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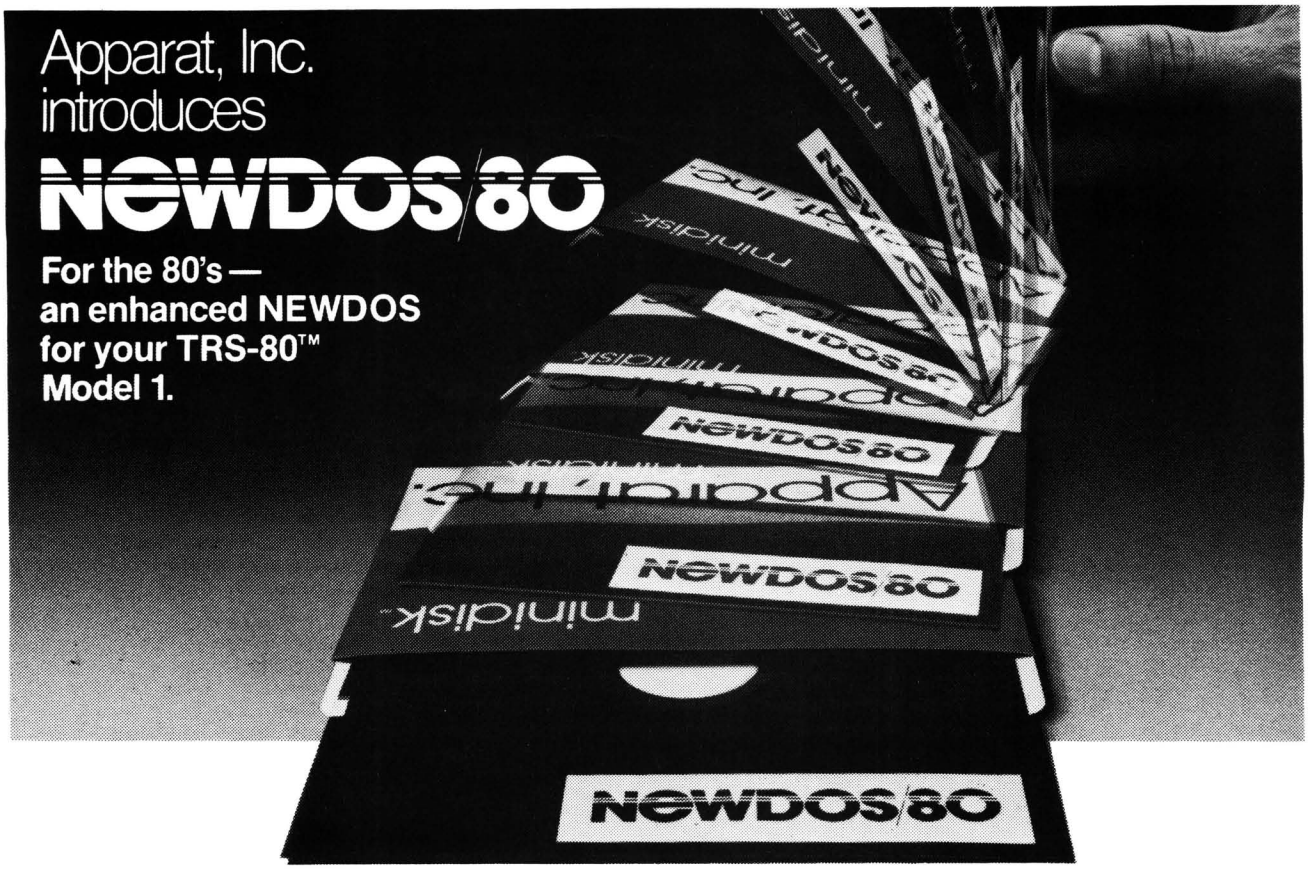

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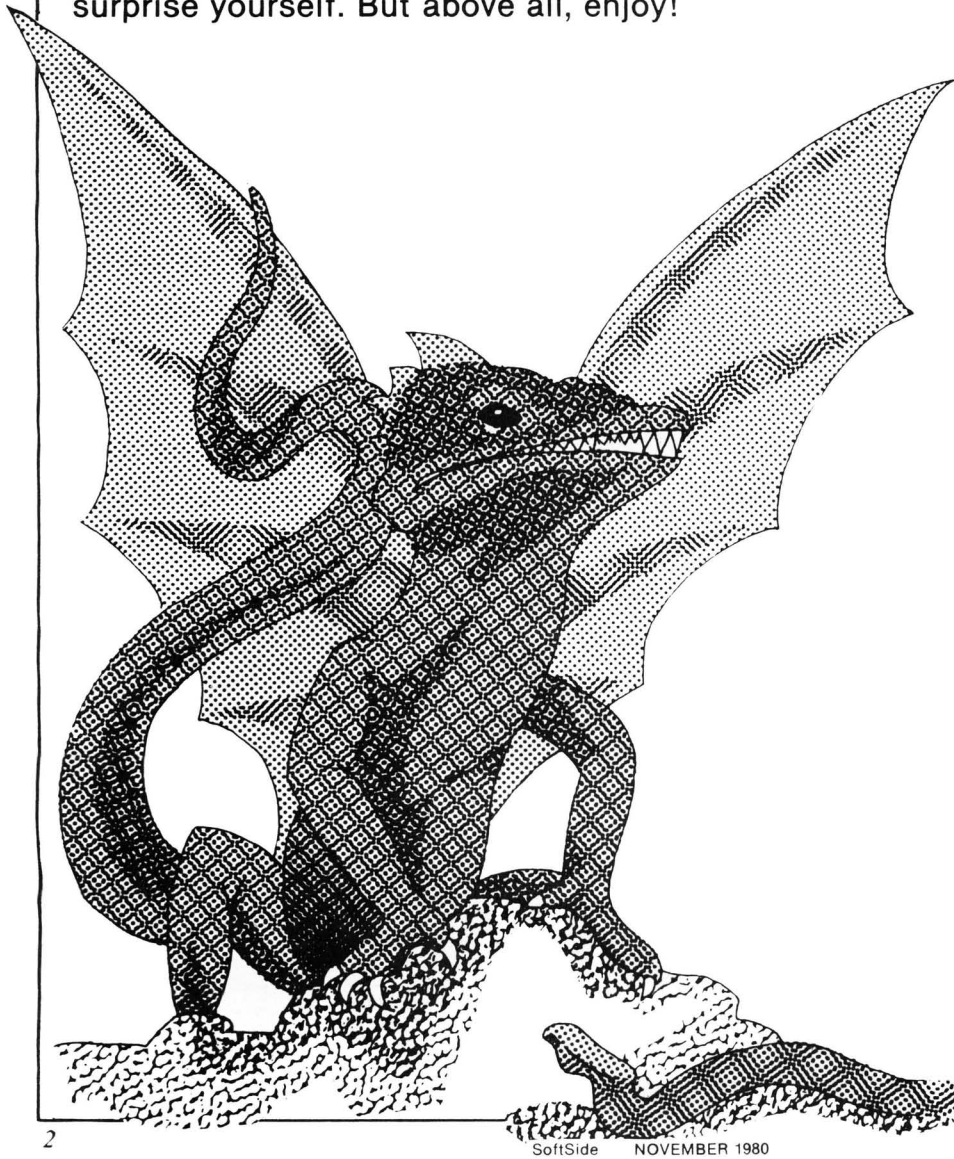

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STAFF

PUBLISHER:
Roger Robitaille Sr.

EDITORIAL DEPARTMENT
Scott Adams
Dave Albert
George Blank
Rich Bouchard
Phil Case
Sandy Dean
James Garon
Lance Micklus
Mark Ohlund
Kay Pasa Atari Submissions
Mark Pelczarski
Richard Taylor
Joan Truckenbrod

PRODUCTION DEPARTMENT
Donna Bennett
Elaine Cheever
Lauri Miller
Jenny Riel
Anne Vadeboncoeur

STAFF
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Ruth Anderson
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Diana Bishop, Subscriptions
Suzanne Breton
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Brenda Cookinham
Donna Cookinham
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Elizabeth Robitaille, Administrator
Cindy Schalk
Paul Rousseau
Jack Torres, Hardware Information
Joanne Tracy
Barbara Warman
Anmar Williams
Ed Umlor
Gary Young

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EDITORIAL

It's funny how software developed on various microcomputers differ in style. Some of the most challenging games are created on the TRS-80, the machine with the fewest game-type options, as opposed to the Apple, Atari, and other flashier machines. The TRS-80, it turns out, has the most capable version of BASIC of all the home computers (except, perhaps the Heaths). Level II BASIC offers IF—THEN—ELSE, VARPTR, STRING$, and a nicer RND function than the other machines, all of which greatly simplifies the logic of programming. All of the DOS commands are included in the TRS-80's Disk BASIC. Compare that with the Apple's bizarre-looking PRINT D$ commands. Most of the programs we see for the color computers seem to be hung up on graphics and sound, and aren't very deep in logic. There are always exceptions, and most of the commercial programs now available are improvements over the all-flash approach of earlier software. A majority of the really interesting software, however, comes in for the TRS-80. I've even seen many instances where program graphics are immensely more creative on the TRS-80, with its SET-RESET graphics, than on the others that have multiple graphic statements. For example, Android Nim, originally for the TRS-80, Dancing Demon, and even Imhotep, for which we published concurrent Apple and TRS-80 versions last month, all make unbelievable use of what most people would consider very limited graphics capabilities. (For those of you who think I may be speaking out of a bias toward the TRS-80; I'm not. I own an Apple myself, on which I do almost all of my programming. I'm even using an Apple word processor, Super-Text, for writing this.) The whole point is the flashier the system, the more that people seem to get caught up in the flash rather than in the actual art of programming.

Programming in itself can be a real art. One of the most interesting ideas I've seen in a long time was the One-Liner idea from Arne Rohde. We printed his original letter in the July **S-80 SoftSide** and have since been running One-Liners as a regular feature. In trying to condense an idea to a program of only one line you can discover much about the intricacies of the computer language you use. As an example, I'd never really taken much time worrying about converting Apple Integer BASIC programs that frequently used the MOD function to Applesoft. The MOD function is somewhat unique to Integer BASIC, returning a value that is the remainder after division. (13 mod 10 is 3, 7 and 2 is 1, etc.) The best conversion of the MOD function I had seen was as a function definition (DEF FN) published in **Call A.P.P.L.E.** Then I came upon a One-Liner by Dennis Ward (in this issue) in which was buried a technique that did much the same thing much more easily (A-500x(A 500), which is similar to a MOD 500. A 500 has the value 1 if true, 0 if false. Actually, this 'MOD' function works only if A is between 0 and 999 and doesn't give the proper result when A equals 500. A true MOD function is: A-INT(A/500)*500). Nifty, though, the techniques discovered when necessity is involved. Then there's the One-Liner we received from Will Evans a couple of days before this issue went to press. It's basically a one-line version of the Meteor Storm programs featured this month. Although it's a stripped down version, it even keeps score. (It's sometimes difficult to keep up with all the advances in the computer field.)

I've talked to a lot of people who lament the lack of software available for certain systems (the Heath computers, Exidy Sorcerer, PET, TI 99/4,. . .) Unfortunately, a rule often learned too late is that one should check out the kinds of software available for a machine

before investing in the hardware. it's not that anyone is necessarily ignoring a particular machine; if someone is going to invest a lot of time or money into developing or promoting software, it's got to be able to provide a return. There just aren't enough TI 99/4s out there yet for people to justify development time and expense. Of course it's an obvious Catch-22: If the software's not there, people won't buy the machine; and if the machine hasn't sold very much, people won't develop the software.

There is even quite a waiting period involved, about a year, from the time a system is reasonably accepted to the time significant software products become available. The Atari 800, which has recently been doing quite well, is now a little over a year old and a range of good quality software is just now beginning to appear. I predict that a year from now the variety of Atari software will have caught up to the current levels of the Apple and TRS-80. It looks like the Heath computers may be just starting that cycle.

I've also had calls from people complaining that after they'd bought software packages, they couldn't make backup copies of the programs. Unfortunately, that's a side effect of piracy. Although it's a great convenience -sometimes a necessity - to backup important disks, software companies simply cannot afford to allow copiable disks to be sold. For each one sold that can be duplicated, maybe five or ten will be illegally copied for friends or acquaintances, especially for the really good programs that are in demand. That severely cuts into a company's profit margin, enough so that they'd be foolish to voluntarily let it happen. So when you buy a commercial program, assume that it can't be duplicated. If it can, let it be a pleasant surprise - and try not to do your friends any favors.

We'd like to welcome another full time editor to our staff this month. Phil Case just arrived from the depths of Missouri with some more TRS-80 and Apple expertise. He promptly wrote a one line adventure. Hmmm. Also, if you've noticed that our grammar and spelling have improved, it's probably due to Dave Albert, who's been assigned the task of taking the miscellaneous atrocities we produce and getting them into reasonable shape before we turn them in to the Art Department. It's been a great help.

Mark Pelczarski

ABOUT THIS ISSUE:

Due to the noted absence of that Magnificent Penguin, we editorial munchkins are going to tell you about what lies between the covers this month. Don't be alarmed if the voice sounds different.

To begin with, that piece of machinery on the cover is merely there to indicate that the guru of computer wargamers, Ron Potkin, has decided to let us all in on the secret workings of his Kriegspiel program. Furthermore, he has graced our pages with another spiel, this one on game design. A tip of our stocking caps to you, Ron!

For you Appleheads, our very own Phil Case has slipped another one in! Bowling. Phil is from Missouri, so we had to show him how you really bowl. . .he still hasn't come to accept candlepins, though. Give him time.

And then there's Bouncing Barney, the madcap trampolinist who can't seem to stay away from the floor. . .he needs you.

Plus it's raining meteors this issue, and there's a mad scientist lurking about, complete with beautiful daughter. The increasingly prolific Scott Adams is still with us, this month he discusses Exatron Stringy Floppy in conjunction with his Adventures. Lance Micklus gives his viewpoint on the home computer front and the infamous SoftSide Continuing Data Base does just that: continues. So do we. 'Til next month, a merry munchkin farewell!

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INPUT

Dear Sirs,

As an Atari owner, I'm delighted with your new format. I am looking forward to a great range of program types. The almost line-by-line documentation is great, but might include more information about possible variations, or machine to machine translations.

The Maze Search on page 48 is a wonderful game! There is one correction necessary in the program. As it stands, the computer goes into attract mode (rotating the colors in each register) after you have been playing for about nine minutes. This is quite distracting, and since the game is such a hit with the whole family, this would happen each game session. To correct that program, change line 1 to read:

1 POKE 77,0: GOTO 100

The POKE resets the attract mode clock to 0 each new maze, so nine minutes cannot go by on that clock.

On our TV set, we preferred changing the SETCOLORs in line 320 to SETCOLOR 0,1,8 and SETCOLOR 4,4,6. It is more fun to watch the maze being drawn without the distractions of flashing random colors. Also, we changed the SETCOLORs in lines 410, 420, and 430 to SETCOLOR 0,1,8 - SETCOLOR 2,0,0 - and SETCOLOR 1,12,10 - all for greater cursor and target visibility (at least, on our TV set).

Has anyone come up with a two-person variation of Maze Search? I've tried with no success so far. Both players would play at the same time on the same maze, either competitively or cooperatively.

Again, congratulations on your magazine. I can hardly wait for the next issue.

Yours truly,
Bruce Frumker
Cleveland Heights, Ohio

Dear **SoftSide** staff,

I am 14 years old and the co-user of an ALTAIR 8800 computer (my Dad and I fight over it!). I am an avid reader of the TRS-80 version of **SoftSide**. I enjoy trying to convert the TRS-80 games to ALTAIR BASIC. TRS-80 BASIC has many neat commands and it's a real challenge to figure out what they do and find a way to do the same thing or close to it in ALTAIR BASIC. The only things I can't decipher are the graphics codes. I bought the LEVEL II BASIC book, hoping that it would help me. It did, to a point. Now I can decode the "control codes," but to see the "graphics codes" I was instructed to run a simple program. If I could display the codes I wouldn't need to decode them! Now I bang my head against the wall every time I see a program with TRS-80 graphics.

But you guys came through again! In the August '80 issue your article "Converting Graphics" gave me the insight I needed. I just want to say, "Thanks and keep up the good work!" All you need to do now is print some programs in ALTAIR BASIC.

Sincerely,
Barbie King
Bellevue, WA

Dear Sirs:

I was very happy to receive my sample copy of the new **SoftSide**. This is certainly a great idea. Those of us who are not as knowledgeable as your marvelous editorial staff will benefit greatly from learning all about the wonderful Atari Computer that can function without a CRT of any kind. The chart on page 58 was most helpful. As soon as I figure out how to hook up my TRS-80 to the color TV that you list as essential equipment, I'm going to get one of those Atari 400s. By the way, how do you know what the computer is doing without the use of a screen?

Sincerely,
James W. Chapman
Diamond Bar, CA

Near's we can figure it, either the Atari is wired for direct connection to the brain or the color TV set belongs to the Atari.

GWB

Gentlemen:

I want to congratulate you on your article DEVELOPING DATA BASE, PART I, by Mark Pelczarski. This was exactly the type of programming I needed to put the computer to work for me. In my business we need a lot of historical trend data and your program came at a perfect time. My son and I were ready to go on the outside and get the software written, but thanks to you we have finished one of our required programs and feel confident that we can accomplish the other objectives.

I estimate that I've already paid for my next several years of subscriptions on this one article.

Keep up the good work and our hats are tipped to Mark.

Yours truly,
Ron Walser
Roslyn Heights, NY

Dear Mr. Garon:
I have been using the Microsoft Basic Compiler recently, and I came across a useful bit of information that you may wish to share with your readers.
I use the RS-232 serial port to drive my Centronics 761 printer, and naturally I need to use my own serial printer driver program to link in with the printer DCB. I wrote a Basic program using LPRINT statements, compiled it, (linked it), then loaded my driver and executed the compiled /CMD file. I crossed my fingers when it came to the LPRINT statement, but instead of print-out, the dreaded "silent death" syndrome appeared.
I figured that one of two things was happening:

a. The compiler was not using the TRS-80 printer DCB, and going straight to 37E8H, the parallel port.
b. My serial driver routine was getting clobbered, causing the machine to go West when it tried to execute it.

Faced with this dilemma, I decided that I should write a short BASIC program:

10 LPRINT "HELLO"
20 END

compile & link it, and disassemble the object code. It should be

obvious what the compiled code was doing, right? Eeegads!! The /CMD file produced by this program was NINE GRANS! This called for serious measures. Apparat's DISASSEM to the rescue!

Using the cross reference table feature of DISASSEM, I produced a listing which would get more rapidly to the place in the code that was doing the direct interface to the printer. Quickly scanning the cross listing revealed no reference to 37E8H, meaning that the compiled version was not going straight to the printer. Breathing a sigh of relief, I discovered that the ROM routine to write a character to the printer DCB should have been called with the character to print. I.e., my printer driver was called but it wasn't home. Something was clobbering it! A little more advanced hackery was needed here. I re-linked my test program, this time telling L80 to put the code it produced up out of DOS' way (-P:7000 command to L80 told it to put the code at 7000H). Now, I could load the code in memory using TRSDOS' LOAD command, and look it over with RSM.

I traced the initialization code, and it only took a few JMPs to find what I was after. The compiled code grabs its value for MEMORY SIZE from location 4049H (16 bits, standard Z-80 order with low order byte first) which is set up by DOS. It then sets the Z-80 stack pointer to this location. My printer driver, which resides at the end of memory, was getting eaten up by the stack! The solution was simple. I added the following to my printer driver code:

```
ORG  4049H  ; DOS memory size
              value
DEFWINIT-1  ; Stuff it with the
              address
            ; of the last byte prior
            ; to the code you
              want to
            ; protect
ORG  0FF00H ; Start of printer
              driver
```

INIT. . .printer driver starts here. . .

I load my printer driver in the usual manner (it performs some ititialization, so it is a /CMD file. . .I just type its name, PRINTER, from DOS READY), and then execute the compiled BASIC code by typing the name of the BASIC object code (/CMD) file.

The BASIC object code picks up the value for memory size put there by my printer driver, and starts the Z-80 stack right before the driver code. Now I can print with compiled code.

Naturally this technique would work with any other machine language program you wanted to protect from BASIC. This will be very useful to those people who purchase the BASIC compiler but not the Microsoft Macro Assembler. If you have the Macro Assembler, you can link your machine language routines right in with your BASIC code when running L80, and then there is no need to protect memory and load them separately. Before I close this out, let me mention that I have not found the BASIC compiler's error recovery to be the world's greatest! Example: when compiling this program:

```
10 PRINT "THIS LINE IS
ENDED BY A DOWN ARROW
AND THE TEXT CONTINUES
ON THE NEXT LINE"
```

the machine goes into DEBUG! Some programs get every error flagged beautifully, but others just cause the machine to go out to lunch, no reboot or anything. How software like this makes it out the door is beyond my wisdom.

I have found that a startling improvement is possible on sorting arrays of integers. An array sort using Shell-Metzner went from 45 seconds interpretively to under a second compiled!

Although I notice that Radio Shack is stating that the compiler is not compatible with Disk Basic (I assume Radio Shack will be selling Microsoft's compiler), I have had no trouble getting things compiled. Bohlke's Golf game from the last **SoftSide** really speeds up, in fact there really should be some delay loops added!! Another BIG improvement was Scott Adams' Backgammon from a few issues back. Interpretively, it was a bit too slow to hold my interest. Now it almost moves instantly, sometimes taking 3 or 4 seconds.

1. Remove CLEAR statements that reserve string space.
2. Add DIM statements that were omitted, using the default array dimensioning feature of the interpreter.
3. The "THEN" in IF. . .THEN cannot successfully be replaced by a comma, (one of Bohlke's favorites) and in many cases where it can be omitted in the interpretive code it is required for the compiler.
4. FOR. . .NEXT loops should be strictly nested. The interpreter is very loose about this, but the compiler is strict. You must have only one NEXT statement for each FOR. You can easily patch existing code wiht multiple NEXTs per FOR by substituting a GOTO line number containing the NEXT for the multiple NEXTs, e.g.

```
10 FOR I = 1 to 20: IF X(I) = 0
   THEN NEXT I
20 X(I) = X(I + 1)
30 NEXT I
```

should be changed to:

```
10 FOR I = 1 TO 20:
   IF X(I) = 0 THEN 30
20 X(I) = X(I + 1)
30 NEXT I
```

If you follow these conventions and you are lucky, the compiler will produce a nice fast (although somewhat bloated) version of your program. Since the object files are quite large, I suggest using the compiler sparingly, only when the speed up is really required.

Sincerely,

Rowland Archer, Jr.
Hillsborough, N C

Gentlemen:

What irony — 'Speed on the TRS-80" on one page and "Opposite Graphics Relationships" on the next (The **S-80**, September, 1980). I don't consider myself a "pro" — I'm a 15-year old, and a sophomore, although I've had nearly a year of on-keyboard experience, in both BASIC and Z-80 assembly language. Yet I must say, I made a total mockery of the inverting program in less than ten minutes at the keyboard. Eliminating the top-to-bottom inverting section (lines 90-200), your program takes 41 seconds to execute, and occupies 259 bytes of memory. My version takes 27 seconds to execute, and with three program *lines it* occupies only 118 bytes of memory. Here's how it goes:

```
10 CLS:DEFINTA:FORA=1TO100:PRINT@RND(1022),CHR$(128+RND(63));:NEXT
20 FORA=15360TO16383:IFPEEK(A)=32POKEA,128ELSEIFPEEK(A)<128NEXT
30 POKEA,319-PEEK(A):NEXT
```

And this one even skips over letters!

Compute it easy,
Nick Kasoff
Yellow Springs, Ohio

APPLE PROGRAMMING HINT

One of the problems with many of the Apple programs we get is that the paddles, if used, are sometimes difficult for the user to control. This is most predominant if the paddle setting is translated to -1, 0, and +1 for the purpose of keeping an object stationary (0), or moving a unit in one of two directions (-1 or +1). The problem arises when the paddle is literally translated into thirds by the programmer. This makes it difficult to find the middle setting (0), and the user often overcompensates and winds up swerving back and forth. (See line 97 of Collision, in this issue.)

A better approach is to have most of the paddle translate into zero, with only the extremes becoming -1 or +1. (As we did with the Apple version of Meteor Storm.) This is done by first taking the paddle reading, which is in the range 0-225, and subtracting the number of units that you want to use at each end for movement, say ten. This gives you a range of ten settings on the left that are negative, leaving 245 on the right that are positive. Now, divide by 245-10, which is 235. The result is ten units on the left, which are still negative, and ten units on the right which are greater than 1. Using the INT function changes this to -1 (ten units on the left), 0 (235 units in the middle), or +1 (ten units on the right). It's now much easier for the user to find the middle range, which does give much better control.

The complete formula is: INT((PDL(0)-10)/235. Generalized, it's INT((PDL(0)-N)/(255-2*N)), where N is the number of units on either side that will translate to -1 and +1. Try using it in line 97 of Collision and see if you notice the difference.

Mark Pelczarski

APPLE PROGRAMMING HINT

RANDOMNESS

Have you ever played with a program that uses RANDOM? You may have noticed that it isn't very random in its ways after you've played it a while. Well, here is a simple fix that will prevent this from ever happening again. At the start of the program, initiate RANDOMness with the following:

10 X = RND(PEEK(78) + PEEK (79)*256):X = RND(-X):REM LOCATIONS
78 & 79 are the keyboard count location

Dennis Ward
Beaverton, Oregon

APPLE PROGRAMMING HINT

For many months I have been trying to change DOS's "CATALOG" to "CAT". Being accustomed to typing "CAT" on the main frames I use, it becomes a royal pain switching between the two. I finally peeked into DOS and figured out how to change it.

First, it pokes a high-byte "T" into "CATalog". The reason for this is when DOS finds the high-byte it signals the end of a command. Then, since we have now shortened the length of the command, we will still have the "ALOG" from catALOG and must dispose of it (or else DOS will do weird things like give you Integer BASIC when you type 'FP'). All we have to do is poke in the commands after "CATALOG" in DOS's command table and we are all set and done. To see DOS's command table (For a 48K Apple), run this program (Applesoft):

```
5  HOME
10  FOR X = 43140 TO 43272: REM
    SUBTRACT 16384 FROM THESE IF
    YOU HAVE 32K
20  PRINT  CHR$ ( PEEK (X));
30  NEXT X
```

The program is written for a 48K Apple with Applesoft (ROM or RAM Applesoft). After you load the program, type "RUN". Then type "CAT" and voila! You CATalog the disk.

If you own a 32K Apple, just subtract 16384 from every value in the program OVER 43000, and it will work.

NOTE: You can INITialize disks and save this modification so that it works every time you boot from the disk.

WARNING:

Some programs will not work with this modification because they are looking for a "CATALOG" and you'll set a "SYNTAX ERR". I tried to have it so that you could use both but it seems impossible. To fix the problem, just boot from a disk that has the normal "CATALOG".

```
5  REM  CATALOG TO CAT
6  REM  RICHARD CRISAFULLI
10  FOR X = 43220 TO 43268
20  READ L
30  POKE X,L
40  NEXT X
50  DATA  212,77,79,206,78,79,77,
    79,206,80,82,163,73,78,163,7
    7,65,88,70,73,76,69,211,70,2
    08,73,78,212,66,83,65,86,197
    ,66,76,79,65,196,66,82,85,20
    6,86,69,82,73,70,217,0
60  END
```

Richard Crisafulli
E. Dennis, Mass.

APPLE PROGRAMMING HINT

The No-Split PRINT STATEMENT

I have seen many programs which I really enjoyed, but every time it printed something, words would be split or you could tell by the LISTing that the programmer spent much time making sure that lines came out just right, because his PRINT statements have plenty of spaces to make sure that no split words are displayed.

OK, so here's a very simple method to ensure no split words in your text displays:

1) in TEXT mode, input your PRINT statements

2) use "?" instead of typing "PRINT" - saving much time

3) PRINT as many lines as you can in one line number for ease in formatting

EXAMPLE:

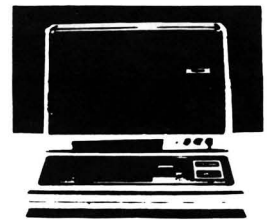
```
]12?"1111111111111111111111111111111111111
1111":?"22222222222222222222222222222222222
2222222":?"33333333333333333333333333333333
3333333333":?"44444444444444444444444444444
4444444444444":?"55555555555555555555555555
5555555555555555"
```

In this example, there will be five lines printed with no problems. The trick? - simply line up the last quote mark with the first quote mark. TAA-Daah!!! Of course less per line is OK, but never more!

Dennis Ward
Beaverton, Oregon

MICROSOFT

BASIC COMPILER



Bringing BASIC Up To Speed

You have all kinds of good reasons to program in BASIC. BASIC came with your TRS-80. It was easy to learn, it's easy to use, and it's powerful enough for a wide variety of applications. But face it, you didn't choose BASIC because it was fast. Until now, if you wanted fast execution time you had to go to a whole new language.

Now you can get fast program execution times and more without giving up BASIC. Microsoft BASIC Compiler is a powerful tool for BASIC programming that makes programs run an average of 3-10 times faster than programs written in Disk BASIC.

How It Works

Microsoft BASIC Compiler can manage those incredible speeds because it's a compiler, instead of an interpreter. (Level II, Disk BASIC and other microcomputer BASICs are interpreters.)

The compiler produces highly optimized, Z-80 machine code that is directly executed by your TRS-80. Disk BASIC, on the other hand, has to scan each line of the source program every time the program is run.

You simply type in and debug your program as usual, using your BASIC interpreter. Then you enter a single command line, telling the compiler what to compile and what options to use.

BASIC Compiler takes it from there, producing optimized machine code as a relocatable binary file. This file, called the object program, is then loaded and linked with BASIC's runtime library using a utility program called LINK-80. Both the runtime library and LINK-80 are included in the BASIC Compiler package.

When you run your compiled program, you'll be amazed at the difference! The increase will vary, depending on the program, but can be **as much as 30 times** the execution speed of your interpreted program if you make maximum use of integer operations.

And you can save your compiled program on disk so you don't have to recompile it every time.

More Than Speed

As if speed weren't enough, Microsoft BASIC Compiler also adds features to the already powerful Disk BASIC to make your programming easier. It incorporates many of the features added to the Microsoft BASIC interpreter in the fifth major release, including:

* WHILE/WEND Statement. A new conditional statement that gives BASIC a more structured flavor.
* CALL Statement. Lets you call assembly language and FORTRAN subroutines much more easily than in Level II.
* Long variable names. Up to 40-character variable names are allowed and they may contain embedded reserved words.
* Double precision transcendental functions. SIN, COS, TAN, ATN, LOG, EXP, SQR are supported as an exclusive feature of BASIC Compiler.

Powerful BASIC language features you can use within Disk BASIC include:

* PRINT USING for formatted output. Includes asterisk fill, floating dollar sign, scientific notation, trailing sign and comma insertion.
* Four variable types: Integer, String, Single Precision Floating Point (7-digits) and Double Precision Floating Point (16-digits)
* Trace facilities (TRON/TROFF)
* Error trapping
* Direct access to CPU I/O ports with INP and OUT
* Read or write any memory location using PEEK/POKE
* Matrices with up to 60 dimensions
* Nested IF/THEN/ELSE
* Boolean operators OR, AND, NOT, XOR, EQV, IMP
* Complete file manipulation statements: OPEN, CLOSE, GET, PUT, KILL, NAME

The Inside Story

It's the optimization processes that take place while a program is being compiled that make programs run under BASIC Compiler compact and incredibly fast. The optimizations occur:

* Expressions are reordered to minimize temporary storage and to transform floating point division into multiplication wherever possible.
* Constants are folded wherever possible.
* Constant multiplications are distributed to allow more complete constant folding.
* Peephole optimizations are performed, including strength reduction.
* The code generator is template-driven, allowing sequences to be generated for the most commonly used operations.
* String operations and garbage collection are extremely fast.

System Requirements

BASIC Compiler will operate on a Radio Shack Model I TRS-80 with one disk and 48K RAM. Programs compiled with the BASIC Compiler may be stored on disk. **$195.00 plus $3.00**

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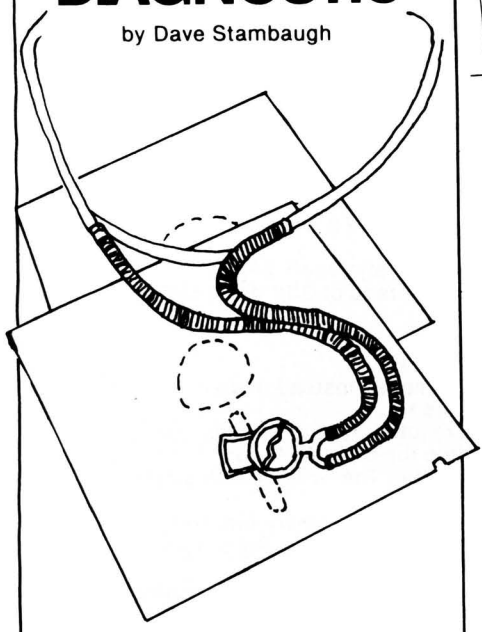
FLOPPY DISK DIAGNOSTIC

by Dave Stambaugh



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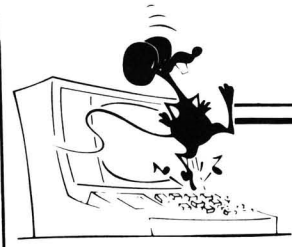


MY SIDE OF THE PAGE

by Lance Micklus

Remember the editorial section of **Prog 80**? Well this is it. I've decided to rename it MY SIDE OF THE PAGE, so as not to confuse it with the regular monthly editorial here in **SoftSide**. This column will appear every other month, time and space permitting (my time and **SoftSide**'s space). So, here we go. . . . .

Since winter is on the way and a lot of new products are coming out, this might be a good time to comment on what the future looks like.

The TRS-80 Model III is certainly going to be a winner if they ever get the operating system straightened out. Although it is priced slightly higher than a Model I, it is still cheaper than the original Model I was back at the beginning. The Model III is definitely going to be the hottest selling machine for at least the next couple of years.

The TRS-80 Model II is going to do better this year than it did last year when it first came out. Slowly, the software is appearing on the market to support it. The unit number of sales will, of course, be much lower for the Model II than the Model III or even the Model I. But, in its own right, it will do quite well.

The Model I is doomed thanks to the F.C.C. regulations. Still, there are a lot of Model Is out there in good working condition. I have yet to see one that has worn out. The compatibility of the Model III to the Model I will also help keep the original TRS-80 alive for a long time to come.

The machine that everybody thought would be called the TRS-90 is being called the TRS-80 COLOR. Atari and Texas Instruments tried to enter this market with similar machines and failed. In my judgement, so will Radio Shack. In fact, compared to Atari, Radio Shack is at the disadvantage. Atari has years of experience writing super games. Radio Shack does not. Let's face it, video gaming is Atari's market and even they have not been able to pull much of a profit out of their top-of-the-line home game machines. Add to that the fact that money is very tight right now, and you're going to see a lot of slow sales in the consumer video market in general - which includes TV projectors, video recorders, and such.

The problem with the Atari 400, Texas Instruments, TRS-80 COLOR, and other machines of this type is purpose. The people who are buying microcomputers want a practical machine - not a toy. In other words, they want a computer that can do useful things first, and play games second. Even the TRS-80 Model II proved that. My Model II GAMES Disk is selling extremely well and you've got to admit the Model II is not a game machine by any reasonable definition. The game computers are coming at this from the other direction. They come across as machines that play super games but can also do useful things. Somehow, that just doesn't wash.

The TRS-80 Pocket Computer is going to sell like gangbusters. It is a solution looking for a problem. It's one of those things that you know has got to be useful, and then you go and find reasons to justify its existence. Sadly, Radio Shack blew it with their tape storage format. The output appears to be RS-232 compatible but at an odd baud rate. A lot of people need a portable computer to collect data that can later be uploaded to a TRS-80. From there you can go anywhere. I have one client here in Vermont who is actually lugging around a TRS-80 Model I in the back of a station wagon, using batteries to run it. He uses it to record his field data about solar energy on tape. When he gets back to his office he transfers the tape to disk, and then uploads it to a PDP-11 using ST80-III. I've already talked to one hardware guy who thinks he can solve the Pocket Computer upload problem using a modified Micro-Connection, so I know it can be done. Once some kind of

practical solution to this data problem does come out, the TRS-80 Pocket Computer should break all sales records.

While the Apple has done well so far, the Apple and the Softcard will probably make all previous Apple sales look bad. A lot of software vendors have avoided Apple because their 8080/Z80 machine language code would have to be completely rewritten for the 6502 chip. Yet, many vendors don't mind modifying their machine language code to bring it up on another system. The Softcard now gives Apple access to either the 6502 or Z80 code and runs CP/M. It now will become feasible to modify Wordstar, Pencil, Microsoft compilers, and ST80s to run on the Apple. In some cases, no modifications will be needed at all. That's going to generate a lot of interest in software vendors who previously couldn't get into the Apple because of the 6502 chip.

The PET is an excellent machine in terms of units sold. But most of the sales are overseas, not here in the U.S. The PET is simply no match for the TRS-80 Model I & III. I don't see this situation changing. If anything, I see it getting worse. Both TSE and I seem to be getting more and more TRS-80 mail from the other side of the world. This indicates to me the fact that the TRS-80 is getting more and more notice than ever before, overseas, even without a Radio Shack store in every city. And that's bad for the PET.

Heathkit has got to get their act together. I don't know who's in charge over there, but they are not keeping up with the state of the art. This shows up in all kinds of ways, big and small. The other day, for instance, I noticed WH-14 printer manual gives the control codes in decimal, octal, and ASCII. Who uses octal anymore and what about hexidecimal? And then there is the disk drive on the All-In-One computer which is hard sector. The last time I saw a hard sectored disk was on an RCA Video IV whose design goes back about 10 years. On the plus side for Heathkit is their excellent customer support. Gee, you can open the cover without voiding the warranty. That's really nice. Heathkit also has got the marketing place.

The Super Brain probably will be a poor seller. It needs the marketing vehicle that Heathkit has. I guess that's like saying that if Heathkit made the Super Brain, it would sell a lot better. One bad omen with the Super Brain is the fact that it is a Z80 CP/M S-100 bus machine. Historically, that magic combination seems to have spelled failure.

The Sorcerer is another sad story. It's a machine that might have made it and didn't. Manufacturer support for the Sorcerer is sadly lacking and rumors abound of financial troubles over at Exidy. They certainly have had a lot of staff turnover during the last 18 months. When you look at the Sorcerer, you see that same curse: Z80 CP/M S-100 bus.

Computer software is also undergoing changes. About 18 months ago, the market was swinging toward low-priced items. Although it seemed to make sense at the time, it was really a stupid idea. People who don't have money don't buy their own personal computer. Computer users do have money. What they want is value which does not necessarily mean low cost. Now, you're going to see slightly less software, higher prices, but better quality, superior packaging, and improved customer support. One good program will always be worth more than five poor ones. This is going to create a void, however, for the small selling low-priced items. I've seen a lot of programs which are good but will only sell in small numbers and at low prices. The problem is going to be how to keep these products on the market. I'm thinking especially of computer games. I predict that something will come up to fill this need but I don't know for sure what that will be.

Over on the hardware side, you're going to see two battles. The first is the modem war. This is not going to be so much of a price war as a performance war. In other words, the price of modems will remain the same, but the features will keep getting better and better. The other war will be in the area of printers. The trend is going to be toward a smaller dot matrix (more dots) and bidirectional printing at faster speeds. Yet the price will keep coming down.

The cost of disk storage, too, will keep coming down while performance will continue to increase. But the ultimate direction in disk storage will be shared file access. The problem with shared file access is in the design problems for a bus structure and an operating system *to support it.*

Digital Research has found a neat way around both of these problems with a new operating system call CP/NET. CP/NET uses a host computer that is well equipped with hardware, especially disk storage. Microcomputers are connected to the host via RS-232 lines. These micros run a special CP/M operating system that automatically sends and receives data with the host using a special protocol. To the microcomputer, the host computer will appear as if it were a disk drive or a printer. This lets several users share the host and its equipment while each user operates with his own CPU and memory.

Still, multi-task multi-user systems are going to be the most conventional way of sharing data files for at least the next couple of years. These are turning out to be mini-computers that use microcomputer chips - usually the Z80 - and memory bank switching. MP/M is one operating system designed to do exactly that. The new 16 bit CPU chips, such as the Z8000, will also create more interest in what is really time-sharing on a small scale.

Rumor has it that Radio Shack is working on such a machine right now. This is supposedly the TRS-80 Model IV. It looks like it will use the Z8000 for a CPU chip. If the rumor is true. I believe the machine will be announced next summer and go into production next fall.

Overall, I think the microcomputer market is going to continue to be very healthy. The biggest problem, I think, is going to be for vendors and users to keep up with all of the new products. Yet, in spite of all of the confusion, someday people will refer to the next few years as the golden era of the computer.

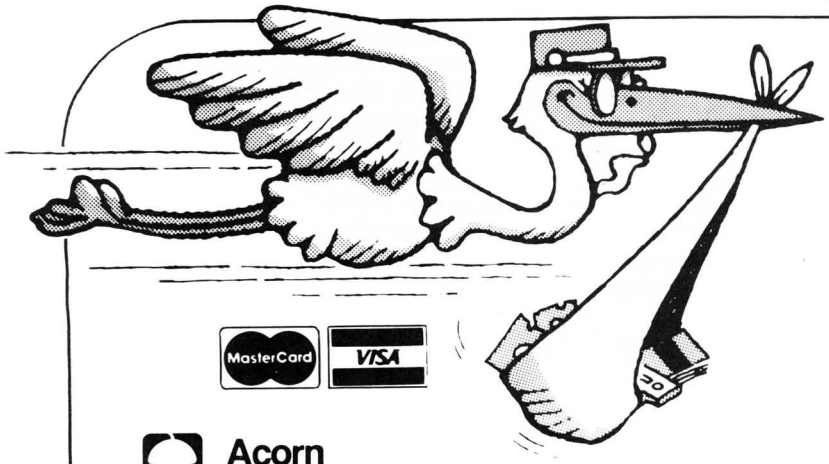
S-80 PROGRAMMING HINT (Level II)

To disable VIDEO, POKE 16413,0.

To re-enable it, POKE 16413,7.

While video is disabled, nothing can be printed on the screen.

Shane Causer
Brunswick, GA



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by Richard P. Wilkes

SUPERSCRIPT is a series of Machine Language programs which permanently customize Scripsit™ for the following:

* The user can now get a DIRECTORY from within SuperScript which lists all files and the number of free grans on the diskette.

* Files can be KILLED from within SuperScript using the 'K' command. This is invaluable when extra space is needed to save a large text file.

* The KEYBOARD DRIVER is changed to allow a correct key repeat which is faster than tapping on a key and which does not destroy the video display.

* Operator may INSERT TEXT into un-justified lines during printout. For example, inserting a name after "Dear" and before the colon.

* Parallel and serial drivers are included on the disk.

* Serial drivers are included which use the ETX/ACK protocol for 1200 baud communications.

* On printers that can backspace, UNDERLINING and SLASHED ZEROS are options.

* On Diablo and NEC printers, one can SUPERSCRIPT, SUBSCRIPT, UNDERLINE, BOLDFACE, SLASH ZEROS, and select 10/12 pitch.

* User can CUSTOMIZE the serial and parallel drivers for use with other types of letter-quality printers.

* The initial character sent to the printer is changed from a linefeed to a carriage return to empty buffer.

* The "L" command used to load a file now requires a filespec to avoid destroying text buffer if the question mark is omitted from the "?L" command.

* A REQUIRED SPACE may be specified when it is undesirable for SuperScript to place spaces between parts of the text when justifying.

* SPECIAL CHARACTERS such as brackets, braces, and carets can now be entered from the keyboard.

* Status messages at the bottom of the screen are more terse and are in upper and lower case.

* SuperScript protects drivers in high memory.

* A relocating LOWER CASE driver is included for use when utilizing the text insert function. Instructions can be obtained from the source code provided on its use in BASIC.

TRS-80 Level II, 32K disk $29.95

RAINYWARE

CONCENTRATION

Select a square and reveal one half of a fabulous prize! Find the other half and it's yours (well, not really). Stereos, televisions, Disneyland trips. . .they're all on the big screen. There's even a TRS-80!

But don't forget the basic rules! Concentrate on what's on the board, or you'll end up helping your opponent more than yourself.

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STATPAL

by Bruce Chalmers

Stumped by statistics? Here's the program for you! Written by a statistician but designed for use in the real world. Helps you: Create files, examine and edit data, and understand descriptive statistics. Sophisticated enough for the working statistician. This powerful interactive statistical package features: Complete error diagnostics, missing value specification and sophisticated graphics.

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by W. J. Kutleuer

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WHO: Investors, Option Writers or Purchasers use this program.

WHAT: Analyzes option prices and responds to current market prices as soon as you receive them.

WHY: Assesses the value of a given option. Monitors the value of your investments. Helps you decide when to purchase or to close out your options.

HOW: Use TRS-80 Disk.

Next to your broker - this program is your best option in creative investing. Analyze option prices before risking any money. Convenient features are data entry and flexibility in handling a wide variety of situations.

Available for Level II, 16K TRS-8 Microcomputers $29.95

SOFTAPE

SCREEN MACHINE

Open the manual and LOAD the cassette. Then get ready to explore the world of programmable characters with the SCREEN MACHINE*. You can now create new character sets - foreign alphabets, electronic symbols, and even Hi-Res playing cards, or use the standard upper and lower case ASCII character set.

