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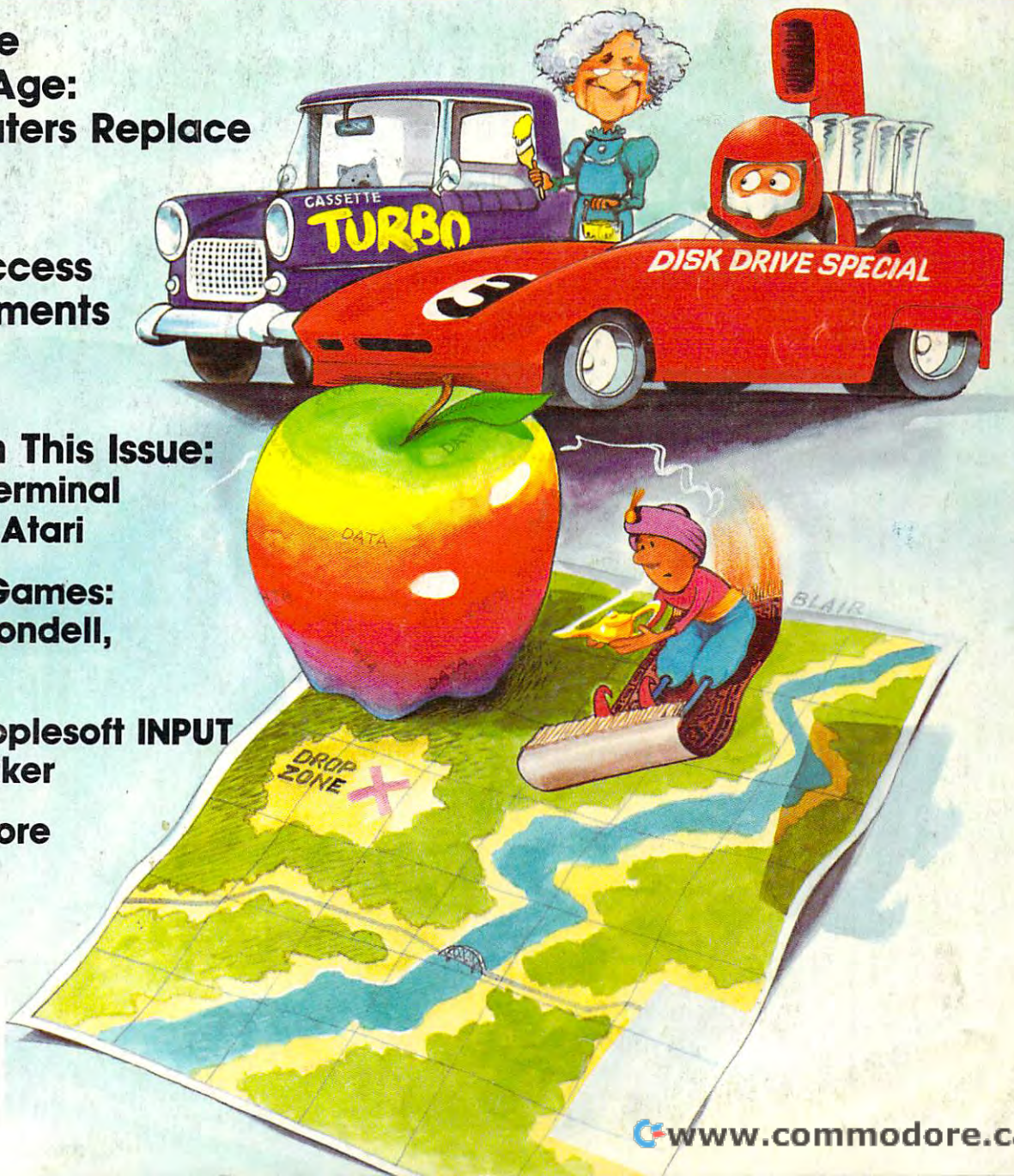

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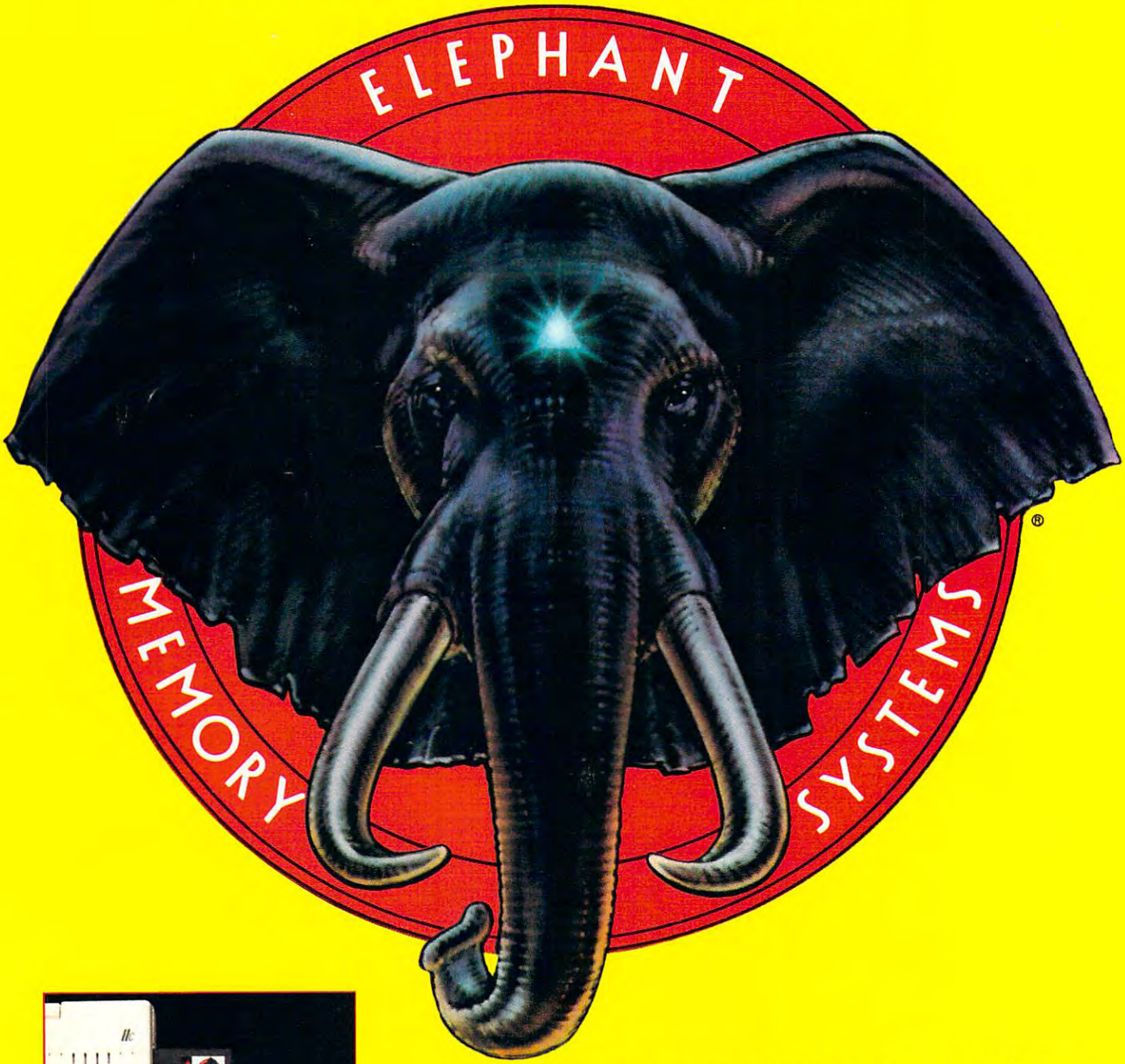

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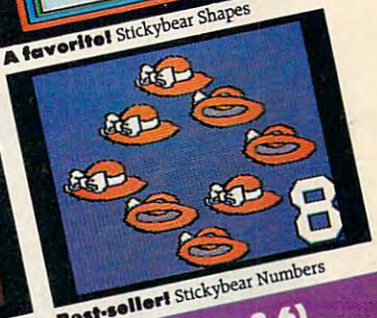

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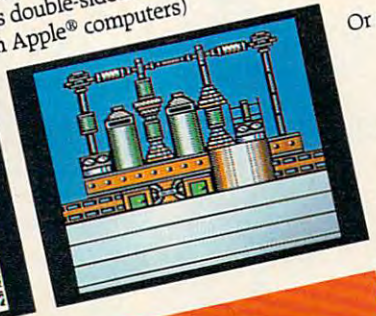

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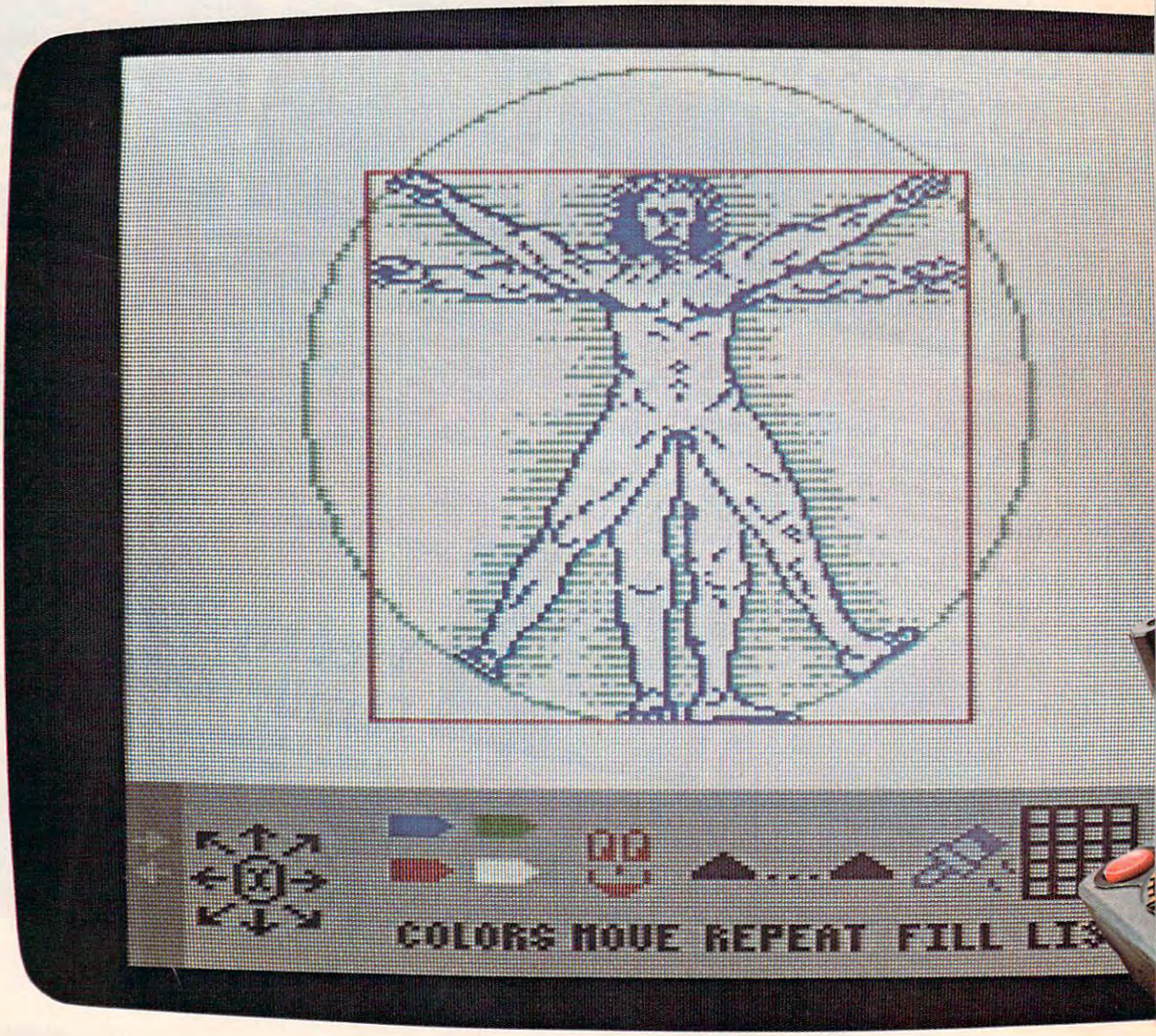

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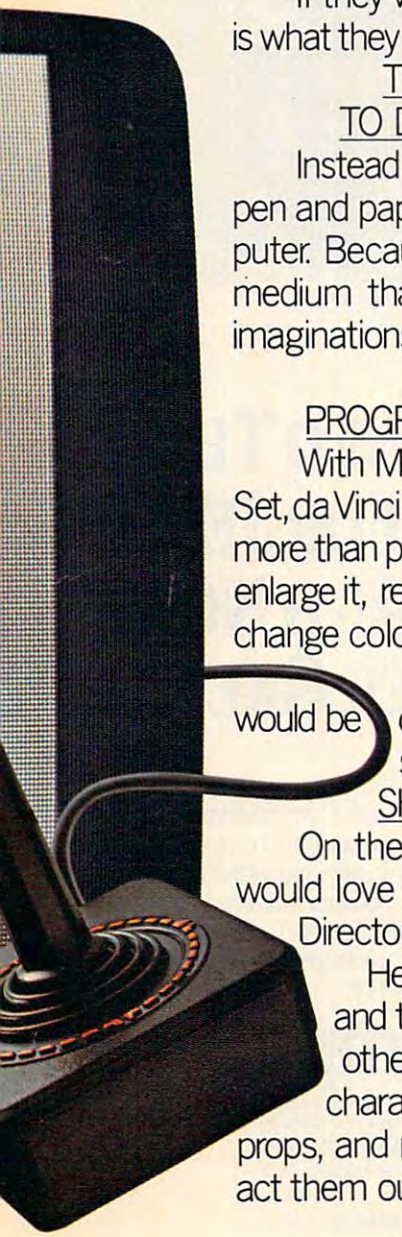

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AP Apple, **Mac** Macintosh, **AT** Atari, **V** VIC-20, **64** Commodore 64, **+4** Commodore Plus/4, **16** Commodore 16, **P** PET/CBM, **TI** Texas Instruments, **PC** IBM PC, **PCjr** IBM PCjr, **CC** Radio Shack Color Computer. *All or several of the above.

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EDITOR'S NOTES

This month's notes are written by Tom R. Halfhill, Editor of COMPUTE!.
—Robert Lock, Editor In Chief

Home Computing: 1985

This issue goes to press in early November, but it will be Christmastime when it hits your doorstep. In a few weeks, soon after New Year's, the Winter Consumer Electronics Show (CES) will get underway in Las Vegas. If you've been a regular reader of COMPUTE! for the past few years, you probably know that the biannual CES is a critically important trade show for the electronics industry. For the home computer industry, this year's Winter CES is particularly important.

To begin with, it's the first CES since the so-called shakeout began in earnest. More than a few companies will be missing from the show floor. Others will have smaller exhibits or will be hanging on for dear life.

More than that, this CES marks a turning point for the home computer industry. We will probably witness the first new home computers introduced for almost five years.

How's that again? Haven't there been dozens of home computers introduced at these shows? Enough to inspire a Defunct Home Computer Edition of *Trivial Pursuit*? Yes, but . . . .

For what's supposed to be an exciting, fast-moving, high-tech industry, the home computer market has been pretty boring. Sure, there have been price wars and rumors of wars, soaring success stories, bankruptcies, ironic turnabouts, and many other wonders. But these were all marketing developments. It's been years since a *really* technologically new home computer was introduced. The Commodore 64, which hit the market with its multicolor sprite graphics and synthesizer chip in August 1982, was arguably the last one. Everything introduced since then has been either a step backward, a step sideways, or a very, very small step forward. And even the Commodore 64 had much in common with the Atari 800, introduced way back in 1979.

Not that we're singling out home computers. In personal computing in general, you could argue that the only real groundbreakers introduced in the past five years were the Osborne 1 (the first transportable) and the TRS-80 Model 100 (the first portable). It's still a little early to determine if the Apple Macintosh will turn out to be revolutionary or evolutionary.

Fortunately, the upcoming CES should unveil the next generation we've been waiting for: home computers that will finally reach beyond 1970s' technology. Both Commodore and Atari are rumored to be preparing incredibly powerful home computers that will even outclass many of the business-oriented personal computers now in use. Sinclair is already starting to sell a computer that offers more raw computing power for $500 than a $4,000 IBM PC-XT. For marketing and other reasons, some of these computers may fail to catch on. But they signal the future. These computers or others like them will dominate the rest of the 1980s.

Could this be the shot in the arm that the home computer industry seems to need?

Perhaps. Today's eight-bit, 64K home computers can already do more than enough for many people. But after several years of marketing revolutions, it'll be a relief to see some true technological advances for a change.

COMPUTE!: 1985

As usual, we'll be on the scene at the Winter CES to bring you a full report. We'd also like to mention some of the other coverage we have planned for you in 1985.

Some valuable software is in the works—and it's free for the typing. In this issue, among other things, you'll notice "TurboTape," a deceptively simple utility which makes Commodore 64 and VIC-20 tapes load as fast as disks (really), and "JTERM," a quality terminal program for Atari computers. But that's just the beginning.

Next month, 64 and VIC users can look forward to "Plus/Term," a topnotch terminal program written mainly in machine language. It even allows uploading and downloading and has 80-column capability. Some great games are scheduled, too, including "Acrobat" for Commodore and Atari computers and the all-ML "Rebound!" for the IBM.

But our most exciting announcement is the upcoming *SpeedScript 3.0* series. Some Commodore readers are familiar with *SpeedScript*, the all-ML word processor we published last year for the VIC and 64 in our sister magazine, COMPUTE!'s GAZETTE. To put it mildly, it was the most popular program ever published by COMPUTE! Publications.

Starting in early 1985, we'll debut *SpeedScript 3.0*, a new and improved version. *SpeedScript 3.0* will be published for the Commodore 64, VIC-20, Atari, and Apple II-series computers. Each version will be written entirely in machine language with special features optimized for each computer. And each version will be yours for the price of a single issue of COMPUTE!.

For various computers, we're also working on a Tiny BASIC Compiler that will significantly speed up your BASIC programs, a utility that lets you create your own animated cartoons, and much, much more.

We hope you'll join us in 1985 for what promises to be an exciting year for home computing and COMPUTE!.

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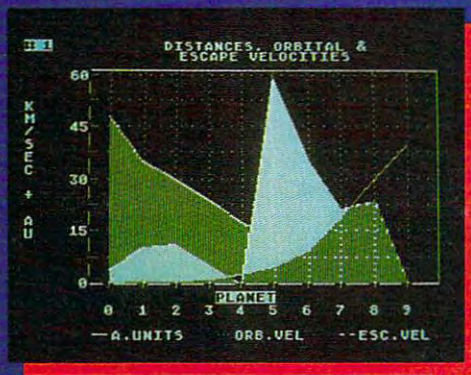

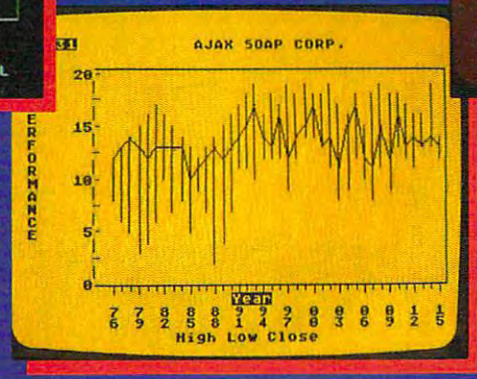

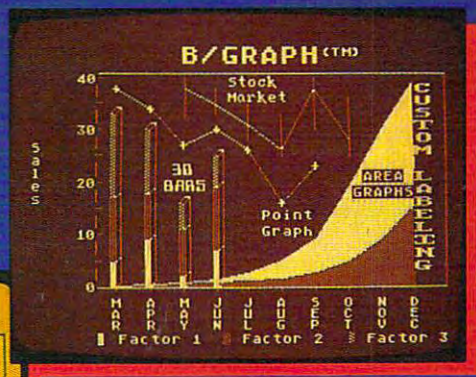

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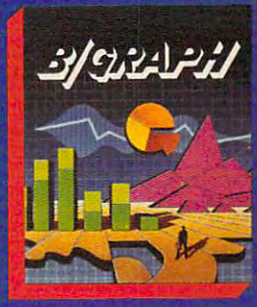

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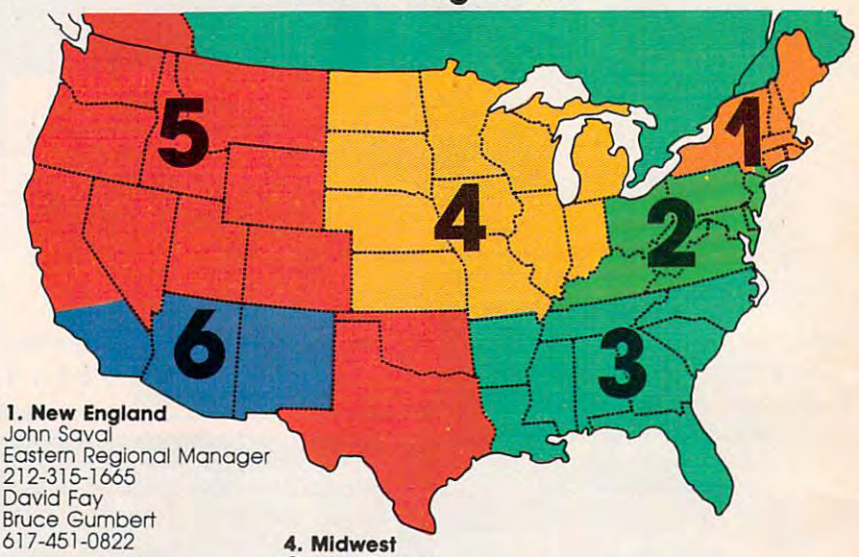

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GREAT NEWS FOR OWNERS OF COMMODORE, APPLE, & ATARI COMPUTERS!

Most printers don't work with Commodore or Atari. And to get one that does, costs too much. That's why the engineers at Blue Chip designed a new personal printer called the M120/10. If you own a computer read on:
Of the ten high speed dot matrix printers most often used with Commodore, Apple, and Atari, none is less expensive than the Blue Chip M120/10. Or more powerful.

Fully equipped, it's about $50 less expensive than a comparable, yet much slower Commodore printer. And in the vicinity of $300 less than an Epson* set-up to work with a Commodore.

Despite its low price, the Blue Chip M120/10 is not a stripped down, bargain basement printer.

In fact, when you judge it by the same stringent standards computer professionals use—by weighing total performance against cost—it's difficult to find a printer that compares to the Blue Chip M120/10.

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READERS' FEEDBACK

The Editors and Readers of COMPUTE!

Keep It On The Ground

I own an Apple II Plus with a three-prong power plug. My house has only the older two-prong outlets. Is it safe to use a three-prong to two-prong adapter, or should I use a spike protector?

Ralph Pepe

Although using a two-prong adapter on a grounded, three-prong plug is defeating a potentially valuable safety feature, many people who—like you—have only the older outlets use them without incident. Adding a spike protector may defend your computer against voltage transients and surges, but it will not provide additional protection against shock hazard in the event of a short circuit, which is the purpose of the grounded prong on the plug.

One alternative is to attach the ground wire provided on some two-prong adapters to the faceplate screw in the center of the outlet. Before you count on this, make sure the outlet box itself is grounded. In some older homes, this may not be the case. To insure safety, it may be necessary to run a separate line for grounding. Contact a qualified electrician.

One additional note: A water pipe may not be a good ground, especially if a water meter is attached in-line in your basement. The meter may contain plastic pipe, insulating the house side from ground.

Atari Player/Missile Graphics

I have an Atari 600XL and would like to know what player/missile graphics are and how they work.

Ronald Mickle

Player/missile graphics *is the Atari term for* sprite graphics *as found on the Commodore 64, TI-99/4A, and Coleco Adam computers. Player/missile or sprite graphics is a built-in hardware feature designed to make it easier for programmers to create and move shapes on the screen quickly and smoothly.*

First, some background. There are four ways to achieve animation on computers: character graphics, bitmapped graphics, screen flipping, and sprite graphics. Character graphics is the simplest method; sprite graphics (including player/missile graphics) is the most advanced.

Practically all computers can use character graphics. Basically you just print a character on the screen, erase it, then print it again at the next position, so the character appears to move across the screen. On some computers you can redesign the character into any shape you want, so the letter A can become a spaceship or an alien creature. Character graphics are relatively easy to program, even in BASIC. But there are two drawbacks. Because the object is moving by one character position at a time, the animation looks rough and jerky. Plus, the moving character erases any other characters it passes over, unless your program reprints the erased character in its original position.

Another approach is bitmapped graphics, the most common technique used on computers like the Apple and IBM. Images are drawn on the screen (mapped) by copying patterns of bits stored in RAM. To move an object, a program must move the pattern of bits through memory. This technique is much more difficult than character graphics. In fact, it's virtually impossible without using machine language. The program must keep track of the current address of the bit pattern, erase the pattern, calculate the new addresses for the pattern, and finally recreate the pattern at the new addresses. Although the animation is smooth, so many calculations are required that you're usually limited to moving a relatively small number of objects.

With screen flipping, you draw a series of screens, each slightly different from the previous one, and store them all in memory. By instantly flipping between the screens, you simulate animation in the same way a cartoonist does with a sequence of frames or cells. The problem with screen flipping is that it requires vast amounts of memory. Also, some computers don't have built-in provisions for instantly flipping screens.

Sprite graphics are similar to bitmapped graphics, except the computer does most of the tedious

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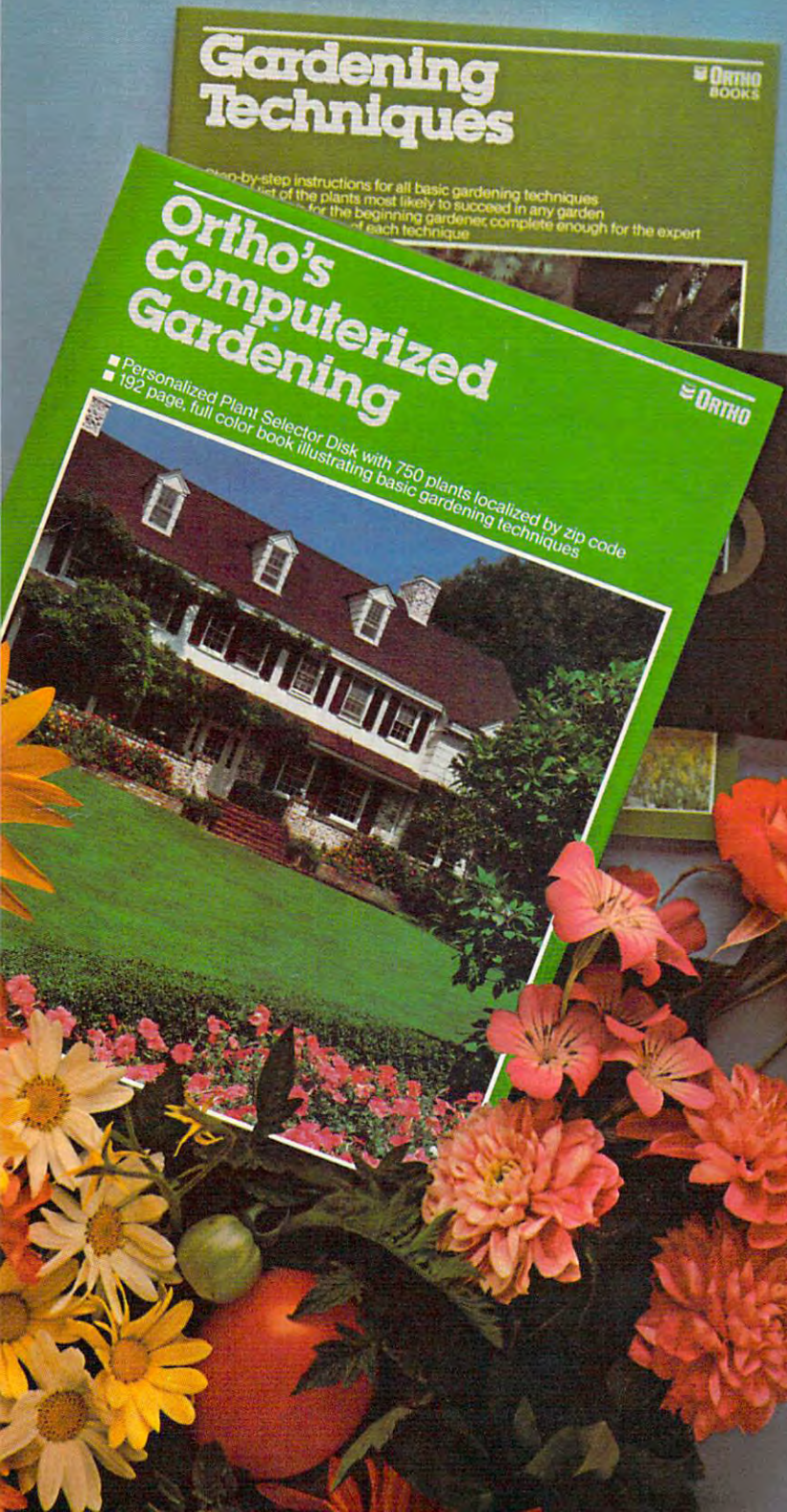

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calculating for you. In addition, the image of the sprite pattern is superimposed on the video output of the computer, so the pattern is not actually moved through memory. That means a sprite can seem to move above or beneath other screen images—including other sprites—without disturbing them. What's more, the computer knows when a sprite is touching another object. That's important if you're writing a game, because your program can keep track of these collisions and respond accordingly.

You probably won't find any mention of Atari player/missile graphics in the manuals which came with your 600XL. In fact, player/missile graphics was an undocumented feature when the Atari computer first hit the market in 1979–1980. The first article revealing its existence—written by Atari programmer Chris Crawford—appeared in the January 1981 issue of COMPUTE!. *This issue is out of print, but the article is reprinted in* COMPUTE!'s First Book of Atari. *More detailed information on programming player/missile graphics can be found in* COMPUTE!'s First Book of Atari Graphics *and* COMPUTE!'s Second Book of Atari Graphics.

Future Of The VIC

Will Commodore discontinue the VIC-20? And if so, will the company still make software and hardware for the VIC-20s that are out there?

Paul Fowlie

The Commodore 16, announced in January 1984 and first marketed in October, replaces the VIC-20 as Commodore's entry-level home computer. By last June Commodore had stopped producing the VIC. Although more than two million VICs have been sold worldwide, Commodore obviously feels that the $100 Commodore 16 is a better value for beginners and also helps promote the company's marketing strategy. The Commodore 16 is essentially a Plus/4 with 16K instead of 64K RAM and no built-in software or modem port. It is upwardly compatible with the Plus/4, not true with the VIC and the Commodore 64.

As early as the Winter Consumer Electronics Show (CES) in January 1984, it was apparent that fewer companies were producing software for the VIC. There was even less software at the Summer CES in June. This doesn't mean that everyone is abandoning the VIC overnight. The installed base is still very large. But it will become increasingly difficult to find new products aimed at the VIC-20—and that includes products from Commodore. Because the peripherals are largely compatible, many people have upgraded from the VIC to a 64.

One high-ranking Commodore executive told us that if someone wants to buy a hundred thousand VIC-20s, Commodore could sell them. In other words, there are plenty of VICs still around, but the company is not planning to market them in competition with its own new machines. The same official told us, however, that owners of VICs who need help will be supported by Commodore. "We have spares. We have everything. If people have a problem, we will fix it, repair it—no problem."

COMPUTE! *will continue covering the VIC-20 as long as there is sufficient reader demand. There are still many thousands of VIC users among our readers.*

TI Peripherals

I noticed an inquiry in "Readers' Feedback" in the October 1984 issue of COMPUTE! regarding the availability of the Peripheral Expansion System and its associated plug-ins. Texas Instruments has a toll-free number (1-800-842-2737) for TI users with questions about product availability.

TI also has a list of third-party suppliers available. Some of them even make products that TI never got around to offering.

Randall L. Powell

Thanks for the information. We received numerous letters informing us of various third-party suppliers for TI peripherals, including alternate expansion systems, peripherals that work without any expansion system, and even leftover supplies of TI's own expansion box and cards. These are available mainly through mail-order outlets. In most areas it has become impossible to find any peripherals for the TI-99/4A in local stores.

Tamea Rector, advertising/marketing director of Tenex Computer Express, also sent us a copy of the company's 48-page catalog of TI products. To get a free copy, write to:

Tenex Computer Express
P.O. Box 6578
South Bend, IN 46660

Cool Computing

I own a Commodore 64, and when I use it for a long time—mostly in the summer—funny-looking waves appear on the screen and scroll downward. After that, the waves get bigger and bigger, the computer starts printing characters all over the screen, and the keyboard won't operate. Is there any way to stop these annoying waves?

Paul Mantsch

It sounds like a classic case of overheating. Computer chips are designed to operate within a specified range of temperatures. For example, the VIC-II video chip in your 64 is rated to function normally between 32° and 158°F (0°–70°C). At the high end of their rated ranges, chips can start acting

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strangely, and if a particular chip isn't quite up to specs, the bizarre behavior can begin to show up at lower temperatures. While it's unlikely that your room temperature is reaching 150°, it could get that hot inside the computer's plastic housing, since all chips emit heat as they operate.

There are a couple of possible solutions. First, make sure the ventilation slots on the underside of the computer and the expansion slots on the back panel aren't obstructed. If that's no problem, perhaps you can set up a table fan to keep air circulating over the computer on hot summer days (it'll help keep you cool, too).

Still no results? A more drastic solution is to remove the foil shell which covers the circuit boards of newer 64s. The foil is designed to reduce RF (Radio Frequency) interference, but it also traps heat. Carefully remove the foil shell and see if this solves the problem. (Unfortunately, removing the foil voids your warranty and may also cause more video interference with nearby TV sets.)

Another alternative is to have your computer checked out by a qualified service technician. Perhaps a slightly defective chip is responsible for the overheating.

Named Subroutines In Microsoft BASIC

Microsoft BASIC supports named subroutines. Sort of. The following construction is legal:

```
GOSUB1200, EVALUATE:IF X=0 THEN PRINT
"WHOOPEE!!"
```

After executing the GOSUB, BASIC returns to the end of the GOSUB line number and looks for the next colon or the beginning of a line. All else is ignored.

This is more useful than a REM, since you can place additional statements on the same line and it saves a byte of memory. It works on the Commodore PET, 64, and VIC computers.

Bill Baldock

Thanks for the tip. This may also work with other machines using Microsoft BASIC, but try it out before embedding it in a crucial program.

Storing Text On Disk

Can a disk drive store text by page?

John B. Gentilucci

Disk files can contain any information you want. However, trying to store a text file by pages would be a time-consuming and inefficient use of disk space. Most word processors allow you to set up limits for page size and also will automatically paginate the printout. You'll find it much easier to store files by chapter or subheadings, and let your computer keep track of the pages when printing the text. This way you'll also be able to make revisions without restructuring your files because of a change in page sizes.

Reading TI Joysticks

I built the joystick adapter presented in "Readers' Feedback" of the August 1983 issue for my TI-99/4A and revised it as suggested in a later issue. I have several questions about the use of joysticks with the TI. First, how do you detect when the fire buttons are being pressed? And second, how do you achieve simultaneous joystick movement?

Matt Phillips

The fire buttons are detected with the CALL KEY statement on the TI. The format is:

```
CALL KEY(unit,key,status)
```

where unit is 1 or 2 for the joystick number. When a fire button is pressed, KEY takes on a value of 18. Ordinarily the key value is 0.

You can also detect firing with the STATUS variable. The STATUS variable can have a value of 0, −1, or +1. STATUS is 0 if the fire button is not pressed, −1 if the fire button is still being pressed since the last CALL KEY, and +1 if the fire button was not pressed at the last CALL KEY, but is presently being pressed.

There's no such thing as true simultaneous joystick movement on the TI or any other computer. Instead, you create the illusion of simultaneity by alternately checking the joysticks very quickly. The following sample program demonstrates one method of doing this and also illustrates use of the fire button. This program lets you move two figures around the screen with the joysticks. Joystick 1 moves a stick man figure, while joystick 2 moves a ball-shaped figure. Pressing the fire button changes the color of the respective figures.

```
10 REM TWO JOYSTICK DEMO
20 CALL CHAR(47,"1818423C183C4242")
30 CALL CHAR(48,"003C7E7E7E7E7E3C")
40 X(1)=15
50 Y(1)=11
60 Y(2)=11
70 X(2)=17
80 C(1)=13
90 C(2)=14
100 CALL COLOR(2,C(1),1)
110 CALL COLOR(3,C(2),1)
120 CALL CLEAR
130 CALL SCREEN(15)
140 FOR I=1 TO 2
150 CALL JOYST(I,DX,DY)
160 CALL KEY(I,K,S)
170 IF K<>18 THEN 200
180 C(I)=C(I)+1+(C(I)=16)*15
190 CALL COLOR(I+1,C(I),1)
200 CALL HCHAR(Y(I),X(I),32)
210 X(I)=X(I)+DX/4
220 Y(I)=Y(I)-DY/4
```

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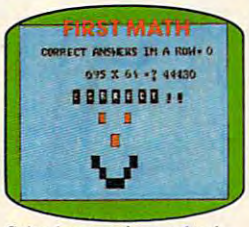

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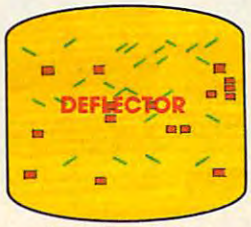

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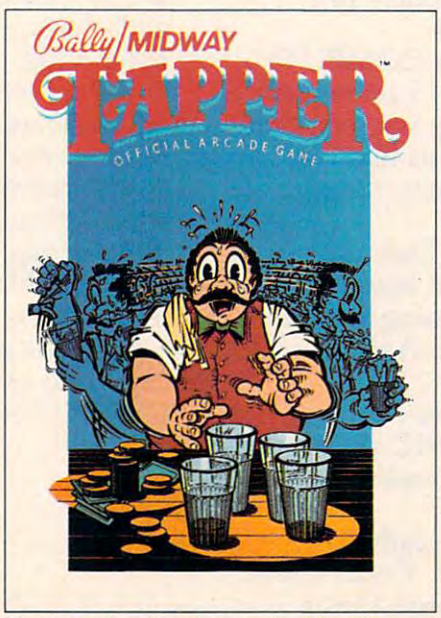
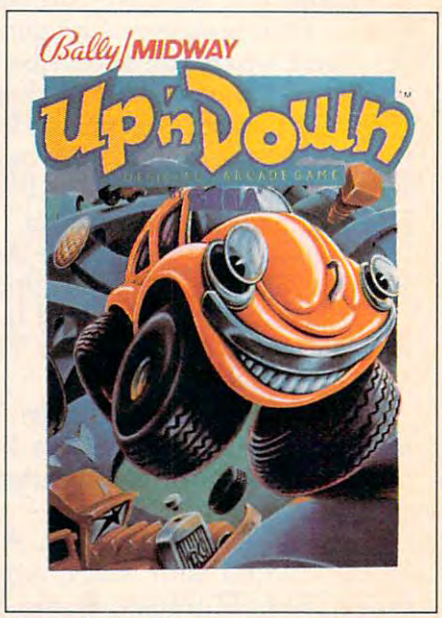


Nominated as Most Innovative Coin-Op Game of 1984 by *Electronic Games* magazine.



#1 Arcade Hit, *Play Meter* Conversions Poll, 8/1/84.

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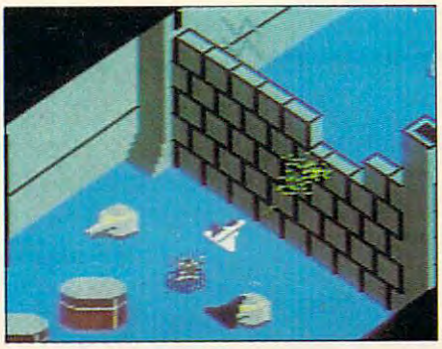

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	SPY HUNTER	TAPPER	UP 'N DOWN	CONGO BONGO	ZAXXON
Atari 2600 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓
Atari 5200 cartridge				✓	✓ NEW
Atari Computers* cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Atari Computers† diskette	✓ NEW	✓ NEW	✓ NEW		✓
ColecoVision & ADAM cartridge	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Commodore 64 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Commodore 64 diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Apple II, IIe, IIc diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
IBM PC diskette	✓ NEW	✓ ** NEW	✓ NEW	✓ ** NEW	✓ ** NEW

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†Atari 800, 600XL, 800XL and 1200XL.
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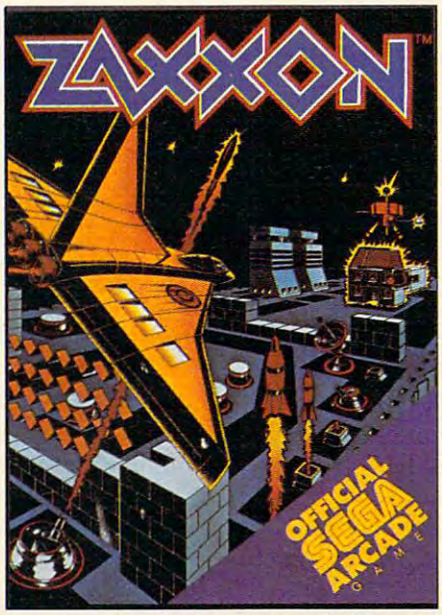
Arcade and Home Smash. Hit #3 on *Billboard* magazine's Top Video Games survey.



