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COMPUTE!

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The Leading Magazine Of Home, Educational, And Recreational Computing

The MS-DOS Invasion

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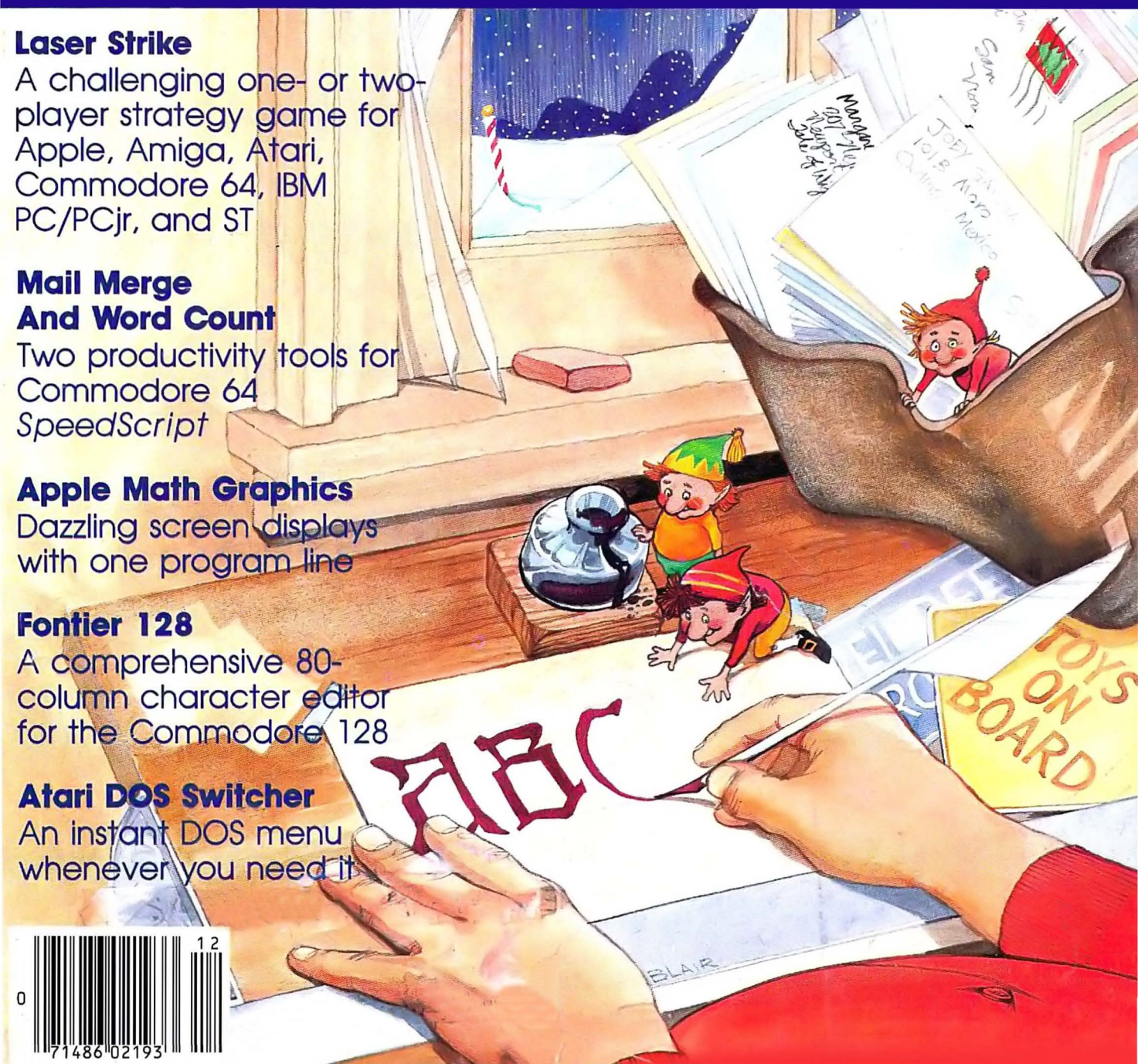

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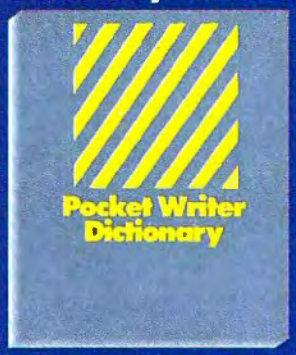

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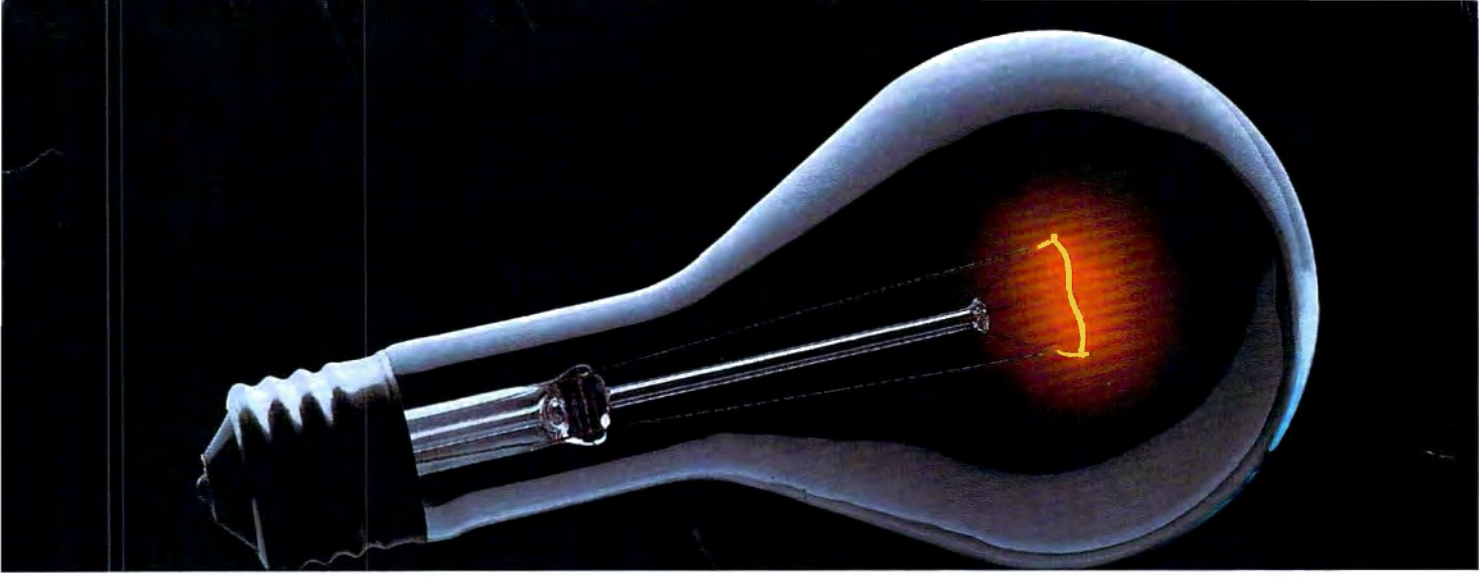

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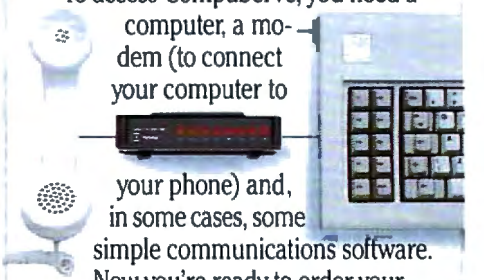

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FEATURES

REVIEWS

COLUMNS AND DEPARTMENTS

THE JOURNAL

NOTE: See page 98 before typing in programs.

AP Apple, **Mac** Macintosh, **AT** Atari, **ST,** Atari ST, **64** Commodore 64, **128** Commodore 128, **P** PET/CBM, **PC** IBM PC, **PCjr** IBM PCjr, **AM** Amiga, *General Interest.

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Editor's Notes

Tom Halfhill's article in this issue on the incredible PC clone market is excellent reading. We recommend it highly. The market spawned by the IBM PC is fast leaving its leader behind. *InfoWorld* recently speculated that this market maker might soon be displaced in favor of new, less clonable machines. We encourage the competition, and suggest that computers like the Toshiba 1100 portable and the Compaq 386 are highly visible and healthy by-products of such active product-development competition.

We were recently taken to task for an error that appeared in a columnist's remarks. Our standards of conduct here are professional, demanding, and of great pride to us. We expect you to be able to rely on us as a continuing source of timely and useful insights and information. We are not primarily a news organization, but, at the same time, we are purveyors of information. In this recent instance, the November "Telecomputing Today" column, we were criticized for quoting a comment without checking its source. Our columnist, Arlan Levitan, had in fact three sources, but, unfortunately, inadvertently fell victim to a situation that he faithfully described but which simply never came to pass. We think Mr. Levitan stuck to the strictest standards in this instance, and in no way acted other than responsibly. Unfortunately, he used someone else's expectations as the basis for a point, and these turned out to be wrong.

Those same standards require that we correct our occasional misunderstandings in print, in the same forum in which we first aired them.

So, while we're clarifying, let's go back a couple more months and look at some "fuzzy" numbers.

In a recent editorial here, we were quite critical of Commodore for what we feel is a less than aggressive approach to marketing an otherwise exceptional computer, the Amiga. A recent preliminary prospectus filed by Atari in support of a planned public offering documents some numbers that fall below estimates we had earlier been given. As of their filing, Atari unit sales were at the 150,000 level. While we estimate this would still have placed them above the level of the Amiga, the magnitude of the difference would not have been nearly as great as we earlier estimated. Atari sales experienced what has been described as an acceleration in late summer, but, concurrently, the Amiga went into European distribution for the first time, a market the Atari was already in. We think we'll wait and see what the companies have to say regarding their sales figures after everyone's had a full holiday season to sell. We'll let you know early in the new year with a wrap-up on both holiday sales and new-year projections from various sources around the industry.

If you've not yet seen it, your local newsstand should have a copy of a very special COMPUTE! publication, our *Apple IIGS 1987 Buyer's Guide*. We have been quite favorably impressed by this higher-end entry of Apple's, and while it's pricey compared to the Atari ST and to the Amiga, it's a clear and marked shift for Apple. Even though we hear you won't see many of the machines in the pre-Christmas pipeline, you'll be able to discover a great deal of excellent information in that special issue. Look for it on your newsstand in early December.

Until next time, enjoy your COMPUTE!. Happy holidays from all of us.

Robert C. Lock
Editor in Chief

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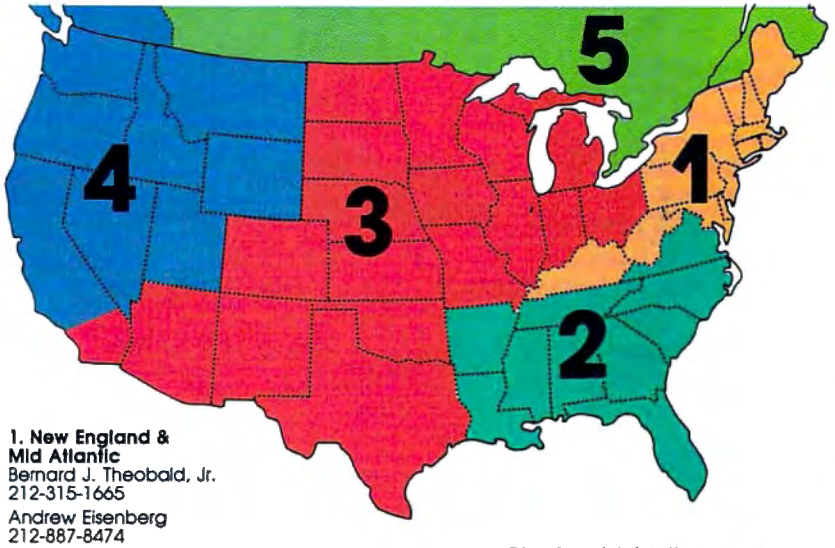

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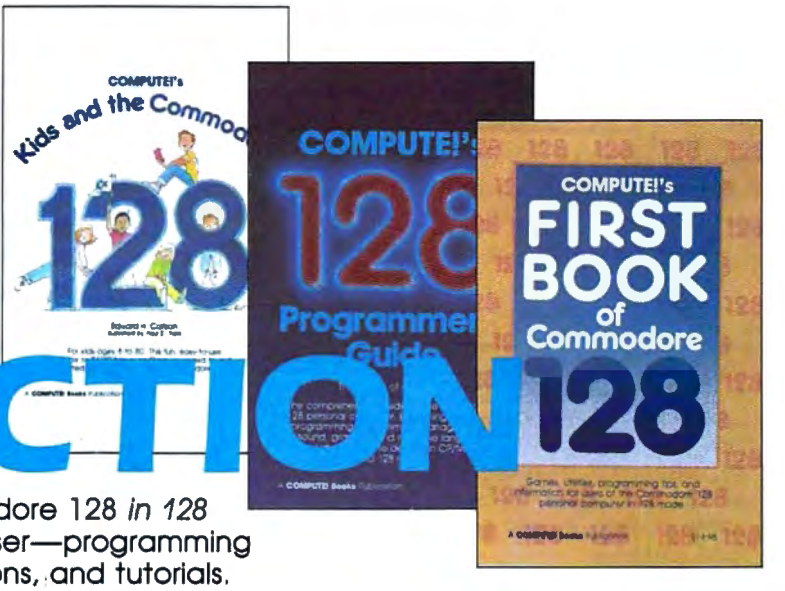

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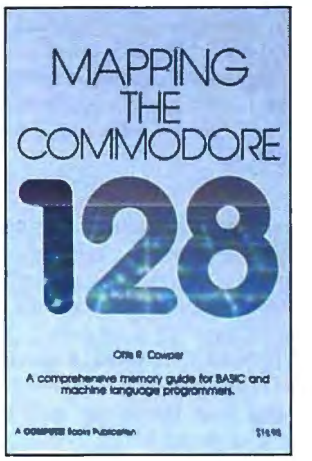

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Readers' Feedback

The Editors and Readers of COMPUTE!

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

Cassette Cacophony

Whenever I save or print a document to tape in Atari *SpeedScript 3.0*, the computer makes an annoying hiss after the cassette operation has finished. When this happens in BASIC, I just type END to kill the sound. However, that's not possible from *SpeedScript*, which runs as an AUTORUN.SYS file. I own an Atari 800XL.

Sepehr Behram

The Atari operating system does not properly reset the sound channels when it finishes input/output operations. One solution would be to turn down the volume control on your TV or monitor, but that makes it impossible to hear the keyclicks as you type. Here's a simpler solution: When you hear the noise, turn off your printer and print to it. The hiss stops immediately, and SpeedScript *displays the harmless error message* Device not present. *(Don't forget to turn the printer back on.) This method takes advantage of the fact that the cassette drive and printer use the same Input/Output Control Block (IOCB).*

PCjr 80-Column Switching Simplified

In the March 1986 installment of this column you explained how to put the PCjr in 80-column mode with the MODE command from MS-DOS. That method works fine, but the MODE command takes up a fair amount of disk space and is not particularly fast. This BASIC program creates a 16-byte machine language program named CLICK&80.COM that not only activates 80-column mode, but also turns on keyboard click. The ML routine executes much faster than MODE and saves disk space as well. You can execute the program by typing CLICK&80 from the DOS prompt or as part of an AUTOEXEC.BAT file which executes automatically when you boot the computer.

```
10 T=0:OPEN "CLICK&80.COM" FO
   R OUTPUT AS 1
20 FOR J=1 TO 15:READ A$:N=VA
   L("&H"+A$)
30 T=T+N:PRINT#1,CHR$(N);:NEX
   T:CLOSE 1
40 IF T=1380 THEN PRINT "FILE
    SUCCESSFULLY CREATED":END
50 PRINT CHR$(7);"***** ERROR
    IN DATA STATEMENTS *****":
   END
60 DATA 1E,33,C0,50,B8,1,4,CD
   ,16,B8
70 DATA 3,0,CD,10,CB
```

David Howorth

Thank you for the program.

ST Resources

Whenever I try to run ST BASIC from an AUTO folder, I get the message *Can't find BASIC.RSC*, and the computer refuses to load BASIC. When I remove BASIC from the AUTO folder, it loads as usual. What is wrong?

Herschel Lee

In the first place, ST BASIC falls in that group of GEM-based programs which you can't run from the AUTO folder. As noted in the November 1986 installment of this column, the ST runs programs from AUTO before *it installs the GEM operating system interface, so it's impossible to autorun any program that depends on GEM's windows, menus, or mouse.*

Your letter also raises a more general issue concerning ST resources. *Many GEM programs, including ST BASIC and 1st Word, rely on a separate resource file in addition to the file that contains the program itself. If the resource can't be loaded, the program can't run and usually aborts with an error message like the one you saw. A resource file has the same filename as the program, but a different extension (.RSC instead of .PRG). Whenever you copy a program to a new disk or directory, check to see whether it has a resource file; if it does, you should copy the resource (BASIC.RSC, in this case) to the same destination.*

What's in a resource file? BASIC.RSC contains everything BASIC needs to create its drop-down menus. In addition to menus, a resource can include selection buttons, custom icons, printed text, and editable text fields (areas where you can enter or change text). Handling interactive dialogs with a resource saves an enormous amount of programming effort, since GEM automatically performs jobs such as displaying a dialog box, managing the interaction, and saving and restoring the screen area overdrawn by the box.

Resource files are usually created and edited with a program known as a resource editor. The Atari ST development system includes such an editor, known as the Resource Construction Set. *Some other development systems include similar editors.*

There are several reasons why a program might use a resource file. Programming convenience is an obvious consideration. Most interactive dialogs require complex data structures which are easy to create with a resource editor, but quite tedious to program from scratch. The ST Programmer's Guide, *available from COMPUTE! Books, has an example program that creates its own menus—not a simple process, even for an experienced programmer.*

Flexibility and portability are equally important factors. If the resource is in an .RSC file, you can change it by simply editing the file rather than rewriting the program. For instance, to create an Italian language version of an English program, you could change the text in the program's resource from English to Italian with a resource editor. Similarly, an often-used resource is easy to include in a new program if it's in an .RSC file. Instead of including large amounts of code to create the resource, the new program can include only what's needed to load and manage the resource.

Cleanest Atari INPUT

This is in reference to your answer about cleaner Atari input in the October 1986, "Readers' Feedback." Your answer is the normally accepted solution to the problem of performing an INPUT without printing a question mark. However, this line works even better:

```
INPUT #16;A$
```

Besides being much shorter than what you suggested, this method eliminates the need to open and close files, and it reduces the risk of experiencing

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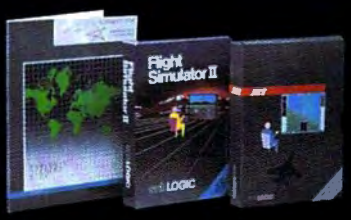

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error 161 and other Input/Output Control Block (IOCB) errors above 128.

Chris Witham

Thanks for the advice.

LIBRARY In Amiga BASIC

After two months of minor frustration trying to use the command LIBRARY "graphics.library" in Amiga BASIC, I have come to two conclusions. Any program using this command must be in the BasicDemos directory of the system disk, and the file *graphics.bmap* must be in the same directory. I have found no other way to use programs which include that LIBRARY statement.

David Hoke

Although the location of graphics.bmap is important, you need not put every program using that file in the BasicDemos directory. The LIBRARY statement, which allows you to access Amiga system routines from BASIC, always looks in the current directory *for the designated .bmap file. If you load and run a program from the BasicDemos directory, the computer looks in BasicDemos for graphics.bmap when you execute the LIBRARY "graphics.library" statement. But the program should also load and run if you copy both files to a different directory.*

The key is to keep the program and the .bmap file it needs in the same directory. Unfortunately, you can't redirect the LIBRARY statement by supplying a directory name in front of the .bmap filename. For instance, you can't use LIBRARY "maps/graphics.library" to access graphics.bmap in the maps subdirectory. However, you can change the current directory with CHDIR. These statements change the current directory to maps and access graphics.bmap from that directory:

```
CHDIR ":maps"
LIBRARY "graphics.library"
```

The disadvantage of using CHDIR is that the directory change affects subsequent disk operations as well. If you resave the program after executing this command, the program goes into the maps directory instead of the directory in which you began. One solution is to CHDIR back to the previous directory, but that assumes a certain directory structure which may not be present if you copy the program to a new disk. A less complicated solution is to keep the program and the .bmap file in the root directory of the disk (not inside any directory).

Regardless of where you put the files, the program should be able to recover gracefully if, for some reason, it can't find the .bmap file. To illustrate, this code sets up an error trap before it executes LIBRARY:

```
ON ERROR GOTO LibTrap
LIBRARY "graphics.library"
ON ERROR GOTO 0
```

After the first ON ERROR statement, the computer goes to the LibTrap routine when any error occurs. The statement ON ERROR GOTO 0 turns off the error trap if no error occurs. The LibTrap routine might look something like this:

```
LibTrap:
IF ERR=53 THEN
PRINT "Can't find graphics.bmap
file."
PRINT "Aborting.":END
END IF
PRINT "Error #";ERR: END
```

Error trapping is particularly important in Amiga BASIC because of its ability to open custom display windows. If an untrapped error occurs after you open a custom window, the error message may appear behind the window, giving you no clue as to what went wrong. Chapter 9 of Advanced Amiga BASIC, *available from COMPUTE! Books, is devoted entirely to the subject of making library calls from Amiga BASIC.*

IBM Proofreader Enhancement

I use your "IBM Proofreader" to enter COMPUTE! programs, but I usually enter an entire page of the listing at once, save the program as an ASCII file, and then run the entire file through the Proofreader. To make this possible, I have added this new line to the Proofreader program:

```
422 IF COMMAND$="CKLIST" THEN
    CKFLAG=1:OPEN "LPT1:" FO
    R OUTPUT AS #1: GOTO 300
```

After this line has been added, the command CKLIST causes the Proofreader to print checksums for an entire program. I find that this method saves time.

Claude Rebeck

Thank you for the modification. To save an IBM BASIC program in ASCII form, add ,A after the filename. For example, the command SAVE "PROGRAM",A saves the file PROGRAM in the form of ordinary ASCII characters rather than in tokenized (compressed) form.

Quiet 1541 Formatting

This is in response to Tom Smith's question about formatting a 1541 disk without knocking the drive head (see "Readers' Feedback," September 1986). I have written a short program that prevents the head from rattling when you format a disk. As suggested in your response, the program asks you to insert a commercially formatted disk for calibration and uses that disk to locate the read/write head at the correct spot for formatting. Then it prompts you to insert the disk to be formatted.

```
10 PRINT"INSERT REFERENCE D
   ISK"
20 GOSUB270
30 OPEN 1,8,15,"I0"
40 OPEN 2,8,2,"#"
50 PRINT#1,"U1";2;0;1;0
60 INPUT#1,N,M$,T,S:PRINT N
   ,M$,T,S
70 IF N=0 THEN130
80 PRINT N,M$;T;S
90 PRINT "TRY AGAIN (Y/N)?"
100 GOSUB280
110 GET F$:IF F$="Y" THEN 5
   0
120 CLOSE 2:CLOSE 1:END
130 PRINT"REMOVE REFERENCE
   {SPACE}DISK"
140 PRINT"INSERT BLANK DISK
   "
150 GOSUB270
160 FOR I=1 TO 25
170 READ D:D$=D$+CHR$(D)
180 NEXT
190 PRINT#1,"M-W";CHR$(0);C
   HR$(5);CHR$(25);D$
200 PRINT#1,"M-W";CHR$(32);
   CHR$(6);CHR$(3);CHR$(10
   );CHR$(64);CHR$(15)
210 POKE 198,0
220 INPUT"ENTER DISK NAME";
   DNAM$
230 INPUT"{13 SPACES}ID";DI
   D$
240 PRINT"FORMATTING..."
250 PRINT#1,"U3:";DNAM$","D
   ID$
260 GOTO120
270 PRINT"PRESS ANY KEY TO
   {SPACE}CONTINUE"
280 PRINT
290 POKE 198,0
300 WAIT 198,1
310 RETURN
320 DATA 169,78,141,0,2,169
   ,48,141,1,2,169,11,141,
   42,2
330 DATA 32,238,193,169,1,1
   33,81,76,13,238
```

The program downloads a very short machine language program to the drive. Here is a brief explanation of the machine language source code. The first four instructions put the characters N0 in place of U3 in the drive's command buffer area at $0200:

```
LDA  #"N"
STA  $0200
LDA  #"0"
STA  $0201
```

These instructions store the command number 11 (for NEW) in $022A, then execute the ROM command parsing routine at $C1EE.

```
LDA  #11
STA  $022A
JSR  $C1EE
```

Finally, the program sets the formatting track number at $51 to 1 and jumps into the ROM format code at $EE0D.

```
LDA  #1
STA  $51
JMP  $EE0D
```

Martin Filteau

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Thanks for this elegant solution. As mentioned in the previous answer, this method takes advantage of the fact that commercially produced disks are usually formatted very accurately. It also assumes that your drive is correctly aligned in the first place. If your drive has alignment problems (often signaled by an inability to load commercial software or read disks formatted on other drives), you should not try to use this program.

It's also important to use a commercial disk that is not copy-protected. Many copy-protection schemes deliberately create bad disk sectors or rely on a nonstandard disk format. Using such a disk for calibration may produce unreliable results. A good choice for the calibration disk is the 1541 Test/Demo disk that comes with the drive. It's a good idea to tape over the write-protect notch on the calibration disk, just in case you become distracted and forget to swap disks before the format begins. This program works on a 1541 drive or 1571 drive being used in 1541 mode. It does not format double-sided or CP/M-format disks on a 1571 drive.

Bug-Free XL?

The July 1986 issue of COMPUTE! says that the bugs in Atari BASIC have been corrected in the 130XE, but occur in earlier models. I bought an 800XL and it came with the bug-free Revision C BASIC ROMs. What gives?

Jerry Bridgman

You're correct. The last 800XL computers manufactured have the same Revision C BASIC found in the 130XE and 65XE. The simplest way to tell whether an 800XL has Revision B or C is to turn it on and type this line in direct mode (without a line number):

```
IF PEEK(43234)=96 THEN
 PRINT "YOU HAVE REVIS
ION B."
```

If you have Revision B BASIC, your best bet is to order a Revision C cartridge by sending a letter to Atari at this address:

Atari Customer Relations
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Automatic Syntax Checking

I read in a recent "Readers' Feedback" column that some versions of BASIC have what is called *instant syntax checking*. I own a Commodore 64, which does not have this feature. Is there any way to reprogram the Kernal so that it checks program lines for syntax errors as they are entered?

Leon Ingleright

The October 1985 issue of COMPUTE!'s GAZETTE *contains a Commodore 64 program called "Automatic Syntax Checker," which does exactly what you're looking for. That program is far too long to include in this column, and, unfortunately, the October 1985 issue is out of print. However, you can probably find a copy through a local Commodore user group or public library. If you type in the program from that issue, note that the correct MLX starting and ending addresses for Automatic Syntax Checker are 2049 and 3008, respectively.*

Since the Commodore 64's BASIC doesn't check for errors when you type in a line (only when it runs the program), you must reprogram BASIC as well as part of the Kernal operating system to add syntax checking. (Portions of a few BASIC statements are found in the 64's Kernal ROM, not BASIC ROM.) When it sets up, Automatic Syntax Checker copies BASIC and the Kernal from ROM into underlying RAM, modifies them extensively, and wedges itself into BASIC's main loop.

When you type a program line, the syntax checker turns off the computer's ROM and uses the modified BASIC and Kernal. The modified BASIC performs a phantom execution *of the line which includes BASIC's normal error checking, but stops short of actually completing the commands in that line. If the line doesn't contain any errors, it's added to the program as usual. Otherwise, the Automatic Syntax Checker prints the same error message you would see if you ran a program containing the erroneous line. After it processes the new line, the program turns the ROM back on for normal operation.*

Syntax checking at the time of entry poses some interesting problems. For the most part, you can use the same checks that BASIC itself performs when it executes the line in a program. The checker must look for misspelled keywords, missing or extra parentheses, misplaced punctuation, and so forth. However, as the name implies, an automatic checker can only catch errors of syntax. That is, it checks the line to see whether it contains meaningful BASIC statements. There are many other runtime errors *which can't be detected at the time of entry. For instance, if you enter the line 1000 NEXT, there's no rational way for a checker to tell whether the NEXT will be matched correctly with a FOR when you finish typing the program. A logic error of this type can only be found by running the complete program. A second class of errors results from some condition external to the program, such as whether a printer is turned on or a disk is in the drive. A checker can evaluate statements such as OPEN or PRINT# for correct syntax, but it has no way to look into the future to determine whether those statements will execute correctly when you run the program.*

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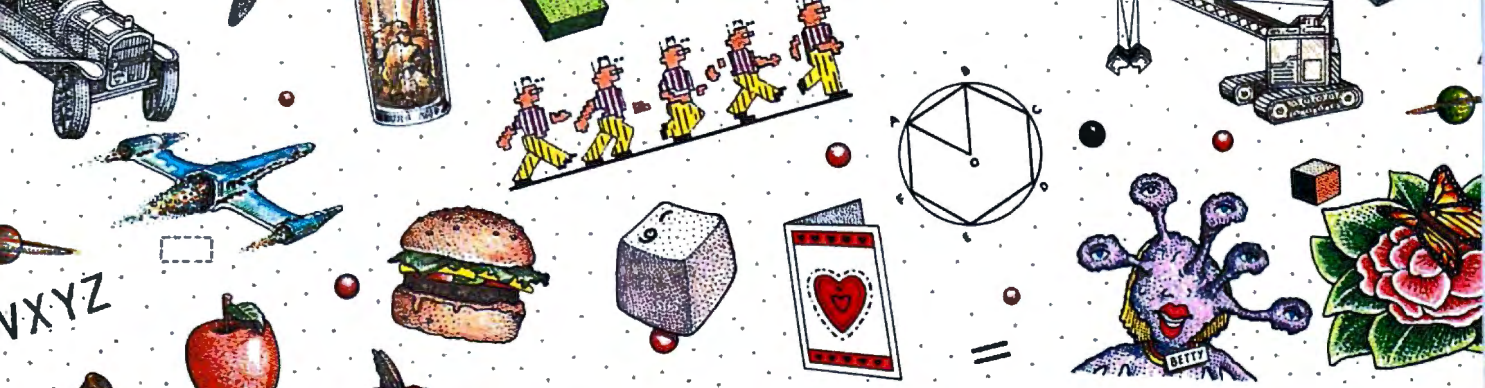

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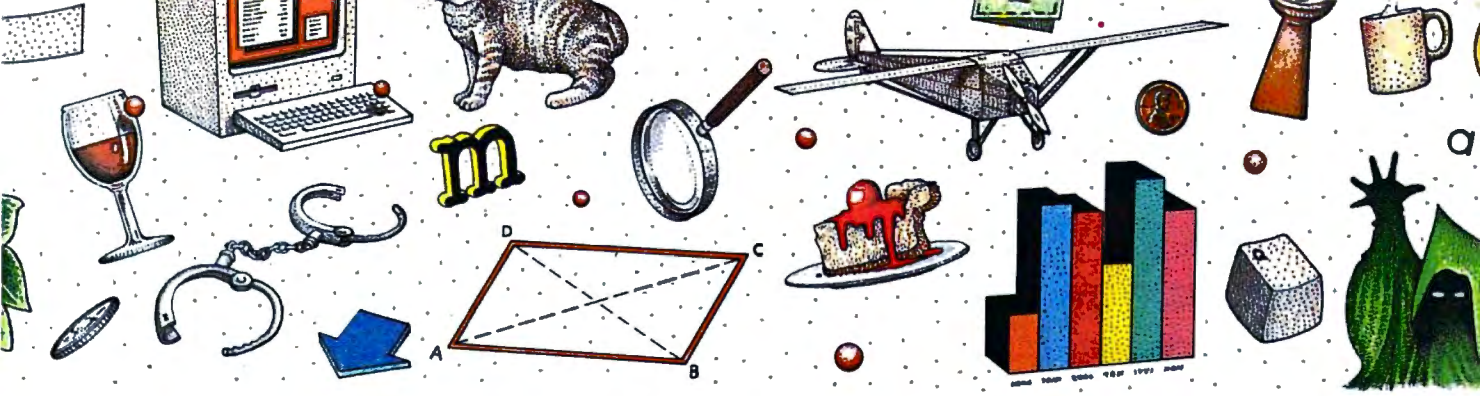

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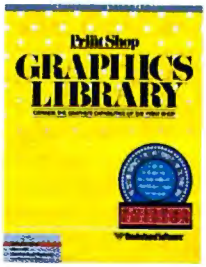

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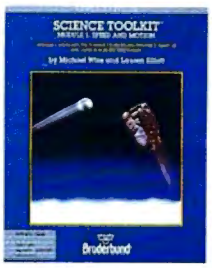

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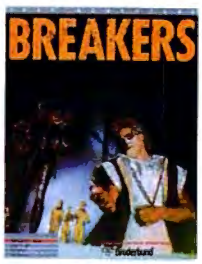

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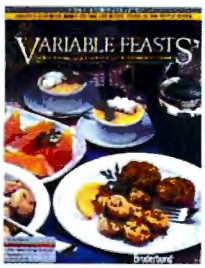

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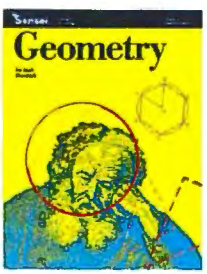

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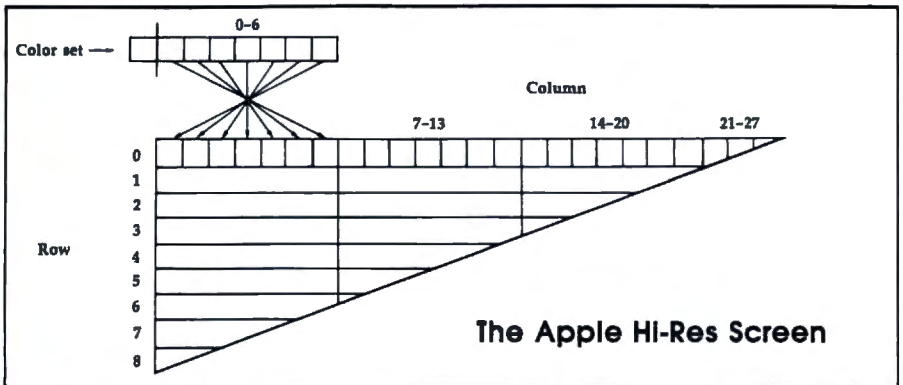

The Apple Hi-Res Screen

Characters In Apple Hi-Res

I have a question concerning the program "Apple Superfont," published in the April 1985 issue of COMPUTE!. I made a character which was a green square, but when I loaded it into my program and printed it, it was purple on every other column. Is there any way around this color problem?

Jim Cooper

Unlike many home computers, the Apple II does not let you replace its standard character set with one of your own design for text-mode display. Apple Superfont redefines characters by displaying custom shapes in the Apple's high-resolution display mode. To understand how redefined characters can appear in different colors in different places on the screen, let's first take a look at how colors are displayed on the Apple II hi-res screen.

You can draw in six different colors in this mode—black, white, green, violet, blue, and orange—but the use of these colors is somewhat limited. As the figure shows, each row of the hi-res screen, containing 280 pixels in all, is described by 40 bytes of memory, and each of those bytes describes 7 pixels. The highest order bit of the byte selects the color set for these 7 pixels. If this bit is on (if the value of the byte is 128 or greater), the pixels controlled by that byte can be blue, orange, black, or white. If the highest bit is off (if the byte's value is 127 or less), the available colors are purple, green, black, and white.

The color that appears for each of the seven pixels depends on the position of the pixel and the state of its neighbors on the same row. If a pixel has been turned on (the associated bit in the controlling byte is set to 1), and both of the adjacent pixels are off (their controlling bits are set to 0), it will appear as a purple, blue, green, or orange dot. If the pixel is in an even-numbered column on the screen, it will be either purple or blue. Odd-numbered pixels will either be green or orange, depending on the state of the high bit in the same byte.

If two adjacent pixels are both turned on, they appear as a white line two pixels long, regardless of position. If a pixel is turned off, it appears as a black dot on the screen unless both neighboring pixels are turned on—in which case the group of three pixels will be seen as a purple, blue, green, or orange line three dots in length.

HROUT, the machine language utility that Apple Superfont uses to print on the hi-res screen, displays each character as a 7 × 8–pixel grid. Not only does this size coincide with the size of text-mode characters, but it also maps neatly into the array of memory bytes which control the hi-res screen. But since each memory byte controls seven pixels, there are two obvious classes of memory bytes: those which begin and end with even-numbered pixels, and those which begin and end with odd-numbered pixels. If you store the same value in two adjacent bytes, the image produced by the second byte has its colors reversed from the first: purple for green and blue for orange.

In your case, you can solve this problem by defining two solid blocks: one which appears to be green when printed in the first column on each row or any other odd column, and another which appears purple in an odd column. If you print them both in even-numbered columns, their colors will be reversed. When you need a green block in an odd-numbered column, you can print the first character. When you need one in an even-numbered column, you can print the second. If you've defined these blocks as characters 94 and 95 (normally ^ and _), this line prints the correct character:

```
OE = POS (Ø) - 2 * INT ( P
OS (Ø) / 2): PRINT CHR$ (9
5 - OE);
```

The function POS returns a value one less than the cursor's horizontal position; after the instruction HTAB 6, POS returns a value of 5. Thus, the variable OE equals 1 if the cursor is in an even column, printing character 94, or it equals 0 if the cursor's column is odd, printing character 95.

By the way, this color effect is not unique to Apple Superfont. The same thing can happen with Apple text characters if you're in combination hi-res/text mode. Just enter the HGR command to get in this mode, then type a bunch of M characters. Half of them will be green and half will be purple. ©

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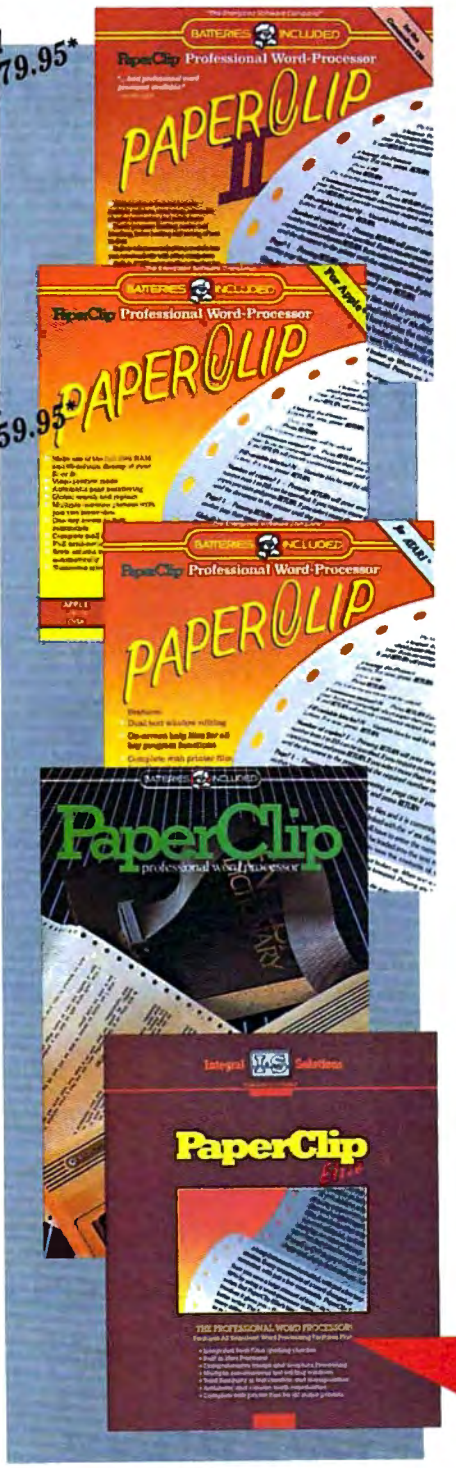

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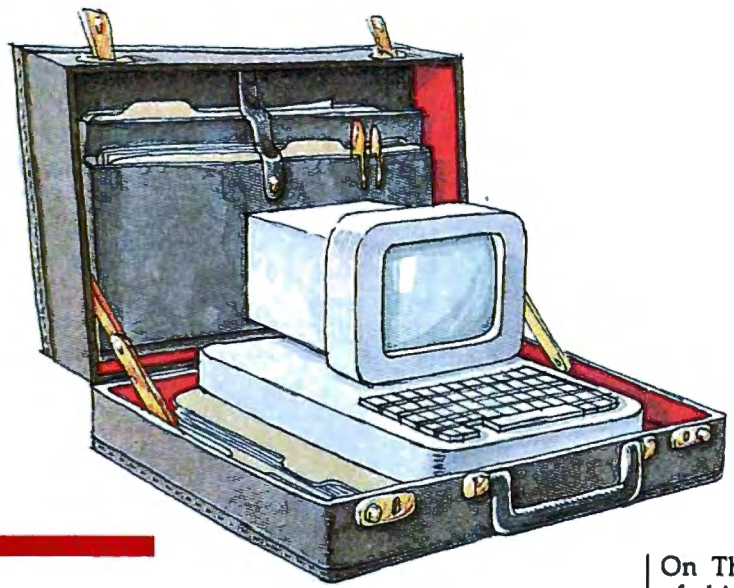

Sophisticated financial-modeling and market-tracking software is being used by home computer owners in a variety of ways—everything from analyzing personal budgets and financial plans to monitoring the stock market. The number of packages has dwindled from the dozens available a couple of years ago, but a few very powerful, easy-to-use packages, designed by financial experts, have been quite successful in helping people manage their money and chart their investments.

