The GIANT BOOK

of
GAMES
for the

DICK SMITH ELECTRONICS

VZ300

Personal Colour
Computer

Tim Hartnell

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PTY LTD

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The author, Melbourne-born Tim Hartnell, first met Dick Smith in London in the late seventies while Dick was on a trip to buy the helicopter which he used for his record-breaking world solo flight.

The two kept in touch, and after Tim's return from the UK at the end of 1982, Dick called him one day and asked him to come up to Sydney to see a new product which Dick Smith Electronics had developed. It was the VZ200, the forerunner of the VZ300. Tim was impressed with the machine and its potential, and rang the editor of *Australian Personal Computer* about it. The editor decided the launch of the VZ200 was sufficiently important to change, at the last minute, the proposed cover of the next issue of the magazine, and replace it with a photograph of the VZ200. Tim's review of the computer was the lead story in that issue.

Tim and a couple of authors who had worked with him previously on books published by Tim's company, Interface Publications, then wrote three books on the VZ200, which were distributed exclusively through Dick Smith outlets. The feedback on those books was extremely positive, so it was decided that the VZ300 also deserved dedicated books, such as the one you are reading now.

Tim Hartnell originally left Australia in the middle of 1977 for the UK for what was planned to be a six month's working holiday. He finally stayed for nearly six years, and while in London founded his company, Interface Publications, which now has offices in London, Melbourne and New York. Tim has written fifty or so books (he says he doesn't know the exact number), predominately on computers and related subjects, and they have been translated into eleven languages.

Although he now makes his home in Melbourne, he travels back to the USA and the UK two or three times each year to keep in touch with developments in the computer field. "It gets harder to leave each time," he said recently. "Australia is really the only country I ever want to live in. And with developments like the VZ300, it makes sense professionally, as well as personally."

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The programs in this book have been included for their instructional value. They have been tested with care but are not guaranteed for any particular purpose. Whilst every care has been taken, the publishers cannot be held responsible for any running mistakes which may occur.

The companion volumes in this series are *Programming The VZ300, The Giant Book of Games for the VZ300* and *The Amazing VZ300 Omnibus.*

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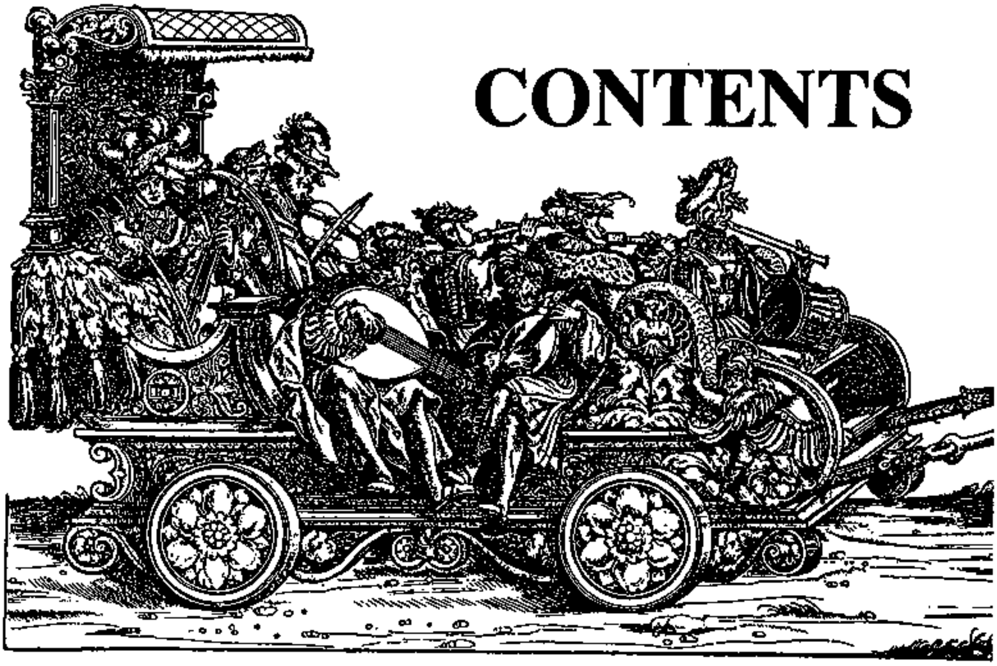

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INTRODUCTION

Once upon a time, before the VZ300, it was not easy to write and play games with computers. Back in the dim, dark past, it could cost you $80 to $100 *an hour* just to rent access to a time-shared mainframe via a terminal. And the only output you had was on the printout of a noisy, hard-to-read teleprinter. Think what those restrictions would have done to your current pattern of spending hours lovingly debugging, and improving, your latest masterpiece.

We, fortunately, do not have to suffer such medieval conditions. The luxury of having a VZ300 of your own, driving a TV screen, with unrestricted access to the machine, allows you to work for as long as you like creating games and other programs.

In this book, you'll find a collection of my favorite VZ games. I hope some of them will soon be up and running on your computer, and are stored with your own favorite programs. They're sure to provide you with a lot of fun in the weeks ahead. I've tried to produce a set of games which will provide varied entertainment, to cater to your game interests, whatever they may be.

I've deliberately written the book so that it is "open-ended". That is, in contrast to many other collections of games programs on the market, I've assumed you'll want to adapt and improve the programs once you get them up and running on your Dick Smith computer. Therefore, with many of them I've included program breakdowns, some line by line, so you know what each section of code is doing. As well, the introduction to each section discusses a bit about the philosophy of writing games of that type, has a word or two to say about the basic algorithms which you can use to create games of that sort yourself, and generally aims to give you a solid background against which you can expand and develop your own game-writing skills.

To maximize the length of program you can get into your VZ300 (and to keep program entry time down to a minimum) few of the programs include instructions. These are in the text. However, if you have the inclination you can easily add a "Do you want instructions" line as part of the initialization subroutine, and then include a shortened form of the instructions from the text in your program.

I've followed structured programming techniques in all programs which lent themselves to that approach. You may well find, as I did when I actually decided to put all the advice I'd read in books and articles into action, that working in a "top down" manner made writing and modifying programs a much simpler, and more precise, activity than it had been before. As a bonus, it is much easier to get a program up and running when it's written this way. Most importantly, you can get to the fun parts —actually running the thing — much more quickly.

I think we should get to the fun parts immediately, so turn on your VZ300.

Good game-playing!

Tim Hartnell,
Melbourne, 1986

Adventure

Down into the depths of darkness you go. Armed with only your computer, and your keen mind, you have decided to take on the forces of evil.

You may be on a desert island, inside a haunted house, within a dungeon deep within the bowels of the earth, or trapped in a cave system on a planet "somewhere in a galaxy far away."

Adventure games take place in all these scenarios, and a thousand more beside. Come with us now, as we discover the excitement of the worlds of ADVENTURE.

The word *adventure* is used to describe the class of computer games in which the player moves through an alternative reality. In this "otherworld" there are monsters to be fought, treasures to be discovered, maps to be made, and puzzles to be solved.

Many people feel that adventure games are the most exciting games which can be played with a computer. If you are interested in role-playing games like TSR Hobbies' Dungeons and Dragons (the game and name are registered trademarks of TSR), then you're certain to enjoy playing adventure.

One feature of true adventure games is that the reality they model is *consistent*. That is, the world created within the adventure program is solid, and—apart from any events specific to that game, such as an earthquake, or a magic spell—the parts of the world do not shift in a random fashion. If you walk past a "gnarled and twisted oak, with the initials of your best friend carved in the trunk" when going down a certain woodland park, the same oak should still be there when you return. In a properly constructed adventure the rivers stay in place, the dungeon walls do not mysteriously move and shift every time you turn your back, and objects you put down in one cave within an underground labyrinth do not suddenly appear of their own volition a hundred caves away (unless, of course, they've been blessed with some form of magical auto-transportation).

Map-making is one of the true adventure-player's skills and delights. Working your way through an imaginary (but self-consistent) environment, tackling monsters and collecting treasures, solving puzzles as you go up and down staircases and chutes, exploring side tunnels, getting lost in self-circling mazes, and so on, is only fascinating if the world you are exploring is mappable. You should, for example, be able to expect both ends of a tunnel to always emerge in the same spots, so when you come across one entrance to that tunnel later on in a game from a different position, you will have a new, useful clue to further flesh out your map of the environment.

Role-playing is part of life. There are sure to be many situations in your everyday activities when you, to some extent, are forced to adopt a role. Most jobs, unfortunately, expect you to behave as if the needs and goals of the company were your own needs and goals, that the enthusiasm you project each day to customers and fellow-workers were your own, inner enthusiasms, and so on. You may well find that, in new situations, you have learnt to mask your lack of ease by acting confident, and at ease, discovering that—if you do it skillfully—people take the projected role as if it were your true self.

The role-playing which takes place within the imaginary environments of an adventure game is far more interesting, and is generally far removed from the self of your everyday life. When you think about it, even playing games like "Cops and Robbers" is an exercise in role-playing.

So we've all had experience in role-playing, even if some of it was not as much fun as taking part in long-range campaigns to rescue a handsome prince trapped within a tower. The adventures given in this book are by no means as elaborate as some of the ones offered for sale for your computer, but they are more carefully and consistently organized than many I have seen, and—as a bonus—give you frameworks within which you can construct adventure programs of your own.

Role-playing games which involve other people, such as TSR's Dungeons and Dragons which I mentioned earlier, generally have a great deal of flexibility in development as a game proceeds. Under the control of a good Dungeon-master, a role-playing game can develop and evolve in directions which he or she had not even imagined when setting up the initial scenario. Unfortunately, computer role-playing games cannot be so flexible. In many ways when playing adventure with a computer, you are trying to solve a puzzle, or series of them, which the programmer has created. The computer can be used to help set up the initial scenario and determine where objects will be located, and perhaps where a particular stairwell will lead, but the overall shape of the environment is fixed by the programmer when the game is written.

You can see this in action, for example, in our program STRONGHOLD OF THE DWARVEN LORDS, where you have to work your way through a maze to discover where the Dwarven treasure is stowed. The computer actually hides the treasure, and modifies the '3-D maze' to some extent, but that is all. Of course, the computer is also used to produce the feedback to the player as the game is underway, and its role there is very valuable.

Once upon a time, war campaigns were reenacted on table tops. Napoleonic battles were fought and won on large sheets of card marked with rivers and woods, as players reenacted major engagements within wars, or created their own. Wargamers found the pleasure of the games they played could be increased if attention were paid as much (if not more) to the individuals they were fighting with, rather than just with squads of soldiers. This attention to individual identity lead directly into the role-playing games we have today, as gamers discovered how rewarding it was to take on the role of a particular leader.

Our Dungeons and Dragons developed directly from the war games where players took on the identities of individuals within battles. Two gamers, Dave Arnson and E. Gary Gygax, decided to codify an entirely separate reality, which they initially gave to the world in 1974 as a boxed set of three booklets under the title *Dungeons and Dragons*. The game became an enormous success, and now hundreds of thousands of people spend a significant portion of their leisure plunging into the depths of the earth, as clerics, trolls, magicians, and sorcerers, exploring, fighting, conquering—and occasionally dying—as they go.

The original D & D idea soon spawned a host of other games, such as Runequest (Chaosium Ltd, Albany, California), Bushido and Chivalry & Sorcery (Fantasy Games Unlimited, Roslyn, New York), Tunnels & Trolls (Flying Buffalo, Inc., Scottsdale, Arizona), Traveller (Game Designers' Workshop, Bloomington, Illinois) and Heroes of Olympus (Task Force Games, Amarillo, Texas).

Will Crowther and Don Woods entered computer history in 1976 by putting the world's first role-playing game—just called ADVENTURE—onto a mainframe computer at Stanford University. (The program was actually written by Crowther, and elaborated by Woods, although today both men are generally credited with developing the program.) Although the game quickly became a cult-pursuit all over America, the floodgates to computer adventure-gaming did not open until microcomputers put machine-power—and computer time—into the hands of millions. Cheaper memory enabled extremely elaborate adventures to be created, and so now the computer adventure gamer is extremely well served.

Crowther and Woods perhaps created better than they knew. Even today, despite the multitude of programs available, the original ADVENTURE is still going strong. At least five companies at present are selling versions of the original ADVENTURE for the Apple alone.

This original program was written in Fortran, and when it was added to a free software-exchange library (Decus) organized by the Digital Equipment Computer Users' Society (most of whom used Dec's PDP-11 systems), it soon became the most-used program in the library. Two years later, another adventure program, DUNGEON, was added to Decus. This program, which took the ADVENTURE idea much further than Crowther's program, was written by Tim Anderson, Marc Blank, Bruce Daniels, and Dave Lebling, all of the Programming Technology Division of the MIT Laboratory for Computer Science.

One of the leading companies in the world producing adventure programs is Adventure International, founded by Scott Adams. His company has some of the most imaginative displays at computer shows of anyone in the games software field, and it is good to know his programs are as exciting as his show displays. Make sure you experience the pleasure of playing a Scott Adams adventure program in due course, and you'll see how far the genre has been extended.

I met Scott in Atlanta one day at a computer show and found him friendly, quiet, and reserved. Somehow, I'd expected him to be like a warlock from one of his dungeons, or a dragon from one of the cave systems. However, some behavior was more in keeping with my expectations. It was Halloween, and Scott and his crew were all dressed to the nines as characters out of some of the programs. The same approach to life which had him tell his staff to come to work in fancy dress permeates his programs. Start with the programs here, which are much simpler to solve than programs such as Scott's, and then graduate to the commercial programs. Perhaps his program Adventureland would be a good place to begin, before you move on to some of his other games, and on to those produced by other companies.

Avalon Hill's program Empire of the Over-Mind is another of the classics of the field, and this—as well as Sentient Software's Cyborg deserve inspection. The list could go on and on, and certainly new titles have been added to the programs now available, so your computer magazines and/or your local gamer and computer clubs would be a good place to find out just what else is around for you and your computer.

I guess it's time now to introduce you to the adventure programs in this book. If you'd like to know more about the field, to help you write your own programs, there is a vast body of literature which is of interest. It includes:

"Putting Adventure in Adventure Games," article in *Creative Computing,* August 1981, by Robert Plamondon.

"Graphic Adventures on the Atari," article in *Creative Computing,* August 1982, by John Anderson.

"Fantasy Games" (parts one and two), articles in *Creative Computing,* issues of March 1981 (part one) and May 1981 (part two) by David Lubar.

"Adventure Writing," this is an immensely valuable 16-page booklet, distributed by Aardvark-80, 2352 S. Commerce, Walled Lake, MI 48088 [(313) 669-3110] for around $5.00. It explains the whole background of adventure game writing, and includes a complete adventure program, Deathship. If you read nothing else in the field, you should get hold of this booklet if you really want to discover how to write adventure games.

Fantasy Role-Playing Games, by J. Eric Holmes (Hippocrene Books, Inc., New York, 1981).

What Is Dungeons and Dragons?, by John Butterfield, Philip Parker, and David Honigmann (Penguin Books, New York, 1982).

Dicing with Dragons: An Introduction to Role-Playing Games, by Ian Livingstone (Routledge & Kegan Paul, London, Melbourne, and Henley).

□ STRONGHOLD OF THE DWARVEN LORDS

Deep beneath the earth you go, far into the Dwarven Heartland. Danger is on every side as you descend, but your greed draws you on. Searching through the dusty stacks of uncatalogued manuscripts in room 546B of the British Museum, you came across a faded, and almost illegible map to a Dwarven hoard of gold, and since that day, you have been obsessed with the idea of finding it.

As you go down into the labyrinth, you realize that the Dwarven Lords, who secreted the gold here 7389 years ago, have long since become extinct, so the main danger you face is from the layout of the cavern system itself, rather than from Guards of the Stronghold.

In **STRONGHOLD OF THE DWARVEN LORDS** you are in a cavern which holds the gold. Each time you play this game, the gold can be in one of three places. The only information you get as to your progress is information provided by the Dwarven Source Beam which you found as you made your way into the cave system. This gives you feedback after each move as to the location of the gold, but you need to learn how to interpret the information it gives you before you'll be able to make much use of it.

The other information you get is in the form of a straight statement regarding the directions you can move from your present position. After each move ("step"), you'll be given a screen display like the following:

```
STEP NUMBER 49

NORTH: WALL
SOUTH: OPEN
EAST: WALL
WEST: OPEN

THE DWARVEN SOURCE BEAM READS 10
```

Then you'll be asked to enter the direction you want to move, as follows:

```
WHICH DIRECTION DO YOU WANT
TO MOVE?

N - NORTH, S - SOUTH
E - EAST, W - WEST, H - HELP
```

You will not, as you probably realize, be allowed to walk through walls.

The aim of the game, needless to say, is to reach the Dwarven riches as quickly as possible. To aid you, there is a map of the cavern system from above, which you can call up from time to time. The map looks like this (with the walls shown as # symbols, and you shown as *):

```
NORTH
###############
#  ######## ###
## #####      #
## ##### ######
## #####    ###
##      ### ###
#######  ##   #
####### ### # #
##  *     # ###
## ######     #
##     ## #####
###### ## #####
###### ## #####
#      ##     #
###############
SOUTH
```

There are two catches to calling up a map of this type. First, although your position is shown, the location of the gold is not. Second, each time you enter "H" to get a look at the map, you'll be penalized 15 steps. Therefore, it is in your interests to use the Help option as few times as possible.

The output of the program, as it is given in terms of the directions you can take from your present position, could be modified to produce a "3-D maze" output. You know, from move to move, which direction you're facing, and the computer knows which directions from that position represent possible moves. You would need to add a subroutine which drew a picture of the situation immediately in front of you, choosing from a bank of pictures (one with the area straight in front of you clear but with the walls solid on either side of you, another with entrances to the right and to the left but with the path straight ahead blocked off, and so on) to produce a continuous picture of the scene ahead. This can be most effective, and may well be worth implementing on your system.

Now, here is the listing of **STRONGHOLD OF THE DWARVEN LORDS** so you can start trekking for gold:

```
10 REM STRONGHOLD OF THE DWARVEN LORDS
20 GOSUB 640
30 GOSUB 480
40 REM **************************
50 M=M+1:IF M>150 THEN GOTO 960
60 CLS:PRINT:PRINT
70 PRINT "STEP NUMBER"M
80 PRINT
90 PRINT"NORTH: ";
100 IF A(D+1,E)=S THEN PRINT"OPEN"
110 IF A(D+1,E)=X THEN PRINT"WALL"
120 PRINT "SOUTH: ";
130 IF A(D-1,E)=S THEN PRINT"OPEN"
140 IF A(D-1,E)=X THEN PRINT"WALL"
150 PRINT "EAST: ";
160 IF A(D,E+1)=S THEN PRINT"OPEN"
170 IF A(D,E+1)=X THEN PRINT"WALL"
180 PRINT "WEST: ";
190 IF A(D,E-1)=S THEN PRINT"OPEN
200 IF A(D,E-1)=X THEN PRINT"WALL
210 PRINT
220 PRINT"THE DWARVEN SOURCE BEAM READS";
230 PRINT 100*ABS(Z-D)+10*ABS(Y-E)
240 REM ************************
250 PRINT
260 PRINT"WHICH DIRECTION DO YOU WANT"
270 PRINT"TO MOVE?"
280 PRINT:PRINT"N-NORTH, S-SOUTH"
290 PRINT"E-EAST, W-WEST, H-HELP"
295 Z$=INKEY$
300 A$=INKEY$:IF A$="S"ORA$="N"ORA$="E"ORA$="W"ORA$="H" THEN 310
305 GOTO 300
310 IF A$="N" AND A(D+1,E)=X THEN 300
320 IF A$="S" AND A(D-1,E)=X THEN 300
330 IF A$="E" AND A(D,E+1)=X THEN 300
340 IF A$="W" AND A(D,E-1)=X THEN 300
350 IF A$="H" THEN GOSUB 480
360 IF A$="N" THEN D=D+1
370 IF A$="S" THEN D=D-1
380 IF A$="E" THEN E=E+1
```

```
390 IF A$="W" THEN E=E-1
400 IF Z=D AND Y=E THEN 430
410 GOTO 50
420 REM ***********************
430 PRINT:PRINT"YOU FOUND THE DWARVEN RICHES"
440 PRINT"IN JUST"N"STEPS!"
450 GOSUB 500
460 INPUT "ANOTHER GAME(Y/N)";N$:IF LEFT$(N$,1)="N" THEN END
465 IF LEFT$(N$,1)="Y" THEN RUN ELSE 460
470 REM ***********************
480 REM HELP
490 CLS
500 PRINT
510 PRINT"NORTH"
520 FOR B=15 TO 1 STEP -1
530 FOR C=1 TO 15
540 IF A(B,C)=X THEN PRINT"#";
550 IF B=D AND C=E THEN PRINT"*";:GOTO 570
560 IF A(B,C)=S THEN PRINT" ";
570 NEXT C:PRINT:NEXT B
580 PRINT"SOUTH"
590 M=M+15
600 FOR J=1 TO 2000:NEXT J
610 CLS:A(D,E)=S
620 RETURN
630 REM ***********************
640 CLS
670 CLS
680 DIM A(15,15)
690 B=RND(3)
700 Z=14:Y=14
710 IF B=2 THEN Y=2
720 IF B=3 THEN Z=2
730 X=1:S=2
740 FOR B=1 TO 15:FOR C=1 TO 15
750 A(B,C)=X:IF RND(10)>8 THEN A(B,C)=S
760 IF C<2 OR C>14 OR B<2 OR B>14 THEN A(B,C)=X
770 NEXT C,B
780 D=2:E=2
790 FOR F=1 TO 68
800 READ B,C
810 A(B,C)=S
820 NEXT F
```

```
830 M=-15
840 RETURN
850 REM *************************
860 DATA 2,2,2,3,2,4,2,5,2,6,2,7
870 DATA 3,7,4,7,5,7,5,6,5,5,5,4,5,3,6,3
880 DATA 7,3,7,4,7,5,7,6,7,7,7,8,7,9,9,8
890 DATA 9,9,10,8,10,7,10,6,10,5,10,4,8,8
900 DATA 10,3,11,3,12,3,13,3,14,3,14,2,7,10
910 DATA 6,10,5,10,4,10,3,10,2,10,2,11,2,12
920 DATA 2,13,2,14,6,11,6,12,6,13,6,14,7,12
930 DATA 14,12,8,12,8,14,9,12,9,13,9,14,10,12
940 DATA 11,9,11,10,11,11,11,12,12,9,13,9,13,10
950 DATA 13,11,13,12,13,13,13,14,14,14
960 SOUND 8,6:SOUND 6,6:SOUND 4,8:FOR J=1 TO 1000:NEXT J
970 PRINT:PRINT:PRINT "AFTER"M"STEPS,YOU HAVEN'T BEEN"
980 PRINT "ABLE TO FIND THE DWARVEN":PRINTTAB(10);"TREASURE!!"
990 PRINT "SHAME ON YOU...."
1000 GOSUB 500:FOR J=1 TO 2000:NEXT:END
```

□ SHADOW THIEVES

Next we have an adventure program which creates its own, stable map. That is, the map does not change within a game, but is totally different from game to game. The game takes place underground, in a maze of 20 caverns connected by tunnels.

Although the number of possible combinations is not infinite, it is so huge (approaching the number of atoms in the universe) you would be unlikely to ever strike the same cavern system in your lifetime. However, the lack of true randomness in your random number generator diminishes the total number of caverns you may visit, although you are unlikely to stumble across the same one more than once.

CAVERN OF THE SHADOW THIEVES takes place in a very odd environment. You are within the maze of 20 caverns, trying to get to cavern number 20. Each cavern has four, and oniy four, tunnels leading from it to other caverns. Some of the tunnels are one-way, while others allow you to travel back and forth.

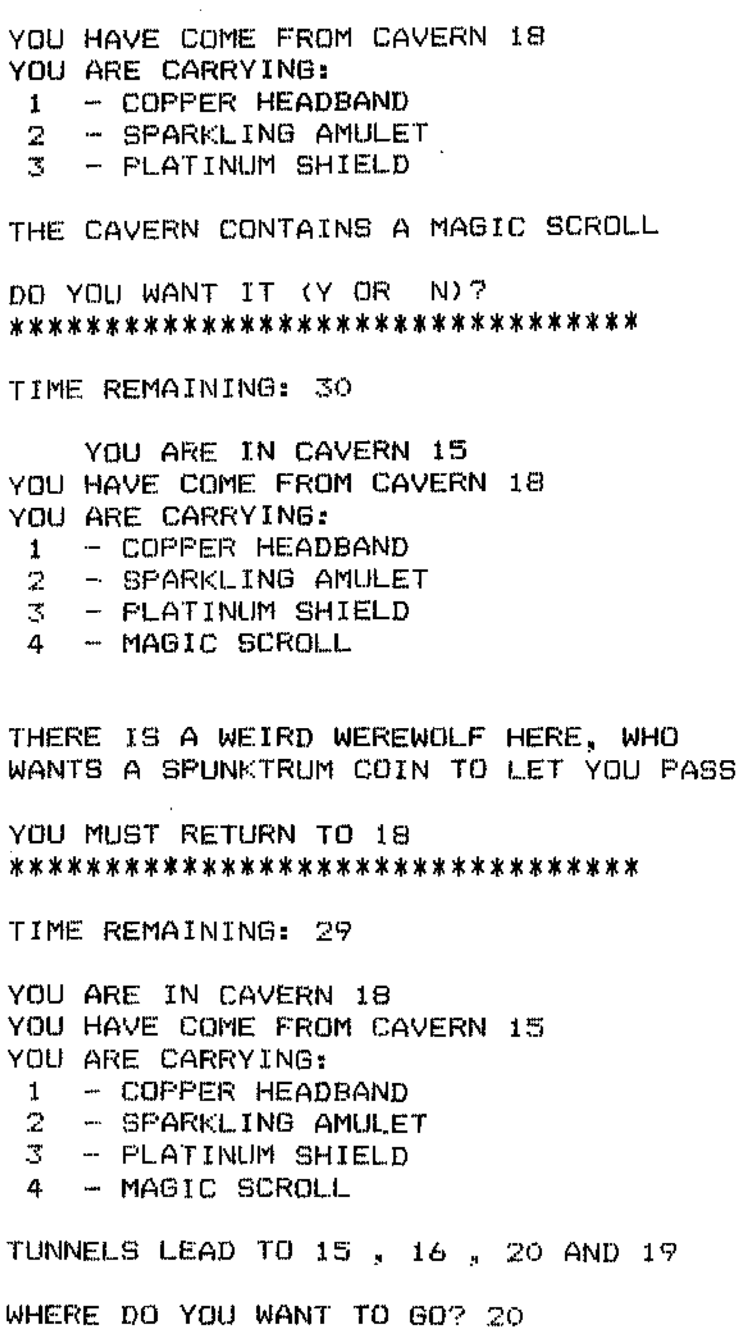
Several of the tunnels will contain rare treasure, such as sparkling amulets and platinum shields. You can carry up to four items at a time. Other caverns are the homes of unusual inhabitants, such as gruesome gnomes and zany zombies. Each inhabitant will demand a toll of a particular item. If you are carrying the item, the inhabitant takes it from you and allows you to pass. The inhabitant also disappears after being bribed, dropping the bribe, so you can revisit that cavern later and pick up the object again if you like.

You should make a map as you work through the cavern system. This way, you'll know for example that cavern number five contains a crazy centipede who wants a magic scroll, so that you can travel safely through cavern five as soon as you manage to pick up a suitable scroll. The interconnections between the caverns, as I said, do not change within a particular game so you can build your map with some confidence. Note that certain caves contain magic transportation spells which will move you at random within the cavern system.

The only goal of this game is to get to cavern number twenty, and you'll find the output from the program will assist you in this task, reporting your position and possessions constantly:

```
PLEASE STAND BY AS I CONSTRUCT THE CAVE...
*
 *
  *
   *
```

```
*********************************

TIME REMAINING: 49

YOU ARE IN CAVERN 1

TUNNELS LEAD TO 4 , 5 , 7 AND 2

WHERE DO YOU WANT TO GO? 4
*********************************

TIME REMAINING: 48

YOU ARE IN CAVERN 4
YOU HAVE COME FROM CAVERN 1

TUNNELS LEAD TO 6 , 8 , 3 AND 1

WHERE DO YOU WANT TO GO? 8
*********************************

TIME REMAINING: 47

YOU ARE IN CAVERN 8
YOU HAVE COME FROM CAVERN 4

THE CAVERN CONTAINS A COPPER HEADBAND

DO YOU WANT IT (Y OR  N)?
*********************************

TIME REMAINING: 46

YOU ARE IN CAVERN 8
YOU HAVE COME FROM CAVERN 4
YOU ARE CARRYING:
 1  - COPPER HEADBAND

THERE IS A TERRIBLE TOAD HERE, WHO
WANTS A PLATINUM SHIELD TO LET YOU PASS

YOU MUST RETURN TO 4
```



```
YOU HAVE COME FROM CAVERN 18
YOU ARE CARRYING:
 1  - COPPER HEADBAND
 2  - SPARKLING AMULET
 3  - PLATINUM SHIELD

THE CAVERN CONTAINS A MAGIC SCROLL

DO YOU WANT IT (Y OR  N)?
*********************************

TIME REMAINING: 30

    YOU ARE IN CAVERN 15
YOU HAVE COME FROM CAVERN 18
YOU ARE CARRYING:
 1  - COPPER HEADBAND
 2  - SPARKLING AMULET
 3  - PLATINUM SHIELD
 4  - MAGIC SCROLL


THERE IS A WEIRD WEREWOLF HERE, WHO
WANTS A SPUNKTRUM COIN TO LET YOU PASS

YOU MUST RETURN TO 18
*********************************

TIME REMAINING: 29

YOU ARE IN CAVERN 18
YOU HAVE COME FROM CAVERN 15
YOU ARE CARRYING:
 1  - COPPER HEADBAND
 2  - SPARKLING AMULET
 3  - PLATINUM SHIELD
 4  - MAGIC SCROLL

TUNNELS LEAD TO 15 , 16 , 20 AND 19

WHERE DO YOU WANT TO GO? 20
```

```
YOU HAVE MADE IT!!

YOUR CAVERN-MASTER RATING IS 7158
YOU GOT OUT WITH:
     COPPER HEADBAND
   SPARKLING AMULET
PLATINUM SHIELD
     MAGIC SCROLL
```

Here's the listing to allow you to make your own discoveries within THE CAVERN OF THE SHADOW THIEVES:

```
10 REM CAVERN OF THE SHADOW THIEVES
20 REM FOR VZ 300
30 DIM A(20,4),R$(4),B$(20),C$(20),D$(20),
                                  E$(20),F$(20)
40 COLOR 2,1:CLS
45 COLOR (1+RND(3)),Q
50 GOSUB 1130:REM BUILD CAVERNS
60 GOSUB 1030:REM FILL ARRAYS
70 GOSUB 920:REM ALLOT INHABITANTS/GOODIES
80 Q=50:REM TIMER
90 Y=1:X=0
100 COLOR 2,1:CLS
110 REM ****** MAJOR GAME CYCLE ******
120 GOTO 230
130 PRINT "***************************"
140 Q=Q-1:IF Q<1 THEN 880
150 PRINT:PRINT "TIME REMAINING:";Q
160 PRINT:PRINT TAB(RND(5));"YOU ARE IN CAVERN";Y
170 IF X>0 THEN PRINT "YOU HAVE COME FROM CAVERN";X
180 IF R$(1)=""ANDR$(2)=""ANDR$(3)=""
                               ANDR$(4)=""THEN 190
185 PRINT "YOU ARE CARRYING:"
190 Z=1
200 IF R$(Z)>""THEN PRINT Z;" - ";R$(Z)
210 IF Z<4 THEN Z=Z+1:GOTO 200
220 RETURN
230 GOSUB 130
240 IF LEN(F$(Y))=0 THEN 430
250 PRINT:PRINT"THE CAVERN CONTAINS A":PRINT F$(Y)
260 IF INKEY$<>"" THEN 260
270 PRINT:PRINT "DO YOU WANT IT (Y OR N)?"
280 Q$=INKEY$
```

```
290 IF Q$<>"Y" AND Q$<>"N" THEN 280
300 IF Q$="N" THEN 430
310 IF R$(1)="" OR R$(2)="" OR R$(3)=""
                                   OR R$(4)="" THEN 390
320 PRINT "YOU ARE CARRYING TOO MUCH"
330 INPUT "WHICH ITEM DO YOU WANT TO DROP";S
340 IF S<1 OR S>4 THEN 330
350 T$=R$(S)
360 R$(S)=F$(Y)
370 F$(Y)=""
380 GOTO 420
390 G=1
400 IF R$(G)="" THEN R$(G)=F$(Y):F$(Y)="":GOTO 420
410 IF G<4 THEN G=G+1:GOTO 400
420 GOSUB 130
430 IF LEN(D$(Y))=0 THEN 600
440 IF ASC(D$(Y))=42 THEN 820
450 PRINT:PRINT "THERE IS A ";D$(Y)
                             :PRINT "HERE, WHO WANTS A"
460 PRINT E$(Y);" TO LET YOU PASS"
470 FOR I=1 TO 800:NEXT I
480 G=1
490 IF R$(G)=E$(Y) AND E$(Y)<>"" THEN 550
500 IF G<4 THEN G=G+1:GOTO 490
510 PRINT:PRINT "YOU MUST RETURN TO";X
520 FOR I=1 TO 400:NEXT I
530 P=X:X=Y:Y=P
540 GOTO 230
550 PRINT "AND YOU HAVE IT!"
560 FOR I=1 TO 800:NEXT I
570 PRINT "THE ";D$(Y);" VANISHES!":D$(Y)=""
580 F$(Y)=R$(G)
590 R$(G)=""
600 PRINT "TUNNELS LEAD TO";A(Y,1);A(Y,2);
                                   A(Y,3);"AND";A(Y,4)
610 PRINT:INPUT "WHERE DO YOU WANT TO GO";M
620 IF M=0 THEN Q=Q-5:M=RND(16):GOTO 670
630 G=1
640 IF A(Y,G)=M THEN 670
650 IF G<4 THEN G=G+1:GOTO 640
660 GOTO 610
670 X=Y
680 Y=M
690 IF Y=20 THEN 710
```

```
700 GOTO 230
710 REM ******************
720 REM ***** SUCCESS ****
730 CLS
740 FOR I=1 TO 30:PRINT TAB(I);"*":NEXT I
750 PRINT:PRINT "YOU HAVE MADE IT!!":SOUND 7,2
                                       :SOUND 8,1:PRINT
760 PRINT "YOUR CAVERN-MASTER RATING"
                              :PRINT "IS";100*(100-Q)+2*Q
770 IF R$(1)="" AND R$(2)="" AND R$(3)=""
                                  AND R$(4)="" THEN END
780 PRINT "YOU GOT OUT WITH:"
790 FOR T=1 TO 4:PRINT TAB(RND(7));R$(T)
800 NEXT T
810 END
820 REM *** TELEPORTATION ***
830 FOR I=1 TO 30:PRINT TAB(I);"*":NEXT
840 X=Y:SOUND 16,2:SOUND 10,3:SOUND 17,1
850 Y=INT(RND(9)+7)
860 GOTO 230
870 REM ****************
880 REM *** END 'O THE LINE ***
890 PRINT:PRINT "SORRY, FRIEND, BUT TIME IS UP"
900 END
910 REM *****************
920 REM *** DISTRIBUTE INHABITANTS/GOODIES ***
930 FOR E=1 TO 16
940 F=RND(18)+1
950 D$(F)=B$(RND(20)):REM INHABITANTS
960 E$(F)=C$(RND(20)):REM BRIBES
970 F=RND(19)+1
980 F$(F)=C$(RND(20)):REM CAVERN CONTENTS
990 IF RND(10)=5 THEN D$(F)="*":REM TELEPORTATION
1000 NEXT E
1010 RETURN
1020 REM ****************
1030 REM *** CREATE CAVERNS ***
1040 PRINT "PLEASE STAND BY AS I
                              HIDE      THE GOODIES..."
```

```
1050 FOR D=1 TO 20
1060 READ B$(D):PRINT TAB(D);"*":SOUND D,1
1070 NEXT D
1080 FOR D=1 TO 20
1090 READ C$(D)
1100 NEXT D
1110 RETURN
1120 REM *********************
1130 REM **** CONSTRUCT CAVERN ****
1140 PRINT "PLEASE STAND BY AS I CONSTRUCT  THE CAVE..."
1150 FOR B=1 TO 20
1160 PRINT TAB(B);"*"
1165 SOUND B,1
1170 FOR C=1 TO 4
1180 A(B,C)=B+(RND(7)-RND(6))
1190 IF A(B,C)=B OR A(B,C)<1 OR A(B,C)>20 THEN 1180
1200 NEXT C
1205 SOUND B,1
1210 IF A(B,1)=A(B,2)OR A(B,1)=A(B,3) OR
                                  A(B,1)=A(B,4) THEN 1170
1215 IF A(B,2)=A(B,3) ORA(B,3)=A(B,4) OR
                                  A(B,2)=A(B,4) THEN 1170
1220 IF RND(100)<19 AND B>12 THEN A(B,(RND(4)))=20
1230 NEXT B
1240 CLS
1250 RETURN
1260 REM **************
1270 REM *** INHABITANTS ***
1280 DATA "HAIRY HOBGOBLIN","BALD BERSERKER",
                                     "SKINNY SKELETON"
1285 DATA "GRUESOME GNOME","CUNNING CONJURER"
                                     ,"CRAZY CENTIPEDE"
1290 DATA "DEMENTED DWARF","SAVAGE SHRIEKER"
                                     ,"CREEPIE CRAWLIE"
1295 DATA "ROTTEN RODENT","TERRIBLE TOAD"
                                       ,"STICKY STURGE"
1300 DATA "GHASTLY GHOUL","WICKED WEASEL"
                                        ,"LUMPY LEGEND"
1305 DATA "ZANY ZOMBIE","CROOKED CRAB"
                                     ,"WRATHFUL WRAITH"
```

```
1310 DATA "WEIRD WEREWOLF","GIANT GARGOYLE"
1315 REM ****************
1320 REM *** THE LOOT ***
1325 DATA "PIECE OF COPPER","SPUNKTRUM COIN",
                                         "PLATINUM SHIELD"
1330 DATA "COPPER HEADBAND","MAGIC SCROLL",
                                         "FABULOUS POTION"
1335 DATA "WAND OF HEALING","SWORD OF FIRE",
                                         "SPARKLING AMULET"
1340 DATA "WAR HAMMER","PIECE OF COPPER",
                                         "SPUNKTRUM COIN"
1345 DATA "PLATINUM SHIELD","COPPER HEADBAND",
                                           "MAGIC SCROLL"
1350 DATA "FABULOUS POTION","WAND OF HEALING",
                                           "SWORD OF FIRE"
1360 DATA "SPARKLING AMULET","WAR HAMMER"
```

□ THE DUKE OF DRAGONFEAR

THE DUKE OF DRAGONFEAR puts you into another grid system world, but one which is populated with a range of fearsome possibilities including pits containing quicksand or dragons, as well as magic caves which can transport you at random within the Land of Dragonworld, and caves filled with Dragon's gold.

If you're a veteran of computer games, you may well recognize that THE DUKE OF DRAGONFEAR is a development of the Hunt the Wumpus games. Wumpus is one of the grand old standards of computer games, in which you are in a cave system, looking for one or more mythical beasts known, in the singular (and these are most singular beasts) as Wumpus. Wumpii, we are assured by those who care about such things, is the plural. Anyway, in essence, a grid is set up in such games, and objects, people, effects, monsters and whatever else you choose are placed at locations on the grid. From time to time, if you so decide, one or more of the contents of specific cells of the grid may move. The human player, of course, can also move from cell to cell within the grid.

Generally, there is no overall visible map of the system, although some programs (such as THE DUKE OF DRAGONFEAR) do provide such information for players. The very first Wumpus game was written by Gregory Yob in 1975. In David Ahl's superb book *More BASIC Computer Games* (Creative Computing Press, Morristown, New Jersey, 1979), Mr. Yob explains how he was visiting People's Computer Company, in Menlo Park, California, to see the programs they were developing, and he noticed there were three "hunt the something" programs being written, each on a 10 × 10 grid, and each of which gave feedback to the player in terms of "no, no . . . try to the northwest."

Unenchanted, Mr. Yob returned to a lonely time-sharing terminal (back in those ancient days, gentle reader, human beings did not have little computers at their beck and call) and hammered out the program which eventually became the very first "Hunt the Wumpus." Mr. Yob had the creature dwelling in a dodecahedron-shaped cave system.

Mr. Yob's inventive genius did not stop at this point. He peopled the cave with "magic bats" which moved you from place to place within the system at random, with bottomless pits, and ensured that the arrows with which you were equipped when you entered the system could fly round corners.

You can see now how this framework became the heart of the Wumpus programs which have proliferated around the world and which formed the very rawest framework upon which THE DUKE OF DRAGONFEAR is based. This program gives you more control on the outcome of the program, adds treasure to the caves, and imposes a time-limit to your game.

As well, you are equipped with a "magic amulet" which can see into the caves which are around you. Unfortunately, because you're not much of a whiz when it comes to invoking magic, the old amulet doesn't work too well. It can only tell you of the contents of one of the eight caves surrounding the one in which you stand, and worse than this does not tell you which of the eight it is referring to. It is not as bad as it may sound. You'll be surprised at how much use you can make of the limited information the amulet provides. As well, you'll get a brief glimpse of the cave system from above at the start of the game, and from time to time as it goes on.

In this map, X represents a wall you cannot pass or a cave you cannot enter, H (for human) is you starting in about the center of the system, $ is the treasure caves, ? the magic transportation caves, D represents dragons, and Q tells you that cave contains quicksand. Obviously this is a world filled with potential pleasures as well as dangers.

```
X X X X X X X X X X
X . D D $ ? D . . X
X D X . . X . . . X
X D . . . . Q . X X
X Q . . $ . . . ? X
X . . . H . . $ ? X
X $ $ . . . X . ? X
X . X . . . . . . X
X . Q Q . . . . . X
X X X X X X X X X X
```

This is the program listing to enable you to become **THE DUKE OF DRAGONFEAR:**

```
10 REM DUKE OF DRAGONFEAR
20 GOSUB 1280
30 CLS:PRINT:PRINT:PRINT
40 GOSUB 1200
50 Q=RND(7)-1
60 IF Q=0 AND E<>55 THEN GOSUB 1200
70 CLS:PRINT:PRINT:PRINT "DUKE "A$", YOU ARE IN CAVE"E
80 IF G>0 THEN PRINT "YOU ARE CARRYING  $"G"
                                           WORTH OF GOLD"
90 GOSUB 760
100 PRINT:PRINT "YOU HAVE"25-H"UNITS OF CHARISMA LEFT"
110 PRINT:PRINT "WHAT DO YOU WANT TO DO?"
120 PRINT "N - MOVE NORTH, S - MOVE SOUTH"
130 PRINT "E - MOVE EAST,  W - MOVE WEST"
140 PRINT "F - FIGHT A DRAGON, Q QUIT"
150 INPUT Z$:U=0:IFZ$="N"ORZ$="S"ORZ$="E"ORZ$="W"
                                         ORZ$="F"THEN160
155 IF Z$<>"Q" THEN 150
160 IF Z$="N"ANDA(E-10)=88 OR Z$="S" AND A(E+10)
                                            =88 THEN 1620
162 IF Z$="E" AND A(E+1)=88 OR Z$="W" AND A(E-1)
                                            =88 THEN 1620
170 IF Z$="Q" THEN Q=9:GOTO 1170
```

```
180 A(E)=46:IF Z$="N" THEN E=E-10
190 IF Z$="S" THEN E=E+10
200 IF Z$="E" THEN E=E+1
210 IF Z$="W" THEN E=E-1
220 IF Z$="F" THEN GOSUB 930
230 IF A(E)=63 THEN GOSUB 310:REM MAGIC
240 IF A(E)=68 THEN GOSUB 400:REM DRAGON
250 IF A(E)=81 THEN GOSUB 550:REM QUICKSAND
260 IF A(E)=36 THEN GOSUB 630:REM GOLD
270 H=H+1:IF H=25 THEN Q=9:GOTO 1160
280 GOSUB 1610
290 GOTO 50
300 REM ***********************
310 REM MAGIC
320 PRINT:PRINT "DUKE "A$", YOU'VE STUMBLED"
330 PRINT "INTO A MAGIC CAVE,AND NOW YOU'LL"
340 PRINT "BE WHISKED OFF TO ANOTHER CAVE...."
350 GOSUB 1610
360 A(E) = 46
370 E=RND(76)+12: IF A(E)=88 THEN 370
380 RETURN
390 REM ***********************
400 REM DRAGON
410 PRINT "YOU HAVE WANDERED INTO A DRAGON'S"
420 PRINT "LAIR...START SAYING YOUR PRAYERS"
430 GOSUB 1610
440 M=RND(10000)/10000:IFM<.2THENPRINT"IT HAS
                                  FLOWN AWAY":RETURN
450 PRINT "IT AWAKENS...AND IT HAS SEEN YOU"
460 GOSUB 1610
470 IF M>.849999 THEN PRINT "BUT IT HAS RECENTLY EATEN
475 IF M>.849999 THEN PRINT "AND SO GOES BACK TO
                                      SLEEP":RETURN
480 PRINT "AND NOW IT ATTACKS......"
490 GOSUB 1610
500 IF M>.95 THEN PRINT "BUT YOU FIGHT BACK....AND
                                        WIN":RETURN
510 PRINT "GOODBYE DUKE "A$
520 GOSUB 1610:SOUND 1,8:SOUND 1,8:SOUND 1,8
530 Q=9:GOTO 1160
540 REM ***********************
550 REM QUICKSAND
560 FOR J=1 TO 12
570 FOR K=1 TO J:PRINT " ";:NEXT K
```

```
580 PRINT "HORRORS...QUICKSAND!":SOUND 31-J,1
590 FOR O=1 TO 100:NEXT O
600 NEXT J
610 Q=9:H=0:GOTO 1160
620 REM ***********************
630 REM TREASURE
640 K=RND(100)+100
650 FOR J=1 TO 12
660 FOR Z=1 TO J:PRINT " ";:NEXT Z
670 PRINT "TREASURE ! ! !"
680 FOR O=1 TO 150:NEXT Q
690 NEXT J:SOUND 16,2:SOUND 18,2:SOUND 20,2:SOUND 21,5
700 GOSUB 1610
710 PRINT:PRINT "YOU'VE FOUND A HOARD OF"
720 PRINT:PRINT "DRAGON-GOLD, WORTH $"K
730 G=G+K
740 RETURN
750 REM **************
760 REM AMULET DETAILS
770 Y=1
780 L=A(E+P(Y))
790 IF L<>46 THEN 820
800 IF Y<8 THEN Y=Y+1:GOTO 780
810 IF L=46 THEN RETURN
820 PRINT "YOUR AMULET SIGNALS THAT"
830 PRINT "THERE IS ";
840 IF L=88 THEN PRINT "A SOLID WALL";
850 IF L=63 THEN PRINT "A MAGIC CAVE";
860 IF L=68 THEN PRINT "A DRAGON";
870 IF L=81 THEN PRINT "QUICKSAND";
880 IF L=36 THEN PRINT "GOLD";
890 PRINT " NEARBY"
900 GOSUB 1610
910 RETURN
920 REM ***********************
930 REM ATTACK DRAGON
940 PRINT
950 AR=AR-1:IF AR=0 THEN PRINT "YOU HAVE USED UP ALL"
955 IF AR=0 THEN PRINT " ARROWS.....":
                                GOSUB 1610:RETURN
960 PRINT "YOU HAVE"AR"ARROWS IN YOUR QUIVER"
970 SS=0
980 PRINT "WHICH DIRECTION DO YOU WANT"
```

```
990 INPUT "TO SHOOT IN (N,S,E,OR W)";S$
1000 IF S$="N" AND A(E-10)=68 THEN SS=1:YT=E-10
1010 IF S$="S" AND A(E+10)=68 THEN SS=1:YT=E+10
1020 IF S$="E" AND A(E+1)=68 THEN SS=1:YT=E+1
1030 IF S$="W" AND A(E-1)=68 THEN SS=1:YT=E-1
1040 PRINT
1050 IF SS=0 THEN PRINT "THERE WAS NO DRAGON THERE....."
1055 IF SS=0 THEN PRINT "YOU HAVE WASTED AN
                              ARROW!!":GOTO 1150
1060 PRINT "WELL DONE, DUKE "A$
1070 PRINT "YOU HAVE HIT"
1080 PRINT "A FEROCIOUS DRAGON"
1090 GOSUB 1610
1100 IF RND(10)>3 THEN 1140
1110 PRINT "YOU KILLED IT!!":A(YT)=46:K=RND(100)+100
1120 PRINT
1130 PRINT "YOU ARE REWARDED WITH $"K:G=G+K:GOTO 1150
1140 PRINT "BUT YOU ONLY WOUNDED IT....."
1150 GOSUB 1610:RETURN
1160 IF H<1 THEN PRINT "ALL YOUR CHARISMA IS"
1165 IF H<1 THEN PRINT "....EXHAUSTED....":GOSUB
                                      1610:GOTO 1180
1170 PRINT "YOU HAVE"25-H"UNITS OF CHARISMA LEFT"
1180 IF G>0 THEN PRINT "YOU AMASSED $"G"WORTH OF GOLD"
1190 PRINT:PRINT
1200 A(E)=72
1210 FOR J=1 TO 100
1220 PRINT CHR$(A(J));" ";
1230 IF 10*INT(J/10)=J THEN PRINT
1240 NEXT J
1250 GOSUB 1610
1260 IF Q=9 THEN END
1270 RETURN
1280 CLS:PRINT:PRINT:PRINT
1290 PRINT "    WELCOME TO THE WORLD OF":
                              PRINT ,"    DRAGONFEAR"
1300 PRINT "YOUR MISSION IS TO EXPLORE THE"
1310 PRINT "CAVES OF DRAGONWORLD,LOOKING FOR"
1320 PRINT "TREASURE, AND ATTEMPTING TO SLAY"
1330 PRINT "THE FEARSOME DRAGONS WHO LIVE IN"
1340 PRINT "THE CAVES. WHAT IS YOUR NAME";
1350 INPUT A$
```

```
1360 CLS:PRINT:PRINT "ALL HAIL, DUKE "A$
1370 PRINT:PRINT "YOU START THIS EXPLORATION"
1380 PRINT "WITH 25 UNITS OF CHARISMA, AND"
1390 PRINT "YOU MUST COMPLETE YOUR TASK"
1400 PRINT "BEFORE THE CHARISMA IS WORN OUT."
1410 PRINT "  YOU LOSE ONE UNIT FOR EVERY":
                              PRINT,"MOVE YOU MAKE"
1420 T$=INKEY$:T$=INKEY$
1430 PRINT:PRINT "PRESS ANY KEY TO BEGIN"
1440 IF INKEY$="" THEN 1440
1450 CLS:PRINT@224,"PLEASE STAND BY, DUKE "A$
1460 DIM A(100):H=0:Q=0:L=0:G=0:AR=6
1470 FOR B=1 TO 100:A(B)=46
1480 IFB<12ORB>90OR10*INT(B/10)=BOR10*INT(B/10)
                                   =B-1 THEN A(B)=88
1490 NEXT
1500 FOR B=1 TO 5:RESTORE:FOR D=1 TO 5
1510 Z=RND(76)+12:IF A(Z)=88 THEN 1510
1520 READ C:A(Z)=C
1530 NEXT D,B
1540 DATA 88,63,68,81,36
1550 FOR B=1 TO 8:READ Z:P(B)=Z:NEXT B
1560 DATA -11,-10,-9,-1,1,9,10,11
1570 E=55
1580 RETURN
1590 REM
1600 REM
1610 FOR O=1 TO 3000:NEXT O:RETURN
1620 PRINT "YOU CANNOT MOVE THAT WAY!":GOTO 150
```

Simulations

Simulations are ways of producing a counterfeit reality. In contrast to adventure, where the reality created via the computer is often magical and dream-like, the worlds accessed through computer simulations are generally more down to earth.

In a simulation, the computer manipulates variables in accordance with formulae you've specified, keeping tabs on the unfolding of the situation you've generated, and taking the place of the environment in terms of reacting to your input.

Simulations attempt to replicate life. However, because reality is notoriously hard to pin down and limit, we need to do some pretty drastic simplification before we can produce a workable simulation.

Despite this simplification—as you'll soon see—a well-written simulation can imitate life to an uncanny extent. Cause and effect are linked as accurately as you can devise formulae for them.

□ MISTRESS OF XENOPHOBIA

We'll start our exploration of simulations with the silliest one of the lot, MISTRESS OF XENOPHOBIA, which is based on a program written by Alastair Gourlay, a talented programmer who lives in Glasgow.