One of only ten games ever to make *Electronic Games'* Hall of Fame.

```
230 X(I)=INT(32*((X(I)-1)/32-INT((X
    (I)-1)/32)))+1
240 Y(I)=INT(24*((Y(I)-1)/24-INT((Y
    (I)-1)/24)))+1
250 CALL HCHAR(Y(I),X(I),46+I)
260 NEXT I
270 GOTO 140
```

In this program, each joystick is checked for movement (line 150) and firing (line 160) within a FOR-NEXT loop. If a fire button is being pressed (K equals 18), the program executes a routine to change the color of the appropriate figure (lines 180–190). The old figures are then erased (line 200), new positions calculated (lines 230–240), and new figures drawn (line 250).

80-Column VIC?

I own a VIC-20 which I use with a TV set. I have seen ads for monitors with 40 or 80 columns. If I were to buy one of these monitors, would my VIC-20 display 40 or 80 columns? If so, would it change the screen memory?

Allen Murphy

Unfortunately, changing the display format of your computer isn't that simple. A video monitor or TV displays exactly what the computer tells it to display. The VIC generates a video signal for a picture consisting of 23 rows of characters with 22 characters per row, and 22 characters is what you see no matter whether you send that signal to a TV, a monochrome monitor, or a color monitor. The 40- or 80-column figure you mention is only the manufacturer's rating of the number of characters per row that the monitor is capable of displaying clearly—a measure of the resolution *of the monitor.*

A monitor that gives a good 80-column display should give an exceptionally crisp 22-column display when connected to a VIC. To actually get an 80-column display, you'd have to use one of the 80-column video adapter boards available for the VIC. The adapter would indeed change screen memory, and you'd probably be disappointed to learn that little of your favorite software would work with the 80-column adapter.

80-Column Atari?

I have an Atari 1200XL, a Rana 1000 disk drive, and am using a TV set as a monitor. Would I need to expand the text field to 80 columns to accommodate a letter-quality printer?

Shawn Johnson

This isn't necessary. An 80-column video adapter board is nice to have when you're using a word processor to prepare a document because the screen can show how the document will appear on paper. It's not required, however, because the word processor allows you to specify any width for printing—including 80 or even 132 columns (if your software and printer can handle this). The size and format of the video display does not limit your choice of a printer.

You should also be aware that most TV sets cannot adequately display 80 characters per line; the characters will usually be much too fuzzy to read. You would need to buy a monochrome computer monitor. In addition, we haven't heard of any 80-column adapters for the 1200XL, and it's not likely that any will be sold. Unlike other Atari computers, including the 600XL and 800XL, the 1200XL has no expansion slot.

BASIC To Machine Language

I have a VIC and am currently learning machine language. How can I pass BASIC variables to an ML subroutine?

David P. Ballin

One of the easiest ways to transfer numbers between BASIC and machine language is to store them in memory. Safe memory locations can be used like post office boxes—BASIC can POKE the mail into the boxes, and machine language can pick it up, or vice versa. Here's an example:
In BASIC:

```
300 A=57
310 POKE 251,A
320 SYS 4096
```

In machine language:

```
$1000 CLC
$1001 LDA $FB ;get the value POKEd into 251
```

Of course, this assumes that location 251 is unused for anything else. Now, here's the reverse (transferring data back to BASIC):
In machine language:

```
$1C49 STA $FB ;store the accumulator value into location 251 ($FB)
$1C4B RTS
```

In BASIC:

```
500 A=PEEK(251)
```

With a single POKE you can transfer values in the range of 0 to 255 back and forth. If you want to transfer values larger than 255, use the following formula (where N is the number to be stored):

```
NN=INT(N/256):POKE byte1,N-(NN*256):POKE byte2,NN
```

This method breaks the value of N into two bytes. The value in memory location byte 1 is the remainder after the integer division of N by 256. The quotient is placed in the following memory location, byte2. The bytes are stored low (least significant) byte first, then high (most significant) byte, a 6502 standard for two-byte numbers. Some good areas for temporary data storage on the VIC

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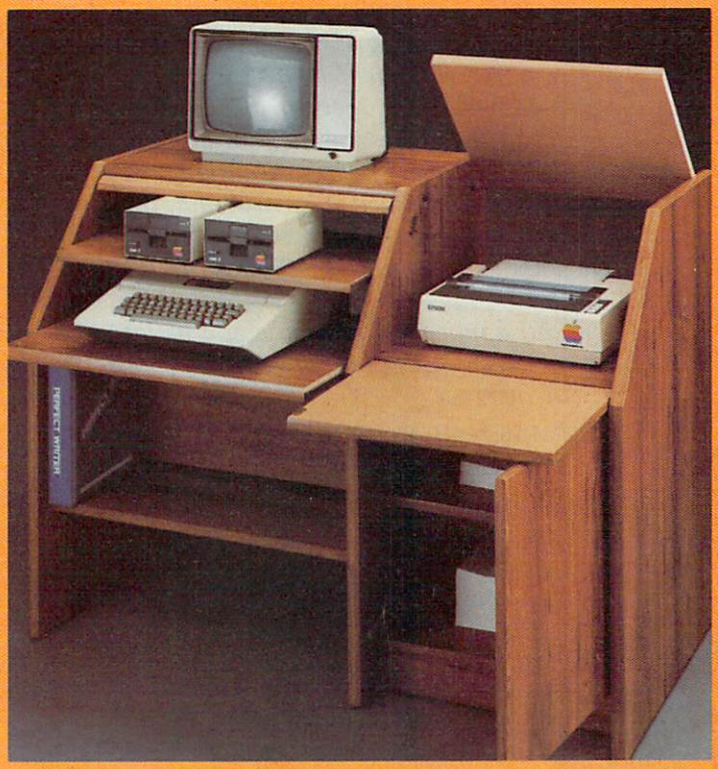

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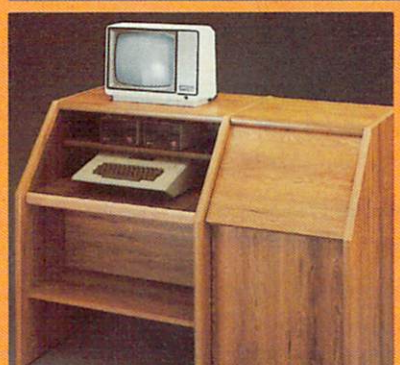

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Behind the lower door are a top shelf for paper, feeding the printer, and a bottom shelf to receive printer copy as well as additional storage.

Stand fits same computers as the CS-1632 as well as the Apple I and II, IBM-PC, Franklin and many others.

The cabinet dimensions overall: 39-1/2" high x 49" wide x 27" deep.

Keyboard shelf 20" deep x 26" wide. Disk drive shelf 15-34" deep x 26" wide. Top shelf for monitor 17" deep x 27" wide. Printer shelf 22" deep x 19" wide.

HYTEC SYSTEMS

are locations 679–767, 828–1019 (the cassette buffer), and 251–254 (free zero page locations). The same locations are available on the Commodore 64, plus 4K of free RAM at 49152–53247.

You can also load the accumulator, X, and Y registers from BASIC on a VIC or 64 with the POKE statement. The accumulator is stored in 780 ($30C), the X register in 781 ($30D), the Y register in 782 ($30E), and the status register, P, in 783 ($30F).

Before a SYS statement in BASIC passes control to the SYS address, each register is loaded with the value found in the corresponding storage address. After the ML program finishes execution and returns to BASIC with the RTS instruction, the new value of each register is stored in the appropriate location. This is true only of SYS, not the USR function.

A useful application of this would be formatting the screen by using Kernal routines from BASIC. For instance:

```
POKE781,10:POKE782,5:POKE783,0:SYS65520:PRINT
"HELLO"
```

This prints "HELLO" at row 10, column 5. This line will work on both the VIC and 64, as the PLOT routine is entered via the Kernal jump table.

Another, more tricky way to pass a single value back and forth between BASIC and ML is with the USR function. Like any function, it looks for a value in parentheses. This value is passed to the machine language program. And like any function, it returns a value. A=USR(B) would pass the value of B to the machine language program, which can then pass back a value to be stored into A.

For more information, see Mapping the VIC, Mapping the Commodore 64, *or any of the machine language books from COMPUTE! Books.*

TI CALL Destroy?

I own a TI-99/4A computer and have been using the CALL statement to do various tasks. I have heard that certain commands can burn out chips. Is this true? What can I do to avoid damaging my computer?

Robert Brower

We've heard many stories about how various programs or copyright protection schemes are able to destroy monitors, disk drives, and computers by some devious means. It's true that on some late-model Commodore PETs, a certain POKE would sometimes cause an interface chip to race out of control and out of sync, burning itself out. But this small possibility was highly exaggerated. Likewise, it was once said that cranking up the volume too high in Atari BASIC SOUND statements would burn out the sound chip, but our tests failed to validate this rumor.

As a general rule, no program or command can permanently alter or damage your computer. The worst that can happen is a lockup or system crash: The computer refuses to acknowledge any command from the keyboard. To regain control, you must turn off the computer, then turn it back on again. Of course, any program stored in memory is gone. So if there's a chance the program you're typing in or working on could lock up the computer, be sure to save it before running it.

Atari BASIC AUTORUN

How can I automatically run a BASIC program?

David Lanese

The Atari Disk Operating System (DOS 2.0 and 3.0) has a feature that lets you automatically load and run a machine language program from disk whenever the computer is turned on. This feature can be adapted to run a program written in BASIC.

Here's a short BASIC loader for a machine language program which tells the system on powerup to run a BASIC program named AUTORUN.BAS from disk:

```
CE 10  OPEN #4,8,0,"D1:AUTORUN.SYS"
BA 20  FOR I=1 TO 94
MA 30  READ A
CB 40  PUT #4,A
ON 50  NEXT I
DD 60  CLOSE #4
DO 70  END
AB 80  DATA 255,255,0,6,81,6,216,24
       ,173,48,2,105,4,133,204,173,
       49,2,105,0,133,205,24,160,0,
       177,204,105,162,133,212
OO 90  DATA 160,1,177,204,105,0,133
       ,213,160,32,185,49,6,145,212
       ,136,208,248,169,13,141,74,3
       ,96,0,48,47,43,37,0,24
NI 100 DATA 20,18,12,17,18,26,50,5
       3,46,0,2,36,17,26,33,53,52,
       47,50,53,46,14,34,33,51,2,2
       26,2,227,2,0,6
```

This program, written by Michael E. Hepner, originally appeared in the January 1984 issue of COMPUTE!. *It creates a machine language program on your disk with the filename AUTORUN.SYS. When the computer is turned on, the operating system loads DOS from disk, then runs AUTORUN.SYS if it finds such a program on the disk.*

To automatically load and run your BASIC program, store it on the same disk with the filename AUTORUN.BAS. Of course, only one program per disk can be automatically run using this method.

Another approach using the program above would be to enter the Atari version of "Super Directory" (COMPUTE!, *April 1984) and save it as AUTORUN.BAS *on each disk. Then every time you turn on your computer, the boot process ends with Super Directory running and a directory of that disk*

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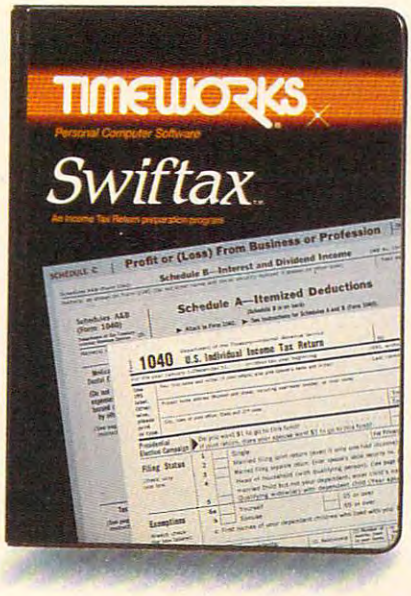

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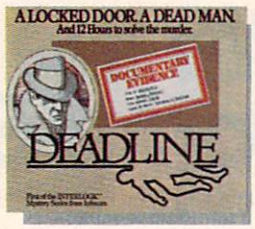

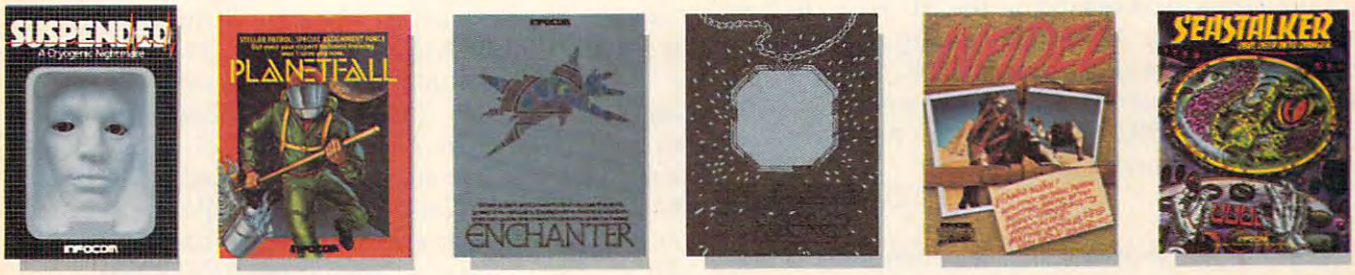

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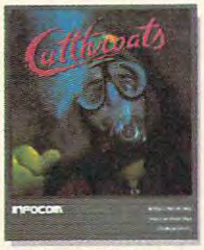

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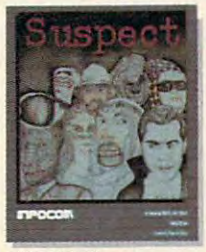

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displayed on your screen. Or you could have the program AUTORUN.BAS chain to any other program you desire.

TI Memory Expansion

I have a question regarding the TI: Why do I always see ads for 32K RAM memory expansion, but never anything more than 32K? Is there any way I could construct a memory expansion with 48K for my TI-99/4A, or does the microprocessor just ignore any extra memory?

David Edwards

Like most microprocessors of its generation, the TI-9900 microprocessor in the TI-99/4 and 99/4A can only address directly a maximum of 64K (65536) memory locations. These locations can't all be used for RAM, since the microprocessor must also have some permanent memory (ROM) to hold its operating system. Still more addresses are required to allow the microprocessor to communicate with the various input/output support chips and peripherals. And the ROM for the built-in BASIC language occupies another large chunk of address space. When all these features are added, only 32K of address space remains free for future memory expansion, which is why no expanders larger than 32K are available.

Note that the 16K of RAM built into the TI-99 console is not directly connected to the microprocessor, and doesn't occupy any of its address space. That memory is part of the VDP (Video Display Processor) chip's address space, and the microprocessor can access it only indirectly, via the VDP. TI's built-in BASIC is designed to access only this VDP memory, which is one of the reasons it's comparatively slow. It also explains why standard TI BASIC can't use any expansion memory connected to the microprocessor. (VDP memory can't be expanded beyond the 16K provided.) To make use of the 32K expanded memory, you need TI Extended BASIC *or some other command module.*

Apple & Atari ML Monitor

I use both an Atari 800XL and an Apple IIe. It's very simple to enter the monitor on the Apple: Just enter CALL −151. Is there a simple method like this on the Atari?

James J. Brennan, Jr.

No, because the Atari does not have a built-in machine language monitor. Few personal computers designed since the late 1970s include ML monitors, since manufacturers feel that only a minority of owners are interested in ML programming and monitors take up valuable ROM space. The Apple IIe and IIc retain an ML monitor because they are enhanced versions of the Apple II, originally designed as a kit-built computer for hobbyists in 1976. The Commodore PET, introduced in 1977, also incorporates an ML monitor. But since then, the only computers introduced for the mass market with a built-in monitor have been the Commodore Plus/4 and 16. Most manufacturers today prefer to eliminate the monitor and use the extra ROM space for a more powerful BASIC or operating system.

Excellent monitors are available separately for the Atari, however. The Atari Assembler Editor *cartridge, Optimized Systems Software's* EASMD *and* MAC/65, *and several other commercial assemblers include monitors.* The Monkey Wrench, *by Eastern House Software, adds several commands to BASIC and includes a Commodore-style monitor that you can call from BASIC. However, it works only in the right cartridge slot of an Atari 800, not with the 800XL.*

POKEing Around

I'm a new ML programmer and would like to know what are the numbers you POKE into memory when entering the machine language parts of some BASIC programs?

Kenny Sumrall

Those numbers are the actual object code (the opcodes and operands) of the machine language program. Each machine language instruction has a value (opcode). This value is what the processor sees and executes.

After you write and debug your machine language program, you can use a utility program to turn the object code into a series of DATA statements. The BASIC program POKEs the numbers into memory, and they can then be executed with a SYS, USR, or CALL statement.

VIC Sound

I own a VIC-20 and use a video monitor instead of a TV. However, the monitor is video only, so I can't hear the sounds in my programs. My monitor cable has an audio output plug, but no one—not even Commodore—has been able to give me exact instructions on how to interface for audio. I have been told I need a high-impedance audio amplifier, but have been given no definition of what that means.

Bob Sterzenbach

If you have a home stereo system, you probably have the high-impedance audio amplifier you need. Simply plug the audio output jack on your monitor cable into the auxiliary input jack of your stereo (use an extension cable if necessary). You might also want to use a Y-adapter, which feeds the single input from the computer into both of your stereo inputs. This should provide superb sound quality. As

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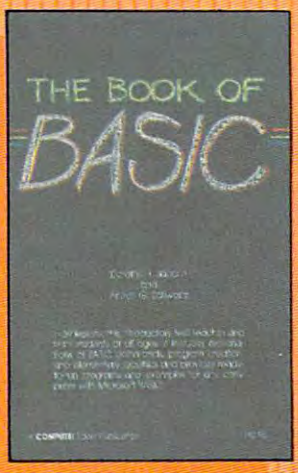

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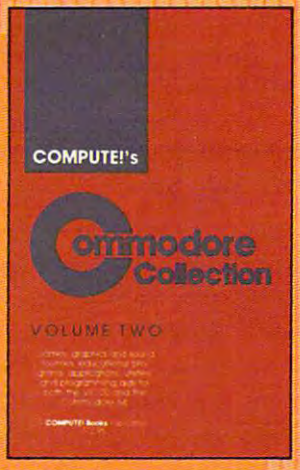

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an alternative, many electronics stores such as Radio Shack sell small battery-powered amplifiers with a built-in speaker. The input jack on the small amplifier may not accept the plug on your monitor cable, so an adapter may be required.

Help For Educators

The Santa Clara County Office of Education has developed a directory of hardware and specifications for over a hundred microcomputer programs that school guidance counselors and administrators might find useful. For more information, contact:

Janey H. Powers
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Thanks for the information.

Apple RAM Cards And Language Cards

I have frequently heard of RAM cards and language cards. What's the difference?

David Chow

These terms usually apply to accessories for Apple II-series computers. A RAM card is a plug-in board with extra Random Access Memory. The RAM can be used as extra memory if the ROM (Read Only Memory) is mapped out. A language card is a RAM card that is used to load a programming language (such as Pascal) on powerup. Instead of residing in ROM, the language is loaded into the RAM in place of the ROM used by BASIC. Not all RAM cards can act as language cards. Similar accessories are available for computers like the Commodore 64 and Atari.

Commodore 64 Randomness

Sometimes using BASIC's random number generator just isn't convenient, especially in machine language. Most ML programmers find other sources for random numbers. Here's a method for generating random numbers in machine language by using voice 3 of the SID Chip. Set the high-byte of the voice 3 frequency control ($D40F, 54287) to 255, and turn on bit 7 of the control register. (This selects the noise waveform.) Now you can read the upper eight bits of the waveform output from oscillator 3 at $D41B (54299) for random numbers between 1 and 255. Here's an example:

```
LDA #$FF      ;load accumulator with 255
STA $D40F     ;store accumulator in high byte of voice 3
LDA $80       ;load accumulator with 128 (binary
                10000000)
STA $D412     ;set bit 7 of voice 3 control register
LDA $D41B     ;load accumulator with oscillator output
```

David Jones

Thanks for the example. To use the voice 3 noise waveform from BASIC, enter:

```
10 POKE 54287,255
20 POKE 54290,128
30 PRINT PEEK(54299)
```

PEEKing 54299 will reveal a number between 1 and 255. You can continue to read this location without setting up the voice again, but you cannot use voice 3 for sound and for random numbers simultaneously—unless you want a high-pitched rushing sound.

Atari VCS To Monitor

How could I connect an Atari VCS videogame machine to a Commodore 1702 monitor?

Mark Pittenger

Unfortunately, there is no easy way, because the Atari VCS has an RF (Radio Frequency) modulated output. That is, the output from the Atari VCS simulates a signal from a TV station so the game machine can be connected directly to the antenna terminals of an ordinary TV set. The video and audio signals are mixed and a carrier signal is added. The RF demodulator inside the TV set breaks down this output into the component parts for sound and video.

A computer monitor such as the Commodore 1701/1702 needs a composite signal*—the video and audio are separated and fed into separate jacks, and no RF element is included.*

Any standard monitor can be used with a device that has a composite output, such as a computer or videocassette recorder. COMPUTE! *uses Commodore, Amdek, and Zenith monitors interchangeably with Commodore, TI, Apple, and Atari computers. We also know of several people who obtain outstanding pictures using computer monitors with VCRs.*

Saving Programs On Tape

If I type in a program from a magazine or book, can I save it on a tape? Are there any restrictions on doing this? Do some programs look for a disk? If so, how can I tell the difference?

David King

You can save any program you type into your computer on tape simply by following the cassette SAVE instructions for your particular brand of computer. However, for various reasons, some programs will run properly only when used with a disk drive. Most programs published in COMPUTE! *offer you a choice of tape or disk storage; whenever one or the other is mandatory, that will be clearly stated in the*

accompanying article.

As you become more familiar with the BASIC of your computer, you'll learn to recognize the commands for disk and tape access. In Commodore programs, look for a device number, the number following a LOAD or SAVE command, or the second number in an OPEN command. The number will be 8 for disk and 1 for tape. On the Atari, the characters D: or D2: before a filename specify disk, and C: is used for tape. IBM BASIC usually defaults to disk for OPEN statements. Almost all programs that use data storage on the Apple require a disk drive. Look for the characters DSK or CS for disk or cassette access on the TI-99/4A.

Commodore Repairs

My Commodore 64 broke down recently, and a service technician said I could send it to Commodore and have it repaired for a fee, even if the warranty had expired. Where should I send it?

Paul Cheng

You can return your 64 (and other Commodore equipment) to Commodore Customer Service at the address below. Commodore will either repair or replace the equipment. Here's a list of standard charges for equipment repair:

VIC-20	**$35**
Commodore 64	**$55**
1541 disk drive	**$85**
1525/1526/801 printer	**$75**
1701/1702 color monitor	**$95**

Send a check or money order and a letter describing the problem you're experiencing to:

Commodore Customer Service
1200 Wilson Drive
West Chester, PA 19380

Commodore recommends that you ship your equipment via UPS, packed carefully in the original box if possible. You may also want to insure it.

Self-Programming Computers

I have a Commodore 64, and recently while running a program I encountered a ?SYNTAX ERROR IN LINE 580 message. When I listed line 580, there was none. When I ran the program again, I got another ?SYNTAX ERROR, but this time in line 13337. When I checked the original listing, there was no line numbered 13337. When I listed 13337, all that was displayed was gibberish. Even worse, when I attempted to delete 13337, the screen went black, a strange sound came out of the speaker, and the keyboard locked up. What happened?

Neal Hatton

You didn't mention what kind of program it was, or where you obtained your listing, but you have encountered one of the more subtle programming bugs, the self-modifying program.

It's sometimes necessary to protect your BASIC program from the operating system of your computer and from the program itself. The program may have overwritten itself by storing sprite data or character data in the middle of the BASIC program area, or variables may have been stored over the program due to a corruption of the pointers to the start of the BASIC array storage area, addresses 47 and 48 ($2F–$30).

When sprite data and redefined character data are POKEd into a program, you must exercise some caution to prevent overwriting areas of the program you need. This is one of the things we check when testing programs for publication. If variables are causing the program to overwrite and crash, it could seem to function normally for a while before the program is corrupted.

That gibberish you saw on the screen when you tried to list the program was caused by your computer attempting to interpret the data it found in memory as a BASIC line, reading the data as tokens. Many strange things can happen when a program is destroyed this way, and it's usually necessary to turn off your computer to regain control from your program's nervous breakdown.

Music in the Computer Age

Richard Mansfield, Senior Editor

Computers are altering every aspect of our lives, but no one likes to be rendered obsolete by a machine—especially artists. Yet, over the past year, a new generation of computerized synthesizers has started to replace some traditional instruments and musicians. You haven't noticed? That's why they're worried.

Is live music dead? Maybe not quite, but it might be dying. You'll probably hear lots of music this week, but it's doubtful that you'll hear any that isn't, in some way, electronically assisted.

If you've ever been in a room while someone was playing a violin, there was nothing between you and the catgut except vibrating air. But such experiences are quite rare these days. If you go to a rock concert, you'll be hearing the music through microphones, amplifiers, and various sound processing devices. Even "live" classical concerts are now miked and amplified.

Also, some apparently live rock music is probably coming from a tape recorder or a sequencer. That means the sounds were played, perfected, and stored weeks ago. The musician onstage presses a playback button and just finger-syncs while his keyboard plays itself.

Breath controllers, drum machines, sequencers, gates, synthesizers, click tracks, samplers, compressors, delays—more and more, music is being made by machines. Some of the sweetest sounds you'll ever hear now come from deep within gray, unfeeling little digital chips.

Are there dangers in the digitization of music? If you're a professional musician, if you've spent your life perfecting your technique on the guitar or violin, the new synthetic music may pose a real threat to your livelihood. The sounds you make can be generated on a keyboard. And a synthesizer can go beyond human abilities: It can play at impossible speeds using impossible fingerings. It never makes mistakes.

Robert Moog, pioneering creator of the Moog Synthesizer, says, "More and more, we see keyboard

instruments replacing guitars. We see the creative juice of electronic drum machines, and we see musicians working with computers on stage, synchronizing whole bunches of instruments."

Music is moving, virtually en masse, into the computer age. Some musicians have stopped practicing scales and are now learning how to *program* their instruments, how to extract beauty from this new technology.

In some ways this shift from people to machines is clearly good for music. It's similar to what happened when Gutenberg invented the printing press. Before his great discovery, every book had to be copied by hand, so few people could read, and fewer still could write. Monks took months making just one copy of the Bible. This obviously had a dampening effect on literature and made many ideas accessible only to the privileged few. After all, the essential value of a book is in its words and ideas, not in the physical nature of the book itself.

Likewise, for most of us, the value of music is in its notes, its beauty, not in the way those notes are reproduced. It can take an instrumentalist months of practice to master a Bach fugue. And when we go to a concert and watch the pianist flying through a torturous piece, isn't it possible that we're responding as much to the player's coordination, his or her physical skills, as to the music itself? Live musical performances have something in common with athletic events. In addition to the qualities of the music, the audience is also paying to witness such things as dexterity and endurance.

The new synthetic music is democratizing this important art form. Until now, the requirements of technique, coordination, and years of practice have prevented most of us from actively making music. We could always hear it, but we certainly couldn't play it.

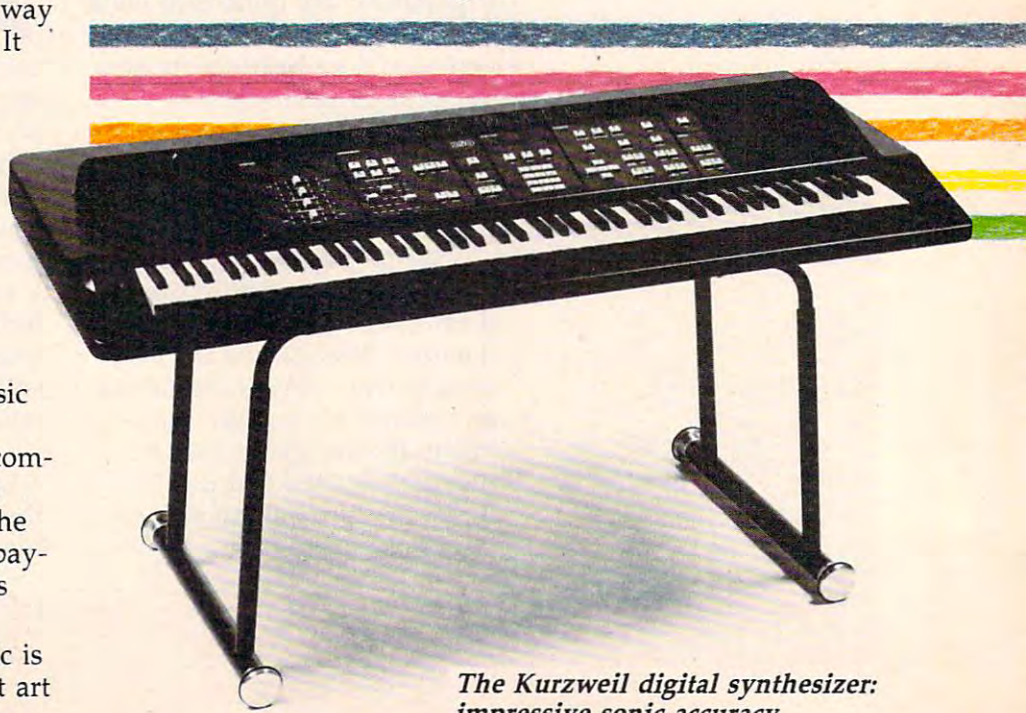
Moog sees some important developments in coming years. "I think more and more now, people are going to be learning to play musical instruments. I'll predict one very specific thing: Within a year or two, there will be electronic pianos that sound every bit as good as professional acoustic pianos, and will play like acoustic pianos, but will be interfaceable with home computers so that you can learn to play the piano with computer-aided instruction programs."

As musical skills become easier to acquire, there is a parallel development in the instruments themselves. Moog and others are now perfecting digital synthesizers that may eventually replace all traditional acoustic instruments, those lovely but costly violins and grand pianos. This kind of synthesizer works by actually recording the acoustic sounds of traditional instruments in digital memory so you can play back the sounds on a keyboard. Sonic accuracy is limited mainly by the quality of the sound system through which these synthesizers are played.

"Technology is such that—and I know this firsthand, this is not a blue-sky prediction—a piano that sounds like a fine grand piano and has a conventional piano keyboard and will be computer-interfaceable, will cost about as much as an inexpensive home spinnet piano," says Moog. "So anyone who can afford to take lessons at home will be interested in this."

Moog is now chief scientist at Kurzweil Music Systems, a company which stunned the music world last year with the introduction of the Kurzweil synthesizer. It looks like a large electric piano, but inside there are no strings, no hammers, probably no wood. Instead, there are rows of computer memory chips holding the digitally recorded sounds of real instruments.

To record these sounds, a musician plays a grand piano, a digital recorder samples the complex sound thousands of



The Kurzweil digital synthesizer: impressive sonic accuracy.

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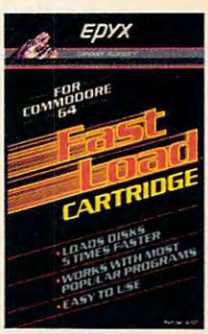

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times a second, a sophisticated pattern-recognition program makes some adjustments, and the resulting series of numbers is burned permanently into Read Only Memory (ROM) chips. Then, when you hit a key on the Kurzweil, the numbers are recalled and it's impossible to tell that you're not listening to a real grand piano. In fact, that's what you *are* listening to: The sound emerges from within a digital chip instead of from a hammer hitting a string, but it *is* the same sound.

A flick of a switch and the Kurzeil becomes a Stratocaster, a timpani, what have you. Any sound can be digitally recorded and played on these synthesizers. For the average person, the only drawback to this amazing device is its current price, $10,795.

The price of computer technology, however, tends to decline quickly. Ensoniq, a Pennsylvania company recently formed by some of the engineers who designed the Commodore 64, has just announced its new Mirage synthesizer. At $1,700, this instrument appears to rival some of the capabilities of the Kurzweil. In some ways, according to engineer Bob Yannes (who designed the SID sound chip inside the Commodore 64), the Mirage exceeds the specifications of the Kurzweil.

The Mirage has a five-octave, velocity (finger pressure) sensitive keyboard. Different tone colors (instruments) can be assigned to different parts of the keyboard. Plus it has all the features of a typical synthesizer: eight-voice polyphony (eight keys can be pressed simultaneously), pitch bend, vibrato, a MIDI (Musical Instrument Digital Interface) jack, an optional foot switch, and more. Any sound can be modified. One hundred different parameters can be manipulated.

Ensoniq's new Mirage has digital sampling and synthesis at a consumer-level price.

But the Mirage goes beyond most inexpensive synthesizers by offering digitally stored sounds, an onboard 330-event *sequencer* (which allows you to record and infinitely overdub sounds in digital memory before recording them on tape), an optional sequencer expansion to 990 events, and a *user-sampling* capability (for recording and synthesizing your own acoustic instrument sounds). There is also a built-in 3.5-inch microfloppy disk drive which can store either sounds or sequences of sounds.

Perhaps the most interesting of the Mirage's features is the user-sampling. You can record up to two seconds of high-quality, 15 kHz sound per sample (up to four seconds with less resolution). You can digitally record a violin, a bassoon, your own voice, barking dogs, or anything else and then play it on the Mirage keyboard. A rear input jack accepts sounds either from a microphone or from a high-level source like a tape recorder.

The value of sampling is in the versatility it brings to your instrument. You can control whatever sounds you wish. Marco Alpert, marketing director for E-Mu Systems, another manufacturer of sampling synthesizers, explains that sampling makes any sound into a pitched instrument. From one tone, a sampling synthesizer can extrapolate all the other tones in the scale over several octaves.

For example, if you sample the sound of a wine glass and feed it into the synthesizer, you'll quickly have octaves of perfectly tuned wine glasses. "Wipe your finger around the top of it and suddenly you've got a glass harmonica under your fingers, perfectly in tune, and much easier to play than any original glass harmonica," says Alpert.

The Ensoniq Mirage, and several other sampling synthesizers, can also be interfaced with personal computers for even more flexibility. You can plug the Mirage into an Apple and shape the sounds visually on the monitor screen. This gives you access to each sound's wave table and the ability to modify it directly.

Mirage designer Yannes claims that Ensoniq was able to keep the Mirage's costs down while including all these sophisticated features by designing a new large-scale integrated microchip to handle much of the work. There's also a 16K operating system which loads from disk (to permit easy future modifications to the program). The synthesizer contains 124K

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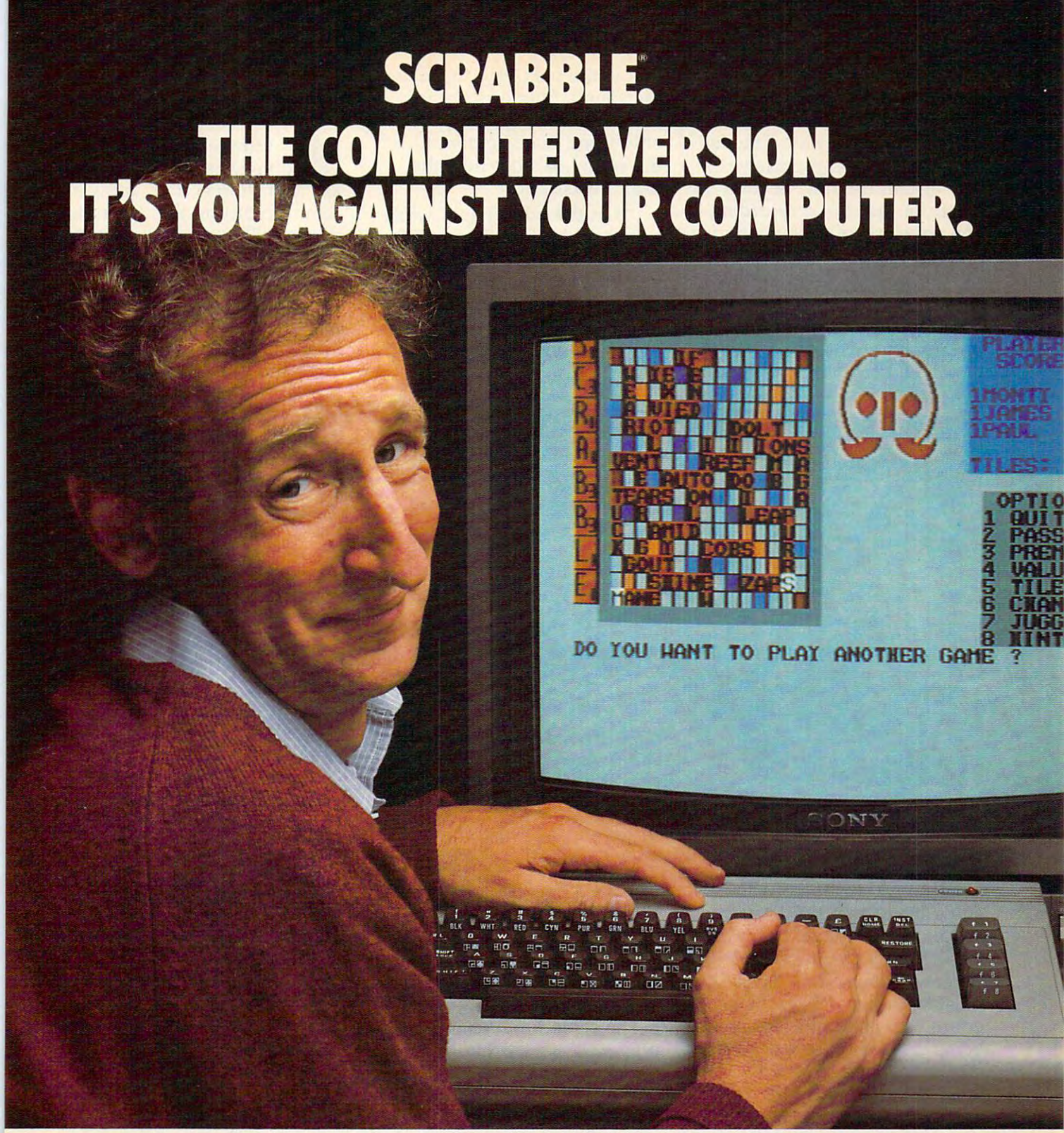

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of sampling storage RAM. Yannes says the Mirage and the Kurzweil both achieve their sounds the same way: The digital sounds repeat themselves if you sustain the note beyond the length of the stored recording. The envelope of each sound is synthesized.

It's clear that this technology is having an impact on musicians everywhere. You hear about musicians' unions threatening boycotts if synthesizers are allowed onstage, drummers being excused from recording sessions because they are less reliable than drum machines, entire orchestral movie scores being created by a single musician on a single machine.

Rocker Todd Rundgren agrees philosophically that it's the musical ends, not the means, that matter. "When someone uses a synthesizer, for instance, to create the sound of an orchestra," Rundgren told COMPUTE!, "we're making some presumption that only because previously it required a large number of people and a lot of catgut and wood instruments and various things like that to create the sound, that that is the only way to create the sound. Sound is sound. From a listener's standpoint, the only thing that's important is the sound. It's not how the sound is created."

On the other hand, while aware of the Luddite rumblings from some musicians, Rundgren senses no fear of synthesizers among his musician friends. "Everybody wants to get their hands on one. Everyone wants to have a Fairlight or something similar—a digital sampling instrument."

The rock band Utopia: (from left) Todd Rundgren, Kasim Sulton, Roger Powell, Willie Wilcox.

Rundgren feels that today's synthesizers are primarily used as tools to assist in composition, not to replace musicians or to offer easy answers to the musical aspirations of the general population. "Nobody who plays a synthesizer claims that they can replace real musicians. A synthesizer puts certain sounds within the grasp of the average musician. Nine times out of ten, it's someone intensely into playing or intensely into composing."

Nevertheless, he foresees a continuing musical revolution based on synthesized sound. "There's no limit to how sophisticated they can get. Things become obsolete every couple of months."

At the center of the controversy, synthesizer manufacturers, too, are wary about predicting that their machines will replace live session musicians. E-Mu Systems' Alpert says it will happen—but only to a degree. "For certain sorts of things, particularly things like string background, I think the day is approaching. It can replace it, but it can replace it, quite honestly, at some reduction in quality. Not so much sound quality, but there is something about a string section full of real players playing the music in realtime that has about it a quality that so far no keyboard instrument can completely emulate."

He feels that synthesized, sampled sounds, while they cannot entirely replace human musicians, do offer an alternative. "It's still not the string section of the London Symphony, even if that's what you've recorded. There's a lot of talk about, well, it's going to put string players out of business. I tend to think it isn't. I tend to think what it does is make high-quality string parts available to people whose choice is not between hiring a string section and buying an emulator; it's between buying an emulator or not having strings at all. If I were a producer and could afford a string section, I'm almost always going to have a string section instead of an emulator. I might work out my parts on an emulator. That's going to give you a pretty fair representation of what it's going to sound like."