The SCREEN MACHINE lets you redefine any keyboard character. Create any symbol by using a few easy key strokes and the SCREEN MACHINE will assign that symbol to the key

of your choice. For example: Create a symbol, an upside down "A," and assign it to the keyboard 'A' key. Now every time you press the 'A' key, or when the Apple prints an 'A', it will appear upside down. Any shape can be assigned to any key.

The SCREEN MACHINE gives you the option of saving your character symbols to disk or tape for later use. There is no complicated 'patching' needed. The SCREEN MACHINE is transparent to your programs. Just print the new character with a BASIC print statement. The SCREEN MACHINE is very easy to use.

Included on the cassette are Apple Hi-Res routines in SOFTAPE prefix format. You can use both Apple's routines and the SCREEN MACHINE to create microcomputing's best graphics.

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Disk version $29.95

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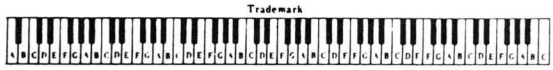

SOFT MUSIC

by Steve Bjork and Patricia Cartier

SOFT MUSIC is a two-voice, seven octave music synthesizing program. Although it is written in Machine Language, it appears as a BASIC line. By this method it is possible to save and load Machine and BASIC Language programs together.

With a general knowledge of music, you will be writing songs and adding to your BASIC programs in no time.

Also included in this package is a MUSIC EDITOR to aid in the development of songs for SOFT MUSIC.

TRS-80 16K Level II, Cassette $24.95

FORTH II

FORTH II is an extremely well-documented version of the Forth language that has been in use since the late 1960s.

It is many times faster than BASIC and is easy to use. Some of its features are:

*Runs on any Apple II computer (24K minimum);

*Supports DOS 3.2;

*Control C Break and Continue;

*Compatible with Autostart ROM;

*"Save it" file for customizing system;

*Disk-based editor and compiler

*Complete instructional reference manual;

*Excellent execution speed and memory efficiency;

*Verbs for graphics, game I/O, sound, disk and tape I/O.
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At last, the sequel to the "Temple of Apshai." Dunjonquest's newest, "Hellfire Warrior," adds four more levels to the lowest reaches of Apshai's dunjon. Undead and fiery demons roam seemingly endless labyrinths, gobbling up all but the hardiest warriors. If you are a beginner, perhaps you should explore other regions first, for "Hellfire Warrior" is for only the most hardened.

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These first three games in the Galactic Saga put you in the commander's seat with complete graphics giving you all the information you need.

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The Problem - unite the galaxy of 20 worlds under a single flag, starting from a single world neither large nor powerful. The Challenge - time and distance are real; if you don't get troops and material to the right place at the proper time, they will do you no good. The Solution - scouting, planning, a head for logistics and picking your targets are the ingredients for your success.

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Soft Sector Marketing, Inc.

BOSS™ 1980 UTILITY REFERENCE MANUAL

by V. B. Hester Version 2.1

The BOSS is designed to aid you in creating and debugging programs written in BASIC. It will allow you to trace the program flow, to single step the BASIC program, to observe the conditions of variables during program execution, and to push your BASIC programs on the stack or pop them off the stack during program development. The BOSS operates with: TRSDOS 2.2-2.3, NEWDOS 80, NEWDOS 2.1, and VTOS - 3.0.

The BOSS will operate with either Level II BASIC or Disk BASIC. Minimum equipment configuration is 16K Level II TRS-80 with cassette input. Functions include:

* TRACE FUNCTION - Allows you to follow the twisted (or logical) path your program takes, without messiness on the screen caused by the other trace function.

* SINGLE STEPPING - Allows you to single step individual lines of a BASIC program of individual instructions within a line.

* BREAK POINT - The trace and single step commands can be invoked by your program while it is running with this feature.

* REVIEWING VARIABLES -Allows you to pause to review selected variables during program execution and return to your program with the display restored to that shown before you review the variables (great if your screen had graphics displayed).

* STACKING PROGRAMS -Allows you to stack one or more programs in high memory while you work on or run another program. Of course, this ability is limited by the amount of free memory space available. You can retrieve the stacked programs at will.

TRS-80, 16K Level II
Cassette $29.95

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$5.50 plus $1

A CONSUMER'S GUIDE TO PERSONAL COMPUTING AND MICROCOMPUTERS

by S. Freiberger and P. Chew Jr.
(Hayden)

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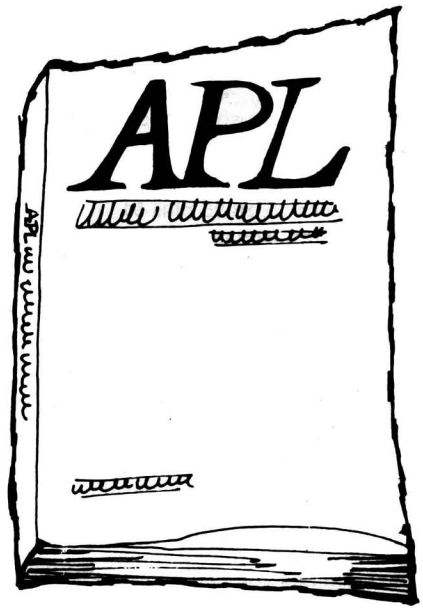

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Additional functions and features now available in both the IBM and Scientific Time Sharing implementations have been included in this edition, and the chapters on workspace management and function definition have been substantially rewritten providing additional graphic aids to the student. Where appropriate, sections have been included on distinctive features of the IBM 5100 Computer.

For this edition, nearly all the example functions in the text have been placed in a workspace named 1 CLASS. If your APL system lacks this workspace, it may be obtained from Scientific Time Sharing Corporation. $16.95 plus $3.

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SAY YOHO

by Scott Adams

This month I will be taking a look at my new Odyssey series, plus I will be covering another way to map adventures.

At the time I developed my original adventure, disks were still just over the horizon and a TRS-80 16K Level I was still not an unusual sight. Thus my constraints were for a fairly complex game to be played in a machine with a limited amount of memory. This meant a reduction in vocabulary and also in textual output during the game, as well as commands having to be limited to one or two words at most.

Today, though, 90% of all Apple owners have disks and probably at least 50% of the TRS-80 owners do too! This gives me a medium to develop adventure-type games beyond my original 16K limitations, by using the additional 100K or so offered by the one-drive system. Adams' Odyssey will have some special additions to it. Some of these new features are:

1) More than one player in an Odyssey at one time. Players may help (or hinder) one another as they see fit!
2) Full paragraphs instead of "baby talk," e.g. "Shoe the horse with the horseshoe and the hammer and nails."
3) Longer messages;
4) Sound effects; and
5) expanded plot lines.

To develop this system I have actually had to develop a new type of computer language which I call OIL (Odyssey Interpretive Language) which is implemented by a special Odyssey assembler that generates Odyssey machine code. This machine code is then implemented on each different micro, e.g. Apple, TRS-80, etc., through a special host emulator to simulate my nonexistent Odyssey computer.

One possibility which I plan to explore further will be putting this host computer in FORTRAN and then running on a sharing system like MICRONET or SOURCE with maybe 100 players interacting in an Odyssey at the same time.

Currently (as of the Washington computer show, Sept., 1980) the system is in the final stages of implementing a host emulator on a TRS-80 32K disk system and writing the first Odyssey (which has been sketched out and is tentatively entitled "Martian Odyssey") in OIL to run on the emulator. I hope that by the time you are reading this, Odyssey Number One will be available from your local computer store or favorite mail order house. Keep in mind, however, that this is but a hope and not a firm promise! In any case, once it does come out I hope it will be as much fun to play as it was to write.

Now a look at another way to map adventures.

Each room is represented by a box with the name of the room in it, and all original items found in it noted alongside. (See Figure 1).

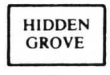


FIGURE 1

Directions from a location are indicated by a line coming out of ANYWHERE on the box, but with the direction leaving the box indicated by the first letter of that direction.

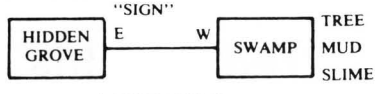


FIGURE 2

Figure 2 shows it is East from the grove to the swamp and West from the swamp to the grove. In the case of being able to go only in one direction, an arrow is put at the end of the path. (See Figure 3).

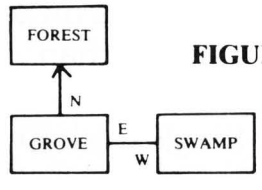


FIGURE 3

This indicates that upon leaving the grove you go north to the forest, but that you cannot return!

The best way to use this system is that, upon entering a location, you draw a line representing each possible exit and its direction. (See Figure 4).Later you connect them to rooms as you continue your exploration.

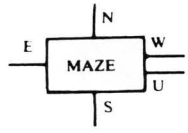


FIGURE 4

The advantage is that you will not forget to explore an exit once you get past your initial probe. Another advantage of this system is that you never need to redraw your map as you stick extra locations anywhere on your paper. (See Figure 5).

Also notice that on the forest the exits N,S,W are available, but that they all return to the forest! Note also that as additional locations were found off the swamp, the map was not redrawn. Instead, the locations were simply put where needed. And since we "climb tree" instead of going in a particular compass heading, we wrote that as directions to leave the swamp.

I hope you'll find this an easy system to use. You should find that once you start using it, you will spend less time mapping or wandering around lost than you may have in the past! (P.S.: Systems analysts may recognize this system as a modified HIPO Diagram used to indicate program flow and control.)

'Til next month, Happy adventuring!

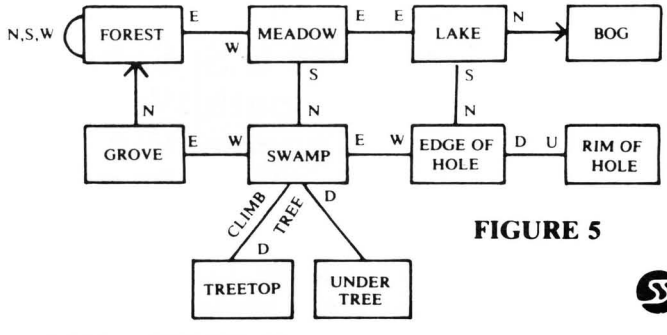
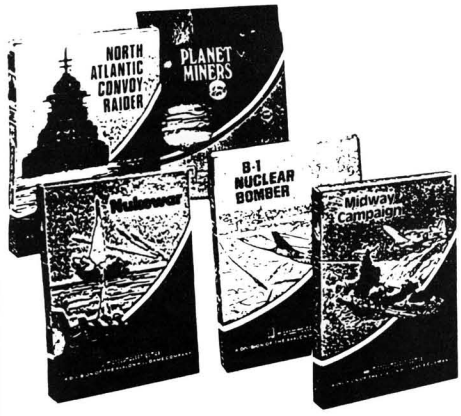


FIGURE 5



From Avalon Hill

NORTH ATLANTIC CONVOY RAIDERS ($15)

This game is a computer simulation of the Bismarck convoy raid of 1941. The computer controls the British convoys and British battleships. Will the Bismarck sink the Hood, only to be sunk in turn by the Rodney and King George V, as in history? Or, will the Bismarck cripple or sink the British Home Fleet and go rampaging through the convoy lanes? Your decisions will determine the fate of the Bismarck.

This SOLITAIRE game includes software and instructions for the following computers: TRS-80* Level II, 16K Memory. Apple II*, Applesoft, BASIC, 16K Memory beyond BASIC. Pet*, 16K Memory.

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PLANET MINERS gives one to four players the chance to compete with each other and the computer to stake valuable mining claims throughout the solar system in the year 2050. Each player must decide which ships to send to which planets and when to try "dirty tricks" like sabotage and claim-jumping. If there are less than four players, the computer takes the other parts. (It can even play all by itself!) Thus, PLANET MINERS can either be played solitaire or with friends.

This 1-4 player game includes software and instructions for the following computers: TRS-80* Level II, 16K Memory. Apple II*, Applesoft* BASIC, 16K Memory beyond BASIC. Pet 2001*, 16K Memory.

B-1 NUCLEAR BOMBER ($15)

This game gives you an opportunity to be the pilot of a B-1 bomber on a mission over the Soviet Union. You must fly the plane through the stiff Russian defenses to the target city, bomb it, and return home. Your computer controls the Soviet air defense bases with their almost unlimited numbers of MIGs (fighters) and SAMs (Surface-to-Air Missiles). Your only chance to get through is to rely on the superior technology of your sophisticated ECM (Electronic Counter Measures) and self-defense missiles. When all else fails, you can try violent evasive maneuvers.

This SOLITAIRE game includes software and instructions for the following computers: TRS-80* Level II, 16K Memory. Apple II*, Applesoft* BASIC, 16K Memory beyond BASIC. Pet*, 16K Memory.

MIDWAY CAMPAIGN ($15)

MIDWAY CAMPAIGN is a computer simulation of the battle for Midway Island. Your microcomputer controls a huge force of Japanese ships whose objective is to invade and capture Midway Island. If the Japanese can win air superiority over Midway, the success of the invasion is virtually guaranteed. If not, they will be forced to turn back to prevent the loss of irreplaceable troops who would be totally vulnerable in their invasion craft. In the actual engagement, the Japanese made several tactical errors which cost them the battle. Your computer probably won't make the same mistakes! You command the badly outnumbered and outranged U.S. Navy forces. Your only advantage is surprise.

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CARD DRAW

by Arthur A. Glecker

CARD DRAW
Card Draw is a 16K S-80 Subroutine.

SUBROUTINE TO "MANAGE" A DECK OF CARDS

Most TRS-80 owners are familiar with card - playing games for computers, especially since a Blackjack tape is included with the TRS-80. The purpose of this article is to acquaint users with some methods of "deck management."

The first method that comes to mind is to have the computer select a number between one and 52 (inclusive), then compare it to the corresponding element of an array in which each element represents one particular card. If the number in that element of the array indicates that the card has already been used, the computer starts over, randomly selecting a new number.

This method is both slow and uses an excessive amount of memory for the array. If there is only one card left, it may take a seemingly endless time to generate a random number that corresponds to the card.

The method used in Radio Shack's Blackjack game is much better, time-wise, than the one described above. Also, it can be (and is being) used on Level One machines. However, it still uses a great amount of array space.

I will not explain the Radio Shack method here, but the reader many certainly examine a copy of Blackjack, beginning at line 200, to discover it.

The following subroutine, which can be used in almost any Level Two program, uses nine variables, and only two of the nine (CD$ and CD) must be "preserved" throughout the main program. (The routine "assumes" that when it is first used during a run, CD is set to zero.

When the subroutine is first called, or after the cards have all been used, CD equals zero, and line 1030 is reached. At 1030, a string variable (CD$) is set up using the first 52 ASCII characters, each representing a card. CD is set to one so that 1030 will not be reached on later calls of the subroutine unless CD is changed.

At 1040, a random number is chosen which is between one and the length of CD$, inclusive. This random number, C2, corresponds to a character within CD$, the ASCII code of which is put into C3.

At 1050, the character indicated by C2 is removed from CD$ so that the card will not be picked again. This is accomplished by concatenating (fancy word for "combining two string variables") all the characters to the left of C2 and all the characters to the right of C2 to get a new value for CD$.

At 1060, the length of CD$ is checked. If the length is zero, all the cards have been used. CD is set to zero so that a new string (CD$) can be set up the next time the subroutine is accessed (line 1030 will be reached). OD can also be used as a flag to the main program to indicate that one deck has been used, in case the program is only supposed to use one deck.

At 1070, the proper suit is calculated using C3.

At 1080, a loop subtracts 13 from C3 until C3 is less than 14. This is to allow lines 1090 to 1220 to select the proper card name within the suit.

Finally, at 1230, the suit and card names are concatenated as CN$, which is returned to the program as the card's name.

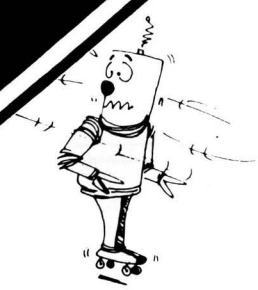
```
1000 ' EFFICIENT CARD - DRAWING SUBROUTINE
       BY ARTHUR A. GLECKLER
       VERSION 800531.1 BAS ii

1010 'VARIABLES USED : CD$, C1$, C2$, CD, C1, C2, CN$, CX, C3
1015 'CN$ IS THE RETURNED NAME OF THE CARD
1020 IFCD=1THEN1040
1030 CD$="":FORCX=1TO52:CD$=CD$+CHR$(CX):NEXT:CD=1

1040 C1=LEN(CD$):C2=RND(C1):C3=ASC(MID$(CD$,C2,1))
1050 CD$=LEFT$(CD$,C2-1)+RIGHT$(CD$,C1-C2)
1060 IFLEN(CD$)=0THENCD=0

1070 IFC3<53THENC1$=" OF CLUBS":IFC3<40THENC1$=" OF SPADES":IFC3
<27THENC1$=" OF HEARTS":IFC3<14THENC1$=" OF DIAMONDS"
1080 IFC3>13THENC3=C3-13:GOTO1080

1090 ON C3 GOTO 1100,1110,1120,1130,1140,1150,1160,1170,1180,119
0,1200,1210,1220
1100 C2$="2":GOTO1230
1110 C2$="3":GOTO1230
1120 C2$="4":GOTO1230
1130 C2$="5":GOTO1230
1140 C2$="6":GOTO1230
1150 C2$="7":GOTO1230
1160 C2$="8":GOTO1230
1170 C2$="9":GOTO1230
1180 C2$="10":GOTO1230
1190 C2$="JACK":GOTO1230
1200 C2$="QUEEN":GOTO1230
1210 C2$="KING":GOTO1230
1220 C2$="ACE"
1230 CN$=C2$+C1$:RETURN
```

An Apple One-Liner (Applesoft)

by Dennis Ward

```
1  HOME : VTAB 23:T = (T + 1) * 2
     :T = T - 500 * (T > 500): PRINT
     TAB( 17);"DESIGN #"T: GR : FOR
     Y = 20 TO 39: FOR X = 20 TO
     39: COLOR= X * Y / (T + 4): PLOT
     X,Y: PLOT 39 - Y,X: PLOT 39 -
     X,39 - Y: PLOT Y,39 - X: NEXT
     X,Y: GOTO 1
```

TRS-80 LEVEL II



Board Games-1, CS-3001 (16K)

• Mugwump $7.95

Mugwump is a board game which uses a 10x10 grid on which four friendly Mugwumps are hiding. Your mission is to locate these mysterious animals and capture them.

• Flip Disc

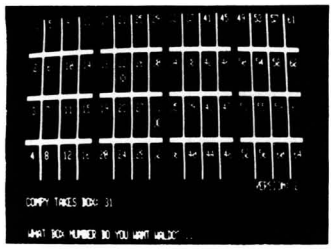
Are you an Othello freak? Flip Disc is a program which will turn your computer into an excellent opponent. Three different skill levels, (good, expert, and genius), provide an introduction for the novice and continuing interest for the experienced player.

• Wumpus

In game 1, you scour a network of underground caves in search of the prized Wumpus. Bagging a Wumpus wins the game, but if you accidentally stumble into his cave, the Wumpus will enjoy a tasty dinner of sauteed computer freak.

• Wumpus 2

If you master the dodecahedron cave network in Wumpus 1, you may proceed to Wumpus 2 which allows you to choose from five different caves, or you can design your own.



• Qubic

Qubic is a three dimensional Tic Tac Toe game. The game is played in a 3 dimensional cube (4x4x4). The object is to outwit the computer and place four pieces in any straight line.

• Backgammon

This is the TRS-80 adaptation of the popular board game. Backgammon uses graphics and all the standard backgammon *rules, not a strange* computer variation. The computer is your opponent in this version, written by Scott Adams of "Adventure" fame.

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Space Games-3, CS-3002 (16K)

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• Star Lanes

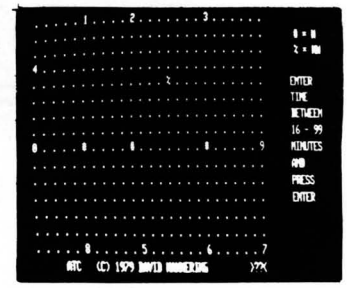
Imagine yourself the president of an intergalactic shipping company. If you're successful, you may be named Imperial Advisor on Economic Affairs. Entrepreneurs: to your ships.

• Star Wars

If you hate Darth Vader, you'll love Star Wars. This real time game is fun for aliens of all ages. May the Force be with you!

• Romulan

Your mission is to destroy an invading Romulan space craft. Maneuver through space and around stars looking for the deadly enemy, but be careful! The nasty Romulans fire back.



Air Traffic Controller, CS-3006 (16K) $7.95

This real time machine language program puts you in the chair of an air traffic controller. There are 27 airplanes — jets and prop planes — which must be controlled as they land, take off and fly over your air space. You give the orders to change altitude, turn, maintain a holding pattern, clear for approach, and land at your two airports. This realistic simulation includes navigational beacons, and requires planes to take off and land into the wind. Air Traffic Controller was written by an air traffic controller and is a favorite of the Creative Computing staff!

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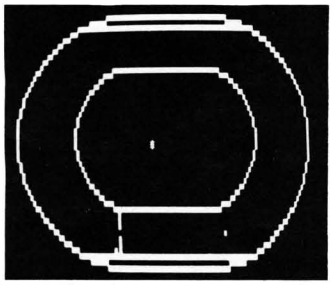

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Motor Racing combines real time racing action with advanced graphics functions. The graphics and animation make Motor Racing fun to watch as well as play.

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Stock Car Race is a real time racing game on a road race circuit.

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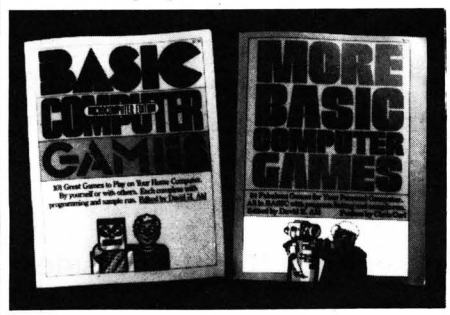

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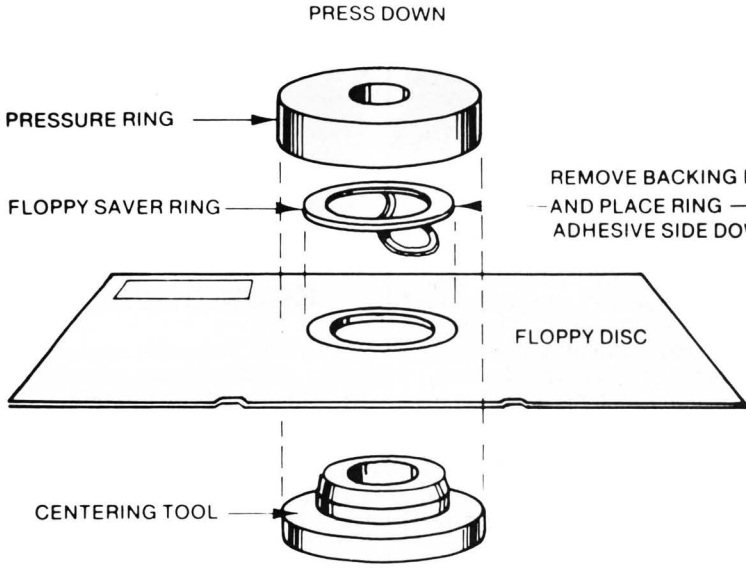

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METEOR STORM

Meteor Storm is for the 16K Level II S-80, any Atari, or any Apple with Applesoft.
by Roy Harper

You have been chosen as the best pilot for the job, only the job looks very bad indeed. You are to fly ahead of your mother ship and blast a path through a severe meteor storm.

This is also a paying proposition. You are given points (the monetary system is in points) for just staying alive by dodging all of the meteors. If you don't want to make your first million within your own lifetime, then just dodge. For each meteor you destroy you get 100 points. When the situation gets to be very dangerous, you can go into hyperspace. I must warn you to use this as few times as possible because you could come out of hyperspace right on top of a meteor, or be hopelessly lost in space. Within a short time, however, you will be navigating through the meteors with the best of them.

Now for the variable list.

A$ - Used for temporary storage of INKEY$ and used all over.

E$ - This is what your shot looks like.

G - This is the PRINT@ location of your shot. If it is zero, then you aren't shooting.

HP - High score (I could have used HS but I love to drive you crazy).

HP$ - The name of the high scorer.

I - Used for FOR-NEXT timer loops.

L - The location of your ship in video memory.

P - temporary storage for PEEK (14400).

PO - Your score.

S - PRINT@ location of the ship.

S1, S2, S3 - PRINT@ location of debris.

S$ - This is what your ship looks like.

S1$, S2$, S3$ - What the debris looks like.

T - Used for FOR-NEXT timer loops.

Y$ - Used to ask, "DO YOU WANT TO TRY ANOTHER MISSION?"

Now to explain myself a little bit. First, the whole secret to this game is the screen's scrolling ability. When the screen is made to scroll, everything on it seems to go flying past. That is the way I made such a fast game with such a small amount of typing.

This, however, is the most useful technique I have found. You may have seen a table that has the keyboard memory on it. Actually, there is no real memory between location 14336 and 15359. It is a bunch of switches that were mapped into a place in memory. First, let's look closely at the row of 14400. If you hold down the ENTER key, the location 14400 will contain a 1. If you hold down the left arrow, it will contain a 32 (easy enough so far?). "But what is that in binary?" Give that man an "A," because when you hold down the ENTER key, it turns on the 1's bit, and when you hold down the left arrow key, it turns on the 32's bit, like this (00000001 for enter and 00100000 for the left arrow). Something very interesting is going on here. Each key will turn on one of the eight bits in that byte. Therefore, when PEEK location 14400 contains a 32, the left arrow is being held down (cheer, cheer, hooray!!). HOLD THE PHONE!! Something could go wrong! Just what could happen to it if the idiot at the keyboard was holding down the left arrow AND the enter key(00100001)? Then 14400 would contain 33 (Nuts, I knew it couldn't last). Never fear!! LEVEL II BASIC to the rescue!!! Do you remember the AND function? It is the one that just might solve our problem. You see the AND function works like this. When you have a 33 (00100000) you get a 32 because in an AND function both of the bits in the input have to be on for the output bit to be on. Here is a table that explains what I just said.

This is called a truth table. The computer will AND one bit at a time and will take an on bit only when both bits in the AND are on. If you want to single out one key (in any of the PEEK values in keyboard "memory"), just AND with the value of that key (PEEK(14400)AND1 for enter, PEEK(14400)AND 128 for space bar, etc.). Now if you write out in your program . . .

IF PEEK(14400) and 32
PRINT "LEFT ARROW"

. . . and hold down the left arrow, it will PRINT the message, "LEFT ARROW". Why don't you need to say IF PEEK(14400) and 32 + 32? I personally don't know, but it works just fine for me.

[Editor's note: The reason is that first, the expression after the IF is evaluated; if the result is zero then everything after the expression is skipped and BASIC "drops through" to the next line. If the result is NOT zero (in the above case the result is 32) then BASIC will continue execution with the first statement following the expression.]

Now you know how to make your programs check to see if the user is holding down the left, right, up or down arrow, or any combination of the arrow keys. Use it in good health; after all, you just typed it in, and it is in your memory. You are encouraged to edit the daylights out of my program.

continued on next page

S-80 One Liner
by Will Evans

The following ONE-LINER is called SPACE SLALOM. The object of the game is to survive for as long as possible, thus getting a higher score. To do this you must avoid colliding with stars (represented by *) and remain within the boundaries (represented by #) of the playing area. To avoid collision, use the two left/right arrowed keys which move your ship in the direction they designate.

```
! H=PEEK(14400):A=SGN(H)*SGN(H-60):P=G+15583+A:IFPEEK(P)=92ORPEE
K(P)=32POKEP,92:PRINTTAB(15)"#";TAB(15+RND(32))"*";TAB(48)"#":G=
G+A:C=C+1:GOTO1ELSEPRINT@207,">>>>>>>>>> SPACE CRASH <<<<<<<<<<
",,"          SCORE:";C-15:FORA=1TO999:NEXT:CLS:G=0:C=0:GOTO1
```

S-80 VERSION

```
100 CLS:INPUT"INSTRUCTIONS";A$:IFLEFT$(A$,1)="Y"THENCLS:GOTO310
```

Line 110: Initialization. If you want to play again, this is where the program will GOTO.

```
110 RANDOM:CLS:DEFINTA-Z:P0=0:L=15390:S=30:G=0:S$=CHR$(135)+CHR$
(188)+CHR$(139):E$=CHR$(133)
```

Line 120: This is where I make all those plus signs go up the screen. I put a meteor at a random position at the bottom of the screen and don't suppress the line feed. The computer then scrolls the entire screen upwards and makes it look like things are moving. Your score is printed in the upper-left corner. There is no penalty for flying over your score (except for a certain amount of difficulty in reading it).

```
120 PRINT@G," ";:PRINT@RND(62)+960,"+";PRINT@0,P0;
```

Line 130: Right here I find out which arrow keys you are HOLDING DOWN. If you are holding down the left arrow, the value at peek location 14400 will be 32. If the right arrow is pressed, the value will be 64. More on that later.

```
130 P=PEEK(14400):IFP=32L=L-1:S=S-1ELSEIFP=64L=L+1:S=S+1
```

Line 140: I keep you within limits right about here. Anywhere between 1 and 61 will do.

```
140 IFS<1S=1:L=L+1ELSEIFS>61S=61:L=L-1
```

Line 150: Once I know where you are, I should like to know if you've been hit. You are sitting at 3 places on the screen and if any of those spaces contain a meteor (ASC("+")=43) then you have been hit.

```
150 IFPEEK(L)=43ORPEEK(L+1)=43ORPEEK(L+2)=43THEN200
```

Line 160: If you haven't been hit yet, then I will put you on the screen.

```
160 PRINT@S,S$;
```

Line 170: When G=0, you aren't shooting. Therefore it would be nice to find out if you would like to shoot (nothing like having your guns fail you when a meteor is examining your nose hairs). If you have just hit the space bar, then the shot's position is right in front of you. If you hit the enter key (CHR$(13)) instead of the space bar, you will be sent to the hyperspace routine.

```
170 IFG=0A$=INKEY$:IFA$=" "THENG=S+65ELSEIFA$=CHR$(13)GOTO250ELS
E190
```

Line 180: This line takes care of the shooting. It moves the shot down to the next line and checks to see that it is still on the screen. If so, a check is made to see if a meteor has been hit. One PEEK finds where it is, the other checks to see if it skipped something (when the shot goes down and the screen scrolls up, it may try to skip one of those little buggers). If you did hit something, the program will go to the approriate explosion routine. If you pressed the ENTER key, it will go to the hyperspace routine. If you did none of the above, then it will put your shot back on the screen. If the shot has gone off the bottom of the screen, it will be reset to zero and the INKEY$ buffer will be cleared (wasn't that a doozie of a line?).

```
180 G=G+64:IFG<1024IFPEEK(15360+G)>32GOSUB230ELSEIFPEEK(15296+G
)>32GOSUB240:GOTO120ELSEA$=INKEY$:IFA$=CHR$(13)THEN250ELSEPRINT@
G,E$;ELSEG=0:A$=INKEY$
```

Line 190: This is the bottom of the loop. If you ain't dead yet, it will add one to your score and jump back to the top of the loop (line 120).

```
190 P0=P0+1:GOTO120
```

Line 200: This is your ship's explosion routine. It puts a white flash on top of your ship, sets up some variables, waits, and then erases the flash.

```
200 PRINT@S-1,STRING$(5,191);:S1$=LEFT$(S$,1):S2$=MID$(S$,2,1):S
3$=RIGHT$(S$,1):S1=S:S2=S+1:S3=S+2:FORI=1TO50:NEXT:PRINT@S-1,"
  ";
```

Line 210: First it erases the old debris, moves the pieces, makes certain that they are still on the screen and puts them on the screen again. After that it waits a jiffy and does the whole thing over again.

```
210 PRINT@S1," ";:PRINT@S2," ";:PRINT@S3," ";:S1=S1+63:S2=S2+64:
S3=S3+65:IFS1<1023ANDS2<1023ANDS3<1023PRINT@S1,S1$;:PRINT@S2,S2$
;:PRINT@S3,S3$;:FORI=1TO50:NEXT:GOTO210
```

Line 220: Waits a couple of seconds and jumps to the "PLAY AGAIN?" routine.

```
220 FORI=1TO1000:NEXT:GOTO270
```

Line 230: If your shot hits a meteor, add 100 points to your score, clear the buffer, flash the screen, wait, erase it, and RETURN.

```
230 P0=P0+100:A$=INKEY$:PRINT@G-1,STRING$(3,143);:FORT=1TO30:NEX
T:PRINT@G-1,"   ";:G=0:RETURN
```

Line 240: Just like 230 only your shot jumped over the meteor instead of landing on it.

```
240 P0=P0+100:A$=INKEY$:PRINT@G-65,STRING$(3,143);:FORT=1TO30:NE
XT:PRINT@G-65,"   ";:G=0:RETURN
```

Line 250: The hyperspace routine. First it sets your shot to zero, then does a neat little trick: if the random number is 1 then it goes to the "HOPELESSLY LOST IN SPACE" routine; if it is between 2 and 10 then all is well (almost: you still might land on a meteor).

```
250 G=0:ONRND(10)GOTO290
```

Line 260: This is hyperspace. It will make between 1 and 75 meteors go flying up the screen (be careful when using hyperspace in any form). The extra PRINT makes things move a little faster. The T$=INKEY$ just clears the buffer. Then back to the top of the loop.

```
260 FORI=1TORND(75):PRINT@RND(62)+960,"+";:PRINT:NEXT:T$=INKEY$:G
OTO120
```

Line 270: This is the endgame or "PLAY AGAIN?" routine. First it checks to see if your score is higher than the previous high score. If it is, then it jumps to line 360 otherwise it prints the high scorer and his score, then tells you what your score was.

```
270 IFP0>HPTHEN360ELSEPRINT@25,HP$";";HP;:PRINT@458,"YOU EARNED"
P0"POINTS ON THAT MISSION";
```

Line 280: Here you are asked if you want to play again. Press ENTER if you do, or press "N" and ENTER if you don't. If you do, control goes to line 110 (the initializing line.

```
280 PRINT@523,;:INPUT"DO YOU WANT TO TRY ANOTHER MISSION";Y$:IFL
EFT$(Y$,1)="N"THENENDELSE110
```

Lines 290 and 300: This is the hopelessly lost in space routine. The time you spend in hyperspace is a little longer so as to make you nervous (ain't I a stinker?). Next, I inform you that you are hopeless(ly lost).

```
290 FORI=1TO100:PRINT@RND(62)+960,"+":PRINT:NEXT
300 PRINT@396,"YOU ARE HOPELESSLY LOST IN SPACE":GOTO270
```

Lines 310 to 350: Instructions. First I try (perhaps in vain) to freak out the inquisitive little brat who wants instructions, then tell him the (in)correct way to play the game.

```
310 FORI=1TO30:PRINT@RND(62)+960,"+":NEXT:PRINTTAB(23);"METEOR S
TORM":PRINTTAB(23);"BY ROY HARPER"
320 PRINT:PRINT"  YOUR MISSION IS TO BLAST A PATH THROUGH A SEVE
RE METEOR
STORM.  YOU ARE ABLE TO STEER LEFT AND RIGHT USING THE LEFT AND
RIGHT ARROW KEYS.  YOUR MISSION ALSO INCLUDES DESTROYING
330 PRINT"METEORS (100 PTS EACH!).  LINE YOURSELF UP WITH A METE
OR AND
PRESS THE SPACE BAR TO FIRE.
  ANOTHER FEATURE OF YOUR SHIP IS ITS ABILITY TO GO INTO HYPER-
SPACE.  USE THE ENTER KEY TO DO THIS.  A WORD OF CAUTION.  BEING
IN HYPERSPACE DOES NOT ADD
OR";
340 PRINT" SUBTRACT FROM YOUR SCORE.  IT MAY LAND YOU ON A METEO
R, OR WORSE YET, YOU MAY BE HOPELESSLY LOST  IN SPACE.
                    GOOD LUCK!!!

350 INPUT"PRESS ENTER TO BEGIN";A$:GOTO110
```

Line 360: This is the message for the slob who just beat your high score (after all, no one should be allowed to beat YOUR high score and live (heh, heh)).

```
360 HP=P0:CLS:PRINT@448,CHR$(23);"YOU GOT THE HIGH SCORE OF"HP:I
NPUT"ENTER YOUR NAME PLEASE";HP$:CLS:GOTO280
370 'xx x x x x x x x x x xx
380 'xx     ROY HARPER      xx
400 'xx  ROSEBURG OREGON   xx
420 'xx x x x x x x x x x xx
```

ATARI VERSION

Initialize. OPEN screen for input.

```
10 GRAPHICS 0:OPEN #1,4,0,"S:":SETCOLOR
2,0,0:DIM HP$(19),S$(3):S$(1)=CHR$(26):S
$(2)="V":S$(3)=CHR$(3):POKE 752,1
```

OPEN keyboard for input. If "Y" is pressed, print the instructions.

```
15 DIM METEOR$(1):METEOR$=CHR$(20):OPEN
#2,4,0,"K:":? "Instructions?";:GET #2,A:
IF A=89 THEN 400
```

Otherwise, skip instructions.

```
16 GOTO 500
```

X is the position of the ship, SC is the score, and G is the missile's row (if there is a missile).

```
20 X=19:SC=0:G=0
```

D is zero at first. It is increased by one for every 1000 points earned. D is then used to control the color of space and the number of meteors.

```
30 D=INT(SC/1000):SETCOLOR 2,D,0:SETCOLO
R 4,D,0:FOR I=0 TO D:POSITION RND(1)*38,
23:? METEOR$;:NEXT I:?
```

Check for the presence of a meteor (CHR$(20)) in any of the three positions where the ship is. If there is one, line 100 takes care of destroying you.

```
40 POSITION X,0:FOR I=1 TO 3:GET #1,L:IF
 L=20 THEN POP :GOTO 100
```

Redraw ship since GET#1 may have erased part of it.

```
45 NEXT I:POSITION X,0:? S$;
```

Add one to score and print it.

```
50 SC=SC+1:POSITION 5,0:? SC;:POSITION X
,0:? S$;
```

Check for stick motion to the left (including diagonal motion). If possible, move ship left.

```
70 P=STICK(0):IF P>8 AND P<12 AND X>0 TH
EN X=X-1
```

Check for motion to the right (as in line 70).

```
80 IF P>4 AND P<8 AND X<36 THEN X=X+1
```

If stick is pressed forward, go to the hyperspace routine at line 200.

```
85 IF P=14 THEN 200
```

If trigger is pressed and if there is no missile then fire one.

```
87 IF STRIG(0)=0 AND G=0 THEN C=X+1:U=14
:GOSUB 300
```

If a missile exists, update its position.

```
88 IF G<>0 THEN GOSUB 300
```

Repeat cycle.

```
90 GOTO 30
```

Erase missile if there is one.

```
100 IF G>0 THEN POSITION C,G-1:? " ";
```

Erase ship and compute locations for debris: L=left, C=center, R=right.

```
105 POSITION X,0:? "   ";:L=X:R=X+2:C=X+
1:POSITION 5,0:? SC;
```

Ship explosion and explosion sounds (at line 700).

```
110 FOR Y=1 TO 22:L=L-1:IF L<0 THEN L=38

120 R=R+1:IF R>38 THEN R=0
130 POSITION L,Y:? CHR$(26);:POSITION C,
Y:? "V";:POSITION R,Y:? CHR$(3);:GOSUB 7
00
150 POSITION L,Y:? " ";:POSITION C,Y:? "
 ";:POSITION R,Y:? " ";
160 NEXT Y
```

Turn off sounds. If player's score is better than all previous players, set player's name.

```
170 FOR I=0 TO 3:SOUND I,0,0,0:NEXT I:IF
 SC>HP THEN 600
```

Print best score and name of player who got it. Then print current score.

```
180 POSITION 15,0:? HP$;":";HP:POSITION
1,12:? "You earned ";SC;" points on that
 mission";:POSITION 1,14:GOTO 480
```

That's all folks!

```
199 END
```

Hyperspace routine. Deactivate missile and its sound. Increase loudness of space noise.

continued on next page

```
200 G=0:SOUND 0,1,0,14:SOUND 1,0,0,0

  Set brightness of space to maximum
  thus creating the illusion that the
  meteors have gone dark. Prepare to fly
  among 10-75 meteors on our voyage
  through hyperspace.

210 SETCOLOR 2,0,14:SETCOLOR 4,0,14:FOR
I=1 TO RND(0)*56+9

  Draw meteors.  Return to normal space
  after restoring normal sounds and
  colors.

220 POSITION RND(1)*38,23:? METEOR$:NEXT
 I:SETCOLOR 2,0,0:SETCOLOR 4,0,0:SOUND 0
,1,0,6:GOTO 30

  Missile handling routine. Erase old
  missile.

300 SOUND 1,25,4,U-U*(U<0):U=U-1:IF G>1
THEN POSITION C,G-1:? " ";

  Check for missile leaving bottom of
  screen.

305 G=G+1:IF G=24 THEN 340

  See if position where missile will be
  redrawn contains a meteor.

310 POSITION C,G:GET #1,L:POSITION C,G:?
 CHR$(L);:IF L=30 THEN 330

  Also check previous row in case meteor
  has scrolled past missile.

315 POSITION C,G-1:GET #1,L:POSITION C,G
-1:? CHR$(L);:IF L=20 THEN G=G-1:GOTO 33
0

  If missile has not hit a meteor,
  redraw the missile on the next lower
  row.

320 POSITION C,G:? CHR$(124);:RETURN

  Missile has hit a meteor. Make appro-.
  priate sound.

330 FOR I=90 TO 0 STEP -5:SOUND 1,I,10,1
4:NEXT I

  Add 100 points to score. Erase center
  of meteor.

331 SC=SC+100:POSITION C,G:? "O";:FOR I=
1 TO 10:NEXT I

  Shrink meteor, until it is gone.

332 POSITION C,G:? "o";:FOR I=1 TO 10:NE
XT I:POSITION C,G:? "."
335 FOR I=1 TO 10:NEXT I:POSITION C,G:?
" ";

  Rejoin our program "already in pro-
  gress."

340 G=0:RETURN

  Instructions

400 FOR I=1 TO 24:POSITION RND(1)*38,23:
? METEOR$:NEXT I:? "***  M E T E O R
S T O R M  ***"
410 ? "BY ROY HARPER":? :? "  Your missi
on is to blast a path":? "through a seve
re Meteor Storm.  You"
420 ? "are able to steer left and right
with":? "the joystick.  Your mission als
o":? "includes destroying meteors."
425 ? "   (at 100 points each!)"
430 ? "  Line yourself up with a meteor
and":? "press the fire-button on the joy
stick.";
440 ? "  Another feature of your ship is
 its ability to enter Hyperspace.  Press
":? "forward on the joystick";
450 ? " to do this.":? "A word of cautio
n: being in Hyperspacedoes not add or su
btract from your"
460 ? "score.  It may even land you in a
":? "meteor!":? "  One final note: for e
ach 1000 pointsyou score,";
470 ? " the game becomes more dif- ficul
t.":POSITION 15,23:? "Good Luck!!!"
480 ? :? "Pull BACK on the joystick to p
lay ...";

  Wait for player to tug on joystick

490 IF STICK(0)<>13 THEN 490

  Make space black. Make blast-off sound
  and begin game.

500 SETCOLOR 2,0,0:SETCOLOR 4,0,0:? CHR$
(125):SOUND 1,0,0,0:FOR I=255 TO 1 STEP
-1:SOUND 0,I,0,6:NEXT I:GOTO 20

  Player has attained high score. Let
  player type his/her name for all to
  see.

600 ? CHR$(125);"YOU GOT THE HIGH SCORE
OF":? SC;" POINTS.":? "ENTER YOUR NAME, P
LEASE";:INPUT HP$:HP=SC:GOTO 480

  Sound of explosion when player has been
  hit by a meteor.

700 FOR I=0 TO 3:SOUND I,RND(1)*255,2*I+
2,14-Y*14/22:NEXT I:RETURN
```

APPLE VERSION

James Garon and Mark Pelczarski

The one distinctive feature of the Apple Meteor Storm program is its use of text commands to produce low resolution graphics. The S-80 and Atari both have graphics symbols that can be put on a text screen. The Meteor Storm program uses the text screen for its motion by scrolling the entire display and only redrawing the ship at the top of the screen. This gives the effect of the ship moving at the meteors, when in actuality it's the opposite. The problem in converting the program to Apple was the discrete graphics and text modes. To use the scrolling, one would be confined using text characters as the only graphics ('x' as a meteor, for example).

After a bit of playing around, however, we discovered that you could trick the computer into thinking it's displaying low resolution graphics. The first step is to clear the screen and go into Lo-Res graphics mode (see line 110). When you set Lo-Res graphics, the text window is reduced to the bottom four lines. Hidden away in the Applesoft manual is a POKE command that lets you set the top of the test window wherever you want. Surprise! Poking that location with a zero (the top line on the screen) suddenly allows us to print anywhere - not just the bottom four lines. But anything printed above those four lines is still interpreted as a graphics character (actually two characters stacked on one another; a text character is twice as tall as a Lo-Res graphics block). Furthermore, when the screen is scrolled, now the entire page moves up, graphics and all, instead of only the bottom four text lines.

The trick now is to discover what to print to get the graphics colors you desire. For that we turned to pages 15 and 17 of the Apple Reference manual (spiral bound version) where there are tables of all the ASCII characters and the color codes for Lo-Res graphic blocks. One text character will print two graphics characters. Working by the hex codes, if we wanted a light green block ($C) on a pink block ($B), you print the character $BC, which in the ASCII table is a Normal ' ' (as opposed to Inverse or Flashing). It gets a little messy, but you can now see why a line of background characters (L$) is set to CHR$(34). 34 in hex is $22, which gives two dark blue blocks. Each graphics shape was created the same way -deciding the colors needed and then finding the corresponding characters.