On Thursday, September 11 of this year, the Dow Jones Industrial average experienced an 86 point plunge—the low point of a week with a 141 point drop. This represented one of the largest declines in history. Though not serious enough to trigger the kind of economic fallout that occurred prior to the Great Depression of the 1930's, that day's trading was so volatile as to greatly alarm anyone with a vested interest in the stock market and send them scurrying to find the causes.

Although many factors doubtless contributed to the day's events, one of these has stirred up a great deal of inter-

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est recently in the financial community—a practice called *program trading*. Very simply, this involves running sophisticated computer programs to analyze all of the transactions in every key financial market in the world and using that information to signal buys and sells. The result can be tremendous fluctuations in the pressures which keep industry and individuals financially balanced.

Should such practices continue, how can the private investor hope to compete with teams of programmers and analysts who have immediate access to all the information necessary to make the most advantageous split-second buying and selling decisions?

The answer is that the private investor cannot. But most people don't expect to compete with billion-dollar corporations and investment firms in the stock market. The best they can expect is to make a small profit and occasionally a sizeable return.

To that end, several software programs are available, in three different categories. *Personal-finance software* helps keep track of income, expenditures, and tax records, so that the user can get a better picture of his or her own financial situation, and do some long-term planning to make that situation better, often by investing excess funds. The second type, *portfolio-management software*, offers a framework for the serious investor to record changes in his or her portfolio, and better plan for the future. And finally there are *stock-market simulations* that familiarize the user with the workings of the market, while providing a bit of challenge and entertainment. (Space prohibits us from extensive descriptions of all popular personal and portfolio management packages. The programs described in this article offer an overview of the generally available features and approaches common to most products in these categories.)

Jerry Rubin
President
Micro Education Corporation
of America

Lee Isgur
First Vice President
Paine Webber

Tying Everything Together

One of the first financial experts to lend his name and design assistance to personal-finance software was Andrew Tobias, author of the best-selling book, *The Only Investment Guide You'll Ever Need.* In conjunction with programmers at MECA (Micro Education Corporation of America), Tobias took all of the major themes covered in his book and developed a very easy-to-use guide to financial management called *Managing Your Money.* In addition to serving as a framework for financial records, the program also offers the user sound information on many aspects of money management.

Managing Your Money, one of the most popular financial-planning programs ever published, has been updated every year since its introduction. Jerry Rubin, president of MECA, explains how he personally uses the program: "First, I keep a very detailed budget, but not to try and stay within it," he says. "I keep highly detailed records for only two reasons. One is so I can do major expenditure planning for the future, using the program's cash-forecasting features. If I want to buy a boat next April, I know how much money I'm going to have next April.

"The second thing is tax planning. My personal tax structure changes frequently through the year as I buy tax shelters or get into investments. I adjust my withholding several times a year so that I don't have to give a loan to the IRS. I don't want a large refund."

Among the significant new capabilities of the latest version is even more flexibility in the tax-planning section, enabling the user to incorporate whatever tax changes Congress ratifies. MECA has stored three separate sets of tax laws, and tax brackets for 1986, 1987, and 1988 as they stand on the date of release.

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In addition, every update since the original has offered five-year budget planning, so that the user can do annual planning five years ahead.

"So it all ties together—the cash forecasting going out five years ties together with the tax planning going out—so that even though we have the extensive budget capabilities for people who want to live on a budget, it may be even more useful for people who have computers to use it as a tax and cash planning tool," says Jerry Rubin, president of MECA. "You can do all sorts of planning years out to see what the impact of the new laws would be. It's very simple to do. You visit each budget category and do five-year projections, then move from budget section to the tax section."

MECA's companion piece to *Managing Your Money* is *Managing the Market*, a stock-price updater whose purpose is to update prices in the portfolio section of *Managing Your Money*. Its built-in telecommunications capabilities allow you access to Dow Jones News/Retrieval, CompuServe, and other online services that offer online stock price information. *Managing Your Money* is available for the IBM PC (256K) and Tandy 1000 for $199.95. *Managing the Market* retails for $149.95.

Serious, Successful, And Time-Saving

Like many software designers-to-be, Lee Isgur, first vice president of Paine Webber, became involved in software design because he couldn't find a program capable of doing what he needed. Having been moderately successful with his own investments, he found few resources available that would allow him to keep track of his portfolios. So he spoke to Mark Skapinker of software publisher Batteries Included, who wrote a portfolio-management program based on Isgur's design.

The Isgur Portfolio System is aimed at three types of people: first, someone whose investments are successful so that returns become sizeable. "Whenever you are serious and can afford to buy a piece of portfolio hardware and software, you might as well do it, because if you're going to be successful, you're going to need it," says Isgur.

"Second, for someone who has been successful or has a moderately large portfolio—and in this case I would say between $50,000 and $100,000—I think you can justify what you're spending. You can get an Atari ST system, including a printer, and the software, for under $1000.

"Third, for someone who feels their time is very valuable. If you do a lot of transactions, keeping records using pencil and paper is going to be expensive. As a result, if you value your time, you'd better use it."

The Isgur Portfolio System is available for IBM PC ($249.95), Atari ST ($199.95), Macintosh ($199.95), and Amiga ($199.95).

Smaller Packages

A number of other personal-finance software packages are available for all personal computers, some of which offer only budget tracking or portfolio management, and some of

which offer a combination of both.

Sylvia Porter's Personal Financial Planner, from Timeworks, is a comprehensive home-finance package that emphasizes financial planning by objective. The user is led step-by-step through a series of questions that will help him or her develop comprehensive plans to determine the best financial moves in relation to his or her career, marital status, children, savings, life insurance, investments, lifestyle, retirement, and estate. It helps in planning ahead for protection against major medical expenses, prolonged disability, and other possible adversities. In addition, the program includes checkbook balancing and check writing, budget preparation, tax aids, financial-statement preparation, and financial-inventory tracking. *Personal Financial Planner* is available for IBM ($129.95), Apple ($99.95), Macintosh ($99.95), Commodore 128 ($69.95), and Commodore 64 ($59.95).

A second volume in the Sylvia Porter series, also available from Timeworks, is *Your Personal Investment Manager*, which helps the user record, manage, and track his or her investments. Telecommunications access to outside database sources, like Dow Jones News/Retrieval, CompuServe, and The Source is also included. Suggested retail prices are: IBM ($129.95), Apple ($99.95), and Commodore 128 ($69.95).

Best Programs publishes *PC/Personal Investor*, a portfolio-management, news-terminal, and quotation system available for the IBM PC for $195.

Sierra On-Line recently released *Smart Money* for the IBM PC and Apple II computers, which contains features to help you determine your personal net worth, remind you of payments coming due, make critical financial decisions, balance your monthly checking and credit-card statements, and gather all your financial data together in detailed reports. Suggested retail price for both versions is $79.95.

Vicarious Risks

For those computer owners without the nerve or capital necessary to play the real stock market, several software publishers have designed authentic, enjoyable investment simulations. Among Blue Chip Software's offerings are *Millionaire*, a stock-market simulation that gives the player $10,000 to invest over a period of 91 weeks. Depending on the player's success, he or she can take further risks with money earned. During the game, players receive periodic updates on events that may affect the market. *Baron* simulates the world of real estate investment, starting the player out at $35,000 with the goal of turning that into a million dollars. *Tycoon: The Commodity Market Simulation* lets the player assume the role of a financial tycoon while trading 15 different commodities, with $10,000 seed money. Programs are available for Apple, Atari, Commodore, and IBM. Prices range from $39.95 to $59.95.

Wall Street Raider, from Oasis Press, is a realistic simulation of the financial marketplace in which players engage in a high-powered game of financial empire building and corporate takeovers. The program allows one to four players to compete among themselves or with the computer, investing in or managing one or more of the 150 com-

panies in 26 industries that make up *Wall Street Raider*'s vast database. The game is educational as well as enjoyable; created by a Harvard lawyer/CPA/economist, it teaches players the fundamentals of corporate finance and stock investment. *Wall Street Raider* is available for the IBM PC for $39.95.

The publishers of these and other financial simulations do not pretend that by playing these simulations you'll become a wizard on Wall Street. They're meant to provide entertainment and insight into the larger financial market.

And publishers of personal-finance packages make no claims that their software alone will make you rich. Software like *The Isgur Portfolio System* and *Managing the Market* are record-keeping systems designed to help you figure out exactly where you stand before taking financial risks. "We warn people quite often in the program that whenever they make an investment decision that for them risks a sizeable amount of money—which means anything they'd miss if they didn't have it tomorrow—they should make sure they consult an expert," says Jerry Rubin.

Lee Isgur agrees that even with well-designed home-computer software and expert advice it's difficult for the small investor to compete with some of the techniques increasingly used on Wall Street. "I don't think any piece of software is really going to be able to tell someone what to do," he says. "The environment is changing too quickly.

"The most sophisticated packages—the ones that some of the banks and mutual funds use for their indexing and trying to beat the market—they have full-time programmers and they spend hundreds of thousands of dollars a year trying to do this. The problem is, it's all analyzing data, and a lot of the data is created by other programs and so they're continually upgrading and changing it. It's almost like a computer war going on. How the heck can a little individual buying a single package expect to beat that?"

As the personal-computer industry continues to evolve, both the machines and the software are becoming more advanced in their capabilities. And that's certainly true in the area of financial-management software. Even though computerized financial programs may not make you rich, they're obviously going to always be a popular application for personal-computer owners.

For further information on the products mentioned here, please contact the publishers listed below:

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The Future of Online Banking

By now, most of us are used to accomplishing at least a part of our banking business without handing slips of paper across a counter to a teller. Automatic teller machines (ATMs) are becoming convenient electronic alternatives to getting out of the car and running into the bank for every simple financial transaction.

As nice as it would be, you can't have an ATM in your living room. But personal computers—in tandem with cooperative ventures between banks, software companies, and online information services—are offering a convenient electronic way to pay bills, balance your statement, and handle many other tasks previously accomplished via paper, pen, and postage stamps. Online banking, though still in early experimental stages, is meeting with approval from bankers and consumers alike.

Unique Services

MECA (Micro Education Corporation of America) offers a unique home banking service through Chase Manhattan bank. The system, called Spectrum, permits Chase customers who own a personal computer and a copy of *Managing Your Money* to check their balances, transfer funds, pay bills, and check loans and rates. The program can also obtain securities quotes, financial account advice, budget and tax preparation assistance, loan and mortgage services, and automatic reconciliations.

The advantages to a system like this, says MECA president Jerry Rubin, are twofold. First, it's convenient. You can initiate the payment of all of your bills using *Managing Your Money*. As long as you've set up that procedure with the software, all of the information will go over the wires and Chase will write the check or submit the funds electronically. It's not merely that you save money or time, but in one step you've paid the bill and entered it into your personal budget and tax records. Also, you can ask for an electronic statement at any time so you can monitor your account balance.

Through a program called Direct Access, Citicorp offers its customers a personal computer banking service, which includes an online IRA account as well as an online link to a discount brokerage service. For a ten-dollar monthly fee, subscribers can access account information, pay bills, transfer money, or call on customer services through electronic mail 24 hours a day. Direct Access also enables customers to set up advance and recurring payments for bills; stop a check, payment, or transfer; get information on interest rates; and receive financial bulletins from Citibank. A helpful record-keeping feature lets customers download their account activity into popular spreadsheets and financial management packages, making budgeting and tax preparation easier.

Through the online IRA feature, customers can see summary balances of all their retirement accounts, monitor opening and maturity dates for each account, and make online contributions to accounts by transferring money from a checking or savings account. The online brokerage feature allows subscribers to review their portfolio information; place realtime buy/sell orders for stocks, bonds, and options; cancel orders not yet executed; and retrieve information about orders.

The Early Stages

Several other joint ventures between banks and home computer owners, operated through special software or online telecommunications services, are currently in the experimental stages. It's still a fairly limited application, though—only about 50,000 people nationwide currently participate in online banking.

Many in the banking and home computer industries are optimistic about the future of online banking. Once everything is in place—assuming consumers accept this method of banking, and various hardware and software problems are addressed—banks could save a lot of time and money.

And though the cost may still be prohibitive for many consumers, there are advantages even at this early stage. For example, if you prefer to wait until the last minute to pay bills so you can maximize interest on your account, paying bills electronically means you don't have to calculate how many days it will take your check to get through the mail and then clear. Also, you don't have to wait for your monthly statement to get a report on your account. And if you're already using your computer to track your finances, online banking takes you one step closer to the electronic home of the future, where, many futurists predict, the lion's share of our educational, entertainment, and home-maintenance needs will be merged in one centralized electronic network. ©

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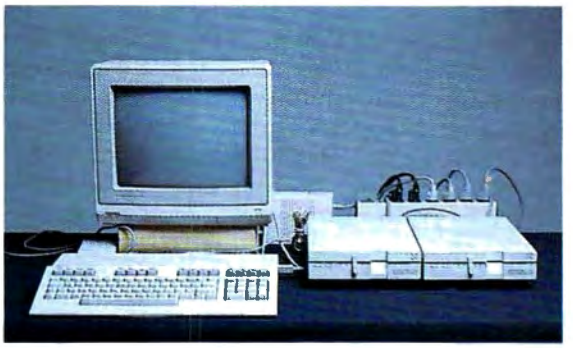

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The MS-DOS Invasion

IBM Compatibles Are Coming Home

Tom R. Halfhill, Staff Editor

Thanks to a flood of inexpensive clones from U.S. and Far Eastern manufacturers, sales of IBM-compatible computers have been rising dramatically over the past year. The original IBM PC—which established the standard and once dominated the business market—is now being swamped by workalikes that offer more features for less money. But perhaps the biggest surprise of all is where a large proportion of the clones are ending up.

A funny thing happened on the way to the office—the world's most popular business computer found a new home.

Since mid-1985, a wave of so-called PC clones flowing from factories both here and abroad has been forcing down prices of IBM-compatible computers. While an IBM PC with 256K RAM and two disk drives retails for $1,595, equivalent compatibles are available for as low as $600. Machines from Tandy, Leading Edge, Epson, and even Hyundai are popping up practically everywhere. It's been a bonanza for buyers who want machines which can run business software written for the industry-standard MS-DOS operating system. Practically any business can afford to computerize at the prices of today's clones.

But prices have plunged so far downward that a new class of customer is emerging: the home user. Tens of thousands of people are buying IBM compatibles and installing them in family rooms and studies all over the U.S.

The ramifications of this trend are beginning to affect the entire personal computer industry. New clones are sprouting up at even lower prices; hardware companies are busily selling memory expansion boards, video/graphics adapters, hard disk drives, monitors, and other accessories; software publishers are scrambling to meet the increased demand for home-oriented MS-DOS programs; and established companies like Commodore, Apple, and Atari are being threatened on their home ground.

With the biggest buying season of the year upon us, industry analysts are predicting that 1986 will be the year of the "MS-DOS Christmas."

Nipping At The Heels

One of the first companies to seriously challenge IBM for the PC market was Compaq Computer Corporation, founded in Houston in 1982. Compaq introduced its first product—a transportable computer that could run all of the popular IBM PC software—in 1983. It followed with a series of compatibles that quickly found their way into thousands of offices. The fledgling company's skyrocketing annual revenues tell the story: $111.2 million in 1983; then $329 million; $503.9 million; and $291.1 million during the first six months of 1986. In April, Compaq shipped its 500,000th computer.

That kind of growth doesn't escape attention—or eager imitation. Before long, dozens of other companies were trying to cash in on compatibles. Most of them have taken a different approach from that of Compaq, however. While Compaq's prices are comparable to IBM's—and Compaq pushes high quality or special features as a selling point—most compatible makers try to undercut IBM prices as much as possible.

This isn't hard to do, for several reasons. First, the IBM PC's retail price is set relatively high compared to its manufacturing cost in order to provide healthy profits for both IBM and the dealers. The clone makers survive on much

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tighter profit margins, hoping to make up the difference in volume. They also rely more heavily on mail order sales, frequently bypassing dealers. Too, the IBM PC is relatively expensive to manufacture due to such features as its metal case and heavy-duty keyboard. Compatibles are generally enclosed in plastic cases, have cheaper keyboards, and economize in other ways as well. And finally, most of the compatibles are either imported from such countries as Japan, South Korea, and Taiwan, or are assembled in the U.S. with components from the Far East.

As a result, it's quite easy to acquire a compatible for hundreds of dollars less than a comparably equipped IBM PC. It's even possible to make your own compatible by buying the components and plugging them together. (See the accompanying article, "Cloning Your Own Compatible.")

But lower prices aren't the whole story behind the success of the compatibles. Many of them offer advantages in terms of features and performance, too.

Again, this isn't as difficult as it may seem, even though the clone makers are dwarfed by IBM's vast financial and scientific resources. The IBM PC has remained essentially unchanged since its debut in 1981, and it was conservatively designed even back then. Many of the compatibles offer faster microprocessors and clock speeds—sometimes 100 percent faster; more standard memory; built-in equivalents of IBM's video-adapter boards; half-height floppy disk drives or hard disks; bundled software; and sometimes more room for future expansion, since the built-in memory chips and video adapters don't occupy card slots.

Migrating Home

When you add up all these advantages, you'd expect businesses to be snapping up compatibles as bargain-basement alternatives to the IBM PC—and they are. But business sales alone can't account for the clone boom.

For one thing, some businesses are wary of compatibles. They'd rather pay the premium for an authentic PC because of IBM's reputation for quality, service, and full compatibility. Although the clones are generally reliable and about 99 percent compatible, there's still a chance that someday the machine could break down or refuse to run a certain piece of software—and that day is dreaded by the employees responsible for the purchasing decision. The old corporate adage "Nobody ever got fired for buying an IBM" still rings true.

Consumers, on the other hand, find the clones more attractive. People tend to be thriftier when they're spending their own money, and the difference of a few hundred dollars that might not be significant to a business can loom large in a household budget.

Something else that makes IBM compatibles attractive to home users is the secure feeling of buying into an established standard: MS-DOS. Other computers may offer more advanced technology at a comparable or lower price, but thousands of programs are available for the IBM PC, and the standard seems here to stay. This is enough to sway some of those who've been hesitating because of the volatile nature of the home computer market.

Clones On The March

No one knows for sure exactly how many compatibles are ending up in the home, since manufacturers quickly lose track of their machines after they're sold. But various sources indicate that a sizeable percentage of IBM clones are *not* ending up in the office.

The new Tandy 1000 EX is a typical example of the low-priced IBM compatibles that are crossing over into the home and educational markets.

For instance, one of the most popular IBM compatibles has been the Tandy 1000, which enjoys wide distribution through Tandy's chain of Radio Shack stores. Tandy estimates that roughly half of its IBM compatibles are now going into homes.

In fact, Tandy was so impressed with the success of the 1000 that it recently introduced two new models at even more attractive prices: the 1000 EX and 1000 SX. Both computers are certified by the Federal Communications Commission for use in the home (where broadcast-interference standards are stricter than for computers used in offices). The 1000 EX even has such unusual features as a headphone jack and volume control for private use in home and classroom settings.

Another indication that IBM

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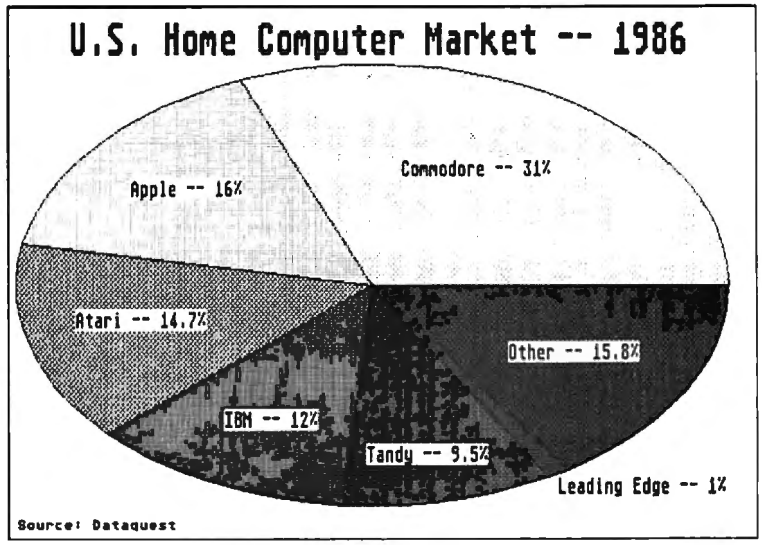

compatibles are on the march is that the number of computers costing more than $500 is steadily increasing in the home. According to a study conducted by Dataquest, a market-research firm in San Jose, 52 percent of the computers installed in U.S. homes in 1986 cost more than $500; over a third cost more than $1000.

Dataquest also found that IBM PCs and compatibles—formerly a negligible force in the home—are rapidly gaining market share. IBM's share of the home market jumped from 8 to 12 percent between 1985 and 1986. Tandy/Radio Shack computers overall have a 9.5-percent share (although this includes non-IBM compatibles like the Color Computer and TRS-80 laptops). And one compatible that wasn't even available in 1985—the Leading Edge Model D—suddenly appeared in the 1986 statistics with a 1-percent share. (See chart.)

The Ripple Effect

The most common explanation for the recent success of the clones is that people are buying them so they can take work home from their IBM-equipped offices. The idea is that people are spending their spare time slaving over spreadsheets and reports. Certainly this accounts for much of the increase in sales. But not everyone is *that* dedicated to their job, as indicated by the simultaneous jump in demand for entertainment-oriented MS-DOS software.

"That's probably why they bought the machine, so they could bring work home," acknowledges Gary Carlston, chairman of Brøderbund Software in San Rafael, California. "But there's certainly an increasing demand for all kinds of home software. The game market—we're hearing a lot of requests for more games and a lot more educational software to run under MS-DOS. We traditionally have not made much of an investment in IBM software because it's our perception that people in the first couple of years bought an IBM and *Lotus 1-2-3* and not much else. But it appears that they do want software, and that we would benefit from having a lot more."

As a result, Brøderbund has been stepping up its production of MS-DOS software, and other home software publishers are doing the same.

"It's kind of interesting because we decided to do a lot more development for IBM at about this time last year," says Robert Botch, vice president for marketing at Epyx Software in Redwood City, California. "We anticipated some price-dropping and some other people getting into the market. Particularly, it was obvious that Tandy was selling an awful lot of IBM clones. Our sales definitely have been increasing month by month, with more and more of the clones being sold."

Significantly, Epyx sells no business or productivity software for the IBM at all. "Most of our IBM software is sports games," says Botch. "*Summer Games II, Winter Games*—those have been real popular in the IBM market. Our baseball game is selling very well on the IBM, too. I think we've been finding that there have been business people buying IBM clones, but the big difference has been with the people taking them into the home. If you're looking for a reason to justify it by saying, 'Oh, I may bring some work home so I can work on the weekends or in the evening,' it makes an awful lot of sense. If you're looking for some reason to spend that $1,000, it helps to explain...why you're bringing this funny-looking piece of hardware home."

That's Entertainment

Another company that noticed its sales of IBM entertainment software picking up in late 1985 is Electronic Arts of San Mateo, California. EA responded by developing its first programs specifically for the IBM, instead of converting titles originally designed for other machines. All of EA's programs are games, though they tend to be more sophisticated than shoot-'em-ups: *Starflight*, a role-playing game; *Grand Slam Bridge*, for card players; *World Tour Golf*; *Chessmaster 2000*; Venture's *Business Simulator*; and others.

"We've found that people who buy their computers primarily to do spreadsheets at home are spending 22 percent of their time playing games, and people who buy their computer as a hobby are spending 22 percent of their time playing games," says Bing Gordon, EA's vice president for marketing. "So although I think the lead justification for buying the clones is not game playing—it's the better-understood computer applications like word processing and spreadsheets and kind of a hint of self-

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improvement—a good game on a computer is a pretty satisfying experience. A lot of people will discover that."

Like Brøderbund, Epyx, Electronic Arts, and other companies, Spinnaker Software of Cambridge, Massachusetts, also noticed that sales of its IBM titles started rising dramatically during the past year. Spinnaker, too, has responded by introducing more MS-DOS programs for home users. Spinnaker is somewhat different, though, because it has always designed all of its software on IBM-based development systems.

"But in the past, we sometimes held back the IBM version simply because there wasn't much of a market for it," says William Bowman, president of Spinnaker. "Now we're always marketing IBM versions on everything that comes out. I think that parents in particular are interested in getting a machine for the home for their children to learn on, to use as a word processor for their schoolwork, and things of that sort. I think that's exactly what we're seeing."

The True Home Computer?

All of this sheds new light on an old debate: When is a personal computer a home computer? And what exactly is a home computer, anyway?

Most computer companies have been shunning the home-computer label in recent years, even when the majority of the machines they sell are going into homes. For instance, during a panel discussion at an industry trade show, Apple Chairman John Sculley emphatically denied that his company is selling home computers. Apple, he maintained, sells "computers for use in the home."

The distinction, supposedly, is that a home computer is a low-powered, low-end machine primarily suited for playing games, and that a personal computer is more practical and pricey. But now that IBM compatibles are selling at the same prices of the home computers of a few years ago—and their owners are demanding more nonbusiness software—the industry may be forced to rethink its traditional definitions of the home-computer market.

Ironically, the compatible makers seem to be succeeding exactly where IBM failed two years ago with the PCjr: They're selling computers to people who want to take work home from the office now and then, play a game now and then, learn more about computers, and help educate their children. It's obvious that the clone makers learned from IBM's mistakes. Unlike the PCjr, the clones are relatively inexpensive, as fast as or faster than a PC, highly compatible, and are perceived as serious computers.

"The PCjr wasn't standard," says EA's Bing Gordon. "Clones have tried much more wholeheartedly to adopt the standard. IBM tried to create a new standard for the home, and I think they misjudged how easy that would be to do."

Slicing Up The Pie

While many hardware and software companies are racking up big sales because of the clone boom, a few other players stand to lose: Commodore, Apple, and Atari, the computer manufacturers which have traditionally dominated the home market.

All three companies are particularly vulnerable to the compatibles right now because they're trying to establish new computers in roughly the same price range. The Commodore Amiga, Atari ST, and Apple IIGS are aimed at the same $500-to-$1,500 market as the clones. These three machines are also being advertised as powerful and versatile enough for home, business, and educational applications—just like the clones. At the same time, there's that trend away from the under-$500 computers which have been staples for Commodore and Atari.

Although Commodore leads the home market, most observers think Apple will lose more ground to the compatibles because of its market position. "I think that the IBM-clone customer so far has been real different from the Commodore 64 customer," says EA's Gordon. "Maybe the Commodore 64 customer is a teenage boy or a male 25 to 40 whose primary interest in the computer is to buy it for his own use and to learn about it—a little more of a hobbyist use, hobbyist/business. And the Apple has traditionally been the family computer, with a lot more mothers involved in the purchase of Apples.

"Now, what we've seen among our own customers," notes Gordon, "is that the IBM customer tends to be very similar to the Apple customer—a lot more family-oriented, a lot more influence of mothers over the purchase, with a real similar kind of ranking of what they think are important applications: productivity first, education second, and entertainment something they don't really like to talk about. If you look at the numbers, Apple II sales have gone down as clone sales have gone up."

Brøderbund's Gary Carlston agrees: "This is definitely the MS-DOS Christmas. I think it will be as big as Apple's, which has probably never happened before." But Carlston thinks the ST and Amiga will weather the storm a little better: "I don't see them as being the same users. ST and Amiga users are people who know what they want. People who buy MS-DOS clones are kind of bringing [them] home from work, and I don't think in most cases have made a decision to buy that over an ST or an Amiga. I think people need to worry about the Apple IIGS a lot more."

The Sincerest Form Of Flattery Forever

Meanwhile, others worry about the sleeping giant—IBM. How long will IBM watch its PC sales eroded by the clones without taking retaliatory action? To make matters worse, IBM's latest personal computer, the AT, also is being smothered by clones that offer more features for less money.

Some observers are awaiting a "clone-basher," a lower-priced PC that will match the clones. Others point out that IBM has never competed at the low end and instead will introduce a proprietary operating system or a new line of graphics-oriented computers in 1987.

The IBM-compatible market is so lucrative, however, that anything IBM does in the future will likely be cloned no matter what the obstacles. IBM may have to resign itself to tolerating the sincerest form of flattery forever.

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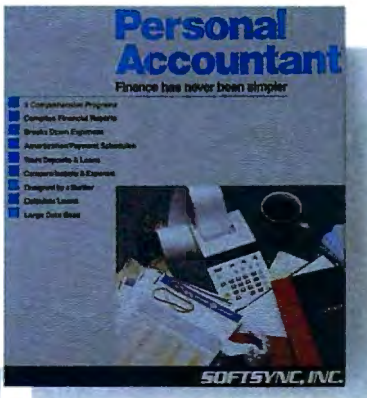

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Cloning Your Own Compatible

Arlan R. Levitan

There's a shadowy side to the PC-compatible market, much akin to the "phantom zone" of Superman comics. Perhaps you've seen the ads: PC compatibles are being hawked under a multitude of innocuous-sounding names at unbelievable prices, typically in the $500 range.

Welcome to the world of *hyperclones*—PC compatibles assembled from very low cost subassemblies. While the advertised price rarely buys a completely equipped system, the overall quality of the hyperclones is higher than their rock-bottom prices imply. If you're willing to put up with some inconveniences, such a machine might be right for you.

Do-It-Yourself PC

Gutsy hobbyists on shoestring budgets have been bolting their own PCs together for about two years. A recent check of some popular hobbyist magazines yielded the following prices for FCC-certified components:

Turbo PC motherboard with BIOS	$99.95
640K RAM	49.95
Keyboard	49.95
Case	29.95
135-watt power supply	65.00
Floppy disk drive controller	39.95
Half-height disk drives (2)	139.90
Monochrome graphics card	69.95
Amber monochrome monitor	69.95
Clock/serial/parallel card	49.95
MS-DOS operating system	49.95
Total	714.45

Although assembling your own PC is not particularly difficult, it's not for the faint-hearted either. More than a few enthusiasts have plugged together a PC only to find that the end product doesn't work. If you're not sure where the problem is, you could be left out in the cold.

Unless you're a troubleshooting novice looking for new experiences, it's best to let someone assemble a machine to your specifications. Typically, the final price will be within a hundred dollars or so of the do-it-yourself system.

Origin Of The Species

Many hyperclone suppliers prominently advertise "Made in the USA." More often than not, this means "Bolted Together in the USA" since many of the components are actually manufactured in the Far East. But the buy-American argument against clones has lost steam as people have become more aware of the facts. Many genuine IBM PCs sold by authorized IBM dealers have enough foreign content to rival some of the clones.

Four years ago, achieving full IBM compatibility was miraculous. But today, fully compatible PC BIOSs (Basic Input/Output Systems) are readily available at nominal prices to PC motherboard manufacturers and hobbyists alike. Incompatible compatibles are now the exception.

As for quality, most out-of-the-box problems with hyperclones tend to be the result of hurried assembly and minimal testing. The prevalent Taiwanese and Korean components are quite good. Actually, most hyperclone boards are only assembled rather than manufactured in Taiwan and Korea. Many of the boards and over 90 percent of the electronic parts are actually produced in Japan. A look at the brand names emblazoned on the chips reads like a *Who's Who* of the semiconductor business—including several American firms.

Almost all floppy disk drives (including so-called American brands) are now manufactured overseas, with Japan producing the lion's share. However, American manufacturers still hold the upper hand in the hard disk market. It's fairly easy to find the same drives that IBM puts in its machines at rock-bottom prices.

On the down side, much of the translated documentation supplied with hyperclones is sparse, overly technical, and sometimes unintelligible.

Serviceability

If a hyperclone fails within its warranty period, usually you return it to the supplier for repair. If you bought it from a mail-order house, even warranty repairs will cost $20–$30 for shipping.

What if the computer fails after the warranty has expired? Given the low cost of the subassemblies that constitute the average hyperclone, you might even consider the components semidisposable. If a board or disk drive malfunctions, buy a new one.

Hyperclones can offer significant savings over other IBM compatibles. This advantage must be weighed against their disadvantages. For many people, the additional cost of a name-brand compatible may represent a fair value, especially if personalized support and service are offered in return. ©

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That is, of course, until you get good enough to do the thrashing yourself.

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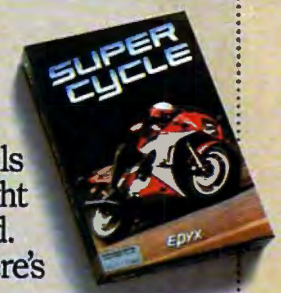

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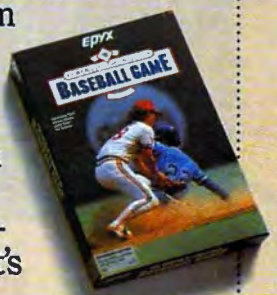

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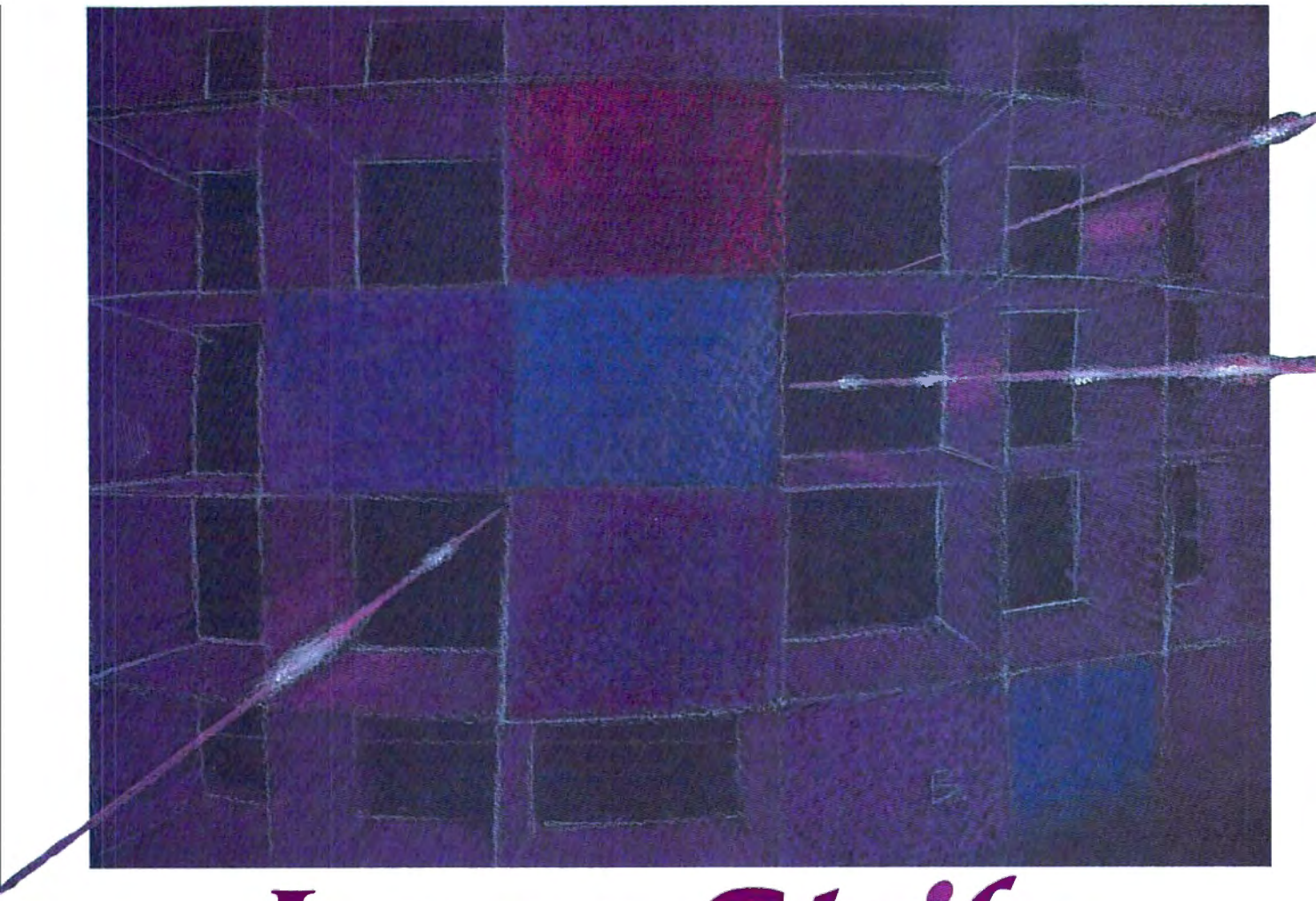

Laser Strike

Barbara Schulak

In this strategy game for one or two players, your mission is to locate and vaporize your opponent's hidden space force before your force suffers the same fate. The original version of "Laser Strike" is written for the Commodore 64. We've added new versions for the ST, Amiga, IBM PC/PCjr, Apple II series, and Atari 400, 800, XL, and XE. The Apple II version runs under either ProDOS or DOS 3.3. A joystick is required for the Commodore 64 and Atari versions (except ST). The IBM PC/PCjr version requires BASICA and a color/graphics card for the PC or cartridge BASIC for the PCjr.

"Laser Strike" is a strategy game based on several popular board games (Battleship is probably the most famous). However, unlike the board games, the action in Laser Strike occurs in outer space. Two players secretly deploy their spaceships around the galaxy and then try to locate the opponent's ships by firing laser strikes on the two-dimensional galaxy grid. The first player to find and destroy all the opponent's ships is the winner.

Typing It In

Type in the correct version of Laser Strike for your computer and save a copy. Every version of Laser Strike is similar, so be sure to read the following general game rules as well as the specific instructions for your computer.

Laser Strike begins by asking each player to enter his or her name. If you wish to play against the computer, press RETURN without typing anything at the first name prompt. If you press RETURN at both name prompts, the computer plays the entire game by itself.

The program then displays two grids, one for each player. In the first stage of the game, each player decides where to locate the ships in his or her grid. The deployment must be secret, so the second player needs to look away from the screen while the first player deploys ships, and vice versa. To deploy a ship, simply move the cursor to the desired location on the screen and press the joystick fire button (space bar in some versions). After choosing the location, you must also decide whether to deploy the ship horizontally or vertically. You cannot place a ship so that it overlaps

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Tandy 1000/IBM PC Jr. screens shown

"0300 Hours. Two hours until dawn. Radar picks up convoy, escorted by two destroyers. We believe that one of the enemy's valuable cargo ships is part of convoy formation."

"0400 Hours. Lookouts on the bridge. Target identification party reports one cargo ship, 4,000 tons, troopship of 10,250 tons, with two *Kaibokan*-type escorts. Moving into attack position."

"0500 Hours. Sound General Quarters! Battle stations manned. Preparing for torpedo run. Gauge Panel OK. Periscope OK. Charts and Attack Plot Board OK. All mechanical systems OK."

"0525 Hours. Torpedo rooms report full tubes forward and aft. Battery at full charge for silent running. We hope water temperature will provide thermal barrier to confuse enemy sonar."

"0600 Hours. We are at final attack position. Convoy moving at 10 knots. Target distance decreasing rapidly... Crash Dive! Escorts have spotted us and are turning to attack! Rig to run silent."

"0700 Hours. Depth charged for one hour. Some minor damage, but repair parties at work. Destroyer propeller noises receding. We'll come to periscope depth for our return punch."

"0715 Hours. Torpedo tubes 1, 2, 3 fired. Two destroyers hit and sinking. One of the enemy's last cargo ships coming into 'scope view — an ideal target position. On my mark... Fire Tube 4! Fire 5!"

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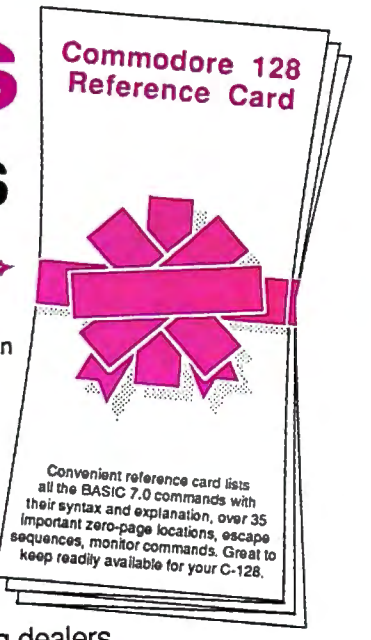

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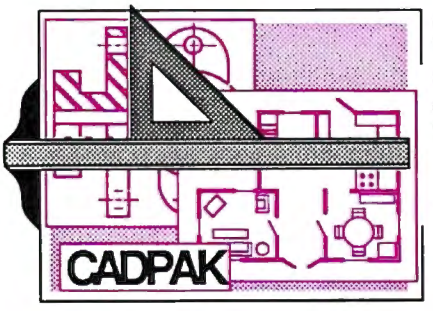

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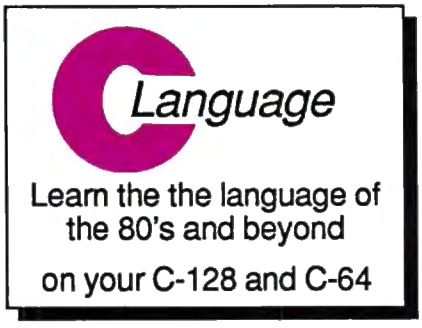

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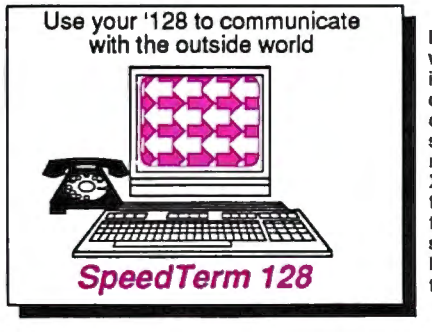

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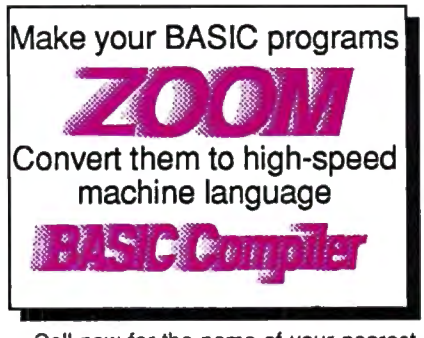

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the border. If you attempt to place a ship illegally, the program warns you and gives you another chance.