Jim Aikin, associate editor of *Keyboard* magazine, finds the new technology both pervasive and powerful. "Synthesizers are having an enormous impact on the music business. They're changing the way people play and think about music. It's not

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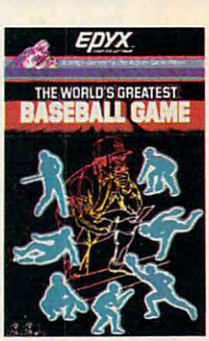

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Strategy Games for the Action-Game Player

PARTY QUIZ

Best kept secret of the season

Computer gamers play PQ for hours

by Tom Benford

What's a PQ, you ask? See—I told you it was the best-kept secret! PQ stands for *Party Quiz,* a computer-trivia game from Suncom Inc.

PQ is a *social* trivia game that allows up to four players to participate simultaneously. Each player uses a controller to respond directly to the trivia questions on the screen.

Recently, a couple of friends, Chuck and Joan, stopped over to visit. I had just received my review copy of *PQ* that afternoon, and I decided to "boot-up" the program and see just how social this game really was. I couldn't have picked a better couple to participate in an "acid test"—Chuck hates board-type trivia games, and Joan absolutely loathes computers, although she likes trivia questions.

Setting up the game was easy. Each set comes with 2700 "general" questions. Suncom will be offering additional question disks covering specific categories including Sports, Entertainment, a "Bible Edition", and General Edition 2 which expands your inventory of general questions. I received the Gommodore/Atari version, although *Party Quiz* is also available for the Apple and will be available soon for the IBM-PC.

After offering my guests beverages and excusing myself to fetch their drinks, I slipped into my study and loaded the game. Returning, I casually asked, "Which country was the first to issue postage stamps and what was the year?" Joan quickly answered, "Great Britain in 1840; now ask me a hard one!" My plan was working; we were on the subject of trivia. I mentioned that I had just received PQ that day, and I was wondering if they'd like to try answering some of the questions asked by the computer. We gravitated into my study.

I handed controllers to Joan and Chuck. My wife, Liz, and I manned the third and fourth. I explained that the computer would display a question,

PQ: First "social" computer entertainment

along with four possible answers which were numbered 1-4. The rules were simple: select the right answer and press the corresponding button on the controller. Joan mumbled something about being a klutz, but she took the controller anyway, eyeing it suspiciously.

After Joan answered the first two questions correctly, I suspected that I was being set-up here; for a "klutz" who hated computers, she was doing very well. She missed on the third question, but Chuck answered correctly. Liz answered the next few questions correctly, and then finally, I got one right. It's not every day I get to look like a dummy in front of my friends!

We spent hours playing Party Quiz and all had a great time playing! The questions covered a myriad of topics, from the color of the Lone Ranger's pants to whether the first footprint on the moon was from a right or left foot.

It had been a special evening, indeed! It's not often that I get the chance to use "non-computing" people for playtesting a new product, and even rarer when I can have my friends actively participate in a computer-based game. We're even considering throwing a PQ Party one of these weekends!

As they were departing for home, Joan mentioned that it was about time she bought a computer for her son to do his schoolwork on. Who's she kidding? Not me—I know she's going to buy one to play Party Quiz on!

As I mentioned at the beginning of this piece, PQ is probably the best-kept secret of this Christmas season, at least for now. If you know someone who has a home computer, and/or is a trivia buff, why not pick up a copy of Party Quiz—it makes a perfect Christmas gift. But you'd better hurry while you can still get one—you know how hard it is to keep things a secret at this time of year!

PQ is available at your favorite local computer retailer. To locate the dealer nearest you, call toll free 1-800-323-8341. (In Illinois 1-312-459-8000).

Tom Benford is Associate Editor of Run Magazine, *Technical Director of* Electronic Games Magazine *and a frequent contributor to* Video *and* In-Cider magazines.

E-Mu Systems offered one of the first sampling synthesizers. This is the more recent Emulator II.

just the synthesizers you're talking about here. You're talking about digital technology in general, which takes the form of a computer code that's dumped onto one channel of the multitrack tape during the recording process, and then everything in the studio is synchronized to that code."

These *click tracks* to which Aikin refers can be relentless in their accuracy. They're like a metronome which triggers every musical instrument in the room except the singer.

Even if synthesizers and computers do start replacing some musicians, many experts draw a distinction between the composition process and the instrumental process. While some concede that it might be possible to replace drummers or pianists, few believe that a machine will soon replace composers. It's easy enough to see that the Gutenberg printing press could replace monks copying manuscripts, but it is more difficult to imagine a machine that could *write* a book or a symphony.

"I think we're ten or fifteen years away from that, minimum," says Aikin, "because the algorithms that are involved in compositional approaches are not simple."

The music press has reported experiments in which melodies were generated randomly via computer, but the order of the notes is deliberately weighted in certain ways so there will be smaller intervals between notes. These and other built-in rules contribute to more aesthetically pleasant melodic lines. Whether or not a computer could achieve sufficient musical sophistication to create tunes that would please humans is open to debate.

But there are exciting prospects in several areas where computerized music can take us beyond what we currently experience at concerts or at the dance.

"We're going to be seeing languages that generate sounds in response to the physical movements of a dancer by directly sensing what the dancer is doing," Aikin says. A synthesizer could create music which reflects the dancer's improvisations. It's this multipurpose nature of computers which Aikin and others see as the greatest contribution of the new technology.

Although the debate continues, most experts do agree that the repercussions of the computerization of music are as yet imperfectly understood, but of enormous import. We haven't heard anything yet. ©

COMPUTE's Author Guide

Most of the following suggestions serve to improve the speed and accuracy of publication. **COMPUTE!** is primarily interested in new and timely articles on VIC, Apple, PET/CBM, Commodore 64, Atari, and TI/99-4A. We are much more concerned with the content of an article than with its style. Above all, articles should be clear and well-explained.

The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page. If your article is specifically directed to one make of computer, please state the brand name and, if applicable, the BASIC or ROM or DOS version(s) involved. In addition, *please indicate the memory requirements of programs.*

3. The underlined title of the article should start about 2/3 of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number. For example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not justify. Leave the lines ragged.

6. Standard typing paper should be used (no erasable, onionskin, or other thin paper) and typing should be on one side of the paper only (upper- and lowercase).

7. Sheets should be attached together with a paper clip. Staples should not be used.

8. If you are submitting more than one article, send each one in a separate mailer with its own tape or disk.

9. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* Please use high quality 10 or 30 minute tapes with the program recorded on both sides. The tape or disk should be labeled with the author's name, the title of the article, and, if applicable, the BASIC/ROM/DOS version(s). Atari tapes should specify whether they are to be LOADed or ENTERed. We prefer to receive Apple programs on disk rather than tape. Tapes are fairly sturdy, but disks need to be enclosed within plastic or cardboard mailers (available at photography, stationery, or computer supply stores).

It is far easier for others to type in your program if you use CHR$(X) values and TAB(X) or SPC(X) instead of cursor manipulations to format your output. For five carriage returns, FOR I=1 TO 5:PRINT:NEXT is far more "portable" to other computers with other BASICs and also easier to type in. And, instead of a dozen right-cursor symbols, why not simply use PRINT SPC(12)? A quick check through your program – making these substitutions – would be greatly appreciated by your editors and by your readers.

10. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), etc. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: use "and" (not &), "reference" (not ref.), "through" (not thru).

11. For greater clarity, use all capitals when referring to keys (RETURN, TAB, ESC, SHIFT), BASIC words (LIST, RND, GOTO), and three languages (BASIC, APL, PILOT). Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word and it will be italicized during typesetting.

12. Articles can be of any length – from a single-line routine to a multi-issue series. The average article is about four to eight double-spaced, typed pages.

13. If you want to include photographs, they should be either 5x7, black and white glossies or color slides.

14. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

15. COMPUTE! pays between $50 and $600 for published articles. In general, the rate reflects the length of the article. Payment is made upon acceptance of an article. Following submission (Editorial Department, **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403) it will take from four to eight weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned to authors who enclose an SASE.*

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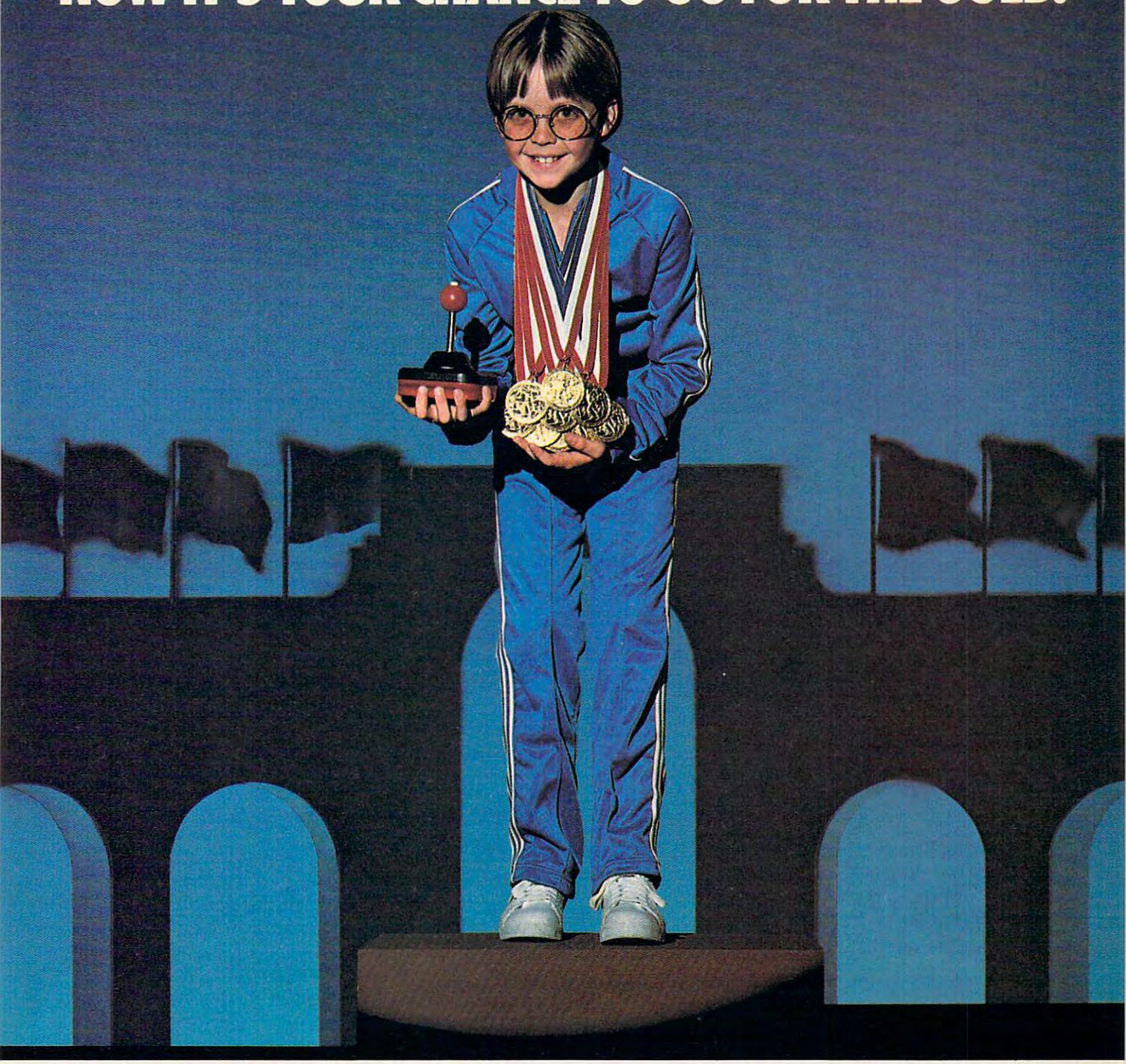

The 84 Olympics are over, but for you, the competition has just begun. How well can you score in track, swimming, diving, shooting, gymnastics and more? So realistic, there's even an opening ceremony and awards presentation after each event.

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Computers And Society

David D. Thornburg, Associate Editor

1984 Revisited

The nightmare predicted by George Orwell in his book *1984* never came true.

Of course, there weren't many people who thought it would. Even so, it was hard to go through this past year without comparing our reality to the Orwellian vision of a totalitarian society that used technology to maintain its grip on people's lives. The technological world predicted by Orwell over 35 years ago is pretty tame compared to the technological realities we have available to us today. He predicted two-way television, word processors, and data base systems.

Ho hum.

Our technological reality has been far more exciting than that—laser disks, personal computers, the entire personal electronics revolution. But, just as Orwell underestimated our technical advances, he overestimated the political changes that formed the basis for his novel. We are not pursued by the Thought Police (thank God), nor are we embroiled in endless wars to support the economy. Most importantly, we have not become slaves to our technology.

Rather than living in an era of repression, we are engaged in a renaissance of rediscovery. Rather than being victimized by our technology, we are liberated by it. Rather than bending our lives to fit the functional patterns of our technology, we are reshaping and refining our technology to be responsive to our ways of doing things.

What Really Happened In 1984

Some examples:

- It was in 1984 that the public continued its long-term rejection of chiclet keyboards. IBM, thought by some to be an industrial metaphor for Big Brother, listened to the customers and gave them what they wanted—a normal typewriter-style keyboard. In this regard, IBM joined ranks with TI and Radio Shack to acknowledge that as far as keyboards are concerned, the public knows what it wants. While this response was a result of customer rejection of the first PCjr product, it is important to know that IBM was responsive to customer's demands.

  Big Brother wouldn't have done that.

- It was in 1984 that a new paradigm in personal computing was introduced in the form of the Apple Macintosh. For the first time, a relatively inexpensive computer was sold on the idea that

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David Thornburg is the author of 11 books, including The KoalaPad Book, Computer Art and Animation *(a Logo book available in versions for the TI, Radio Shack, Atari, and Commodore computers), and* Exploring Logo Without a Computer *(published by Addison-Wesley). His whimsical look at computing (*101 Ways to Use a Macintosh*) has been published by Random House. Later this year, his first book on Logo as a tool for exploring topics like artificial intelligence (*Beyond Turtle Graphics*) will be published by Addison-Wesley. Thornburg's editorial opinions have appeared in* COMPUTE! *since its inception.*

people should be able to use this technology in an intuitive, descriptive manner—telling the computer what to do, instead of prescribing how to do it.

My guess is that Apple will have shipped 300,000 of these machines by the time the dust settles from 1984, with another 900,000 to move into people's homes, schools, and businesses in 1985.

- It was in 1984 that PROLOG started to receive more attention as a programming language in the U.S. Software companies sprang into existence to use this language to create programs that function as "expert advisers" to the user. At last the chains of rigidly defined data base structures are being broken, as users can extract information with free-form queries in an English-like language.
- It was in 1984 that people took even greater advantage of computer portability as machines like the Radio Shack Model 100 started showing up in board rooms and at the beach, replacing the ubiquitous yellow legal pad and carrying their owners firmly into the twentieth century.

Gaining Personal Control

In looking at the growth in hardware and software technology in 1984, one trend became increasingly clear as the year progressed. Technology moved in the direction of giving people independent control over their tools. Even the home entertainment software industry showed that we are far from becoming a nation of couch potatoes. Just look at the overwhelming popularity of "construction set" games such as *Loderunner*, in which players get to create their own playfields and game levels.

If there is a message to be gained from Orwell's *1984*, it is this: People can be enslaved with the help of their technology only when they relinquish control of their lives to others. A reason that computers have failed to become the faceless masters of our future is that we have taken personal control of this technology, molding and shaping it to serve both our needs and our whims.

The existence of several million personal computers in people's homes has an importance that goes beyond the technology itself. By becoming familiar with computers, we, as a nation, have become aware of what computers can and cannot do. We are aware of their benefits and potential dangers. As an informed public, we are able to comprehend the implications and ramifications of computers in the government, workplace, school, and home.

Had we known as much about nuclear power 20 years ago, I doubt we would be facing our current dilemma on that topic.

In December 1983, I suggested in this column that it was our increased sensitivities as human beings that were going to keep 1984 from being anything like Orwell's vision for that year. I remain encouraged in this regard. A recent article in a major magazine for computer department managers suggested that we should populate our data processing departments with musicians rather than computer scientists—that diversity and breadth in education is far more important than the acquisition of intensely defined skills in a narrow field.

A Technological Renaissance

It is this sort of thinking that suggests that we are embarking on a renaissance—a period in which technology and the arts are in harmony with each other, rather than being in perpetual conflict. More and more, I am finding technologists who are "people" people first—whose sense of values is directed more toward peaceful cohabitation on this planet than towards the twiddling of bits.

In fact, it is the technology itself that makes this renaissance possible. It is made possible first by taking over the cumbersome repetitive tasks that previously occupied much of our time. By relegating such tasks to the computer, we are freed to exercise those creative tasks that are uniquely human.

Second, computer technology has allowed the creation of a new aesthetic—a new breed of art and artisans who paint through numbers rather than with them.

For example, I am presently exploring the features of a new version of Logo that lets me create and manipulate three-dimensional objects on the display screen of my Macintosh. (This is *ExperLogo* from Expertelligence in Santa Barbara, California.) I can, with simple procedures, create a model of a three-dimensional object that I can modify, manipulate, rotate, and view on the screen from any angle I choose. I can use programs I have written in this language to explore the properties of objects that are only fantasies of my mind—that are not yet constructed, and that may never be constructed.

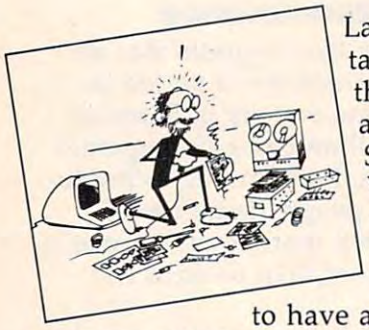
This freedom to explore mental constructs with ease was unknown during the first Renaissance. It will be commonplace in this one.

And so, as we enter 1985, let us all acknowledge that it is we who shape and control our technological destiny, and that it is we who will determine whether our lives will be controlled or enhanced by our inventions.

I vote for enhancement—Happy New Year! ©

Our Computer Handyman

Fred D'Ignazio, Associate Editor



Late last spring I was talking with David James, the computer instructor at Patrick Henry High School here in Roanoke, Virginia. I told David I was using and reviewing all sorts of computers, and I would love to have an assistant who could help me with the technical aspects. I complained about my .06 percent mechanical aptitude (see my October and November columns, "How Computers Made Me Smarter After Only Thirteen Years of Daily Use"). David smiled. "I have just the student for you!" he exclaimed.

Two days later Howard Boggess showed up. Howard was a senior at Patrick Henry on his way to Tulane University in New Orleans. He had worked at a local computer store and was a dedicated hacker. Most nights (school nights) he would sit up fiddling with his Apple IIe with its twin monitor screens until 2:00 or 3:00 a.m.

Before Howard came we had lots of computer equipment around the house. But lots of it was unplugged, disconnected, or banished to the computer "graveyard" in the attic.

The computer graveyard was an eerie place. A magazine photographer working on a story once made me take him up to the graveyard. He took pictures of me kneeling on the floor, surrounded and dwarfed by old card cages, S-100 motherboards, upended video monitors, twining, snakelike cables, stacks of out-of-date circuit cards, and dead computers. When his photograph appeared in the magazine I noticed that two joysticks were sitting on a box behind me and stuck up above my head like high-tech devil's horns.

When I first led Howard up into the attic, he was impressed. "Wow!" he said. "What is all this stuff?"

I explained, and he asked me why I stored it away in the attic. "Because I can't make it work," I confessed. "So I bring it up here. I don't have time to fix all this stuff. I'm a writer, not a computer mechanic."

Howard was appalled. All his computer equipment was scavenged, secondhand, and patched together. To him my graveyard looked like the delicious leftovers from a sumptuous royal banquet. "Maybe we can use some of this equipment," he said.

"All right," I said. "Do with it what you will." I turned around and fled back downstairs, glad to return to a world where at least some of the machines were still alive.

A Houseful Of Computers

Howard worked up in the attic for about a month, unearthing and resurrecting the machines. Then he brought his motley crew back downstairs. The machines made a miraculous recovery and beeped and whirred and processed information like any of my other healthy computers.

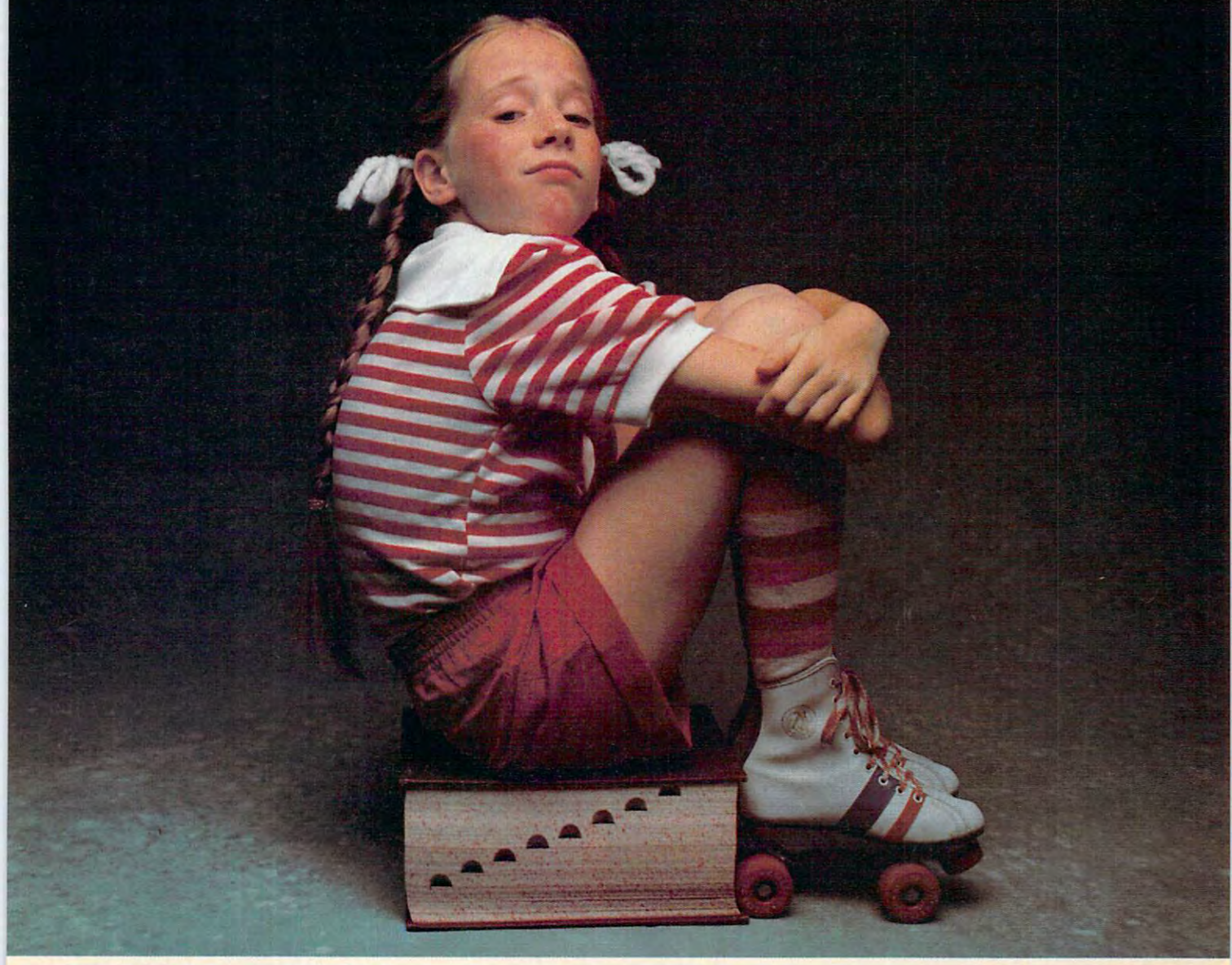
Howard had worked a major miracle, but he didn't stop there. Once he returned downstairs, he began fixing and plugging in all the computers that lay idle or ignored. And, I'm embarrassed to admit, there were quite a number of machines that fell into this category.

My five-year-old son Eric was impressed

Fred D'Ignazio is a computer enthusiast and author of several books on computers for young people. His books include Katie and the Computer *(Creative Computing),* Chip Mitchell: The Case of the Stolen Computer Brains *(Dutton/Lodestar),* The Star Wars Question and Answer Book About Computers *(Random House), and* How To Get Intimate With Your Computer (A 10-Step Plan To Conquer Computer Anxiety) *(McGraw-Hill).*

As the father of two young children, Fred has become concerned with introducing the computer to children as a wonderful tool rather than as a forbidding electronic device. His column appears monthly in COMPUTE!.

IN A CLASS BY HERSELF.



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with all the new computers we seemed to have around the house. He didn't know we had so many computers because most of the time they didn't work.

Eric came home from kindergarten one day and walked around the house, watching all the machines happily spitting out paper, playing music, and flashing words and pictures. When he arrived in my study, I could see that he was in awe. When he asked me who had fixed them all, I named Howard. "How did Howard do it?" he asked.

Just then my eight-year-old daughter Catie stuck her head in the door and answered, "Because Howard is naturally intelligent.

"Unlike Daddy," she continued, "who is naturally dumb."

The Computer Party Line

One day while I was tapping away at my computer keyboard in my upstairs study, Howard came in and asked me why none of the computers was connected to a modem. I knew that Howard was a bulletin board fanatic. He spent most of the time using his Apple to roam around the country's bulletin boards, trading software and acting as dozens of people's on-line handyman.

"It seems a shame to have all these computers," he said, "and none of them can talk to each other."

I think I must have scratched my head at that point. Or else maybe I nodded. In any case, Howard took that as a green light to get our computers on-line with each other and communicating. Within a month he had every computer in the house talking with every other computer. We had joined four information networks, and the phone company was making house calls every other day.

By the end of the month our lives settled into a semblance of order. But during the month utter chaos reigned. For example, my wife would come home from work at night, and the phone would ring. She would run into the kitchen to answer it, but no one would be at the other end. This was because the kitchen phone was not ringing. Instead it was another phone on a different line that had just been installed that day. And it was still ringing.

Janet would hang up the kitchen phone and dash into our dining room and pick up the phone in there. Again nobody would answer. It was another phone that was ringing. It was the upstairs phone that had been installed in my son's bedroom the day before.

This daily mad dash for the telephone did nothing to improve my wife's mood after a hard day at the office. And it wasn't the only thing she faced when she returned to the house.

Musical Telephones

I tried to dedicate some of the telephone lines to the computers, some to my professional work, and some to the family. Except I kept changing my mind. So every couple of days, I called the phone company, and they came back and switched the phone lines. By the time Janet came home from work each night, all the phones had different numbers than when she left the house that morning.

Playing musical telephones was bad enough, but things got even worse. The computers began spending more and more time on the phones, and as they got on-line, they bumped family members off-line. For a brief period, almost every time somebody would pick up a telephone they would find that a computer was already there, chatting to another computer.

Also, during the same period, we went through a couple of days in which we were shut off from the world. No one who called us could reach us because every time the phone rang, a computer would answer. Whenever a phone rang, somebody would race wildly through the house picking up receivers and crying "Hello! Hello!" But a computer would always be there first, whining its irritating high-frequency carrier tone at whoever had the misfortune to call us.

As I remember, handyman Howard was not available during this period. He must have been taking tests at school or something. So without his help, we just gave up. One day my wife arrived home from work, and the phone rang.

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How many plates can the Juggler juggle?

Chinese Juggler

That depends on you. You are the Juggler and your act is the delicate art of plate spinning. Yours will be a tough act to follow if you succeed in matching colors and spinning plates on all 8 poles at the same time.

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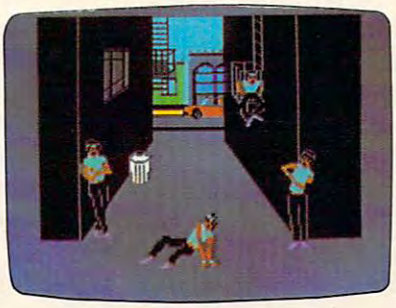

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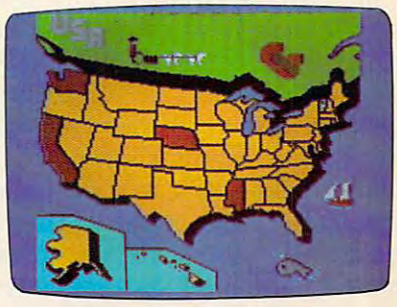

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C R E A T I V E S O F T W A R E

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"Aren't you going to get it?" she asked. "Nope," I said. "The computer will answer it."

It did. Then it promptly hung up.

It was a very efficient way to handle calls.

Our Family's Electronic Mailboxes

After about a month, as I said, our lives gradually returned to normal. We kicked the computers off the phones at certain hours of the day, and we forbade them from answering the phones, unless we were sure another computer was making the call.

This was when we discovered electronic mailboxes. Electronic mailboxes and bulletin boards have been the biggest new thing in our family's life since Eric was potty-trained.

With Howard as our guide, we began setting up electronic mailboxes and posting bulletins on The Source, CompuServe, MCI Mail, the Plato Learning Network, and on bulletin board systems around the country. Then we filled the mailboxes and boards with messages. Going online was a marvelous experience—like launching helium balloons with our names and messages tied to them. We were reaching out to utter strangers, and we didn't know who would respond or where they might respond from.

And the strangers responded. We heard from a teenager in Wisconsin, an engineer in Texas, a retired teacher in Kentucky, and from many other people. And we wrote back.

To encourage more people to correspond with me electronically, I began listing all my mailbox user-identification codes on the river of paper mail that flows out of my office every day. And whenever I called anyone on the phone I made a point of saying, "You know, this voice stuff is really old hat. We should be talking computer-to-computer, not person-to-person. That's the way to really stay in touch."

When I did this, even more people responded. I got software publishers on the networks, teachers, parents, and distant members of my family. But I still wasn't satisfied. In fact, none of us were. Then I realized: We were all hooked. We had developed an appetite for electronic mail the same way we had an appetite for paper mail. The big difference was that with paper mail, you know you can count on only one delivery a day, six days a week. But with electronic mail, there's always the hope that the electronic "mailperson" has delivered a letter for you and it's waiting on some computer system right now. All you have to do is turn on your computer and check all your mailboxes. One of them may contain a letter.

Intra-Home Electronic Mail

This hunger for electronic mail became insatiable, and it affected all of us, except for Mowie the cat. When we woke up in the morning, even before we made trips to the bathroom, all of us would dash to a computer and begin checking our mailboxes. After breakfast we would check our mailboxes again. As soon as my kids came home from school, they checked their mailboxes. When Janet got home from work, she checked her mailbox. And we all checked our mailboxes again at dinner, and before we went to bed.

We have a lot of friends, but we don't have enough friends who can spend all day writing us letters to keep our electronic mailboxes full. So we found that most of the time our mailboxes were empty, and this made us unhappy.

Then Howard showed up, listened to our problem, and came up with a great idea. "Why not," he said, "send letters to each other?"

At first this seemed like a crazy idea. Why should we send letters to each other? We lived with each other, saw each other, and talked with each other all the time. Why should we send mail to each other?

"Just try it," said Howard, "and I'll bet you like it."

He was right! We began leaving each other little notes on the computer, and pretty soon we were sending long letters. It was as if we had opened the floodgates. Apparently, we had a lot more to say to each other than we had been able to say face-to-face.

And no wonder! All the members of my family are so busy and going in so many directions at once that we rarely have the chance to sit down and casually ask questions like, "How was your day?" or "How is your life?" or "Is anything bothering you?" The moment rarely arises when two people in our family are in a mood or have enough time to have a conversation.

But now, using our electronic mailboxes, we ask these questions electronically and have electronic conversations—long, serious conversations unlike any we've ever had before. The mailboxes bring the different members of my family together by letting them talk when they have time or want to talk, and listen when they have time or are in the mood to listen.

In the past, it was rare that a family talker could find a listener when they had something to say. So they just didn't say it. And either it stayed bottled up inside and festered, or they simply forgot it. Now, when family members have something to say, they sit down at the computer and type it as a letter and send copies to each family member they want to say it to. And when those family members feel in the mood to get mail or have time to listen, they sit down at the computer and read their mail. And then they write back.

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E-Mail Away From Home

We have all become so dependent on this new avenue for family communication that when Janet or I go out of town we take a portable computer just to stay in touch. When we get to a hotel room or pay phone, we log onto a network, check our mailbox, and send letters to the rest of the family. The rest of the family, meanwhile, logs onto the computer two or three times a day and writes long, chatty letters to the traveling parent.

This system is far cheaper than making long-distance phone calls, and it's also better. For example, the other night Janet called us from Washington, DC, where she had been attending a conference for a week. She had been in daily touch by electronic mail, but she called because she wanted to hear our voices.

She got to hear our voices, all right. And a whole lot more. I was running the vacuum cleaner when she called and ran to the phone without turning it off. The TV was blaring. Catie and Eric had their friend Alexa over, and the three kids were playing breakdancing music on the stereo while racing through the house hooting and hollering. When I yelled at the kids to quiet down, the doorbell rang. I told Janet to wait a minute so I could go to the door. Just then the other telephone rang. Eric ran to get the phone and tripped over the vacuum cleaner and began crying.

When I got back to the phone a few minutes later, Janet was no longer in the mood to hear our voices. "I'll send you some E-mail," she said.

Epilogue

Most of these events happened during the summer and fall. Today our computer handyman, Howard, is a student down in New Orleans at Tulane, and things have calmed down around here considerably. The computers which fill the house still work, but not quite as well as when Howard was here.

We are still in love with electronic mail. We write to Howard every day on The Source, and he writes back. Janet and I have started sending each other electronic love letters. And Catie, Eric, and I have started exploring The Source's CHAT system and CompuServe's CB Simulator. Using these systems we can have an electronic conversation with over a hundred thousand people.

After our experience with using computers to communicate, I am firmly convinced that Howard was right when he said computers should talk to each other. He was right because when computers talk to each other, so do people. ©

GUEST COMMENTARY

Now-Silent Beethovens

Richard Mansfield, Senior Editor

Until very recently, automation has only crushed the minor arts, the crafts: candlemaking, weaving, pottery. Now music, a major art form, is about to become automated. This raises serious questions. What about musicians who've spent their lives practicing the violin? And if music, one of the most complex forms of human expression, can be made on a machine—what's next? Literature? Justice?

We've watched a rising tide of mechanization over the last century. The benefits of tractors were so obvious that few bemoaned the passing of hand plowing. Indeed, until recently, most automation has replaced unpleasant or dangerous *physical* jobs. Now, though, machines are proving adept at some of the more delicate mental activities upon which many people base their definition of human value.

The Fairlight, the Synergy, the Kurzweil—today's most advanced computerized music machines—can now automatically play as beautifully, for all practical purposes, as many musicians.

What's more, these synthesizers aren't just threatening to replace individual artists. A synthesizer can reproduce the sound of any instrument, even the sound of an entire orchestra playing in concert. Containing digitized recordings of real acoustic instruments, the new machines are the sonic equal of the finest handmade pianos, the best violins.

Synthesizers can be played like a piano: There's a keyboard, traditional sustain pedals, and so forth. In that mode, they still require an experienced keyboard artist to sound good.

But they have another mode: Driven by sequencers, a synthesizer can be preprogrammed. You sit down and teach the machine to memorize the music just the way you would program a computer. This programming can be done either by playing the pianolike keyboard or by typing into a computer keyboard. And you don't need dexterity. You can enter the notes at any speed. You don't even need a sense of rhythm. You can instruct the instrument to resolve the music into the degree of rhythmic accuracy that pleases you. Since total accuracy sounds mechanical, it's best to quantize slightly off the beat to create that human quality we've come to think of as warm and pleasing.

You can even buy entire musical pieces on floppy disks and just insert them into the synthesizer, push a button, and stand back. The instrument plays itself. And you'd be hard-pressed to tell you weren't listening to Bach on a concert grand.

It seems likely that synthesizers will follow the traditional path of most new technologies. Right now the best synthesizers cost between $10,000 and $40,000. Soon, however, the prices should be in the hundreds of dollars, and consequently, millions of people will have unprecedented access to creative play with music. It won't be necessary to struggle for years to learn to read musical notation, to play a difficult instrument, or to learn harmony or rhythm. All those things will be waiting behind buttons on these machines.

It won't be necessary to find others to form a band. You can, like Prince, play all the parts yourself. If you come up with something lovely, you won't need to buy an expensive multitrack tape recorder or, worse, spend a fortune at a professional recording studio. Inside these synthesizers is a full, multitrack, digital recorder. You become the engineer and can do everything from the editing of a single note to the transposition of the entire piece.

There is pain here though. Conductors, recording engineers, and professional musicians will be less frequently called upon. There will, of course, always be traditional instrumentalists, just as there will always be people hand-dipping candles and climbing mountains. But their efforts may be increasingly thought of as a trick rather than a talent, something pleasantly nostalgic, but, ultimately, eccentric.

Becoming a truly expert violinist has always been a kind of personal torture, but it had great value to society. Master violinists of the future will likely be admired in that strange way we admire people who can climb difficult mountains: admired more for their self-discipline than for any practical results of that discipline.

Nevertheless, with all the tools of music in every living room, with musical skills at everyone's fingertips that previously took a lifetime to develop, who knows how many now-silent Beethovens will suddenly rise and be heard across the world? ©

MSX IS COMING

Part 2: Inside MSX

Tom R. Halfhill, Editor

Last month, Part 1 of this special two-part series reported how more than a dozen companies—primarily Japanese—are preparing to invade the U.S. market with low-priced home computers based on a new standard called *MSX*. Already established in Japan, and just getting underway in Europe, MSX is expected on U.S. shores in early 1985. This month, Part 2 takes you inside MSX and evaluates the performance of a typical MSX home computer.

If you've been involved in personal computing very long, chances are you've heard of the RS-232 serial standard, the Centronics parallel standard, the CP/M standard, the IBM PC standard, the MS-DOS standard, and a few other standards.

Now there's a new one: *MSX*. What—if anything—sets MSX apart from all the others?

Here's the quick answer: MSX is perhaps the most workable standard of them all because it's the only *true* standard.

That statement is not as bold as it sounds. It simply means that MSX was designed from the very beginning as a complete hardware/software standard to be licensed to any manufacturers who want to participate. That concept alone sets MSX apart from all the other so-called standards in personal computing. The others are really de facto standards—they were adopted over the past eight years by accident or by default.

Consider a few examples. Until recently, CP/M (Control Program for Microcomputers) was the dominant operating system on business and high-end personal computers. Thousands of programs have been written for CP/M. You can run it on dozens of different machines, from battery-powered lap portables to desktop computers with multiple floppy drives and hard disks. In 1984, Commodore even released a plug-in cartridge that lets you run CP/M on its popular Commodore 64 home computer.

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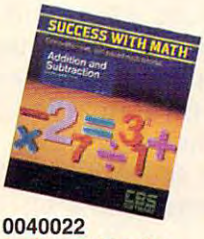

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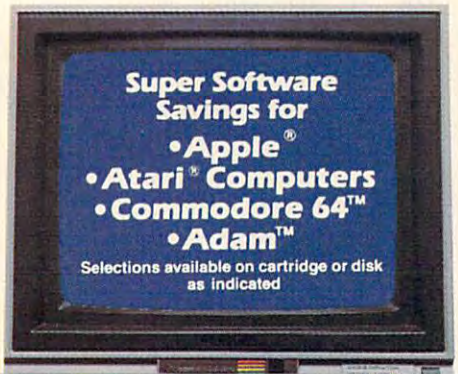

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It would seem that any computer which could run CP/M could also run CP/M programs, but it's not always that easy. For instance, a Commodore 64 with the CP/M cartridge can theoretically run any CP/M program—if you can load the program into the computer. Unfortunately, the Commodore disk format is not compatible with other CP/M disk formats. So you can't just stick a CP/M disk into a 1541 disk drive and load up a CP/M program, even though the program would probably run if you could. Instead, you have to wait for someone to make the program available on a Commodore disk.

Or consider the IBM Personal Computer standard. Since the IBM PC was introduced in 1981, it has emerged as the dominant machine for business computing. PC-compatible computers made by independent manufacturers abound. MS-DOS and PC-DOS—close relatives to each other—have dethroned CP/M as the ruling operating systems. More than a thousand programs have been written. But none of the so-called IBM-compatible computers are really 100 percent compatible, because IBM aggressively defends its copyrights and patents (as it has every right to do). When other manufacturers copy the IBM PC too closely, they can wind up in court. When they don't copy it closely enough, they can wind up out of business.

Even IBM's own computers within the PC line are not fully compatible. Some PC programs just don't run on the PCjr—including IBM Disk BASIC. The Portable PC has encountered a few difficulties too.

Likewise, just because a printer or some other peripheral has a Centronics-standard parallel port or an RS-232-standard serial port doesn't mean it will match perfectly with the parallel or serial port on your computer. Quite often there are interfacing problems with connectors and so forth.

The basic problem with all the de facto standards is that, because they were developed more or less haphazardly and were not thoroughly and rigidly defined (or adhered to), they aren't true standards. And that's exactly what MSX aims to change. The main question is: How well will it succeed?

The MSX designers chose technology which is relatively simple, proven, and cheap.

Although MSX is primarily backed by Japanese consumer electronics and computer companies, it was invented by an American company—Microsoft, Inc. (See Part 1 in last month's COMPUTE!.) *MSX* stands for *Microsoft Extended.* As the name implies, MSX is an extension of current technology rather than an entirely new technology.