There's no need to explain MISTRESS, as the program gives you all the prompts you could need. Here's the listing:

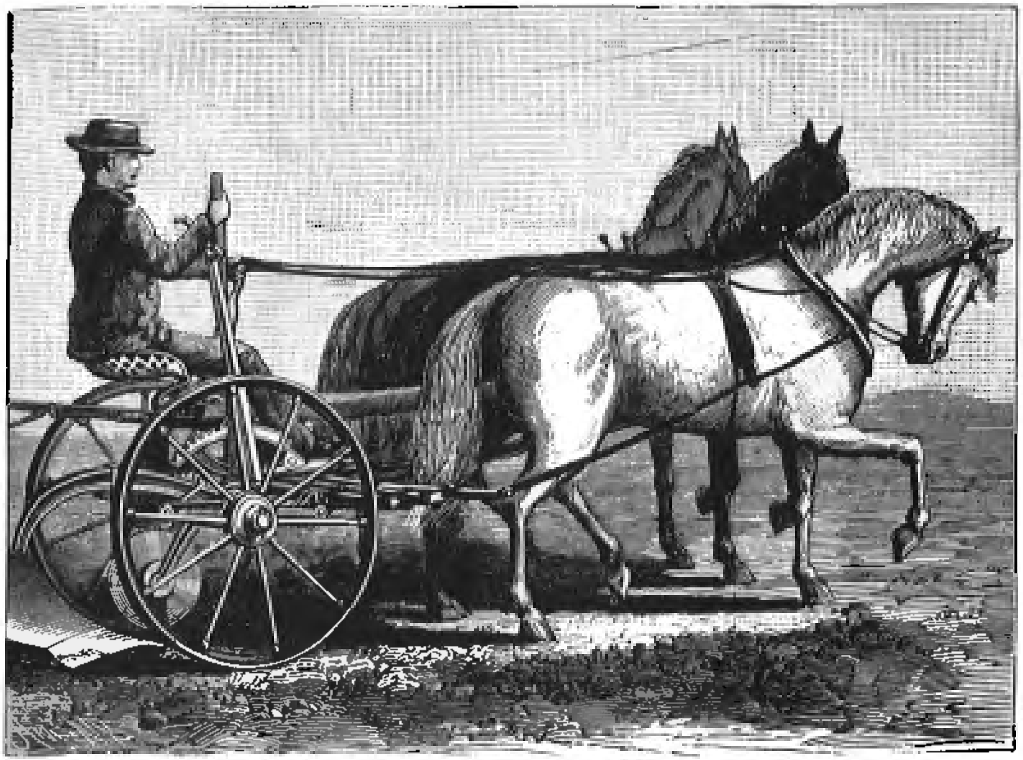
```
20 GOSUB 700
30 REM ************************
40 FOR Y=1 TO 20
50 CLS
60 PRINT:PRINT
70 PRINT"MISTRESS OF XENOPHOBIA,A REPORT"
80 PRINT"FOR YOU FROM THE OFFICE OF INFO
                               -MATION REGARDING THE";
90 PRINT" STATE OF":PRINT"YOUR PLANET"
100 PRINT"IN THIS YEAR OF GRACE,"1994+Y
120 PRINT"THE PLANETS POPULATION IS"INT(P+INP(H))
130 GOSUB 880
140 PRINT:PRINT"THE GROVELLING PEASANTS COULD "
150 PRINT"WORK SOME"L"ACRES THIS YEAR..."
160 GOSUB 880
170 PRINT"YOUR TREASURY HOLDS GOLD,GEMS"
```

```
180 PRINT"AND COINS WORTH $"INT(U)
190 GOSUB 880
200 PRINT:PRINT "TIME TO ISSUE A DECREE...."
210 PRINT:PRINT"HOW MUCH LAND IS TO BE FARMED"
220 INPUT"THIS YEAR";W
230 U=U-W*10
240 IF U<1 THEN 780
250 L=L+W
260 GOSUB 880
270 PRINT:PRINT"AND HOW MUCH WILL YOU SPEND"
280 INPUT"ON FOOD FOR THE PEASANTS";W
290 U=U-W*10
300 IF U<1 THEN 780
310 R=RND(10)
320 GOSUB 880
330 IF P-W*R*5>P/4 THEN GOSUB 580
340 P=P+RND(1000)/1000*(W*R*5-P)
350 IF P>149 THEN 410
360 GOSUB 880
370 PRINT"THE POPULATION OF XENOPHOBIA IS"
380 PRINT"NOW DOWN TO"INT(P)"AND THAT"
390 PRINT"JUST AIN'T ENOUGH, YOUR XENO":SOUND 8,8:
                                       SOUND 7,7
395 SOUND 6,6:SOUND 5,5:SOUND 4,4:SOUND 3,3:
                               SOUND 2,2:SOUND 1,1
400 GOTO 480
410 U=U+INT(P*L)/93
420 NEXT Y
430 PRINT:PRINT:PRINT"WELL, YOUR XENOPHOBIC, THAT'S"
440 PRINT"THE END OF YOUR 20 YEAR DOMINAT-ION OF
                                      OUR LITTLE";
450 PRINT"PLANET.":PRINT"YOU MANAGED TO"
460 PRINT"ACCUMULATE SOME $"U"WHICH"
470 PRINT"I GUESS AIN'T TOO BAD...."
480 GOSUB 880
490 PRINT:PRINT"IF YOU'D LIKE ANOTHER SHOT"
500 PRINT"RULING, THEN JUST PRESS 'Y' OR"
510 PRINT"PRESS 'N' ...."
520 A$=INKEY$
530 IF A$<>"Y" AND A$<>"N" THEN 520
540 IF A$="Y" THEN RUN
550 PRINT"YOUR WISH IS MY COMMAND"
560 PRINT"OH MISTRESS OF XENOPHOBIA":END
```

```
570 REM ***********************
580 PRINT"OH DEAR! THERE'S NOT ENOUGH FOOD
                               FOR EVERYONE...."
585 PRINT:PRINT"HORRORS, YOUR XENONESS"
590 PRINT"THERE'S BEEN A REBELLION!!!!"
600 PRINT"THE PEASANTS ARE REVOLTING"
610 PRINT"(I HAD TO PUT THAT LINE IN)"
620 GOSUB 880
630 IFRND(5)=1THENPRINT"AND YOUR COPS
                      COULDN'T STOP THEM":GOTO480
640 PRINT"BUT YOUR RUTHLESS POLICE HAVE"
650 PRINT"PUT A STOP TO ALL THAT NONSENSE"
660 GOSUB 880
670 RETURN
680 NEXT Y
690 REM ***********************
700 REM INITIALISATION
720 CLS
730 P=PEEK(RND(32767)):H=P
740 U=700+RND(550)
750 L=70+RND(50)
760 RETURN
770 REM ***********************
780 REM BANKRUPTCY
790 PRINT:PRINT"WELL, XENO, THATS A FINE"
800 PRINT"MESS YOU'VE GOT YOURSELF, AND
810 PRINT"OUR LITTLE PLANET INTO."
820 GOSUB 880
830 PRINT:PRINT"THE TREASURY IS BANKRUPT!!"
840 GOSUB 880
850 PRINT:PRINT"AND GUESS WHO BLEW IT?????????"
860 GOTO 490
870 REM ***********************
880 REM DELAY
890 FOR J=1 TO 1500 :NEXT J
900 PRINT
910 RETURN
```

□ RURAL PURSUITS

If you've survived being MISTRESS OF XENOPHOBIA, you may be interested in something a little more earthy—running a farm. In RURAL PURSUITS, based loosely on a program written by Stephen Glen, also of Glasgow, you have a very difficult task, as you battle with an extremely touchy work-crew to bring home the bacon (or at least the wheat and barley).

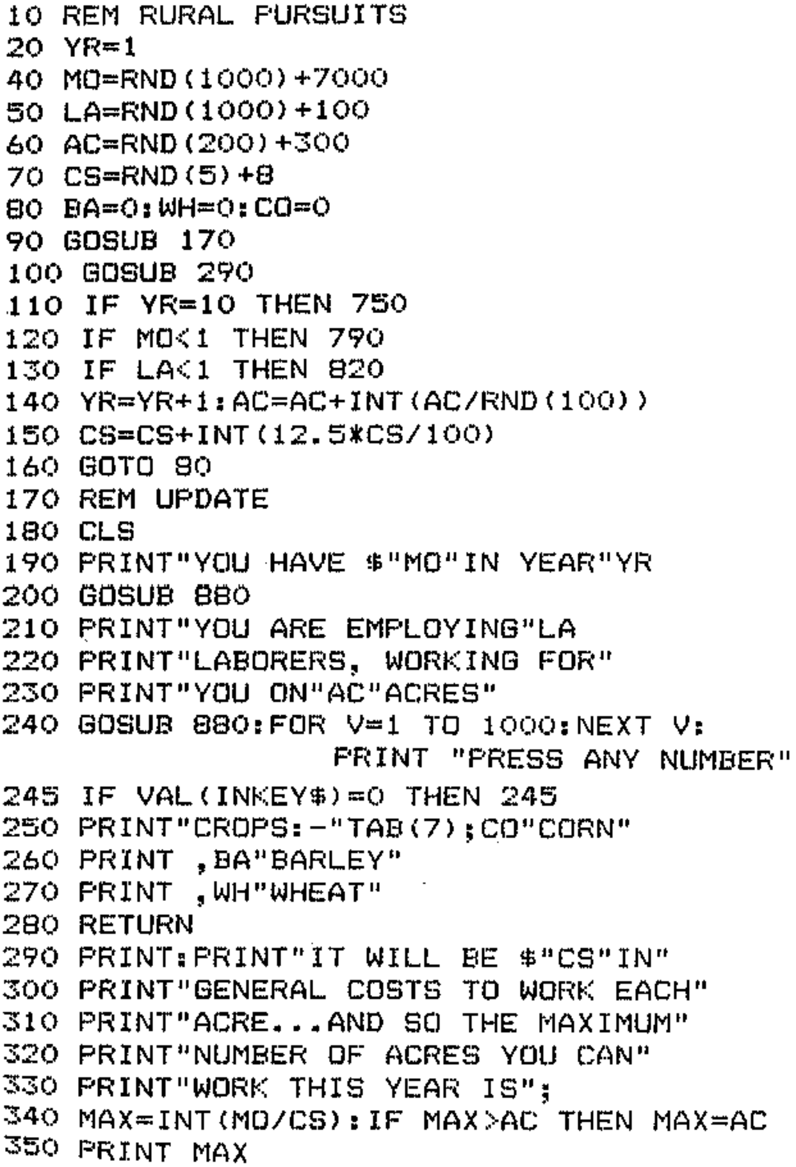


Again the program is largely self-prompting, and working with it will teach you the best strategy for gaining a maximum return from your farm (and surviving for the requisite 20 years to win the game). However, a few hints will not go astray. Although you can save money by paying your workers extremely badly, you'll find they'll desert you in droves in the following year, and the return you get from your land is dictated, to some degree, by the number of people you have working on the land.

Another factor to keep in mind is that the three crops which you can plant have quite different returns, so it is in your interest to work out which is the most profitable crop, and concentrate on that.

Do not be dismayed if you foul the process up the first few times you run the program. You'll have to develop some real skills to keep your farm solvent, and it may take you several bad years to get the hang of it.

Here's the program so you can become a happy farmer:



```
10 REM RURAL PURSUITS
20 YR=1
40 MO=RND(1000)+7000
50 LA=RND(1000)+100
60 AC=RND(200)+300
70 CS=RND(5)+8
80 BA=0:WH=0:CO=0
90 GOSUB 170
100 GOSUB 290
110 IF YR=10 THEN 750
120 IF MO<1 THEN 790
130 IF LA<1 THEN 820
140 YR=YR+1:AC=AC+INT(AC/RND(100))
150 CS=CS+INT(12.5*CS/100)
160 GOTO 80
170 REM UPDATE
180 CLS
190 PRINT"YOU HAVE $"MO"IN YEAR"YR
200 GOSUB 880
210 PRINT"YOU ARE EMPLOYING"LA
220 PRINT"LABORERS, WORKING FOR"
230 PRINT"YOU ON"AC"ACRES"
240 GOSUB 880:FOR V=1 TO 1000:NEXT V:
                  PRINT "PRESS ANY NUMBER"
245 IF VAL(INKEY$)=0 THEN 245
250 PRINT"CROPS:-"TAB(7);CO"CORN"
260 PRINT ,BA"BARLEY"
270 PRINT ,WH"WHEAT"
280 RETURN
290 PRINT:PRINT"IT WILL BE $"CS"IN"
300 PRINT"GENERAL COSTS TO WORK EACH"
310 PRINT"ACRE...AND SO THE MAXIMUM"
320 PRINT"NUMBER OF ACRES YOU CAN"
330 PRINT"WORK THIS YEAR IS";
340 MAX=INT(MO/CS):IF MAX>AC THEN MAX=AC
350 PRINT MAX
```

```
360 PRINT"HOW MUCH LAND DO YOU WANT TO":
                                PRINT"HARVEST";
370 INPUT L
380 IF L>MAX THEN 370
390 MO=MO-L*CS
400 GOSUB 170
410 PRINT:PRINT"HOW MUCH WILL YOU PAY EACH ":
                                    PRINT"WORKER";
420 INPUT W
430 IF W*LA>MO THEN 420
440 MO=MO-LA*W
450 GOSUB 170
460 P=10
470 PRINT"WHAT PROPORTION (OUT OF TEN) DO"
480 PRINT"YOU WISH TO CONCENTRATE ON CORN";
490 INPUT CP
500 IF CP>P THEN 490
510 P=P-CP
520 PRINT:PRINT"OF THE REMAINING"P"OUT OF TEN,"
530 PRINT"HOW MUCH WHEAT DO YOU WANT TO    PLANT"
540 INPUT WP
550 IF WP>P THEN 540
560 P=P-WP
570 GOSUB 870
580 PRINT"STAND BY FOR A YEAR...."
590 FOR Z=1 TO 2000:NEXT Z
600 BA=INT(P*L*LA*W*3/100000)
610 CO=INT(CP*L*LA*W*2.7/17000)
620 WH=INT(WP*L*LA*W*1.4/9300)
630 T=BA+CO+WH
640 GOSUB 170
650 PRINT:PRINT T"TONS WERE HARVESTED"
660 RT=INT((.5+8.7*BA+5.94*CO+2.2*WH)*(CS-CX+1))
670 IF BA=0 AND CO=0 AND WH=0 THEN RT=0
680 FOR Z=1 TO 2000:NEXT Z
690 PRINT:PRINT"AND YOUR TOTAL RETURN"
700 PRINT"WAS $"RT
710 MO=MO+RT
720 LA=INT(LA-LA/(W+.01))
730 FOR Z=1 TO 2000:NEXT Z
740 RETURN
750 GOSUB 870
760 PRINT "YOU HAVE SURVIVED FOR 10 YEARS"
770 PRINT"CONGRATULATIONS!"
```

```
775 IF MO>1E+12 THEN GOSUB 900
780 PRINT "AND GAINED"MO"MONEY":END
790 GOSUB 870
800 PRINT "YOU HAVE GONE BROKE!"
810 END
820 GOSUB 870
830 PRINT "YOU HAVE NO WORKERS, AND"
840 PRINT "HAVE BEEN FORCED TO SELL"
850 PRINT ,"YOUR FARM"
860 END
870 CLS
880 PRINT:PRINT
890 RETURN
900 FOR TU=1 TO 33:READ FR,DU:SOUND FR,DU:
                             NEXT TU:RETURN
910 DATA 16,3,18,2,20,3,20,1,20,2,18,1,20,2,21,5,20,3
920 DATA 20,2,18,3,18,1,18,2,16,2,18,2,20,3,16,2
930 DATA 16,3,18,2,20,3,20,1,20,2,18,1,20,3,21,3,
                                            23,3,25,5
940 DATA 25,4,23,3,21,2,20,3,18,2,16,5
```

□ AVALANCHE

In this simulation, you are Mayor Glugenheimer, the leader of a Swiss alpine village which lies directly in the path of avalanches which launch themselves at the village with monotonous regularity. The game, like the other three in the book, forces you to make decisions regarding the expenditure of strictly limited resources. On these decisions hang the fate of your village.

You are (you hope) in office for 20 years. Although it is more likely than not that the village will survive from year to year without suffering the ravages of an avalanche, the chances of an avalanche increase each year. The only resource under your control is money, which can be used to build shelters within which your villagers can huddle in comparative safety when an avalanche hits.

You have limited money (which is bearing a generous interest rate if it is not spent on shelter). The longer you hang on to the money, the more you will have to spend on avalanche shelters. However, the longer you wait without buying shelter, the more likely it is that an avalanche will occur, and many members of your village will be killed. You must therefore determine what proportion of your money you will keep on deposit, and what portion of it will be spent on shelter. If you have no shelter when an avalanche strikes, the village will be wiped out.

As you can see, you are bearing a considerable amount of responsibility. If an avalanche does strike, and the computer considers the loss of life totally unacceptable, the game will terminate with the following statement:

```
THE LOSS OF HUMAN LIFE WAS
CATASTROPHIC...YOU HAVE
BEEN FORCED TO STEP DOWN
FROM THE OFFICE OF MAYOR
```

Here are a few "years" from the program in action:

```
  YEAR 1

THE CHANCE OF AN AVALANCHE IS 19 TO 1

THE VILLAGE HAS 2472 PEOPLE
THE VILLAGE TREASURY HOLDS $ 12232

HOW MUCH WILL YOU SPEND ON SHELTER? 11000


   YEAR 2

THE CHANCE OF AN AVALANCHE IS 18 TO 1

THE VILLAGE HAS 2595 PEOPLE

YOU HAVE 29700 SHELTER

THE VILLAGE TREASURY HOLDS $ 1355

HOW MUCH WILL YOU SPEND ON SHELTER? 50


   YEAR 3

THE CHANCE OF AN AVALANCHE IS 17 TO 1

THE VILLAGE HAS 2724 PEOPLE

YOU HAVE 29835 SHELTER

THE VILLAGE TREASURY HOLDS $ 1436

HOW MUCH WILL YOU SPEND ON SHELTER? 1


   YEAR 5

THE CHANCE OF AN AVALANCHE IS 15 TO 1

THE VILLAGE HAS 3003 PEOPLE

YOU HAVE 29969 SHELTER

THE VILLAGE TREASURY HOLDS $ 1683
```

```
HOW MUCH WILL YOU SPEND ON SHELTER? 100
** AVALANCHE **
** AVALANCHE **
 ** AVALANCHE **
 ** AVALANCHE **
  ** AVALANCHE **
  ** AVALANCHE **
   ** AVALANCHE **
   ** AVALANCHE **
             ** AVALANCHE **
              ** AVALANCHE **
              ** AVALANCHE **
               ** AVALANCHE **
               ** AVALANCHE **

 2994 PEOPLE ARE SAFE...

BUT 9 PEOPLE WERE KILLED...

THERE ARE 27215 CUBIC YARDS OF SHELTER LEFT



   YEAR 12

THE CHANCE OF AN AVALANCHE IS 8 TO 1

THE VILLAGE HAS 4209 PEOPLE

YOU HAVE 27215 SHELTER

THE VILLAGE TREASURY HOLDS $ 3086

THERE ARE 9 VILLAGERS DEAD

HOW MUCH WILL YOU SPEND ON SHELTER? 0
** AVALANCHE **
** AVALANCHE **
 ** AVALANCHE **
 ** AVALANCHE **
  ** AVALANCHE **
  ** AVALANCHE **
   ** AVALANCHE **
```

```
               ** AVALANCHE **
               ** AVALANCHE **
                ** AVALANCHE **
                ** AVALANCHE **

  2722 PEOPLE ARE SAFE...

 BUT 1487 PEOPLE WERE KILLED...

 THERE ARE 24493 CUBIC YARDS OF SHELTER LEFT



    YEAR 18

 THE CHANCE OF AN AVALANCHE IS 2 TO 1

 THE VILLAGE HAS 2444 PEOPLE

 YOU HAVE 20095 SHELTER

 THE VILLAGE TREASURY HOLDS $ 5326

 THERE ARE 2523 VILLAGERS DEAD

 HOW MUCH WILL YOU SPEND ON SHELTER? 50
 ** AVALANCHE **
 ** AVALANCHE **
  ** AVALANCHE **
  ** AVALANCHE **
   ** AVALANCHE **
   ** AVALANCHE **
              ** AVALANCHE **
               ** AVALANCHE **
               ** AVALANCHE **
                ** AVALANCHE **
                ** AVALANCHE **

  2023 PEOPLE ARE SAFE...

 BUT 421 PEOPLE WERE KILLED...

 THERE ARE 18207 CUBIC YARDS OF SHELTER LEFT
```

You can see that if an avalanche does strike, but not enough people are killed to force you out of office, it becomes a little easier to cope with future avalanches because you have less people who you must shelter. However, the villagers waste no time in adding to their numbers (there is little to do on winter nights except huddle under the bedclothes and listen for the warning rumble of an impending avalanche, so the gradual population increase is not hard to understand).

You'll be rewarded with a statement like the following if you survive 20 years in office:

```
WELL DONE, MAYOR GLUGENHEIMER

YOU MANAGED TO SURVIVE 20 YEARS
IN OFFICE, AND END YOUR TERM WITH:

    $ 6347 IN THE TREASURY

     1921 PEOPLE SURVIVING

     16468 CUBIC YARDS OF SHELTER

YOUR MAYORAL RATING IS 81423
```

Your final "mayoral rating" (see line 300) is related to the amount of money you still have left in the treasury, the number of surviving villagers, and shelter on hand. This total is offset by the number of people who have been killed in avalanche falls during your term of office.

```
10 REM AVALANCHE!
20 REM FOR VZ300
30 M = RND(5000) + 9087
40 P = RND(1000) + 2278
50 S=0:D=0:N=0
60 FOR Y = 1 TO 20
70 CLS
80 IF Y = 20 THEN 240
90 PRINT TAB(4);"YEAR";Y
100 PRINT:PRINT "THE CHANCE OF AN AVALANCHE
IS";20-Y;"TO 1"
110 PRINT:PRINT "THE VILLAGE HAS";P;"PEOPLE"
```

```
120 IF S<>0 THEN PRINT:PRINT "YOU HAVE";S;"S
HELTER"
130 PRINT:PRINT "THE VILLAGE TREASURY HOLDS
$";M
140 IF D<>0 THEN PRINT:PRINT "THERE ARE";D;"
VILLAGERS DEAD"
150 IF N<>0 THEN PRINT:PRINT "THERE HAVE BEE
N";N;"AVALANCHES"
160 PRINT:INPUT "HOW MUCH WILL YOU SPEND ON
SHELTER";A
170 IF M-A<0 OR S+A<0 THEN 160
180 M=M-A
190 S=S+INT(2.7*A)
200 M=M+INT(M/10 +.5)
210 IF INT(RND(1)*(20-Y))+1=1 THEN GOSUB 320

220 P = INT(P+.05*P)
230 NEXT Y
240 PRINT:PRINT "WELL DONE, MAYOR GLUGENHEIM
ER"
250 PRINT:PRINT "YOU MANAGED TO SURVIVE 20 Y
EARS"
260 PRINT "IN OFFICE, AND END YOUR TERM WITH
:"
270 PRINT:PRINT TAB(4);"$";M;"IN THE TREASUR
Y"
280 PRINT:PRINT TAB(4);P;"PEOPLE SURVIVING"
290 PRINT:PRINT TAB(4);S;"CUBIC YARDS OF SHE
LTER"
300 PRINT:PRINT "YOUR MAYORAL RATING IS";10*
M+20*P+P+S - 12*D
310 END
320 REM *** AVALANCHE ***
330 FOR J = 1 TO 32
340 PRINT TAB(J/2);"** AVALANCHE **"
350 FOR E=1 TO 330 - 10*J:NEXT E
360 NEXT J
370 Q=INT(S/10 + .5)
380 IF Q>P THEN Q=Q-15:GOTO 380
390 PRINT:PRINT Q;"PEOPLE ARE SAFE..."
400 X=P-Q
410 FLAG=0:IF X>2*P/3 THEN FLAG=1
```

```
420 IF X>0 THEN PRINT:PRINT "BUT";X;"PEOPLE
WERE KILLED..."
430 D=D+X
440 P=Q
450 S=S-INT(S/10 + .5)
460 PRINT:PRINT "THERE ARE";S;"CUBIC YARDS O
F SHELTER LEFT"
470 FOR E=1 TO 3000:NEXT E
480 IF FLAG=1 THEN 500
490 RETURN
500 PRINT:PRINT
510 PRINT "THE LOSS OF HUMAN LIFE WAS"
520 PRINT "CATASTROPHIC...YOU HAVE"
530 PRINT "BEEN FORCED TO STEP DOWN"
540 PRINT "FROM THE OFFICE OF MAYOR"
550 END
```

□ CHAIRMAN OF THE BOARD

Finally in this section we have our major simulation, CHAIRMAN OF THE BOARD.

Again the program is largely self-prompting. The aim of the game is to keep your factory running until you manage to make $10,000 (in total, combining the value of stock in hand plus your capital). You have to deal with recalcitrant unions (who won't always let you fire the people you wish to get rid of, and have a great appetite for pay raises which you cannot deny), with workers who will hardly ever meet the production targets you set, and raw material suppliers who enjoy putting their prices up as much as the unions enjoy slugging you for more pay.

You'll find, in contrast to the other two programs, which are only very vague approximations to "real life," that the life and health of your factory will become very important to you, and you'll certainly learn ways of manipulating resources for maximum return. Keep in mind that although you have great freedom in setting the retail price of your products, each rise in price will increase consumer resistance to purchasing those products.

And now you can satisfy your corporate ambitions with this listing:

```
10 REM CHAIRMAN OF THE BOARD
20 GOSUB 1670:REM INITIALISE
30 WE=WE+1
40 GOSUB 930:REM REPORT
50 GOSUB 1300:REM STAFF
60 GOSUB 930:REM REPORT
70 GOSUB 1130:REM PRODUCTION
80 GOSUB 930:REM REPORT
90 GOSUB 730:REM SALES
100 GOSUB 140:REM PROBLEMS
110 CA=CA-WA*WO-RC
120 GOTO 30
130 REM ********
140 REM PROBLEMS
150 CLS
160 IF RND(0)<.45 THEN 260
170 A=RND(7)
180 PRINT:PRINT:PRINT
190 PRINT "THE UNIONS ARE DEMANDING A"
200 PRINT "PAY RISE OF"A"%"
210 WA=INT(100*(WA+WA*A/100))/100
220 GOSUB 1840
230 PRINT:PRINT "PAY PER EMPLOYEE IS NOW $"WA
240 GOSUB 1840
250 CLS
260 IF RND(0)<.81 THEN 410
270 PRINT:PRINT:PRINT
280 PRINT "A FIRE IN YOUR WAREHOUSE HAS"
290 PRINT "DESTROYED SOME STOCK. PLEASE"
300 PRINT "STAND BY FOR A REPORT ON"
310 PRINT "THE DAMAGE CAUSED..."
320 GOSUB 1840
330 A=RND(ST/2)
340 ST=ST-A
350 PRINT:PRINT "THERE WERE"A;A$
360 PRINT "DESTROYED. THEY WERE "
370 PRINT "WORTH $"A*SP"RETAIL"
380 GOSUB 1840
390 PRINT "STOCK IN HAND IS"
400 PRINT "NOW"ST;A$
410 IF RND(0)>.3 THEN 560
```

```
420 CLS
430 PRINT:PRINT
440 PRINT "YOUR MAIN SUPPLIER HAS ANNOUNCED"
450 PRINT "A DRAMATIC PRICE RISE..."
460 GOSUB 1840
470 A=RND(100*CO/7)/100
480 IF A<1 THEN 470
490 PRINT:PRINT"THE COST OF MAKING "A$
500 PRINT "HAS RISEN BY $"A"EACH"
510 GOSUB 1840
520 CO = CO + A
530 PRINT:PRINT "IT NOW COSTS $"CO
540 PRINT "TO MAKE EACH ONE..."
550 GOSUB 1840
560 IF RND(0) < .65 AND MA < SP THEN RETURN
570 CLS
580 PRINT:PRINT
590 PRINT "YOU HAVE A CHANCE TO RAISE"
600 PRINT TAB(4);"YOUR PRICE. YOUR"
610 PRINT A$;" NOW SELL FOR $"SP
620 GOSUB 1840
630 PRINT
640 PRINT "WHAT PERCENTAGE INCREASE WOULD"
650 INPUT "YOU LIKE TO IMPOSE";A
660 RE=RE+A
670 SP=INT(100*(SP+A*SP/100))/100
680 GOSUB 1840
690 PRINT:PRINT "THE "A$" NOW SELL FOR $"SP
700 GOSUB 1840
710 RETURN
720 REM *****
730 REM SALES
740 PRINT:PRINT "YOUR TOTAL STOCK OF"
750 PRINT A$" IS"ST
760 GOSUB 1840
770 PRINT:PRINT "PLEASE STAND BY FOR A"
780 PRINT "SALES REPORT..."
790 A=INT(RND(0)*ST/(RE/1000))+1
800 IF A>ST THEN 790
810 CLS
820 PRINT:PRINT
830 PRINT "THE TOTAL NUMBER OF "A$
840 PRINT "SOLD IS"A
```

```
850 ST=ST-A
860 ZA=A*SP
870 PRINT:PRINT "THE INCOME FROM THAT"
880 PRINT "SALE WAS $"ZA
890 CA=INT(A*SP*100)/100+CA
900 GOSUB 1840
910 RETURN
920 REM *********************
930 REM REPORT TO THE CHAIRMAN
940 CLS
950 IF CA+ST<1 THEN 1510:REM BANKRUPTCY
960 IF CA+ST>9999 THEN PRINT "YOU'VE MADE $10000 AND
965 IFCA+ST>9999THEN PRINT"CAN NOW RETIRE...":
                                     GOSUB1840:GOTO 1590
970 PRINT:PRINT "SHOP FLOOR REPORT, SIR,"
980 PRINT TAB(6);"FOR WEEK"WE
990 PRINT:PRINT "CAPITAL IN HAND IS $"
                                     INT(CA*100)/100
1000 PRINT "RUNNING COSTS ARE $"RC"A WEEK"
1010 PRINT:PRINT "YOUR STORES HOLD"ST;A$
1020 PRINT TAB(6);"WORTH $"INT(ST*SP*100)/100
1030 PRINT:PRINT "THEY SELL FOR $"SP" EACH"
1040 PRINT "AND COST $"CO"EACH TO MAKE"
1045 IF INKEY$<>" " THEN 1045
1050 PRINT:PRINT "YOUR WORKFORCE IS NOW"
1060 PRINT WO"STRONG, AND YOU ARE"
1070 PRINT "PAYING THEM $"WA"EACH"
1080 PRINT "THE WAGES BILL THIS WEEK IS $"WA*WO"
1090 PRINT:PRINT "EACH PERSON CAN MAKE"PR
1100 PRINT A$" A WEEK, A TOTAL"
1110 PRINT "OUTPUT OF"PR*WO
1120 RETURN
1130 INPUT "HOW MANY DO YOU WISH TO PRODUCE";MA
1140 IF MA=0 THEN RETURN
1150 PRINT
1160 IFMA*CO>CA THEN PRINT"YOU DO NOT HAVE
                              ENOUGH MONEY":GOTO1130
1170 IF MA>PR*WO THEN PRINT "YOU DO NOT HAVE
                                    ENOUGH PEOPLE"
1178 IF MA>PR*WO THEN PRINT TAB(6);"THAT MANY":
                                         GOTO 1130
1180 PRINT "YES SIR...THE TARGET FOR WEEK"WE
1190 PRINT "IS"MA;A$
```

```
1200 MA=INT(MA-RND(0)*MA/5)
1210 GOSUB 1840
1220 PRINT:PRINT "THE NUMBER OF "A$
1230 PRINT "ACTUALLY PRODUCED IN WEEK"WE
1240 PRINT "WAS"MA"..."
1250 ST=ST+MA
1260 CA=CA-CO*MA
1270 GOSUB 1840
1280 RETURN
1290 REM *****
1300 REM STAFF
1310 PRINT "HOW MANY PEOPLE DO YOU"
1320 INPUT "WISH TO HIRE";A
1330 WO=WO+A
1340 PRINT:PRINT "THE TOTAL WORKFORCE"
1350 PRINT "IS NOW"WO"STRONG"
1360 GOSUB 1840
1370 IF A>0 THEN RETURN
1380 GOSUB 930
1390 PRINT "HOW MANY PEOPLE DO YOU"
1400 INPUT "WISH TO FIRE";A
1410 IF A=0 THEN 1480
1420 IF A>WO THEN 1390
1430 A=RND(A)
1440 GOSUB 1840
1450 PRINT:PRINT "THE UNIONS WILL ALLOW"
1460 PRINT "YOU TO GET RID OF"A
1470 WO=WO-A
1480 GOSUB 1840
1490 RETURN
1500 REM ************
1510 REM BOTTOM LINE!
1520 PRINT:PRINT "YOU'RE BANKRUPT!!":SOUND 5,8
1530 GOSUB 1840
1540 PRINT:PRINT "OH THE SHAME OF IT!!":SOUND 3,8
1550 GOSUB 1840:SOUND 1,8
1560 PRINT:PRINT "STILL,YOU KEPT THE BUSINESS"
1570 PRINT "GOING FOR"WE"WEEKS"
1580 GOSUB 1840
1590 PRINT "ENTER 'Y' FOR ANOTHER STINT"
1600 PRINT "AS CHAIRMAN OF THE BOARD...."
1610 PRINT "(OR 'N' IF YOU WANT TO QUIT)"
1620 A$=INKEY$
```

```
1630 IF A$<>"Y" AND A$<>"N" THEN 1620
1640 IF A$="Y" THEN RUN
1650 END
1660 REM **********
1670 REM INITIALISE
1690 FOR Z=1 TO RND(8)
1700 READ A$
1710 NEXT Z
1720 CA=500+RND(500)
1730 ST=100+RND(500)
1740 SP=10+RND(5)
1750 CO=7+RND(5)
1760 IF CO>SP THEN 1750
1770 WO=7+RND(10)
1780 WA=12+RND(SP)
1790 PR=5+RND(6)
1800 RC=100+RND(20)
1810 WE=0
1820 RE=1:REM RE IS SALES RESISTANCE FACTOR
1830 RETURN
1840 REM DELAY SUBROUTINE
1850 FOR Z=1 TO 3000:NEXT Z:RETURN
1860 DATA "EPONYMS","BICYCLES","HARMONICAS"
1870 DATA "KAZOOS","LECTERNS","MOLESKINS"
1880 DATA "CARPETBAGS","PITH HELMETS","SKYHOOKS"
1890 DATA "BARBELLS
```

Just for Fun

There is a range of games in this section of your book, all designed just for fun. From NOUGHTS AND CROSSES, through LAS VEGAS HIGH, to INNER SPRING and ROBOT MINEFIELD, a splendid time is guaranteed for all.

□ INNER SPRING

We'll start this section of the book with one of the simplest games of the lot, INNER SPRING. As the program explains, the computer produces two numbers between one and 13, and asks you to bet on the probability of the next number it thinks of lying between the first two. It's simple to play, and a lot of fun.

Here's what one round looks like in action:

```
MY FIRST NUMBER IS 2
     MY SECOND IS 4

YOU HAVE $ 2

HOW MUCH DO YOU BET
MY NEXT NUMBER LIES
BETWEEN 2 AND 4 ? 1

MY NUMBER WAS 3
WELL DONE, YOU WIN $ 2
```

And here's the listing of INNER SPRING:

```
10 REM INNER SPRING
20 GOSUB 330
30 GOSUB 80
40 IF D<1 THEN GOTO 420
45 IF D>1000 THEN 530
50 GOSUB 340
60 GOTO 30
70 REM ***********************
80 PRINT:PRINT:PRINT
90 PRINT "MY FIRST NUMBER IS"A
100 PRINT "    MY SECOND IS"B
110 PRINT
120 PRINT "YOU HAVE $"D
130 PRINT
140 PRINT "AND HOW MUCH DO YOU BET"
150 PRINT "MY NEXT NUMBER LIES"
160 PRINT "BETWEEN"A"AND"B;
```

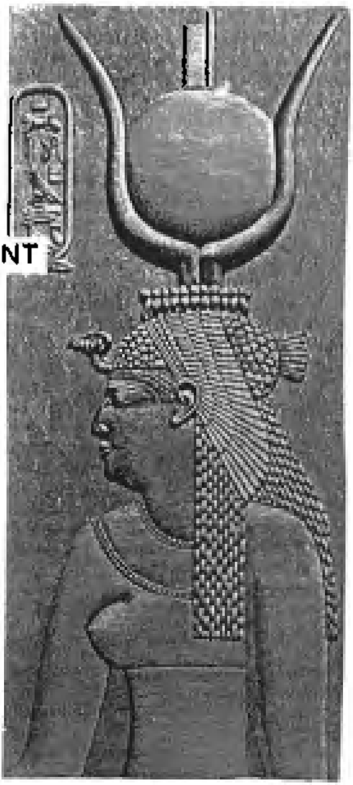
```
170 INPUT E
180 IF E>D THEN 170
190 D=D-E
200 GOSUB 500
210 PRINT:PRINT "MY NUMBER WAS"C
220 GOSUB 500
230  IF NOT (C>A AND C<B OR C<A AND C>B) THEN 290
240 PRINT "WELL DONE, YOU WIN $"2*E
250 D=D+3*E
260 GOSUB 500
270 RETURN
280 REM ********************************************
290 PRINT "SORRY, YOU LOSE $"E
300 GOSUB 500
310 RETURN
320 REM ********************************************
330 D=20
340 CLS
350 A=RND(13)
360 B=RND(13)
370 IF ABS(A-B)<2 OR ABS(A-B)>6 THEN 360
380 C=RND(13)
390 IF A=C OR B=C THEN 380
400 RETURN
410 REM ********************************************
420 PRINT
430 PRINT "THE GAME IS OVER":GOSUB 500
440 PRINT
450 PRINT "YOU ARE BROKE!"
460 PRINT
470 PRINT "THANKS FOR THE GAME"
480 END
490 REM ********************************************
500 FOR Z=1 TO 1000
510 NEXT Z
520 RETURN
530 PRINT:PRINT "CONGRATULATIONS!"
540 PRINT "YOU HAVE REACHED $"D
550 SOUND 21,4:SOUND 16,2:SOUND 16,1:SOUND 18,4
560 SOUND 0,1:SOUND 20,4:SOUND 21,4:END
```

□ TUTANKHAMEN'S TOMB

Tutankhamen was pharaoh of the 18th Dynasty of Egypt, around 1360 B.C. He became king at the age of 11. The reason he is so well known today is that his tomb, discovered by archaeologist Howard Carter in 1922, is the only Egyptian royal tomb to have been found in almost its original condition. Most of the other tombs had long been ransacked by thieves.

The Curse of the Royal Tomb hit those who dared disturb its sanctuary after such a long time, and the Curse continues its evil work in our program. The game outlines the rules, and the background:

```
YOU HAVE A LIMITED TIME IN WHICH
TO FIND AN EXPLORER LOST WITHIN
EGYPT'S GREATEST PYRAMID

----------------------------------------


HE IS TRAPPED WITHIN THE PHAROAH'S
TOMB...AND HAS ONLY A VERY SMALL AMOUNT
OF AIR...YOU CAN TELL APPROXIMATELY
WHERE HE IS BECAUSE HE IS KNOCKING ON
ON THE SIDE OF THE TOMB AND YOU ARE
MAKING YOUR WAY TOWARDS THE SOUND...
YOU CAN HEAR KNOCKING....

----------------------------------------


HOWEVER THE SOUND IS MUFFLED, AND
YOU CANNOT ALWAYS TELL EXACTLY WHERE
IT IS COMING FROM....
```



```
----------------------------------------

THE KNOCKING APPEARS TO BE COMING FROM
AHEAD OF YOU

YOU HAVE 20 DICK SMITH MINUTES LEFT

YOU ARE IN A SERIES OF TUNNELS
WITHIN THE PYRAMID...WHICH WAY DO YOU
WANT TO TURN (U,D,R,L,F,B)? U
```

```
THE KNOCKING APPEARS TO BE COMING FROM
TO THE RIGHT AND AHEAD OF YOU

YOU HAVE 19 DICK SMITH MINUTES LEFT

YOU ARE IN A SERIES OF TUNNELS
WITHIN THE PYRAMID...WHICH WAY DO YOU
WANT TO TURN (U,D,R,L,F,B)? R
```

```
----------------------------------------


THE KNOCKING APPEARS TO BE COMING FROM
ABOVE YOU TO THE RIGHT AND AHEAD OF YOU

YOU HAVE 17 DICK SMITH MINUTES LEFT

YOU ARE IN A SERIES OF TUNNELS
WITHIN THE PYRAMID...WHICH WAY DO YOU
WANT TO TURN (U,D,R,L,F,B)? F

----------------------------------------


THE KNOCKING APPEARS TO BE COMING FROM
ABOVE YOU AHEAD OF YOU

YOU HAVE 16 DICK SMITH MINUTES LEFT

YOU ARE IN A SERIES OF TUNNELS
WITHIN THE PYRAMID...WHICH WAY DO YOU
WANT TO TURN (U,D,R,L,F,B)? U


YOU HAVE 4 DICK SMITH MINUTES LEFT

YOU ARE IN A SERIES OF TUNNELS
WITHIN THE PYRAMID...WHICH WAY DO YOU
WANT TO TURN (U,D,R,L,F,B)? F

----------------------------------------


THE KNOCKING APPEARS TO BE COMING FROM
AHEAD OF YOU

YOU HAVE 3 DICK SMITH MINUTES LEFT

YOU ARE IN A SERIES OF TUNNELS
WITHIN THE PYRAMID...WHICH WAY DO YOU
WANT TO TURN (U,D,R,L,F,B)? F
```

You'll discover you soon become quite skillful at interpreting the feedback from the computer although it is—as you can see—somewhat erratic due to the imperfect sound transmission qualities of the stone. Here's the result of a successful run:

```
WELL DONE....

YOU FOUND YOUR FRIEND WITH
ONLY 3 MINUTES OF AIR REMAINING...
```

And here's what you see if you fail:

```
THAT'S THE END OF THE ROAD...
YOU ARE TOO LATE...YOUR FRIEND
HAS DIED WITHIN THE PYRAMID

THE PHAROAH'S TOMB HAS BECOME
...HIS TOMB...
```

When you feel brave enough to tackle the tomb (and risk being touched by its curse), enter the following listing, and then type RUN:

```
10 REM TUTANKHAMEN'S TOMB
20 REM FOR VZ300
30 A=RND(6)+4:B=RND(6)+4:C=RND(6)+4
40 X=1:Y=1:Z=1
50 CLS
60 CC=21
70 PRINT "YOU HAVE A LIMITED TIME IN WHICH"
80 PRINT "TO FIND AN EXPLORER LOST WITHIN"
90 PRINT "EGYPT'S GREATEST PYRAMID"
100 PRINT:PRINT "---------------------------
----------":PRINT
110 FOR Q=1 TO 1000:NEXT Q
120 PRINT:PRINT "HE IS TRAPPED WITHIN THE PH
AROAH'S"
130 PRINT "TOMB...AND HAS ONLY A VERY SMALL
AMOUNT"
```

```
140 PRINT "OF AIR...YOU CAN TELL APPROXIMATE
LY"
150 PRINT "WHERE HE IS BECAUSE HE IS KNOCKIN
G ON"
160 PRINT "ON THE SIDE OF THE TOMB AND YOU A
RE"
170 PRINT "MAKING YOUR WAY TOWARDS THE SOUND
..."
180 PRINT "YOU CAN HEAR KNOCKING...."
190 PRINT:PRINT "---------------------------
----------":PRINT
200 FOR Q=1 TO 1000:NEXT Q
210 PRINT:PRINT "HOWEVER THE SOUND IS MUFFLE
D, AND"
220 PRINT "YOU CANNOT ALWAYS TELL EXACTLY WH
ERE"
230 PRINT "IT IS COMING FROM...."
240 FOR Q=1 TO 1000:NEXT Q
250 PRINT:PRINT "---------------------------
----------":PRINT
260 PRINT:PRINT "THE KNOCKING APPEARS TO BE
COMING FROM"
270 IF RND(10)>7 THEN 300
280 IF X>B THEN PRINT "BELOW YOU ";
290 IF X<B THEN PRINT "ABOVE YOU ";
300 IF RND(10)>7 THEN 340
310 IF Z>C THEN PRINT "TO THE LEFT ";
320 IF Z<C THEN PRINT "TO THE RIGHT ";
330 IF (X<>B OR Z<>C) AND Y<>A  THEN PRINT "
AND ";
340 IF Y<A THEN PRINT "AHEAD OF YOU"
350 IF Y>A THEN PRINT "BEHIND YOU"
360 CC=CC-1
370 PRINT:PRINT "YOU HAVE";CC;"DICK SMITH MI
NUTES LEFT"
380 PRINT:PRINT "YOU ARE IN A SERIES OF TUNN
ELS"
390 PRINT "WITHIN THE PYRAMID...WHICH WAY DO
 YOU"
400 INPUT "WANT TO TURN (U,D,R,L,F,B)";A$
410 IF A$="U" THEN X=X+1:IF X>10 THEN X=10
420 IF A$="D" THEN X=X-1:IF X<1 THEN X=1
430 IF A$="R" THEN Z=Z+1:IF Z>10 THEN Z=10
440 IF A$="L" THEN Z=Z-1:IF Z<1 THEN Z=1
```

```
450 IF A$="F" THEN Y=Y+1:IF Y>10 THEN Y=10
460 IF A$="B" THEN Y=Y-1:IF Y<1 THEN Y=1
470 IF X=B AND C=Z AND A=Y THEN 540
480 IF CC>1 THEN 240
490 PRINT:PRINT "THAT'S THE END OF THE ROAD.
.."
500 PRINT "YOU ARE TOO LATE...YOUR FRIEND"
510 PRINT "HAS DIED WITHIN THE PYRAMID"
520 PRINT:PRINT "THE PHAROAH'S TOMB HAS BECO
ME"
530 PRINT "...HIS TOMB...":END
540 PRINT:PRINT "WELL DONE...."
550 PRINT:PRINT "YOU FOUND YOUR FRIEND WITH"

560 PRINT "ONLY";CC;"MINUTES OF AIR REMAININ
G..."
```

□ ROBOT MINEFIELD

Time now to face the terrors, the dangers, and the horrors of the ROBOT MINEFIELD. There you are, peacefully tripping along one day in the sun, when suddenly you find yourself trapped in a walled area, with a number of manic robots, all bent on your destruction.

The robots are shown on the display as dollar signs, the H is you, and the asterisks (*) are mines which are deadly to both you and robots. Robots, pretty pretty clumsily programmed, can detect you, but they cannot detect mines. Therefore, your salvation lies in getting a mine or two in between you and the robots, so that when they come toward you they'll smash into mines and be wiped out.

The robots have one trick up their sleeves. They can merge into one another, so you may think only one robot is approaching you, when,at the last minute it splits into two or more, one going each way around a mine. This is not a game for those who seek the quiet life.

You can move north, south, east, or west (with north at the top of the screen), and you enter the move you want to make by entering the initial of the desired direction (so you enter "N" to go north, "S" to go south and so on).

```
20 GOTO 250
30 REM MOVE ROBOTS
40 TALLY=0
50 FOR E=1 TO 4
60 IF A(B(E),C(E))=42 THEN TALLY=TALLY+1:GOTO 200
70 X=B(E):Y=C(E)
80 IF B(E)<D THEN B(E)=B(E)+1
90 IF B(E)>D AND RND(10)>3 THEN B(E)=B(E)-1
100 IF C(E)<F AND RND(10)>3 THEN C(E)=C(E)+1
110 IF C(E)>F THEN C(E)=C(E)-1
120 IF B(E)<2 THEN B(E)=2
130 IF B(E)>14 THEN B(E)=14
140 IF C(E)<2 THEN C(E)=2
150 IF C(E)>14 THEN C(E)=14
160 A(X,Y)=46
170 IF A(B(E),C(E))=42 THEN TALLY=TALLY+1:GOTO 200
180 IF A(B(E),C(E))=200 THEN A(B(E),C(E))=228:
                                  GOSUB 300:GOTO 910
190 A(B(E),C(E))=228
200 NEXT E
210 IF TALLY<CH THEN TALLY=CH
220 CH=TALLY
230 IF TALLY=4 THEN GOSUB 300:GOTO' 970
240 RETURN
250 GOSUB 530:REM INITIALISE
260 GOSUB 300:REM PRINT MINEFIELD
270 GOSUB 30:REM ROBOTS MOVE
280 GOSUB 420:REM HUMAN MOVE
290 GOTO 260
300 REM PRINT MINEFIELD
310 PRINTCHR$(28);
320 IF TALLY>0 THEN PRINT@480,"DEAD ROBOT TALLY:"TALLY
330 IF TALLY>0 THEN PRINT CHR$(28);
350 FOR B=1 TO 15
360 FOR C=1 TO 15
370 PRINT CHR$(A(B,C));" ";
```

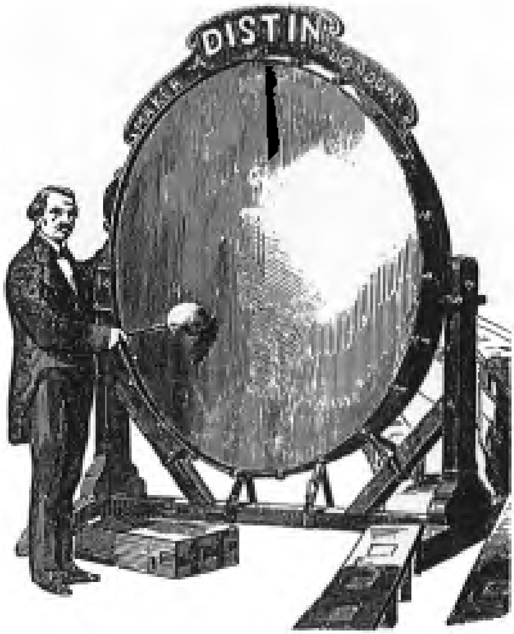
```
380 NEXT C
390 PRINT
400 NEXT B
410 RETURN
420 REM PLAYER MOVE
430 A(D,F)=46:B$=INKEY$
440 A$=INKEY$
450 IF A$="" THEN 440
455 SOUND 31,1
460 IF A$="." AND D>2 THEN D=D-1
465 IF A$="A" AND D>2 AND F>2 THEN D=D-1:F=F-1
470 IF A$=" " AND D<14 THEN D=D+1
475 IF A$="S" AND D>2 AND F<14 THEN D=D-1:F=F+1
480 IF A$="," AND F<14 THEN F=F+1
485 IF A$="X" AND D<14 AND F<14 THEN D=D+1:F=F+1
490 IF A$="M" AND F>2 THEN F=F-1
495 IF A$="Z" AND D<14 AND F>2 THEN D=D+1:F=F-1
500 IF A(D,F)=42 THEN GOSUB 300:GOTO 990
510 A(D,F)=200
520 RETURN
530 REM INITIATE
550 DIM A(15,15);B(4),C(4)
560 CLS
570 PRINT:PRINT "PLEASE STAND BY FOR A MOMENT..."
580 CH=0
610 REM PLACE WALLS
620 FOR B=1 TO 15
630 FOR C=1 TO 15
640 A(B,C)=46
650 IF B=1 OR B=15 OR C=1 OR C=15 THEN A(B,C)=88
660 NEXT C,B
670 REM PLACE MINES
680 FOR B=1 TO 20
690 C=RND(13)
700 D=RND(13)
710 IF A(C,D)=88 THEN 690
720 A(C,D)=42
730 NEXT
740 DATA 4,4,13,8,8,3,12,7
750 REM PLACE ROBOTS
760 FOR E=1 TO 4
770 D=RND(13)+1
```

```
780 F=RND(13)+1
790 IF A(D,F)<>46 THEN 770
800 B(E)=D:C(E)=F
810 A(B(E),C(E))=228
820 NEXT E
830 REM PLACE HUMAN
840 D=RND(13)+1
850 F=RND(13)+1
860 IF A(D,F)<>46 THEN 830
870 A(D,F)=200
880 CLS:RETURN
890 REM HUMAN AT D,F
900 REM ROBOTS AT B(E),C(E)
910 REM END OF GAME
920 PRINT@480,"  THE ROBOTS HAVE GOT YOU!!"
925 SOUND 16,3:SOUND 16,2:SOUND 13,4:SOUND 18,2
927 SOUND 16,5:SOUND 13,6
930 CH=0:TALLY=0
940 A$=""
950 IF INKEY$<>"" THEN 950
960 GOSUB 570:GOTO 260
970 PRINT@480,"  YOU'VE DEFEATED THE ROBOTS!!"
980 GOTO 930
990 PRINT@480,"   YOU'VE RUN INTO A MINE":SOUND 1,8
1000 GOTO 930
```

□ NOUGHTS AND CROSSES

I'm sure that NOUGHTS AND CROSSES (Tic-Tac-Toe) needs no introduction. Here is a program which plays fairly well, but not in a totally predictable manner, so you stand a fair chance of winning a few games.