After both players' ships have been placed, the contest begins. The players alternate firing laser shots on each other's grids. To fire a shot, move the cursor to the desired location; then press the fire button or the space bar. If you hit a ship, that square of the grid is marked in the color of the ship you hit. If you miss, the square is marked in a neutral color. The game continues until one player has found and eliminated all of the other player's ships. At that point you can exit the program or play a new game.

Commodore 64 Version

This version of Laser Strike (Program 1) requires at least one joystick. If you play the game with two human players, you may use either one or two joysticks. When using only one joystick, plug the stick into port 2.

Apple II Version

The Apple II version of Laser Strike (Program 2) uses keyboard controls and runs in either ProDOS or DOS 3.3. Move the cursor with the cursor keys and press the space bar to fire.

Amiga Version

This version of Laser Strike (Program 3) includes speech synthesis and stereo sound effects. To hear the stereo effect, make sure that both of the Amiga's audio channels are connected to your monitor or amplifier as explained in the user's manual. Press the cursor keys to move the cursor and the space bar to fire or deploy ships.

IBM PC/PCjr Version

Laser Strike for the IBM PC/PCjr (Program 4) requires BASICA and a color/graphics card for the PC or cartridge BASIC for the PCjr. Use keyboard controls to play the game: The space bar fires the laser and the cursor keys move the cursor.

Laser Strike For Atari 400, 800, XL, And XE

This version of Laser Strike (Program 5) requires a joystick. Plug the joystick into port 1 before you run the program. For a two-player game, both players share the same joystick. The ships are all the same color—either blue or orange, depending on which Atari model you are using. Move the cursor with the joystick and press the fire button to deploy a ship or fire the laser.

ST Version

Laser Strike for the Atari 520ST or 1040ST (Program 6) requires a color monitor. Set the screen to low-resolution mode before booting BASIC. The game is played with the mouse. Move the mouse cursor to the desired square; then press the left mouse button. Do not type more than eight characters when you enter a player's name. If you wish to play again after finishing a game, you must reboot the computer by pressing the reset button, run BASIC from the desktop, and rerun the program.

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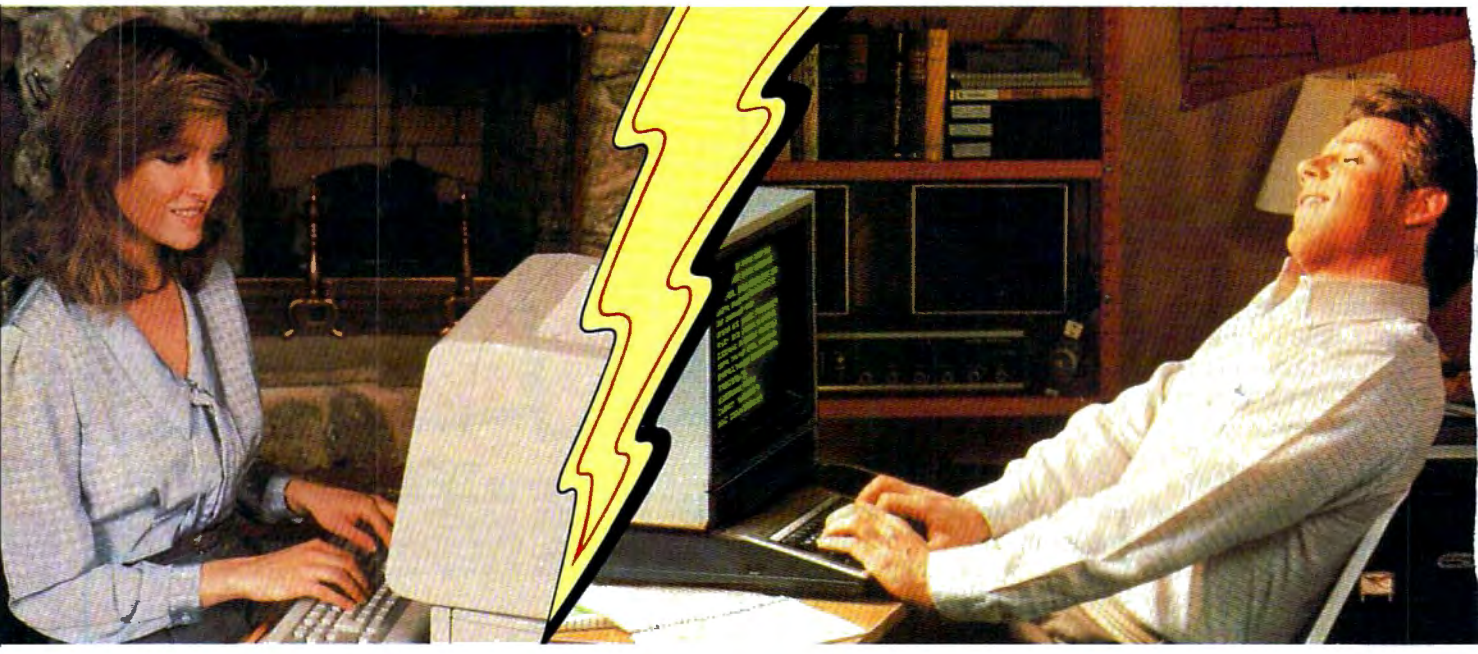

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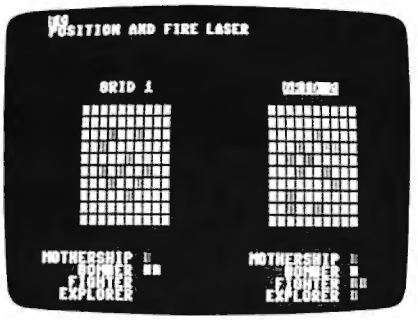
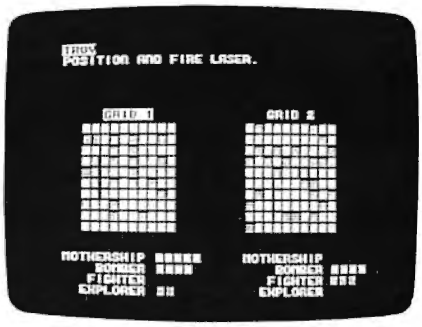
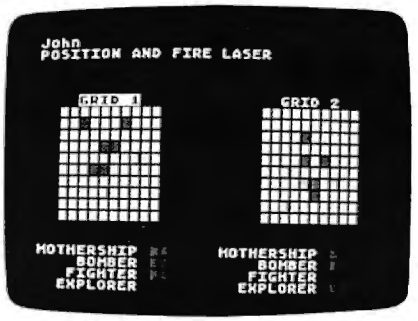


"Laser Strike" for the Commodore 64, an interesting strategy game for one or two players.



The Apple II version of "Laser Strike" runs under DOS 3.3 or ProDOS.

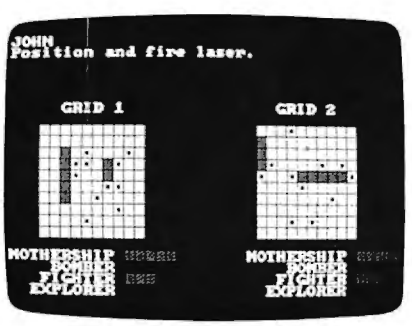


"Laser Strike" for the Atari 400, 800, XL, and XE.

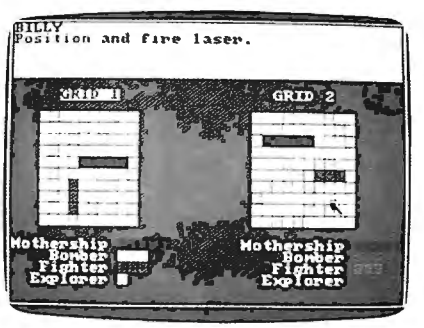
For instructions on entering these programs, please refer to "COMPUTE!'s Guide to Typing In Programs" in this issue of COMPUTE!.

Program 1: Commodore 64 Laser Strike

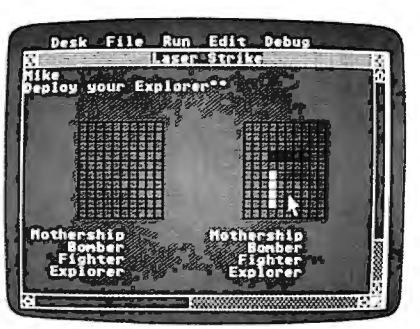
```
MF 10 :REM OPENING
HH 20 POKE53281,0:POKE53280,0:
      PRINTCHR$(142)"{CLR}
      {10 DOWN}";
PS 30 S=54272:FORI=0TO24:POKEI
      +S,0:NEXT
XS 40 C$="{WHT}{RED}{CYN}{PUR}
      {GRN}{BLU}{YEL}{F1}{F2}{F3}
      {F6}{F7}":D$="LASER STRIKE
      "
KD 50 POKES+6,240:POKES,100:PO
      KES+1,100:POKES+4,129
GS 60 FORI=1TO12:POKES+24,I
BG 70 PRINT"{UP}"TAB(14)LEFT$(
      C$,I);LEFT$(D$,I):POKE53
      280,I
JD 80 FORJ=1TO100:NEXTJ,I:POKE
      S+4,0:POKE53280,0
QJ 90 :REM SET-UP
FE 100 DIMG(1,9,9),NH(1,5),XH(
       1,5),YH(1,5),DX(1,5),DY
       (1,5),TA(1,5)
MQ 110 GB(0)=55620:GB(1)=55641
       :JS=56320:NJ=0:GOSUB900
QB 120 B$="{39 SPACES}"
DB 130 A$="{RVS}LLLLLLLLL"
ED 140 FORI=2TO5:READS$(I):NEX
       T
DC 150 FORI=0TO6:READC(I):NEXT
XJ 160 PRINT"{3 DOWN}{WHT}"
CX 170 FORI=0TO1:PRINT"PLAYER"
       STR$(I+1);:INPUTP$(I)
AP 180 IFP$(I)=""THENCP(I)=1:P
       $(I)="COMPUTER"
PA 190 PX(I)=0:PY(I)=0:NEXT:IF
       CP(0)=1ORCP(1)=1THEN240
JG 200 PRINT"NUMBER OF JOYSTIC
       KS (1/2)?"
CR 210 GETK$:IFK$<>"1"ANDK$<>"
       2"THEN210
AB 220 NJ=VAL(K$)-1
SQ 230 :REM DRAW SCREEN
BP 240 PRINT"{CLR}{6 DOWN}
       {WHT}"TAB(6)"GRID 1"SPC
       (15)"GRID 2"
EF 250 GOSUB950
MK 260 PRINT:PRINT"{WHT}"
CH 270 FORN=5TO2STEP-1:L=10-LE
       N(S$(N))
BR 280 PRINTSPC(L)S$(N)SPC(13+
       L)S$(N):NEXT
HA 290 :REM DEPLOY SHIPS
BS 300 FORPP=0TO1:P=ABS(PP-1):
       FORN=5TO2STEP-1
MH 310 PRINT"{HOME}{WHT}{RVS}"
       P$(PP)
RP 320 PRINT"DEPLOY YOUR "S$(N
       );
SC 330 POKE646,C(N):PRINTLEFT$
       (A$,N+1)
XH 340 IFCP(PP)=0THENGOSUB1000
       :GOSUB1090:GOTO360
CP 350 X=INT(RND(0)*(10-N)):Y=
       INT(RND(0)*(10-N)):JV=2
       +INT(RND(0)*2)*6:GOSUB1
       110
DX 360 IFER=1THEN310
ER 370 GOSUB1270:NEXT:GOSUB950
       :NEXT:FORI=0TO1:PX(I)=0
       :PY(I)=0:NEXT
AE 380 :REM MAIN LOOP
XP 390 PRINT"{HOME}{WHT}{RVS}"
       P$(P):PP=P
DP 400 PRINT"POSITION AND FIRE
        LASER":PRINT"{3 DOWN}"
QS 410 IFP=0THENPRINTSPC(6)"
       {RVS}GRID 1{OFF}"SPC(15
       )"GRID 2"
GX 420 IFP=1THENPRINTSPC(6)"GR
       ID 1"SPC(15)"{RVS}GRID
       {SPACE}2"
DK 430 PRINT"{5 UP}":IFCP(P)=0
       THENGOSUB1000:GOTO450
FQ 440 GOSUB630
XQ 450 GOSUB1290:GOSUB1420:GOS
       UB980:GOSUB1270
QM 460 IFTH(P)=14THEN490
JS 470 P=ABS(P-1):GOTO390
PP 480 :REM END GAME
ER 490 PRINT"{CLR}{CYN}"
CR 500 PRINTSPC(14)"O{9 Y}P"
GC 510 PRINTSPC(14)"{H}{YEL}GA
       ME OVER{CYN}{N}"
MM 520 PRINTSPC(14)"L{9 P}@"
FC 530 PRINT"{2 DOWN}{WHT}"TAB
       (20-LEN(P$(P))/2)P$(P)
KK 540 PRINTSPC(9)"HAS FREED T
       HE GALAXY!"
CK 550 PRINT"{3 DOWN}"SPC(12)"
       PLAY AGAIN [Y/N]"
BX 560 GETK$
FR 570 PRINT"{HOME}{2 DOWN}"SP
       C(15)"{YEL}GAME OVER":F
       ORI=1TO200:NEXT
```



The IBM PC/PCjr version of "Laser Strike" requires BASICA and a color/graphics card for the PC.



Amiga "Laser Strike," a strategy game with stereo sound effects.



"Laser Strike" for Atari ST computers takes advantage of the ST's mouse.

```
HG 580 PRINT"{HOME}{2 DOWN}"SPC(15)"{4}GAME OVER":FORI=1TO200:NEXT
BD 590 IFK$="Y"THENRUN
SK 600 IFK$="N"THENPRINT"{CLR}":END
XQ 610 GOTO560
RG 620 :COMPUTER STRIKE
CA 630 H=0:FORN=2TO5:IFNH(P,N)>0ANDNH(P,N)<NTHENSH=N:H=1
ER 640 NEXT:IFH=0THEN830
JM 650 X=XH(P,SH):Y=YH(P,SH):IFNH(P,SH)>1THEN760
PS 660 FORI=0TO3:PR(I)=0:NEXT
QB 670 R=INT(RND(0)*4):IFPR(R)=1THEN670
DG 680 DX(P,SH)=0:DY(P,SH)=0:ER=0:PR(R)=1:GOSUB1680
XJ 690 IFR=0THENDX(P,SH)=1:IFTX<SHORXP<XNTHENER=1
DE 700 IFR=1THENDX(P,SH)=-1:IFTX<SHORXN<XPTHENER=1
PA 710 IFR=2THENDY(P,SH)=1:IFTY<SHORYP<YNTHENER=1
KC 720 IFR=3THENDY(P,SH)=-1:IFTY<SHORYN<YPTHENER=1
QX 730 X=X+DX(P,SH):Y=Y+DY(P,SH)
XQ 740 GOSUB1640:IFER=0THENIFG(P,X,Y)<>1THEN870
ER 750 X=X-DX(P,SH):Y=Y-DY(P,SH):GOTO670
AR 760 X=X+DX(P,SH):Y=Y+DY(P,SH)
XP 770 ER=0:GOSUB1640:IFER=1THENGOSUB810:GOTO760
SM 780 IFG(P,X,Y)=1THENGOSUB810:GOTO760
AS 790 IFG(P,X,Y)=0THENGOSUB810
XJ 800 GOTO870
PQ 810 IFTA(P,SH)=0THENDX(P,SH)=-DX(P,SH):DY(P,SH)=-DY(P,SH):TA(P,SH)=1
MJ 820 RETURN
KH 830 X=INT(RND(0)*10):Y=INT(RND(0)*10)
BJ 840 IF((X+Y)AND1)=0THEN830
KP 850 IFG(P,X,Y)=1THEN830
XJ 860 GOSUB1680:IFTX<LS(P)ANDTY<LS(P)THEN830
BX 870 CO=7:GOSUB980
CX 880 RETURN
JP 890 :INIT ARRAYS
QF 900 FORI=0TO1:FORJ=0TO9:FORK=0TO9:G(I,J,K)=0:NEXTK,J,I
JC 910 FORI=0TO1:TH(I)=0:CP(I)=0:LS(I)=5
QJ 920 FORJ=0TO5:NH(I,J)=0:TA(I,J)=0:NEXTJ,I
MB 930 RETURN
DK 940 :DRAW GRID
DC 950 PRINT"{HOME}{7 DOWN}{7}"
GX 960 FORI=1TO10:PRINTTAB(4)A$SPC(11)A$:NEXT:RETURN
QK 970 :PUT GRID PT ON SCREEN
KH 980 AD=GB(P)+40*Y+X:PC=PEEK(AD)AND15:POKEAD,CO:RETURN
QA 990 :CURSOR AROUND GRID UNTIL FIRE
KB 1000 X=PX(P):Y=PY(P):X1=X:Y1=Y:CO=7:GOSUB980
HS 1010 JV=15-PEEK(JS+PP*NJ)AND15
RG 1020 IF(PEEK(JS+PP*NJ)AND16)=0THENPX(P)=X:PY(P)=Y:RETURN
GK 1030 IFJV=1THENIFY1>0THENY1=Y1-1
XX 1040 IFJV=2THENIFY1<9THENY1=Y1+1
AJ 1050 IFJV=4THENIFX1>0THENX1=X1-1
XA 1060 IFJV=8THENIFX1<9THENX1=X1+1
SQ 1070 CO=PC:GOSUB980:X=X1:Y=Y1:CO=C(6):GOSUB980:GOTO1010
QA 1080 :DRAW SHIP
AM 1090 PRINT"{WHT}HORIZONTAL{SPACE}[RIGHT] OR VERTICAL [DOWN]?"
JC 1100 JV=15-PEEK(JS+PP*NJ)AND15:IFJV<>2ANDJV<>8THEN1100
RJ 1110 IFJV=8ANDX+N-1>9THEN1220
QM 1120 IFJV=2ANDY+N-1>9THEN1220
FE 1130 ER=0:X1=X:Y1=Y:IFJV=8THEN1180
AC 1140 FORI=YTOY+N-1:IFG(P,X,I)<>0THENER=1
MB 1150 NEXT:IFER=1THEN1220
KS 1160 FORY=Y1TOY1+N-1:G(P,X,Y)=N:IFCP(PP)=0THENCO=C(N):GOSUB980
CB 1170 NEXT:RETURN
PJ 1180 FORI=XTOX+N-1:IFG(P,I,Y)<>0THENER=1
SQ 1190 NEXT:IFER=1THEN1220
BS 1200 FORX=X1TOX1+N-1:G(P,X,Y)=N:IFCP(PP)=0THENCO=C(N):GOSUB980
MH 1210 NEXT:RETURN
KB 1220 ER=1:IFCP(PP)=0THENPRINT"INVALID CHOICE":CO=PC:GOSUB980:GOSUB1250
QG 1230 GOSUB1270:RETURN
MK 1240 :DELAY
DE 1250 FORI=1TO1500:NEXT:RETURN
FS 1260 :ERASE TOP OF SCREEN
ED 1270 PRINT"{HOME}";:FORI=1TO5:PRINTB$:NEXT:RETURN
MK 1280 :LASER SOUND
DC 1290 FORI=0TO24:POKEI+S,0:NEXT
RM 1300 POKES+24,15:POKES+6,240
BA 1310 FORI=15TO1STEP-1
GD 1320 POKES+24,I:POKES+4,17:POKES,75:POKES+1,34
BQ 1330 FORJ=1TO25:NEXT:POKES+4,16
XP 1340 NEXT:POKES+24,0:RETURN
MP 1350 :WAVE SOUND
AJ 1360 FORI=0TO6:POKEI+S,0:NEXT
HC 1370 POKES+3,8:POKES+6,240:POKES+4,129:POKE54273,75
XF 1380 FORI=1TO10STEP.15:POKES+24,I:NEXT
GQ 1390 FORI=10TO1STEP-.02:POKES+24,I:NEXT
MM 1400 POKES+4,128:POKES+24,0:RETURN
GF 1410 :CHECK LASER STRIKE
RR 1420 N=G(P,X,Y)
ME 1430 IFN=0THENPRINT"MISS!":GOSUB1250:CO=C(1):G(P,X,Y)=1:RETURN
AG 1440 IFN=1THENPRINT"ALREADY HIT":GOSUB1250:CO=PC:RETURN
```

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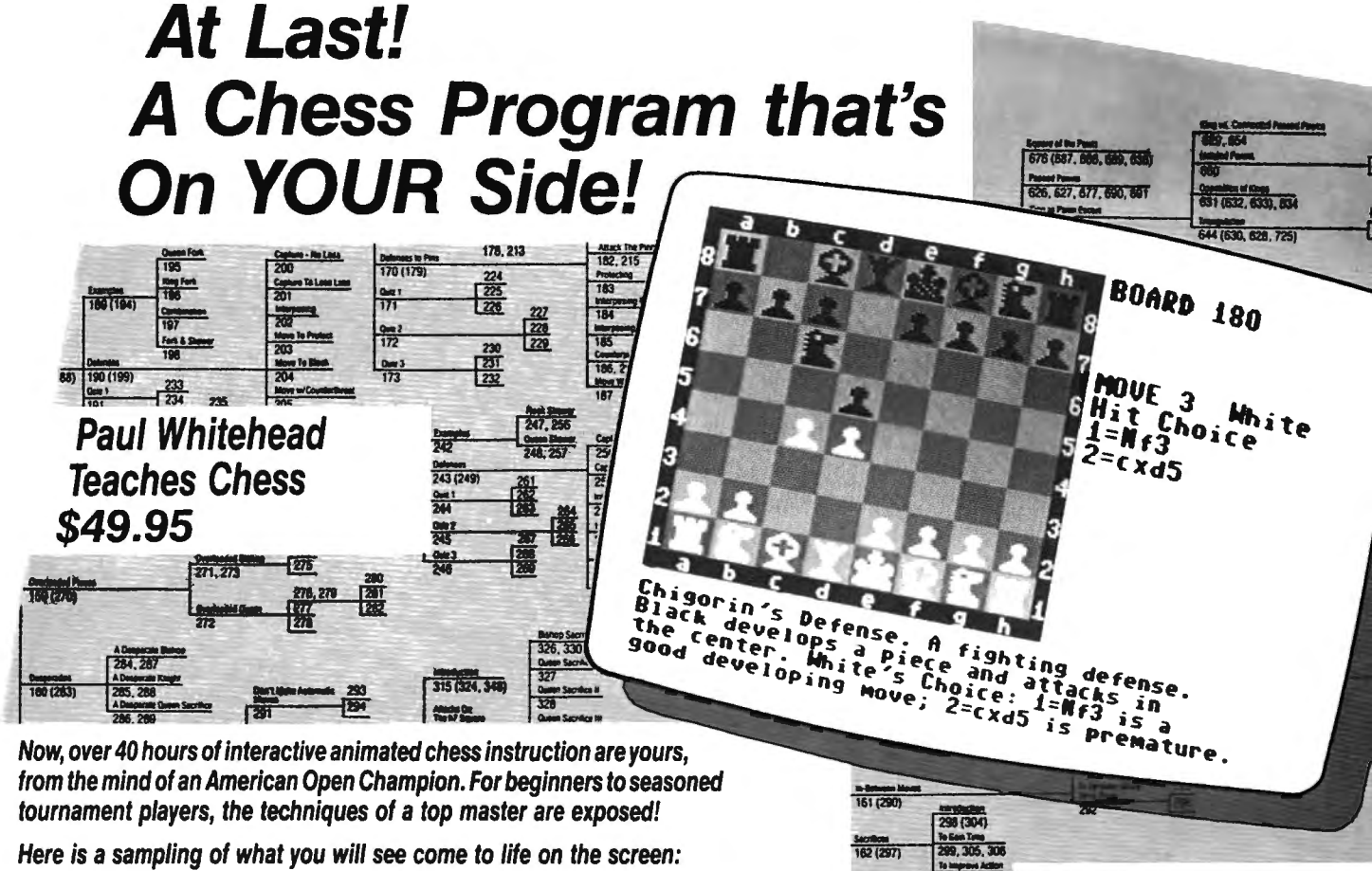

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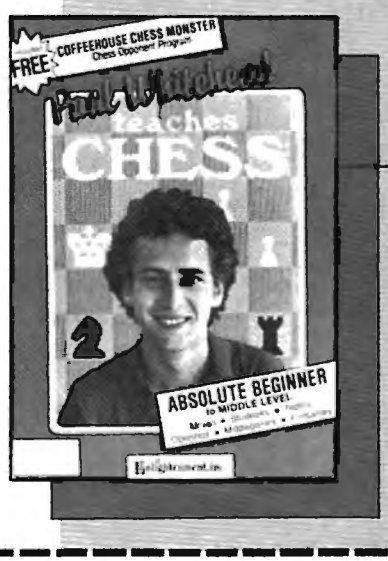

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```
PC 1450 PRINT"{GRN}DIRECT HIT!
        "
EK 1460 FORI=ØTO24:POKES+I,Ø:N
        EXT
KQ 1470 POKES+24,15:POKES+8,1:
        POKES+7,Ø:POKES+12,21:
        POKES+13,250:POKES+11,
        129
DJ 1480 FORI=1TO11:POKE53280,I
        :FORJ=1TO25:NEXTJ,I:PO
        KES+11,128:POKE53280,Ø
QC 1490 NH(P,N)=NH(P,N)+1:TH(P
        )=TH(P)+1
FP 1500 G(P,X,Y)=1:PRINT"
        {HOME}{18 DOWN}"
JD 1510 FORI=ØTO5-N:PRINT:NEXT
KC 1520 IFP=ØTHENPRINTSPC(11);
CG 1530 IFP=1THENPRINTSPC(34);
XC 1540 CO=C(N):POKE646,CO:PRI
        NTLEFT$(A$,NH(P,N)+1)
KQ 1550 IFN<>NH(P,N)THENXH(P,N
        )=X:YH(P,N)=Y:GOTO1620
DP 1560 FORI=2TO5:IFNH(P,I)=ØT
        HENLS(P)=I
EC 1570 NEXT:GOSUB1360:PRINT"
        {HOME}{3 DOWN}{CYN}"
KE 1580 FORI=1TO10
SD 1590 PRINT"{UP}"TAB(20-LEN(
        S$(N))/2)S$(N)
HJ 1600 PRINTSPC(15)"DESTROYED
        !":FORJ=1TO50:NEXT
KQ 1610 PRINT"{2 UP}"TAB(20-LE
        N(S$(N))/2)"{RVS}"S$(N
        ):FORJ=1TO50:NEXTJ,I
AH 1620 FORI=1TO500:NEXT:RETUR
        N
CA 1630 :CHECK X AND Y
XS 1640 IFX<ØORX>9THENER=1
XJ 1650 IFY<ØORY>9THENER=1
DJ 1660 RETURN
EK 1670 :CHECK X SIZE OF SPACE
BR 1680 X1=X
FG 1690 X1=X1+1:IFX1<=9THENIFG
        (P,X1,Y)<>1THEN1690
AS 1700 XP=X1-X:X1=X
HP 1710 X1=X1-1:IFX1>=ØTHENIFG
        (P,X1,Y)<>1THEN1710
KB 1720 XN=X-X1:TX=XN+XP-1:Y1=
        Y
AK 1730 Y1=Y1+1:IFY1<=9THENIFG
        (P,X,Y1)<>1THEN1730
JB 1740 YP=Y1-Y:Y1=Y
FK 1750 Y1=Y1-1:IFY1>=ØTHENIFG
        (P,X,Y1)<>1THEN1750
CH 1760 YN=Y-Y1:TY=YN+YP-1:RET
        URN
SB 1770 DATA EXPLORER,FIGHTER,
        BOMBER,MOTHERSHIP
JX 1780 DATA 14,11,8,4,5,2,7
```

Program 2: Apple II Laser Strike

Version by Tim Midkiff, Editorial Programmer

```
FA 40 HGR2
A5 50 DIM G(1,9,9),C(1,9,9),NH(1
      ,5),XH(1,5),YH(1,5),DX(1,5
      ),DY(1,5),TA(1,5)
5F 60 RESTORE : FOR I = Ø TO 6:
      READ CH(I): NEXT :GX(Ø) =
      18:GX(1) = 158
AF 70 DATA 3,4,5,2,1,6,3
78 80 B$ = " ": FOR I = 1 TO 37:
      B$ = B$ + " ": NEXT
D6 90 FOR I = 2 TO 5: READ S$(I)
      : NEXT
C6 100 DATA EXPLORER,FIGHTER,BOM
       BER,MOTHERSHIP
9D 110 GOSUB 1330: GOSUB 1460
8A 112 IF PEEK (190 * 256) = 76
       THEN PRINT CHR$ (4);"PR#A
       768": GOTO 116
C4 114 POKE 54,Ø: POKE 55,3: CAL
       L 1002
5B 116 POKE 6,Ø: POKE 7,141: POK
       E 230,64
C1 118 HGR2
3B 120 VTAB 11: HTAB 14: INVERSE
       : PRINT "LASER STRIKE":
       NORMAL : PRINT
E1 130 FOR I = Ø TO 1
27 140 PRINT "PLAYER " STR$ (I +
       1);: INPUT P$(I)
8B 150 IF P$(I) = "" THEN CP(I)
       = 1:P$(I) = "COMPUTER"
96 160 NEXT : HGR2 : VTAB 7: HTA
       B 6: PRINT "GRID 1" SPC(
       14)"GRID 2"
4B 170 FOR P = Ø TO 1: GOSUB 700
       : NEXT : VTAB 20
9C 180 FOR N = 5 TO 2 STEP - 1:L
       = 10 - LEN (S$(N))
BB 190 PRINT SPC( L)S$(N) SPC( 1
       2 + L)S$(N): NEXT
65 200 D = Ø: FOR PP = Ø TO 1:P
       = ABS (PP - 1):LS(P) = 5
5A 210 FOR N = 5 TO 2 STEP - 1:E
       R = 1
B5 220 VTAB 1: INVERSE : PRINT P
       $(PP): NORMAL
72 230 PRINT "DEPLOY YOUR "S$(N)
       " ";
EE 240 FOR I = 1 TO N: PRINT CHR
       $ (CH(2));: NEXT
5F 250 IF CP(PP) = Ø THEN GOSUB
       790: GOTO 270
92 260 X = INT ( RND (1) * (10 -
       N)):Y = INT ( RND (1) *
       (10 - N))
2A 270 GOSUB 870: IF ER = 1 THEN
       220
65 280 GOSUB 1050: NEXT : GOSUB
       700: NEXT :P = 1:D = 1: G
       OSUB 1050: FOR I = Ø TO 1
       :PX(I) = Ø:PY(I) = Ø: NEX
       T
9A 290 P = ABS (P - 1):PP = P
8B 300 VTAB 1: HTAB 1: INVERSE :
       PRINT P$(P): NORMAL
8F 310 PRINT "POSITION AND FIRE
       LASER.": VTAB 7: HTAB 6
69 320 IF P = Ø THEN INVERSE : P
       RINT "GRID 1";: NORMAL :
       PRINT SPC( 14)"GRID 2"
97 330 IF P = 1 THEN PRINT "GRID
       1" SPC( 14);: INVERSE :
       PRINT "GRID 2": NORMAL
74 340 IF CP(P) = Ø THEN GOSUB 7
       90: GOTO 360
7B 350 GOSUB 450:CO = 1: GOSUB 7
       20
78 360 GOSUB 1060: GOSUB 720: GO
       SUB 1050
02 370 IF TH(P) < 14 THEN 290
2B 380 HGR2 : VTAB 11: HTAB 15:
       INVERSE : PRINT "GAME OVE
       R": NORMAL
25 390 VTAB 13: HTAB 20 - LEN (P
       $(P)) / 2: PRINT P$(P)
EB 400 VTAB 14: HTAB 9: PRINT "H
       AS FREED THE GALAXY!"
9A 410 VTAB 17: HTAB 12: PRINT "
       PLAY AGAIN [Y/N]";
5C 420 GET K$: IF K$ < > "Y" AND
       K$ < > "N" THEN 420
7B 430 IF K$ = "Y" THEN RUN
AB 440 IF K$ = "N" THEN HOME : E
       ND
6B 450 H = Ø: FOR N = 2 TO 5: IF
       NH(P,N) > Ø AND NH(P,N)
       < N THEN SH = N:H = 1
21 460 NEXT : IF H = Ø THEN 650
BE 470 X = XH(P,SH):Y = YH(P,SH)
       : IF NH(P,SH) > 1 THEN 58
       Ø
9F 480 FOR I = Ø TO 3:PR(I) = Ø:
       NEXT
8A 490 R = INT ( RND (1) * 4): I
       F PR(R) = 1 THEN 490
81 500 DX(P,SH) = Ø:DY(P,SH) = Ø
       :ER = Ø:PR(R) = 1: GOSUB
       1240
FD 510 IF R = Ø THEN DX(P,SH) =
       1: IF TX < SH OR XP < XN
       THEN ER = 1
25 520 IF R = 1 THEN DX(P,SH) =
       - 1: IF TX < SH OR XN < X
       P THEN ER = 1
30 530 IF R = 2 THEN DY(P,SH) =
       1: IF TY < SH OR YP < YN
       THEN ER = 1
64 540 IF R = 3 THEN DY(P,SH) =
       - 1: IF TY < SH OR YN < Y
       P THEN ER = 1
D8 550 X = X + DX(P,SH):Y = Y +
       DY(P,SH)
B4 560 GOSUB 1210: IF ER = Ø THE
       N IF G(P,X,Y) < > 1 THEN
       RETURN
16 570 X = X - DX(P,SH):Y = Y -
       DY(P,SH): GOTO 490
DE 580 X = X + DX(P,SH):Y = Y +
       DY(P,SH)
CD 590 ER = Ø: GOSUB 1210: IF ER
       = 1 THEN GOSUB 630: GOTO
       580
7A 600 IF G(P,X,Y) = 1 THEN GOSU
       B 630: GOTO 580
EB 610 IF G(P,X,Y) = Ø THEN GOSU
       B 630
1A 620 RETURN
78 630 IF TA(P,SH) = Ø THEN DX(P
       ,SH) = - DX(P,SH):DY(P,SH
       ) = - DY(P,SH):TA(P,SH) =
       1
1E 640 RETURN
76 650 X = INT ( RND (1) * 10):Y
       = INT ( RND (1) * 10)
78 660 IF (X + Y) / 2 = INT ((X
       + Y) / 2) THEN 650
EE 670 IF G(P,X,Y) = 1 THEN 650
52 680 GOSUB 1240: IF TX < LS(P)
       AND TY < LS(P) THEN 650
28 690 RETURN
91 700 CO = Ø: FOR X = Ø TO 9: F
       OR Y = Ø TO 9: IF C(P,X,Y
       ) < > Ø THEN
49 710 GOSUB 720: NEXT Y,X: RETU
       RN
E0 720 HCOLOR= CH(CO):HX = X * 8
       + GX(P):HY = Y * 8 + 59
28 730 FOR I = Ø TO 5: HPLOT HX,
       HY + I TO HX + 5,HY + I:
       NEXT :PC = C(P,X,Y):C(P,X
       ,Y) = CO
7B 740 IF CO = 6 THEN HCOLOR= 4:
       FOR I = Ø TO 5 STEP 2: H
       PLOT HX,HY + I TO HX + 5,
       HY + I: NEXT
21 750 RETURN
C1 760 IF X > Ø THEN T = C(P,X -
       1,Y): IF T < > Ø AND T <
       > 6 THEN HCOLOR= CH(T):X
       2 = HX - 8: FOR I = Ø TO
       5: HPLOT X2,HY + I TO X2
       + 5,HY + I: NEXT
97 770 IF X < 9 THEN T = C(P,X +
       1,Y): IF T < > Ø AND T <
       > 6 THEN HCOLOR= CH(T):X
       2 = HX + 8: FOR I = Ø TO
       5: HPLOT X2,HY + I TO X2
       + 5,HY + I: NEXT
```

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```
27 780 RETURN
B0 790 X = PX(PP):Y = PY(PP):X1
       = X:Y1 = Y:CO = 1: GOSUB
       720: GOSUB 760
25 800 K = PEEK (49152):T = RND
       (1): IF K > 127 THEN POKE
        49168,0
4F 810 IF K = 160 THEN PX(PP) =
       X:PY(PP) = Y: RETURN
5E 820 IF K = 149 THEN IF X1 < 9
        THEN X1 = X1 + 1
59 830 IF K = 136 THEN IF X1 > 0
        THEN X1 = X1 - 1
68 840 IF K = 139 THEN IF Y1 > 0
        THEN Y1 = Y1 - 1
6B 850 IF K = 138 THEN IF Y1 < 9
        THEN Y1 = Y1 + 1
6E 860 CO = PC: GOSUB 720: GOSUB
        760:X = X1:Y = Y1:CO = 1
       : GOSUB 720: GOSUB 760: G
       OTO 800
75 870 IF G(P,X,Y) < > 0 THEN 10
       20
7C 880 K$ = CHR$ (10 + INT ( RND
       (1) * 2) * 11): IF CP(PP
       ) = 1 THEN 910
37 890 VTAB 3: HTAB 1: PRINT "HO
       RIZONTAL [RIGHT] OR VERTI
       CAL [DOWN]?": GOSUB 720
15 900 GET K$: IF K$ < > CHR$ (1
       0) AND K$ < > CHR$ (21) T
       HEN 900
54 910 ER = 0:CO = N: IF K$ = CH
       R$ (21) THEN 970
B1 920 IF Y + N - 1 > 9 THEN PC
       = 0: GOTO 1020
9C 930 FOR I = Y TO Y + N - 1: I
       F G(P,X,I) < > 0 THEN ER
       = 1
34 940 NEXT : IF ER = 1 THEN PC
       = 0: GOTO 1020
BD 950 Y1 = Y: FOR Y = Y1 TO Y1
       + N - 1:G(P,X,Y) = N: IF
       CP(PP) = 0 THEN GOSUB 720
D1 960 NEXT : RETURN
9B 970 IF X + N - 1 > 9 THEN PC
       = 0: GOTO 1020
36 980 FOR I = X TO X + N - 1: I
       F G(P,I,Y) < > 0 THEN ER
       = 1
3E 990 NEXT : IF ER = 1 THEN PC
       = 0: GOTO 1020
22 1000 X1 = X: FOR X = X1 TO X1
        + N - 1:G(P,X,Y) = N: I
       F CP(PP) = 0 THEN GOSUB
       720
2F 1010 NEXT : RETURN
CE 1020 ER = 1: IF CP(PP) = 0 TH
       EN VTAB 4: HTAB 1: PRINT
        "INVALID CHOICE"
C5 1030 CO = PC: GOSUB 720: GOSU
       B 1040: GOSUB 1050: RETU
       RN
69 1040 FOR I = 1 TO 1500: NEXT
       : RETURN
C7 1050 VTAB 1: HTAB 1: FOR I =
       1 TO 5: PRINT B$: NEXT :
        RETURN
10 1060 FOR I = 15 TO 5 STEP - 5
       : FOR J = 1 TO I:S = PEE
       K (49200): NEXT : FOR J
       = 1 TO 10: NEXT : NEXT
44 1070 N = G(P,X,Y): VTAB 3: HT
       AB 1
B2 1080 IF N = 0 THEN PRINT "MIS
       S!": GOSUB 1040:CO = 6:G
       (P,X,Y) = 1: RETURN
16 1090 IF N = 1 THEN PRINT "ALR
       EADY HIT":CO = PC: GOSUB
        1040: RETURN
C1 1100 CO = N: PRINT "DIRECT HI
       T!"
2C 1110 FOR I = 1 TO 15:S = PEEK
        (49200): FOR J = 1 TO I
       : NEXT : NEXT
6F 1120 NH(P,N) = NH(P,N) + 1:TH
       (P) = TH(P) + 1
10 1130 G(P,X,Y) = 1:HY = (24 -
       N) * 8 + 1:HX = (NH(P,N)
        + 9 + 19 * P) * 8: HCOL
       OR= CH(CO)
82 1140 FOR I = 0 TO 5: HPLOT HX
       ,HY + I TO HX + 5,HY + I
       : NEXT
70 1150 IF N < > NH(P,N) THEN XH
       (P,N) = X:YH(P,N) = Y: G
       OTO 1200
AE 1160 FOR I = 2 TO 5: IF NH(P,
       I) = 0 THEN LS(P) = I
75 1170 NEXT : INVERSE : FOR I =
        1 TO 10:S = PEEK (49200
       )
41 1180 VTAB 4: HTAB 20 - LEN (S
       $(N)) / 2: PRINT S$(N):
       HTAB 15
FA 1190 PRINT "DESTROYED!": FOR
       J = 1 TO 50: NEXT : NEXT
        : NORMAL
4A 1200 FOR I = 1 TO 500: NEXT :
        RETURN
AF 1210 IF X < 0 OR X > 9 THEN E
       R = 1
F3 1220 IF Y < 0 OR X > 9 THEN E
       R = 1
E1 1230 RETURN
0F 1240 X1 = X
9F 1250 X1 = X1 + 1: IF X1 < = 9
       THEN IF G(P,X1,Y) < > 1
       THEN 1250
E0 1260 XP = X1 - X:X1 = X
99 1270 X1 = X1 - 1: IF X1 > = 0
       THEN IF G(P,X1,Y) < > 1
       THEN 1270
54 1280 XN = X - X1:TX = XN + XP
       - 1:Y1 = Y
CD 1290 Y1 = Y1 + 1: IF Y1 < = 9
       THEN IF G(P,X,Y1) < > 1
       THEN 1290
EF 1300 YP = Y1 - Y:Y1 = Y
55 1310 Y1 = Y1 - 1: IF Y1 > = 0
       THEN IF G(P,X,Y1) < > 1
       THEN 1310
A7 1320 YN = Y - Y1:TY = YN + YP
       - 1: RETURN
E4 1330 FOR I = 768 TO 855: READ
       A: POKE I,A: NEXT
E7 1340 RETURN
3B 1350 DATA 216,120,133,69,134,
       70,132,71
78 1360 DATA 166,7,10,10,176,4,1
       6,62
F6 1370 DATA 48,4,16,1,232,232,1
       0,134
13 1380 DATA 27,24,101,6,133,26,
       144,2
0D 1390 DATA 230,27,165,40,133,8
       ,165,41
DD 1400 DATA 41,3,5,230,133,9,16
       2,8
46 1410 DATA 160,0,177,26,36,50,
       48,2
5F 1420 DATA 73,127,164,36,145,8
       ,230,26
8D 1430 DATA 208,2,230,27,165,9,
       24,105
58 1440 DATA 4,133,9,202,208,226
       ,165,69
60 1450 DATA 166,70,164,71,88,76
       ,240,253
59 1460 FOR I = 36096 TO 36111:
       READ A: POKE I,A: NEXT
F8 1470 FOR I = 36208 TO 36591:
       READ A: POKE I,A: NEXT :
        RETURN
72 1480 DATA 0,0,0,0,0,0,0,0,0
5D 1490 DATA 0,24,24,24,24,0,24,
       0
EC 1500 DATA 128,128,128,128,128
       ,128,152,128
E6 1510 DATA 128,128,176,152,140
       ,134,128,128
B7 1520 DATA 128,188,230,246,238
       ,230,188,128
9F 1530 DATA 128,152,156,152,152
       ,152,188,128
DB 1540 DATA 128,188,230,176,140
       ,230,254,128
02 1550 DATA 128,188,230,176,224
       ,230,188,128
0B 1560 DATA 128,176,184,180,254
       ,176,176,128
86 1570 DATA 128,254,134,190,224
       ,230,188,128
CD 1580 DATA 128,188,134,190,230
       ,230,188,128
B3 1590 DATA 128,254,224,176,152
       ,140,140,128
82 1600 DATA 128,188,230,188,230
       ,230,188,128
B3 1610 DATA 128,188,230,230,252
       ,176,152,128
89 1620 DATA 128,128,128,128,128
       ,128,128,128
62 1630 DATA 0,0,0,0,0,0,0,0,0
66 1640 DATA 0,0,0,0,0,0,0,0,0
6A 1650 DATA 0,0,0,0,0,0,0,0,0
6E 1660 DATA 0,0,0,0,0,0,0,0,0
8C 1670 DATA 128,188,230,176,152
       ,128,152,128
21 1680 DATA 128,128,128,128,128
       ,128,128,128
2D 1690 DATA 128,252,230,230,254
       ,230,230,128
66 1700 DATA 128,190,230,230,190
       ,230,254,128
D7 1710 DATA 128,188,230,134,134
       ,230,190,128
F9 1720 DATA 128,190,230,230,230
       ,230,190,128
93 1730 DATA 128,254,134,134,190
       ,134,254,128
92 1740 DATA 128,254,134,134,190
       ,134,134,128
F2 1750 DATA 128,188,230,134,246
       ,230,190,128
62 1760 DATA 128,230,230,230,254
       ,230,230,128
85 1770 DATA 128,152,152,152,152
       ,152,152,128
5D 1780 DATA 128,224,224,224,224
       ,230,188,128
8E 1790 DATA 128,230,230,182,158
       ,230,230,128
3D 1800 DATA 128,134,134,134,134
       ,134,254,128
50 1810 DATA 128,230,254,230,230
       ,230,230,128
F0 1820 DATA 128,190,230,230,230
       ,230,230,128
FF 1830 DATA 128,188,230,230,230
       ,230,188,128
04 1840 DATA 128,190,230,230,190
       ,134,134,128
08 1850 DATA 128,188,230,230,230
       ,182,236,128
0C 1860 DATA 128,190,230,230,190
       ,230,230,128
21 1870 DATA 128,188,230,140,176
       ,230,190,128
1C 1880 DATA 128,254,152,152,152
       ,152,152,128
67 1890 DATA 128,230,230,230,230
       ,230,190,128
45 1900 DATA 128,230,230,230,230
       ,230,152,128
```

```
7F 1910 DATA 128,230,230,230,230
      ,254,230,128
6B 1920 DATA 128,230,230,230,188
      ,230,230,128
2B 1930 DATA 128,230,230,230,188
      ,152,152,128
61 1940 DATA 128,254,176,152,140
      ,134,254,128
99 1950 DATA 0,30,6,6,6,6,30,0
74 1960 DATA 0,0,0,0,0,0,0,0
EA 1970 DATA 0,60,48,48,48,48,60
      ,0
```