Whenever someone sets out to design a new standard, the first decision they face is whether to make it compatible with existing technology, to discard old restrictions to take full advantage of new technology, or to strike some sort of balance. The MSX designers struck a balance.

Trying to create a standard for home computers, not for expensive business or high-end personal computers, the MSX designers chose technology which is relatively simple, proven, and cheap. It's sufficient to get the job done, but technological overkill it's not. Still, because the technology has been around so long (in computer industry terms), the MSX designers were able to squeeze out every drop of potential performance.

The MSX standard is based on the following components and specifications:

- Zilog Z80A Central Processing Unit (CPU)—an eight-bit microprocessor chip clocked at four megahertz.
- 32K of Read Only Memory (ROM), containing MSX BASIC and the Basic Input/Output System (BIOS).
- 8K minimum Random Access Memory (RAM), with 64K recommended for the U.S. and European markets.
- 16K of video RAM (screen memory). This is in addition to user RAM.
- Texas Instruments TMS9918A video chip, which provides several text modes ranging from 29 columns × 24 rows to 40 columns × 24 rows; 256 redefinable characters (6 × 8 pixels), including alphanumeric, European, and graphic characters; several graphics modes, with a maximum resolution of 256 × 192 pixels; 16 colors; and 32 sprites (maximum four per horizontal line). This is the same video chip found in the TI-99/4A computer and the Coleco Adam.
- General Instruments AY-3-8910 programmable sound chip, providing three sound channels covering eight octaves with 12-bit frequency resolution. This is the same sound chip found in the TI-99/4A, Coleco Adam, and IBM PCjr. The chip also controls input/output via the joystick controller port (at least one Atari-type port required).

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• At least one physical expansion slot for system expansion and cartridge software. The slot contains address lines for four logical slots, each addressing 64K, so memory space is expandable to 256K. In addition, each logical slot can be split into four more physical slots, yielding a system total of 16 expansion slots with total memory space of one megabyte (1000K).

• Keyboard with at least 70 keys, including separate cursor-control keys, screen editing keys, five special function keys which can be shifted to provide ten functions, and keys to shift the keyboard into graphic and special character sets. (But no numeric keypad.)

• MSX-DOS floppy disk drive interface. Although the hardware interface is not necessarily standardized, the disk format is: MS-DOS. That means an MSX drive can read disks formatted on an IBM PC or PC-compatible. Formats are standardized for 8-inch, 5¼-inch, 3½-inch, and 3-inch disks. MSX-DOS requires a system with at least 64K RAM.

• Cassette interface using frequency shift keying format, selectable 1200/2400 baud.

• Standardized cartridge slot sizes, expansion addressing schemes, pin assignments on all interfaces, signal levels on all pins, memory maps, operating system entry points, RAM vectors, etc.

The above specifications are the *minimum MSX requirements*. Beyond them, MSX defines "standardized optional extensions" and also leaves manufacturers free to add enhancements of their own—as long as they don't interfere with the standards. The standardized extensions include an 80-column text mode, RS-232 serial port, parallel printer port, and a battery backed-up CMOS clock. Enhancements seen to date range from videodisc-mixing interfaces to instrument-quality music synthesizers—features that are either unavailable or much more expensive on American personal computers which claim to be more advanced technologically than MSX.

The enhancements are significant from a marketing as well as a technological standpoint. Since all MSX computers are basically the same, any extras added by each manufacturer serve to differentiate their models in the marketplace. Usually these extras reflect the manufacturer's expertise in other areas of consumer electronics. For example, JVC's MSX computer has a videodisc interface which can mix video and computer graphics on the screen simultaneously. The result is videogames and interactive educational programs with stunning realism.

> ***Manufacturers are free to add enhancements—as long as they don't interfere with the standards.***

A Yamaha MSX machine—the CX5M Music Computer—has a built-in synthesizer that puts even the Commodore 64 SID chip to shame. With its MIDI (Musical Instrument Digital Interface) jack and two optional music keyboards, the CX5M may find as many buyers among musicians as among computer hobbyists.

Another important MSX feature is the software compatibility of MSX-DOS. You might think that because MSX-DOS uses the same disk format as MS-DOS, it should run MS-DOS software. But it doesn't—remember, MS-DOS is an operating system for 16-bit computers. Instead, MSX-DOS is designed to run software written for the most popular eight-bit operating system: CP/M-80 2.2. This opens up a huge library of existing programs, including business and professional programs such as *Multiplan*. This partially answers the frequent criticism that most MSX software is game-oriented. However, exactly how much CP/M software is compatible with MSX-DOS remains to be seen.

In theory, then, MSX seems like an organized, carefully constructed standard. But the real world is messy. How workable is MSX in practice? After all, inventing a standard is the relatively easy part; the strict compliance that's necessary to keep it viable is much harder.

In Japan, where MSX made its debut in late 1983, it seems to be working well. Hundreds of thousands of machines have been sold, capturing a significant share of the home market, even though Japanese MSX computers are rarely equipped with disk drives or more than 16K RAM. Hundreds of cartridge programs have been released—mostly games—and all the cartridges are fully compatible with all the MSX machines (more than a dozen different brands). Japanese computer magazines publish programs in MSX BASIC and machine language that run on every MSX computer without modification.

Two enforcers guard the software and hardware gates of the MSX standard. First, marketing pressure: No software publisher wants to narrow its potential market by writing a program which is compatible with some MSX computers, but

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not others. Second, legal pressure: MSX licensees must comply with Microsoft's minimum MSX specifications to use the MSX label on their computers. So adherence to the standard seems virtually guaranteed.

Although the MSX hardware seems unlikely to win any awards for advanced technology, the designers have extracted maximum performance with some impressive system software. In fact, MSX BASIC may well be the most powerful BASIC interpreter built into any personal computer at any price.

MSX BASIC is an extension of Microsoft BASIC 4.5 and is patterned after GW-BASIC, a common BASIC on 16-bit computers. It is a close relative to both TRS-80 Color Computer Extended BASIC and IBM PCjr Cartridge BASIC. Unlike the BASICs built into, say, the Atari and Commodore 64—computers with powerful sound and graphics capabilities—MSX BASIC has nearly all the commands you need to access its sound and graphics features without PEEKs, POKEs, or machine language. And that includes the sprites.

This article can't cover every command, statement, and function in MSX BASIC, but here are some highlights:

Besides the usual decimal numbers, constants can be expressed in hexadecimal, octal, or binary with the prefixes &H, &O, and &B. Variables can be any length, two characters significant, and either integer, single-precision, or double-precision. Arithmetic is performed with double-precision accuracy to 14 digits in Binary Coded Decimal (BCD), so the rounding errors common on other home computers are much rarer on MSX machines. There's a full set of relational operators (=, <, >, <>, <=, >=) and bitwise operators (NOT, AND, OR, XOR, EQV, IMP). Line numbers can range from 0 to 65529.

MSX BASIC has full-screen editing similar to Commodore, Atari, and IBM computers. The ten special function keys are preprogrammed with BASIC commands and can be redefined by the user. Auto line numbering and renumbering are built-in. TRON/TROFF commands let programmers trace a program as it executes, and ERROR lets them trap bugs from within programs. MSX BASIC supports DEF FN (defined functions); DEFUSR (jumps to machine language routines); array ERASE; variable CLEAR; LINE INPUT; PRINT USING and LPRINT USING; RESTORE to a line number; RESUME after error; SWAP variable values; conversions between decimal, hex, octal, and binary constants; VARPTR (variable address pointer); numerous string manipulators; KEY, KEY LIST, KEY ON/OFF, and ON KEY GOSUB (for the function keys); STOP ON/OFF/STOP and ON STOP GOSUB (for trapping the STOP key); and INTERVAL ON/OFF/STOP (interrupts from BASIC).

MSX BASIC may be the most powerful BASIC built into any personal computer at any price.

For graphics and sound, MSX BASIC supports SCREEN (for setting the graphics mode and other options), LOCATE (to specify a character position for PRINT), POINT (to determine the color of a specified pixel), COLOR (for setting screen colors), CIRCLE, DRAW, LINE, PAINT (a fill command), SPRITE$ (to define a sprite), SPRITE ON/OFF/STOP, PUT SPRITE, VPEEK and VPOKE (PEEK and POKE video RAM), BEEP, PLAY, and SOUND. Other interesting functions are STICK (read the joystick), STRIG (read the joystick button), PDL (for paddle controllers), and PAD (to interpret input from a touch tablet).

There are many more features, but from this overview it's clear that MSX BASIC is not only more powerful than the BASICs built into other home computers, it's also as powerful as most extended BASICs available at extra cost. There's even a CALL statement which lets manufacturers add their own commands for special features, such as CALL TALK for a voice synthesizer. There's nothing basic about MSX BASIC.

Despite its eight-bit leash, MSX BASIC contains another pleasant surprise: It's lightning fast.

To measure just how fast, COMPUTE! Assistant Editor Philip Nelson ran a series of benchmark tests using a simple bubble sort program. The program was written in plain-vanilla BASIC so it would run unmodified on a variety of popular computers. It creates a numeric array of 150 elements which are then sorted. Although this certainly isn't the most thorough benchmark test that could be devised, it is revealing. Several typical operations are involved, including array dimensioning, looping, and relational comparisons. Here's a listing of the test program:

```
100 PRINT "CREATING
    ARRAY"
110 DIM A(150)
```

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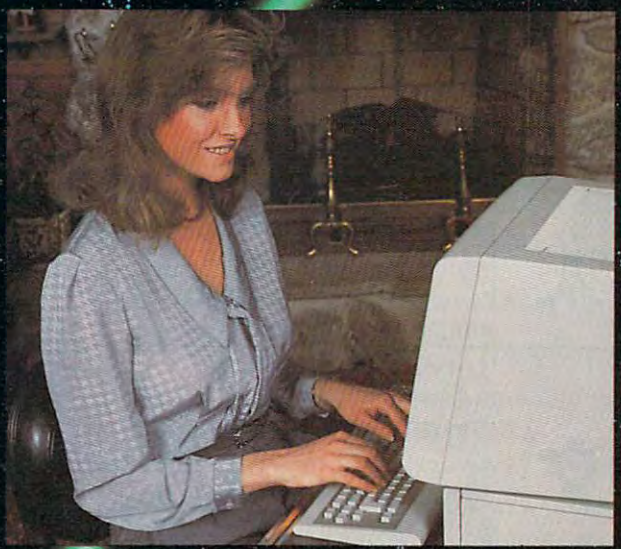

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```
120 FOR J=1 to 150
130 A(J)=151-J
140 NEXT J
150 PRINT "SORTING"
160 EX=0
170 FOR K=0 TO 149
180 IF A(K)>A(K+1) THEN T=A(K):A(K)=A(K+1):
    A(K+1)=T:EX=1
190 NEXT K
200 IF EX<>0 THEN GOTO 160
```

The only changes made to this program were double colons in line 180 as required for the TI-99/4A. Following are the test results expressed in minutes:seconds.

IBM PC	**5:45**
GoldStar MSX	**6:20**
Apple II Plus	**6:24**
Apple IIc	**6:33**
Commodore VIC-20	**6:34**
IBM PCjr	**6:59**
Commodore 64	**7:02**
Commodore 8032	**7:16**
TRS-80 Color Computer	**8:01**
Commodore 16	**8:35**
Commodore Plus/4	**8:36**
Atari 800XL	**8:55**
Atari 800	**9:00**
TI-99/4A	**12:58**

The specific results of this test aren't as important as the general conclusion. Although an MSX-based computer (and virtually any machine designed earlier than about two years ago) could be termed technologically ancient, the streamlined performance of the MSX is nothing to sneeze at.

Nevertheless, it remains difficult to predict whether or not MSX will succeed in America. Will consumers in 1985 be impressed with its affordable features, or bored by its technology? Both Commodore and Atari are expected to introduce new 16-bit or even 32-bit home computers at the same Winter Consumer Electronics Show where MSX will probably debut in January. Will these machines make MSX look even more tired in comparison? As long as a home computer has sufficient software and power to get the job done, does it matter to the average user if it contains an 8-bit or a 32-bit CPU?

Will MSX succeed because of the compatibility solution it offers? Are consumers tired of new computers that won't run anybody else's software? Or will they prefer the latest hot-technology machines, even if it means waiting for software?

If MSX does prevail, how will competitors react? Will they resist the standard or join it?

After IBM's recent tribulations with the PCjr, and the brick walls that TI, Atari, Mattel, and Coleco ran into in the fast lane, nothing is certain anymore in the home computer market. ©

"Paratrooper" is a game of high responsibility—you control the destiny of ten parachutists, giving the go signal that ejects them from the plane. Their safe landings depend on your ability to judge weight factors, windage, and the all-important crucial moment when they should leap. Originally written for the TI-99/4A (with 16K and Extended BASIC), the program has been adapted for the Commodore 64, unexpanded VIC, Atari (with at least 32K), Apple, IBM PC (with color/graphics adapter and BASICA), PCjr (with Cartridge BASIC), and the Commodore Plus/4 and 16.

Paratrooper

John Goetz

Almost everyone has seen a parachuting exhibition. Perhaps you've wished that you, too, could fall from the sky on the wings of the wind. The plane drones on, cruising at the proper altitude. You peer out the hatch through wispy remnants of clouds as you decide where to land. You can barely see three tiny squares, far below, surrounded by water. These must be the landing pads, your drop zones. An aquatic landing can lead only to disgrace and severe embarrassment, so you know that you must jump at just the right moment.

There are three different-sized landing pads: The smaller pads promise the greatest honor and reward, but allow less room for error. Nearby, graceful sailboats ply the water. You know that soon these tiny features will grow at an alarming rate. You consult with the pilot and estimate the perfect moment for your jump by carefully considering your altitude, the speed of the wind, and your own body weight.

Too many late-night pizzas coupled with a low wind speed, and you'll drop like a stone. But if you're a featherweight, and the wind's kicking up, you'll find yourself drifting quite a way. With all the facts in, you wait for just the right moment. Then you leap out into the cold, crisp wind—with fingers crossed, of course.

If even reading this description makes you nervous, you'll be glad "Paratrooper" is just a computer game. Rarely is such a simple game so fun to play. The single key (or joystick) control and adjustable difficulty levels makes this an easy to learn, yet challenging, game for young children too.

Let Your Fingers Do The Jumping

The various versions of Paratrooper differ slightly, but the concept is the same. Your plane continuously flies across the screen at an altitude which changes randomly for each jump. The paratroopers' weights and the wind speed change for each jump, too. All this information is displayed on the screen. You have ten paratroopers: ten chances for glory, or ten chances for dripping disaster. To drop a trooper, press any key (on the TI-99/4A, press Q or the fire button on joystick 1). The three landing pads are worth 25, 50, and 75 points, depending on their size.

All versions have more than one difficulty level. The TI version lets you choose between Novice and Experienced at the start of the game (you must rerun the program to change the level). The plane always moves at the same speed, but the landing pads are smaller in the Experienced level. Versions for the IBM, Atari, Plus/4, Commodore 16, and VIC-20 let you choose between Novice and Expert—again, the plane travels at the same speed, but the landing zones get smaller. The Commodore 64 version adds an Intermediate level. The Apple version has Easy and Hard levels, and the plane flies faster on the Hard level while the landing pads remain the same size.

Special Instructions

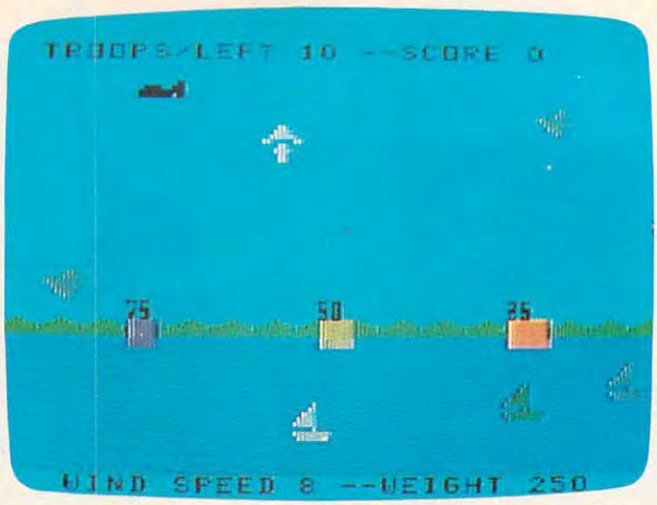
After typing in the Atari version (Program 5), it's important to save it on tape or disk before running it for the first time. Before loading the game, clear the computer by turning it off, then on again, and type POKE 128,0:POKE 129,64: NEW and press RETURN. This rearranges memory to make room for a machine language subroutine.

The VIC-20 version is broken into two parts so it works on an unexpanded VIC. Type in Program 3 and save it to tape or disk. If you are using tape, be sure to change the 8 to a 1 in line 40 of Program 3. Type in and save Program 4 as "P2" (for Part 2). Save Program 4 immediately after Program 3 on the tape.

Program 1: Paratrooper For TI-99/4A

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 REM EXTENDED BASIC REQUIRED
20 CALL CLEAR
30 FOR T=10 TO 14 :: FOR I=10 TO 14
   :: DISPLAY AT(12,9):"PARATROOPE
   R"
40 CALL SCREEN(T):: NEXT I :: NEXT
   T
50 CALL CHAR(131,"183C7EC3183C1818"
   ):: CALL SCREEN(12)
60 FOR T=450 TO 550 STEP 50 :: FOR
   I=9 TO 19
```



A paratrooper leaps for the landing pads in the TI version of "Paratrooper."

```
70 DISPLAY AT(14,I):CHR$(131)
80 CALL SOUND(10,T,3):: NEXT I :: N
   EXT T
90 FOR I=1 TO 100 :: NEXT I :: GOSU
   B 920
100 DISPLAY AT(22,2):"NEED INSTRUCT
    IONS?(Y/N)"
110 ACCEPT AT(22,25)VALIDATE("YNyn"
    ):Y$
120 IF (Y$="Y")OR(Y$="y")THEN 750
130 IF (Y$="N")OR(Y$="n")THEN 860
140 CALL CLEAR :: CALL SCREEN(8)
150 CALL CHAR(33,"E7A424E7E781A5E7"
    ,34,"E78585E5E525A5E7")
160 CALL CHAR(37,"F7941417276141 47"
    ,42,"503D7C7C7C7A0088D")
170 CALL CHAR(43,"183C7DC300000000"
    ,44,"08183878F808FF7E")
180 CALL CHAR(46,"187E5A183C000000"
    ,98,"01031FFFFFFFFFF")
190 CALL CHAR(99,"80C0FCFDFDFFFFFF
    ",107,"FFFFFFFFFFFFFFFF")
200 CALL CHAR(117,"FFFFFFFFFFFFFFFF
    ",122,"00E0A6E6A6FEBAEE")
210 CALL CHAR(130,"00000173FFFD0000
    ",133,"FFFFFFFFFFF0000")
220 CALL CHAR(134,"FCFCFCFCFCFC0000
    ",135,"FEFEFEFEFEFE0000")
230 CALL CHAR(137,"183C7E7EFFFF1818
    ",143,"0E5FFE7F3E1C0800")
240 CALL SCREEN(8):: CALL COLOR(9,4
    ,8,10,6,1)
250 CALL HCHAR(16,1,107,256)
260 FOR I=1 TO 31 STEP 2 :: CALL HC
    HAR(16,I,98):: CALL HCHAR(16,I+
    1,99):: NEXT I
270 POINT=0 :: PARA=10
280 RANDOMIZE :: FOR N=22 TO 24 ::
    G=INT(RND*100)+10
290 CALL SPRITE(#N,143,15,G,G+120,0
    ,.60):: NEXT N
300 S=7 :: FOR N=4 TO 6 :: S=S-1 ::
     RANDOMIZE
310 D=INT(RND*5)+1 :: DD=INT(RND*14
    )+3 :: IF (D=OD)+(DD=ODD)+(DD=6
    )THEN 310
```

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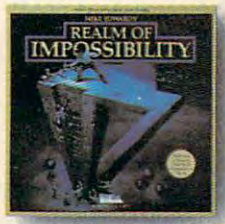

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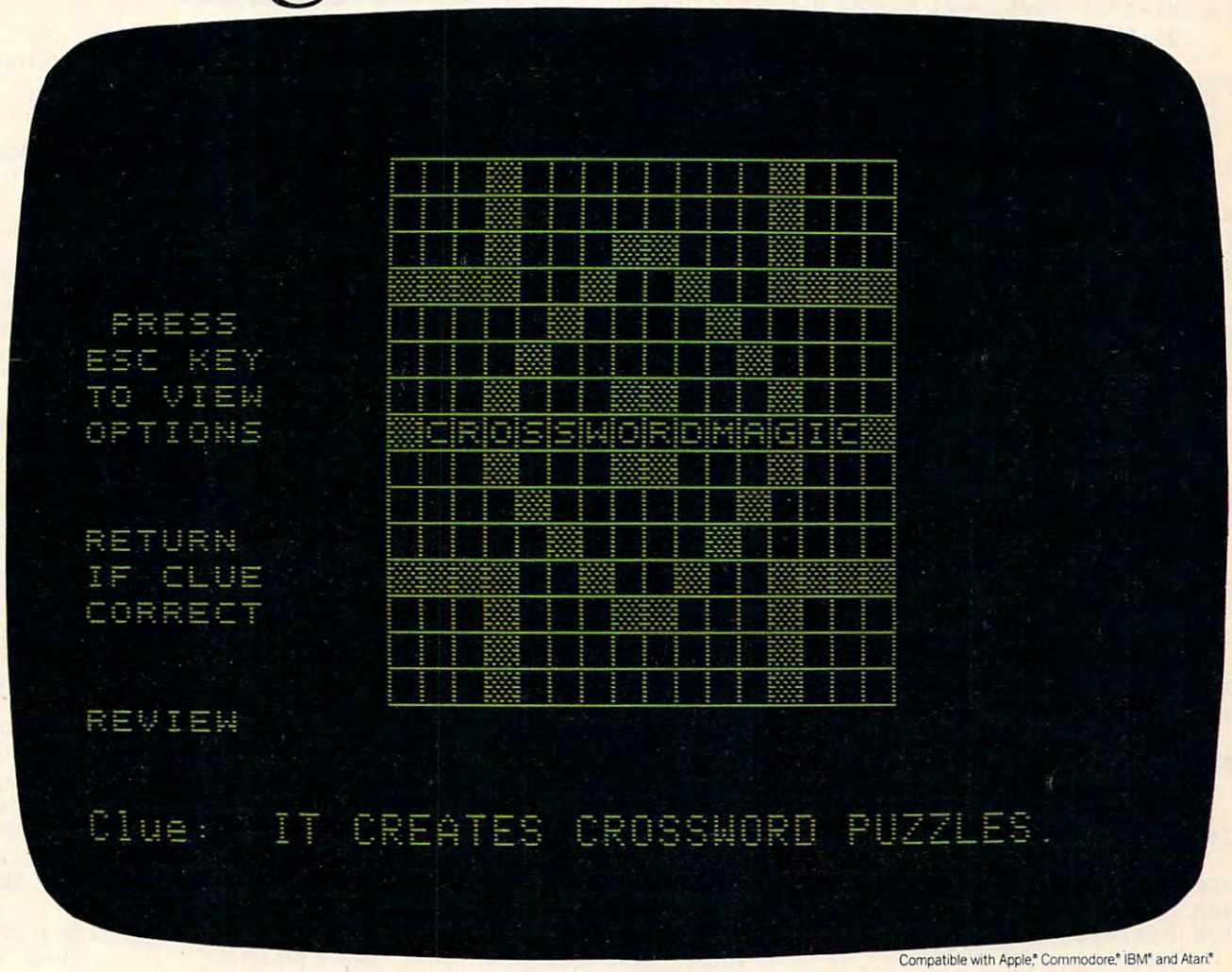
```
320 OD=D :: ODD=DD :: J=N*10+90+RND
    *10 :: CALL SPRITE(#S,44,DD,J,J
    ,0,D):: NEXT N
330 IF FL=1 THEN 370 ELSE DISPLAY A
    T(15,5):CHR$(37):: DISPLAY AT(1
    5,14):CHR$(34)
340 DISPLAY AT(15,23):CHR$(33)
350 CALL SPRITE(#3,32,1,180,180,0,6
    0):: REM INVISIBLE OCEAN SPRITE
360 CALL SPRITE(#7,133,10,121,193,#
    8,135,12,121,121,#9,134,14,121,
    49):: REM PADS
370 IF PARA=0 THEN 630 ELSE RANDOMI
    ZE :: U=INT(RND*70)+10 :: REM P
    LANE ROW
380 CALL SPRITE(#1,130,2,U,10,0,-12
    ,#2,130,16,U,7,0,-12):: REM PLA
    NE & TROOPER
390 V=INT(RND*9)+1 :: L=INT(RND*4)+
    1 :: REM WEIGHT & WIND FACTORS
400 DISPLAY AT(1,1):"TROOPS/LEFT";P
    ARA;"--SCORE";POINT
410 DISPLAY AT(24,2):"WIND SPEED";L
    *2;"--WEIGHT";(V*25)+50
420 CALL KEY(1,X,Y)
430 IF X=18 THEN CALL PATTERN(#2,13
    1)ELSE 420
440 CALL MOTION(#2,V,L):: CALL SOUN
    D(30,-6,5,150,5)
450 CALL COINC(#2,#7,Z,C)
460 CALL COINC(#2,#8,Z,CC)
470 CALL COINC(#2,#9,Z,CCC)
480 IF (C=-1)+(CC=-1)+(CCC=-1)THEN
    510
490 CALL COINC(#2,#3,50,R):: IF R=-
    1 THEN 570
500 GOTO 450
510 CALL MOTION(#2,0,0):: CALL PATT
    ERN(#2,46):: CALL SOUND(-1500,5
    995,4)
520 FOR T=950 TO 1500 STEP 50 :: CA
    LL SOUND(50,T,3):: NEXT T
530 POINT=POINT-25*(C=-1)-50*(CC=-1
    )-75*(CCC=-1)
540 CALL DELSPRITE(#1,#2):: DISPLAY
     AT(13,5):"MISSION ACCOMPLISHED
    "
550 FOR I=1 TO 150 :: NEXT I
560 CALL HCHAR(13,5,32,22):: GOTO 3
    70
570 CALL MOTION(#2,0,0):: CALL SOUN
    D(200,-4,3):: CALL PATTERN(#2,4
    3)
580 FOR I=1 TO 200 :: NEXT I :: CAL
    L PATTERN(#2,42)
590 CALL DELSPRITE(#1,#2):: DISPLAY
     AT(13,3):"YOU MISSED THE DROP
    ZONE"
600 POINT=POINT-10 :: PARA=PARA-1
610 FOR I=1 TO 150 :: NEXT I :: CAL
    L HCHAR(13,3,32,26)
620 GOTO 370
630 CALL HCHAR(1,1,32,29):: CALL HC
    HAR(24,1,32,29)
640 FOR I=450 TO 850 STEP 25 :: CAL
    L SOUND(50,I,3):: NEXT I
650 FOR T=850 TO 450 STEP -25 :: CA
    LL SOUND(50,T,3):: NEXT T
660 DISPLAY AT(7,10):"GAME OVER"
670 DISPLAY AT(9,6):"YOU HAD ";POIN
    T;"POINTS"
680 DISPLAY AT(12,2):"WANT TO PLAY
    AGAIN? (Y/N)"
690 ACCEPT AT(12,27)VALIDATE("YN"):
    R$
700 IF R$="N" THEN 730
710 CALL HCHAR(12,4,32,26):: CALL H
    CHAR(7,12,32,9):: CALL HCHAR(9,
    6,32,24)
720 FL=1 :: GOTO 270
730 CALL CLEAR :: CALL DELSPRITE(AL
    L):: CALL SCREEN(14):: DISPLAY
    AT(12,10):"GOOD BYE  "
740 GOSUB 920 :: END
750 CALL CLEAR :: CALL SCREEN(12)
760 PRINT "LAND YOUR PARATROOPERS O
    N","DROP PADS WORTH 75, 50, OR"
770 PRINT "25 POINTS. RELEASE EACH"
    ,"WITH THE FIRE BUTTON ON","JOY
    STICK #1 OR THE (Q) KEY.": :
780 PRINT "IF YOU MISS, YOU WILL DR
    IFT","INTO THE OCEAN AND LOSE 1
    0"
790 PRINT "POINTS. YOU CAN ONLY LOS
    E","10 TROOPERS BEFORE THE","GA
    ME ENDS.": : :: PRINT "THE WIND
     SPEED AND WEIGHT"
800 PRINT "OF EACH TROOPER ARE DIS-
    ","PLAYED AT THE BOTTOM OF THE"
    ,"SCREEN. CONSIDER THE SPEED"
810 PRINT "OF DESCENT AND THE DRIFT
    --"
820 PRINT "CHECK THESE BEFORE RELEA
    SING","EACH PARATROOPER.": :
830 PRINT TAB(10);"GOOD LUCK!": :
840 PRINT TAB(4);"PRESS ANY KEY TO
    BEGIN"
850 CALL KEY(0,K,S):: IF S=0 THEN 8
    50
860 CALL CLEAR :: DISPLAY AT(8,6):"
    PARATROOPER RANK ?"
870 DISPLAY AT(11,2):"<N>OVICE OR <
    E>XPERIENCED"
880 ACCEPT AT(8,24)VALIDATE("EN"):C
    $
890 IF C$="E" THEN 910
900 CALL MAGNIFY(2):: Z=10 :: GOTO
    140
910 Z=5 :: GOTO 140
920 CALL SOUND(300,330,3):: CALL SO
    UND(300,392,3)
930 CALL SOUND(500,392,3):: CALL SO
    UND(200,349,3)
940 CALL SOUND(100,330,3):: CALL SO
    UND(200,294,3)
950 CALL SOUND(300,330,3):: CALL SO
    UND(300,349,3)
960 CALL SOUND(300,370,3):: CALL SO
    UND(300,392,3)
970 CALL SOUND(250,440,3):: CALL SO
    UND(150,524,3)
980 CALL SOUND(500,524,3)
990 CALL SOUND(300,583,3):: CALL SO
    UND(100,523,3)
1000 CALL SOUND(200,440,3):: CALL S
     OUND(300,392,3)
1010 RETURN
```

Only one program lets you create your own crossword, instead of filling in someone else's.



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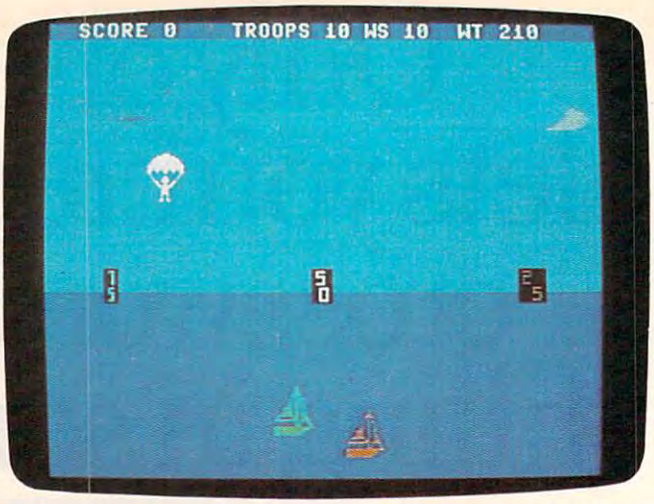
Program 2: Paratrooper For Commodore 64

Version by Gary Black, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

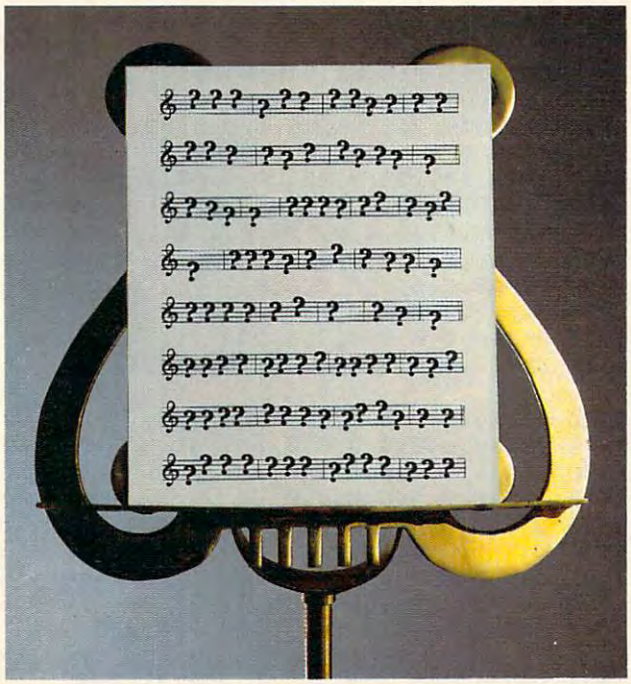
```
100 PRINT"{CLR}{5 DOWN}"TAB(13)"PLEASE WA
    IT":JS=56320                          :rem 29
110 FORI=1TO1016:READA:CH=CH+A:NEXT I
                                          :rem 237
120 IFCH<>67163THENPRINT"INCORRECT DATA":
    END                                   :rem 2
130 RESTORE                               :rem 184
140 GOSUB930                              :rem 177
150 A$="{HOME}{39 SPACES}"                :rem 143
160 SC=0:TR=10:MB=53264:XP=53248:YP=XP+1:
    XA=YP+1:YA=XA+1:JS=56320:SD=12288
                                          :rem 173
170 PR=2040:EN=53269:CD=53278:CL=194:SH=1
    95:PL=193:PA=192:CR=53287:S=54272
                                          :rem 227
180 GOSUB630:GOSUB370:FORI=53250TO53256ST
    EP2:POKEI,INT(RND(0)*255):NEXT
                                          :rem 128
190 FORI=YPTOYP+14STEP2:READA:POKEI,A:NEX
    T                                     :rem 41
200 GOSUB 690                             :rem 177
210 GOSUB650:GOSUB530                     :rem 0
220 POKEEN,254:POKE53276,224:POKE53258,35
    :POKE53260,170:POKEMB,32:POKE53262,50
                                          :rem 7
230 REM ***** START GAME *****            :rem 197
240 SYS49360                              :rem 155
250 WS=INT(RND(0)*10)+1:WT=INT(RND(0)*225
    )+75:GOSUB530:POKE49155,11-WS         :rem 75
260 POKE49156,11-WS:GETB$:IFB$=""THEN260
                                          :rem 44
270 REM *** JUMP! ****                    :rem 0
280 D=PEEK(CD):POKEMB,(PEEK(MB))OR((PEEK(
    MB)AND2)/2):PX=PEEK(XA):PY=PEEK(YA)+2
    1                                     :rem 44
290 POKEXP,PX:POKEYP,PY:POKEEN,255:GOSUB8
    80:DX=WS/7:DY=WT/200                  :rem 238
300 POKEXP,PX:POKEYP,PY:HT=INT(RND(0)*20)
    +170                                  :rem 40
310 PY=PY+DY:IFPY>HTTHENGOTO440           :rem 55
320 PX=PX+DX:IFPX>255THENPX=0:POKEMB,PEEK
    (MB)OR1                               :rem 115
330 IF(PX>80)AND((PEEK(MB)AND1)=1)THENPX=
    10:POKEYP,0:POKEMB,PEEK(MB)AND254
                                          :rem 42
340 TP=PEEK(CD):IF(TPAND1)THENIF(TPAND224
    )THENIFPEEK(YP)<=141THEN560           :rem 11
350 GOTO300                               :rem 100
360 REM**READ IN SPRITE DATA**            :rem 201
370 FORI=SDTOSD+767:READA:POKEI,A:NEXT
                                          :rem 214
380 POKEPR,PA:POKEPR+1,PL:POKEPR+2,CL:POK
    EPR+3,SH:POKEPR+4,SH                  :rem 220
390 IFA$="N"THEN410                       :rem 35
400 POKEPR+5,196:POKEPR+6,197:POKEPR+7,19
    8                                     :rem 5
410 POKECR,1:POKECR+1,11:POKECR+2,15:POKE
    CR+3,8:POKECR+4,5:POKECR+5,2          :rem 197
420 POKECR+6,7:POKECR+7,3:RETURN          :rem 247
430 REM**BAD LANDING**                    :rem 231
440 POKEPR,200:GOSUB850:PRINTA$"{HOME}
    {10 SPACES}TROOPER MISSED TARGET"
                                          :rem 184
450 FORI=1TO1000:NEXT:PRINTA$:POKEEN,254:
    TR=TR-1:SC=SC-10                      :rem 85
```



Commodore 64 "Paratrooper" has three levels of difficulty; this is the hardest level with the smallest landing pads.

```
460 POKEMB,PEEK(MB)AND254:POKEPR,PA:IFTR=
    0THENGOTO480                          :rem 159
470 POKE198,0:GOTO250                     :rem 210
480 PRINTA$:GOSUB530:PRINT:PRINT:PRINT:PR
    INTTAB(15)"GAME OVER"                 :rem 36
490 PRINT:PRINTTAB(7)"PRESS ANY KEY TO PL
    AY AGAIN":POKE198,0                   :rem 146
500 GET B$:IF B$=""THEN500                :rem 79
510 POKEEN,0:POKE53277,0:PRINT"{CLR}":GOS
    UB700:SC=0:TR=10:GOTO210              :rem 49
520 REM**DISPLAY SCORE**                  :rem 181
530 PRINT"{HOME}{WHT}{2 SPACES}SCORE"SC"
    {LEFT} "TAB(13)"TROOPS"TR"{LEFT} "TAB
    (23)"WS"WS"{LEFT} ";                  :rem 243
540 PRINTTAB(30)"WT"WT"{LEFT}":RETURN
                                          :rem 70
550 REM**GOOD LANDING**                   :rem 76
560 POKE2040,199:FORI=1TO500:NEXTI:GOSUB7
    80                                    :rem 138
570 PRINTA$"{HOME}{10 SPACES}MISSION ACCO
    MPLISHED{7 SPACES}":FORI=1TO1000:NEXT
    :PRINTA$                              :rem 84
580 IF(TPAND32)=32THENSC=SC+25:GOTO610
                                          :rem 47
590 IF(TPAND64)=64THENSC=SC+50:GOTO610
                                          :rem 56
600 IF(TPAND128)=128THENSC=SC+75           :rem 143
610 POKEMB,PEEK(MB)AND254:POKEEN,254:POKE
    2040,PA:POKE198,0:GOTO250             :rem 20
620 REM**CLEAR SOUND REGISTERS**          :rem 204
630 FORI=STOS+24:POKEI,0:NEXT:RETURN
                                          :rem 129
640 REM**GAME BACKGROUND**                :rem 32
650 RW=1584:CR=54272:FORI=RWTORW+39:POKEC
    R+I,5:NEXT:POKE53280,0:POKE53285,0
                                          :rem 117
660 B$="{7}{RVS}{40 SPACES}"              :rem 47
670 FORI=1TO14:PRINTB$;:NEXT:RETURN
                                          :rem 62
680 REM**TITLE SCREEN**                   :rem 108
690 PRINT"{CLR}":FORA=0TO10:READL:GOSUB91
    0:NEXT                                :rem 69
700 PRINT"{12 DOWN}"TAB(14)"{CYN}(N)OVICE
    ":PRINTTAB(14)"{YEL}(I)NTERMEDIATE"
                                          :rem 187
710 PRINTTAB(14)"{GRN}(E)XPERT":POKE198,0
                                          :rem 164
```

Compose music, even if you can't read a note.