A-counts how many thousands of points the player has, controlling the meteor colors.

A$-user answer

B-A mod 4 (meteor color)

B$-one character of background color

E$-character used for missile (the right bracket is a Shift-M)

F-flag that tells in which line the hit meteor is in.

G-row in which missile is

H-used in checking whether meteor is hit (each time two rows must be checked since the missile advances and the screen scrolls)

HP-high player score

HP$-high player's name

I-loop index

L$-one line of background characters

M$(0-3)-meteor characters; four variations, dependent on score.

P-paddle setting (-1,0,1)

P1-score

S-horizontal location of ship

S$-ship characters

S1,S2,S3-locations for ship fragments after explosion

T-timing loop counter after meteor is hit

Y-vertical location of ship fragments after collision

```
 Initialize background string and
 meteor characters.

90 L$ = "": FOR I = 1 TO 40:L$ =
     L$ +  CHR$ (34): NEXT : FOR
     I = 0 TO 3: READ M$(I): NEXT
     : DATA @,H,D,X
100  TEXT : NORMAL : HOME : PRINT
     "INSTRUCTIONS?";: GET A$: IF
     A$ = "Y" THEN  HOME : GOTO 3
     10

 Set Text-Graphics mode and
 initialization of other
 character-graphics.

110  HOME : GR : POKE 34,0:P1 = 0
     :S1 = 1:S = 20:G = 1:S$ = "$
     2$":E$ = "J":B$ =  CHR$ (34)
     :A = 0:B = 0

 Clear screen to background.

115  INVERSE : FOR I = 1 TO 20: VTAB
     I: PRINT L$;: NEXT

 Check if change in number of
 thousands of points.

120  IF A <  > INT (P1 / 1000) THEN
     A = A + 1:B = B - 4 * (B > 2
     ) + 1

 Place meteors.

125  VTAB G: HTAB S1: PRINT B$: NORMAL
     : VTAB 21: HTAB 1: PRINT P1;
     : INVERSE : FOR I = 0 TO  INT
     (P1 / 1000): VTAB 20: HTAB 1
      +  INT ( RND (1) * 39): PRINT
     M$(B): NEXT

 Check paddle.

130 P =  INT (( PDL (0) - 2) / 25
     1):S = S + P
140  IF S < 1 THEN S = 1
145  IF S > 38 THEN S = 38

 Check for collision.

150  IF  SCRN( S - 1,2) <  > 2 OR
      SCRN( S,2) <  > 2 OR  SCRN(
     S + 1,2) <  > 2 THEN  VTAB 2
     4: PRINT : VTAB 20: PRINT L$
     ;: GOTO 200

 Print next row.

160  VTAB 24: PRINT : VTAB 20: PRINT
     L$;: VTAB 1: HTAB S: PRINT S
     $;

 Check for firing.

170  IF G = 1 AND  PEEK ( - 16287
     ) > 127 THEN G = 2:S1 = S +
     1: GOTO 180

 Check for hyperspace (keystroke).

171  IF  PEEK ( - 16384) > 127 THEN
     250
172  IF G = 1 THEN 190

 Missile routine.

175  IF G > 19 THEN G = 1: GOTO 1
     90
180 G = G + 1: IF  SCRN( S1 - 1,G
      + G - 1) <  > 2 THEN  GOSUB
     230: GOTO 120
182  VTAB G: HTAB S1: NORMAL : PRINT
     E$;: INVERSE
185 F = 0:H = G - 1: IF  SCRN( S1
      - 1,H + H - 1) <  > 2 THEN
     G = H:F = 1: GOSUB 230
190 P1 = P1 + 1: GOTO 120

 Collision.

200  VTAB 21: HTAB 1: NORMAL : PRINT
     P1;:Y = 1:S1 = S:S2 = S + 1:
     S3 = S + 2
210  INVERSE : VTAB Y: HTAB S1: PRINT
     B$;: HTAB S2: PRINT B$;: HTAB
     S3: PRINT B$;:Y = Y + 1: IF
     Y < 20 THEN S1 = S1 - 1 + 39
      * (S1 < 2):S3 = S3 + 1 - 38
      * (S > 39): VTAB Y: HTAB S1
     : PRINT "$";: HTAB S2: PRINT
     "2";: HTAB S3: PRINT "$";: FOR
     I = 1 TO 150: NEXT : GOTO 21
     0
220  NORMAL : FOR I = 1 TO 1000: NEXT
     : GOTO 270

 Meteor is hit.

230 P1 = P1 + 100: HTAB S1 - 1: VTAB
     G: PRINT "333": FOR T = 1 TO
     30: NEXT : HTAB S1 - 1: VTAB
     G: PRINT  CHR$ (34); CHR$ (3
     4); CHR$ (34): IF F = 1 THEN
      VTAB G + 1: HTAB S1: PRINT
     B$
235 G = 1: RETURN

 Hyperspace.

250  INVERSE : POKE  - 16368,0:G =
     1: FOR I = 1 TO 10 +  RND (1
     ) * 70: VTAB 24: PRINT : VTAB
     20: HTAB 1: PRINT L$: VTAB 2
     0: HTAB 1 +  INT ( RND (1) *
     40): PRINT M$(B): NEXT : GOTO
     120

 End of game.

270  VTAB 22: IF P1 > HP THEN 360

275  HTAB 15: PRINT HP$;":";HP: PRINT
     "YOU EARNED ";P1;" POINTS ON
      THAT MISSION"
280  PRINT "DO YOU WANT TO TRY AN
     OTHER MISSION?";: GET A$: IF
     A$ <  > "N" THEN 110
285  TEXT : HOME : END

 Instructions.

310  FOR I = 1 TO 35: VTAB 24: HTAB
     1 +  RND (1) * 40: PRINT "O"
     : NEXT : HTAB 13: PRINT "MET
     EOR STORM": HTAB 13: PRINT "
     BY ROY HARPER": PRINT "APPLE
      TRANSLATION : GARON AND PEL
     CZARSKI
320  PRINT : PRINT " YOUR MISSION
      IS TO BLAST A PATH THROUGHA
      SEVERE METEOR STORM.  YOU A
     RE ABLE TO STEER LEFT AND RI
     GHT USING PADDLE ZERO. YOUR
     MISSION ALSO INCLUDES DESTRO
     YING  METEORS (AT 100 POINT
     S EACH!).  LINE "
330  PRINT "YOURSELF UP WITH A ME
     TEOR AND PRESS THE PADDLE-BU
     TTON TO FIRE.": PRINT " ANOT
     HER FEATURE OF YOUR SHIP IS
     ITS": PRINT "ABILITY TO ENTE
     R HYPERSPACE.  PRESS ANY KEY
      TO DO THIS. A WORD OF CAUTI
     ON: WHILEBEING IN HYPERSPACE
      DOES NOT ";
340  PRINT "ADD TO OR  SUBTRACT F
     ROM YOUR SCORE, IT MAY EVEN
       LAND YOU ON A METEOR (IN W
     HICH CASE -": PRINT "YOUR MI
     SSION IS OVER!)": PRINT : HTAB
     13: PRINT "GOOD LUCK!!!": PRINT
     : PRINT
 Note: this routine at the end of
 the instructions fools around with
 the width of the text window and
 scrolling. Poking 32 sets the
 left edge of the window, and poking
 33 sets the width.
350  HTAB 8: PRINT "PRESS ANY KEY
      TO BEGIN";: POKE  - 16368,0
     : GET A$: FOR I = 1 TO 20: POKE
     32,20 - I: POKE 33,2 * I: PRINT
     : PRINT : NEXT : FOR I = 1 TO
     24: PRINT : NEXT : GOTO 110
360  NORMAL :HP = P1: HTAB 1: PRINT
     "YOU GOT THE HIGH SCORE OF "
     ;HP: INPUT "ENTER YOUR NAME
     PLEASE: ";HP$: GOTO 280
```

SARGON II

At HAYDEN, The Best Has Gotten Better.

Sargon, the program that came in first in the Creative Computing Microcomputer Chess Tournament, has become Sargon II. The game has been vastly improved and now has a faster response time. A new Level 0 has been incorporated for beginners. The board is easier to pre-set and there is now a Hint mode that provides suggestions from the computer. Sargon II took on the maxi-computers in the West Coast tournament and finished in the money! Shows more thinking power than you ever expected.

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GAME DESIGN

by Ron Potkin

Ron Potkin also wrote our feature program for this issue, Kriegspiel.

The most important point to bear in mind when designing a computerized game, is that the computer is merely a tool. It should be as unobtrusive as possible: Do not try to introduce features that detract from the playing of the game. Making the game playable and absorbing is a must.

If you have a good idea for a game do not spoil it by not paying attention to detail. We can take it for granted that it will work satisfactorily and do all that you intended it to do, but will it appeal to anyone else? It's all a question of cosmetics.

Pay attention to rhythm - do everything you can to get rid of irritating delays. On the other hand, it may be that you must introduce timing delays - make sure they are the right length.

Try to keep the player's attention. Do all you can to keep processing to a minimum. If a particular routine causes a long delay, think about converting it to machine language, using the string packing technique. It takes time, but the final result is worth the effort.

Avoid scrolling the screen after every turn. It should be possible to keep the board or cards on the screen at all times and update it using the "PRINT @" function. Use a flashing routine so that the player can see what has happened.

If possible, use graphics rather than keyboard characters. The letters tend to strain the eyes after a time and are unrealistic. In "STUD POKER," graphics were used to indicate the suit. This was easier to follow then merely "JC."

Should sound be introduced? One needs to think about this carefully. Sometimes, particularly in arcade type games, sound is a must, but in others is it really desirable? In "KRIEGSPIEL" I decided that tanks should not fire at each other with laser beams, so I omitted it. I also felt that it would distract the player. This is an example of putting the computer before the game.

Keep the input requirements simple. Don't ask the player to enter complicated angles to the nearest degree. After all, that's what computers are for. If I knew the answer, I would not have bought one!

Comments are another problem. Naturally, they are needed to insure that the player knows the rules and is corrected if he makes a mistake, but do not use them unless they are apt. They can be comical but - and this should be a cardinal rule of computer games - do not talk down to the player or be rude. The first time it may be funny but he probably will not play it again. The trouble with comments that are included just to liven up the game is that they tend to be repetitive and therefore a large number of them are needed (60 to 80 is not unreasonable) so that they repeat at infrequent intervals. That will eat up a great deal of memory, so if you are not sure, they should be omitted.

Finally, play the game as often as you can and check the points above. Did you become bored? If you did then so will everyone else and sooner. Come back to it after a month. Does it still appeal to you? It does? That's good. Send it to our friends at "**SOFTSIDE.**" Provided it is original they may be interested.

S-80 PROGRAMMING HINT

If when typing in a long line the computer will not accept any more characters, enter as much as you can and then EDIT the line, type X, and continue typing. You should be able to insert about 15 more characters.

If you operate in Level II BASIC with an expansion interface and you wish to return to the MEMORY SIZE question, type:

```
SYSTEM
/117
```

This is the exit used by the DOS BASIC 2 command.

Joe Sewell
Melbourne, Florida

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SOFTSIDE'S DATA BASE

by Mark Pelczarski

S-80 translation by James Garon, Atari translation by Rich Bouchard

Part Three - Sorting

Now that you can put things into your data base, modify them, and get them back out, it's time to consider what can be done with information that's been stored. This month we'll add a sorting routine that will allow you to sort in ascending or descending order on any heading. Ascending order would be used for something like alphabetizing a list of names. Descending order would be used to list amounts from greatest to smallest, for example. Next month we'll add a search routine that will allow you to find an item or group of items quickly and easily, without needing to know record numbers.

The type of sorting routine that we chose is actually the brute force method. The technique is to simply go through the entire list and find the smallest item, put it in position one, find the next smallest, put it in position two, and so on. It's not the fastest sorting routine around, but in our case it does work better than some that would usually be faster. If there are N items in the list, only N-1 interchanges are made. The advantage this creates with our program is that an interchange (swapping the positions of two items) actually requires a switch of each pair of items across the record (names, addresses, phone numbers, etc., instead of just the name). Being rather time consuming, it's nice to minimize the number of swaps. Once again, in the future we'll have occasion to talk about much more elegant methods of sorting.

The actual routine itself is rather short. Two lines must be added in the main routine to present and accept the sort option. (In the Atari version, we've also added a couple of TRAP statements that *will catch a blank* input and not crash the program. We also had to dimension a temporary string variable, T$, that will be used in the interchange process. This is done in both the load and add routines, which is where the record length is calculated.) The first line of the routine checks if there is anything actually there to sort. Then in lines 7010 to 7050 the user is asked to choose the heading under which the sort should be performed (the choice is stored in J1). In lines 7060 to 7090 the user chooses ascending or descending order for the sort. A switch, A, is set to 1 for ascending, or 2 for descending.

The main loop of the sort routine goes from line 7100 to line 7180, and uses 'I' as a counter from position 0 in the array to the next to last (NI-1) position. Each time through this loop the smallest (or largest) item remaining will be selected and put in the Ith position. To do this, another variable T keeps track of the smallest item found at any given point. It starts out equal to I, since none of the other elements have been checked. Then the inner loop (7120-7145) compares the Tth element with each other element to the end of the list, changing T if it finds something smaller. Line 7122 just prints something on the screen for you to count while you wait (and can be removed). The numbers printed are the loop counters and should give you an idea of how the sort progresses. Line 7125 simply directs the program to the proper IF statement, depending on the value of A. Upon completion of the inner loop, T holds the index of the smallest or largest item. If this happens to be the Ith element, the interchange is skipped; otherwise the loop from 7150 to 7170 swaps the Ith and Tth records. T$ is used as a temporary holding variable, which is necessary for interchanges. The last step is to set the save switch (SS) to zero, meaning a change in the file has been made since the last time it was saved.

Data Base Input

Dear **SoftSide**,

September's DEVELOPING DATA BASE is fantastic. The only problem I had was in predicting output appearance for long strings. Changing line 4020 to

4020 PRINT H$(J);: PRINT ":",: INPUT "";I$(NI,J)

gives an input format which matches the output format.

Frank Coker
Valley Cottage, N.Y.

APPLE LISTING

```
260  PRINT "(T) SORT"
370  IF A$ = "T" THEN  GOSUB 7000
     : GOTO 200
6999  REM  SORT SUBROUTINE V.1
7000  IF NI =  - 1 THEN  GOSUB 90
     00: RETURN
7010  PRINT : FOR J = 0 TO NH
7020  PRINT "(";J + 1;") ";H$(J)
7030  NEXT J
7040  INPUT "SORT ON WHICH HEADIN
     G?";J1
7045 J1 = J1 - 1
7050 IF J1< 0 OR J1 > NH THEN RETURN
7060  PRINT "(A) ASCENDING, OR (D
     ) DESCENDING": GET A$
7070  IF A$ = "A" THEN A = 1: GOTO
     7100
7080  IF A$ = "D" THEN A = 2: GOTO
     7100
7090  GOTO 7060
7100  FOR I = 0 TO NI - 1
7110 T = I
7120  FOR I1 = T + 1 TO NI
7122  PRINT I;"  ";I1
7125  ON A GOTO 7130,7140
7130  IF I$(I1,J1) < I$(T,J1) THEN
     T = I1
7135  GOTO 7145
7140  IF I$(I1,J1) > I$(T,J1) THEN
     T = I1
7145  NEXT I1
7150  IF T = I THEN 7180
7155  FOR J = 0 TO NH
7160 T$ = I$(T,J):I$(T,J) = I$(I,
     J):I$(I,J) = T$
7170  NEXT J
7180  NEXT I
7200 SS = 0: RETURN
]
```

ATARI LISTING

```
110 TRAP 110:PRINT "}(I) INITIALIZE A NE
W DATA SET"
200 TRAP 200:RL=(NH+1)*IL:PRINT "}(S) SA
VE CURRENT DATA"
260 PRINT "(T) SORT"
370 IF CHR$(A)="T" THEN GOSUB 7000:GOTO
200
1043 INPUT #1,IL:DIM T$(NH*IL+IL)
4004 IF IL>0 THEN 4010
4005 PRINT "ENTER MAXIMUM ITEM LENGTH";:
INPUT IL
4006 PRINT :PRINT "RECORD NUMBER ";NI+1:
PRINT
4008 IF IL<1 THEN IL=0:GOTO 4005
4009 DIM T$(NH*IL+IL)
6999 REM SORT SUBROUTINE V.1
7000 IF NI=-1 THEN GOSUB 9000:RETURN
7010 PRINT :FOR J=0 TO NH
7020 PRINT "(";J+1;")";H$(J*HL+1,J*HL+HL
)
7030 NEXT J
7040 ? :PRINT "SORT WHICH HEADING";:INPU
T J1
7045 J1=J1-1
7050 IF J1<0 OR J1>NH THEN RETURN
7060 ? :PRINT "(A) ASCENDING, OR (D) DES
CENDING":GET #2,A
7070 IF CHR$(A)="A" THEN A=1:GOTO 7100
7080 IF CHR$(A)="D" THEN A=2:GOTO 7100
7090 GOTO 7060
7100 FOR I=0 TO NI-1
7110 T=I
7120 FOR I1=T+1 TO NI
7122 PRINT I;"  ";I1
7125 ON A GOTO 7130,7140
7130 IF I$(I1*RL+1+J1*IL,I1*RL+J1*IL+IL)
<I$(T*RL+1+J1*IL,T*RL+J1*IL+IL) THEN T=I
1
7135 GOTO 7145
7140 IF I$(I1*RL+1+J1*IL,I1*RL+J1*IL+IL)
>I$(T*RL+1+J1*IL,T*RL+J1*IL+IL) THEN T=I
1
7145 NEXT I1
7150 IF T=I THEN 7180
7160 T$=I$(T*RL+1,T*RL+RL):I$(T*RL+1,T*R
L+RL)=I$(I*RL+1,I*RL+RL):I$(I*RL+1,I*RL+
RL)=T$
7180 NEXT I
7200 SS=0:RETURN
```

S-80 VERSION

```
260 PRINT "(T) SORT"
370 IF A$ = "T" GOSUB 7000:GOTO 200
6999 REM SORT SUBROUTINE V.1
7000 IF NI = -1 GOSUB 9000:RETURN
7010 PRINT:FOR J=0 TO NH
7020 PRINT "("; J+1 ;")"; H$(J)
7030 NEXT J
7040 INPUT "SORT ON WHICH HEADING";J1
7045 J1 = J1-1
7050 IF J1<0 OR J1>NH RETURN
7060 PRINT "(A) ASCENDING OR (D) DESCENDING":GOSUB 60000
7070 IF A$="A" THEN A=1:GOTO 7100
7080 IF A$="D" THEN A=2:GOTO 7100
7090 GOTO 7060
7100 FOR I=0 TO NI-1
7110 T=I
7120 FOR I1=T+1 TO NI
7122 PRINT @960,I;I1;
7125 ON A GOTO 7130,7140
7130 IF I$(I1,J1) < I$(T,J1) THEN T=I1
7135 GOTO 7145
7140 IF I$(I1,J1) > I$(T,J1) THEN T=I1
7145 NEXT I1
7150 IF T=I THEN 7180
7155 FOR J=0 TO NH
7160 T$ = I$(T,J):I$(T,J) = I$(I,J):I$(I,J) = T$
7170 NEXT J
7180 NEXT I
7200 SS=0:RETURN
```

sensational software

ADVANCED AIR TRAFFIC CONTROLLER

This real-time machine language program puts you in the chair of a busy air-traffic controller. 27 prop planes and jets are depending on you as they take off, land and fly over your air space. You give orders to turn, maintain a holding pattern, change altitude, approach and land at either of two airports.

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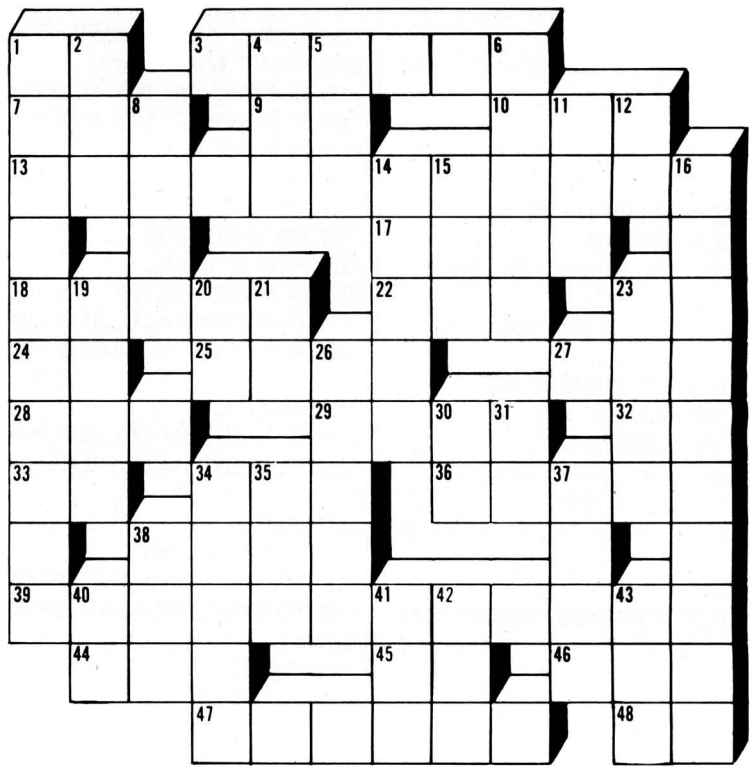
CROSSWORD PUZZLE

by James Garon



ACROSS

1. Comes in handy more than once in ADVENTURELAND

3. There's one in moorhtab s'TNUOC EHT

7. A verb which is also a palindrome

9. Soldier

10. BASIC function which always strives for a positive attitude

13. Adventure # 4

17. If you find any in GHOST TOWN, you could try feeding them to the horse

18. He follows you around the PYRAMID OF DOOM

22. Three quarters of an object found in MYSTERY FUN HOUSE and perhaps in GHOST TOWN as well

23. When Alice is in the middle of an Adventure and must go to bed behind the mirror, she types: EMAG E--S

24. Caesar's penultimate Latin word

25. Not the best place to leave your computer overnight

27. Type of sail used in Caribbean Cruising (August '80 **SoftSide**)

28. The Atari and S-80 use this command to link a machine language subroutine to a BASIC program (Apple uses "CALL" for this purpose)

29. Slightly larger than a subatomic particle

32. Found in the middle of snow

33. Two-thirds of a color

34. One of the creatures that lurk behind the fireplace in PYRAMID OF 8 DOWN

36. Found in one of the rooms of 13 ACROSS

38. Type of package

39. One of 13 treasures hidden in GHOST TOWN

44. BASIC function which indicates how much memory is available

45. Found in the middle of dust

46. Before (poetic)

47. The software pirate may need a good one someday

48. There is one near a deep hole in ADVENTURELAND

DOWN

1. These are the main theme of this month's puzzle

2. Versatile Atari BASIC instruction which can do at least 16 different things

4. I (Latin)

5. If you can find some, it could be useful after your krad seog pmal in ADVENTURELAND

6. One method of identifying unknown substances in GHOST TOWN

8. Adventure # 8: PYRAMID OF ————

11. Bengal Tiger Soup (abbr.)

12. Found in the middle of isle

14. Adventure # 5 THE -----

15. Amalgamated Adventurers Society (abbr.)

16. Went into greater detail

19. Adventure # 7: MYSTERY FUN H----

20. Nickname of fellow who left his lamp in the cave in ADVENTURELAND

21. District Attorney (abbr.)

23. Wine (Italian)

26. Where the * GOLDEN FISH * hang out in ADVENTURELAND

30. Two thirds of a constricting snake

31. Something Scott Adams is (abbr.)

34. Composer of tune ("Bolero") which had such a startling effect on Bo Derek in the movie **10**

35. tnemdnema sthgir lauqe (abbr.)

37. The horse in GHOST TOWN acts like one

38. Atari command to undimension arrays

40. THEN's companion

41. A difficult thing to do to your ticket into 19 DOWN

42. Discovering how to do this to the telegraphic key in GHOST TOWN is part of the challenge

43. Liquid laundry detergent having something in common with 35 down

G	N	U	■	F	O	R	■	S	H	I	P
I	■	P	L	A	C	E	B	O	■	N	E
G	O	S	U	B	■	C	O	F	F	I	N
O					S	O	O	T	■	T	■
■	R	A	M	W	O	R	K	S	■	I	T
B	E	L	A	Y	■	D	■	I	R	A	N
Y	S	T	I	■	O	■	A	D	U	L	T
E	T	■	N	I	N	E	T	E	N	S	■
■	O	■	T	O	E	S	■	■	■	■	F
O	R	G	A	N	S	■	S	O	L	A	R
R	E	■	I	S	E	V	E	R	Y	■	A
E	D	E	N	■	E	N	T	■	E	A	T

Solution to last months puzzle

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KRIEGSPIEL

by Ron Potkin
This program is for a 16K S-80

SOLDIER! PICK UP YOUR MUSKET!

About three years ago I bought several boxes of those small one-inch high plastic soldiers. They represented the French and British from the Battle of Waterloo. In all there must have been 400-500 pieces. The next three months were spent painting the detail on each piece using a magnifying glass, but after the first 100 I regret that my enthusiasm began to wane. There is no doubt that the sight of several hundred warriors lined up for battle is very appealing but I felt there had to be an easier way.

All this occurred about 12 months before the "Birth of the Byte." I had played several commercial wargames and although they were very interesting, there was a lack of realism because I felt that a General should be allowed to concentrate on the battle and not be tied down to rolling dice and consulting charts. The TRS-80 has changed all that. Think of the advantages:

It determines when conflict should occur and the nature of the conflict.

It rolls the dice and resolves all combat between opposing sides.

It is an impartial referee.

It will not tolerate heavy breathing or that gasp of relief that moves a complete armor division across the Mediterranean.

Real hidden movement is possible. No longer does one need to write down on a piece of paper the current location of each hidden piece.

It was with these points in mind that I wrote "KRIEGSPIEL."

While designing the game. I had to consider:

The minimum size of hex.

The shape of each piece.

The necessity to be able to distinguish pieces on each side. Each must be oriented left or right so squares and oblongs are out.

Keyboard characters are unrealistic. When playing, one should be totally involved and feel as though the battle is really happening: I am afraid the letter "A" for army does not turn me on.

I finally determined that four bytes were required to build up a neat shape and meet all my requirements. After allowing for a line of messages and spaces between the pieces. I had a board of about 120 hex. In "KREIGSPIEL II," I have adopted a different approach so that it is possible to have 500 hex.

I think you will enjoy the game. My son Leigh, and I have played it many times and have developed our own personal strategies. Invariably, one scenario becomes particularly interesting and we play it over and over

"KRIEGSPIEL II" is a further development of this game with more pieces, minefields, weather, recruiting, a larger board and other features, but the same basic strategies apply.

I am not going to give any advice on tactics other than to urge you to study the table of odds very carefully before you attack.

Before getting involved in the detailed programming, you should understand the overall operation of the program. There are four arrays which control all movement and attack these are:

1. Video screen - Run the program and put the hex board on the screen. Each hex is numbered according to its first "print 0" position. The top left-hand hex is number 4. The next is number 12 and so on up to 60 in steps of 8. The second line runs from 64 to 120. Note that alternate rows are offset by four so that the hexes fit together. The same format continues down to hex number 956 leaving the bottom line for messages. Let's look at a section of the screen using hex number 400 as an example (Figure 1). Now deduct 400 from every number to arrive at the offsets (Figure 2). If we know the direction. These enable us to move a piece from one hex to another. We could calculate them but it is faster to use "on-direction-goto" (Line 21500). As an alternative a table of values could be used.

2. Piece table "PC" - This is a 32 by 6 array and contains details of the 16 pieces on each side. The first column is the current hex number position on the screen. The second contains the type of piece - tank, infantry, engineer or capital. The other four columns

contain combat pointers which will be described later. When a piece is eliminated, column 1 is set to zero.

3. The board "BO" - This is a 16 by 16 array, including the zero index and is an internal representation of the map. Each indexed position is equal to one hex on the screen. Each vacant position on the screen is set to zero on the board. An occupied position contains the index of that piece in the piece table. Positions occupied by mountains contain -1, -2, or -3 according to the type of mountain.

4. Characters "PC$" - This is a 7 by 4 character string holding the shapes to be printed on the screen. The correct character is obtained by means of its index in the second column of the piece table.

It will be apparent from figure 3 that, using the information in each of the arrays, we can easily move from one table to another. There is one missing link: This is the conversion from the hex number to the board coordinates which is carried out in line 2100:

$$Y1 = INT(P/64)$$

$$X1 = (P-64 \cdot Y1)/4$$

(Where "P" is the hex number)

Much of the program is concerned with the manipulation of these arrays. It is in motion by putting the initial hex position of each piece in each array and then running through the piece table prompting for a decision on each piece in turn. Assuming the piece is on hex 400 (Figure 1) and you type direction 6, the program calculates the board coordinates, checks that hex 352 is vacant and, if it is, moves the piece. It now checks the six hexes surrounding the new hex to see whether it is next to an opponent. One side has indices 1 to 16; the other 17 to 32: So if piece 12 (less than 17) is next to piece 24 (greater than 16), an attack takes place and any further movement ceases.

The following is an outline of the movement sequence:

1. Line 200 controls the whole game. At the end of a player's turn, the program returns here and changes sides.

2. Turns are determined by "5" in line 1000 which sets the variable 1, to either 1 or 17 indicating the index of the first piece to be moved.

3. Gets the hex number FL, the number of moves "MV," and the character "FL$." (lines 1010, 1020)

4. Prompt for a decision by flickering "FL$" and "MV." (line 1030)

5. If the input is a number, check if valid and either move the piece or continue prompting. (lines 1050 -1210)

6. Checks during movement (line 1065) for the winning condition.

7. Line 1075 checks "river crossing." If this is true, an extra movement factor is deducted.

8. Line 1182 checks one hex in every direction using "Search," looking for an opponent.

9. Intermingled in the coding is the "Hold routine. Follow this through watching the variables "HD," "K1," and "HL" in lines 1000, 1010, 1017/8, 1047/8, and 1218.

10. The "C," "S," and "F" commands are easier to follow, but note that "C" jumps immediately to line 1300, whereas "F" carries out a full check of pieces that have not been prompted to check for posible attacks. Since this involves checking six hexes for every piece, it is a slow process and therefore, if it can be seen that no pieces are adjacent, it is better to use "C."

Let us take stock of what we have when we finally reach line 1300 - the start of the attack sequence:

1. The board, video, and piece table have been updated in respect to all movement.

2. Mountains will have been adjusted on the board and video when they have been eaten away by the engineer.

3. Columns 3, 4, 5, and 6 of the piece table contain information regarding attacks. Note that if column 4 is set to one that attack will be automatic and requires no prompting. If it is greater than 1, then a decision is required by the player.

COMBAT SEQUENCE

Lines 1305 to 1500 are a prompting routine and settle all attacks. Note that the use of the flag "22" -This is set to one if an attack is found. If it is zero at line 1550, it means there are no attacks and the combat sequence is finished.

Lines 1600 to 1745 are more complex. They are concerned with determining which pieces are involved in each individual combat, whether the defender has support; whether the attack is across the river; and finally selecting a random result from the attack table.

A defender table "DR," is set up. This holds details of each defender as it is found in the piece table (line 1620). The attacker is put in the attacker's table "Q" (lines 1680 -1690). We now go through the rest of the piece table searching for any other pieces attacking the same defender. These are added to the "Q" table. As each is added, the attack factor "AT" is increased (and increased again if the attacker is a tank), the river crossing flag is "and" ED with "DR(3)" and column 3 of the piece table negated so that that piece cannot be involved in another attack.

Lines 1700 - 1710 calculate the defender's factors and go to the subroutine at 4000/4200 to check for support.

Lines 1720 - 1740 calculate the attack ratio and find the appropriate column in the attack table from which it selects a random result. If you are like me, you probably find typing the rules is drudgery, so if you want to see the attack table, look at lines 20162 - 20167. Now read through lines 40192 - 40415 which tell you the outcome for each value in the table.

Note the use of the flag "RV," which indicates whether the attack is across the river. The rules state that the defense factor is doubled unless the defender is also being attacked on the same side, of the river. Put simply, this means that if the river flags of all attackers (column 6 of the piece table) are set, then the attack is across the river. If any flag is not set then all others are nullified and the defense is not doubled. This result is very easily obtained by using the "And" instruction and what at first appears extremely complex is resolved in a single instruction!

continued on next page

continued from previous page

Lines 1750 to 2500 carry out the results of the combat result "R" as follows:

1. Exchange:

The defender is automatically eliminated (line 24000), but a test must be made to check how many factors the attacker had (line 1706/7). If they were less or equal to the defender's, then elimination is automatic. Otherwise the attacker is prompted for the pieces to be eliminated.

2. Attacker Eliminated:

This is automatic and all attackers are eliminated using the routine at line 25000.

3. Defender Eliminated:

This is automatic and the defender is eliminated using the routine at line 24000.

4. Defender Retreats:

The player is prompted for the direction of retreat and a check is made for legality. If there is no retreat then an "E" is typed and the piece is eliminated. The variable "RD" is a count of the number of hexes moved. Remember that the defender is now allowed to move next to an opponent.

5. Attacker Retreats:

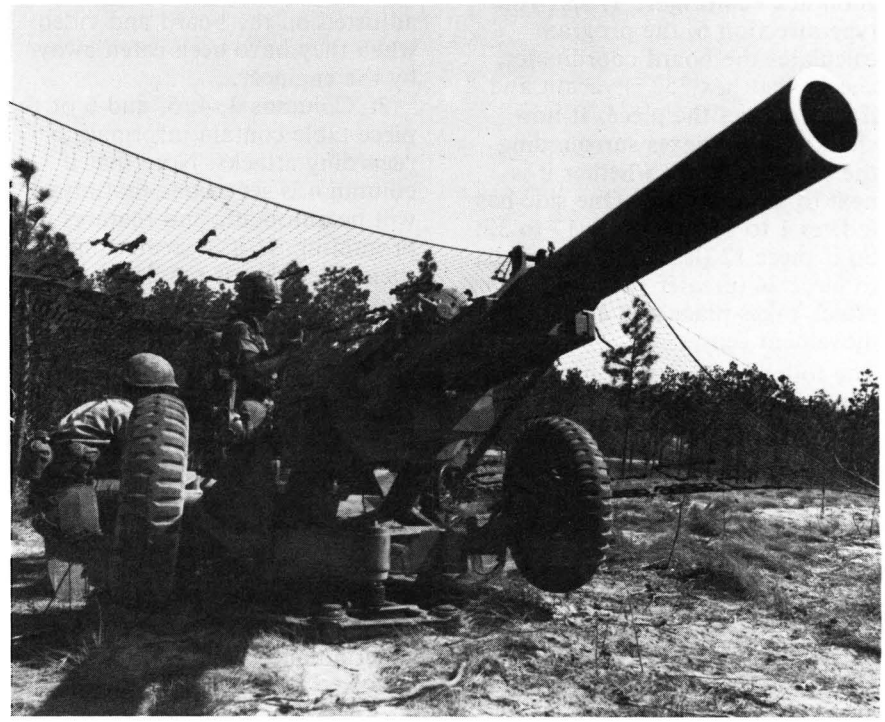
This is essentially the same as "Defender Retreats" except, of course, that all attackers must retreat.

The program now returns to line 1600 to look for further combat. Exit back to the main routine via the return in line 1610.

The following is a list of the variables used in the program:

"A"	direction indicator.
"A$"	input from keyboard.
"AD"	defender support factors.
"AF"	attack ratio
"AJ"	piece in adjacent hex
"AT"	attack factors.
"AX"	"AT" plus 50%.
"B"	temporary variable.
"B$"	temporary keyboard input
"B1"	piece index in adjacent hex
"B2"	used during initialization.
"BD"	internal board.
"CL"	used in calculating attack result.
"CT"	temporary variable.
"DF"	defender's factors (including support).
"DR"	defender pointers.
"DT"	defender's factors.
"EX"	used in exchange to ensure that enough attackers are removed.
"F2"	attack flag.
"F3"	flag used when looking for support.
"FL"	current hex number.
"FL$"	current piece character.
"HA"	pointer to current attacker when looking for defenders in combat sequence.
"HB"	maintains count of attackers in table "Q."
"HC"	temporary count.
"HD"	"hold" variable.
"HL"	"hold" variable.
"HX$"	hex board request.
"I"	index to piece being moved.
"J"	temporary variable.
"K"	temporary variable.
"K1"	"hold" variable.
"KP"	used to save pointer.
"LN"	used to create river.
"MS"	used for prompt messages.
"MT"	number of mountains.
"MV"	moves left.
"P"	new hex number.
"PC"	piece table.
"PC$"	piece characters.
"Q"	table of attackers.
"R1"	used in random number generator.
"R1$"	hex board.
"R2$"	hex board.
"R3$"	hex board.
"R3"	used in random number generator.
"R4$"	hex board.
"RD"	retreat count.
"RN"	random number.
"RT"	attack result.
"RV"	river crossing flag.
"S"	whose turn is it?
"SD"	random number seed.
"SE"	holds "SD." This is necessary since the number of mountains requested could upset the shape of the river. The river can't be placed first because it would be destroyed by the mountains.
"SR"	used to create river.
"TB"	table of attack outcomes.
"X"	coordinates to river graphics to check for river.
"X1"	hex number to board coordinates.
"X2"	save "X1."
"Y"	see "X."
"Y1"	see "Y1."
"Y2"	see "X2."
"Z"	hex offset.
"ZZ"	attack flag.

I hope you will enjoy this program and, maybe, with the help of this explanation, find ways to improve it. I adopted most of the ideas in this game in "Kriegspiel II," but the programming methods changed in several instances. For example, I found that many routines (particularly "search" and "river crossing") could be simplified by using tables of data. Probably the best change I made however was to surround the board with a boarder of 99s. This greatly simplified checking for movement off the edge of the board.



```
1 CLS:PRINT@143,"xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx";:
     PRINT@207,"x           KRIEGSPIEL           x"
    :PRINT@271,"x   A WARGAME FOR TWO PLAYERS   x"
    :PRINT@335,"x         BY RON POTKIN          x"
2    PRINT@399,"xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx"
3 CLEAR280:DEFINTA-Q,T-Z:RANDOM
5 DIMPC(32,6),TB(6,11),BD(15,15)
6 GOSUB20000:CLS
10 INPUT"DO YOU WANT THE RULES";B$:IFLEFT$(B$,1)="Y"THENGOSUB400
00
13 INPUT"DO YOU WANT A HEX BOARD";HX$:IFHX$="Y"THENRV$="N"
14 PRINT"SET YOUR SCENARIO":INPUT"HOW MANY MOUNTAINS (0TO25)";MT
:IFHX$="N"THENINPUT"DO YOU WANT A RIVER";RV$
16 IF(MT>0)OR(RV$<>"N")THENINPUT"ENTER THE SCENARIO NUMBER";SD:S
D=SD*.528416:SE=SD
100 CLS:GOSUB20450:S=17:IFRND(2)=1S=1
200 GOSUB1000:S=18-S:GOTO200
1000 A$=INKEY$:A$="":PRINT@960,"1.. MOVE SEQUENCE";:I=S:HD=0:HL=
0
1005 FORK1=1TO32:PC(K1,3)=0:PC(K1,4)=0:NEXTK1
1010 MV=3-2*(I<(S+7)):K1=ABS(PC(I,1)):IFPC(I,1)=0THEN1200
1017 IFHL=0THEN1020
1018 IFPC(I,1)>0THEN1200ELSEPC(I,1)=-PC(I,1):HD=HD-1
1020 IFPC(I,3)<>0 THEN 1200ELSEFL=PC(I,1):FL$=PC$(PC(I,2))
1022 IFA$="F" THEN 1182
1025 MS$=STR$(MV)
1028 PRINT@980,"";:IFI=STHENPRINT"ENGINEER";ELSEIFI<(S+7)THENPRI
NT"TANK";ELSEPRINT"INFANTRY";
1029 PRINTSTR$(I);:R4=I-10*INT(I/10):IF(I>10)AND(I<21)THENPRINT"
TH";ELSEIFR4=1THENPRINT"ST";ELSEIFR4=2THENPRINT"ND";ELSEIFR4=3TH
ENPRINT"RD";ELSEPRINT"TH";
1030 GOSUB 23000
1040 IFA$="S" THEN 1182
1045 IFA$="F" THENFORK=STOS+14:PC(K,1)=ABS(PC(K,1)):NEXTK:HL=0:H
D=0:GOTO 1182
1047 IFA$="H"THENIFK1<>PC(I,1)THEN1030ELSEIF(PC(I,1)>0)THENPC(I,
1)=-PC(I,1):HD=HD+1:GOTO1200
1048 IFA$="C" THEN FORK=STOS+14:PC(K,1)=ABS(PC(K,1)):NEXTK:HL=0:
HD=0:PRINT@980,STRING$(12," ");:GOTO1300
1050 A=VAL(A$):IF(A<1)OR(A>7) THEN 1030
1060 GOSUB 21500
1065 IF((S=17)AND(P=200))OR((S=1)AND(P=820))THEN30000
1067 X2=X1:Y2=Y1:GOSUB 31075:Y1=Y2:X1=X2:IFAJ<>-2THEN1070ELSE
IFRVTHENPRINT@1000,"MOUNTAIN ACROSS RIVER";:FORK=1TO1000:NEXTK:P
RINT@1000,STRING$(22," ");:GOTO 1030
1068 MV=1:BD(Y1,X1)=BD(Y1,X1)+1:IFBD(Y1,X1)<>0THENPRINT@P,MT$(-B
D(Y1,X1));:GOTO1182ELSEGOSUB21010:IFY>1THENRESET(X+2,Y-2):RESET(
X+5,Y-2)
1069 PRINT@P,"    ";:RESET(X+2,Y+2):RESET(X+5,Y+2):GOTO 1182
1070 IFAJ<>0 THEN 1030
1075 IFMV=1ANDRVTHEN1030ELSEMV=MV+(RV=1)
1170 PRINT@FL,"    ";:PRINT@P,FL$;
1175 GOSUB 21000
1180 PC(I,1)=P:BD(Y1,X1)=I:P=FL:GOSUB21000:BD(Y1,X1)=0:FL=FL+Z
1182 FORA=1TO6:GOSUB21500:GOSUB22000:NEXTA
1189 IFA$="S"ORA$="F"THEN1200
1190 MV=MV-1:IFMVTHEN1020
1200 PRINT@980,STRING$(15," ");:I=I+1:IFI<(S+15) THEN 1010
1210 IFHD>0THENHL=1:I=S:GOTO1010
1300 PRINT@960,"2.COMBAT SEQUENCE";STRING$(45," ");
1305 ZZ=0
1310 FORI=STOS+14
1315 IF(PC(I,3)=0)THEN1500
1318 ZZ=1
1320 IF(PC(I,4)=1)THEN1500ELSEFL=PC(I,1):FL$=PC$(PC(I,2))
1325 MS$="AT"
1330 GOSUB23000
1340 A=VAL(A$):IFA=(A<1)OR(A>7)THEN1330
1350 GOSUB21500
1370 GOSUB22000
1380 IFF2=0GOTO1330
1500 NEXTI
1550 IFZZ=0RETURN
1600 AT=0:HA=S:HB=0
1610 IFPC(HA,3)<=0THENHA=HA+1:IFHA>(S+14)THENRETURNELSEGOTO1610
1620 DR(1)=PC(HA,3):DR(2)=PC(HA,5):DR(3)=PC(HA,6)
1630 GOSUB1680
1640 HA=HA+1:IFHA>(S+14)THEN1700
1650 IFPC(HA,3)<>DR(1)THEN1640
1660 GOSUB1680
1670 GOTO1640
1680 HB=HB+1:Q(HB,1)=PC(HA,1):Q(HB,2)=HA:
AT=AT+1:DR(3)=DR(3)ANDPC(HA,6):PC(HA,3)=-PC(HA,3)
1685 IF(PC(HA,2)=2)OR(PC(HA,2)=5)THENAT=AT+1
1690 RETURN
1700 DT=1
1710 IF(PC(DR(2),2)=2)OR(PC(DR(2),2)=5) THEN DT=DT+1
1712 GOSUB4000
1715 IFDR(3)<>0 THEN DT=DT+DT
1720 AX=INT(AT+.5*AT):IFAX>(DT+AD) THEN AF=INT(AX/(DT+AD)):DF=1:
CL=AF+5:GOTO 1740
1730 DF=INT((DT+AD)/AX):AF=1:CL=7-DF
1740 IFAF>6 THEN RT=1ELSEIFDF>6 THEN RT=-1ELSERT=TB(RND(6),CL)
1745 PRINT@980,"ATTACKER";AX;"DEFENDER";DT+AD;
1750 IFRT<>0 THEN 1900
1755 PRINT" EXCHANGE";
1770 GOSUB 24000
1780 HA=1
1785 IFHB=1 THEN GOSUB 25000:GOTO 1900
1786 K=0:FORHA=1TOHB:K=K+1:IF(PC(Q(HA,2),2)=2)OR(PC(Q(HA,2),2)=5
)THENK=K+1
1787 NEXTHA:IFK<=DTTHENFORHA=1TOHB:GOSUB25000:NEXTHA:GOTO1900
1790 HA=1:EX=DT:CT=HB
1795 IFQ(HA,1)=0THEN1880
1800 MS$="EL":FL=PC(Q(HA,2),1):FL$=PC$(PC(Q(HA,2),2))
1810 GOSUB 23000
1820 IFA$="E" THEN 1850
1830 IFA$="N" THEN 1880
1840 GOTO 1810
1850 GOSUB 25000
1860 Q(HA,1)=0
1865 CT=CT-1:IFCT=0 THEN 1900
1870 IFEX<=0 THEN 1900
1880 HA=HA+1:IFHA<(HB+1) THEN 1795
1890 IFEX>0 THEN 1790
1900 '
1910 IFABS(RT)<>1 THEN 2000
1920 IFRT=-1 THEN PRINT"ATTACKER ELIMINATED";ELSEGOTO 1950
1930 FORHA=1TOHB:GOSUB 25000:NEXT
1940 GOTO 2000
1950 PRINT"DEFENDER ELIMINATED";
1960 GOSUB 24000
2000 IFRT=2 THEN PRINT"DEFENDER RETREATS 2";ELSEGOTO 2100
2005 RD=1
2010 MS$="RT":FL=PC(DR(2),1):FL$=PC$(PC(DR(2),2))
2020 GOSUB 23000
2030 IFA$="E" THEN GOSUB 24000:GOTO 2100
2035 A=VAL(A$):IF(A<1)OR(A>7) THEN 2020
2040 GOSUB 21500:IFAJ<>0 THEN 2020
2045 KP=FL:FL=P:A=1
2050 GOSUB 21500:IFAJ<0 THEN 2070
2055 IFP=KP THEN 2070
2060 IF((S=17)AND(AJ>3)AND(AJ<7))OR((S=1)AND(AJ<4)AND(AJ>0))THEN
FL=KP:GOTO2020
2070 A=A+1:IFA<7 THEN 2050
2075 P=FL:FL=KP:PRINT@FL,"    ";:PRINT@P,FL$;:DR(1)=P:PC(DR(2),1
)=P:GOSUB 21000:BD(Y1,X1)=DR(2):P=FL:GOSUB 21000:BD(Y1,X1)=0
```

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```
2080 RD=RD+1:IFRD=2 THEN 2010
2100 IFRT=-2 THEN PRINT"ATTACKER RETREATS 2";ELSEGOTO 2500
2110 FORHA=1TOHB
2115 RD=1
2120 MS$="RT":FL=PC(Q(HA,2),1):FL$=PC$(PC(Q(HA,2),2))
2130 GOSUB 23000
2140 IFA$="E" THEN GOSUB 25000:GOTO 2195
2145 A=VAL(A$):IF(A<1)OR(A>7) THEN 2130
2150 GOSUB 21500
2155 IFAJ<>0 THEN 2130
2160 KP=FL:FL=P:A=1
2165 GOSUB 21500:IFAJ<0 THEN 2185
2170 IFP=KP THEN 2185
2175 IF(S=17)AND((AJ=2)OR(AJ=3)OR(AJ=1))THENFL=KP:GOTO2130
2180 IF(S=1)AND((AJ=4)OR(AJ=5)OR(AJ=6))THENFL=KP:GOTO2130
2185 A=A+1:IFA<7THEN2165
2190 P=FL:FL=KP:PRINT@FL,"    ";:PRINT@P,FL$;:Q(HA,1)=P:PC(Q(HA,
2),1)=P:GOSUB 21000:BD(Y1,X1)=Q(HA,2):P=FL:GOSUB 21000:BD(Y1,X1)
=0
2192 RD=RD+1:IFRD=2 THEN 2120
2195 NEXT HA
2500 FORK=1TO500:NEXTK:PRINT@980,STRING$(42," ");:GOTO 1600
4000 'CHECK FOR DEFENDER SUPPORT
4010 AD=0:FORB=1TOHB:FL=Q(B,1)
4020 FORA=1TO6:GOSUB21500
4040 IF(AJ<=0)OR(AJ=7)OR((S=17)AND(AJ>3))OR((S=1)AND(AJ<4))THEN4
200
4055 IFPC(B1,3)=1THEN4200
4060 F3=0:FORI=STOS+14
4070 F3=0:FORI=STOS+14:F3=F3-(ABS(PC(I,3))=P)
4075 NEXTI
4080 IFF3=0THENAD=AD+1:PC(B1,3)=1:IF(AJ=2)OR(AJ=5)THENAD=AD+1
4200 NEXTA,B:RETURN
```

Initialization

Lines 20000-20600: Set up the pieces and place the river and mountains on the map. Note the use of a random number generaton which does not depend on RND (line 32000), so that a given scenario can be repeated.