Program 3: Amiga Laser Strike

Version by Tim Midkiff, Editorial Programmer

```
DEFINT a-z:DEFSNG r,g,b
DIM g(1,9,9),c(1,9,9),nh(1,5),xh
(1,5),yh(1,5),dx(1,5),dy(1,5),ta
(1,5),s(27,8),w1(255),w2(255)
SCREEN 1,320,200,3,1:WINDOW 3,""
,(0,0)-(311,186),16,1:WINDOW OUT
PUT 3:COLOR 6,0
FOR i=0 TO 255:w1(i)=RND*255-128
:w2(i)=RND*255-128:NEXT
RESTORE PaletteData:FOR i=0 TO 7
:READ r,g,b:PALETTE i,r,g,b:NEXT
PaletteData:
DATA .13,0,.73,.13,0,.73,1,.73,0
,.8,0,.93,.33,.87,0,.8,.2,0,.9,.
9,.9,0,.73,.73
RESTORE VoiceData:FOR i=0 TO 8:R
EAD v%(i):NEXT
VoiceData:
DATA 110,0,150,0,22200,64,10,1,0
WIDTH 40:CLS:RANDOMIZE TIMER
FOR co=1 TO 7:CLS:LINE(1,1)-(7,7
),co,BF:GET(1,1)-(8,8),s(0,co):N
EXT
CLS:LOCATE 11,14:CALL Echo("LASE
R STRIKE",v%()):PRINT
gx(0)=24:gx(1)=192:gy=64
b$="
"
RESTORE ShipNames:FOR i=2 TO 5:R
EAD s$(i):NEXT
ShipNames:
DATA Explorer,Fighter,Bomber,Mot
hership
FOR i=0 TO 1
PRINT "Player"+STR$(i+1);:INPUT
p$(i):IF p$(i)="" THEN cp(i)=1:p
$(i)="Computer"
NEXT:CLS:LOCATE 7,6:COLOR 1,0:PR
INT"GRID 1"SPC(15)"GRID 2"
GOSUB DrawGrid:LOCATE 20,1:COLOR
6,0
FOR n=5 TO 2 STEP-1:l=10-LEN(s$(
n))
PRINT SPC(l)s$(n)SPC(13+l)s$(n):
NEXT

DeployShips:
d=0:FOR pp=0 TO 1:p=ABS(pp-1):ls
(p)=5:FOR n=5 TO 2 STEP-1:er=1
WHILE er=1
LOCATE 1,1:PRINT p$(pp)
PRINT"Deploy your "s$(n)".";
FOR i=1 TO n:PUT(i*8+POS(0)*8,8)
,s(0,n),PSET:NEXT
IF cp(pp)=0 THEN GOSUB Human ELS
E x=INT(RND*(10-n)):y=INT(RND*(1
0-n))
GOSUB SelectDir
WEND
GOSUB ClearTop:NEXT:GOSUB DrawGr
id:NEXT
p=1:d=1:GOSUB ClearTop:PALETTE 1
,.5,.5,.5
FOR i=0 TO 1:px(i)=0:py(i)=0:NEX
T

MainLoop:
WHILE th(p)<14:p=ABS(p-1):pp=p:W
HILE INKEY$<>"":WEND
LOCATE 7,6:COLOR p,ABS(p-1):PRIN
T"GRID 1";:COLOR ABS(p-1),p:PRIN
T SPC(15)"GRID 2"
LOCATE 1,1:COLOR 0,1:PRINT p$(p)

PRINT"Position and fire laser."
IF cp(p)=0 THEN GOSUB Human ELSE
GOSUB Computer
GOSUB FireLaser:GOSUB PutFigure:
GOSUB ClearTop
WEND

EndGame:
COLOR 5,0:CLS:LOCATE 11,15:CALL
Echo("GAME OVER",v%())
COLOR 4:LOCATE 13,20-LEN(p$(p))/
2:CALL Echo(p$(p),v%())
LOCATE 14,9:CALL Echo("Has freed
the galaxy!",v%())
COLOR 2:LOCATE 17,12:PRINT"Play
again [Y/N]"
SAY TRANSLATE$("play again"),v%:
c=1
WHILE k$<>"Y" AND k$<>"N"
k$=UCASE$(INKEY$):c=ABS(c-1)
COLOR 5+c:LOCATE 11,15:PRINT"GAM
E OVER":FOR i=1 TO 200:NEXT
LOCATE 11,1:PRINT b$:FOR i=1 TO
200:NEXT
WEND
IF k$="Y" THEN RUN
IF k$="N" THEN CLS:END

Delay:FOR i=1 TO 1500:NEXT:RETUR
N

ClearTop:LOCATE 1,1:COLOR,d:FOR
i=1 TO 5:PRINT b$:NEXT:RETURN

PutFigure:PUT(x*8+gx(p),y*8+gy),
s(0,co),PSET:pc=c(p,x,y):c(p,x,y
)=co:RETURN

DrawGrid:
co=7:FOR y=0 TO 9:FOR x=0 TO 9:F
OR p=0 TO 1:IF c(p,x,y)<>1 THEN
GOSUB PutFigure
NEXT p,x,y:RETURN

CheckXY:
IF x<0 OR x>9 THEN er=1
IF y<0 OR y>9 THEN er=1
RETURN

FitShip:
x1=x
80 x1=x1+1:IF x1<=9 THEN IF g(p,
x1,y)<>1 THEN 80
xp=x1-x:x1=x
90 x1=x1-1:IF x1>=0 THEN IF g(p,
x1,y)<>1 THEN 90
xn=x-x1:tx=xn+xp-1:y1=y
100 y1=y1+1:IF y1<=9 THEN IF g(p
,x,y1)<>1 THEN 100
yp=y1-y:y1=y
110 y1=y1-1:IF y1>=0 THEN IF g(p
,x,y1)<>1 THEN 110
yn=y-y1:ty=yn+yp-1:RETURN

Human:
x=px(p):y=py(p):x1=x:y1=y:co=6:G
OSUB PutFigure:k$=""
WHILE k$<>" ":k$=INKEY$
IF k$=CHR$(30) THEN IF x1<9 THEN
x1=x1+1
IF k$=CHR$(31) THEN IF x1>0 THEN
x1=x1-1
IF k$=CHR$(28) THEN IF y1>0 THEN
y1=y1-1
IF k$=CHR$(29) THEN IF y1<9 THEN
y1=y1+1
co=pc:GOSUB PutFigure:x=x1:y=y1:
co=6:GOSUB PutFigure
WEND:px(p)=x:py(p)=y:RETURN

Computer:
h=0:FOR n=2 TO 5:IF nh(p,n)>0 AN
D nh(p,n)<n THEN sh=n:h=1
NEXT:IF h=0 THEN 40
x=xh(p,sh):y=yh(p,sh):IF nh(p,sh
)>1 THEN 20
FOR i=0 TO 3:pr(i)=0:NEXT
10 r=INT(RND*4):IF pr(r)=1 THEN
10
dx(p,sh)=0:dy(p,sh)=0:er=0:pr(r)
=1:GOSUB FitShip
IF r=0 THEN dx(p,sh)=1:IF tx<sh
OR xp<xn THEN er=1
IF r=1 THEN dx(p,sh)=-1:IF tx<sh
OR xn<xp THEN er=1
IF r=2 THEN dy(p,sh)=1:IF ty<sh
OR yp<yn THEN er=1
IF r=3 THEN dy(p,sh)=-1:IF ty<sh
OR yn<yp THEN er=1
x=x+dx(p,sh):y=y+dy(p,sh)
GOSUB CheckXY:IF er=0 THEN IF g(
p,x,y)<>1 THEN 50
x=x-dx(p,sh):y=y-dy(p,sh):GOTO 1
0
20 x=x+dx(p,sh):y=y+dy(p,sh)
er=0:GOSUB CheckXY:IF er=1 THEN
GOSUB 30:GOTO 20
IF g(p,x,y)=1 THEN GOSUB 30:GOTO
20
IF g(p,x,y)=0 THEN GOSUB 30
GOTO 50
30 IF ta(p,sh)=0 THEN dx(p,sh)=-
dx(p,sh):dy(p,sh)=-dy(p,sh):ta(p
,sh)=1
RETURN
40 x=INT(RND*10):y=INT(RND*10)
IF ((x+y) AND 1)=0 THEN 40
IF g(p,x,y)=1 THEN 40
GOSUB FitShip:IF tx<ls(p) AND ty
<ls(p) THEN 40
50 co=6:GOSUB PutFigure:RETURN

SelectDir:
IF g(p,x,y)<>0 THEN 70
k$=CHR$(29+INT(RND*2))
IF cp(pp)=0 THEN
PRINT"Horizontal [right] or vert
ical [down]?"
k$="":WHILE k$<>CHR$(30) AND k$<
>CHR$(29):k$=INKEY$:WEND
END IF:er=0
IF k$=CHR$(30) THEN 60
IF y+n-1>9 THEN 70
FOR i=y TO y+n-1:IF g(p,x,i)<>0
THEN er=1
NEXT:IF er=1 THEN 70
yl=y:FOR y=yl TO yl+n-1:g(p,x,y)
=n:IF cp(pp)=0 THEN co=n:GOSUB P
utFigure
NEXT:RETURN
60 IF x+n-1>9 THEN 70
FOR i=x TO x+n-1:IF g(p,i,y)<>0
THEN er=1
NEXT:IF er=1 THEN 70
xl=x:FOR x=xl TO xl+n-1:g(p,x,y)
=n:IF cp(pp)=0 THEN co=n:GOSUB P
utFigure
NEXT:RETURN
70 er=1:IF cp(pp)=0 THEN LOCATE
4,1:COLOR 5:PRINT"INVALID CHOICE
":GOSUB Delay
COLOR 6:co=pc:GOSUB PutFigure:GO
SUB ClearTop:RETURN

FireLaser:
WAVE 0,SIN:WAVE 1,SIN:k=1
FOR i=250 TO 1 STEP -75:k=ABS(k-
1):SOUND 660,.5,i,k
FOR j=1 TO 500:NEXT:SOUND 0,0,0,
```

```
k:FOR j=1 TO 500:NEXT:NEXT←
n=g(p,x,y)←
IF n=0 THEN PRINT"MISS!":GOSUB D
elay:co=1:g(p,x,y)=1:RETURN←
IF n=1 THEN PRINT"ALREADY HIT":c
o=pc:GOSUB Delay:RETURN←
co=n:PRINT"DIRECT HIT!"←
WAVE 0,w1:WAVE 1,w2←
FOR i=255 TO 10 STEP-10:SOUND 10
0,.1,i,0:SOUND 100,.1,i,3:FOR j=
1 TO RND*20:NEXT:NEXT←
nh(p,n)=nh(p,n)+1:th(p)=th(p)+1←
g(p,x,y)=1:PUT((10+23*p+nh(p,n))
*8,(24-n)*8),s(0,n),PSET←
IF n<>nh(p,n) THEN ←
xh(p,n)=x:yh(p,n)=y←
ELSE←
FOR i=2 TO 5:IF nh(p,i)=0 THEN 1
s(p)=i←
NEXT←
IF n<>4 THEN ←
SAY TRANSLATE$(s$(n)+" deestroye
d"),v%:c=1←
ELSE ←
SAY TRANSLATE$("bommer deestroye
d"),v%:PRINT  s$(n)←
END IF←
FOR i=1 TO 10:c=ABS(c-1):COLOR n
+(6-n)*c,c←
LOCATE 4,20-LEN(s$(n))/2:PRINT U
CASE$(s$(n))←
LOCATE 5,15:PRINT"DESTROYED!":FO
R j=1 TO 50:NEXT:NEXT←
END IF←
FOR i=1 TO 500:NEXT:RETURN←
←
SUB Echo(s$,v%(1)) STATIC←
SAY TRANSLATE$(s$),v%:PRINT s$:E
ND SUB←
←
←
```

Program 4: IBM PC/PCjr Laser Strike

Version by Tim Midkiff, Editorial Programmer

```
BM 10 KEY OFF:DEF SEG=0:DEFINT A
      -Z:POKE 1047,PEEK(1047) OR
       64:RANDOMIZE TIMER
DO 20 DIM G(1,9,9),C(1,9,9),NH(1
      ,5),XH(1,5),YH(1,5),DX(1,5
      ),DY(1,5),TA(1,5)
II 30 DIM S$(5),PR(3),P$(1),GB(1
      ),TH(1),CP(1),LS(1),S0(20)
      ,S1(20),S2(20),S3(20)
NA 40 SCREEN 1,0:COLOR 0,1:WIDTH
       40:CLS
FN 50 CO=1:GOSUB 710:GET(1,1)-(8
      ,8),S1
DB 60 DRAW"C0BM3,3R2D2L2U2BM4,4P
      0,0":GET(1,1)-(8,8),S0
IJ 70 CO=2:GOSUB 710:GET(1,1)-(8
      ,8),S2
KE 80 CO=3:GOSUB 710:GET(1,1)-(8
      ,8),S3
IE 90 CLS:LOCATE 11,14:PRINT"LAS
      ER STRIKE":PRINT
JF 100 GX(0)=24:GX(1)=192:GY=64:
      O=INT(RND(0)*2)
JE 110 FOR I=0 TO 1:LS(I)=5:NEXT
BA 120 B$="
                                "
DG 130 FOR N=2 TO 5:READ S$(N):N
      EXT
DE 140 FOR I=0 TO 1:PRINT"Player
      "STR$(I+1);:INPUT P$(I)
BP 150 IF P$(I)="" THEN CP(I)=1:
      P$(I)="Computer"
FD 160 NEXT:CLS:LOCATE 7,6:PRINT
      "GRID 1"SPC(15)"GRID 2"
PK 170 GOSUB 720:LOCATE 20,1
QJ 180 FOR N=5 TO 2 STEP-1:L=10-
      LEN(S$(N))
BB 190 PRINT SPC(L)S$(N)SPC(13+L
      )S$(N):NEXT
FC 200 REM DEPLOY SHIPS
BH 210 FOR PP=0 TO 1:P=ABS(PP-1)
      :FOR N=5 TO 2 STEP-1
DI 220 LOCATE 1,1:PRINT P$(PP)
KI 230 PRINT"DEPLOY YOUR "S$(N);
PM 240 FOR I=1 TO N:PUT(I*8+POS(
      0)*8,8),S2:NEXT
MF 250 IF CP(PP)=0 THEN GOSUB 80
      0:GOTO 270
OB 260 X=INT(RND*(10-N)):Y=INT(R
      ND*(10-N))
GH 270 GOSUB 880:IF ER=1 THEN 22
      0
LJ 280 GOSUB 1070:NEXT:GOSUB 720
      :NEXT:P=0:FOR I=0 TO 1:PX
      (I)=0:PY(I)=0:NEXT
LB 290 LOCATE 1,1:PRINT P$(P):PP
      =P
CP 300 PRINT"Position and fire l
      aser."
CF 310 IF CP(P)=0 THEN GOSUB 800
      :GOTO 330
JL 320 GOSUB 450
KA 330 GOSUB 1080:GOSUB 1100:GOS
      UB 740:GOSUB 1070
MK 340 IF TH(P)=14 THEN 360
PO 350 P=ABS(P-1):GOTO 290
GM 360 CLS:COLOR 1,2:LOCATE 13,2
      0-LEN(P$(P))/2:PRINT P$(P
      )
EK 370 PRINT SPC(9)"Has freed th
      e galaxy!"
KB 380 LOCATE 17,12:PRINT"Play a
      gain [Y/N]":C=1
GN 390 K$=INKEY$:C=ABS(C-1)
BM 400 LOCATE 11,16:PRINT"GAME O
      VER":FOR I=1 TO 200:NEXT
DD 410 LOCATE 11,1:PRINT B$:FOR
      I=1 TO 200:NEXT
KF 420 IF K$="Y" THEN RUN
OM 430 IF K$="N" THEN CLS:END
IO 440 GOTO 390
JJ 450 H=0:FOR N=2 TO 5:IF NH(P,
      N)>0 AND NH(P,N)<N THEN S
      H=N:H=1
HC 460 NEXT:IF H=0 THEN 650
KG 470 X=XH(P,SH):Y=YH(P,SH):IF
      NH(P,SH)>1 THEN 580
IC 480 FOR I=0 TO 3:PR(I)=0:NEXT
FN 490 R=INT(RND*4):IF PR(R)=1 T
      HEN 490
JA 500 DX(P,SH)=0:DY(P,SH)=0:ER=
      0:PR(R)=1:GOSUB 1270
PP 510 IF R=0 THEN DX(P,SH)=1:IF
       TX<SH OR XP<XN THEN ER=1
BP 520 IF R=1 THEN DX(P,SH)=-1:I
      F TX<SH OR XN<XP THEN ER=
      1
JM 530 IF R=2 THEN DY(P,SH)=1:IF
       TY<SH OR YP<YN THEN ER=1
LP 540 IF R=3 THEN DY(P,SH)=-1:I
      F TY<SH OR YN<YP THEN ER=
      1
LC 550 X=X+DX(P,SH):Y=Y+DY(P,SH)
PC 560 GOSUB 1240:IF ER=0 THEN I
      F G(P,X,Y)<>1 THEN 690
JE 570 X=X-DX(P,SH):Y=Y-DY(P,SH)
      :GOTO 490
MI 580 X=X+DX(P,SH):Y=Y+DY(P,SH)
AA 590 ER=0:GOSUB 1240:IF ER=1 T
      HEN GOSUB 630:GOTO 580
JG 600 IF G(P,X,Y)=1 THEN GOSUB
      630:GOTO 580
FE 610 IF G(P,X,Y)=0 THEN GOSUB
      630
KK 620 GOTO 690
FN 630 IF TA(P,SH)=0 THEN DX(P,S
      H)=-DX(P,SH):DY(P,SH)=-DY
      (P,SH):TA(P,SH)=1
MI 640 RETURN
JF 650 X=INT(RND*10):Y=INT(RND*1
      0)
LI 660 IF ((X+Y) AND 1)=0 THEN 6
      50
HB 670 IF G(P,X,Y)=1 THEN 650
FP 680 GOSUB 1270:IF TX<LS(P) AN
      D TY<LS(P) THEN 650
FO 690 CO=3:GOSUB 740
MB 700 RETURN
CD 710 DRAW"C=CO;BM1,1R6D6L6U6BM
      2,2P=CO;,=CO;":RETURN
OC 720 CO=1:FOR Y=0 TO 9:FOR X=0
       TO 9:FOR P=0 TO 1:IF C(P
      ,X,Y)<>1 THEN GOSUB 740
FH 730 NEXT P,X,Y:RETURN
KL 740 IF CO=0 THEN PUT(X*8+GX(P
      ),Y*8+GY),S0,PSET
NB 750 IF CO=1 THEN PUT(X*8+GX(P
      ),Y*8+GY),S1,PSET
AH 760 IF CO=2 THEN PUT(X*8+GX(P
      ),Y*8+GY),S2,PSET
EN 770 IF CO=3 THEN PUT(X*8+GX(P
      ),Y*8+GY),S3,PSET
OL 780 PC=C(P,X,Y):C(P,X,Y)=CO
ND 790 RETURN
GI 800 X=PX(P):Y=PY(P):X1=X:Y1=Y
      :CO=3:GOSUB 740
JB 810 K$=INKEY$:IF K$=" " THEN
      PX(P)=X:PY(P)=Y:RETURN
KH 820 K$=RIGHT$(K$,1)
9D 830 IF K$=CHR$(77) THEN IF X1
      <9 THEN X1=X1+1
HO 840 IF K$=CHR$(75) THEN IF X1
      >0 THEN X1=X1-1
LI 850 IF K$=CHR$(72) THEN IF Y1
      >0 THEN Y1=Y1-1
CN 860 IF K$=CHR$(80) THEN IF Y1
      <9 THEN Y1=Y1+1
AG 870 CO=PC:GOSUB 740:X=X1:Y=Y1
      :CO=3:GOSUB 740:GOTO 810
GJ 880 IF G(P,X,Y)<>0 THEN 1040
CC 890 K$=CHR$(77+INT(RND*2)*3)
CI 900 IF CP(PP)=1 THEN GOTO 930
PO 910 PRINT"Horizontal [right]
      or vertical [down]?"
CD 920 K$=RIGHT$(INKEY$,1):IF K$
      <>CHR$(77) AND K$<>CHR$(8
      0) THEN 920
OL 930 ER=0:IF K$=CHR$(77) THEN
      990
NF 940 IF Y+N-1>9 THEN 1040
IP 950 FOR I=Y TO Y+N-1:IF G(P,X
      ,I)<>0 THEN ER=1
LM 960 NEXT:IF ER=1 THEN 1040
DJ 970 Y1=Y:FOR Y=Y1 TO Y1+N-1:G
      (P,X,Y)=N:IF CP(PP)=0 THE
      N CO=2:GOSUB 740
HJ 980 NEXT:RETURN
MH 990 IF X+N-1>9 THEN 1040
FP 1000 FOR I=X TO X+N-1:IF G(P,
       I,Y)<>0 THEN ER=1
OM 1010 NEXT:IF ER=1 THEN 1040
PN 1020 X1=X:FOR X=X1 TO X1+N-1:
      G(P,X,Y)=N:IF CP(PP)=0 T
      HEN CO=2:GOSUB 740
JD 1030 NEXT:RETURN
LJ 1040 ER=1:IF CP(PP)=0 THEN LO
      CATE 4,1:PRINT"INVALID C
      HOICE":CO=PC:GOSUB 740:G
      OSUB 1060
LE 1050 GOSUB 1070:RETURN
FE 1060 FOR I=1 TO 1500:NEXT:RET
      URN
BN 1070 LOCATE 1,1:FOR I=1 TO 5:
      PRINT B$:NEXT:RETURN
KC 1080 FOR I=15 TO 1 STEP-4:SOU
      ND 350,I/15:FOR J=I TO 1
      0:NEXT:FOR K=1 TO 100:NE
      XT:SOUND 32767,0:NEXT:RE
      TURN
```

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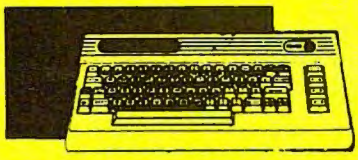

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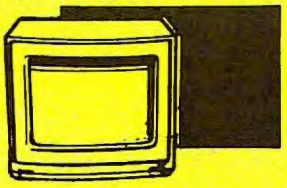

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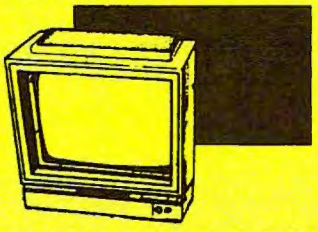

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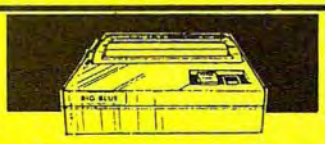

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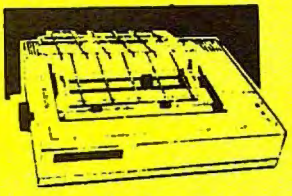

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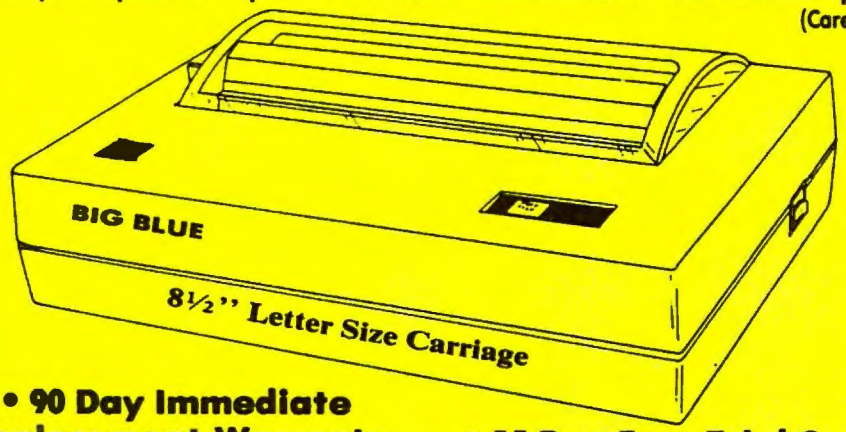

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```
NH 1090 FOR I=1 TO 3:SOUND 1760,
        50:FOR J=1 TO D:NEXT:SOU
        ND 32767,0:FOR K=1 TO 50
        :NEXT:NEXT:RETURN
EH 1100 N=G(P,X,Y)
QI 1110 IF N=0 THEN PRINT"MISS!"
        :GOSUB 1060:CO=0:G(P,X,Y
        )=1:RETURN
AD 1120 IF N=1 THEN PRINT"ALREAD
        Y HIT":CO=PC:GOSUB 1060:
        RETURN
NF 1130 CO=2:PRINT"DIRECT HIT!"
FB 1140 FOR I=15 TO 1 STEP-1:SOU
        ND 220,I/15:FOR J=I TO 1
        5:NEXT:SOUND 32767,0:NEX
        T
MO 1150 NH(P,N)=NH(P,N)+1:TH(P)=
        TH(P)+1
IG 1160 G(P,X,Y)=1:PUT((10+23*P+
        NH(P,N))*8,(24-N)*8),32,
        PSET
JF 1170 IF N<>NH(P,N) THEN XH(P,
        N)=X:YH(P,N)=Y:GOTO 1230
IC 1180 FOR I=2 TO 5:IF NH(P,I)=
        0 THEN LS(P)=I
IH 1190 NEXT:C=1
QH 1200 FOR I=1 TO 10:LOCATE 4,2
        0-LEN(S$(N))/2:PRINT S$(
        N)
BK 1210 LOCATE 5,15:PRINT"DESTRO
        YED!":FOR J=1 TO 50:NEXT
        :NEXT
BH 1220 D=75:GOSUB 1090:FOR I=1
        TO 20:NEXT:D=150:GOSUB 1
        090:FOR I=1 TO 20:NEXT:D
        =75:GOSUB 1090
OG 1230 FOR I=1 TO 500:NEXT:RETU
        RN
ME 1240 IF X<0 OR X>9 THEN ER=1
PA 1250 IF Y<0 OR Y>9 THEN ER=1
JB 1260 RETURN
AB 1270 X1=X
CO 1280 X1=X1+1:IF X1<=9 THEN IF
         G(P,X1,Y)<>1 THEN 1280
CC 1290 XP=X1-X:X1=X
CB 1300 X1=X1-1:IF X1>=0 THEN IF
         G(P,X1,Y)<>1 THEN 1300
JE 1310 XN=X-X1:TX=XN+XP-1:Y1=Y
BL 1320 Y1=Y1+1:IF Y1<=9 THEN IF
         G(P,X,Y1)<>1 THEN 1320
FM 1330 YP=Y1-Y:Y1=Y
PG 1340 Y1=Y1-1:IF Y1>=0 THEN IF
         G(P,X,Y1)<>1 THEN 1340
LC 1350 YN=Y-Y1:TY=YN+YP-1:RETUR
        N
JL 1360 DATA EXPLORER,FIGHTER,BO
        MBER,MOTHERSHIP
```

Program 5: Laser Strike For Atari 400, 800, XL, And XE

Version by Tim Midkiff, Editorial Programmer

```
BA 10 GRAPHICS 0:? "PLEASE W
      AIT...":GOSUB 750:SETC
      OLOR 2,0,0:? CHR$(125)
JJ 20 OPEN #1,4,0,"K:"
NA 30 POSITION 14,10:? "LASE
      R STRIKE"
NH 40 DIM C(1,99),G(1,99),GB
      (9,9),NH(1,5),XH(1,5),
      YH(1,5),DX(1,5),DY(1,5
      ),TA(1,5)
FL 50 DIM P$(20),P1$(20),P2$
      (20),S$(13),SR$(13),A$
      (10),CC$(3),B$(37)
GO 60 DIM PR(3),CC(3),GX(1),
      TH(1),CP(1),LS(1),PX(1
      ),PY(1)
IA 70 GOSUB 900
EP 80 B$="(37 SPACES)"
GD 90 A$="%%%%%%%%%":POKE 7
      52,0:NJ=0
CL 100 ? "PLAYER 1";:INPUT P
      1$:IF P1$="" THEN CP(
      0)=1:P1$="COMPUTER"
DB 110 ? "PLAYER 2";:INPUT P
      2$:IF P2$="" THEN CP(
      1)=1:P2$="COMPUTER"
IN 120 IF CP(0)=1 OR CP(1)=1
       THEN 150
JF 130 ? "NUMBER OF JOYSTICK
      S (1/2)?";
LD 140 GET #1,NJ:NJ=NJ-49:IF
       NJ<>0 AND NJ<>1 THEN
       140
GD 150 ? CHR$(125):POKE 752,
      1:FOR I=0 TO 1:PX(I)=
      0:PY(I)=0:NEXT I
EB 160 POSITION 6,6:? "GRID
      1":POSITION 26,6:? "G
      RID 2"
CM 170 GOSUB 950:POSITION 2,
      18
PM 180 FOR N=5 TO 2 STEP -1:
      GOSUB 830:L=10-LEN(S$
      )
MH 190 POSITION L+2,18+5-N:?
       S$:POSITION L+20,18+
      5-N:? S$:NEXT N
EF 200 FOR PP=0 TO 1:P=ABS(P
      P-1):GOSUB 880:FOR N=
      5 TO 2 STEP -1:GOSUB
      830
EJ 210 POSITION 2,0:? P$:? "
      DEPLOY YOUR ";S$;
PC 220 FOR I=1 TO N:? CHR$(C
      C(0));:NEXT I
OO 230 IF CP(PP)=0 THEN GOSU
      B 970:GOSUB 1040:GOTO
       260
KB 240 X=INT(RND(0)*(10-N)):
      Y=INT(RND(0)*(10-N)):
      JV=7:IF RND(0)<0.5 TH
      EN JV=13
LE 250 JV=7+INT(RND(0)*2)*6:
      GOSUB 1060
OO 260 IF ER=1 THEN 210
BE 270 GOSUB 1200:NEXT N:GOS
      UB 950:NEXT PP
EM 280 FOR I=0 TO 1:FOR J=0
      TO 99:C(I,J)=2:NEXT J
      :PX(I)=0:PY(I)=0:NEXT
      I
HP 290 POKE 77,0:PP=P:GOSUB
      880:POSITION 2,0:? P$
EB 300 ? "POSITION AND FIRE
      LASER":POSITION 6,5
NB 310 IF P=0 THEN ? "GRID 1
      ";:POSITION 26,5:? "G
      RID 2"
ND 320 IF P=1 THEN ? "GRID 1
      ";:POSITION 26,5:? "G
      RID 2"
CA 330 IF CP(P)=0 THEN GOSUB
       970:GOTO 350
LE 340 GOSUB 490
DB 350 GOSUB 1210:GOSUB 1220
      :GOSUB 960:GOSUB 1200
NB 360 IF TH(P)=14 THEN 380
AK 370 P=ABS(P-1):GOTO 290
ME 380 ? CHR$(125)
HI 390 POSITION 14,10:? "
      {Q}{9 R}{E}"
AH 400 POSITION 14,11:? "GA
      ME OVER!"
HK 410 POSITION 14,12:? "
      {Z}{9 R}{C}"
BN 420 POSITION 20-LEN(P$)/2
      ,14:? P$
JO 430 POSITION 9,15:? "HAS
      FREED THE GALAXY!"
IC 440 POSITION 8,17:? "PRES
      S FIRE TO PLAY AGAIN"
OE 450 POSITION 15,11:? "GAM
      E OVER":FOR I=1 TO 20
      0:NEXT I
BI 460 POSITION 15,11:? "GAM
      E OVER":FOR I=1 TO 20
      0:NEXT I:POKE 77,0
BK 470 IF STRIG(0)=1 THEN 45
      0
BE 480 ? CHR$(125):RESTORE :
      CLR :GOTO 30
ED 490 H=0:FOR N=2 TO 5:IF N
      H(P,N)>0 AND NH(P,N)<
      N THEN SH=N:H=1
GD 500 NEXT N:IF H=0 THEN 69
      0
AJ 510 X=XH(P,SH):Y=YH(P,SH)
      :IF NH(P,SH)>1 THEN 6
      20
KP 520 FOR I=0 TO 3:PR(I)=0:
      NEXT I
GJ 530 R=INT(RND(0)*4):IF PR
      (R)=1 THEN 530
GD 540 DX(P,SH)=0:DY(P,SH)=0
      :ER=0:PR(R)=1:GOSUB 1
      430
DE 550 IF R=0 THEN DX(P,SH)=
      1:IF TX<SH OR XP<XN T
      HEN ER=1
GD 560 IF R=1 THEN DX(P,SH)=
      -1:IF TX<SH OR XN<XP
      THEN ER=1
DM 570 IF R=2 THEN DY(P,SH)=
      1:IF TY<SH OR YP<YN T
      HEN ER=1
GL 580 IF R=3 THEN DY(P,SH)=
      -1:IF TY<SH OR YN<YP
      THEN ER=1
BD 590 X=X+DX(P,SH):Y=Y+DY(P
      ,SH)
KF 600 GOSUB 1400:IF ER=0 TH
      EN IF G(P,GB(X,Y))<>1
       THEN 730
BL 610 X=X-DX(P,SH):Y=Y-DY(P
      ,SH):GOTO 530
AN 620 X=X+DX(P,SH):Y=Y+DY(P
      ,SH)
EB 630 ER=0:GOSUB 1400:IF ER
      =1 THEN GOSUB 670:GOT
      O 620
LJ 640 IF G(P,GB(X,Y))=1 THE
      N GOSUB 670:GOTO 620
KO 650 IF G(P,GB(X,Y))=0 THE
      N GOSUB 670
GP 660 GOTO 730
IK 670 IF TA(P,SH)=0 THEN DX
      (P,SH)=-DX(P,SH):DY(P
      ,SH)=-DY(P,SH):TA(P,S
      H)=1
HO 680 RETURN
FM 690 X=INT(RND(0)*10):Y=IN
      T(RND(0)*10)
IJ 700 IF INT((X+Y)/2)=(X+Y)
      /2 THEN 690
CO 710 IF G(P,GB(X,Y))=1 THE
      N 690
JM 720 GOSUB 1430:IF TX<LS(P
      ) AND TY<LS(P) THEN 6
      90
PF 730 CO=3:GOSUB 960
HL 740 RETURN
BN 750 POKE 752,1:CHBAS=5734
      4:CHSET=(PEEK(106)-8)
      *256
DA 760 FOR I=0 TO 1023:POKE
      CHSET+I,PEEK(CHBAS+I)
      :NEXT I
HO 770 POKE 756,CHSET/256
```

