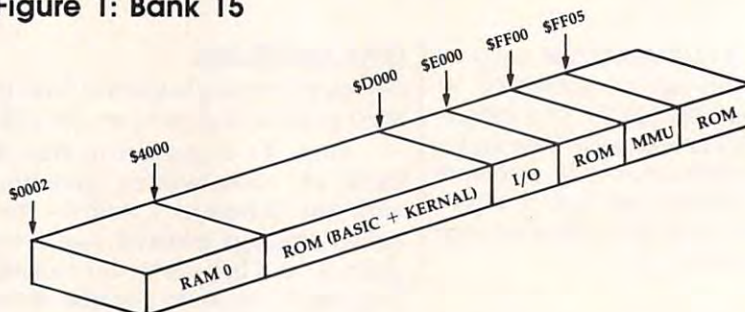


Figure 2: Bank 0

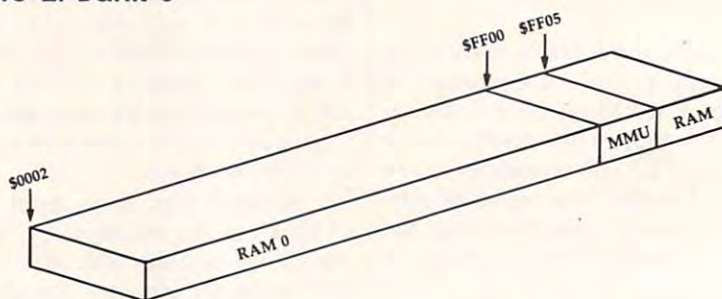
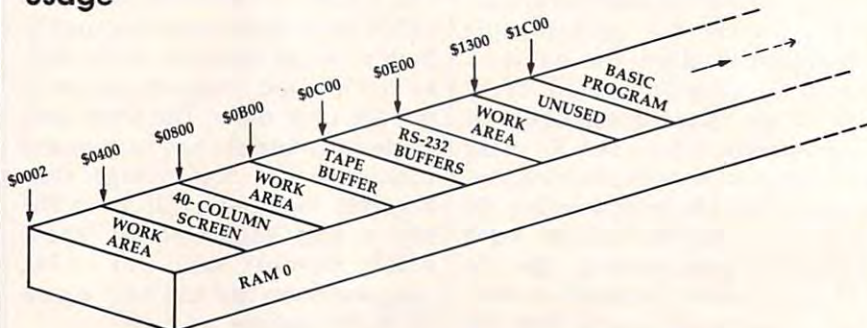


Figure 3: RAM 0 Memory Usage



the cassette buffer from 2816-3071 (\$0B00-\$0BFF) is free. If you aren't using telecommunications, the RS-232 buffers from 3072-3583 (\$0C00-\$0DFF) are also available. And there's a large block of empty memory marked *reserved for applications software* that stretches from 4864-7167 (\$1300-\$1BFF), providing over 2K of contiguous free space.

Friendlier BASIC

BASIC 7.0, the vastly improved BASIC in 128 mode, has several features that simplify the process of combining BASIC and ML. We won't explain all of them in detail, but here is a brief survey. (Your *System Guide* contains additional information.)

In addition to calling an ML routine, the SYS statement can also pass values from BASIC to ML. The values must be in the range 0-255 and are placed in the microprocessor's registers just before the ML routine takes over. Simply tack them onto the end of the SYS command, separated by commas. Conversely, the RREG command lets you read the processor's registers from BASIC after an ML routine has finished.

The BLOAD command can bring in any ML module (or a graphics screen, etc.) with no fuss or bother. The file loads into the same memory area from which it was saved, and BASIC continues with the next command. This is much simpler than the gyrations required in earlier versions of Commodore BASIC.

BASIC 7.0 also makes it easy to convert numbers between decimal and hexadecimal. The DEC function converts a hexadecimal string into a decimal number. The HEX\$ function converts a decimal number into a hexadecimal string.

A Rudimentary Example

The following program isn't particularly useful, but may interest you in the 128's new features. It counts the number of 1 bits in any eight-bit number and prints them out in a table. You may not be excited to learn that the number 14 (binary 00001110) contains three 1 bits, while the number 16 (binary 00010000) contains only one, but

the program does demonstrate how to pass information from BASIC to machine language and back again. We'll explain the purpose of each program line as we go. Here's the first one:

```
100 BANK 15
```

This statement puts the computer into bank 15, the safest configuration. Since the ML part of our program won't use any Kernal routines or I/O chips, we could use bank 0. But there's no advantage in doing so, and another time we might not be so lucky. Remember, it's always wise to set the bank explicitly rather than assume everyone's computer will be in bank 15.

```
110 DATA 162,0,74,144,1,232
    ,168,208,249,96
```

This is the short ML program, stored in the form of DATA statements. It takes a value from the accumulator (A register), counts the 1 bits in the value, and places the result in the X register.

```
120 FOR J=2816 TO 2825
```

The actual ML code goes in locations 2816-2825 (\$0B00-\$0B09), the bottom of the cassette buffer.

```
130 READ X:T=T+X
140 POKE J,X
150 NEXT J
```

Before the ML can be used, it has to be READ from the DATA line and POKEd into memory. A simple additive checksum detects most typing errors.

```
160 IF T<>1334 THEN STOP
```

If the program stops at line 160, you've made a typing error, most likely in the DATA statements. If not, the ML code is safely planted in memory and we can proceed to the job of bit counting.

```
200 FOR J=0 TO 20
```

We're going to count the 1 bits in numbers from 0-20. You can examine higher numbers if you like, but don't try anything over 255.

```
210 SYS 2816,J
```

This statement calls the ML program at its starting address of 2816 and passes the value of the variable J to the processor's A register. When the machine language program begins to run, the A register will contain that value. We could also have passed values to

the X and Y registers, but this program doesn't require them.

```
220 RREG S,T
```

When we reach line 220, the ML program has returned control to BASIC. We'd like to know what values were in the processor's registers, especially the X register, which contained the bit count. The RREG command reads the registers and places their values into BASIC variables. The A register goes into variable S and the X register goes into T. Now T contains the bit count.

```
230 PRINT J,T
240 NEXT J
```

That's all it takes. We print the value of J and the bit count T, then go back to do it again.

Yet To Come

We haven't touched yet on the 128's excellent built-in machine language monitor, nor have we explained how to "break the bank"—free ourselves of some of the constraining features of working within banks. Later in this series, we'll do all of this and more. ©

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Foolproof Input For Amiga BASIC

Tom Bunker

Here's an extremely handy tool for Amiga BASIC programmers—a routine that creates edit field boxes for accepting various kinds of keyboard input. The routine also demonstrates how well-designed subprograms can, in effect, add new commands to Amiga BASIC.

Amiga BASIC's ability to use custom subprograms is one of its most valuable features: It allows programmers to accumulate a library of very useful routines that can be attached to virtually any BASIC program. The simple requester window subprogram presented in the March 1986 issue of *COMPUTE!* is just one example. Another subprogram that should be in every programmer's collection is a foolproof input routine.

The ideal input routine would simulate the Amiga operating system's own edit field boxes. An example of such an edit field appears when you select the *Save as* option in Amiga BASIC's *Project* menu. A similar routine in BASIC would give your programs much more control than provided by the standard INPUT statement. It would be helpful, for instance, to be able to limit the number of characters that can be entered, or to limit numeric input to integers rather than print error messages after the fact. The input routine shown here has all of these capabilities and more.

Edit Fields In BASIC

The complete input routine consists of two subprograms: "Getline,"

which gets a line of input from the keyboard, and "Box," which Getline calls to draw an edit field box and cursor on the screen. The Box subprogram is very useful in its own right and can be used independently of Getline.

Getline lets you create the equivalent of an edit field box in Amiga BASIC. Here are some of its features:

- The main program which calls Getline sets the maximum length of input allowed.
- The Box subprogram draws an edit field box of appropriate size.
- The cursor inside the box can be flashing or nonflashing.
- The main program can select the type of input allowed: alphanumeric characters, real numbers, or integers.
- The range of alphanumeric characters accepted for input can be adjusted.
- Pressing the ESCape key aborts the input operation.
- A single keystroke can erase all input within the edit field box.
- The main program can display a default entry within the edit field box which the user can edit.

Getline can be used any time your program needs to accept input from the keyboard, for entry of data, filenames, or whatever. To use Getline, your program should first print any desired prompt message and leave the cursor at the point on the screen where input is to begin. Then you must call Getline using this general format:

CALL Getline (string\$,maxlength%, inputtype%)

The string variable *string\$* holds whatever default text you want to display inside the edit field box for the user to edit, and also returns the input entered by the user. For instance, if Getline is called as part of a save-data-to-disk routine, you could suggest a default filename or use a filename which the user has previously indicated. If you don't want to display anything within the edit field box when it appears, set this string variable to a null string (""), before calling Getline. In any case, Getline returns the user's input in this string variable after the subprogram passes control back to your main program.