```
20000 DATA1,516
20060 DATA2,576,456,276,156,208,328
20080 DATA3,216,336,396,268,140, 80,260,320
20100 DATA7,200
20110 DATA4,504
20120 DATA5,444,564,744,864,692,812
20140 DATA6,804,624,684,752,700,760,880,940
20150 DATA7,820
20160 DATA-1
20162 DATA-1,-1,-2,-2, 2, 1, 1,1,1,1,1
20163 DATA-1,-1,-1,-2, 0, 0, 0,0,0,2,2
20164 DATA-2,-2,-2,-2,-2, 2, 2, 2,1,1,1
20165 DATA-1,-2,-2,-2,-2,-2,-2, 2,2,2,1
20166 DATA-1,-1,-1,-1,-1,-1, 0, 0,2,1,1
20167 DATA-1,-1,-1,-1,-1,-1,-1, 1,1,1,1
20180 I=1
20200 READX:IF(X<0) THEN 20262
20220 IF(X<8) THEN Y=X:GOTO 20200
20240 PC(I,1)=X:PC(I,2)=Y
20260 I=I+1:GOTO 20200
20262 FORI=1TO32:P=PC(I,1):GOSUB21000:BD(Y1,X1)=I:NEXTI
20265 FORI=1TO6:FORJ=1TO11:READTB(I,J):NEXT J,I
20280 PC$(2)=" "+CHR$(183)+CHR$(187)+CHR$(132)
20290 PC$(1)=" "+CHR$(157)+CHR$(140)+CHR$(132):
      PC$(4)=CHR$(136)+CHR$(140)+CHR$(174)
20300 PC$(5)=CHR$(136)+CHR$(183)+CHR$(183)
20320 PC$(3)=CHR$(168)+CHR$(173)+CHR$(94):
      PC$(6)=CHR$(93)+CHR$(168)+CHR$(173)
20340 PC$(7)=" "+CHR$(191)+CHR$(191)
20350 A$=CHR$(166):B$=CHR$(153):
      MT$(1)=A$+CHR$(162)+CHR$(145)+B$:
      MT$(2)=A$+A$+B$+B$:
      MT$(3)=A$+CHR$(174)+CHR$(157)+B$
20355 RETURN
20450 IFHX$="Y"THENB1$="    ":B2$=CHR$(153)+CHR$(140)+CHR$(140)+
CHR$(166):R1$=B1$+B2$:R2$=B2$+B1$:R4$="":R3$="":FORI=1TO8:R3$=R3
$+R1$:R4$=R4$+R2$:NEXTI
20500 IFHX$="Y"THENFORI=0TO832STEP128:PRINT@I,R4$;:PRINT@I+64,R3
$;:NEXT:PRINT@896,R4$;
20520 FORI=1TO32:PRINT@PC(I,1),PC$(PC(I,2));:NEXT
20525 IFMT<1THEN20580ELSEFORK=1TOMT
20530 SD=SD+.528416:R3=15:GOSUB32000:X=RN:R3=14:GOSUB32000:Y=RN
20532 IF(XAND1)=(YAND1)THENX=X+1:IFX>15THENX=X-2
20535 P=64*Y+4*X
20537 FL=P:A=1
20538 GOSUB21500:IFAJ=0THEN20540ELSEA=A+1:IFA>6THEN20530ELSE2053
8
20540 GOSUB21000:R3=3:GOSUB32000:BD(Y1,X1)=-RN:PRINT@P,MT$(-BD(Y
1,X1));
20550 IFY>1 THEN SET(X+2,Y-2):SET(X+5,Y-2)
20560 SET(X+2,Y+2):SET(X+5,Y+2):GOSUB33000
20570 NEXTK
20580 IFRV$="N"THEN20600ELSESD=SE:SR=64:SET(SR,0):SR=SR+1:LN=1
20583 R3=10:GOSUB32000:B1=RN+2:GOSUB32000:B2=RN+2
20585 FORK=0TO14
20586 IFSR>110THENRV=2ELSEIFSR<20THENRV=1ELSER3=2:GOSUB32000:RV=
RN
20590 IF(SRAND1)=1THENGOSUB26000ELSEGOSUB26500
20595 NEXT K
20600 RETURN
21000 Y1=INT(P/64):X1=(P-64*Y1)/4
21010 Y=1+Y1*3:X=X1*8:RETURN
```

Search

Lines 21500-21630: Given the direction A, and the hex number FL, the following are calculated:

- P - the new hex number in the given direction
- AJ - contains:
  - -1 if the move is illegal
  - 0 if the hex is vacant
  - -2 if the piece being moved is an engineer and the new hex contains a mountain, or
- B1 - the index of the occupant.

```
21500 '
21510 ONAGOTO21520,21530,21540,21550,21560,21570,21520
21520 Z=-60:GOTO 21575
21530 Z=68:GOTO 21575
21540 Z=128:GOTO 21575
21550 Z=60:GOTO 21575
21560 Z=-68:GOTO 21575
21570 Z=-128:GOTO 21575
21575 P=FL+Z
21580 Y1=INT(P/64):X1=(P-64*Y1)/4
21590 AJ=0
21600 IF((X1AND1)=(Y1AND1))OR(Y1>14)OR(Y1<0) THEN AJ=-1:RETURN
21610 B1=BD(Y1,X1)
21615 IFB1<0 THENIFI<>S THEN AJ=-1:RETURNELSEAJ=-2:RETURN
21620 IFB1<>0THENAJ=PC(B1,2)
21630 RETURN
```

Set up attack

Lines 22000-22010: Given the hex number FL, the piece index I, the direction A, and the piece index of the occupant B1, this routine checks for attack. If there is an attack, it sets up the following:

1) Column 3 of the piece table is set to the hex number of the opponent;
2) Column 4 is increased by one;
3) Column 5 is set to B1, the type of defender;
4) "River crossing" is checked and column 6 will contain RV

```
22000 GOSUB34000:IFF2=0RETURNELSE:PC(I,3)=P:PC(I,4)=PC(I,4)+1:PC
(I,5)=B1:F2=1:GOSUB 31075:PC(I,6)=RV
22005 PRINT@1000,"ATTACK";:IFRV=1THEN PRINT" ACROSS RIVER";
22007 FORK=1TO1000:NEXT:PRINT@992,STRING$(30," ");
22010 RETURN
23000 'FLICKER FOR INPUT
23010 A$=INKEY$:IFA$<>"" THEN RETURNELSEPRINT@FL,MS$;"  ";:FORJ=
1TO50:NEXT :PRINT@FL,FL$;:GOTO 23010
23999 'DEF. ELIM
24000 FORHA=1TO40:PRINT@DR(1),MT$(RND(3));:NEXT:PRINT@DR(1),"
 ";:PC(DR(2),1)=0:PC(DR(2),3)=0:P=DR(1):GOSUB 21000:BD(Y1,X1)=0:
RETURN
25000 FORHC=1TO40:PRINT@Q(HA,1),MT$(RND(3));:NEXT :PRINT@Q(HA,1)
,"    ";:PC(Q(HA,2),1)=0:PC(Q(HA,2),3)=0:P=Q(HA,1):GOSUB 21000:B
D(Y1,X1)=0
25010 EX=EX-1:AJ=PC(Q(HA,2),2):IF(AJ=2)OR(AJ=5) THEN EX=EX-1
25020 RETURN
26000 IFRV=2THENGOSUB26900:GOTO26100
26010 FORJ=0TO5STEP2:SET(SR+J,LN):NEXT:SR=SR+5:GOSUB26800
26100 LN=LN+3:RETURN
26500 IFRV=1THENGOSUB26800:GOTO26580
26510 FORJ=0TO5STEP2:SET(SR-J,LN):NEXT:SR=SR-5:GOSUB26900
26580 LN=LN+3:RETURN
26800 IF(B1=K)OR(B2=K)THEN26810ELSESET(SR+1,LN+1):SET(SR+2,LN+2)
26810 SR=SR+3:RETURN
26900 IF(B1=K)OR(B2=K) THEN 26910ELSESET(SR-1,LN+1):SET(SR-2,LN+
2)
26910 SR=SR-3:RETURN
30000 GOSUB33000:IFS=17THENPRINT@960,"SOUTHEAST WINS";ELSEPRINT@
960,"NORTHWEST WINS";
30010 PRINT@P,"WIN ";
30020 B$=INKEY$:IFB$=""THEN30020ELSEEND
31074 'RIVER CHK
```

River crossing

lines 31075-31120: Given the hex number FL and the direction A, this routine returns a flag RV which, if set, indicates that moving in that direction involves crossing the river. This is used both for movement and for calculating the river defense.

```
31075 IFHX$="Y"THENRV=0:RETURNELSEKP=P:P=FL:GOSUB21000:P=KP:RV=0
31080 ON A GOTO 31085,31090,31095,31100,31105,31110,31085
31085 IF(X>120)OR(Y<2)THENRETURNELSEIFPOINT(X+7,Y-2) THEN RV=1
31086 RETURN
31090 IF(X>120)THENRETURNELSEIFPOINT(X+7,Y+2) THEN RV=1
31091 RETURN
31095 IF(X>124)THENRETURNELSEIFPOINT(X+2,Y+3)ORPOINT(X+3,Y+3) TH
EN RV=1
31096 RETURN
31100 IF(X<1)THENRETURNELSEIFPOINT(X-1,Y+1) THEN RV=1
31101 RETURN
31105 IF(X<1)OR(Y<1)THENRETURNELSEIFPOINT(X-1,Y-1) THEN RV=1
31106 RETURN
31110 IF(X>124)OR(Y<3)THENRETURNELSEIFPOINT(X+2,Y-3)ORPOINT(X+3,
Y-3) THEN RV=1
31111 GOTO 31120
31120 RETURN
31999 'RANDOM NO.
32000 R1=SD*997:SD=R1-INT(R1):RN=INT(SD*R3)+1:RETURN
33000 PRINT@960,STRING$(63," ");:RETURN
```

Attack

Line 34000: Given the variables S, the attacker's number, and the value of AJ, the occupant of the adjacent hex, this routine returns a flag F2 which, if set, indicates an attack.

```
34000 F2=0:IF(AJ=7)OR(AJ<1)THENRETURN
      ELSEIFNOT(((S=1)AND(AJ>3))OR((S=17)AND(AJ<4)))THEN
      RETURNELSEF2=1:RETURN
35000 LPRINT " ";FORX=15360TO16359STEP64:A$=""
35010 FORY=0TO63:A$=A$+CHR$(PEEK(X+Y))
35020 NEXTY:LPRINTA$:NEXTX:A$="":RETURN
40000 CLS:PRINT@84,"TRS-80 WARGAME  1.1"
      :PRINT@200,"THIS GAME SIMULATES A WAR BETWEEN TWO COUNTR
IES:";PRINT@400,"NORTHWEST  VERSUS  SOUTHWEST"
40002 PRINT@586,PC$(2);:PRINT@615,PC$(5);:PRINT@687,PC$(6);:PRIN
T@712,PC$(3);:PRINT@758,PC$(4);:PRINT@720,PC$(1);:
40010 GOSUB51000
40015 PRINT@15,"OPERATING INSTRUCTIONS:"
40020 PRINT
40025 PRINT:PRINT"DO YOU WANT A HEX BOARD?
      IT IS ADVISABLE TO PLAY ON A HEX BOARD UNTIL YOU ARE
      ACCUSTOMED TO THE MOVEMENT OF THE PIECES.
40030 PRINT"HOW MANY MOUNTAINS?
      MOUNTAINS CREATE A MORE INTERESTING GAME. THEY APPEAR AT
      RANDOM ON THE BOARD.
40040 PRINT"DO YOU WANT A RIVER?
      THIS OPTION IS NOT AVAILABLE ON A HEX BOARD.
40045 PRINT"ENTER THE SCENARIO NUMBER
      THIS ENABLES THE SAME SCENARIO TO BE REPLAYED.":GOSUB51000
40056 PRINT"EACH PLAYER HAS 16 PIECES CONSISTING OF:
40060 PRINTTAB(15);"NORTHWEST";TAB(27);"SOUTHWEST";TAB(38);"NUMB
ER";TAB(46);"VALUE";TAB(54);"MOVEMENT"
40061 PRINT
40065 PRINT"CAPITAL";TAB(20);PC$(7);TAB(30);PC$(7);TAB(40);1;TAB
(48);0;TAB(58);0
40066 PRINT
40070 PRINT"ENGINEER";TAB(20);PC$(1);TAB(30);PC$(4);TAB(40);1;TA
B(48);1;TAB(58);5
40071 PRINT
40075 PRINT"TANK";TAB(20);PC$(2);TAB(30);PC$(5);TAB(40);6;TAB(48
);2;TAB(58);5
40076 PRINT
40080 PRINT"INFANTRY";TAB(20);PC$(3);TAB(30);PC$(6);TAB(40);8;TA
B(48);1;TAB(58);3
40081 PRINT
40085 PRINT"OBJECTIVE:
      THE FIRST PLAYER TO ENTER HIS OPPONENT'S
      CAPITAL IS THE WINNER.
40090 GOSUB51000
40100 PRINT"MOVEMENT:
    THE FIRST PLAYER IS RANDOMLY SELECTED.IF YOU WISH THE OTHER
PLAYER TO MOVE FIRST PRESS = C =. EACH PIECE WILL, IN TURN, FLIC
KER ON THE SCREEN SHOWING THE MAXIMUM NUMBER OF MOVES AVAILABLE.
40105 PRINT"TO MOVE THE PIECE:  PRESS DIRECTION 1 TO 6 ACCORDING
 TO THE FOLLOWING:
40110 PRINTTAB(8);6;TAB(20);"(THESE DIRECTIONS ARE ALSO";PRINTTA
B(6);5;TAB(10);1;TAB(20);"USED TO ATTACK AND RETREAT)":PRINTTAB(
6);4;TAB(10);2;PRINTTAB(8);3
40115 PRINT"IF YOU WISH TO MOVE LESS THAN THE MAXIMUM PRESS = S
=.
YOU MUST STOP IF YOU MOVE NEXT TO AN OPPOSING PIECE (EXCEPT THE
CAPITAL).
 IT TAKES TWO MOVES TO CROSS A RIVER.
40120 GOSUB51000
40125 PRINT:PRINT"NO PIECE MAY ENTER A MOUNTAIN SQUARE.
IF YOU WISH TO MOVE A PIECE IN AN ORDER DIFFERENT FROM THE ORDER
FLICKERED PRESS = H = AND THE TRS-80 WILL REPEAT THIS PIECE WHEN
OTHER MOVEMENT IS COMPLETE.
40130 PRINT"IF YOU DETERMINE THAT MOVEMENT IS COMPLETE AND NO FU
RTHER PIECES NEED BE MOVED PRESS = F =. YOU CAN ALSO PRESS =C=.
 THIS IS FASTER BUT DOES NOT CHECK FOR PIECES STILL ADJACENT FRO
M THE LAST  COMBAT.":GOSUB51000
40135 PRINT"ENGINEER
      THIS PIECE IS ABLE TO CUT A ROAD THROUGH MOUNTAINS.THERE A
RE THREE TYPES OF MOUNTAIN:":PRINT:
40140 FORA=1TO3:PRINTTAB(A*16);A;TAB(A*16+5);MT$(A);:NEXTA:PRINT
:FORY=11TO15STEP4:FORX=44TO108STEP32:SET(X,Y):SET(X+3,Y):NEXTX,Y
:PRINT:PRINT
```

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```
40145 PRINT"  TO CLEAR THE ROAD MOVE THE ENGINEER IN THAT DIREC
TION. A 3 MOUNTAIN CHANGES TO A 2 MOUNTAIN; A 2 TO A 1 AND A 1 T
O A BLANK SPACE.
40150 PRINT" THE ENGINEER STOPS WHEN CLEARING THE ROAD AND THE R
EMAINDER OF HIS MOVEMENT IS LOST.":PRINT:GOSUB51000
40155 PRINT"RIVER
     IT COSTS TWO MOVES TO CROSS A RIVER UNLESS THERE IS A BRID
GE. ENGINEERS MAY NOT CLEAR A ROAD IF THE RIVER IS IN BETWEEN.
40160 PRINT:PRINT"THE VALUE OF A DEFENDER UNDER ATTACK IS DOUBLE
D IF THE RIVER IS BETWEEN THE DEFENDER AND ATTACKER UNLESS IT IS
 ALSO ATTACKED BY ANOTHER PIECE ON THE SAME SIDE OF THE RIVER.":
GOSUB51000
40165 PRINT"COMBAT:
      WHEN PLAYER MOVES AND PLACES A PIECE NEXT TO AN OPPOSING
 PIECE HE MUST ATTACK. EACH ATTACKING PIECE MUST ATTACK =ONE= DE
FENDER. IF THERE IS AN OPTION, THE PIECE WILL FLICKER WITH =AT=.
"
40167 PRINT"THE PLAYER MUST INDICATE THE DIRECTION OF ATTACK.
40170 PRINT"     ALL COMBAT TAKES PLACE SIMULTANEOUSLY ON COMPLE
TION OF MOVEMENT"
40175 PRINT"ATTACKER'S FACTORS: INTEGER VALUE OF 150% OF VALUE O
F ATTACKERS.
40180 PRINT"DEFENDER'S FACTORS: VALUE OF DEFENDER PLUS ANY DEFEN
DER
                                ADJACENT TO ATTACKER PROVIDED
                                THAT PIECE IS NOT ALSO UNDER
                                ATTACK.":GOSUB51000
40185 PRINT"COMBAT RESULT:
      ATTACKER'S AND DEFENDER'S ODDS ARE ROUNDED TO SIMPLE ODD
S(E.G. 11 VS 4 BECOMES 2-1). THE FOLLOWING TABLE IS CONSULTED AN
D A RANDOM ROW SELECTED:
40190 PRINT"  1-6 1-5 1-4 1-3 1-2 1-1 2-1 3-1 4-1 5-1 6-1":FORA=
1TO6:FORB=1TO11:PRINTUSING"###";TB(A,B);:NEXTB:PRINT:NEXTA
40192 PRINT:PRINT"-1 A ELIM: -2 A RET: 0 EXCHG: 1 D ELIM: 2 D RE
T":GOSUB51000
40195 PRINT"-1 ATTACKER(S) ELIMINATED.
40200 PRINT" 1 DEFENDER ELIMINATED.
40205 PRINT" 0 EXCHANGE    ATTACKER MUST ELIMINATE UP TO VALUE O
F DEFENDER.IF THERE IS AN OPTION THE ATTACKERS FLICKER WITH =EL=
.PRESS =E= TO ELIMINATE. PRESS =N= IF YOU DO NOT WISH TO ELIMINA
TE.FLICKERING CONTINUES UNTIL SUFFICIENT ELIMINATED.
40210 PRINT"-2 ATTACKER RETREATS 2 HEX:":PRINT" 2 DEFENDER RETRE
ATS 2 HEX:
40415 PRINT" THE PIECE FLICKERS WITH=RT=.IT MUST RETREAT AND NOT
 PASS THROUGH ANY HEX ADJACENT TO AN OPPONENT OR MOVE OFF BOARD.
IF IT CANNOT, PRESS =E= TO ELIMINATE.
51000 PRINT@960,"PRESS =ENTER= TO CONTINUE ( =P= TO PRINT )";
51050 B$=INKEY$:IFB$=""THEN51050
51060 IFB$="P"GOSUB35000
51080 CLS:RETURN
```

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FROM STRATEGIC SIMULATIONS . . .

Sink the Bismarck!

Historic wargaming may be the only intellectual hobby which creates more intensely devoted fanatics than home computing. When two wargamers spend an evening refighting a famous battle, they'll spend several hours happily setting up the gameboard, firepower charts, unit strength tables and so forth . . . all before the first shot can be fired! There are such paper and pencil simulations of every famous battle from Shiloh to El Alamein. If you've ever tried one, you already know the excitement and challenge of trying to be a better general than Rommel.

If you've got an Apple II Plus (or an Apple II with Applesoft Firmware ROM Card) with 48K memory and a 5 1/4" mini floppy disk drive, you can be playing Computer Bismark in a few days. For $59.95, you get the game program disc, 2 mapboard charts (for plotting secret strategies in grease pencil between moves), 2 ship data charts, 2 system command cards, a loading instruction sheet, and a rulebook. $59.95

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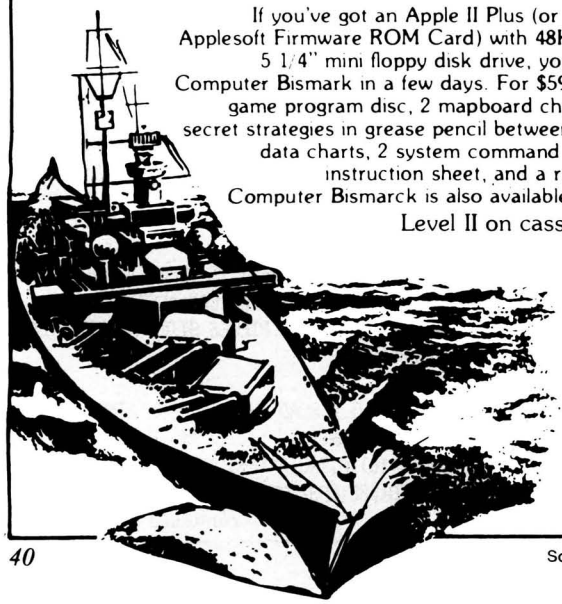

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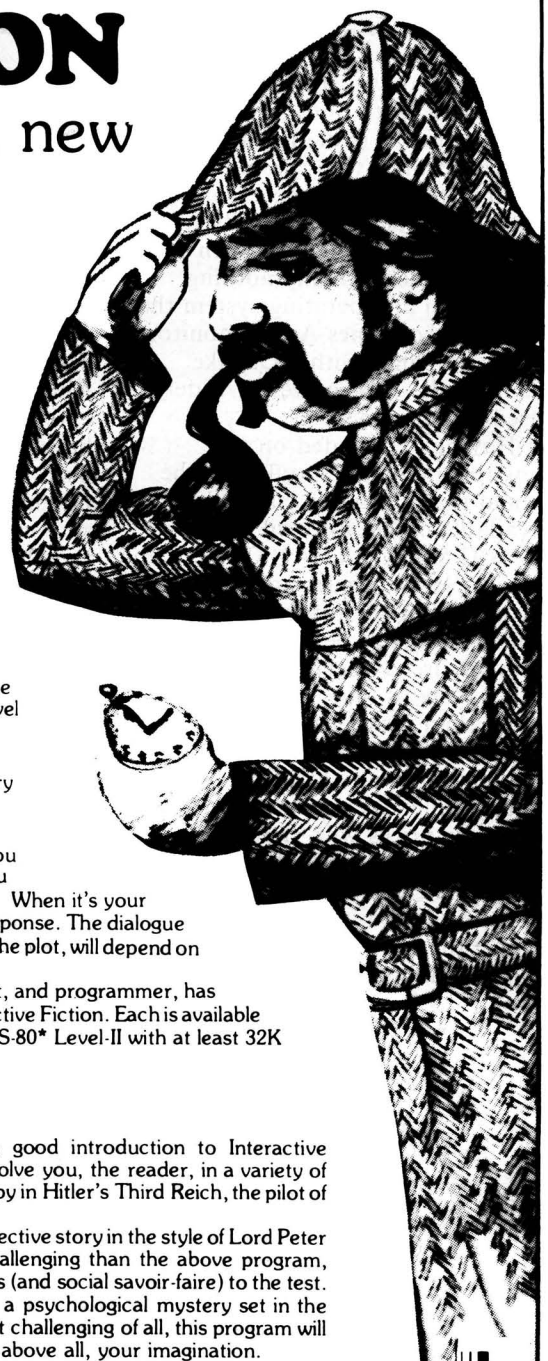

Traditionally, literature has been a one-way medium. The information flow was from the novel to the reader, period. Interactive Fiction changes this by permitting the reader to participate in the story itself.

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Six Micro Stories offers a good introduction to Interactive Fiction. Six very short stories involve you, the reader, in a variety of situations: You are an American spy in Hitler's Third Reich, the pilot of a doomed 747, and more.

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APPLE REVIEWS

by Mark Pelczarski

The Microsoft Z-80 Softcard
DOS 3.3

One of the dreams of many since microcomputers first became available was that someday they'd be able to do what the big computers could. BASIC is often scoffed at by professional programmers, perhaps unjustifiably if they haven't followed the evolution of the language. But experienced programmers can rightly argue the merits of structured languages with IF-THEN-ELSEs, DO WHILEs (or PERFORM UNTILs), and actual parameter passing to subroutines. These advantages by name wouldn't mean much to those who've used only BASIC, but they sure can make programming much easier. Many have been waiting for micros to offer "real" languages, such as COBOL or FORTRAN.

Apple Computer Company has hoped that Pascal, itself a very good language, would become THE higher level language of microcomputers. A noble cause, but there are notable obstacles. The three most popular computer languages remain to be three of the first developed languages: COBOL for business, FORTRAN for scientific applications, and BASIC on time-shared and micro systems. Many equally, or even more, capable languages have developed, but have met the same fate as the metric system in this country. So when Mirosoft announced their Z-80 Softcard, which has the capability of handling FORTRAN ,COBOL,and Microsoft's BASIC 5.0, the most advanced BASIC around, and all previously unavailable for the Apple, one suspected that they had a hot item. Not least among the attractions is the fact that Microsoft will also have a BASIC compiler available for the Softcard, something most Apple owners have longed for, capable of making mere BASIC programs travel at the speed of machine language, etc.

The Z-80 is the other microprocessor. Apple, Atari, and PET use the 6502 chip. TRS-80, Cromemco, North Star, and others use the Z-80 chip. Now Apple users can conveniently live like either half, with both available in one computer. (For the sake of this conversation, I've purposely ignored other microprocessors. That's a whole column in itself.) The Softcard also comes with CP/M, which is really nothing more than an operating system that basically combines Apple monitor-like commands with DOS-like commands. It is, however, widely used in micro-systems.

Having expounded on the possible merits, it should now be noted that all that is currently available is the Softcard with BASIC 5.0.FORTRAN,COBOL,and the BASIC compiler are merely promises for the future; promises which shouldn't be doubted since they've already been developed on other systems, but they will be more than inexpensive additions. The Softcard works flawlessly, plugging into any available slot in your Apple. To reasonably compare prices with the Pascal system you'd actually have to include the cost of a 16K memory expansion card, which gives your Apple the full 64K afforded by the Pascal Language system, and extra room for the Microsoft languages (it is, however, NOT a necessity). Such a card is available from Andromeda Computer Systems, and,even with this included,the Z-80 Softcard is the less expensive alternative.

Much has been made of the fact that with the Softcard you can take advantage of the multitude of software already available for Z-80 systems. True, there is a lot already available for the Z-80, and particularly for CP/M, the operating system most prevalent on micros, especially those which are business based. But it's not yet available on Apple formatted disks. There is the possibility of being able to download through a phone connection, but there may also be problems with that approach with compatibility of the programs with Apple's input/output structure.

Microsoft's BASIC 5.0 is a joy to use. It has several features not available with Apple's BASICs, such as the inclusion of the ELSE clause with an IF statement (If condition is true, THEN do this, ELSE do that), WHILE and WEND (While a condition is true, repeat these steps), PRINT USING (easy formatting of output), real disk commands (unlike Apple's ungodly PRINT D$ approach), BUTTON (no more PEEKing to find a pressed paddle button), and HSCRN (to tell whether a point on the HI-RES screen is on or off). To use the HI-RES commands, which are in GBASIC, an extension of BASIC 5.0, you'll have to be able to use a 16 sector disk. The 13 sector version does not support the HI-RES graphics, so you'd need a very new Apple, the DOS 3.3 upgrade, or the Pascal system. Both the 13 sector and 16 sector version are included with the Softcard, along with two nice, thick, and well done manuals: one about the Softcard and the use of CP/M, and the other about BASIC 5.0.

If you are looking for a more sophisticated programming language, or if you were considering the Apple Pascal Language system, the Z-80 Softcard is well worth investigating.

DOS 3.3

We got a copy of the DOS 3.3 upgrade kit a few days ago. Priced at $60, it should not be considered a necessity for Apple owners. Its main advantage is that it provides over 20% more room on each disk you use. It also has a single drive copy program included, as well as a file maintenance program, which basically lets you perform DOS commands for files or sets of files in only a few keystrokes. The disadvantage is that part of the upgrade is the replacement of two chips, meaning you can't freely switch from DOS 3.2 to DOS 3.3 and back. DOS 3.2 disks can be converted to DOS 3.3, unless they are copy protected in certain ways. If so, they can still be run with DOS 3.3, but you must first boot with a special BASICs disk that is provided with the upgrade. This means that most commercial programs now available will require a double boot for use, an inconvenience that for now may

continued on next page

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outweigh the advantages of the file manager program. A possible advantage mentioned earlier is the availability of the Z-80 Softcard's 16-sector disk, if you have that product.

Unless you need extra space on your disks for file storage, don't assume that DOS 3.3 is a necessary upgrade.

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by Tim Hays

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COLLISION

by Mark Pelczarski

Collision is an Apple program that requires 16K and Applesoft in ROM.

You may recognize this program as an arcade-type game that has also gone under the name "Head On." The game board consists of five concentric tracks, each covered with mines that are worth points to you when you pick them up. Your vehicle travels around the track counterclockwise, while the computer has a vehicle moving clockwise on a collision course with you. Fortunately, there are four points in the track where you may change lanes to avoid the oncoming vehicle by steering with the paddle control. You may also double your speed by holding down the paddle button (use paddle zero).

Each mine that you pick up is worth one point. Occasionally, the computer's vehicle will drop special bonus mines that are worth five points each. When you clear an entire rack you are given a new, complete one. If at any point you think you've got the game mastered, wait until you try the third rack. (No one, to date, has made it past three.)

The program itself uses a table of three shapes. The first is a regular mine, the second is a bonus mine (which is larger), and the third is the rocket-like vehicle. It also uses POKEs and PEEKs for storing the board's status, instead of an array that would take more space and be more time-consuming in operation. Oh, and for those of you who cringe when they see one of my programs in anticipation of a few dozen lines of shape table, there's only one DATA statement *in this* entire program! (I'm learning how to avoid droves of phone calls.)

Collision - Variables

A,A$,B - used in poking shape table into memory.

C - count of how many mines are left.

DC,DD,DY - direction (1-4) of the computer 1, computer 2, and you.

HS - high score.

I - loop counter.

L - pointer to memory locations.

LC,LD,LY - level in track; 1-inside, 5-outside.

R - random number to choose whether new mines appear.

RK - number of racks cleared.

S - start of the board table in memory.

SC - score.

SW - if the computer has two vehicles, this tells which has the next move.

T - how many moves you get (doubles when paddle button is pressed).

X,Y - coordinates used in setting up board.

XC,YC,XD,YD,XY,YY - x,y coordinates at any time of computer1, computer2, and player.

Z - working storage, used to minimize the number of long computations.

```
10  REM  COLLISION
20  REM  C. 1980, MARK PELCZARSKI


 Initialization starts at 1000.

50  GOTO 1000

 If button is pushed, double your
 speed.

60  IF  PEEK ( - 16287) > 127 THEN
     T = 2

 Erase your vehicle.


65  HCOLOR= 0: ROT= DY * 16: DRAW
     3 AT 6 + 12 * XY,6 + 12 * YY



 Are you at a location where you can
 switch tracks?

70  IF  ABS (XY - 11) > 1 AND  ABS
     (YY - 6) > 1 THEN 110

 Shift track check depends on
 direction.
75  ON DY GOTO 80,85,90,95
80  IF XY = 12 THEN 150
82 Z =  INT ( PDL (0) / 86) - 1:L
     Y = LY + Z:YY = YY + Z: IF L
     Y < 1 OR LY > 5 THEN LY = LY
      - Z:YY = YY - Z
84  GOTO 150
85  IF YY = 5 THEN 150
87 Z =  INT ( PDL (0) / 86) - 1:L
     Y = LY + Z:XY = XY - Z: IF L
     Y < 1 OR LY > 5 THEN LY = LY
      - Z:XY = XY + Z
89  GOTO 150
90  IF XY = 10 THEN 150
92 Z =  INT ( PDL (0) / 86) - 1:L
     Y = LY + Z:YY = YY - Z: IF L
     Y < 1 OR LY > 5 THEN LY = LY
      - Z:YY = YY + Z
```

```
94  GOTO 150
95  IF YY = 7 THEN 150
97 Z =  INT ( PDL (0) / 86) - 1:L
    Y = LY + Z:XY = XY + Z: IF L
    Y < 1 OR LY > 5 THEN LY = LY
     - Z:XY = XY - Z
99  GOTO 150

 Change direction? (if at corner)

110  IF  ABS (XY - 11) < LY + 6 OR
     ABS (YY - 6) < LY + 1 THEN
    150
120 DY = DY - 1: IF DY = 0 THEN D
    Y = 4

 Change position.

150  ON DY GOTO 160,170,180,190
160 XY = XY + 1: GOTO 200
170 YY = YY + 1: GOTO 200
180 XY = XY - 1: GOTO 200
190 YY = YY - 1

 Check for collision.

200  IF XY = XC AND YY = YC THEN
    1013
205  IF RK > 2 THEN  IF XY = XD AND
    YY = YD THEN 1013

 Check for points.

210 Z = XY * 13 + YY + S: IF  PEEK
    (Z) < 1 THEN 240

 Erase mine.

220  ROT= 0: DRAW  PEEK (Z) AT XY
     * 12 + 6,YY * 12 + 6:SC = S
    C + ( PEEK (Z) - 1) * 4 + 1:
    C = C - 1: POKE Z,0: VTAB 22
    : HTAB 1: PRINT SC


 If all erased, new rack.



230  IF C = 0 THEN 1015
240  IF T = 2 THEN T = 1: GOTO 11
    0


 Redraw vehicle.


250  HCOLOR= 7: ROT= DY * 16: DRAW
    3 AT XY * 12 + 6,YY * 12 + 6

 If two computer vehicles, check
 which one moves.

260  IF RK > 2 THEN T = 2:SW = 1 -
    SW: ON SW + 1 GOTO 300,500

 Move first computer vehicle. (Same
 sequence as moving yours.)

300  HCOLOR= 0: ROT= DC * 16: DRAW
    3 AT XC * 12 + 6,YC * 12 + 6

305 Z =  PEEK (XC * 13 + YC + S):
     IF Z THEN  HCOLOR= Z: ROT=
    0: DRAW Z AT XC * 12 + 6,YC *
    12 + 6
310  IF XC <  > 11 AND YC <  > 6 THEN
    360
315 R = 0: IF  RND (1) < .05 THEN
    R = 1
320 Z =  SGN (LY - LC):LC = LC +
    Z
330  ON DC GOTO 335,340,345,350
335 YC = YC - Z: GOTO 400
340 XC = XC + Z: GOTO 400


345 YC = YC + Z: GOTO 400
350 XC = XC - Z: GOTO 400
360  IF  ABS (XC - 11) < LC + 6 OR
     ABS (YC - 6) < LC + 1 THEN
    400
370 DC = DC + 1: IF DC = 5 THEN D
    C = 1
400  ON DC GOTO 410,420,430,440
410 XC = XC + 1: GOTO 450
420 YC = YC + 1: GOTO 450
430 XC = XC - 1: GOTO 450
440 YC = YC - 1
450  IF XC = XY AND YC = YY THEN
    1013
455  IF  NOT R THEN 470
457 Z = XC * 13 + YC + S: IF  PEEK
    (Z) = 0 THEN C = C + 1
460  POKE Z,2
470  IF T = 2 THEN T = 1: GOTO 30
    0
480  HCOLOR= 5: ROT= DC * 16: DRAW
    3 AT XC * 12 + 6,YC * 12 + 6

490  GOTO 60


 Move second computer vehicle.


500  HCOLOR= 0: ROT= DD * 16: DRAW
    3 AT XD * 12 + 6,YD * 12 + 6

505 Z =  PEEK (XD * 13 + YD + S):
     IF Z THEN  HCOLOR= Z: ROT=
    0: DRAW Z AT XD * 12 + 6,YD *
    12 + 6
510  IF XD <  > 11 AND YD <  > 6 THEN
    560
520 Z =  SGN (LY - LD):LD = LD +
    Z
530  ON DD GOTO 535,540,545,550
535 YD = YD - Z: GOTO 600
540 XD = XD + Z: GOTO 600
545 YD = YD + Z: GOTO 600
550 XD = XD - Z: GOTO 600
560  IF  ABS (XD - 11) < LD + 6 OR
     ABS (YD - 6) < LD + 1 THEN
    600
570 DD = DD + 1: IF DD = 5 THEN D
    D = 1
600  ON DD GOTO 610,620,630,640
610 XD = XD + 1: GOTO 650
620 YD = YD + 1: GOTO 650
630 XD = XD - 1: GOTO 650
640 YD = YD - 1
650  IF XD = XY AND YD = YY THEN
    1013
652  IF XD = XY AND YD = YY THEN
    1013
655  IF T = 2 THEN T = 1: GOTO 50
    0
660  HCOLOR= 5: ROT= DD * 16: DRAW
    3 AT XD * 12 + 6,YD * 12 + 6

670  GOTO 60

 Go initialize shape table.

1000  GOSUB 1300

1010  POKE 232,0: POKE 233,30

 Initialize variables.

1011 HS = 0:SC = 0:SW = 0

 New game.

1013  IF SC > HS THEN HS = SC
1014 SC = 0:RK = 0

 New rack.

1015 C = 200:RK = RK + 1

 Draw layout.

1020  HGR : HCOLOR= 6
1030  FOR Y = 0 TO 60 STEP 12
```

```
1040  HPLOT Y,Y TO 276 - Y,Y TO 2
      76 - Y,156 - Y TO Y,156 - Y TO
      Y,Y
1050  NEXT
1060  HCOLOR= 0
1070  FOR Y = 12 TO 48 STEP 12
1080  HPLOT Y,65 TO Y,91
1090  HPLOT 276 - Y,65 TO 276 - Y
      ,91
1100  HPLOT 125,Y TO 151,Y
1110  HPLOT 125,156 - Y TO 151,15
      6 - Y
1120  NEXT
```

Instead of using an array to store the board status, 299 bytes are used to store the contents of each location on the board: 0 if empty, and 1 if there's a mine. The board is 23 by 13, and the proper location is found with the formula S+X*13+Y, where S is the start of the table. This technique saves both time and space.

```
1121 S = 7716

1122  FOR L = S TO S + 298: POKE
      L,0: NEXT
```

Put in the mines.

```
1125  HCOLOR= 1: ROT= 0: SCALE= 1

1130  FOR Y = 0 TO 4
1140  FOR X = 0 TO 9
1150  DRAW 1 AT 6 + 12 * X,6 + 12
      * Y: POKE 13 * X + Y + S,1
1160  DRAW 1 AT 270 - 12 * X,6 +
      12 * Y: POKE 13 * (22 - X) +
      Y + S,1
1170  DRAW 1 AT 6 + 12 * X,150 -
      12 * Y: POKE 13 * X + (12 -
      Y) + S,1
1180  DRAW 1 AT 270 - 12 * X,150 -
      12 * Y: POKE 13 * (22 - X) +
      (12 - Y) + S,1
1190  NEXT X: NEXT Y
```

Initial locations for you (Y) and the computer (C).

```
1220 XC = 10:YC = 12:DC = 3:LC =
     5
1230 XY = 12:YY = 12:DY = 1:LY =
     5
1240  ROT= DY * 16: HCOLOR= 7: DRAW
      3 AT XY * 12 + 6,YY * 12 + 6

1250  ROT= DC * 16: HCOLOR= 5: DRAW
      3 AT XC * 12 + 6,YC * 12 + 6
```

If more than two racks emptied, set the second for the computer (D).

```
1255  IF RK > 2 THEN XD = 10:YD =
      0:DD = 1:LD = 5: ROT= DD * 1
      6: DRAW 3 AT XD * 12 + 6,YD *
      12 + 6
1260  HOME : VTAB 21: PRINT "SCOR
      E","HIGH SCORE": PRINT SC,HS
```

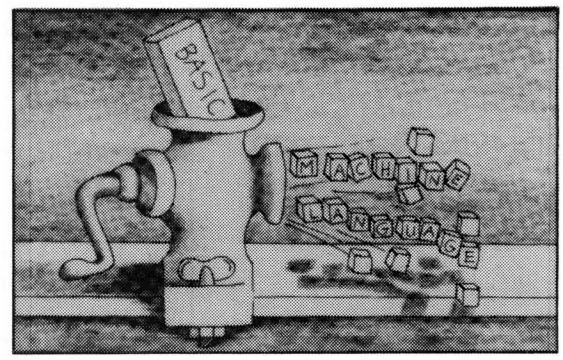
Jump to movement section.

```
1270  FOR I = 1 TO 1000: NEXT : GOTO
      60
```

Load shape table.

```
1300 L = 7680
1310 A$ = "030008000B0012003E2C00
     3E2E2E2C3C3C0037373F3E362E2C
     252D352D2E243C3C272700"
1320  FOR I = 1 TO 72 STEP 2
1330 A =  ASC ( MID$ (A$,I,1)) -
     48: IF A > 9 THEN A = A - 7
1340 B =  ASC ( MID$ (A$,I + 1,1)
     ) - 48: IF B > 9 THEN B = B -
     7
1350  POKE L,A * 16 + B:L = L + 1
      : NEXT I: RETURN
```


The Lazy Man's Shortcut to Machine Language!