```
FF 780 FOR I=CHSET+24 TO CHS
       ET+55:READ A:POKE I,A
       :NEXT I:RETURN
KA 790 DATA 0,21,21,21,21,21
       ,21,0
KK 800 DATA 0,42,42,42,42,42
       ,42,0
LN 810 DATA 0,63,63,63,63,63
       ,63,0
BI 820 DATA 0,0,0,0,0,0,0,0
BH 830 ON N-1 GOTO 840,850,8
       60,870
BE 840 S$="EXPLORER":SR$="EX
       PLORER":RETURN
MF 850 S$="FIGHTER":SR$="FIG
       HTER":RETURN
KC 860 S$="BOMBER":SR$="BOMB
       ER":RETURN
DL 870 S$="MOTHERSHIP":SR$="
       MOTHERSHIP":RETURN
ML 880 IF PP=0 THEN P$=P1$:R
       ETURN
BC 890 P$=P2$:RETURN
AB 900 K=0:FOR I=0 TO 9:FOR
       J=0 TO 9:GB(I,J)=K:K=
       K+1:NEXT J:NEXT I
EC 910 FOR I=0 TO 3:CC(I)=35
       +I:NEXT I
HI 920 FOR I=0 TO 1:FOR J=0
       TO 99:C(I,J)=2:G(I,J)
       =0:NEXT J:NEXT I
KD 930 FOR I=0 TO 1:TH(I)=0:
       CP(I)=0:LS(I)=5
EL 940 FOR J=0 TO 5:NH(I,J)=
       0:TA(I,J)=0:NEXT J:NE
       XT I:RETURN
ME 950 FOR I=6 TO 15:POSITIO
       N 4,I:? A$:POSITION 2
       4,I:? A$:NEXT I:RETUR
       N
KH 960 PC=C(P,GB(X,Y)):C(P,G
       B(X,Y))=CO:POSITION X
       +4+P*20,Y+6:? CHR$(CC
       (CO));:RETURN
EM 970 X=PX(P):Y=PY(P):X1=X:
       Y1=Y:CO=PP:GOSUB 960
GC 980 JV=STICK(PP*NJ):IF ST
       RIG(PP*NJ)=0 THEN PX(
       P)=X:PY(P)=Y:RETURN
AH 990 IF JV=14 THEN IF Y1>0
        THEN Y1=Y1-1
CK 1000 IF JV=13 THEN IF Y1<
        9 THEN Y1=Y1+1
CB 1010 IF JV=11 THEN IF X1>
        0 THEN X1=X1-1
PM 1020 IF JV=7 THEN IF X1<9
         THEN X1=X1+1
NK 1030 CO=PC:GOSUB 960:X=X1
        :Y=Y1:CO=3:GOSUB 960
        :GOTO 980
PB 1040 POSITION 2,2:? "HORI
        ZONTAL[RIGHT] OR VER
        TICAL[DOWN]?"
DE 1050 JV=STICK(PP*NJ):IF J
        V<>7 AND JV<>13 THEN
         1050
ML 1060 IF JV=7 AND X+N-1>9
        THEN 1170
AK 1070 IF JV=13 AND Y+N-1>9
         THEN 1170
FA 1080 ER=0:X1=X:Y1=Y:IF JV
        =7 THEN 1130
MF 1090 FOR I=Y TO Y+N-1:IF
        G(P,GB(X,I))<>0 THEN
         ER=1
BA 1100 NEXT I:IF ER=1 THEN
        1170
JP 1110 FOR Y=Y1 TO Y1+N-1:G
        (P,GB(X,Y))=N:IF CP(
        PP)=0 THEN CO=0:GOSU
        B 960
HG 1120 NEXT Y:RETURN
LP 1130 FOR I=X TO X+N-1:IF
        G(P,GB(I,Y))<>0 THEN
         ER=1
BE 1140 NEXT I:IF ER=1 THEN
        1170
KA 1150 FOR X=X1 TO X1+N-1:G
        (P,GB(X,Y))=N:IF CP(
        PP)=0 THEN CO=0:GOSU
        B 960
HJ 1160 NEXT X:RETURN
GG 1170 ER=1:IF CP(PP)=0 THE
        N ? "INVALID CHOICE"
        :CO=PC:GOSUB 960:GOS
        UB 1190
CH 1180 GOSUB 1200:RETURN
HP 1190 FOR I=1 TO 250:NEXT
        I:RETURN
CP 1200 POSITION 0,0:FOR I=1
         TO 5:? B$:NEXT I:RE
        TURN
CO 1210 FOR I=15 TO 0 STEP -
        2:SOUND 1,60,10,I:FO
        R J=I TO 15:NEXT J:S
        OUND 1,0,0,0:NEXT I:
        RETURN
BL 1220 N=G(P,GB(X,Y))
KL 1230 IF N=0 THEN POSITION
         2,3:? "MISS!":GOSUB
         1190:CO=1:G(P,GB(X,
        Y))=1:RETURN
MD 1240 CO=0:IF N=1 THEN POS
        ITION 2,3:? "ALREADY
         HIT":GOSUB 1190:RET
        URN
EM 1250 POSITION 2,3:?."DIRE
        CT HIT!"
ID 1260 FOR I=15 TO 0 STEP -
        1:SOUND 0,150,0,I:SE
        TCOLOR 4,I,0:FOR J=1
         TO I:NEXT J:NEXT I
BC 1270 NH(P,N)=NH(P,N)+1:TH
        (P)=TH(P)+1
HA 1280 G(P,GB(X,Y))=1:POSIT
        ION 12+P*18+NH(P,N),
        18+5-N
AB 1290 ? CHR$(CC(CO));
BH 1300 IF N<>NH(P,N) THEN X
        H(P,N)=X:YH(P,N)=Y:G
        OTO 1390
BD 1310 FOR I=2 TO 5:IF NH(P
        ,I)=0 THEN LS(P)=I
KD 1320 NEXT I:GOSUB 830
BK 1330 FOR I=0 TO 10 STEP 0
        .5:SOUND 1,0,0,I:NEX
        T I
EE 1340 FOR I=10 TO 0 STEP -
        0.1:SOUND 1,0,0,I:NE
        XT I
GL 1350 FOR I=1 TO 10
MF 1360 POSITION 20-LEN(S$)/
        2,3:? S$:FOR J=1 TO
        10:NEXT J
JH 1370 POSITION 15,4:? "DES
        TROYED!"
ML 1380 POSITION 20-LEN(S$)/
        2,3:? SR$:FOR J=1 TO
         10:NEXT J:NEXT I
DC 1390 GOSUB 1190:RETURN
LM 1400 IF X<0 OR X>9 THEN E
        R=1
LP 1410 IF Y<0 OR Y>9 THEN E
        R=1
KH 1420 RETURN
OG 1430 X1=X
DI 1440 X1=X1+1:IF X1>9 THEN
         1470
LO 1450 IF G(P,GB(X1,Y))=1 T
        HEN 1470
MN 1460 GOTO 1440
BH 1470 XP=X1-X:X1=X
CO 1480 X1=X1-1:IF X1<0 THEN
         1510
LN 1490 IF G(P,GB(X1,Y))=1 T
        HEN 1510
MM 1500 GOTO 1480
LC 1510 XN=X-X1:TX=XN+XP-1
OI 1520 Y1=Y
DL 1530 Y1=Y1+1:IF Y1>9 THEN
         1560
LO 1540 IF G(P,GB(X,Y1))=1 T
        HEN 1560
MN 1550 GOTO 1530
BM 1560 YP=Y1-Y:Y1=Y
DB 1570 Y1=Y1-1:IF Y1<0 THEN
         1600
LN 1580 IF G(P,GB(X,Y1))=1 T
        HEN 1600
MF 1590 GOTO 1570
MC 1600 YN=Y-Y1:TY=YN+YP-1:R
        ETURN
```

Program 6: ST Laser Strike

Version by Kevin Mykytyn, Editorial Programmer

```
10    dim board(9,9,2),name$(2)
      ,sn$(5),sh(5,2):misscol=8
      :randomize 0
20    dim xh(2,5),yh(2,5),dx(2,
      5),dy(2,5),ta(2,5),pr(3),
      th(2),ls(2),a%(15)
30    delx(1)=1:dely(1)=0:delx(
      2)=0:dely(2)=1:color 1,1
40    for a=0 to 9:for b=0 to 9
      :for c=1 to 2:board(a,b,c
      )=0:next c,b,a
50    for a=1 to 5:for b=1 to 2
      :sh(a,b)=0:ta(b,a)=0:next
       b,a
60    for a=1 to 2:ls(a)=4:th(a
      )=0:next
70    TITLESCREEN: gosub SETPAL
      ETTE:openw 2:fullw 2:clea
      rw 2:x(1)=50:x(2)=190
80    gosub SETPALETTE:title$="
      Laser Strike":gosub SETTI
      TLE:color 1,1,1
90    for a=1 to 2:gotoxy 0,6+a
      :print "Player"a;:input n
      ame$(a)
100   if (len(name$(a))=0) then
       name$(a)="Computer"
110   next:gosub DRAWSCREEN
120   gosub DEPLOYMENT:pl=1:t$=
      name$(1):name$(1)=name$(2
      ):name$(2)=t$
130   MOVE: for a=1 to 2:if th(
      a)=4 then 1420
140   next:pl=3-pl:gotoxy 0,0:p
      rint space$(20):gotoxy 0,
      0:color 1:print name$(pl)
      
150   print "Position and fire
      laser"
160   if name$(pl)="Computer" t
      hen gosub 930 else gosub
      READMOUSE
170   sp=board(mx,my,pl):if sp=
      0 then 290
180   if sp=6 then goto ALREADY
      
190   gotoxy 0,2:print "Direct
      Hit":color 1,hitcol:gosub
       HITSOUND
200   sh(sp,pl)=sh(sp,pl)+1
210   gotoxy pl*16-5+sh(sp,pl),
      18-sp:color sc(sp):print
      chr$(249)
220   color 1,sc(sp):if sh(sp,p
      l)<>sp then xh(pl,sp)=mx:
      yh(pl,sp)=my:goto 260
230   for a=2 to 5:if sh(a,pl)=
      0 then ls(pl)=a:next
```

```
240   gotoxy 0,2:print sn$(sp)"
       Destroyed":gosub SPLASHS
      OUND
250   th(pl)=th(pl)+1
260   COLOUR: board(mx,my,pl)=6
      :gosub CONVERT:fill tx,ty

270   for td=1 to 1000:next:got
      oxy 0,2:print space$(20)
280   wave 0,0,0,0,0:goto MOVE
290   gotoxy 0,2:print "Miss":c
      olor 1,misscol:gosub 900
300   goto COLOUR
310   ALREADY: gotoxy 0,2:print
       "Already hit":gosub MISS
      SOUND:goto 270
320   end
330   SETTITLE: a#=gb:gintin=pe
      ek(a#+8)
340   poke gintin,peek(systab+8
      ):poke gintin+2,2
350   s#=gintin+4:title$=title$
      +chr$(0)
360   poke s#,varptr(title$):ge
      msys(105)
370   return
380   READMOUSE: poke contrl,12
      4
390   poke contrl+2,0:poke cont
      rl+6,0
400   vdisys(0)
410   mx=peek(ptsout):my=peek(p
      tsout+2)
420   if peek(intout)=0 then RE
      ADMOUSE
430   DEMOUSE: vdisys(0):if pee
      k(intout)=0 then DEMOUSE
440   mx=int((mx-x(pl))/7):my=i
      nt((my-y)/7)-3:gosub CONV
      ERT
450   if mx<0 or mx>9 or my<0 o
      r my>9 then READMOUSE els
      e return
460   CONVERT: tx=x(pl)+mx*7+3:
      ty=y+my*7+3:return
470   FORMALERT: a#=GB:gintin=p
      eek(a#+8):gintout=peek(a#
      +12)
480   addrin#=peek(a#+16):poke
      gintin,0
490   text$=text$+chr$(0)+chr$(
      0)
500   poke addrin#,varptr(text$
      )
510   gemsys(52):ch=peek(gintou
      t)
520   return
530   SETPALETTE: restore 580
540   for a=0 to 15:read b$:for
       b=1 to 3
550   t$=mid$(b$,b,1):n=(asc(t$
      )-48)*125:poke intin+b*2,
      n
560   next:poke intin,a:poke co
      ntrl,14:poke contrl+6,4:v
      disys(0)
570   next:return
580   data 007,077,720,070,707,
      770,000,050,555,222,077,0
      55,707,505,550,777
590   DRAWSCREEN: color 1,1,6:x
      =50:y=40:clearw 2:for a=0
       to 10
600   h=x+a*7:linef h,y,h,y+70:
      linef 140+h,y,140+h,y+70
610   next
620   for b=0 to 10:v=y+b*7:lin
      ef x,v,x+70,v:linef 140+x
      ,v,210+x,v
630   next
640   restore 670:for a=5 to 2
      step-1:read sn$(a),t,sc(a
      )
650   for b=0 to 1:gotoxy 1+b*1
      7,18-a:print spc(t);sn$(a
      )
660   next b,a:return
670   data Mothership,0,2,Bombe
      r,4,3,Fighter,3,4,Explore
      r,2,5
680   DEPLOYMENT: for pl=1 to 2
      :f=(name$(pl)="Computer")
      :for sh=5 to 2 step-1
690   color 1:gotoxy 0,0:print
      space$(20):gotoxy 0,0:pri
      nt name$(pl)
700   gotoxy 0,1:print space$(3
      0):gotoxy 0,1:print "Depl
      oy your "sn$(sh);
710   color sc(sh):for a=1 to s
      h:print chr$(249);:next
720   NOGOOD: if f then mx=int(
      rnd(1)*10):my=int(rnd(1)*
      10) else gosub READMOUSE
730   if board(mx,my,pl)<>0 the
      n NOGOOD
740   if not f then color 1,sc(
      sh):fill tx,ty
750   text$="[0][! Ship placeme
      nt    !][Right!Down]"
760   if f then ch=int(rnd(1)*2
      )+1 else gosub FORMALERT
770   cx=mx:cy=my:for a=1 to sh

780   if mx<0 or mx>9 or my<0 o
      r my>9 then gosub INVALID
      :goto 690
790   if board(mx,my,pl)<>0 the
      n gosub INVALID:goto 690
800   mx=mx+delx(ch):my=my+dely
      (ch)
810   next:mx=cx:my=cy:board(mx
      ,my,pl)=sh
820   for a=1 to sh-1:mx=mx+del
      x(ch):my=my+dely(ch):boar
      d(mx,my,pl)=sh
830   if not f then gosub CONVE
      RT:color 1,sc(sh):fill tx
      ,ty
840   next:next
850   if f then 870
860   for mx=0 to 9:for my=0 to
       9:gosub CONVERT:color 1,
      0:fill tx,ty:next my,mx
870   next:return
880   INVALID: if f then return

890   color 1,0:fill tx,ty:retu
      rn
900   MISSSOUND: wave 1,1,12,90
      0,5:sound 1,15,5,5:wave 1
      ,1,0,1900,5:return
910   SPLASHSOUND: wave 8,1,14,
      5000,50:return
920   HITSOUND: wave 8,1,0,5000
      ,40:return
930   COMPUTER: savx=x:savy=y:s
      avtx=tx:savty=ty
940   p=pl:h=0:for n=2 to 5
950   if sh(n,p)>0 and sh(n,p)<
      n then sh=n:h=1
960   next:if h=0 then 1150
970   x=xh(p,sh):y=yh(p,sh):if
      sh(sh,p)>1 then 1080
980   for i=0 to 3:pr(i)=0:next

990   r=int(rnd(1)*4):if pr(r)=
      1 then 990
1000  dx(p,sh)=0:dy(p,sh)=0:er=
      0:pr(r)=1:gosub 1240
1010  if r=0 then dx(p,sh)=1:if
       tx<sh or xp<xn then er=1
1020  if r=1 then dx(p,sh)=-1:i
      f tx<sh or xn<xp then er=
      1
1030  if r=2 then dy(p,sh)=1:if
       ty<sh or yp<yn then er=1

1040  if r=3 then dy(p,sh)=-1:i
      f ty<sh or yn<yp then er=
      1
1050  x=x+dx(p,sh):y=y+dy(p,sh)

1060  gosub 1210:if er=0 then i
      f board(x,y,p)<>6 then 11
      90
1070  x=x-dx(p,sh):y=y-dy(p,sh)
      :goto 990
1080  x=x+dx(p,sh):y=y+dy(p,sh)

1090  er=0:gosub 1210:if er=1 t
      hen gosub 1130:goto 1080
1100  if board(x,y,p)=6 then go
      sub 1130:goto 1080
1110  if board(x,y,p)=0 then go
      sub 1130
1120  goto 1190
1130  if ta(p,sh)=0 then dx(p,s
      h)=-dx(p,sh):dy(p,sh)=-dy
      (p,sh):ta(p,sh)=1
1140  return
1150  x=int(rnd(1)*10):y=int(rn
      d(1)*10)
1160  if ((x+y)and 1)=0 then 11
      50
1170  if board(x,y,p)=6 then 11
      50
1180  gosub 1240:if tx<ls(p) an
      d ty<ls(p) then 1150
1190  mx=x:x=savx:my=y:y=savy:t
      x=savtx:ty=savty
1200  return
1210  if x<0 or x>9 then er=1
1220  if y<0 or y>9 then er=1
1230  return
1240  x1=x
1250  x1=x1+1:if x1>9 then 1280

1260  if board(x1,y,p)=6 then 1
      280
1270  goto 1250
1280  xp=x1-x:x1=x
1290  x1=x1-1:if x1<0 then 1320

1300  if board(x1,y,p)=6 then 1
      320
1310  goto 1290
1320  xn=x-x1:tx=xn+xp-1
1330  y1=y
1340  y1=y1+1:if y1>9 then 1370

1350  if board(x,y1,p)=6 then 1
      370
1360  goto 1340
1370  yp=y1-y:y1=y
1380  y1=y1-1:if y1<0 then 1410

1390  if board(x,y1,p)=6 then 1
      410
1400  goto 1380
1410  yn=y-y1:ty=yn+yp-1:return

1420  text$="[0][!      GAME OV
      ER!       "+name$(a)
1430  text$=text$+"!Has freed t
      he galaxy!      ][OK]"
1440  gosub FORMALERT:clear:era
      se:goto 10
```

Whole Brain Spelling

David and Robin Minnick

Requirements: Apple II-series computer with a minimum of 48K memory; Commodore 64; disk drive required.

Whole Brain Spelling is a study tool that lets you review, word by word, any of 200 ten-word lists contained in the program. It's menu-driven, and there are help windows in the program as well as a very thorough manual.

Whole Brain Spelling, from SubLOGIC, offers several varieties of word study, and each category is sold separately. You choose which word list you wish to study: General—based on studies of words correctly spelled by fifth through eighth graders; A Child's Garden of Words—lists for ages 5–9 (preschool through third grade); Fairy Tale—words taken from Grimm's and other fantasy tales; Scientific—divided into general, earth, life, and physical sciences; Medical—terminology, diagnosis, anatomy, and drugs; and Business—real estate, insurance, legal, commercial, and accounting. The *Whole Brain Spelling* program and one set of word lists (2000 words per set) are sold on one disk.

The program makes use of highlighting, multiple colors, upper- and lowercase, flashing, and other graphics techniques to emphasize a word's spelling pattern. For example, the double *A* in *AARDVARK* is highlighted, and words are spelled out one letter at a time. This helps you to visualize the word in your mind's eye, the internal visualization technique on which this program is based. Thus you learn not only the spellings of the words on your list, but also *how to learn* to spell.

Reviewing words is done at your own pace in the Study Words section. Then in the Spell Words section, you can check how well you've studied. Misspellings are analyzed and trouble spots identified by visual display.

The manual is the same for all lists. It's an all-encompassing handbook that explains not only how the program works, but also the philosophy behind it and who created it. Plus, the manual contains all the word lists, so you can tell by looking at it what other disks you may want.

So, why not just study the manual?

Whole Brain Spelling provides another method of study. It teaches you how to learn to spell—not just these words, but any word—by teaching you to visualize. At the same time, when studying the words on the lists, the program holds your interest far more firmly than gazing at a black-and-white printed list, covering it with your hand, squeezing your eyes shut, and trying to recall the spelling of each word.

Whole Brain Spelling focuses on one word at a time, emphasizing patterns in a word's spelling. It allows practice and testing, and it can be used effectively by students from pre-school through, and beyond, college. Primarily, it helps you develop a *method* for learning how to spell.

While there could be more excitement on the screen when the student spells a word correctly (it would be more rewarding), only one thing could make a major improvement on *Whole Brain Spelling*. That would be the addition of some kind of speech synthesizer—digitized, preferably—used in the Spell Words segment. Nonetheless, the *Whole Brain Spelling* program is excellent just as it is.

SubLOGIC Corporation
713 Edgebrook Dr.
Champaign, IL 61820
Apple version, $34.95
Commodore 64 version, $29.95

Norton Commander For IBM

Richard Mansfield

Requirements: IBM PC computer or PC-compatible computers, with a minimum of 128K of memory.

There are many *shell* programs, software that sits on top of DOS and helps you interact more gracefully with your machine. File management shells are especially worthwhile for hard disks because they make it far easier to organize, maintain, and access hundreds of files, and to easily manipulate subdirectories.

The *Norton Commander* is such a shell, and it's an excellent, efficient program. It's one of those rare utilities that, once you've used it, you never want to be without again.

Perhaps its most outstanding feature is the "point and shoot" user interface. You generally maneuver around with the cursor keys, highlighting whatever you wish, and then select an action such as delete. While difficult to describe, it's an exceptionally intuitive, easy way to get a lot done very quickly.

For example, you can select all the files in a directory by hitting the plus key. Then, pressing F8 can delete all of them, or pressing F5 will copy them all. While the delete command, and some few others, have an "Are You Sure?" window, it's not obtrusive, and simply pressing ENTER carries out the command. The program is so well designed that it remembers where you left off when you move between directories. And it displays other kinds of built-in intelligence. It features a quick filename search where you hold down ALT and start typing the name. After a letter or two, the file is highlighted in the panel and ready to work with. And there's just the right balance between preventing you from accidents and preventing you from efficiency.

It offers a MOVE command (unfortunately missing from DOS) which copies a file and simultaneously removes it from the directory of origin. You can rename files, subdirectories, and directories by simply pressing a function key. Hidden files are displayed. Most features can be accessed with wildcards, and there is an excellent, built-in file editor and help system.

As you might expect from a program this well-thought-out, you have a number of options and can configure it to suit your particular needs. Screen colors, automatic user-defined menus, the prompt, and the function key window are all options under your control. Likewise, the two display windows which list your files can be turned on or off at will and can contain the filenames alone, names with size and date, or a description of the directory and the current status of the system. If you are RAM poor, there's an optional 14K loader that's the only thing resident. Hard disk users won't notice any appreciable difference between this mode and the fully resident version.

If you need the kind of help this program offers, you're unlikely to find better.

Norton Commander
Peter Norton Computing
2210 Wilshire Blvd. #186
Santa Monica, CA 90403
$75

Leader Board For The Amiga

Robert J. Stumpf

Requirements: Amiga, Atari ST, Commodore 64, or Atari 800 (48K minimum memory) computers.

In the last year or so, sports simulations have become very popular with home-computer owners. Many different team and individual sports have been translated into challenging, graphics-intensive game formats, and several of these products have gone on to be best sellers. *Leader Board*, a 3-D animated golf simulator from Access Software, is one of the most recent of such simulations.

Your perspective in the game originates from a point behind and slightly above your golfer. From this angle, what you see is precisely what you would see if you were actually on the course, golfing yourself. Like the excellent graphics and control mechanisms of the game, the perspective provides the game with a "you are there" feeling.

The golf course terrain imagery is extremely well done, with a variety of hazards, including trees, sand traps, and waterways. Beautiful background scenes enhance the view, ranging from carnival grounds and hanging bridges in the near distance to remote mountains topped with summer clouds. The TOP control may be used to switch between the golfer's view of the course and a map showing the overall layout of the hole and the current position of the active player's ball. Four different

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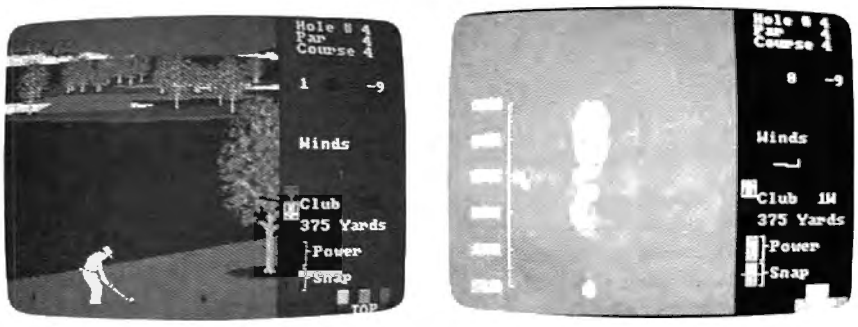


Two perspectives are used in Leader Board *from Access: a tee shot facing the water hazard, and an overhead view of one of the holes.*

18-hole layouts provide sufficient variety to generate many hours of golfing enjoyment.

Three levels of play, from novice to professional, provide distinct levels of challenge for up to four players at a time. With each increasing level of difficulty, more real-world factors come into play. For example, the power of your swing is generated through a combination of timing and length of your swing. *Snap* is the amount of slice or hook you give the ball. At the novice level, neither wind nor snap is taken into account, while at the professional level you must adjust your stroke for wind direction and velocity, and you must try to provide the right amount of snap and power.

On the Amiga, the golf swing is controlled by pressing and holding the right mouse button until you achieve the desired power level. The timing between releasing the button and pressing it a second time controls the snap. Two indicators on the right of the screen let you judge the timing, which, with practice, can be made very accurate. The effect is realistic, and it's beautifully coordinated with the animation of the golfer onscreen. Through practice, you develop a real feel for controlling your swing.

Three minor aspects of *Leader Board* could, I feel, have been handled a little better. One is the putting game. Even the real pros don't sink long putts with the consistency you can achieve here; the long putting game should be more difficult. Another problem occurs when you manage to place your ball close behind a tree. On the screen, you can see daylight under the branches, but every swing, no matter how weak, seems to climb skyward like an F-15 taking off. Some provision should be made to allow the player, through proper choice of club and stroke, to chip a shot out from under the tree. Finally, the game's form of copy protection is potentially troublesome. The disk can be backed up as often as you wish, but the game cannot be played unless the accompanying *dongle*, a small key, is inserted in the second joystick port. This is a nice feature as far as backup goes, providing you don't lose the dongle.

Overall, though, *Leader Board* is one of the best games yet released for the Amiga. The quality of the colorful 3-D graphics, the animation, and the feel of the player controls combine to create an excellent sports simulation.

Access Software
#A 2561 South 1560 West
Woods Cross, UT 84087
$39.95 (all versions)

Gettysburg: The Turning Point

James V. Trunzo

Requirements: Apple II-series computer with a minimum of 64K, Commodore 64, and Atari 8-bit computers (64K minimum).

Even those with only a passing interest in the War Between the States nod knowingly when they hear the names Big Round Top and Little Round Top, Devil's Den, Seminary Ridge, and Cemetery Hill. These names were part of the most infamous battle fought on our own soil: the Battle of Gettysburg. Now, on the heels of the critically acclaimed *Battle of Antietam*, Strategic Simulations has released yet another outstanding computer war game, *Gettysburg: The Turning Point*.

While Gettysburg has been the theme of numerous board games and several earlier computer simulations, never has it been done with such thoroughness and accuracy. *Gettysburg: The Turning Point* was designed by Chuck Kroegel and programmed by David Landrey; and if the game bears more than a passing resemblance to its illustrious predecessor *Antietam*, it's no coincidence. The same two talented individuals created *Antietam*.

A First-Rate Simulation

SSI's product contains all the elements that one expects in a top-notch simulation: playability, good use of graphics, and a well-thought-out phase system. Combine the aforementioned with such factors as fatigue, routs, the effects of superior and inferior command, the effects of elevation, realistic terrain, and so forth, and you have a winner.

Gettysburg: The Turning Point offers a great number of options: Any one of four scenarios can be selected for play (Day 1, Day 2, Day 3, or a Campaign game), and the computer can play either or both sides, or two people can play. There are three difficulty levels, and optional hidden units, icons or symbols, variable orders of appearance (which can alter the historical accuracy of the game), and optional cavalry reinforcements.

One of the outstanding features of *Antietam* is the "feel" of the game. *Gettysburg* retains that feature by its very structure. The simulation, like the actual battle, begins with a skirmish between the Confederate forces of Heth and the Union forces of Buford. Game turn by game turn, more and more troops appear on the screen, awaiting combat orders. Like a small fire feeding first on twigs and finally turning into a blaze, the game grows into the major conflict it simulates, a conflict that eventually involved over 160,000 troops and decided, during the course of three days, the fate of a nation.

Many Refinements

Gamers who have played *Antietam* will enjoy the similarities between it and *Gettysburg*. However, the system used in the earlier game has been even further refined to insure greater accuracy and playability. While the changes are numerous, some of the more significant ones include ammunition points; more realistic fatigue rules; an End-of-the-Day Phase that provides an accurate score at that point in the game; clearer cursor plotting in the combat phase (with the cursor first appearing over the firing unit and then appearing over the target unit when casualties are inflicted); artillery units containing both men and guns; no activation limits; and much greater emphasis on and flexibility in Command control. Commanders can be shifted from one Brigade, Division, or Corps to another as the player desires.

It's hard to improve on a product like *Antietam*, but SSI has done it with *Gettysburg*. This simulation is a worthy addition to any war-gamer's library; especially if the gamer has an abiding interest in the Civil War.

Gettysburg: The Turning Point
Strategic Simulations
1046 N. Rengstorff Ave.
Mountain View, CA 94043-1716
$59.95

Word Count for *SpeedScript*

Jonathan Bell

"Word Count" is a resident utility that works with the latest versions of SpeedScript, COMPUTE!*'s popular Commodore 64 word processor. Since Word Count adds a new command to* SpeedScript, *it's available whenever you use the word processor. Although the code is written in machine language, you can take advantage of the new command without understanding machine language.*

In many writing situations, it's useful to know how many words you've written. For a writer's contest, for instance, you may be limited to 2500 words or less. For a term paper, on the other hand, you may need to write a minimum number of words on a certain topic. "Word Count" adds a new command to the latest and most powerful versions (3.0 and higher) of COMPUTE!'s Commodore 64 word processor, *SpeedScript*. (The program will not work with versions prior to 3.0.) The new command is available at all times from within the word processor and it doesn't take any memory away from *SpeedScript*'s text space. Word Count is also compatible with other *SpeedScript* enhancements such as "Preview-80" (COMPUTE!'s GAZETTE, November, 1985) and "Commodore 64 *SpeedScript* Fontmaker" (COMPUTE!, January, 1986).

Installing The Program

The program accompanying this article is a BASIC loader that creates an enhanced version of *SpeedScript* which contains Word Count. Type in and save the program on disk or tape. If you're using tape, change the 8 at the end of line 120 to a 1. Follow these steps exactly as shown to install Word Count in *SpeedScript*:

1. Load a copy of *SpeedScript* (version 3.0 or higher) and run it as usual.
2. Select the border and text colors you want.
3. Exit *SpeedScript* by tapping the RESTORE key and responding to the prompt with Y.
4. Type **POKE 44,40: POKE 10240, 0: NEW** and press RETURN.
5. Load the Word Count loader program from disk or tape.
6. Insert the disk or tape on which you want to store the enhanced version of *SpeedScript*.
7. Run the BASIC loader program and respond to the prompts as indicated on the screen.

The loader program ends by saving the enhanced version of *SpeedScript* under a new filename. Be careful that you don't overwrite your copy of the original version of *SpeedScript*. You may need the original again if you made any mistakes in typing in the BASIC loader. When the save is finished, turn the computer off and on, then load and run the new version of *SpeedScript*. Load any document into *SpeedScript*, then press CTRL-W (hold down the CTRL key and press W). The number of words in the document appears in the command line at the top of the screen.

The new word count command is fast—it takes only about two and a half seconds to tally all the words in the largest document *SpeedScript* can hold (over 43,000 bytes). The count is very close to the actual number of words. However, no counting routine can be perfect. Word Count is occasionally fooled by hyphenated words, dashes with a space on either side, embedded printer commands followed by a space, or cases where no space appears after a comma or other punctuation.

After you confirm that the word count feature works properly, you can delete the BASIC loader program. To make copies of the enhanced version of *SpeedScript*, simply load *SpeedScript* and save it to a new disk or tape as usual.

Inside Word Count

You can use the new word count feature without understanding how it works. However, machine language programmers may be interested in its basic operation. Unlike some other *SpeedScript* enhancements, Word Count doesn't steal any memory from the word processor's text space. Its ML code resides in the 143-byte free area (locations 9329–9472) between the end of *SpeedScript* and the beginning of the document. Word Count uses 126 of those free bytes.

If you have a copy of the book *SpeedScript: The Word Processor for the Commodore 64 and VIC-20*, refer to the routine labeled CONTROL on page 101. Word Count wedges into that routine, diverting the

normal program flow if an unidentified CTRL combination is used. The new code checks to see if you pressed CTRL-W. If not, nothing is done and control returns to *SpeedScript* as usual. If CTRL-W was pressed, Word Count counts the words in the document by counting the number of blank spaces which are preceded by anything other than a space. When Word Count is done counting, it runs part of the *display free memory* routine (see page 104 of the book). At this point it returns control to *SpeedScript*.

The same technique can be used by machine language programmers to create other *SpeedScript* utilities that rely on unimplemented CTRL key combinations. Typing POKE 2854,114: POKE 2855,36 diverts control to location 9330 ($2472) whenever *SpeedScript* detects an unknown CTRL combination. The accumulator (A register) holds the ASCII value of the CTRL combination. Your code at $2472 should compare that value to the CTRL combination you are looking for. If there's a match, branch to the rest of your program. If no match appears, execute JMP $0A69 to reenter the main loop of *SpeedScript*.

If you install a new routine with this wedge technique, make sure that the routine ends with the instruction JMP $0A69 to return control to the proper place. One last hint: Before you write any new routines, check the *SpeedScript* source code to see whether it already contains a routine you can use. One reason Word Count can do its job in only 126 bytes is that it uses part of an existing routine to perform part of its work.

Word Count For *SpeedScript*

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

```
RD 10 PRINT "{CLR}{DOWN}SPEEDSCRIPT COMMAND ENH
      ANCER FOR SS 3.1":PRINT
KP 20 PRINT "STORING WORD COUNT IN RAM...".
MK 30 FORI=9330TO9456:READA:POKEI,A:B=B+A:NEXT
JH 40 IFB<>12074THEN PRINT"ERROR, CHECK DATA ST
      ATEMENTS.":STOP
GS 50 POKE2854,114:POKE 2855,36:POKE9070,0
FD 60 PRINT:PRINT "CHOOSE DEFAULT DEVICE FOR LO
      AD & SAVE:":PRINT "{2 SPACES}TAPE (T)
      {2 SPACES}";
ES 70 PRINT "DISK (D){2 SPACES}NO DEFAULT (N)"
XQ 80 PRINT "{2 UP}"SPC(38);:POKE19,1:INPUTA$
HJ 90 PRINT "{2 DOWN}OK.{DOWN}":IF A$="N"THEN 1
      20
RD 100 IF A$="T" THEN POKE 4904,234:POKE 4905,1
       69:POKE 4906,84:GOTO 120
KM 110 IF A$="D" THEN POKE 4904,234:POKE 4905,1
       69:POKE 4906,68
PE 120 POKE43,1:POKE44,8:POKE45,240:POKE46,36:S
       AVE"SPEEDSCRIPT3/C",8
FX 130 DATA 201,23,240,3,76,105,10,169,0,133,25
       ,133,26,173,8,32,133,3,173,9,32
QJ 140 DATA 133,4,173,23,32,133,5,173,24,32,133
       ,6,56,165,3,229,5,133,28,165,4
DH 150 DATA 229,6,5,28,240,28,160,0,177,3,201,3
       2,208,10,197,27,240,6,230,25,208
CQ 160 DATA 2,230,26,133,27,230,3,208,217,230,4
       ,208,213,169,170,133,3,169,177,133
AA 170 DATA 4,169,145,133,5,169,179,133,6,56,16
       9,0,229,25,133,28,169,0,229,26,5,28
GD 180 DATA 240,6,230,25,208,2,230,26,32,78,10,
       165,26,166,25,32,1,30,76,105,10,0
```

Atari DOS Switcher

Jonathan Gluck

This short program makes the Atari DOS 2.5 menu appear instantly whenever you need it—without destroying the program you've been working on. For Atari computers with at least 64K.

If you use Atari DOS 2.5, you've probably spent a lot of time staring at the screen waiting for the menu to appear. When the menu has come and gone, so has the BASIC program you were working on—unless, of course, you have the MEM.SAV file on the disk, which makes the whole process take even longer. Many programmers simply save the program to disk, call the DOS menu, then load the program back into memory. But if you forget to save your program, it's lost for good.

"DOS Switcher" allows you to switch back and forth between BASIC and the DOS 2.5 menu whenever you like, without losing the program in memory. It's also useful for 130XE owners who want to use the machine's expanded memory for something besides a RAMdisk. (The program works only on computers that have at least 64K of memory. This includes the 800XL, 65XE, and 130XE, but *does not* include the Atari 400, 800, or unexpanded 600XL.)

Instant DOS Menu

Type in and save DOS Switcher. When you run the program, it creates a binary object file named SWITCH.OBJ. To use DOS Switcher, type DOS and press RETURN to bring up the usual DOS 2.5 menu. If you have a MEM.SAV file on the disk, delete it; you won't need MEM.SAV now that DOS Switcher is available. Type L and press RETURN; then type SWITCH.OBJ and press RETURN to install DOS Switcher. After the screen has blinked, enter B to go back to BASIC.

DOS Switcher is now active. To see it work, type in a short BASIC program like this one:

```
10 PRINT "HELLO"
```

After you've entered the program, type DOS and press RETURN. The DOS 2.5 menu appears instantly. Enter B to go back to BASIC; then LIST the program to confirm that it's still safe in memory. Now the DOS menu is available whenever you need it, without threatening your BASIC programs.

DOS Switcher works by hiding the DOS menu (the visible part of DOS, also called the Disk Utilities Package or simply DUP) underneath the operating system in a protected area of RAM. Whenever you enter the DOS command from BASIC, Switcher moves your program to a safe RAM area and moves the DOS menu into RAM where it can execute. When you exit the menu, Switcher simply switches your program and the DOS menu back to their original locations.

DOS Switcher

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

```
NB 100  OPEN #1,8,0,"D1:SWITC
        H.OBJ"
FL 110  TRAP 200
AJ 120  READ Z
GH 130  PUT #1,Z
GB 140  GOTO 120
FM 200  CLOSE #1
NJ 210  STOP
MK 1000 DATA 255,255,0,64,57
        ,64,169,0,141,14
BL 1010 DATA 212,120,169,0,1
        41,0,212,173,1,211
DB 1020 DATA 41,254,141,1,21
        1,162,0,189,124,29
KG 1030 DATA 157,0,224,232,2
        08,247,238,23,64,238
GN 1040 DATA 26,64,173,23,64
        ,201,52,208,232,173
JG 1050 DATA 1,211,9,1,141,1
        ,211,169,64,141
HJ 1060 DATA 14,212,88,96,22
        6,2,227,2,0,64
EC 1070 DATA 115,24,117,24,1
        60,1,96,247,23,249
NI 1080 DATA 23,76,117,32,70
        ,23,143,23,169,0
EO 1090 DATA 141,14,212,120,
        141,0,212,173,1,211
GB 1100 DATA 41,254,141,1,21
        1,169,29,141,107,23
PA 1110 DATA 141,114,23,169,
        224,141,111,23,141,1
        18
EF 1120 DATA 23,162,0,189,12
        4,29,168,189,0,224
NG 1130 DATA 157,124,29,152,
        157,0,224,232,208,23
        9
```

Commodore 128 Machine Language

Part 5

Jim Butterfield, Associate Editor

In this installment, Jim Butterfield delves further into the subject of memory configurations on the 128.

As mentioned earlier in this series of articles, the Commodore 128 has the ability to reconfigure its memory in many different ways. Certain standard configurations have been defined as *banks*. For example, Figure 1 shows the configuration called bank 15. Many programmers use this configuration. However, since the program must be in RAM, this means your program itself must fit into the area below address $4000. Figure 2 shows the configuration for bank 0. This bank contains plenty of RAM, but no input/output (I/O) chips and no Kernal operating system in ROM to perform I/O tasks.

This creates a dilemma. Few applications can do without input or output of some sort, so we need the I/O chips and ROM. Yet many applications need lots of memory to store variables and strings. It seems as if we can't have both.

The most obvious solution is to live in bank 15 and call the routines INDFET ($FF74) or INDSTA ($FF77) to read or write from anywhere in memory. This will work, but it has a definite speed penalty. As we demonstrated in part 4 of this series, these routines perform *two* bank switches for each byte that they reference. At machine language (ML) speeds, that may not matter in some cases. But it could cause an unacceptable slowdown in big jobs that require a lot of computation.

Perhaps the ideal solution is for the machine language program to reconfigure memory on the fly, setting the computer for bank 0 to process large amounts of data, then kicking it into bank 15 when it's time to perform I/O tasks. This isn't a method to use lightly, however. Among other pitfalls, you must be careful not to configure the computer so that your program itself disappears.

Insights, Gimmicks, and Red Herrings

Here are some advanced ideas to consider when planning configuration changes. First, it's notable that Commodore designed the bank system with memory expansion (both RAM and ROM) as an integral part of the plan. As a result, only four banks are used in normal circumstances. Bank 0 selects a configuration which is almost entirely RAM from block 0. The bank 1 configuration is mainly RAM from block 1 (but with block 0 RAM below address $0400). Banks 14 and 15 have RAM from block 0 in addresses up to $3FFF. Above that address is ROM—BASIC, machine language monitor, and the Kernal operating system, with the slot from $D000–$DFFF containing either I/O chips (bank 15) or character ROM (bank 14). The 12 remaining bank numbers all assume extra memory of some sort.

You may have noticed that in a normal 128, memory below address $0400 (1024) is *never* switched; it's always RAM from block 0. A program in this part of memory can switch configurations around as much as it wants without danger of making itself disappear, since it's in unswitchable memory. This is where you find the business end of system routines such as INDFET and INDSTA. You can put your own code here, but beware—this 1K block is already packed with important routines which the computer needs for its own work.

MMU Register

A machine language program can create its own configuration by storing a value in location $FF00 (the MMU, or Memory Management Unit). The number stored here is *not* the same as the bank number. (We'll return to this point in the next article in this series.) For the moment, the following numbers will work:

Bank number	Value in $FF00
0	$3F
1	$7F
14	$01
15	$00

Preconfiguration Registers

There's a simpler way to switch banks, too. Built into the 128's configuration scheme are four preset configurations, which can be triggered instantly by storing a value in one of four *preconfiguration* registers. Before we explain how to use them, note that you should use these registers only from machine language, not from a BASIC program.

The preconfiguration registers are located from $FF01–$FF04. Here are the configurations they produce.

Address	Bank
$FF01	0
$FF02	1
$FF03	14
$FF04	nonstandard

These registers work in an unusual way. It doesn't matter what you store in them (nothing actually gets stored, anyway), and it doesn't matter which processor register (A, X, or Y) you use. The new configuration is triggered automatically by the simple act of doing a store. For instance, you can instantly switch to bank 0 with STA $FF01, STX $FF01, or STY $FF01. All three instructions have exactly the same effect. And in each case, the computer doesn't care what value is in A, X, or Y before the store.

Oddly, there's no preconfiguration register to select bank 15, the most common configuration. To get bank 15, you must store a zero in $FF00. The nonstandard configuration invoked by a store to $FF04 creates something similar to bank 14 but with RAM from block 1 instead of block 0. However, you *can* create useful nonstandard configurations by working out the correct value to store in $FF00. That's another subject we'll save for next month's article.

Browsing Through BASIC

Let's try a project that calls for bank switching. We wish to examine a BASIC program and count the number of lines it contains. While we're at it, we'll log the lowest and highest line numbers.

This is a somewhat longer example than the previous ML programs in this series. It requires some extra tasks such as converting our binary numbers to decimal. Keep in mind that the objective is to show how to reconfigure the computer from machine language: We'll use both $FF01 for preconfiguration and $FF00 for specific (bank 15) configuration.

BASIC programs, which are stored in RAM 0, can grow as high as location $FEFF. That's underneath the I/O chips and Kernal ROM, which leaves us little choice. To look through BASIC, you must switch out the Kernal ROM and I/O addresses. To output the results, you must switch them back in.

You could use INDFET to browse through BASIC. But if you examine thousands of bytes, you'll do thousands of configuration switches with INDFET—definitely not the most efficient method. So we'll do a direct switch, stay in bank 0 until the job is done, and then switch back to 15. If the program is located in bank 0 (specifically, at location $1A00) it won't risk switching itself out of the processor's reach.

The following code was written using the built-in monitor (not an assembler). If you'd rather type in the program from BASIC (which allows you to use COMPUTE!'s "Automatic Proofreader"), enter the program at the end of this article. However, you can enter it from the monitor, too: Simply enter the monitor (type MONITOR and press RETURN) and type each program line as it appears below. After you've entered the first line, the monitor will automatically provide the A and address for you.