The second parameter (*maxlength%*) is an integer which sets the maximum input length. For instance, if you want to limit input to 30 characters, you'd specify a 30 for this parameter by supplying either an integer variable or a constant.

The last parameter (*inputtype%*) is an integer which tells Getline which type of input to accept. There are three possible values:

0 accepts all alphanumeric characters without restriction.

1 accepts real numbers—the digits 0 to 9 and the decimal point.

2 accepts integers—only the digits 0 to 9.

The real and integer types also accept the plus and minus signs, but only in the first character position. Getline simply ignores all keystrokes that do not conform to the type of input selected.

CALLING Getline

Here are a couple of examples. Let's say you want the user to enter his or her name, up to 14 characters long, and you want your program to store the information in the string variable NAME\$. The proper CALL would be

CALL Getline (NAME\$,14,0)

If you want the user to enter a three-digit integer number (perhaps a telephone area code), the proper CALL would be

CALL Getline (NUMBER\$,3,2)

Note that Getline always returns the user's input in a string variable. If the input you're seeking is an integer or real number, you can convert it from string to numeric form with the VAL function after Getline returns control to your main program.

Remember, too, that Amiga BASIC's CALL statement has an alternate syntax: You can omit the CALL keyword if you delete the parentheses surrounding the arguments. The following statements work the same as the examples above:

Getline NAME\$,14,0
Getline NUMBER\$,3,2

This syntax saves a bit of program space, but also sacrifices a certain amount of program clarity. If you include the CALL keyword, it is always clear to others that the program is calling a subprogram.

Special Keystrokes

When called, the Getline subprogram first draws an edit field box the proper size to hold the input. If the string variable supplied in the call is not a null string (two quotes with nothing between them), the subprogram prints the string inside the box. A flashing cursor indicates that the program is awaiting keyboard input. Like the Amiga operating system's own edit fields, Getline recognizes the following special keystrokes:

- ESCape exits the edit field and leaves the string variable with the value it had when Getline was called.
- RETURN exits the edit field and assigns the user's entry to the string variable.

- BACKSPACE deletes the character to the left of the cursor.
- DEL deletes the entry currently in the edit field.
- CURSOR LEFT moves the cursor one space to the left.
- CURSOR RIGHT moves the cursor one space to the right.

The last four commands, of course, are valid only if at least one character is within the edit field.

Customizing Getline

Note that Getline is designed to work only when Amiga BASIC's default font is used and Preferences is set to 80 columns. If you're using a 60-column screen or a different font, the text doesn't appear properly within the edit field box. You can modify the subprograms to solve this problem if you don't regularly use the default 80-column font.

If you don't want to bother with three parameters every time you call Getline, you can omit either the maximum string length or input type or both, as long as you also delete the corresponding items from the parameter list of the SUB statement. The Getline call can be made as simple as this:

Getline NAME\$

In this case, the SUB statement would have to be changed to look for only one argument:

SUB Getline(inputstring\$) STATIC

Getline substitutes default values for maxlength% or inputtype% when they are missing from the parameter list. Maxlength% defaults to 40, and inputtype% defaults to 0 (thus accepting all types of input). You can change these defaults too, if you wish.

Two variables in the Getline subprogram—*asc.low* and *asc.high*—determine the ASCII range of characters that are accepted in the edit field. You can change these variables to make the subprogram accept any range of characters desired, even to the extent of restricting input to only one key. They could also be declared in a SHARED statement and set by your main program.

The ESCape key aborts the input and exits the edit field. If your

main program needs to know whether or not the edit field was terminated by ESCape (as opposed to a RETURN with no other input), add the following line to the Getline subprogram immediately following the SUB statement:

SHARED K

After the subprogram ends, your main program can test the value of K. If K=27, the ESCape key was pressed.

You can also program one or more of the special function keys to work in a similar fashion by adding additional lines directly below the ESCape key line to test for any other ASCII value. For example, the addition of this line:

IF K>=129 AND K<=138 THEN EXIT SUB

makes all the function keys abort the input like ESCape. Your main program could then test to see if K is equal to the ASCII value of any of the function keys and take whatever action is desired.

By deleting a single line as instructed by comments within the subprogram, Getline will always start with an empty string. Other comments show how the flashing cursor can be changed to a non-flashing cursor and how the box around the edit field can be eliminated. To make these changes, it's not necessary to actually delete the lines which are indicated. Simply insert a REM at the beginning of the line to disable it; this has the same effect and is more easily reversed.

The Box Subprogram

To draw the box around the edit field, Getline calls the Box subprogram. This subprogram selects a rectangular area of the screen and alters it in one of four ways. You may find this technique useful for other purposes as well. Here is the general format of the Box subprogram call:

CALL Box (wide%,high%,border%,mode%)

or

Box wide%,high%,border%,mode%

The first two parameters (*wide%* and *high%*) set the size of the boxed area by specifying the width and height in number of characters. The third parameter

(border%) changes the size selected by increasing or decreasing the area on all four sides by the number of pixels specified. If this argument is 0, the perimeter of the area falls on the character boundaries. The last parameter (mode%) can range from 0 to 3:

0 fills the box interior using a PAT-TERN statement.

1 inverts the interior of the box.

2 outlines the area using the foreground color.

3 fills the box interior using the foreground color.

The Box subprogram can be very useful when you want to erase a word or clear any rectangular section of the screen. Consider this statement:

```
COLOR background#:Box 30,1,0,3
:COLOR foreground#
```

This erases a section of the screen 30 characters long without affecting any surrounding text. It sets the foreground color equal to the background color, fills the area, and resets the color. Of course, you can achieve the same effect by printing spaces, but the Box subprogram works much faster.

Getline Input Routine

Note: The left-arrow symbols in this listing indicate when to press RETURN at the end of each program line. Do not attempt to type the arrows themselves.

```
SUB Getline(inputstring$, maxlen
gth%, type%) STATIC
'Value of type% should be 0 for
character, 1 for real, 2 for int
eger
'Set default maximum length:4
defaultlength=404
IF maxlen%>0 THEN maxlen%<=
defaultlength
y=CSRLIN:x=POS(o):a$=""4
asc.low=32:asc.high=125 'Set ASC
II limits4
'Delete next line to disable edi
t mode:4
a$=inputstring$ 4
cursor=LEN(a$):strlength=LEN(a$)
4
'Delete next line to eliminate i
nput box:4
Box maxlen%,1,2,2 4
Print.line:4
LOCATE y,x:PRINT a$+SPACE$(maxle
ngth%-LEN(a$))4
Getkey:4
k$=INKEY$ 4
'Delete next line for nonflashin
g cursor:4
count=count-1 4
IF count<=0 AND cursor<maxlength
% THEN4
LOCATE y,x+cursor:Box 1,1,0,14
count=100 'Set cursor flash rate
:4
```

```
END IF4
IF k$="" THEN Getkey4
k=ASC(k$):count=04
IF k=13 THEN inputstring$a$:GOT
O Done 'Return key4
IF k=27 THEN Done 'ESCAPE key4
IF k>=asc.low AND k<=asc.high AN
D strlength<maxlength% THEN4
IF type%>0 THEN 'Check if real o
r integer4
IF k<43 OR k>57 OR k=44 OR k=47
THEN Print.line4
IF (k=43 OR k=45) AND cursor>0 T
HEN Print.line4
IF type%>1 AND k=46 THEN Print.l
ine4
END IF 4
LOCATE y,x+cursor:cursor=cursor+
1:strlength=strlength+1 4
a$=LEFT$(a$,cursor-1)+k$+MID$(a$
,cursor)4
PRINT MID$(a$,cursor):GOTO Getke
y4
END IF4
IF k=31 AND cursor>0 THEN 'Curs
or left4
cursor=cursor-1 4
ELSEIF k=30 AND cursor<strlength
THEN 'Cursor right4
cursor=cursor+14
ELSEIF k=127 THEN 'Delete entry4
a$="":cursor=0:strlength=0 4
ELSEIF k=8 AND cursor>0 THEN 'Ba
ckspace key4
cursor=cursor-1:strlength=strlen
gth-14
a$=LEFT$(a$,cursor)+MID$(a$,curs
or+2)4
END IF4
GOTO Print.line4
Done:4
LOCATE y,x4
PRINT inputstring$+SPACE$(maxlen
gth%-LEN(inputstring$))4
END SUB4
4
SUB Box(wide%, high%, border%, m
ode%) STATIC4
'wide% and high% set size expres
sed as number of characters4
'border% is to be given as numbe
r of pixels4
'mode% - use 0 for pattern fill;
1 to invert area4
'mode% - use 2 for area outline;
3 to fill area with foreground c
olor4
y=CSRLIN*8-9-border%:yl=y:IF yl<
0 THEN yl=04
x=POS(o)*8-9-border%:xl=x:IF xl<
0 THEN xl=04
x2=x+wide%*8+1+2*border% 4
IF x2>=WINDOW(2) THEN x2=WINDOW(
2)-1 4
y2=y+high%*8+1+2*border% 4
IF y2>=WINDOW(3) THEN y2=WINDOW(
3)-14
IF xl>x2 THEN xl=x2 4
IF yl>y2 THEN yl=y24
IF mode%=2 THEN LINE (xl,yl)-(x2
,y2),,b:EXIT SUB4
IF mode%=3 THEN LINE (xl,yl)-(x2
,y2),,bf:EXIT SUB4
AREA (xl,yl):AREA (x2,yl):AREA (
x2,y2):AREA (xl,y2)4
AREAFILL mode%4
END SUB4
4
```

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The Screen Machine II

Part 2

Pull-Down Menus In IBM BASIC

Charles Brannon, Program Editor

Last month we presented "The Screen Machine II," a full-featured drawing program for the IBM PC and PCjr. Pull-down menus make it quick and easy to use. Many programmers would like to add user interface tools like pull-down menus to their own programs, so this month we'll take a look at the techniques used in Screen Machine II. The programs require an IBM PC with color/graphics adapter and BASICA or a PCjr with Cartridge BASIC. A joystick or graphics tablet is optional but recommended.