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```
720 GETB$:IFB$=""THEN720              :rem 87
730 PRINT"{CLR}"                      :rem 254
740 IFB$="N"THENPOKE53277,224:POKE2045,20
    1:POKE2046,202:POKE2047,203:RETURN
                                      :rem 130
750 IFB$="E"THENPOKE2045,201:POKE2046,202
    :POKE2047,203:RETURN              :rem 69
760 POKE2045,196:POKE2046,197:POKE2047,19
    8:RETURN                          :rem 131
770 REM**CHARGE SOUND**               :rem 93
780 POKES,97:POKES+1,8:POKES+5,0:POKES+6,
    240:POKES+24,15:POKES+4,33        :rem 28
790 FORI=1TO75:NEXT:POKES+4,32:POKES,143:
    POKES+1,10:POKES+4,33             :rem 68
800 FORI=1TO75:NEXT:POKES+4,32:POKES+1,12
    :POKES+4,33:FORI=1TO75:NEXT       :rem 30
810 POKES+4,32:POKES,195:POKES+1,16:POKES
    +4,33:FORI=1TO150:NEXT:POKES+4,32
                                      :rem 32
820 POKES,143:POKES+1,12:POKES+4,33:FORI=
    1TO75:NEXT:POKES+4,32:POKES,195
                                      :rem 199
830 POKES+1,16:POKES+4,33:FORI=1TO150:NEX
    T:POKES+4,32:RETURN                :rem 9
840 REM**SPLASH**                     :rem 243
850 POKES,0:POKES+1,64:POKES+5,17:POKES+6
    ,249:POKES+24,15                  :rem 160
860 POKES+4,129:FORI=1TO100:NEXT:POKES+4,
    128:FORI=1TO500:NEXT:POKES+1,0:RETURN
                                      :rem 197
870 REM**"POOF!" SOUND**              :rem 77
880 POKES,0:POKES+1,5:POKES+5,145:POKES+6
    ,245:POKES+24,15:POKES+4,129      :rem 127
890 FORI=1TO25:NEXT:POKES+4,128:FORI=1TO2
    00:NEXT:POKES+1,0:RETURN          :rem 184
900 REM**TITLE LETTERS**              :rem 202
910 FORI=1038+ATO1478+ASTEP40:T=I+54272:P
    OKET,1:POKET-40,6:POKEI,L         :rem 249
920 FORW=1TO10:NEXTW:NEXTI:RETURN:rem 247
930 I=49152                           :rem 39
940 READ A:IF A=256 THEN RETURN       :rem 237
950 POKE I,A:I=I+1:GOTO 940           :rem 248
960 DATA 0,0,0,0,0,0                  :rem 181
970 DATA 0,20,10,88,1,32              :rem 143
980 DATA 173,192,173,2,208,56         :rem 160
990 DATA 233,1,144,38,141,2            :rem 45
1000 DATA 208,173,16,208,41,2         :rem 132
1010 DATA 208,39,173,2,208,205        :rem 188
1020 DATA 10,192,176,31,32,196        :rem 189
1030 DATA 192,173,9,192,141,2         :rem 142
1040 DATA 208,173,16,208,9,2           :rem 92
1050 DATA 141,16,208,76,71,192        :rem 196
1060 DATA 141,2,208,173,16,208        :rem 187
1070 DATA 41,253,141,16,208,206       :rem 236
1080 DATA 3,192,208,94,173,4          :rem 100
1090 DATA 192,141,3,192,169,2         :rem 147
1100 DATA 141,0,192,14,0,192           :rem 75
1110 DATA 172,0,192,170,169,1         :rem 136
1120 DATA 10,202,208,252,141,1        :rem 169
1130 DATA 192,185,0,208,24,105        :rem 187
1140 DATA 1,153,0,208,176,36           :rem 87
1150 DATA 173,16,208,45,1,192         :rem 143
1160 DATA 240,37,185,0,208,205        :rem 189
1170 DATA 9,192,144,29,32,187         :rem 157
1180 DATA 192,153,0,208,173,1         :rem 139
1190 DATA 192,73,255,45,16,208        :rem 205
1200 DATA 141,16,208,76,159,192       :rem 248
1210 DATA 173,16,208,13,1,192         :rem 135
1220 DATA 141,16,208,173,0,192        :rem 185
1230 DATA 74,168,200,152,192,5        :rem 193
1240 DATA 208,170,76,49,234,169         :rem 2
1250 DATA 255,141,15,212,169,128      :rem 38
1260 DATA 141,18,212,173,27,212       :rem 236
1270 DATA 96,32,183,192,41,15         :rem 151
1280 DATA 153,0,208,96,32,183         :rem 148
1290 DATA 192,41,40,24,105,50         :rem 136
1300 DATA 141,3,208,96,120,169        :rem 191
1310 DATA 11,141,20,3,169,192         :rem 132
1320 DATA 141,21,3,88,96,120           :rem 90
1330 DATA 169,49,141,20,3,169,256     :rem 94
1340 REM PARA                         :rem 208
1350 DATA0,60,0,1,255,128,7,255       :rem 24
1360 DATA224,15,255,240,31,255,248,63
                                      :rem 79
1370 DATA255,252,63,255,252,59,189,220
                                      :rem 144
1380 DATA049,24,140,16,0,8,8,24       :rem 31
1390 DATA16,4,60,32,3,60,192,1        :rem 231
1400 DATA153,128,0,255,0,0,60,0        :rem 9
1410 DATA0,60,0,0,60,0,0,36            :rem 57
1420 DATA0,0,36,0,0,102,0,255         :rem 157
1430 DATA0,0,0,0,0,0,0,0              :rem 150
1440 DATA0,0,0,0,0,0,0,0              :rem 151
1450 DATA0,0,0,0,0,0,0,0              :rem 152
1460 DATA0,0,0,0,0,3,1,224             :rem 5
1470 DATA7,66,16,15,79,255,255,127
                                      :rem 204
1480 DATA255,255,64,0,0,64,0,0        :rem 231
1490 DATA0,0,0,0,0,0,0,0              :rem 156
1500 DATA0,0,0,0,0,0,0,190            :rem 254
1510 DATA0,0,0,0,0,0,0,0              :rem 149
1520 DATA0,0,0,0,0,0,0,0              :rem 150
1530 DATA0,0,0,0,0,0,0,0              :rem 151
1540 DATA0,0,0,0,0,0,0,7              :rem 159
1550 DATA128,0,15,240,0,31,252,0      :rem 61
1560 DATA31,254,0,63,255,0,255,255
                                      :rem 182
1570 DATA1,255,255,7,255,254,31,255
                                      :rem 242
1580 DATA248,255,255,192,0,0,0,0      :rem 78
1590 DATA0,6,0,0,6,0,0,15            :rem 223
1600 DATA0,0,31,128,0,22,128,0        :rem 211
1610 DATA038,192,0,38,64,0,102,64:rem 127
1620 DATA0,230,96,3,230,96,3,230      :rem 74
1630 DATA96,7,230,112,31,246,112,32
                                      :rem 224
1640 DATA30,120,127,254,252,0,6,140
                                      :rem 216
1650 DATA0,7,6,255,255,255,255,255
                                      :rem 195
1660 DATA248,255,255,224,255,255,128,0
                                      :rem 140
1670 DATA21,85,84,26,149,84,21,149
                                      :rem 203
1680 DATA84,21,149,84,26,149,84,25
                                      :rem 207
1690 DATA85,84,25,86,164,25,86,84:rem 168
1700 DATA26,150,84,21,86,164,21,85
                                      :rem 188
1710 DATA100,21,85,100,21,85,100,21
                                      :rem 205
1720 DATA86,164,21,85,84,0,0,0        :rem 237
1730 DATA0,0,0,0,0,0,0,0              :rem 153
1740 DATA0,0,0,0,0,0,0,255             :rem 6
1750 DATA5,85,80,6,149,80,6,85         :rem 4
1760 DATA80,6,85,80,6,149,80,5         :rem 0
1770 DATA149,80,5,154,144,5,153,144
                                      :rem 242
1780 DATA6,153,144,5,89,144,5,89      :rem 107
1790 DATA144,5,89,144,5,89,144,5      :rem 107
1800 DATA90,144,5,85,80,0,0,0         :rem 179
1810 DATA0,0,0,0,0,0,0,0              :rem 152
```

```
1820 DATA0,0,0,0,0,0,0,255          :rem 5
1830 DATA1,85,64,1,165,64,1,101     :rem 28
1840 DATA64,1,101,64,1,101,64,1     :rem 16
1850 DATA101,64,1,101,64,1,85,64    :rem 77
1860 DATA1,90,64,1,89,64,1,90       :rem 199
1870 DATA64,1,86,64,1,86,64,1       :rem 203
1880 DATA90,64,1,85,64,0,0,0        :rem 138
1890 DATA0,0,0,0,0,0,0,0            :rem 160
1900 DATA0,0,0,0,0,0,0,255           :rem 4
1910 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0
                                    :rem 193
1920 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0
                                    :rem 194
1930 DATA24,0,1,60,128,1,60,128     :rem 21
1940 DATA1,24,128,1,255,128,0,60    :rem 76
1950 DATA0,0,60,0,0,60,0,0           :rem 9
1960 DATA36,0,0,36,0,0,36,0         :rem 73
1970 DATA0,102,0,255                :rem 254
1980 DATA0,0,0,0,0,0,0,0            :rem 160
1990 DATA0,0,0,0,0,0,0,0            :rem 161
2000 DATA0,0,0,0,0,0,0,0            :rem 144
2010 DATA0,0,0,0,24,0,112,24         :rem 97
2020 DATA14,204,24,51,6,24,96,3      :rem 23
2030 DATA60,192,1,189,128,112,189,14
                                     :rem 30
2040 DATA220,255,59,7,126,224,1,255
                                    :rem 231
2050 DATA128,0,255,0,0,126,0,0      :rem 213
2060 DATA5,85,80,6,165,80,5,101      :rem 33
2070 DATA80,6,165,80,6,85,80,6      :rem 250
2080 DATA85,80,6,165,80,5,85,80      :rem 49
2090 DATA5,90,144,5,89,80,5,90      :rem 252
2100 DATA144,5,85,144,5,85,144,5     :rem 85
2110 DATA90,144,5,85,80,0,0,0       :rem 174
2120 DATA0,0,0,0,0,0,0,0            :rem 147
2130 DATA0,0,0,0,0,0,0,255            :rem 0
2140 DATA1,85,64,1,169,64,1,149      :rem 39
2150 DATA64,1,169,64,1,89,64,1      :rem 248
2160 DATA89,64,1,169,64,1,85,64      :rem 53
2170 DATA1,106,64,1,102,64,1,102     :rem 60
2180 DATA64,1,102,64,1,102,64,1      :rem 16
2190 DATA106,64,1,85,64,0,0,0       :rem 179
2200 DATA0,0,0,0,0,0,0,0            :rem 146
2210 DATA0,0,0,0,0,0,0,255          :rem 255
2220 DATA0,85,0,0,105,0,0,89        :rem 120
2230 DATA0,0,89,0,0,89,0,0           :rem 23
2240 DATA89,0,0,89,0,0,85,0          :rem 85
2250 DATA0,105,0,0,101,0,0,105      :rem 197
2260 DATA0,0,89,0,0,89,0,0           :rem 26
2270 DATA105,0,0,85,0,0,0,0          :rem 60
2280 DATA0,0,0,0,0,0,0,0            :rem 154
2290 DATA0,0,0,0,0,0,0,255            :rem 7
2300 DATA0,70,80,220,210,160,160,160
                                    :rem 254
2310 DATA16,1,18,1,20,18,15,15,16,5,18
                                    :rem 102
```

Program 3: Paratrooper, VIC Loader (Part 1)

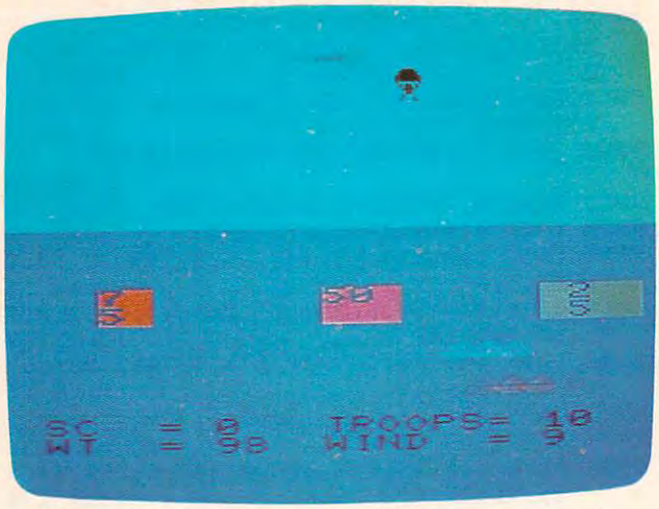
Version by Kevin Mykytyn, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering these listings.

```
1J POKE52,27:POKE56,27:CLR:I=6912:rem 162
15 PRINT"{CLR}{3 DOWN}{5 RIGHT}PLEASE WAI
   T"                               :rem 125
20 READ A:IF A=256 THEN35           :rem 58
30 CH=CH+A:POKE I,A:I=I+1:GOTO 20:rem 123
35 IFCH<>21476THENPRINT"ERROR IN DATA":EN
   D                                :rem 76
40 S$="LO"+CHR$(34)+"P2"+CHR$(34)+",8:"+C
   HR$(131):REM CHANGE 8TO1 FOR TAPE USER
   S                                :rem 194
50 FORI=1TOLEN(S$):POKE630+I,ASC(MID$(S$,
   I)):NEXT:POKE198,I:END           :rem 92
6000 I=6912:IFPEEK(I)=120THENRETURN
                                    :rem 133
6020 READ A:IF A=256 THENRETURN     :rem 24
6030 POKE I,A:I=I+1:GOTO 6020       :rem 78
6912 DATA 120,169,13,141,20,3,169,27,141,
     21,3,88                        :rem 55
6918 DATA 96,169,1,240,11,206,14,27,169,1
     10,141,15                      :rem 162
6924 DATA 144,76,21,235,173,4,144,208,251
     ,169,32,141                    :rem 11
6930 DATA 37,145,169,130,141,36,145,238,1
     4,27,169,59                    :rem 26
6936 DATA 141,15,144,198,0,208,9,160,44,3
     2,171,27                       :rem 118
6942 DATA 165,251,133,0,198,1,208,9,160,8
     8,32,171                       :rem 121
6948 DATA 27,165,252,133,1,198,2,208,9,16
     0,110,32                       :rem 116
6954 DATA 171,27,165,253,133,2,206,232,3,
     208,73,173                     :rem 216
6960 DATA 233,3,141,232,3,172,234,3,169,3
     2,153,0                        :rem 50
6966 DATA 30,200,153,0,30,206,234,3,16,36
     ,169,20                        :rem 48
6972 DATA 141,234,3,173,20,145,77,24,145,
     74,74,74                       :rem 126
6978 DATA 74,74,74,168,185,194,27,141,107
     ,27,141,111                    :rem 33
6984 DATA 27,141,160,27,141,166,27,76,168
     ,27,172,234                    :rem 28
6990 DATA 3,169,2,153,0,30,200,169,3,153,
     0,30                           :rem 152
6996 DATA 76,191,234,162,21,185,73,31,133
     ,254,185,72                    :rem 30
7002 DATA 31,153,73,31,136,202,208,246,16
     5,254,153,73                   :rem 48
7008 DATA 31,96,0,22,44,66,88,256:rem 101
```

Program 4: Paratrooper, VIC Main Program (Part 2)

```
0 PRINT"{CLR}{6 DOWN}{5 RIGHT}{BLK}{RVS}
  {SPACE}PARATROOPER"               :rem 124
1 PRINT"{3 DOWN}{RED}{7 SPACES}{RVS}(N)OV
  ICE":PRINT"{2 DOWN}{RED}{7 SPACES}{RVS}
  (E)XPERT"                         :rem 252
2 B1$="{RED}7{DOWN}{LEFT}5{UP}":B2$="
  {PUR}50{DOWN}{2 LEFT}//{UP}":B3$="{WHT}
  /2/{DOWN}{3 LEFT}/5/{UP}":E$="/{DOWN}
  {LEFT}/{UP}":Q$="{HOME}{20 DOWN}"
                                    :rem 236
3 GETA$:IFA$="N"THENB1$=B1$+E$:B2$=B2$+E$
  :B3$=B3$+E$:GOTO5                 :rem 195
4 IFA$<>"E"THEN3                    :rem 141
5 PRINT"{CLR}":FORA=38400TO38905:POKEA,0:
  NEXT:FORA=38752TO38773:POKEA,5:NEXT:C=3
  0720                              :rem 243
6 FORA=38796TO38817:POKEA,2:NEXT:FORA=388
  40TO38861:POKEA,7:NEXT            :rem 180
7 FORA=1TO9:READSO(A):NEXT:DATA 175,195,2
  07,215,215,207,215,215,0          :rem 94
10 POKE36869,255:FORI=7168TO7223:READA:PO
   KEI,A:NEXT                       :rem 133
15 FORA=7552TO7632:POKEA,PEEK(A+26624):NE
   XT:FORA=7544TO7551:POKEA,255:NEXT
                                    :rem 27
```



Sailboats glide over the water while the plane passes overhead in the VIC-20 version of "Paratrooper."

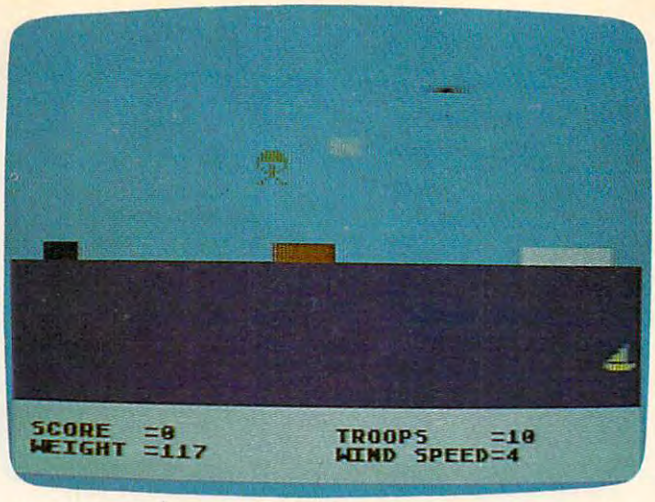
```
16 FORA=7424TO7431:POKEA,0:NEXT  :rem 142
20 DATA 60,126,126,255,255,255,129,90,90,
   60,24,24,32,36,66,0           :rem 134
25 DATA14,17,127,255,1,0,0,0,3,7,255,255,
   248,248,120,56                :rem 181
27 DATA 0,1,3,7,8,63,31,15,128,192,224,24
   0,176,248,240,224,195,36,24,219,60,24,
   24,24                         :rem 30
30 POKE1002,20:POKE1001,10:SYS6912
                                 :rem 166
31 PRINT"{HOME}{13 DOWN}{2 RIGHT}"B1$"
   {6 RIGHT}"B2$"{5 RIGHT}"B3$   :rem 238
35 PRINT"{HOME}{16 DOWN}{GRN} DE{BLK}":PR
   INT"{DOWN}{RED} DE":TR=10:SC=0:SQ=7996
                                 :rem 9
40 WT=INT(RND(1)*125+75):WS=INT(RND(1)*9+
   1):POKE198,0:POKESQ,32:POKESQ+C,0
                                 :rem 165
42 POKESQ+22,32:POKESQ+C+22,0:FORA=38730T
   O38751:POKEA,6:NEXT           :rem 147
45 POKE251,20-WS:POKE252,18-WS:POKE0,20-W
   S:POKE1,18-WS                 :rem 7
47 PRINT"{HOME}{5 DOWN}{BLK}{22 SPACES}"
                                 :rem 52
50 PRINTQ$"{BLK}{RVS}SC{2 RIGHT}="SC"
   {LEFT}{2 SPACES}":PRINTQ$"{10 RIGHT}
   {RVS}TROOPS="TR"{LEFT} "      :rem 48
51 PRINTQ$"{DOWN}{RVS}WT{2 SPACES}="WT"
   {LEFT} ":PRINTQ$"{RVS}{DOWN}{10 RIGHT}
   WIND{2 RIGHT}="WS"{LEFT} "    :rem 60
52 IFTR=0THEN300                 :rem 203
55 GETA$:IFA$=""THEN55           :rem 247
60 SX=PEEK(1002):SY=PEEK(7019)/22+1:DX=WS
   /20:DY=WT/400                 :rem 176
70 POKESQ,32:POKESQ+22,32:SP=SX+7680+INT(
   SY)*22                        :rem 94
72 CL=PEEK(SP+30742)AND 15:CO=PEEK(SP+307
   20)AND 15:IF CL<>0 OR CO<>0 THEN 90
                                 :rem 171
75 POKESP,0:POKESP+22,1          :rem 146
80 SX=SX+DX:SY=SY+DY:SQ=SP:FORA=1TO100:NE
   XT                            :rem 148
85 GOTO70                        :rem 13
90 IFCL=2ANDSY<13THENSC=SC+75:GOSUB200:GO
   TO40                          :rem 103
100 IFCL=1ANDSY<13THENSC=SC+25:GOSUB200:G
    OTO40                        :rem 137
110 IFCL=4ANDSY<13THENSC=SC+50:GOSUB200:G
    OTO40                        :rem 139
190 PRINT"{HOME}{5 DOWN}{BLK}{2 SPACES}
    {RVS}PARATROOPER FAILED":TR=TR-1:POKE
    SQ,6:POKESQ+C,1:FORV=15TO0STEP-1
                                 :rem 88
195 POKE36877,210:POKE36878,V:FORTD=1TO50
    :NEXT:NEXT:POKE36877,0:SC=SC-10:GOTO4
    0                            :rem 148
200 POKESQ,0:POKESQ+22,1:PRINT"{HOME}
    {5 DOWN}{BLK} {RVS}MISSION ACCOMPLISH
    ED"                          :rem 93
210 POKE36878,15:FORA=1TO9:POKE36876,SO(A
    ):FORB=1TO130:NEXT:NEXT:RETURN
                                 :rem 251
300 PRINT"{HOME}{5 DOWN}{BLK}{7 SPACES}
    {RVS}GAME OVER":PRINT"{DOWN}
    {5 SPACES}{RVS}ANOTHER GAME?" :rem 92
310 POKE37166,127:POKE788,191:POKE789,234
    :POKE37166,192               :rem 117
320 GETA$:IFA$="Y"THENRUN        :rem 6
330 IFA$<>"N"THEN320             :rem 90
```

Program 5: Paratrooper For Atari

Version by Kevin Mykytyn, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
BD 0  DIM SND(7,1):FOR A=1 TO 7:REA
      D B,C:SND(A,0)=B:SND(A,1)=C:N
      EXT A:DATA 121,1,96,1,81,1,60
      ,2,81,1,60,2,0,1
JH 1  GRAPHICS 17:POSITION 4,8:PRIN
      T #6;"paratrooper":POSITION 5
      ,10:PRINT #6;"[CTRL]OVICE":POSIT
      ION 5,12
DM 2  PRINT #6;"[ESC]XPERT":POKE 764,
      255:DIM A$(3),B$(3),C$(3)
JM 3  IF PEEK(764)=42 THEN A$="z":B
      $="[ALT]":C$="[ALT]":GOTO 6
HG 4  IF PEEK(764)=35 THEN A$="y":B
      $="[ALT]":C$="[ALT]":GOTO 6
KB 5  GOTO 3
HJ 6  POKE 54279,56:GRAPHICS 1:SETC
      OLOR 4,9,10:SETCOLOR 0,8,3:SE
      TCOLOR 2,0,15:SETCOLOR 1,0,0
EM 10 POKE 559,62:POKE 53277,3:POK
      E 704,200:POKE 705,0:POKE 70
      6,13:POKE 707,44:POKE 623,1
OP 11 T=0:IF PEEK(13824)<>169 THEN
       FOR A=13824 TO 14147:READ B
      :T=T+B:POKE A,B:NEXT A:IF T<
      >39469 THEN PRINT "ERROR":EN
      D
PO 15 IF PEEK(14345)<>24 THEN FOR
      A=14336 TO 14848:POKE A,PEEK
      (A+43008):NEXT A
FA 16 POKE 756,56:FOR A=14790 TO 1
      4799:POKE A,255:NEXT A
GC 20 FOR A=14800 TO 14808:POKE A,
      15:NEXT A
BG 30 FOR A=0 TO 19:FOR B=12 TO 23
      :POSITION A,B:PRINT #6;"Y";:
      NEXT B:NEXT A
KC 35 POSITION 1,11:PRINT #6;A$;"
      {6 SPACES}";B$;"{6 SPACES}";
      C$:A=USR(13824)
```



Atari "Paratrooper" uses player/missile graphics, a display list interrupt, and machine language to smooth out the action.

```
EK 40  TR=10:SC=0:FOR A=14326 TO 14
       328:POKE A,100:NEXT A
MF 50  POKE 14320,0:FOR TD=1 TO 100
       0:NEXT TD:POSITION 0,1:PRINT
        #6;"{20 SPACES}":POKE 752,1
GG 52  WS=INT(RND(1)*9)+1:WT=INT(RN
       D(1)*125)+75:BS=WS-1:CS=WS+1
       :POKE 14330,15-CS:POKE 14331
       ,15-CS
KF 55  POKE 14332,15-BS:POKE 14333,
       15-BS
JO 60  POKE 656,1:POKE 657,1:PRINT
       "SCORE  =";SC;"  ":POKE 656,
       1:POKE 657,20:PRINT "TROOPS
       {4 SPACES}=";TR;" "
FG 61  IF TR=0 THEN POSITION 5,5:PR
       INT #6;"GAME OVER":POSITION
       4,7:POKE 764,255:GOTO 300
BF 70  POKE 656,2:POKE 657,1:PRINT
       "WEIGHT =";WT;" ":POKE 656,2
       :POKE 657,20:PRINT "WIND SPE
       ED=";WS:POKE 764,255
HO 80  IF PEEK(764)=255 THEN 80
BK 90  POKE 14145,0:POKE 704,200:EN
       =(RND(1)*50)+120:START=PEEK(
       14321):INC=WT/300:C=WS/10:B=
       PEEK(14326)
JK 100  FOR A=START TO EN STEP INC:
        POKE 53278,0:POKE 14320,A:P
        OKE 14325,B:B=B+C:IF B>200
        THEN B=40
MI 110  P=PEEK(53252):ON P GOTO 210
        ,220,210,230,210,210,210,24
        0
DF 210  NEXT A:SC=SC-10:TR=TR-1:POS
        ITION 1,1:PRINT #6;"PARATRO
        OPER FAILED"
NA 215  POKE 14145,30:POKE 704,15:F
        OR A=15 TO 0 STEP -1:SOUND
        0,10,8,A:FOR B=1 TO 10:NEXT
         B:NEXT A:GOTO 50
KC 220  SC=SC+75:GOTO 245
JO 230  SC=SC+25:GOTO 245
IP 240  SC=SC+50
MK 245  POSITION 0,1:PRINT #6;"MISS
        ION ACCOMPLISHED"
DM 250  FOR A=1 TO 7:SOUND 0,SND(A,
        0),10,15:FOR B=1 TO 50*SND(
        A,1):NEXT B:NEXT A:GOTO 50
LN 300  PRINT #6;"HIT RETURN"
NG 301  IF PEEK(764)=255 THEN 301
CI 310  FOR A=704 TO 707:POKE A,0:N
        EXT A:POKE 623,4:RUN
JF 13824  DATA 169,0,160,0,153,0,60
          ,153,0,61,153,0,62,153,0,
          63,136,208
BF 13842  DATA 241,160,11,185,41,55
          ,153,74,62,185,53,55,153,
          163,63,136,16,241
CN 13860  DATA 160,47,162,54,169,7,
          32,92,228,104,96,216,206,
          244,55,208,38,169
HP 13878  DATA 3,141,244,55,206,246
          ,55,173,246,55,201,48,208
          ,23,169,200,141,246
LK 13896  DATA 55,173,10,210,16,8,1
          69,80,141,241,55,76,91,54
          ,169,50,141,241
IC 13914  DATA 55,206,250,55,208,21
          ,173,251,55,141,250,55,23
          8,247,55,173,247,55
HC 13932  DATA 201,200,208,5,169,48
          ,141,247,55,206,252,55,20
          8,21,173,253,55,141
DL 13950  DATA 252,55,238,248,55,17
          3
PK 13956  DATA 248,55,201,200,208,5
EF 13962  DATA 169,48,141,248,55,16
          9
AK 13968  DATA 0,141,249,55,173,249
AA 13974  DATA 55,168,24,105,60,133
CL 13980  DATA 204,169,0,133,203,18
          5
AL 13986  DATA 242,55,168,169,0,162
CA 13992  DATA 15,145,203,200,202,1
          6
HM 13998  DATA 250,173,249,55,168,1
          85
OP 14004  DATA 65,55,24,105,252,141
LL 14010  DATA 205,54,169,0,105,54
CH 14016  DATA 141,206,54,185,240,5
          5
PC 14022  DATA 153,242,55,168,162,0
JA 14028  DATA 189,255,255,145,203,
          200
FJ 14034  DATA 232,224,15,208,245,2
          38
CP 14040  DATA 249,55,173,249,55,20
          1
AB 14046  DATA 2,144,179,173,245,55
PD 14052  DATA 141,0,208,173,246,55
PL 14058  DATA 141,1,208,173,247,55
PK 14064  DATA 141,2,208,173,248,55
MP 14070  DATA 141,3,208,76,98,228
GE 14076  DATA 60,126,126,255,255,1
          29
MC 14082  DATA 153,153,90,60,24,24
KO 14088  DATA 36,66,195,1,99,255
```

```
LJ 14094  DATA 255,0,0,0,0,0,0,0,0,
          0,0,0,129,66,36,153,90,64
          ,0,0,0,0,0,0
FD 14118  DATA 0,0,0,102,247,239
CE 14124  DATA 255,126,255,239,102,
          0
EK 14130  DATA 0,0,0,4,4,12
LL 14136  DATA 12,28,60,60,124,132
IJ 14142  DATA 255,255,126,0,15,0
```

Program 6: Paratrooper For Apple

Version by Tim Victor, Editorial Programmer

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

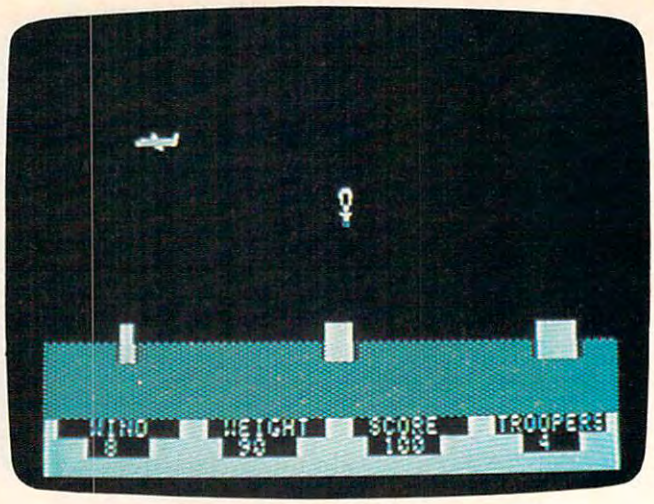
```
100  GOTO 150
110  VTAB AL: HTAB AH: PRINT SK$;
120 AH = AH - 1: IF AH = 0 THEN AH = 38

130  VTAB AL: HTAB AH: PRINT PL$;
140  RETURN
150 SK$ = "    ":WA$ = "#$%&":PL$ = "'()
     ":TR$(0) = "*":TR$(1) = "+"
160 P1$ = ",":P2$ = "-":S1$ = ".":S2$ =
     "/"
170 KB = 49152
180 X = 0: FOR I = 141 * 256 + 24 TO I +
     103: READ A:X = X + A: POKE I,A: NEXT

190  FOR I = 141 * 256 TO I + 7: POKE I
     ,0: NEXT
200  FOR I = 768 TO I + 84: READ A:X =
     X + A: POKE I,A: NEXT : IF X <  >
     23201 THEN  PRINT "ERROR IN DATA S
     TATEMENTS.": STOP
210  POKE 6,0: POKE 7,141
220  POKE 54,0: POKE 55,3: CALL 1002
230  HOME : HGR
240  FOR I = 17 TO 20: VTAB I: HTAB 1: FOR
     J = 1 TO 39 STEP 4: PRINT WA$;
250  NEXT : NEXT
260  FOR I = 16 TO 17: VTAB I
270  INVERSE : HTAB 6: PRINT " ";: HTAB
     20: PRINT "  ";: HTAB 35: PRINT "
       ";: NEXT
280  FOR I = 21 TO 23: HTAB 1: VTAB I: FOR
     J = 0 TO 39: PRINT " ";: NEXT : NEXT

290  NORMAL : VTAB 21: HTAB 2: PRINT "
      WIND  ";: HTAB 12: PRINT " WEIGHT
      ";: HTAB 22: PRINT " SCORE  ";: HTAB
     32: PRINT "TROOPERS";
300  GOSUB 730
310 AL =  RND (1) * 7 + 1:AH = 39:WD =
      INT (1 + 10 *  RND (1)):WG =  INT
     (75 + 175 *  RND (1))
320 PD = WD / 15:PG = WG / 250
330  VTAB 22: HTAB 4: PRINT "     ";: HTAB
     13: PRINT "     ";
340  HTAB 23: PRINT "     ";: HTAB 34: PRINT
     "    ";
350  VTAB 22: HTAB 5: PRINT WD;: HTAB
     14: PRINT WG;
360  HTAB 24: PRINT SC;: HTAB 35: PRINT
     TR;
370  POKE 49168,0
380  GOSUB 110: FOR I = 1 TO DF: NEXT :
      IF  PEEK (KB) > 128 THEN  POKE 49
     168,0: GOTO 400
390  GOTO 380
400 PY = AL + 1:PX = AH + 1
410  GOSUB 110: FOR I = PY TO PY + 1: VTAB
     I: HTAB PX: PRINT TR$(I - PY);: NEXT

420  FOR I = 1 TO 80: NEXT
```



The landing pads are always the same size in Apple "Paratrooper," but the plane moves faster in the harder level.

```
430  FOR I = PY TO PY + 1: VTAB I: HTAB
     PX: PRINT " ";: NEXT
440 PX = PX + PD: IF PX > 41 THEN PX =
     PX - 40
450 PY = PY + PG: IF PY > 14 THEN  GOSUB
     480: IF PY = 0 THEN 310
460  IF PY > 16 THEN  GOSUB 620: GOTO 3
     10
470  GOTO 410
480  IF PX < 6 THEN  RETURN
490  IF PX < 7 THEN SC = SC + 75: GOTO
     550
500  IF PX < 20 THEN  RETURN
510  IF PX < 22 THEN SC = SC + 50: GOTO
     550
520  IF PX < 35 THEN  RETURN
530  IF PX < 38 THEN SC = SC + 25: GOTO
     550
540  RETURN
550  FOR I = 14 TO 15: VTAB I: HTAB PX:
      PRINT TR$(I - 14);: NEXT
560  VTAB AL: HTAB AH: PRINT SK$;
570  FOR I = 1 TO 200: NEXT : VTAB 14: HTAB
     PX: PRINT " ";: HTAB PX: PRINT P1$
     ;
580  FOR I = 1 TO 200: NEXT : HTAB PX: PRINT
     " ";: HTAB PX: PRINT P2$;
590  VTAB 24: HTAB 2: PRINT "CONGRATULA
     TIONS! MISSION ACCOMPLISHED";: FOR
     I = 1 TO 1200: NEXT : HTAB 1: CALL
      - 868
600  FOR I = 14 TO 15: VTAB I: HTAB PX:
      PRINT " ";: NEXT
610 PY = 0: RETURN
620  VTAB AL: HTAB AH: PRINT SK$;
630  FOR I = 15 TO 16: VTAB I: HTAB PX:
      PRINT " ";: NEXT
640  VTAB 16: HTAB PX: PRINT S1$;: FOR
     I = 1 TO 200: NEXT : VTAB 16: HTAB
     PX: PRINT " ";
650  VTAB 16: HTAB PX: PRINT S2$;: VTAB
     24: HTAB 2: PRINT "SPLASH! PARATRO
     OPER MISSED THE TARGET";
660  FOR I = 1 TO 1200: NEXT : HTAB 1: CALL
      - 868: VTAB 16: HTAB PX: PRINT "
     ";
670 SC = SC - 10: IF SC < 0 THEN SC = 0

680 TR = TR - 1: IF TR > 0 THEN  RETURN
```

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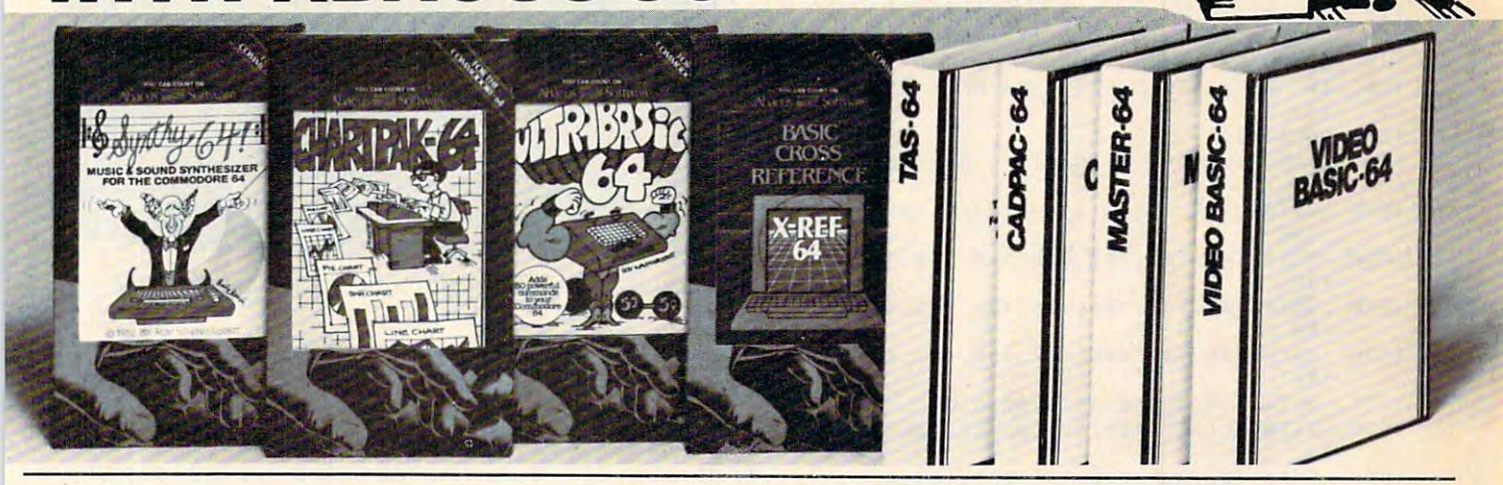

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```
690  VTAB 22: HTAB 24: PRINT SC;: HTAB
     35: PRINT TR;
700  VTAB 24: HTAB 2: PRINT "GAME OVER-
      PRESS ANY KEY TO PLAY AGAIN";
710  IF  PEEK (KB) < 128 THEN 710
720  POKE 49168,0: VTAB 24: HTAB 1: CALL
      - 868
730 SC = 0:TR = 10
740  VTAB 24: HTAB 2: PRINT "SELECT DIF
     FICULTY: (1) EASY, (2) HARD";
750  IF  PEEK (KB) < 128 THEN 750
760  POKE 49168,0: IF  PEEK (KB) = 49 THEN
     DF = 150: GOTO 790
770  IF  PEEK (KB) = 50 THEN DF = 30: GOTO
     790
780  GOTO 750
790  VTAB 24: HTAB 1: CALL  - 868: RETURN

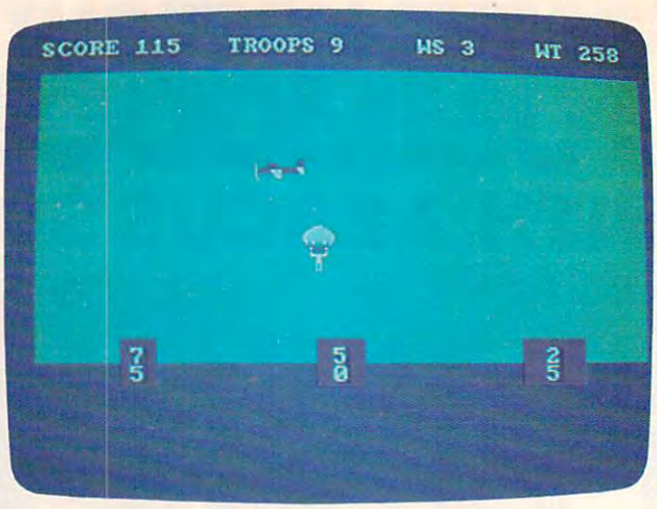
1000  DATA  145,196,145,196,145,196,145
     ,196
1010  DATA 162,136,162,136,162,136,162,
     136
1020  DATA 196,145,196,145,196,145,196,
     145
1030  DATA 136,162,136,162,136,162,136,
     162
1040  DATA 0,0,0,252,255,255,0,0
1050  DATA 0,134,143,255,255,255,252,22
     4
1060  DATA 192,224,240,255,255,191,0,0
1070  DATA 190,255,227,227,162,162,162,
     156
1080  DATA 156,136,255,156,156,148,148,
     148
1090  DATA   0,0,190,255,227,227,162,15
     6
1100  DATA   0,0,0,0,0,0,0,156
1110  DATA 190,255,227,227,156,156,136,
     255
1120  DATA  0,0,0,0,190,255,227,227
1130  DATA 133,69,134,70,132,71,166,7
1140  DATA 10,10,176,4,16,62,48,4
1150  DATA 16,1,232,232,10,134,27,24
1160  DATA 101,6,133,26,144,2,230,27
1170  DATA 165,40,133,8,165,41,41,3
1180  DATA 5,230,133,9,162,8,160,0
1190  DATA 177,26,36,50,48,2,73,127
1200  DATA 164,36,145,8,230,26,208,2
1210  DATA 230,27,165,9,24,105,4,133
1220  DATA 9,202,208,226,165,69,166,70
1230  DATA 164,71,76,240,253
```

Program 7: Paratrooper For IBM PC/PCjr

Version by Patrick Parrish, Programming Supervisor

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
LK 100 KEY OFF
DB 110 DEF FNSZ(X,Y)=(4+INT((X+7)/8)*Y
       )/2
CH 120 GOSUB 890 ' title screen 1
MF 130 GOSUB 250 ' title screen 2
BA 140 GOSUB 230 ' initialize variable
       s
GG 150 GOSUB 330 ' set up background
OA 160 GOSUB 420 ' start game
GD 170 LOCATE 10,15:PRINT "GAME OVER"
KC 180 LOCATE 12,7:PRINT "PRESS ANY KE
       Y TO PLAY AGAIN":DEF SEG=0:POKE
        1050,PEEK(1052)
NH 190 A$=INKEY$:IF A$=""THEN 190
NN 200 FLAG=0
CA 210 GOTO 130
```