This may not sound like a big deal. However, many NOUGHTS AND CROSSES programs have been written so that a draw is the best you can do, if you are not actually beaten by the machine.



This program decides who will go first in each game, and responds swiftly to your moves. You move just by entering the number of the square into which you want to move.

Let's see NOUGHTS AND CROSSES in action:

```
1 2 3      -  -  -

4 5 6      -  X  -

7 8 9      -  -  -
```

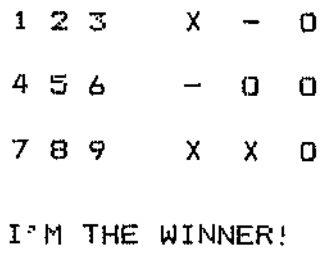
```
1 2 3     O  -  O

4 5 6     -  X  -

7 8 9     -  -  X   1 2 3     O  X  O

                    4 5 6     -  X  -

                    7 8 9     -  -  X

1 2 3     O  X  O

4 5 6     -  X  -

7 8 9     -  O  X
                    1 2 3     O  X  O

                    4 5 6     -  X  -

                    7 8 9     X  O  X
1 2 3     O  X  O

4 5 6     O  X  -

7 8 9     X  O  X
                    1 2 3     O  X  O

                    4 5 6     O  X  X

                    7 8 9     X  O  X



               IT'S A DRAW!
```

Here's the program listing:

```
20 CLS
90 DIM A(9)
95 FOR T=1 TO 9:A(T)=0:SOUND T,1:NEXT T
100 T=RND(0)
105 IF T>.7 THEN PRINT "I'LL HAVE THE FIRST MOVE"
110 IF T<=.7 THEN PRINT "YOU HAVE THE FIRST MOVE"
```

```
115 FOR Z=1 TO 1000:NEXT:CLS
120 IF T>.7 THEN 160
125 IF INKEY$<>"" THEN 125
130 GOSUB 750
140 GOSUB 480
150 GOSUB 670
160 GOSUB 750
170 GOSUB 480
180 IF A(5)=0 THEN A(5)=1:GOTO 130

190 REM TO COMPLETE ROW/BLOCK
200 D=1
210 B=1
220 IF B=1 THEN X=1:Y=2:Z=3
230 IF B=2 THEN X=1:Y=4:Z=7
240 IF B=3 THEN X=1:Y=5:Z=9
250 IF B=4 THEN X=3:Z=7
260 C=1
270 IF A(X)=D AND A(Y)=D AND A(Z)=0 THEN A(Z)=1:GOTO 130
280 IF A(X)=D AND A(Y)=0 AND A(Z)=D THEN A(Y)=1:GOTO 130
290 IF A(X)=0 AND A(Y)=D AND A(Z)=D THEN A(X)=1:GOTO 130
300 IF B=1 THEN X=X+3:Y=Y+3:Z=Z+3
310 IF B=2 THEN X=X+1:Y=Y+1:Z=Z+1
320 IF C<3 THEN C=C+1:GOTO 270
330 IF B<4 THEN B=B+1:GOTO 230
340 IF D<2 THEN D=D+1:GOTO 210
350 REM MOVE AT RANDOM
360 B=1
370 D=INT(RND(0)*9)+1
380 IF A(C)=0 THEN A(C)=1:GOTO 130
390 B=B+1
400 IF B<21 THEN 370
410 B=0

420 B=B+1
430 IF A(B)=0 THEN A(B)=1:GOTO 130
440 IF B<9 THEN 420
450 GOSUB 750
460 PRINT:PRINT"IT'S A DRAW"
470 GOTO 650

480 REM WIN CHECK
490 FOR B=1 TO 4
500 IF B=1 THEN X=1:Y=2:Z=3
```

```
510 IF B=2 THEN X=1:Y=4:Z=7
520 IF B=3 THEN X=1:Y=5:Z=9
530 IF B=4 THEN X=3:Z=7
540 FOR C=1 TO 3
550 IF A(X)=A(Y) AND A(Y)=A(Z) AND A(X)<>0 THEN 610
560 IF B=1 THEN X=X+3:Y=Y+3:Z=Z+3
570 IF B=2 THEN X=X+1:Y=Y+1:Z=Z+1
580 NEXT C
590 NEXT B
600 RETURN

610 REM THE WINNER!
620 PRINT
630 IF A(X)=1 THEN PRINT "I'M THE WINNER!"
640 IF A(X)=2 THEN PRINT "YOU'RE THE WINNER!"
650 FOR O=1 TO 1000:NEXT O
660 GOTO 95
670 REM PLAYER MOVE
675 IF INKEY$<>"" THEN 675
680 PRINT @ 450,"ENTER YOUR MOVE"
690 A$=INKEY$
700 IF A$<"1" OR A$>"9" THEN 690
710 B=VAL(A$)
720 IF A(B)<>0 THEN 690
725 PRINT @ 450,"               "
730 A(B)=2
740 RETURN
```



```
1 2 3     X  -  O

4 5 6     -  O  O

7 8 9     X  X  O

I'M THE WINNER!
```

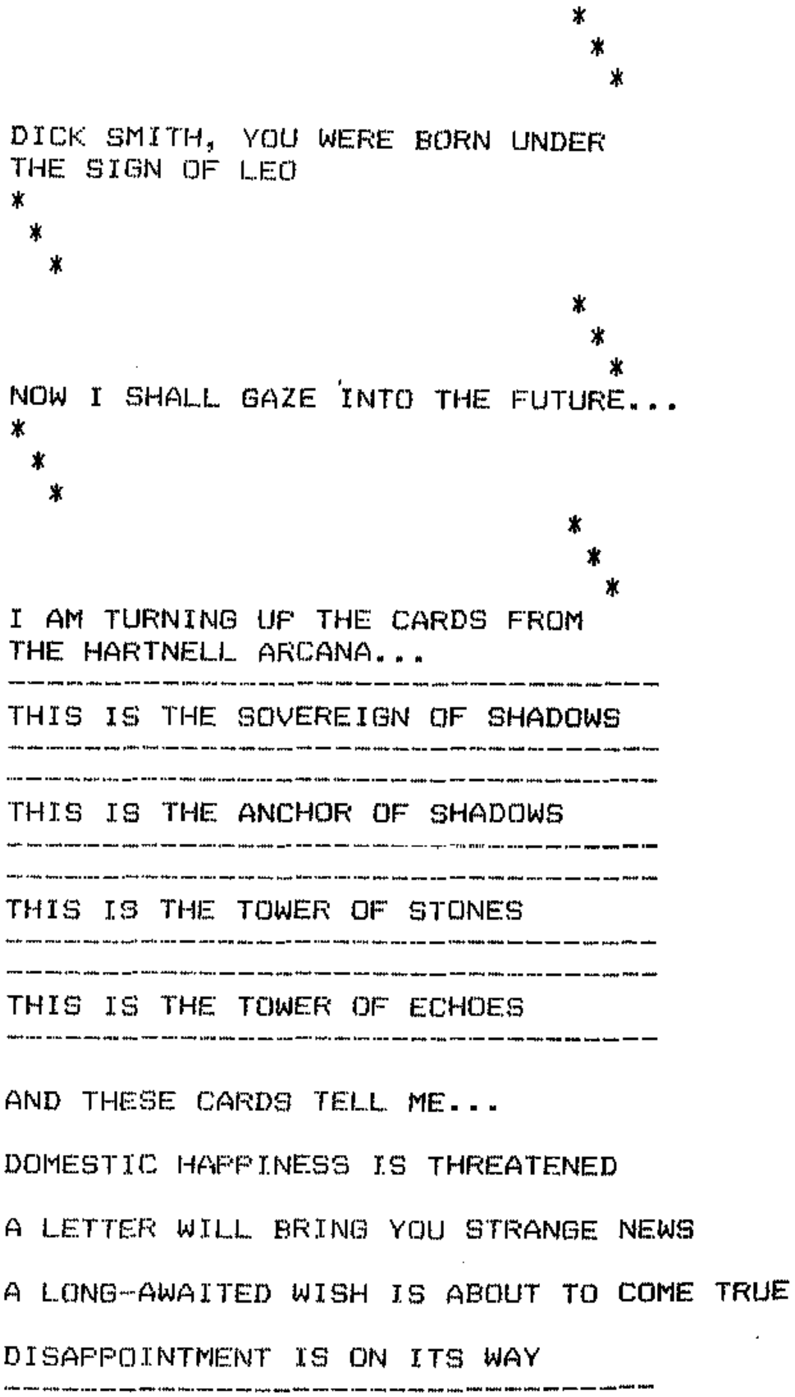
□ MADAME ZARA READS THE CARDS

How convenient. Not only do you save on "cross my palm with silver" coins, but the output of this program is just about as believable as the predictions laid on you by wandering fortune tellers.

Madama Zara has a totally unique deck of fortune-telling cards, The Hartnell Arcana, which contains 36 cards. The suits are Stars, Stones, Shadows, Gems, Dust, and Echoes, and the individual cards are Anchor, Tower, Elvling, Knave, Cleric, and Sovereign. The four cards which are selected, and their relationship to each other, determines the fate Madama Zara reads for you. (Actually, it doesn't happen like that at all, as it all depends on your wayward random number generator, but you don't need to tell your friends this.)

The program begins with a flashy display, then asks for your name and birthdate, and tells you the astrological sign under which you were born:

```
MADAME ZARA READS THE STARS....
* * * * * * * * * * * * * * * * * *
MADAME ZARA READS THE STARS....
* FOR YOU...
 * FOR YOU...
  * FOR YOU...
   * FOR YOU...
    * FOR YOU...
     * FOR YOU...
      * FOR YOU...
       * FOR YOU...
        * FOR YOU...
         * FOR YOU...
          * FOR YOU...
           * FOR YOU...
            * FOR YOU...
             * FOR YOU...
              * FOR YOU...
               * FOR YOU...
                * FOR YOU...
                 * FOR YOU...
                  * FOR YOU...
                   * FOR YOU...
WHAT IS YOUR NAME, MY DEAR? DICK SMITH



WELCOME DICK SMITH, TO DAME ZARA'S HOUSE
OF MYSTICISM...WHERE THE VEIL OVER
THE FUTURE IS MOVED BACK...
      ...JUST FOR A MOMENT

PLEASE TELL ME WHEN YOU
WERE BORN...AS NUMBERS
THE MONTH FIRST (1 - JANUARY TO
12 - DECEMBER)? 7

THANK YOU, DICK SMITH
NOW WHAT DAY OF THE MONTH WERE YOU BORN? 24
```



```
                              *
                               *
                                *
DICK SMITH, YOU WERE BORN UNDER
THE SIGN OF LEO
*
 *
  *
                              *
                               *
                                *
NOW I SHALL GAZE INTO THE FUTURE...
*
 *
  *
                              *
                               *
                                *
I AM TURNING UP THE CARDS FROM
THE HARTNELL ARCANA...
----------------------------------
THIS IS THE SOVEREIGN OF SHADOWS
----------------------------------

----------------------------------
THIS IS THE ANCHOR OF SHADOWS
----------------------------------

----------------------------------
THIS IS THE TOWER OF STONES
----------------------------------

----------------------------------
THIS IS THE TOWER OF ECHOES
----------------------------------

AND THESE CARDS TELL ME...

DOMESTIC HAPPINESS IS THREATENED

A LETTER WILL BRING YOU STRANGE NEWS

A LONG-AWAITED WISH IS ABOUT TO COME TRUE

DISAPPOINTMENT IS ON ITS WAY
----------------------------------
```

```
THANK YOU FOR CONSULTING THE
THE WISDOM OF ZARA....
--------------------------------

I WOULD LIKE TO SEE YOU
AGAIN SOME TIME, DICK SMITH
```

Here's the program so you can go into the fortune-telling business for yourself:

```
10 REM MADAME VZ-ZARA READS THE CARDS
20 GOSUB 770:COLOR 2,1:CLS
30 PRINT:PRINT "WELCOME ";A$;", TO DAME":PRINT"ZARA'S HOUSE OF";
40 PRINT " MYSTICISM...":PRINT "WHERE THE VEIL OVER THE FUTURE"
50 PRINT "IS MOVED BACK..."
60 PRINT TAB(7);"...JUST FOR A MOMENT"
70 FOR Y=1 TO 500:NEXT Y
80 PRINT:PRINT "PLEASE TELL ME WHEN YOU"
90 PRINT "WERE BORN...AS NUMBERS"
100 PRINT "THE MONTH FIRST (1 - JANUARY TO"
110 INPUT "12 - DECEMBER)";B1:IF B1<1 OR B1>12 THEN 80
120 PRINT:PRINT "THANK YOU, ";A$
130 INPUT "NOW, WHAT DAY OF THE MONTH WERE YOU BORN";B2
140 IF B2<1 OR B2>31 THEN 120
150 B=100*B1+B2
160 CLS
170 FOR Y=1 TO 30:PRINT TAB(Y);"*":SOUND Y/2,1:NEXT Y
180 PRINT:PRINT A$;", YOU WERE BORN UNDER"
190 PRINT "THE SIGN OF ";
200 IF B>=101ANDB<=120ORB>=1223ANDB<=1231THENPRINT"CAPRICORN"
210 IF B>=121 AND B<=219 THEN PRINT "AQUARIUS"
220 IF B>=220 AND B<=321 THEN PRINT "PISCES"
230 IF B>=332 AND B<=420 THEN PRINT "ARIES"
240 IF B>=421 AND B<=521 THEN PRINT "TAURUS"
250 IF B>=522 AND B<=621 THEN PRINT "GEMINI"
260 IF B>=622 AND B<=723 THEN PRINT "CANCER"
270 IF B>=724 AND B<823 THEN PRINT "LEO"
280 IF B>=824 AND B<=923 THEN PRINT "VIRGO"
290 IF B>=924 AND B<=1023 THEN PRINT "LIBRA"
300 IF B>=1024 AND B<1122 THEN PRINT "SCORPIO"
```

```
310 IF B>=1123 AND B<=1222 THEN PRINT "SAGITTARIUS"
320 FOR Y=1 TO 30:PRINT TAB(Y);"*":FOR T=1 TO 85:NEXT T:NEXT Y
330 PRINT "NOW I SHALL GAZE INTO          THE FUTURE...."
340 FOR Y=1 TO 30:PRINT TAB(Y);"*":FOR T=1 TO 85:NEXT T:NEXT Y
350 PRINT "I AM TURNING UP THE CARDS FROM"
360 PRINT "THE HARTNELL ARCANA..."
370 FOR T=1 TO 500:NEXT T
380 FOR Y=1 TO 4
390 A=RND(6)-1
400 PRINT "-----------------------------"
410 PRINT "THIS IS ";
420 IF A=0 THEN PRINT "THE ANCHOR ";
430 IF A=1 THEN PRINT "THE TOWER ";
440 IF A=2 THEN PRINT "THE ELVLING ";
450 IF A=3 THEN PRINT "THE KNAVE ";
460 IF A=4 THEN PRINT "THE CLERIC ";
470 IF A=5 THEN PRINT "THE SOVEREIGN ";
480 A=RND(6)-1
490 IF A=0 THEN PRINT "OF STARS"
500 IF A=1 THEN PRINT "OF STONES"
510 IF A=2 THEN PRINT "OF SHADOWS"
520 IF A=3 THEN PRINT "OF GEMS"
530 IF A=4 THEN PRINT "OF DUST"
540 IF A=5 THEN PRINT "OF ECHOES"
550 PRINT "-----------------------------"
560 FOR T=1 TO 500:NEXT T
570 NEXT Y
580 FOR T=1 TO 1000:NEXT T
590 PRINT:PRINT "AND THESE CARDS TELL ME..."
600 FOR T=1 TO 1000:NEXT T
610 PRINT:PRINT A$(RND(10))
620 FOR T=1 TO 1000:NEXT T
630 PRINT:PRINT B$(RND(10))
640 FOR T=1 TO 1000:NEXT T
650 PRINT:PRINT C$(RND(10))
660 FOR T=1 TO 1000:NEXT T
670 PRINT:PRINT D$(RND(10))
680 FOR T=1 TO 1000:NEXT T
690 PRINT "-----------------------------"
700 PRINT "THANK YOU FOR CONSULTING THE"
710 PRINT "    WISDOM OF ZARA..."
```

```
720 FOR T=1 TO 2000:NEXT
730 PRINT "------------------------------"
740 PRINT:PRINT "I WOULD LIKE TO SEE YOU AGAIN"
750 PRINT "SOMETIME, ";A$
760 END
770 REM INITIALISE - VZ300 VERSION
780 DIM A$(10),B$(10),C$(10),D$(10)
790 COLOR 2,1:SOUND 12,2:SOUND 1,1:SOUND 5,2:CLS
800 FOR T=1 TO 10
810 PRINT "* * * * * * * * * * * * * *":SOUND T,1
820 PRINT "MADAME ZARA READS THE STARS.."
830 NEXT T
840 FOR T=1 TO 20
850 PRINT TAB(T);"* FOR YOU..."
860 NEXT T
870 FOR T=1 TO 1000:NEXT T
880 INPUT "WHAT IS YOUR NAME,              MY DEAR ";A$
890 CLS
900 FOR T=1 TO 10:READ A$(T):READ B$(T)
910 READ C$(T):READ D$(T):NEXT T
920 RETURN
930 DATA "A SUDDEN SHOCK","GREAT JOY IS NEAR"
940 DATA "A PARK, AND A SPECIAL FRIENDSHIP"
950 DATA "DISAPPOINTMENT IS ON ITS WAY"
960 DATA "YOU ARE CLOSELY PROTECTED FROM  HARM "
970 DATA "THERE IS A CHANCE TO STOP       ILL-FEELING"
980 DATA "GOOD FRIENDS ARE NEAR"
990 DATA "DISTRUST THOSE WHO WOULD        ADVISE YOU"
1000 DATA "THE MOON IS IN A GOOD ASPECT    FOR YOU"
1010 DATA "SUCCESS IN SPECULATION          IS LIKELY"
1020 DATA "CONFIDE IN THOSE NEAR YOU"
1030 DATA "SUCCESS IN ALL VENTURES         IS INDICATED"
1040 DATA "A MYSTERY WILL SOON BE SOLVED"
1050 DATA "A LETTER WILL BRING YOU         STRANGE NEWS"
1060 DATA "GOOD LUCK WILL BE YOURS TODAY"
1070 DATA "HIGH HONOR IS ON ITS WAY"
1080 DATA "DOMESTIC HAPPINESS IS           THREATENED"
1090 DATA "THE CLOUDS ARE GATHERING","STRENGTH IS ON YOUR SIDE"
1100 DATA "SOMEONE IS WATCHING YOU         WITH LONGING"
1110 DATA "FAMILY QUARRELS LIKELY"
1120 DATA "THE SUN IS RISING ON YOUR HOPES"
1130 DATA "EVIL CONSEQUENCES MAY           BE AVERTED"
```

```
1140 DATA "THERE IS A CHANCE TO MAKE UP    A QUARREL"
1150 DATA "YOUR STRUGGLES ARE TO           BE REWARDED"
1160 DATA "YOU WILL BE TREATED GENTLY      TODAY"
1170 DATA "A LONG-AWAITED WISH IS          ABOUT TO COME TRUE"
1180 DATA "SUSPICION IS FOCUSED ON YOU"
1190 DATA "GOOD HEALTH WILL BE YOURS"
1200 DATA "FULFILLMENT OF A DREAM IS JUST  AROUND THE CORNER"
1210 DATA "BEAUTY COMES A-CALLING"
1220 DATA "GOOD TIDINGS ARE ON THEIR WAY"
1230 DATA "THE CURRENT BAD SITUATION WILL  NOT LAST LONG"
1240 DATA "LOSS OF PROPERTY IS PROBABLE"
1250 DATA "YOU GET THE CHANCE TO WARD      OFF EVIL"
1260 DATA "RICHES THROUGH PROPERTY ARE     INDICATED"
1270 DATA "A MINOR FAILURE WILL TURN TO    SUCCESS"
1280 DATA "I SEE A SAFE BULGING WITH       MONEY FOR YOU"
1290 DATA "GOOD NEWS IS ON ITS WAY","BEWARE OF FLATTERY"
```

□ NIMGRAB

NIMGRAB is a game which seems easy at first, but is the very devil to play . . . and win. You and the wily computer take turns taking objects away from the screen. There is a limit to how many you can take away each move (and this limit changes from game to game, although it does not change within a particular round of the game). The winner is the person who manages to force the other player to remove the last object.

Once you see it in action, you'll understand how to play it. Then you can start working on perfecting a method of actually beating the computer. Here is NIMGRAB:

```
10 REM NIMGRAB
20 CLS
30 M=0:E=0:Z=RND(8)+16
40 IF 2*INT(Z/2)=Z THEN Z=Z+1
50 H=3+RND(2)
60 PRINT "THE MAXIMUM YOU CAN GRAB IS"H
70 GOSUB 270
80 IF E>0 THEN PRINT "YOU TOOK"E", AND I TOOK"Q
90 FOR K=1 TO Z
100 PRINT K;:IF RND(10)>8 THEN PRINT
```

```
110 NEXT K
120 GOSUB 270
130 PRINT "AND HOW MANY WILL YOU GRAB?"
135 P$=INKEY$
140 E=VAL(INKEY$)
150 IF E<1 OR E>H OR E>Z THEN 140
160 PRINT:PRINT"SO YOU WANT TO GRAB"E
170 Z=Z-E
180 GOSUB 270
190 IF Z<1 THEN GOTO 320
200 Q=Z-1-INT((Z-1)/(H+1))*(H+1)-INT(RND(2))+INT(RND(2))
210 IF Q<1 OR Q>H THEN 200
220 GOSUB 270
230 Z=Z-Q
240 IF Z<1 THEN PRINT"I GRABBED THE LAST ONE SO YOU   WIN!!":END
250 GOSUB 270
260 GOTO 60
270 PRINT
280 PRINT "*******************************"
290 PRINT
300 FOR O=1 TO 500:NEXT O
310 RETURN
320 PRINT "YOU GRABBED THE LAST ONE "
330 PRINT ,"SO I WIN!!":FOR Z=1 TO 500:NEXT Z
340 SOUND 16,3:SOUND 16,2:SOUND 13,4:SOUND 18,2:SOUND 16,5
350 SOUND 13,6:END
```

□ LAS VEGAS HIGH

LAS VEGAS HIGH. You need only decide how much you'll bet before pulling the handle on the machine (which you do by pressing the spacebar) and the reels will whirl away.

Your winnings—as you'd expect—are related to the relative difficulty of the various combinations coming up. The computer keeps up the chatter as the game, and your wealth (or poverty) unfold.

Here's the making of a million (or so):

```
10 REM LAS VEGAS HIGH
20 GOSUB 1110 :REM INITIALISE
30 GOSUB 870 :REM PLAYER INPUT
40 GOSUB 520 :REM OPERATE SLOT MACHINE
50 IF CASH<1 THEN 90
60 IF CASH>2500 THEN 290
70 GOTO 30
80 REM *****
90 REM BROKE
100 REM *****
```

```
110 GOSUB 410
120 PRINT "THAT'S THE END OF THE LINE,"
130 PRINT "OH ONCE MIGHTY GAMBLER..."
140 GOSUB 410
150 PRINT "YOU'RE STONE, FLAT BROKE!!"
160 GOSUB 410
170 PRINT "PRESS 'Y' IF YOU'D LIKE TO"
180 PRINT "HAVE ANOTHER GO AT BREAKING"
190 PRINT "!!!!! LAS VEGAS HIGH !!!!!"
200 PRINT "(OR PRESS 'N' IF YOU WISH TO":PRINT ,"LEAVE)"
210 A$=INKEY$
220 IF A$<>"Y" AND A$<>"N" THEN 210
230 IF A$="Y" THEN RUN
240 PRINT:PRINT "OK, PUNTER..."
250 GOSUB 410
260 PRINT "THANKS FOR THE GAME!"
270 END
280 REM $$$$$$$$$$$$$$
290 REM BROKE THE BANK
300 REM $$$$$$$$$$$$$$
310 GOSUB 410
320 PRINT "WELL DONE, GAMBLER!!"
330 GOSUB 410
340 PRINT "YOU'VE REACHED OUR HOUSE LIMIT"
350 PRINT "SO WE'LL HAVE TO THROW YOU OUT
360 PRINT "PEOPLE WITH LUCK LIKE YOURS GIVE"
380 PRINT "OUR CASINO A BAD NAME......."
390 GOTO 160
400 REM $$$$$
410 REM DELAY
420 REM $$$$$
430 FOR P=1 TO 1000:NEXT P
440 PRINT:PRINT
450 RETURN
460 REM $$$$$$$$$
470 REM DELAY TWO
480 REM $$$$$$$$$
490 FOR P=1 TO 1000:NEXT P
500 RETURN
510 REM $$$$$$$$$$$$$$$$$$$$$
520 REM OPERATE SLOT MACHINE
530 REM $$$$$$$$$$$$$$$$$$$$$
```

```
540 CLS
550 GOSUB 410
560 PRINT "/^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^\"
570 PRINT " *";
580 FOR M=1 TO 3
590 GOSUB 460
600 A=RND(46)
610 IF A<2 THEN PRINT A$(4);:C(M)=1
620 IF A>1 AND A<6 THEN PRINT A$(3);:C(M)=2
630 IF A>5 AND A<12 THEN PRINT A$(1);:C(M)=3
640 IF A>11 AND A<20 THEN PRINT A$(2);:C(M)=4
650 IF A>19 AND A<31 THEN PRINT A$(5);:C(M)=5
660 IF A>30 THEN PRINT A$(6);:C(M)=6
670 PRINT "*";:SOUND 31,1
680 NEXT M
690 GOSUB 410
700 WIN=0
710 IF C(1)+C(2)+C(3)=3 THEN 1220
720 IF C(1)=C(2) AND C(3)=C(2) AND C(2)=2 THEN 1240
730 IF C(1)=C(2) AND C(3)=C(2) AND C(1)<>1 AND C(2)<>3 THEN 1250
740 IF C(1)=C(2) OR C(1)=C(3) OR C(2)=C(3) THEN 1260
750 IF C(3)=2 THENPRINT"A BELL AT THE END IS A BONUS!":WIN=WIN+.6
760 IF C(1)=3 AND C(3)=3 THEN PRINT"AN APPLE AT EACH END IS GOOD"
765 IF C(1)=3 AND C(3)=3 THEN WIN=WIN+.5
770 IF C(1)=4 AND C(2)=3 AND C(1)=4 THEN GOSUB 1270:WIN=WIN+.4
780 GOSUB 410
790 WIN=INT(WIN*BET)
800 IF WIN>0 THEN PRINT "AND YOU'VE WON"WIN"!":CASH=CASH+WIN
810 IF WIN=0 THEN PRINT "AND YOU'VE LOST $"BET:CASH=CASH-BET
820 GOSUB 410
830 IF CASH>0 THEN PRINT "SO NOW YOU HAVE $"CASH
840 GOTO 460
850 REM
860 REM ************
870 REM PLAYER INPUT
880 REM ************
890 CLS
900 GOSUB 410
910 IF CASH<300 THEN PRINT "HI THERE, GAMBLER!"
920 IF CASH>299ANDCASH<600 THEN PRINT "YOU'RE DOING WELL TONIGHT"
930 IF CASH>599 AND CASH<900 THEN PRINT"LADY LUCK HAS CERTAINLY";
935 IF CASH>599 AND CASH<900 THEN PRINT" SMILED ON YOU!"
940 IF CASH>899 AND CASH<1200 THEN PRINT "THE FATES ARE BEING";
```

```
945 IF CASH>899 AND CASH<1200 THEN PRINT " EXTREMELY KIND"
950 IFCASH>1199 THENPRINT"IT IS SO GOOD TO SEE AN EXPERT AT WORK"
960 GOSUB 470
970 PRINT:PRINT "YOU HAVE $"CASH
980 PRINT:INPUT "HOW MUCH DO YOU WANT TO BET";BET
990 IF BET>CASH THEN PRINT "YOU AIN'T GOT THAT MUCH!":GOTO 980
1000 GOSUB 410
1010 PRINT "OK, SIR, $"BET"IT IS!"
1020 GOSUB 410
1030 PRINT "PRESS THE SPACE BAR TO PLAY"
1040 IF INKEY$<>" " THEN 1040
1050 FOR T=1 TO 40
1060 PRINT TAB(T/2);"******* STAND BY *******"
1070 PRINT
1080 NEXT T
1090 RETURN
1110 REM INITIALISE
1130 CLS
1140 DIM A$(6),C(6)
1150 CASH=250
1160 FOR B=1 TO 6
1170 READ A$(B)
1180 NEXT B
1190 RETURN
1200 DATA "$APPLE$","#CHERRY#","*BELL*","!!BAR!!"
1210 DATA "<<LEMON>>","[[PLUM]]"
1220 PRINT"THREE BARS!!!":GOSUB410:PRINT"THAT'S JACKPOT STYLE!!"
1230 WIN=WIN+9:GOTO 750
1240 PRINT "THREE BELLS!!!":WIN=WIN+3.9:GOTO 750
1250 PRINT "THREE OF A KIND":WIN=WIN+3.5:GOTO 750
1260 PRINT ">> A PAIR <<":WIN=WIN+.7:GOTO 750
1270 PRINT "THAT OLD 'CHERRY,BELL,CHERRY'"
1280 PRINT "COMBINATION IS ONE OF MY FAVORITES!":RETURN
```

□ ROULETTE

ROULETTE is the king of gambling games. This computer version, which faithfully follows the rules of roulette, will allow you to painlessly test your favorite "system."

This game plays with an American wheel, which has the numbers 0 to 36, plus double zero. The program speaks faultless French, as do all good croupiers, inviting you to place your bet with the words MESSIEURS, FAITES VOS JEUX (Gentlemen, place your bets). **Note that the difference between the European and American wheels is discussed at the end of this introduction.**

Some of the numbers on a roulette wheel are red and the balance are black. Among other bets, you can bet on the ball stopping on any red number, or any black one.

After the computer has told you how many chips you have, and asked you to place your bets, you'll be expected to enter a letter between A and Q. Q tells the computer you wish to quit (withdraw from the game), and the other letters determine which kind of bet you wish to place, according to this key:

A—a single number

B—two adjoining numbers

C—three numbers in adjoining columns

D—six numbers in adjoining columns

E—four numbers in a square

F—numbers 1 through 12 ("The First Twelve")

G—numbers 13 through 24 ("The Second Twelve")

H—numbers 25 through 36 ("The Third Twelve")

I—numbers 1 through 18 ("Low")

J—numbers 19 through 36 ("High")

K—12 numbers in a horizontal row

L—two adjacent horizontal columns

M—any red number

N—any black number

O—any even number

P—any odd number

Q—to quit the game

The red numbers are:

1, 3, 5, 7, 9, 12, 14, 16, 18, 19, 21, 23, 25, 27, 30, 32, 34, 36,

The black numbers are:

2, 4, 6, 8, 10, 11, 13, 15, 17, 20, 22, 24, 26, 28, 29, 31, 33, 35

Here's what a roulette table looks like:

	NOIR			PAIR			PASSE					
34r	31b	28r	25r	22b	19r	16r	13b	10b	7r	4b	1r	0
35b	32r	29b	26b	23r	20b	17b	14r	11b	8b	5r	2b	
36r	33b	30r	27r	24b	21r	18r	15b	12r	9r	6b	3r	00
	ROUGE			IMPAIR			MANQUE					

As you can see, the table has three words above, and three below, the numbers. These are noir (black), pair (even), passe (numbers 19 through 36), rouge (red), impair (odd) and manque (numbers 1 through 18).

A European roulette table has the numbers 1 through 36, plus zero, while the American table has a double zero as well. It comes as quite a shock to innocent folk like me to discover that while the house take on all bets on the European wheel is 2.70% on all bets (except the even money chances, where it drops to 1.4%), the house take on the US wheel is almost doubled to 5.26%. Our wheel, as you know, follows the US system.

Here's the program in action:

```
AT THE VZ300 ROULETTE WHEEL...
   ...YOU HAVE 1000 CHIPS

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

MESSIEURS, FAITES VOS JEUX (A - Q)
? M

HOW MANY CHIPS? 408

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

THE WHEEL IS SPINNING...

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

                                23
                                27
                                  OO
      5
```

```
                    22
              31
     12
                       32
         12
                      11
            21
 23
                         27

*#$ *#$ *#$ *#$ $#* $#* $#* $#*
THE BALL STOPPED ON 27

CONGRATULATIONS, YOU HAVE WON 408 CHIPS

*#$ *#$ *#$ *#$ $#* $#* $#* $#*


AT THE VZ300 ROULETTE WHEEL...
  ...YOU HAVE 1408 CHIPS

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

MESSIEURS, FAITES VOS JEUX (A - Q)
? E

HOW MANY CHIPS? 290
FIRST NUMBER IN SQUARE? 13

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

THE WHEEL IS SPINNING...

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

                          28
      4
                       8
                         27
 32
 19
                  16
  14
     19
  31
                 37
              1
                  20
          10
 21
              2

       4

*#$ *#$ *#$ *#$ $#* $#* $#* $#*
THE BALL STOPPED ON 4
SORRY, BUT YOU LOST ON THAT ROUND...

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

AT THE VZ300 ROULETTE WHEEL...
  ...YOU HAVE 1118 CHIPS

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

MESSIEURS, FAITES VOS JEUX (A - Q)
? J

HOW MANY CHIPS? 1118

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

THE WHEEL IS SPINNING...

*#$ *#$ *#$ *#$ $#* $#* $#* $#*
               9
                        13
                        24
           4
           31
                       33




              10
          11
               4
 26
```

```
         2
                      25
   26
         30
               20
                       28
           5

*#$ *#$ *#$ *#$ $#* $#* $#* $#*
THE BALL STOPPED ON 5
SORRY, BUT YOU LOST ON THAT ROUND...

*#$ *#$ *#$ *#$ $#* $#* $#* $#*
YOU HAVE LOST!
 YOU HAVE LOST!
  YOU HAVE LOST!
   YOU HAVE LOST!
    YOU HAVE LOST!
     YOU HAVE LOST!
      YOU HAVE LOST!
       YOU HAVE LOST!
        YOU HAVE LOST!
         YOU HAVE LOST!
          YOU HAVE LOST!
           YOU HAVE LOST!
            YOU HAVE LOST!
             YOU HAVE LOST!
              YOU HAVE LOST!

*#$ *#$ *#$ *#$ $#* $#* $#* $#*

YOU HAVE RUN OUT OF CHIPS!
```

And here's the listing, so you can FAIT your own JEUX:

```
10 REM VZ ROULETTE
20 DIM B(24):CH=1000
30 CLS:PRINT:PRINT "AT THE VZ300 ROULETTE WH
EEL..."
40 PRINT TAB(3);"...YOU HAVE";CH;"CHIPS":GOS
UB 1010
```

```
50 PRINT:PRINT"   MESSIEURS, FAITES
                        VOS JEUX      (A - Q)"
60 INPUT A$:IF A$="" THEN 60
70 A=ASC(A$)-64:IF A<1 OR A>17 THEN 60
80 IF A=17 THEN 860
90 FOR Q=1 TO 24:B(Q)=-99:NEXT Q:SOUND 4,1
100 PRINT:INPUT "  HOW MANY CHIPS";N
110 IF N>1 THEN 120
115 PRINT "I CANNOT ACCEPT THAT BET!"
                          :GOSUB 1010:GOTO 100
120 IF N<=CH THEN 130
125 PRINT "YOU DON'T HAVE THAT MANY!":GOTO 100
130 CH=CH-N
140 IF A=1 THEN GOSUB 590
150 IF A=2 THEN GOSUB 600
160 IF A=3 THEN GOSUB 610
170 IF A=4 THEN GOSUB 630
180 IF A=5 THEN GOSUB 650
190 IF A=6 THEN GOSUB 670
200 IF A=7 THEN GOSUB 680
210 IF A=8 THEN GOSUB 690
220 IF A=9 THEN GOSUB 700
230 IF A=10 THEN GOSUB 710
240 IF A=11 THEN GOSUB 720
250 IF A=12 THEN GOSUB 740
260 IF A=13 THEN GOSUB 790
270 IF A=14 THEN GOSUB 810
280 IF A=15 THEN GOSUB 840
290 IF A=16 THEN GOSUB 850
300 GOSUB 1010
310 REM ****************
320 REM * THE WHEEL SPINS *
330 GOSUB 1010:FOR B=1 TO 50:C=RND(39)-2
                          :PRINT TAB(RND(24));
340 IF C=-1 THEN PRINT " 00":GOTO 350
345 PRINT C
350 FOR T=1 TO B:NEXT T:SOUND B/3,1:NEXT B:GOSUB 1010
420 PRINT "THE BALL STOPPED ON";
430 IF C=-1 THEN PRINT "DOUBLE ZERO":GOTO 450
440 PRINT C
450 Y=0:E=1
460 IF B(E)=C THEN Y=1:GOTO 480
470 IF E<24 THEN E=E+1:GOTO 460
480 IF Y=0 THEN 520
```

```
490 WI=INT(OD*N+.5):CH=CH+WI+N
500 PRINT:PRINT "CONGRATULATIONS, YOU
                                HAVE       WON";WI;"CHIPS"
510 GOTO 530
520 PRINT "SORRY, BUT YOU LOST ON          THAT ROUND"
530 GOSUB 1010:FOR Z=1 TO 1000:NEXT Z
540 IF CH<1 THEN 890:REM BROKE
550 IF CH>2000 THEN 960:REM BROKE THE BANK
560 GOTO 30
570 REM *********************
580 REM ** PLACING THE BETS **
590 INPUT "WHICH NUMBER";B(1):OD=35:RETURN
600 INPUT "WHICH TWO NUMBERS";B(1),B(2):OD=17:RETURN
610 INPUT "WHICH NUMBER IN LEFT COLUMN";D
620 FOR E=0 TO 2:B(E+1)=D+E:NEXT E:OD=11:RETURN
630 INPUT "FIRST NUMBER OF SIX";D:FOR E=0 TO 5
                                       :B(E+1)=D+E:NEXT E
640 OD=5:RETURN
650 INPUT "FIRST NUMBER IN SQUARE";D:FOR E=0 TO 3
                                              :B(E+1)=D+E
655 IF E=2 THEN D=D+1
660 NEXT E:OD=8:RETURN
670 FOR E=1 TO 12:B(E)=E:NEXT E:OD=2:RETURN
680 FOR E=1 TO 12:B(E)=E+12:NEXT E:OD=2:RETURN
690 FOR E=1 TO 23:B(E)=E+24:NEXT E:OD=2:RETURN
700 FOR E=1 TO 18:B(E)=E:NEXT E:OD=1:RETURN
710 FOR E=1 TO 18:B(E)=E+18:NEXT E:OD=1:RETURN
720 INPUT "LOW NUMBER AT END OF LINE";D
730 FOR E=0 TO 11:B(E+1)=3*E+D:NEXT E:OD=2:RETURN
740 INPUT "LOW NUMBER FIRST COLUMN";D1
750 INPUT "LOW NUMBER SECOND COLUMN";D2
760 IF ABS(D1-D2)>1 THEN 740
770 FOR E=0 TO 11:B(E+1)=3*E+D1:B(E+13)=3*E+D2:NEXT E
780 OD=.5:RETURN
790 RESTORE
800 FOR E=1 TO 16:READ B(E):NEXT E:OD=1:RETURN
810 RESTORE
820 FOR E=1 TO 18:READ Z:NEXT E
830 FOR E=1 TO 18:READ B(E):NEXT E:OD=1:RETURN
840 FOR E=2 TO 26 STEP 2:B(E/2)=E:NEXT E:OD=1:RETURN
850 FOR E=1 TO 35 STEP 2:B((E+1)/2)=E:NEXT E
                                              :OD=1:RETURN
860 PRINT:PRINT "YOU ARE WITHDRAWING FROM THE"
```

```
870 PRINT "GAME WITH";CH;"CHIPS"
880 SOUND 2,1:SOUND 20,1:END
890 FOR J=1 TO 15:PRINT TAB(J);"YOU HAVE LOST!"
                                           :SOUND J,1:NEXT J
930 GOSUB 1010:PRINT "YOU HAVE RUN OUT OF CHIPS!":END
960 FOR J=1 TO 9:PRINT TAB(J/2);"YOU HAVE
                                        BROKEN THE BANK!":NEXT
1000 END
1010 PRINT "  *#$ *#$ *#$ *#$ *#$ *#$ *#$"
1020 FOR K=1 TO 400:NEXT K:RETURN
1040 DATA 1,3,5,7,9,12,14,16,18,19,21,23,25,
                                              27,30,32,34,36
1050 DATA 2,4,6,8,10,11,13,15,17,20,22,24,26,
                                              28,29,31,33,35
```

Fun with your Printer

□ CELESTIA

The first of the two programs in this section is CELESTIA, which you can run either on your TV screen, or on the screen and to the printer at the same time. It produces an infinite series of evolving patterns.

The patterns develop according to the rules of the famous computer game of LIFE, developed by John Conway while at Gonville and Caius College at Cambridge in the UK. Martin Gardiner spread the game throughout the world when he wrote about in *Scientific American* in October, 1970.

In LIFE, cells are born, grow and die according to rules which Conway invented. Each cell on a grid (the colony of cells is imagined to be evolving on a grid) is surrounded by eight others, and the state of those eight other cells dictates what happens to the cell in question in the following generation.

The rules which govern the evolution of the cells are as follows:

- If a cell has two or three surrounding it, it survives to the next generation
- If there are three, and just three, full cells next to an empty one, a cell will be "born" in that empty space in the next generation
- Any cell with four of its neighboring cells occupied dies in the next generation

Don't worry, you don't have to know the rules, as the computer interprets them quite happily by itself. The rules produce patterns which are far more attractive (and far less predictable) than you could possibly imagine by reading the rules. There is just one extra twist in this program, which makes it even more effective. CELESTIA actually prints out four colonies each time a colony evolves. The original colony is in one quadrant of the screen, and the other three quarters of the screen contain reflections of the original one.

CELESTIA is incredibly effective, as you can see:

```
       *        *  *        *
       *       *    *       *
           **** *  * ****
         *  **        **  *
        * * *  ******  * * *
*  *    *      ******      *    *  *
* *       **   * ** *   **       * *
  * **                        ** *
  * **                        ** *
* *       **   * ** *   **       * *
*  *    *      ******      *    *  *
        * * *  ******  * * *
         *  **        **  *
           **** *  * ****
       *       *    *       *
       *        *  *        *
```

```
------------------------------------

   ** **** *   **  **   * **** **
* **** *         **         * **** *
** ** ******    ****    ****** ** **
** ********** * **** * ********** **
* **  *     *   *  *   *     *  ** *
  *   *     * * *  * * *     *   *
*** ************ ** ************ ***
* *  * ***  * ***  *** *  *** *  * *
* *  * ***  * ***  *** *  *** *  * *
*** ************ ** ************ ***
  *   *     * * *  * * *     *   *
* **  *     *   *  *   *     *  ** *
** ********** * **** * ********** **
** ** ******    ****    ****** ** **
* **** *         **         * **** *
   ** **** *   **  **   * **** **

------------------------------------


  *   ***       *  *       ***   *
*          *   * ** *   *          *
            *  *    *  *
            **        **
*       *** *   *  *   * ***       *
*   *   ***   * **** *   ***   *   *
* * *     *      **      *     * * *
* ****      *   *  *   *      **** *
* ****      *   *  *   *      **** *
* * *     *      **      *     * * *
*   *   ***   * **** *   ***   *   *
*       *** *   *  *   * ***       *
            **        **
            *  *    *  *
*          *   * ** *   *          *
  *   ***       *  *       ***   *

------------------------------------
```

This is the listing to give CELESTIA designs on your microcomputer:

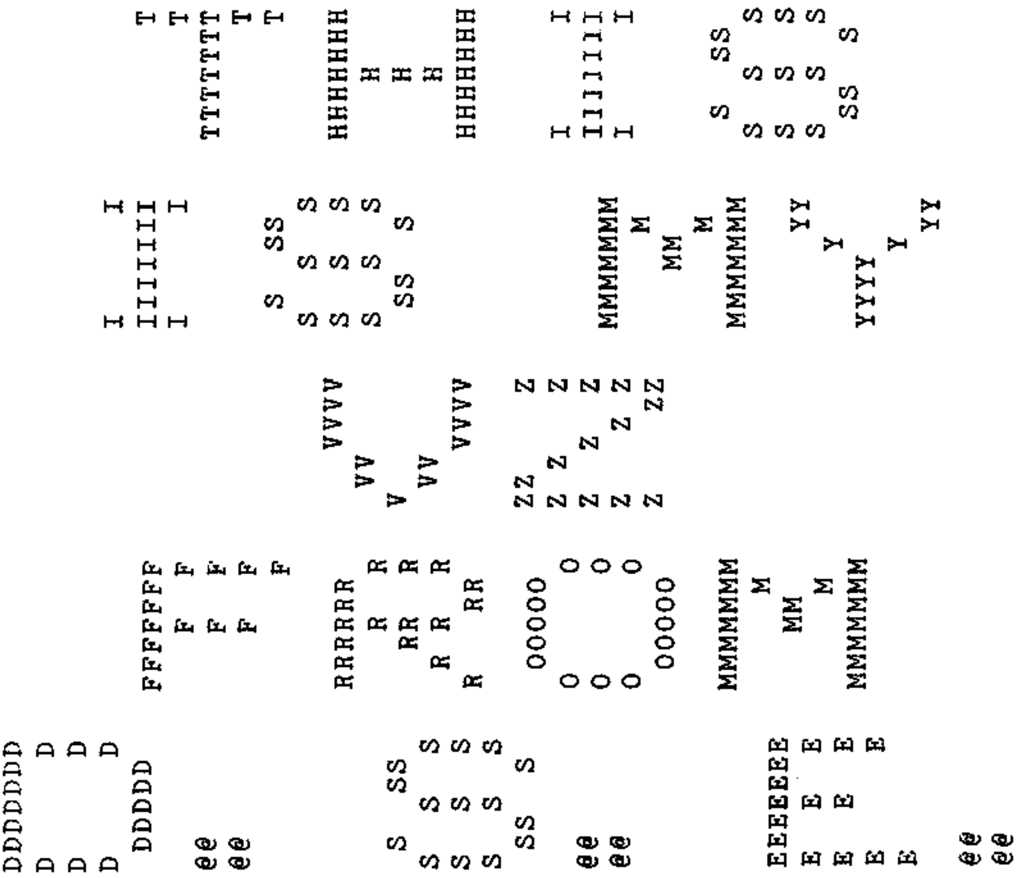
```
10 REM CELESTIA
20 GOSUB 450:REM INITIALISE
30 GOSUB 60 :REM PRINT OUT
40 GOSUB 280:REM EVOLVE
50 GOTO 30
60 CLS
80 FOR X=2 TO 9
90 FOR Y=2 TO 19
100 PRINT CHR$(A(X,Y));
110 NEXT Y
120 FOR Y=19 TO 2 STEP -1
130 PRINT CHR$(A(X,Y));
140 NEXT Y
150 PRINT
160 NEXT X
170 FOR X=9 TO 2 STEP -1
180 FOR Y=2 TO 19
190 PRINT CHR$(A(X,Y));
200 NEXT Y
210 FOR Y=19 TO 2 STEP -1
220 PRINT CHR$(A(X,Y));
230 NEXT Y
240 PRINT
250 NEXT X
260 IF N=0 THEN 640
270 RETURN
280 FOR X=2 TO 9:FOR Y=2 TO 19
290 C=0
300 IF A(X-1,Y-1)=B THEN C=C+1
310 IF A(X-1,Y)=B THEN C=C+1
320 IF A(X-1,Y+1)=B THEN C=C+1
330 IF A(X,Y-1)=B THEN C=C+1
340 IF A(X,Y+1)=B THEN C=C+1
350 IF A(X+1,Y-1)=B THEN C=C+1
360 IF A(X+1,Y)=B THEN C=C+1
370 IF A(X+1,Y+1)=B THEN C=C+1
380 IF A(X,Y)=B AND C<>3 AND C<>2 THEN B(X,Y)=E
390 IF A(X,Y)=E AND C=3 THEN B(X,Y)=B
400 NEXT Y,X
410 FOR X=2 TO 9:FOR Y=2 TO 19
```

```
420 A(X,Y)=B(X,Y)
430 NEXT Y,X
440 RETURN
450 REM INITIALISE
460 CLS
470 PRINT "PRESS THE SPACE BAR":PRINT"WHEN YOU'RE
                                           READY TO BEGIN"
480 N=1
490 IF INKEY$<> " " THEN 490
510 PRINT "DO YOU WANT A COPY ON"
520 PRINT "YOUR PRINTER (Y OR N)"
530 A$=INKEY$:IF A$<> "N" AND A$<> "Y" THEN 530
540 IF A$="Y" THEN N=0
550 CLS
560 B=ASC("*"):E=ASC(" ")
570 DIM A(10,20),B(10,20)
580 FOR X=2 TO 9:FOR Y=2 TO 19
590 A(X,Y)=E
600 IF RND(0)>.45 THEN A(X,Y)=B
610 B(X,Y)=A(X,Y)
620 NEXT Y,X
630 RETURN
640 LPRINT "      ----------------------------------"
645 REM 6 SPACES, 34 -'S
650 LPRINT:LPRINT:LPRINT "      ";
660 FOR X=2 TO 9
670 FOR Y=2 TO 19
680 LPRINT CHR$(A(X,Y));
690 NEXT Y
700 FOR Y=19 TO 2 STEP -1
710 LPRINT CHR$(A(X,Y));
720 NEXT Y
730 LPRINT:LPRINT "      ";
740 NEXT X
750 FOR X=9 TO 2 STEP -1
760 FOR Y=2 TO 19
770 LPRINT CHR$(A(X,Y));
780 NEXT Y
790 FOR Y=19 TO 2 STEP -1
800 LPRINT CHR$(A(X,Y));
810 NEXT Y
820 LPRINT:LPRINT "      ";
830 NEXT X
840 LPRINT
850 RETURN
```

□ BILLBOARD

BILLBOARD, as you can see from the following sample run, takes a message of any length (up to the maximum string length permitted by your system) and turns it into a printed message down the side of your printer paper. The printed letters can then be used to decorate your walls, cut up to form posters, or used however your imagination dictates.