"The Screen Machine II" is a powerful graphics program that lets you draw in full color with a complete set of drawing tools. It is designed to be as easy to learn as possible without encumbering advanced users. Last month in Part 1, we listed Screen Machine II without REMarks for the sake of brevity. This month, we're publishing the fully commented version with an explanation of how you can use the menu subroutines in your own programs. See Part 1 for an explanation of how to use Screen Machine II.

Why A Visual Interface?

The visual user interface—consisting of pull-down menus, icons, and screen windows—is rapidly becoming the most popular way to

operate a personal computer. Since the Apple Macintosh was introduced in 1984, nearly a million Macs have been sold. The basic principles have been adapted by the Atari ST series and Commodore Amiga, and several similar shells are available for IBM PC computers—including Digital Research's GEM, IBM's Topview, and Microsoft's Windows. Even the older eight-bit computers, such as the Commodore 64, are being updated with visually oriented operating systems like GEOS.

Those who prefer this style sometimes say that the best advantage of the visual interface is that it makes you feel as if you have a tangible presence within the computer. Instead of viewing yourself as a somewhat remote user of the machine, an operator at a terminal, you feel more like a part of the system. Your sense of flow is enhanced because you can instantly recognize graphic metaphors (such as a picture of a disk) or simply scan through pull-down menus to see what commands are available and appropriate.

A drawing program that takes advantage of this approach lets you preview the figures you're drawing before you actually set them in stone (or phosphor). For instance, using a mouse controller, joystick, or graphics tablet, you can move the pointing arrow across the

screen canvas, then click a button to set one endpoint of a line. Now, as you move the pointer, a "rubber-band" line is drawn between the first point and the current cursor position. You can move the line around, changing its orientation and length, until you've put it right where you want it. Then you press a button again to stamp it down. Of course, if this still isn't what you want, an Undo command could restore the screen to its former state.

If you've never had a chance to work with pull-down menus, you might not appreciate their advantages. Since the menus let you both view and execute the program's commands, they serve two functions: They provide a way to use the program while acting as built-in documentation. Menus that drop down from the top of the screen let you work with nearly the full screen area, instead of cluttering it up with help screens or conventional menus.

On the other hand, if you prefer a written approach to communication, you may find the act of scurrying around a dynamic screen to be clumsy and inefficient, particularly if you have little trouble memorizing lots of commands and typing at least 30 words per minute. A program that seeks to keep everybody happy can provide alternative keyboard commands as well as menus and icons.

Programming Menus

Writing a program which incorporates a visual user interface can be tricky. The newest Microsoft BASICs—such as Microsoft BASIC for the Macintosh and Amiga BASIC—have built-in commands to create and manage pull-down menus. Creating a menu is as simple as listing the text in a series of MENU statements. There are even ON MENU GOSUB statements which set up *event traps* (BASIC interrupts) to detect menu selections. Other commands, such as ON MOUSE GOSUB, let the program read the pointing device and respond to button clicks.

IBM BASIC lacks these features, but does include event-trapping statements like ON STRIG GOSUB for the joystick. This makes it possible to simulate the operations which are handled automatically by the newer BASICs. When the user clicks the selection button on the pointing device, the program has to check to see if the pointer is within the menu bar (the first line of the screen). If so, it then checks to see if the arrow is pointing at one of the menu titles. If so, the program drops down the menu (saving the screen contents of the area overwritten by the menu box), and again checks the pointer position to see which menu item is being pointed at. The program highlights the item, and then un-highlights it if the pointer moves away from the item. Finally, when an item is selected (or when the menu selection is canceled), the program has to remove the menu from the screen, restoring the screen contents overlapped by the menu.

Again, all of these details are handled for the programmer in Macintosh and Amiga BASIC. Nevertheless, with enough programming, you can do the same thing in IBM BASIC. The key is being able to drop down a menu and then later restore the part of the screen overlapped by the menu.

BASIC's GET and PUT commands are the solution: GET is used to copy a rectangular portion of the screen into a storage array, and PUT copies the image from the array back to the screen. Naturally, this technique requires using a

graphics mode, since you can't GET or PUT with the text screen. However, with a machine language routine to buffer part of the text screen, this method could be adapted for use with a text-only display adapter.

Simulated MENU Commands

Screen Machine II demonstrates how this technique works. It contains several subroutines which simulate the MENU commands and event traps found in Macintosh and Amiga BASIC. Fortunately, you don't have to know about the inner workings of these subroutines to use them in your programs. There are a few variables and arrays that need to be defined (some of these are initialized automatically), but you need only three GOSUBs to do everything:

GOSUB 11000 is used to add a menu title or menu item to the list of menus.

GOSUB 14000, used within a loop, tracks the arrow pointer and continually checks for a menu selection. If a menu is selected, it automatically handles the mechanics of dropping down the menu, getting a selection, and then restoring the screen. You then examine the variables MNID (menu id) and MNIT (menu item) to see which, if any, menu item was selected.

GOSUB 20000 reads the pointer position and optionally tracks the cursor automatically.

Essentially, these subroutines are substitutes for the MENU command, MENU function, and MOUSE function built into Macintosh and Amiga BASIC. Therefore, they can be very handy for translating Macintosh and Amiga programs into IBM BASIC.

A few other useful subroutines let you turn the cursor on or off and print text on the graphics screen in reverse-video. All of these routines let you set variables to allow special options or fetch additional information. Most importantly, they are designed to be used with any program, not just Screen Machine II, so you can easily add them to an existing program or use them as a starting point for your next project.

Screen Machine II is far too large to cover in detail, but the list-

ing below (Program 1) is liberally commented with REMs. By following these comments you can easily deduce the flow of the program. If you didn't type in the program last month, you can enter this listing and omit the comments without ill effect. (Aside from the remarks, this month's program is identical to last month's.) In fact, the remarks take up too much memory to allow the program to run. If you type in the program as listed, use Program 2, "REMOVER," to remove all the remarks to create a runnable version.

REMOVER can be used to strip comments from other IBM BASIC programs, too. When you run REMOVER, first enter the name of the program you're deleting the REMs from, followed by a unique filename for the REMless program to be created. You then have two options. Option 1 changes all REM statements into a single apostrophe (the abbreviation for REM). This preserves the line in case it is the target of a GOTO or GOSUB (not a problem with Screen Machine II), but deletes the text of the remark. Option 2 deletes all REM or apostrophe statements, and if the REM is the only statement in the line, deletes the entire line as well. It's not safe to use Option 2 on programs that may branch to a line beginning with a remark, but it works just fine with Screen Machine II. Be sure you keep a copy of your unprocessed, remarked program for future reference.

Using Menus In Your Program

You can detach the menu package from the rest of the program either by deleting everything except lines 10000-21040, or by saving just the menu lines to disk as an ASCII file suitable for merging with another program. Just enter

LIST 10000-21040,"MENU.PAK"

to create an ASCII file on disk called MENU.PAK. You can then type MERGE "MENU.PAK" to add these lines to an existing program. If you are starting from scratch, type LOAD "MENU.PAK".

Before your program can call the menu package, you need to initialize certain variables. These variables are shown in lines 210-340 of

the Screen Machine II listing. See the section on GETXY below to see how to set ACC, DACC, FROZEN, XMAX, YMAX, XOFF, and YOFF. Check the section on CURSOR_ON and CURSOR_OFF for information on setting the CURSOR flag. Finally, you can choose sound effects by setting SNDFX to -1. If you set it to zero, no sound is used.

Lines 9000-9340 illustrate how to define your menu structure. For example, the DATA statements for the Picture menu are

```
DATA 1,0,1,"Picture" ""
DATA 1,1,1,"Undo" "U"
DATA 1,2,1,"New" "N"
DATA 1,3,1,"Open" "O"
DATA 1,4,1,"Save" "S"
DATA 1,5,1,"View" "V"
DATA 1,6,1,"Quit" "Q"
```

The first number is the *menu-ID*, the number specifying which menu is being defined. It must be at least 1, and less than 9 (unless you change line 11000 to allow more than 8 menus and/or more than 8 items in each menu). The next number is the *menu item*. A menu item of 0 defines the title of the menu, and other numbers specify the name of each item within the menu. The next number is a *status flag* for that menu item. A value of 1 is normal. Use 2 to display a checkmark next to an item.