Tiny Comp.

by David Bohlke

A BASIC **Compiler** in BASIC! Run your source program in BASIC, compile it into FAST Z-80 Code and execute the compiled version — all without reloading. 26 integer variables, GOTO, GOSUB, END, REM, RND, LET, +, *, /, IF, THEN,<, =, >, INKEY$, CLS, PRINT@, CHR$, PEEK, POKE, Compiled programs may be saved via TAPEDISK.

Supplied with game program, "3D TIC TAC TOE", which uses all of the TINY COMP statement set and is ready to compile.

Manual includes several sample programs as well as thorough documentation of the Compiler for those who like to know "how things work" and for those who might even wish to EXPAND on TINY COMP's capabilities.

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BOWLING

APPLEBOWLER
from
COM-SOFT
(Submitted by Phillip Case)

Applebowler for the Apple works with 16K memory and requires Integer BASIC in ROM.

APPLEBOWLER is a one or two player 16K full color graphics program which takes you to the lanes without leaving your living room. Also with this program you need not worry about straining yourself.

To play, the first thing you do is enter the number of players and the difficulty level (1-3). The difficulty level determines the speed of the position indicator. Once started, all further input is from the paddle buttons only.

If only one person is playing, then be sure to use paddle zero. The high score to date is 273, see if you can beat that.

VARIABLES:

MATRIX VARIABLES:

A(1-10) = Indicators to tell if pin is still standing.
C(1-13) = 1st player's individual frame scores.
C(14-23) = 2nd player's individual frame scores.
B(1-10) = 1st player's total cumulative scores.
B(14-23) = 2nd player's total cumulative scores.

NON-MATRIX VARIABLES:

V = Number of players.
T1 = Difficulty factor.
K = Player turn indicator.
X = Path of ball down alley & misc. logic.
G = The current frame in play.
S = Sound producing address.

```
Dimensions Memory

  0 REM   APPLEBOWLER FROM COM-SOFT
       SUBMITTED BY PHILLIP CASE
  1 DIM B(26),C(26),A(10): CALL
    -936

Initializes Variables

 2 TEXT : CALL -936: PRINT "HOW MAN
   Y PLAYERS (1 OR 2)";: INPUT
   V: IF V<1 OR V>2 THEN 2
 3 FOR X=1 TO 26:B(X)=0:C(X)=0
   : NEXT X: FOR X=1 TO 10:A(X)
   =0: NEXT X
 4 PRINT "DIFFICULTY FACTOR (1-3)"
   ;: INPUT T1:T1=4-T1: IF T1<
   1 OR T1>3 THEN 4
 5 XX=1:H=1: CALL -936

 6 K=1
 8 C2=13:C1=2:G=1

This routine is the create the
screen graphics display.

   9 GR : COLOR=C1: HLIN 0,39 AT
     0: HLIN 0,39 AT 19: COLOR=C2:
      FOR X=0 TO 39: VLIN 1,18 AT
     X: NEXT X
  10 T=1
  20 COLOR=C1
  51 PLOT 37,5: PLOT 37,6: PLOT
     37,9: PLOT 37,10: PLOT 37,13
     : PLOT 37,14
  52 PLOT 35,7: PLOT 35,8: PLOT
     35,11: PLOT 35,12: PLOT 33,
     9: PLOT 33,10
  53 PLOT 39,3: PLOT 39,4: PLOT
     39,7: PLOT 39,8: PLOT 39,11
     : PLOT 39,12: PLOT 39,15: PLOT
     39,16
  54 FOR X=1 TO 10:A(X)=1: NEXT
     X
  55 Y=1:Z=18:H=1
  56 COLOR=0: FOR X=19 TO 22: VLIN
     24,35 AT X: NEXT X:GG=G: IF
     GG>10 THEN GG=10
  58 IF G=G5 AND K=K1 THEN C3=3:
      IF K#K1 OR G#G5 THEN C3=15
     : IF G>10 THEN C3=3:K1=K:G5=
     G: GOSUB 1500

Move pin pointer back & forth.
And reset old position.

  60 FOR X=Y TO Z STEP SGN (Z-Y)
     : COLOR=C2: PLOT 0,XX: COLOR=
     0: PLOT 0,X

Scan for paddle input.

  63 IF PEEK (-16288+K)>127 THEN
     90

Difficulty delay loop.

  65 XX=X
  66 IF T1=1 THEN 70: FOR Z1=1 TO
      (T1-1) ^ 3: NEXT Z1
  70 NEXT X: GOSUB 2500:H=H+1: IF
     H MOD 2=0 THEN 77

Reset indicators to move ball other
direction.

  75 Y=1:Z=18: GOTO 60
  77 Z=1:Y=18: GOTO 60

Display ball rolling down alley.

  90 REM
  95 COLOR=C2: PLOT 0,XX
  98 PLOT 0,X
 100 YY=0: FOR Y=1 TO 39: IF SCRN(
     Y,XX)=C1 THEN 105: COLOR=C2:
      PLOT YY,XX
 101 COLOR=0: PLOT Y,XX:YY=Y
 102 FOR Z1=1 TO (T1-1) ^ 3: NEXT
     Z1,Y

Check X=(Path of ball) & call
various subroutines depending upon
pin patterns and random elements.

105 COLOR=C2: PLOT YY,XX
109 X=XX
110 IF X=2 OR X=3 THEN 900
111 IF X=16 OR X=17 THEN 902
112 IF X=14 OR X=15 THEN 910
113 IF X<2 OR X>17 THEN 200
114 IF X=4 OR X=5 THEN 920

115 IF X=6 THEN 180: IF X#7 THEN
    120: GOSUB 220: GOSUB 240: GOSUB
    280: IF A(4)=1 AND A(2)=1 THEN
    GOSUB 270: IF A(4)=1 AND RND
    (2)=1 THEN GOSUB 270

116 IF A(2)=1 THEN 1300
119 GOTO 200
120 IF X=13 THEN 190: IF X#12 THEN
    125: GOSUB 230: GOSUB 260: GOSUB
    290: IF A(6)=1 AND A(3)=1 THEN
```

```
    GOSUB 300: IF A(6)=1 AND RND
    (2)=1 THEN GOSUB 300
121 IF A(3)=1 THEN 1350
122 GOTO 200
125 IF X#8 THEN 135
126 GOSUB 210: GOSUB 220: GOSUB
    280: IF A(1)=1 OR A(2)=1 THEN
    GOSUB 270
127 IF A(1)=1 AND RND (4)>0 THEN
    GOSUB 300
128 IF A(1)#1 THEN GOSUB 250
129 IF A(1)=1 OR A(2)=1 THEN GOSUB
    240
130 IF A(1)=1 AND A(4)=1 AND A(
    8)=1 AND RND (3)>0 THEN GOSUB
    290
131 IF RND (3)=1 AND A(1)=1 THEN
    950
132 GOTO 200
135 IF X#11 THEN 145
136 GOSUB 210: GOSUB 230: GOSUB
    290: IF A(1)=1 OR A(3)=1 AND
    RND (4)>0 THEN GOSUB 300
137 IF A(1)=1 AND RND (4)>0 THEN
    GOSUB 270
138 IF A(1)=1 OR A(3)=1 THEN GOSUB
    260
139 IF A(1)#1 THEN GOSUB 250
141 IF RND (3)=1 AND A(1)=1 THEN
    960
142 IF A(1)=1 AND A(6)=1 AND A(
    9)=1 AND RND (3)>1 THEN GOSUB
    280
144 GOTO 200
145 IF X=10 THEN 170
147 GOSUB 210: IF RND (6)>0 THEN
    GOSUB 250
148 GOSUB 220: GOSUB 280: IF A(
    1)=1 THEN GOSUB 230
149 IF A(1)=1 OR A(2)=1 THEN 970
```

```
150 IF A(1)=1 AND RND (6)>0 THEN
    980
151 IF A(1)=0 AND A(5)=1 THEN 990
152 IF A(5)=1 AND RND (5)>0 THEN
    GOSUB 290
153 GOTO 200
170 GOSUB 210: IF RND (6)>0 THEN
    GOSUB 250
171 GOSUB 230: GOSUB 290: IF A(
    1)=1 THEN GOSUB 220
172 IF A(1)=1 OR A(3)=1 THEN 1000
173 IF A(1)=1 AND RND (6)>0 THEN
    1010
174 IF A(1)=0 AND A(5)=1 THEN 1020
175 IF A(5)=1 AND RND (5)>0 THEN
    GOSUB 280
176 GOTO 200
180 GOSUB 220: GOSUB 240: GOSUB
    280: IF A(8)=1 OR A(4)=1 THEN
    GOSUB 270
181 IF A(2)=1 THEN 1030
182 IF A(3)=1 AND A(5)=1 AND RND
    (3)>0 THEN GOSUB 250
183 IF A(2)=1 AND RND (2)=1 THEN
    GOSUB 290
184 GOTO 200
190 GOSUB 230: GOSUB 260: GOSUB
    290: IF A(9)=1 OR A(6)=1 THEN
    GOSUB 300
191 IF A(3)=1 THEN 1040
193 IF A(3)=1 AND RND (2)=1 THEN
    GOSUB 280
200 GOSUB 2000
201 IF T<>1 THEN 202:RR=10-J:B(
    G+13*K-13)=10-J: IF B(G+13*
    K-13)#10 THEN 202:B(G+K*13-
    13)=20:X=2: GOTO 400
202 IF T#1 THEN 203:T=0: GOTO 55
203 IF T=0 THEN 1200
Remove pins from screen routine.
 210 Y=33:Z=9: GOTO 310
 220 Y=35:Z=7: GOTO 310
 230 Y=35:Z=11: GOTO 310
 240 Y=37:Z=5: GOTO 310
 250 Y=37:Z=9: GOTO 310
 260 Y=37:Z=13: GOTO 310
 270 Y=39:Z=3: GOTO 310
 280 Y=39:Z=7: GOTO 310
 290 Y=39:Z=11: GOTO 310
 300 Y=39:Z=15
 310 COLOR=C2: PLOT Y,Z: PLOT Y,
     Z+1
Create sound effects.
 311 S=-16336
 318 FOR I1=1 TO 3
 320 LT= PEEK (S)
 325 NEXT I1
 350 RETURN
Determine performance
 360 PRINT "";: RETURN
400 IF G=1 THEN 416
401 IF G=2 THEN 405
404 IF B(G-2+K*13-13)=20 AND B(
    G-1+K*13-13)=20 THEN 1100
405 D=B(G+K*13-13): IF D=20 THEN
    D=10
407 IF B(G-1+K*13-13)=20 AND B(
    G+13*K-13)=20 THEN 500
410 IF B(G-1+13*K-13)=20 THEN 1400
415 IF B(G-1+13*K-13)=10 THEN 1110
416 IF B(G+13*K-13)=10 OR B(G+13
    *K-13)=20 THEN 500
420 IF G<=10 THEN 1120
440 REM
500 GG=G: IF G>10 THEN GG=10
501 B=B(G+13*K-13): IF B>9 THEN
    GOSUB 360: IF B>10 THEN GOSUB
    360
Print score.
 502 VTAB 2*K+19: TAB G*3:B=B(G+
     13*K-13): IF B<10 THEN PRINT
     RR;B-RR;: IF B=20 THEN PRINT
     "X";: IF B=10 THEN PRINT RR;
     "/";
End of game routine.
 503 IF V=1 THEN 508: IF G>=10 AND
     K=1 AND C(10+13*K-13)=0 THEN
     1130
 504 IF I=1 THEN 1140
 505 IF G>=10 AND K=2 AND C(23)=
     0 THEN 1150
 508 IF C(10+V*13-13)#0 THEN 600
 509 IF V=1 THEN 1150
 510 IF K=2 THEN 1170:K=2: GOTO
     10
Print totals and end game.
 600 FOR X=1 TO 2000: NEXT X
 602 TEXT : CALL -936
 603 PRINT
 605 FOR X=1 TO V: PRINT "PLAYER "
     ;X;"'S SCORE WAS ";C(10+X*13
     -13): PRINT : PRINT : NEXT
     X
 610 PRINT "PRESS RETURN FOR ANOTHER
     GAME";: INPUT A$: GOTO 2
Continuation of pin-reaction
subroutines.
 900 GOSUB 270: IF X=2 AND A(7)=
     1 THEN GOSUB 280
 901 GOTO 200
 902 GOSUB 300: IF X=17 AND A(10
     )=1 THEN GOSUB 290
 903 GOTO 200
 910 GOSUB 260: GOSUB 300: IF A(
     6)=1 THEN 915
 912 IF A(10)=1 AND X=14 THEN 915
 913 GOTO 200
 915 GOSUB 290: GOTO 200
 920 GOSUB 240: GOSUB 270: IF A(
     4)=1 THEN 925
 922 IF A(7)=1 AND X=5 THEN 924
```

```
 923 GOTO 200
 924 GOSUB 290: GOTO 200
 925 GOSUB 280: GOTO 200
 950 GOSUB 250: GOSUB 230: GOSUB
     260: GOSUB 290: GOTO 200
 960 GOSUB 250: GOSUB 220: GOSUB
     240: GOSUB 280: GOTO 142
 970 GOSUB 240: GOSUB 270: GOTO
     150
 980 GOSUB 260: IF RND (8)>1 THEN
     GOSUB 300
 981 GOTO 151
 990 GOSUB 290: GOSUB 250: GOTO
     152
1000 GOSUB 260: GOSUB 300: GOTO
     173
1010 GOSUB 240: IF RND (8)>1 THEN
     GOSUB 270
1011 GOTO 174
1020 GOSUB 280: GOSUB 250: GOTO
     175
1030 GOSUB 250: GOSUB 260: IF A(
     5)=1 AND RND (4)>1 THEN GOSUB
     300
1031 GOTO 182
1040 GOSUB 250: GOSUB 240: IF A(
     5)=1 AND RND (4)>1 THEN GOSUB
     270
1041 GOTO 193
Special scoring routines for
strikes & spares.
1100 C(G-2+K*13-13)=C(G-3+K*13-13
     )+20+RR
1105 VTAB 2*K+20: TAB G*3-6: PRINT
     C(G-2+13*K-13);
1106 IF B(G+13*K-13)=20 THEN 500
1108 GOTO 405
1110 C(G-1+13*K-13)=C(G-2+13*K-13
     )+10+RR: IF G<12 THEN 1115
1111 GOTO 416
1115 VTAB 2*K+20: TAB G*3-3: PRINT
     C(G-1+13*K-13);
1118 GOTO 416
1120 C(G+13*K-13)=C(G-1+K*13-13)
     +B(G+13*K-13)
1125 VTAB 2*K+20: TAB G*3: PRINT
     C(G+13*K-13);
1128 GOTO 500
Variable logic for next frames,
counters, player updates, etc.
1130 G=G+1:I=1: GOTO 10
1140 G=10:K=2:I=0: GOTO 10
1150 G=G+1: GOTO 10
1170 G=G+1:K=1: GOTO 10
Check for spare, update score.
1200 B(G+13*K-13)=B(G+13*K-13)+10
     -J-RR: IF B(G+13*K-13)=10 THEN
     X=1
1205 GOTO 400
Continuation of pin-reaction
subroutines.
1300 GOSUB 250: IF A(5)#1 THEN 200
     : GOSUB 290: IF RND (3)=1 THEN
     200: GOSUB 260: IF RND (3)=
     1 THEN 200: GOSUB 260: IF RND
     (3)=1 THEN 200: GOSUB 300
1301 IF RND (3)>0 THEN GOSUB 260
1302 IF RND (3)>0 THEN GOSUB 300
1305 GOTO 200
1350 GOSUB 250: IF A(5)#1 THEN 200
     : GOSUB 280: IF RND (3)=1 THEN
     200: GOSUB 240: IF RND (3)=
     1 THEN 200: GOSUB 240: IF RND
     (3)=1 THEN 200: GOSUB 270
1351 IF RND (3)>0 THEN GOSUB 240
1352 IF RND (3)>0 THEN GOSUB 270
1355 GOTO 200
Move scoring logic and print score.
1400 C(G-1+K*13-13)=C(G-2+K*13-13
     )+D+10: IF G>11 THEN 415
1405 VTAB 2*K+20: TAB G*3-3: PRINT
     C(G-1+13*K-13);
1410 GOTO 416
Display frame number (Graphically).
1500 COLOR=C3: IF GG=1 THEN 1550
     : IF GG=2 THEN 1560: IF GG=
     3 THEN 1570: IF GG=4 THEN 1580
     : IF GG=5 THEN 1590: IF GG=
     6 THEN 1600
1510 IF GG=7 THEN 1610: IF GG=8 THEN
     1620: IF GG=9 THEN 1640: GOTO
     1630
1550 GOSUB 1710: GOSUB 1720: RETURN
1560 GOSUB 1700: GOSUB 1750: GOSUB
     1760: GOSUB 1720: GOSUB 1730
     : RETURN
1570 GOSUB 1700: GOSUB 1750: GOSUB
     1740: GOSUB 1730: GOSUB 1760
     : RETURN
1580 GOSUB 1710: GOSUB 1760: GOSUB
     1740: GOSUB 1750
1585 RETURN
1590 GOSUB 1700: GOSUB 1710: GOSUB
     1760: GOSUB 1740: GOSUB 1730
     : RETURN
1600 GOSUB 1700: GOSUB 1710: GOSUB
     1720: GOSUB 1730: GOSUB 1740
     : GOSUB 1760: RETURN
1610 GOSUB 1700: GOSUB 1750: GOSUB
     1740: RETURN
1620 GOSUB 1700: GOSUB 1710: GOSUB
     1720: GOSUB 1730: GOSUB 1740
     : GOSUB 1750: GOSUB 1760: RETURN
1630 VLIN 24,35 AT 16: GOSUB 1700
     : GOSUB 1710: GOSUB 1720: GOSUB
     1730: GOSUB 1740: GOSUB 1750
     : RETURN
1640 GOSUB 1710: GOSUB 1700: GOSUB
     1750: GOSUB 1760: GOSUB 1740
     : GOSUB 1730: RETURN
1700 HLIN 19,22 AT 24: HLIN 19,22
      AT 25: RETURN
1710 VLIN 24,30 AT 19: RETURN
1720 VLIN 29,35 AT 19: RETURN
1730 HLIN 19,22 AT 34: HLIN 19,22
      AT 35: RETURN
1740 VLIN 29,35 AT 22: RETURN
1750 VLIN 24,30 AT 22: RETURN
1760 HLIN 19,22 AT 29: HLIN 19,22
      AT 30: RETURN
Delete all pins then check to see
which pins are left to be replaced on
screen.
2000 J=0: FOR A=1 TO 10:A(A)=0: NEXT
     A
2005 FOR A=1 TO 10
2010 IF A=1 THEN 2020: IF A=2 THEN
     2030: IF A=3 THEN 2040: IF
     A=4 THEN 2050: IF A=5 THEN
     2060
2012 IF A=6 THEN 2070: IF A=7 THEN
     2080: IF A=8 THEN 2090: IF
     A=9 THEN 2100: IF A=10 THEN
     2110
Logic for accumulating total pins
scored.
2020 Y=33:Z=9: GOTO 2200
2030 Y=35:Z=7: GOTO 2200
2040 Y=35:Z=11: GOTO 2200
2050 Y=37:Z=5: GOTO 2200
2060 Y=37:Z=9: GOTO 2200
2070 Y=37:Z=13: GOTO 2200
2080 Y=39:Z=3: GOTO 2200
2090 Y=39:Z=7: GOTO 2200
2100 Y=39:Z=11: GOTO 2200
2110 Y=39:Z=15: GOTO 2200
2200 IF SCRN(Y,Z)=C1 THEN 2210: GOTO
     2250
2210 A(A)=1
2220 J=J+1
2250 NEXT A: RETURN
Another sound generating routine.
2500 FOR I1=1 TO 2
2505 LT= PEEK (S)+ PEEK (S)+ PEEK
     (S)+ PEEK (S)+ PEEK (S)
2509 NEXT I1
2510 RETURN
End of program.
5000 END
```

ENGINEER

by David Bohlke
translation by James Hagani

Engineer is for an 8K Atari with a joystick

Have you ever had the urge to build a bridge but just couldn't find the time or place to construct one? If so, then this simulation is for you.

The object of this game is to successfully build a bridge from the ground up. You have been hired by the San Francisco Public Works Commission to rebuild the famous Golden Gate which was recently destroyed by a powerful invasion from space. You must connect the two blocks at the top of the screen. You do so by placing beams from the bottom until you can support the connecting beams across the top.

There are only a few rules, as you are your own boss. You must have the right end of the beams supported by either another beam or the rocky cliffs on the side. The only other item to be aware of is the ever-present inspector, who will walk up and down during construction. All he asks of you is that you lay beams below his feet only (so you can't drop one on his head).

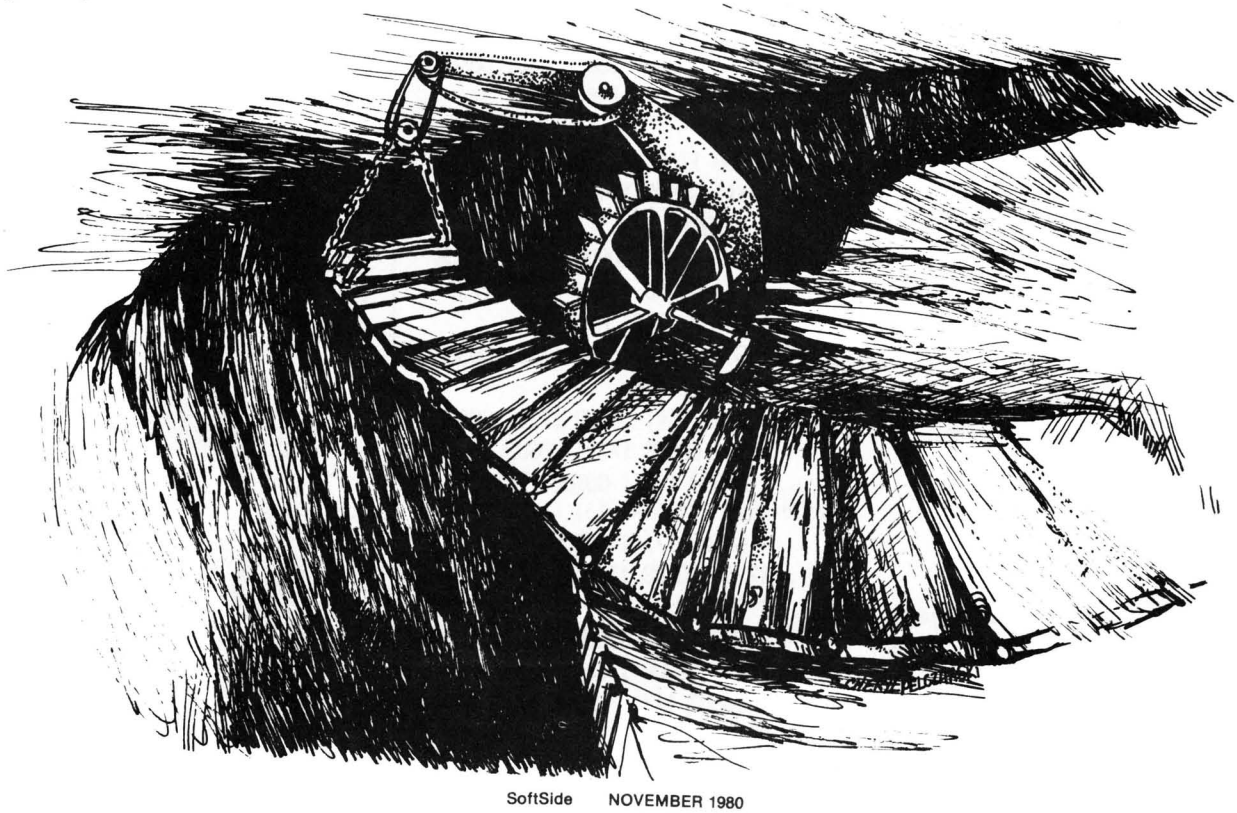
The game itself is simple to play and win, so the challenge is in completing the entire work in as few days as possible. To play, all you need is an 8K Atari with one joystick, which goes into the leftmost slot.

VARIABLES

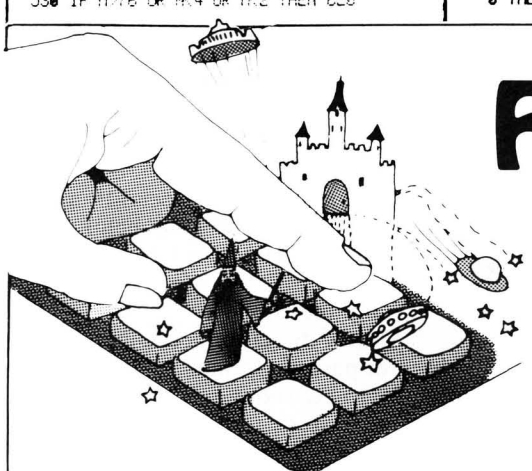
DA---days of construction so far.
X,Y---location of inspector
M,N---location of pointer on screen
W---if 1 then move inspector left,
if 0 then move him right

```
10 GRAPHICS 0:POSITION 13,0:? "BRIDGE BU
ILDER":POSITION 19,1:? "BY":POSITION 14,
2:? "JAMES HAGANI"
15 POKE 752,1:OPEN #2,4,0,"K:"
20 ? :? :? " YOU ARE NOW AN OFFICIAL ENG
INEER!!!":? "YOUR MISSION IS TO BUILD A
BRIDGE"
25 ? "CONNECTING THE TWO BLOCKS AT THE T
OP":? "OF OF THE SCREEN. YOU DO SO BY PL
ACING";
30 ? "BEAMS BELOW THE INSPECTOR'S FEET."
:? "SIMPLY MOVE THE POINTER TO THE PLACE
"
35 ? "WHERE YOU WISH TO PLACE THE BEAM,
THEN";:? "ENTER THE DIRECTION YOU WISH T
O SET"
40 ? "THE BEAM. TRY TO CONSTRUCT THE BRI
DGE":? "IN AS FEW DAYS AS POSSIBLE.":? :
? "      HIT ANY KEY TO BEGIN..."
50 GET #2,A

  Set colors and graphic mode.
```

```
150 GRAPHICS 5:SETCOLOR 2,0,0:POKE 752,1
:SETCOLOR 1,11,10:SETCOLOR 0,15,0:SETCOL
OR 4,8,4
155 COLOR 1
  Draw blocks at top and random valley.

160 FOR X=0 TO 79:PLOT X,39:NEXT X
165 PLOT 0,8:DRAWTO 5,8:PLOT 0,9:DRAWTO
5,9:PLOT 79,8:DRAWTO 74,8:PLOT 79,9:DRAW
TO 74,9
170 Y=10:D=71:X=4
190 PLOT 0,Y:DRAWTO X+3,Y:PLOT 79,Y:DRAW
TO X+D-3,Y
200 Y=Y+1:IF INT(RND(1)*10)>3 THEN X=X+1
:D=D-2
210 IF Y=39 THEN 220
215 GOTO 190
  Set up Inspector's initial position
  and then draw him.

220 X=29+INT(RND(1)*17):Y=38
230 GOSUB 1030

  Place beam pointer on screen, not on a
  present beam or part of valley.

240 M=INT(RND(1)*31)+25:N=0
260 LOCATE M,N+1,XX
262 IF XX<>0 THEN 280
270 N=N+1:GOTO 260
280 N=N-10:IF N<0 THEN N=0
285 ? :? :? :? :? "USE JOYSTICK TO MOVE
BEAM POINTER...":? "      DAY # ";DA+1;"
 OF CONSTRUCTION.":?
290 COLOR 2:PLOT M,N:PLOT M+1,N

  Get input from joystick on movement of
  beam.

320 FOR XX=1 TO 20:NEXT XX:C=STICK(0):IF
 C=15 THEN 320
330 IF C=7 THEN 380
340 IF C=11 THEN 400
350 IF C=13 THEN 420
360 IF C=14 THEN 424
370 GOTO 290
```



```
  Check to see if beam should be
  placed. Move it right, left, down, or
  up.
390 LOCATE M+2,N,XX:IF XX<>0 THEN 440
395 COLOR 0:PLOT M,N:PLOT M+1,N:M=M+2:CO
LOR 1:GOTO 290
400 LOCATE M-1,N,XX:IF XX<>0 THEN 440
410 COLOR 0:PLOT M,N:PLOT M+1,N:M=M-2:CO
LOR 1:GOTO 290
420 LOCATE M,N+1,XX:IF XX<>0 THEN 440
421 COLOR 0:PLOT M,N:PLOT M+1,N:N=N+1:CO
LOR 1:GOTO 290
424 COLOR 0:PLOT M,N:PLOT M+1,N:N=N-1:IF
 N<1 THEN N=1
425 COLOR 2:GOTO 290

  If beam is at or below Inspector's
  feet then move is legal; otherwise,
  give error message

440 IF N<Y THEN ? :? "STICK MUST START B
ELOW INSPECTOR!!!":COLOR 0:PLOT M,N:PLOT
M+1,N:COLOR 1
450 IF N<Y THEN FOR I=1 TO 200:SOUND 0,3
6,36,36:NEXT I:SOUND 0,0,0,0:GOTO 240

  Which way to place new beam?

460 ? :? :? "     USE JOYSTICK TO SET BE
AM" ? "IN EITHER ! OR    DIRECTION"
465 ? "TO SET IN   DIRECTION, PRESS BUTT
ON "
480 D=0:C=STICK(0):CC=STRIG(0):IF C=15 A
ND CC=1 THEN 480
482 IF C=14 THEN D=1:II=18
483 IF CC=0 THEN D=2:II=18
484 IF C=7 THEN D=3:II=18
485 IF D<1 OR D>3 THEN 480

  Another day of work completed!!!
510 DA=DA+1:M1=M:N1=N

  Draw beam and check if beam should
  end.

520 FOR I=1 TO 18
525 SOUND 0,100,60,100:FOR XX=1 TO 10:NE
XT XX:SOUND 0,0,0,0
530 IF M>76 OR M<4 OR N<2 THEN 630
540 COLOR 2:PLOT M,N:PLOT M+1,N
550 LOCATE M+2,N,XX:IF XX<>0 AND XX<>3 T
HEN 770
560 ON D GOTO 570,580,590,600
570 I=I+INT(RND(1)*2):N=N-1:I1=I1+1:GOTO
 610
580 M=M+1:N=N-1:GOTO 610
590 M=M+1:GOTO 610
600 M=M+1:N=N+1
610 NEXT I
  Check if right side of beam is sup-
  ported. If not, erase it, buzz, and
  try again.
620 LOCATE M+2,N-1,XX:IF XX<>0 AND XX<>3
 OR D=1 THEN 770
630 M=M1:N=N1
650 ? :? :? "RIGHT END OF BEAM MUST BE S
UPPORTED!":? :QQ=1:FOR I=1 TO 200:SOUND
0,36,36,36:NEXT I:SOUND 0,0,0,0
670 IF QQ=19 THEN QQ=18
672 FOR I=1 TO QQ:COLOR 0:PLOT M,N:PLOT
M+1,N
675 SOUND 0,100,60,100:FOR XX=1 TO 10:NE
XT XX:SOUND 0,0,0,0
680 ON D GOTO 690,700,710,720
690 N=N-1:GOTO 730
700 M=M+1:N=N-1:GOTO 730
710 M=M+1:GOTO 730
720 M=M+1:N=N+1
730 IF N<2 THEN 750
740 NEXT I
750 REM
760 GOTO 240
770 SOUND 0,0,0,0:IF W=0 THEN W=1:GOTO 7
90
780 W=0

  Inspection; move Inspector left or
  right, up and down.

790 ? "           INSPECTION...":? :?
810 FOR I=1 TO INT(RND(1)*40)+10
820 SOUND 0,60,6,10:SOUND 0,0,0,0:GOSUB
1050
830 IF W=1 THEN 880
840 LOCATE X-2,Y+1,X1:LOCATE X,Y+1,X2:LO
CATE X+2,Y+1,X3:IF X1=0 AND X2=0 AND X3=
0 THEN Y=Y+1:GOTO 910
850 LOCATE X-1,Y,XX:IF XX=0 THEN X=X-1:G
OTO 910
860 LOCATE X,Y-1,XX:IF XX=0 THEN Y=Y-1:G
OTO 910
870 GOTO 910
880 LOCATE X+1,Y+1,XX:LOCATE X+3,Y+1,X1:
LOCATE X,Y+1,X2:IF X2=0 AND XX=0 AND X1=
0 THEN Y=Y+1:GOTO 910
890 LOCATE X+3,Y,XX:IF XX=0 THEN X=X+1:G
OTO 910
900 LOCATE X,Y-1,XX:IF XX=0 THEN Y=Y-1:G
OTO 910
910 GOSUB 1030:IF Y<6 OR X<5 OR X>69 THE
N 930
920 NEXT I
  Check to see if bridge is complete
  (Beams must extend from top left block
  to top right block).
930 REM
960 FOR I=5 TO 75:FOR J=5 TO 10
970 LOCATE I,J,XX:IF XX<>0 THEN 990
980 NEXT J:GOTO 240
990 NEXT I

  You have finished the game. Print out-
  come and start again.

1000 FOR Z=1 TO 5:FOR Z1=200 TO 80 STEP
-7:SOUND 0,Z1,10,7:SOUND 1,Z1+7,10,7:SOU
ND 2,Z1+14,10,7:NEXT Z1:NEXT Z
1005 ? "YOU'VE FINISHED!!!!!!!! IT TOOK
YOU";? "A TOTAL OF ";DA;" DAYS!!!!!!!!"
1007 FOR X=0 TO 2:SOUND X,0,0,0:NEXT X
1010 ? "PRESS ANY KEY TO PLAY AGAIN.....
....":GET #2,A:RUN

  Subroutine to draw Inspector in his
  black suit.

1030 COLOR 3:PLOT X,Y:PLOT X+1,Y-1:PLOT
X+2,Y:PLOT X+1,Y-3:PLOT X,Y-2:PLOT X+1,Y
-2:PLOT X+2,Y-2:RETURN
  Erase Inspector so he can be redrawn.
1050 COLOR 0:PLOT X,Y:PLOT X+1,Y-1:PLOT
X+2,Y:PLOT X+1,Y-3:PLOT X,Y-2:PLOT X+1,Y
-2:PLOT X+2,Y-2:RETURN
```

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MAD SCIENTIST

by Thomas Hamlin III

Mad Scientist is an S-80 program requiring at least 16K.

Have you ever felt the urge to go adventuring, but were foiled by a severe deficiency of giants, dragons, and mad scientists in your neighborhood? Well, here's your chance!

It will be your task to enter the mad scientist's haunted house, rescue the fiend's beautiful daughter, and get out of the house before it's blown sky-high after about 225 turns. It won't be easy! The daughter's room cannot be entered until a certain event has occured. Secret passageways will bar your path. Monsters will pop up at inopportune moments and try to kill you, as is their custom. The directional compass in the lower corners of the screen won't show you everything!

You get things accomplished in this game by use of one - or two - word keys such as "GO NORTH" and "SCORE." Finding these will be part of the fun. Let it be a challenge to you!

NUMERIC:

BU 1 when fence on, else -1.
DA 1 when have daughter, else 0.
FL 2 before door passed, 1 just after, 0 after door passed.
F2 1 after fence goes on, else 0.
GS 1 if ghost, 0 if skeleton.
LF 1 if no weapon, else 0.
MV moves gone (score).
NR prospective next room.
OE 1 when door passed, else 0.
OL room you're in for monster random reposition routine.
PP Print position to start input.
RM room you're in.
SH ammo left.
TIME multiplied by 100 for delay loop.
WZ 1 when trap door just passed, else 0.
X flashing "ENTER" timing, array initialization loop.
XE cursor-blink timing loop.
XP directions obvious (for compass) loop.
Y array initialization loop.
Z program wait loop.

CURSOR BLINK AND LINE INPUT ROUTINE DISSECTION

This routine has many advantages over the usual INPUT statement and is one you will probably wish to include in your own programs. The blinking cursor draws attention to the fact that input is required. Leading blanks, colons, commas and quotation marks may all be input. No question mark is automatically generated and there is no messy linefeed when you hit ENTER. Nurse! Hand me my scalpel!

5000 Print the cursor at the assigned position plus the length of the string being input. If no key is hit for 40 iterations of the XE loop, print a blank over the cursor. If no key is hit for 40 more iterations, start over.

5010 If the key hit was ENTER, print a blank where the cursor is and return to the main program.

5020 If the key hit was backspace, start over if the entered string has no length; if it does, truncate the rightmost character, print blanks where the string was, print the new string and start over. Note that this line is necessary as otherwise the string would look shorter, but would actually have a backspace added to it.

5030 Add the key to the end of the input string, print the new string, and start over.

Note also that the input string must be nulled before this routine is accessed, i.e., WH$="".

VARIABLE TABLE

ARRAY:

A room connections in order, N, E, S, W, U, D.
A$ room descriptions.
AR rooms where special things happen - i.e., door shuts behind you. AR (Room #) = 1 for special rooms.
GW$ monsters.
M new direction accessible when secret passage found.
MO new room accessible when secret passage found.
MO$ moveable objects.
SG$ killed-monster messages.
ZE print positions for compass dots.

STRING:

CO$, UD$ N, E, S, W, and U, D compasses, respectively.
EF$, NM$, TD$ special messages.
GM$, OD$ special commands.
MO$ object to move.
WA$ direction to go.
WH$ command input - built from WY$.
WP$, RU$ game over-play again? inputs.
WY$ letter input.

Lines 5-80: Program set-up: initialization of variables and printout of instructions.

```
5 REM    x MAD SCIENTIST x  VERSION 2.7   APRIL 26, 1980
        COPYRIGHT (C) 1980       TOM HANLIN
        SPRINGFIELD, VIRGINIA

10 CLS:CLEAR500:DEFINTA-Y:RANDOM:DIMMO$(64),MO(64),M(64),A$(64)
,A(64,6),AR(64):TD$="A TRAP DOOR OPENS UP BENEATH YOUR FEET!
 YOU'RE FALLING DOWN A
CHUTE!":FLAG=2:GM$="GET MAP":OD$="OPEN DOOR":AR(4)=1:AR(8)=1:AR(
12)=1:AR(14)=1
20 GW$(1)="THE GHOST":GW$(0)="OLD BONY ":PRINT TAB(19)"M A D   S
 C I E N T I S T

":ZE(0)=709:ZE(1)=841:ZE(2)=965:ZE(3)=833:ZE(4)=765:ZE(5)=1021:E
F$="YOU DON'T WANT TO GO THAT WAY- THERE'S AN ELECTRIFIED FENCE!
"
30 PRINT"  IT IS YOUR MISSION TO RESCUE THE MAD SCIENTIST'S BEAU
TIFUL
DAUGHTER FROM HIS HAUNTED MANSION.  THERE ARE MANY HIDDEN
PASSAGEWAYS (OF COURSE!) WHICH MAY BE FOUND ALL OVER THE HOUSE.
ALSO HIDDEN SOMEWHERE IN THE HOUSE IS A WEAPON, WHICH MAY PROVE

40 PRINT"USEFUL IF YOU RUN INTO ONE OF THE RESIDENT MONSTERS, TH
OUGH
THEY MAY BE SUCCESSFULLY DEALT WITH IN OTHER WAYS.  'SCORE'
TELLS YOU THE MOVES YOU'VE GONE-- THE REMAINING COMMANDS YOU
MUST DISCOVER FOR YOURSELF!
45 RN=150+RND(150):M(1)=6:M(11)=6:M(15)=3:M(18)=3:MO(15)=19:MO$(
15)="BOOKCASE":NM$="NEVER MIND, IT'S A ROAD MAP OF TRANSYLVANIA!
":LF=1:GOSUB6000:CLS:PRINT"THE DAUGHTER CAN'T BE REACHED TIL A C
ERTAIN ROOM'S BEEN":MO$(1)="TABLE":MO(1)=24
50 PRINT"ENTERED; KEEP THIS IN MIND DURING YOUR EXPLORATIONS.  Y
OU ARE
GIVEN THE OBVIOUS DIRECTIONS YOU CAN GO IN THE LOWER CORNERS OF
THE SCREEN.  SHUT DOORS AND SECRET PASSAGEWAYS ARE NOT SHOWN,
60 PRINT"SO USE YOUR INTUITION IF YOU THINK EITHER MIGHT BE NEAR
BY.
  HAVE A NICE TRIP, BEWARE OF THE GHOSTS, WATCH OUT FOR THE MAD
SCIENTIST, AND, ABOVE ALL, DO RESCUE THE BEAUTIFUL DAUGHTER!
70 FORX=1TO64:READA$(X):FORY=1TO6:READA(X,Y):NEXTY,X:RM=51:MO$(1
8)="PAINTING":MO(18)=20:MO$(11)="CARPET":MO(11)=31:CO$="  N"+CHR
$(26)+STRING$(3,24)+"W + E"+CHR$(26)+STRING$(3,24)+"S":AR(18)=1:
AR(29)=1:AR(35)=1:AR(4)=1
80 SG$(1)="ZZZZZAP!  THE GHOST DISAPPEARS IN A CLOUD OF STEAM!":
SG$(0)="ZZZORCH!  THE SKELETON TURNS INTO A PILE OF ASHES!":GOSU
B6000:CLS:UD$="U"+CHR$(26)+CHR$(24)+"+"+CHR$(26)+CHR$(24)+"D":BU
=1:REM xx  ABOVE WAS SET-UP: MAIN PROGRAM BELOW
```

line 100: Main program start. Print room description, directions open.

```
100 PRINT@829,UD$;:PRINT@771,CO$;:PRINT@0,A$(RM);:FORXP=1TO6:IFA
(RM,XP)>0THENPRINT@ZE(XP-1),CHR$(140);:NEXTELSENEXT
```

Lines 105-150: Get command. If movement, print appropriate message if move is illegal. If number of moves is greater than a predetermined number, blow up house and terminate game.

```
105 PP=349:WH$="":PRINT@330,"WHAT DO WE DO NOW? ";:GOSUB5000:IFL
EFT$(WH$,3)="GO "ANDLEN(WH$)>3THENWA$=MID$(WH$,4,1)ELSE260
110 IFWA$="N"THENNR=A(RM,1)ELSEIFWA$="E"THENNR=A(RM,2)ELSEIFWA$=
"S"THENNR=A(RM,3)ELSEIFWA$="W"THENNR=A(RM,4)ELSEIFWA$="U"THENNR=
A(RM,5)ELSEIFWA$="D"THENNR=A(RM,6)ELSEPRINT@601,"SAY WHAT!?!?!";
:TIME=15:GOTO610
120 MV=MV+1:IFMV>RNTHENCLS:PRINT"YOU SHOULD HAVE MOVED FASTER!
THE MAD SCIENTIST SLIPPED WITH
ONE OF HIS POTIONS AND BLEW THE WHOLE HOUSE OFF THE MAP!
":INPUT"WANT TO TRY AGAIN";WP$:IFLEFT$(WP$,1)="Y"THENRUNELSEPRIN
T:END
130 IFNR=-1THENPRINT@578,EF$;:TIME=15:GOTO610ELSEIFNR=-2THENPRIN
T@661,"YOU CAN'T GO THAT WAY!":TIME=14:GOTO610ELSEIFNR=-3THENPRI
NT@599,"THE DOOR IS SHUT.";:TIME=15:GOTO610
140 IFNR=-4THENPRINT@598,"THE DOOR IS LOCKED!";:TIME=15:GOTO610E
LSEIFNR=-5THENPRINT@586,"DON'T BE CHICKEN!  THE GATE IS TO THE S
OUTH!";:TIME=15:GOTO610
150 IFNR=-6THENPRINT@596,"YOU'RE OUT OF YOUR MIND!";:TIME=20:GOT
O610ELSEIFRND(30)=30THENPRINT@330,CHR$(31);:GOTO2500ELSEIFRM=1TH
ENA(37,6)=27
160 IFNR=4ANDDA=1ANDBU=-1THENA(4,1)=35:RM=NR:CLS:GOTO100ELSEIFRM
=17ANDRND(10)<7THENCLS:GOTO100
```

Line 190: Update room number if changed. If room not special, branch back to line 100. If command was not "GO...", continue.

```
190 RM=NR:CLS:IFAR(RM)=0THEN100
```

Lines 200-240: Special rooms: end game, move door, electrify fence, etc.

```
200 IFRM=12ANDLF=1THENPRINT@711,"THERE'S A LASER GUN ON THE TABL
E IN FRONT OF YOU.";:GOTO100ELSEIFRM=12THENAR(RM)=0:CLS:GOTO100E
LSEIFRM=4ANDDA=1ANDBU=1THENPRINT@725,"THE FENCE IS STILL ON!";:G
OTO100
210 IFRM=14THENPRINTA$(RM):FORX=1TO5000:NEXT:NR=1:GOTO190
220 IFRM=8ANDFLAG=1THENPRINT@0,A$(RM);:PRINT@592,"THE DOOR SLAMS
 SHUT BEHIND YOU!";:FLAG=0:TIME=30:GOTO610
225 IFRM=4ANDF2=0THENPRINT@0,A$(RM);:PRINT@576,"THE GATE CLICKS
SHUT BEHIND YOU, AND YOU HEAR A SOFT HUM AS THE
FENCE IS ELECTRIFIED!";:BU=1:TIME=45:F2=1:GOTO610ELSEIFRM=4ANDFL
=2THENCLS:GOTO100ELSEIFRM=8THENCLS:GOTO100
230 IFRM=35THENPRINTA$(RM):PRINT"IT TOOK YOU"MV"MOVES.

WANT TO TRY AGAIN";:INPUTRU$ELSE250
240 IFLEFT$(RU$,1)="Y"THENRUNELSEPRINTSTRING$(4,26):END
```