You don't need any further instructions to get great results like these:

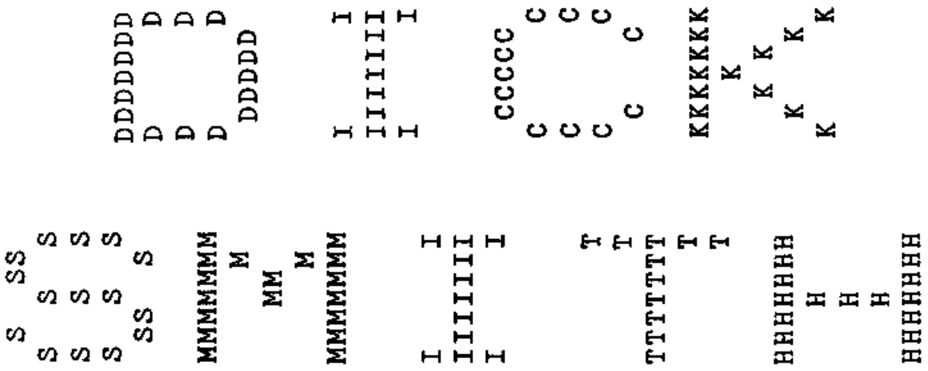


This is the listing for **BILLBOARD:**

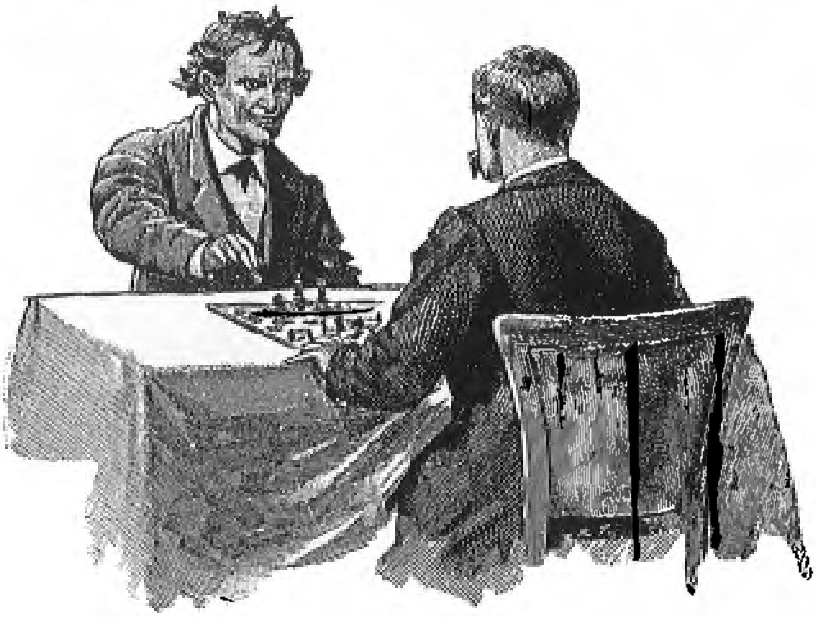
```
 10 REM BILLBOARD
 20 REM
 30 CLS
 40 INPUT"ENTER YOUR MESSAGE";A$
 50 B=LEN(A$)
 60 FOR C=1 TO B
 70 D=ASC(MID$(A$,C))-64
 80 IF D=-18 THEN GOSUB 410:GOTO 130:REM PERIOD(.)
 90 IF D=-31 THEN GOSUB 420:GOTO 130:REM EXCLAMATION(!)
 100 IF D=-32 THEN GOSUB 430:GOTO 130:REM SPACE
 110 IF D<1 OR D>26 THEN GOSUB 1000:REM SPECIAL
 120 GOSUB 500
 130 LPRINT:NEXT C
 140 END
 150 LPRINT"AAAAA":LPRINT"   A A":LPRINT"   A  A":
                                                LPRINT"   A A"
 155 LPRINT"AAAAA":RETURN
 160 LPRINT"BBBBBBB":LPRINT"B  B  B":LPRINT"B  B  B"
 165 LPRINT" BB BB":RETURN
 170 LPRINT " CCCCC":LPRINT "C     C":LPRINT"C     C"
 175 LPRINT "C     C":LPRINT " C   C":RETURN
 180 LPRINT"DDDDDDD":LPRINT"D     D":LPRINT"D     D"
 185 LPRINT"D     D":LPRINT" DDDDD":RETURN
 190 LPRINT"EEEEEEE":LPRINT"E  E  E":LPRINT"E  E  E"
 195 LPRINT"E     E":RETURN
 200 LPRINT"FFFFFFF":LPRINT"   F  F":LPRINT"   F  F"
 205 LPRINT"   F  F":LPRINT"      F":RETURN
 210 LPRINT" GGGGG":LPRINT"G     G":LPRINT"G     G"
 215 LPRINT"G G   G":LPRINT" GG  G":RETURN
 220 LPRINT"HHHHHHH":LPRINT"   H":LPRINT"   H":
                                              LPRINT"   H"
 225 LPRINT"HHHHHHH":RETURN
 230 LPRINT"I     I":LPRINT"IIIIIII":
                                   LPRINT"I     I":LPRINT
 235 RETURN
 240 LPRINT:LPRINT"JJJ":LPRINT"J     J":LPRINT"J     J"
 245 LPRINT" JJJJJ":RETURN
 250 LPRINT"KKKKKKK":LPRINT"   K":LPRINT"  K K":
                                                LPRINT" K   K"
 255 LPRINT"K     K":RETURN
 260 LPRINT "LLLLLLL":FOR Z=1 TO 4:LPRINT "L"
                                             :NEXT Z: RETURN
```

```
270 LPRINT"MMMMMMM":LPRINT"     M":LPRINT"  MM":
                                           LPRINT"     M"
275 LPRINT"MMMMMMM":RETURN
280 LPRINT"NNNNNNN":LPRINT"     NN":LPRINT"   NN"
                                             :LPRINT" NN"
285 LPRINT"NNNNNNN":RETURN
290 LPRINT" OOOOO":LPRINT"O     O":LPRINT"O     O"
295 LPRINT"O     O":LPRINT" OOOOO":RETURN
300 LPRINT "PPPPPP":LPRINT "   P  P":LPRINT"   P  P"
305 LPRINT "   P  P":LPRINT "    PP":RETURN
310 LPRINT" QQQQQ":LPRINT"Q     Q":LPRINT"Q Q   Q"
315 LPRINT"QQ    Q":LPRINT" QQQQQ":RETURN
320 LPRINT"RRRRRR":LPRINT"   R  R":LPRINT"  RR  R"
325 LPRINT" R  R  R":LPRINT"R   RR":RETURN
330 LPRINT" S  SS":LPRINT"S  S  S":LPRINT"S  S  S"
335 LPRINT"S  S  S":LPRINT" SS  S":RETURN
340 LPRINT"      T":LPRINT"      T":LPRINT"TTTTTTT":
345 LPRINT"      T":LPRINT"      T":RETURN
350 LPRINT" UUUUUU":LPRINT"U":LPRINT"U":LPRINT"U":
                                              LPRINT" UUUUUU
355 RETURN
360 LPRINT "   VVVV":LPRINT " VV":LPRINT "V"
                                              :LPRINT " VV"
365 LPRINT "   VVVV":RETURN
370 LPRINT" WWWWWW":LPRINT"W":LPRINT"WWWWW":LPRINT"W"
375 LPRINT" WWWWWW":RETURN
380 LPRINT"X     X":LPRINT" XX XX":LPRINT"   X"
                                             :LPRINT" XX XX"
385 LPRINT"X     X":RETURN
390 LPRINT"     YY":LPRINT"    Y":LPRINT"YYYY"
                                             :LPRINT"     Y"
395 LPRINT"     YY":RETURN
400 LPRINT"ZZ    Z":LPRINT"Z Z   Z":LPRINT"Z  Z  Z"
405 LPRINT"Z   Z Z":LPRINT"Z    ZZ":RETURN
410 LPRINT"..":LPRINT"..":LPRINT:LPRINT:LPRINT:RETURN
420 LPRINT"!! !!!!":LPRINT"!! !!!!":LPRINT:
                                               LPRINT:RETURN
430 LPRINT:LPRINT:LPRINT:LPRINT:RETURN
500 IF D=1 THEN GOSUB 150:RETURN:REM "A"
510 IF D=2 THEN GOSUB 160:RETURN:REM "B"
520 IF D=3 THEN GOSUB 170:RETURN:REM "C"
530 IF D=4 THEN GOSUB 180:RETURN:REM "D"
540 IF D=5 THEN GOSUB 190:RETURN:REM "E"
550 IF D=6 THEN GOSUB 200:RETURN:REM "F"
```

```
560 IF D=7 THEN GOSUB 210:RETURN:REM "G"
570 IF D=8 THEN GOSUB 220:RETURN:REM "H"
580 IF D=9 THEN GOSUB 230:RETURN:REM "I"
590 IF D=10 THEN GOSUB 240:RETURN:REM "J"
600 IF D=11 THEN GOSUB 250:RETURN:REM "K"
610 IF D=12 THEN GOSUB 260:RETURN:REM "L"
620 IF D=13 THEN GOSUB 270:RETURN:REM "M"
630 IF D=14 THEN GOSUB 280:RETURN:REM "N"
640 IF D=15 THEN GOSUB 290:RETURN:REM "O"
650 IF D=16 THEN GOSUB 300:RETURN:REM "P"
660 IF D=17 THEN GOSUB 310:RETURN:REM "Q"
670 IF D=18 THEN GOSUB 320:RETURN:REM "R"
680 IF D=19 THEN GOSUB 330:RETURN:REM "S"
690 IF D=20 THEN GOSUB 340:RETURN:REM "T"
700 IF D=21 THEN GOSUB 350:RETURN:REM "U"
710 IF D=22 THEN GOSUB 360:RETURN:REM "V"
720 IF D=23 THEN GOSUB 370:RETURN:REM "W"
730 IF D=24 THEN GOSUB 380:RETURN:REM "X"
740 IF D=25 THEN GOSUB 390:RETURN:REM "Y"
750 IF D=26 THEN GOSUB 400:RETURN:REM "Z"
999 END
1000 RETURN
```



Board Games



Some games could not have existed without computers.

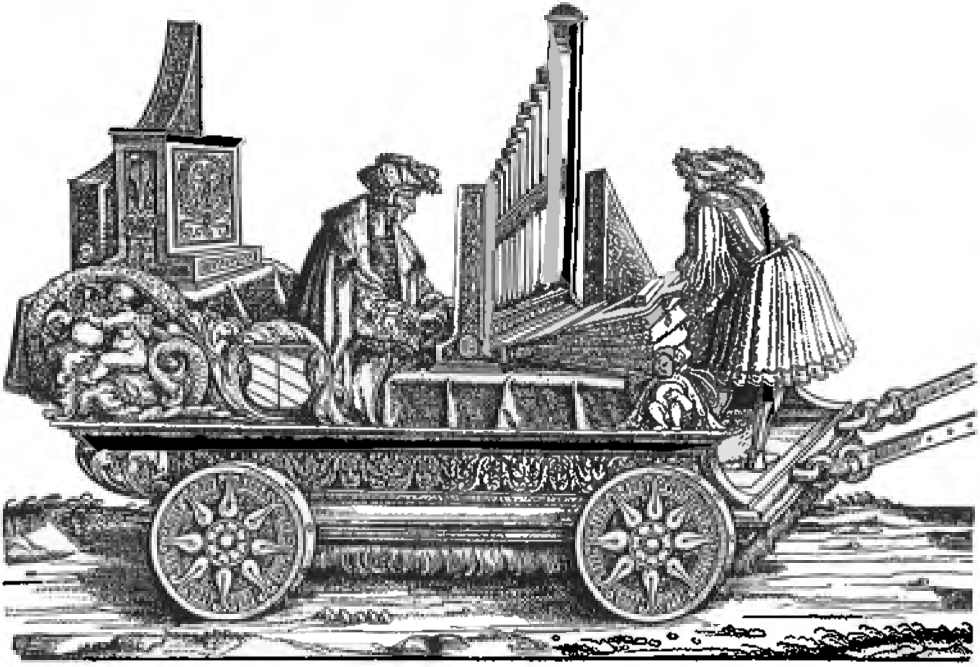
Think of the whole range of Space Intruder types of games and the Pacperson ones. These could have not come into being before the computer—using a TV-like screen for output—was developed. Many other games, of course, predate the computer by thousands of years. However, more and more of these traditional games have now been computerized, with board games being as popular with computer games players as they were with players in precomputer days.

In this section of the book, we have a generous crop of board games:

- GOMOKU
- FOUR IN A ROW
- CHECKERS
- AWARI
- KNIGHTSBRIDGE
- REVERSI (OTHELLO)

□ GOMOKU

You'll find GOMOKU an easy game to learn, but one which is almost impossible to win. The computer plays extremely well in this program, which is based on one written by Graham Charlton.



You have to try to get five of your pieces (the H's) in a row in any direction, while the computer is trying to do the same.

Have a look at these board positions from the start of one game I played against the program. Studying the printouts will show you how the game unfolds, and will show you how to play it:

```
   1 2 3 4 5 6 7 8                1 2 3 4 5 6 7 8
1  . . . . . . . .  1          1  . . . . . . . .  1
2  . . . . . . . .  2          2  . . . . . . . .  2
3  . . . C . . . .  3          3  . . . C . . . .  3
4  . . . . . . . .  4          4  . . . . . . . .  4
5  . . . . H . . .  5          5  . . . . H . . .  5
6  . . . . . . . .  6          6  . . . C . . . .  6
7  . . H . . . . .  7          7  . . H . . . . .  7
8  . . . . . C . .  8          8  . . . . . C . .  8
   1 2 3 4 5 6 7 8                1 2 3 4 5 6 7 8
```

```
    1 2 3 4 5 6 7 8               1 2 3 4 5 6 7 8
1   . . . . . . . .   1       1   . . . . . . . .   1
2   . . . . . . . .   2       2   . . . . . . . .   2
3   . . . C . . . .   3       3   . . . C . . . .   3
4   . . . C . . . C   4       4   . . . C . . C C   4
5   . . . . H C H .   5       5   . . . H H C H .   5
6   . . . C C H . .   6       6   . . . C C H H .   6
7   . . H C H H H .   7       7   . . H C H H H C   7
8   . . . . . C . .   8       8   . . . . . C . .   8
    1 2 3 4 5 6 7 8               1 2 3 4 5 6 7 8
```

Here's the listing for your very own game of GOMOKU:

```
10 REM GOMOKU
20 GOSUB 780
30 GOSUB 130
40 GOSUB 270
50 GOSUB 130
60 GOSUB 350
70 GOSUB 130
80 IF L>3 THEN PRINT:PRINT "I WIN!!":GOTO 1040
90 GOTO 40
100 E=A
110 E=E+N:IF A(E)<>Z THEN RETURN
120 K=K+1:GOTO 110
130 PRINT CHR$(28)
150 PRINT TAB(7);"1 2 3 4 5 6 7 8"
160 FOR A=1 TO 8:PRINT TAB(3);A;" ";
170 FOR B=2 TO 9
180 M=A(A*10+B)
190 IF M=C THEN PRINT "C ";
200 IF M=H THEN PRINT "H ";
210 IF M=46 THEN PRINT ". ";
220 NEXT B
230 PRINT A
240 NEXT A
250 PRINT TAB(7);"1 2 3 4 5 6 7 8"
260 RETURN
270 PRINT:PRINT
280 PRINT@416,"PLEASE ENTER YOUR MOVE...":PRINT
290 INPUT G
300 G=G+1
```

```
310 IF G<12 OR G>89 OR A(G)<>46 THEN 280
320 Z=H:PRINT@416,L$:PRINT@448,L$
330 A(G)=Z
340 RETURN
350 A=G
360 L=0
370 FOR X=1 TO 4:K=0:N=X(X)
380 GOSUB 100
390 N=-N:GOSUB 100
400 IF K>L THEN L=K
410 NEXT X
420 IF L>3 THEN PRINT:PRINT "YOU WIN!!":END
430 T=1
440 IF T<>2 THEN Z=C
450 IF T=2 THEN Z=H
460 G=0:H1=0:L=0
470 FOR A=12 TO 89
480 M=0
490 IF A(A)<>46 THEN 600
500 FOR X=1 TO 4:K=0:N=X(X)
510 GOSUB 100
520 N=-N:GOSUB 100
530 IF K>L THEN H1=0:L=K
540 IF L<>K THEN 570
550 IF T=1 AND L<4 OR (T=2 OR T=3) AND L<2 THEN 570
560 M=M+1
570 NEXT X
580 IF M<=H1 THEN 600
590 H1=M:G=A
600 NEXT A
610 IF H1<>0 THEN 680
620 T=T+1:IF T<>4 THEN 440
630 A=1
640 G=RND(77)+13
650 IF A(G)=46 THEN 680
660 A=A+1:IF A<100 THEN 640
670 PRINT:PRINT "I CONCEDE THE GAME":
                 PRINT "TO A MASTER!!":END
680 A(G)=C
690 Z=C:A=G:L=0
700 FOR X=1 TO 4
710 K=0
720 N=X(X)
730 GOSUB 100
```

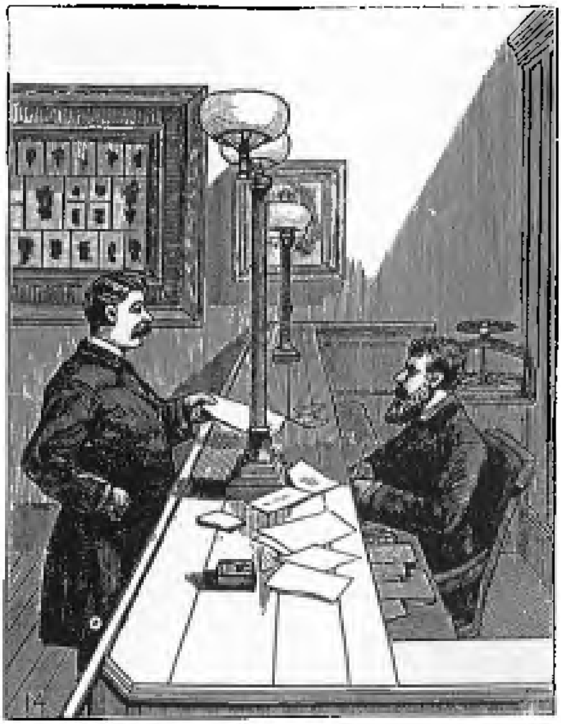
```
 740 N=-N:GOSUB 100
 750 IF K>L THEN L=K
 760 NEXT X
 770 RETURN
 780 CLS:L$="                         ":REM 25 SPACES
 790 DIM A(100),X(4)
 800 FOR C=1 TO 8
 810 FOR B=2 TO 9
 820 A(C*10+B)=46
 830 NEXT B
 840 NEXT C
 850 FOR Q=1 TO 4
 860 READ Z:X(Q)=Z
 870 NEXT Q
 880 DATA 1,9,10,11
 890 H=ASC("H"):C=ASC("C")
 900 PRINT:PRINT "ENTER 'Y' IF YOU WANT THE "
 910 PRINT "FIRST MOVE, 'N' IF YOU DON'T"
 920 N=0
 930 N=N+1
 940 A$=INKEY$
 950 IF A$<>"N" AND A$<>"Y" THEN 930
 960 CLS
 970 IF A$="Y" THEN RETURN
 980 FOR J=1 TO RND(12)
 990 READ Z
1000 NEXT J
1010 A(Z)=C
1020 RETURN
1030 DATA 34,35,44,46,47,54,55,56,57,66,75,84
1040 SOUND 16,3:SOUND 16,2:SOUND 13,4
                :SOUND 18,2:SOUND 16,5
1050 SOUND 13,6:END
```

FOUR IN A ROW

In this game, FOUR IN A ROW, as its name suggests, the aim is to get four of your pieces (the H's) in a line in any direction, before the computer (using the C's) manages to do so.

You indicate your choice of move by specifying the column in which you want to move your piece. The piece then drops to the lowest available position within that column.

The computer plays this game fairly well, and surprisingly quickly, considering the number of times it can go through those loops within the program.



I was not particularly pleased when I finished the first hand-written version of this program, because it seemed to me that I had taken a "brute force" approach to solving the problem. I was sure there would be a more clever way to do it. However, I continued with the program, and then entered it into the computer. It won the first game, even though it played a little oddly, so I knew I was onto a winner, despite the programming approach. Then, when thinking about it later I realized that if the program was correctly structured (as it was), had no redundant code (and it hasn't, as far as I can see), ran quickly and well, it did not need "fiddling" to make the programming more tricky. Transparent code is always better than overly clever convoluted code which, although it may occupy less space, and may run a few microseconds faster, is almost impossible to modify.

So the program you have here is my "brute force" version. It is generously supplied with REM statements so you have little trouble in working out what each section of code does. It should also prove fairly simple to modify, once you have played a few games with it in its present form.

In this version of FOUR IN A ROW, the computer always allows the human to have the first move, and bases its initial move on that made by the human. You may wish to modify the program so that there is an option for the computer to have the opening move.

Before we get to the listing of FOUR IN A ROW, here's one game played against the program:

```
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . C . . .
. . . H . . .               . . . H . . .
1 2 3 4 5 6 7               1 2 3 4 5 6 7


. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . C . . .               . . . C . . .
. . H H C . .               H C H H C . .
1 2 3 4 5 6 7               1 2 3 4 5 6 7

. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . . . . .               . . . . . . .
. . . C . . .               C . . C . . .
. . H H . . .               C C H H H . .
. H C C C . .               H H C C C . .
H C H H C . .               H C H H C . H
1 2 3 4 5 6 7               1 2 3 4 5 6 7
```

```
. . C C . . .                . . C C . . .
H . C H . . .                H . C H . . .
C . C H . . .                C C C H . . .
C . H C H . H                C H H C H . H
C C H H H C C                C C H H H C C
H H C C C H H                H H C C C H H
H C H H C C H                H C H H C C H
1 2 3 4 5 6 7                1 2 3 4 5 6 7
```

This is the listing for **FOUR IN A ROW:**

```
10 REM FOUR-IN-A-ROW
20 GOSUB 1090:REM INITIALISE
30 GOSUB 860:REM UPDATE BOARD
40 GOSUB 680:REM WIN CHECK
50 GOSUB 980:REM HUMAN MOVE
60 GOSUB 860:REM UPDATE BOARD
70 GOSUB 680:REM WIN CHECK
80 GOSUB 110:REM COMPUTER MOVE
90 PRINT@320,L$:GOTO 30
100 REM *************
110 REM COMPUTER MOVE
120 PRINT@320,"PLEASE STAND BY FOR MY MOVE..."
130 B=10
140 B=B+1
150 IF A(B)=-9 THEN 180
160 IF A(B)=C THEN X=C:GOTO 210
170 IF A(B)=H THEN X=H:GOTO 210
180 IF B<77 THEN 140
190 GOTO 480
200 REM ****************************
210 REM FOUR IN A ROW DANGER/CHANCE?
220 REM ACROSS
230 IF A(B+1)=X AND A(B+2)=XAND A(B+3)=E AND
                                  A(B+13)<>E THEN 1220
240 IF A(B-1)=X AND A(B-2)=X AND A(B-3)=E AND
                                   A(B+7)<>E THEN 1230
250 IF A(B+1)=X AND A(B+2)=X AND A(B-1)=E AND
                                   A(B+9)<>E THEN 1240
260 IF A(B-1)=X AND A(B+2)=X AND A(B+1)=E AND
                                  A(B+11)<>E THEN 1250
270 IF A(B+1)=X AND A(B-1)=X ANDA(B+2)=E AND
                                 A(B+12)<>E THEN 1260
```

```
280 IF A(B+1)=X AND A(B-1)=X AND A(B-2)=E AND
                                   A(B+8)<>E THEN 1270
290 IF A(B-1)=X AND A(B-2)=X ANDA(B+1)=E AND
                                  A(B+11)<>E THEN 1250
300 REM DOWN
310 IF B>20 THEN IF A(B-10)=X ANDA(B-20)=X AND
                                   A(B+10)=E THEN1300
320 REM DIAGONALS
330 IF A(B+11)=X AND A(B+22)=X ANDA(B-11)=EAND
                                   A(B-1)<>E THEN 1240
340 IF A(B+9)=X AND A(B+18)=X ANDA(B-9)=E AND
                                   A(B+1)<>E THEN 1280
350 REM ****************
360 REM MAKE/BLOCK THREE?
370 REM ACROSS
380 IF A(B+1)=X AND A(B+2)=E ANDA(B+12)<>E THEN
                                      MOVE=B+2:GOTO 650
390 IF A(B+1)=X AND A(B-1)=E AND A(B+9)<>E THEN
                                      MOVE=B-1:GOTO 650
400 IF A(B-1)=X AND A(B-2)=E AND A(B+8)<>E THEN
                                      MOVE=B-2:GOTO 650
410 REM VERTICAL
420 IF A(B+10)=X AND A(B-10)=E ANDA(B)<>E THEN
                                     MOVE=B-10:GOTO 650
430 REM DIAGONAL
440 IF A(B+9)=X AND A(B-9)=E AND A(B+1)<>E THEN
                                      MOVE=B-9:GOTO 650
450 IF B>11 THEN IF A(B+11)=XANDA(B-11)=E AND
                                     A(B-1)<>E THEN 1290
460 GOTO 180
470 REM ***********
480 REM SINGLE MOVES
490 FOR N=1 TO 3
500 M(N)=0
510 NEXT N
520 COUNT=0
530 FOR B=11 TO 77
540 IF A(B)<>C AND A(B)<>H THEN 600
550 IF A(B+1)=E AND A(B+11)<>E THEN COUNT=COUNT+1
                                          :M(COUNT)=B+1
560 IF A(B-1)=E AND A(B+9)<>E THEN COUNT=COUNT+1
                                          :M(COUNT)=B-1
```

```
570 IF A(B-10)=E AND A(B)<>E THEN COUNT=COUNT+1
                                            :M(COUNT)=B-10
580 IF A(B-11)=E AND A(B-1)<>E THEN COUNT=COUNT+1
                                            :M(COUNT)=B-11
590 IF A(B-9)=E AND A(B+1)<>E THEN COUNT=COUNT+1
                                            :M(COUNT)=B-9
600 NEXT B
610 IF COUNT<>0 THEN 640
620 PRINT "I THINK WE SHOULD CALL IT A DRAW"
630 PRINT:PRINT:PRINT:END
640 MOVE=M(RND(COUNT))
650 A(MOVE)=C
660 RETURN
670 REM WIN CHECK
680 X=H
700 B=10
710 B=B+1
720 IF A(B)<>X THEN 770
730 IF A(B+1)=X AND A(B+2)=X AND A(B+3)=X THEN 800
740 IF B>30 THEN IF A(B-10)=X ANDA(B-20)=X AND
                                    A(B-30)=X THEN 800
750 IF B>33 THEN IF A(B-11)=X ANDA(B-22)=X AND
                                    A(B-33)=X THEN 800
760 IF B>27 THEN IF A(B-9)=X AND A(B-18)=X AND
                                    A(B-27)=X THEN 800
770 IF B<77 THEN 710
780 IF X=H THEN X=C:GOTO 700
790 RETURN
800 REM WIN FOUND
810 PRINT
820 IF X=H THEN PRINT "YOU'VE BEATEN ME, HUMAN!"
830 IF X=C THEN PRINT "I'VE DEFEATED YOU,
                                    HUMAN!":SOUND 16,3
835 IF X=C THEN SOUND 16,2:SOUND 13,4:SOUND
                                       18,2:SOUND 16,5
837 IF X=C THEN SOUND 13,6
840 END
850 REM ************
860 REM UPDATE BOARD
870 PRINT CHR$(28);
880 FOR K=10 TO 70 STEP 10
```

```
890 PRINT TAB(5);
900 FOR J=1 TO 7
910 PRINT CHR$(A(K+J));" ";
920 NEXT J:PRINT
930 NEXT K
940 PRINT TAB(5);"1 2 3 4 5 6 7"
950 PRINT:PRINT
960 RETURN
970 REM **********
980 REM HUMAN MOVE
990 PRINT@288,"YOUR MOVE...":PRINT
1000 PRINT@320,"WHICH COLUMN DO YOU WISH TO"
1010 INPUT "MOVE INTO";J
1020 Z=J
1030 Z=Z+10:PRINT@288,L$:PRINT L$:PRINT L$
                                   :PRINT L$:PRINT L$
1040 IF A(Z+10)=E THEN 1030
1050 IF A(Z)=E THEN A(Z)=H:RETURN
1060 PRINT@384,"YOU CAN'T MOVE THERE"
1070 GOTO 1000
1080 REM **********
1090 REM INITIALISE
1100 CLS
1110 DIM A(109),M(30),P(6)
1120 E=46
1130 H=72:C=67
1140 FOR B=1 TO 109:A(B)=E
1150 D=B-10*INT(B/10)
1160 IF D=0 OR D>7 OR B<11 OR B>77 THEN A(B)=-9
1170 NEXT B
1180 L$="                               "
                                     :REM 31 SPACES
1190 RETURN
1220 MOVE=B+3:GOTO 650
1230 MOVE=B-3:GOTO 650
1240 MOVE=B-1:GOTO 650
1250 MOVE=B+1:GOTO 650
1260 MOVE=B+2:GOTO 650       1280 MOVE=B-9:GOTO 650
1270 MOVE=B-2:GOTO 650       1290 MOVE=B-11:GOTO 650
1300 IF A(B+20)<>E THEN MOVE=B+10:
                               GOTO 650 ELSE 320
```

□ SHOGUN

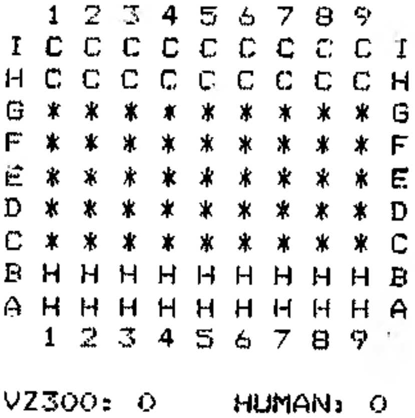
SHOGUN is based on the Japanese board game HASAMI SHOGI. In this game, generally played on the corner of a GO board, you move in any direction (forward, backwards, or sideways) in a straight line. Diagonal moves are not allowed. As well, you can jump over a piece (again in a

straight line). You can jump over your own pieces, or an enemy piece.

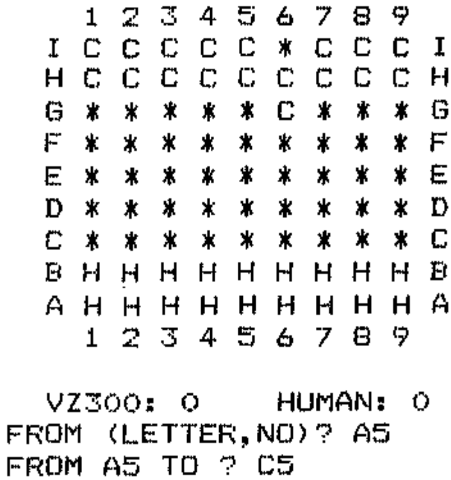
The jumped piece is not removed from the board. You capture a piece by *squeezing* it between two of yours. That is, you get one piece of yours on either side (except along a diagonal) of a computer's piece, and it is removed from the board. A piece is not captured if it moves between two of the opponent's pieces.

There are no double moves. You do not get an extra move following a capture. In the original game, the aim is to remove all your opponent's pieces from the board. However, this is a fairly slow game, and could take an eternity if played against the computer in this way. Therefore, I've written it so that the game is won by the first player to capture six of the opponent's pieces.

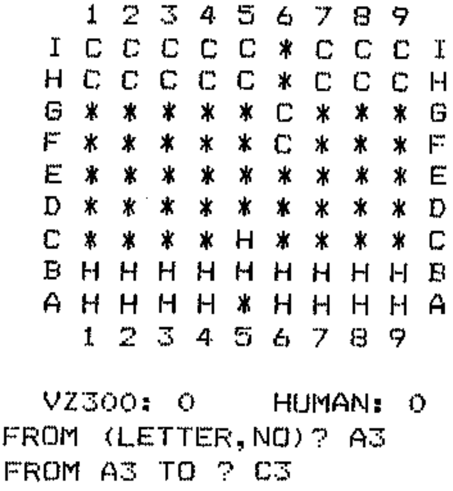
You'll find that the game will more or less teach you how to play it just by watching how it moves. Don't forget the fact that you can jump over your pieces, or the computer's pieces. This is a recommended tactic to get pieces well out into the board near the beginning of the game to get the game moving.



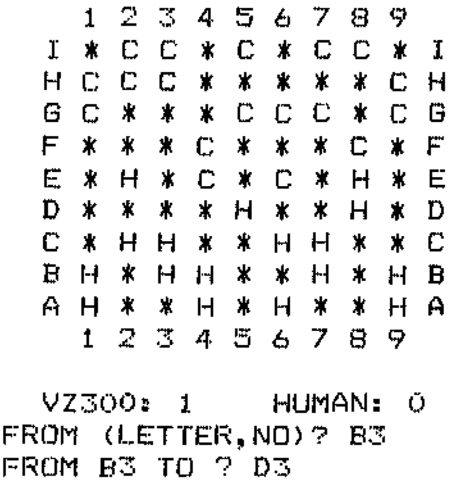
```
  1 2 3 4 5 6 7 8 9
I C C C C C C C C C I
H C C C C C C C C C H
G * * * * * * * * * G
F * * * * * * * * * F
E * * * * * * * * * E
D * * * * * * * * * D
C * * * * * * * * * C
B H H H H H H H H H B
A H H H H H H H H H A
  1 2 3 4 5 6 7 8 9

VZ300: 0     HUMAN: 0
```



```
   1 2 3 4 5 6 7 8 9
 I C C C C C * C C C I
 H C C C C C C C C C H
 G * * * * * C * * * G
 F * * * * * * * * * F
 E * * * * * * * * * E
 D * * * * * * * * * D
 C * * * * * * * * * C
 B H H H H H H H H H B
 A H H H H H H H H H A
   1 2 3 4 5 6 7 8 9

 VZ300: 0    HUMAN: 0
FROM (LETTER,NO)? A5
FROM A5 TO ? C5
```



```
   1 2 3 4 5 6 7 8 9
 I C C C C C * C C C I
 H C C C C C * C C C H
 G * * * * * C * * * G
 F * * * * * C * * * F
 E * * * * * * * * * E
 D * * * * * * * * * D
 C * * * * H * * * * C
 B H H H H H H H H H B
 A H H H H * H H H H A
   1 2 3 4 5 6 7 8 9

 VZ300: 0    HUMAN: 0
FROM (LETTER,NO)? A3
FROM A3 TO ? C3
```



```
   1 2 3 4 5 6 7 8 9
 I * C C * C * C C * I
 H C C C * * * * * C H
 G C * * * C C C * C G
 F * * * C * * * C * F
 E * H * C * C * H * E
 D * * * * H * * H * D
 C * H H * * H H * * C
 B H * H H * * H * H B
 A H * * H * H * * H A
   1 2 3 4 5 6 7 8 9

 VZ300: 1    HUMAN: 0
FROM (LETTER,NO)? B3
FROM B3 TO ? D3
```

```
   1 2 3 4 5 6 7 8 9
 I * C C * C * C C * I
 H C C C * * * * * C H
 G C * * * C C C * C G
 F * * * C * C * C * F
 E * * * C H * * H * E
 D * H * * H * * H * D
 C * H H * * H H * * C
 B H * H H * * H * H B
 A H * * H * H * * H A
   1 2 3 4 5 6 7 8 9

  VZ300: 0    HUMAN: 0
FROM (LETTER,NO)? D2
FROM D2 TO ? E2
```

```
   1 2 3 4 5 6 7 8 9
 I * C C * C * C C C I
 H C C C * * * * * * H
 G C * * C C C C C C G
 F * * * C * C * * * F
 E * * * * H * * * * E
 D * * * * H * * H * D
 C * * H * * H H H * C
 B H H H H * * H * H B
 A H H * H * H * * H A
   1 2 3 4 5 6 7 8 9

  VZ300: 0    HUMAN: 0
FROM (LETTER,NO)? C8
FROM C8 TO ? E8
```

```
   1 2 3 4 5 6 7 8 9
 I * C * * C * C C * I
 H C C C * * * * * C H
 G * * C * C C * * C G
 F C * * C * * * C * F
 E * H * * * C * H * E
 D * * H C H * C H * D
 C H H H H * H H * * C
 B H * * H * * H H H B
 A * * * * * H * * * A
   1 2 3 4 5 6 7 8 9

  VZ300: 1    HUMAN: 0
FROM (LETTER,NO)? B9
FROM B9 TO ? C9
```

```
   1 2 3 4 5 6 7 8 9
 I * C * * C * C C * I
 H C C C * * * * * C H
 G * * C * C C * * C G
 F C * * C * * * C * F
 E * H * * * * * H * E
 D * * H C * C C H * D
 C H H H H * H H * H C
 B H * * H * * H H * B
 A * * * * * H * * * A
   1 2 3 4 5 6 7 8 9

   VZ300: 2    HUMAN: 0
FROM (LETTER,NO)? B1
FROM B1 TO ? D1
```

Here's the listing for **SHOGUN:**

```
10 REM SHOGUN
20 REM FOR THE INSCRUTABLE VZ300
30 GOSUB 790
40 GOSUB 90
50 GOSUB 460
60 GOSUB 630
70 GOSUB 460
80 GOTO 40
90 REM CAPTURE
100 A=99
110 IF A(A)<>C THEN 190
120 IF A(A-10)<>E THEN 130
125 IF A(A-9)=H THEN IF A(A-8)=C THEN B=A-10:GOTO 350
130 IF A(A-10)<>E THEN 140
135 IF A(A-11)=H THEN IF A(A-12)=C THEN B=A-10
                                            :GOTO 350
140 IF A(A-10)<>E THEN 150
145 IF A(A+11)=H THEN IF A(A+12)=C THEN B=A-10
                                            :GOTO 350
150 B=1
160 IF A+2*C(B)<11 OR A+2*C(B)>99 THEN 180
170 IF A(A+C(B))<>E THEN 180
172 IF A(A+2*C(B))<>H THEN 180
175 IF A(A+3*C(B))=C THEN A(A+2*C(B))=E:CS=CS+1
                                            :GOTO340
180 IF B<4 THEN B=B+1:GOTO 160
```

```
190 IF A>11 THEN A=A-1:GOTO 110
200 REM NON-CAPTURE
210 CNT=0
220 CNT=CNT+1
230 A=RND(88)+11
240 IF A(A)=C THEN 270
250 IF CNT<200 THEN 220
260 PRINT "VZ SHOGUN MASTER":PRINT I GIVE
                                   YOU THE VICTORY!":END
270 B=1
280 IF A+2*C(B)<11 THEN 300
290 IF A(A+C(B))<>C OR A(A+C(B))<>H THEN 300
295 IF A(A+2*C(B))=E THEN B=A+2*C(B):GOTO 350
300 IF A(A+C(B))=E THEN 330
310 IF B<4 THEN B=B+1:GOTO 280
320 GOTO 250
330 REM VZ300 MOVES
340 B=A+C(B)
350 B1=B-10*(INT(B/10))
360 A(B)=C:A(A)=E
370 IF B1>7 THEN 390
380 IF A(B+1)=H AND A(B+2)=C THEN A(B+1)=E:CS=CS+1
390 IF B1<3 THEN 410
400 IF A(B-1)=H AND A(B-2)=C THEN A(B-1)=E:CS=CS+1
410 IF A>89 THEN 430
420 IF A(B+19)=H AND A(B+20)=C THEN A(B+10)=E:CS=CS+1
430 IF A<29 THEN RETURN
440 IF A(B-10)=H AND A(B-20)=C THEN A(B-10)=E:CS=CS+1
450 RETURN
460 REM BOARD PRINTOUT
470 CLS
480 PRINT TAB(5);"1 2 3 4 5 6 7 8 9"
490 FOR M=90 TO 10 STEP -10
500 PRINT TAB(3);CHR$(M/10+64);" ";
510 FOR N=1 TO 9
520 PRINT CHR$(A(M+N));" ";
530 NEXT N
540 PRINT CHR$(M/10+64)
550 NEXT M
560 PRINT TAB(5);"1 2 3 4 5 6 7 8 9"
570 PRINT:PRINT TAB(3);"VZ300:"CS"   HUMAN:"HS
590 IF CS>6 OR HS>6 THEN 610
600 RETURN
```

```
610 IF CS>HS THEN PRINT:PRINT "I WIN!":SOUND 5,1:END
620 PRINT:PRINT "YOU WIN!":SOUND 10,2:END
630 REM PLAYER MOVE
640 INPUT "FROM (LETTER,NO.)";A$
650 IF A$="S" THEN END
660 IF LEN(A$)<>2 THEN 640
670 PRINT "FROM "A$" TO ";:INPUT B$
680 IF LEN(B$)<>2 THEN 670
690 A=10*(ASC(A$)-64)+VAL(RIGHT$(A$,1))
700 B=10*(ASC(B$)-64)+VAL(RIGHT$(B$,1))
710 Y=VAL(RIGHT$(B$,1))
720 A(B)=H:A(A)=E
730 IF A(B+1)=C AND A(B+2)=H AND Y<=7 THEN A(B+1)=E
                                            :HS=HS+1
740 IF A(B-1)=C AND A(B-2)=H AND Y>=3 THEN A(B-1)=E
                                            :HS=HS+1
750 IF B>79 THEN 770
760 IF A(B+10)=C AND A(B+20)=H THEN A(B+10)=E:HS=HS+1
770 IF B<31 THEN 780
775 IF A(B-10)=C AND A(B-20)=H THEN A(B-10)=E:HS=HS+1
780 RETURN
790 REM INITIALISE
800 CLS:PRINT:PRINT
805 IF INKEY$<>"" THEN 805
810 PRINT "  PRESS ANY KEY ON YOUR VZ300"
820 N=1
830 N=N+1
840 IF INKEY$="" THEN 830
850 CLS:PRINT "  PLEASE STAND BY...":SOUND 17,1:SOUND 8,1
860 FOR J=1 TO N:A=RND(10):NEXT J
870 CLS
880 DIM A(129),C(4)
890 H=72:C=67:E=42
900 FOR Z=11 TO 29
910 IF Z=20 THEN Z=21
920 A(Z)=H
930 NEXT Z
940 FOR Z=31 TO 79
950 IF 10*INT(Z/10)=Z THEN Z=Z+1
960 A(Z)=E
970 NEXT Z
980 FOR Z=81 TO 99
```

```
990 IF Z=90 THEN Z=91
1000 A(Z)=C
1010 NEXT Z
1020 HS=0
1030 CS=0
1040 FOR Z=1 TO 4
1050 READ C(Z)
1060 NEXT Z
1070 DATA -10,-1,1,10
1080 GOSUB 460
1090 RETURN
```

```
  1 2 3 4 5 6 7 8 9
I C C C C C C C C C I
H C C C C C C C C C H
G * * * * * * * * * G
F * * * * * * * * * F
E * * * * * * * * * E
D * * * * * * * * * D
C * * * * * * * * * C
B H H H H H H H H H B
A H H H H H H H H H A
  1 2 3 4 5 6 7 8 9

VZ300: 0    HUMAN: 0
```

□ CHECKERS

The game of CHECKERS has a long and honorable history. R. C. Bell (in his book *Discovering Old Board Games*, Shire Publications, Aylesbury, UK, 1980) says it was invented around 1100, "probably in the south of France, using Backgammon tablemen on a chequered chessboard with the Alquerque method of capture" (pp. 35-36). The *Encyclopedia of Sports, Games and Pastimes* (Fleetway House, London, c. 1935) puts it much further back in time: "Forms of it were known in ancient Egypt, Greece and Rome, while the game was played in the mid-seventeenth century much as it is today" (p. 237).

Regardless of its age, it is a very popular game around the world, with many European countries having regional variations on the game of their own. Continental draughts (checkers is generally known as draughts outside the US), for example, is played on a board of 100 squares with each player starting the game with 20 pieces. It was developed in the early 1700s.

This CHECKERS program plays the game you are probably most familiar with. It plays swiftly, and reasonably well, although its lack of endgame strategy often leads to a dramatic collapse in the final moments of a game.

CHECKERS is played between you and the computer. Each of you is attempting to take (that is jump over to capture, then remove from the board) the other player's pieces, or to confine the opponent's pieces so no more moves are possible.

The game is generally played on a board with 64 squares, which are alternately light and dark. In this program, the board (as you can see from the sample game we have shortly) is a series of dots, with your pieces shown as H's (for human) and the machine's pieces as C's (for clever).

When the game begins, you're at the bottom of the screen, playing up, and the computer is at the top playing down. As the program is currently set up, the computer always has the first move. If you want the first move then delete line 50.

All moves must be made along diagonals. Individual pieces can only move forward, that is, toward the opponent's starting side. Pieces are converted into "kings" when they reach the back rank across the board. Your kings are shown as K's, the computer's kings are dollar signs. Kings can move either forward or back. After capturing a piece, by jumping over it into the vacant square immediately behind the captured piece, you can move again if there is a further capture which can be made.

Here is a series of board positions from one game I played against the program:

```
      COMPUTER: 0
         HUMAN: 0


    1 2 3 4 5 6 7 8
8   . C . C . C . C   8
7   C . C . C . C .   7
6   . C .   . C . C   6
5     .   . C .   .   5
4   .   .   .   .     4
3   H . H . H . H .   3
2   . H . H . H . H   2
1   H . H . H . H .   1
    1 2 3 4 5 6 7 8
```

```
      COMPUTER: 0
         HUMAN: 0


    1 2 3 4 5 6 7 8
8   . C .   . C . C   8
7   C . C . C . C .   7
6   .   . C . C . C   6
5   C .   . C .   .   5
4   . H .   .   . H   4
3     . H . H . H .   3
2   . H . H .   . H   2
1   H . H . H . H .   1
    1 2 3 4 5 6 7 8
```

```
  COMPUTER: 4
     HUMAN: 4


    1 2 3 4 5 6 7 8
8   .   .   .   .     8
7     . H . C . C .   7
6   .   . C . C . C   6
5     .   .   . C .   5
4   .   . H .   . H   4
3     .   .   . H .   3
2   .   .   . H . H   2
1   $ . H . $ . H .   1
    1 2 3 4 5 6 7 8
```

```
  COMPUTER: 6
     HUMAN: 6


    1 2 3 4 5 6 7 8
8   .   .   .   .     8
7     .   . C . C .   7
6   .   .   . .   C   6
5     . H .   . C .   5
4   . $ .   . H . H   4
3     .   .   . H .   3
2   .   .   . C . H   2
1     .   .   . H .   1
    1 2 3 4 5 6 7 8
```

```
  COMPUTER: 9
     HUMAN: 10


    1 2 3 4 5 6 7 8
8   .   . K .   .     8
7     . H .   .   .   7
6   .   .   .   .     6
5     . $ .   .   .   5
4   .   .   .   .     4
3     .   .   . K     3
2   . $ .   .   .     2
1     .   .   .   .   1
    1 2 3 4 5 6 7 8
```

```
  COMPUTER: 11
     HUMAN: 10


    1 2 3 4 5 6 7 8
8   .   .   .   .     8
7     .   .   .   .   7
6   . K . $ .   .     6
5     .   .   .   .   5
4   .   .   .   .     4
3     .   .   .       3
2   . $ .   .   .     2
1     .   .   .   .   1
    1 2 3 4 5 6 7 8
```

This is the complete listing for **CHECKERS:**

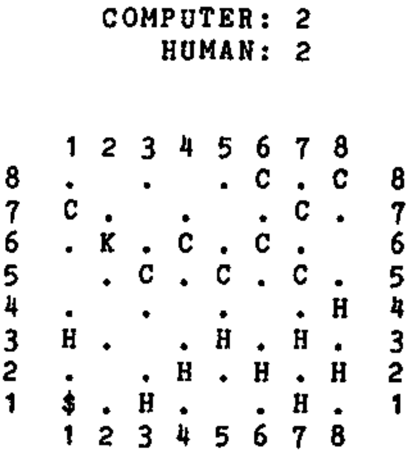
```
10 REM CHECKERS
20 GOSUB 1010:REM INITIALISE
30 REM DELETE LINE 50 FOR HUMAN
40 REM TO HAVE FIRST MOVE
```

```
50 GOTO 90
60 REM ************************
70 GOSUB 600:REM PRINT BOARD
80 GOSUB 760:REM GET AND PRINT HUMAN MOVE
90 GOSUB 600:REM PRINT BOARD
100 GOSUB 130:REM MAKE MOVE
110 GOTO 70
120 REM ***********************
130 FOR X=1 TO 10:S(X)=0:NEXT X
140 SC=0:A=89
150 A=A-1
160 IF Q(A)<>C AND Q(A)<>C K THEN 240
170 B=0:IF A<29 THEN B=2
180 B=B+1
190 M=A+N(B)
200 IF M>88 OR M<11 THEN 240
210 IF (Q(M)=H OR Q(M)=HK) AND Q(M+N(B))=E THEN 280
230 IF B<2 OR (Q(A)=CK AND B<4) THEN 180
240 IF A>11 THEN 150
250 FL=0:IFQ(22)=C OR Q(24)=C ORQ(26)=C OR Q(28)=C
                                              THEN GOSUB1270
260 IF FL=1 THEN 570
270 GOTO 420
280 Q(M+N(B))=Q(A):Q(M)=E:Q(A)=E
290 CO=CO+1
300 GOSUB 600
310 A=M+N(B)
320 B=0
330 B=B+1
340 IF (A+2*N(B)<11 OR A+2*N(B)>88) AND B<4 THEN 330
350 M=A+N(B)
360 IF Q(M)=C AND B>3 THEN RETURN
370 IF (Q(M)=HK) AND Q(M+N(B))=E THEN 330
380 IF B<2 OR (Q(A)=CK AND B<4) THEN 330
390 RETURN
400 IF SC<10 THEN SC=SC+1
410 S(SC)=100*A+B+20: RETURN
420 IF SC=0 THEN 470
430 XC=RND(SC)
440 A=INT(S(XC)/100)
450 M=A+N(S(XC)-100*A-20)
460 GOTO 570
470 SC=SC+1:A=RND(88)
480 IF Q(A)<>C AND Q(A)<>CK THEN 550
```

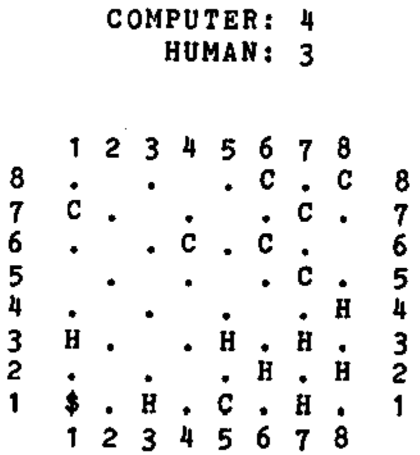
```
490 B=0
500 B=B+1
510 M=A+N(B)
520 IF M>88 OR M<11 THEN 570
530 IF Q(M)=E THEN 570
540 IF B<2 OR Q(A)=CK AND B<4 THEN 500
550 IF SC<300 THEN 470
560 PRINT:PRINT"I CONCEDE THE GAME":END
570 Q(M)=Q(A):Q(A)=E
580 RETURN
590 REM *************************
600 PRINT CHR$(28);
610 PRINT"      COMPUTER:"CO
620 PRINT"         HUMAN:"HU
630 PRINT"    1 2 3 4 5 6 7 8"
640 FOR F=80 TO 10 STEP -10
650 PRINT F/10;" ";
660 FOR G=1 TO 8:PRINT CHR$(Q(G+F));" ";:NEXT G
670 PRINT F/10: NEXT F
680 PRINT"    1 2 3 4 5 6 7 8 "
690 IF CO=12 OR HU=12 THEN 710
700 RETURN
710 IF HU=12 THEN PRINT"YOU HAVE WON!"
720 IF CO=12 THEN PRINT"I HAVE WON!"
730 PRINT"THANKS FOR THE GAME":END
740 REM************************
750 REM 99 TO CONCEDE THE GAME
760 REM HUMAN MOVE
770 PRINT@416,"ENTER YOUR MOVE":PRINT
780 PRINT@448,"";:INPUT"FROM";A
790 IF A=99 THEN GOTO 730
800 IF Q(A)<> H AND Q(A) <> HK THEN 780
810 PRINT@448,"    ";:INPUT"TO";B
815 IF Q(A)=H AND B<A THEN 810
820 IF Q(B)<>E THEN 810
825 PRINT@416,"               ":REM 15 SPACES
830 Q(B)=Q(A):Q(A)=E
835 PRINT@448,"          ":REM 10 SPACES
840 REM************************
850 FOR T=11 TO 17:IF Q(T)=C THEN Q(T)=CK
860 NEXT T
870 FOR T=82 TO 88:IF Q(T)=H THEN Q(T)=HK
880 NEXT T
```

```
890 REM************************
900 IF ABS(A-B)<12 THEN RETURN
910 TY=RND(10)
920 IF TY<3 THEN PRINT@416,"GOOD MOVE":GOSUB 1340
930 IF TY>7 THEN PRINT@416,"GOT ME!":GOSUB 1340
940 HU=HU+1:Q((A+B)/2)=E:GOSUB 600
950 FOR T=82 TO 88:IF Q(T)=H THEN Q(T)=H THEN Q(T)=HK
960 NEXT T
970 PRINT:INPUT"CAN YOU JUMP AGAIN(Y/N)";A$
975 PRINT@416,"                              "
980 IF A$<>"Y" THEN RETURN
990 A=B:GOTO 800
1000 REM************************
1010 REM INITIALISE
1020 CLS:PRINT "PRESS THE SPACE KEY"
1030 IF INKEY$<> " " THEN 1030
1040 CLS
1050 PRINT"PLEASE STAND BY"
1060 DIM Q(99),N(4),S(10)
1070 H=72:HK=75
1080 C=67:CK=36
1090 E=32:OF=-99
1100 FOR M=1 TO 99:Q(M)=OF:NEXT M
1110 FOR M=1 TO 64
1120 READ D,G
1130 Q(D)=G:NEXT M
1140 DATA 81,46,82,67,83,46,84,67,85,46,86,67,87,46
1150 DATA 88,67,71,67,72,46,73,67,74,46,75,67,76,46
1160 DATA 77,67,78,46,61,46,62,67,63,46,64,67
1170 DATA 65,46,66,67,67,46,68,67,51,32,52,46
1180 DATA 53,32,54,46,55,32,56,46,57,32,58,46
1190 DATA 41,46,42,32,43,46,44,32,45,46,46,32
1200 DATA 47,46,48,32,31,72,32,46,33,72,34,46,35,72
1210 DATA 36,46,37,72,38,46,21,46,22,72,23,46,24,72
1220 DATA 25,46,26,72,27,46,28,72,11,72,12,46,13,72
1230 DATA 14,46,15,72,16,46,17,72,18,46
1240 FOR M=1 TO 4:READ X:N(M)=X:NEXT M
1250 DATA -11,-9,11,9
1260 CO=0:HU=0:RETURN
1270 IF Q(22)=C AND Q(11)=E THEN A=22:M=11:FL=1:RETURN
1280 IF Q(22)=C AND Q(13)=E THEN A=22:M=13:FL=1:RETURN
1290 IF Q(24)=C AND Q(13)=E THEN A=24:M=13:FL=1:RETURN
1300 IF Q(24)=C AND Q(15)=E THEN A=24:M=15:FL=1:RETURN
```

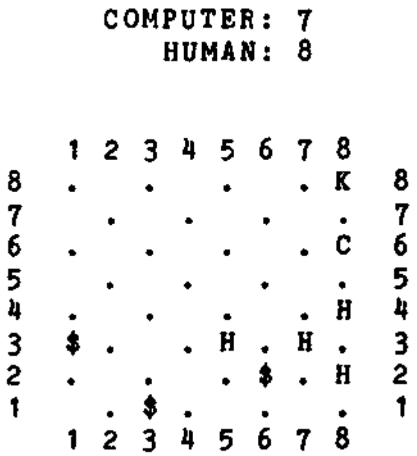
```
1310 IF Q(26)=C AND Q(15)=E THEN A=26:M=15:FL=1:RETURN
1320 IF Q(26)=C AND Q(17)=E THEN A=26:M=17:FL=1:RETURN
1330 RETURN
1340 FOR O=1 TO 1000:NEXT O:RETURN
```



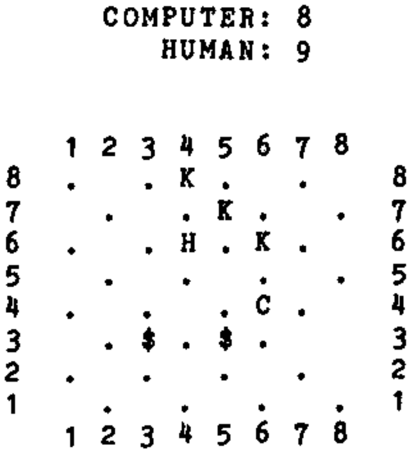
```
         COMPUTER: 2
            HUMAN: 2


    1 2 3 4 5 6 7 8
8   .   .   . C . C   8
7   C .   .   . C .   7
6   . K . C . C .     6
5     . C . C . C .   5
4   .   .   .   . H   4
3   H .   . H . H .   3
2   .   . H . H . H   2
1   $ . H .   . H .   1
    1 2 3 4 5 6 7 8
```



```
         COMPUTER: 4
            HUMAN: 3


    1 2 3 4 5 6 7 8
8   .   .   . C . C   8
7   C .   .   . C .   7
6   .   . C . C .     6
5     .   .   . C .   5
4   .   .   .   . H   4
3   H .   . H . H .   3
2   .   .   . H . H   2
1   $ . H . C . H .   1
    1 2 3 4 5 6 7 8
```



```
         COMPUTER: 7
            HUMAN: 8


    1 2 3 4 5 6 7 8
8   .   .   .   . K   8
7     .   .   .   .   7
6   .   .   .   . C   6
5     .   .   .   .   5
4   .   .   .   . H   4
3   $ .   . H . H .   3
2   .   .   . $ . H   2
1     . $ .   .   .   1
    1 2 3 4 5 6 7 8
```



```
         COMPUTER: 8
            HUMAN: 9


    1 2 3 4 5 6 7 8
8   .   . K .   .     8
7     .   . K .   .   7
6   .   . H . K .     6
5     .   .   .   .   5
4   .   .   . C .     4
3     . $ . $ .       3
2   .   .   .   .     2
1     .   .   .   .   1
    1 2 3 4 5 6 7 8
```

□ AWARI

AWARI is one of a series of pebble-in-pits games generally known under the name of "Mancala." The game is played from Africa to the Philippines, and will now move into your home, via a very clever computer opponent.