```
A 1A00 JMP  $1A06
A 1A03 JMP  $1A80
```

This a jump table. It's handy for writing the program (subroutines not yet written can be linked through the JMPs). The first JMP is for the program start. The second is for the subroutine that converts binary numbers to decimal and prints them. Jump tables can also be of help if a program needs to be relocated. The following sets the value of the line count ($1B80–$1B81) to zero:

```
A 1A06 LDA  #$00
A 1A08 STA  $1B80
A 1A0B STA  $1B81
```

The following sets the working pointer to the start of BASIC program space:

```
A 1A0E LDA  $2D
A 1A10 STA  $FC
A 1A12 LDA  $2E
A 1A14 STA  $FD
```

Now you're ready to start looking through the BASIC program. But first, you must select bank 0, cutting away the ROM and I/O chips, so that you can see the entire BASIC program space:

```
A 1A16 STA  $FF01
```

Remember, it doesn't matter what's in the accumulator: The act of storing does the configuration job. Now for the main portion of the routine; we'll loop back to this point:

```
A 1A19 LDY  #$00
A 1A1B LDA  ($FC),Y
A 1A1D INY
A 1A1E ORA  ($FC),Y
A 1A20 BEQ  $1A54
```

Figure 1. Bank 15 Configuration

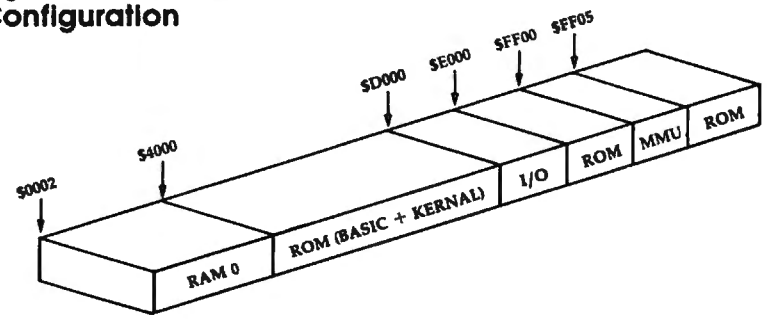
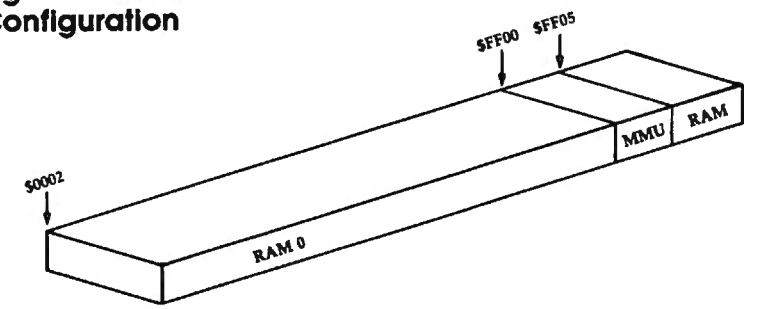


Figure 2. Bank 0 Configuration



It's time to examine the first two bytes of the BASIC line. If they are both zero, you've found the end of the BASIC program, and may hop ahead to print the summary. If not, you continue by scanning the line number:

```
A 1A22 INY
A 1A23 LDA  ($FC),Y
A 1A25 TAX
A 1A26 INY
A 1A27 LDA  ($FC),Y
```

The low byte of the line number is in X, the high byte in the accumulator. These values are stored in a pair of locations that represents the highest line number (whatever line number is in these locations when the end of the program is reached will be the highest line number):

```
A 1A29 STX  $1B82
A 1A2C STA  $1B83
```

The line number for the very first line gets stored in another pair of locations. This is the lowest line number in the program. We can check for this by looking at the line number count. If it's not zero, this isn't the first line:

```
A 1A2F TAY
A 1A30 LDA  $1B80
A 1A33 ORA  $1B81
A 1A36 BNE  $1A3E
A 1A38 STX  $1B84
A 1A3B STY  $1B85
```

Now we add one to the line count:

```
A 1A3E INC  $1B80
A 1A41 BNE  $1A46
A 1A43 INC  $1B81
```

This line is finished. Let's move to the next one. We'll reload the pointer with the first two bytes from the current BASIC line. In Commodore BASIC, these bytes are the line link—the starting address of the next line:

```
A 1A46 LDY  #$00
A 1A48 LDA  ($FC),Y
A 1A4A TAX
A 1A4B INY
A 1A4C LDA  ($FC),Y
A 1A4E STX  $FC
A 1A50 STA  $FD
A 1A52 BNE  $1A19
```

The last branch is always taken, since the high byte of the line link will always be greater than zero (BASIC programs always begin at an address greater than $00FF). That completes the analysis loop. In order to print the results, we must switch back to bank 15 where the Kernal ROM and I/O chips are available:

```
A 1A54 LDA  #$00
A 1A56 STA  $FF00
```

We begin by printing the number of lines. The value to be printed is in the X (low-byte) and Y (high-byte) registers and the accumulator contains the character code for the letter N ($4E). The subroutine will take care of all of this:

```
A 1A59 LDX  $1B80
A 1A5C LDY  $1B81
A 1A5F LDA  #$4E
A 1A61 JSR  $1A03
```

Next, we print the lowest line number found in the program. (Actually, the value we have stored is the number of the first line in the program, but under normal circumstances the first line will have the lowest line number.) In this case, the accumulator contains the character code for the letter L ($4C):

```
A 1A64 LDX  $1B84
A 1A67 LDY  $1B85
A 1A6A LDA  #$4C
A 1A6C JSR  $1A03
```

Now we'll print the highest line number found (actually, the number of the last line in the program). In this case, we load the accumulator with the character code for the letter H ($48):

```
A 1A6F LDX  $1B82
A 1A72 LDY  $1B83
A 1A75 LDA  #$48
A 1A77 JSR  $1A03
```

Now we print an extra RETURN and wind things up:

```
A 1A7A LDA  #$0D
A 1A7C JSR  $FFD2
A 1A7F RTS
```

Here's the convert-and-print subroutine. It's linked from the jump table at $1A03. First, we store the line number (from the X and Y registers) in a work area, then print the character code in the accumulator followed by a space:

```
A 1A80 STX  $1B86
A 1A83 STY  $1B87
A 1A86 JSR  $FFD2
A 1A89 LDA  #$20
A 1A8B JSR  $FFD2
```

Now for the decimal conversion. We'll use the 6502's decimal mode to help with the job:

```
A 1A8E LDA  #$00
A 1A90 STA  $1B88
A 1A93 STA  $1B89
A 1A96 STA  $1B8A
A 1A99 LDX  #$10
A 1A9B SEI
A 1A9C SED
```

We've cleared our output area, set the bit count to 16, and switched to decimal mode. The SEI instruction disables interrupts so that normal IRQ functions such as scanning the keyboard don't misbehave as a result of decimal mode:

```
A 1A9D ASL  $1B86
A 1AA0 ROL  $1B87
A 1AA3 LDA  $1B88
A 1AA6 ADC  $1B88
A 1AA9 STA  $1B88
A 1AAC LDA  $1B89
A 1AAF ADC  $1B89
A 1AB2 STA  $1B89
A 1AB5 LDA  $1B8A
A 1AB8 ADC  $1B8A
A 1ABB STA  $1B8A
```

We have slipped the bit out of the binary number and added it to the decimal value. On to the next bit:

```
A 1ABE DEX
A 1ABF BNE  1A9D
A 1AC1 CLD
A 1AC2 CLI
```

Our binary-coded number is now sitting in work area $1B88–$1B8A, two digits to a byte. All we need to do is unpack the digits and print them:

```
A 1AC3 LDX  #$02
A 1AC5 LDY  #$01
A 1AC7 LDA  $1B88,X
A 1ACA CPY  #$01
A 1ACC BNE  $1AD2
A 1ACE LSR
A 1ACF LSR
A 1AD0 LSR
A 1AD1 LSR
A 1AD2 AND  #$0F
A 1AD4 ORA  #$30
A 1AD6 JSR  $FFD2
A 1AD9 DEY
A 1ADA BPL  $1AC7
A 1ADC DEX
A 1ADD BPL  $1AC5
```

The number is printed as six digits, without suppressing any leading zeros. Now to wind up the subroutine by printing RETURN:

```
A 1ADF LDA  #$0D
A 1AE1 JMP  $FFD2
```

That's the whole program. If you're entering the program from the monitor, save it with the following command:

```
S "PROGRAM" 8 1A00 1AE4
```

Of course, you can replace PROGRAM with any legal Commodore filename; substitute a 1 for the 8 if you're using tape instead of disk. Enter X to exit to BASIC.

Using The ML Program

Before you can use the ML program, you must make sure it's in memory. If you've typed in the BASIC loader, simply load and run that program. If you've saved the program from the monitor, enter it with MONITOR and type this command:

```
L "PROGRAM" 8
```

Again, substitute your filename for PROGRAM and replace 8 with 1 if you use tape. Once you've installed the ML code, load any BASIC program into memory to give the ML program something to look at. To run the ML program, enter this command from BASIC:

```
BANK 15:SYS 6656
```

The program gives you a count of the lines in the program, plus the first and last line numbers. Not a profound computation, but the example shows how ML can quickly reconfigure the computer to scan through the BASIC program area.

Here are a couple of small projects you might like to try. First, if there is no program in memory, the first and last numbers will be random values. You might like to change the program so it doesn't display those two values. Additionally, you might find it an interesting challenge to add zero suppression to the output program, so it displays 000750, for example, as 750.

What have we learned? An ML program can set specific configurations as needed. The preconfiguration registers are a convenience for certain cases. And ML lets you select configurations that are not available as bank numbers. The next article in this series demonstrates when a nonstandard configuration might be useful and how to select it.

BASIC Loader

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

```
SC 100 DATA 76,6,26,76,128,26,
       169,0,141,128,27,141,12
       9,27
DF 105 DATA 165,45,133,252,165
       ,46,133,253,141,1,255
RF 110 DATA 160,0,177,252,200,
       17,252,240,50,200,177,2
       52
GA 115 DATA 170,200,177,252,14
       2,130,27,141,131,27,168
PE 120 DATA 173,128,27,13,129,
       27,208,6,142,132,27,140
       ,133,27
PQ 125 DATA 238,128,27,208,3,2
       38,129,27,160,0,177,252
       ,170
PB 130 DATA 200,177,252,134,25
       2,133,253,208,197,169,0
       ,141,0,255
BX 135 DATA 174,128,27,172,129
       ,27,169,78,32,3,26,174,
       132,27
JK 140 DATA 172,133,27,169,76,
       32,3,26,174,130,27,172,
       131,27
PQ 145 DATA 169,72,32,3,26,169
       ,13,32,210,255,96,142,1
       34,27
AG 150 DATA 140,135,27,32,210,
       255,169,32,32,210,255,1
       69,0
ED 155 DATA 141,136,27,141,137
       ,27,141,138,27,162,16,1
       20,248
DE 160 DATA 14,134,27,46,135,2
       7,173,136,27,109,136,27
       ,141,136,27
KC 165 DATA 173,137,27,109,137
       ,27,141,137,27,173,138,
       27,109,138,27
BC 170 DATA 141,138,27,202,208
       ,220,216,88,162,2,160,1
       ,189,136,27
KR 175 DATA 192,1,208,4,74,74,
       74,74,41,15,9,48,32,210
       ,255
JR 180 DATA 136,16,235,202,16,
       230,169,13,76,210,255
QG 200 FOR J=6656 TO 6883:READ
        X:T=T+X
RP 210 POKE J,X
ED 220 NEXT J
KS 230 IF T<>26383 THEN PRINT
       {SPACE}"ERROR!":STOP
CJ 240 PRINT "SYS 6656 TO SCAN
        BASIC"
```

HOTWARE: Software Best Sellers

This Month	Last Month	Title	Publisher	Remarks	Systems: Apple	Atari	Commodore	IBM	Macintosh
Entertainment									
1.		*World Karate Champ*	Epyx	Action/adventure game		●	●		
2.	1.	*Silent Service*	MicroProse	Submarine simulation	●	●	●	●	
3.		*King's Quest II*	Sierra On-Line	Adventure game	●			●	
4.		*Infiltrator*	Mindscape	Helicopter flight simulator			●		
5.		*Bop 'n Wrestle*	Mindscape	Sports simulation			●		
Education									
1.	4.	*Bingo Bugglebee Presents: Home Alone*	Quest Learning Systems	Childhood safety program	●		●		
2.		*I Am The C64*	Creative/ Activision	Introduction to the C-64			●		
3.	2.	*Homework Helper: Math Word Problems*	Spinnaker	Math tutorial, high school level	●		●		
4.	1.	*Typing Tutor III*	Simon & Schuster	Typing instruction program	●		●	●	●
5.	5.	*Math Blaster!*	Davidson	Introductory math program, ages 6-12	●	●	●	●	
Home Management									
1.	1.	*Print Shop Companion*	Broderbund	Print shop enhancement package	●	●	●	●	
2.	5.	*The Newsroom: Clip Art Collection, Vol. 1*	Springboard	Additional graphics	●		●	●	●
3.		*Cardware*	Hi-Tech Expressions	Greeting card maker disk	●	●	●	●	
4.	2.	*The Newsroom*	Springboard	Do-it-yourself newspaper	●		●	●	●
5.	3.	*Three-In-One-Bundle*	Timeworks	Integrated productivity package			●		

Mail Merge For *SpeedScript*

Jerry Starling

This productivity booster lets you produce personalized form letters by merging a SpeedScript word processing document with a file of names and addresses. A disk drive and printer are required.

Many word processors include a powerful feature known as *mail merge*, which allows you to create personalized form letters. If you're not familiar with a mail merge, here's how it works. First you create a file containing names and addresses (if you operate a business or conduct lots of correspondence, you probably have such a file already). Then you write a form letter with the word processor, leaving special markers in the places where each person's name and address will appear. To perform the mail merge, you tell the word processor which document and address file to use. The program automatically prints out a personalized letter for each person in the file, filling in the special blank spaces with each person's name and address. Although the technique is most often used to print form letters, you can use the same feature to merge any sort of data into a standard form document.

SpeedScript doesn't have a mail merge feature, but you can accomplish the same goal with this program, "Mail Merge." With it, you can create computer-generated mail with a personal touch. You'll also be relieved of much of the tedium of preparing personalized letters for your club, church, or business. Type in and save the program; then read the following instructions carefully before you attempt to use it.

How To Use The Program

Before you can use Mail Merge, it's necessary to understand some basic facts about how it works. To produce personalized form letters, Mail Merge reads two sequential files. The first file is a document created with *SpeedScript* and the second is created by an address or database program. I use a commercial database program, but many programs can do the job. If you don't have a database program, Mail Merge can also create the address file (however, it does not have the ability to edit an existing address file). Another option is to use *SpeedScript* itself to create the address file: Simply type in the data using the format described below; then print the file to disk (note that this file must be *printed*, not saved, to disk). If you also save the address file from *SpeedScript* (using a different filename), you'll have the ability to edit the file.

The address file, of course, contains several items of information for each person. In database terminology, the term *record* is used to refer to each set of information (one person's name, address, city, state, zip code, and so on). Each item within the record is called a *field*. In a simple address file, the first field in the record might contain the person's salutation (Ms., Mr., Dr., or whatever); the second field could contain the person's name; the third, the person's street address; and so forth.

Mail Merge expects the address file to have a very simple record and field structure. Each field within the record ends with a carriage return (character 13) and the end of each record is marked with an extra carriage return. For instance, say that your address file contains records consisting of a name, address, and city for each person. In each record, a single carriage return appears after the name and address, while two carriage returns appear after the city to mark the end of the record. The complete file consists of a number of these records in sequence.

The form letter is written with *SpeedScript* and *printed* (not saved) to disk with *SpeedScript's* SHIFT–CTRL–P command. If you have some other file that creates sequential files, you can probably use those files with Mail Merge, as well.

The form letter must include special markers to show Mail Merge where to insert information from the address file. Each such marker is a number within square brackets ([ ]). When Mail Merge finds a number in square brackets, it reads a field from the address file. The number inside the brackets tells Mail Merge which field from the current record to print at that place in the form letter. Thus, at various places in the letter you might have the markers [1] and [3]. The marker [1] tells Mail Merge to insert field 1 at that place in the letter. The marker [3] tells the program to insert field 3 at the place where that marker appears. Note that the markers can appear in any order (marker [3] can appear before or after marker [1], and so on) and you can use the same marker as often as you want. For instance, you might want to print the per-

son's name at several different places in the letter.

Another special indicator must appear as the very first line in the form letter. This marker tells Mail Merge how many fields each record contains. It consists of a left square bracket followed by the number of fields and a lowercase *v* character. For example, this indicator tells Mail Merge that each record in the address file contains five fields:

```
[5v
```

Mail Merge ignores everything in the document which appears *before* this indicator, so it also serves as a "start printing" command for the program. Mail Merge stores this value in a string array which it DIMensions with 25 elements in line 120. This means you can merge an address file whose records contain as many as 25 fields. To merge files with more fields, increase the value 25 in line 120 as needed.

A Walk Through

Here's a brief description of the prompts you encounter when using Mail Merge.

• *Enter name of letter file.* At this prompt, Mail Merge expects you to enter the name of the *SpeedScript* document (form letter) or other sequential form file which you previously printed to disk.

• *Enter name of list file.* Enter the name of the address file. If you have not already created an address file, enter a new filename for the file you are about to create.

• *Create file or input from disk?* Enter C to create a new address file or I to use a file that already exists. If you use an existing file, you'll skip ahead to the *Enter date* prompt (see below).

• *How many variables per letter?* This prompt appears only when you are creating a new address file. When it creates the file, Mail Merge needs to know how many fields (variables) are contained in a record. Enter that number (it should be the same as the number in the indicator at the beginning of the *SpeedScript* form letter).

• *Enter name for variable.* This name is used as a prompt while you are entering address file data. It will be repeated for each of the fields in the record.

• *Enter END when all entries are entered.* This is the data entry portion of Mail Merge. The program prompts you with the names you entered in the last step, storing the data you enter for the fields in each record. When you've finished entering all the data, enter END to terminate this section of the program.

• *Enter date for letter (M/D/Y)?* Mail Merge can insert a date wherever the form letter has the special indicator **[date]**. You must always enter a date, even if your form letter doesn't use it. Enter the date in the format M/D/Y. The year can be entered as either two digits or four digits. If you enter two digits, Mail Merge adds 19 in front of the digits you enter. For example, the year 1986 can be entered as either 86 or 1986. The month and day can be entered as either one or two digits. Enter 2 for the month of February, 12 for December, and so on. When it prints the letter, Mail Merge converts that date to the usual written format (December 24, 1986). The year can be entered as two digits (which assumes 19*nn*), or as four digits. The date is checked for validity, but February 29 is not considered a valid date by Mail Merge.

• *Press RETURN when ready to input letter.* This prompt indicates that Mail Merge is ready to store the form letter in memory. Insert the disk containing the form-letter file and press RETURN. Mail Merge reads the document, examining each line for special Mail Merge markers. As it reads each line, Mail Merge prints a period (.) on the screen. This process takes longer than simply loading the document, so be patient.

• *Continuous form or single sheet feed?* Mail Merge gives you the option of using continuous form (fanfold) paper or feeding sheets in one at a time. Press C for continuous form or S for single sheet paper. Note that letters which exceed one page in length cannot be used with the single sheet option, since Mail Merge makes no provision for pausing except at the end of the document.

• *Press RETURN when ready to begin printing.* At this point Mail Merge is ready to print the final letters. Insert the disk containing the address file and make sure the printer is turned on. When the system is ready to print, press RETURN. Mail Merge proceeds to print a letter for each record in the address file.

• *Press RETURN when ready.* This prompt appears only if you select the single sheet paper option. It alerts you when it's time to insert each new sheet of paper.

• *End of Job.* Mail Merge has finished printing all the letters.

Programming Notes

Here's a description of the various sections of Mail Merge.

Lines	Notes
100–110	Opening screen display; set maximum size for arrays for number document lines and number variables in list file.
120	Dimension arrays; read data for date conversion routine.
130–160	Input file information.
170–270	Create list file (optional).
280–300	Date formatting.
330–380	Read number of variables list file will contain.
390–500	Read document from; flag lines containing variables.
510–530	Select continuous or single sheet paper feed.
540–550	Request list file disk.
560	Open list file and printer.
570	Read a variable set from the list file; initialize the document line counter.
580	Check for a variable flag in the document line.
590	If no variable is found, print the line as is.
600–690	If a variable is found in the document line, insert variables and print the line.
700	Update document line counter; process next line.
710–720	End of document routine (entered from line 600). Eject page or wait for new sheet. Check for end of job. If not at end of job, read next variable set for next list file.
770–780	Wait for RETURN from keyboard.
790–810	Check for errors in input.
820–840	Data for date conversion routine.
850–880	Input list file variable set and print to screen.
890–910	Break down date elements from M/D/Y format.
920–980	Error message for improper document preparation.

Mail Merge

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

```
KK 100 POKE50281,1:POKE50280,1
       :PRINTCHR$(14):PRINT "
       {CLR}{DOWN}"TAB(15)"
       {RVS}MAIL MERGE{OFF}"
CB 110 NL=1000:NV=25
CX 120 DIMM$(12),M(12),L$(NL),
       V$(NV):FORI=1TO12:READM
       $(I),M(I):NEXT
GB 130 INPUT"{DOWN}ENTER NAME
       {SPACE}OF LETTER-FILE";
       L0$:L0$="0:"+LEFT$(L0$,
       16)+",S,R"
AP 140 INPUT"{DOWN}ENTER NAME
       {SPACE}OF LIST-FILE";L1
       $:L1$="0:"+LEFT$(L1$,16
       )+",S,R"
KG 150 INPUT"{DOWN}{RVS}C{OFF}
       REATE FILE OR {RVS}I
       {OFF}NPUT FROM DISK";C$
       :IFC$<>"C"ANDC$<>"I"THE
       N150
FG 160 IFC$="I"THEN260
JG 170 OPEN15,8,15:GOSUB800:OP
       EN2,8,2,LEFT$(L1$,LEN(L
       1$)-1)+"W":GOSUB800
KH 180 INPUT"{DOWN}HOW MANY VA
       RIABLES PER LETTER";N
BJ 190 FORI=1TON:PRINT"ENTER N
       AME FOR VARIABLE #";MID
       $(STR$(I),2);:INPUTN$(I
       ):NEXT
PE 200 PRINT"{DOWN}ENTER {RVS}
       END{OFF} WHEN ALL ENTRI
       ES ARE ENTERED. ":FORI=
       1TON
GG 210 PRINTN$(I);:INPUTV$:IFV
       $="END"ORV$="END"ORV$="
       END"THENI=N:GOTO230
FF 220 PRINT#2,V$
PG 230 NEXT:IFV$="END"ORV$="EN
       D"ORV$="END"THEN250
JH 240 PRINT#2,CHR$(13);:PRINT
       :GOTO200
QD 250 CLOSE2:CLOSE15:PRINT"
       {2 DOWN}"
GM 260 INPUT"{DOWN}ENTER DATE
       {SPACE}FOR LETTER (M/D/
       Y)";D$
SX 270 X=VAL(D$):IFX<1ORX>12TH
       EN260
QK 280 GOSUB890:DATE$=M$(X):Y=
       VAL(D$):IFY<1ORY>M(X)TH
       EN260
DH 290 DATE$=DATE$+STR$(Y)+",
       ":GOSUB890:Z=VAL(D$):IFZ
       <100THENZ=Z+1900
XF 300 DATE$=DATE$+STR$(Z)
HG 310 PRINT"{DOWN}PRESS {RVS}
       RETURN{OFF} WHEN READY
       {SPACE}TO INPUT LETTER"
       :GOSUB770
QE 320 OPEN15,8,15:GOSUB800:OP
       EN2,8,2,L0$:GOSUB800:L=
       1:FLAG=0:X$=""
MS 330 GET#2,IP$:IFSTTHEN920
DE 340 IFIP$<>"["THEN330
CX 350 GET#2,IP$:IFSTTHEN920
QR 360 IFIP$<>"V"ANDIP$<>"V"TH
       ENX$=X$+IP$:IFLEN(X$)=2
       55THEN920
XC 370 IFIP$<>"V"ANDIP$<>"V"TH
       EN350
DX 380 N=VAL(X$):IFN=0THEN920
QC 390 L$="":F1=0
EQ 400 GET#2,IP$:IFSTTHENFLAG=
       1:GOTO460
CD 410 IFIP$=CHR$(13)THEN440
XF 420 L$=L$+IP$:IFIP$="["THEN
       F1=1
SR 430 GOTO400
CP 440 L$(L)=L$
XC 450 IFF1=1THENL$(L)="["+L$
CG 460 IFL$(L)=""ANDFLAG=1THEN
       L$(L)="[[]":GOTO500:REM
        FLAG END OF LETTER
QS 470 IFL$(L)=""THENL$(L)=" "
       :GOTO490:REM BLANK LINE
        TO PRINT
CE 480 IFFLAG=1THENL$(L+1)="[[
       ]":GOTO500: REM FLAG EN
       D OF FILE
MK 490 L=L+1:PRINT".";:GOTO390
MC 500 CLOSE2:PRINT"{DOWN}LETT
       ER INPUT COMPLETE"
RF 510 INPUT"{DOWN}{RVS}C{OFF}
       ONTINUOUS FORM OR {RVS}
       S{OFF}INGLE SHEET FEED"
       ;CF$
MP 520 IFCF$<>"C"ANDCF$<>"S"TH
       EN510
CX 530 CF=-1:IFCF$="S"THENCF=0
SJ 540 PRINT"{DOWN}PRESS {RVS}
       RETURN{OFF} WHEN READY
       {SPACE}TO BEGIN
       {8 SPACES}PRINTING"
JJ 550 PRINTTAB(10)"MOUNT MAIL
       -LIST DISK":PRINTTAB(10
       )"PREPARE PRINTER":GOSU
       B770
HE 560 OPEN2,8,2,L1$:GOSUB800:
       OPEN4,4,7
MD 570 GOSUB850:I=1
DC 580 IFLEFT$(L$(I),1)="["THE
       N600
MX 590 PRINT#4,L$(I):GOTO700
QH 600 OP$="":FLAG=0:IFL$(I)="
       [[]"THEN710
EK 610 FORJ=2TOLEN(L$(I)):IP$=
       MID$(L$(I),J,1)
QR 620 IFFLAGTHEN650
JJ 630 IFIP$="["THENFLAG=1:X$=
       "":GOTO690
KK 640 OP$=OP$+IP$:GOTO690
SS 650 IFIP$<>"]"THENX$=X$+IP$
       :GOTO690
JF 660 IFX$="DATE"THENOP$=OP$+
       DATE$:GOTO680
RR 670 OP$=OP$+V$(VAL(X$))
QC 680 FLAG=0:X$=""
AG 690 NEXT J:PRINT#4,OP$
MR 700 I=I+1:GOTO580
AK 710 IFCFTHENPRINT#4,CHR$(12
       ):IF EOJ<>1THEN570
JS 720 IFEOJ<>1THENPRINT"
       {DOWN}PRESS {RVS}RETURN
       {OFF} WHEN READY{DOWN}"
       :GOSUB770:GOTO570
EG 730 REM EOJ
MA 740 PRINT"{2 DOWN}"TAB(15)
       {SPACE}"END OF JOB"
BG 750 CLOSE2:CLOSE4:CLOSE15:E
       ND
HC 760 REM ******** SUB-ROUTIN
       ES ********
EA 770 GETI$:IFI$<>CHR$(13)THE
       N770
HJ 780 RETURN: REM WAITING ROU
       TINE
GG 790 REM OPEN NEW FILE ROUTI
       NE
FS 800 INPUT#15,E1,E2$,E3$,E4$
       :IFE1=0THENRETURN
FC 810 PRINTE1,E2$,E3$,E4$:PRI
       NT"TAKE CORRECTIVE ACTI
       ON & TYPE {RVS}CONT
       {OFF}":STOP:RUN
AF 820 DATA "JANUARY",31,"FEBR
       UARY",28,"MARCH",31,"AP
       RIL",30,"MAY",31,"JUNE"
       ,30
QP 830 DATA "JULY",31
QX 840 DATA "AUGUST",31,"SEPTE
       MBER",30,"OCTOBER",31,"
       NOVEMBER",30,"DECEMBER"
       ,31
EQ 850 FORK=1TON+1:L$=""
GM 860 GET#2,IP$:IFSTTHENEOJ=1
AJ 870 IFIP$<>CHR$(13)THENL$=L
       $+IP$:GOTO860
RS 880 PRINTL$:V$(K)=L$:NEXT:R
       ETURN
SJ 890 J=LEN(D$): REM BREAK DO
       WN DATE
GR 900 FORI=1TOJ:A$=MID$(D$,I,
       1):IFA$<"0"ORA$>"9"THEN
       D$=MID$(D$,I+1):I=J
DD 910 NEXT:RETURN
KF 920 PRINT"{CLR}LETTER FILE
       {SPACE}DOES NOT INDICAT
       E HOW MANY"
XE 930 PRINT"VARIABLES TO EXPE
       CT FROM THE LIST FILE."
XM 940 PRINT"{DOWN}{RVS}RE-CRE
       ATE THE LETTER FILE WIT
       H THE FIRST";
BJ 950 PRINT"{RVS}LINE SHOWING
        THE NUMBER OF VARIABLE
       S AS ";
RB 960 PRINT"{RVS}FOLLOWS:
       {32 SPACES}"
XG 970 PRINT"{15 SPACES}{RVS}[
       NV{OFF} OR {RVS}[NV
       {OFF}
DP 980 PRINT"{DOWN}WHERE N = N
       UMBER OF VARIABLES":CLO
       SE2:CLOSE15:END
```

Access:
Using All The 130XE's Memory

Mark Slagell

This compact machine language program opens up an extra 64K of programming space for BASIC programmers who own an Atari 130XE. No machine language knowledge is needed to use it.

The Atari 130XE is ostensibly a 128K machine, but half of that memory is useless to many BASIC programmers. BASIC doesn't know about the added 64K of memory, nor does the operating system. The reason for this concerns how the computer's microprocessor "sees" memory. The processor in the 130XE uses 16-bit numbers to select memory locations, which limits it to locations with addresses in the range 0–65535. Thus, the computer can access only one 64K (65536-byte) segment of memory at any given time.

Atari circumvented this limitation for the 130XE by creating an *access window* at locations 16384–32767. The 130XE can see any one of five different 16K banks of memory in that space: the normal RAM for those addresses or one of four 16K chunks of the extra 64K. The only catch is that when you bring a new segment of memory into the access window, it replaces whatever was there. All of the 130XE's memory is usable—just not at the same time.

At first, this scheme seems most inconvenient. Except in very short programs, BASIC uses the memory in the access window for variable storage. In fact, many programs will themselves reside partly in the access window, since it occupies over half of BASIC's free space. If you don't understand this system, it's easy to lock up the computer when trying to use extra memory from BASIC.

Fast Bank Switching

"Access" is a short machine language program that allows you to access the extra memory from BASIC with safety and convenience. It switches one of the blocks of extra memory into the access window, performs the necessary read or write operation, then restores the true memory before it returns control to BASIC. All transfers between banks occur at the rate of about 9000 bytes per second.

BASIC still won't know that the extra memory is there, so you won't be able to use it to add more program lines. But you can PEEK and POKE freely in this space; store strings, arrays, and display screens in it; and even use it to pass data from one program to another.

You won't have to worry about the configuration of the four banks of extra memory. Given an address in the extra memory area from 0–65535, the correct bank will be selected and brought into the access window. This gives you the virtual equivalent of an additional 64K of memory to work with.

Starting Out

Type in and save "Access Loader." It's a BASIC loader that POKEs the machine language Access program into memory. Be sure to press RESET to disable the Proofreader before you run the program. The machine language fills most of page six. That's a popular area for machine language programs; if you already use that zone for something, see "Machine Language Notes" at the end of this article.

Once Access has been installed, you have access to 64K of auxiliary memory. The Access package consists of three machine language routines. Lines 1–2 of the loader program assign the addresses of these routines to the variables AUXBYTE, AUXDUMP, and AUXLOAD. Each routine can then be called with the USR function, the appropriate address variable, and one or more additional parameters. Here's how to use them.

The AUXBYTE operation lets you do the equivalent of a PEEK or POKE in auxiliary memory. The following statement works like a PEEK. The value in location *address* in extra memory will be assigned to the variable X (*address* can be any number in the range 0–65535):

```
X = USR(AUXBYTE, address)
```

This statement works like a POKE, storing the value of the variable X in the specified address in extra memory:

```
X = USR(AUXBYTE, address, value)
```

The AUXDUMP operation works like a multibyte version of POKE, moving an entire block of values from normal memory into the specified block in extra memory:

X = USR(AUXDUMP, *source, destination, size*)

The *source* and *destination* parameters indicate the starting addresses of the source block in normal memory and destination block in extra memory, respectively. The *size* parameter indicates how many bytes to move.

The AUXLOAD operation is like AUXDUMP in reverse—it transfers the contents of a block of values from extra memory into normal memory:

X = USR(AUXLOAD, *source, destination, size*)

In this case, *source* is the starting address of the block in extra memory and *destination* is the starting address of the block in normal memory.

To take a simple example, the statement X=USR(AUXBYTE, 1790, 200) stores the value 200 in location 1790 in extra memory. The statement PRINT USR(AUXBYTE, 1790) does the equivalent of a PEEK of that location, and should produce 200 if you stored as previously mentioned. Note that location 1790 in normal memory is unaltered.

Now try saving an entire screen. Type the following commands, ending each line with RETURN:

```
LIST
SCREEN = PEEK(88) + 256 * PEEK(89)
X=USR(AUXDUMP,SCREEN,0,960)
PRINT CHR$(125)
POSITION 2,23
```

After you execute those statements, the screen is stored in locations 0–959 of auxiliary memory. To retrieve the screen, type this statement and press RETURN:

```
X=USR(AUXLOAD,0,SCREEN,960)
```

A little arithmetic shows that you have enough room in auxiliary memory to store 68 text screens.

Using Access In Your Programs

When you type NEW after having loaded and run the Access Loader program, the machine language in page six of memory remains intact for your use. However, the variables AUXBYTE, AUXDUMP, and AUXLOAD are no longer defined. For this reason, any program using Access should begin with those assignments (simply copy the first two lines from the loader program). Alternatively, you can substitute the actual addresses for the variables: 1624 for AUXBYTE, 1655 for AUXDUMP, and 1718 for AUXLOAD.

If you have a disk drive and an Atari version of DOS, Access can be configured as an AUTORUN.SYS file to make it present whenever you boot the system. To do this, change the following lines in the loader program and run it with a disk in the drive.