The Ghost In The Machine

For example, the Tools menu puts a checkmark next to the currently selected tool. This allows a menu to be used to select items, show which commands are available, and show the status of each menu item.

When you specify a value of 0 for the menu status flag, that menu item is *ghosted out*, or dimmed. A ghosted item is still readable, but the text is distorted, indicating to the user that this particular command is currently disabled or not appropriate at the current time. This helps users avoid confusion over what they can and cannot do in a given situation—they can always access a command unless it's ghosted out.

There are many times when a program would want to change these assignments, depending on program context. For instance, after you select a new tool, the previous tool is reset to a flag of 1 (normal), and the new item is set to 2

(checked). In the Preferences menu, some of the menu items—such as Bkgd Color—are ghosted out when you are in 640 × 200 mode (because you can't change the screen color in this mode), but revert to normal when you select another graphics mode.

Initializing Menus

Here are descriptions of all the major routines in Screen Machine II:

11000 MENU To initialize or change the value of a menu item, assign values to the variables MNID, MNIT, and MNSTR\$, then GOSUB 11000. MNID holds the number of the menu (1-8); MNIT holds which menu item is being changed (0-8, where 0 is the menu title); and MNSTR\$ is the text displayed as the menu title or menu item. A program can modify all of these items at any time, changing the appearance of the menu when it drops down.

The subroutine at line 9000 in Screen Machine II can be used as a model for initializing your own menus. This routine stores the values in the arrays MTITLE\$, MFLAGS, and MITEMS. It stores the number of the highest menu-ID used so far in TOPID to find out how many menus there are. The one-dimensional array MITEMS holds the number of menu items in each menu. MTITLE\$ and MFLAGS are two-dimensional arrays that use MNID and MNIT to point to the title string and flag setting for a menu item. Hence, MFLAGS(1,2) holds the status flag value of menu 1, item 2. MTITLE\$(3,0) holds the title of the third menu.

It can be convenient to assign values to these arrays directly—for example, when you just want to change one menu item's status flag. MFLAGS(3,4)=0 would ghost out the fourth item of the third menu. You could change it back to normal with MFLAGS(3,4)=1. Or you might want to change the text of a menu entry by modifying the MTITLE\$ array. For instance, a menu item could initially read SOUND ON, then change to SOUND OFF after you've turned on the sound. This is an alternative to using the checkmark, but it can be confusing. Does SOUND ON imply that the sound is already on, or that the item

will turn on the sound? Most programs use checkmarks to avoid this confusion.

12000 MENU_REFRESH Use GOSUB 12000 to display the title bar of your menus after you've initialized them after successive calls to the subroutine at line 11000. Your program should try to avoid using the top line of the screen, but you can always use GOSUB 12000 to redisplay the menu bar if the top line is lost. This routine also links in the positions of each menu item so that the MENU_POLL routine (line 14000) can figure out which menu you are pointing at. These positions are stored in the MX array.

13000 RVSMMSG\$ There is no easy way to print reverse-video text on the IBM graphics screen, but this is the effect we want when we highlight a menu title or menu entry. The menu bar is also printed in reverse. To display reverse text, set MSG\$ to the text you'd like to PRINT, then GOSUB 13000. This routine prints the text, uses GET to copy the text into an array, then uses the PRESET option of PUT to stamp down a reverse copy of the text.

14000 MENU_POLL This is the workhorse of the menu package. When you call this routine, it checks to see if the pointer is pointing at a menu title and the button is pressed. If not, it just RETURNS, leaving the variables MNID and MNIT set to 0. Otherwise, it drops down the menu, gets the selection, and exits with MNID and MNIT set to the value of the menu-ID and menu item. If the user canceled the selection by moving outside of the menu box, MNIT and MNID are reset to 0.

This routine uses simple sound effects as additional audio cues for the user. If you set the variable SNDFX to 0, you won't get sound effects. If you want them, set SNDFX to -1.

This routine also preserves your screen display and cursor position. If the keyboard is used for menu selection, the keyboard offset (see below) is increased to speed up movement between menu items.

Be aware that this routine works like INKEY\$—if there is no menu selected yet, it immediately

RETURNS. You need to continually call this routine within a loop until MNIT is nonzero, meaning that a menu has been selected. The cursor arrow is updated automatically throughout the menu selection process. Even if no menu is selected, calling this routine continually calls the GETXY routine at line 20000 to update the cursor position.

15000 This subroutine is used only by MENU_POLL to flash a selected menu item.

16000 MENU_DOWN Given a value in MNID, this routine drops down the indicated menu, saving the screen contents erased by the menu in the MSAVE% array (initialized in line 11010). This routine is really only called by the MENU_POLL routine when a menu has been selected, but you may be able to use it for some special effects. To remove the menu, be sure to use the next routine, MENU_AWAY, to discard the menu and restore the screen contents.

17000 MENU_AWAY Again, this is really only used by MENU_POLL to roll away the menu after the user has made a selection. You can use it to remove the menu and restore the screen if you used MENU_DOWN to drop the menu yourself.

Cursor Routines

18000 CURSOR_ON

19000 CURSOR_OFF The arrow pointer is defined in this program in the subroutine at line 3000, used to select various graphics modes. You could excerpt line 3050 (as long as you remember to DIM ARROW% (32) at the start of your program) to use this cursor in your own program. Otherwise, draw your cursor on the screen and use GET (x1,y1)-(x2,y2),ARROW% to copy the cursor into the ARROW% array (x1,y1, and x2,y2 are opposite endpoints of an imaginary rectangle that should completely enclose the cursor shape). The GETXY routine (20000) needs to know the width and height of the cursor, so store these values in XARROW and YARROW.

The cursor is animated with the XOR option of PUT. When you PUT the arrow, it combines itself with the existing screen display so that it is always in contrast. Just

think of the cursor as a stamp that uses "negative ink"—ink that reverses the color of anything it touches. For example, a white arrow on a black background would be white, but on a white background would be black. The magic of XOR is that when you PUT the shape back down on top of itself, it reverses the action, removing the arrow and restoring the previous screen contents. Although PUT with XOR can be flicker-prone, you can reduce the flicker by increasing the delay between drawing the arrow and erasing it.

You don't have to worry about updating the arrow cursor yourself. As long as you continually call either MENU_POLL (14000) or GETXY (20000), the arrow position is updated while the routine is checking the pointer position. But you have to remember to remove the arrow from the screen before you draw anything that might overlap the arrow. If you drew a white line through the cursor while it was resting on a white area, you've drawn a white line through the black arrow. When the arrow is PUT back on top of itself to erase the arrow, the conditions are no longer the same. The cursor reverses itself, so the cursor is gone, but you're left with a black line where the cursor used to be (remember the "negative ink" analogy).

Therefore, your program needs to erase the cursor from the screen before drawing anything. After you've drawn your figure, you can turn the cursor back on, or just allow GETXY (20000) to turn it back on automatically the next time you check for the cursor position.

So use GOSUB 19000 to turn off the cursor, and GOSUB 18000 to turn it back on. This is not the same as setting the CURSOR flag (see GETXY below). The CURSOR flag prevents or enables automatic cursor updates, but doesn't graphically affect the display. However, you should turn off the cursor with GOSUB 19000 before you turn off the cursor flag. If this seems confusing, examine the drawing routines in Screen Machine II (lines 1000-1660) to see how this is done.

20000 GETXY This routine is the core of the whole package. It is used any time a routine wants to know

where the cursor is pointing. As part of the normal checks for the joystick position, it can also update the cursor automatically. To get automatic cursor tracking, be sure to set the CURSOR flag to -1; otherwise you are responsible for your own cursor movement. For use with a joystick or graphics tablet, this routine converts the joystick/tablet values to actual screen positions by multiplying the controller position times the values XRATIO# and YRATIO#.

XRATIO# and YRATIO# are the horizontal and vertical size of the screen divided by the maximum X and Y values of the controller (the lower-right position). When multiplied by the joystick value, these values scale the joystick values to actual screen coordinates. A range of 0-255 multiplied by 1.251 (319/255) gives us a range from 0-319.

Set XRATIO# to the horizontal size of the screen divided by the maximum value of the controller. If the maximum value of the joystick is 132, and you're working with the 320 × 200 mode, then XRATIO# = 320/132. Similarly, YRATIO# is the number of rows divided by the maximum vertical position of the controller, as in YRATIO# = 200/130.

Reading The Pointing Device

XOFF is the minimum horizontal value of the joystick, and YOFF is the smallest vertical value returned by the joystick. You can test this by pushing the joystick to the upper-left corner, then executing PRINT STICK(0), STICK(1). Similarly, you can move the joystick to the lower-right corner and PRINT STICK(0), STICK(1) to assign default values to XMAX and YMAX as shown in lines 230 and 240. Screen Machine II illustrates how to set these values in the screen setup routine at line 3000. Also, the Calibrate function from the Preferences menu (refer to lines 2440-2510) is used to read the values of XMAX, YMAX, XOFF, and YOFF.