A chutist plunges downward in "Paratrooper" for the IBM PC/PCjr.

```
GD 220 ' initialize variables
EG 230 SCORE=0:TROOPS=10:WT=0:WS=0:RET
       URN
HB 240 ' input level routine
JC 250 CLS:SCREEN 1:DEF SEG=0:POKE 105
       0,PEEK(1052)
OK 260 LOCATE 10,15:PRINT "LEVEL :"
EO 270 LOCATE 12,15:PRINT "(N)ovice"
PH 280 LOCATE 14,15:PRINT "(E)xpert"
PE 290 A$=INKEY$:IF A$=""THEN 290
OP 300 CLS
MP 310 RETURN
HB 320 ' set up background
AF 330 CLS
NI 340 COLOR 9,1:LINE(0,0)-(320,150),1
       ,BF
MB 350 GOSUB 800 ' display score
PD 360 IF A$="N" OR A$="n" THEN 370 EL
       SE 380
OP 370 LINE(43,140)-(60,160),2,BF:LINE
       (143,140)-(168,160),2,BF:LINE(2
       51,140)-(284,160),2,BF:A=284:B=
       170:C=60:D=249:E=139:F=41:GOTO
       390
KI 380 LINE(46,140)-(57,160),2,BF:LINE
       (146,140)-(165,160),2,BF:LINE(2
       54,140)-(281,160),2,BF:A=281:B=
       165:C=57:D=252:E=144:F=44
JI 390 LOCATE 19,7:PRINT "7":LOCATE 20
       ,7:PRINT "5":LOCATE 19,20:PRINT
        "5":LOCATE 20,20:PRINT "0":LOC
       ATE 19,34:PRINT "2":LOCATE 20,3
       4:PRINT "5"
MO 400 RETURN
FO 410 ' game routine
BJ 420 PLX=1
OF 430 DEF SEG=&H40 : RANDOMIZE PEEK(&
       H6D)
IA 440 GOSUB 800
PH 450 PLY=INT(RND(1)*30)+40:NY=PLY
LE 460 GOSUB 840
DF 470 IF JUMP=1 THEN 490
```

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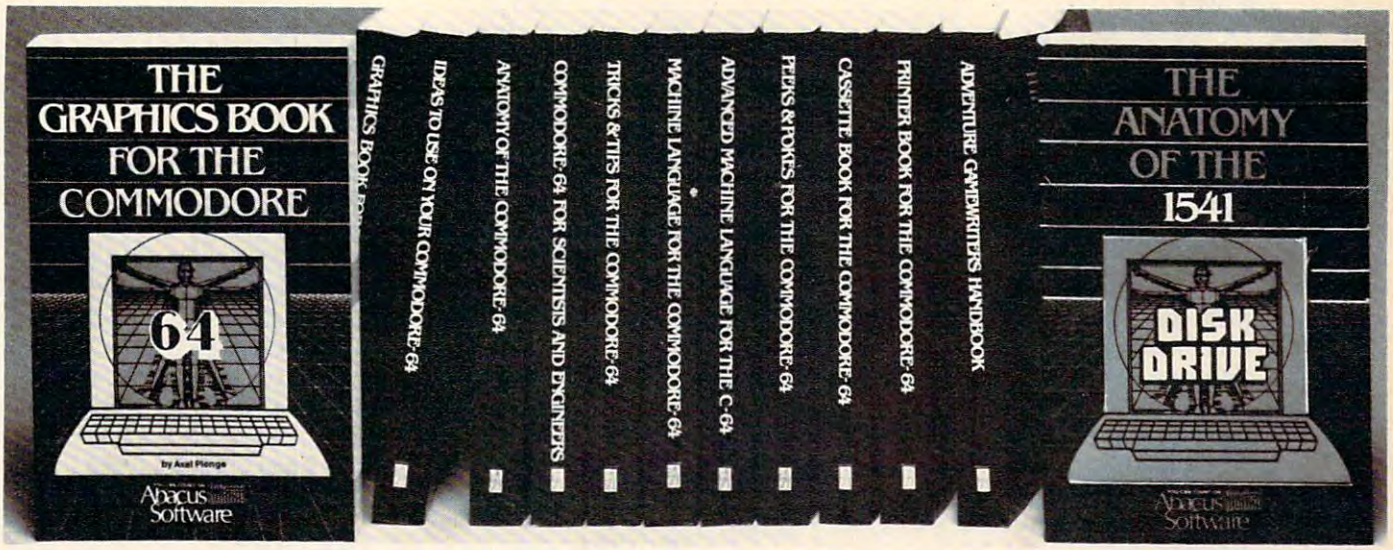

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```
KK 480 IF INKEY$<>"" THEN JUMP=1:PX=PL
       X+5:PY=PLY+10:PUT (PX,PY),TROOP
       %
JG 490 IF JUMP=1 THEN GOSUB 540
OI 500 IF TROOPS=0 THEN FLAG=1:GOTO 52
       0
GC 510 GOTO 460
MD 520 RETURN
HG 530 ' jump routine
AC 540 PUT(PX,PY),TROOP%:PX=PX+DX:PY=P
       Y+DY:IF PX>299 THEN PX=1
HK 550 PUT(PX,PY),TROOP%
OL 560 T=INT(PY):IF T<=119 AND T>=116
       THEN 600
EE 570 IF PY>=BOT THEN 730
MP 580 RETURN
OE 590 ' hit?
EM 600 L=PX+9
EM 610 IF L<=A AND L>=D THEN PAD=1:GOT
       O 650
IM 620 IF L<=B AND L>=E THEN PAD=2:GOT
       O 650
MM 630 IF L<=C AND L>=F THEN PAD=3:GOT
       O 650
MI 640 RETURN
BH 650 PUT(PX,PY),TROOP%:PUT(PX,PY),LA
       ND%
EI 660 SCORE=SCORE+PAD*25
IE 670 LOCATE 1:PRINT "           MISSI
       ON SUCCESSFUL!            "
BD 680 FOR W=1 TO 100:GOSUB 830:NEXT W
MK 690 PUT(PX,PY),LAND%:NY=INT(RND(1)*
       30)+40
JB 700 JUMP=0:GOSUB 800
FM 710 DEF SEG=0:POKE 1050,PEEK(1052):
       RETURN
OG 720 ' miss !
PM 730 PUT(PX,PY),TROOP%:PUT(PX,PY),SP
       LASH%
OF 740 LOCATE 1:PRINT "           TROOPE
       R MISSED TARGET           "
BO 750 FOR W=1 TO 100:GOSUB 830:NEXT W
DM 760 TROOPS=TROOPS-1:SCORE=SCORE-10:
       JUMP=0:GOSUB 800
DP 770 PUT(PX,PY),SPLASH%:NY=INT(RND(1
       )*30)+40
GL 780 DEF SEG=0:POKE 1050,PEEK(1052):
       RETURN
JP 790 ' display score
GF 800 WS=INT(RND(1)*11):DX=WS/6:WT=IN
       T(RND(1)*225)+75:DY=WT/150:BOT=
       INT(RND(1)*15)+160
MI 810 LOCATE 1:PRINT "SCORE";TAB(6);S
       CORE;TAB(13);"TROOPS";TAB(19);T
       ROOPS;TAB(26);"WS";TAB(28);WS;T
       AB(34);"WT";TAB(36);WT;TAB(40);
       " "
MG 820 RETURN
FB 830 ' move plane routine
IB 840 PLX=PLX-1
AA 850 IF PLX=0 THEN LINE(1,PLY)-(28,P
       LY+10),1,BF:PLX=280:PLY=NY
DN 860 PUT(PLX,PLY),PLANE%,PSET
NA 870 RETURN
IJ 880 ' read sprite data and display
       title page
FL 890 READ X,Y:N=FNSZ(X,Y)
IB 900 DIM PLANE%(N)
HE 910 PLANE%(0)=X:PLANE%(1)=Y
PC 920 FOR I=2 TO N:READ PLANE%(I):NEX
       T I
EA 930 READ X,Y:N=FNSZ(X,Y)
CO 940 DIM TROOP%(N)
DG 950 TROOP%(0)=X:TROOP%(1)=Y
IH 960 FOR I=2 TO N:READ TROOP%(I):NEX
       T I
FI 970 READ X,Y:N=FNSZ(X,Y)
MB 980 DIM LAND%(N)
EK 990 LAND%(0)=X:LAND%(1)=Y
OB 1000 FOR I=2 TO N:READ LAND%(I):NEX
       T I
GC 1010 READ X,Y:N=FNSZ(X,Y)
HC 1020 DIM SPLASH%(N)
FN 1030 SPLASH%(0)=X:SPLASH%(1)=Y
AF 1040 FOR I=2 TO N:READ SPLASH%(I):N
       EXT I
DK 1050 TEMP$="E8G16G3L16FEDL5EFF#G":T
       EMP1$="A8>C16C3L16DC<AG2":TEMP
       3$="B8>D16D3L16C<BA>D2":T$=TEM
       P$+TEMP1$:S$=TEMP$+TEMP3$
MN 1060 CLS:SCREEN 1:COLOR 9,1
MC 1070 PLAY "MB T90 O2 L8;XT$;"
FJ 1080 A$="P":L=11:X=75:GOSUB 1220
LK 1090 A$="A":L=13:X=91:GOSUB 1220
QP 1100 A$="R":L=15:X=107:GOSUB 1220
FK 1110 A$="A":L=17:X=123:GOSUB 1220
ME 1120 A$="T":L=19:X=139:GOSUB 1220
KO 1130 PLAY "MB T90 O2 L8;XS$;"
BH 1140 A$="R":L=21:X=155:GOSUB 1220
PO 1150 A$="O":L=23:X=171:GOSUB 1220
LK 1160 A$="O":L=25:X=187:GOSUB 1220
PL 1170 A$="P":L=27:X=203:GOSUB 1220
EJ 1180 A$="E":L=29:X=219:GOSUB 1220
CP 1190 A$="R":L=31:X=235:GOSUB 1220
ED 1200 FOR I=1 TO 500:NEXT I
IC 1210 RETURN
BM 1220 FOR I=1 TO 64:PUT(X,I),TROOP%,
       PSET:NEXT I:PUT(X,64),TROOP%:P
       UT(X,64),LAND%:LOCATE 9,L:PRIN
       T A$:RETURN
OE 1230 ' plane
OM 1240 DATA &H38,&hB,&h5555,&h5555,&h
       5555,&h5555,&h5555,&h5555
NB 1250 DATA &HA555,&H5555,&H5555,&H56
       55,&HD5A5,&HA956,&H5555,&HA55A
DP 1260 DATA &H5AD5,&H550A,&h5A55,&hD5
       A5,&h2A8,&hAAAA,&HF5AF,&HAAEA
CK 1270 DATA &HFAFF,&HABAA,&HEAF5,&HBF
       AA,&HAAFA,&HF5AA,&H55D5,&HF55F
EL 1280 DATA &H5555,&HD555,&H5755,&H55
       F5,&H5555,&H55D5,&H5555,&H5555
MB 1290 DATA &H55
BL 1300 ' TROOPER
EE 1310 DATA &H2A,&H17,&H0,&H0,&H0,&H0
       ,&H80AA,&H0
EE 1320 DATA &HA00,&HA8AA,&H0,&HAA00,&
       HAAAA,&H80,&HAA02,&HAAAA
PJ 1330 DATA &HA0,&HAA0A,&HAAAA,&HA8,&
       HAA0A,&HAAAA,&HA8,&HAA0A
IO 1340 DATA &HAAAA,&HA8,&H8A02,&HA888
       ,&HA0,&H8200,&H2000,&H80
QP 1350 DATA &hC300,&H3000,&HC0,&H3B00
```

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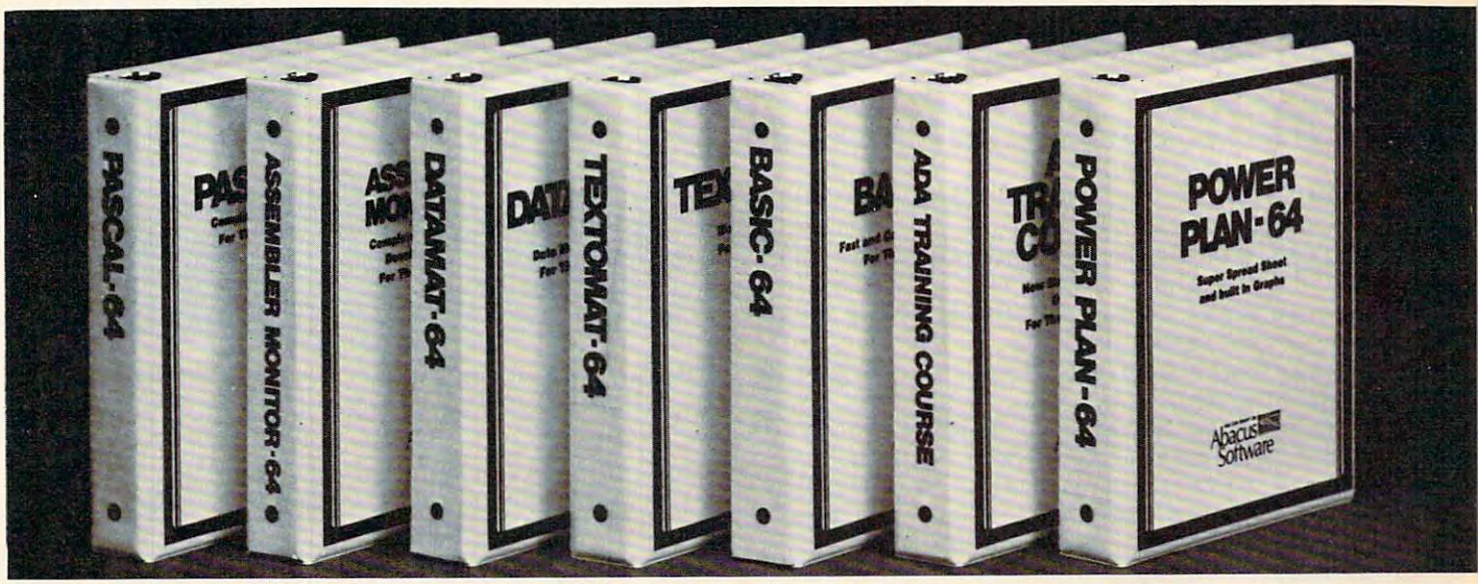

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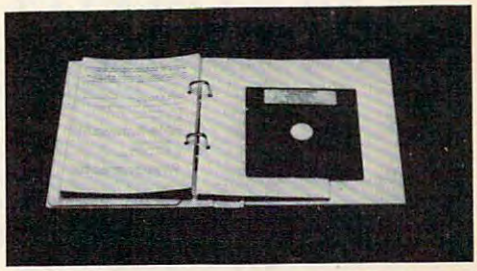

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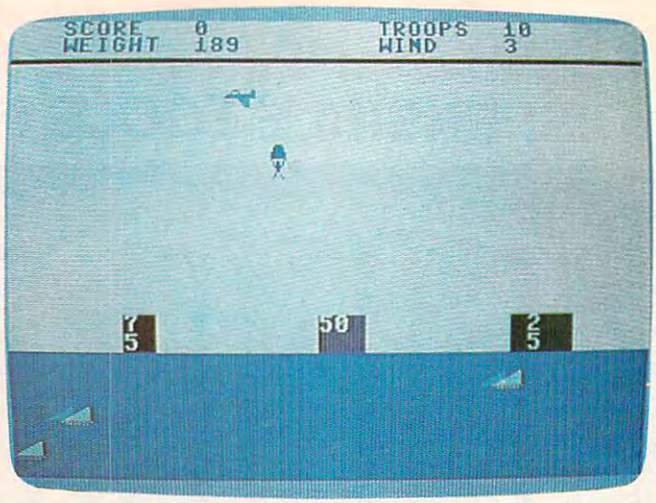
```
        ,&H3B3F,&H0,&HF00,&H3C3F
NL 1360 DATA &H0,&HB00,&H380C,&H0,&HA0
        0,&HA8AA,&H0,&H0
MB 1370 DATA &H2A,&H0,&H0,&H2A,&H0,&H0
        ,&H2A,&H0
BH 1380 DATA &H0,&H22,&H0,&H0,&H22,&H0
        ,&H0,&H22
JK 1390 DATA &H0,&H0,&H22,&H0,&H0,&H0,
        &H0,&H0
PE 1400 ' LAND
FL 1410 DATA &H22,&H17,&H0,&H0,&H0,&H0
        ,&H0,&H0
BP 1420 DATA &H0,&H0,&H0,&H0,&H0,&H0,&
        H0,&H0
BC 1430 DATA &H0,&H0,&H0,&H0,&H0,&H0,&
        H0,&H0
BF 1440 DATA &H0,&H0,&H0,&H0,&H0,&H0,&
        H0,&H0
BI 1450 DATA &H0,&H0,&H0,&HC00F,&H0,&H
        8F00,&HC8,&H0
QP 1460 DATA &H883,&H0,&HAA00,&HA8,&H0
        ,&H800A,&H0,&HA00
JD 1470 DATA &H80,&H0,&H800A,&H0,&H800
        ,&H80,&H0,&H8008
LL 1480 DATA &H0,&H800,&H80,&H0
CF 1490 ' SPLASH
EL 1500 DATA &H30,&H17,&H0,&H0,&H0,&H0
        ,&H0,&H0
BO 1510 DATA &H0,&H0,&H0,&H0,&H0,&H0,&
        H0,&H0
BB 1520 DATA &H0,&H0,&H0,&H0,&H0,&H0,&
        H0,&H0
BE 1530 DATA &H0,&H0,&H0,&H0,&H0,&H0,&
        H0,&H0
PA 1540 DATA &H0,&H0,&H0,&H0,&H5555,&H
        0,&H5500,&H5555
AF 1550 DATA &H55,&H5505,&HFFFF,&H5055
        ,&HFF15,&HFFFF,&H54FF,&HFF17
ID 1560 DATA &HFFFF,&HD4FF,&HFF55,&HFF
        FF,&H55FF,&H5515,&HFD7F,&H5455
CN 1570 DATA &H5505,&H5555,&H5055,&H55
        00,&H5555,&H55,&H300,&H57D5
PE 1580 DATA &HC0,&H300,&HFFFF,&HC0,&H
        0,&HFC3F,&H0,&H0
```

Program 8: Paratrooper For Plus/4 & Commodore 16

Version by Patrick Parrish, Programming Supervisor

Refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 POKE55,0:POKE 56,60:CLR:GOSUB500:C=-10
   24:SQ=3072:SYS1002
20 RESTORE 40:FORA=15632TO15687:READB:POK
   EA,B:NEXT
30 FORA=15360TO15367:POKEA,255:NEXT
40 DATA 60,126,126,255,255,255,129,90,90,
   60,24,24,32,36,66,0
50 DATA14,17,127,255,1,0,0,0,3,7,255,255,
   248,248,120,56
60 DATA255,255,255,254,250,234,085,213
70 DATA251,235,171,171,171,171,85,87,195,
   36,24,219,60,24,24,24
80 PRINT"{CLR}{8 DOWN}{RED}"SPC(14)"PARAT
   ROOPER"
90 PRINT"{2 DOWN}{BLU}"SPC(15)"(N)OVICE"
100 PRINT"{DOWN}"SPC(15)"(E)XPERT"
```



"Paratrooper" is one of COMPUTE!'s *first programs for the new Commodore Plus/4 and 16.*

```
110 PRINT"{DOWN}"SPC(16)"(Q)UIT"
120 B1$="{RED}A{DOWN}{LEFT}?{UP}":B2$="
    {PUR}?:{DOWN}{2 LEFT}@@{UP}":B3$="
    {GRN}@<@{DOWN}{3 LEFT}@?@{UP}":E$="@
    {DOWN}{LEFT}@{UP}"
130 GETKEY A$:IFA$="N"THENB1$=B1$+E$:B2$=
    B2$+E$:B3$=B3$+E$:GOTO 160
140 IFA$="Q"THENPRINT"{CLR}":END
150 IFA$<>"E"THEN130
160 PRINT"{CLR}"
170 POKE 65298,PEEK(65298)AND251
180 POKE 65299,PEEK(65299)AND3OR4*15
190 PRINT"{HOME}{16 DOWN}{7 RIGHT}"B1$"
    {10 RIGHT}"B2$"{9 RIGHT}"B3$
200 FORA=3152TO3191:POKEA,68:POKEA+C,0:NE
    XT
210 FORA=3792TO4071:POKEA,0:NEXT
220 PRINT"{2 DOWN}{CYN}&'{2 DOWN}{BLK}&'
    {2 DOWN}{RED}&'"
230 POKE65287,PEEK(65287)OR16:FORA=3792+C
    TO4071+C:POKEA,78:NEXT
240 POKE1041,38:SYS819:TR=10:SC=0
250 WT=INT(RND(1)*125+75):WS=INT(RND(1)*9
    +1):POKE SQ,32:POKESQ+C,70
260 FORTD=1TO1000:NEXT
270 PRINT"{HOME}{BLU}{9 DOWN}"SPC(10)"
    {21 SPACES}"
280 POKE1032,35-2*WS:POKE1033,30-2*WS:POK
    E1034,40-2*WS:POKE 1040,20
290 PRINT"{BLU}{HOME}{3 SPACES}SCORE
    {2 SPACES}"SC"{LEFT} ":PRINT"{HOME}"S
    PC(23)"TROOPS "TR"{LEFT} "
300 PRINT"{HOME}{DOWN}{3 SPACES}WEIGHT "W
    T"{LEFT} ":PRINT"{HOME}{DOWN}"SPC(23)
    "WIND{3 SPACES}"WS"{LEFT} "
310 IFTR=0THEN470
320 POKE239,0:WAIT 239,1
330 SX=PEEK(1041):SY=PEEK(949)/40+3:DX=WS
    /20:DY=WT/400
340 POKESQ,32:POKESQ+40,32:SP=SX+3072+INT
    (SY)*40
350 CL=PEEK(SP+C):CO=PEEK(SP+C+40):IFCL<>
    70OR CO<>70THEN370
360 OX=SX:POKESP,34:POKESP+40,35:SX=SX+DX
    :SY=SY+DY:SQ=SP:FORA=1TO80:NEXT:GOTO3
    40
370 IFCO=50ANDSY<16THENSC=SC+75:GOSUB440:
    GOTO250
```

```
380 IFCO=68ANDSY<16THENSC=SC+50:GOSUB440:
    GOTO250
390 IFCO=53ANDSY<16THENSC=SC+25:GOSUB440:
    GOTO250
400 PRINT"{HOME}{9 DOWN}{RVS}"SPC(11)"PAR
    ATROOPER FAILED":TR=TR-1:SC=SC-10
410 R=3752+OX:IFR>3791THENR=3752
420 POKER,40:SOUND 3,700,60:FORV=7TO1STEP
    -1:VOL V:FORTD=1TO100:NEXT:NEXT
430 POKER,32:GOTO250
440 POKESQ+40,35:PRINT"{HOME}{9 DOWN}
    {RVS}"SPC(11)"SUCCESSFUL LANDING"
450 RESTORE460:VOL8:FORA=1TO4:READN1,D1,N
    2,D2:SOUND 1,N1,D1:SOUND 2,N2,D2:NEXT
460 DATA 169,10,169,10,345,20,169,20,596,
    10,685,10,685,40,739,40
462 FORV=8TO0STEP-1:VOLV:FORTD=1TO50:NEXT
    :NEXT:POKESQ+40,32:RETURN
470 PRINT"{HOME}{9 DOWN}{RVS}"SPC(10)"GAM
    E OVER HIT ANY KEY"
480 POKE65290,0:POKE788,14:POKE789,206:PO
    KE65290,162
490 POKE239,0:WAIT239,1:POKE65298,196:POK
    E65299,208:POKE65287,72:GOTO80
500 I=819:T=0:RESTORE530:PRINT"{CLR}
    {4 DOWN}"SPC(14)"PLEASE WAIT"
510 READ A:T=T+A:IFA=256THENIFT=22264THEN
    RETURNELSEPRINT"ERROR IN DATA":END
520 POKE I,A:I=I+1:GOTO 510
530 DATA 120,169,64,141,20,3
540 DATA 169,3,141,21,3,88
550 DATA 96,216,206,11,4,208
560 DATA 11,160,80,32,191,3
570 DATA 173,8,4,141,11,4
580 DATA 206,12,4,208,11,160
590 DATA 160,32,191,3,173,9
600 DATA 4,141,12,4,206,13
610 DATA 4,208,11,160,240,32
620 DATA 191,3,173,10,4,141
630 DATA 13,4,206,15,4,208
640 DATA 70,173,16,4,141,15
650 DATA 4,172,17,4,169,32
660 DATA 153,119,12,153,120,12
670 DATA 206,17,4,208,38,169
680 DATA 38,141,17,4,32,221
690 DATA 3,74,74,74,74,74
700 DATA 74,168,185,216,3,141
710 DATA 181,3,24,105,1,141
720 DATA 130,3,141,186,3,105
730 DATA 1,141,133,3,76,188
740 DATA 3,169,36,153,118,12
750 DATA 169,37,153,119,12,76
760 DATA 14,206,162,40,185,207
770 DATA 14,141,14,4,185,206
780 DATA 14,153,207,14,136,202
790 DATA 208,246,173,14,4,153
800 DATA 208,14,96,119,159,199
810 DATA 239,199,173,18,4,10
820 DATA 10,56,109,18,4,141
830 DATA 18,4,96,160,0,185
840 DATA 0,208,153,0,60,185
850 DATA 0,209,153,0,61,185
860 DATA 0,210,153,0,62,185
870 DATA 0,211,153,0,63,24
880 DATA 76,19,4,0,0,0
890 DATA 0,0,0,0,0,0
900 DATA 0,0,136,208,214,160
910 DATA 70,185,128,209,73,255
920 DATA 153,208,61,136,16,245
930 DATA 96,256
```

Rescue Of Blondell

Grant Albrecht

"Rescue Of Blondell" is a fast-action game with smooth horizontal scrolling. All versions (Atari, Commodore 64, and VIC-20 with 8K or more expansion) are written completely in machine language and offer the challenge of artificially intelligent attacking birds. A joystick is required.

When the king summoned you before him you were sure it was for a magic carpet parking violation, but now you know better. His only daughter, Blondell, has been kidnapped by an evil sorcerer—and the king wants you to rescue her. You were chosen for the task because you're the most reputable genie in the kingdom.

The princess is being held captive in a tower. You must try to save her from the clutches of the evil sorcerer by flying your magic carpet toward the tower, picking her up, and flying back to your base. It won't be easy, though. The sorcerer owns very swift and powerful birds that he sends out to combat you. These birds are intelligent and will home in on your flying carpet. Worse, the sorcerer has bestowed some of his powers on the birds. They can summon the elements and hurl fiery lightning bolts at you.

Since you are a genie, you'll have magic on your side, but beware—magic lasts only for a while. The more times the birds crash into you or strike you with lightning bolts, the less magic you'll have left to defend yourself. You have one other defense; you, too, can summon lightning and throw bolts at your foes. Try to strike the swooping birds.

Multiple Skill Levels

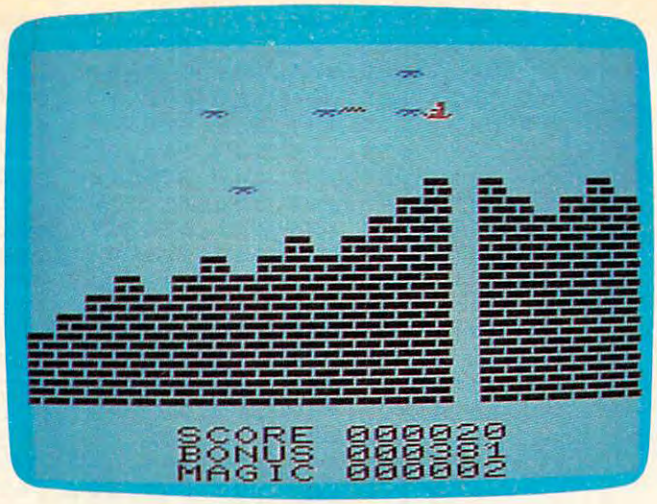
"Rescue Of Blondell" is an arcade-style game that features smooth horizontal scrolling and multiple levels of difficulty. On the Atari version, choose the level at the beginning of the game by pressing one of the number keys (1=hard, 9=easy). On the Commodore versions, you can choose the number of attacking birds (1 to 3 on the Commodore 64, and 1 to 9 on the VIC).

Once the game begins, you fly toward the right of the screen by pushing the joystick while keeping a watchful eye out for the sorcerer's birds. At the bottom of the screen is your score, the amount of magic you have left, and the bonus points you'll receive for rescuing Blondell. The Atari version awards 50 points for each bird you destroy with a lightning bolt, and 10 points for each bird that crashes into the ground while in wild pursuit of your flying carpet. The Commodore versions award only 10 points for birds, no matter how they meet their end. In all versions, the rescue bonus decreases with time, so you might want to be expedient in your quest.

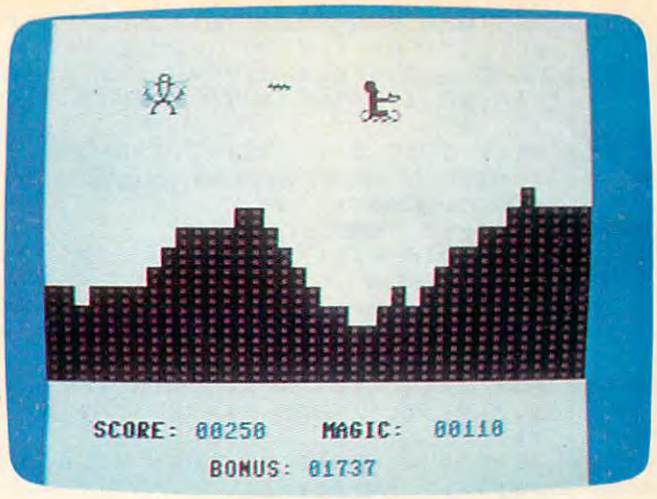
Remember that the king is counting on you to rescue Blondell, so don't retreat to your base until you have her. Trying to land on your base without Blondell has unfortunate results.

Program 1, for the Atari, is a BASIC program with the machine language for Rescue Of Blondell in DATA statements. The program gives you the options of using this data to create either a boot tape (select option B) or a binary file on disk (select option D). Make sure that the disk or tape on which you wish the machine language to be stored is in the drive when you run the program. The BASIC program will check the DATA for typing errors, then write out the machine language file.

If you use Program 1 to create a boot tape, you start the game by turning off the computer and removing the BASIC cartridge if one is present (and turning off the disk drive, if you have one connected), then mounting and rewinding the boot tape. Next, hold down the START button (both the START and OPTION buttons if you have a 600XL or 800XL) and turn the computer on. When the Atari beeps, press PLAY on the recorder and then RETURN. The tape should load and the game screen will appear. If you created a binary file on disk, go to the DOS menu and use the L option to load the binary file you created. The game will start automatically after it is loaded. Alternatively, if you use the name



Swarms of hostile birds attack this genie as he hovers over the tunnel leading to the imprisoned Blondell (VIC version).



The genie is being pursued by one of the evil sorcerer's dreaded birds (64 version).

AUTORUN.SYS for the file you create, it will load and run automatically whenever you boot the disk.

Commodore 64 And VIC-20 Notes

Both the Commodore 64 and VIC-20 versions of "Rescue Of Blondell" are written entirely in machine language and are presented as BASIC loader programs. Programs 2 and 3 POKE the machine language stored in DATA statements into memory, then use a SYS to start the game. Both programs check the DATA statements for typing errors.

To use the VIC version, at least 8K of memory expansion is required. It is necessary to reconfigure memory before loading this version; otherwise, the program will overwrite itself as it executes. To reconfigure memory, enter the following two lines in direct mode (no line numbers), pressing RETURN after each, *before* loading Program 3:

```
POKE 44,32:POKE 32*256,0:NEW
POKE 648,30:SYS 58648
```

The Commodore 64 version of Rescue Of Blondell offers a choice of from one to three attack birds to add to the challenge, while the VIC version allows up to nine. Although the birds in the VIC version do not fire, eventually they may overwhelm you by their numbers.

The princess in the Commodore 64 version is at the top of the tower. To save her, simply approach her with your genie. After a safe rendezvous, she disappears and your genie turns blue. In the VIC version, the princess is held captive at the bottom of a deep tunnel. To save her, you must fly to the bottom of the tunnel and land. Then a secret door opens and the princess becomes visible. Just touch her to pick her up. Finally, carry her back to your base through the swarming attack birds.

For the Commodore 64, plug the joystick into port 2.

Program 1: Rescue Of Blondell, Atari Version

Please refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
AB 100 GRAPHICS 0:? :? :? "[illegible]
       [illegible]BLONDELL[illegible]":BEG=8192:FIN=10064
       :STARTADR=8192
IG 110 BYTS=FIN-BEG:DIM BUFFER$(BYTS+
       127),T$(20),F$(20),CIO$(7)
DE 120 OPEN #1,4,0,"K:":? :? "Boot Ta
       pe or Disk Binary File:";
NB 130 BUFFER$=CHR$(0):BUFFER$(FIN-BE
       G+30)=BUFFER$:BUFFER$(2)=BUFFE
       R$
BN 140 I=1:T=10:CIO$="hhh":CIO$(4)=CH
       R$(170):CIO$(5)="LV":CIO$(7)=C
       HR$(228)
EF 150 GET #1,MEDIA:IF MEDIA<>66 AND
       MEDIA<>68 THEN 150
OI 160 ? CHR$(MEDIA):? :IF MEDIA<>ASC
       ("B") THEN BUFFER$="":GOTO 230
PJ 170 BEG=BEG-24:BUFFER$=CHR$(0):BUF
       FER$(2)=CHR$(INT((FIN-BEG+127)
       /128))
KM 180 H=INT(BEG/256):L=BEG-H*256:BUF
       FER$(3)=CHR$(L):BUFFER$(4)=CHR
       $(H)
EJ 190 PINIT=BEG+8:H=INT(PINIT/256):L
       =PINIT-H*256:BUFFER$(5)=CHR$(L
       ):BUFFER$(6)=CHR$(H)
OP 200 FOR I=7 TO 24:READ A:BUFFER$(I
       )=CHR$(A):NEXT I:DATA 24,96,16
       9,60,141,2,211,169,0,133,10,16
       9,0,133,11,76,0,0
DN 210 H=INT(STARTADR/256):L=STARTADR
       -H*256:BUFFER$(15)=CHR$(L):BUF
       FER$(19)=CHR$(H)
KJ 220 BUFFER$(23)=CHR$(L):BUFFER$(24
       )=CHR$(H)
```