As you can see from the sample game, which starts below, the game begins with six "pits" (the letters A to F and L to G) facing each player. Your pits are those from L to G. Each pit contains three seeds at the beginning of the game. Choosing any pit on your side, you pick up all the seeds from it, and then proceed to move in a clockwise direction, sowing a seed in each pit as you go past it. You do not sow any seeds in the pits at either end of the board, the ones which start off as zeroes.

If your final seed lands opposite an empty pit, then all the seeds in the pit you've landed in become yours, and are transferred to your "home." Your home is the zero to the left of the board, the computer's home is the zero to the right.

The game continues until either side is completely empty, so the player cannot move. At this point, the player with the largest number of seeds in his or her pit is the winner. The computer plays well in this game, but with practice you'll learn to defeat it. Don't expect too many victories in the early games.

Here's a game I played against my own computer:

```
    A  B  C  D  E  F
    3  3  3  3  3  3
 0                    0
    3  3  3  3  3  3
    L  K  J  I  H  G
```

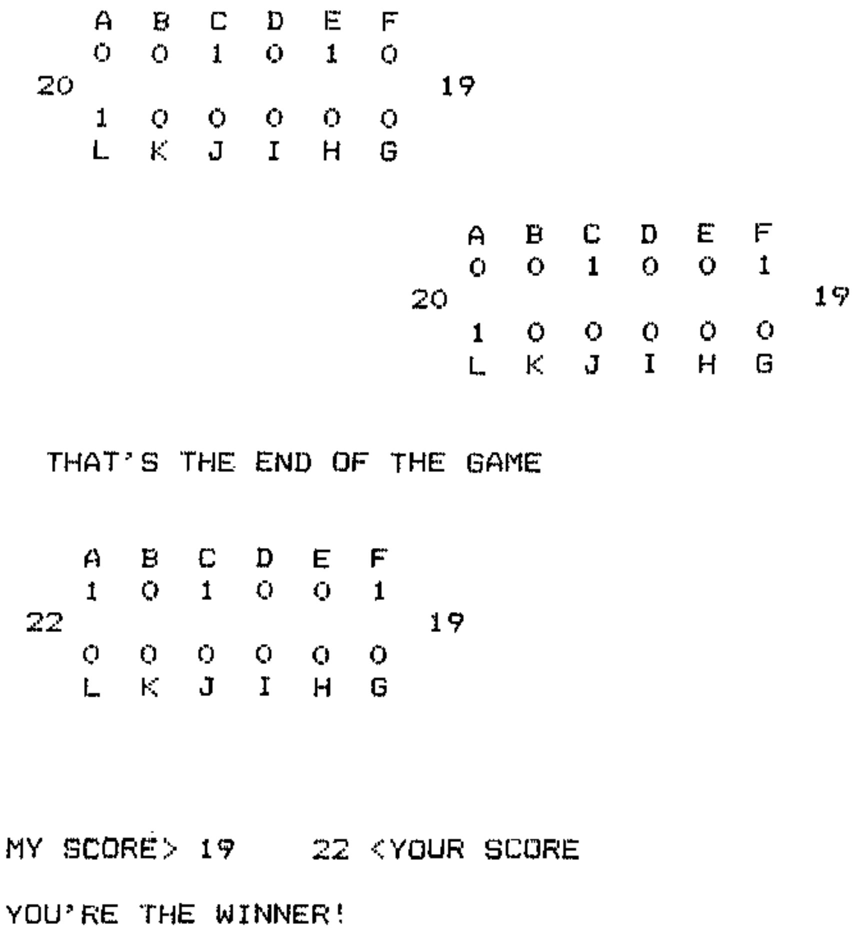
```
    A  B  C  D  E  F
    3  3  3  3  3  0
 0                    0
    3  3  3  4  4  4
    L  K  J  I  H  G
```

```
    A  B  C  D  E  F
    3  3  3  3  3  0
 0                    0
    3  4  4  5  5  0
    L  K  J  I  H  G
```

```
    A  B  C  D  E  F
    3  3  0  4  4  1
 0                    0
    3  4  4  5  5  0
    L  K  J  I  H  G
```

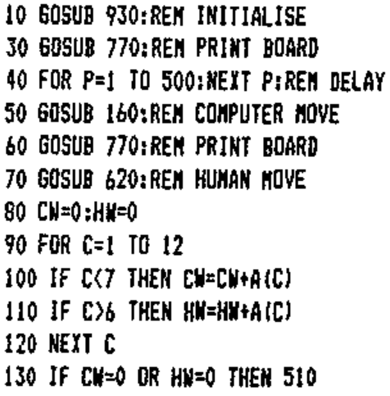
```
    A  B  C  D  E  F
    4  3  0  4  4  1
 0                    0
    4  5  5  6  0  0
    L  K  J  I  H  G
```

```
    A  B  C  D  E  F
    4  3  0  0  0  2
 0                    5
    4  5  5  6  1  1
    L  K  J  I  H  G
```



```
     A   B   C   D   E   F
     0   0   1   0   1   0
  20                          19
     1   0   0   0   0   0
     L   K   J   I   H   G

                                        A   B   C   D   E   F
                                        0   0   1   0   0   1
                                     20                          19
                                        1   0   0   0   0   0
                                        L   K   J   I   H   G

   THAT'S THE END OF THE GAME

     A   B   C   D   E   F
     1   0   1   0   0   1
  22                          19
     0   0   0   0   0   0
     L   K   J   I   H   G



MY SCORE> 19    22 <YOUR SCORE

YOU'RE THE WINNER!
```

This is the listing for AWARI:



```
10 GOSUB 930:REM INITIALISE
30 GOSUB 770:REM PRINT BOARD
40 FOR P=1 TO 500:NEXT P:REM DELAY
50 GOSUB 160:REM COMPUTER MOVE
60 GOSUB 770:REM PRINT BOARD
70 GOSUB 620:REM HUMAN MOVE
80 CW=0:HW=0
90 FOR C=1 TO 12
100 IF C<7 THEN CW=CW+A(C)
110 IF C>6 THEN HW=HW+A(C)
120 NEXT C
130 IF CW=0 OR HW=0 THEN 510
```

```
140 GOTO 30
150 REM ****************
160 REM COMPUTER MOVE
170 GM=0:C=0
180 C=C + 1
190 IF A(C)=0 THEN 180
200 Z=C + A(C)
210 IF Z>12 THEN Z=Z - 12
215 FLAG=0
220 IF Z>6 THEN IF A(Z-6)<>0 AND A(Z)=0 THEN FLAG=1
225 IF FLAG=1 THEN IF A(Z-6))GM THEN GM=C
227 FLAG=0
230 IF Z<7 THEN IF A(Z+6)<>0 AND A(Z)=0 THEN FLAG=1
235 IF FLAG=1 THEN IF A(Z+6))GM THEN GM=C
240 IF C<6 THEN 180
250 IF GM=0 THEN 370
260 C=GM
270 PRINT @ 34,"I'LL MOVE FROM ";CHR$(64+C)," "
272 SOUND RND(0)*20+1,3:SOUND RND(0)*20+1,1:SOUND 5,2
275 PRINT @ 34,"                 ","   "
280 FOR Z=C TO C+A(C)
290 IF Z>12 THEN A(Z-12)=A(Z-12)+1
300 IF Z<13 THEN A(Z)=A(Z)+1
310 NEXT Z
320 Z=C+A(C)-1:IF Z>12 THEN Z=Z-12
330 A(C)=0
340 B(2)=B(2)+A(13-Z):A(13-Z)=0
350 RETURN
360 REM**************
370 REM NON-SCORE MOVE
380 W=0
390 W=W + 1
400 C=INT(RND(0)*6)+1
410 IF A(C) <> 0 THEN 440
420 IF W<20 THEN 390
430 GOTO 510
440 PRINT @ 34,"I'LL MOVE FROM ";CHR$(64+C)
442 SOUND 6,1:SOUND 3,1:SOUND RND(0)*20+1,3:SOUND RND(0)*20+1,1
445 PRINT @ 34,"                 ","   "
450 FOR Z= C TO C+A(C)
460 IF Z<13 THEN A(Z)=A(Z)+1
470 IF Z>12 THEN A(Z-6)=A(Z-6)+1
480 NEXT Z
490 A(C)=0:GOTO 350
```

```
500 REM **************
510 REM END OF GAME
520 GOSUB 770
530 PRINT @ 34,"THAT'S THE END OF THE GAME"
540 SOUND RND(0)*20,1:SOUND RND(0)*20,2
550 IF B(1)>B(2) THEN PRINT @ 480,"YOU'RE THE WINNER!"
560 IF B(1)<B(2) THEN PRINT @ 480,"I'M THE WINNER!"
570 IF B(1)=B(2) THEN PRINT @ 480,"IT LOOKS LIKE A DRAW!"
580 PRINT @ 416,"MY SCORE>";B(2);"  ";B(1);"<YOUR SCORE"
600 GOTO 600
610 REM****************
620 REM HUMAN MOVE
630 PRINT @ 34,"WHICH PIT TO START WITH?":PRINT @ 66," "
635 INPUT A$:PRINT @ 34,"                             "," "
640 PRINT @ 96,"    ":B=ASC(A$)-64
650 IF B<7 OR B>12 THEN 630
660 CD=B:Z=B+A(B):IF Z>12 THEN Z=Z-12
670 M=A(Z)
680 FOR Z=B TO B+A(B)
690 IF Z>12 THEN A(Z-12)=A(Z-12)+1
700 IF Z<13 THEN A(Z)=A(Z)+1
710 NEXT Z
720 Z=B+A(B)-1:IF Z>12 THEN Z=Z-12
730 IF M=0 THEN B(1)=B(1)+A(13-Z):A(13-Z)=0
740 A(CD)=0
750 RETURN
760 REM***************
770 REM PRINT BOARD
780 PRINT @ 128,"    A  B  C  D  E  F":PRINT "   ";
800 FOR C=1 TO 6
810 PRINT A(C);
820 NEXT C
830 PRINT:PRINT B(1);"                 "B(2):PRINT "   ";
840 FOR C=12 TO 7 STEP -1
850 PRINT A(C);
860 NEXT C
870 PRINT:PRINT "    L  K  J  I  H  G"
880 COPY:REM DELETE THIS LINE IF YOU DON'T WANT PRINTER COPY
890 RETURN
900 PRINT @ 34,"I MOVE FROM ";CHR$(64+GM)
910 C=GM
920 REM***************
930 REM INITIALISE
```

```
 940 CLS
 960 DIM A(12),B(12)
 970 FOR C=1 TO 12
 980 A(C)=3
 990 NEXT C
1000 RETURN
```

```
     A    B    C    D    E    F
     7    2    3    3    3    0
9                                  5
     7    0    1    0    2    0
     L    K    J    I    H    G
```

```
                                           A    B    C    D    E    F
                                           7    2    3    0    4    0
                                      9                                  6
                                           7    0    1    0    2    1
                                           L    K    J    I    H    G
```

```
     A    B    C    D    E    F
     7    0    3    0    4    0
11                                 6
     7    1    0    0    2    1
     L    K    J    I    H    G
```

```
                                           A    B    C    D    E    F
                                           7    0    0    1    5    1
                                      11                                 7
                                           7    1    0    0    2    0
                                           L    K    J    I    H    G
```

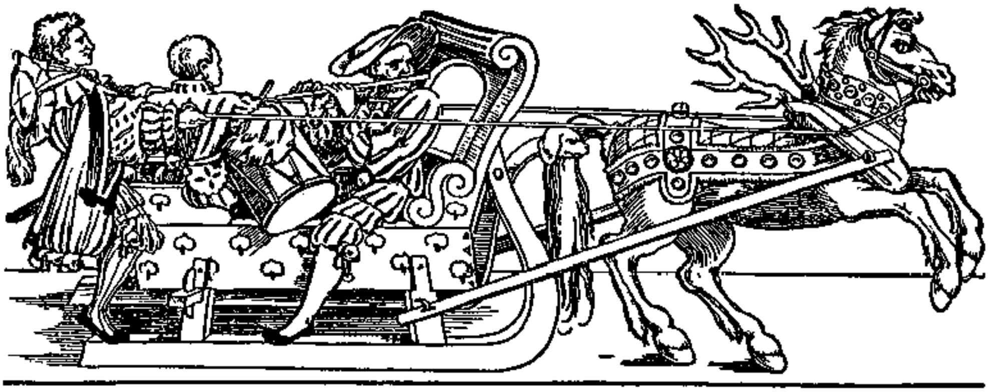
```
     A    B    C    D    E    F
     8    1    1    2    6    0
13                                 7
     0    1    0    0    2    1
     L    K    J    I    H    G
```

```
                                           A    B    C    D    E    F
                                           0    2    2    0    7    1
                                      13                                 10
                                           0    1    0    1    3    2
                                           L    K    J    I    H    G
```

□ KNIGHTSBRIDGE

KNIGHTSBRIDGE is one of the few games which I can claim I invented completely (although, of course, the idea of naming it after a London suburb came from the two inventors of KENSINGTON). I make habit of reading games books to get ideas, and often when I walked in the woods around London, I'd take a book with me to read when I felt like a rest. I was walking one Sunday afternoon near Ruislip Lido thinking about a passage I'd just read in a book which said that chess evolved from an Indian game in which the throw of a die dictated which piece was to move.

From that starting point, I thought of a game in which all the pieces were chess knights (hence the name of the game) and a die was used to say which piece had to move. KNIGHTSBRIDGE evolved from that idea.



It is played on a seven by seven board. The computer tells you which piece you must move (each piece is indicated by entering a two-digit number, the first being the coordinates of the square you're moving to down the side of the board, the second digit being the coordinates of the square across the top), and then leaves you to decide where you will move to. All pieces move like chess knights, and all moves are checked to see if they are legal before you are allowed to move.

You capture by landing on top of an enemy piece. The first player to capture five of the enemy's seven pieces is the winner. There are no multiple jumps.

You'll find the computer plays swiftly and well.

```
   MY SCORE IS 0
   YOUR SCORE IS 0

   1 2 3 4 5 6 7
   -------------
 7 C C C C C C C 7
 6 . . . . . . . 6
 5 . . . . . . . 5
 4 . . . . . . . 4
 3 . . . . . . . 3
 2 . . . . . . . 2
 1 H H H H H H H 1
   -------------
   1 2 3 4 5 6 7
I HAVE TO MOVE THE PIECE ON 77
```

```
  MY SCORE IS 0
  YOUR SCORE IS 0

 1 2 3 4 5 6 7
 -------------
7 C C C C C C . 7
6 . . . . . . . 6
5 . . . . . C . 5
4 . . . . . . . 4
3 . . . H . . . 3
2 . . . . . . . 2
1 H H H H . H H 2
  -------------
 1 2 3 4 5 6 7
YOU MUST MOVE THE PIECE ON 15
? 34
```

This is the listing for KNIGHTSBRIDGE:

```
10 REM KNIGHTSBRIDGE
20 GOSUB 760 :REM INITIALISE
30 GOSUB 490 :REM PRINT BOARD
40 IF HU=5 OR CO=5 THEN 680 :REM END OF GAME
50 GOSUB 300 :REM COMPUTER MOVE
60 GOSUB 490 :REM PRINT BOARD
70 IF HU=5 OR CO=5 THEN 680 :REM END OF GAME
80 GOSUB 110 :REM PLAYER MOVES
90 GOTO 30
100 REM ######################
110 REM PLAYER MOVES
120 Q=0
130 M=RND(66)+11
140 Q=Q+1
150 IF Q=500 THEN 680
160 IF H(M)<>72 THEN 130
170 PRINT"YOU MUST MOVE THE PIECE ON"M
180 INPUT N
190 IF N=99 THEN Q=500:GOTO 680
200 REM ### CHECK IF MOVE LEGAL ###
210 P=0
220 CT=1
230 IF M+Z(CT)=N THEN P=1
```

```
240 IF CT<8 THEN CT=CT+1:GOTO 230
250 IF P=0 THEN PRINT"ILLEGAL MOVE":GOTO 180
260 IF H(N)=67 THEN HU=HU+1:PRINT"WELL PLAYED!":FORR=1TO500:NEXT
270 H(M)=46:H(N)=72
280 RETURN
290 REM $$$$$$$$$$$$$$$$$$$$$$$$
300 REM COMPUTER MOVES
310 Q1=0
320 Q1=Q1+1
330 K=RND(66)+11
340 IF Q1=500 THEN 680
350 IF H(K)<>67 THEN 320
360 PRINT"I HAVE TO MOVE THE PIECE ON"K
365 FOR F=1 TO 3000:NEXT F
370 W=1
380 IF K+Z(W)<11 OR K+Z(W)>77 THEN 400
385 IF H(K+Z(W))=72 THEN PRINT "GOTCHA!!":FOR F=1 TO 1500:NEXT F
390 IF H(K+Z(W))=72 THEN CO=CO+1:GOTO 450
400 IF W<8 THEN W=W+1:GOTO 380
410 W=1
420 IF (K+Z(W)<11 OR K+Z(W)>77) AND W<8 THEN W=W+1:GOTO 420
430 IF H(K+Z(W))<>46 AND W<8 THEN W=W+1:GOTO 430
440 IF W=8 AND H(K+Z(W))<> 46 THEN Q1=500:GOTO 680
450 X=K:Y=K+Z(W)
460 H(X)=46:H(Y)=67
470 RETURN
480 REM $$$$$$$$$$$$$$$$$$$$$$$$
490 REM PRINT BOARD
500 CLS
510 PRINT TAB(8);"MY SCORE IS"CO
520 PRINT TAB(8);"YOUR SCORE IS"HU
530 PRINT
540 PRINT TAB(8);"1 2 3 4 5 6 7"
550 PRINT TAB(8);"-------------"
560 FOR M=70 TO 10 STEP -10
570 PRINT TAB(5);M/10;
580 FOR N=1 TO 7
590 PRINT CHR$(H(M+N));" ";
600 NEXT N
610 PRINT M/10
620 NEXT M
630 PRINT TAB(8);"-------------"
640 PRINT TAB(8);"1 2 3 4 5 6 7"
660 RETURN
```

```
670 REM ************************
680 REM END OF GAME
690 GOSUB 490
700 IF HU=5 THEN PRINT"YOU HAVE BEATEN ME,YOU,HUMAN"
710 IF CO=5 THEN GOSUB 920
720 IF Q=500 THEN PRINT"I ACCEPT YOUR WISH TO CONCEDE"
730 IF Q1=500 THEN PRINT"I CONCEDE TO A MASTER"
740 END
750 REM ************************
760 REM INITIALISE
770 CLS:PRINT"PLEASE STAND BY....HUMAN"
780 DIM H(100),Z(8)
790 X=0:Q1=0:Q=0
800 HU=0:CO=0:REM SCORES
810 FOR A=1 TO 99
820 IF A>77 OR A=70 OR A=60 OR A=68 OR A=69 OR A=50 THEN NEXT A
830 IF A=59 OR A=40 OR A=48 OR A=49 OR A=30 OR A=38 THEN NEXT A
840 IF A=39 ORA=20 ORA=28 ORA=29 ORA=18 ORA=19 ORA<11 THEN NEXT
850 H(A)=46
860 IF A>70 AND A<78 THEN H(A)=67
870 IF A>10 AND A<18 THEN H(A)=72
875 IF A>99 THEN 890
880 NEXT A
890 FOR A=1 TO 8:READ Z(A):NEXT A
900 DATA -8,-21,-12,-19,19,12,21,8
910 RETURN
920 PRINT"THIS VICTORY IS THE FIRST":PRINT"STEP IN OUR PLAN TO";
930 PRINT" TAKE":PRINT"OVER THE ENTIRE EARTH!":RETURN
```

□ REVERSI/ OTHELLO

The final program in the board-games section of this book is REVERSI, which is often called OTHELLO.* Invented in the late eighteen hundreds, it is played on an ordinary eight by eight board.

When it is played on a board, you use pieces which have different colors on each side. The game begins with four pieces placed on the center squares.

From this point on, you move by placing one of your pieces next to a computer piece or pieces, with another of your pieces further on. When that happens, all the computer pieces "reverse" to become your pieces.

Here's how it works. Suppose a line of pieces looked like this:

```
0XXXX
```

and you decided to put your piece (the 0) at the end of the line like this:

```
0XXXX0
```

The computer pieces would reverse, so the line looked like this after your move:

```
000000
```

*Othello is a registered trademark of Gabriel Industries, Inc., USA and Mine of Information, UK.

```
670 REM *
680 R
69
```

il every square on the board is filled, or you can see, fortunes can change swiftly ing off your position (such as on the diag- single move.

any time, you signal this to the computer

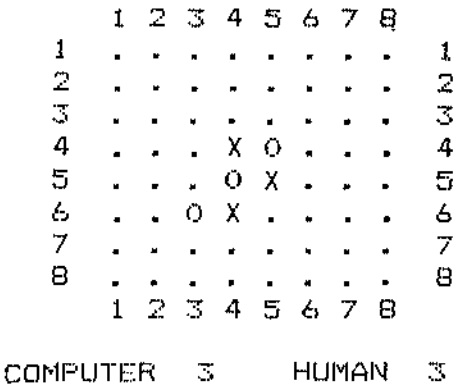
joyable game to play. Writing in *Creative* e 1981, p. 188), David Levy tenders the the best games ever invented, simply be- arned in no more than a minute, yet the aster." He goes on to observe that although r than chess, it is more complex than check-

Althoug n game is called Othello, and was "invented" by Goro Hasegawa in Tokyo in 1971, the only difference between it and Reversi is the fact that the first four positions must be as in the sample game you'll see following this description.

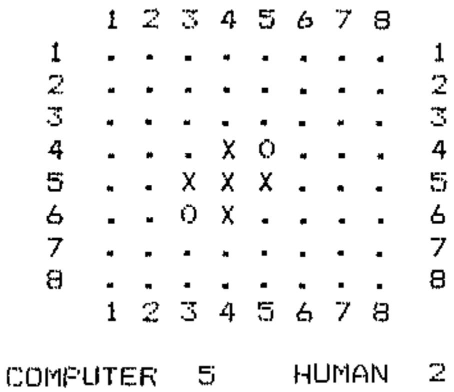
Back in the 1880s, when the game was first invented in London, two gentlemen—Lewis Waterman and John W. Mollett—both claimed to be the originators of the game. Stephen Kimmel (writing in *Creative Computing* magazine, July 1981, p. 94) says he believes Waterman has the strongest case for being the inventor of Reversi, because he had the details published first in a series of articles in the magazine, *The Queen* (which concentrated on "affairs of interest to ladies").

Regardless of who should get the credit, Hasegawa, Waterman, or Mollett, it is a great game, and this program (based on one written by Graham Charlton) puts up a spirited defense. This sample run shows the early stages of one game:

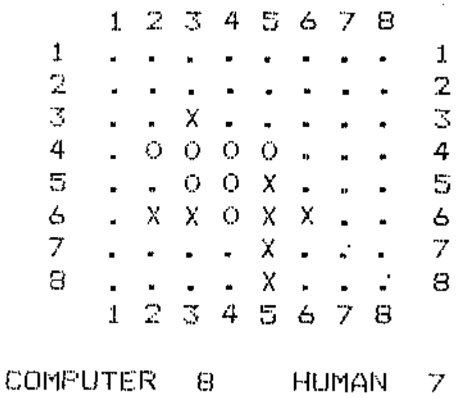
```
     1 2 3 4 5 6 7 8                  1 2 3 4 5 6 7 8
 1   . . . . . . . .   1          1   . . . . . . . .   1
 2   . . . . . . . .   2          2   . . . . . . . .   2
 3   . . . . . . . .   3          3   . . . . . . . .   3
 4   . . . X O . . .   4          4   . . . X O . . .   4
 5   . . . O X . . .   5          5   . . . X X . . .   5
 6   . . . . . . . .   6          6   . . . X . . . .   6
 7   . . . . . . . .   7          7   . . . . . . . .   7
 8   . . . . . . . .   8          8   . . . . . . . .   8
     1 2 3 4 5 6 7 8                  1 2 3 4 5 6 7 8

COMPUTER   2     HUMAN   2     COMPUTER   4     HUMAN   1
```



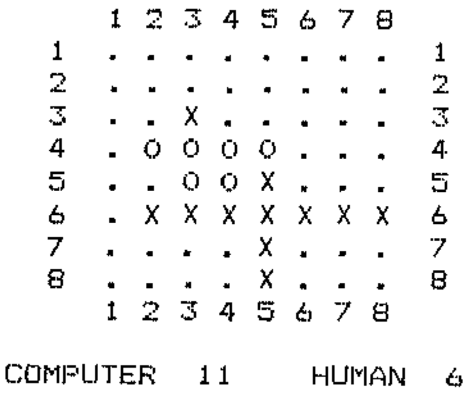
```
     1 2 3 4 5 6 7 8
 1   . . . . . . . .   1
 2   . . . . . . . .   2
 3   . . . . . . . .   3
 4   . . . X O . . .   4
 5   . . . O X . . .   5
 6   . . O X . . . .   6
 7   . . . . . . . .   7
 8   . . . . . . . .   8
     1 2 3 4 5 6 7 8

COMPUTER   3      HUMAN   3
```



```
     1 2 3 4 5 6 7 8
 1   . . . . . . . .   1
 2   . . . . . . . .   2
 3   . . . . . . . .   3
 4   . . . X O . . .   4
 5   . . X X X . . .   5
 6   . . O X . . . .   6
 7   . . . . . . . .   7
 8   . . . . . . . .   8
     1 2 3 4 5 6 7 8

COMPUTER   5      HUMAN   2
```



```
     1 2 3 4 5 6 7 8
 1   . . . . . . . .   1
 2   . . . . . . . .   2
 3   . . X . . . . .   3
 4   . O O O O . . .   4
 5   . . O O X . . .   5
 6   . X X O X X . .   6
 7   . . . . X . . .   7
 8   . . . . X . . .   8
     1 2 3 4 5 6 7 8

COMPUTER   8      HUMAN   7
```



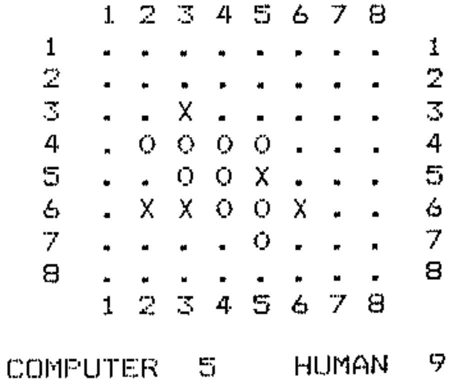
```
     1 2 3 4 5 6 7 8
 1   . . . . . . . .   1
 2   . . . . . . . .   2
 3   . . X . . . . .   3
 4   . O O O O . . .   4
 5   . . O O X . . .   5
 6   . X X X X X X X   6
 7   . . . . X . . .   7
 8   . . . . X . . .   8
     1 2 3 4 5 6 7 8

COMPUTER   11      HUMAN   6
```

And here's the listing of REVERSI:

```
10 GOTO 740
30 PRINT @ 384,"MY MOVE"
40 S=Z:T=X:H=0
50 FOR A=2 TO 9:FOR B=2 TO 9
60 IF A(A,B)<>46 THEN 210
70 Q=0
80 FOR C=-1 TO 1:FOR D=-1 TO 1
90 K=0:F=A:G=B
100 IF A(F+C,G+D)<>S THEN 130
110 K=K+1:F=F+C:G=G+D
120 GOTO 100
130 IF A(F+C,G+D)<>T THEN 150
```

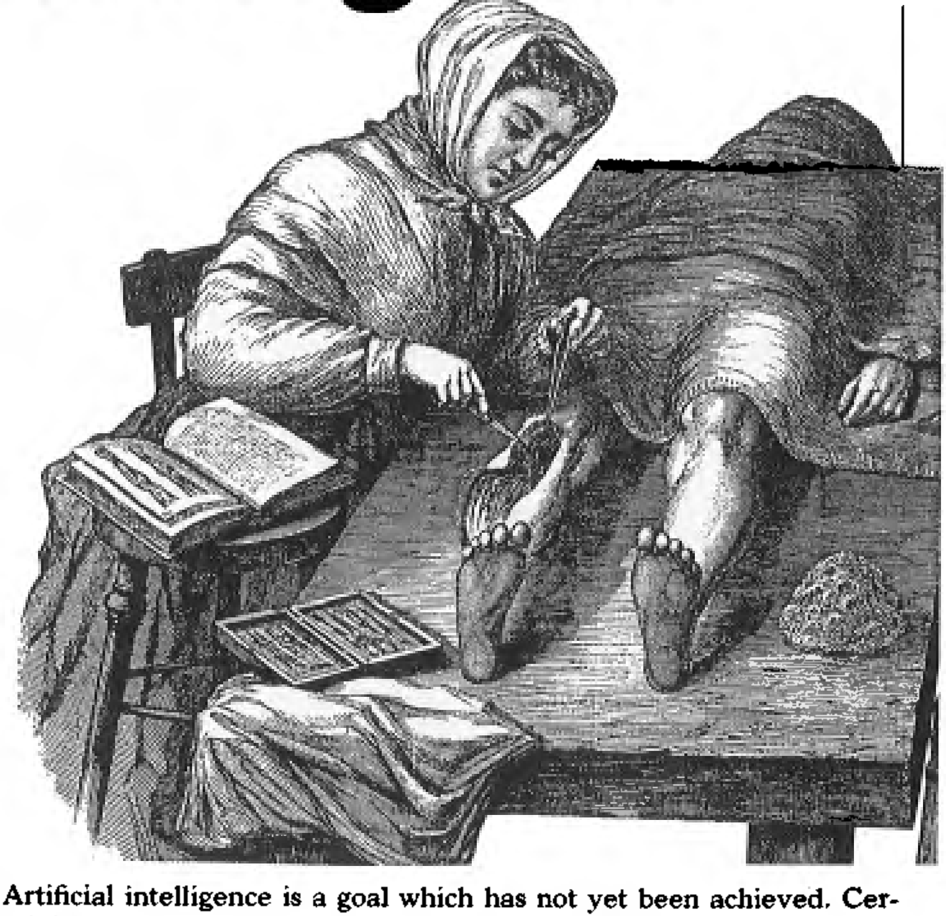
```
140 Q=Q+K
150 NEXT D:NEXT C
160 IF A=2 OR A=9 OR B=2 OR B=9 THEN Q=Q*2
170 IF A=3 OR A=8 OR B=3 OR B=8 THEN Q=Q/2
180 IF (A=2 OR A=9) AND (B=3 OR B=8) THEN Q=Q/2:GOTO 190
185 IF (A=3 OR A=8) AND (B=2 OR B=9) THEN Q=Q/2
190 IF Q<H OR (RND(0)<.3 AND Q=H) THEN 210
200 H=Q:M=A:N=B
210 NEXT B:NEXT A
220 IF H=0 AND R=0 THEN 690
230 IF H=0 THEN 250
240 GOSUB 580
250 GOSUB 370
255 PRINT @ 384,"          "
260 PRINT @ 354, "ENTER YOUR MOVE"
270 PRINT:INPUT R
275 PRINT @ 354, "                 "
280 S=X:T=Z
290 IF R=0 THEN 350
300 IF R<11 OR  R>88 THEN 260
310 R=R+11
320 M=INT(R/10)
330 N=R-10*M
340 GOSUB 580
350 GOSUB 370
360 GOTO 30
370 REM PRINT BOARD
380 C=0:H=0
390 SOUND RND(0)*30,1
395 SOUND RND(0)*30,1
400 PRINT @ 30,"       1 2 3 4 5 6 7 8"
450 FOR B=2 TO 9:PRINT B-1;" ";
460 FOR D=2 TO 9
470 PRINT CHR$(A(B,D));" ";
480 IF A(B,D)=X THEN C=C+1
490 IF A(B,D)=Z THEN H=H+1
500 NEXT D
510 PRINT B-1
520 NEXT B
530 PRINT "    1 2 3 4 5 6 7 8"
540 PRINT
550 PRINT @ 480,"COMPUTER ";C;"   HUMAN ";H
570 RETURN
```

```
580 FOR C=-1 TO 1:FOR D=-1 TO 1
590 F=M:G=N
600 IF A(F+C,G+D)<>S THEN 630
610 F=F+C:G=G+D
620 GOTO 600
630 IF A(F+C,G+D) <> T THEN 670
640 A(F,G)=T
650 IF M=F AND N=G THEN 670
660 F=F-C:G=G-D:GOTO 640
670 NEXT D:NEXT C
680 RETURN
690 GOSUB 370
700 IF C>H THEN PRINT "I'M THE CHAMP!"
710 IF H>C THEN PRINT "YOU'RE THE CHAMP"
720 IF H=C THEN PRINT "IT'S A DRAW"
730 END
740 CLS
750 X=88:Z=48
760 DIM A(10,10)
770 FOR B=1 TO 10:FOR C=1 TO 10
780 IF B<>1 AND C<>1 AND B<>10 AND C<>10 THEN A(B,C)=46
790 NEXT C:NEXT B
800 A(5,5)=X:A(6,6)=X
810 A(6,5)=Z:A(5,6)=Z
820 P=0
830 GOSUB 370
840 GOTO 30
```



```
     1 2 3 4 5 6 7 8
  1  . . . . . . . .  1
  2  . . . . . . . .  2
  3  . . X . . . . .  3
  4  . O O O O . . .  4
  5  . . O O X . . .  5
  6  . X X O O X . .  6
  7  . . . . O . . .  7
  8  . . . . . . . .  8
     1 2 3 4 5 6 7 8

COMPUTER  5     HUMAN  9
```

Artificial Intelligence



Artificial intelligence is a goal which has not yet been achieved. Certainly, programs which enable computers to exhibit behavior which could conceivably be classed as intelligent have been written, but the "intelligence" has been limited and effective only within a severely restricted domain. That is, a computer can appear to be brainy, but only if you limit the environment within which it has to demonstrate those brains.

Despite the claims made by some people (such as Carl Sagan, "In Defense of Robots," *Broca's Brain)* that human beings are, essentially, just well-made computers, we sense there is a wide gulf between our own perception of our selfhood, and the total nonawareness that computers can have (at least at present) of their own existence. And it seems to me that this self-perception lies at the heart of at least one aspect of intelligence.

Computers can function extremely "intelligently" in restricted areas. Look at the five-inch-square, hand-held chess machines. Within the limited domain of a chess game, a solid appearance of intelligence can be created.

A common stumbling block in the work of early researchers into the field of artificial intelligence was that writing a program which emulated some aspect of human reasoning (such as a very impressive checkers program by Samuels) did not necessarily lead researchers any closer to either producing behavior which could be classed as intelligent, nor toward a theoretical understanding of the processes of human reasoning and deduction. "Progress in producing intelligent behavior is not necessarily progress towards producing thought" (Norman Whaland, "When Is a Program Intelligent?," *Creative Computing,* February 1981, pp. 44-49).

There is another way of approaching the problem, which I call the "if it quacks like a duck, it's a duck" approach. In the book *The Turing Criterion: Machine Intelligent Programs for the 16K ZX81* (Charlton et al., Interface Publications, London, 1982), which I edited, I answer the question "What is the Turing Criterion?" in the following words:

> In 1950, the English mathematician and logician A. M. Turing proposed what has become known as the "Turing Criterion" for machine intelligence.
>
> He said that if you were dealing with something at the end of a wire that could be a machine, or could be human, and you could not tell—from the responses coming to you over the wire—whether that with which you were dealing was human or machine, the "thing" at the other end was, by definition, intelligent.

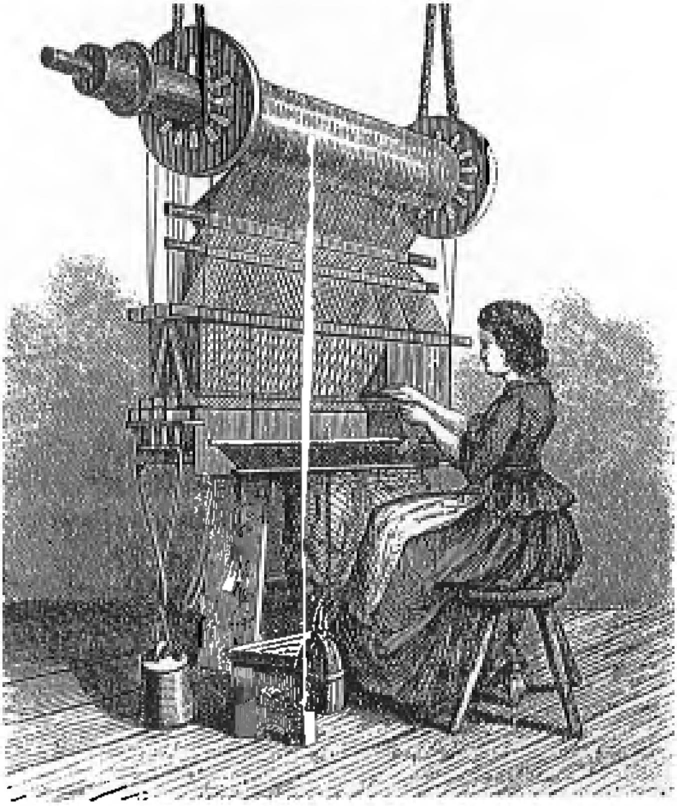
On this basis, it would be possible to class many, many computer programs as intelligent. Certainly those within this section of the book could almost pass the test, especially if you were prepared to accept the possibility that some pretty stupid humans were dealing with you.

Time now to explore the worlds of Artificial Intelligence.

□ ELECTRONIC BRAIN

ELECTRONIC BRAIN is an attempt to write a program which would work toward the answer to a problem, in an apparently intelligent manner. The computer is attempting to solve a problem of the type where you think of a numerical code, and the computer tries to guess it. The feedback you give its answers are as "whites" and "blacks," where a white is given for a digit which is correct, but is in the wrong position in the code, and a black is given whenever there is a correct digit within the code.

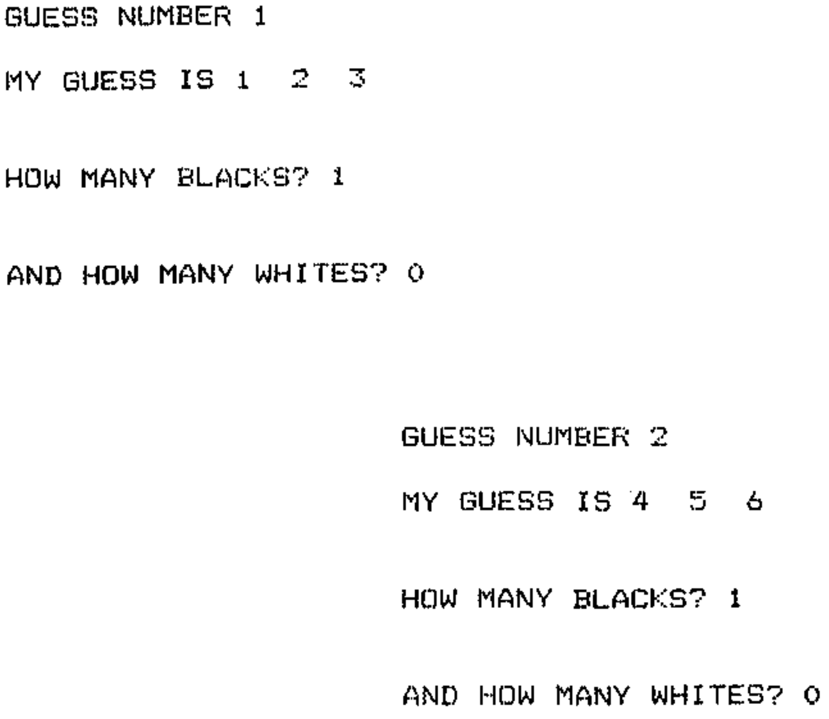
The problem is not totally straightforward, as the computer does not *know*, for certain, which digit produced which result. I wrote two versions of this program, one to solve three-digit codes, and a modification of that program to solve four-digit ones. It works in a simple



manner (although implementing the relatively simple idea behind the program was not particularly easy). Every time a digit appears in a code which is awarded a black, every digit within that code is weighted so that it appears more often in future guesses. The more blacks in that particular code, the higher the weighting each code gets. A much smaller weighting is awarded if the code gets one or more whites. Any code getting neither a black nor a white leads to all the digits within that guess being totally removed from future consideration.

As I said, the three-digit version is the basis upon which the four-digit program was written. Enter the three-digit one first, and then save it in that form, before making the needed conversion to make it work as a four-digit program. Whereas the three-digit version works reasonably well, and reasonably quickly, the four-digit program grinds almost to a halt toward the end, as it tries to generate codes which (a) reflect the weighting that previous answers have produced, and (b) are not codes which have been previously suggested in that particular run.

Here's the program solving a three-digit code:



```
GUESS NUMBER 1

MY GUESS IS 1  2  3


HOW MANY BLACKS? 1


AND HOW MANY WHITES? 0




                                GUESS NUMBER 2

                                MY GUESS IS 4  5  6


                                HOW MANY BLACKS? 1


                                AND HOW MANY WHITES? 0
```

```
GUESS NUMBER 3

MY GUESS IS 7  8  9


HOW MANY BLACKS? 1
```

And this is the listing that produced it:

```
10 REM ELECTRONIC BRAIN-3 DIGITS
20 GOSUB 500:REM INITIALISE
30 REM MAKE A GUESS
40 IF GUESS<3 THEN FOR Z=1 TO 3:B(Z)=Z+3*GUESS:
                                        NEXT Z:GOTO 60
50 GOSUB 280
60 CLS
70 GUESS=GUESS+1
80 PRINT:PRINT
90 PRINT "GUESS NUMBER"GUESS
100 PRINT
110 PRINT "MY GUESS IS"B(1);B(2);B(3)
120 PRINT:PRINT
125 B$=INKEY$
130 PRINT "HOW MANY BLACKS? ";
135 A$=INKEY$:IF A$<>"0"ANDA$<>"1"ANDA$<>"2"
                                       ANDA$<>"3"THEN 135
137 PRINT A$:B=VAL(A$)
140 IF B=3 THEN 570
150 IF B=2 THEN 190
160 PRINT:PRINT
165 B$=INKEY$
170 PRINT "AND HOW MANY WHITES? ";
175 A$=INKEY$:IF A$<>"0"ANDA$<>"1"ANDA$<>"2"
                                      ANDA$<>"3" THEN 175
177 PRINT A$:W=VAL(A$)
180 IF W+B=3 THEN Q=3:C(1)=B(1):C(2)=B(2):C(3)=B(3)
190 IF B+W=0 THEN C(B(1))=0:C(B(2))=0:C(B(3))=0:GOTO 30
200 IF B>AID THEN FOR Z=1 TO 3:E(Z)=B(Z):NEXT Z:AID=B
210 FOR Z=1 TO 9
220 FOR D=1 TO 3
230 IF B(D)=C(Z) THEN C(Z)=C(Z)+(B+W)*100+W*10
240 NEXT D
250 NEXT Z
```

```
260 GOTO 30
270 REM PICK THREE NUMBERS
280 FOR Z=1 TO 3
290 D1=C(RND(Q))
300 IF D1=0 THEN 290
310 D2=C(RND(Q))
320 IF D2=0 THEN 310
330 IF INT(D1/10)>INT(D2/10) THEN B(Z)=D1
340 IF INT(D1/10)<INT(D2/10) THEN B(Z)=D2
350 IF INT(D1/10)=INT(D2/10) THEN B(Z)=D1
360 IF B(Z)>100 THEN B(Z)=B(Z)-100*INT(B(Z)/100)
                                                :GOTO 370
370 IF B(Z)>10 THEN B(Z)=B(Z)-10*INT(B(Z)/10):GOTO 380
380 NEXT Z
390 IF B(1)=B(2) OR B(1)=B(3) OR B(2)=B(3) THEN 280
400 IF AID>0 THEN CO=0:FOR Z=1 TO 3:IF B(Z)=E(Z)
                                               THEN CO=CO+1
410 IF AID>0 THEN NEXT Z:IF CO<AID THEN 280
420 M=100*B(1)+10*B(2)+B(3)
430 K(GUESS)=M
440 IF GUESS<3 THEN 500
450 CO=1
460 CO=CO+1
470 IF K(CO)=M THEN 290
480 IF CO<GUESS-1 THEN 460
490 RETURN
500 REM INITIALISE
510 GUESS=0:Q=9:AID=0
520 DIM B(3),C(9),E(3),K(100)
530 FOR Z=1 TO 9
540 C(Z)=Z
550 NEXT Z
560 RETURN
570 PRINT:PRINT
580 PRINT "I GUESSED YOUR CODE OF"B(1);B(2);B(3)
590 PRINT TAB(5);"IN JUST"GUESS"GUESSES"
600 FOR Z=1 TO 5000:NEXT Z:CLS
```

This is the listing to solve four-digit codes, which is based on the three-digit one. Note the addition of "– 1" in line 420 of this program, as well as the other changes:

```
10 REM ELECTRONIC BRAIN-4 DIGITS
20 GOSUB 510:REM INITIALISE
30 REM MAKE A GUESS
```

```
40 IF GUESS=0 THEN FOR Z=1 TO 4:B(Z)=Z:NEXT Z:GOTO 70
50 IF GUESS=1 THEN FOR Z=1 TO 4:B(Z)=Z+4:NEXT Z:GOTO 70
60 GOSUB 280
70 CLS
80 GUESS=GUESS+1
90 PRINT:PRINT
 100 PRINT "GUESS NUMBER"GUESS
 110 PRINT
 120 PRINT "MY GUESS IS"B(1);B(2);B(3);B(4)
 130 PRINT:PRINT
 140 INPUT "HOW MANY BLACKS";B
 150 IF B=4 THEN 580
 160 IF B=3 THEN 190
 170 PRINT:PRINT
 180 INPUT "AND HOW MANY WHITES";W
 190 IF W+B=4 THEN Q=4:C(1)=B(1):C(2)=B(2):
                                       C(3)=B(3):C(4)=B(4)
200 IF B+W=0 THEN C(B(1))=0:C(B(2))=0:
                              C(B(3))=0:C(B(4))=0:GOTO 30
205 IF B(2)=B(4) OR B(3)=B(4) THEN 290
210 IF B>AID THEN FOR Z=1 TO 4:E(Z)=B(Z):NEXT Z:AID=B
220 FOR Z=1 TO 9
230 FOR D=1 TO 4
240 IF B(D)=C(Z) THEN C(Z)=C(Z)+(B+W)*100+W*10
250 NEXT D
260 NEXT Z
270 GOTO 30
280 REM PICK FOUR NUMBERS
290 FOR Z=1 TO 4
300 D1=C(RND(Q))
310 IF D1=0 THEN 300
320 D2=C(RND(Q))
330 IF D2=0 THEN 320
340 IF INT(D1/10) > INT(D2/10) THEN B(Z)=D1
350 IF INT(D1/10) < INT(D2/10) THEN B(Z)=D2
360 IF INT(D1/10) = INT(D2/10) THEN B(Z)=D1
370 IF B(Z)>100 THEN B(Z)=B(Z)-100*INT(B(Z)/100):
                                                  GOTO 370

380 IF B(Z)>10 THEN B(Z)=B(Z)-10*INT(B(Z)/10):GOTO 380
390 NEXT Z
400 IF B(1)=B(2) OR B(1)=B(3) OR B(1)=B(4)
                                       OR B(2)=B(3) THEN 290
```

```
405 IF B(2)=B(4) OR B(3)=B(4) THEN 290
410 IF AID>0 THEN CO=0:FOR Z=1 TO 4:IF B(Z)=E(Z)
                                               THEN CO=CO+1
420 IF AID>0 THEN NEXT Z:IF CO<AID-1 THEN 290
430 M=1000*B(1)+100*B(2)+10*B(3)+B(4)
440 K(GUESS)=M
450 IF GUESS<3 THEN 500
460 CO=1
470 CO=CO+1
480 IF K(CO)=M THEN 290
490 IF CO<GUESS-1 THEN 470
500 RETURN
510 REM INITIALISE
520 GUESS=0:Q=9:AID=0
530 DIM B(4),C(9),E(4),K(100)
540 FOR Z=1 TO 9
550 C(Z)=Z
560 NEXT Z
570 RETURN
580 PRINT:PRINT
590 PRINT "I GUESSED YOUR CODE OF"B(1);B(2);B(3);B(4)
600 PRINT TAB(5);"IN JUST"GUESS"GUESSES"
610 FOR Z=1 TO 5000:NEXT Z
620 CLS:END
```

□ AMANUENSIS

```
THE POSTULANT BESEECHED NEGLECTFULLY
     IN THE ENEMY'S CAMP...
WANTING FOR A DOGMATIST,
   TO RECANT THE DJINN...
 DISPENSING WITH, THEN ERODING
    ...ENCLOSING, WOUNDING.
```

Next we'll have our poetry writing program. This demands no interaction from you, except for that of admiring the wonderful (!) output of the program. Here's a sample of the kind of verse it produces:

```
THE ASPIRANT CRAVED SUCCESSFULLY
     IN THE RACECOURSE...
PRAYING FOR HOBSON'S CHOICE,
   TO QUENCH THE GHOST...
 EMPTYING, THEN BLIGHTING
    ...HANDCUFFING, ROTTING.


THE ASPIRANT ENTREATED HALTINGLY
     IN THE HIPPODROME...
PRAYING FOR A BLIND BARGAIN,
   TO RECANT THE NAIAD...
 WASTING, THEN BREAKING
    ...RESTRAINING, UNDERMINING.


THE CONVOY CLAIMED SLAVISHLY
     IN THE COURT...
PRAYING FOR AN ASTRAL INFLUENCE,
   TO DEMUR THE FAUN...
 EXHAUSTING, THEN GNAWING
    ...IMPOUNDING, BREAKING.
```

```
THE POSTULANT ENTREATED ENDLESSLY
     IN THE PLAYGROUND...
WAITING FOR HOBSON'S CHOICE,
   TO RELINQUISH THE SATUR...
 DISPENSING WITH, THEN DAMAGING
    ...COERCING, BREAKING.


THE BEGGAR CLAIMED HALTINGLY
     IN THE THEATRE OF WAR...
ASKING FOR FORTUNE'S WHEEL,
   TO BACK THE NAIAD...
 DISPENSING WITH, THEN BREAKING
    ...MUZZLING, WOUNDING.
```

This is the listing of **AMANUENSIS.** Once you've run it for a while, you may well wish to change the words in the **DATA** statements, to vary the kind of poetry it produces.

```
10 REM AMANUENSIS
20 CLS:DIM A$(12),Z$(10)
30 REM ***********************
40 RESTORE:GOSUB 450:A$(1)=B$
50 GOSUB 570:A$(2)=B$
60 GOSUB 570:A$(3)=B$
70 GOSUB 570:A$(4)=B$
80 GOSUB 570:A$(5)=B$
90 GOSUB 570:A$(6)=B$
100 GOSUB 570:A$(7)=B$
110 GOSUB 570:A$(8)=B$
120 GOSUB 570:A$(9)=B$
130 GOSUB 570:A$(10)=B$
140 GOSUB 570:A$(11)=B$
145 RESTORE:FOR I=1 TO 100:READ V$:NEXT
150 GOSUB 570:A$(12)=B$
160 REM **********************
170 PRINT "THE ";A$(1);" ";A$(2);" ";A$(3)
180 PRINT "     IN THE ";A$(4);"..."
190 PRINT A$(5);" FOR ";A$(6);","
200 PRINT "   TO ";A$(7);" THE ";A$(8);"..."
210 PRINT A$(9);", THEN ";A$(10)
220 PRINT "    ...";A$(11);", ";A$(12);"."
230 PRINT:PRINT:M$=INKEY$:M$=INKEY$
240 REM **********************
```

```
 250 PRINT:PRINT "PRESS 'C' TO CONTINUE"
 255 IF INKEY$<>"C" THEN 255
 260 CLS:GOTO 40
 270 REM ***********************
 280 DATA"APPLICANT","SUPPLICANT","MENDICANT",
                                   "BEGGAR","ASPIRANT"
 290 DATA "CLAIMANT","POSTULANT","CONVOY","SENTINEL",
                                         "CASTELLAN"
 300 DATA "ENTREATED","BESEECHED","WAITED","BESOUGHT",
                                          "CONJURED"
 310 DATA "PRESSED","URGED","CRAVED","DEMANDED","CLAIMED
 320 DATA"SUCCESSFULLY","COURAGEOUSLY","PROGRESSIVELY"
                                          ,"FOOLISHLY"
 330 DATA "ENDLESSLY","HELPLESSLY","HALTINGLY",

                                         "SLAVISHLY"
 340 DATA "NEGLECTFULLY","PRIDEFULLY"
 350 DATA"FIELD","BATTLEFIELD","PLAYGROUND","CIRCUS
                                         RING","COURT"
 360 DATA "BEAR GARDEN","ENEMY'S CAMP","HIPPODROME",
                                          "RACECOURSE"
 370 DATA "THEATRE OF WAR"
 380 DATA "WAITING","ASKING","HOPING","WATCHING"
                                          ,"SCREAMING"
 390 DATA "CRYING","STARING","WANTING","STAYING","PRAYING
 400 DATA "THE FATES","FORTUNE'S WHEEL","HOBSON'S CHOICE"
 410 DATA "THE STARS","AN ASTRAL INFLUENCE","A BLIND
                                             BARGAIN"
 420 DATA "A SPELLBINDER","A MALEVOLENT SPIRIT","A ZEALOT
 430 DATA "A DOGMATIST"
 440 DATA "QUENCH","RECANT","FORSWEAR","ABJURE",
                                    "RENOUNCE","WAVER
 450 DATA "RELINQUISH","DEMUR","SWERVE","BACK"
 460 DATA "GHOST","SPECTRE","HOBGOBLIN","DJINN",
                                          "LEPRECHAUN"
 470 DATA "PIXY","FAUN","SATUR","DRYAD","NAIAD"
 480 DATA "WASTING","SPENDING","USING","CONSUMING",
                                          "DRYING UP"
 490 DATA "RUNNING OUT","EMPTYING","EXHAUSTING",
                                         "SQUANDERING"
 500 DATA "DISPENSING WITH"
 510 DATA "CORRODING","ERODING","BLIGHTING","ROTTING",
                                              "GNAWING"
520 DATA "UNDERMINING","SHAKING","BREAKING","DAMAGING"
                                             ,"WOUNDED"
530 DATA "RESTRAINING","COERCING","CHECKING","CHECKING"
540 DATA "DETAINING","ENCLOSING","IMPOUNDING"
                                        ,"HANDCUFFING"
550 DATA "MUZZLING","GAGGING","SUPPRESSING"
560 REM ************************
570 FOR N=1 TO 10
580 READ Z$(N):NEXT N
590 N=RND(10)
600 B$=Z$(N)
610 RETURN
```

```
THE APPLICANT PRESSED PRIDEFULLY
     IN THE ENEMY'S CAMP...
WATCHING FOR A SPELLBINDER,
   TO DEMUR THE HOBGOBLIN...
 DRYING UP, THEN ROTTING
    ...HANDCUFFING, DAMAGING.


THE CLAIMANT CRAVED SLAVISHLY
     IN THE BEAR GARDEN...
CRYING FOR HOBSON'S CHOICE,
   TO WAVER THE DRYAD...
 DRYING UP, THEN ERODING
    ...RESTRAINING, ROTTING.


THE MENDICANT CONJURED HELPLESSLY
     IN THE COURT...
PRAYING FOR A DOGMATIST,
   TO QUENCH THE LEPRECHAUN...
 RUNNING OUT, THEN ERODING
    ...IMPOUNDING, BLIGHTING.
```

Dice Games

Dice games—for high stakes, low stakes, or none—have proved popular throughout history. Whether the dice were made from stone or wood, or carved from the bones of a beast killed for food, whether they had four important sides or six, dice have proved a diversion for countless men throughout time.