```
PK 90 OPEN #3,8,0,"D:AUTORUN
     .SYS"
LJ 100 FOR I=1 TO 251:READ A
     :PUT #3,A:NEXT I
FO 110 CLOSE #3
PH 120 DATA 255,255,0,6,244,
     6
```

These routines should not be used if you're using the extra memory of the 130XE as a ramdisk. Since RAMDISK.COM will run automatically from DOS 2.5 when you turn the machine on, make sure that file is not on the disk you boot up with.

Machine Language Notes

You may wish to add other machine language routines to this program, such as an AUXSEARCH, or an AUXMOVE that transfers blocks of data from one auxiliary memory area to another. Here are some instructions for addressing single bytes in auxiliary memory.

To load a byte, place the target address in locations 214–215 (low byte at 214, high byte at 216) and perform JSR 1560. Upon return from the subroutine, the contents of the specified auxiliary memory location can be stored at location 212. To store a byte, place the target auxiliary memory address in locations 214–215 as described above, and place in location 212 the value to be stored in auxiliary memory; then perform JSR 1536. In either case, locations 215 and 217 are changed, along with the A register. The Y register is cleared.

Access can be moved out of page six if desired. However, it cannot be moved into the access window itself. Be sure to change all the JSR commands in the program (they appear as the sequences 32,0,6 and 32,44,6 in the loader program). For instance, if you move the program to page 29 (locations 7424–7670), those instructions would become 32,0,29 and 32,44, 29, respectively. Finally, don't forget to change the values of the BASIC variables AUXBYTE, AUXDUMP, and AUXLOAD accordingly.

Access Loader

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

```
FN 1 AUXBYTE=1624
LK 2 AUXDUMP=1655:AUXLOAD=17
     18
LI 100 FOR I=1536 TO 1780:RE
     AD A:POKE I,A:NEXT I
BE 1000 DATA 160,0,173,1,211
     ,41,195,133,217,165,
     216,41,192,74
CE 1010 DATA 74,74,74,9,32,5
     ,217,141,1,211,165,2
     16,41,63
OP 1020 DATA 9,64,133,215,16
     5,212,145,214,165,21
     7,9,48,141,1
BD 1030 DATA 211,96,160,0,17
     3,1,211,41,195,133,2
     17,165,216,41
GA 1040 DATA 192,74,74,74,74
     ,9,32,5,217,141,1,21
     1,165,216
PH 1050 DATA 41,63,9,64,133,
     215,177,214,133,212,
     165,217
FF 1060 DATA 9,48,141,1,211,
     96,104,133,245,198,2
     45,104,133,216
BL 1070 DATA 104,133,214,165
     ,245,208,6,32,44,6,1
     32,213,96,104
DC 1080 DATA 104,133,212,32,
     0,6,24,144,243,104,1
     04,133,225,104
GE 1090 DATA 133,224,104,133
     ,216,104,133,214,104
     ,133,227,104,133,226
AH 1100 DATA 160,0,132,229,1
     32,228,177,224,133,2
     12,32,0,6,230
JM 1110 DATA 224,208,2,230,2
     25,230,214,208,2,230
     ,216,230,228,208
DD 1120 DATA 2,230,229,165,2
     28,197,226,208,225,1
     65,229,197,227,208
DE 1130 DATA 219,96,104,104,
     133,216,104,133,214,
     104,133,225,104,133
MC 1140 DATA 224,104,133,227
     ,104,133,226,160,0,1
     32,229,132,228,32
HB 1150 DATA 44,6,165,212,14
     5,224,230,224,208,2,
     230,225,230,214
LK 1160 DATA 208,2,230,216,2
     30,228,208,2,230,229
     ,165,228,197,226
JA 1170 DATA 208,225,165,229
     ,197,227,208,219,96
```

IBM PC/PCjr One-Liner

Paul W. Carlson

How much programming can you pack into one line of IBM BASIC? Here's an example that may prompt you to try your hand at this popular programming challenge. It runs on any IBM PCjr or PC with a color/graphics card.

Programs don't have to be long to be useful. The one-line program listed below can be used to entertain pre-schoolers, while teaching them the alphabet and the computer's keyboard at the same time. Adults can benefit from the program by gaining an increased understanding of how characters are produced on the IBM's video display. However it's used, the program is certainly worth the time it takes to type in the single line. Here's the complete program:

```
0J 1 KEY OFF:DEF SEG=&HFFA6:L$=I
     NPUT$(1):N=ASC(L$):CLS:LOCA
     TE 24,1,0:FOR L=0 TO 7:A=PE
     EK(N*8+L+14):A$="":FOR J=0
     TO 7:M=A AND 1:W=32+M*187:A
     $=CHR$(W)+CHR$(W)+CHR$(W)+A
     $:A=(A-M)/2:NEXT J:PRINT SP
     C(28)A$:PRINT SPC(28)A$:NEX
     T L:PRINT:PRINT:GOTO 1
```

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

Don't forget to save the program. When you run it, nothing seems to happen. Now press any letter key on the keyboard. A giant character matching the key you pressed rises from the bottom of the screen and centers itself on the display. Press another key. The same thing happens and continues happening until you press Ctrl-Break (Fn-Break on the PCjr).

The program enlarges all the letters (uppercase and lowercase), symbols, and punctuation that appear on your keyboard—plus a few that don't appear on the keycaps. If you press Ctrl along with a letter or number key, you'll see one of the IBM's graphics characters. Even the function keys produce results. Try pressing F1 to see what happens.

How It Works

Despite its small size, the program contains some techniques you may find useful in other programs. Here's a detailed explanation of each step in the program.

1. The program begins by setting the segment to location $FFA6. This is 14 bytes before the PEL (character definition) map in ROM (Read Only Memory). The program reads your keystroke and converts it to the corresponding ASCII code.
2. Then the program loops through eight bytes for the character, with byte zero (the first byte) containing the bits for the top row of the character and byte seven containing those for the bottom row. It stores the value of the PEL map in the variable A and initializes A$ as a null string.
3. We begin to loop through the eight bits of the current byte, testing the rightmost bit first. The variable M equals one if the bit is set and equals zero if it's not. The value of the variable W equals 32 (the ASCII code for a blank space) if the bit is not set and equals 219 (the ASCII code for a solid block) if the bit is set. Either three blanks or three solid blocks are added to the beginning of A$. Then the program shifts all bits in the current byte by subtracting the value of the rightmost bit and dividing by two. This step is repeated for each bit of the current byte.
4. The next step is to print A$ preceded by 28 blanks. This is done twice to double the character's height. Then the program branches back to step 2 and repeats the process for each byte of the PEL map that defines the character. After the last byte of the PEL map has been processed, we print two blank lines and return to step 1 to wait for another keypress.

Experienced programmers may notice that the code could be made even more compact. Some statements could be combined, but this would result in parentheses several levels deep, making the program more difficult to understand. C

Fontier 128

Tapan Desai

This thoughtfully designed program provides all the features you could ask for in an 80-column character editor for the Commodore 128. The custom characters you create with this program can be used in CP/M and Commodore 64 mode as well as Commodore 128 mode. An 80-column monitor and disk drive are required.

The 80-column video display of the Commodore 128 is a significant improvement over the chunky 40-column display of its predecessor, the Commodore 64. In fact the 128's 80-column resolution compares very favorably with those of machines costing much more. One thing the 80-column screen lacks, however, is a character set of its own: It borrows the familiar 40-column character definitions. These characters do not do justice to the superb resolution of the 80-column screen, since they were designed to overcome the limitations of a coarser screen format.

"Fontier 128" helps you create new 80-column fonts. It gives you complete control over character design and manipulation and makes extensive use of the 128's windowing abilities. The program is entirely menu-driven: All you need to do is choose options from the onscreen menus and follow the program's prompts. Best of all, the fonts you create with Fontier 128 can be installed and used independently with other programs—in CP/M and Commodore 64 mode as well as 128 mode.

Typing It In

Type in Fontier 128 and save a copy to disk or tape. Although the program uses a machine language routine, this part of the program is POKEd into memory from BASIC. You don't need to understand machine language in order to use Fontier 128. Enter it as you would any BASIC program. Save the program on disk before you run it.

Before you run the program, be sure that your 80-column monitor is properly connected and that the 80-column screen is the active display. Also, check that the 40/80 DISPLAY key is depressed to the 80-column position so that the 80-column display will remain active after you press RUN/STOP–RESTORE. Since the program runs in FAST mode, it does not work at all with a 40-column monitor.

Four Windows

When you run Fontier 128, it spends a few seconds initializing, then it displays a screen containing four windows. Here's an explanation of what the windows contain.

The *pattern window* is located at the upper left. All pixel-level work is done here. The window displays an enlarged view of the current character (the one you are editing), the character set number (0 or 1), and the current character number (0–255). The blinking element in the pattern window is the *pixel cursor.*

The *character set window* is centrally placed. It shows all the characters of a set in their true size. The blinking character in this window marks the current character and is referred to as the *character cursor.*

The *dialog window* on the right displays prompts and receives input from you. When you begin the program, this window shows a menu of special keys.

The *menu window* is a static portion of the screen which displays the various options available to you.

One-Key Commands

Every command in Fontier 128 is invoked with a single keystroke. Here's a description of what each command key does.

General Commands

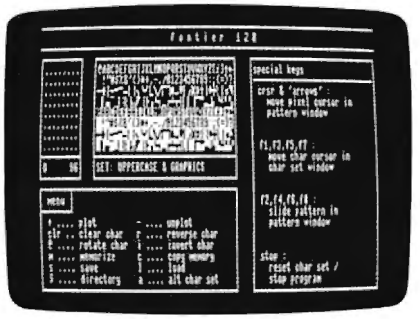
Key	Description
cursor keys	Move the pixel cursor in the pattern window.
f1	Move character cursor up.
f3	Move character cursor down.
f5	Move character cursor left.
f7	Move character cursor right.
STOP	Restore original (40-column) character set and stop program.
A	Alternate between character sets 0 (uppercase/graphics) and 1 (lowercase/uppercase).

Character Manipulation Commands

Key	Description
+	Turn pixel on and move cursor.
−	Turn pixel off and move cursor.
R	Reverse character(s) and move character cursor.
I	Invert character.
@	Rotate character clockwise.
SHIFT–CLR/HOME	Clear current character.
f2	Slide character pattern up.
f4	Slide character pattern down.
f6	Slide character pattern left.
f8	Slide character pattern right.
M	Memorize character(s) starting from the current character.
C	Copy memorized character(s) from the current character onward. (An M command should always precede this command.)

Disk Commands

Key	Description
S	Save Font file. Files saved by this option are program files. They may be loaded and RUN like any BASIC program in 128 mode. Press RETURN to abort.
L	Load Font file (don't try to load a file created by any other program). Press RETURN to abort.
$	Display disk directory.



"Fontier 128" includes many one-key commands for easily creating and manipulating your custom-designed character sets.

What You See Is What You Get

When you change a character definition in the pattern window, the change appears immediately in the character-set window, too. The advantage of this system is that you can see immediately how a character will look in its normal size and in relation to other characters in the set. The menu and dialog windows always use the character set not being edited at that time. If you're editing uppercase/graphics characters (set 0), all text in the dialog and menu windows will use the lowercase/uppercase set (set 1), and vice versa. It's best to edit only one character set at a time. For example, if you change all the letters in the uppercase/graphics set to new shapes and then press A to edit the lowercase/uppercase set, the text in the menu and dialog windows will use those new shapes and will be unreadable. The solution is to complete all your editing of one character set, save your changes, and then restore the original character set before switching to edit the other set.

Once you've created and saved a custom character set, how do you use it? With Fontier, it's easy. When you save a character set, the program automatically adds a routine to the character set data that will install the new character set for you. You don't need Fontier to load the new character definitions; simply load and run the font file as you would a BASIC program. For example, if you use Fontier to design an italic character set and save it using the name ITALIC.FNT, you can enable your custom character set at any time by typing RUN "ITALIC.FNT". You must not have a hi-res graphics area allocated when you run the font file. For example, Fontier allocates the hi-res area (see the GRAPHIC 1 statement in line 100) to create an area of reserved memory. You must reclaim this space before running a font file. Use the statement GRAPHIC CLR to deallocate any existing graphics area. The built-in font loader program will delete itself after the new font is loaded. (You should note, however, that loading and running the font file will overwrite any existing BASIC program.)

Once a new character set is in place, it behaves exactly like the original character set. It is not affected by RUN/STOP–RESTORE, and will be preserved intact if you switch to CP/M or Commodore 64 mode. For instance, you can run an 80-column CP/M word processor or telecommunications program with your own, personal character set. The same is true of any program written for a 128 in Commodore 64 mode that takes advantage of the 80-column display, such as "SpeedScript-80" (see the June 1986 issue of COMPUTE!'s GAZETTE). Of course, any 80-column program that installs its own custom character set will overwrite the Fontier 128 character set. When using a Fontier 128 font in CP/M mode, keep in mind that CP/M always uses character set 1. You will not see any custom characters from set 0 in CP/M mode unless you invoke the *alternate character set* escape sequence (ESC G1).

Fontier 128 opens exciting possibilities in font design. For instance, 80-column word processors may now include foreign-language character sets, mathematical or scientific symbols, italics, or subscript and superscript characters. Special characters can be used to form background textures in charts or graphs, and even to build shapes in arcade-type games.

Fontier 128

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

```
AQ 100 FAST:GRAPHIC 1:GRAPHIC
       {SPACE}5
BP 110 TRAP 1920
CP 120 GE=15935:PU=15974
EC 130 MA=15993:SE=16060
KP 140 BA=DEC("1D00"):BU=DEC("
       2D00"):BB=DEC("1C01"):B
       C=DEC("3E00")
HR 150 IF PEEK(BC)<>10 OR PEEK
       (BC+2)<>10 THEN GOSUB 2
       230
PG 160 BANK 15
PB 170 SYS GE,0,0,255:SYS GE,1
       ,0,255
SE 180 GOSUB 1770
GE 190 GOSUB 1570
JC 200 GOSUB 1280
JA 210 GOSUB 1240
FF 220 POKE 208,0:GETKEY X$
XR 230 X=INSTR(X$,X$):IF X=0 T
       HEN 330
GS 240 ON X GOTO 510,540,250,2
       60,270,280,290,300,310,
       320,1330,1380,1430,1470
AQ 250 CP=(CP-8) AND 63:GOTO 2
       10
JQ 260 CP=(CP+8) AND 63:GOTO 2
       10
FB 270 CP=(CP-1) AND 63:GOTO 2
       10
RB 280 CP=(CP+1) AND 63:GOTO 2
       10
XR 290 CH=(CH-1) AND 255:GOTO
       {SPACE}200
EC 300 CH=(CH+1) AND 255:GOTO
       {SPACE}200
BQ 310 CH=(CH-32) AND 255:GOTO
        200
KQ 320 CH=(CH+32) AND 255:GOTO
        200
FQ 330 IF X$="A"THEN CS=1-CS:G
       OTO 190
AG 340 IF X$="R"THEN GOSUB 570
       :GOTO 200
HQ 350 IF X$="@"THEN GOSUB 700
       :GOTO 440
MA 360 IF X$="{CLR}"THEN GOSUB
        670:GOTO 440
EF 370 IF X$="S"THEN GOSUB 118
       0:GOTO 210
RB 380 IF X$="L"THEN GOSUB 109
       0:GOTO 210
RE 390 IF X$="$"THEN GOSUB 115
       0:GOTO 210
QP 400 IF X$="C"THEN GOSUB 920
       :GOTO 210
XJ 410 IF X$="M"THEN GOSUB 800
       :GOTO 210
DG 420 IF X$="I"THEN GOSUB 151
       0:GOTO 440
QR 430 GOTO 220
QC 440 SYS PU,CS,CH,0:GOTO 210
ER 450 REM *** GENERAL COMMAND
       S ***
HH 460 C=BA+CS*2048+CH*8+CP/8
QX 470 B=2↑(7-(CPAND7))
BE 480 RETURN
JD 490 C=BA+CS*2048+CH*8
QF 500 RETURN
DD 510 GOSUB 460
XQ 520 POKE C,PEEK(C) OR B
QH 530 GOTO 560
```

```
RM 540 GOSUB 460:B=255-B
SA 550 POKE C,PEEK(C) AND B
XJ 560 CP=(CP+1) AND 63:GOTO 4
       40
BA 570 FF$="REVERSE CHAR":GOSU
       B 760
AC 580 PRINT"(0 TO ABORT,MAX"2
       56-CH")
GG 590 RC=0:INPUT"NO OF CHARS
       {3 SPACES}1{3 SPACES}
       {6 LEFT}";RC
PM 600 IF RC<1 OR (RC+CH-1)>25
       5 THEN PRINT"OUT OF RAN
       GE":GOTO 1030
XJ 610 GOSUB 1040
MR 620 FOR CH=CH TO CH+RC-1
SM 630 GOSUB 490
XF 640 FOR I=0 TO 7:POKE C+I,2
       55-PEEK(C+I):NEXT I
AM 650 NEXT CH:SYS PU,CS,0,255
       :CH=CH AND 255
PR 660 GOTO 1020
SX 670 GOSUB 490
BP 680 FOR I=0 TO 7:POKE C+I,0
       :NEXT I
ED 690 RETURN
CG 700 GOSUB 490:FF$="ROTATE C
       HAR":GOSUB 760:GOSUB 10
       40
GQ 710 FOR I=0 TO 7:B=0:K=2↑(7
       -I):FOR J=0 TO7
XJ 720 B=B-((PEEK(C+J)ANDK)>0)
       *2↑J
HX 730 NEXT J:S(I)=B:NEXTI
JE 740 FOR I=0 TO 7:POKE C+I,S
       (I):NEXT I
BD 750 GOTO 1020
DX 760 WINDOW 50,4,77,23,1
DA 770 PRINT"FUNCTION: "FF$
SK 780 PRINT D4$
KK 790 RETURN
GA 800 FF$="MEMORIZE CHARS":GO
       SUB 760
QC 810 PRINT"ENTER NO. OF CHAR
       S
KS 820 PRINT"( 0 TO ABORT, MAX
        "256-CH"){DOWN}"
JP 830 NC=0
HG 840 INPUT"{UP}{2 SPACES}1
       {4 SPACES}{7 LEFT}";NC
DF 850 IF NC<0 OR NC>256-CH TH
       EN 830
XS 860 PRINT
JS 870 IF NC=0 THEN 1030
DX 880 PRINT"PLEASE WAIT"
RR 890 GOSUB 490
GX 900 FOR I=0 TO NC*8-1:POKE
       {SPACE}BU+I,PEEK(C+I):N
       EXT I
XM 910 GOTO 1020
BQ 920 FF$="COPY MEMORY":GOSUB
        760
CP 930 IF NC=0 THEN PRINT"MEMO
       RY EMPTY":GOTO 1030
DD 940 PRINT"CHARS IN MEMORY:
       {SPACE}"NC
KK 950 IF NC=1 THEN 990
JD 960 PRINT"ARE YOU SURE ? (Y
       /N) ";
RS 970 GETKEY Y$:PRINT Y$:IF Y
       $<>"Y" THEN 1030
MF 980 PRINT"PLEASE WAIT
HC 990 GOSUB 490
CS 1000 FOR I=0 TO NC*8-1:POKE
        C+I,PEEK(BU+I):NEXT I
CP 1010 SYS PU,CS,0,255
FA 1020 PRINT D4$:PRINT"** DON
       E **":RETURN
SA 1030 PRINT D4$:PRINT"** ABO
       RTED **":RETURN
PK 1040 PRINT"PLEASE WAIT...":
       RETURN
JE 1050 REM *** DISK OPERATION
       S ***
GD 1060 F$=""
JF 1070 INPUT"FILENAME";F$:PRI
       NT D4$
XF 1080 RETURN
XM 1090 FF$="LOAD":GOSUB 760
QA 1100 GOSUB 1060:IF F$=""THE
       N 1030
MP 1110 BLOAD(F$):PRINT DS$
SG 1120 IF DS THEN 1030
KD 1130 SYS PU,0,0,255:SYS PU,
       1,0,255
FH 1140 GOTO 1020
FK 1150 FF$="DIRECTORY":GOSUB
       {SPACE}760
AS 1160 PRINT ES$"L";:DIRECTOR
       Y:PRINT ES$"M";
AP 1170 RETURN
SP 1180 FF$="SAVE":GOSUB 760
HJ 1190 GOSUB 1060:IF F$=""THE
       N 1030
CX 1200 BSAVE(F$),B0,P(BB) TO
       {SPACE}P(DEC("2CFF")):
       PRINT DS$
BJ 1210 IF DS THEN 1030
KP 1220 GOTO 1020
RH 1230 REM *** PATTERN/SET WI
       NDOWS ***
RS 1240 PRINT CHR$(142):SYS MA
       ,CS,CH,CP
MF 1250 PRINT"********";
BR 1260 PRINT USING"#
       {4 SPACES}###";CS,CH
PA 1270 PRINT CHR$(14+128*CS):
       RETURN
DP 1280 SYS SE,CS,CH
ER 1290 PRINT"{OFF}**********
       **********
       {UP}";
JH 1300 PRINT SE$;CS$(CS)
HD 1310 RETURN
GS 1320 REM *** SLIDE ***
BE 1330 GOSUB 490
AB 1340 FOR I=0 TO 7
XR 1350 POKE C+I,(PEEK(C+I)*2-
       ((PEEK(C+I)AND128)>0))
       AND255
EB 1360 NEXT I
GF 1370 GOTO 440
CJ 1380 GOSUB 490
DF 1390 FOR I=0 TO 7
CC 1400 POKE C+I,PEEK(C+I)/2+1
       28*(PEEK(C+I)AND1)
KD 1410 NEXT I
RH 1420 GOTO 440
GE 1430 GOSUB 490:B=PEEK(C)
SE 1440 FOR I=1 TO 7:POKEC+I-1
       ,PEEK(C+I):NEXT I
MA 1450 POKE C+7,B
KJ 1460 GOTO 440
CG 1470 GOSUB 490:B=PEEK(C+7)
CA 1480 FOR I=7 TO 1 STEP-1:PO
       KE C+I,PEEK(C+I-1):NEX
       T I
JE 1490 POKE C,B
BM 1500 GOTO 440
RK 1510 GOSUB 490:FF$="INVERT
       {SPACE}CHAR":GOSUB 760
       :GOSUB 1040
PD 1520 FOR I=0 TO 7:B=0:FOR J
       =0 TO 7
EK 1530 B=B-((PEEK(C+I)AND2↑(7
       -J))>0)*2↑J
KM 1540 NEXT J:POKE C+I,B:NEXT
        I
AB 1550 GOTO 1020
HR 1560 REM *** SCREEN SETUP *
       **
JF 1570 PRINT CHR$(14+128*CS):
       PRINT"{2 HOME}{CLR}"ES
       $"M"D5$
XG 1580 PRINTTAB(30)"F O N T I
        E R{3 SPACES}1 2 8"
DM 1590 PRINT D5$
PQ 1600 PRINT"{A}********{S}
       {2 SPACES}{A}*********
       **********
       *{S}{3 SPACES}{A}*****
       **********
       *{S}
JG 1610 FOR I=0 TO 7:PRINT D1$
       :NEXT I
SH 1620 PRINT"{Q}********{W}
       {2 SPACES}{Q}*********
       **********
       *{W}"D3$
XP 1630 PRINTD1$
AK 1640 PRINT"{Z}********{X}
       {2 SPACES}{Z}*********
       **********
       *{X}"D3$
RE 1650 PRINT"{A}******{R}****
       **********
       **********{S}"D3$
CQ 1660 PRINT"- MENU -
       {37 SPACES}-"D3$
AD 1670 PRINT"{Q}*****{X}
       {37 SPACES}-"D3$
CK 1680 PRINT"- + .... PLOT
       {9 SPACES}- .... UNPLO
       T{10 SPACES}-"D3$
FR 1690 PRINT"- CLR .. CLEAR C
       HAR{3 SPACES}R .... RE
       VERSE CHAR{4 SPACES}-"
       D3$
DQ 1700 PRINT"- @ .... ROTATE
       {SPACE}CHAR{2 SPACES}I
        .... INVERT CHAR
       {5 SPACES}-"D3$
KR 1710 PRINT"- M .... MEMORIZ
       E{5 SPACES}C .... COPY
        MEMORY{5 SPACES}-"D3$
QS 1720 PRINT"- S .... SAVE
       {9 SPACES}L .... LOAD
       {12 SPACES}-"D3$
RF 1730 PRINT"- $ .... DIRECTO
       RY{4 SPACES}A .... ALT
        CHAR SET{4 SPACES}-"D
       3$
BX 1740 PRINT"{Z}**********
       **********
       *********{X}{3 SPACES}
       {Z}**********
       *********{X}
AB 1750 GOTO2060
JA 1760 REM *** INITIALIZATION
        ***
XQ 1770 DIM CS$(1),S(7)
GG 1780 R1$="{RVS}@":R0$="
       {OFF} ":ES$=CHR$(27)
RE 1790 CS$(0)="UPPERCASE & GR
       APHICS{6 SPACES}"
EX 1800 CS$(1)="LOWERCASE & UP
       PERCASE{5 SPACES}"
PX 1810 SE$=ES$+"O{OFF}{DOWN}S
       ET: "
CS 1820 D1$="-{8 SPACES}-
       {2 SPACES}-{32 SPACES}
       -{3 SPACES}-
       {28 SPACES}-
MJ 1830 D2$="-{44 SPACES}-
       {3 SPACES}-{28 SPACES}
       -
HA 1840 D3$="{3 SPACES}-
       {28 SPACES}-
BM 1850 D4$="*******T**********
       *********
JR 1860 D5$=D4$+D4$+"*********
       **********"
XC 1870 UY$=CHR$(2):UN$=CHR$(1
       30)
XH 1880 FOR I=1 TO 8:KEY I,CHR
       $(132+I):NEXT I
```

```
DD 1890 K$="+-{UP}{DOWN}{LEFT}
        {RIGHT}{F2}{F6}{F1}
        {F5}{F4}{F8}{F3}{F7}"
SG 1900 RETURN
GK 1910 REM *** ERROR TRAP ***
PH 1920 IF ER<>30 THEN PRINT"
        {2 HOME}{CLR}UNRECOVER
        ABLE ERROR IN"EL" ...
        {SPACE}PLEASE RE-RUN":
        END
FJ 1930 FF$="RESET / STOP":GOS
        UB 760
AP 1940 PRINT"RESET CHAR SET ?
         (Y/N) ";
BM 1950 GETKEY Y$:PRINT Y$
XM 1960 IF Y$="Y"THEN BEGIN
MD 1970 SYS 52748
EQ 1980 SYS GE,0,0,255:SYS GE,
        1,0,255
SS 1990 BEND
RP 2000 PRINT D4$:PRINT"STOP P
        ROGRAM ? (Y/N) ";
MJ 2010 GETKEY Y$:PRINT Y$:IF
        {SPACE}Y$="Y"THEN 2040
FR 2020 PRINT"{DOWN} *** STOP
        {SPACE}ABORTED ***
CH 2030 RESUME
KJ 2040 PRINT ES$"L{2 HOME}
        {CLR}PROGRAM STOPPED."
        :END
CA 2050 REM *** SPECIAL KEYS M
        ENU ***
HJ 2060 WINDOW 50,4,77,23,1
BJ 2070 PRINT"SPECIAL KEYS"
GK 2080 PRINT D4$
GJ 2090 PRINT" CRSR & 'ARROWS'
         :
FG 2100 PRINT"{3 SPACES}MOVE P
        IXEL CURSOR IN
RR 2110 PRINT"{3 SPACES}PATTER
        N WINDOW
SR 2120 PRINT"{2 DOWN} F1,F3,F
        5,F7 :
GF 2130 PRINT"{3 SPACES}MOVE C
        HAR CURSOR IN
SM 2140 PRINT"{3 SPACES}CHAR S
        ET WINDOW
CF 2150 PRINT"{2 DOWN} F2,F4,F
        6,F8 :
XC 2160 PRINT"{3 SPACES}SLIDE
        {SPACE}PATTERN IN
SG 2170 PRINT"{3 SPACES}PATTER
        N WINDOW
MC 2180 PRINT"{2 DOWN} STOP :
KQ 2190 PRINT"{3 SPACES}RESET
        {SPACE}CHAR SET /
AF 2200 PRINT"{3 SPACES}STOP P
        ROGRAM
RP 2210 RETURN
RX 2220 REM *** ML ROUTINES **
        *
AF 2230 FOR I=0 TO 314:READ A:
        C1=A+C1:POKE BC+I,A:NE
        XT I
BJ 2240 IF C1<>41677 THEN PRIN
        T"ERROR IN DATA STATEM
        ENTS ... FIRST BLOCK":
        END
AJ 2250 FOR I=0 TO 107:READ A:
        C2=A+C2:POKE BB+I,A:NE
        XT I
GS 2260 IF C2<>12370 THEN PRIN
        T"ERROR IN DATA STATEM
        ENTS ... SECOND BLOCK"
        :END
PS 2270 RETURN
SD 2280 DATA10,10,10,72,169,0,
        134,250,6,250,42,6,250
        ,42,6,250,42,133,251,1
        66,250
PM 2290 DATA134,252,6,252,42,1
        33,253,104,170,24,101,
        251,105,29,133,251,138
        ,10,5
SS 2300 DATA253,9,32,133,253,2
        00,132,99,160,0,162,18
        ,165,253,32,204,205,23
        2,165
EJ 2310 DATA252,76,204,205,32,
        0,62,32,216,205,145,25
        0,200,192,8,208,246,32
        ,82,62
JB 2320 DATA208,241,96,165,250
        ,24,105,8,133,250,144,
        2,230,251,32,216,205,1
        36,208
CJ 2330 DATA250,198,99,96,32,0
        ,62,177,250,32,202,205
        ,200,192,8,208,246,32,
        82,62
MA 2340 DATA208,241,96,32,0,62
        ,169,1,162,8,32,42,63,
        169,128,133,255,198,99
        ,208
FA 2350 DATA4,169,15,208,2,169
        ,143,32,210,255,177,25
        0,37,255,240,9,169,18,
        32,210
AQ 2360 DATA255,169,186,208,2,
        169,46,32,210,255,169,
        146,32,210,255,70,255,
        144,214
FP 2370 DATA200,192,8,208,205,
        169,143,32,210,255,96,
        134,255,72,169,13,162,
        44,32
MB 2380 DATA42,63,104,208,4,16
        9,142,208,2,169,14,32,
        210,255,169,146,72,32,
        210,255
DB 2390 DATA162,0,165,255,208,
        4,169,15,208,2,169,143
        ,32,210,255,138,201,32
        ,176
FK 2400 DATA4,9,64,208,15,201,
        64,144,11,201,96,176,4
        ,9,32,208,3,24,105,64,
        72,32
JR 2410 DATA210,255,104,201,34
        ,208,15,169,27,32,210,
        255,169,79,32,210,255,
        104,72
GX 2420 DATA32,210,255,198,255
        ,232,16,190,104,201,14
        6,208,4,169,18,208,175
        ,169
XD 2430 DATA143,76,210,255,133
        ,230,134,231,169,4,133
        ,229,169,13,133,228,16
        9,19
SC 2440 DATA76,210,255
HD 2450 DATA49,49,10,0,222,156
        ,58,158,32,55,50,50,48
        ,58,162,58,34,13,14,14
        5,198
AP 2460 DATA79,78,84,73,69,82,
        32,32,66,89,32,212,46,
        196,69,83,65,73,32,32,
        205,65
XE 2470 DATA89,32,39,56,54,0,0
        ,0,169,32,162,18,32,20
        4,205,232,169,0,32,204
        ,205
BG 2480 DATA133,250,169,29,133
        ,251,160,0,177,250,32,
        202,205,200,192,8,208,
        246,169
PG 2490 DATA0,32,202,205,136,2
        08,250,165,250,24,105,
        8,133,250,144,229,230,
        251,165
SF 2500 DATA251,201,45,208,221
        ,96
```

Apple Math Graphics

Warren Block

If you're looking for a programming challenge, you might try to duplicate this programmer's feat: Writing an entire graphics program in one line of BASIC. The results are interesting to see, and the process can teach you a lot about efficient programming techniques. The program runs on any Apple II-series computer.

There is only one requirement in creating a useful one-line program. It must do something significant and, of course, be no longer than one line. This condition often results in splendid examples of the hacker's art—programs so obscure that even their author can't figure them out. Even though it would seem that very few programs of this type could do anything at all, some quite elegant little programs have been written in this way.

Some time ago, I decided to try my hand at creating some one-liners limited specifically to unusual graphics displays. Additionally, I decided not to use any machine language routines for speed, although any and all of the features provided by Applesoft would be fair game. I set out writing routines that used polar and Cartesian math functions, shape tables (tables of instructions that define shapes which can be drawn quickly), and several other graphics goodies to draw interesting shapes. Each was a separate program in its own right, but I found that almost every one needed certain common constants (the *x* and *y* coordinates of the center of the screen, for example).

After some time, my disk directory was filling up with lots of these little programs. If I wanted to show them to anyone, I had to sit at the keyboard and load them in sequence. The need to reenter all the common constants for every new one-liner I wished to write was slowing me down, too. The obvious solution was to combine all of them into one larger program that shared variable definitions, shape tables, and all the other things that they had in common. This program would cycle through all the routines repeatedly, so there would be no need for anyone to operate the computer.

At the time I combined my original one-liners, there were 12 of them. This made for a moderately interesting program, but some of the routines seemed too similar to me. I removed these and then something strange happened. Maybe it was just the common variable definitions; in any case, after the dust had settled there were 20 different routines in the program, at least half of which were new. [Editor's note: Although all of the routines will fit on one program line if typed in with all spaces omitted, three of the one-liners will not fit on one line if typed with the extra spaces between BASIC keywords that LIST adds when it displays a program line. Thus, to avoid confusion, we found it necessary when listing the program to split three of the routines—Square Spinner, Roller Coaster, and Roller Coaster II—into two lines. This in no way affects the operation of the routines.]

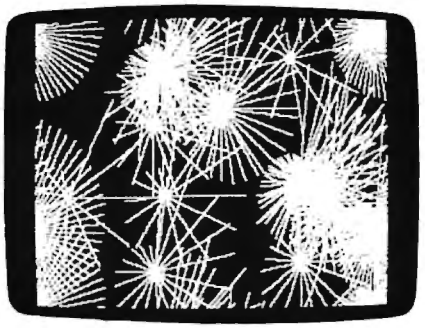
Portable Logic

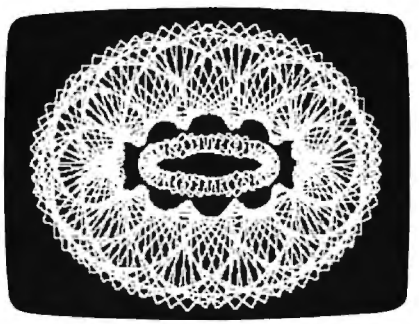
If you just want to view the graphics, type in and save the program; then run it. However, many of the program's modules are worth a closer look, especially if you're interested in graphing math functions. The techniques used apply to almost any relative of the Algol language, a group that includes BASIC, FORTRAN, Pascal, Modula-2, and many others. Representatives of polar and Cartesian coordinate systems and functions in both of those systems are present, as are shape table methods that mimic "real" math functions. Oddly, some of the most impressive looking routines were the easiest to create.

Ball of String (line 380) was the first one-liner I wrote for this pro-

ject, and it is largely responsible for the program's existence. The algorithm it uses is:

1. Pick a random point on the edge of a circle. (Call it Point A).
2. Pick another random point on the circle. (Call this one Point B).
3. Draw a line from A to B.
4. Make the old Point B the new Point A.
5. Go back to step 2.





Each of these interesting designs can be created with just one program line of Applesoft BASIC.

When I wrote this program, I didn't know exactly how it would look, but that's how programming is sometimes. If a happy accident occurs, be ready to accept it and make it work for you.

Multiple Lobes (line 520) is simply a graphic representation of a polar math function that is often seen in textbooks. For those who are curious, its formula is R=C* SIN(A*Theta). The constant A in this formula determines how many lobes the figure will have. In Math Graphics, this number changes randomly, so the display will differ from time to time.

Sunflowers (line 540), *Logo Squares* (line 560), and *Snail Shells* (line 580) are all based on the same routine. A random location on the screen is picked; then a shape table is rotated and enlarged while being drawn in that spot. There are minor differences among the three, but the main one is simply which shape table is used. For those who like to experiment, try the following procedure. Press the CTRL and C keys (while the program is running) to stop it; then type the following, pressing the RETURN key at the end of each line (if you have an Apple IIe, make sure the CAPS LOCK key is down):

```
HGR
HCOLOR=3
SCALE=1:ROT=0
DRAW 1 AT 140,96
```

In the center of the screen, you'll see a tiny mark shaped like a plus sign; this is the shape table that *Sunflowers* uses, seen at its ordinary size (SCALE=1). When SCALE is changed, the plus sign can be drawn in a much larger size—and at a much greater speed—than results from simply using HPLOTs. To see the other two shape tables used by Math Graphics, change the 1 in the last line to 2 or 3.

Math Graphics creates some interesting displays, but it's just a starting point. Programming can be a very creative experience, and I encourage you to jump in and modify constants, change loop increments, and generally have a lot of fun.

Apple Math Graphics

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

```
C2 110 VTAB 4: HTAB 10: INVERSE
CC 120 PRINT "
       "
71 130 HTAB 10: PRINT "APPLE MAT
       H GRAPHICS"
D2 140 HTAB 10: PRINT "
                "
88 150 NORMAL : PRINT : PRINT
9C 160 PRINT "          A GRAPHIC
       S PROGRAM."
D2 170 FOR L = 1 TO 4000: NEXT
49 180 REM SET UP SHAPE TABLES
56 190 FOR A = 32768 TO 32788: R
       EAD D: POKE A,D: NEXT
31 200 POKE 232,0: POKE 233,128
A7 210 REM INITIALIZE
98 220 HGR2 : HCOLOR= 3
59 230 REM SET NUMERIC CONSTANTS
A9 240 PI = 3.14159:P2 = PI * 2:
       P3 = PI / 2
B9 250 X = 140:Y = 96:O = 1
88 260 REM SHAPE TABLE NUMBERS
8B 270 S1 = 1:S2 = 2:S3 = 3
C3 280 FOR T = 1 TO 20
5D 290 ON T GOSUB 380,400,420,44
       0,460,480,500,520,540,560
       ,580,600,620,640,660,680,
       700,720,740,760
69 300 REM WAIT A SECOND
3F 310 FOR L = 1 TO 1500
FE 320 NEXT
6D 330 REM RESET AND CONTINUE
A9 340 HGR2
05 350 NEXT
21 360 GOTO 280
BD 370 REM *A BALL OF STRING*
4C 380 OX = 52:OY = 59:R = 95: F
       OR L = 1 TO 150:Z = RND (
       0) * P2:NX = R * COS (Z)
       + X:NY = R * SIN (Z) + Y:
        HPLOT OX,OY TO NX,NY:OX
       = NX:OY = NY: NEXT : RETU
       RN
5B 390 REM *LINED CIRCLE*
E9 400 Z = P2 * RND (0):R = 95:C
       X = R * COS (Z) + X:CY =
       R * SIN (Z) + Y: FOR L =
       1 TO 110:Z = P2 * RND (0)
       :NX = R * COS (Z) + X:NY
       = R * SIN (Z) + Y: HPLOT
       CX,CY TO NX,NY: NEXT : RE
       TURN
B1 410 REM *SQUARE CIRCLE*
F8 420 R = 95:R2 = R ^ 2 + 1: FO
       R J = 0 TO R STEP 5:PX =
       SQR (R2 - J * J):PY = SQR
        (R2 - PX * PX): HPLOT PX
        + X,PY + Y TO X - PX,PY
       + Y TO X - PX,Y - PY TO P
       X + X,Y - PY TO PX + X,PY
        + Y: NEXT : RETURN
43 430 REM *CLOVERLEAF*
9E 440 Z = 2:R = 0:ZI = .5:RI =
       .5:C = 10.18: SCALE= 3: F
       OR L = 1 TO 150:Z = Z + Z
       I:R = R + RI:NX = R * COS
        (Z) + X:NY = R * SIN (Z)
        + Y: HPLOT X,Y TO NX,NY:
        ROT= (Z - P2 * INT (Z /
       P2)) * C: DRAW S1 AT NX,N
       Y: NEXT : RETURN
41 450 REM *CIRCULAR SPIKES*
B6 460 R1 = 20:R2 = 45:R3 = 115:
       R4 = 85: FOR L = 0 TO P2
       STEP PI / 3: FOR L1 = 0 T
       O P2 STEP PI / 6:X1 = R3
       * COS (L1) + X:Y1 = R4 *
       SIN (L1) + Y:X2 = R1 * CO
       S (L) + X:Y2 = R2 * SIN (
       L) + Y: HPLOT X1,Y1 TO X2
       ,Y2: NEXT : NEXT : RETURN
0A 470 REM *EXPLODED CIRCULAR SP
       IKES*
E7 480 R1 = 20:R2 = 45:R3 = 115:
       R4 = 85: FOR L = 0 TO P2
       STEP PI / 3: FOR L1 = 0 T
       O P2 STEP PI / 6:X1 = R3
       * COS (L1) + X:Y1 = R4 *
       SIN (L) + Y:X2 = R1 * COS
        (L) + X:Y2 = R2 * SIN (L
       1) + Y: HPLOT X1,Y1 TO X2
       ,Y2: NEXT : NEXT : RETURN
83 490 REM *FLOWING CONE*
D9 500 R = 95:L = 3: FOR J = 0 T
       O P2 STEP PI / 100:PX = R
        * COS (J * L) + X:PY = R
        * SIN (J) + Y: HPLOT X,Y
        TO PX,PY: NEXT : RETURN
5F 510 REM *MULTIPLE LOBES*
C3 520 C = 95:L = 2 + 2 * ( RND
       (0) > .5): FOR TH = 0 TO
       P2 STEP P2 / 128:R = C *
       SIN (L * TH):NX = R * COS
        (TH) + X:NY = R * SIN (T
       H) + Y: HPLOT X,Y TO NX,N
       Y: NEXT : RETURN
12 530 REM *SUNFLOWERS*
4D 540 FOR J = 1 TO 14:RX = 280
       * RND (0):RY = 192 * RND
       (0): FOR K = 1 TO 50 STEP
        5 * RND (0) + 1.5: SCALE
       = K: ROT= K: DRAW S1 AT R
       X,RY: NEXT : NEXT : RETUR
       N
```