```
NA 230 RESTORE BEG:? :? "Filling buff
       er...":FOR J=I TO I+BYTS
GI 240 READ A:BUFFER$(J)=CHR$(A):CK=C
       K+A:IF J/T=INT(J/T) THEN ? "*"
       ;
HN 250 NEXT J:IF CK<>195192 THEN ? :?
       "■ERROR DETECTED IN DATA STA
       TEMENTS!■":STOP
OB 260 ? :? :? "■DATA OK■"
DO 270 IF MEDIA=ASC("B") THEN 390
OJ 280 REM ■DISK■
PL 290 ? :? "Enter filename":? :? "(U
       se AUTORUN.SYS for automatic u
       se)":? :INPUT T$
FK 300 F$=T$:IF LEN(T$)>2 THEN IF T$(
       1,2)<>"D:" THEN F$="D:":F$(3)=
       T$
CF 310 TRAP 370:CLOSE #2:OPEN #2,8,0,
       F$:? :? "Writing..."
PL 320 PUT #2,255:PUT #2,255
DG 330 H=INT(BEG/256):L=BEG-H*256:PUT
        #2,L:PUT #2,H:H=INT(FIN/256):
       L=FIN-H*256:PUT #2,L:PUT #2,H
MG 340 GOSUB 450:IF PEEK(195)>1 THEN
       370
EP 350 PUT #2,224:PUT #2,2:PUT #2,225
       :PUT #2,2:H=INT(STARTADR/256):
       L=STARTADR-H*256:PUT #2,L:PUT
       #2,H
AE 360 TRAP 32767:CLOSE #2:? "Finishe
       d.":END
FH 370 ? "Error ";PEEK(195);" trying
       to access":? F$:CLOSE #2:? :GO
       TO 290
LN 380 REM ■BOOT TAPE■
AL 390 ? :? :? "Insert, Rewind Tape."
       :? "Press PLAY & RECORD":? :?
       "Press ■RETURN■ when ready.";
DE 400 TRAP 430:CLOSE #2:OPEN #2,8,12
       8,"C:":? :? "Writing..."
MB 410 GOSUB 450:IF PEEK(195)>1 THEN
       430
PD 420 CLOSE #2:TRAP 32767:? "Finishe
       d.":? :? :END
AN 430 ? :? "Error ";PEEK(195);" when
        writing boot tape":? :CLOSE #
       2:GOTO 390
HL 440 REM ■I/O SAVE FILE■
HA 450 X=32:ICCOM=834:ICBADR=836:ICBL
       EN=840:ICSTAT=835
JM 460 H=INT(ADR(BUFFER$)/256):L=ADR(
       BUFFER$)-H*256:POKE ICBADR+X,L
       :POKE ICBADR+X+1,H
DA 470 L=FIN-BEG+1:H=INT(L/256):L=L-H
       *256:POKE ICBLEN+X,L:POKE ICBL
       EN+X+1,H
PF 480 POKE ICCOM+X,11:A=USR(ADR(CIO$
       ),X)
OP 490 POKE 195,PEEK(ICSTAT):RETURN
FE 8192 DATA 032,007,035,169,000,141
FD 8198 DATA 060,006,141,050,006,141
EN 8204 DATA 066,006,141,008,210,141
EC 8210 DATA 000,208,141,001,208,141
EM 8216 DATA 002,208,141,003,208,141
FE 8222 DATA 076,006,169,004,141,111
FC 8228 DATA 002,169,010,141,054,006
FE 8234 DATA 141,053,006,169,003,141
EG 8240 DATA 015,210,169,100,141,002
FI 8246 DATA 210,169,232,141,071,006
GH 8252 DATA 169,016,141,234,037,169
FH 8258 DATA 003,141,072,006,169,200
FG 8264 DATA 141,073,006,169,000,141
FI 8270 DATA 049,006,141,057,006,141
FH 8276 DATA 059,006,141,004,006,141
EM 8282 DATA 000,006,141,064,006,141
GK 8288 DATA 065,006,169,048,141,007
FO 8294 DATA 212,141,058,006,032,068
FP 8300 DATA 034,160,168,162,035,169
FN 8306 DATA 007,032,092,228,169,120
EM 8312 DATA 141,002,006,169,103,141
EK 8318 DATA 033,006,141,003,006,032
FM 8324 DATA 145,038,032,211,034,169
ED 8330 DATA 001,141,111,002,169,003
FM 8336 DATA 141,029,208,169,001,141
EN 8342 DATA 030,208,032,070,035,032
FJ 8348 DATA 060,036,032,145,036,032
FJ 8354 DATA 015,037,032,184,035,032
FE 8360 DATA 221,035,032,237,037,032
FL 8366 DATA 060,036,173,004,208,240
FB 8372 DATA 005,169,000,141,051,006
GH 8378 DATA 173,007,208,240,005,169
FC 8384 DATA 001,141,062,006,173,005
FB 8390 DATA 208,201,001,208,044,160
GB 8396 DATA 012,185,081,038,153,003
GB 8402 DATA 059,136,016,247,032,237
FH 8408 DATA 037,169,207,141,001,210
ED 8414 DATA 160,125,140,000,210,140
FA 8420 DATA 193,002,166,020,228,020
FD 8426 DATA 240,252,200,208,241,160
FE 8432 DATA 000,140,029,208,076,150
GC 8438 DATA 037,201,008,208,024,169
FD 8444 DATA 001,141,066,006,169,000
FA 8450 DATA 141,250,061,141,250,062
FN 8456 DATA 162,050,032,096,037,202
FF 8462 DATA 208,250,076,031,033,201
GB 8468 DATA 002,208,008,173,066,006
GI 8474 DATA 240,175,076,114,037,173
GB 8480 DATA 067,006,240,044,206,068
FJ 8486 DATA 006,208,021,169,000,141
GK 8492 DATA 067,006,141,235,037,169
GB 8498 DATA 001,141,053,006,169,216
FI 8504 DATA 141,194,002,076,161,033
FH 8510 DATA 173,068,006,074,141,003
FD 8516 DATA 210,074,074,024,105,040
FM 8522 DATA 141,235,037,076,161,033
GE 8528 DATA 173,006,208,240,024,169
FM 8534 DATA 032,141,068,006,141,067
FF 8540 DATA 006,169,000,141,057,006
GE 8546 DATA 169,246,141,194,002,032
GJ 8552 DATA 096,037,076,161,033,173
EP 8558 DATA 014,208,201,001,208,011
FM 8564 DATA 162,004,032,096,037,202
FO 8570 DATA 208,250,076,085,033,201
FI 8576 DATA 002,240,210,206,069,006
GC 8582 DATA 208,005,169,100,141,069
GB 8588 DATA 006,173,069,006,201,050
GJ 8594 DATA 144,008,169,008,141,235
FJ 8600 DATA 037,076,161,033,169,000
FN 8606 DATA 141,235,037,173,013,208
EO 8612 DATA 201,004,144,005,206,073
FM 8618 DATA 006,240,050,173,076,006
GC 8624 DATA 208,029,206,074,006,208
FJ 8630 DATA 024,173,071,006,056,233
FG 8636 DATA 001,141,071,006,173,072
EN 8642 DATA 006,233,000,141,072,006
GC 8648 DATA 240,008,169,030,141,074
GE 8654 DATA 006,076,147,032,173,071
FK 8660 DATA 006,208,243,169,001,141
GH 8666 DATA 076,006,076,202,033,076
FB 8672 DATA 203,032,169,112,141,000
EO 8678 DATA 042,141,001,042,141,002
FL 8684 DATA 042,162,020,160,003,169
FO 8690 DATA 060,141,001,006,169,086
EP 8696 DATA 153,000,042,200,173,000
```

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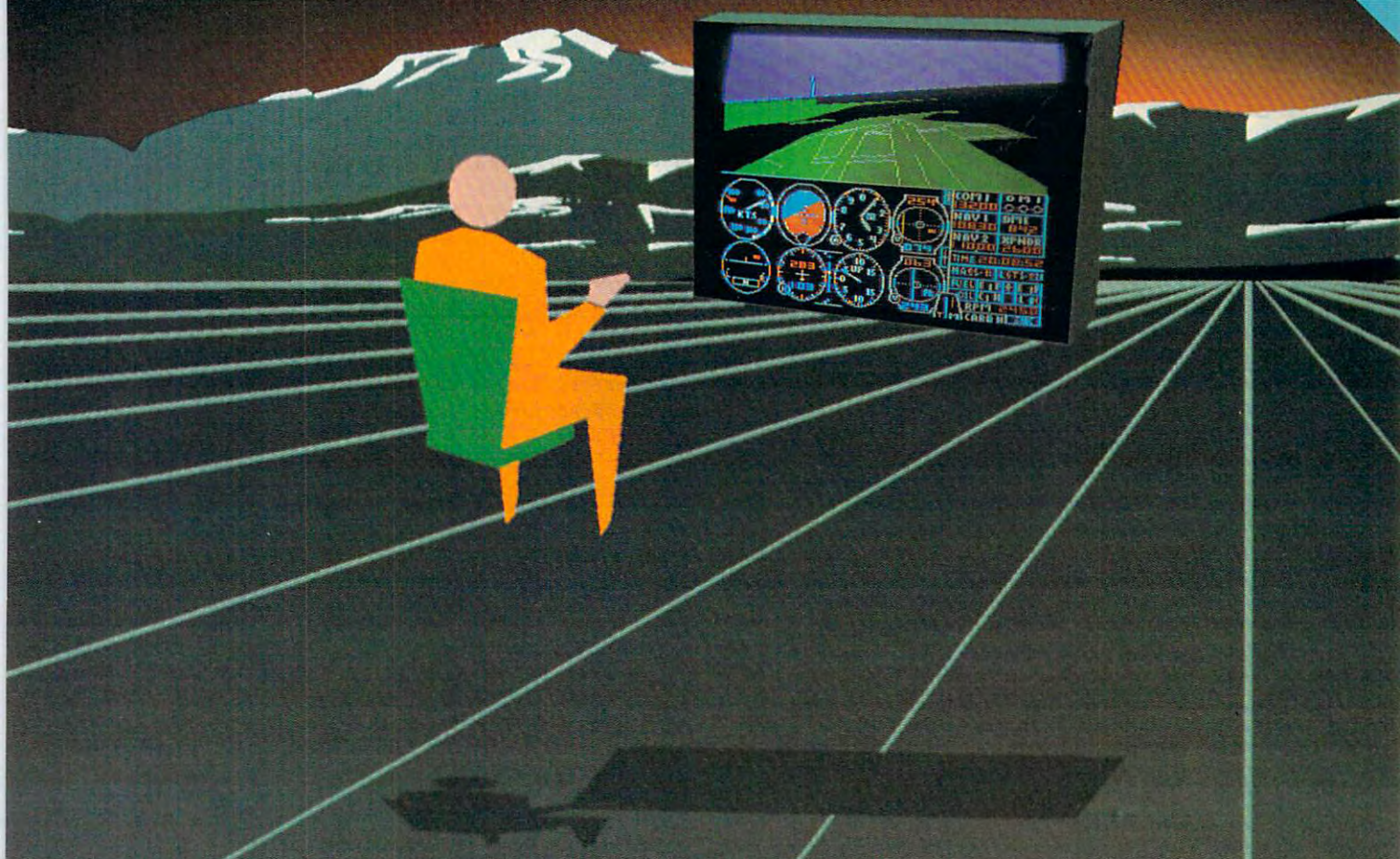

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```
EI 8702 DATA 006,153,000,042,173,001
EG 8708 DATA 006,200,153,000,042,200
FB 8714 DATA 238,001,006,202,208,230
FN 8720 DATA 169,070,153,000,042,169
EO 8726 DATA 000,200,153,000,042,169
EL 8732 DATA 059,200,153,000,042,200
GB 8738 DATA 169,006,153,000,042,192
GO 8744 DATA 068,208,246,200,169,065
EL 8750 DATA 153,000,042,169,000,200
FD 8756 DATA 153,000,042,141,048,002
FE 8762 DATA 169,042,200,153,000,042
GB 8768 DATA 141,049,002,096,162,001
EK 8774 DATA 160,000,032,140,034,200
FM 8780 DATA 192,010,208,248,162,010
FI 8786 DATA 032,140,034,200,192,015
FK 8792 DATA 208,248,173,010,210,201
FP 8798 DATA 150,144,008,224,004,240
FF 8804 DATA 009,202,076,110,034,224
EI 8810 DATA 018,240,001,232,032,140
FP 8816 DATA 034,200,192,250,208,228
EH 8822 DATA 162,001,032,140,034,200
GH 8828 DATA 208,250,160,004,169,065
FG 8834 DATA 153,010,070,136,016,250
GE 8840 DATA 032,187,034,096,134,205
GC 8846 DATA 169,000,133,203,169,060
FD 8852 DATA 133,204,162,000,169,000
GA 8858 DATA 145,203,230,204,232,228
GJ 8864 DATA 205,208,247,169,001,145
EO 8870 DATA 203,230,204,232,224,020
HM 8876 DATA 208,247,166,205,169,194
GJ 8882 DATA 141,250,061,169,195,141
GN 8888 DATA 250,062,096,160,004,185
HI 8894 DATA 096,038,153,024,059,185
GB 8900 DATA 101,038,153,044,059,185
GK 8906 DATA 106,038,153,064,059,136
GG 8912 DATA 016,235,096,160,016,185
HA 8918 DATA 199,038,153,001,059,136
GM 8924 DATA 016,247,169,255,141,252
FD 8930 DATA 002,173,252,002,162,008
FJ 8936 DATA 221,216,038,240,006,202
GN 8942 DATA 016,248,076,227,034,138
EE 8948 DATA 010,010,010,105,020,141
GA 8954 DATA 075,006,160,016,169,000
FN 8960 DATA 153,001,059,136,016,250
GN 8966 DATA 096,169,062,141,047,002
FB 8972 DATA 169,001,141,111,002,032
HI 8978 DATA 047,035,169,166,141,192
GD 8984 DATA 002,141,193,002,169,216
FN 8990 DATA 141,194,002,141,195,002
GC 8996 DATA 169,001,160,003,153,008
GC 9002 DATA 208,136,016,250,096,169
FC 9008 DATA 052,133,204,169,000,133
EO 9014 DATA 203,162,029,160,000,145
EF 9020 DATA 203,200,208,251,230,204
FO 9026 DATA 202,208,244,096,172,033
EJ 9032 DATA 006,174,002,006,173,000
FM 9038 DATA 211,074,176,005,192,040
FG 9044 DATA 240,001,136,074,176,005
EG 9050 DATA 192,200,240,001,200,074
GB 9056 DATA 072,176,031,169,024,141
FH 9062 DATA 234,037,224,080,208,021
FJ 9068 DATA 238,004,006,173,004,006
FH 9074 DATA 201,008,208,008,169,000
EF 9080 DATA 141,004,006,206,000,006
FK 9086 DATA 076,130,035,202,104,074
GG 9092 DATA 176,026,169,016,141,234
GB 9098 DATA 037,224,150,208,016,206
FE 9104 DATA 004,006,016,008,169,007
EE 9110 DATA 141,004,006,238,000,006
FD 9116 DATA 076,160,035,232,142,002
FA 9122 DATA 006,140,033,006,096,024
FC 9128 DATA 216,173,004,006,141,004
EN 9134 DATA 212,032,226,033,032,232
GJ 9140 DATA 035,076,098,228,173,053
FH 9146 DATA 006,141,034,006,173,054
EM 9152 DATA 006,141,002,208,173,002
FE 9158 DATA 006,141,001,208,173,050
FB 9164 DATA 006,141,000,208,173,060
FC 9170 DATA 006,141,003,208,173,061
FP 9176 DATA 006,141,035,006,096,162
GA 9182 DATA 005,160,255,136,208,253
GL 9188 DATA 202,208,248,096,169,000
GC 9194 DATA 141,048,006,173,048,006
FA 9200 DATA 168,024,105,052,133,204
EJ 9206 DATA 169,000,105,000,133,203
FO 9212 DATA 185,016,006,168,169,000
FA 9218 DATA 162,008,145,203,200,202
GC 9224 DATA 208,250,172,048,006,185
FF 9230 DATA 233,037,024,105,193,141
FP 9236 DATA 039,036,169,037,105,000
FD 9242 DATA 141,040,036,185,032,006
FL 9248 DATA 153,016,006,168,162,000
GF 9254 DATA 189,255,255,145,203,200
GA 9260 DATA 232,224,008,208,245,238
FP 9266 DATA 048,006,173,048,006,201
GP 9272 DATA 004,208,178,096,173,049
FH 9278 DATA 006,208,040,173,132,002
FL 9284 DATA 208,034,173,033,006,141
FD 9290 DATA 032,006,173,002,006,056
FM 9296 DATA 233,003,141,050,006,169
EO 9302 DATA 050,141,051,006,141,049
FL 9308 DATA 006,173,234,037,141,052
EM 9314 DATA 006,169,005,141,001,210
FE 9320 DATA 096,173,052,006,201,024
FK 9326 DATA 208,006,206,050,006,076
FE 9332 DATA 121,036,238,050,006,206
FD 9338 DATA 051,006,016,012,169,000
FE 9344 DATA 141,049,006,141,032,006
FB 9350 DATA 141,001,210,096,173,051
FG 9356 DATA 006,141,000,210,096,173
FO 9362 DATA 067,006,240,001,096,173
GF 9368 DATA 055,006,208,036,172,053
FK 9374 DATA 006,204,033,006,046,056
FI 9380 DATA 006,174,054,006,236,002
FN 9386 DATA 006,046,056,006,173,010
GB 9392 DATA 210,237,075,006,205,075
HB 9398 DATA 006,176,248,109,075,006
GC 9404 DATA 141,055,006,096,173,056
FG 9410 DATA 006,074,072,144,013,173
FE 9416 DATA 054,006,201,045,144,006
FK 9422 DATA 206,054,006,076,222,036
FN 9428 DATA 173,054,006,201,203,176
FP 9434 DATA 243,238,054,006,104,074
GD 9440 DATA 176,006,238,053,006,076
GB 9446 DATA 245,036,206,053,006,208
FO 9452 DATA 008,238,053,006,169,001
FO 9458 DATA 141,055,006,206,055,006
FG 9464 DATA 173,053,006,205,003,006
EP 9470 DATA 240,009,173,010,210,205
GM 9476 DATA 058,006,144,001,096,169
GA 9482 DATA 001,141,057,006,096,173
HB 9488 DATA 059,006,208,045,173,057
FM 9494 DATA 006,240,033,173,054,006
EP 9500 DATA 141,060,006,173,053,006
FI 9506 DATA 141,061,006,169,050,141
FK 9512 DATA 062,006,141,059,006,173
FE 9518 DATA 054,006,205,002,006,144
FF 9524 DATA 006,169,000,141,063,006
FM 9530 DATA 096,169,001,141,063,006
GC 9536 DATA 096,173,063,006,240,006
GK 9542 DATA 238,060,006,076,079,037
FK 9548 DATA 206,060,006,206,062,006
FN 9554 DATA 208,011,169,000,141,059
FE 9560 DATA 006,141,057,006,141,060
```

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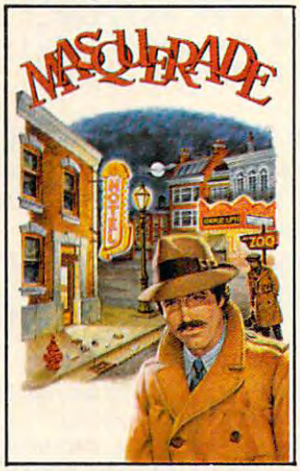

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```
GG 9566 DATA 006,096,173,064,006,024
FF 9572 DATA 105,010,141,064,006,173
FL 9578 DATA 065,006,105,000,141,065
GJ 9584 DATA 006,096,160,012,185,066
GD 9590 DATA 038,153,003,059,136,016
GJ 9596 DATA 247,173,071,006,024,109
FI 9602 DATA 064,006,141,064,006,173
FN 9608 DATA 072,006,109,065,006,141
FL 9614 DATA 065,006,032,237,037,032
EO 9620 DATA 031,039,169,000,141,001
FE 9626 DATA 210,141,003,210,160,098
GG 9632 DATA 162,228,169,007,032,092
GA 9638 DATA 228,160,010,185,111,038
GL 9644 DATA 153,063,059,136,016,247
GC 9650 DATA 169,255,141,252,002,173
FP 9656 DATA 252,002,201,255,240,249
FK 9662 DATA 076,000,032,195,060,024
EC 9668 DATA 036,000,000,000,000,060
EO 9674 DATA 114,165,129,000,000,000
FC 9680 DATA 000,000,048,050,039,062
GK 9686 DATA 048,189,126,000,012,076
GB 9692 DATA 228,124,012,189,126,000
DM 9698 DATA 000,003,003,000,000,000
EL 9704 DATA 000,032,016,000,032,169
FJ 9710 DATA 009,141,070,006,174,064
FJ 9716 DATA 006,173,065,006,032,023
GD 9722 DATA 038,169,029,141,070,006
GE 9728 DATA 174,071,006,173,072,006
GF 9734 DATA 032,023,038,169,049,141
GD 9740 DATA 070,006,174,073,006,169
FM 9746 DATA 000,032,023,038,096,134
FG 9752 DATA 212,133,213,032,170,217
FD 9758 DATA 032,230,216,160,000,132
FO 9764 DATA 031,177,243,072,041,031
GA 9770 DATA 238,070,006,174,070,006
GG 9776 DATA 157,020,059,104,048,005
GC 9782 DATA 164,031,200,208,232,169
GJ 9788 DATA 000,232,157,020,059,096
HM 9794 DATA 185,175,181,128,179,161
GP 9800 DATA 182,165,164,128,168,165
IA 9806 DATA 178,129,096,176,175,175
HP 9812 DATA 178,128,176,178,169,174
ID 9818 DATA 163,165,179,179,129,096
GC 9824 DATA 115,099,111,114,101,098
FJ 9830 DATA 111,110,117,115,109,097
GF 9836 DATA 103,105,099,232,233,244
HE 9842 DATA 192,225,238,249,192,235
HA 9848 DATA 229,249,254,254,254,000
GA 9854 DATA 239,239,239,000,000,024
FH 9860 DATA 036,102,024,060,126,126
GG 9866 DATA 102,060,126,126,255,255
FJ 9872 DATA 255,160,000,185,000,224
GB 9878 DATA 153,000,056,185,000,225
GA 9884 DATA 153,000,057,185,000,226
GE 9890 DATA 153,000,058,136,208,235
GE 9896 DATA 160,007,141,244,002,185
GA 9902 DATA 122,038,153,008,056,136
GD 9908 DATA 016,247,160,015,185,130
GE 9914 DATA 038,153,016,056,136,016
GE 9920 DATA 247,169,056,141,244,002
FD 9926 DATA 096,101,110,116,101,114
FH 9932 DATA 064,108,101,118,101,108
HI 9938 DATA 064,072,081,077,089,073
FJ 9944 DATA 031,030,026,024,029,027
FJ 9950 DATA 051,053,048,060,060,060
FE 9956 DATA 081,072,081,000,000,060
FH 9962 DATA 060,060,081,072,081,000
GD 9968 DATA 081,072,081,000,081,072
GH 9974 DATA 081,000,081,091,096,108
FI 9980 DATA 108,121,121,121,243,217
GA 9986 DATA 193,243,182,243,000,000
HA 9992 DATA 243,217,193,243,182,243
FP 9998 DATA 000,243,182,243,000,243
HO 10004 DATA 182,243,000,243,182,182
HM 10010 DATA 162,162,243,243,243,160
FP 10016 DATA 000,140,001,210,140,003
HK 10022 DATA 210,169,239,141,005,210
ID 10028 DATA 141,007,210,185,225,038
HF 10034 DATA 141,004,210,185,000,039
GO 10040 DATA 141,006,210,165,020,105
HL 10046 DATA 020,197,020,208,252,200
HO 10052 DATA 192,031,208,231,169,000
HC 10058 DATA 141,005,210,141,007,210
LE 10064 DATA 096
```

Program 2: Rescue Of Blondell, 64 Version

Version by Kevin Mykytyn, Editorial Programmer

Please refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 PRINT"{CLR}{3 DOWN}"TAB(11)"{5 SPACE}{RVS}RE
   SCUE OF BLONDELL"                    :rem 24
20 PRINT"{4 DOWN}"TAB(12)"{CYN}{RVS}ENTER
   ING ML DATA"                         :rem 6
30 FOR I=49152 TO 51972                 :rem 128
40 READ A:POKE I,A:CK=CK+A:NEXT         :rem 88
50 IF CK<>318395 THEN PRINT"{3 DOWN}{7
   {RVS}{3 SPACES}ERROR DETECTED IN DATA
   {SPACE}STATEMENTS{4 SPACES}":STOP
                                        :rem 29
60 SYS 49152                            :rem 106
49152 DATA 76,46,202,32,145,196          :rem 5
49158 DATA 32,151,195,32,142,194         :rem 54
49164 DATA 32,197,193,32,222,193         :rem 57
49170 DATA 32,164,195,32,209,201         :rem 45
49176 DATA 173,31,208,165,2,208          :rem 2
49182 DATA 57,173,60,3,201,232           :rem 200
49188 DATA 240,3,76,125,192,173          :rem 9
49194 DATA 61,3,201,65,240,3             :rem 98
49200 DATA 76,125,192,162,50,32          :rem 249
49206 DATA 50,193,202,208,250,169        :rem 98
49212 DATA 6,141,39,208,162,32           :rem 200
49218 DATA 142,2,68,142,3,68             :rem 109
49224 DATA 142,2,70,142,3,70             :rem 92
49230 DATA 169,1,133,2,32,164            :rem 146
49236 DATA 195,76,125,192,169,13         :rem 66
49242 DATA 205,60,3,169,64,237           :rem 209
49248 DATA 61,3,144,25,173,1             :rem 103
49254 DATA 208,201,118,144,18,173        :rem 98
49260 DATA 0,208,201,114,176,11          :rem 238
49266 DATA 169,168,133,113,169,198
                                         :rem 174
49272 DATA 133,114,76,107,202,32         :rem 41
49278 DATA 60,201,32,174,200,32          :rem 245
49284 DATA 78,199,32,53,196,206          :rem 24
49290 DATA 248,207,208,8,32,35           :rem 212
49296 DATA 200,169,2,141,248,207         :rem 53
49302 DATA 32,60,201,32,174,200          :rem 233
49308 DATA 162,0,189,249,7,201           :rem 210
49314 DATA 250,208,40,222,170,2          :rem 240
49320 DATA 208,35,169,253,157,52         :rem 56
49326 DATA 3,169,252,157,55,3            :rem 164
49332 DATA 138,10,168,169,25,153         :rem 55
49338 DATA 3,208,173,27,212,174          :rem 3
49344 DATA 60,3,224,15,176,4             :rem 103
49350 DATA 201,120,144,242,153,2         :rem 29
49356 DATA 208,232,228,20,208,204        :rem 96
49362 DATA 173,31,208,72,74,144          :rem 4
49368 DATA 20,32,211,202,169,10          :rem 244
49374 DATA 133,113,169,199,133,114
                                         :rem 157
49380 DATA 169,0,133,106,133,107         :rem 43
49386 DATA 76,107,202,104,13,30          :rem 249
49392 DATA 208,74,144,13,206,167         :rem 57
```

A Printer For All Reasons

Search For The Best High Quality Graphic Printer

If you have been looking very long, you have probably discovered that there are just too many claims and counterclaims in the printer market today. There are printers that have some of the features you want, but do not have others. Some features you probably don't care about; others are vitally important to you. We understand. In fact, not long ago, we were in the same position. Deluged by claims and counterclaims. Overburdened by rows and rows of specifications, we decided to separate all the facts — prove or disprove all the claims to our own satisfaction. So we bought printers. We bought samples of all major brands and tested them.

Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We wanted to give our customers the best printer on the market today at a bargain price.

The Results Are In

The search is over. We hae reduced the field to a single printer that meets all our goals (and more). The printer is the GP-550 from Seikosha, a division of Seiko. We ran this printer through our battery of tests and it came out shining. This printer *can* do it all. Standard draft printing up to a respectable (and honest) 86 characters per second, and with a very readable 9 (horizontal) by 8 (vertical) character matrix. At this rate, you will get an average 30 line letter printed in only 28 seconds.

"NLQ" Mode

One of our highest concerns was about print quality and readability. The GP-550 has a print mode termed Near Letter Quality printing (NLQ mode). This is where the GP-550 outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 9 (horizontal) by 16 (vertical). This equates to 14,400 addressable dots per square inch. Now we're talking *quality* printing. You can even do graphics in the high resolution mode. The results are the best we've ever seen. The only other printers currently available having resolution this high go for $500 and more *without* the interface or cable needed to hook up to your computer.

Features That Won't Quit

With the GP-550 your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 18 font styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H_2O or X^2. This fantastic machine will do it automatically, through easy software commands right from your keyboard. All fonts have true descenders.

One of the fonts we like best is "Proportional" because it looks most like typesetting. The spacing for thin characters like "i" and "l" are given less space which "tightens" the word making reading easier and faster. This is only one example of the careful planning put into the GP-550.

Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) to make the words stand out. Or, if you wish to be even more emphatic, underline the words. Or do **both.** You may also wish to "headline" a title. Each basic font has a corresponding elongated (double-wide) version. You can combine any of these modes to make the variation almost endless. Do you wnat to express something that you can't do with words? Use graphics with your text — even on the same line.

You can now do virtually any line spacing you want. You may select 6, 8, 7½ or 12 lines per inch. PLUS you have variable line spacing of 1.2 lines per inch to infinity (no space at all) and 97 other software selectable settings in between. You control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and ... VOILA! The letter now fits on one page.

Forms? Yes! Your Letterhead? Of Course!

Do you print forms? No problem. This unit will do them all. Any form up to 10 inches wide. The tractors are adjustable from 4½ to 10 inches. Yes, you can also use single sheets. Plain typing paper, your letterhed, short memo forms, anything you choose. Any size under 10" in width. Multiple copies? Absolutely! Put forms or individual sheets with carbons (up to 3 deep), and the last copy will be as readable as the first. Spread sheets with many columns? Of course! Just go to condensed mode printing and print a full 136 columns wide. Forget expensive wide-carriage printers and changing to wide carriage paper. You can no do it all on a standard 8½" page.

Consistent Print Quality

Most printers have a continuous loop ribbon cartridge or a single spool ribbon which gives nice dark printing when new, but quickly starts to fade after a while. To keep the printers' output looking consistently dark, the ribbons must be changed more often than is healthy for the pocketbok. The GP-550 solves this problem completely by using a replaceable, inexpensive ink cassette which is separately replaceable from the actual ribbon. It keeps the ribbon loaded with ink at all times. You only replace the ribbon when it truly wears out, not when it starts to run low on ink. Just another example of the superb engineering applied to the GP-550. (When you finally do wear out your ribbon, replacement cost is only $10.95. Ink cassette replacement cost is only $5.95, both postpaid.)

The Best Part

When shopping for a quality printer with all these features, you could expect to pay around $500 or more. *Not any more!* We have done our homework. You don't have to worry about interfaces or cables. Everything is included. You need absolutely nothing else to start printing — just add paper.

No Risk Offer

We give you a 15-day satisfaction guarantee. If you are not completely satisfied for any reason we will refund the full purchase price. A 1-year warranty is included with your printer.

The Bottom Dollar

GP-550A	*Standard Parallel (No Cable)*	*$249.95*
GP-550CD	*Commodore (Direct Connect)*	*$259.95*
GP-550AT	*Atari (Direct Connect)*	*$259.95*
GP-550AP	*Apple II or IIe (Direct Connect)*	*$299.95*
GP-550PC	*IBM PC & Compatables (No Cable)*	*$259.95*
GP-550TI	*TI 99/4A (Direct Connect)*	*$299.95*

"Prices & Availability Subject to Change. CALL!"

Shipping is $8.00 — UPS within the continental USA. If you are in a hurry, UPS Blue (second day air) is $18.00. Canada, Alaska, Mexico are $25.00 (air). Other foreign is $60.00 (air). California residents add 6% tax. These are cash prices — VISA and MC add 3% to total. We ship the next business day on money orders, cashiers' checks, and charge cards. A 14-day clearing period is required for checks.

TO ORDER CALL TOLL FREE
1-(800) 962-5800 USA
OR 1-(800) 962-3800 CALIF.

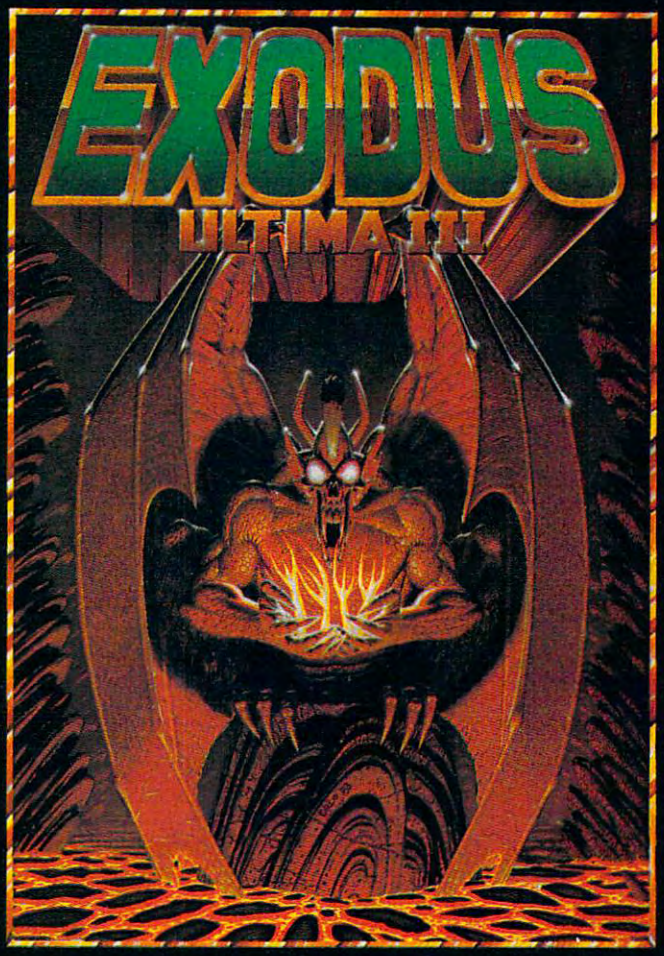
or send payment to:

APROPOS TECHNOLOGY
1071-A Avenida Acaso
Camarillo, CA 93010

Technical Info: 1-(805) 482-3604

```
49398 DATA 2,174,167,2,224,255    :rem 217
49404 DATA 208,3,76,217,192,160     :rem 2
49410 DATA 0,74,72,144,26,185     :rem 155
49416 DATA 249,7,201,250,240,19   :rem 254
49422 DATA 32,50,193,169,20,153   :rem 253
49428 DATA 170,2,169,250,153,52     :rem 2
49434 DATA 3,153,55,3,153,249     :rem 159
49440 DATA 7,104,200,196,20,208   :rem 245
49446 DATA 220,173,141,2,208,251   :rem 42
49452 DATA 32,68,193,76,27,192    :rem 224
49458 DATA 173,168,2,24,105,10    :rem 205
49464 DATA 141,168,2,173,169,2    :rem 213
49470 DATA 105,0,141,169,2,96     :rem 155
49476 DATA 173,168,2,133,253,173   :rem 60
49482 DATA 169,2,133,254,169,130   :rem 57
49488 DATA 141,249,207,32,120,193:rem 106
49494 DATA 173,167,2,133,253,169   :rem 64
49500 DATA 0,133,254,169,147,141   :rem 44
49506 DATA 249,207,32,120,193,165:rem 103
49512 DATA 106,133,253,165,107,133
                                   :rem 142
49518 DATA 254,169,218,141,249,207
                                   :rem 165
49524 DATA 32,120,193,96,160,9     :rem 210
49530 DATA 169,0,141,32,203,165   :rem 247
49536 DATA 253,217,174,193,165,254
                                   :rem 165
49542 DATA 249,175,193,144,20,165:rem 110
49548 DATA 253,56,249,174,193,133:rem 120
49554 DATA 253,165,254,249,175,193
                                   :rem 171
49560 DATA 133,254,238,32,203,208 :rem 97
49566 DATA 224,173,32,203,32,185   :rem 52
49572 DATA 193,169,0,141,32,203   :rem 254
49578 DATA 136,136,16,209,96,1    :rem 221
49584 DATA 0,10,0,100,0,232        :rem 29
49590 DATA 3,16,39,238,249,207    :rem 220
49596 DATA 174,249,207,9,48,157    :rem 29
49602 DATA 208,6,96,160,0,169     :rem 161
49608 DATA 0,133,251,169,64,133      :rem 1
49614 DATA 252,162,40,169,32,145   :rem 51
49620 DATA 251,200,208,249,230,252
                                   :rem 140
49626 DATA 202,208,244,96,160,0   :rem 255
49632 DATA 169,0,133,251,169,64      :rem 7
49638 DATA 133,252,169,0,145,251   :rem 54
49644 DATA 32,121,194,200,192,16   :rem 45
49650 DATA 208,246,169,0,133,251   :rem 51
49656 DATA 169,86,133,252,145,251:rem 116
49662 DATA 32,121,194,200,192,27   :rem 47
49668 DATA 208,246,169,0,145,251   :rem 63
49674 DATA 32,121,194,200,208,66   :rem 51
49680 DATA 230,252,232,224,2,208   :rem 42
49686 DATA 59,169,1,141,2,68      :rem 124
49692 DATA 169,2,141,3,68,169     :rem 173
49698 DATA 3,141,2,70,169,4        :rem 64
49704 DATA 141,3,70,169,32,141    :rem 201
49710 DATA 0,68,141,1,68,141      :rem 100
49716 DATA 0,70,141,0,66,141       :rem 96
49722 DATA 1,66,141,2,66,141      :rem 101
49728 DATA 1,70,141,3,66,160      :rem 104
49734 DATA 16,169,5,153,0,86      :rem 116
49740 DATA 200,192,22,208,248,96   :rem 55
49746 DATA 173,27,212,201,85,144   :rem 54
49752 DATA 173,201,160,176,14,165:rem 101
49758 DATA 252,201,72,144,163,56   :rem 58
49764 DATA 233,2,133,252,76,6     :rem 161
49770 DATA 194,165,252,201,96,176:rem 116
49776 DATA 149,24,105,2,133,252      :rem 3
49782 DATA 76,6,194,165,252,72    :rem 227
49788 DATA 169,0,145,251,230,252   :rem 58
49794 DATA 230,252,165,252,201,136
                                   :rem 151
49800 DATA 144,242,104,133,252,96 :rem 96
49806 DATA 169,4,141,60,3,169     :rem 164
49812 DATA 64,141,61,3,169,147    :rem 212
49818 DATA 32,210,255,160,255,169:rem 107
49824 DATA 14,153,255,215,153,254:rem 103
49830 DATA 216,153,253,217,153,252
                                   :rem 150
49836 DATA 218,136,208,241,169,1   :rem 59
49842 DATA 141,33,208,162,24,169   :rem 54
49848 DATA 0,157,0,212,202,16     :rem 148
49854 DATA 250,169,129,141,18,212:rem 107
49860 DATA 169,200,141,15,212,169:rem 100
49866 DATA 15,141,24,212,160,4     :rem 201
49872 DATA 162,21,24,32,240,255   :rem 253
49878 DATA 160,198,169,152,32,30   :rem 67
49884 DATA 171,160,20,162,21,24   :rem 251
49890 DATA 32,240,255,160,198,169:rem 116
49896 DATA 160,32,30,171,160,12   :rem 252
49902 DATA 162,23,24,32,240,255   :rem 249
49908 DATA 160,199,169,70,32,30    :rem 13
49914 DATA 171,169,129,141,26,208:rem 110
49920 DATA 169,127,141,13,220,169:rem 102
49926 DATA 0,141,40,208,141,41    :rem 195
49932 DATA 208,141,42,208,141,45   :rem 48
49938 DATA 208,141,44,208,141,43   :rem 54
49944 DATA 208,169,11,141,46,208   :rem 58
49950 DATA 169,251,141,255,7,141   :rem 56
49956 DATA 254,7,141,253,7,141     :rem 214
49962 DATA 252,7,169,33,141,4      :rem 164
49968 DATA 212,169,208,133,106,169
                                   :rem 167
49974 DATA 7,133,107,169,0,133     :rem 212
49980 DATA 108,169,16,141,5,212      :rem 4
49986 DATA 169,240,141,6,212,169   :rem 65
49992 DATA 15,141,24,212,162,2     :rem 201
49998 DATA 169,253,157,52,3,169     :rem 30
50004 DATA 252,157,55,3,202,16     :rem 189
50010 DATA 243,169,0,141,18,208    :rem 238
50016 DATA 173,17,208,41,127,141   :rem 36
50022 DATA 17,208,160,7,169,0      :rem 143
50028 DATA 153,0,57,136,16,250     :rem 194
50034 DATA 160,47,185,104,198,153 :rem 98
50040 DATA 0,56,136,16,247,169     :rem 200
50046 DATA 2,141,35,208,169,0      :rem 143
50052 DATA 141,34,208,133,2,169    :rem 242
50058 DATA 200,141,167,2,169,0     :rem 192
50064 DATA 141,168,2,141,169,2     :rem 196
50070 DATA 96,120,169,123,141,20   :rem 34
50076 DATA 3,169,199,141,21,3      :rem 154
50082 DATA 88,96,173,60,3,141      :rem 158
50088 DATA 201,195,173,61,3,141    :rem 248
50094 DATA 202,195,169,0,141,204   :rem 39
50100 DATA 195,169,4,141,205,195   :rem 43
50106 DATA 162,19,169,0,141,63     :rem 196
50112 DATA 3,173,17,208,16,251     :rem 190
50118 DATA 160,39,185,0,0,153      :rem 143
50124 DATA 0,0,136,16,247,173      :rem 139
50130 DATA 204,195,24,105,40,141   :rem 26
50136 DATA 204,195,173,205,195,105
                                   :rem 145
50142 DATA 0,141,205,195,238,202   :rem 31
50148 DATA 195,238,202,195,202,208
                                   :rem 149
50154 DATA 219,96,206,62,3,16      :rem 154
50160 DATA 50,238,60,3,208,3        :rem 90
50166 DATA 238,61,3,169,7,141      :rem 156
50172 DATA 62,3,32,164,195,76      :rem 156
50178 DATA 35,196,238,62,3,173     :rem 214
50184 DATA 62,3,201,8,208,21        :rem 91
50190 DATA 206,60,3,173,60,3        :rem 90
50196 DATA 201,255,208,3,206,61    :rem 246
```

"A LIVING TAPESTRY . . ."