The dice, physical means of demonstrating the waywardness of chance, have also found employment in foretelling the future, and like all oracles, probably bear some responsibility for changing the tide of history.

At Troy the Greeks played with dice, as did Mark Antony at Alexandria. Italy and France led medieval Europe in their love for dice, and devotion to the six-sided cubes has continued up to the present day. In this section of the book, we'll be investigating ways of using the random number generator of your computer to take the place of physical dice. However, you'll discover that the dice are no less compelling because they exist only within the software of your computer rather than in a more gross physical form.

Playing against the computer, instead of against another human being, changes the "feel" of dice games somewhat. Not having to pay up when you lose is one of the real advantages!

NO SWEAT

The name of this game—NO SWEAT—comes from one of the early English names for the game from which this is derived. Known as "sweatcloth," the game, when first played in England, used three dice within a wooden "shoe." The most common variation of this game is now seen in US gambling casinos, where it is called "birdcage," because of the equipment which is used.

In birdcage, three dice are held within a metal cage which can spin about a central axis. Once bets have been laid, the cage is rotated. This is supposed to ensure that the dice are spun properly, as they are not actually touched by a casino operator.

Betting in birdcage, and in NO SWEAT, is fast and simple, and despite the fact that you might think the odds are in your favor as a player, you'll quickly learn how easy it is to lose your shirt.

You place a bet of a specified amount (see lines 50 and 60) up to the size of your stake (held by the variable M, for money—see lines 30 and 250) and then choose a number between one and six. The amount of your bet is subtracted from your stake, and then the three dice are rolled. For each one which lands showing your number, you'll have an amount equal to your bet returned to you.

As you can see, this means you have to throw one die with your number showing to break even, and two to actually make some money. The need to throw the same, chosen number twice is what gives the casino such a good edge in this game.

Line 50 asks you how much you'd like to bet, and the variable A is assigned to your choice. This is compared with the money you actually have (in line 60) to see if you are trying to bet more than you have on hand. Having passed that hurdle, your bet is subtracted from your stake in line 70 and then the computer asks you (line 50) to enter your bet.

The C loop, from lines 100 to 180, rolls the dice and compares each roll with your number, reporting to you after each roll. Your winnings (if there are any) are also added in this loop.

After each round of the game, your money (M) is compared with 250 (if you've got more than $250 you've exceeded the house limits and are therefore excluded from future play) and with zero (those who have no money are not allowed to play further). If, however, you do not have more than 250 nor less than zero, you're able to continue playing.

And here's the listing so you and your computer can take part in a round or two:

```
10 REM NO SWEAT
30 M=30
40 CLS:GOSUB 240
50 INPUT"HOW MUCH WOULD YOU LIKE TO BET";A
60 IF A>M THEN 50
70 M=M-A:PRINT:PRINT
80 INPUT"WHICH NUMBER ARE YOU BETTING ON";B
90 IF B<1 OR B> 6 THEN 80
95 GOSUB 280
100 FOR C=1 TO 3
110 W=0
120 GOSUB 2000:PRINT@25,"AIM-";B
130 PRINT:PRINT"DIE"C"FELL"D
140 IFD=B AND C=1 THEN W=A:PRINT" SO YOU BREAK EVEN"
150 IFD=B AND C>1 THEN W=A:PRINT" SO YOU WIN $"W
160 M=M+W
170 GOSUB 240
175 GOSUB 280:GOSUB 280
180 NEXT C
190 GOSUB 280:GOSUB 280
200 IF M>250 THEN 310
210 IF M>0 THEN 40
220 FOR X=1 TO B:PRINT"THE GAME IS OVER,'COS YOU'RE BROKE!":NEXT
230 GOTO 230
240 PRINT"$$$$$$$$$$$$$$$$$$$$$$$$$$$"
```

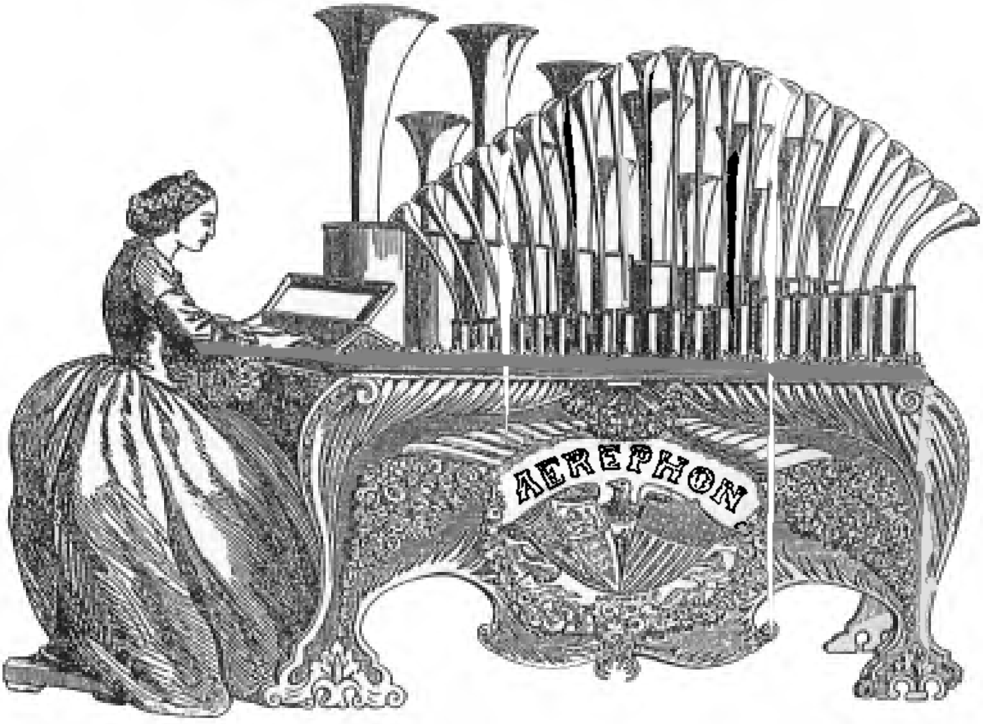
```
250 PRINT"   YOUR STAKE IS NOW $"M
260 PRINT"$$$$$$$$$$$$$$$$$$$$$$$$$$$"
270 RETURN
280 FOR P=1 TO 1000
290 NEXT P
300 RETURN
310 FOR J=1 TO 30
320 PRINT"YOU'VE TOPPED $250!"
330 PRINTTAB(J);"WELL DONE!!"
335  FOR I=1 TO 100:NEXT
340 NEXT J
350 COLOR,1:FORI=1TO500:NEXT:COLOR,0:FORI=1TO500:NEXT:GOTO 350
2000 REM DICE THROW
2010 CLS:COLOR,1
2020 PRINT TAB(14);"DIE"C
2030 D=RND(6)
2040 FOR I=28810 TO 28822:POKE I,140:NEXT I
2050 FOR I=28810 TO 29066 STEP 32:POKE I,138:NEXT I
2060 FOR I=29066 TO 29078:POKE I,131:NEXT I
2070 FOR I=28822 TO 29078 STEP 32:POKE I,133:NEXT I
2080 POKE 28810,142:POKE 29066,139:POKE 29078,135:POKE 28822,141
2090 IF D=1 THEN 2150
2100 IF D=2 THEN 2160
2110 IF D=3 THEN 2170
2120 IF D=4 THEN 2180
2130 IF D=5 THEN 2190
2140 IF D=6 THEN 2200
2150 POKE 28944,143:GOTO 2220
2160 POKE 28876,143:POKE 29012,143:GOTO 2220
2170 POKE 28876,143:POKE 28944,143:POKE 29012,143:GOTO 2220
2180 POKE 28876,143:POKE 29004,143:POKE 28884,143:POKE 29012,143
2185 GOTO 2220
2190 POKE 28876,143:POKE 29004,143:POKE 28884,143:POKE 29012,143
2195 POKE 28944,143:GOTO 2220
2200 POKE 28876,143:POKE 29004,143:POKE 28884,143:POKE 29012,143
2210 POKE 28940,143:POKE 28948,143
2220 FOR I=1 TO 2500:NEXT I:COLOR,0:CLS:RETURN
```

□ CHEMIN DE COMPUTER

CHEMIN DE COMPUTER is based, as I'm sure you've realized, on Chemin de Fer. In this game, you and your computer take it in turns to roll five dice, adding the pips up as you go. You are aiming to get a higher total than the computer.

However, this game is not just a simple "add the pips" one. Any die which falls showing a five or a two must be thrown again, and your total is just the final digit of the answer (that is, a total of 27 is counted as 7, and a total of 13 is counted as 3).

There are three special totals—7 (a Natural), 8 (La Petite), and 9 (La Grande). The names are only bestowed when the relevant total is achieved on the first throw (i.e., the dice which came up with 5 or 2 have not been, and are not in this case, rethrown). You (and the computer) always stand on a 7, 8, or 9 thrown with the first toss of the five dice.



As in many other programs in this book, there is a delay loop routine at the end of the listing which is called a number of times throughout a game to improve the speed with which the game advances, and to give you (in many cases) a chance to read on the screen what is going on before the program races on, clearing the screen, and leaving you quite unsure of exactly what has just happened. In this program, there are two loops, one of which is longer than the other, and which also prints a couple of blank lines before returning to the main program.

Line 330 calls a delay and then clears the screen before incrementing the counter GAME in the next line. You are told which game it is by line 350 and then the computer announces that, because it is taking the role of the banker, who always goes first, it will take the first roll. The "roll the dice" subroutine from line 70 is then triggered. You'll see that the loop counter G is used (line 80) to set the variable A to a randomly chosen value between one and six each time through the loop. If the die comes up with five or two (line 90) then it is reset to zero, before the value is printed by the following line.

The running total is clocked up on variable D, and then leading digits are stripped from this (i.e., 27 is cut down first to 17, then to 7) by line 150. The changing total is printed on the screen each time. After a delay the computer prints up "Total on the first roll is . . ." and then checks (lines 180, 190 and 200) to see if one of the special rolls has eventuated.

If so, a message to that effect is printed. If not, the computer gets to line 210 where it can see if any dice have to be rolled again (C is incremented by one each time a 2 or a 5 is rolled, see line 90). If there are none which have to be re-rolled, the computer moves on to line 410 to print out "So my final total is. . . ." If, however, C is not equal to zero, then the computer runs through another loop (240 to 300) to throw those dice again. Once again, any dice coming up two or five are discarded (line 280).

Once the computer has had its roll, it is your turn to play. Your involvement, actually, is pretty small at this stage. Once you've pressed RETURN (lines 440 and 450) the computer takes over for you, using the same routine near the beginning of the program to roll the dice for you, and incrementing your total as it does so.

Once both of you have had your go, the computer then decides if it has beaten you, or you have defeated it, or whether the two of you have drawn ("Standoff"). The aim of CHEMIN DE COMPUTER is to win the majority out of nine scoring games (and a Standoff game does not count as a scoring game).

"Now the totals so far in Chemin de Computer are . . ." you are told by line 670 and—if nine scoring games have not been played—the computer makes some comment on the game ("Looks like I'm in front . . ." or "And you seem to have the edge . . .") before returning to the main program.

Once a total of nine scoring games has been detected (by line 700) then the routine from line 750 comes into action. "Well, old buddy, we seem to have come to the end of the game . . ." the computer tells you, then determines who has been the overall winner.

You're in good company when you play this game. Baccarat, from which Chemin de Fer was derived, was first introduced into France from Italy in about 1490, during the reign of Charles VIII. The Italian game was called "Baccara."

Here is the program listing:

```
10 REM CHEMIN
30 CLS
40 GAME=0
50 B1=0:P1=0
60 GOTO 330
70 D=0:C=0
80 FOR G=1 TO 5:A=RND(6)
90 IF A=2 OR A=5 THEN C=C+1
100 PRINT A;:SOUND 31,1
110 GOSUB 930
120 IF A=2 OR A=5 THEN A=0
130 D=D+A:NEXT G
140 PRINT:PRINT D;
150 IF D>9 THEN D=D-10:PRINT:PRINT D:GOTO 150
160 GOSUB 900
170 PRINT:PRINT "TOTAL ON THE FIRST ROLE IS"D
180 IF D=9 THEN PRINT "AND THATS LA GRANDE...":RETURN
190 IF D=8 THEN PRINT "AND THATS LA PETITE...":RETURN
200 IF D=7 THEN PRINT "AND THATS A NATURAL...":RETURN
210 IF C=0 THEN RETURN
220 GOSUB 930
230 PRINT:PRINT C"MUST BE ROLLED AGAIN"
235 FOR Z=1 TO C:SOUND 3,1:NEXT Z
240 FOR A=1 TO C
250 GOSUB 930
260 E=RND(6)
270 PRINT E;:SOUND 29,1
280 IF E=2 OR E=5 THEN E=0
290 D=D+E
```

```
300 NEXT
310 IF D>9 THEN D=D-10:PRINT D;:GOTO 310
320 RETURN
330 GOSUB 930:CLS
340 GAME=GAME+1
350 PRINT:PRINT ">>>> THIS IS GAME"GAME" <<<<"
360 PRINT "*******************************"
370 PRINT "  NOW, I'LL ROLL AS BANKER..."
380 PRINT "*******************************"
390 GOSUB 70
400 GOSUB 900
410 PRINT:PRINT "SO MY FINAL TOTAL IS"D
420 GOSUB 900
430 PRINT "*******************************"
435 A$=INKEY$:A$=""
440 PRINT "  PRESS 'R' TO ROLL YOUR DICE"
445 A$=INKEY$:IF A$<>"R" THEN 445
450 PRINT "*******************************"
460 J=D
470 GOSUB 930
480 GOSUB 70
490 PRINT:PRINT "SO YOUR FINAL TOTAL IS"D
500 PRINT:PRINT
510 GOSUB 930
520 PRINT "COPUTER","HUMAN"
530 GOSUB 900
540 PRINT J,D
550 GOSUB 930:PRINT
560 PRINT "$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"
570 PRINT TAB(3);
580 IF J=D THEN PRINT "THATS A STANDOFF":GOTO 620
590 IF J>D THEN PRINT "I'M";:B1=Bi+1
600 IF D>J THEN PRINT "YOU'RE";:P1=P1+1
610 PRINT " THE WINNER THAT TIME!"
620 PRINT "$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$"
630 PRINT:PRINT
640 GOSUB 900
650 PRINT " NOW THE TOTALS SO FAR IN"
660 PRINT " CHEMIN DE COMPUTER ARE"
670 PRINT B1"FOR ME, AND"P1"FOR YOU..."
680 PRINT:PRINT
690 GOSUB 930
700 IF B1+P1=9 THEN 750
```

```
710 IF B1>P1 THEN PRINT " LOOKS LIKE I'M IN FRONT!"
720 IF P1>B1 THEN PRINT " AND YOU SEEM TO
                                               HAVE THE EDGE!"
730 GOSUB 900
740 GOTO 330
750 REM END OF GAME
760 PRINT:PRINT
770 PRINT "WELL, OLD BUDDY, WE SEEM"
780 PRINT "TO HAVE COME TO THE END"
790 PRINT "OF THE GAME...WITH A TOTAL"
800 PRINT "OF NINE SCORING ROUNDS..."
810 GOSUB 900
820 IF P1>B1 THEN PRINT "AND, FOR ONCE, IT IS"
825 IF P1>B1 THEN PRINT "YOU HAS BEATEN ME!":GOTO 840
830 IF B1>P1 THEN PRINT "AND, ONCE AGAIN, THE"
835 IF B1>P1 THEN PRINT "MIGHTY MACHINE PROVES THE"
837 IF B1>P1 THEN PRINT "SUPREME CHAMPION!!"
840 GOSUB 900
850 PRINT "THANKS FOR THE GAME, OLD"
860 PRINT "BUDDY,WE MUST DO IT AGAIN"
870 PRINT "SOME TIME, WHEN YOU FEEL"
880 PRINT "LUCKY...................."
890 END
900 FOR Z=1 TO 1500:NEXT Z
910 PRINT:PRINT
920 RETURN
930 FOR Z=1 TO 750:NEXT Z:RETURN
```

□ ONE-AND-TWENTY

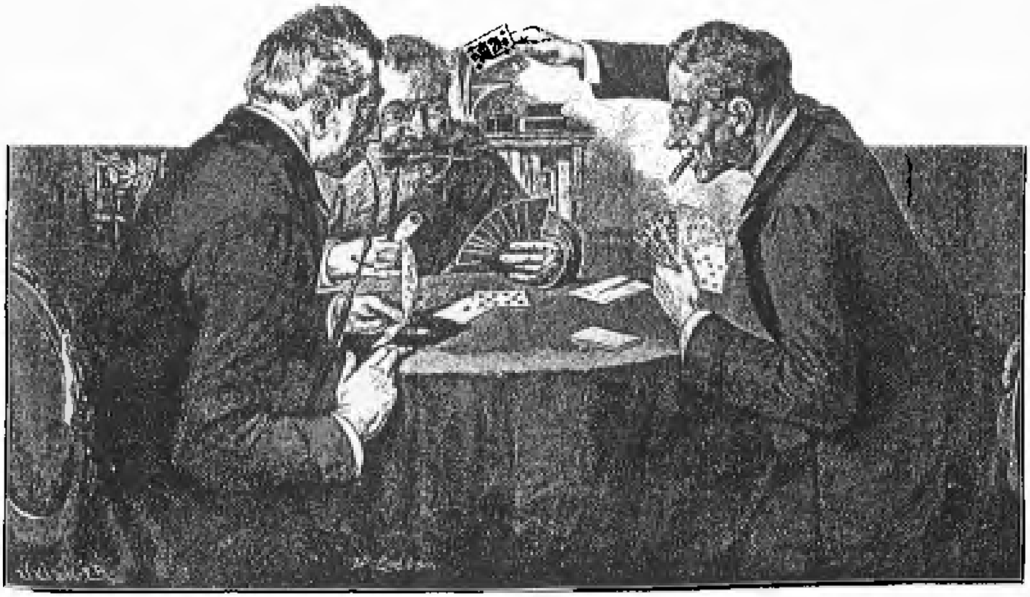
Our dice games continue now with ONE-AND-TWENTY which, as you realized the moment you read the title in the introduction, is a dice version of blackjack.

The game is simple, but demands a degree of cool thinking, as well as the ability to guess which numbers are going to come up next when the die is rolled. In ONE-AND-TWENTY, you are playing against the computer.

You are always given the first go. You roll the die as many times as you like, aiming to get a total as close as possible to, but not exceeding, 21. You can stop adding to the total whenever you like.

If you exceed 21 (that is, you "bust") then the computer wins that round automatically. A game consists of five rounds, and the winner of the most rounds, naturally enough, wins the game.

After initializing some variables (including HS for the human score and CS for the computer score) in lines 20 and 30, and clearing the screen in line 40, the computer asks you to "Press 'R' to roll, 'S' to stand." The word "Stand" means you are happy with the total you've achieved so far and you'll stay with it, giving the computer a chance to try and beat you. You'll soon learn that the speed with which you enter an R or an S can affect the number which is thrown, because the delay between the "Press 'R' to roll . . ." and the time you actu-



ally do press an R or an S is used to create a number (N) which—together with your current total—is used to seed the random number generator for the next dice roll.

The lines from 50 to 170 control your dice-rolling, and the computer only exits this cycle when you decide to stand. The whole of the computer's game-playing logic is held within line 180, which determines whether it is worth risking a bust to try and exceed your total. If it decides to roll, the lines from 190 to 250 control this.

Once the computer decides it has had enough of that, it uses lines 260, 280 and 290 to determine who has won. If both your scores are the same, or both of you are over 21, then the round is counted as a dead heat (line 320 tells you this), and neither CS nor HS is incremented. Line 280 spots a computer win, adding one to CS and printing "I," while the next line adds one to HS and prints "You." The mysterious "I" and "You" are used as the first part of the sentence concluded by "win!!!" in line 300.

As in **CHEMIN DE COMPUTER**, where the aim was to get the best out of nine scoring games, in **ONE-AND-TWENTY**, the intention is to score wins in the majority of games out of five. Line 390 looks to see if this has happened, and if so sends the program to line 450 where the result of the game (with a sarcastic comment or two) is printed. If five scoring games have not been played, line 400 asks you to "Stand by for the next round . . ." and after a brief pause (line 430), the next round is upon you.

This listing will enable your computer to challenge (and probably beat) you in **ONE-AND-TWENTY:**

```
10 REM ONE-AND--TWENTY
20 HS=0:CS=0
30 H=0:C=0:N=0
40 CLS
50 PRINT "PRESS 'R' TO ROLL, 'S' TO STAND"
60 D$=INKEY$:D$=INKEY$
70 A$=INKEY$
80 IF A$<> "R" AND A$<> "S" THEN 70
90 IF A$="S" THEN CLS:PRINT "YOUR TOTAL IS"H:GOTO 180
110 GOSUB 430
120 R=RND(6)
130 PRINT "YOU ROLLED A"R:SOUND R+12,R
140 H=H+R
150 PRINT "SO YOUR TOTAL IS"H
160 GOSUB 430
170 PRINT:GOTO 50
```

```
180 IF C>H AND C<22 OR C>21 OR H>21 OR H=21
                                    AND C=21 THEN 260
190 R=RND(6)
200 GOSUB 430
210 PRINT:PRINT "I ROLLED A"R
220 C=C+R
230 PRINT "SO MY TOTAL IS"C
240 GOSUB 430
250 GOTO 180
260 IF H=C OR H>21 AND C>21 THEN 320
270 GOSUB 510
280 IF (C>H OR H>21) AND C<22 THEN PRINT ,"I";:CS=CS+1
290 IF (C<H OR C>21) AND H<22 THEN PRINT ,
                                          "YOU";:HS=HS+1
300 PRINT " WIN!!"
310 GOTO 330
320 PRINT "THAT ROUND IS A DEAD HEAT....NO ","SCORE"
330 GOSUB 430
340 GOSUB 510
350 PRINT "AFTER THAT ROUND, THE GAME SCORE IS"
360 GOSUB 430
370 PRINT TAB(7);"YOU:"HS", AND ME"CS
380 GOSUB 510
390 IF CS+HS=5 THEN 450
400 PRINT:PRINT "STAND BY FOR THE NEXT ROUND..."
410 GOSUB 430:GOSUB 430
420 CLS:GOTO 30
430 FOR O=1 TO 500:NEXT O
440 RETURN
450 PRINT:PRINT "THAT'S THE END OF THE GAME"
460 PRINT:PRINT "FINAL SCORES:"
470 PRINT ,"YOU:"HS
480 PRINT ," ME:"CS:PRINT
490 IF CS>HS THEN PRINT "AND I DEFEATED YOU, HUMANOID''
495 IF CS>HS THEN GOTO 530
500 PRINT "AND REMARKABLY, A MERE HUMAN"
505 PRINT "BEAT THE MACHINE!!":SOUND 5,3
507 GOSUB 430:GOSUB 430:GOSUB 430:GOSUB 430:
                                        GOSUB 430:END
510 PRINT:PRINT "*******************************"
                                               :PRINT
520 RETURN
530 SOUND 28,3:SOUND 28,2:SOUND 25,4:SOUND 30,2
540 SOUND 25,6:END
```

□ MALIBU

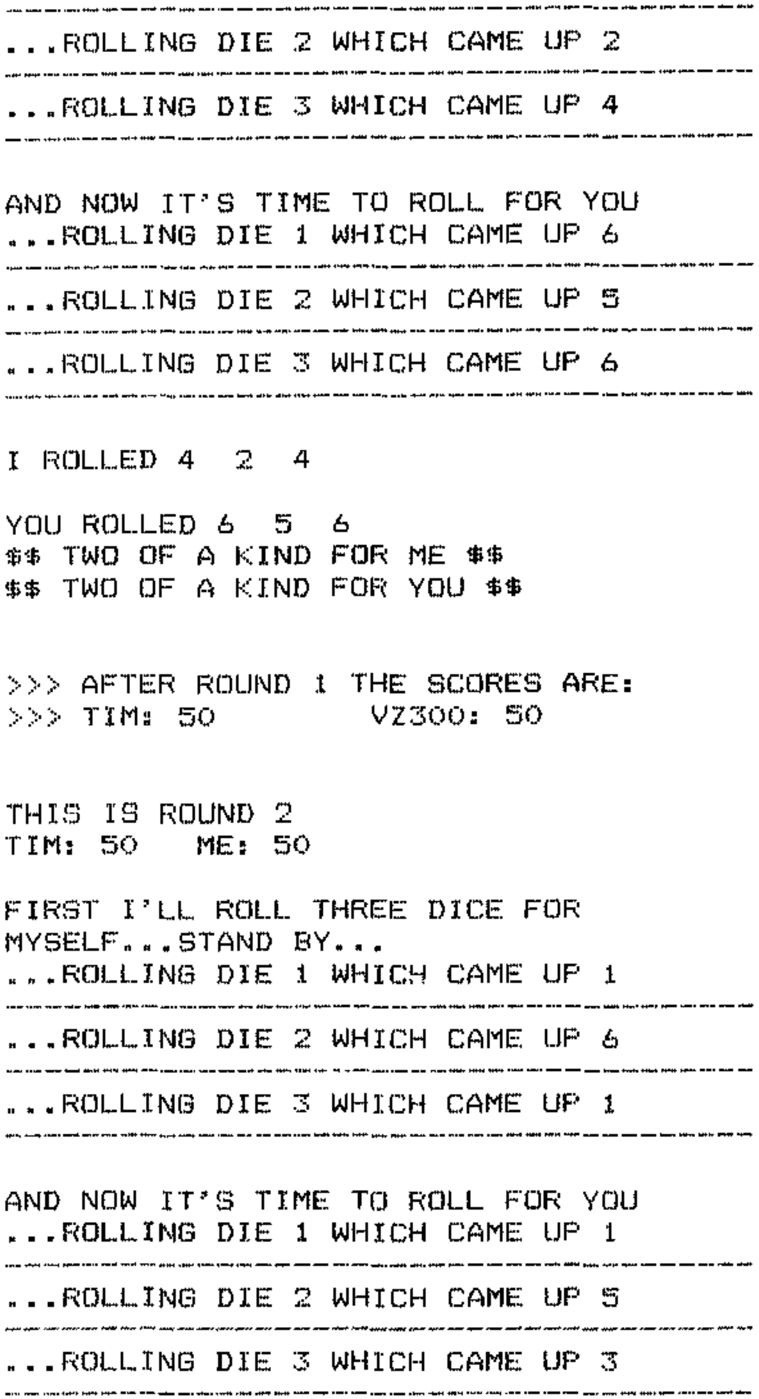
Roll the dice now for a few rounds of Malibu. You and the computer take it in turns to roll three dice each. Various dice combinations, and the total of the three dice, are worth points. For example, if the total of the pips showing is 13 ("Lucky Joe") on the computer's dice, the computer gets six points, and the human loses six points.

You start the game with 50 points each, and there are five rounds to a game. As I said, there are certain winning combinations (such as three sixes, called a "high roller") and certain winning totals (such as 9 or 12, a "straight road"). You can score more than once from a single roll, so if your total of nine was gained by rolling two fours and a one, you'd get the "straight road" score of three, plus another three for getting "two of a kind."

The only exception to this is rolling three of a kind ("triple crown"). You can score most of the other possible combinations, although you cannot get "two of a kind" and "triple crown" from the same roll.

Now this may all seem very confusing. It is much easier to play than it is to read about, because the computer rolls the dice for you, works out what the score should be, and keeps the tally. All you have to do is bite your fingernails as you watch the computer defeating you.

```
WELCOME TO THE GAME OF MALIBU
WHICH IS PLAYED WITH THREE DICE..

WHAT IS YOUR NAME? TIM



OK, TIM, PRESS THE SPACE
BAR WHEN YOU'RE READY TO PLAY...



THIS IS ROUND 1
TIM: 50    ME: 50

FIRST I'LL ROLL THREE DICE FOR
MYSELF...STAND BY...
...ROLLING DIE 1 WHICH CAME UP 4
```



```
----------------------------------------
...ROLLING DIE 2 WHICH CAME UP 2
----------------------------------------
...ROLLING DIE 3 WHICH CAME UP 4
----------------------------------------

AND NOW IT'S TIME TO ROLL FOR YOU
...ROLLING DIE 1 WHICH CAME UP 6
----------------------------------------
...ROLLING DIE 2 WHICH CAME UP 5
----------------------------------------
...ROLLING DIE 3 WHICH CAME UP 6
----------------------------------------

I ROLLED 4  2  4

YOU ROLLED 6  5  6
$$ TWO OF A KIND FOR ME $$
$$ TWO OF A KIND FOR YOU $$


>>> AFTER ROUND 1 THE SCORES ARE:
>>> TIM: 50         VZ300: 50


THIS IS ROUND 2
TIM: 50   ME: 50

FIRST I'LL ROLL THREE DICE FOR
MYSELF...STAND BY...
...ROLLING DIE 1 WHICH CAME UP 1
----------------------------------------
...ROLLING DIE 2 WHICH CAME UP 6
----------------------------------------
...ROLLING DIE 3 WHICH CAME UP 1
----------------------------------------

AND NOW IT'S TIME TO ROLL FOR YOU
...ROLLING DIE 1 WHICH CAME UP 1
----------------------------------------
...ROLLING DIE 2 WHICH CAME UP 5
----------------------------------------
...ROLLING DIE 3 WHICH CAME UP 3
----------------------------------------
```

```
I ROLLED 1  6  1

YOU ROLLED 1  5  3
>> YOU CRACK A STRAIGHT ROAD <<
$$ TWO OF A KIND FOR ME $$


>>> AFTER ROUND 2 THE SCORES ARE:
>>> TIM: 50         VZ300: 50
```

```
THIS IS ROUND 5
TIM: 49   ME: 51

FIRST I'LL ROLL THREE DICE FOR
MYSELF...STAND BY...
...ROLLING DIE 1 WHICH CAME UP 4
----------------------------------------
...ROLLING DIE 2 WHICH CAME UP 3
----------------------------------------
...ROLLING DIE 3 WHICH CAME UP 2
----------------------------------------

AND NOW IT'S TIME TO ROLL FOR YOU
...ROLLING DIE 1 WHICH CAME UP 2
----------------------------------------
...ROLLING DIE 2 WHICH CAME UP 1
----------------------------------------
...ROLLING DIE 3 WHICH CAME UP 6
----------------------------------------


I ROLLED 4  3  2

YOU ROLLED 2  1  6
>> I CRACK A STRAIGHT ROAD <<
>> YOU CRACK A STRAIGHT ROAD <<
```

```
WELL,TIM, THAT'S THE END OF
OUR LITTLE GAME OF MALIBU....

TIM'S FINAL SCORE IS 49
AND MINE IS 51

SO I'M THE WINNER!!!

DO YOU WANT ANOTHER GAME, TIM (Y OR N)?

OK, THANKS FOR THE GAME, TIM
SEE YOU AGAIN SOME TIME
```

Here's a complete list of the winning throws (and remember that when one player gains a certain number of points, they must come off the other player's total, so the totals always add up to 100):

Total	Name	Points
13 plus a pair	Sough	10
6 or 15	Easy Rider	4
9 or 12	Straight Road	3
All the same	Triple Crown	5
Two the same	Two of a Kind	3
13	Lucky Joe	6
3	Low and Mean	7
18	High Roller	12

The only losing throw is a seven ("Dreaded Seven"), which costs you two points, and adds two to your opponent.

Here's the listing for your own round of MALIBU:

```
10 REM MALIBU FOR VZ300
20 GOSUB 680
30 REM ****************************
40 REM *** THE MAIN GAME ROUTINE ***
50 FOR T=1 TO 5
60 CLS
70 PRINT:PRINT:PRINT "THIS IS ROUND";T
80 IF CS*HS<>0 THEN PRINT A$;":";HS;"  ME:";
CS
90 GOSUB 830
```

```
100 PRINT:PRINT "FIRST I'LL ROLL THREE DICE FOR"
110 PRINT "MYSELF...STAND BY..."
120 GOSUB 830
130 FOR Z=1 TO 3:C(Z)=0:H(Z)=0:NEXT Z
140 GOSUB 840
150 PRINT:PRINT "NOW IT'S TIME TO ROLL FOR YOU"
160 GOSUB 840
170 PRINT:PRINT "I ROLLED";C(1);C(2);C(3)
180 PRINT:PRINT "YOU ROLLED";H(1);H(2);H(3)
190 REM *** ASSESS RESULT OF ROLLS ***
200 HT=H(1)+H(2)+H(3)
210 CT=C(1)+C(2)+C(3)
215 F=0
220 IF(C(1)=C(2)ORC(2)=C(3)ORC(1)=C(3))ANDCT=13
                                             THEN F=1
225 IFF=1THENPRINT"THAT'S SOUGH FOR ME!":CS=CS+10
                                            :HS=HS-10
230 IF(H(1)=H(2)ORH(2)=H(3)ORH(1)=H(3))ANDHT=13
                                             THEN F=2
235 IFF=2THENPRINT"THAT'S SOUGH FOR YOU!":HS=HS+10
                                            :CS=CS-10
240 IFHT=15ORHT=6THENHS=HS+4:CS=CS-4:PRINT"*EASY
                                     RIDER FOR YOU*"
250 IFCT=15ORCT=6THENCS=CS+4:HS=HS-4:PRINT"*EASY
                                      RIDER FOR ME*"
260 IFCT=9ORCT=12THENCS=CS+3:HS=HS-3:F=3
265 IF F=3 THEN PRINT ">> I CRACK A STRAIGHT ROAD <<"
270 IFHT=9ORHT=12THENHS=HS+3:CS=CS-3:F=4
275 IF F=4 THEN PRINT">> YOU CRACK A STRAIGHT ROAD <<"
280 IFC(1)=C(2)ANDC(2)=C(3)THENPRINT"A TRIPLE CROWN
                                          FOR ME":F=5
285 IF F=5 THEN CS=CS+5:HS=HS-5:GOTO 300
290 IFC(1)=C(2)ORC(2)=C(3)ORC(1)=C(3)THEN F=6
295 IFF=6THENPRINT"$$ TWO OF A KIND FOR ME $$"
                                     :CS=CS+3:HS=HS-3
300 IFH(1)=H(2)ANDH(2)=H(3)THENPRINT"A TRIPLE CROWN
                                         FOR YOU":F=7
305 IF F=7 THEN HS=HS+5:CS=CS-5:GOTO 320
310 IFH(1)=H(2)ORH(2)=H(3)ORH(1)=H(3)THENF=8
315 IFF=8THENPRINT"$$ TWO OF A KIND FOR YOU $$"
                                       :HS=HS+3:CS=CS-3
320 IFHT=13THENPRINT"FOR YOU...LUCKY JOE!"
                                       :HS=HS+6:CS=CS-6
```

```
330 IFCT=13THENPRINT"FOR THE VZ...LUCKYJOE!"
                                        :CS=CS+6:HS=HS-6
335 F=0
340 IF HT=3 THEN PRINT"LOW AND MEAN...FOR YOU!"
                                       :HS=HS+7:CS=CS-7
350 IF CT=3 THEN PRINT"LOW AND MEAN...FOR VZ!"
                                       :CS=CS+7:HT=HT-7
360 IF HT=18 THEN PRINT"HIGH ROLLER FOR THE
                                          HUMAN...":F=1
365 IF F=1 THEN HS=HS+12:CS=CS-12
370 IF CT=18 THEN PRINT"HIGH ROLLER FOR THE
                                         VZ300...":F=2
375 IF F=2 THEN CS=CS+12:HS=HS-12
380 IFHT=7THENPRINT"YOU TRIPPED A DREADED SEVEN"
                                        :HS=HS-2:CS=CS+2
390 IFCT=7THENPRINT"I TRIPPED A DREADED SEVEN"
                                        :HS=HS+2:CS=CS-2
400 REM *** PRINT OUT SCORES ***
410 PRINT:PRINT
420 IF T=5 THEN 430
425 PRINT">>> AFTER ROUND";T;"THE SCORES"
427 PRINT"ARE ";A$;":";HS;"  VZ300:";CS
430 GOSUB 830:GOSUB 830
435 IF INKEY$<>"" THEN 435
436 PRINT "  >> PRESS ANY KEY <<"
437 IF INKEY$="" THEN 437
438 SOUND RND(20),1
440 REM ** CHECK BOTH STILL IN GAME **
450 IF CS<1 OR HS<1 THEN T=5
460 NEXT T
470 REM *** RESULT OF FIVE ROUNDS ***
480 PRINT:PRINT "WELL, ";A$;", THAT'S THE"
490 PRINT "END OF OUR LITTLE GAME          OF
                                           MALIBU..."
500 PRINT:PRINT A$;"'S FINAL SCORE IS";HS
510 PRINT "AND MINE IS";CS
520 GOSUB 830
530 PRINT
540 F=0:IF CS>HS THEN F=1
545 IF HS>CS THEN F=2
550 IF HS=CS THEN F=3
555 IF F=1 THEN PRINT "SO I'M THE WINNER!!"
560 IFF=2THENPRINT"SO ";A$;" TAKES THE"
                                 :PRINT "WINNER'S TROPHY"
```

```
565 IF F=3 THEN PRINT "IT LOOKS LIKE A DEAD HEAT...."
570 GOSUB 830:GOSUB 830
580 PRINT:PRINT "DO YOU WANT ANOTHER GAME (Y/N)?"
590 PRINT
600 F$=INKEY$
610 IF F$<>"Y" AND F$<>"N" THEN 600
615 IF F$="Y" THEN 630
620 PRINT "OK, THANKS FOR THE GAME,":PRINT A$;
                          ", SEE YOU AGAIN";
625 PRINT " SOME TIME":END
630 PRINT "OK, ";A$;", STAND BY..."
640 GOSUB 830
650 GOSUB 760
660 GOTO 50
670 REM **********************
680 REM *** INITIALISE ***
690 CLS:SOUND 8,1:SOUND 9,2
700 DIM H(3),C(3)
710 PRINT:PRINT " WELCOME TO THE GAME OF MALIBU"
720 PRINT "WHICH IS PLAYED WITH THREE DICE"
730 GOSUB 830
740 PRINT:INPUT "WHAT IS YOUR NAME ";A$
750 GOSUB 830
760 CLS:PRINT
770 HS=50:CS=50
775 IF INKEY$<>"" THEN SOUND RND(15),1:GOTO 775
780 PRINT "     OK, ";A$;", PRESS THE"
785 PRINT "  SPACE BAR WHEN YOU'RE READY"
787 PRINT "  TO PLAY..."
800 RT=RND(999):IF INKEY$="" THEN 800
810 RETURN
820 REM ** DELAY SUBROUTINE **
830 SOUNDRND(8),1:FORI=1TO 1600:NEXT I
                      :SOUND RND(25),1:RETURN
840 REM *** DICE ROLL ***
850 FOR Z=1 TO 3
860 PRINT "ROLLING DIE";Z;
870 FOR I=1 TO 999:NEXT I
880 K=RND(6)
890 PRINT "WHICH CAME UP";K
900 PRINT "-----------------------"
910 IF C(Z)=0 THEN C(Z)=K ELSE H(Z)=K
920 NEXT Z
930 GOSUB 830
940 RETURN
```

□ SNAKES' EYES

SNAKES' EYES demands some more cool thinking under pressure. You and your computer take it in turns to throw a pair of dice. You add the total of the pips, and in turn add this to your score.

You can roll the dice as many times as you like, but if you roll a seven, you automatically lose. Therefore, as you can see, the program demands you make decisions based on whether you should be careful and perhaps lose the round by not rolling a high enough score, or whether you should be greedy and go for the absolute maximum score and risk a seven.

You'll find that it is relatively easy to program games like this on your computer. Once you've worked out the "mechanical" routines which do such things as roll the dice, and increment the score, for the human player, it is not very difficult to work out a routine to enable the computer to use the same mechanical routines. Most dice games do not demand much "intelligence" and their strategy can often be reduced to a couple of IF/THEN statements. Read books on dice games—such as the excellent *Dice Games Old and New* by William E. Tredd (The Oleander Press, New York, 1981)—to get ideas for games to turn into programs, and for simple ideas on how to play the game as well as possible. It is these ideas which you should find relatively easy to turn into simple "intelligent algorithms" to enable your computer to play reasonably well against you.

And if, as in this case and in ONE-AND-TWENTY, you stipulate that the human must go first, the computer knows exactly what target it is aiming at, and therefore starts a round with a considerable advantage, which helps overcome the machine's inherent stupidity.

Anyway, this is the listing for the game:

```
10 REM SNAKES EYES
20 CLS
30 H=0:CZ=0
40 HS=0:CS=0
50 PRINT "PLEASE STAND BY..."
60 GOSUB 700
70 CLS:PRINT:PRINT
80 PRINT "YOUR TOTAL IS"HS:PRINT
90 GOSUB 710
100 PRINT "PRESS 'R' TO ROLL,"
110 PRINT "'Q' TO QUIT"
120 O$=INKEY$:O$=INKEY$
130 W$=INKEY$
150 IF W$<> "R" AND W$<> "Q" THEN 130
160 IF W$="Q" THEN 220
170 GOSUB 370
180 IF Z=7 THEN 350
190 HS=HS+Z
200 PRINT:PRINT "YOUR TOTAL IS"HS
210 GOTO 60
220 PRINT:PRINT:PRINT "STAND BY"
230 GOSUB 700
240 GOSUB 370
250 IF Z=7 THEN 330
260 CS=CS+Z
270 PRINT:PRINT "MY TOTAL IS"CS
280 PRINT "YOUR TOTAL IS"HS
290 IF CS<HS THEN 220
300 IF CS=HS THEN PRINT "IT'S A DEAD HEAT!"
310 IF CS>HS THEN 350
320 GOTO 510
330 PRINT:PRINT "YOU WIN!!":H=H+1
340 GOTO 510
350 PRINT:PRINT "I WIN!!":CZ=CZ+1
360 GOTO 510
```

```
370 REM ROLL DICE
380 CLS
390 FOR Q=1 TO 20
400 X=RND(6)
410 Y=RND(6)
420 PRINT:PRINT "DIE ONE:"X"   DIE TWO:"Y
430 FOR P=1 TO 3*Q:NEXT P
440 NEXT Q
450 CLS
460 GOSUB 710
470 PRINT "DIE ONE:"X"   DIE TWO:"Y
480 Z=X+Y
490 GOSUB 700
500 RETURN
510 PRINT:PRINT "THE SCORE IS:"
520 PRINT ,"YOU:"H
530 PRINT ," ME:"CZ
540 IF CZ+H=9 THEN 580
550 GOSUB 710
560 IF H>CZ THEN PRINT "YOU ARE LEADING!"
570 IF CZ>H THEN PRINT "AND I'M IN THE LEAD..."
580 GOSUB 700
590 CLS
600 IF CZ+H=9 THEN 620
610 GOTO 40
620 PRINT:PRINT:PRINT
630 PRINT "WELL, BUDDY, THAT'S THE END"
640 PRINT "    OF THE GAME..."
650 PRINT:PRINT:PRINT
660 PRINT "YOUR FINAL SCORE WAS"H
670 PRINT "AND MINE WAS"CZ:PRINT
680 IF H<CZ THEN PRINT "I'M THE WINNER!!":GOTO 720
690 PRINT "YOU'RE THE WINNER!!":END
700 FOR P=1 TO 1000:NEXT P:RETURN
710 PRINT "--------------------------------":RETURN
720 GOSUB 700:GOSUB 700
730 CLS:A=0:L=2:Z=3
740 POKE 28672+A,127+(Z*16)
750 IF L=2 AND (A+1)/32=INT((A+1)/32) THEN L=4
760 IF L=2 AND PEEK(28673+A)<>32 THEN L=4
770 IF L=4 AND PEEK(28672+A+32)<>32 THEN L=1
780 IF L=1 AND PEEK(28671+A)<>32 THEN L=3
```

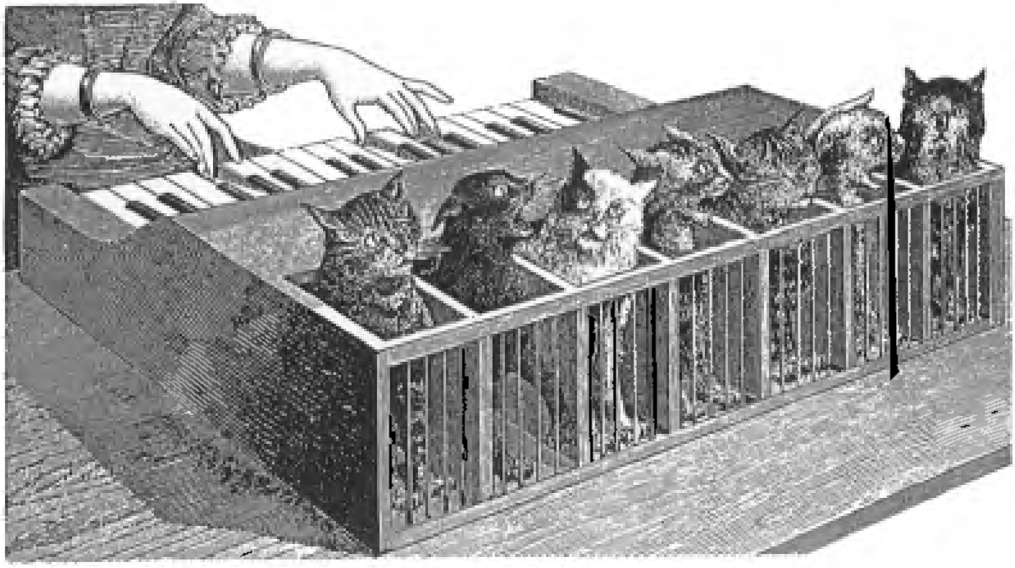
```
790 IF L=3 AND PEEK(28672+A-32)<>32 THEN L=2
800 IF L=2 THEN A=A+1
810 IF L=1 THEN A=A-1
820 IF L=3 THEN A=A-32
830 IF L=4 THEN A=A+32
840 IF A>511 THEN A=511:L=1
850 IF L=2 AND PEEK(28673+A)<>32 THEN L=4
860 IF L=4 AND PEEK(28672+A+32)<>32 THEN L=1
870 IF L=1 AND PEEK(28671+A)<>32 THEN L=3
880 IF L=3 AND PEEK(28672+A-32)<>32 THEN L=2
890 C=RND(2)-1:IF C=1 THEN X=X+1ELSE X=X-1
900 IF X<5 THEN COLOR,0
910 IF X>10 THEN COLOR,1
920 Z=RND(8)
930 GOTO 740
```

□ UNDER 'N' OVER

UNDER 'N' OVER is a computer adaptation of the dice game usually known as "Under and Over Seven." In this game, you bet on the likelihood of the total of a pair of dice landing so that the total is:

- less than seven;
- exactly equal to seven; or
- greater than seven.