Lines 250-400: Commands other than movement - check legality according to flags, current room location, etc. and enact command if ok; set flags, change room, etc., else print appropriate message.

```
250 REM        COMMANDS OTHER THAN "GO $"
260 IFRM=18ANDWH$="FLIP SWITCH"THENBU=-BU:GOTO4000
270 IFRM=29ANDDA=0ANDWH$="GET DAUGHTER"THENPRINT@589,"OK, YOU'VE
 GOT THE DAUGHTER; LET'S GO!";:TIME=20:DA=1:GOTO610ELSEIFRM=29AN
DWH$="GET DAUGHTER"THENPRINT@592,"YOU'VE ALREADY GOT HER, STUPID
!";:TIME=20:GOTO610
280 IFLEFT$(WH$,5)="MOVE "THENIFMO$(RM)=""THENPRINT@580,"THERE'S
 NOTHING HERE YOU CAN MOVE.  TRY SOMETHING ELSE.":TIME=15:GOTO61
0:REM xx SEE IF MOVEABLE OBJECT IN ROOM
290 IFLEFT$(WH$,4)="MOVE"ANDLEN(WH$)<6THENPRINT@600,"MOVE WHAT??
!?!!":TIME=15:GOTO610ELSEIFLEFT$(WH$,4)<>"MOVE"THEN320
300 MO$=RIGHT$(WH$,LEN(WH$)-5):IFMO$=MO$(RM)THENA(RM,M(RM))=MO(R
M):PRINT@(57-LEN(MO$))/2+448,MO$" MOVED.";:PRINT@(26-LEN(MO$))/2
+512,"THE "MO$" WAS COVERING A SECRET PASSAGEWAY!";:TIME=20:GOTO
610
310 PRINT@(54-LEN(MO$))/2+576,"WHAT "MO$"?!?!?";:TIME=15:GOTO610
320 IFLEFT$(WH$,5)="SCORE"THENPRINT@658,"YOU'VE GONE"MV"MOVES SO
 FAR.";:TIME=20:GOTO610ELSEIFWH$="GET LASER"ANDRM=12ANDLF=1THENL
F=0:PRINT@534,"YOU'VE GOT THE LASER";:SHOTS=5:TIME=20:GOTO610
330 IFWH$="GET LASER"ANDLF=0THENPRINT@594,"YOU'VE ALREADY GOT IT
, STUPID!";:TIME=15:GOTO610
335 IFSH>0ANDLEN(WH$)>5ANDLEFT$(WH$,5)="SHOOT"ANDLF=0THENPRINT@6
03,"ZZZZZATT!";:SH=SH-1:PRINT@661,"YOU HAVE"SH"SHOTS LEFT.";:TI
ME=25:GOTO610ELSEIFLEFT$(WH$,5)="SHOOT"ANDLF=0ANDSHOTS>0THENPRIN
T@602,"SHOOT WHAT?";:TIME=15:GOTO610
340 IFLEFT$(WH$,5)="SHOOT"ANDLF=0THENPRINT@598,"YOU'RE OUT OF AM
```


continued on next page

```
MO!";:TIME=15:GOTO610ELSEIFLEFT$(WH$,5)="SHOOT"THENPRINT@589,"YO
U DON'T HAVE ANYTHING TO SHOOT WITH!";:TIME=15:GOTO610ELSEIFWH$=
GM$ANDRM=16THENPRINT@586,NM$;:TIME=20:GOTO610
345 IFDA=0ANDRM=29THENPRINT@592,"THE DAUGHTER IS HERE!";:GOTO100
ELSEIFRM=29ANDDA=1THENCLS:GOTO100ELSEIFLEFT$(WH$,3)="RUN"THENPRI
NT@594,"WHAT IS THERE TO RUN FROM?!";:TIME=15:GOTO610
350 IFOE=1ANDDA=0ANDRM=4THENPRINT@0,A$(RM);:PRINT@576,"HEY!  YOU
 (LITERALLY!) CAN'T LEAVE WITHOUT THE GIRL!  GO BACK!";:TIME=30:
GOTO610
360 IFRM=38ANDWH$=OD$THENA(38,3)=8:FLAG=1:PRINT@601,"DOOR OPENED
.":TIME=15:OE=1:GOTO610
370 IFRM=8AND(WH$=OD$ORWH$="UNLOCK DOOR")THENPRINT@598,"THE DOOR
 WON'T OPEN!";:TIME=20:GOTO610ELSEIFRM=38ANDWH$="UNLOCK DOOR"THE
NPRINT@600,"IT ISN'T LOCKED.";:TIME=15:GOTO610
390 IFWH$="PULL RING"ANDRM=22THENPRINT@576,TD$;:FORZ=1TO4000:NEX
T:RM=18:WZ=1:CLS:GOTO4000ELSEIFWH$="FLIP SWITCH"THENPRINT@602,"W
HAT SWITCH?";:TIME=15:GOTO610ELSEIFWH$="PULL RING"THENPRINT@603,
"WHAT RING?";:TIME=15:GOTO610
400 IFLEFT$(WH$,3)="GET"THENPRINT@576+(46-LEN(WH$))/2,"I DON'T S
EE A";RIGHT$(WH$,LEN(WH$)-3);"!";:TIME=15:GOTO610ELSEPRINT@599,"
I DON'T KNOW HOW!";:TIME=15:GOTO610
```

Lines 410-600: Room data: description, rooms reached by going N, E, S, W, U, D respectively. Negative rooms will generate error messages.

```
410 REM        DATA- DESCRIPTION, N E S W U D
(FOR NEGATIVES, SEE LINES 120-152)          XXXXX
420 DATA"YOU'RE LYING ON A TABLE.  COLD GREEN FLAMES DANCE AROUN
D YOU.",-2,-2,-2,-2,-2,-2,-2,"YOU'RE SURROUNDED BY HENBANE, BELLADO
NNA, AND ACONITE.  THIS
MUST BE THE HERB GARDEN.",-1,3,-2,-1,-2,-2
430 DATA"THIS IS THE FRONT LAWN.  THE WINDOWS OF THE HOUSE APPEA
R TO BE
WATCHING YOU.",-1,4,-2,2,-2,-2,"YOU'RE ON A LONG, COBBLED DRIVEW
AY.",-1,5,38,3,-2,-2
440 DATA"THIS IS A GRAVEYARD.  THERE ARE TOMBSTONES LYING ABOUT,
 AND IN
THE MIDDLE OF THE PLOT THERE IS A MAUSOLEUM.",-1,-1,-2,4,-2,-2
450 DATA"THE LIVING ROOM.  A HUMAN SKULL HANGS OVER THE FIREPLAC
E, WHICH
IS THE ONLY SOURCE OF ILLUMINATION IN THE ROOM.",-2,7,11,-2,-2,-
2,"OVERSTUFFED CHAIRS ARE SCATTERED AROUND THE ROOM.  THIS MUST
BE
THE PARLOR.",-2,8,-2,6,-2,-2
460 DATA"YOU'RE INSIDE THE DOORWAY.",-4,9,-2,7,-2,-2,"YOU'RE AT
THE BOTTOM OF A LONG STAIRCASE.",-2,-2,-2,8,10,-2,"YOU'RE ON A L
ANDING BETWEEN FLOORS.",-2,-2,-2,-2,22,9
470 DATA"THERE'S A BEAUTIFUL PERSIAN CARPET COVERING THE FLOOR A
ND A
LARGE TAPESTRY ON THE WEST WALL.",6,12,15,-2,-2,-2,"THE WEST SID
E OF AN ENORMOUS LABORATORY.  BEAKERS OF BUBBLY,
ERRR, BUBBLING BEAKERS, AND RETORTS SURROUND YOU."
490 DATA-2,13,-2,11,-2,-2,"THE MIDDLE OF THE LABORATORY.  A HUGE
 CONTRAPTION WITH BLINKING
LIGHTS AND WHIRRING TAPE REELS TAKES UP AN ENTIRE WALL.  I THINK
IT'S SOME KIND OF SOPHISTICATED HI-FI SYSTEM."
500 DATA-2,14,17,12,-2,-2,"OH OH!  THE MAD SCIENTIST IS HERE! (S
ERVES YOU RIGHT FOR
SNOOPING AROUND IN HIS LABORATORY!)

HE ZAPS YOU AND CARRIES YOU OFF!",-2,-2,-2,13,-2,-2
510 DATA"THERE'S A BOOKCASE AT THE SOUTH END OF THE ROOM.",11,-2
,-2,-2,50,-2,"AHA!  THERE'S A MAP IN THE MIDDLE OF THE ROOM!",-2
,17,-2,-2,-2,-2
520 DATA"THE FLOOR IS COVERED WITH SLIPPERY GOO!  IT MAY BE HARD
 TO GET
OUT OF HERE!",13,-2,-2,16,-2,-2,"THERE'S A LARGE PAINTING ON THE
 SOUTH WALL.  NEXT TO THE
PAINTING IS A SWITCH WITH A L.E.D. READOUT ABOVE IT.",-2,-2,-2,-
2,-2,-2
521 DATA"YOU'RE IN A LONG, DARK HALLWAY.",15,42,-2,-2,-2,-2
530 DATA"DOWN A DARK HALL.",-2,-2,-2,43,-2,-2,"YOU'RE ON A CREAK
Y BALCONY OVERLOOKING THE GRAVEYARD.  DANK
GHOST-LIKE MISTS SWIRL AROUND THE GRAVESTONES.",24,-2,-2,64,-2,-
2
540 DATA"YOU'RE AT THE TOP OF A LONG STAIRCASE.  A BRONZE RING I
S
EMBEDDED IN THE FLOOR NEXT TO YOUR FEET.",-2,-2,23,30,-2,10,"THE
 FOOT OF A STAIRWAY.",22,-2,-2,-2,36,-2,"THIS IS THE BELFRY.  A
CARPET OF BATS CLINGS TO THE CEILING."
550 DATA36,-2,21,25,-2,-2,"A PLACARD ON THE NORTH WALL PROCLAIMS
 THIS TO BE 'THE BAT-ROOM'.",41,24,-2,26,-2,-2,"MOON ROOM.  FLAS
HING LETTERS SPELL 'BEAUTIFUL DAUGHTER NEAR' !",37,25,-2,61,-2,-
2,"THE FOOT OF A STAIRCASE.",29,-2,-2,49,37,-2
560 DATA"THE COMPUTER ROOM.  AMONG OTHERS THINGS, THIS ROOM CONT
AINS A
48K RAM LEVEL II TRS-80 WITH A LINE PRINTER AND JOYSTICKS AND
TWO DISK DRIVES AND A LIGHT PEN AND COLOR GRAPHICS AND...
ALL RIGHT, STOP DROOLING!  LET'S MOVE ALONG!"
570 DATA30,-2,44,-2,-2,-2,"A BEDROOM.",-2,30,27,52,-2,-2,"SUN RO
OM.",-2,22,28,-2,-2,-2,"A (HITHERTO-SECRET) PASSAGEWAY.",33,-2,-
2,-2,11,-2,"A DARK ROOM.",-2,39,-2,33,-2,-2,"A DARK ROOM.",-2,32
,31,-2,-2,-2
580 DATA"THIS LOOKS LIKE THE END OF THE PASSAGEWAY.  A FAINT LIG
HT
FILTERS IN FROM ABOVE.",-2,-2,40,-2.5,-2,"YOU'VE MADE IT!  NICE
JOB!",-2,-2,-2,-2,-2,-2,"YOU'RE AT THE HEAD OF A STAIRWAY.",-2,-
2,24,-2,-2,23,"YOU'RE AT THE TOP OF THE STAIRS."
590 DATA-2,-2,26,-2,-2,-2,"YOU'RE AT THE ENTRANCE.",4,-2,-3,-2,-
2,-2,"DARK ROOM.  YOU STUMBLE OVER AN OBJECT IN THE MIDDLE OF TH
E
ROOM.",-2,40,-2,32,-2,-2,"DARK ROOM.  IT APPEARS SLIGHTLY LIGHTE
R TO THE NORTH.",34,-2,-2.39,-?,-?
591 DATA"THE ROOM REEKS OF INCENSE.  THERE'S A PENTACLE ENGRAVED
 ON THE
FLOOR, AND STRANGE FIGURES ARE PAINTED ON THE WALLS.",-2,-2,25,-
2,-2,-2,"THE BLOODSHOT EYES OF A PAINTING ON THE SOUTH WALL SEEM
 TO BE
FOLLOWING YOU.",-2,43,-2,19,57,-2
592 DATA"A BLACK CAT WALKS SEDATELY ACROSS YOUR PATH.",-2,20,-2,
42,-2,-2,"SUPPLY ROOM.  JARS OF CHEMICALS, GLASS AND RUBBER TUBI
NG, BOXES
OF RESISTORS, CANS OF TOADSTOOL SOUP AND BALES OF BAT FUR LINE
THE WALLS.",28,-2,45,-2,-2,-2
593 DATA"SUPPLY ROOM.  BLANK DISKETTES, VARIOUS TOOLS, AND A WOL
F HIDE
ADORN THE WALLS.  PICKLED PEOPLE PIECES ARE IN JARS BY THE
CORNER.",44,55,-2,46,-2,-2,"THIS ROOM IS FULL OF CLOCKS AND WATC
HES OF ALL KINDS- ALL
RUNNING BACKWARDS."
595 DATA-2,45,-2,47,-2,-2,"STRANGE TICKING NOISES CAN BE HEARD T
O THE EAST.",48,46,56,-2,-2,-2,"THERE'S A HOLE IN THE SOUTHWEST
CORNER OF THE FLOOR!",49,53,47,-2,-2,50,"MUFFLED SNORING NOISES
ARE COMING FROM THE EAST"
600 DATA-2,-2,48,-2,-2,-2,"YOU'RE PRECARIOUSLY PERCHED ATOP A BO
OKCASE.",-2,-2,-2,-2,48,15,"YOU'RE AT THE GATE OF THE HOUSE.",-5
,-5,4,-5,-2,-2
```

Line 610: Time delay loop; change TIME*100 to TIME*XX (where XX is a number) to alter length of pauses.

```
610 FORZ=1TOTIME*100:NEXT:CLS:GOTO100
```

Lines 2500-2560: Monster attack routine. Choose monster, get command. If command bad, end game. Otherwise, randomly select a new room, change nothing, or decrement ammuntion count as appropriate to the command and room you're in. Return to main program.

```
2500 PRINT@156," "CHR$(170)STRING$(2,183)CHR$(149)" "CHR$(26)STR
ING$(6,24)CHR$(160)CHR$(176)CHR$(138)CHR$(133)CHR$(160)CHR$(176)
CHR$(26)STRING$(6,24)CHR$(136)CHR$(140)STRING$(2,131)CHR$(137)CH
R$(140):PRINT@320,"UH OH!  A ";
2510 IFRND(2)=1THENGS=1:PRINT"GHOST";ELSEPRINT"SKELETON";:REM
xx      MONSTER ROUTINE
2520 WH$="":PRINT" JUST POPPED OUT IN FRONT OF YOU!
WHAT ARE YOU GOING TO DO? ";:PP=410:GOSUB5000:IF((WH$="SHOOT GHO
ST"ANDGS=1)OR(WH$="SHOOT SKELETON"ANDGS=0))ANDLF=0ANDSHOTS<1THEN
PRINT@470,"YOU'RE OUT OF AMMO!";:WH$=""
2530 IFLEFT$(WH$,3)="RUN"THENPRINT@576,"GOOD WORK!  YOU OUTRAN "
GW$(GS)"!  (UNFORTUNATELY,
YOU GOT LOST IN THE PROCESS!)";:TIME=25:GS=0:GOTO2550
2540 IF((WH$="SHOOT GHOST"ANDGS=1)OR(WH$="SHOOT SKELETON"ANDGS=0
))ANDLF=0THENSH=SH-1:PRINT@583,SG$(GS);:PRINT@661,"YOU HAVE"SH"S
HOTS LEFT.";:GS=0:TIME=30:GOTO610ELSEPRINT@587,GW$(GS)" GOT YOU!
  BETTER LUCK NEXT TIME!
";:END
2550 IF(RM<6ANDRM>1)ORRM=38ORRM=51THENPRINT@610,CHR$(31);:GOTO61
0ELSEOL=RM
2560 RM=RND(64):IFRM=OLORRM>1ANDRM<6)ORRM=35ORRM=29ORRM=12ORRM=
18ORRM=51THEN2560ELSE610
Lines 3220-3260: Room DATA continued from lines 410-600.
3220 DATA"A BATHROOM.  A LONE BAT HANGS FROM THE CURTAIN ROD.",-
2,29,-2,-3,-2,-2,"THE 'GAME ROOM'.  THE ROOM'S LIBERALLY STREWN
WITH IMPLEMENTS
RANGING FROM THUMBSCREWS TO AN 'IRON MAIDEN'.",-2,-2,-2,48,-2,-2
3230 DATA"A POOL (!) OF BRACKISH GREEN WATER COVERS MOST OF THE
ROOM.
A PAIR OF BEADY EYES AND A BLUNT SNOUT ARE VISIBLE JUST ABOVE
WATER.",-6,-2,55,-2,-2,-6,"THE ROOM SMELLS STRANGELY SWAMPY.",54
,-2,59,45,-2,-2
3240 DATA"THE FLOOR, WALLS, AND CEILING OF THIS ROOM ARE COVERED
 WITH
MIRRORS.",47,57,-2,-2,-2,-2,"SEVERAL BOARDS LIE AROUND A LARGE H
OLE IN THE FLOOR.",-2,58,-2,56,-2,42,"STAIRS COIL UP FROM THE CO
RNER OF THE ROOM.",-2,59,-2,57,64,-2
3250 DATA"ODD, MUDDY TRACKS LEAD NORTH.",55,-2,-2,58,-2,-2,"THE
YARD IS VISIBLE FAR BELOW THROUGH THE NORTH WINDOW.",-2,-2,61,-2
,-2,-2,"A GIGGLING HEAD APPEARS IN THE CENTER OF THE ROOM AND SL
OWLY
FADES OUT AS YOU WATCH.",60,26,62,-2,-2,-2
3260 DATA"A GOAT SKULL IS NAILED OVER THE NORTH DOOR.",61,63,-2,
-2,-2,-2,"THE FLOOR IS COVERED BY A PEOPLE-HAIR RUG.",-2,64,-2,6
2,-2,-2,"A SPIRAL STAIRCASE WINDS DOWN INTO THE HOUSE.",-2,21,-2
,63,-2,58
Lines 4000-4010: Fence readout update for trap door room.
4000 IFBU>0THENPRINT@530,"THE READOUT SAYS, 'FENCE ON' ";ELSEIFB
U<0THENPRINT@530,"THE READOUT SAYS, 'FENCE OFF'";
4010 PRINT@349,CHR$(203);:IFWZ=1THENWZ=0:GOTO100ELSE100
Lines 5000-5030: Cursor-flash and line input routine.  See
      detailed analysis.
5000 PRINT@PP+LEN(WH$),CHR$(95);:FORXE=1TO40:WY$=INKEY$:IFWY$=""
THENNEXT:PRINT@PP+LEN(WH$)," ";:FORXE=1TO40:WY$=INKEY$:IFWY$=""T
HENNEXT:GOTO5000:REM
 xx    FLASHING CURSOR/LINE INPUT FOR INPUT ROUTINE (5000-5030)

5010 IFWY$=CHR$(13)THENPRINT@PP+LEN(WH$)," ";:RETURN
5020 IFASC(WY$)=8ANDLEN(WH$)>0THENWH$=LEFT$(WH$,LEN(WH$)-1):PRIN
T@PP,STRING$(LEN(WH$)+2,32);:PRINT@PP,WH$;:GOTO5000ELSEIFASC(WY$
)=8THEN5000

5030 WH$=WH$+WY$:PRINT@PP,WH$;:GOTO5000

line 6000: Flashing "ENTER" for instructions paging.

6000 PRINT@980,"HIT =ENTER= TO CONTINUE";:FORX=1TO85:IFINKEY$=CH
R$(13)THENRETURNELSENEXT:PRINT@984,CHR$(199);:FORX=1TO85:IFINKEY
$=CHR$(13)THENRETURNELSENEXT:GOTO6000:REM
      xx FLASHING "ENTER" FOR INSTRUCTIONS PAGING
```


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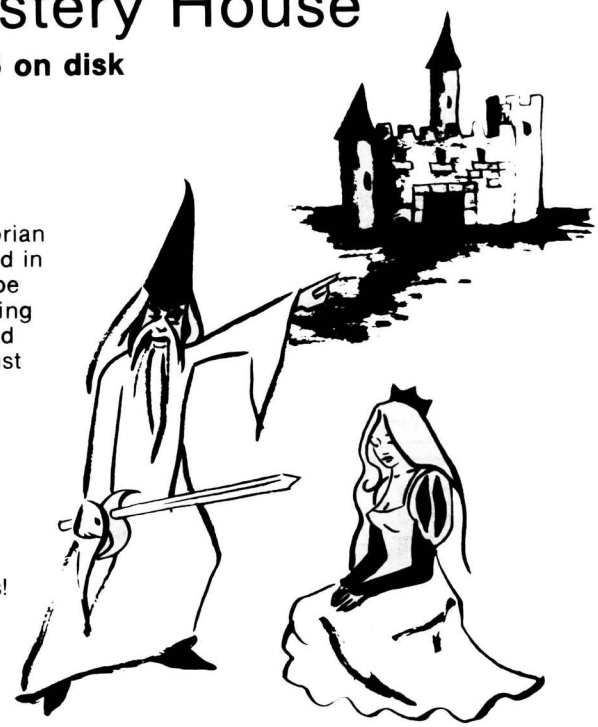

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CARDS

by John T. Philips

Cards is a subroutine for 16K S-80s.

Everybody plays cards and sometimes it seems that everyone is writing programs that play cards. No matter how sophisticated the programs are, however, all the user ever sees are the graphics on the screen and all he ever remembers is how specific he had to be when entering information (such as his choice of cards) into the computer.

This program provides two subroutines that can be incorporated into your own programs. The first subroutine will print the cards of the deck (including face cards) anywhere on the screen. Good-bye to rectangles labled "JH" that are supposed to represent the Jack of Hearts!! The second subroutine will accept a wide variety of input to represent the names of the cards. For example, if the card to be entered is the "six of clubs," the computer will accept "six of clubs," "sixofclubs," "sixclubs," "6 of clubs," "6ofclubs," "6 clubs," "6C," "6ofC," "six of C,". . . almost anything a reasonable person might use to represent the six of clubs. The same wide variety of input is accepted for all the other cards of the deck.

The program is divided into four parts:

Part 1: Lines 10-90 provide the strings to be packed with graphics characters. Lines 60000-65000 have the graphics characters in DATA statements and the POKE routines to pack the strings. Once the super graphics strings M1$-M7$ and P1$-P8$ have been generated, lines 60000-65000 are deleted. The graphics strings can be SAVED on tape or SAVED on disk, but cannot be edited!

Part 2: Lines 100-133 comprise the subroutine (GOSUB100) which prints a super-graphics card on the screen. The routine requires values for
S- Suit value 1-4 (hearts 1, spades 2, diamonds 3, clubs 4)
V- Card value 1-13 (ace 1, jack 11, king 13)
X- The point on the screen to "print@"
and used the super-graphics strings generated by Part 1. Each card is 11 characters wide and eight lines tall, so ten cards can be displayed on the screen at one time (at X = 0, 13, 26, 39, 52, 512, 525, 538, 551, and 564). The routine also returns
V$ card name (ace-king)
S$ suit name (heart-clubs)
so if the routine is passed the values S = 2, V = 12, then PRINT "the"; V$; "of"; S$ will print "the queen of spades."

Part 3: Lines 200-374 comprise the subroutine (GOSUB200) which inputs A$ - any reasonable name for a card the user wishes to enter into the computer- and outputs:
V$-card name (ace-king)
S$ suit name (hearts-clubs)
V-card value 1-13
S-suit value 1-4
The V and S values can be passed to subroutine 100 to print the card at X!

Part 4: Consists of 2 routines to exercise the sub-routines. Lines 1000-1010 call sub 100 and print all 52 cards - back and front- on the screen one after the other. Lines 2000-2030 call sub 200 and prompt the user for the name of a card, and then print the full name and suit on the screen as input "AS" output "the ace of spades."

These subroutines should make your own card-playing programs more fun to watch and easier for the user.

```
4 '    xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
       x          ---------- "CARDS" ----------          x
5 '    x                                                 x
       x          TWO SUBROUTINES TO BE ADDED TO         x
       x          YOUR CARD PLAYING PROGRAMS ---         x
       x            BY   JOHN T. PHILLIPP                x
6 '    xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

7 ' COPYRIGHT APRIL, 1980   JOHN T. PHILLIPP
10 M1$="0000000000-----THERE SHOULD BE 172 CHARACTERS IN THIS ST
RING-----0000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000"
20 M2$="0000000000-----THERE SHOULD BE 172 CHARACTERS IN THIS ST
RING-----0000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000"
30 M3$="0000000000-----THERE SHOULD BE 172 CHARACTERS IN THIS ST
RING-----0000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000"
40 M4$="0000000000-----THERE SHOULD BE 172 CHARACTERS IN THIS ST
RING-----0000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000"
50 M5$="0000000000-----THERE SHOULD BE 172 CHARACTERS IN THIS ST
RING-----0000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000"
60 M6$="0000000000----THERE SHOULD BE 70 CHARACTERS IN THIS STRI
NG-----0000000"
65 M7$="0000000000-----THERE SHOULD BE 104 CHARACTERS IN THIS ST
RING-----00000000000000000000000000000000000000000"
70 P1$="00000000";P2$="00000000";P3$="00000000";P4$="000000000
0"
80 P5$="0000000000";P6$="00000000";P7$="0000000000";P8$="0000000
000"
```

continued on next page

continued from previous page

```
90 GOTO 60000 ' * JUMP TO GRAPHIC STRING PACKING ROUTINES
                  DELETE AFTER STRINGS PACKED *
99 GOTO 1000  ' * DELETE AFTER SUB-ROUTINE TESTED *
100 ' * CARD PRINTING SUB-ROUTINE *
INPUT:
V - CARD VALUE: ACE 1, JACK 11, QUEEN 12, KING 13
S - SUIT VALUE: HEARTS 1, SPADES 2, DIAMONDS 3, CLUBS 4
X - POINT ON SCREEN TO 'PRINT AT'
RETURNS:
V$ - NAME: ACE - KING
S$ - SUIT: HEARTS - CLUBS
110 IFS=1THENS$="HEARTS":P$=P1$:P0$=P5$:ELSEIFS=2THENS$="SPADES"
:P$=P2$:P0$=P6$:ELSEIFS=3THENS$="DIAMONDS":P$=P3$:P0$=P7$:ELSEIF
S=4THENS$="CLUBS":P$=P4$:P0$=P8$
115 PRINT@X,M2$;:PRINT@X,M6$;
120 ONVGOTO121,122,123,124,125,126,127,128,129,130,131,132,133
121 V$="ACE":IFS=2THENPRINT@X+65,M7$;:RETURN:ELSEPRINT@X+65,"A";
:PRINT@X+196,P$;:PRINT@X+393,"A";:RETURN
122 V$="TWO":PRINT@X+65,"2";:PRINT@X+68,P$;:PRINT@X+324,P$;:PRIN
T@X+393,"2";:RETURN
123 V$="THREE":PRINT@X+65,"3";:PRINT@X+68,P$;:PRINT@X+196,P$;:PR
INT@X+324,P$;:PRINT@X+393,"3";:RETURN
124 V$="FOUR":PRINT@X+65,P$;:PRINT@X+71,P$;:PRINT@X+321,P$;:PRIN
T@X+327,P$;:PRINT@X+393,"4";:RETURN
125 V$="FIVE":PRINT@X+65,P$;:PRINT@X+71,P$;:PRINT@X+196,P$;:PRIN
T@X+321,P$;:PRINT@X+327,P$;:PRINT@X+393,"5";:RETURN
126 V$="SIX":PRINT@X+65,P$;:PRINT@X+71,P$;:PRINT@X+193,P$;:PRINT
@X+199,P$;:PRINT@X+321,P$;:PRINT@X+327,P$;:PRINT@X+393,"6";:RETU
RN
127 V$="SEVEN":PRINT@X+65,P$;:PRINT@X+71,P$;:PRINT@X+193,P$;:PRI
NT@X+196,P$;:PRINT@X+199,P$;:PRINT@X+321,P$;:PRINT@X+327,P$;:PRI
NT@X+393,"7";:RETURN
128 V$="EIGHT":PRINT@X+65,P$;:PRINT@X+68,P$;:PRINT@X+71,P$;:PRIN
T@X+193,P$;:PRINT@X+196,P$;:PRINT@X+199,P$;:PRINT@X+321,P$;:PRIN
T@X+324,P$;:PRINT@X+327,P$;:PRINT@X+393,"8";:RETURN
129 V$="NINE":PRINT@X+65,P$;:PRINT@X+68,P$;:PRINT@X+71,P$;:PRINT
@X+193,P$;:PRINT@X+196,P$;:PRINT@X+199,P$;:PRINT@X+321,P$;:PRINT
@X+324,P$;:PRINT@X+327,P$;:PRINT@X+393,"9";:RETURN
130 V$="TEN":PRINT@X+65,P$;:PRINT@X+68,V$;:PRINT@X+71,P$;:PRINT@
X+193,P$;:PRINT@X+196,P$;:PRINT@X+199,P$;:PRINT@X+321,P$;:PRINT@
X+388,V$;:PRINT@X+327,P$;:RETURN
131 V$="JACK":PRINT@X,M3$;:PRINT@X+65,P$;:PRINT@X+327,P0$;:RETUR
N
132 V$="QUEEN":PRINT@X,M4$;:PRINT@X+65,P$;:PRINT@X+327,P0$;:RETU
RN
133 V$="KING":PRINT@X,M5$;:PRINT@X+65,P$;:PRINT@X+327,P0$;:RETUR
N
200 ' * SUB-ROUTINE TO ACCEPT ALMOST ANY CARD *
INPUT:
A$ - YOUR ANSWER TO "TYPE IN ANY CARD"
RETURNS:
V$ - VALUE OF THE CARD: ACE - KING
S$ - SUIT: HEARTS - CLUBS
V  - VALUE: 1 - 13
S  - SUIT:  1 - 4
220 F1$="ACTWTHFOFISISEEINITEJAQUKI":F2$="A234567891JQK":F3$="TS
ESDSBS":F4$="HSDC":V$="":S$=""
230 Y$=F1$:O=2:GOSUB300:IFV$<>""THEN250
240 Y$=F2$:O=1:GOSUB300:IFV$<>""THEN250ELSECLS:PRINT@448,"I DON'
T UNDERSTAND THE VALUE OF ";CHR$(34);A$;CHR$(34):PRINT"TRY SOMET
HING LIKE - SIX OF CLUBS - OR - 6C":FORI=1TO2000:NEXTI:A$="":RET
URN
250 Y$=F3$:O=2:GOSUB350:IFS$<>""THEN275
260 Y$=F4$:O=1:GOSUB350:IFS$<>""THEN275ELSECLS:PRINT@448,"I DON'
T UNDERSTAND THE SUIT OF ";CHR$(34);A$;CHR$(34):PRINT"TRY SOMETH
ING LIKE - SIX OF CLUBS - OR - 6C":FORI=1TO2000:NEXTI:A$="":RETU
RN
275 CLS:PRINT@448,"YOUR CARD WAS THE ";V$;" OF ";S$;", RIGHT";:I
NPUTXX$:IFLEFT$(XX$,1)="N"THENPRINT"ONE OF US HAS MADE A MISTAKE
.  TRY AGAIN.":A$="":FORI=1TO1500:NEXTI:RETURN:ELSERETURN
300 FORX=0TO12:IFO=1THENY=X+1ELSEY=(X*2)+1
305 W$=MID$(Y$,Y,O):W1$=LEFT$(A$,O)
310 IFW$=W1$THEN315ELSENEXTX:RETURN
315 V=X+1:IFV=1THENV$="ACE"ELSEIFV=2THENV$="TWO"ELSEIFV=3THENV$=
"THREE"ELSEIFV=4THENV$="FOUR"ELSEIFV=5THENV$="FIVE"ELSEIFV=6THEN
V$="SIX"ELSEIFV=7THENV$="SEVEN"ELSEIFV=8THENV$="EIGHT"ELSEIFV=9T
HENV$="NINE"
316 IFV=10THENV$="TEN"ELSEIFV=11THENV$="JACK"ELSEIFV=12THENV$="Q
UEEN"ELSEIFV=13THENV$="KING"
328 RETURN
350 FORX=0TO3:IFO=1THENY=X+1ELSEY=(X*2)+1
360 W$=MID$(Y$,Y,O):W1$=RIGHT$(A$,O)
365 IFW$=W1$THEN370ELSENEXTX:RETURN
370 S=X+1:IFS=1THENS$="HEARTS"ELSEIFS=2THENS$="SPADES"ELSEIFS=3T
HENS$="DIAMONDS"ELSEIFS=4THENS$="CLUBS"
374 RETURN
1000 ' * EXERCISE THE SUBROUTINE - PRINTS ALL THE CARDS *
1010 CLS:FORS=1TO4:FORV=1TO13:X=280:PRINT@X,M1$;:PRINT@789,CHR$(
30);:FORI=1TO100:NEXTI:GOSUB100:PRINT@789,"THE ";V$;" OF ";S$;:F
ORI=1TO250:NEXTI:NEXTV:NEXTS:PRINT:PRINT
2000 ' * TRY THE "ANY CARD SUB-ROUTINE" *
2010 CLS:PRINT@448,"TYPE ANY CARD";:INPUTA$:GOSUB200
2020 IFA$=""THEN2000ELSEPRINT"VERY WELL.  IT WORKS.":FORI=1TO100
0:NEXTI:GOTO2000
2030 PRINT"VERY WELL.  IT WORKS.":FORI=1TO1000:NEXT:GOTO2000
60000 ' * READ GRAPHICS CHARACTERS AND POKE STRINGS *
60005 CLS:PRINT"PACKING GRAPHICS STRINGS. . .":PRINT
60010 ' * CARD BACK -- M1$ *
60020 I=VARPTR(M1$):J=PEEK(I+1)+256*PEEK(I+2)
60030 FORK=JTOJ+171:READZ:POKEK,Z:NEXTK
60210 DATA 176,176,176,176,176,176,176,176,176,176,176,176
60230 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60240 DATA 151,164,137,146,164,131,152,161,134,152,171
60260 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60270 DATA 151,164,137,146,164,131,152,161,134,152,171
60290 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60300 DATA 151,164,137,146,164,131,152,161,134,152,171
60320 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60330 DATA 181,134,152,161,134,176,137,146,164,137,186
60350 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60360 DATA 181,134,152,161,134,176,137,146,164,137,186
60380 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60390 DATA 181,134,152,161,134,176,137,146,164,137,186
60410 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60420 DATA 131,131,131,131,131,131,131,131,131,131,131
60425 PRINT"M1$ - CARD BACK COMPLETED"
60430 ' * ALL BLANKS -- M2$ *
60440 I=VARPTR(M2$):J=PEEK(I+1)+256*PEEK(I+2)
60450 FORK=JTOJ+171:READZ:POKEK,Z:NEXTK
60510 DATA 128,128,128,128,128,128,128,128,128,128,128
60530 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60540 DATA 128,128,128,128,128,128,128,128,128,128,128
60560 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60570 DATA 128,128,128,128,128,128,128,128,128,128,128
60590 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60600 DATA 128,128,128,128,128,128,128,128,128,128,128
60620 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60630 DATA 128,128,128,128,128,128,128,128,128,128,128
60650 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60660 DATA 128,128,128,128,128,128,128,128,128,128,128
60680 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60690 DATA 128,128,128,128,128,128,128,128,128,128,128
60710 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60720 DATA 128,128,128,128,128,128,128,128,128,128,128
60725 PRINT"M2$ - ALL BLANKS COMPLETED"
60800 ' * JACK -- M3$ *
60810 I=VARPTR(M3$):J=PEEK(I+1)+256*PEEK(I+2)
```

```
60820 FORK=JTOJ+171:READZ:POKEK,Z:NEXTK
60850 DATA 176,176,176,176,176,176,176,176,176,176,176,176
60870 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60880 DATA 149,128,128,128,169,142,175,172,129,074,170
60900 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60910 DATA 149,128,128,128,154,128,128,152,129,170,170
60930 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60940 DATA 149,157,140,131,128,128,128,137,140,174,174
60960 DATA 26,24,24,24,24,24,24,24,24,24,24,24
60970 DATA 157,157,140,144,128,128,128,176,140,174,170
60990 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61000 DATA 149,149,160,134,128,128,150,128,128,128,170
61020 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61030 DATA 149,074,160,141,189,156,165,128,128,128,170
61050 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61060 DATA 131,131,131,131,131,131,131,131,131,131,131
61065 PRINT"M3$ - JACK COMPLETED"
61100 ' * QUEEN -- M4$ *

61110 I=VARPTR(M4$):J=PEEK(I+1)+256*PEEK(I+2)
61120 FORK=JTOJ+171:READZ:POKEK,Z:NEXTK
61150 DATA 176,176,176,176,176,176,176,176,176,176,176,176
61170 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61180 DATA 149,128,128,128,169,173,141,141,145,081,170
61200 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61210 DATA 149,128,128,128,137,144,128,128,162,132,170
61230 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61240 DATA 149,156,131,137,140,129,128,128,137,172,170
61260 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61270 DATA 149,141,164,128,128,168,140,164,176,142,170
61290 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61300 DATA 149,136,145,128,128,130,164,128,128,128,170
61320 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61330 DATA 149,081,162,172,172,173,165,128,128,128,170
61350 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61360 DATA 131,131,131,131,131,131,131,131,131,131,131
61365 PRINT"M4$ - QUEEN COMPLETED"
61370 ' * KING -- M5$ *
61380 I=VARPTR(M5$):J=PEEK(I+1)+256*PEEK(I+2)
61390 FORK=JTOJ+171:READZ:POKEK,Z:NEXTK
61420 DATA 176,176,176,176,176,176,176,176,176,176,176,176
61440 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61450 DATA 149,128,128,128,169,173,173,173,161,075,170
61470 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61480 DATA 149,128,128,128,130,172,173,134,170,171,170
61500 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61510 DATA 149,152,131,131,131,129,128,131,131,170,170
61530 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61540 DATA 149,149,176,176,128,160,176,176,176,134,170
61560 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61570 DATA 149,181,149,152,173,141,144,128,128,128,170
61590 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61600 DATA 149,075,161,173,173,173,165,128,128,128,170
61620 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61630 DATA 131,131,131,131,131,131,131,131,131,131,131
61635 PRINT"M5$ - KING COMPLETED"
61700 ' * OUTLINE -- M6$ *
61710 I=VARPTR(M6$):J=PEEK(I+1)+256*PEEK(I+2)
61720 FORK=JTOJ+69:READZ:POKEK,Z:NEXTK
61750 DATA 176,176,176,176,176,176,176,176,176,176,176,176
61760 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61770 DATA 149,26,24,149,26,24,149,26,24,149,26,24,149,26,24,149
,26,24
61780 DATA 131,131,131,131,131,131,131,131,131,131,131,131
61790 DATA 27,24,170,27,24,170,27,24,170,27,24,170,27,24,170,27,
24,170
61795 PRINT"M6$ - CARD OUTLINE COMPLETED"
61796 ' * ACE -- M7$ *
61797 I=VARPTR(M7$):J=PEEK(I+1)+256*PEEK(I+2)
61798 FORK=JTOJ+103:READZ:POKEK,Z:NEXTK
61799 DATA 065,128,128,128,176,128,128,128,128
61800 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61801 DATA 128,128,160,134,128,137,144,128,128
61802 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61803 DATA 160,134,129,128,128,128,130,137,144
61804 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61805 DATA 170,128,128,128,128,128,128,128,149
61806 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61807 DATA 128,137,140,169,128,150,140,134,128
61808 DATA 26,24,24,24,24,24,24,24,24,24,24,24
61809 DATA 128,128,128,131,131,131,128,128,065
61810 PRINT"M7$ - ACE COMPLETED"
61815 ' * PIPS -- P1$ TO P8$ *
61820 I=VARPTR(P1$):J=PEEK(I+1)+256*PEEK(I+2)
61830 FORK=JTOJ+8:READZ:POKEK,Z:NEXTK
61840 DATA 188,184,148,26,24,24,24,130,135
61850 I=VARPTR(P2$):J=PEEK(I+1)+256*PEEK(I+2)
61860 FORK=JTOJ+7:READZ:POKEK,Z:NEXTK
61870 DATA 160,180,26,24,24,131,135,129
61880 I=VARPTR(P3$):J=PEEK(I+1)+256*PEEK(I+2)
61890 FORK=JTOJ+8:READZ:POKEK,Z:NEXTK
61900 DATA 184,189,144,26,24,24,24,130,135
61910 I=VARPTR(P4$):J=PEEK(I+1)+256*PEEK(I+2)
61920 FORK=JTOJ+9:READZ:POKEK,Z:NEXTK
61930 DATA 184,188,144,26,24,24,24,131,135,129
61940 I=VARPTR(P5$):J=PEEK(I+1)+256*PEEK(I+2)
61950 FORK=JTOJ+9:READZ:POKEK,Z:NEXTK
61960 DATA 128,184,144,26,24,24,24,138,135,143
61970 I=VARPTR(P6$):J=PEEK(I+1)+256*PEEK(I+2)
61980 FORK=JTOJ+7:READZ:POKEK,Z:NEXTK
61990 DATA 160,184,176,26,24,24,139,129
62000 I=VARPTR(P7$):J=PEEK(I+1)+256*PEEK(I+2)
62010 FORK=JTOJ+9:READZ:POKEK,Z:NEXTK
62020 DATA 128,184,144,26,24,24,24,130,175,135
62030 I=VARPTR(P8$):J=PEEK(I+1)+256*PEEK(I+2)
62040 FORK=JTOJ+9:READZ:POKEK,Z:NEXTK
62050 DATA 160,184,176,26,24,24,24,130,143,135
62060 PRINT"P1$ TO P8$ - PIPS COMPLETED":PRINT
65000 PRINT"     TYPE    DELETE 60000 - 65000   <ENTER>   THEN
     TYPE    DELETE 90    <ENTER>":PRINT
```

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MIND MASTER 6403

This classic strategy game takes on a new dimension as the computer designs the hidden problems and reports the results of each guess. Multiple players may compete against the computer and each player may select the level of difficulty that matches their skill, ability, and patience. This program also contains a formula for solving logic problems. Create the answer and watch the computer use deductive logic to discover the secret code. Both 8K and 16K versions.
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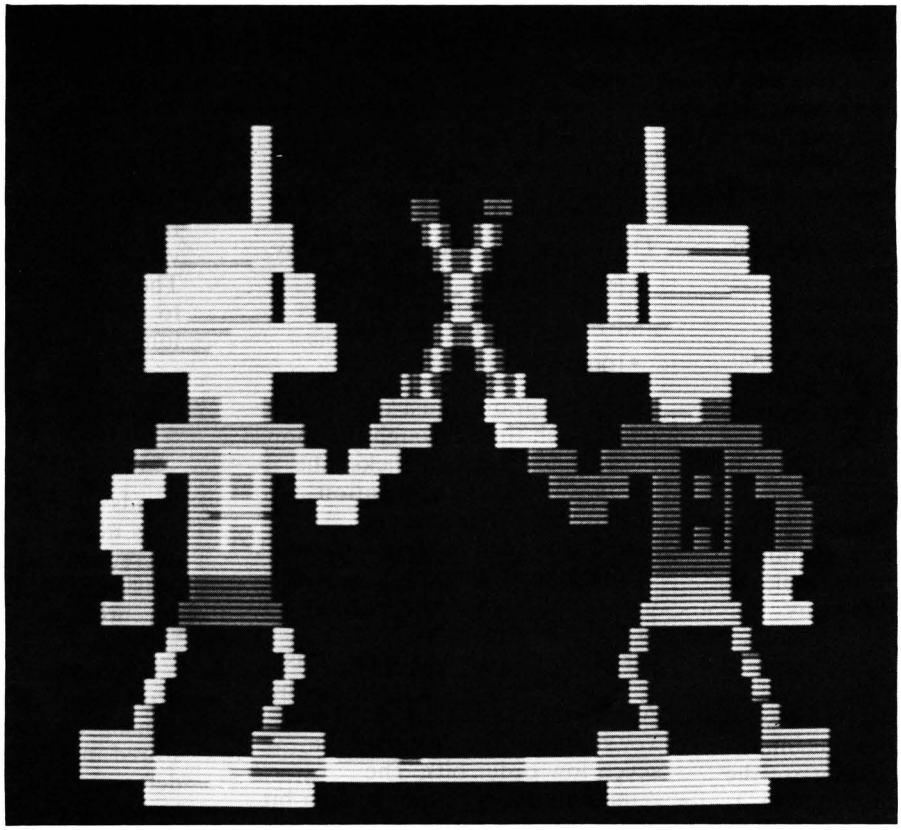

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KEYBOARD ORGAN

by Rob Hausman

KEYBOARD ORGAN is a machine language routine that will work with any Apple.

My son was slightly over a year old when he discovered that the RESET key produced a pleasing beep. It didn't take long, about ten minutes of constant beeping, for me to decide that it was time for him to move on to bigger and better (or at least more varied) things. The result was a keyboard organ.

The organ is divided into two sections. The machine language program occupies locations $1000 through $1025, while the data for the program is stored in $1080 through $10FF.

The data can be entered directly from either the Integer or Applesoft monitor. This is accessed by typing CALL-151. You should get an '8' prompt. For example, the first eight bytes re entered by simply typing

*1080 1 1 1 1 1 1 1 1

The number preceding the colon is starting address (in hexadecimal), and the numbers following are the bytes to be input (again in "hex").