XOFF and YOFF, the minimum (top-left) values of the controller, are used to adjust the calculations, as well as to check whether a stylus is pressed against a graphics tablet

surface. For example, the KoalaPad usually returns 7 and 7 as its X and Y values when there is no surface contact. This can be used as a convenient shortcut. While in drawing mode, for example, you start drawing by clicking the button, and stop drawing by either clicking the button again, or simply moving the stylus off the tablet surface.

Another note about the KoalaPad: It is extremely sensitive to glitches unless you bear down on the tablet with firm pressure. Unfortunately, pressing too hard will score the tablet surface. If you don't press hard enough, the values jitter uncontrollably. Fortunately, BASIC is too slow to notice most of these glitches, which occur for a fraction of a second before the values reset to normal. If you compile the program, though, it is much more sensitive to these glitches. An averaging routine could be used to detect the glitches and ignore them, but would greatly slow down the uncompiled program.

For keyboard control, GETXY allows the cursor keys to be used to move the cursor. If the keyboard was used instead of the controller, the variable KEYMODE is set to -1; otherwise KEYMODE is reset to 0 when the joystick or graphics tablet is used.

Cursor movement can be very slow, though, if you are moving only one pixel at a time. You must set the variable DACC to the number of pixels you'd like the pointer to move each time a cursor key is pressed, and initialize the variable ACC to this value. If the key is pressed successively or held down until it repeats, ACC counts up, accelerating the speed of the arrow cursor. When the key is released or a different key is pressed, ACC is reset to the value of DACC.

On the other hand, if DACC is a negative quantity, no acceleration is performed. Every keypress just advances the cursor by the absolute value of DACC (as if it were positive). You can change these values throughout your program depending on the context. The MENU_POLL routine sets DACC to -8 during menu selection so that the cursor keys move by one screen line at a time without accelerating.

Reading The Keyboard

If the flag FROZEN equals -1, the joystick or graphics tablet is ignored in favor of the keyboard. Do this when you need keyboard control while the joystick is plugged in. Although the keyboard is always active, it attempts to increment or decrement the values of MX and MY, but these variables are continually reset to the scaled value of the joystick position. With the graphics tablet, we can tell if the stylus is pressed down and ignore the tablet position if it isn't. So the keyboard and tablet work interchangeably, but you need to set FROZEN to -1 if you want keyboard control only while ignoring the joystick.

Line 20050 checks for keyboard equivalents that indirectly activate menu entries. Most commands in Screen Machine II have keyboard equivalents—O for Open, L for Lines, CTRL-N (^N) for New, etc. In addition to streamlining the program for advanced users, keyboard commands satisfy those who are uncomfortable with pointing and clicking. If you don't mind memorizing every keystroke, you don't really need menus. However, not every menu item is always represented by a keystroke, and it's hard to find unique assignments for every menu item.

You really don't need to bother with keyboard equivalents, but if you want them, initialize the string CM\$ as illustrated in line 9060. For each keyboard equivalent, include the keyboard character followed by the digit of the menu-ID and the digit of the menu item for that menu selection. This limits you to nine menus and items, but makes keyboard checking quick. INSTR\$ is used to instantly find out if the command key is part of CM\$, and just as easily retrieve the subsequent values of MNID and MNIT. Strictly speaking, this line does not really belong in GETXY, but we need it here to use the same keystroke that GETXY uses to check for a cursor key.

Study the program listing for more ideas. Since nearly every line is commented, it should be easy enough to follow. We would be interested in seeing the kinds of programs you develop using these techniques.

Quick Reference To Subroutines

12000 MENU_REFRESH

Uses MNID, MNIT, and MNSTR\$ to initialize a menu item.

MNID: Which menu

MNIT: Which menu item

Fills the arrays MTITLE\$(), MFLAGS(), MITEMS()

13000 RVSMMSG\$

Displays MSG\$ in reverse video at current cursor position.

14000 MENU_POLL

If a menu item is found, returns menu-ID in MNID and menu item in MNIT; otherwise MNID=0 and MNIT=0.

18000 CURSOR_ON

If the cursor flag is set (CURSOR<>0), draws pointer cursor and tells the package that the cursor is on the screen by setting TOGGLE=1.

19000 CURSOR_OFF

If the cursor flag is set (CURSOR<>0), removes pointer cursor from screen and tells the package that the cursor is not on the screen by setting TOGGLE=0.

20000 GETXY

Polls keyboard and optionally the joystick (if FROZEN=0). See text for necessary initialization. Returns MX, MY, MB (mouse/joystick position and button status). If CURSOR flag is nonzero, automatically updates an arrow cursor at position MX, MY.

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

Program 1: The Screen Machine II

```

NP 100 'Screen Machine II
GB 110 'Requires CGA or PCjr, AB
      ASIC 2.x or Cartridge BAS
      IC
HA 120 DEFINT A-Z
CP 130 'Test for PCjr
PA 140 PCJR=0:ON ERROR GOTO 150:
      SOUND OFF: CLEAR ,,,32768:
      DEFINT A-Z:PCJR=-1
JF 150 IF NOT PCJR THEN RESUME 1
      60
OJ 160 ON ERROR GOTO 0
HC 170 '
OL 180 'Constants used by menuin
      g package:
HG 190 '
HG 200 'To compile this program,
      remove apostrophe from f
      ollowing line, delete lin
      e 11010
OK 210 'DIM MTITLE$(8,8),MFLAGS(
      8,8),MITEMS(8),MSAVE%(160
      8),mx(8):TOPID=0
AF 220 DIM ARROW%(32),ZZTEMP%(64
      8) 'reserve memory for cu
      rsor, temp use
MJ 230 'XMAX=100:YMAX=100:XOFF=3
      :YOFF=3 'recommended for
      joystick.
FF 240 XMAX=250:YMAX=230:XOFF=7:
      YOFF=7 'recommended for u
      se with touch tablet
AH 250 HIGHLIGHT=2 '# of flashes

```



```

when menu item selected
00 260 TRUE=-1:CURSOR=TRUE 'enab
les automatic arrow curso
r
MP 270 KEY OFF:SCREEN 0,0,0:WIDT
H 40:COLOR ,1,1:CLS:LOCAT
E 4,11,0:COLOR 12:PRINT "
SCREEN MACHINE II"
MP 280 LOCATE 7,12:COLOR 10:PRIN
T"Charles Brannon"
KD 290 COLOR 14:LOCATE 13,10:PRI
NT"One moment, please..."
KH 300 GOSUB 9000 'initialize th
e menus
CK 310 SMODE=1:COLR=1:GOSUB 3000
'sets up screen, XRES,YR
ES,MAXCOLOR,SWIDTH,ARROW%
cursor
MH 320 SNDFX=TRUE 'set to non-ze
ro for sound effects
IP 330 ACC=1:DACC=1 'DACC is #pi
xels moved per keystroke.
If negative, makes keybo
ard movement constant, el
se allows acceleration
DD 340 FROZEN=0 'if frozen=true
(-1), joystick or touch
tablet is ignored in favo
r of keyboard input
HA 350 '
LH 360 'Program starts here
HE 370 '
FI 380 COLR=1:TOOL=1 'current co
lor, drawing action
OP 390 STRIG ON 'enable mouse bu
tton
ID 400 MX=XRES/2:MY=YRES/2:NX=MX
:NY=MY:GOSUB 18000 'turn
on cursor initially
JJ 410 DIM UNDO%(15000) 'buffer
portion of screen
HL 420 '
FJ 430 'Main loop:
HP 440 '
EI 450 WHILE TRUE 'i.e. forever,
if true=-1
BN 460 GOSUB 18000:MB=0:MNID=0
CM 470 WHILE MNID=0 AND MB=0 'w
hile there's no menu sele
ction and no button press
LF 480 GOSUB 14000 'poll menus
BH 490 WEND
BP 500 IF MB<>0 THEN GOSUB 1000
'draw
BM 510 IF MNID THEN GOSUB 2000
'process menus
EM 520 WEND
HO 530 '
OO 1000 WHILE MB:GOSUB 20000:WEN
D 'wait for button relea
se
NH 1010 GOSUB 19000 'turn off cu
r sor
AC 1020 IF MY>=CY THEN COLR=INT(
MX/XR#):GOSUB 6000:RETUR
N
EC 1030 GET (1,8)-(XRES-2,CY-1),
UNDO%:CLS:PUT (1,8),UNDO
do buffer.
JC 1035 SCMS=CM$:CM$="" 'tempora
rily disable keyboard co
mmands
LG 1040 ON TOOL GOSUB 1070,1170,
1300,1430,1560,1630
LN 1045 CM$=SCMS 'restore keyboa
rd commands
JK 1050 RETURN
NF 1060 'Drawing routine
FK 1070 IF PENU AND NOT KEYMODE
THEN RETURN 'drawing on
ly works with pen down
CH 1080 CURSOR=0 'disable cursor
for faster drawing