```
A8 550 REM *LOBO SQUARES*
F8 560 FOR J = 1 TO 14:RX = 280
      * RND (0):RY = 192 * RND
      (0): FOR K = 1 TO 50 * RN
      D (0) STEP 5 * RND (0) +
      .5: SCALE= K: ROT= K: DRA
      W S2 AT RX,RY: NEXT : NEX
      T : RETURN
56 570 REM *SNAIL SHELLS*
A6 580 C = 2: FOR J = 1 TO 16:RX
       = 280 * RND (0):RY = 192
       * RND (0): FOR K = 2 TO
      80 STEP 5 * RND (0) + .75
      : SCALE= K / C: ROT= K: D
      RAW S3 AT RX,RY: NEXT : N
      EXT : RETURN
20 590 REM *PLUS OVAL*
C8 600 C = 10.18: SCALE= 25:R1 =
       110:R2 = 50: FOR J = 0 T
      O P2 STEP P2 / 64: ROT= J
       * C: DRAW S1 AT R1 * COS
       (J) + X,R2 * SIN (J) + Y
      : NEXT : RETURN
ED 610 REM *SQUARE SPINNER*
B9 620 SCALE= 25:R1 = 105:R2 = 6
      0:SC = 40.74: FOR J = 0 T
      O P2 STEP P2 / 119: ROT=
      J * SC: DRAW S2 AT R1 * C
      OS (J) + X,R2 * SIN (J) +
       Y: NEXT
67 625 SCALE= 5:R1 = 50:R2 = 14:
      SC = 20.37: FOR J = 0 TO
      P2 STEP P2 / 50: ROT= J *
       SC: DRAW S2 AT R1 * COS
      (J) + X,R2 * SIN (J) + Y:
       NEXT : RETURN
33 630 REM *LINE SPINNER*
B9 640 SCALE= 25:R1 = 90:R2 = 45
      :S = 20.37 + (20.37 * ( R
      ND (1) > .5)): FOR J = 0
      TO P2 STEP P2 / 192: ROT=
       J * S: DRAW S3 AT R1 * C
      OS (J) + X,R2 * SIN (J) +
       Y: NEXT : RETURN
9A 650 REM *DOUBLE OVAL*
B6 660 FOR J = 0 TO P2 STEP PI /
       64:R1 = 95:R2 = 35:R3 =
      110:X1 = R3 * COS (J) + X
      :Y1 = R2 * SIN (J) + Y:X2
       = R2 * COS (J - PI) + X:
      Y2 = R1 * SIN (J - PI) +
      Y: HPLOT X1,Y1 TO X2,Y2:
      NEXT : RETURN
56 670 REM *MOEBIUS RING*
F9 680 OF = PI / 3: FOR J = 0 TO
       P2 STEP PI / 64:R1 = 95:
      R2 = 35:R3 = 110:X1 = R3
      * COS (J) + X:Y1 = R2 * S
      IN (J) + Y:X2 = R2 * COS
      (J) + X:Y2 = R1 * SIN (J
      + OF) + Y: HPLOT X1,Y1 TO
       X2,Y2: NEXT : RETURN
10 690 REM *BOUNCING LINE*
99 700 OF = PI / 3: FOR J = 0 TO
       P2 STEP PI / 64:R1 = 95:
      R2 = 35:R3 = 110:X1 = R3
      * COS (J) + X:Y1 = R2 * S
      IN (J) + Y:X2 = R2 * COS
      (J + OF) + X:Y2 = R1 * SI
      N (J) + Y: HPLOT X1,Y1 TO
       X2,Y2: NEXT : RETURN
B9 710 REM *ROLLER COASTER*
B7 720 SCALE= 15:SC = 2.6:PX = 1
      5:R = 70:C = 10.18: FOR J
       = 0 TO P2 + PI STEP P2 /
       64: ROT= J * C: DRAW S1
      AT PX,R * SIN (J) + Y:PX
      = PX + SC: NEXT
10 725 FOR J = 0 TO P2 + PI STEP
       P2 / 64:PX = PX - SC: RO
      T= JC: DRAW S1 AT PX,R *
      SIN ( - J) + Y: NEXT : RE
      TURN
93 730 REM *ROLLER COASTER II*
FA 740 SC = 2.8: SCALE= 10:PX =
      10:R = 70:C = 10.18: FOR
      J = 0 TO P2 + PI STEP P2
      / 64: ROT= J * C: DRAW S3
       AT PX,R * SIN (J) + Y:PX
       = PX + SC: NEXT
82 745 FOR J = 0 TO P2 + PI STEP
       P2 / 64:PX = PX - SC: RO
      T= J * C + 32: DRAW S3 AT
       PX,R * SIN ( - J) + Y: N
      EXT : RETURN
35 750 REM *DOUBLE OVAL CONE*
26 760 R1 = 120:R2 = 30:Y1 = 40:
      Y2 = 152: FOR J = PI TO 3
      * PI STEP PI / 32:PX = X
      - R1 * COS (J):PY = Y1 -
      R2 * SIN (J):CX = R1 * C
      OS (J) + X:CY = R2 * SIN
      (J) + Y2: HPLOT PX,PY TO
      CX,CY: NEXT : RETURN
45 770 REM SHAPE TABLE DATA
89 780 DATA 3,0,8,0,13,0,19,0
3A 790 DATA 38,52,47,61,0,35
B0 800 DATA 45,54,63,4,0,45,0
```

Donald B. Trivette

Run, Puma, Run

Mercury, the son of Jupiter and Maia, was the Greek god of wrestling, gymnastic exercises, and anything requiring great speed (including thievery). His swiftness was attributed to a winged cap and winged shoes.

Were Mercury around today, he'd be wearing new Pumas. Although they don't come with wings, they do come with a computer in the heel that would make even Zeus jealous.

Here's how they work. Attached to the heel of each shoe is a cab made from the same material as the sole. The cab on the left shoe is for looks and balance; inside the cab on the right shoe is a printed circuit board encased in water-proof shrink-wrap material. It has a red button and a black button protruding. The circuit board contains a timer, a foot-fall counter, memory, a beeper, and a tiny nonreplaceable battery. There's also a trap door which opens to reveal four prongs of a male electrical connection.

Two-Button Shoes

Prior to a run, the jogger presses the red button to reset the electronics and clear the shoe's memory. Then, as the run begins, the athlete presses the black button to start the clock and the counter. Should the runner pause for a stoplight or drink of water, it's also necessary to pause and restart the shoe. This is done by pressing the black button. Finally, once the run has ended, the black button is pressed to stop the recording of data.

Once back in the house or gym, the shoe is plugged into a computer. Puma supports several computers: the IBM PC family including the PCjr (with disk drive); the Apple IIe and II+ (48K); the Commodore 64, 128 (in 64 mode), and SX-64; and all MS-DOS and PC compatibles. The disk that comes with the shoes contains the software for each of these machines. For the IBM family, the cable attaches to the parallel port, which means you need an optional board in the PCjr (most PC and XT machines already have a parallel port). I asked the people at Puma why the shoe wasn't designed to run on the serial port, which everyone has (in fact, many of us have several free serial ports), but received no satisfactory answer. I'm afraid that Puma knows a lot more about shoes and running—as you'll soon see—than about computers and programming.

The software for the IBM PC is written in BASIC (type RUN "PUMA") although it may not work on your PC. The people Puma hired to write the program knew more about other makes of computers than they did about the PC. Instead of getting the address of the parallel port from a table in memory, the programmer hard-coded the address used by the IBM-brand parallel printer interface board. Many non-IBM brands use different addresses. This causes no problem with most software because programmers know to look for the address in the computer's memory. Puma has promised to modify the program to use a memory lookup, but if your program doesn't work, you may have an old version.

Once I patched the address of my Apparat board into the program, it worked. I selected *read data from shoe* on the menu and followed the instructions on the screen. It successfully read that I had jogged four miles in 39 minutes. The program recorded this for future comparisons, and, since I had already entered my body weight, it calculated that I had burned about 700 calories. It's also possible to send data to the shoe. Say you want to run six miles and stop. Just plug the shoe in and, using the menu, download 6 miles. When you've jogged that distance, the shoe will beep three times.

Software Weaknesses

Unfortunately, I discovered more poor programming. It reports time and distance, but, for reasons unknown, it doesn't calculate the speed. I can only suppose that serious runners, for whom this shoe is intended, don't care about speed. The IBM version does not take advantage of color; output does not line up under headings; and, most inexcusable of all, the program has no print commands—it depends entirely on IBM's print-screen routines for hardcopy output.

Bad programming aside (it *is* BASIC, so you can fix it yourself), Puma must be applauded for trying something new and different. The program and shoe do make it easy to keep a daily diary of workouts, and that—according to Mark Nenow, the world-record holder for the 10,000-meter road event—is what's important. Mark has used a pair of Puma RS-Computer shoes for several months. "Improvement comes gradually in running, so this gives the athlete a way to compare weeks and months of running—and graphically see how much he's improving."

If you're thinking, as I was, how great these shoes would be for walking, I'm sorry to tell you that the foot-fall sensor isn't delicate enough to record a walk. But the shoes *are* uncommonly comfortable—as they should be for $200—and Puma is studying the possibility of marketing a shoe sensitive enough to measure a walk. C

The World Inside the Computer

Fred D'Ignazio, Associate Editor

What Is COMPUTE! Doing Here?

Last weekend I took my family to Atlanta for the 44th Annual World Science Fiction Convention. My wife and two children registered as "fans," but I registered as a reporter and got a badge with my name and "COMPUTE!" on it. Hanging from the badge was a pretty green ribbon which said PRESS.

"COMPUTE!?" exclaimed an embarrassing number of the 7000 fans as they rode up and down crowded elevators with me and squinted at my badge. "What's COMPUTE! doing at a science-fiction convention?"

But I held my ground.

In my own mind I saw no problem with COMPUTE! covering a science-fiction convention. After all, I've been fascinated with computers ever since 1970. But I had been reading science fiction for ten years before I saw my first computer. Many science-fiction fans are like me. They read science fiction at night, but they work on computers or go to a computer job during the day. Do they like science fiction because of computers? Or like computers because of science fiction? It's impossible to tell; they are both so intertwined.

The Larger View

In fact, it's now more important than ever for fiction writers to explore the implications of computers. And for computer users to spend some time reading science fiction about computers.

Why? Because computers have a lot more growing up to do. Sure, they've undergone mind-boggling changes since the vacuum-tube and electronic-relay days of the 1940s and 1950s. But this is only a hint of the changes that are just around the corner.

And as tiny computers in the guise of intelligent microchips slip quietly into people's dishwashers, typewriters, microwaves, watches, telephones, and TVs, the computer's power to transform society and culture grows. Who can foresee where things will end up?

No one can, of course. But science-fiction writers can take us on an exciting journey into the future and expose us to the good and bad effects of the current computer proliferation.

Computers are changing at an amazing rate. So it is excusable for us to scramble after the latest advances in RAM, ROM, operating systems, word processors, and the like. But we shouldn't lose sight of the larger issues and the more distant future. This is where science fiction can be a valuable aid. Computer books and magazines largely focus on the computers of today; science fiction makes us think about the computers of tomorrow. And tomorrow is not far away.

In the old days (maybe five years ago), some science-fiction writing about robots and computers was ill-informed, stereotyped, and just plain silly. But with the spread of low-cost personal computers and robots, the writing has improved dramatically. Most science-fiction writers now use computers as word processors; many are sending their entire manuscripts over the phone lines to their publishers.

Among The Best

Among the very best science-fiction writers focusing on computers is Orson Scott Card. Card's newest work, *Ender's Game*, not only won the Nebula and Hugo Awards for best novel, but it was the first science-fiction novel to be published completely online (on the Delphi network—a year before its hardcover publication in 1985). Incidentally, Scott served as editor of COMPUTE! Publications' Book Division in 1983.

Another computer novel to watch for is *When Gravity Fails* by George Alec Effinger, due to appear just about the time that this issue of COMPUTE! hits the stands.

And (if you have a strong stomach), you shouldn't miss the "Cyber-Punk" writers, including William Gibson (*Neuromancer*) and Bruce Sterling (*Schismatrix* and a novella titled *Green Days in Brunei*); the computer scientist and mathematician Rudy Rucker (*Software, Wetware,* and the still-unfinished *Hardware*); and John Varley (see his novella *Press Enter* and other works).

Two other highly interesting books are *Human Error* by Paul Preuss, which examines how organic biochips may someday replace silicon microchips, and *True Names* by Vernor Vinge, a futuristic D & D novel.

The Cyber-Punk authors are writing for adults, and their fiction may not be appropriate for younger readers. Children—and their parents and teachers—should be on the lookout for *Machines That Think*, edited by Isaac Asimov, Patricia Warrick, and Martin Greenberg; *When Harlie Was One* by David Gerrold; *I, Robot; Caves of Steel; Bicentennial Man;* and other stories and books by Isaac Asimov (which examine the cultural, psychological, and social effects of human-robot interaction); the newer books in the Star Trek series (see the titles by Diane Duane); Jane Yolen's *The Robot and Rebecca* mystery series; and my novel, *Robot Odyssey I*, based on the popular *Robot Odyssey I* software game from The Learning Company. ©

The Beginner's Page

C. Regena

Arrays

Sometimes you need to tag a whole list of information with names that the computer can manipulate. Usually, you give things names by assigning *variable names* to them. For example, you can write A$ = "APPLES" and B$ = "MILK" so that whenever you PRINT B$, you'll see the word MILK appear.

However, there's an even more effective way to manipulate related information: arrays. Let's assume you are making up a shopping list in the example above. When you're ready to print out the list, you'll need to PRINT A$; PRINT B$; and so on down the whole list. But using the array A$(1) = "APPLES":A$(2) = "MILK" instead will let you print out the whole list easily:

```
10 FOR I = 1 TO 35
20 PRINT A$(I)
30 NEXT I
```

Even if there are 35 items in this list (as in the example program above) you'll still only need these three lines to print out the whole list. Likewise, if you're reading a list from DATA statements *into* an array, this is a more efficient way to program than to assign individual variables to each item:

```
10 FOR I = 1 TO 35
20 READ A$(I)
30 NEXT I
40 DATA APPLES,MILK,BREAD...etc.
```

Varieties Of Arrays

Arrays can be used with either numeric or string variables on most computers. An exception is that many versions of BASIC on the Atari do not allow string arrays.

Let's look at another example of how arrays can be used. Suppose you're describing four boys. We can assign names in BASIC with these statements:

```
NAME$(1)="RICHARD"
NAME$(2)="ROBERT"
NAME$(3)="RANDY"
NAME$(4)="BRETT"
```

More arrays can be used to list traits about each of the boys:

```
AGE(1)=15
AGE(2)=10
AGE(3)=6
AGE(4)=1

COLOR$(1)="BLACK"
COLOR$(2)="RED"
COLOR$(3)="BLUE"
COLOR$(4)="PURPLE"

SPORT$(1)="BASEBALL"
SPORT$(2)="FOOTBALL"
SPORT$(3)="BASKETBALL"
SPORT$(4)="BASEBALL"
```

With the information set up in this way, your program can provide a list of the boys by using a single loop and a variable subscript as we did in the shopping list example. Printing information using different variable names would take quite a few statements, but using arrays can make programming more efficient:

```
200 FOR J=1 TO 4
210 PRINT NAME$(J);AGE(J),COLOR$(J),
    SPORT$(J)
220 NEXT J
```

Avoiding Repetitive Programming

Also, searching and sorting data becomes easier when you use arrays. If you want to know about a particular boy, you can print only his information by searching the arrays for his particular subscript. To find out Randy's favorite color:

```
300 N=3
310 PRINT NAME$(N),COLOR$(N)
```

Although this example uses only four boys, you can see how much arrays can reduce repetitive programming. In a larger list of people, for example, you might want to find all the ten-year-old boys. Let T be the total number of boys in the list. In the following loop, each age in the AGE array is checked. If the age is 10, then line 420 is executed and the name is printed.

```
400 FOR C=1 TO T
410 IF AGE(C)<>10 THEN 430
420 PRINT NAME$(C)
430 NEXT C
```

One final point before we go on to more complicated arrays. Most BASICs require that you DIMension an array if it's going to be larger than ten elements:

```
10 DIM AGE(60)
```

This would set aside enough memory to hold 60 different items in the AGE array. And you must DIM early in your program (before you actually make use of the array).

Many Dimensions

If you want to get really fancy, you can create an array of two or more dimensions. (In practice, however, few programmers ever need to get this fancy.) In any case, you use two numbers separated by a comma to indicate two dimensions. For example, instead of using 12 different variable names for related items, you can use a two-dimensional array:

```
C(1,1)  C(1,2)  C(1,3)
C(2,1)  C(2,2)  C(2,3)
C(3,1)  C(3,2)  C(3,3)
C(4,1)  C(4,2)  C(4,3)
```

Each element names its own memory location and contains its own value. In a two-dimensional array, you can visualize the elements by thinking the first number indicates the row and the second number indicates the column. C

Telecomputing Today

Arlan R. Levitan

What To Give For Christmas

Why not consider making this a telecomputing holiday season for the computer owner on your gift list? With modem prices having dropped through the floor over the past year, it's more affordable than ever to give (or receive) a modem.

Low-cost 300-bps units are thicker than investors at a Microsoft stock offering. Atari's XM-301 modem is a good example of what's available. It's pegged at a list price of $40 and includes software. A quick rummage through the bargain bin at your local computer store will likely turn up a variety of 300-bps units mixed in among the Timex and PCjr accessories. Just make sure that the unit you purchase is compatible with the recipient's system.

Automatic Interfacing

The darling of the budget-minded telecomputing clan this year is the Avatex 1200 modem. While not 100-percent Hayes compatible, it does respond to the Hayes dialing commands. Other minor inconveniences are a manual 300/1200 bps switch, no internal speaker for monitoring the progress of calls, and manual disconnect. On the plus side are a full set of LED status lights, its compact size, and a two-year warranty. At the going rate of $75–$100, who's complaining?

Ever run into a modem or other serial device that just refuses to talk to your computer? Chances are the fault lies within your serial cable rather than the device. Buying a custom cable from a store is no guarantee either; I've run into a number of botched cables purchased from service technicians who should have known better. I keep a nifty device from I.Q. Technologies called Smartcable for the times I just want to get things working and figure out what's wrong after I'm done with the task at hand.

Using Smartcable couldn't be easier. At one end of the cable there's a couple of light emitting diodes and some slide switches. You simply hook up the cable between the two ill-mannered pieces of equipment and flip the slide switches until each of their associated LEDs turns green. Voilà! Instant interface. At around $60, Smartcable is a godsend for the inveterate RS-232 tinkerer. A more expensive unit that actually ends up telling you how to wire a cable that will work is available for about $150. Tempting, and guaranteed to take all the witch-doctor mystique out of making RS-232 cables.

Fight Or Flight

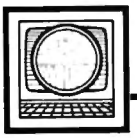
Don't forget the nicest present of all for the serious telecomputerist: a separate phone line for data communications. A separate line lets you segregate the costs of modem calls from voice traffic. Most importantly, it can keep the peace in a household by not keeping the phone tied up for hours—leave that to the humans in the family.

SubLOGIC, whose Bruce Artwick brought us the popular *Flight Simulator I* and *II* programs for 8-bit machines, has a surprise in store for Atari ST and Amiga owners. *Flight Simulator II* for the aforementioned 32-bit machines includes a nifty feature of more than passing interest to the telecommunications community.

A special option within the program allows you to hook up two computers via modem (or modem eliminator, if located within the same room or building). When playing on machines so connected, both players can share the same airspace. Both planes will appear on each system's display screen. An option within the program allows each flyer to change the type and color of his or her aircraft so that the planes may be distinguished from each other.

While each player may fire weapons at the other, there is no mechanism built within the program yet for detection of weapons hits or midair collisions. Those features may be incorporated in future releases of *FS II* or another product. If most of the problems involved with such an implementation can be worked out in the short term, you may see the ST and Amiga versions of *Jet*, SubLOGIC's F-16 and F-18 simulator, in early 1987. Until then we'll have to be satisfied with precision flying à la Blue Angels. ©

An item in my November telecommunications column is subject to misinterpretation. It was stated that a CompuServe assistant sysop was directly compensated by receiving a portion of the connect-time charges incurred during any downloading of his terminal program. This information came from a reliable source, but it has since been brought to my attention that the arrangement is not as was stated in the column. We do not know the specifics of the arrangements which were finally agreed to in this case, and erred in assuming that it remained as previously described. In other cases of which we're aware, compensation in the form of free access time to the CompuServe service is common as a payment to assistant sysops. Although the assistant sysop referred to as "Dash" in the column has not complained to us, these concerns were pointed out by a third party. We regret any misunderstanding.



Microscope

Sheldon Leemon

It looks like Tandy may have jumped the gun on its announcement of two new Model 1000 computers. Tandy went ahead with a big product rollout without waiting for the results of FCC tests for radio frequency interference (RFI). Apparently, those tests weren't the mere formality Tandy thought them to be, because when it came time to sell the new computers, the FCC said no. Making the best of a bad situation, Tandy dealers continued to show the machines and take deposits for waiting lists, but even that was too much for the FCC. They forbade Tandy dealers to so much as turn the offending machines on, even for display purposes. Tandy management could react only by determining to do whatever necessary to bring the machines into compliance (hopefully in time to salvage holiday-season sales).

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Tandy isn't the only computer manufacturer to face rejection by the FCC. In an industry where new products are routinely announced long before they're ready for sale, the FCC approval process has become one of the landmarks by which insiders can judge when a piece of hardware will appear on store shelves. Even the computing public follows the proceedings. Amiga owners waiting for peripherals like the Genlock interface and Sidecar listen closely for rumors about approval (last word: Genlock, yes; Sidecar, not yet).

Sometimes, though, the FCC is used as a convenient scapegoat for slipped production schedules. It isn't hard to meet federal RFI standards as long as you design the product correctly and don't cut too many corners. But getting a product tested can take longer than the manufacturer might like, especially when timing is critical. The FCC is a government agency whose limited staff is unlikely to get any bigger in the face of budget reductions. To add to the problem, they moved earlier this year to stop the importation and sale of IBM compatibles that were not FCC approved. As a result, the clones from every offshore manufacturer all went to the FCC for clearance at the same time, causing some delays.

What does the FCC, whose mandate is to regulate the broadcast media, have to do with computers, anyway? The fact that computers can cause TV interference is only a partial answer, since hair dryers also disrupt the picture. It's the *way* that computers interfere that's important. Appliances with motors create interference at a low frequency that affects only TVs plugged into the same circuit, but computers generate much higher radio frequencies, acting like little transmitters. In fact, someone sitting in a van outside your home or office could probably pick up the image on your monitor using inexpensive equipment. That's not so reassuring to a company that stores sensitive financial material on personal computers, and it has caused the government to issue stringent shielding specifications for computers used in classified areas.

****

Apple's introduction of the IIGS, an impressive 16-bit machine that competes with the Atari ST and Amiga while maintaining compatibility with current Apple software, may give new meaning to the "Apple II forever" slogan. But the pricing of the Apple line raises some interesting questions. The new IIGS, a 256K computer with eight expansion slots, is selling for $999 without a monitor or disk drive. The IIc, a 128K computer with no slots and a built-in 5¼-inch drive sells for $939, also without a monitor. The 128K IIe (with slots) sells for $829 without a drive or monitor.

It would appear that Apple has the $830–$1,000 price range covered rather thoroughly. But when you add a 3½-inch drive for the GS ($400) and an analog RGB monitor ($500), the price of the system comes to $1,900, about the same as the Macintosh 512 Enhanced. The GS can use a low-cost monitor, but it can't work with the inexpensive 5¼-inch drives available for the older Apple II computers (you can get a $300 5¼-inch drive from Apple).

While there are some price differences in the Apple line, the IIGS is close enough to both the IIc and 512K Mac to erode sales of both machines. The prospects of the IIc, in particular, don't appear bright, despite Apple's claim that they expect it to remain the mainstay of the line. Apple had to fight hard to win acceptance for the IIc in the first place because it lacked expandability, and the announcement of a $500 upgrade of the IIe to a GS may make IIc owners feel a bit abandoned. With a price difference of $60 plus the cost of a disk drive, it's hard to believe that consumers will pick the IIc over a machine with twice the functionality, three times the speed, a nice detached keyboard, and eight expansion slots.

[*Editor's Note: On September 16, the following news item was released by Tandy.*] "The Tandy 1000 EX and Tandy 1000 SX have now been certified by the Federal Communications Commission. Shipments of these high performance PC-compatible computers will begin this week.

"While the delay in obtaining certification of these products has inconvenienced many, we fully support the FCC's efforts to maintain a satisfactory electromagnetic environment for all products."

ST Outlook

Philip I. Nelson, Assistant Editor

In Search Of The Shortest ST Program

The tale behind this month's program began when I undertook to write a desk accessory program for the ST. Desk accessories are newly installed when the computer does a cold start—when you turn the power off and on—but not when you press the reset button. To test each new version of the accessory, I found myself turning the power off and on, over and over. Computers are sturdy tools, but flipping the power switch, say, 40 times in an evening isn't particularly good for any electrical device, be it a microcomputer or a dishwasher. To make life easier on me and my ST, I wrote a program that causes a cold start.

Short and Simple

The resulting program is only 59 bytes long—one of the shortest ST programs you're likely to see. Even if you're not writing an accessory, there are many situations when it's useful to reset the ST to virtual power-on status. Some crashes can leave the computer in apparent working order when it's actually confused about how much memory is free, how many files are open, and so forth. Another problem has to do with memory allocation. If you press the reset button while a RAMdisk is present, for instance, the RAMdisk becomes unusable, but the memory which it uses may not be released to the system. Here's the assembly language source code for this program in its entirety:

```
start:
clr.l       -(sp)
move.w      #$20,-(sp)
trap        #1
clr.l       $420
move.l      $4,a0
jmp         (a0)
.dc.l       start
```

The first three instructions shift the processor from user mode into supervisor mode so that we can access otherwise forbidden addresses such as system variables. This is done by executing GEMDOS routine $20, known as Super. In 68000 assembly language, system routines are executed through a *trap* instruction. A trap #1 instruction executes a GEMDOS routine, trap #14 executes an XBIOS routine, and so forth. Most system routines expect to receive information of one sort or another; such information is passed by pushing it onto the processor's stack before you execute the trap. In this case, only one parameter is needed: a zero to signal that we wish to go from user mode to supervisor mode.

Once the parameters have been pushed, you must push the opcode that identifies the routine ($20, in this case). After returning from the trap, you would ordinarily increment the stack pointer to adjust for the bytes that were previously pushed (after a call to Super, you would perform *addq.l #6,sp* to adjust for a four-byte longword and a two-byte word). But that's wasted effort in this case, since we know that a cold start causes the ST to reinitialize its stack pointer, anyway.

Most routines return information, as well, typically in register d0. Super returns the previous address of the supervisor stack pointer. Under ordinary circumstances, this address should be saved so that you can switch back to user mode when you've finished working in supervisor mode. Since we don't expect to return from a cold start, the program ignores this otherwise critical information.

The fourth instruction clears the system variable *memvalid* ($420) to indicate that the current memory configuration is no longer valid. This forces the ST to clear and reconfigure its memory, steps it might otherwise skip on reset. The last two instructions move a 32-bit address from location $4 into address register a0 and perform an indirect jump to that address. Location $4 contains the address of the code to execute on reset: To emulate a cold start, we simply jump to the same code the computer executes when you turn on the power. The same address is usually found in *sysbase* ($4f2), the system pointer to the beginning of the operating system.

GEM Loader Oddity

You may wonder why the source code begins with a useless label (*start:*) and ends with an equally useless constant definition (*.dc.l start*). The answer concerns the GEMDOS loader that loads and runs ST programs. If you assemble this program without the label and constant, GEMDOS refuses to run it, generating the message *TOS error #35* about nine times out of ten. That message appears when you try to run something (often, a garbled or misnamed file) which GEMDOS doesn't recognize as an executable program. Since this program *is* executable, why doesn't it run consistently without the extra baggage?

Begin with the facts that all ST programs are expected to be relocatable, and that GEMDOS ordinarily decides where to load a program based on the ST's current memory configuration and the program's memory requirements. In addition to the naked code itself, each ST program file begins with a short header that tells GEMDOS what it needs to know for loading. Most programs refer to variables or data of some sort, and one of the loader's more important tasks is to resolve such references after it has brought the program into memory. At the very end of the program file is relocation data that tells the loader which program elements to adjust.

This program is highly unusual in that it doesn't need to refer to

any data or variables whatsoever. Parodoxically, it's that very simplicity that causes GEMDOS to balk at this program unless we include a useless reference. The loader seems to need *at least one reference that requires relocation.* If no such reference exists, the loader takes relocation information from free memory and gets confused more often than not. Thanks to COMPUTE! programmer Tim Victor for tracking down this ST feature, which you may or may not consider a bug. (It's a rare program, after all, that can get by without any external variables or data.)

Of course, no program—especially one this short—can eliminate the need for an occasional hardware reset. There are still many cases when the only prudent solution is to reach for the reset button or the power switch. For those who don't have an assembler, here's a BASIC filemaker that creates the program under the name COLDSTAR.PRG:

```
100   close:open "R",1,"A:\COLD
      STAR.PRG",59
110   field #1,59 as a$
120   for j=1 to 59:read byt$
130   byt=val("&H"+byt$)
140   c=c+1:chk=chk+c+byt
150   x$=x$+chr$(byt):next
160   lset a$=x$:put 1,0:close
170   if chk<>3207 then ? "Typi
      ng error."
180   data 60,1A,00,00,00,1A,00
190   data 00,00,00,00,00,00,00
200   data 00,00,00,00,00,00,00
210   data 00,00,00,00,00,00,00
220   data 42,A7,3F,3C,00,20,4E
230   data 41,42,B9,00,00,04,26
240   data 20,79,00,00,00,04,4E
250   data D0,00,00,00,00,00,00
260   data 00,16,00
```

©

Attention Programmers

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

Jacket Lister

All versions of this handy utility program from the September issue (p. 52) suffer from the same minor bug. If the directory contains an odd number of filenames, the last name in the alphabetized list will not be printed on the jacket. (This occurs only for odd numbers greater than 32 in the Commodore and Apple versions.) To correct this, make the appropriate change for the version of the program you are using.

For Commodore (Program 1), Apple (Program 3), and IBM (Program 5), change line 870 to:

```
870 CX = INT((C - 33) / 2 + 0.5): CZ =
  CX + 32
```

For the IBM only, also add the following line:

```
445 C = C + 1
```

The IBM version has an additional limitation. Because of the way directory entries are read from the disk, the maximum number of entries that can be read is 76. For disks that contain more than 76 files, only the last 76 filenames will be printed on the jacket. Thus, the test for more than 88 filenames in line 190 is irrelevant.

For Atari (Program 2), add line 305 and change line 530 as shown:

```
305 DIR$(FILE*17+1,LEN(DI
    R$))="(17 SPACES)":FIL
    E=FILE+1
530 CX=INT((FILE-33)/2+0.
    5):CZ=CX+32
```

Amiga Pyramid Power

We stated in last month's CAPUTE! column that we'd try to avoid the use of lowercase l as a variable name in Amiga program listings, since that character is impossible to distinguish from the number 1 in our listings. Unfortunately, at that the time the October issue containing the "Pyramid Power" was already out, and it has the same problem. The problem is amplified in Pyramid Power because that program uses both kl and k1 as variable names, and it's impossible to tell which is which. In the following cases, the variable should be kl (we recommend using KL to make the change more obvious):

In the rightmost column of page 57, both instances of **IF KL=1 THEN gameover.**

In the leftmost column of page 58, both instances of **IF KL=1 THEN gameover.**

In the *move:* subroutine, both instances of **IF KL=1 THEN RETURN.**

In the *creaturerock:* subroutine, **NEXT: KL=1: RETURN.**

In the *edge:* subroutine, **IF z>6 THEN KL=1: RETURN.**

In the *gameover:* subroutine, **score=0: lev=1: sq=0: ts=0: sp=.25: KL=0: GOTO readdata.**

In any other cases, the variable listed should be k1.

In the following cases, the variable should be l (we recommend using L to make the change more obvious):

In both the *player:* and *creatureshape:* subroutines, **L=87:DIM a(L):** and **FOR i=0 TO L:**. ©

News & Products

Apple Educational Software

Learning Technologies has introduced a line of 20 educational software programs for Apple computers. The programs are directed at teaching prereading, memory, and problem-solving skills as well as early math concepts for children in preschool through grade 8. In addition, each program offers a Learning Kit of supplemental learning aids. Each kit contains a full-color poster which features characters from the software program, custom lesson plans that help define skills and learning objectives presented in each program, reproducible worksheets which contain exercises to support and extend the activities presented in the software, and student management charts to record progress.

The series is divided into two different learning levels: the Early Learning Series, designed to help develop early reading and math skills, and the Thinking Strategy Series, intended to develop problem-solving skills such as observation, deduction, evaluation, visual discrimination, and strategy formation. Each program retails for $19.95.

Learning Technologies, 4255 LBJ, Suite 265, Dallas, TX 75244.

Circle Reader Service Number 198.

GEnie Adds Online Encyclopedia

The electronic edition of Grolier's *Academic American Encyclopedia* is now available on GEnie, the General Electric Network for Information Exchange for personal computers.

First available online in 1980, the Grolier encyclopedia includes more than 32,000 articles composed of some ten million words with extensive cross-referencing. The encyclopedia is updated online four times a year.

There are three subscription options available for Grolier's *Academic American Online Encyclopedia* on GEnie: $49.95 for a one-year subscription, $29.95 for a six-month subscription, and $7.50 for a one-month subscription.

GEnie is available for $5 an hour during non–prime time access at either 300 or 1200 baud. The non–prime time hours are Monday through Friday from 6 p.m. to 8 a.m. local time, and all day Saturday and Sunday and national holidays.

General Electric Information Services Co., 401 North Washington St., Rockville, MD 20850.

Circle Reader Service Number 199.

Commodore Hard Disk Drive

A new ten-megabyte hard disk drive for the Commodore 64 and 128 has been introduced by Progressive Peripherals & Software. Device 9-"The Vault" emulates the 1541 disk drive and plugs directly into the serial port of the 64 or 128; no interface is required. It can also be daisy-chained to your printer using one of two serial ports.

"The Vault" provides complete, automatic protection of data by inserting "shields" between the disk and heads when the computer is turned off and by retracting the carriage to the edge of the disk. You can also DIP switch–select four device numbers.

The hard disk drive is 3.5 inches high × 10 inches wide × 15.5 inches long. It has a built-in fan, an external drive enclosure with power supply, an AC power cord, and fuse. It comes with a five-year limited warranty and a one-year warranty on the disk. A manual is included.

Suggested retail price for Device 9-"The Vault" is $899.95.

Progressive Peripherals & Software, 464 Kalamath St., Denver, CO 80204.

Circle Reader Service Number 200.

IBM Foreign Language Skills

Two new software packages from Gessler help you improve your French, Spanish, and German language skills. *R.S.V.P.*, for advanced beginner to in-

termediate French and Spanish language students, is designed to improve communicative proficiency. The program concentrates on developing reading, writing, spelling, and grammar skills while reinforcing syntax and vocabulary. It presents you with 19 different day-to-day situations with a passage in which letters or words are missing. You must fill in the blanks. Hints and word definitions are provided. *R.S.V.P.* also contains a text editor and vocabulary quiz.

TUCO is a German tutorial for beginning- to intermediate-level students. It provides a review of the German language from the basic conjugation of verbs and word order through subjunctive and relative clauses. Feedback is geared to the individual responses of the students. The five disks contain over 40 different topics such as pronouns, adjective endings, and interrogatives. Comprehensive exercises follow each passage to reinforce the lesson.

Both *R.S.V.P* and *TUCO* are available for the IBM PC/PCjr.

R.S.V.P. retails for $59.95 and *TUCO* (with five disks) for $195.

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

Circle Reader Service Number 201.

Commodore-Compatible Printer

Star Micronics has introduced the NX-10C, a fully Commodore-compatible dot-matrix printer which connects to a Commodore 64 or 128 through a built-in Commodore serial interface. The NX-10C features its own built-in character set with upper- and lowercase letters, numbers and symbols, and block graphics.

A front touchpad panel lets you select draft or near-letter-quality print mode, typeface, print pitch, margin settings, and form alignment without adjusting the rear DIP switches. Speeds range from 120 characters per second (cps) for draft output to 30 cps for near-letter-quality printing.

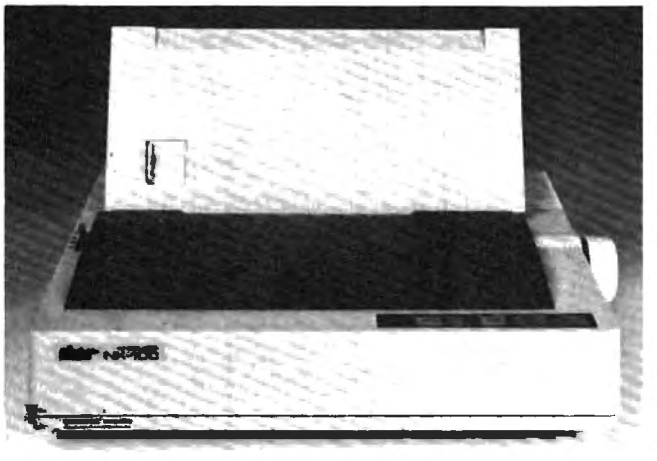
The NX-10C also offers automatic paper feed with both rear tractor feed and friction feed, so you can use either fanfold paper or single sheets. A micro-feed allows you to use preprinted forms as well.

The NX-10C is also bidirectional and has logic-seeking capability.

Suggested retail price for the NX-10C is $349. The package includes a snap-in ribbon cassette.

Star Micronics, 200 Park Ave., Suite 3510, New York, NY 10166.

Circle Reader Service Number 202.



The Star Micronics NX-10C is a $349 dot-matrix printer that is fully compatible with the Commodore 64 and 128 computers.

COMPUTE!'s Guide To Typing In Programs

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

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

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

Atari 400/800/XL/XE

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

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

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

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

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

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

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

The Automatic Proofreader

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

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

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

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

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

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

IBM Proofreader Commands

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

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

Program 1: Atari Proofreader

By Charles Brannon, Program Editor

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

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

Program 2: IBM Proofreader

By Charles Brannon, Program Editor

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

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

Program 3: Commodore Proofreader

By Philip Nelson, Assistant Editor

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

Program 4: Apple Proofreader

By Tim Victor, Editorial Programmer

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

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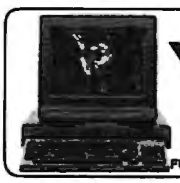

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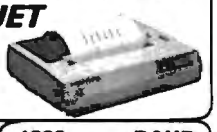

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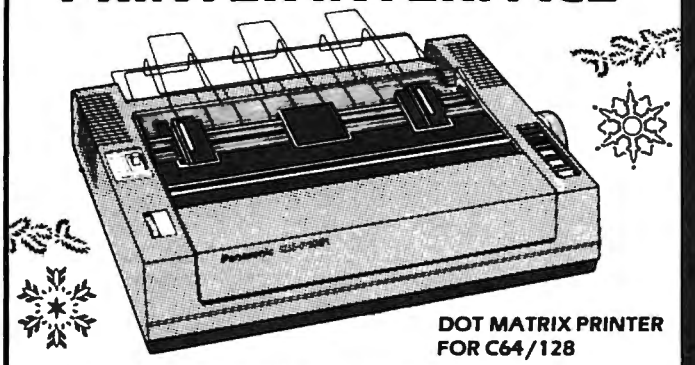

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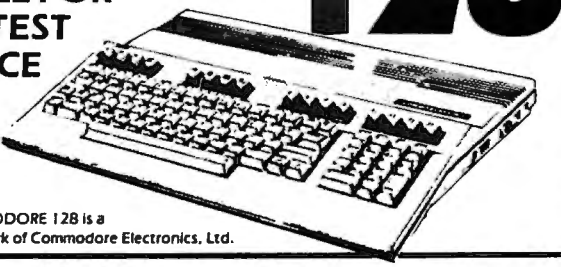

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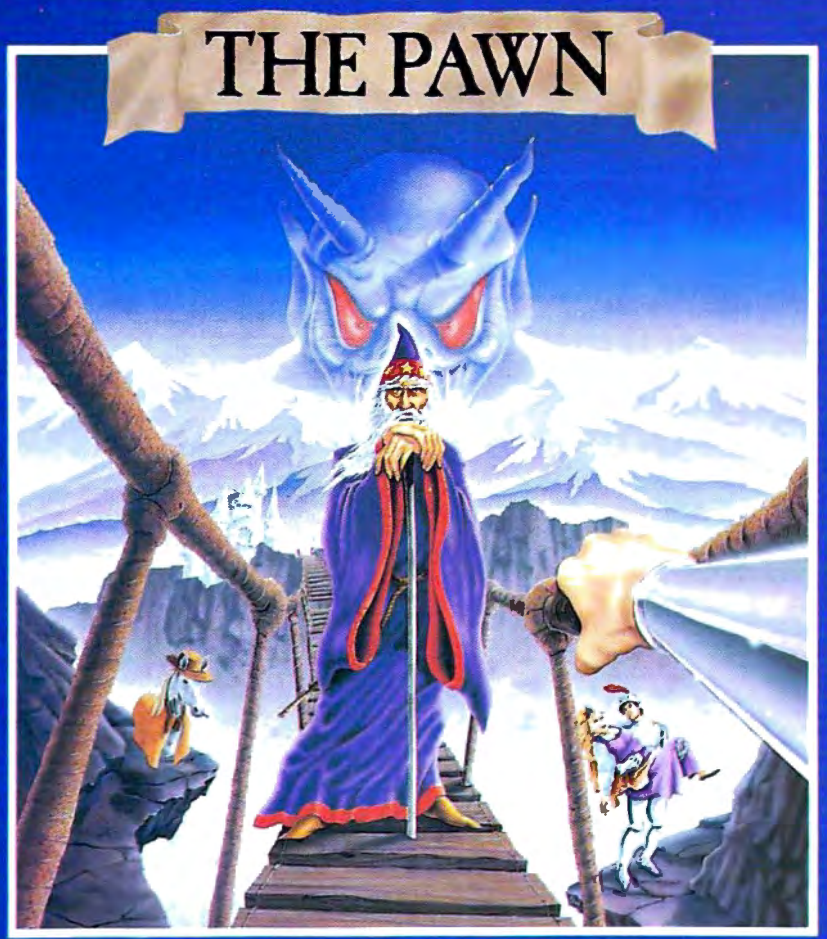

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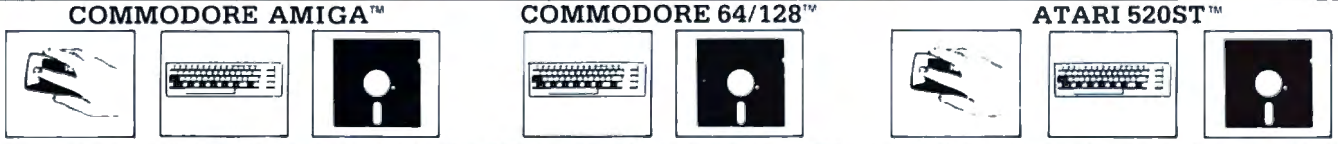

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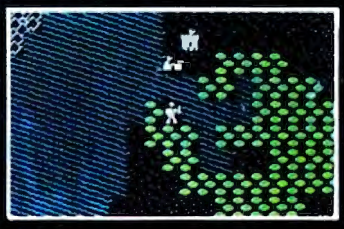

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