The program itself may also be input as just another set of data; in this case, the machine language bytes. However, on the Apple there is a built-in mini-assembler. In order to use it, type:

*F666G

while in the Integer BASIC monitor. (Both an assembly listing and a memory dump are provided, in case you don't have Integer BASIC.) The resulting exclamation mark is the mini-assembler prompt. The first instruction may now be entered

1100:LDA $CO30

Again, the number preceding the colon is the address at which the instruction is to be stored. Subsequent instructions may be entered by merely typing a space followed by the instruction. When you are done entering the program, hit the reset key to get back to the monitor and then list the program by

*1000L

Unless you enjoy typing, you will want to save the organ using

*1000.10FFW

The organ can now be loaded by

*1000.10FFR

and then executed by

*1000G

The program is just one large loop. Each time through the loop, the first instruction "clicks" the speaker by accessing location $C030 (hex). The second instruction then loads the contents of the byte at location $C000 into index register X. (The $ reminds us that the address is given in hexadecimal.) In the Apple, this location is special. It contains the ASCII representation of the last key pressed. This takes up the seven low order bits. The remaining bit is called the sign bit and in this case it tells us whether a key has been pressed since we last checked. If this bit is one (minus), then a key has been pressed. Oherwise, the bit is zero (plus). The instruction

$1006 BPL $1019

"Branches on PLus" to $1019, that is, it causes execution to branch to the instruction at location $1019 if no key has been pressed.

If one has been pressed, then we continue with the instruction at $1008 which resets the sign bit of $C000 to zero. The next instruction selects a value from the data section. The value in index register X is added to $1000 and the byte at that address is loaded into the accumulator. It is then stored into $1030.

The instructions in locations $1011 through $1018 constitute two nested delay loops. Together they provide a slight hesitation between notes. Consider first the inside loop:

$1013 DEY

$1014 BNE $1013

The first instruction Decrements the value in the Y register. If the value was 0, then it becomes 255. The second instruction jumps back to the decrement instruction as long as the value in Y is non-zero.

The outside loop consists of the instructions at $1011, $1016 and $1017. The instruction

$1011 LDX #$0F

Loads the value 15 (=$OF) into X. This means that X must be decremented 15 times before the outside loop is exited and execution can continue at location $1019.

The remaining instructions provide the delay between speaker "clicks" dictated by the value stored in $1030. This value determines the pitch; a large value being associated with a low pitch.

The instruction at $1019 loads this value into X. This is the number of times that the subsequent loop is traversed. The mnemonic NOP stands for "No Operation." These instructions are nothing more than time wasters. The final instructions JumMPs back to the beginning of the program at $1000.

The organ, as listed, uses only the keys shown below.

If you want to add more notes or rearrange those above, you need merely change the values in the data section. To find the byte associated with a particular key, add the ASCII value of the key to $1080. The byte at the resulting

```
Q E R Y U I   P          "Black keys"
A S D F G H J K L ; ← →  "White keys"
```

address contains the data which will be copied into $1030 when the key is struck.

One warning. Recent research indicates that a one-year-old pounding an organ can be just as distracting as a one-year-old pounding a RESET key.

Assembly Listing of Program

```
]CALL-151
*1000.1030L
1000-  AD 30 C0   LDA  $C030
1003-  AE 00 C0   LDX  $C000
1006-  10 11      BPL  $1019
1008-  8D 10 C0   STA  $C010
100B-  BD 00 10   LDA  $1000,X
100E-  8D 30 10   STA  $1030
1011-  A2 0F      LDX  #$0F
1013-  88         DEY
1014-  D0 FD      BNE  $1013
1016-  CA         DEX
1017-  D0 FA      BNE  $1013
1019-  AE 30 10   LDX  $1030
101C-  CA         DEX
101D-  EA         NOP
101E-  EA         NOP
101F-  EA         NOP
1020-  EA         NOP
1021-  D0 F9      BNE  $101C
1023-  4C 00 10   JMP  $1000
```

Memory Dump of Entire Routine with Data

```
1000- AD 30 C0 AE 00 C0 10 11
1008- 8D 10 C0 BD 00 10 8D 30
1010- 10 A2 0F 88 D0 FD CA D0
1018- FA AE 30 10 CA EA EA EA
1020- EA D0 F9 4C 00 10
1030- 01
1080- 01 01 01 01 01 01 01 01
1088- 39 01 01 01 01 01 01 01
1090- 01 01 01 01 01 36 01 01
1098- 01 01 01 01 01 01 01 01
10A0- 01 01 01 01 01 01 01 01
10A8- 01 01 01 01 01 01 01 01
10B0- 01 01 01 01 01 01 01 01
10B8- 01 01 01 41 01 01 01 01
10C0- 01 9F 01 01 85 8D 76 6F
10C8- 63 52 58 4E 49 01 01 01
10D0- 45 A9 7D 96 01 5D 01 01
10D8- 01 69 01 01 01 01 01 01
10E0- 01 01 01 01 01 01 01 01
10E8- 01 01 01 01 01 01 01 01
10F0- 01 01 01 01 01 01 01 01
10F8- 01 01 01 01 01 01 01 01
```


RAINWARE™

COLUMN CALCULATOR 4.1

by David T. Gray

6382472

8390645

COLUMN CALCULATOR is a "word processor for numbers," a number processor designed to be used like a desk calculator. It is different than a calculator in that it can handle large blocks of information as if handling one number at a time. The work space can be thought of as a large matrix with rows and columns much like an accountant's spread-sheet. Each column or row can be labeled. The cursor can move around the worksheet. Data can be easily entered into the columns; and the columns can then be moved around. Columns can be overlaid from an existing data file on disk. One column can be added, subtracted, multiplied, divided, or raised to a power of another and the results put in another column. Columns can be compared to one another (if column A is greater than, less than, equal to, not equal to column B, then put the contents of column C into column D). Columns can be totaled, or set with a constant, and any column can be sorted, carrying the rest of the columns with it. A predefined function (series of computations) can be defined, thereby pre-programming the worksheet. Enter the data, execute the function, and print the results. The COLUMN CALCULATOR is an all-purpose data manipulator.

The statistical section provides analysis of the data. The analysis includes simple statistics (mean, median, mode and standard deviation), linear regression, simple correlation, histogram and the T-test.

The information can be printed out on the line printer in a compressed format at any stage in the development of a data base. Thus, it can be used as a finished report or as a copy of the worksheet to permit the filling in of additional data for later entry into the data base. The data base can be saved on disk and recalled at a later date for modification or for generating a report. Any column in a file on disk can be referenced and added to the current worksheet. This is particularly useful for generating composite reports.

All user communication with COLUMN CALCULATOR uses FLASH, the line input/editor routine. This enables the user to not only key in his instruction to COLUMN CALCULATOR, but to edit errors or data as well.

By connecting an amplifier and speaker to the cassette aux output from the computer, the user can hear data entry feedback sounds which enable him to enter information into his worksheet without constantly watching the screen for visual feedback.

Information may be reviewed at will by scrolling up, down, left or right. Everything appears on the video display screen as it occurs, thereby eliminating guesswork.

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Program on disk for minimum 16K 1 disk system, with instruction manual. $29.95

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The first intelligent monitor available for the TRS-80. Ultramon is the first ROM independent machine language monitor which puts you in COMPLETE CONTROL with exclusive INTERPRETIVE EXECUTION.

Each instruction is individually fetched, decoded, disassembled, and analyzed by Ultramon's "BRAIN" so that your efforts cannot "Bomb-out" and so that you can put breakpoints anywhere . . . You can even put breakpoints in ROM.

ULTRA-MON displays, disassembles, traces (hard-copy trace disassembly, too!) lineprints, modifies, relocates memory, and even relocates itself with its commands. This 13-page documentation SHOWS YOU HOW TO DO IT.

Totally ROM independent, Ultramon will work in both the old and the newer ROM and will not be affected by any lower case modifications.

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ATARI PROGRAMMING HINT

Any ATARI program which does not use any keyboard input and has an execution time of over nine minutes and seven seconds initiates the color change routine. After this time the color registers are changed every few seconds. This prevents any one particular phosphor in your television's picture tube from being worn out.

If not wanted, this color change routine can be overcome by inserting

POKE 77,0

in a frequently used portion of the program. This will reset the counter that keeps track of how long it has been used.

Robert Schommer
Maplewood, N.J.

S-80 PROGRAMMING HINT

Here is a subroutine which allows "full screen" graphics to be printed out on a Quick Printer II. Anyone owning a Quick Printer II will know that it is not supposed to be able to print graphics.

The one problem I had was that the "QPII" has a maximum of 32 characters per line. Thus, to get a "full screen" printout, I had to print it in four strips!

But for "one shot" printouts it is very handy.

The routine is easily modified so that any section of the screen you want can be printed, ignoring what you don't need, just by changing the range of the FOR/NEXT loops - but watch it! Line 3010 must have 32 total loops, no more, no less, in order to maintain the proper format to the printer. But that 32 can start anywhere!

```
2900 'QUICK PRINTER II
2910 'GRAPHIC PRINTER SUBROUTINE
2920 'BY JOHN D. WILLIAMS
2940 'TAMPA, FLORIDA
2950 'USE A GOSUB AFTER THE
2960 'SCREEN IS PRINTED TO
2970 'INITIATE LINE PRINT
2980 'SUBROUTINE.  SCREEN IS
2990 'PRINTED IN 4 SECTIONS.
3000 Q=0:R=31
3005 FORBB=0TO47
3010 FORAA=QTOR
3020 IFPOINT(AA,BB)THENLPRINT
CHR$(127);:ELSELPRINT" ";
3030 NEXTAA
3040 NEXTBB
3050 Q=R+1:R=R+32:IFR<=95THEN
GOTO3005ELSERETURN
3060 END
```

John D. Williams
Tampa, Florida

HI RESOLUTION DRAWING

Connect any points on the screen, fill areas, paint with a set of nine "brushes" (or define your own), and draw with, plot, rotate, and scale shapes that you define.

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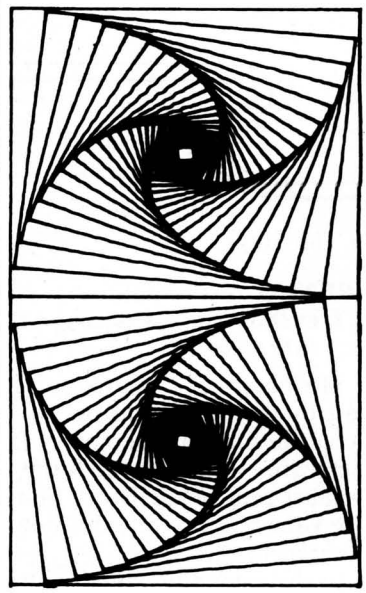

THREE D

Create 3-dimensional graphics!

by Mark Pelczarski

3-dimensional figures can be rotated, shifted, scaled, or distorted. Each figure can be saved on disk and later assembled into larger figures, with each part capable of being manipulated. Screen images may be saved and used with other programs.

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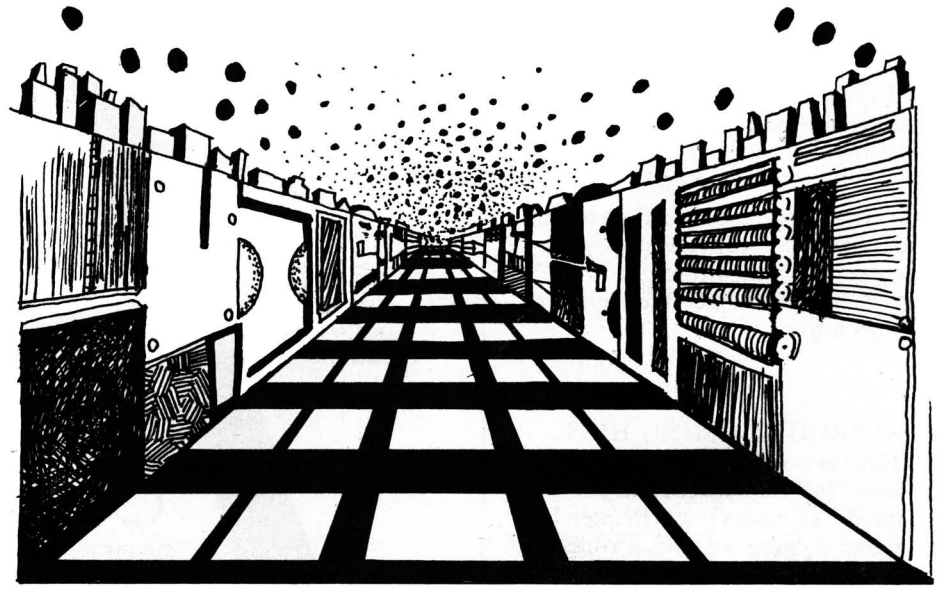
TRENCH

by Tim Hays



TRENCH

Trench requires 1 Atari joystick and 16K memory.

The object of this program is to destroy the Death Star by maneuvering your ship away from a crossfire until you reach the exhaust vent of the Death Star and fire your photon torpedos down the trench.

In the beginning you are already in the trench, flying down the corridor at your ship's top speed. There are three laser posts located on the left and right walls, and on the floor bottom. These lasers flash by you and fire on your ship at random intervals. The frequency of the fire from the laser posts is determined by the level of difficulty you choose, (1-19), with 1 being the hardest. All three lasers will aim at you independently. Each will fire at the mid-point between you and the last spot fired upon. As long as you keep your ship moving away from the three laser shots, and keep track, you should not get hit.

You will be able to see the number of miles to go at the bottom of your screen. This will be higher at more difficult levels of play. When the distance to go reaches 20, the on-board attack computer will be activated, the lasers will stop firing at you, and the end of the trench will come into view. You now have to quickly line up the center (one pixel) of this well so that the exhaust vent is exactly in the center of your sights.

When you approach the last 30 miles, set your ship close to the center so that you can line up the approaching target more easily. When you do have everything lined up, you must fire on the vent after the bottom wall is below the bottom of your sights and the target is close enough to be hit accurately, (the computer will say, 'FIRE NOW!'). If you succeed in hitting your target, you must immediately pull back on your joystick to pull up and out of the trench. If you don't do this, you will run into the wall and be destroyed. Upon pulling out of the trench, the screen will go back to normal mode and show a window view of your ship moving out of the trench, and then switch to an aft view showing the Death Star being destroyed.

During your flight down the trench, remember that if you go too close to the sides of the corridor or the floor, you will run into them and be destroyed. If you go off the top of the screen, you will be out of the trench and your mission will be aborted.

Variables used in TRENCH

NOTE: Many of these variables are used more than once, or for more than one item storage or loop.

letters:

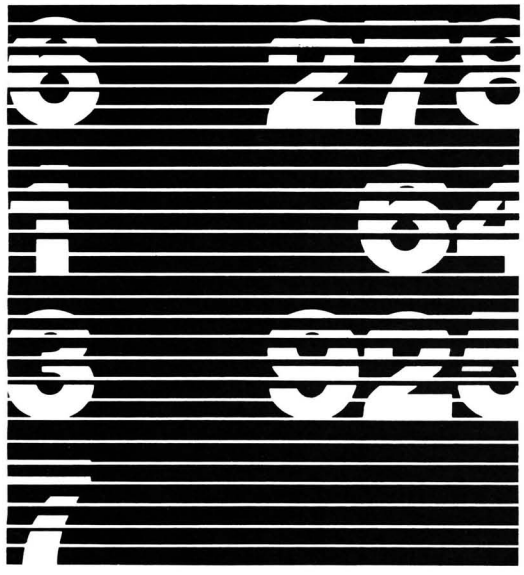
'A'	Looping (FOR - NEXT).
'B'	RND GOSUB of Laser fire, dependant on 'R'.
'C'	Screen refresh (redraw what was erased by ship & lasers).
'D'	"X" Position of upper-left laser post.
'E'	"Y" Position of upper-left laser post.
'F'	"X" Position of upper-right laser post.
'G'	"Y" Position of upper-right laser post & "X" size of the target wall.
'H'	"X" Position of bottom laser post & "Y" size of target wall.
'I'	"Y" Position of bottom laser post.
'J'	Looping.
'L'	Length of time until ship runs into wall.
'R'	Input level of difficulty.
'T'	Miles left to target.
'U'	FOR-NEXT loops, control var., color locate var.
'X'	Ship positioning.
'Y'	" "
'Z'	Used as a TRUE/FALSE var. (eg. IF Z = 1 THEN GOTO. . . .).
'STRIG'	Status of joystick trigger.
'JS'	Joystick positioning status.
'Z1'	used the same as "Z".
'L1'	looping (nested with "L").
'U1'	nested looping with "U".
'J1'	wait looping - nested with "U1 above.

```
1 REM BY TIM HAYS  SEBREE'S COMPUTING :
Copyright 1980 by SEBREE'S
2 REM 456 Granite Ave., Monrovia, CA. 91
016
3 REM When INPUTing this Program, DON'T
leave unnecessary SPACES. You may run ov
er the program LINE if you do;
4 REM Then the ATARI will NOT accept the
 line. Pay particular attention to the l
ong lines FROM 60 TO 110.

  Traps input errors, inhibit cursor,
  resets keyboard for input

5 TRAP 10:GRAPHICS 0:POKE 752,1:F=90:G=2
0:H=130:I=30:POKE 764,255:POSITION 6,10:
? "INPUT LEVEL OF DIFFICULTY"
```

```
  Sets difficulty.
10 INPUT R:T=125-(R*5):? "** Press TRIGG
ER to start TRENCH **"
  Checks for trigger to be pressed.
20 IF STRIG(0)=1 THEN 20
  Sets parameters.
30 GRAPHICS 7:POKE 752,1:COLOR 2:D=80:E=
10:X=20:Y=20:? "    MILES TO TARGET="
  Stars.
40 FOR A=1 TO 25:PLOT RND(1)*87+38,RND(1
)*18:NEXT A:GOTO 110
  Player's ship.
50 PLOT X-5,Y:DRAWTO X+5,Y:PLOT X-2,Y+1:
DRAWTO X,Y-2:DRAWTO X+2,Y+1:RETURN
  Upper left laser post.
60 COLOR 2:PLOT 62,32:DRAWTO 62,48:PLOT
47,24:DRAWTO 47,55:PLOT 17,9:DRAWTO 17,7
0:COLOR 4:PLOT 62,32:DRAWTO 62,48
61 SOUND 1,90,8,8:PLOT 47,24:DRAWTO 47,5
5:PLOT 17,9:DRAWTO 17,70:COLOR 3:PLOT 0,
0:D=(D+X)/2:E=(E+Y)/2:DRAWTO D,E
  Did laser hit ship?
62 IF D<X+5 THEN IF D>X-5 THEN IF E>Y-2
THEN IF E<Y+2 THEN 400
  Erase laser.
63 COLOR 4:PLOT 0,0:DRAWTO D,E:SOUND 1,0
,0,0:RETURN
  Upper right laser.
70 COLOR 2:PLOT 96,32:DRAWTO 96,49:PLOT
113,24:DRAWTO 113,55:PLOT 145,9:DRAWTO 1
45,72:COLOR 4:PLOT 96,32:DRAWTO 96,49
71 SOUND 1,60,8,8:PLOT 113,24:DRAWTO 113
,55:PLOT 145,9:DRAWTO 145,72:COLOR 3:PLO
T 159,0:F=(F+X)/2:G=(G+Y)/2:DRAWTO F,G
  Did laser hit? and erase
72 IF (F>X-5 AND F<X+5 AND G>Y-2 AND G<Y
+2) THEN 400
73 COLOR 4:PLOT 159,0:DRAWTO F,G:SOUND 1
,0,0,0:RETURN
  Bottom laser
80 COLOR 3:PLOT 63,49:DRAWTO 96,49:PLOT
43,59:DRAWTO 113,59:PLOT 18,71:DRAWTO 14
3,71:COLOR 4:PLOT 63,49:DRAWTO 96,49
81 SOUND 1,40,8,8:PLOT 43,59:DRAWTO 113,
59:PLOT 18,71:DRAWTO 143,71:COLOR 3:PLOT
 0,79:H=(H+X)/2:I=(I+Y)/2:DRAWTO H,I
  Did laser hit the ship; if not, erase
  laser.
82 PLOT 159,79:DRAWTO H,I:IF (H>X-5 AND
H<X+5 AND I>Y-2 AND I<Y+2) THEN 400
83 COLOR 4:PLOT 0,79:DRAWTO H,I:PLOT 159
,79:DRAWTO H,I:SOUND 1,0,0,0:RETURN
  Trench walls.
110 COLOR 1:PLOT 2,0:DRAWTO 157,79:PLOT
0,0:DRAWTO 159,79:PLOT 157,0:DRAWTO 2,79
:PLOT 159,0:DRAWTO 0,79
120 COLOR 2:PLOT 80,40:PLOT 79,39:PLOT 7
9,40:PLOT 80,39:C=0:SOUND 0,RND(1)*11+4,
8,2
  Joystick positioning
130 JS=STICK(0):IF JS=7 OR JS=6 OR JS=5
THEN X=X+4:IF X>152 THEN GOTO 410
140 B=RND(0)*8:IF JS=11 OR JS=10 OR JS=9
 THEN X=X-4:IF X<5 THEN GOTO 430
150 IF JS=14 OR JS=6 OR JS=10 THEN Y=Y-2
:IF Y<3 THEN ? "  OUT OF TRENCH! MISSION
 ABORTED!!":END
  POKEs position cursor to print out
  miles remaining
160 T=T-0.5:POKE 656,0:POKE 657,22:? INT
(T);" ":IF JS=13 OR JS=9 OR JS=5 THEN Y=
Y+2:IF Y>77 THEN GOTO 430
  GOSUB 50 to erase ship
170 COLOR 3:GOSUB 50:IF B<0.5 THEN GOSUB
 INT(RND(1)*3)*10+50
  If there are less than 20 miles re-
  maining, activate attack computer and
  GOTO 2nd half of program
180 IF T<20 THEN GOTO 600
  If screen needs refreshing, GOSUB
  screen redraw, else GOTO 130
190 COLOR 4:GOSUB 50:C=C+1:IF C=5 THEN C
OTO 110
200 GOTO 130
  Explosion routine; the POKE of 712
  will alter the background colors fas-
  ter than SETCOLOR will.
300 TRAP 310:SOUND 0,99,8,8:SOUND 1,75,8
,8:SOUND 2,60,8,8:SOUND 3,20,8,8
305 FOR L=1 TO 16:POKE 712,15*(RND(1)*17
):NEXT L:RETURN
310 FOR L=8 TO 0 STEP -2:FOR L1=1 TO 8:P
OKE 712,15*(RND(1)*17):NEXT L1
320 SOUND 0,99,8,L:SOUND 1,75,8,L:SOUND
2,60,8,L:SOUND 3,20,8,L:NEXT L:POKE 712,
0
  If explosion was used as a subroutine,
  RETURN.
330 IF Z1=10 THEN RETURN
  Wait for response from keyboard, then
  RUN.
380 ? "PRESS ENTER TO RISK YOUR LIFE AGA
IN":POKE 764,255
390 IF PEEK(764)<>255 THEN RUN
395 GOTO 390
  Graphics for laser post hit.
400 GOSUB 300:? " YOU'VE BEEN HIT BY A L
ASER POST!!"
401 GOSUB 300:FOR U=4 TO 20:SOUND INT(RN
D(1)*4),RND(1)*99,8,8
402 COLOR RND(1)*8:PLOT X,Y:DRAWTO RND(1
)*159,RND(1)*79:PLOT X+U,Y+U:DRAWTO RND(
1)*3+X+U,Y-U-RND(1)*3
403 DRAWTO X-U+RND(1)*3,Y-U-RND(1)*3:DRA
WTO X-U+RND(1)*2,Y+U+RND(1)*3:DRAWTO X+U
+RND(1)*3,Y+U+RND(1)*3
404 POKE 712,U:NEXT U:GOTO 310
  Graphics for hitting the right wall.
410 GOSUB 300:? " HIT THE RIGHT WALL!!":
FOR U=150 TO 90 STEP -1:SOUND INT(RND(1)
*4),RND(1)*U,8,8
415 COLOR RND(1)*8:PLOT X,Y:DRAWTO X-RND
(1)*45,10+RND(1)*65:POKE 712,U:NEXT U:GO
TO 310
  Graphics for hitting bottom of
  TRENCH
420 GOSUB 300:? " RAN INTO THE TRENCH BO
TTOM!!":FOR U=150 TO 90 STEP -1:SOUND IN
T(RND(1)*4),RND(1)*U,8,8
425 COLOR RND(1)*8:PLOT X,Y:POKE 712,U:D
RAWTO RND(1)*159,40+RND(1)*39:NEXT U:GOT
O 310
  Graphics for hitting the left wall.
430 GOSUB 300:? " HIT THE LEFT WALL!!":F
OR U=150 TO 90 STEP -1:SOUND INT(RND(1)*
4),RND(1)*U,8,8
435 COLOR RND(1)*8:PLOT X,Y:POKE 712,U:D
RAWTO X+RND(1)*45,10+RND(1)*65:NEXT U:GO
TO 310
  Attack computer is activated
600 FOR J=1 TO 16:SOUND 2,30,12,4:POKE 8
4,2:POKE 85,1:? "↑ATTACK COMPUTER ENGAGI
NG":SOUND 2,61,12,4:G=1:H=1
609 L=0:TRAP 401:REM REVERSE VIDEO LETTE
RS↓↓↓
610 FOR U=1 TO 13:NEXT U:POKE 84,2:POKE
85,1:? "↑ATTACK COMPUTER ENGAGING":NEXT
J
620 GRAPHICS 7:POKE 712,43:POKE 708,0:PO
KE 710,255:? "  ATTACK COMPUTER ACTIVATE
D!!":POKE 709,105
  Graphics for window view of ship
  coming out of the trench.
890 FOR U=0 TO 79 STEP 4:GRAPHICS 23:COL
OR 2:PLOT 0,U:DRAWTO 70,U/3+30:PLOT 159,
U:DRAWTO 98,U/3+30:PLOT 17,87:DRAWTO 70,
U/3+56
891 COLOR 1:PLOT 72,43-U/3:DRAWTO 96,43-
U/3:PLOT 84,31-U/3:DRAWTO 84,55-U/3:COLO
R 2
895 IF U>46 THEN PLOT 0,U/3+23:DRAWTO 15
9,U/3+23
900 PLOT 142,87:DRAWTO 98,U/3+56:PLOT 70
,U/3+30:DRAWTO 98,U/3+30:DRAWTO 98,U/3+5
6:DRAWTO 70,U/3+56:DRAWTO 70,U/3+30
  Graphics for aft view of death star.
910 NEXT U:GRAPHICS 7:POKE 712,16:PLOT 0
,79:DRAWTO 40,65:DRAWTO 80,50:DRAWTO 119
,65
920 DRAWTO 159,79:PLOT 73,62:DRAWTO 79,6
8:DRAWTO 81,79:PLOT 75,62:DRAWTO 81,68:D
RAWTO 84,79
  Display warning, timing loop. NOTE:
  CTRL-up-arrow is used on both lines.
925 FOR U1=1 TO 10:SOUND 2,61,10,4:POKE
84,2:POKE 85,1:? "↑AFT VIEW  __ __ RANGE
 CRITICAL!!":SOUND 2,123,10,4
927 FOR J1=1 TO 16:NEXT J1:POKE 84,2:POK
E 85,1:? "↑AFT VIEW  __ __ RANGE CRITICA
L!!":POKE 709,15*(RND(1)*17):NEXT U1
  Death Star explodes. POKEs control the
  colors better than SETCOLOR would
  here.
930 FOR U=1 TO 99:POKE 709,15*(RND(1)*17
):NEXT U:GOSUB 300:FOR U=170 TO 90 STEP
-1:SOUND INT(RND(1)*4),RND(1)*U,8,8
940 COLOR RND(1)*8:PLOT RND(1)*159,79:PO
KE 712,U:DRAWTO RND(1)*159,RND(1)*79:NEX
T U:Z1=10:GOSUB 310
  Resets forestound color.
950 POKE 709,15:? "CONGRATULATIONS!! YO
U'VE SAVED THE  UNIVERSE!!!";
  Wait for input from keyboard, then
  RUN
960 ? " PRESS ANY KEY TO PLAY AGAIN.";:P
OKE 764,255
970 IF PEEK(764)<>255 THEN RUN
980 GOTO 970
  Crosshairs.
630 COLOR 1:PLOT 56,60:DRAWTO 105,60:DRA
WTO 105,25:PLOT 0,43:DRAWTO 159,43:PLOT
84,0:DRAWTO 84,79
640 COLOR 2:FOR U=56 TO 98 STEP 7:PLOT U
,56:DRAWTO U,59:NEXT U:FOR U=25 TO 59 ST
EP 6:PLOT 100,U:DRAWTO 104,U:NEXT U
  Joystick sampling and X,Y position-
  ing.
650 SOUND 2,RND(1)*11+4,8,3:G=G+1:H=H+1:
JS=STICK(0):IF JS=7 OR JS=5 OR JS=6 THEN
 X=X-1
660 IF JS=11 OR JS=10 OR JS=9 THEN X=X+1
670 IF JS=13 OR JS=9 OR JS=5 THEN Y=Y+1
675 IF STRIG(0)=0 THEN 900
680 IF JS=14 OR JS=6 OR JS=10 THEN Y=Y-1
  Distance checking and looping.
681 IF L=16 THEN ? " CLOSE ENOUGH TO TAR
GET! FIRE NOW!"
682 IF L>28 THEN ? " TOO LATE!! RAN INTO
 WALL!!":GOSUB 300:GOTO 401
685 L=L+1:GOSUB 690:Z=1:GOSUB 690:GOTO 6
30
  If the target pixel is on top of a
  solid line, make it a reverse color.
690 COLOR 1:LOCATE X,Y,U:IF U>0 THEN COL
OR 4
  Plot center target point and trench wa
  lls.
695 PLOT X,Y:COLOR 3:IF Z THEN COLOR 4:Z
=0
700 PLOT X+G,Y+H:DRAWTO X+G,Y-H:DRAWTO X
-G,Y-H:DRAWTO X-G,Y+H:DRAWTO X+G,Y+H
710 PLOT 0,0:DRAWTO X-G,Y-H:PLOT 159,0:D
RAWTO X+G,Y-H:PLOT 0,79:DRAWTO X-G,Y+H:P
LOT 159,79:DRAWTO X+G,Y+H
720 RETURN
  Shot was fired: check to see if it was
  valid.
800 IF L<15 THEN ? " FIRED TOO SOON!!":G
OTO 680
810 SOUND 1,90,8,8:COLOR 1:PLOT 27,79:DR
AWTO 84,43:DRAWTO 137,79:IF X=84 AND Y=4
3 THEN 850
820 ? " MISSED!! THE UNIVERSE IS DOOMED!
!":GOTO 310
  The POKEs reset the cursor to the same
  spot.
850 ? " THE SHOT IS GOOD!!!":FOR J=1 TO
9:SOUND 1,50,12,4:POKE 84,2:POKE 85,2:?
"↑PULL UP & OUT OF TRENCH!!"
  If the joystick is pulled back, GOTO
  next section.
860 SOUND 1,122,12,4:IF STICK(0)=13 THEN
 SOUND 1,0,0,0:GOTO 890
  Wait loop and warning.
870 FOR U=1 TO 7:NEXT U
880 POKE 84,2:POKE 85,2:? "↑PULL UP & OU
T OF TRENCH!!":NEXT J:L=30:GOTO 682
```

PERSONAL SOFTWARE

VISICALC



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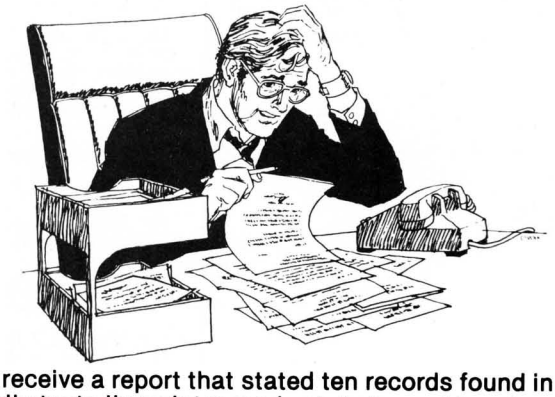

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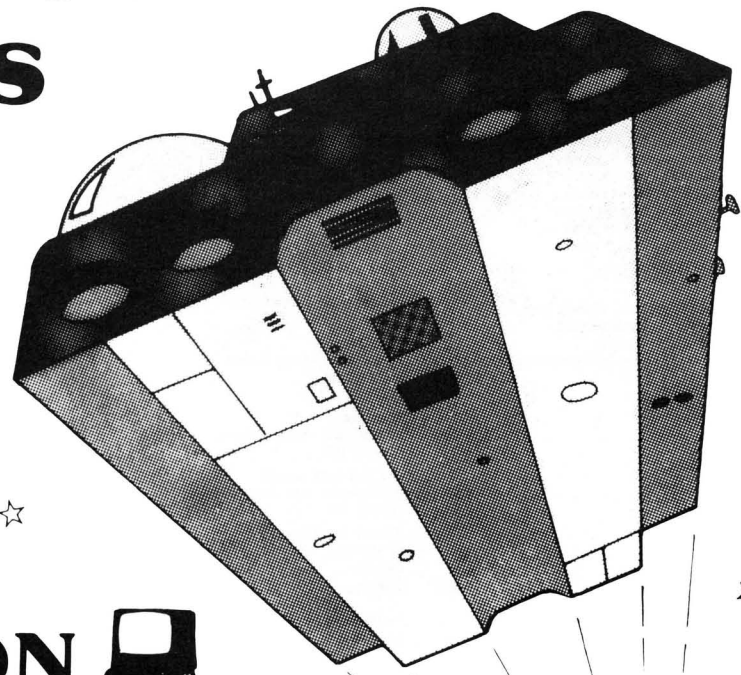

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by Joan Truckenbrod

ROTATION TECHNIQUES Part I

Figure rotation is one of the basic methods used in computer graphics for transforming shapes and forms. There are many applications for rotated figures in creating visual compositions and animated sequences. A toy top is a good example of an object rotating in place as it spins around on the center post. A car making a U-turn is rotating around a point. The reflector on a bicycle wheel rotates around the hub of the wheel as the bike is pedalled. These examples are representative of one type of rotation, in which the objects are revolving around a point, that is, an axis perpendicular to a flat plane. Figures or objects can also rotate in other directions. A boat on the ocean, for instance, can rotate around three different axes, one axis is running through the center of the boat lengthwise, one axis through the center of the boat crosswise, and a third running through the center of the boat perpendicular to the horizontal deck. A boat can rise and fall in the water sideways, backwards and forwards, as well as revolving around in a circle on top of the water. This article will discuss the first type of rotation in which a figure is rotated around an axis that is perpendicular to the drawing plane. The next article will discuss two additional types of rotation, in which the axes are flush with the drawing plane and the figures can be rotated in three-dimensional space in various directions.

In the first type of rotation, the video screen will be the drawing plane and the axis of rotation will be perpendicular to this screen. Rotation of a figure around this axis changes the orientation and possibly the position of the figure, but not the shape of the figure. To visualize this change in the orientation of rotated figures, write your name on a piece of paper, lay the paper flat on the table, and then turn the paper around. As you turn the paper around, the appearance and legibility of your name changes.

The basic element of the rotational process is the axis of rotation. The rotated figure revolves around a point on the screen that represents this axis. This point is analogous to the hub of a wheel or the center of a pinwheel. In using the microprocessor, the center point is the intersection point of the perpendicular axis of rotation and the video screen. Figures on this screen are defined by X and Y coordinates. The rotation formula is applied to all of the points defining a figure, and the rotated figure is drawn on the screen. With the use of FOR/NEXT loops any number of sequentially rotated figures can be created and drawn. The rotation formula rotates all figures in a counter-clockwise manner, around a specified center, beginning with the position of the figure on the screen. The basic formula for this type of rotation is as follows:

X and Y arrays contain the coordinates defining the figure or shape

A = the angle of rotation.

R = A/57.2958 (translation of angles into radians).

XC = the X coordinate of the desired center point.

YC = the Y coordinate of the desired center point.

Rotated X =(X(I)-XC*COS (R)+(Y(I)-YC)*SIN(R)+XC

Rotated Y =(Y(I)-YC)* COS(R)-(X(I)—XC * SIN(R) + YC

There are various ways to apply this formula to achieve different visual effects. Figures can be rotated in place, or they can be rotated and redrawn in a circular path on the screen.

SUPERIMPOSED ROTATION

Rotation of a figure in place is like a ballerina twirling around on her toe. This type of rotation consists of identifying the center location of the given figure and rotating the figure on that point. The axis of rotation is positioned in the middle of the figure and the figure is spun around that axis like a pointer on a game dial. The figure or shape is coded in X and Y coordinates in the desired location on the screen. The center point of the figure is calculated by a routine listed in the sample program in subroutine 3000, and the X and Y values of this point are assigned to XC and YC. The angle of rotation is established by the value assigned to A in the FOR/NEXT loop in line 95 of the sample program. The number of rotated figures is controlled by the limit set in this loop in coordination with the step value. This program line will cause the figure to be drawn five times, incrementing the angle of rotation by ten degrees each time.

FOR A = 0 to 40 STEP 10

The rotated figures can be sequentially drawn on top of one another as illustrated in figure 1, or the screen can be erased prior to the drawing of each new figure.

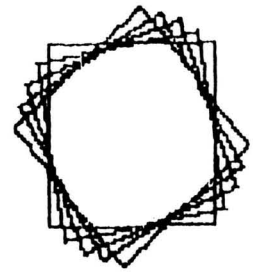

Figure 1

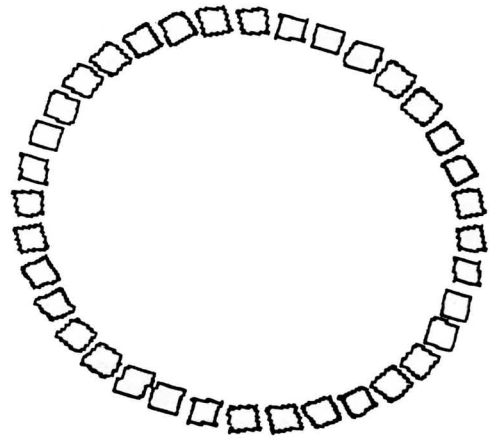

Figure 2

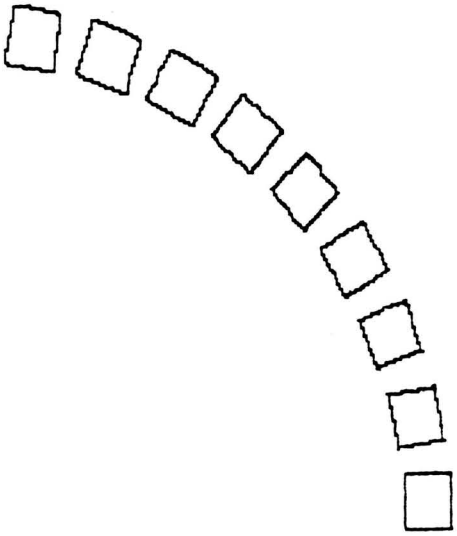

Figure 3

ROTATION AROUND A NEW CENTER

A figure or shape can also be rotated around any point inside or outside the figure, within the limits of the screen or beyond these limits. Rotation around an external point creates a circular path or arc of figures on the screen. This circular path will begin at the original location of the figure. If the external point is within the central area of the screen, a circle will be constructed by the rotating figures. An example of this is shown in figure 2. If the point is outside of the limits of the screen or on the perimeter of the screen, an arc will be constructed as illustrated in figure 3. Otherwise, in specifying the location of a point of rotation, carefully coordinate the location of the center with the original location of the figure to avoid exceeding the limits of the screen as the figure is rotated and redrawn.

SAMPLE ROTATION PROGRAM

```
 LIST
5  REM  PROGRAM BY J. TRUCKENBROD

20  REM  THIS PROGRAM FACILITATES
      ROTATION OF A FIGURE ON THE
      SCREEN IN THREE WAYS.
25 FLAG = 0
27  REM  NP REPRESENTS THE NUMBER
      OF POINTS IN THE FIGURE TO
      BE ROTATED
30 NP = 5
40  DIM X(NP),Y(NP)
50  FOR I = 1 TO NP
60  READ X(I),Y(I)
70  NEXT I
75  REM  THE DATA STATEMENTS CONT
      AINS THE COORIDINATES THAT D
      EFINE THE SHAPE OR FIGURE.
      THESE COORDINATES MUST BE CA
      REFULLY PLANNED TO CORRESPON
      D TO THE TYPE OF ROTATION DE
      SIRED.
77  REM  FIGURE IS CODED IN DESIR
      ED LOCATION FOR ROTATING A F
      IGURE IN PLACE OR FOR THE BE
      GINNING OF A CURVED PATH.
80  DATA  135,170,145,170,145,180
      ,135,180,135,170
85  HOME : PRINT
86  PRINT "WHICH TYPE OF ROTATION
       WOULD YOU LIKE TO SEE?"
87  PRINT : PRINT "1. ROTATE IN P
      LACE"
88  PRINT : PRINT "2. CHOOSE A NE
      W CENTER FOR ROTATION"
89  PRINT : PRINT "3. ROTATE AROU
      ND THE ORIGIN (0,0)"
90  PRINT : INPUT C
92  ON C GOSUB 3000,3100,3200
94  HGR2 : HCOLOR= 7
95  FOR A = 0 TO 350 STEP 10
100 R = A / 57.2958
150  GOSUB 1000
190  NEXT A
200  END
1000  REM  DRAWING SUBROUTINE
1005 I = 1
1010  GOSUB 2000
1015  IF FLAG = 0 THEN  GOTO 1020
1017  HGR2
1020  HPLOT NX,NY
1030  FOR I = 2 TO NP: GOSUB 2000
1040  HPLOT  TO NX,NY
1050  NEXT I
1060  RETURN
2000  REM  ROTATION SUBROUTINE
2010 NX = (X(I) - XC) * COS (R) +
     (Y(I) - YC) * SIN (R) + XC
2020 NY = (Y(I) - YC) * COS (R) -
     (X(I) - XC) * SIN (R) + YC
2035  IF NX > 279 GOTO 200
2036  IF NY > 191 GOTO 100
2037  IF NX < 0 GOTO 200
2038  IF NY < 0 GOTO 200
2040  RETURN
3000  REM  SUBROUTINE TO CALCULAT
      E THE CENTER POINT OF THE FI
      GURE, XC AND YC
3005  REM  FIGURE IS ROTATED IN P
      LACE
3010 XS = 280:YS = 192:XL = 0:YL =
      0
3020  FOR J = 1 TO NP
3030  IF X(J) < XS THEN XS = X(J)
3040  IF X(J) > XL THEN XL = X(J)
3050  IF Y(J) < YS THEN YS = Y(J)
3060  IF Y(J) > YL THEN YL = Y(J)
3070  NEXT J
3080 XC = (XS + XL) / 2:YC = (YS +
     YL) / 2
3085 FLAG = 1
3090  RETURN
3100  REM  SUBROUTINE TO IDENTIFY
       NEW CENTER FOR ROTATION OF
      FIGURE.  FIGURE IS ROTATED A
      ROUND THIS NEWLY ESTALISHED
      CENTER.
3110  INPUT "TYPE IN THE X AND Y
      COORDINATES OF THE POINT YOU
       WANT THE FIGURE ROTATED ARO
      UND.";XC,YC
3120  RETURN
3200  REM  FIGHURE IS ROTATED ARO
      UND ORIGIN OF THE GIVEN COOR
      DINATE SYSTEM IN THE UPPER L
      EFT-HAND CORNER OF THE SCREE
      N.
3210 XC = 0:YC = 0: RETURN
```

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LOWER to UPPER CONVERSION

LOWER TO UPPER CONVERSIONS is for S-80 disk systems.

by Robert F. Nicholas

Ever since I had a lower case modification added to my computer, I've been writing just about everything in upper and lower case. It makes programs much easier to read while debugging. Text stands out clearly from the rest of the BASIC commands.

However, it seems that most software publishers and magazine editors prefer line listings to be in the normal all-upper case mode. This is reasonable since that's what most computer hobbyists have at the present time. (Obviously if the lower case capability is necessary to the proper functioning of the program for some reason, then that would be acceptable.)

As a result, before I submit anything for consideration, I have to convert all of the lower case back to upper case. One way would be to do it by hand. Rather ridiculous considering that the computer can do it quite nicely.

The following program does just that. Save a copy of your program to be converted in ASCII format. For example, if your program is named"TREK79, "then save another version by typing SAVE"TREK79/ASC,"A. Be sure you end up with your original program and a second version of it in ASCII.

Now run the conversion program and answer the questions when prompted. It will load your ASCII version in line-by-line, scan for any lower case, convert them to upper, indicate how many it's found so far and then save the program to disk again in the process. When it's all done, it will load the converted program in for you to review and resave to disk in non-ASCII format, if you desire.