```

```

SA 1090 WHILE MB=0 AND (NOT PENU
P OR KEYMODE)
ES 1100 SX=MX:SY=MY:GOSUB 20000:
MY=-MY*(MY>7 AND MY<CY)-
B*(MY<8)-(CY-1)*(MY>=CY)
LM 1110 LINE (SX,SY)-(MX,MY),COL
R 'connect the line
FK 1120 WEND
PJ 1130 WHILE MB:GOSUB 20000:WEN
D 'wait for button relea
se
HC 1140 CURSOR=TRUE
JM 1150 RETURN
OO 1160 'Draw lines
HN 1170 SX=MX:SY=MY:CURSOR=0 'di
sable cursor during line
drawing
MP 1180 WHILE MB=0
LL 1190 LINE (SX,SY)-(MX,MY),0
'erase previous line
OG 1200 GOSUB 20000:MY=-MY*(MY>
7 AND MY<CY)-B*(MY<8)-(C
Y-1)*(MY>=CY)
BL 1210 LINE (SX,SY)-(MX,MY),CO
LR 'draw new line
EA 1220 EX=MX:EY=MY
FP 1230 WEND
PD 1240 WHILE MB:GOSUB 20000:WEN
D 'wait for button relea
se
CL 1250 PUT (1,8),UNDO%,PSET 're
store mangled screen
ED 1260 LINE (SX,SY)-(EX,EY),COL
R 'draw final line
IN 1270 CURSOR=TRUE
JH 1280 RETURN
FL 1290 'Draw boxes
CF 1300 SX=MX:SY=MY:CURSOR=0 'di
sable cursor
LO 1310 WHILE MB=0
OF 1320 LINE (SX,SY)-(MX,MY),0,
B 'erase previous box
PB 1330 GOSUB 20000:MY=-MY*(MY>
7 AND MY<CY)-B*(MY<8)-(C
Y-1)*(MY>=CY)
KD 1340 LINE (SX,SY)-(MX,MY),CO
LR,B 'draw new box
FL 1350 EX=MX:EY=MY
BK 1360 WEND
OJ 1370 WHILE MB:GOSUB 20000:WEN
D 'wait for button relea
se
CG 1380 PUT (1,8),UNDO%,PSET 're
store mangled screen
LA 1390 LINE (SX,SY)-(EX,EY),COL
R,B 'draw final line
HM 1400 CURSOR=TRUE
IG 1410 RETURN
OB 1420 'Draw circles
DA 1430 SX=MX:SY=MY:CURSOR=0 'di
sable cursor
MJ 1440 WHILE MB=0
PM 1450 CIRCLE (SX,SY),SQR(ABS(
SX-MX)^2+ABS(SY-MY)^2),0
GOSUB 20000:MY=-MY*(MY>
7 AND MY<CY)-B*(MY<8)-(C
Y-1)*(MY>=CY)
NP 1470 CIRCLE (SX,SY),SQR(ABS(
SX-MX)^2+ABS(SY-MY)^2),C
OLR
FG 1480 EX=MX:EY=MY
GF 1490 WEND
PI 1500 WHILE MB:GOSUB 20000:WEN
D 'wait for button relea
se
FA 1510 GOSUB 3000:PUT (1,8),UND
O%,PSET 'restore mangled
screen
JA 1520 CIRCLE (SX,SY),SQR(ABS(
SX-MX)^2+ABS(SY-MY)^2),CO
LR
CL 1530 CURSOR=TRUE:GOSUB 12000:
GOSUB 6000 'redraw scree

```

```

n bar and color bars in
case circle overwrote it
JB 1540 RETURN
ON 1550 'Spraycan
GB 1560 WHILE MB=0 AND (NOT PENU
P OR KEYMODE)
JE 1570 GOSUB 20000:IF MY<12 OR
MY>CY-5 THEN 1590
BG 1580 GOSUB 19000:PSET (MX+4-
B*RND,MY+4-B*RND),COLR
GH 1590 WEND
OI 1600 WHILE MB:GOSUB 20000:WEN
D
JK 1610 RETURN
LO 1620 'Paint
NA 1630 ON ERROR GOTO 1660:PAINT
(MX,MY),COLR:LINE (0,0)
-(XRES-1,YRES-1),,B:GOSU
B 6000:GOSUB 12000
FA 1640 ON ERROR GOTO 0:WHILE MB
:GOSUB 20000:WEND 'relea
se
JG 1650 RETURN
KA 1660 RESUME NEXT
BO 1670 'Menu handler:
GF 2000 ON MNID GOSUB 2030,2320,
2380 'Picture, Tools, Sc
reen
IP 2010 RETURN
OO 2020 'File menu
PC 2030 ON MNIT GOSUB 2060,2080,
2100,2170,2240,2300 'Und
o,New,Open,Save,View,Qui
t
JI 2040 RETURN
JB 2050 'Undo:
AF 2060 GOSUB 19000:PUT (1,8),UN
DO%,PSET:RETURN
EO 2070 'New:
HE 2080 GOSUB 3000:RETURN
IH 2090 'Open:
NB 2100 TYP$="OPEN":GOSUB 4000 '
get filename
OJ 2110 IF FILENAME$="" THEN 213
0
NC 2120 ON ERROR GOTO 5500:DEF S
EG=SEGADR:BLOAD FILENAME
$,0
JD 2130 ON ERROR GOTO 0:CLOSE#1
ED 2140 LINE (0,0)-(XRES-1,YRES-
1),,B:GOSUB 12000:GOSUB
6000
JN 2150 RETURN
EO 2160 'Save:
MY 2170 TYP$="SAVE":GOSUB 4000 '
get filename
NA 2180 IF FILENAME$="" THEN 221
0
FN 2190 GET (1,8)-(XRES-2,CY-1),
UNDO%:CLS:PUT (1,8),UNDO
%,PSET
OL 2200 ON ERROR GOTO 5500:DEF S
EG=SEGADR:BSAVE FILENAME
$,0,SCREEN!
KP 2210 ON ERROR GOTO 0:CLOSE#1:
GOSUB 3000:PUT (1,8),UND
O%,PSET
IG 2220 RETURN
NM 2230 'View:
DF 2240 GOSUB 19000:CURSOR=0
ED 2250 GET (1,8)-(XRES-2,CY-1),
UNDO%:CLS:PUT (1,8),UNDO
%,PSET
HB 2260 WHILE MB=0:GOSUB 20000:W
END
OG 2270 WHILE MB:GOSUB 20000:WEN
D
MF 2280 GOSUB 3000:PUT (1,8),UND
O%,PSET:CURSOR=-1:RETURN
KD 2290 'Quit
CM 2300 SCREEN 0,0,0,0:END 'use
SYSTEM to exit to DOS
KK 2310 'Tools menu

```



```

KF 2320 MFLAGS(MNID,TOOL)=1 'turn
n off previous tool
MC 2330 MFLAGS(MNID,MNIT)=2:TOOL
=MNIT 'turn on current t
ool
JO 2340 RETURN
HB 2350 STOP 'protect subroutine
s from accidental execut
ion
IE 2360 '
FJ 2370 'Screen:
NF 2380 IF MNIT<4 THEN SMODE=MNI
T-2*(MNIT=3):GOSUB 3000
PK 2390 IF MNIT=4 THEN COLOR,1:
MFLAGS(MNID,4)=2:MFLAGS(
MNID,5)=1
BM 2400 IF MNIT=5 THEN COLOR,2:
MFLAGS(MNID,4)=1:MFLAGS(
MNID,5)=2
IF 2410 IF MNIT=6 THEN BG=(BG+1)
AND 15:IF SMODE=1 THEN
COLOR BG ELSE COLOR,BG
GF 2420 IF MNIT=7 THEN FROZEN=NO
T FROZEN:MFLAGS(MNID,MN
IT)=1-FROZEN
DE 2430 IF MNIT>8 THEN RETURN
GA 2440 GOSUB 19000:LOCATE 1,1:M
SG$=LEFT$("Move stick to
upper left, press butto
n."+SPACE$(80),WIDTH):G
OSUB 13000
IJ 2450 WHILE STRIG(1)=0:XOFF=ST
ICK(0):YOFF=STICK(1):WEN
D
NJ 2460 WHILE STRIG(1)<>0:WEND '
wait for release
FO 2470 LOCATE 1,1:MSG$=LEFT$("M
ove stick to lower right
, press button."+SPACE$(
80),WIDTH):GOSUB 13000
HK 2480 WHILE STRIG(1)=0:XMAX=ST
ICK(0):YMAX=STICK(1):WEN
D
NC 2490 WHILE STRIG(1)<>0:WEND '
wait for release
DH 2500 XRATIO=XRES/XMAX:YRATIO
=YRES/YMAX
IF 2510 GOSUB 12000:RETURN
KA 2520 'Set up a screen, given
XRES,YRES,PCJRMODE
NG 3000 GOSUB 19000 'turn off cu
rsor
KO 3010 IF SMODE=PMODE THEN 3030
KO 3020 ON SMODE GOSUB 3110,3150
,3030,3030,3190
CP 3030 PMODE=SMODE
NO 3040 SWIDTH=INT(XRES/8):XRATI
O=XRES/XMAX:YRATIO=YRES
S/YMAX 'screen width
PE 3050 CLS:PSET (10,10):DRAW "b
m10,10d3e313f5":GET (10,
10)-(17,17),ARROW% 'cre
ate cursor
ME 3060 XARROW=8:YARROW=8 'horiz
ontal and vertical size
of cursor
JO 3070 CLS:LINE (0,0)-(XRES-1,Y
RES-1),,B 'border
PC 3080 GOSUB 6000:GOSUB 12000
KI 3090 RETURN
HP 3100 '
DD 3110 SCREEN 1:COLOR 0,1:COLR=
1:XRES=320:YRES=200:BG=0
:MAXCOLOR=4
HA 3120 GOSUB 3230:MFLAGS(3,1)=2
:SEGADR=&H800:SCRLEN=1
6384
PJ 3130 MFLAGS(3,4)=2:MFLAGS(3,5
)=1:MFLAGS(3,6)=1
JL 3140 RETURN
QN 3150 SCREEN 2:XRES=640:YRES=2
00:MAXCOLOR=2:COLR=1
JS 3160 GOSUB 3230:MFLAGS(3,2)=2