"The world of Ultima III can only be compared to a living tapestry — complex and beautiful . . . This is the best fantasy game in computing. Indeed, it is one of the best fantasy worlds in which to live. Lord British is a veritable JRR Tolkien of the keyboard." — Popular Mechanics

"Exodus: Ultima III, with a superior plot to match its superior gaming system, is a great game. It upgrades the market; in several ways it sets new standards for fantasy gaming state of the art." — Softline

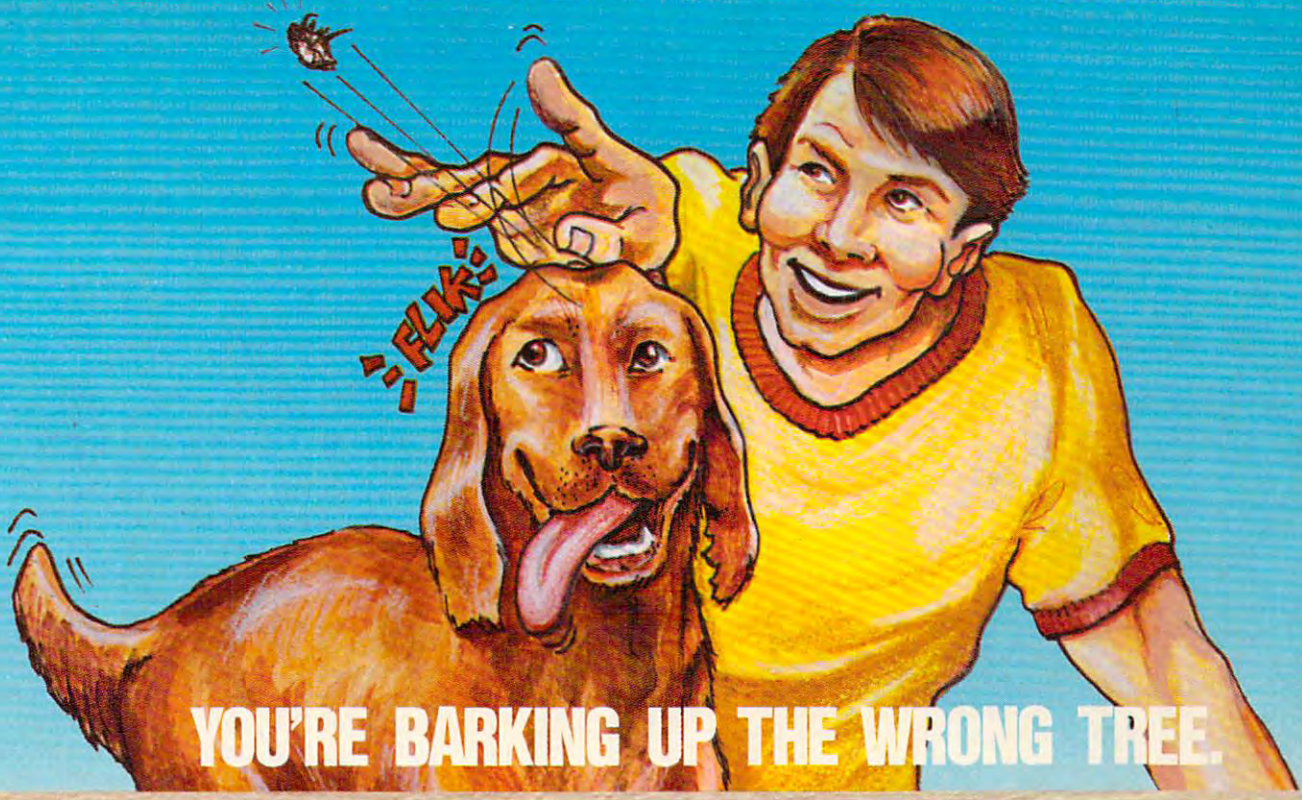
"Exodus: Ultima III is Lord British's magnum opus — so far. It's fun and exciting to play and constantly intriguing. And the ending is marvelously unexpected and not a bit disappointing — except that it is the ending, and as with a good book, you'll probably wish there were more." — Softalk

Available on: Apple, Atari, Com64, IBM

ORIGIN SYSTEMS INC. 1545 OSGOOD ST., #7 NORTH ANDOVER, MA 01845
(617) 681-0609

```
50202 DATA 3,169,0,141,62,3          :rem 35
50208 DATA 32,164,195,32,46,196      :rem 3
50214 DATA 96,133,38,134,39,132      :rem 253
50220 DATA 40,96,165,38,166,39       :rem 210
50226 DATA 164,40,96,174,0,208       :rem 201
50232 DATA 172,1,208,169,0,133       :rem 190
50238 DATA 251,173,0,220,74,176      :rem 248
50244 DATA 5,192,47,144,1,136        :rem 149
50250 DATA 74,176,5,192,175,176      :rem 7
50256 DATA 1,200,74,176,21,72        :rem 144
50262 DATA 169,255,141,248,7,104     :rem 49
50268 DATA 224,107,208,9,32,39       :rem 207
50274 DATA 196,32,4,196,76,106       :rem 213
50280 DATA 196,202,74,176,21,72      :rem 254
50286 DATA 169,254,141,248,7,104     :rem 54
50292 DATA 224,205,208,9,32,39       :rem 203
50298 DATA 196,32,236,195,76,130     :rem 62
50304 DATA 196,232,74,176,5,169      :rem 7
50310 DATA 1,141,128,3,142,0         :rem 75
50316 DATA 208,140,1,208,96,160      :rem 245
50322 DATA 255,185,231,196,153,127
                                     :rem 149
50328 DATA 62,185,104,197,153,0      :rem 253
50334 DATA 63,136,208,241,169,255:rem 101
50340 DATA 141,21,208,169,2,141      :rem 237
50346 DATA 39,208,169,254,141,248:rem 109
50352 DATA 7,169,118,141,1,208       :rem 199
50358 DATA 169,138,141,0,208,173     :rem 50
50364 DATA 22,208,41,247,141,22      :rem 242
50370 DATA 208,169,4,141,62,3        :rem 148
50376 DATA 169,0,141,63,3,169        :rem 157
50382 DATA 20,141,3,208,141,5        :rem 136
50388 DATA 208,141,7,208,169,80      :rem 7
50394 DATA 141,2,208,169,160,141     :rem 42
50400 DATA 4,208,169,240,141,6       :rem 191
50406 DATA 208,96,144,0,2,64         :rem 99
50412 DATA 0,16,184,0,38,20          :rem 35
50418 DATA 0,0,41,16,36,4            :rem 193
50424 DATA 68,80,2,130,36,1          :rem 43
50430 DATA 64,168,0,176,0,1          :rem 42
50436 DATA 52,64,0,240,16,95         :rem 100
50442 DATA 104,208,196,0,128,73      :rem 249
50448 DATA 128,0,166,34,160,141      :rem 247
50454 DATA 72,32,1,34,74,0           :rem 249
50460 DATA 202,41,0,0,160,0          :rem 21
50466 DATA 0,2,0,0,18,0              :rem 86
50472 DATA 0,0,0,0,0,0               :rem 24
50478 DATA 0,0,0,0,0,0               :rem 30
50484 DATA 0,0,0,0,0,0               :rem 27
50490 DATA 0,0,0,0,0,0               :rem 24
50496 DATA 0,0,0,2,34,0              :rem 87
50502 DATA 5,85,64,0,136,128         :rem 99
50508 DATA 0,0,0,0,0,0               :rem 24
50514 DATA 0,0,0,0,0,0               :rem 21
50520 DATA 0,0,0,0,0,0               :rem 18
50526 DATA 0,0,0,0,0,0               :rem 24
50532 DATA 0,0,0,0,0,0               :rem 21
50538 DATA 0,0,0,0,0,60              :rem 81
50544 DATA 0,0,66,0,0,66             :rem 144
50550 DATA 0,0,90,0,3,195            :rem 192
50556 DATA 192,12,66,48,16,66        :rem 165
50562 DATA 8,32,66,4,73,165          :rem 59
50568 DATA 146,146,36,73,164,24      :rem 8
50574 DATA 37,168,189,21,168,195     :rem 71
50580 DATA 21,81,0,138,2,0           :rem 242
50586 DATA 64,2,0,64,5,0             :rem 153
50592 DATA 160,0,0,0,0,0             :rem 130
50598 DATA 0,255,0,0,0,0             :rem 141
50604 DATA 0,0,0,60,0,0              :rem 75
50610 DATA 66,0,128,66,1,126         :rem 95
50616 DATA 90,126,33,195,132,192     :rem 49
50622 DATA 66,3,32,66,4,32           :rem 254
50628 DATA 66,4,80,36,10,24          :rem 51
50634 DATA 36,24,20,24,40,3          :rem 38
50640 DATA 189,192,0,195,0,1         :rem 99
50646 DATA 0,128,2,0,64,2            :rem 196
50652 DATA 0,64,5,0,160,0            :rem 190
50658 DATA 0,0,0,0,0,255             :rem 138
50664 DATA 0,0,0,0,0,0               :rem 27
50670 DATA 0,0,0,15,128,0            :rem 185
50676 DATA 31,192,0,31,192,0         :rem 94
50682 DATA 31,224,0,15,240,0         :rem 83
50688 DATA 3,224,96,3,224,127        :rem 160
50694 DATA 3,255,195,3,255,252       :rem 212
50700 DATA 3,224,0,3,224,0           :rem 232
50706 DATA 3,224,0,59,255,156        :rem 153
50712 DATA 67,255,130,131,255,129 :rem 95
50718 DATA 71,24,226,56,231,28       :rem 206
50724 DATA 0,0,0,184,0,0             :rem 133
50730 DATA 0,0,0,0,0,0               :rem 21
50736 DATA 0,0,1,240,0,3             :rem 133
50742 DATA 248,0,3,248,0,7           :rem 254
50748 DATA 248,0,15,240,6,7          :rem 53
50754 DATA 192,254,7,192,195,255     :rem 64
50760 DATA 192,63,255,192,0,7        :rem 156
50766 DATA 192,0,7,192,0,7           :rem 4
50772 DATA 192,57,255,220,65,255     :rem 58
50778 DATA 194,129,255,193,71,24     :rem 66
50784 DATA 226,56,231,28,0,0         :rem 99
50790 DATA 0,184,85,105,105,85       :rem 206
50796 DATA 85,105,105,85,5,22        :rem 160
50802 DATA 22,7,15,63,62,59          :rem 53
50808 DATA 80,148,148,208,240,252:rem 102
50814 DATA 188,236,15,15,15,63       :rem 207
50820 DATA 63,63,255,255,240,240     :rem 43
50826 DATA 240,252,252,252,255,255
                                     :rem 148
50832 DATA 255,255,255,255,255,255
                                     :rem 160
50838 DATA 255,255,144,83,67,79      :rem 23
50844 DATA 82,69,58,0,144,77         :rem 120
50850 DATA 65,71,73,67,58,0          :rem 63
50856 DATA 158,89,79,85,32,83        :rem 186
50862 DATA 65,86,69,68,32,84         :rem 130
50868 DATA 72,69,32,80,82,73         :rem 122
50874 DATA 78,67,69,83,83,32         :rem 132
50880 DATA 33,0,28,66,79,78          :rem 70
50886 DATA 85,83,17,17,157,157       :rem 227
50892 DATA 157,157,157,83,67,79      :rem 29
50898 DATA 82,69,17,17,157,157       :rem 231
50904 DATA 157,157,72,73,84,32       :rem 214
50910 DATA 65,78,89,32,75,69         :rem 128
50916 DATA 89,0,28,78,85,77          :rem 80
50922 DATA 66,69,82,32,79,70         :rem 121
50928 DATA 32,66,73,82,68,83         :rem 124
50934 DATA 32,40,49,45,51,41         :rem 101
50940 DATA 32,79,82,32,81,32         :rem 106
50946 DATA 84,79,32,81,85,73         :rem 127
50952 DATA 84,0,158,80,79,79         :rem 125
50958 DATA 82,32,80,82,73,78         :rem 123
50964 DATA 67,69,83,83,32,66         :rem 129
50970 DATA 76,79,78,68,69,76         :rem 145
50976 DATA 76,0,7,12,120,7           :rem 2
50982 DATA 233,120,8,97,240,7        :rem 158
50988 DATA 233,240,7,12,240,7        :rem 153
50994 DATA 12,120,7,233,120,8        :rem 145
51000 DATA 97,120,10,143,120,7       :rem 178
51006 DATA 233,120,8,97,120,7        :rem 143
51012 DATA 12,240,28,66,79,78        :rem 157
51018 DATA 85,83,58,0,162,3          :rem 54
51024 DATA 160,255,136,208,253,202
                                     :rem 135
51030 DATA 208,248,165,108,208,30 :rem 89
51036 DATA 198,109,208,26,169,20     :rem 53
```

IF THIS IS YOUR IDEA OF A FLEA FLICKER ON A RED DOG,



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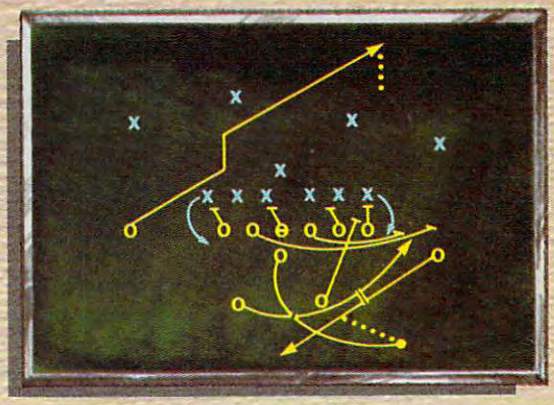

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```
51042 DATA 133,109,198,106,165,106
                                  :rem 143
51048 DATA 201,255,208,14,198,107 :rem 96
51054 DATA 16,10,169,1,133,108    :rem 190
51060 DATA 169,0,133,106,133,107  :rem 31
51066 DATA 96,169,1,141,25,208    :rem 207
51072 DATA 173,18,208,201,204,144 :rem 85
51078 DATA 36,173,22,208,41,248     :rem 0
51084 DATA 9,0,141,22,208,173     :rem 144
51090 DATA 24,208,41,240,9,5        :rem 94
51096 DATA 141,24,208,173,22,208  :rem 42
51102 DATA 41,239,141,22,208,169  :rem 38
51108 DATA 0,141,18,208,76,205    :rem 194
51114 DATA 199,173,22,208,41,240  :rem 41
51120 DATA 13,62,3,141,22,208     :rem 130
51126 DATA 169,205,141,18,208,173 :rem 96
51132 DATA 24,208,41,240,9,14     :rem 139
51138 DATA 141,24,208,173,22,208  :rem 39
51144 DATA 9,16,141,22,208,173    :rem 196
51150 DATA 13,220,41,1,240,76     :rem 131
51156 DATA 206,133,3,208,68,169     :rem 2
51162 DATA 5,141,133,3,173,132    :rem 187
51168 DATA 3,208,30,169,1,141     :rem 146
51174 DATA 132,3,173,52,3,141     :rem 140
51180 DATA 249,7,173,53,3,141     :rem 151
51186 DATA 250,7,173,54,3,141     :rem 150
51192 DATA 251,7,169,129,141,11   :rem 251
51198 DATA 212,208,28,173,55,3    :rem 207
51204 DATA 141,249,7,173,56,3     :rem 151
51210 DATA 141,250,7,173,57,3     :rem 141
51216 DATA 141,251,7,169,128,141   :rem 43
51222 DATA 11,212,169,0,141,132   :rem 229
51228 DATA 3,76,49,234,76,188     :rem 172
51234 DATA 254,162,0,138,74,168   :rem 255
51240 DATA 185,249,7,201,250,240   :rem 38
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51252 DATA 144,43,201,105,176,6   :rem 242
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51264 DATA 201,150,176,13,189,2   :rem 247
51270 DATA 208,201,200,240,77,254 :rem 83
51276 DATA 2,208,76,152,200,201   :rem 241
51282 DATA 190,176,6,222,3,208    :rem 201
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51294 DATA 76,152,200,189,2,208     :rem 0
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51312 DATA 157,176,2,76,133,200   :rem 245
51318 DATA 189,2,208,201,255,240   :rem 43
51324 DATA 27,254,2,208,169,0     :rem 149
51330 DATA 157,176,2,189,3,208    :rem 206
51336 DATA 205,1,208,240,18,144   :rem 242
51342 DATA 6,222,3,208,76,152     :rem 147
51348 DATA 200,254,3,208,173,27   :rem 249
51354 DATA 212,201,2,176,5,169    :rem 197
51360 DATA 1,157,80,3,232,232     :rem 140
51366 DATA 228,21,240,3,76,37     :rem 154
51372 DATA 200,96,162,0,189,192     :rem 0
51378 DATA 2,208,68,189,80,3      :rem 117
51384 DATA 208,3,76,38,201,189    :rem 213
51390 DATA 176,2,157,224,2,240    :rem 197
51396 DATA 12,189,2,208,56,233    :rem 210
51402 DATA 20,157,8,208,76,218    :rem 203
51408 DATA 200,189,2,208,24,105   :rem 244
51414 DATA 20,157,8,208,32,45     :rem 148
51420 DATA 201,141,255,2,173,21   :rem 231
51426 DATA 208,13,255,2,141,21    :rem 189
51432 DATA 208,189,3,208,157,9    :rem 212
51438 DATA 208,169,1,157,192,2    :rem 209
51444 DATA 169,56,157,240,2,189    :rem 10
51450 DATA 224,2,240,6,222,8       :rem 89
51456 DATA 208,76,7,201,254,8     :rem 159
51462 DATA 208,222,240,2,208,26   :rem 242
51468 DATA 169,0,157,192,2,157    :rem 214
51474 DATA 80,3,32,45,201,24       :rem 93
51480 DATA 105,255,141,255,2,173   :rem 41
51486 DATA 21,208,45,255,2,141    :rem 200
51492 DATA 21,208,232,232,228,21   :rem 37
51498 DATA 208,132,96,138,74,168   :rem 70
51504 DATA 169,16,192,0,208,1     :rem 147
51510 DATA 96,10,136,76,50,201    :rem 193
51516 DATA 173,129,3,208,77,173     :rem 5
51522 DATA 128,3,208,1,96,169     :rem 157
51528 DATA 1,141,129,3,173,21     :rem 143
51534 DATA 208,9,128,141,21,208   :rem 249
51540 DATA 169,129,141,4,212,169   :rem 48
51546 DATA 0,141,16,208,169,85    :rem 207
51552 DATA 141,131,3,173,1,208    :rem 188
51558 DATA 141,15,208,173,248,7     :rem 4
51564 DATA 201,255,208,15,169,1   :rem 251
51570 DATA 141,130,3,173,0,208    :rem 186
51576 DATA 56,233,19,141,14,208     :rem 0
51582 DATA 96,169,0,141,130,3     :rem 151
51588 DATA 173,0,208,24,105,19    :rem 204
51594 DATA 141,14,208,96,173,130   :rem 49
51600 DATA 3,208,26,238,14,208    :rem 195
51606 DATA 173,14,208,201,255,208 :rem 91
51612 DATA 19,173,16,208,9,128    :rem 207
51618 DATA 141,16,208,169,0,141   :rem 248
51624 DATA 14,208,76,176,201,206   :rem 45
51630 DATA 14,208,206,131,3,173   :rem 239
51636 DATA 131,3,141,1,212,208    :rem 185
51642 DATA 21,173,21,208,41,127   :rem 242
51648 DATA 141,21,208,169,0,141   :rem 247
51654 DATA 129,3,141,128,3,169    :rem 206
51660 DATA 128,141,4,212,96,169     :rem 1
51666 DATA 0,141,13,212,141,12    :rem 182
51672 DATA 212,141,8,212,160,0    :rem 186
51678 DATA 185,34,199,141,1,212     :rem 5
51684 DATA 185,35,199,141,0,212     :rem 2
51690 DATA 190,36,199,169,255,133:rem 116
51696 DATA 41,198,41,208,252,202   :rem 52
51702 DATA 208,245,200,200,200,192
                                  :rem 124
51708 DATA 36,144,223,169,32,141   :rem 47
51714 DATA 4,212,169,114,141,13   :rem 241
51720 DATA 212,169,17,141,12,212   :rem 32
51726 DATA 141,8,212,96,120,169     :rem 0
51732 DATA 49,141,20,3,169,234    :rem 201
51738 DATA 141,21,3,169,0,141     :rem 144
51744 DATA 26,208,169,255,141,13   :rem 51
51750 DATA 220,169,0,141,21,208   :rem 239
51756 DATA 88,96,32,91,255,162    :rem 225
51762 DATA 10,160,3,24,32,240     :rem 135
51768 DATA 255,169,230,160,198,32:rem 112
51774 DATA 30,171,169,1,141,33    :rem 199
51780 DATA 208,165,203,201,62,208 :rem 91
51786 DATA 1,0,201,56,208,4        :rem 46
51792 DATA 162,1,208,14,201,59    :rem 200
51798 DATA 208,4,162,2,208,6      :rem 109
51804 DATA 201,8,208,229,162,3    :rem 198
51810 DATA 134,20,138,10,133,21   :rem 230
51816 DATA 76,3,192,169,0,141     :rem 157
51822 DATA 24,212,32,18,202,173   :rem 240
51828 DATA 24,208,41,240,9,5      :rem 103
51834 DATA 141,24,208,169,147,32   :rem 50
51840 DATA 210,255,162,10,160,8   :rem 240
51846 DATA 24,32,240,255,165,113   :rem 44
51852 DATA 164,114,32,30,171,165   :rem 41
51858 DATA 106,133,253,165,107,133
                                  :rem 148
51864 DATA 254,169,19,141,249,207:rem 113
51870 DATA 32,120,193,162,18,160   :rem 41
51876 DATA 12,24,32,240,255,169     :rem 1
51882 DATA 194,160,198,32,30,171   :rem 54
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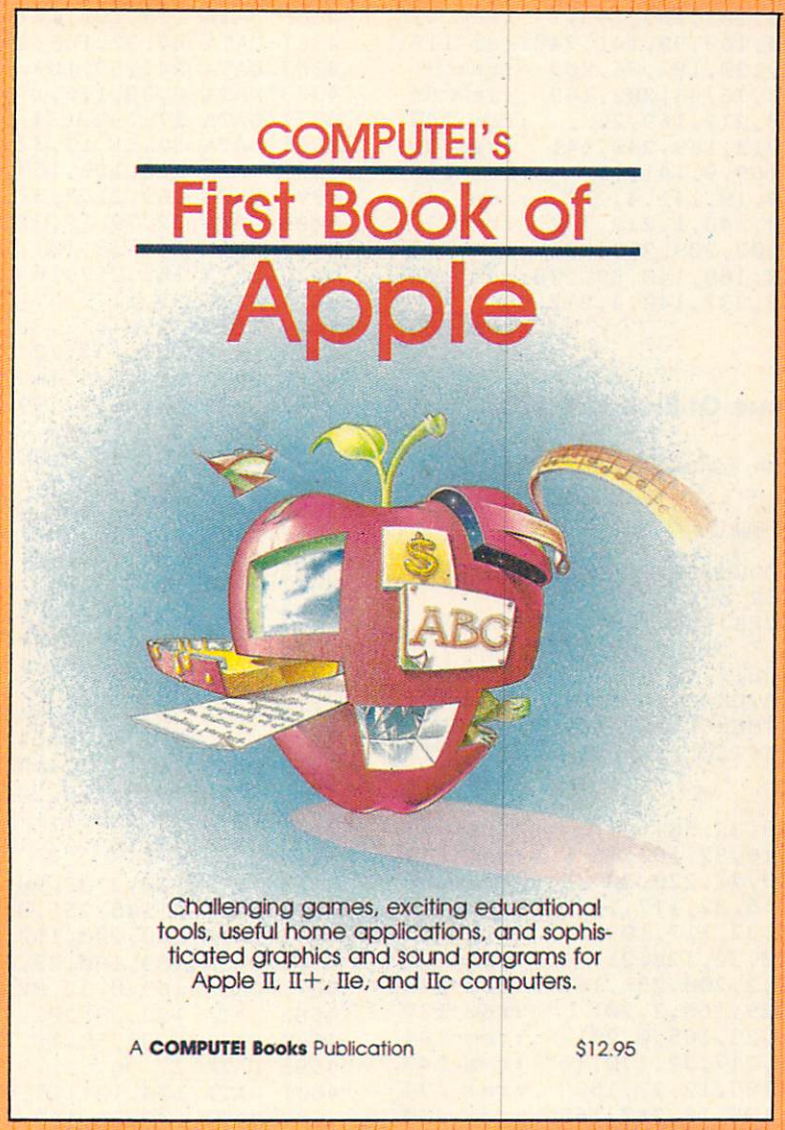

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```
51888 DATA 169,0,141,33,208,165     :rem 6
51894 DATA 106,24,109,168,2,133     :rem 0
51900 DATA 253,165,107,109,169,2    :rem 47
51906 DATA 133,254,169,99,141,249   :rem 116
51912 DATA 207,32,120,193,36,203    :rem 36
51918 DATA 112,252,76,46,202,169    :rem 54
51924 DATA 8,141,3,212,169,20       :rem 147
51930 DATA 141,5,212,169,240,141    :rem 36
51936 DATA 6,212,169,9,141,15       :rem 158
51942 DATA 212,169,19,141,4,212     :rem 249
51948 DATA 160,255,140,1,212,152    :rem 39
51954 DATA 160,3,202,208,253,136    :rem 42
51960 DATA 208,250,168,140,39,208   :rem 102
51966 DATA 136,208,237,140,4,212,96
                                    :rem 202
```

Program 3: Rescue Of Blondell, VIC Version

Version by Kevin Mykytyn, Editorial Programmer

Please refer to "COMPUTE!'s Guide To Typing In Programs" before entering this listing.

```
10 PRINT"{CLR}{4 DOWN}{RVS}{2 SPACES}RESC
   UE OF BLONDELL{2 SPACES}":PRINT"
   {2 DOWN}{2 SPACES}{BLK}{RVS} ENTERING
   {SPACE}ML DATA "                 :rem 161
20 FOR I=4109 TO 5812               :rem 16
30 READ A:POKE I,A:CK=CK+A:NEXT     :rem 87
40 IF CK<>176773 THEN PRINT"{3 DOWN}{BLU}
   {RVS}ERROR DETECTED IN DATA STATEMENTS
   ":STOP                           :rem 163
50 SYS 4109                         :rem 50
4109 DATA 32,12,19,32,58,18         :rem 49
4115 DATA 32,127,16,32,150,18       :rem 139
4121 DATA 32,68,19,32,222,20        :rem 88
4127 DATA 32,181,16,32,117,19       :rem 146
4133 DATA 32,3,19,32,117,19         :rem 43
4139 DATA 32,19,20,32,128,21        :rem 91
4145 DATA 173,141,2,208,251,165     :rem 245
4151 DATA 4,240,229,165,2,201       :rem 137
4157 DATA 10,208,223,165,0,201      :rem 184
4163 DATA 229,208,217,32,170,16     :rem 249
4169 DATA 160,21,185,12,22,153      :rem 194
4175 DATA 132,30,136,16,247,165     :rem 250
4181 DATA 65,24,101,63,133,65       :rem 146
4187 DATA 165,66,101,64,133,66      :rem 209
4193 DATA 32,68,19,160,10,185       :rem 154
4199 DATA 56,22,153,181,30,136      :rem 204
4205 DATA 16,247,32,128,21,165      :rem 196
4211 DATA 203,201,11,240,149,201    :rem 15
4217 DATA 28,208,246,76,34,253      :rem 210
4223 DATA 169,147,32,210,255,32     :rem 246
4229 DATA 68,19,160,18,185,67       :rem 170
4235 DATA 22,153,222,30,136,16      :rem 187
4241 DATA 247,32,249,253,164,203    :rem 44
4247 DATA 185,94,236,201,49,144     :rem 6
4253 DATA 247,201,58,176,243,56     :rem 3
4259 DATA 233,48,10,141,72,3        :rem 97
4265 DATA 96,169,32,160,0,153       :rem 155
4271 DATA 0,30,136,208,250,96       :rem 145
4277 DATA 166,1,164,2,32,51         :rem 48
4283 DATA 17,32,95,17,169,0         :rem 58
4289 DATA 141,19,145,173,17,145     :rem 4
4295 DATA 74,74,74,176,5,192        :rem 122
4301 DATA 2,144,1,136,74,72         :rem 40
4307 DATA 176,19,200,192,19,208     :rem 254
4313 DATA 14,136,165,3,208,9        :rem 98
4319 DATA 169,1,133,3,169,36        :rem 107
4325 DATA 141,154,31,104,74,72      :rem 193
4331 DATA 176,15,169,33,133,109     :rem 252
4337 DATA 224,7,176,6,32,245        :rem 106
4343 DATA 17,76,252,16,202,104      :rem 194
4349 DATA 74,176,4,169,1,133        :rem 111
4355 DATA 113,169,127,141,34,145    :rem 45
4361 DATA 44,32,145,48,15,169       :rem 157
4367 DATA 34,133,109,224,15,144     :rem 249
4373 DATA 6,32,176,17,76,29         :rem 64
4379 DATA 17,232,134,1,132,2        :rem 93
4385 DATA 32,51,17,32,95,17         :rem 56
4391 DATA 165,109,160,0,145,251     :rem 246
4397 DATA 169,2,32,82,19,96         :rem 71
4403 DATA 32,79,17,32,104,18        :rem 97
4409 DATA 24,138,101,251,133,251    :rem 34
4415 DATA 165,252,105,0,133,252     :rem 239
4421 DATA 32,122,18,136,208,250     :rem 239
4427 DATA 32,87,17,96,120,133       :rem 156
4433 DATA 105,134,106,132,107,96    :rem 38
4439 DATA 165,105,166,106,164,107   :rem 99
4445 DATA 88,96,32,79,17,160        :rem 122
4451 DATA 0,177,251,240,20,201      :rem 182
4457 DATA 38,240,8,201,36,208       :rem 153
4463 DATA 56,169,1,133,4,198        :rem 112
4469 DATA 69,165,69,201,0,208       :rem 164
4475 DATA 44,169,15,141,14,144      :rem 204
4481 DATA 169,39,145,251,32,82      :rem 212
4487 DATA 19,88,165,162,105,100     :rem 3
4493 DATA 197,162,208,252,32,170    :rem 52
4499 DATA 16,169,0,160,21,133       :rem 152
4505 DATA 63,133,64,185,34,22       :rem 151
4511 DATA 153,132,30,136,16,247     :rem 241
4517 DATA 76,97,16,169,32,145       :rem 170
4523 DATA 251,32,87,17,96,32        :rem 108
4529 DATA 79,17,32,104,18,165       :rem 161
4535 DATA 0,201,10,240,56,162       :rem 133
4541 DATA 19,160,1,177,251,208      :rem 199
4547 DATA 18,169,32,145,251,136     :rem 4
4553 DATA 208,3,32,98,19,169        :rem 116
4559 DATA 0,145,251,32,82,19        :rem 104
4565 DATA 200,200,192,22,208,229    :rem 37
4571 DATA 189,180,23,136,145,251    :rem 51
4577 DATA 169,0,32,82,19,32         :rem 59
4583 DATA 122,18,202,208,210,198    :rem 43
4589 DATA 0,32,58,18,32,87          :rem 15
4595 DATA 17,96,32,79,17,32         :rem 70
4601 DATA 104,18,165,0,201,229      :rem 187
4607 DATA 240,56,162,19,160,20      :rem 196
4613 DATA 177,251,208,20,169,32     :rem 252
4619 DATA 145,251,200,192,21,208    :rem 39
4625 DATA 3,32,98,19,169,0          :rem 10
4631 DATA 145,251,32,82,19,136      :rem 201
4637 DATA 136,16,229,189,200,23     :rem 1
4643 DATA 200,145,251,169,0,32      :rem 192
4649 DATA 82,19,32,122,18,202       :rem 152
4655 DATA 208,210,230,0,32,58       :rem 142
4661 DATA 18,32,87,17,96,169        :rem 123
4667 DATA 32,160,19,153,180,23      :rem 202
4673 DATA 153,200,23,136,16,247     :rem 248
4679 DATA 164,0,192,17,240,12       :rem 152
4685 DATA 185,181,22,168,169,0      :rem 216
4691 DATA 153,180,23,136,16,250     :rem 249
4697 DATA 164,0,185,202,22,168      :rem 208
4703 DATA 169,0,153,200,23,136      :rem 190
4709 DATA 16,250,96,169,0,133       :rem 158
4715 DATA 251,169,30,133,252,169    :rem 50
4721 DATA 0,133,110,173,3,144       :rem 132
4727 DATA 16,251,96,165,251,24      :rem 210
4733 DATA 105,22,133,251,165,252    :rem 37
4739 DATA 105,0,133,252,96,165      :rem 206
4745 DATA 251,56,233,22,133,251     :rem 248
4751 DATA 165,252,233,0,133,252     :rem 244
4757 DATA 96,169,10,133,2,169       :rem 166
4763 DATA 7,133,1,169,147,32        :rem 106
4769 DATA 210,255,169,0,133,113     :rem 251
```

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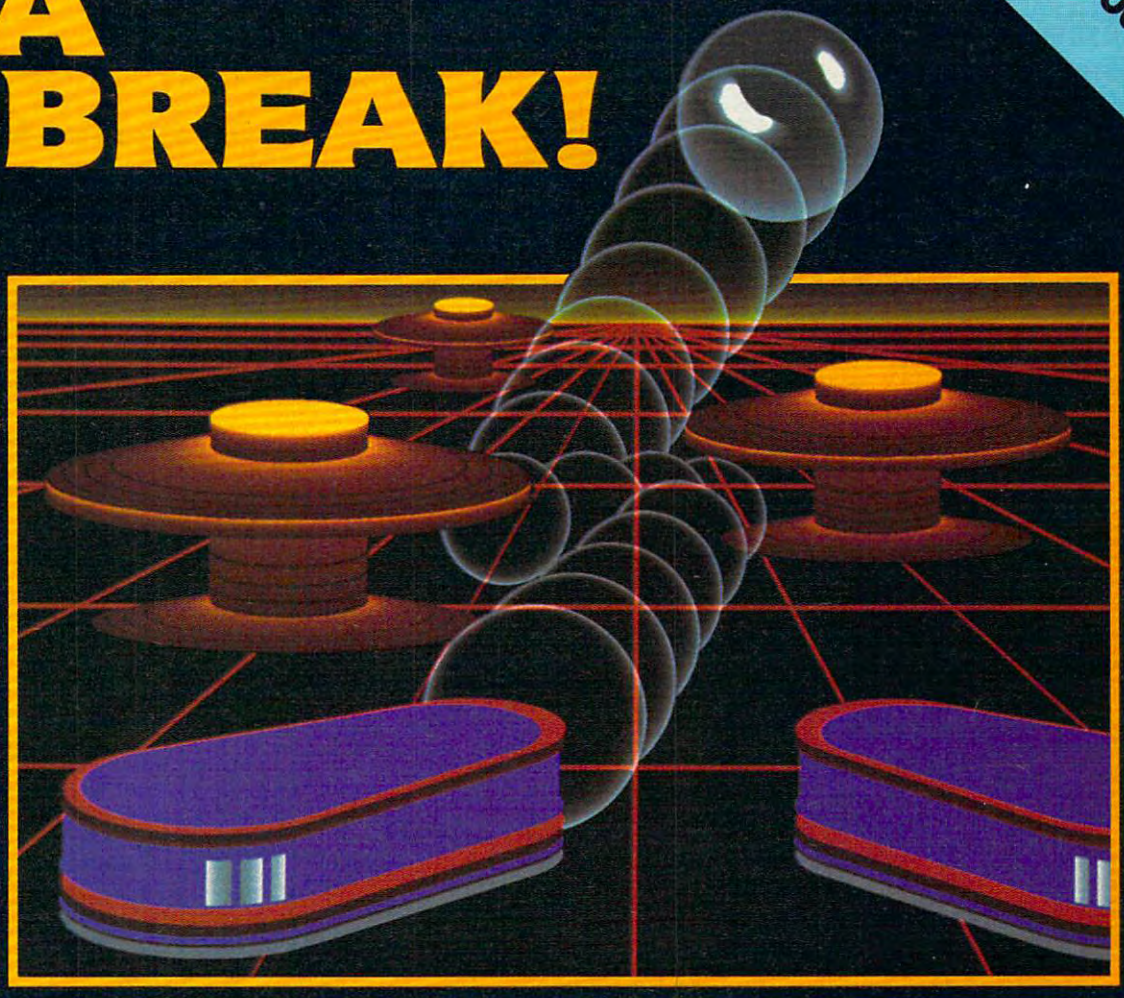

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4775 DATA 133,114,133,3,133,4     :rem 143
4781 DATA 168,153,220,23,136,208   :rem 47
4787 DATA 250,169,34,133,109,133   :rem 54
4793 DATA 116,160,22,32,176,17    :rem 203
4799 DATA 136,16,250,160,0,185    :rem 208
4805 DATA 0,128,153,0,28,185       :rem 99
4811 DATA 0,129,153,0,29,136       :rem 94
4817 DATA 208,241,169,255,141,5     :rem 2
4823 DATA 144,160,79,185,101,22   :rem 251
4829 DATA 153,8,29,136,16,247     :rem 167
4835 DATA 160,7,185,173,22,153    :rem 206
4841 DATA 0,28,136,16,247,169     :rem 159
4847 DATA 232,133,63,169,3,133    :rem 206
4853 DATA 64,169,0,133,65,133     :rem 157
4859 DATA 66,133,70,169,25,133    :rem 216
4865 DATA 69,96,165,162,105,5     :rem 171
4871 DATA 197,162,208,252,96,160   :rem 61
4877 DATA 12,169,8,153,167,23     :rem 167
4883 DATA 136,16,250,160,242,162   :rem 45
4889 DATA 9,138,153,181,22,32     :rem 164
4895 DATA 58,19,201,150,176,8     :rem 166
4901 DATA 224,3,144,9,202,76       :rem 98
4907 DATA 50,19,224,16,176,1      :rem 103
4913 DATA 232,136,208,229,169,252:rem 104
4919 DATA 133,0,96,165,108,10     :rem 153
4925 DATA 10,56,101,108,133,108   :rem 241
4931 DATA 96,169,0,160,0,153      :rem 102
4937 DATA 0,150,153,0,151,136     :rem 141
4943 DATA 208,247,96,72,165,251    :rem 13
4949 DATA 133,43,165,252,24,105   :rem 255
4955 DATA 120,133,44,104,145,43   :rem 245
4961 DATA 96,165,110,208,14,32    :rem 203
4967 DATA 136,18,169,32,145,251    :rem 10
4973 DATA 32,122,18,169,1,133     :rem 152
4979 DATA 110,96,165,114,208,44     :rem 8
4985 DATA 165,113,240,39,165,251   :rem 55
4991 DATA 133,253,165,252,133,254:rem 101
4997 DATA 169,1,133,115,169,15    :rem 216
5003 DATA 141,14,144,165,109,201   :rem 27
5009 DATA 33,208,6,169,1,133       :rem 98
5015 DATA 111,208,4,169,0,133     :rem 137
5021 DATA 111,169,7,133,112,133   :rem 234
5027 DATA 114,96,177,253,240,99    :rem 10
5033 DATA 165,115,208,6,160,0     :rem 139
5039 DATA 169,32,145,253,169,0    :rem 208
5045 DATA 133,115,165,111,208,9   :rem 244
5051 DATA 230,253,208,2,230,254   :rem 236
5057 DATA 76,206,19,198,253,165    :rem 14
5063 DATA 253,201,255,208,2,198   :rem 251
5069 DATA 254,165,253,133,251,165:rem 102
5075 DATA 254,133,252,198,112,165:rem 100
5081 DATA 112,240,48,10,10,10     :rem 125
5087 DATA 10,24,105,158,141,13    :rem 191
5093 DATA 144,177,253,240,34,201   :rem 41
5099 DATA 38,208,20,32,114,21     :rem 146
5105 DATA 169,39,145,253,169,7    :rem 216
5111 DATA 32,82,19,169,15,141     :rem 147
5117 DATA 14,144,76,12,20,169     :rem 148
5123 DATA 35,145,253,169,0,32     :rem 146
5129 DATA 82,19,96,169,0,133      :rem 113
5135 DATA 113,133,114,96,160,0    :rem 188
5141 DATA 132,25,185,220,23,170   :rem 237
5147 DATA 133,20,185,221,23,168   :rem 247
5153 DATA 133,21,132,26,32,51     :rem 135
5159 DATA 17,160,0,177,251,76     :rem 157
5165 DATA 120,20,169,32,145,251   :rem 243
5171 DATA 164,26,32,58,19,201     :rem 150
5177 DATA 215,144,114,228,1,240   :rem 244
5183 DATA 7,144,4,202,76,71        :rem 52
5189 DATA 20,232,196,2,240,7      :rem 101
5195 DATA 144,4,136,76,82,20      :rem 106
5201 DATA 200,132,26,32,51,17     :rem 129
5207 DATA 32,148,20,169,38,160    :rem 202
5213 DATA 0,145,251,169,6,32       :rem 94
5219 DATA 82,19,164,25,138,153    :rem 210
5225 DATA 220,23,165,26,153,221   :rem 239
5231 DATA 23,200,200,204,72,3     :rem 124
5237 DATA 208,158,96,201,38,240     :rem 2
5243 DATA 179,165,21,240,175,164   :rem 50
5249 DATA 25,32,58,19,74,74        :rem 67
5255 DATA 74,74,153,220,23,169    :rem 207
5261 DATA 0,153,221,23,76,112     :rem 136
5267 DATA 20,160,0,177,251,201    :rem 189
5273 DATA 32,240,17,201,33,240    :rem 185
5279 DATA 13,201,34,240,9,166     :rem 151
5285 DATA 20,164,21,132,26,32     :rem 141
5291 DATA 51,17,96,32,58,19        :rem 64
5297 DATA 201,60,176,8,224,20     :rem 150
5303 DATA 240,4,232,76,219,20     :rem 141
5309 DATA 201,120,176,8,224,0     :rem 139
5315 DATA 240,4,202,76,219,20     :rem 141
5321 DATA 201,180,176,5,192,1     :rem 141
5327 DATA 240,1,136,201,181,144   :rem 238
5333 DATA 5,192,20,240,1,200       :rem 80
5339 DATA 76,82,20,120,169,235    :rem 208
5345 DATA 141,20,3,169,20,141     :rem 138
5351 DATA 21,3,88,96,165,251      :rem 109
5357 DATA 72,165,252,72,198,116    :rem 11
5363 DATA 208,3,32,38,21,160       :rem 94
5369 DATA 7,165,116,201,10,144    :rem 197
5375 DATA 20,173,14,144,240,3     :rem 142
5381 DATA 206,14,144,185,141,22   :rem 245
5387 DATA 153,48,29,136,16,247    :rem 219
5393 DATA 76,29,21,185,133,22     :rem 158
5399 DATA 153,48,29,136,16,247    :rem 222
5405 DATA 104,133,252,104,133,251 :rem 77
5411 DATA 76,191,234,169,20,133   :rem 251
5417 DATA 116,32,104,18,162,19    :rem 197
5423 DATA 160,21,177,251,201,39   :rem 244
5429 DATA 144,27,201,42,176,23    :rem 200
5435 DATA 24,105,1,72,169,130     :rem 145
5441 DATA 141,13,144,104,201,42   :rem 229
5447 DATA 208,2,169,32,145,251    :rem 205
5453 DATA 169,7,32,82,19,136      :rem 113
5459 DATA 16,220,32,122,18,202    :rem 191
5465 DATA 16,212,198,63,165,63    :rem 214
5471 DATA 201,255,208,14,198,64     :rem 1
5477 DATA 165,64,201,255,208,6    :rem 210
5483 DATA 169,0,133,63,133,64     :rem 155
5489 DATA 96,165,65,24,105,10     :rem 163
5495 DATA 133,65,165,66,105,0     :rem 157
5501 DATA 133,66,96,165,65,133    :rem 209
5507 DATA 73,165,66,133,74,169    :rem 219
5513 DATA 14,133,77,32,197,21     :rem 151
5519 DATA 165,63,133,73,165,64    :rem 214
5525 DATA 133,74,169,36,133,77    :rem 215
5531 DATA 32,197,21,165,69,133    :rem 207
5537 DATA 73,165,70,133,74,169    :rem 217
5543 DATA 58,133,77,32,197,21     :rem 162
5549 DATA 160,4,185,86,22,153     :rem 161
5555 DATA 189,31,185,91,22,153    :rem 213
5561 DATA 211,31,185,96,22,153    :rem 201
5567 DATA 233,31,136,16,235,96    :rem 211
5573 DATA 169,0,133,98,133,99     :rem 171
5579 DATA 133,100,162,15,6,73     :rem 151
5585 DATA 38,74,120,248,165,98    :rem 225
5591 DATA 101,98,133,98,165,99    :rem 227
5597 DATA 101,99,133,99,165,100    :rem 10
5603 DATA 101,100,133,100,216,88   :rem 24
5609 DATA 202,16,227,162,2,181    :rem 197
5615 DATA 98,72,74,74,74,74        :rem 77
5621 DATA 32,2,22,104,41,15        :rem 31
5627 DATA 32,2,22,202,16,237       :rem 92
5633 DATA 96,230,77,164,77,9      :rem 123
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5639 DATA 48,153,180,31,96,25      :rem 165
5645 DATA 15,21,32,19,1,22         :rem 247
5651 DATA 5,4,32,20,8,5            :rem 100
5657 DATA 32,16,18,9,14,3          :rem 211
5663 DATA 5,19,19,16,15,15           :rem 6
5669 DATA 18,32,16,18,9,14          :rem 12
5675 DATA 3,5,19,19,32,2           :rem 160
5681 DATA 12,15,14,4,5,12          :rem 196
5687 DATA 12,16,12,1,25,32         :rem 250
5693 DATA 1,7,1,9,14,63            :rem 109
5699 DATA 14,21,13,2,5,18          :rem 207
5705 DATA 32,15,6,32,2,9           :rem 152
5711 DATA 18,4,19,32,49,45           :rem 6
5717 DATA 57,19,3,15,18,5          :rem 215
5723 DATA 2,15,14,21,19,13         :rem 245
5729 DATA 1,7,9,3,12,12            :rem 103
5735 DATA 4,60,12,189,126,0         :rem 50
5741 DATA 48,48,32,60,48,189       :rem 120
5747 DATA 126,0,0,0,84,170         :rem 250
5753 DATA 0,0,0,0,24,36             :rem 89
5759 DATA 90,60,90,24,60,126       :rem 109
5765 DATA 0,0,195,60,24,36           :rem 1
5771 DATA 0,0,0,0,0,126             :rem 83
5777 DATA 153,36,0,0,0,0           :rem 146
5783 DATA 68,60,94,56,64,0          :rem 19
5789 DATA 0,38,124,60,124,58       :rem 111
5795 DATA 72,0,194,102,252,46      :rem 157
5801 DATA 255,90,44,69,254,254     :rem 214
5807 DATA 254,0,239,239,239,0      :rem 159
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