(Note: At SoftSide we run our listings directly from working copies of programs, and we do have lower case capabilities -Ed.)

```
10 REM          LOWER TO UPPER CONVERSION
20 REM             ROBERT F. NICHOLAS
30 REM                 07/07/80
40 CLS:CLEAR2000
50 PRINT"     THIS PROGRAM TAKES A BASIC PROGRAM SAVED IN ASCII
FORMAT
60 PRINT"WHICH HAS SOME LOWER CASE LETTERS IN IT AND CONVERTS AL
L OF THE
70 PRINT"LOWER CASE TO UPPER CASE."
80 PRINT"     THE RESULTING PROGRAM WILL ALSO BE IN ASCII FORMAT
."
90 PRINT"SIMPLY LOAD IT INTO YOUR COMPUTER AND SAVE IT BACK AGAI
N AS A
100 PRINT"NORMAL BASIC PROGRAM."
110 PRINT:INPUT"ENTER THE PROGRAM TO BE CONVERTED";F1$
120 PRINT:INPUT"WHAT SHALL I CALL THE RESULTING PROGRAM.";F2$
130 CLS:X=0:PRINT@448,"NUMBER OF CONVERSIONS MADE:";:PRINT@480,X
;
140 OPEN"I",1,F1$
150 OPEN"O",2,F2$
160 LINEINPUT#1,Z2$
170 FORZ2=1TOLEN(Z2$):Z3=ASC(MID$(Z2$,Z2,1)):IFZ3>96ANDZ3<123THE
NMID$(Z2$,Z2,1)=CHR$(Z3-32):X=X+1:PRINT@480,X;
180 NEXT
190 PRINT#2,Z2$
200 IFEOF(1)THENCLOSE:GOTO210ELSE160
210 CLS:PRINTF2$" HAS BEEN SAVED IN ASCII."
220 PRINT:PRINT"I AM NOW LOADING IT IN."
230 PRINT"LOOK IT OVER AND THEN SAVE IT TO DISK IN NON-ASCII FOR
MAT
240 PRINT"IF YOU WISH.
250 LOADF2$
```


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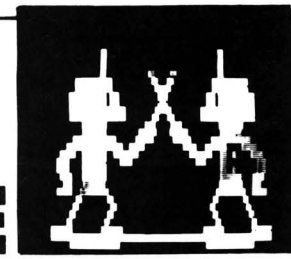

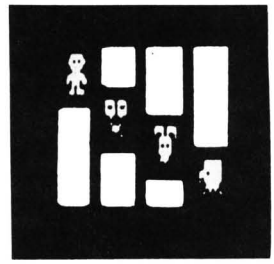

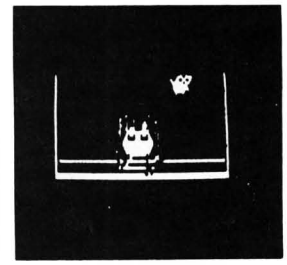

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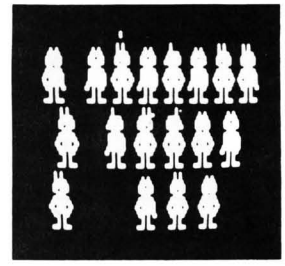

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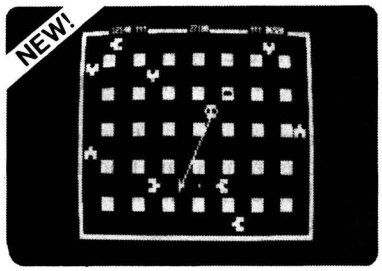

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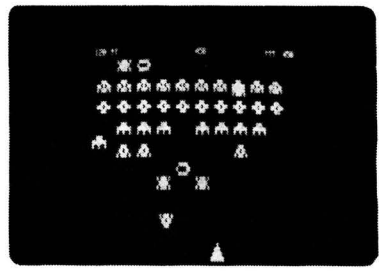

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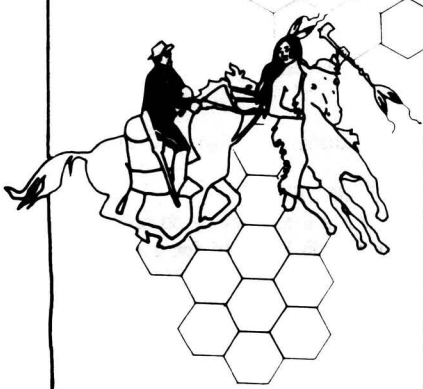

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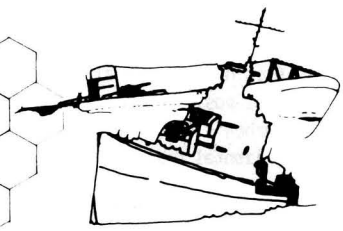

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Barney doesn't bounce as "normal" people do, because "normal" people tend to stay on the trampoline. Barney likes to bounce all over the gymnasium. He can bounce off the walls and ceiling with no problem, but he doesn't seem to realize that bouncing off the floor is harmful. While under the employment of the management, you have been given the awesome responsibility of keeping the trampoline under Barney. There are ten skill levels, numbered zero to nine, depending on how exuberant you want Barney to be. Be warned! Level zero is so easy you might be tempted to go right to level nine. Don't do it! Level nine is for people who like seeing their futile efforts result in messy consequences. Stick to the lower levels until you have developed your proficiency somewhat, for Barney's sake.

S-80 Version

Instructions

```
0 REM: BOING! - BY RON WEBSTER - RFD 1 BOX 489 - CANAAN, CT.
1 CLS:PRINT@17,"x x x B O I N G ! x x x":PRINT
2 PRINT"DON'T LET BOUNCING BARNEY DOWN! BARNEY LIKES BOUNCING,"
3 PRINT"BUT HE HAS TROUBLE STAYING ON HIS TRAMPOLINE. USE THE"
4 PRINT"LEFT & RIGHT ARROW KEYS TO KEEP IT UNDERNEATH HIM. IF"
5 PRINT"HE HITS THE LEFT SIDE OF THE TRAMPOLINE HE BOUNCES TO"
6 PRINT"THE RIGHT. IF HE HITS THE RIGHT SIDE OF THE TRAMPOLINE"
7 PRINT"HE BOUNCES TO THE LEFT. THIS AFFECTS BARNEYS BOUNCING"
8 PRINT"MORE AND MORE AS THE SKILL LEVEL INCREASES, AND MAKES"
9 PRINT"IT HARDER TO KEEP HIM IN THE AIR. <BREAK> RESETS THE"
10 PRINT"GAME. SEE HOW LONG YOU CAN KEEP BARNEY BOUNCING."
11 PRINT:PRINT"GOOD LUCK!! (BARNEY NEEDS IT!)"
```

Strobe the keyboard until user hits a number from zero to nine. This number is the skill level. A$ contains the number in string form.

```
12 PRINT@917,"SKILL LEVEL? (0-9)";:CLEAR70:RANDOM:A$=INKEY$
13 A$=INKEY$:IFA$=""THEN13ELSEIFASC(A$)<48ORASC(A$)>57THEN13
```

H = (skill level + 2) / 4, a number from 0.5 to 2.75 which will be used to determine how much Barney Bounces to the left or right. B$ is the trampoline. It has two blanks on either side so that when it moves (in two space increments), it wont leave part of itself behind in the previous position, which otherwise would not be cleared. PRINT@2,STRING$(59,131) prints the ceiling of the gymnasium. Line 16 prints the walls of the gymnasium by POKEing into video memory the value of a full graphics block (191) at the proper locations.

```
14 H=(VAL(A$)+2)/4:CLS:FORX=1TO4:B$=B$+CHR$(131):NEXT
15 B$=" "+CHR$(135)+B$+CHR$(139)+" ":PRINT@2,STRING$(59,131)
16 FORX=15361TO16263STEP64:POKEX,191:POKEX+59,191:NEXT
```

Barney is represented on the screen as a single graphics block. A is his horizontal position (from 4 to 119) and B is his vertical position (from 1 to 44). To give the illusion of motion, Barney's image is updated many times each second. C is the horizontal distance he moves for each update. This value does not change until Barney hits the trampoline or either wall. If Barney has just hit the trampoline, the new value of C will depend on which part of the trampoline he hit. If Barney hit a wall, then C is changed to -C. For positive, negative, or zero values of C, Barney moves left, right or straight up and down respectively. To prevent straight up and down motion from happening on many consecutive bounces (thus allowing the player to keep scoring until there is a blackout or a dinner bell), C is randomized enough to make it almost impossible to send Barney straight up more than once.

D is the vertical distance Barney moves on each update. This number is decreased by 0.4 because Barney follows a parabolic curve rather than a straight line. If Barney hits the ceiling D is set to the negative absolute value of D. Why not simply -D? There is a rare case, which happened to me once, in which D turns out to be positive and Barney walks from wall to wall on the ceiling, never coming down. When Barney hits the trampoline, D is set to E (see below). If D is positive, Barney is ascending. If D is negative, Barney is descending. If D is zero, Barney has reached the top of his bounce. E is the new D value at the beginning of each bounce. At every bounce E is increased by a random amount between 0.0 and 0.5. If Barney hits the ceiling E is decreased by a number between 0.6 and 1.6 so that he won't hit it again on his next bounce. The larger E is, the higher Barney's next bounce will be. P is the PRINT@ position of the trampoline (from 960 to 1012).

```
17 E=1.5:P=986:A=62:B=43:D=1.5:C=RND(2)*4-(3*4/2):PRINT@P,B$;
```

Barney walks out to the trampoline, climbs up and walks into the center.

```
18 FORX=1TO55STEP.5:RESET(X-1,46):SET(X,46)
19 NEXT:FORX=46TO44STEP-.1:RESET(55,X+1)
20 SET(55,X):NEXT:FORX=56TO61STEP.5
21 RESET(X-1,44):SET(X,44):NEXT:RESET(61,44)
```

14400 is an address used by the keyboard scan routine in BASIC. It contains 32 if the left arrow is pressed and 64 if the right arrow is pressed. Add or subtract from P (trampoline's position) depending on which (if any) arrow is being pressed.

```
22 IFPEEK(14400)=32ANDP>960P=P-2
23 IFPEEK(14400)=64ANDP<1012THENP=P+2
```

If Barney is exactly on a level with the trampoline, print BOING! where the trampoline would usually be. Otherwise, print the trampoline.

```
24 IFB=44THENPRINT@P," BOING! ";ELSEPRINT@P,B$;
```

Erase Barney and update his X and Y positions as well as the vertical step, D.

```
25 RESET(A,B):A=A-C:B=B-D:D=D-.4
```

If Barney hits either wall then change the sign of C so that he bounces off it.

```
26 IFA<4THENA=4:C=-CELSEIFA>119THENA=119:C=-C
```

If Barney hits the ceiling, change D so that he bounces off it, and change E so that he won't do it again for a while. If Barney is at a level with or below the trampoline, reset D to E.

```
27 IFB<1THENB=1:D=-ABS(D):E=E-RND(0)-.6ELSEIFB>=44THENB=44:D=E
```

If Barney missed the trampoline, print S P L A T ! ! and number of bounces. CO is incremented after each sucsessful

bounce. Then go back to line 12 (skill level question).

```
28 IFB=44ANDPOINT(A,45)=0SET(A,46):PRINT@600,"S P L A T ! !";
29 IFB=44ANDPOINT(A,45)=0PRINT@664,CO"BOUNCE";:IFCO<>1PRINT"S";
30 IFB=44ANDPOINT(A,45)=0RUN12
```

If Barney hit trampoline, increment CO, get a new value for C, and update E.

```
31 IFB=44THENCO=CO+1:C=(A/2+955-P+RND(0)/2-.25)*H:E=E+RND(0)/2
```

Display Barney and start the whole thing all over again.

```
32 SET(A,B):GOTO22
```

Atari Version

Create picture of trampoline in B$ and print instructions.

```
0 REM BOING! BY RON WEBSTER
ATARI TRANSLATION BY JAMES GARON
5 DIM B$(10):FOR I=1 TO 10:READ X:B$(I)=
CHR$(X):NEXT I

10 GRAPHICS 0:POKE 82,5:POSITION 9,1

15 ? "* * * B O I N G ! * * *":?

20 ? "Don't let Bouncing Barney down!"

25 ? "Barney likes bouncing, but he"

30 ? "has trouble staying on his"

35 ? "trampoline. Use the joystick"

40 ? "to keep it underneath him. If"

45 ? "he hits the left side of the"

50 ? "trampoline he bounces to the"

55 ? "right. If he hits the right"

60 ? "side of the trampoline, he"

65 ? "bounces to the left. This af-"

70 ? "fects Barney's bouncing more"

75 ? "and more as the skill level"

80 ? "increases, and makes it harder"

85 ? "to keep him in the air. See"

90 ? "how long you can keep Barney"

95 ? "bouncing.":? :? "Good luck !! ";

100 ? "(Barney needs it!)"
```

Open keyboard for input.

```
110 OPEN #1,4,0,"K"
```

Ask for skill level and wait until player presses a number from one to nine.

```
120 ? "     Skill level (0-9)?";
125 GET #1,Q:Q=Q-48
130 IF Q<0 OR Q>9 THEN 125
```

Calculate difficulty level, H, go to GRAPHICS 5, and turn off cursor.

```
140 H=(Q+2)/4:GRAPHICS 5:POKE 752,1
```

Select colors for the gymnasium and draw it.

```
145 SETCOLOR 4,10,2:SETCOLOR 2,4,2
150 SETCOLOR 0,4,2:SETCOLOR 1,8,12
155 COLOR 1:FOR I=0 TO 5:PLOT I,39:DRAWT
O I,0:NEXT I
160 DRAWTO 74,0:FOR I=74 TO 79:PLOT I,0:
DRAWTO I,39:NEXT I
```

A, B, C, D, and E are used in the same manner as in line 17 of the S-80 version of "BOING!" P is POKEd into location 657 to position the trampoline at the top of the text window. COUNT is the number of bounces. (The first bounce is free!)

```
170 E=1.5:P=16:A=39:B=A:D=E:COUNT=1:U=14

172 C=INT(RND(0)*2+1)*H-3/2*H

175 POKE 656,0:POKE 657,P:? B$;
```

Barney walks out to the trampoline, climbs up and walks into the center.

```
180 FOR X=0 TO 16:FOR I=15 TO 32 STEP 17
:POKE 656,0:POKE 657,X:? CHR$(I);

185 FOR J=1 TO 10:NEXT J:NEXT I:NEXT X

190 POKE 657,16:? CHR$(11);:FOR I=1 TO 5
0:NEXT I:POKE 657,16:? " ";:FOR X=34 TO
39

200 COLOR 2:PLOT X,B:FOR I=1 TO 10:NEXT
I:COLOR 0:PLOT X,B:FOR I=1 TO 50:NEXT I:
NEXT X:COLOR 2:PLOT A,B
```

If player presses stick to the left (including diagonally), subtract one from P (Trampoline's position) unless it is against the left wall of the gymnasium. Line 230 performs similarly if the stick is pressed to the right.

```
220 S=STICK(0)

225 IF S>8 AND S<12 AND P>2 THEN P=P-1

230 IF S>4 AND S<8 AND P<30 THEN P=P+1
```

Make "BOING!" sound by increasing pitch and decreasing volume of sound.

```
235 SOUND 0,150+2*B,10,U:U=U-2:IF U<0 TH
EN U=0
```

Position the text window cursor to print the trampoline.

```
240 POKE 656,0:POKE 657,P
```

Print the trampoline or the word "Boing!" if Barney has just bounced on it.

```
242 IF B>38.5 THEN ? " Boing!";:GOTO 250

245 ? B$;
```

Erase Barney and update his position as well as the vertical step, D.

```
250 COLOR 0:PLOT INT(A),INT(B):A=A-C:B=B
-D

255 D=D-0.4
```

If Barney hits either wall, change C so that he bounces off it. Make sound at line 400.

```
260 IF A<6 THEN A=6:C=-C:GOSUB 400

265 IF A>73 THEN A=73:C=-C:GOSUB 400
```

If Barney hit the ceiling, change D so that he bounces off it, and E so that he won't do it again on his next bounce. Reset D to E if Barney hit trampoline. Set volume of bounce sound to maximum and calculate position of left edge of trampoline (LEFT).

```
270 IF B<1 THEN B=1:D=-ABS(D):E=E-RND(0)
-1:GOSUB 400

275 IF B<38.5 THEN 320

280 B=39:D=E:U=14:LEFT=P+P
```

If Barney landed on the trampoline, bounce to line 310.

```
285 IF INT(A)>LEFT AND INT(A)<LEFT+14 TH
EN 310
```

Barney missed. Print "S P L A T ! !" and number of successful bounces.

```
290 ? :? "S P L A T ! !",COUNT;" Bounce"
;:IF COUNT>1 THEN ? "s"
```

Show where Barney landed and make an appropriate sound.

```
295 COLOR 2:PLOT INT(A),INT(B):FOR U=14
TO 0 STEP -0.1:SOUND 0,253,12,U:NEXT U:I
F COUNT=1 THEN ?
```

Display previous skill level and bounce to beginning of game.

```
300 ? "     Skill level was ";Q:GOTO 120
```

Barney landed on the trampoline. Add one to the number of bounces, increase the height to which he will bounce, E, and calculate his new horizontal momentum, C.

```
310 IF B>38.5 THEN COUNT=COUNT+1:E=E+RND
(0)/2:C=(A-8-LEFT+RND(0))*H/4
```

Draw Barney and bounce back to line 220 to see if player is trying to move the trampoline.

```
320 COLOR 2:PLOT INT(A),INT(B):GOTO 220
```

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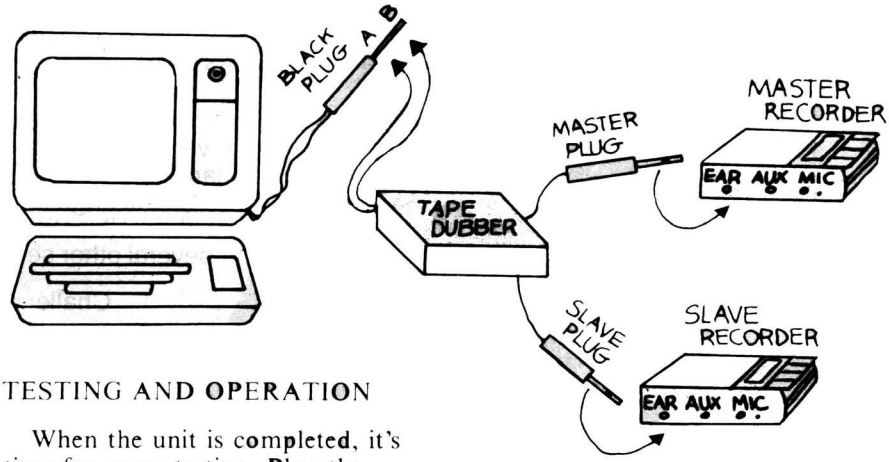
POCKET TAPE DUBBER

by Edward Ting

Almost everyone has experienced tape loading troubles with their computers, but the TRS-80 is notoriously bad. Dropped bits and misread data are all too common problems.

To solve these problems, *products are now* on the market which not only enhance loading, but allow you to dub tapes. Unfortunately, these devices cost upwards of $50, which is quite steep. So most of us suffer.

The Pocket Tape Dubber is a simple device that performs the same functions as commercially-available units. It even dubs tapes for you! The main difference is that the Pocket Tape Dubber will save you loads of money. It can be built for under $5. If you're an electronics hobbyist, run to your parts box! The components used in construction are among the most common. If you need help with parts, here is a list.



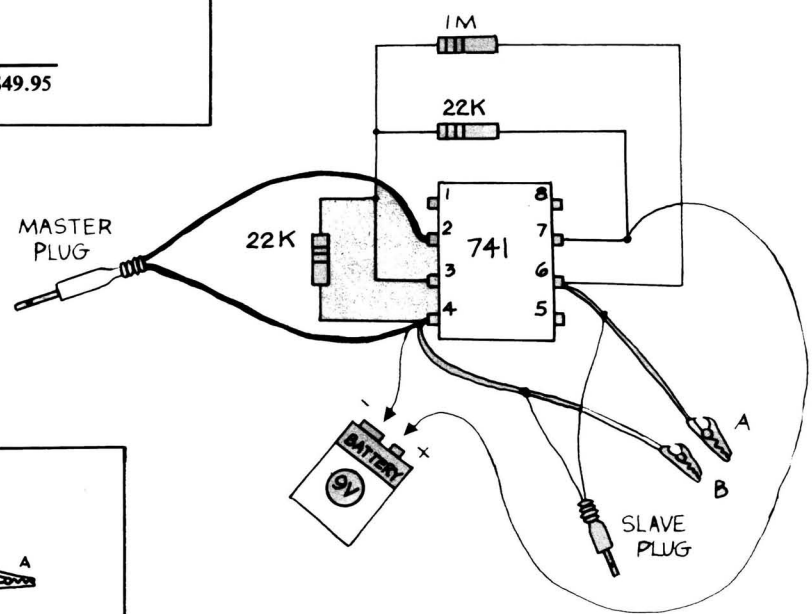
TESTING AND OPERATION

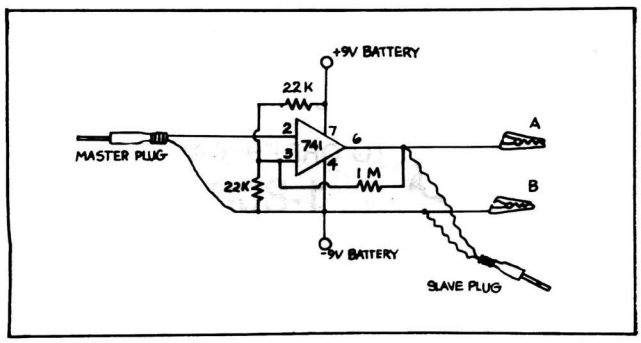
When the unit is completed, it's time for some testing. Plug the 'Master' plug into the ear jack of your master recorder (the one you normally use). Connect the two alligator clips to the black plug from the computer. Be sure that clip B connects to the tip terminal and clip A connects to the body terminal. Also be sure these two clips are not touching. With the power on, load tapes as usual. Note: The two gray plugs from the computer connect normally.

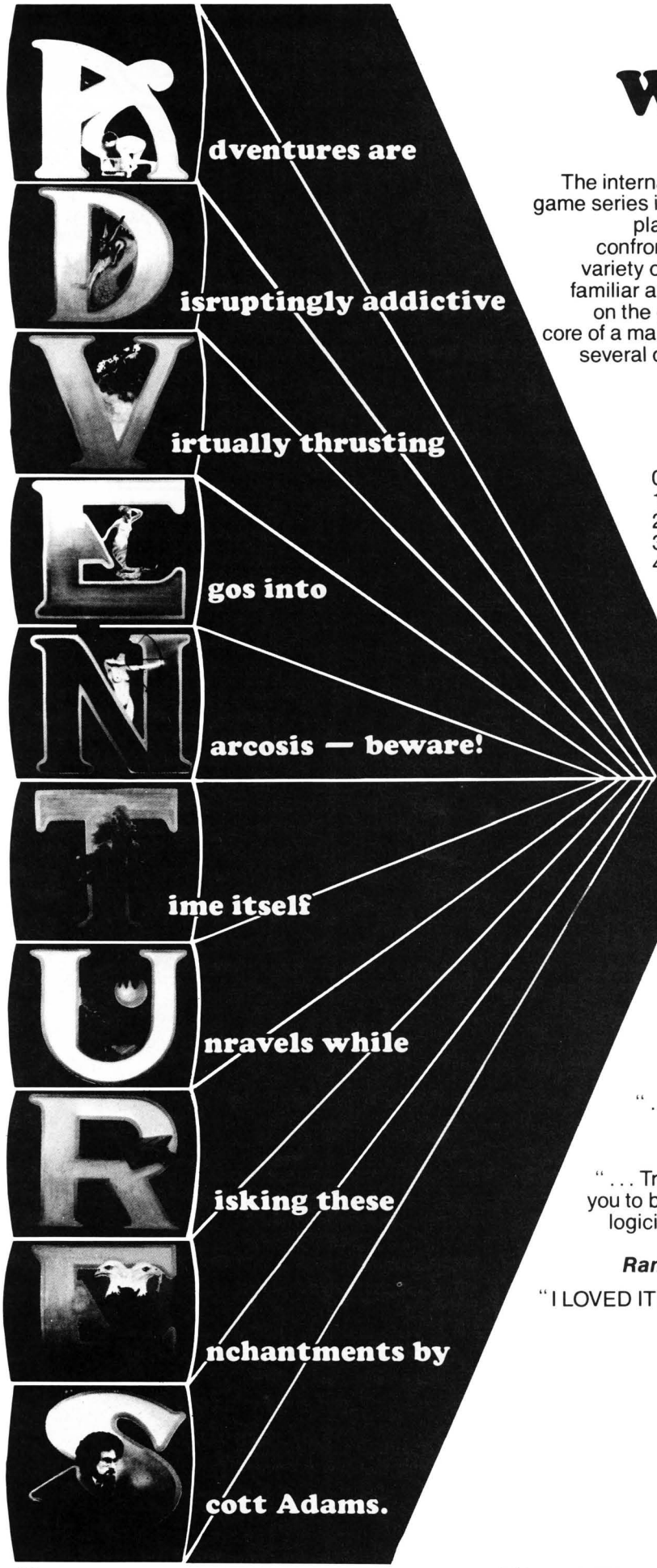
If you wish to copy the tape being played, place a blank tape in the slave recorder. Plug the 'Slave' plug into the AUX. jack. Press "record" and "play." Load the tape from the master recorder as usual. The tape will be copied onto the slave recorder's tape. Remember that the computer will not stop the slave recorder, so you will have to do this manually. Note: This process is intended only for making back-up copies for your own use. Please don't abuse this function.

1)	741 op-amp IC (RS cat# 276-007)	.69	1) Commercially
2)	22K Resistors (RS# 271-038)	.19	available unit
3)	1 Meg resistor (RS# 271-059)	.19	
4)	1/8" phone plugs (S# 274-286)	1.29	
5)	10 alligator clips (you'll only use 2) RS# 270-373	.99	
		$3.35	$49.95

If you've never used an IC before, please don't get scared. Just think of it as a transistor with a lot of legs. Any type of construction may be used, including PC board, Perf-board, or even cardboard.







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COPYCAT+

by A. Douglas Werbeck

COPYCAT+ is a S-80 program requiring 4K of RAM.

The May issue of **SoftSide-80** carried my little program called LIVEKEYS on page 12.

During the past two months I have received several letters from subscribers with favorable comments (thank goodness) concerning my program. I had even forgotten the line listing included my address; it was very flattering to receive the response.

All of the letters contained suggestions. Some of them requested me to write an additional "line or two" of program that they could insert in order to add various features, the most popular one being a cursor.

Adding the features was going to be easy enough; however, **SoftSide** had bestowed upon my program the title of "World's Smallest Word Processor." That meant I had to watch length and not challenge SCRIPSIT! It seemed to me that the world's smallest anything needs to be able to fit on the video without annoying scrolling, so that was the goal I set for the revised program. The changes got so extensive I decided to rename the program COPYCAT+.

Instructions for COPYCAT+

1. Type the first line of your text on the keyboard. Do not type more characters than your printer is set to print on one line of paper.

For instance, if your printer is set to print 64 characters per line on paper, you could type up to one video line (also 64 characters). If your printer was set to print 100 characters per line on paper, then you could type up to a line and a half on the video screen (64=32 + 96).

2. You can correct a typing error if you DO NOT type past it. After you have typed an incorrect character, immediately type #. That will make the error disappear. You can now proceed to type in the correct character and continue. You cannot use the # in normal operation; it is a reserved character.

3. Whenever you wish to transfer your video line to the printer, just press ENTER. A bar will appear at the end of the dumped line on video to indicate that it has been dumped so you do not need to constantly glance at the printed copy to see where you are.

4. END

```
10 REM                xxx C O P Y C A T xxx
15 REM:
20 REM         COPYRIGHT BY A. DOUGLAS WERBECK 1980
25 REM              POB 787 RUSKIN FL 33570
30 :
35 CLS:PRINT@N,CHR$(93)
40 A$=INKEY$:IFA$=""THEN40
45 IFA$="#"THENB$="":A$="":N=N-1:PRINT@N,CHR$(128);:GOTO60
50 IFASC(A$)=13THENLPRINTB$:PRINT@N-1,A$:B$="":GOTO90
55 PRINT@N+1,CHR$(128);:N=N+1:PRINT@N+1,CHR$(93);
60 LPRINTB$;:PRINT@N-1,A$;
65 B$=INKEY$:IFB$=""THEN65
70 IFB$="#"THENA$="":B$="":N=N-1:PRINT@N,CHR$(128);:GOTO40
75 IFASC(B$)=13THENLPRINTA$:PRINT@N-1,B$:A$="":GOTO90
80 PRINT@N+1,CHR$(128);:N=N+1:PRINT@N+1,CHR$(93)
85 LPRINTA$;:PRINT@N-1,B$;:GOTO40
90 PRINT@N+1,CHR$(138);:A=A+64:IFA>448THENA=0
95 N=A*2:PRINT@N+1,CHR$(93);:GOTO40
```


X-WING II

by Chris Freund

RAINWARE

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Pennington tells you most of what you need to know about TRS-80 disk drives; how disks are organized, how space is allocated, how files are located on disks, and the tools that one may use to look at disk files and directories. The book both provides a geneneral understanding of how disk systems operate, and discusses and explains how to fix disk problems such as lost files, Electric Pencil bugs and other seemingly impossible tangles.

On top of that, Pennington's drawings and his language are engaging and quite amusing. If you can beat knowledge and fun in one package, then seek elsewhere. If not, then **TRS-80 Disk and Other Mysteries** might be for you.

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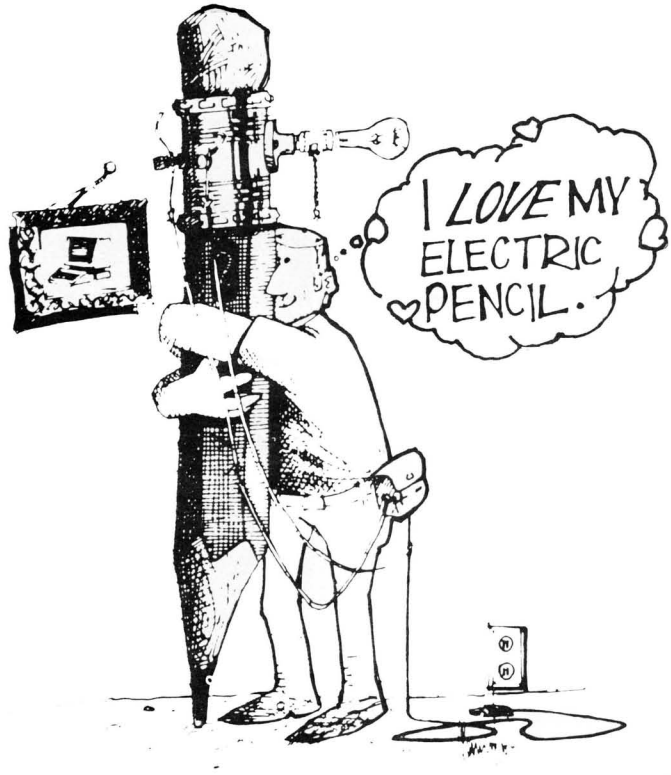

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To aid in learning APL, lessons are included on the disk. Starting from the basics, you are brought step by step through the various programming techniques involved with APL. These lessons act as a tutor in a "learning by doing" atmosphere which will have you "talking APL" in no time. Also available is the book, **APL: An Interactive Approach,** which reinforces many of the examples given in the lessons. The book also provides additional insight into APL programming.

LIMITATIONS

Due to the absence of the special APL character set on the TRS—80, APL-80 uses shifted letters to represent the various APL characters. These shifted letters are identified on the screen by a graphics block before each shifted letter. If you have a modified TRS-80 , a lower case driver is included to display the shifted letters on the screen.

In addition to the keyboard limitations, there are several other limitations. Lamination, domino, and matrix inverse are not implemented but can be derived with user-defined functions.

Multiple specifications must be split into two statements unless the left-hand assignment is to a quad. This also applies to implied multiple specifications.

Reduction and reshape (p) are not permitted for empty arguments; the argument of add/drop may not be scalar; empty indices are not permitted.

A quad (q) can't be typed in response to a quad (nor can the name of a function which itself gets input from a quad). Quote-quad (m) is permitted.

No more than 32 user functions can be defined in a single workspace and a function may not contain more than 255 lines.

A comment (c) must occupy a separate line: a comment can't follow a function statement on the same line.

In the tape version, arrays are limited to five (5) dimensions.

FEATURES

APL-80 on disk contains the following features:)SAVE and)LOAD workspace on disk;)COPY other workspaces into current ones; Return to DOS for directory or commands without losing your workspace; Send output to lineprinter; Five workspaces of lessons included; Sequential and random files; 15 digit precision; Monadic and dyadic transposition; Easy editing within FUNCTION lines; Latent expression (FUNCTION can "come up running" when loaded); Tracing of function execution; Real-time clock; User-control of random link; Workspace is 25587 bytes (in 48K machine); Arrays may have up to 63 dimensions.

COMMANDS APL-80

APL-80 supports the following commands: Absolute value, add, and, assign, branch, catenate, ceiling, chr$/asc, circular, combinatorial, comment, compress, deal, decode, divide, drop, encode, equal, expand, exponential, factorial, floor, format, grade down, grade up, greater, greater/equal, index generator, indexing, index of, inner product, label, less, less/equal, logarithm, maximum, member, minimum, multiply, nand, negate, nor, not, not equal, or, outer product, peek, poke, quad, quote quad, random, ravel, reciprocal, reduction, reshape, residue, reverse, rotate, scan, shape, sign, system, subtract, take, transposition.

SPECIFICATIONS

Minimum system requirements: 32K disk system (48K recommended) Includes APL-80, Five workshapes of lessons, instruction manual.

Price: $39.95 on disk

Reduced feature: 16K Level II tape version, no lessons.

Transpositions, format, and inner product not implemented. Reduced domain for some functions. 6 digit accuracy.

Price: $14.95 on cassette

APL: An Interactive Approach

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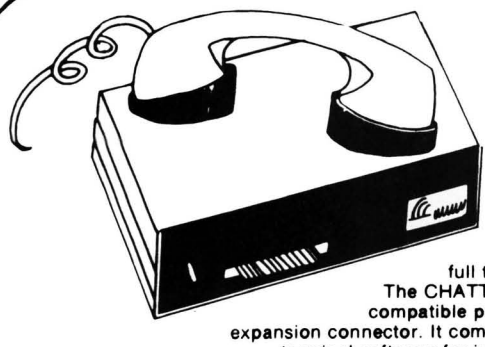

The Chatterbox

A TRS-80 Interfacing Alternative

The CHATTERBOX is a unique packaging combination of the presently available COMM-80 I/O Interface for the TRS-80* and an acoustic modem. This one box is all that is required to turn even a barebones 4K TRS-80* into a full time-sharing terminal.

The CHATTERBOX includes built-in programmable 50-19200 baud serial port, a Centronics compatible parallel printer port, a 300 baud acoustic originate modem, and a spare TRS-BUS expansion connector. It comes complete with power supply, ribbon cable and connector, user's manual, and terminal software for immediate operation. When the modem is in use, the complete data conversion is automatically routed to the serial output port where it can be logged on a printer.

The CHATTERBOX is the only peripheral needed to allow a TRS-80* to communicate with time-sharing systems such as MICRONET and the SOURCE.

It is completely hardware and software compatible with existing TRS-80* products and connects either to the keyboard connector or screen printer port on the RS Expansion Interface. Features: Full 8-bit parallel port; RS-232-C serial port (up to 19,200 baud); Acoustic modem; TRS-BUS connector for future expansion; Connects to Keyboard or E.I.; Includes terminal software; Users manual; Power supply. $259.95

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	LIST PRICE	OUR PRICE
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Centronics 737	$995.00	$869.00
Centronics 779	$1395.00	$1095.00
Centronics 779 w/lower case	$1595.00	$1195.00
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NEC 5520 SpinWriter	$3395.00	$2895.00
NEC 5530 SpinWriter	$3195.00	$2495.00
NEC Tractor-Feed Option	$249.00	$225.00
LRC 7000[8] (64-col.)	$405.00	$299.00
LRC 7000[8] (40-col.)	$389.00	$289.00
Okidata Microline-80	$800.00	$699.00
Tractor-Feed Option	$140.00	$129.00
RS-232-C Option	$299.00	$279.00

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LRC to PET, IEEE	$59.00
LRC to RS232C, male or female	$65.00
730 or 737 to TRS-80	$29.00
NEC or 779 to TRS-80	$35.00
RS-232-C to RS-232-C, male to male	$24.95

GENERAL INTEREST

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BUSY BOX, TRS-80	$114.95	$99.95
BUSY BOX, S-100	$119.95	$114.95
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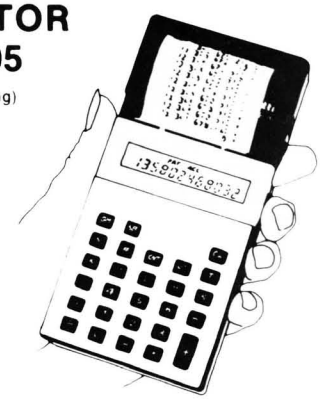

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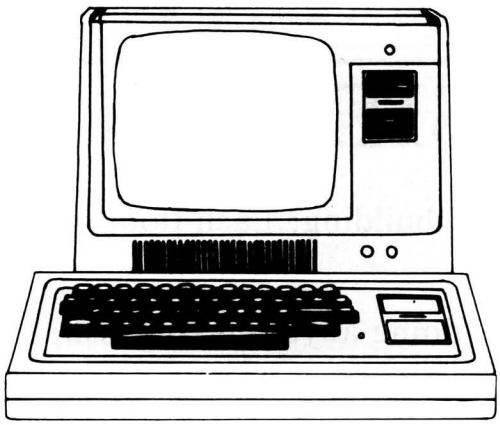

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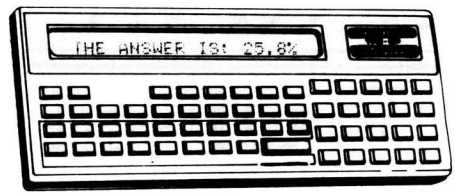

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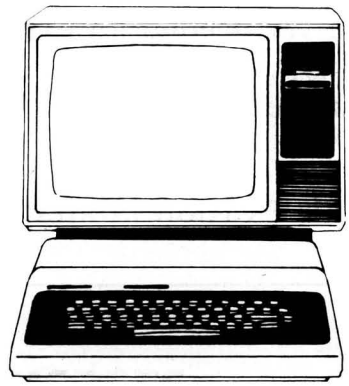

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Hardside, 40-track Disk Drive	$399.00	$359.00
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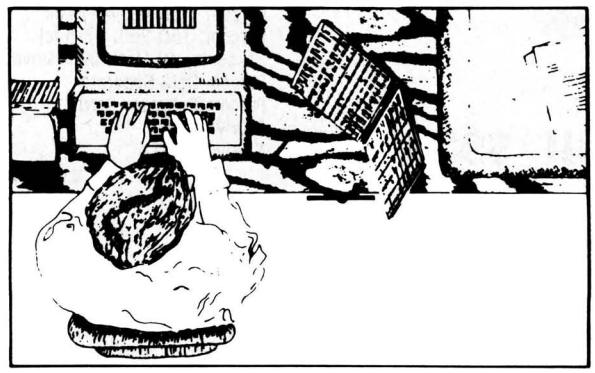

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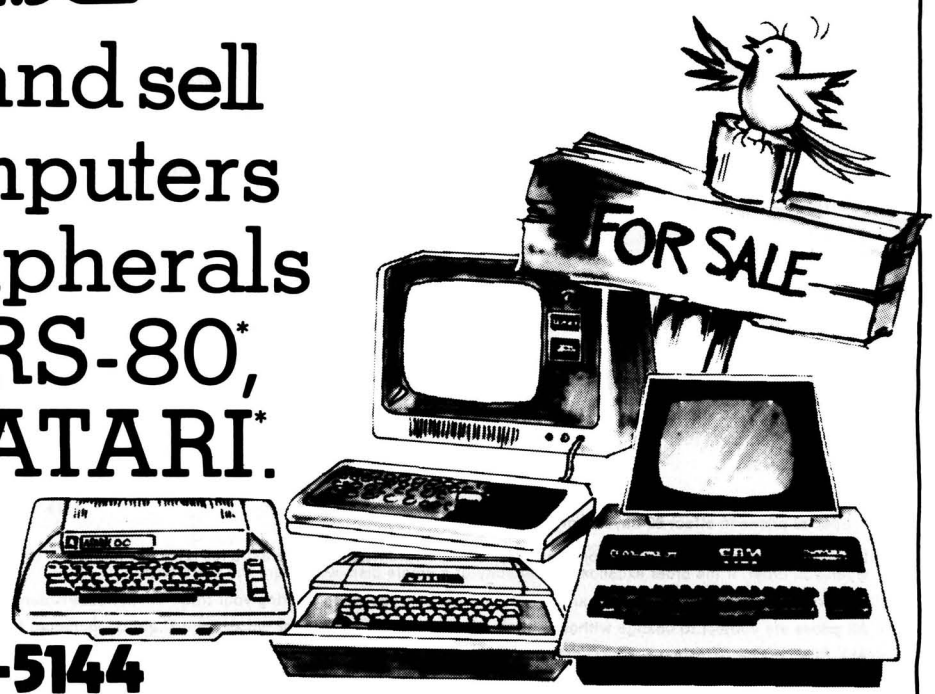

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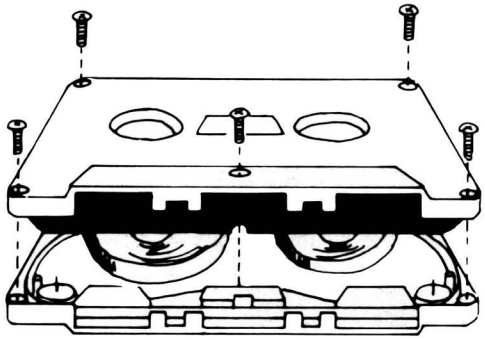

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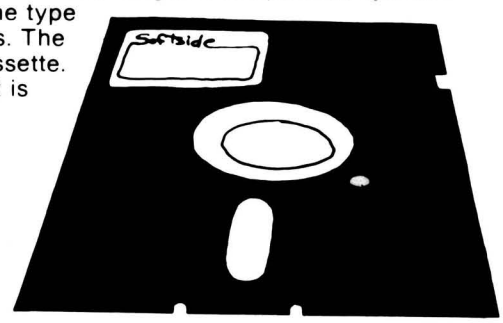

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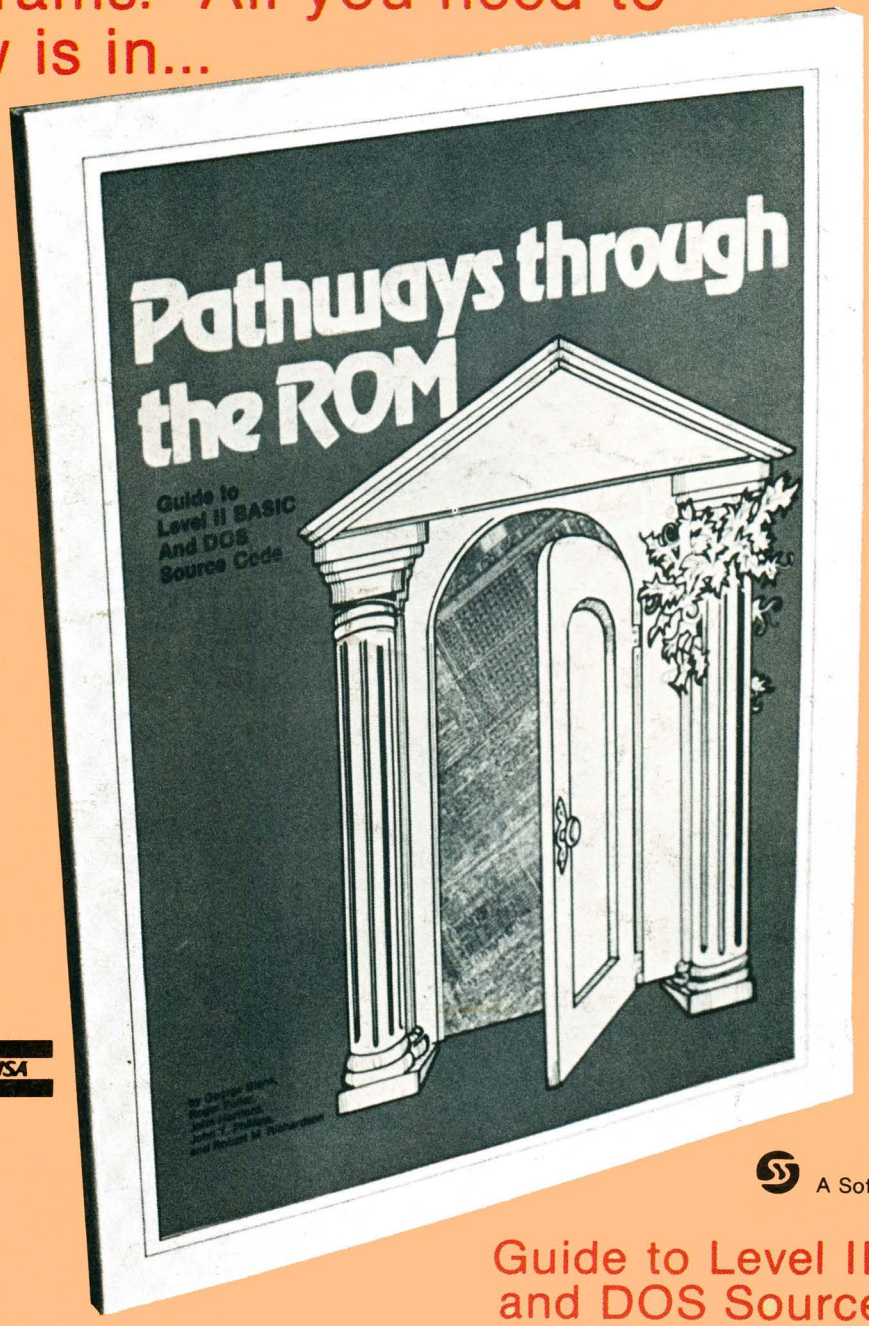

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