```

```

:SEGADR=&H800:SCRLEN=1
6384
ID 3170 MFLAGS(3,4)=0:MFLAGS(3,5
)=0:MFLAGS(3,6)=0
JH 3180 RETURN
JK 3190 SCREEN 5:XRES=320:YRES=2
00:MAXCOLOR=16:COLR=1
FE 3200 GOSUB 3230:MFLAGS(3,3)=2
:SEGADR=&H1800:SCRLEN=1
2768!
KR 3210 MFLAGS(3,4)=0:MFLAGS(3,5
)=0:MFLAGS(3,6)=1
IH 3220 RETURN
JP 3230 MFLAGS(3,1)=1:MFLAGS(3,2
)=1:MFLAGS(3,3)=PCJR:RE
TURN 'reset modes
CM 3240 'Get a filename...
EG 4000 GOSUB 19000:GET (1,8)-(X
RES-2,CY-1),UNDO% 'save
screen
JO 4010 MSG1$="Please enter name
":MSG2$="of picture to "
+TYP$
JP 4020 TW=SWIDTH/2-10:LINE (TW*
8-10,50)-(TW*8+160,100),
0,BF:LINE (TW*8-10,50)-(
TW*8+160,100),,B:LINE (T
W*8-8,52)-(TW*8+158,98),
,B 'draw box
HD 4030 LOCATE 8,SWIDTH/2-LEN(MS
G1$)/2:PRINT MSG1$:LOCAT
E 9,SWIDTH/2-LEN(MSG2$)/
2:PRINT MSG2$
PG 4040 LINE (TW*8-5,78)-(TW*8+1
55,89),,B:LOCATE 11,TW+1
:MAXLEN=18:GOSUB 5000
IP 4050 FILENAME$=EDT$:IF FILENA
ME$>"" THEN IF MID$(EDT$,
LEN(EDT$)+3*(LEN(EDT$)>
3),1)<>". " THEN FILENAME
$=FILENAME$+".PI"+CHR$(4
8+SMODE)
PK 4060 PUT (1,8),UNDO%,PSET 're
store screen
JD 4070 RETURN
BM 4080 'Get a line of text (EDT
$) of maximum length MAX
LEN
QP 5000 EDT$="":IX=POS(0):IY=CSR
LIN:XI=IX:KBD=-1:IF MAXL
EN=0 THEN MAXLEN=79-IX
GB 5010 WHILE KBD<>13
GE 5020 XI=LEN(EDT$)+IX:LOCATE
IY,XI:PRINT "_":KBD$=IN
PUT$(1)
PF 5030 KBD=ASC(KBD$):LOCATE IY
,XI:PRINT " ";
DC 5040 IF KBD=8 AND LEN(EDT$)>
0 THEN EDT$=LEFT$(EDT$,L
EN(EDT$)-1)
KH 5050 IF LEN(EDT$)<MAXLEN AND
(KBD AND 127)>=32 THEN
EDT$=EDT$+KBD$:LOCATE IY
,XI:PRINT KBD$;
GI 5060 WEND
JE 5070 RETURN
GB 5080 'Error trap:
HL 5500 CLOSE #1 'close any file
FE 5510 GOSUB 19000:GET (1,8)-(X
RES-2,CY-1),UNDO% 'save
screen
KK 5520 TW=SWIDTH/2-10:LINE (TW*
8-10,50)-(TW*8+160,100),
0,BF:LINE (TW*8-10,50)-(
TW*8+160,100),,B:LINE (T
W*8-8,52)-(TW*8+158,98),
,B 'draw box
PK 5530 IF ERR>52 THEN MSG1$="D
OS ERROR #"+STR$(ERR):EL
SE MSG1$="ERROR #"+STR$(
ERR)+" in line"+STR$(ERL
)
JF 5540 MSG2$="(R)etry or (C)anc

```

```

e1"
PD 5550 LOCATE 8,SWIDTH/2-LEN(MS
G1$)/2:PRINT MSG1$:LOCAT
E 10,SWIDTH/2-LEN(MSG2$)
/2:PRINT MSG2$
BF 5560 KBD$=INPUT$(1):IF KBD$<>
"r" AND KBD$<>"R" AND KB
D$<>"c" AND KBD$<>"C" TH
EN 5560
ND 5570 PUT (1,8),UNDO%,PSET 're
draw screen
HL 5580 IF KBD$="r" OR KBD$="R"
THEN RESUME ELSE RESUME
NEXT
NN 5590 'Draw color bars
FH 6000 XR#XRES/MAXCOLOR:CH=11:
CY=YRES-CH-1
PH 6010 LINE (0,CY)-(XRES-1,YRES
-1),0,BF
EJ 6020 FOR I=0 TO MAXCOLOR-1
DA 6030 LINE (I*XR#+2,CY+3)-(I*X
R#+XR#+3,CY+CH-3),I,BF
QN 6040 NEXT
BH 6050 LINE (0,CY)-(XRES-1,YRES
-1),,B
JD 6060 LINE (COLR*XR#,CY+2)-(CO
LR*XR#+XR#+1,CY+CH-2),,B
JF 6070 RETURN
FP 6080 'Initialize the menus
BK 9000 RESTORE 9090
BO 9010 WHILE MNSTR$<>"x"
NJ 9020 READ MNID,MNIT,MFLAG,MN
STR$
ME 9030 IF MNSTR$<>"x" THEN GOS
UB 11000
FG 9040 WEND
PI 9050 MFLAGS(3,3)=PCJR 'allow
/disallow special jr mod
e
IP 9060 CM$="U11"+CHR$(14)+"1201
3S14V15"+CHR$(17)+"16D21
L22R23C24A25P26B36K37J38
" 'key followed by corre
sponding MNID and MNIT
KI 9070 RETURN
LJ 9080 'structure is MenuId,Men
uItem,flag(0,1,2) and t
itle for each entry
BD 9090 DATA 1,0,1,"Picture "
HE 9100 DATA 1,1,1,"Undo "
IN 9110 DATA 1,2,1,"New ^N"
LH 9120 DATA 1,3,1,"Open O"
PN 9130 DATA 1,4,1,"Save S"
EM 9140 DATA 1,5,1,"View V"
EK 9150 DATA 1,6,1,"Quit ^Q"
IH 9160 '
ND 9170 DATA 2,0,1," Tools
"
HJ 9180 DATA 2,1,2," Draw D
"
ML 9190 DATA 2,2,1," Line L
"
PH 9200 DATA 2,3,1," Rectangle R
"
ID 9210 DATA 2,4,1," Circle C
"
JC 9220 DATA 2,5,1," Airbrush A
"
PI 9230 DATA 2,6,1," Paint P
"
ID 9240 '
GP 9250 DATA 3,0,1,"Preferences
"
HG 9260 DATA 3,1,2," 320 x 200
"
OI 9270 DATA 3,2,1," 640 x 200
"
KO 9280 DATA 3,3,0," 320x200 PCj
r"
DB 9290 DATA 3,4,2," cyn/mag/wht
"
JI 9300 DATA 3,5,1," red/grn/yel
"