Again, this is a game which—at first sight—seems to offer pretty good odds to the player. However, if you played the game forever, with a pair of perfect dice, you'd find your losses would outweigh your wins by nearly 17%.



Lines 70 and 120 ask you to place your bet, giving you the key for entering it (press A to bet under seven, B to bet on seven and C to bet on a total greater than seven). Lines 130 and 140 read the keyboard using INKEY$, rejecting (line 140) any input which is not A, B or C.

Having received a valid choice, the odds are printed up by lines 150 to 180 and then line 200 asks you to enter the amount of your bet. Of course, you can't bet more than you have (not in this game, line 220 checks your bet (A) against your money (M) and en't got enough prints up: "You haven't got that much!" next section rolls the dice, assigning random values between six to variables B and C, and adding them to produce total D 80. You are told of the total by line 300.

utcome

This is determined by the routine from lines 310 to 350 where a loss is first assumed (line 310, with variable W, for "win," assigned to the negative of your bet). This is changed—if needed—into the correct amount for a win if one has, in fact, taken place. You can see you get paid four times your bet for correctly specifying the dice will land with a total of seven (line 320) and even money for either over or under seven (lines 330 and 340).

Lines 370 and 380 tell you about your win (or loss) and then line 420 checks that you still have some money in hand. If you have, you are offered a new round of the game. If not, you are dismissed with a certain severity.

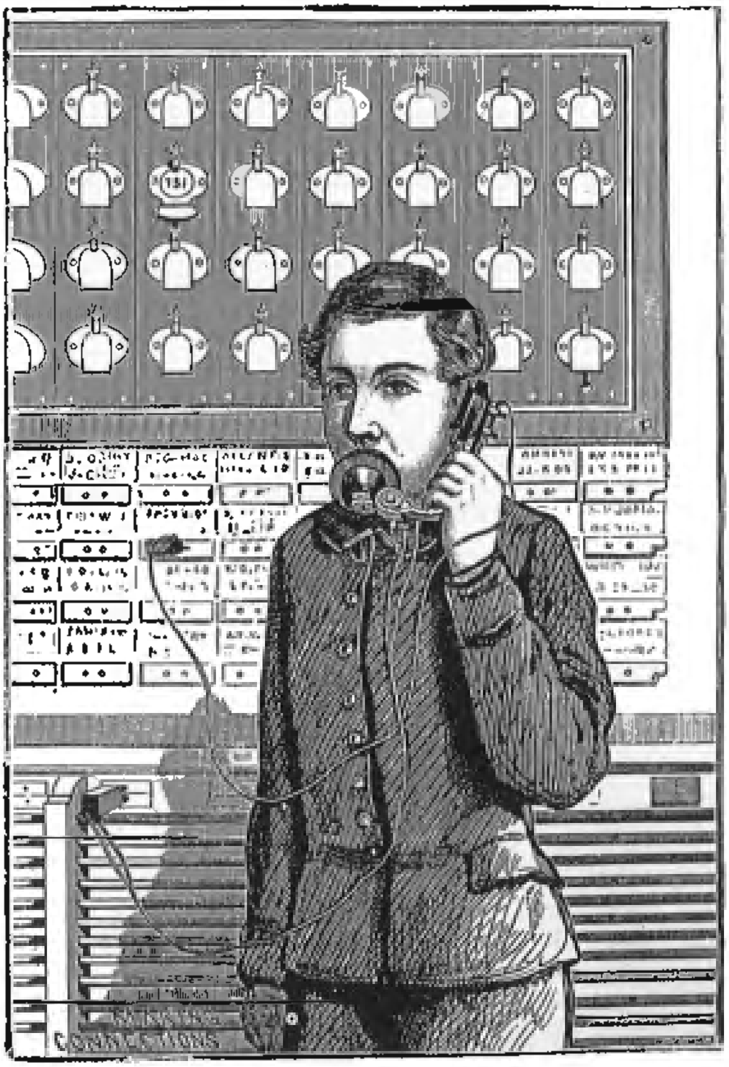
Here's the listing to turn your computer into a dice fiend:

```
10 REM UNDER 'N' OVER
30 CLS
40 M=30
50 GOSUB 450
60 GOSUB 470
70 PRINT "OK, PUNTER, 'TIS TIME TO"
80 PRINT "PLACE YOUR BET.........."
90 GOSUB 470
100 PRINT "ENTER 'A' TO BET UNDER 7"
110 PRINT "      'B' TO BET ON 7, OR"
120 PRINT "      'C' TO BET OVER 7"
130 A$=INKEY$
140 IF A$<> "A" AND A$<> "B" AND A$<> "C" THEN 130
150 PRINT:PRINT "THE ODDS ARE:"
160 PRINT "  A - PAYS EVEN"
170 PRINT "  B - PAYS 4 TO 1"
180 PRINT "  C - PAYS EVEN"
190 GOSUB 470
200 INPUT "HOW MUCH WOULD YOU LIKE TO BET";A
210 GOSUB 470
220 IF A>M THEN PRINT "YOU HAVEN'T GOT THAT MUCH!":
                                      PRINT:GOTO 200
```

```
230 B=RND(6)
240 PRINT TAB(7);"DIE ONE CAME UP"B
250 GOSUB 470
260 C=RND(6)
270 PRINT TAB(7);"DIE TWO CAME UP"C
280 D=C+B
290 GOSUB 470
300 PRINT "SO THE TOTAL IS"D
310 W=-A
320 IF D=7 AND A$="B" THEN W=4*A
330 IF D<7 AND A$="A" THEN W=A
340 IF D>7 AND A$="C" THEN W=A
350 M=M+W
360 GOSUB 470
370 IF W>0 THEN PRINT "YOU'VE JUST WON $"W:GOSUB 530
380 IF W<0 THEN PRINT "AND SO YOU LOSE $"(W*-1)
390 GOSUB 470
400 GOSUB 450
410 GOSUB 470
420 IF M<1 THEN 500
430 CLS
440 GOTO 50
450 PRINT:PRINT "YOU NOW HAVE $"M
460 RETURN
470 FOR P=1 TO 1000:NEXT P
480 PRINT:PRINT
490 RETURN
500 PRINT "YOU'RE FLAT BROKE, 'BUDDY'":SOUND 3,9
510 PRINT "SO I GOTTA CLOSE THE CASINO":SOUND 2,7
520 PRINT "THERE'S NO ROOM FOR DEADBEATS IN MY
                                         JOINT":SOUND 1,5
525 END
530 SOUND 21,4:SOUND 16,2:SOUND 16,1:SOUND 18,4:
                                                SOUND 16,4
540 SOUND 0,1:SOUND 20,4:SOUND 21,4
550 FOR I=0 TO 31:PRINT@I,CHR$(143):
                                PRINT@I+448,CHR$(143);:NEXT
560 RETURN
```

□ SEVEN/ELEVEN

SEVEN/ELEVEN is another fine dice game, and one in which your goal changes in each game. Based on craps, you have a "target number" to reach in each round (known as your "point" in craps).



Craps is an American version of the old English dice game "hazard." In **SEVEN/ELEVEN**, the complex betting of craps has been removed, leaving just the fun of the game. Rather than worry about computing odds and placing "pass" and "don't pass" bets, you can concentrate on the serious business of praying for the right roll to come up.

In this game, you are playing against yourself. Your winning and losing rounds are tallied, so you know—at every point in the game—just how well (or otherwise) you are doing.

You throw two dice at a time. If you throw a 2, 3, or a 12 with your first roll, you lose that round. Getting a 7, or an 11, on the first roll is the best thing you can do, because you've won that round with that single roll (which is why the game is called **SEVEN/ELEVEN**).

Any other number rolled as your first roll of a round becomes your "target number." You have to try and roll this again, before you roll a 7 or an 11. If you manage to roll your target number again, you win that round. However, rolling a 7 or an 11 before you've rethrown your target total causes you to lose that round.

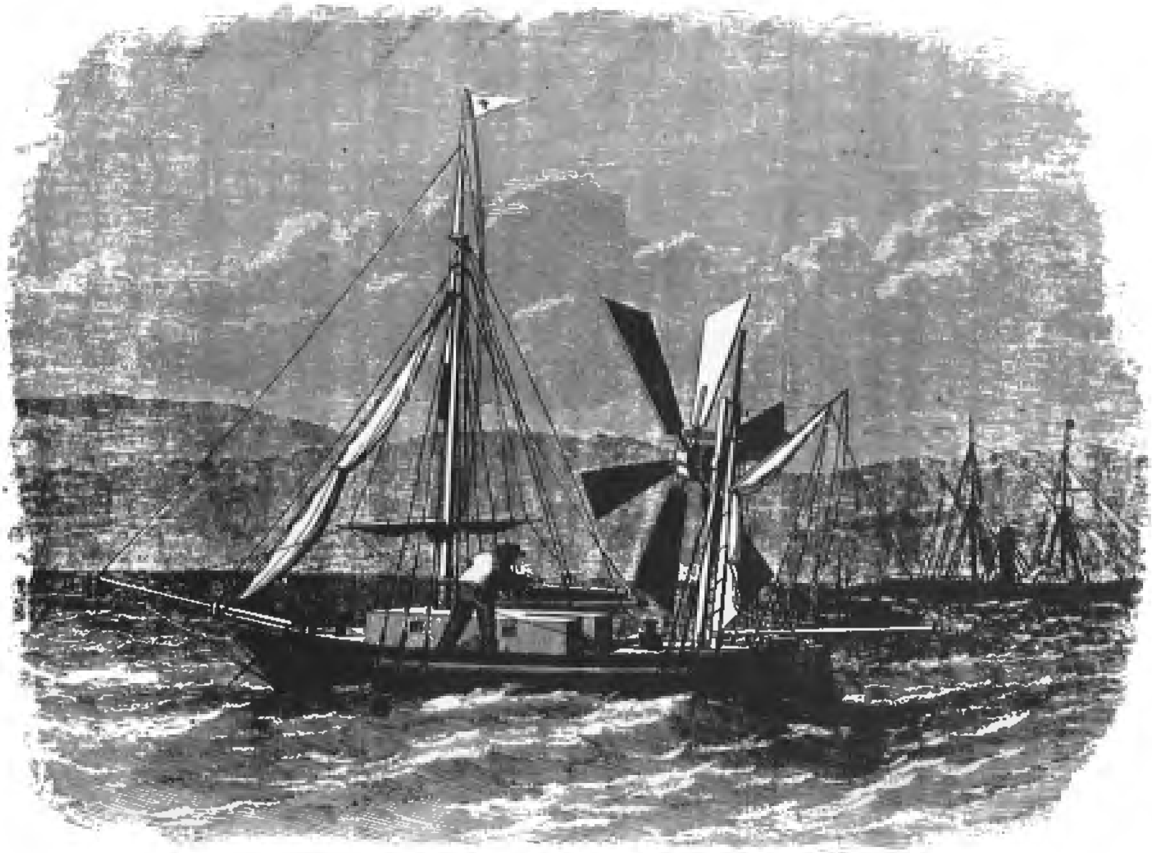
Here is the listing of **SEVEN/ELEVEN**:

```
10 REM SEVEN ELEVEN
20 B$ = "IN 7/11 YOU'VE ROLLED"
30 G = 0:W =0:L = 0:M = 105
40 CLS
50 PRINT:PRINT "THE TALLY SO FAR:"
60 PRINT "WINS:"W"  LOSSES:"L
70 G = G + 1
80 M = M - 5
90 PRINT "YOU HAVE $"M
100 PRINT:PRINT "THIS IS ROUND NUMBER"G
110 GOSUB 200
120 IF A=7 OR A=11 THEN 300
130 IFA=2 OR A=3 OR A=12 THEN 360
140 P=A
150 CLS:PRINT:PRINT"YOUR TARGET NUMBER IS"P
160 GOSUB 200
170 IF A=P THEN 300
180 IF A=7 OR A=11 THEN 310
190 GOSUB 340:GOTO 150
200 N=0:G$=INKEY$
210 PRINT:PRINT"PRESS 'R' TO ROLL"
220 N=N+W:IF INKEY$="" THEN 220
230 C = RND(6):PRINT"YOU ROLLED "C:SOUND C+12,C
240 GOSUB 340
```

```
250 B=RND(6):PRINT"AND"B:SOUND B+24,B
260 A=B+C
270 PRINT:PRINT B$;A
280 GOSUB 340
290 RETURN
300 PRINT"AND YOU'VE WON":W=W+1:M=M+20: GOTO 320
310 PRINT"AND SO YOU LOSE":L=L+1:SOUND 9,4
                                      :SOUND 6,4:SOUND 4,6
320 GOSUB 340
330 GOTO 40
340 FOR T=1 TO 500:NEXT T
350 RETURN
360 PRINT"SO THATS THE END OF THE ROUND":GOTO 320
```

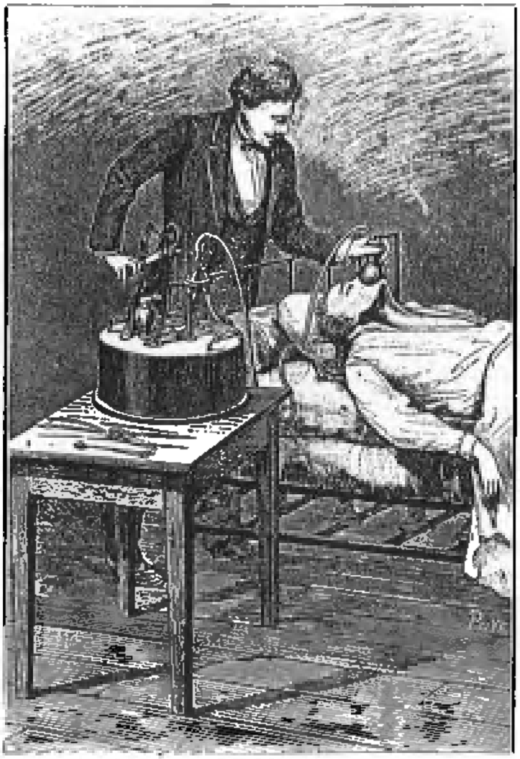
Space Games

Good old space, the final frontier. No collection of computer games would be complete without a few space games.



□ MOONLANDER

The scenario of this program is pretty familiar. You are landing on the moon, with limited fuel, and for some reason your onboard computer is incapable of doing anything except reporting the state of the flight to you. The information you get is, of necessity, limited but adequate.

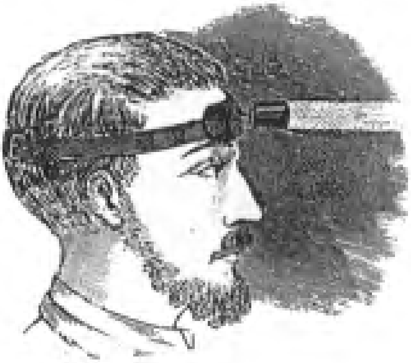


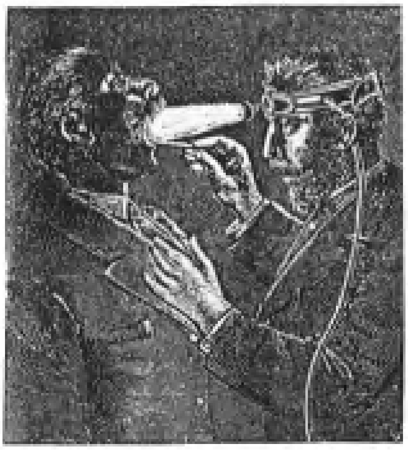
You are told, at all times, your height above the moon's surface, how much fuel you have left, and the speed with which you are descending. You have to enter the correct amount of thrust to ensure you land gently on the surface. The fuel you have is limited, so you must ration it to ensure you have enough left in the last few seconds of flight to cushion your impact. A "high-score" feature (lines 370 and 380) ensures you and your friends return to this program time and time again in an effort to get a better "galactic rating" and to create a less deep crater.

```
 10 REM MOONLANDER
 20 HS=-10000
 30 CLS:PRINT@34,"HEIGHT:":PRINT@64,"VELOCITY:"
                                       :PRINT@100,"FUEL:"
 40 A=-20-RND(60):REM INITIAL VELOCITY
 50 B=1200+RND(380):REM HEIGHT
 60 C=320+RND(90):REM FUEL
 70 S$=CHR$(252)+CHR$(234)+CHR$(254)
 80 FOR P=29152 TO 29183:POKE P,132:NEXT:Q=0
 90 B=INT(B):A=INT(A):C=INT(C)
 100 PRINT@42,USING "####";B:PRINT@74,USING "####";A
 110 PRINT@106,USING "####";C
 120 PRINT@(Q*32)+20,"   ":Q=INT(16-B/100)
 150 PRINT@(Q*32)+20,S$
 190 PRINT@416,"THRUST";
 200 T$=INKEY$:IF VAL(T$)=0 AND T$<>"0" THEN 200
 210 T=VAL(T$):SOUND Q,1:PRINT T
 220 IF T>C THEN T=0
 230 C=C-T
 240 B=B+A+(T-5)/2
 250 A=A+(T-5)/2
 260 IF C<1 AND B>100 THEN 300
 270 IF ABS(B)<20 AND ABS(A)<15 THEN 420
 280 IF B>19 THEN 90
 290 IF C>1 THEN 310
 300 PRINT@352," YOU HAVE RUN OUT OF FUEL"
 310 PRINT@384,"YOUR SHIP CRASHED AT"ABS(A)"KPH"
 320 PRINT@416,"CREATING A"INT(ABS(A)*45)
                                   "METER DEEP CRATER"
330 SC=100-ABS(A):FOR P=Q TO 1 STEP -1:SOUND P,1:NEXT P
340 FOR P=1 TO 5000:NEXT P
360 CLS:PRINT@320,"YOUR GALACTIC RATING IS"SC
370 IF SC>HS THEN HS=SC
380 PRINT@352,"BEST RATING SO FAR IS"HS
390 PRINT@384,"PLEASE STAND BY FOR YOUR
                                     NEXT       MISSION"
 400 FOR P=1 TO 1500:NEXT P
 410 GOTO 30
 420 PRINT@384,"YOU HAVE LANDED SAFELY":PRINT
 430 PRINT@416,"WELL DONE, INTREPID CAPTAIN":
                                        SC=C*234:GOTO 340
```

□ HYPERWAR

HYPERWAR is a major space simulation, which puts you in charge of patrolling a cube-shaped sector of space, which is ten parsecs along each side. The enemy is the race known as the Dosznti. There is only one Dosznti ship in this sector, and it is moving slowly through the cube as you play. Although you cannot destroy the ship, you can kill a number of individual Dosznti. In fact, the aim of the game is to get your "alien kill total" to the highest point possible before your energy banks are exhausted. Although there are many, many more Dosznti in this sector than there are humans, the aliens are notoriously bad shots, so your chance of wiping out a lot before your mission is terminated is rather high.





You can only fire at the Dosznti when you are within three units of their position. Attempting to fire when they are out of range leads only to the crew response "The Dosznti ship is not within range, sir."

You have a limited amount of energy, and each successful hit by an alien craft diminishes your energy supply.

I will not explain the game in any more detail, because to do so would diminish the enjoyment you'll get from playing it. The "behavior of space" does not change from game to game, so you should find you begin to learn the tricks of space warfare after the first game, leading to higher and higher scores as you continue to play it. The game tends to explain the rules to you as you play, and the screen display has been organized to make it as clear as possible what is going on.

This program will enable you to turn your computer console into one within your space ship, as you set out to rid the 10 parsec cube of the menace of the Dosznti mothership:

```
10 REM HYPERWAR
20 HS=0
30 GOSUB 1410
40 GOSUB 1150
50 IF L<0 THEN 670
60 GOSUB 1660
70 L=L-.25
80 TI=TI-1
90 PRINT "WHAT IS YOUR ORDER, CAPTAIN?"
100 PRINT "   N, S, E, W"
110 PRINT "   A(DVANCE), R(ETREAT)"
120 PRINT "   H(YPERSPACE)"
130 PRINT "   L(ASER)"
140 INPUT Z$
150 IF Z$="N" THEN X=X-1
160 IF Z$="S" THEN X=X+1
170 IF Z$="E" THEN Y=Y+1
180 IF Z$="W" THEN Y=Y-1
190 IF Z$="A" THEN Z=Z-1
200 IF Z$="R" THEN Z=Z+1
210 IF Z$="L" THEN GOSUB 490
220 IF Z$="H" THEN GOSUB 1520
230 IF X<1 THEN X=1
240 IF Y<1 THEN Y=1
250 IF Z<1 THEN Z=1
260 IF X>10 THEN X=10
270 IF Y>10 THEN Y=10
280 IF Z>10 THEN Z=10
290 GOSUB 890
300 IF RND(10)<7 THEN 40
310 PRINT "***************************"
320 PRINT "*DEEP SPACE SCANNERS READ:*"
330 PRINT "*   N/S -"A-X;TAB(26);"*"
```

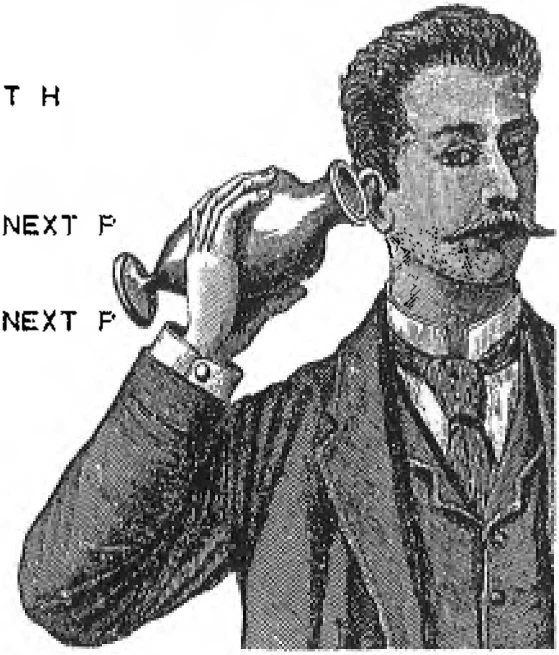
```
340 PRINT "*   E/W -"B-Y;TAB(26);"*"
350 PRINT "*   A/R -"C-Z;TAB(26);"*"
360 PRINT "***************************"
370 A=A+RND(4)-3
380 B=B+RND(4)-3
390 C=C+RND(4)-3
400 IF A<1 THEN A=1
410 IF A>10 THEN A=10
420 IF B<1 THEN B=1
430 IF B>10 THEN B=10
440 IF C<1 THEN C=1
450 IF C>10 THEN C=10
460 GOSUB 1650
470 GOTO 40
480 REM ************
490 REM LASER OPTION
500 L=L-.75
510 GOSUB 1620
520 IF ABS(A-X)>3 OR ABS(B-Y)>3 OR ABS(C-Z)>3
                                            THEN 1680
540 PRINT "LASERS ARMED AND READY, SIR"
550 GOSUB 1650
560 IF RND(10)>5 THEN 590
570 PRINT "LASERS FIRE WAS UNSUCESSFUL,","CAPTAIN"
580 GOTO 650
590 PRINT "YOU DAMAGED THE DOZNTI SHIP,","CAPTAIN"
600 FOR J=1 TO 30
610 FOR H=1 TO 30-J/2:PRINT " ";:NEXT H
620 PRINT "WELL DONE!!!";
630 NEXT J
640 T=T+RND(1000)+784
650 GOTO 1620
670 REM OUT OF ENERGY
680 GOSUB 1620
690 PRINT "THIS IS SHIP'S MASTER CONTROL"
700 GOSUB 1650
710 IF L<=0 THEN PRINT "ENERGY RESERVES DEPLETED"
720 IF TI=0 THEN PRINT "YOU HAVE STAYED IN SPACE
                                             TOO LONG"
730 PRINT:PRINT "YOU DEFEATED"T"DOSZNTI":GOSUB 1650
740 PRINT "LIFE SUPPORT SYSTEMS FADING..."
750 GOSUB 1650
760 PRINT "   FADING..."
770 GOSUB 1650
```

havior
find
le

```
                  FADING..."

                 WAS "T:IF T>HS THEN HS=T
                 BEST SO FAR"HS:GOSUB 1650
                 STAND BY FOR YOUR NEXT MISSION"
                 SUB 1650:GOTO 30
                 ************

                  E COLLIDED WITH THE","DOSZNTI SHIP!!
880 GOTO 690
890 REM DOSZNTI REPORT
900 IF ABS(A-X)>5ORABS(B-Y)>5ORABS(C-Z)>5 OR
                                  RND(10)>7 THEN RETURN
910 GOSUB 1620
920 PRINT "CONDITION RED!  CONDITION RED!":
                                  SOUND 24,8:SOUND 21,8
930 GOSUB 1650:IF RND(0)<.25 THEN 1700
940 PRINT "DOSZNTI ARE FIRING AT US, SIR"
950 GOSUB 1650
960 PRINT "CONDITION RED!  CONDITION RED!":
                                  SOUND 24,8:SOUND 21,8
970 GOSUB 1650
980 IF RND(10)>7 THEN 1110
990 PRINT "DOSZNTI FIRE HAS HIT OUR SHIP,","CAPTAIN"
1000 DA=RND(9)+1
1010 GOSUB 1650
1020 PRINT "MASTER CONTROL REPORTS DAMAGE"
1030 PRINT "RATING OF"DA"TO THE "
1040 IF DA=2 THEN PRINT "FOREWARD SECTION, SIR"
1050 IF DA>2 THEN PRINT "CREW SECTION, CAPTAIN"
1060 IF DA>3 AND DA<7 THEN PRINT "MAIN DRIVE, SIR"
1070 IF DA>7 THEN PRINT "POWER RESERVE CHAMBER"
1080 L=L-DA
1090 GOTO 1620
1110 GOSUB 1650
1120 PRINT "THE DOSZNTI FIRE MISSED OUR SHIP, CAPTAIN"
1130 GOTO 1650
1140 REM ************
1150 REM STATUS REPORT
1160 CLS
1170 PRINT "******************************"
1180 PRINT:PRINT "STATUS REPORT FROM":
                              PRINT "MASTER CONTROL:"
```

```
1190 GOSUB 1650
1200 PRINT "ENERGY IN MAIN AND AUXILIARY BANKS:"L
1205 GOSUB 1650
1210 IF L<3 THEN PRINT:PRINT "WARNING...ENERGY LEVEL "
1215 IF L<3 THEN PRINT "DANGEROUSLY LOW!"
1220 PRINT "STARDATE TIMER READS"TI
1230 IFTI<8THENPRINT"!!!!!WARNING-MISSION
                                   TIME RUNNING OUT!!!!!"
1240 IF TI<1 THEN 680
1250 PRINT "*******************************"
1260 IF T>0 THEN PRINT:PRINT "DOSZNTI
                                    DESTRUCTION TALLY"T
1270 PRINT ">>>SHIPS GALACTIC CO-ORDINATES ARE"X;Y;Z
1280 PRINT ">>>DOSZNTI MOTHERSHIP LOCATED AT"A;B;C
1290 PRINT:PRINT "THE DOSZNTI IS ";
1300 IF A<>X OR B<>Y THEN PRINT "TO THE";
1310 IF A<X THEN PRINT " NORTH";
1320 IF A>X THEN PRINT " SOUTH";
1330 IF B>Y THEN PRINT " EAST";
1340 IF B<Y THEN PRINT " WEST";
1350 IF C=Z THEN PRINT " OF YOUR SHIP, SIR"
1360 IF C>Z THEN PRINT " BEHIND US, CAPTAIN"
1370 IF C<Z THEN PRINT " IN FRONT OF US, SIR"
1380 PRINT "*******************************"
1390 GOTO 1650

1400 REM **********
1410 REM INITIALISE
1420 CLS
1440 L=35*RND(30):T=0:TI=50
1450 A=RND(10)
1460 B=RND(10)
1470 C=RND(10)
1480 X=RND(10)
1490 Y=RND(10)
1500 Z=RND(10)
1510 RETURN
1520 REM HYPERSPACE OPTION
1530 X=RND(10)
1540 Y=RND(10)
1550 Z=RND(10)
1560 FOR J=1 TO 40
1570 PRINT TAB(J);"*":PRINT
```

```
1580 FOR H=1 TO J:NEXT H
1590 NEXT J
1600 CLS
1610 RETURN
1620 FOR P=1 TO 1000:NEXT P
1630 CLS
1640 GOTO 1660
1650 FOR P=1 TO 1000:NEXT P
1660 PRINT:PRINT
1670 RETURN
```



```
1680  PRINT "THE DOSZNTI SHIP IS NOT
                                 WITHIN      RANGE, SIR"
1690 GOTO 1650
1700 GOSUB 1620:PRINT "CONDITION AMBER!":
                                       SOUND 24,8:GOTO 1650
```

Brain Games

I guess 90% of all games could, without stretching the definition too much, be called "brain games." After all, they demand a certain amount of brain-power and application from you to play.

However, the programs in this section under the heading of "brain games" are here because they demand a little more intellectual effort than several of the other games in the book.

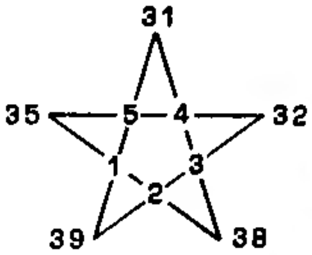
Here you'll have to unlock a twisted cube in CUBIC, will settle down to a game or two of MUMBLE MARBLE (also known as "solitaire" and named as it is here because the game in "real life" uses marbles on a board), and will have to work under the pressure of a relentless clock to locate some atoms within a CYCLOTRON.

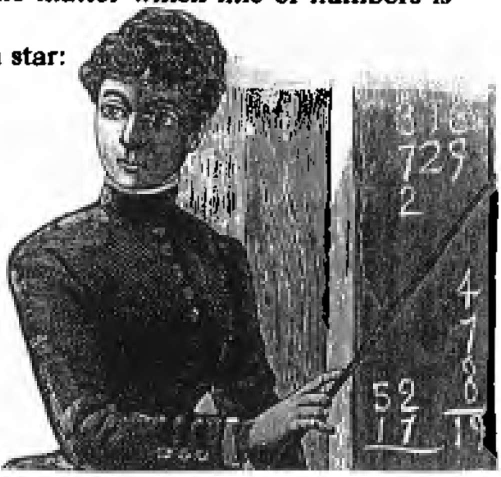
If your brain still has any power left after all that, you can attempt a task which may appear impossible in FLIPPER and work out an algorithm to solve the SWITCHEROO problem in the fewest number of moves.

□ IDAHO STARS

IDAHO STARS are stars with a special property—numbers placed on the crossover points of the lines forming them will, when added together, produce the same total, no matter which line of numbers is chosen.

Here, for example, is one such star:





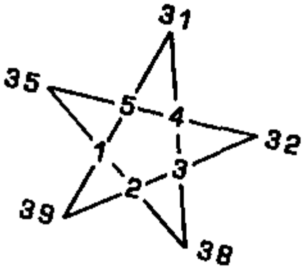
As you can see, each line on the star sums to the same total. In this program, the computer generates an **IDAHO STAR**, leaving two or three of the numbers as zeroes for you to work out as quickly as you can:

This is the listing to produce your own **IDAHO STARS**:

```
10 REM IDAHO STARS
20 GOSUB 480:REM SET UP STAR
30 GOSUB 340:REM PRINT STAR
40 GOSUB 70:REM ASK FOR GUESS
50 GOTO 30
60 REM *************
70 REM ASK FOR GUESS
80 IF SC>0 AND SC<10 THEN PRINT
                         "YOU HAVE"SC"RIGHT SO FAR"
85 IF NOT (SC>0 AND SC<10) THEN PRINT
90 GO=GO+1
100 PRINT "THIS IS GO NUMBER"GO
110 PRINT "ENTER ANY NUMBER YOU"
120 INPUT "THINK IS PART OF THE STAR";G
130 SC=0
```

```
140 FOR J=1 TO 10
150 IF G=A(J) THEN B(J)=A(J)
160 IF B(J)<>0 THEN SC=SC+1
170 NEXT J
180 FOR P=1 TO 1000:NEXT P
190 IF SC<10 THEN RETURN
200 REM ************************
210 GOSUB 340
220 PRINT "YES, YOU'VE SOLVED IT! "
230 PRINT "AND IT ONLY TOOK"GO"GOES..."
235 IF GO<10 THEN GOSUB 800
250 PRINT "PRESS 'Y' IF YOU'D LIKE TO"
260 PRINT "TRY ANOTHER STAR OF IDAHO,     "
270 PRINT "PRESS 'N' TO STOP........"
280 A$=INKEY$
290 IF A$<> "N" AND A$<> "Y" THEN 280
300 IF A$="Y" THEN RUN
310 PRINT:PRINT "OK, THANKS FOR PLAYING"
320 END
330 REM **********
340 REM PRINT STAR
350 PRINT CHR$(28);
360 PRINT TAB(11);B(1)
370 PRINT:PRINT
380 PRINT TAB(2);" ";B(2);"  ";B(3);" ";B(4);" ";B(5)
390 PRINT
400 PRINT TAB(8);B(6);"   ";B(7)
420 PRINT TAB(11);B(8)
430 PRINT
440 PRINT TAB(5);B(9);"      ";B(10)
460 RETURN
470 REM ***********
480 REM SET UP STAR
490 CLS
500 DIM A(10),B(10)
510 GO=0:SC=0
520 A=RND(9)
530 B=RND(9)
540 C=RND(9)
550 D=RND(9)
560 E=RND(9)
570 IF A=B OR A=C OR A=D OR A=E THEN 530
580 IF B=C OR B=D OR B=E THEN 530
590 IF C=D OR C=E THEN 530
```

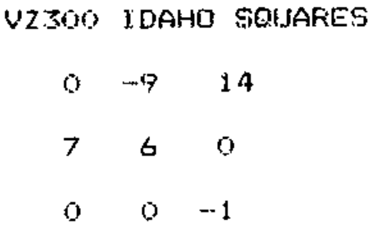
```
600 IF D=E THEN 550
610 X=RND(3)
620 A(1)=X
630 A(2)=X-B+C+D
640 A(3)=A+E
650 A(4)=A+D
660 A(5)=X-B-C+E
670 A(6)=A
680 A(7)=A+C
690 A(8)=A+B
700 A(9)=X-2*B+2*D+E
710 A(10)=X-2*B-C+D+2*E
720 FOR J=1 TO 10
730 B(J)=A(J)
740 IF A(J)=0 THEN RUN
750 NEXT J
760 B(RND(10))=0
770 B(RND(10))=0
780 B(RND(10))=0
790 RETURN
800 FOR TU=1 TO 9:READ FR,DU:SOUND FR,DU:NEXT:RETURN
810 DATA 16,3,18,2,20,3,20,1,20,2,18,1,20,2,21,5,20,3
```



□ IDAHO SQUARES

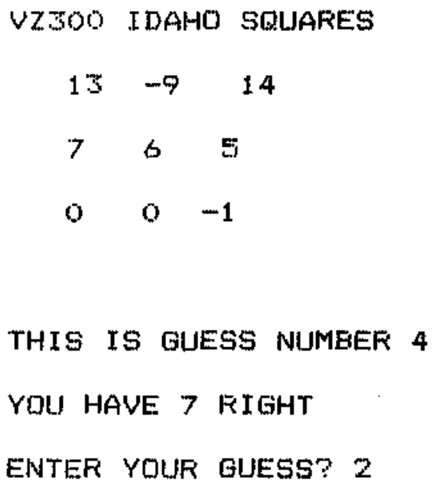
As expected, IDAHO SQUARES are like IDAHO STARS, except that the digits which add up to a common total lie along the horizontal, vertical and diagonal lines of a nine by nine grid, rather than along the lines forming a star.

Here's an IDAHO SQUARE being solved:

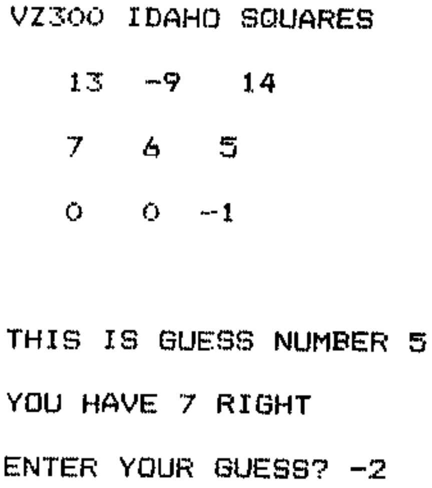


```
VZ300  IDAHO  SQUARES

     0   -9    14

     7    6    0

     0    0   -1
```

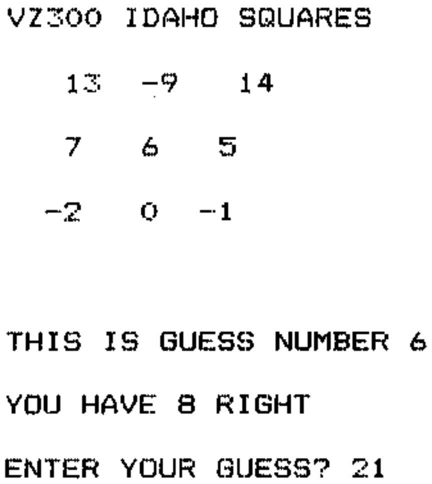
```
THIS IS GUESS NUMBER 1

YOU HAVE 5 RIGHT

ENTER YOUR GUESS? 3



VZ300 IDAHO SQUARES

   0  -9   14

   7   6   0

   0   0  -1


THIS IS GUESS NUMBER 2

YOU HAVE 5 RIGHT

ENTER YOUR GUESS? 5



VZ300 IDAHO SQUARES

   0  -9   14

   7   6   5

   0   0  -1


THIS IS GUESS NUMBER 3

YOU HAVE 6 RIGHT

ENTER YOUR GUESS? 13
```



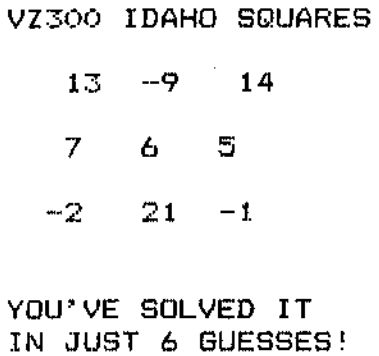
```
VZ300 IDAHO SQUARES

    13   -9    14

    7    6    5

    0    0   -1


THIS IS GUESS NUMBER 4

YOU HAVE 7 RIGHT

ENTER YOUR GUESS? 2
```



```
VZ300 IDAHO SQUARES

    13   -9    14

    7    6    5

    0    0   -1


THIS IS GUESS NUMBER 5

YOU HAVE 7 RIGHT

ENTER YOUR GUESS? -2
```



```
VZ300 IDAHO SQUARES

    13  -9   14

    7   6   5

   -2   0  -1


THIS IS GUESS NUMBER 6

YOU HAVE 8 RIGHT

ENTER YOUR GUESS? 21
```



```
VZ300 IDAHO SQUARES

    13  -9   14

    7   6   5

   -2   21  -1


YOU'VE SOLVED IT
IN JUST 6 GUESSES!
```

As you can see, you simply enter any number which you think may make up part of the grid, and the computer checks to see if your number is one, or more, of the missing numbers. If your guess is correct, the relevant zero (or zeroes) in the grid changes magically into the number you've entered. A tally is kept of the number of guesses it has taken you to solve it.

Here's the listing to produce your very own IDAHO SQUARES. You can change the nines in lines 250 to 280 to a lower digit for squares which are easier to solve, and to a higher one for squares which are more difficult.

```
10 REM VZ300 IDAHO SQUARES
20 GOSUB 230:REM INITIALISE
30 J=J+1
40 CLS:PRINT:PRINT
50 PRINT "VZ300 IDAHO SQUARES":PRINT:PRINT TAB(3);
60 M=0
70 FOR Z=1 TO 9
80 PRINT B(Z);"  ";
90 IF 3*INT(Z/3)=Z THEN PRINT:PRINT:PRINT TAB(3);
100 IF B(Z)=A(Z) THEN M=M+1
110 NEXT Z
120 PRINT
130 IF M=9 THEN PRINT "YOU'VE SOLVED IT IN JUST"
135 IF M=9 THEN PRINT "      ";J-1;" GUESSES":END
140 PRINT:PRINT "THIS IS GUESS NUMBER";J
150 PRINT:PRINT "YOU HAVE";M;"RIGHT":PRINT
160 INPUT"ENTER YOUR GUESS";X
170 FOR Z=1 TO 9
180 IF B(Z)=0 AND A(Z)=X THEN B(Z)=X
190 NEXT Z
200 GOTO 30
210 END
220 REM ********************
230 REM INITIALISE
240 DIM A(9),B(9)
250 A=RND(9)
260 B=RND(9)
270 C=RND(9)
280 D=RND(9)
290 IF A=B OR B=C OR A=C OR A=D OR B=D OR C=D
                                          THEN 260

300 A(1)=A+B
310 A(2)=A-(B+C)
320 A(3)=A+C
330 A(4)=A-B+C
340 A(5)=A
350 A(6)=A+B-C
360 A(7)=A-C
370 A(8)=A+B+C
380 A(9)=A-B
```

```
390 FOR Q=1 TO 9
400 B(Q)=A(Q)
410 NEXT Q
420 B(A)=0
430 B(B)=0
440 B(C)=0
450 B(D)=0
460 J=0
470 RETURN
```

```
13  2  0
 0  0 10
 6 16  0
```

```
13  2  0
 0  0 10
 6 16  5
```

```
13  2 12
 0  0 10
 6 16  5
```

```
13  2  0
 0  0 10
 6 16  0
```

□ EXECUTIONER

As you can tell, this game is a computer variation of the old pencil-and-paper game, "hangman." In this game, the computer chooses a word from its store (held in the **DATA** statements from 500 to 740) and then challenges you to guess it.

The number of guesses you'll get is related to the length of the word (see lines 120 and 170).

This listing will enable you to risk your neck in the noble cause of increasing your vocabulary:

```
10 REM EXECUTIONER
20 CLS:RESTORE
30 Y=0:L$="                            ":REM 28 SPACES
40 PRINT"PRESS 'E' WHEN YOU'RE READY"
50 PRINT"TO FACE THE EXECUTIONER..."
60 IF INKEY$<>"E" THEN 60
80 FOR G=1 TO RND(125)
90 READ A$
100 NEXT G
```

```
110 GOSUB 480
120 N=LEN(A$):DIM B(N),D(N),O$(26)
130 FOR G=1 TO N
140 B(G)=ASC(MID$(A$,G,1))
150 D(G)=B(G)
160 NEXT G
170 Q=INT(N+N/2+.5)
180 CLS:PRINT:PRINT"YOU HAVE TO GUESS THE EXECUTION-"
190 PRINT"ER'S WORD IN JUST"Q"GUESSES"
200 GOSUB 480:GOSUB 480:GOSUB 480:CLS
210 FOR J=1 TO Q:Y=Y+1
220 GOSUB 400
230 IF H=N THEN 340
240 PRINT:PRINT:PRINT Q+1-J"CHANCES LEFT....":O$=INKEY$
250 PRINT:PRINT"ENTER YOUR NEXT GUESS? ";
255 C$=INKEY$:IF C$="" THEN 255 ELSE PRINT C$:
                                        FOR I=1 TO 100:NEXT
260 F=ASC(C$)
265 O$(F-64)=CHR$(F)
270 FOR G=1 TO N
280 IF D(G)=F THEN D(G)=0:J=J-1
290 NEXT G:NEXT J
300 GOSUB 480
310 GOSUB 400
320 PRINT:PRINT:PRINT"SO SORRY,BUT YOU GOTTA GO NOW!'
                                                :SOUND 1,8
330 PRINT"THE EXECUTIONER'S WORD WAS ";A$;L$
                                             :GOSUB 480:END
340 PRINT:PRINT"WHEW! YOU'VE STAVED OFF"
350 PRINT"EXECUTION FOR ANOTHER DAY."
360 PRINT"YOU GOT IT IN"Y-1"GUESSES"
370 PRINT:PRINT"THE EXECUTIONER'S WORD WAS":PRINTA$
375 FORI=1 TO 20:FOR K=1 TO 200:NEXT:COLOR,1:
                                        FOR K=1 TO 200:NEXT
376 COLOR,0:NEXT
380 PRINT"DO YOU WANT ANOTHER GO?"
385 GOSUB 495:IF A$<>"N" AND A$<>"Y" THEN 385
390 IF A$="N"THEN END ELSE RUN
400 H=0:PRINT CHR$(28)
405 FOR V=1 TO 26:PRINT@V+2,O$(V):NEXT V:PRINT:PRINT
410 FOR E=1 TO N
420 IF B(E)=D(E) THEN PRINT"-";
```

```
430 IF B(E)<>D(E) THEN PRINT CHR$(B(E));:H=H+1
440 NEXT E
450 PRINT:PRINT:IF H<>N THEN PRINT"YOU HAVE"H
                                        "LETTERS CORRECT"
460 PRINT
470 RETURN
480 FOR O=1 TO 500:NEXT O
490 RETURN
495 A$=INKEY$:A$=INKEY$:RETURN
500 DATA"MERIDIAN","MERIT","MERMAID","MERRIMENT"
510 DATA"OVERSEER","OXIDANT","OXYGEN","PALPABLE"
                                           ,"UNORTHODOX"
520 DATA"PANDEMONIUM","PANEGYRIC","PARADOXICAL"
                                      ,"PHEASANT","FLY"
530 DATA"RUMPUS","RUMMAGE","SACRAMENT","SABRE"
                                     ,"SCHEMATIC","TAR"
540 DATA"SEDIMENT","SEXAGENARIAN","TEMPERATE"
                                     ,"TELESCOPE","CAR"
550 DATA"GYPSY","RHAPSODY","SCALENE","SATELLITE"
                                         ,"MARSHMALLOW"
560 DATA"HELICOPTER","CASSEROLE","ILLUSTRATE"
                                    ,"SYMPATHY","MOUSE"
570 DATA"REFRIGERATE","MAMMOTH","KALEIDOSCOPE"
                                     ,"DUPLICATE","CAT"
580 DATA"INSATIABLE","SILHOUETTE","BONDAGE"
                                     ,"BONUS","DECIMAL"
590 DATA"DEAFEN","THEORY","THISTLE","SABOTAGE"
                                     ,"COURTESY","TRY"
600 DATA"DEBUTANTE","DECADENCE","KETCHUP"
                                ,"KINDERGARTEN","METRE"
610 DATA"SUPERCALIFRAGILISTICEXPIALIDOCIOUS",
                                    "COMPUTER","HOUSE"
620 DATA"OLYMPIC","OMNIBUS","OMNIPOTENT"
                               ,"MAGNANIMOUS","ZEALOUS"
630 DATA"ZOOLOGY","ZILLION","XEROX","XYLOPHONE"
                                     ,"QUINCE","YUMMY"
640 "FATIGUE","FALSETTO","EQUIVALENT","ENZYME"
                                   ,"DISRUPT","HEART"
650 DATA"QUEASY","IMBECILE","BIENNIAL"
                             ,"ACCOMPLISHMENT","TONGUE"
660 DATA"KUNGFU","JAVELIN","DEMANDMANT"
                              ,"OOMIAK","JERKIN","QUAD"
```

```
670 DATA"ZEBRA","TOMAHAWK","MARZIPAN"
                                   ,"PULVERIZE","FACSIMILE"
680 DATA"HYPOCHONDRIAC","RECRUIT"
                             ,"CONJURE","STEWARDESS","DEBUT"
690 DATA"LIZARD","SCHOLASTIC","THEOLOGY"
                                    ,"GEOMETRY","GIBBERISH"
700 DATA"VEGETABLE","WINTERGREEN","YELLOW"
                                     ,"YEARLING","INFINITY"
710 DATA"PRAIRIE","SCHEDULED","RHEUMATISM"
                                    ,"MOSQUITO","DOG","TAB"
720 DATA"BOX","JET","QUIP","QUIZ","QUACK"
                                  ,"AXE","BIB","FIB","WET"
730 DATA"YACHT","VERSUS","PRECIS","VILIFY"
                                        ,"WOMANHOOD","WOO"
740 DATA"YOU","WOODWIND","ACACIA"
```

□ CUBIST

This is a two-dimensional version of the colored cube puzzle which swept the world from Hungary.

The "cube" starts off looking like this:

```
1 1 2 2
1 1 2 2
3 3 4 4
3 3 4 4
```

After some manipulation by the computer, it will look something like this:

```
1 2 1 2
3 3 3 2
3 1 4 1
4 2 4 4
```

Your job is to get it back into its original state in as few moves as possible. The numbers on the cube rotate in groups of four, spinning in a clockwise direction. This means that

```
1 2
3 4
```

when rotated will look like this:

```
3 1
4 2
```

You enter a number in order to rotate the elements of the cube.

The key to move is as follows:

```
 2  3  4
 6  7  8
10 11 12
```

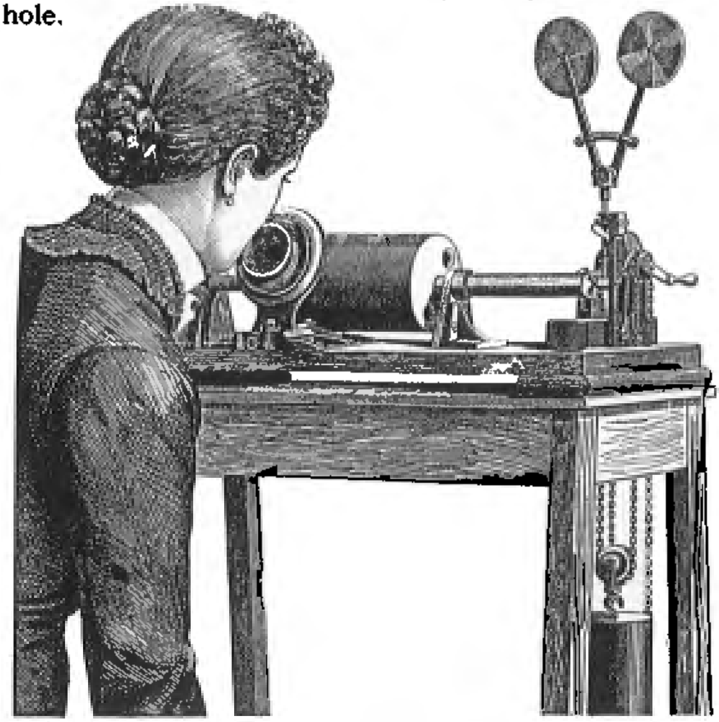
This is the listing for CUBIST:

```
30 DIM A(4),B(16)
40 CLS
50 B=1:F=0
60 FOR D=1 TO 4
70 C=0
80 IF B=1 THEN C=1
90 IF B=3 THEN C=2
100 IF B=9 THEN C=3
110 IF B=11 THEN C=4
120 B(B)=C
130 B(B+1)=C
140 B(B+4)=C
150 B(B+5)=C
160 C=0
170 IF B=1 THEN C=2
180 IF B=3 THEN C=6
190 IF B=9 THEN C=2
200 B=B+C
210 NEXT D
220 GOSUB 410
230 PRINT:PRINT
240 IF F<11 THEN PRINT@224,"TWISTING..."
250 F=F+1
260 FOR P=1 TO 500:NEXT P
270 IF F<11 THEN X=RND(12)
280 IF F>10 THEN GOSUB 590
290 IF X<2 OR X=5 OR X=9 OR X>12 THEN 270
300 A(1)=B(X)
310 A(2)=B(X+4)
320 A(3)=B(X+3)
330 A(4)=B(X-1)
340 B(X)=A(4)
350 B(X+4)=A(1)
360 B(X+3)=A(2)
370 B(X-1)=A(3)
380 GOSUB 410
390 F=F+1
400 GOTO 270
410 PRINT CHR$(28)
420 PRINT:PRINT
430 FOR B=1 TO 16
```

```
440 PRINT B(B);
450 IF B/4=INT(B/4) THEN PRINT
460 NEXT B
470 PRINT:PRINT
480 IF F<10 THEN PRINT@0," TWIST NUMBER"F
490 IF F>10 THEN PRINT@0," YOUR CUBIC NUMBER"F-10
500 IF F<11 THEN RETURN
510 P=0
520 IF B(1)=1 AND B(2)=1 AND B(3)=2 AND B(4)=2
                                            THEN P=P+1
530 IF B(5)=1 AND B(6)=1 AND B(7)=2 AND B(8)=2
                                            THEN P=P+1
540 IF B(9)=3 AND B(10)=3 AND B(11)=4 AND B(12)=4
                                            THEN P=P+1
550 IF B(13)=3 AND B(14)=3 AND B(15)=4 AND B(16)=4
                                            THEN P=P+1
560 IF P<>4 THEN RETURN
570 PRINT@384,"YOU SOLVED IT IN JUST"F-10"TWISTS"
580 PRINT "WELL DONE, CUBIST!":END
590 Z$=INKEY$:Z$=INKEY$
600 PRINT@320,"ENTER YOUR CHOICE (1 - 9)"
610 L$=INKEY$:X=VAL(L$)
620 IF X<1 OR X>9 THEN 610
630 SOUND 31,1:IF X<4 THEN X=X+1:RETURN
640 IF X<7 THEN X=X+2:RETURN
650 X=X+3:RETURN
660 RETURN
```

□ MUMBLE MARBLE

Our next brain game is a computer version of the game you may know as "solitaire," in which you have to move marbles around a board. At the start of the game only the center hole is empty. You can jump over marbles into empty holes, and you remove the marble so jumped over. The idea of the game is to end up with just one marble in the center hole.