```



```

JN 9310 DATA 3,6,1," Bkgd color
B"
ED 9320 DATA 3,7,1," Keyboard
K"
IB 9330 DATA 3,8,1," Calibrate
J"
OD 9340 DATA ,,,X
HM 10000 'Menu package runs from
lines 10000-29999
MC 10010 'Graphics adaptor requi
red (works with a wide
variety of modes)
FN 10020 'This entry point is fo
r defining an individua
l menu entry
OM 10030 '(equivalent to MENU me
nuid,menuitem,flag,menu
string$ in Mac/Amiga BA
SIC)
HF 10040 'Pass variables MNID,MN
IT,MFLAG, and MNAME$
MH 10050 'MNID=which menu
JH 10060 'MNIT=which item (or 0
to define menu title)
PG 10070 'MFLAG=0 (ghosted), 1 (
normal), 2 (checked)
OE 10080 'MNSTR$=name of menu or
menu item
FN 10090 'You can also fill the
MENUTITLE$( ), MFLAGS( ),
MITEMS( ) arrays direct
ly. Set Topid to # of
last menu, and call MEN
U_REFRESH to update oth
er arrays
FC 10100 'include the DIM statem
ents following the MENU
entry point
ID 10110 'If you don't set the v
ariable SWIDTH (screen
width) to 40 or 80, it
defaults to 80
LN 10120 '
LH 10130 '*** MENU ***
LF 10140 '
HK 10150 MAXMENUS=8:MAXITEMS=8 '
maximum # of menus and
menu items
GF 10160 IF NOT MENUINIT THEN DI
M MTITLE$(MAXMENUS,MAXI
TEMS),MFLAGS(MAXMENUS,M
AXITEMS),MITEMS(MAXMENU
S),MSAVE$(800*MAXITEMS+
8),MX(MAXMENUS):TOPID=0
:MENUINIT=-1
JE 10170 IF MNID<1 OR MNID>MAXME
NUS OR MNIT<0 OR MNIT>M
AXITEMS THEN PRINT "ILL
EGAL MENU PARAMETERS":S
TOP
IH 10180 MTITLE$(MNID,MNIT)=MNST
R$:MFLAGS(MNID,MNIT)=M
FLAG
OL 10190 IF MNIT>MITEMS(MNID) TH
EN MITEMS(MNID)=MNIT
BA 10200 IF MNID>TOPID THEN TOPI
D=MNID
IF 10210 RETURN
MA 10220 '
GD 10230 'Next entry point redra
ws menu bar at top of s
creen
NI 10240 '
HH 10250 '*** MENU_REFRESH ***
LL 10260 '
QJ 10270 IF SWIDTH=0 THEN IF XSI
ZE THEN SWIDTH=INT(XSI
ZE/8+.5) ELSE SWIDTH=80
DM 10280 MSG$="" :MX(0)=8:SVX=PO
S(0):SVY=CSRLIN
GL 10290 FOR MI=1 TO TOPID:MX(MI
)=MX(MI-1)+8+LEN(MTITL
E$(MI,0)):8:MSG$=MSG$+"
"+MTITLE$(MI,0):NEXT:MS
G$=MSG$+SPACE$(SWIDTH-L
EN(MSG$))
KA 10300 LOCATE 1,1:GOSUB 13000
'print MSG$ in reverse
video
HC 10310 LOCATE SVY,SVX:RETURN
ML 10320 '
EF 10330 'Print MSG$ in reverse
video
BI 10340 X1=POS(0)*8-8:Y1=CSRLIN
*8-8:PRINT MSG$:X2=X1+
LEN(MSG$)*8-1:IF X2>SW
IDTH*8 THEN X2=SWIDTH*8
-1
LL 10350 GET (X1,Y1)-(X2,Y1+7),Z
TEMP$:PUT (X1,Y1),ZZTE
MP$,PRESET:RETURN
LA 10360 '
CL 10370 ' Following entry point
checks for menu select
ion
OH 10380 ' If a menu item is sele
cted, returns MNID (men
u id) and MNIT (menu it
em)
HN 10390 '
EO 10400 '*** MENU_POLL ***
ME 10410 '
ND 10420 XSAVE=POS(0):YSAVE=CSRL
IN
LP 10430 MNIT=0:MNID=0:GOSUB 200
00 'get "mouse" coordin
ates
BJ 10440 IF MY>7 OR MB=0 THEN RE
TURN 'no menu event
IO 10450 WHILE MB:GOSUB 20000:WE
ND 'wait for button rel
ease
EH 10460 MI=1:WHILE MI<=TOPID AN
D NOT (MX)=MX(MI-1) AND
MX<=MX(MI)):MI=MI+1:WE
ND
EL 10470 IF MI>TOPID THEN RETURN
'no menu selected
OI 10480 MNID=MI 'found which me
nu, but not which item
HJ 10490 IF SNDFX THEN SOUND 100
00,.5
FP 10500 GOSUB 16000:GOSUB 20000
'drop menu, check "mou
se"
KI 10510 SAVDACC=DACC:SAV$=CM$:C
M$="" :IF KEYMODE THEN M
Y=2:NY=MY:DACC=-8 'spee
d up keyboard temporari
ly, to make menu select
ion easier
DN 10520 WHILE MX=MX(MNID-1) AN
D MX<=MX(MNID) AND MB=0
HM 10530 GOSUB 20000 'sets mx,m
y,mb
HD 10540 MI=INT(MY/8):IF MI>MIT
EMS(MNID) THEN GOTO 141
50
AF 10550 IF MI=MNIT OR MFLAGS(M
NID,MI)=0 THEN 14180
IJ 10560 GOSUB 19000 'turn curs
or off during rendering
GC 10570 IF MNIT>0 THEN LOCATE
MNIT+1,INT(MX(MNID-1)/8
+2):PRINT MTITLE$(MNID,
MNIT) 'un-reverse previ
ous item
QA 10580 IF MI>0 AND MI<=MITEMS
(MNID) THEN MNIT=MI:LOC
ATE MNIT+1,INT(MX(MNID-
1)/8)+2:MSG$=MTITLE$(M
NID,MNIT):GOSUB 13000:IF
SNDFX THEN SOUND 20000
,.1 'print MSG$ in reve
rse
OD 10590 IF MI>MITEMS(MNID) THEN
MNIT=0
LL 14180 WEND
AE 14190 IF MX<MX(MNID-1) OR MX>
MX(MNID) THEN MNIT=0 'm
oved away from menu, so
menu item is invalid
GO 14200 IF MNIT THEN GOSUB 15000
'flash selection
LP 14210 GOSUB 17000 'remove men
u
IA 14220 WHILE MB:GOSUB 20000:WE
ND 'wait for button rel
ease
HG 14230 'Delete next line if yo
u want to know if a men
u was selected, even if
no menu item was selec
ted.
HG 14240 IF MNIT=0 THEN MNID=0:IF
F SNDFX THEN SOUND 150,
2:SOUND 50,1 'uh-oh
DG 14250 GOSUB 18000:DACC=SAVDAC
C:CM$=SAV$:LOCATE YSAVE
,XSAVE 'restore main pr
ogram's settings
JB 14260 RETURN
NM 14270 '
CL 14280 'Flash selected menu it
em MNIT
JM 15000 IF MNIT=0 OR HIGHLIGHT=
0 THEN RETURN
FN 15010 MSG$=MTITLE$(MNID,MNIT)
:FOR MI=1 TO HIGHLIGHT:
LOCATE MNIT+1,XP:GOSUB
13000 'reverse it
ON 15020 IF SNDFX THEN SOUND 100
00+MI*500,.1
HG 15030 LOCATE MNIT+1,XP:PRINT
MSG$ 'unreverse it
BN 15040 NEXT:RETURN
MA 15050 '
CH 15060 'Drop down a menu, give
n MNID. Saves backgrou
nd of image for when me
nu is restored
HD 15070 '*** MENU_DOWN ***
NM 15080 '
KE 16000 WX1=MX(MNID-1):WX2=MX(M
NID):WY1=8:WY2=8+8*MITE
MS(MNID):XP=INT(WX1/8)+
2
JC 16010 GOSUB 19000 'erase curs
or
CL 16020 LOCATE 1,XP-1:PRINT " "
+MTITLE$(MNID,0)
FP 16030 GET (WX1-2,WY1)-(WX2+2,
WY2+2),MSAVE$ 'save men
u area
DG 16040 LINE (WX1-2,WY1-1)-(WX2
+2,WY2+2),,B 'draw bord
er.
MH 16050 LINE (WX1-1,WY1)-(WX2+1
,WY2+1),0,BF 'erase in
side of border
NM 16060 FOR MI=1 TO MITEMS(MNID
)
JO 16070 LOCATE MI+1,XP:PRINT M
TITLE$(MNID,MI)
OL 16080 IF MFLAGS(MNID,MI)=2 T
HEN PSET (WX1,MI*8+5):D
RAW "f2e5"
CA 16090 IF MFLAGS(MNID,MI)=0 T
HEN GET (WX1,MI*8)-(WX1
+LEN(MTITLE$(MNID,MI))*
8+7,MI*8+7),ZZTEMP$:PUT
(WX1,MI*8),ZZTEMP$,PSE
T:PUT (WX1+1,MI*8),ZZTE
MP$
QL 16100 NEXT MI
IO 16110 RETURN
NJ 16120 '
QP 16130 '*** MENU_AWAY ***
NB 16140 '

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