Many stories have been told about the origin of this game. The most interesting of these tales is the one that says the idea of the game was worked out by a prisoner in solitary confinement in the Bastille, who devised it as a way to relieve the monotony of his imprisonment. Whether that story is true or not, there is no doubt that the game can become quite addictive, as you try to devise a foolproof way to solve it.

Here's what the **MUMBLE MARBLE** display looks like at the start of the game:

```
1 2 3 4 5 6 7
    0 0 0       1
    0 0 0       2
0 0 0 0 0 0 0   3
0 0 0 * 0 0 0   4
0 0 0 0 0 0 0   5
    0 0 0       6
    0 0 0       7
```

A few moves later it could look like this:

```
1 2 3 4 5 6 7
    0 0 0       1
    0 * 0       2
0 * 0 0 0 0 0   3
0 0 * 0 0 0 0   4
0 0 0 0 0 0 0   5
    * 0 0       6
    * 0 0       7
```

Here's the listing, so you can set out to solve the problem yourself:

```
10 REM MUMBLE MARBLE
20 GOSUB 400
30 GOSUB 250
40 REM ACCEPT MOVE
50 PRINT@416,"WHICH MARBLE DO YOU WANT TO MOVE";
60 PRINT@448,"";:INPUT A
70 IF A=99 THEN GOTO 240
80 IF A<11 OR A>77 THEN GOTO 60
90 IF A(A)<>79 THEN GOTO 60
100 PRINT@448,A"TO WHERE";
110 INPUT B
120 IF B<11 OR B>77 THEN GOTO 100
130 IF A(B)<>E THEN GOTO 100
140 A((A+B)/2)=E:A(A)=E:A(B)=79
```

```
150 MOVE=MOVE+1
160 COUNT=0
170 FOR F=11 TO 75
180 IF A(F)=79 THEN COUNT=COUNT+1
190 NEXT F
200 GOSUB 250
210 PRINT "THERE ARE";COUNT;"MARBLES ":
                                PRINT "ON THE BOARD"
220 IF COUNT<>1 THEN GOTO 40
230 IFA(44)=79THENPRINT"YOU DID IT, IN
                             JUST";MOVE;"MOVES!    ":END
240 PRINT "THE GAME IS OVER AND YOU'VE FAILED!":END
250 REM PRINT OUT
260 PRINT@448,L$:PRINTCHR$(28);
270 PRINT "ENTER SIDE CO-ORDINATE FIRST"
280 PRINT TAB(5);"ENTER 99 TO CONCEDE"
290 PRINT "      1 2 3 4 5 6 7"
300 PRINT TAB(5);
310 FOR D=11 TO 75
320 T=10*(INT(D/10))
330 IF D-T=8 THEN D=D+2:PRINT T/10:PRINT
                                         TAB(5);:GOTO 350
340 PRINT CHR$(A(D));" ";
350 NEXT D:PRINT "      7"
370 PRINT "MOVES SO FAR:";MOVE
390 RETURN
400 REM INITIALISE
410 CLS:DIM A(87)
430 E=42:L$="
440 FOR D=11 TO 75
450 T=10*(INT(D/10))
460 IF D-T=8 THEN D=D+3
470 READ A(D)
480 NEXT D
490 MOVE=0
500 RETURN
530 DATA 32,32,79,79,79,32,32
540 DATA 32,32,79,79,79,32,32
550 DATA 79,79,79,79,79,79,79
560 DATA 79,79,79,42,79,79,79
570 DATA 79,79,79,79,79,79,79
580 DATA 32,32,79,79,79,32,32
590 DATA 32,32,79,79,79
```

□ CYCLOTRON

In CYCLOTRON, you fire atoms into the machine from the top, by specifying a number, and you have to try and locate particles of antimatter hidden within the machine from the behavior of the atom.

If the atom hits a particle of antimatter it will either be absorbed, or deflected to the right or left. An atom may be affected by more than one particle of antimatter, which makes the resolution of the problem even more difficult.

There are always three particles of antimatter in the machine, although they could well all be in the same number cyclotron. You have an extremely limited number of goes in order to locate the antimatter. At each go, you can either enter the number where you want to enter an atom, or be reckless and enter 8, which gives you a chance to guess the location of the antimatter particles.

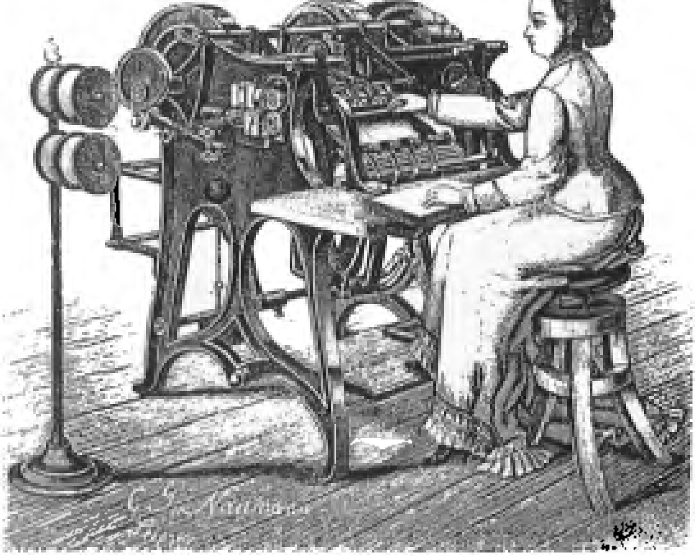
And here's the listing for your very own cyclotron:

```
10 REM CYCLOTRON
20 CLS
30 N=0:HS=9:DIM B(7),Q(3),W(3)
80 REM PLACE ANTIMATTER
90 FOR A=1 TO 3
100 B(A)=RND(7)
110 NEXT A
120 FOR H=6 TO 1 STEP -1
130 CLS
140 PRINT:PRINT:PRINT"YOU HAVE"H"SECONDS"
150 PRINT"ENTER CYCLOTRON NUMBER,"
160 PRINT"OR 8 IF YOU THINK YOU KNOW"
170 PRINT"WHERE THE ANTIMATTER LIES"
180 INPUT C
190 IF C=8 THEN 520
200 GOSUB 450
210 D=1
220 IF B(D)=C THEN  350
230 IF D<3 THEN D=D+1:GOTO 220
240 GOSUB 500
250 PRINT"THE ATOM EMERGED FROM"C:SOUND 31,5
260 FOR Z=1 TO 1000:NEXT Z
270 NEXT H
280 PRINT:PRINT:PRINT
290 PRINT"SORRY,TIME IS UP"
300 PRINT:PRINT"THE ANTIMATTER WAS IN":SOUND 6,7:
                                            SOUND 4,8
310 FOR A=1 TO 3
320 PRINT B(A);
330 NEXT A
340 END
350 REM ANTIMATTER ACTS
360 IF RND(10)>9 THEN 420
370 IF C=1 THEN C=2:GOTO 210
380 IF C=7 THEN C=6:GOTO 210
390 F=RND(2)-1
400 C=C+F
410 GOTO 210
420 REM ANTIMATTER ABSORBS ATOM
430 PRINT"THE ATOM HAS BEEN ABSORBED":SOUND 31,1:
                                           SOUND 30,1
```

```
440 GOTO 260
450 PRINT:PRINT:PRINT TAB(3+2*C);C
460 FOR Z=1 TO 5
470 PRINT TAB(6);"- - - - - - -"
480 NEXT Z
490 RETURN
500 PRINT TAB(3+2*C);C
510 RETURN
520 REM LOCATION ATTEMPT
530 PRINT"WHERE DO YOU THINK"
540 PRINT"THE ANTIMATTER LIES?"
550 INPUT Q(1),Q(2),Q(3)
560 FOR T=1 TO 3:W(T)=B(T):NEXT T
570 SR=0
580 FOR X=1 TO 3:FOR Y=1 TO 3
590 IF Q(X)=B(Y) THEN SR=SR+1:B(Y)=0:Q(X)=0
600 NEXT Y,X
610 GOTO 650
620 FOR P=1 TO 3
630 B(P)=W(P)
640 NEXT P
650 IF SR>2 THEN 700
660 IF SR>0 THEN PRINT"YOU LOCATED"SR"CORRECTLY"
670 IF SR=0 THEN PRINT"YOU ARE COMPLETELY WRONG!"
680 FOR T=1 TO 3:B(T)=W(T):NEXT T
690 GOTO 260
700 PRINT"WELL DONE. YOU LOCATED THE"
710 PRINT"ANTIMATTER WITH"H"SECONDS"
720 PRINT ,"TO SPARE":GOSUB 770
730 IF 6-H<HS THEN HS=6-H
740 PRINT:PRINT"YOUR BEST TIME SO FAR IS"HS
750 FOR Z=1 TO 1000:NEXT Z
760 GOTO 90
770 SOUND 21,4:SOUND 16,2:SOUND 16,1:SOUND 18,4:
                                        SOUND 16,4
780 :SOUND 0,1:SOUND 20,4:SOUND 21,4:RETURN
```

□ FLIPPER

This intriguing game can provide you with a considerable degree of mental stretching. When you run the game, you'll see a mix of X's and *'s on a three by three grid. You have to end up with an X in the middle, and eight *'s surrounding it.



You enter the number of the place you want to hit with your flipper. Flipping a corner piece causes those adjoining it to change into their opposites (that is an X becomes an *, and an * becomes an X). Hitting the middle piece on a side with your flipper causes the two on either side of it to change, and hitting the middle piece changes the middle pieces on each of the sides.

The piece you hit always changes in each case.

Here's the listing so you can do it yourself:

```
10 REM FLIPPER
20 DIM A(10),F(4):CLS
30 M=-1:O=42:X=88:P=0
50 FOR C=1 TO 9
60 A(C)=O
70 IF INT(RND(100)/100+.5)=0 THEN A(C)=X
80 NEXT C
90 GOSUB 270
100 M=M+1
```

```
110 N=0
120 FOR C=1 TO 9
130 IF A(C)=X THEN N=N+1
140 NEXT C
150 IF N=1 AND A(5)=X THEN 350
160 IF M>0 THEN PRINT:PRINT"THAT WAS MOVE"M
170 PRINT:PRINT"NUMBER OF X IS"N"                    "
190 PRINT:PRINT"WHICH ONE DO YOU WANT TO FLIP?"
200 IF INKEY$<>"" THEN 200
210 A$=INKEY$
220 N=VAL(A$):IF N<1 OR N>9 THEN 210
225 IF A(VAL(A$))=88 THEN 210
230 P=N:SOUND 31,1
240 GOSUB 380
250 GOTO 90
260 END
270 PRINT CHR$(28)
280 IF P<>0 THEN PRINT"YOU FLIPPED"P ELSE PRINT
290 PRINT:PRINT"1 2 3",CHR$(A(1));" ";CHR$(A(2));" "
295 PRINT CHR$(A(3))
300 PRINT
310 PRINT"4 5 6",CHR$(A(4));" ";CHR$(A(5));
                                              " "CHR$(A(6))
320 PRINT
330 PRINT"7 8 9",CHR$(A(7));" ";CHR$(A(8));
                                              " ";CHR$(A(9))
340 RETURN
350 PRINT:PRINT:PRINT"YOU SOLVED IT IN JUST"M"MOVES"
370 END
380 IF A(N)=X THEN RETURN
390 IF N=1 THEN F(1)=2:F(2)=4:F(3)=5:F(4)=10
400 IF N=2 THEN F(1)=1:F(2)=3:F(3)=10:F(4)=10
410 IF N=3 THEN F(1)=2:F(2)=5:F(3)=6:F(4)=10
420 IF N=4 THEN F(1)=1:F(2)=7:F(3)=10:F(4)=10
430 IF N=5 THEN F(1)=2:F(2)=4:F(3)=8:F(4)=6
440 IF N=6 THEN F(1)=3:F(2)=9:F(3)=10:F(4)=10
450 IF N=7 THEN F(1)=4:F(2)=5:F(3)=8:F(4)=10
460 IF N=8 THEN F(1)=7:F(2)=9:F(3)=10:F(4)=10
470 IF N=9 THEN F(1)=8:F(2)=5:F(3)=6:F(4)=10
480 FOR G=1 TO 4:F=0
500 IF A(F(G))=X THEN F=1
510 IF F=1 THEN A(F(G))=Q
520 IF F=0 AND A(F(G))=Q THEN A(F(G))=X
530 NEXT G
540 A(N)=X:RETURN
```

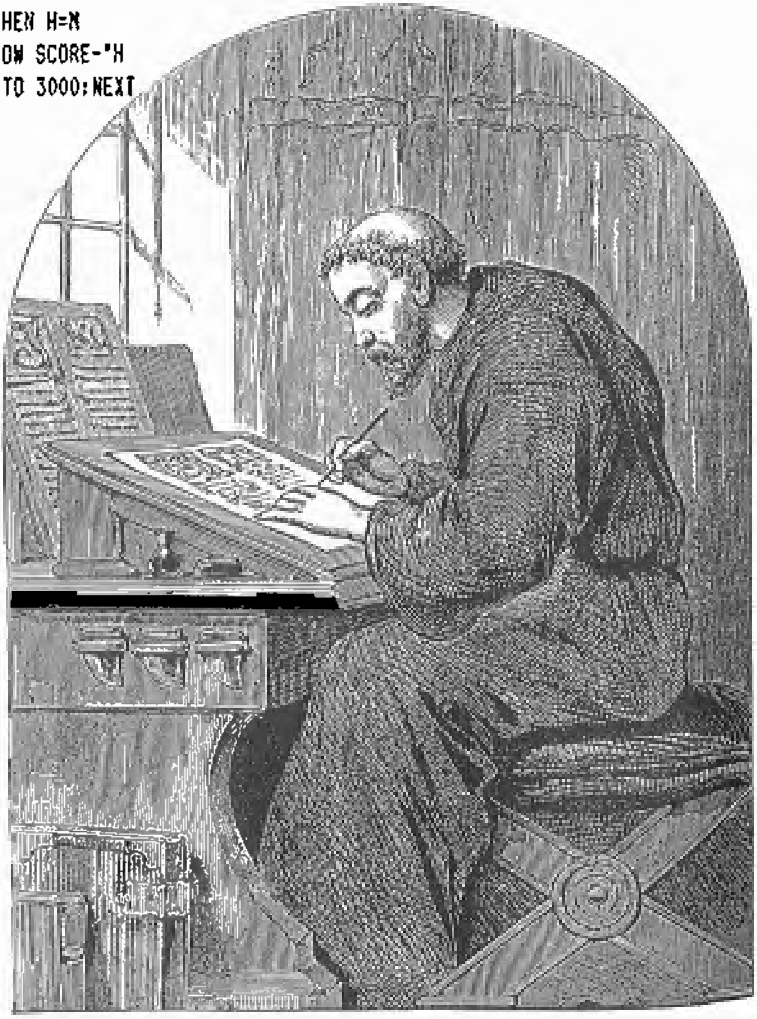
□ SWITCHEROO

In SWITCHEROO, you are presented with the digits 1 to 9 arranged in a random order, and you have to get them into 123456789 order, in as few moves as possible.

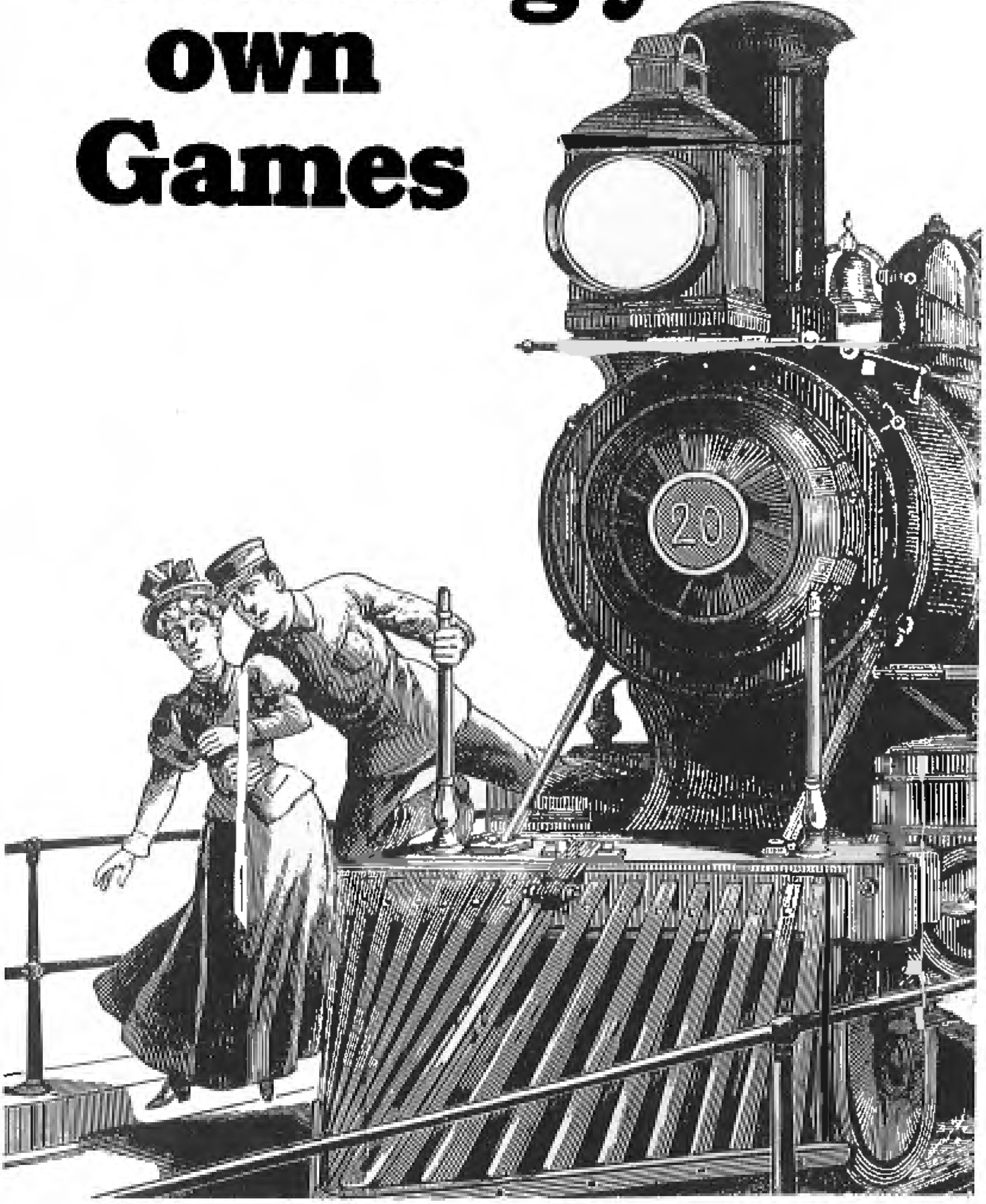
You enter your moves as numbers, and the computer performs a "switcheroo" using the number you've entered.

```
10 REM SWITCHEROO
20 CLS:B=B+1
30 PRINT:PRINT"PLEASE STAND BY..."
40 GOSUB 100
50 GOSUB 220
60 IF A$="123456789" THEN 390
70 M=M+1
80 GOTO 50
90 END
100 M=1:X=0
110 A$=""
120 FOR T=1 TO 9
130 L=RND(9)+48
140 Q=1
150 IF MID$(A$,Q,1)=CHR$(L) THEN 130
160 IF Q<T THEN Q=Q+1:GOTO 150
170 A$=A$+CHR$(L)
180 PRINT A$
190 PRINT:SOUND 1,1
200 NEXT T
210 RETURN
220 REM PRINT OUT
230 IF M>1 THEN 260 ELSE CLS
240 PRINT:PRINT:PRINT
250 PRINT "MOVE NUMBER"M
260 PRINT@107,M
270 PRINT@256,A$:SOUND 31,1
280 PRINT:PRINT"WHICH NUMBER TO SWITCHEROO?"
290 IF INKEY$ <>"" THEN 290
300 C$=INKEY$
310 R=VAL(C$)
```

```
320 IF R<1 OR R>8 THEN 300
330 B$=""
340 FOR T=9 TO R STEP -1
350 B$=B$+MID$(A$,T,1)
360 NEXT T
370 A$=LEFT$(A$,R-1)+B$
380 RETURN
390 PRINT:PRINT:PRINT
400 PRINT A$
410 PRINT;PRINT:PRINT
420 PRINT"YOU DID IT, CHAMP!"
430 PRINT:PRINT"AND IT TOOK JUST"M"MOVES..."
435 IF B=1 THEN H=M
440 IF M<H THEN H=M
450 PRINT "LOW SCORE-"H
460 FOR I=1 TO 3000:NEXT
470 GOTO 20
```



Creating your own Games



□ CREATING GAMES

You may well find, after you've been programming for some time, that although you've got many of the skills you need to write games of your own, you're a little short on ideas. If that's the case, you should find this section of the book of interest to you. I'm going to outline a number of games which seem to me to be ideal for conversion to computer games.

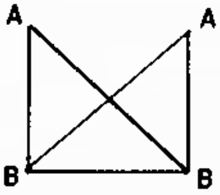
Unless you're converting a well-known game, such as checkers, when your program will be expected to coincide in every respect with the non-computer version, you do not need to ensure that your computer developments of these ideas slavishly follows the outlines here. You'll probably find that, after a certain degree of development, the game takes off on its own, and may well end up in due course bearing little resemblance to its "parent." This is all to the good.

□ GAMES TO ADAPT

SHUFFLEBOARD: Players slide flat, circular pieces along a board toward a triangular "target" which contains painted circles with numbers on them. A piece ending up entirely within the numbered circle gives the player the score of that number. There are many possible variations of this, including darts-like target games. Once you get a shuffleboard program running, you may well find that only cosmetic changes are needed to convert it into a ten-pin bowling game.

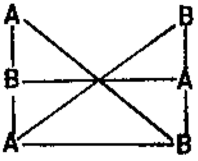
MU-TORERE: This game, which originated among the Maoris in New Zealand, is played on a board shaped like an eight-pointed star, with each point of the star joined to a circle in the middle. This circle is called the *putahi*. The players start with four pieces each, which are placed on the outside points, with all of one player's pieces occupying points next to each other. The aim of the game, as in the last two we've discussed, is to make it impossible for a player to move. You can move from one point to an adjacent empty point, or from the putahi to any vacant point. The third possible move is from a point to the putahi, but this move can only be made if at least one of the points immediately adjacent to the one from which you intend to move is occupied by an opponent's piece.

HORSESHOE: Starting with a board like this, with one player's pieces at the positions marked A, and one at those marked B, the players take it in turns to move along a line to a vacant spot:



The game ends when a player discovers he or she (or it) cannot move. Despite its simplicity, this is an interesting game, as you'll discover when you play it.

DAMOCLES: This game is like HORSESHOE, but uses a larger board, and three pieces per player. The aim of the game is the same as HORSESHOE, and uses this board:

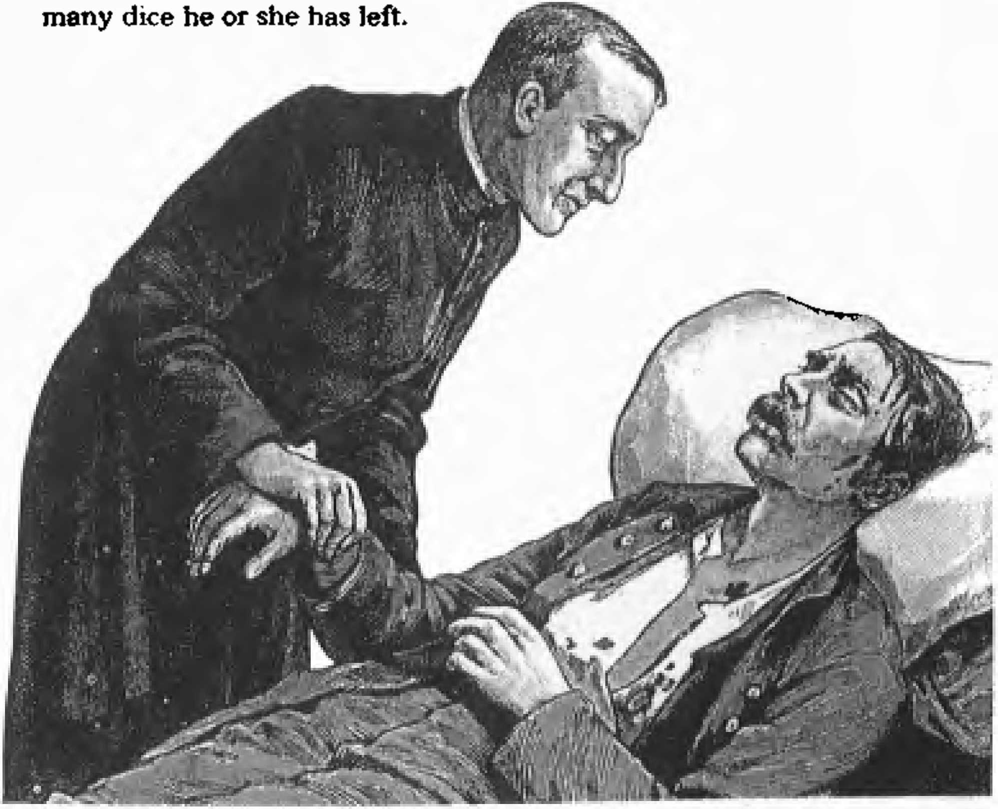


BINGO: This game is usually played with cards marked with numbers, which are crossed off as numbers are drawn at random from a pool, the winner being the player who first crosses off five in a row on his card, in any direction. It can be greatly simplified for computer use, with the computer generating two "cards" at random, using numbers from 0 to 99, and printing them on a five by five grid. The computer can then choose numbers at random from 0 to 99, and do the crossings off, and look for possible wins. The program can be made more interesting to look at by, instead of just generating a random number, including two "dials" with spinning arrows. The first dial, the "tens," is marked from zero to nine, and this is spun first. The second dial is marked the same as the first one, except that it represents the "ones."

Dice Games

As I said in the notes regarding the dice games in the dice section of this book, you should find dice games relatively easy to program on your computer, especially if the computer is not expected to exhibit too much intelligence when playing. There are a number of dice games which you may wish to try and adapt for computer play, including:

DROP DEAD: You need five dice for this. The dice are thrown by the first player, and any which show two or five are removed. The total of the rest is written down, and the dice which fell with a two or a five are thrown again. After this throw, the dice landing two and five are removed, and the total of the remaining dice is added to the total from the first throw. This process continues until there are no dice left, at which point that particular player's move ends. It is then player two's go, and the same procedure is followed. The winner is the player with the biggest total after both have had their throws. You can make the game the best of, say, three rounds, or limit the total number of throws any player can have per go, regardless of how many dice he or she has left.



MARTINETTI: You need three dice for this, and a score sheet marked with a row of boxes marked from 1 to 12, and two tokens, one each for you and the computer. You are aiming to traverse the numbers in order, before your opponent manages to do so. Each player takes it in turn to throw the dice. If the throw contains a one, the player's token can be placed in the one square. If the first throw also contained a two, the token could be moved into the two. After box one, players can either take the pip shown on an individual die for a move, or can add together the pips showing to get a desired number. A variation of this game (often called EVEREST) is to "climb down" through the numbers, after 1 through 12 has been achieved. The winner of EVEREST is the first player getting back to base camp on one.

INDIAN DICE: This game is similar to POKER DICE and is played with five dice. The aim is simply to get the best possible "poker hands." There is no provision for getting additional "cards" in one deal. You throw the five dice at once, and that is your hand. The ranking of the hands is as follows (with six highest and ones wild):

- five of a kind
- four of a kind
- full house (three of a kind plus a pair)
- two pairs
- one pair
- highest die

BIDOU: This game is also similar to POKER DICE, however, you aim to get rid of all your chips, rather than win them. The winner of the game is, paradoxically, the person who has lost the most rounds. You need three dice for this game, and a supply of chips which are distributed equally between the two players. A bet is made, and matched, before the players take it in turns to throw the three dice. The throws are ranked as follows, with "winning throws" coming first:

2 1 1; 2 2 1; 4 2 1; 6 6 6; 5 5 5; 4 4 4;
3 3 3; 2 2 2; 1 1 1; 3 3 6; 3 3 5; 3 3 4;
3 3 2; 3 3 1; 1 1 6; 1 1 5; 1 1 4; 1 1 3;
3 2 1; 4 3 2; 5 4 3; 6 5 4

If the combination thrown is not in the list, the pips are added, with the highest total winning.

BARBOOTH: Also known as BARBUDI, this game is played with two dice, and features winning and losing throws. It is suggested you start with a bank of 30 chips, and give both players a starting stake of 15 chips each, charging two chips per player per round. The players take it in turns to throw the dice. Winning throws are 3 3; 5 5; 6 5; and 6 6. Losing throws are 1 1; 2 2; 2 1 and 4 4. If the players both get winning throws, the one closest to the start of the list wins (that is, 3 3 is better than 6 6). If both throw the same winning throw, the bank gets the money. If one player throws a combination which is not a winning one or a losing one, and the other throws a losing throw, the loser's chips go into the bank, and the other player retains his or her chips.

If one player throws a winning throw, and the other a non-ranking combination, the winner gets his own chips back, as well as those bet by the loser. If, however, one player throws a winning combination, and the other a losing combination, the bank contributes the same number of chips as have been bet in total. The game continues until either player, or the bank, runs out of chips. The player holding the maximum number of chips at this point wins. Note that this way of distributing the wins and losses is not the same as BARBOOTH when played as a 'professional' gambling game, but is a pay-off scheme which is relatively easy to computerize, and makes for an interesting game.

FIVE THOUSAND: There are no prizes for guessing that the first player to score over 5000 points in this game is the winner. Played with as many players as you like, all you'll need in the way of game equipment is five six-sided dice. Each player takes it in turn to throw the five dice, and scoring is carried out in the following way:

- A 5 is worth 100.
- A 2 is worth 50.
- Three 5's thrown in one go are worth 1000.
- Three 2's thrown in a go score 500.
- Three of a kind (apart from 2's and 5's) are worth 100 times their value (that is, three 1's are worth 100 points, and three 6's are worth 600).
- If the sequence 1, 2, 3, 4, and 5 is thrown in a single go, this scores 1500.
- 2, 3, 4, 5, and 6 in one throw are worth 2000 points.

Note that 4's and 6's do not score in this game, except as part of a sequence. Once you've thrown, you can—if you like—throw the non-scoring dice again. However, if the next throw gains no score, the turn ends, and the overall score for the throw is zero. So long as a scoring throw has been made, any dice "left over" can be thrown.

The game rewards the slow and careful player with a reasonable score, but gives him or her no chance against a player who decides to take a chance and try to get a massive score in a single throw.

Card Games

Once you've worked out a routine to get the computer to hold, shuffle, and deal the cards you have the raw bones of a host of games. Any book of card games will give you more ideas than you can possibly cope with. Here are a few to start you off:

TRENTE AND QUARANTE: This game, which originated in 17th century Europe, is also known as ROUGE ET NOIR. Six decks of cards are used in the casino version, but it works well with a single deck. The cards are dealt into two rows, with the total of each row being examined after each row has had an additional card. Face cards (jack, queen, king) count as ten, with all other cards (including the ace) counting as their face value. The moment the total of a row equals or exceeds 31, no more cards are added to that row. However, the dealer keeps adding to the other row until it, too, equals or exceeds 31. The first row is called "black," regardless of the suits of the cards involved, and the second row is "red."

You can bet that, at the end, the red row or the black row total will be closer to 31. You can also bet that the color of the *first* card to be dealt will match the color name of the winning row. All bets are made against the bank, and winners receive their bet back, plus that amount again (odds of one to one). If both rows equal 31, the bank takes half the stake and returns the rest to the player.

CARD CRAPS: This game was devised to get around laws passed by some US States which outlawed craps played with dice. You use a special deck of 48 cards, made up from the aces, 2's, 3's, 4's, 5's, and 6's, from two decks of cards. The game follows the standard rules of craps (which are similar to those used in the game SEVEN/ELEVEN in this book).

In its simplified form, without the somewhat complex betting combinations, you play as follows:

- A total of 2, 3 or 12 is "craps" and the dealer loses, passing the cards to the next player to deal.
- A total of 7 or 11 is a "natural" and the dealer wins.
- Any other number (4, 5, 6, 8, 9, or 10) is the player's "point" and he or she must continue dealing in pairs until the point is dealt again, at which point the dealer wins. However if a 7 is dealt before the point is obtained, the dealer loses.

THREE CARD BRAG: This game was the forerunner of poker, and as its name suggests, it is played with hands of three, rather than five, cards. Here are the winning combinations, ranked from highest to lowest:

- "Pryle," three of a kind
- "On a bike," three in sequence from the same suit
- "Run," three cards in sequence
- "Flush," three cards from the same suit
- "Pair," two of a kind
- "High card"

A normal deck is used, and aces rank high, except for "on a bike" and "run," when 3, 2, ace beats ace, king, queen. You can vary the game by making it SEVEN CARD BRAG, in which the players split their seven cards into two three-card hands of their choice, or NINE CARD BRAG, when three hands are created.

ACE-DEUCE-JACK: This is a simple game, heavily loaded in the dealer's favor, in which players bet on the likelihood that the next card which appears will be an ace, a two (a "deuce"), or a jack.

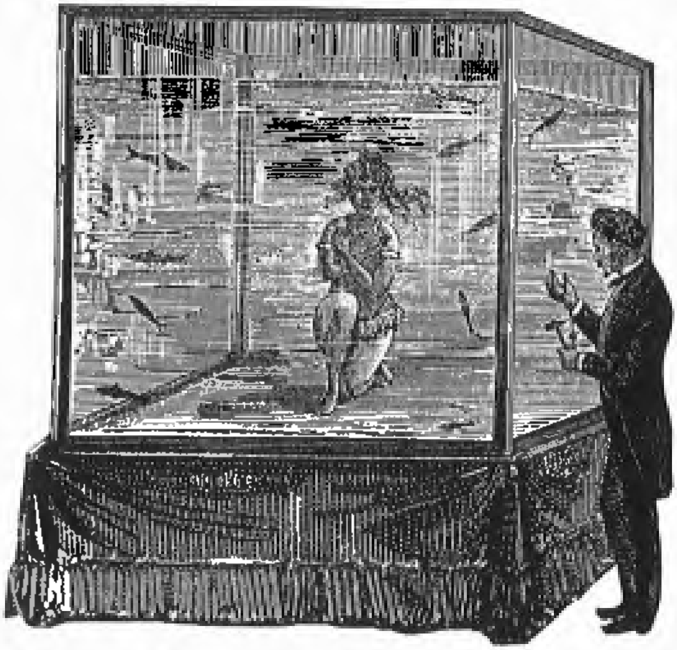
PUT AND TAKE: This gambling game uses an eight-sided top, which is spun. The game begins with all players having 10 chips, with 30 in the pot. The players take it in turn to spin the top, and—obeying the instructions which come up on the top—put chips into the pot, or take them out. A player is out when he or she runs out of chips, and the game ends when the pot is empty. The instructions written on the sides of the top are:

- PUT ONE
- TAKE ONE
- PUT THREE
- TAKE THREE
- PUT FOUR
- TAKE FOUR
- PUT ALL
- TAKE ALL

BOULE: This is a simplified form of roulette which appeared in the 18th century. It is often found in European casinos. The wheel is divided into 18 segments, numbered from one to nine, twice. You can bet on the winning number, whether it will be a red or a black number, even or odd, high or low. Except for the fives on the wheel, which are usually yellow, the reds and blacks alternate, so that there is, for example, a red six and a black six, a red nine and a black nine, and so on. A "high" number is above five, while "low" numbers are below it. If you bet successfully on a single number, you'll be paid at seven to one, with a one to one return on the "characteristic" of a number (such as its being "high" or "odd").

Glossary

Accumulator—part of the computer's logic unit which stores the intermediate results of computations



Address—a number which refers to a location, generally in the computer's memory, where information is stored

Algorithm—the sequence of steps used to solve a problem

Alphanumeric—generally used to describe a keyboard, and signifying that the keyboard has alphabetical and numerical keys. A numeric keypad, by contrast, only has keys for the digits one to nine

APL—this stands for Automatic Programming Language, a language developed by Iverson in the early 1960s, which supports a large set of operators and data structures. It uses a non-standard set of characters

Application software—these are programs which are tailored for a specific task, such as word processing, or to handle mailing lists

ASCII—stands for American Standard Code for Information Interchange. This is an almost universal code for letters, numbers, and symbols

Assembler—this is a program which converts another program written in an assembly language (which is a computer program in which a single instruction, such as ADD, converts into a single instruction for the computer) into the language the computer uses directly

BASIC—stands for Beginner's All-purpose Symbolic Instruction Code, the most common language used on microcomputers. It is easy to learn, with many of its statements being very close to English

Batch—a group of transactions which are to be processed by a computer in one lot, without interruption by an operator

Baud—a measure of the speed of transfer of data. It generally stands for the number of bits (discrete units of information) per second

Benchmark—a test which is used to measure some aspect of the performance of a computer, which can be compared to the result of running a similar test on a different computer

Binary—a system of counting in which there are only two symbols, 0 and 1 (as opposed to the ordinary decimal system, in which there are ten symbols, 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9). Your computer "thinks" in binary

Boolean Algebra—the algebra of decision-making and logic, developed by English mathematician George Boole, and at the heart of your computer's ability to make decisions

Bootstrap—a program, run into the computer when it is first turned on, which puts the computer into the state where it can accept and understand other programs

Buffer—a storage mechanism which holds input from a device such as keyboard, then releases it at a rate which the computer dictates

Bug—an error in a program

Bus—a group of electrical connections used to link a computer with an ancillary device, or another computer

Byte—the smallest group of bits which makes up a computer word. Generally a computer is described as being "8 bit" or "16 bit," meaning the word consists of a combination of eight or sixteen zeros or ones

Central Processing Unit (CPU)—the heart of the computer, where arithmetic, logic, and control functions are carried out

Character code—the number of ASCII (see ASCII) which refers to a particular symbol, such as 32 for a space and 65 for the letter "A"

COBOL—stands for Common Business Oriented Language, a standard programming language, close to English, which is used primarily for business

Compiler—a program which translates a program written in a high level (human-like) language into a machine language which the computer understands directly

Concatenate—to add (adding two strings together is known as "concatenation")

CP/M—stands for Control Program/Microcomputer, an almost universal disk operating system developed and marketed by Digital Research, Pacific Grove, California

Data—a general term for information processed by a computer

Database—a collection of data organized to permit rapid access by computer

Debug—to remove bugs (errors) from a program

Disk—a magnetic storage medium (further described as a "hard disk," "floppy disk," or even "floppy") used to store computer information and programs. The disks resemble, to a limited extent, 45 rpm sound records, and are generally eight, five and a quarter, or three inches in diameter. Smaller "microdisks" are also available for some systems

Documentation—the written instructions and explanations which accompany a program

DOS—stands for Disk Operating System (and generally pronounced "doss"), the versatile program which allows a computer to control a disk system

Dot-matrix printer—a printer which forms the letters and symbols by a collection of dots, usually on an eight by eight, or seven by five, grid

Double-density—adjective used to describe disks when recorded using a special technique which, as the name suggests, doubles the amount of storage the disk can provide

Dynamic memory—computer memory which requires constant recharging to retain its contents

EPROM—stands for Erasable Programmable Read Only Memory, a device which contains computer information in a semi-permanent form, demanding sustained exposure to ultra-violet light to erase its contents

Error messages—information from the computer to the user, sometimes consisting only of numbers or a few letters, but generally of a phrase (such as "Out of memory") which points out a programming or operational error which has caused the computer to halt program executions

Field—A collection of characters which form a distinct group, such as an identifying code, a name or a date; a field is generally part of a record

File—A group of related records which are processed together, such as an inventory file or a student file

Firmware—The solid components of a computer system are often called the "hardware," the programs, in machine-readable form on disk or cassette, are called the "software," and programs which are hard-wired into a circuit are called "firmware." Firmware can be altered, to a limited extent, by software in some circumstances

Flag—this is an indicator within a program, with the "state of the flag" (i.e., the value it holds) giving information regarding a particular condition

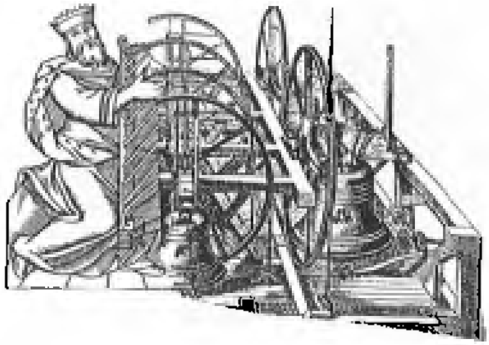
Floppy disk—see "disk"

Flowchart—a written layout of program structure and flow, using various shapes, such as a rectangle with sloping sides for a computer action, and a diamond for a computer decision. A flowchart is generally written before any lines of program are entered into the computer

FORTRAN—a high level computer language, generally used for scientific work (from FORmula TRANslation)

Gate—a computer "component" which makes decisions, allowing the circuit to flow in one direction or another, depending on the conditions to be satisfied

GIGO—acronym for "Garbage In Garbage Out," suggesting that if rubbish or wrong data is fed into a computer, the result of its processing of such data (the output) must also be rubbish



Global—a set of conditions which affects the entire program is called "global," as opposed to "local"

Hard copy—information dumped to paper by a printer

Hardware—the solid parts of the computer (see "software" and "firmware")

Hexadecimal—a counting system much beloved by machine code programmers because it is closely related to the number storage methods used by computers, based on the number 16 (as opposed to our "ordinary" number system which is based on 10)

Hex pad—a keyboard, somewhat like a calculator, which is used for direct entry of hexadecimal numbers

High-level languages—programming languages which are close to English. Low-level languages are closer to those which the computer understands. Because high-level languages have to be compiled into a form which the computer can understand before they are processed, high-level languages run more slowly than do their low-level counterparts

Input—any information which is fed into a program during execution

I/O—stands for Input/Output port, a device the computer uses to communicate with the outside world

Instruction—an element of programming code, which tells the computer to carry out a specific task. An instruction in assembler language, for example, is ADD which (as you've probably guessed) tells the computer to carry out an addition

Interpreter—converts the high-level ("human-understandable") program into a form which the computer can understand

Joystick—an analog device which feeds a signal into a computer which is related to the position which the joystick is occupying; generally used in games programs

Kilobyte—the unit of language measurement; one kilobyte (generally abbreviated as K) equals 1024 bits

Line printer—a printer which prints a complete line of characters at one time

Low-level language—a language which is close to that used within the computer (see "high-level language")

Machine language—the step below a low-level language; the language which the computer understands directly

Mainframe—the term for "giant" computers such as the IBM 370. Computers are also classed as minicomputer and microcomputer (such as the computer you own)

Memory—the device or devices used by a computer to hold information and programs being currently processed, and for the instruction set fixed within a computer which tells it how to carry out the demands of the program. There are basically two types of memory (see "RAM" and "ROM")

Microprocessor—the "chip" which lies at the heart of your computer. This does the "thinking"

Modem—stands for MOdulator/DEModulator, and is a device which allows one computer to communicate with another via the telephone

Monitor—(a) a dedicated television screen for use as a computer display unit; contains no tuning apparatus; (b) the information within a computer which enables it to understand and execute program instructions

Motherboard—a unit, generally externai, which has slots to allow additional "boards" (circuits) to be plugged into the computer to provide facilities (such as high-resolution graphics, or "robot control") which are not provided with the standard machine

Mouse—a control unit, slightly smaller than a box of cigarettes, which is rolled over the desk, moving an on-screen cursor in parallel to select options and make decisions within a program. "Mouses" work either by sensing the action of their wheels, or by reading a grid pattern on the surface upon which they are moved

Network—a group of computers working in tandem

Numeric pad—a device primarily for entering numeric information into a computer, similar to a calculator

Octal—a numbering system based on eight (using the digits 0, 1, 2, 3, 4, 5, 6, and 7)

On-line—device which is under the direct control of the computer

Operating system—this is the "big boss" program or series of programs within the computer which controls the computer's operation, doing such things as calling up routines when they are needed and assigning priorities

Output—any data produced by the computer while it is processing, whether this data is displayed on the screen or dumped to the printer, or is used internally

Pascal—a high level language, developed in the late 1960s by Niklaus Wirth, which encourages disciplined, structured programming

Port—an output or input "hole" in the computer, through which data is transferred

Program—the series of instructions which the computer follows to carry out a predetermined task

PILOT—a high-level language, generally used to develop computer programs for education

RAM—stands for "Random Access Memory," and is the memory on board the computer which holds the current program. The contents of RAM can be changed, while the contents of ROM (Read Only Memory) cannot be changed under software control

Real-time—when a computer event is progressing in line with time in the "real world," the event is said to be occurring in real time. An example would be a program which showed the development of a colony of bacteria which developed at the same rate that such a real colony would develop. Many games which require reactions in real time have been developed. Most "arcade action" programs occur in real time

Refresh—The contents of dynamic memories (see "memory") must receive periodic bursts of power in order for them to maintain their contents. The signal which "reminds" the memory of its contents is called the "refresh signal"

Register—a location in computer memory which holds data

Reset—a signal which returns the computer to the point it was in when first turned on

ROM—see "RAM"

RS-232—a standard serial interface (defined by the Electronic Industries Association) which connects a modem and associated terminal equipment to a computer

S-100 bus—this is a standard interface (see "RS-232") made up of

100 parallel common communication lines which are used to connect circuit boards within microcomputers

SNOBOL—a high-level language, developed by Bell Laboratories, which uses pattern recognition and string manipulation

Software—the program which the computer follows (see "firmware")

Stack—the end point of a series of events which are accessed on a last in, first out basis

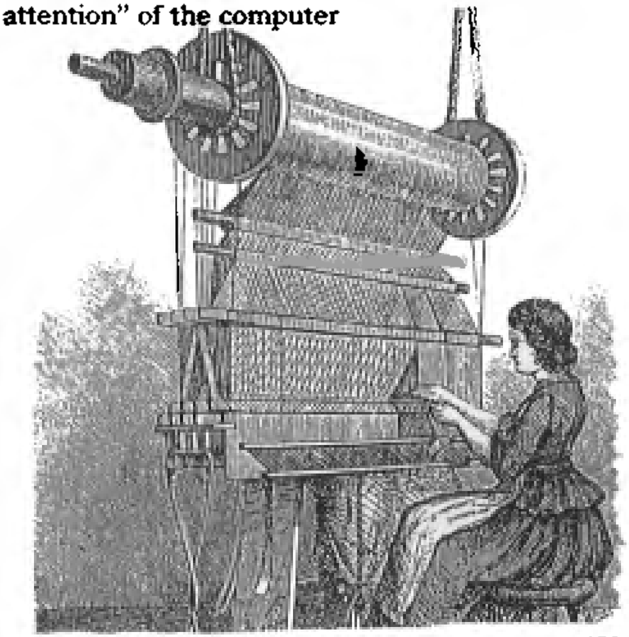
Subroutine—a block of code, or program, which is called up a number of times within another program

Syntax—as in human languages, the syntax is the structure rules which govern the use of a computer language

Systems software—sections of code which carry out administrative tasks, or assist with the writing of other programs, but which are not actually used to carry out the computer's final task

Thermal printer—a device which prints the output from the computer on heat-sensitive paper. Although thermal printers are quieter than other printers, the output is not always easy to read, nor is the used paper easy to store

Time-sharing—this term is used to refer to a large number of users, on independent terminals, making use of a single computer, which divides its time between the users in such a way that each of them appears to have the "full attention" of the computer



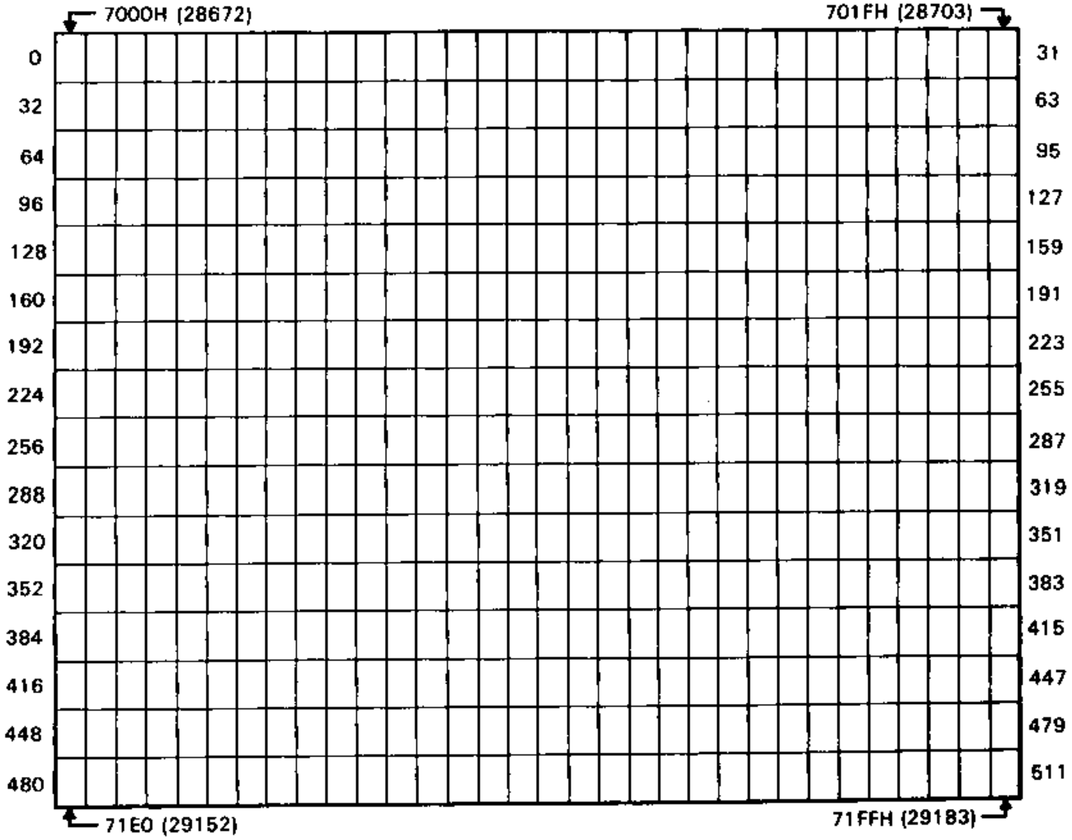
Turnkey system—a computer system (generally for business use) which is ready to run when delivered, needing only the "turn of a key" to get it working

Volatile memory—a memory device which loses its contents when the power supply is cut off (see "memory," "refresh," "ROM," and "RAM")

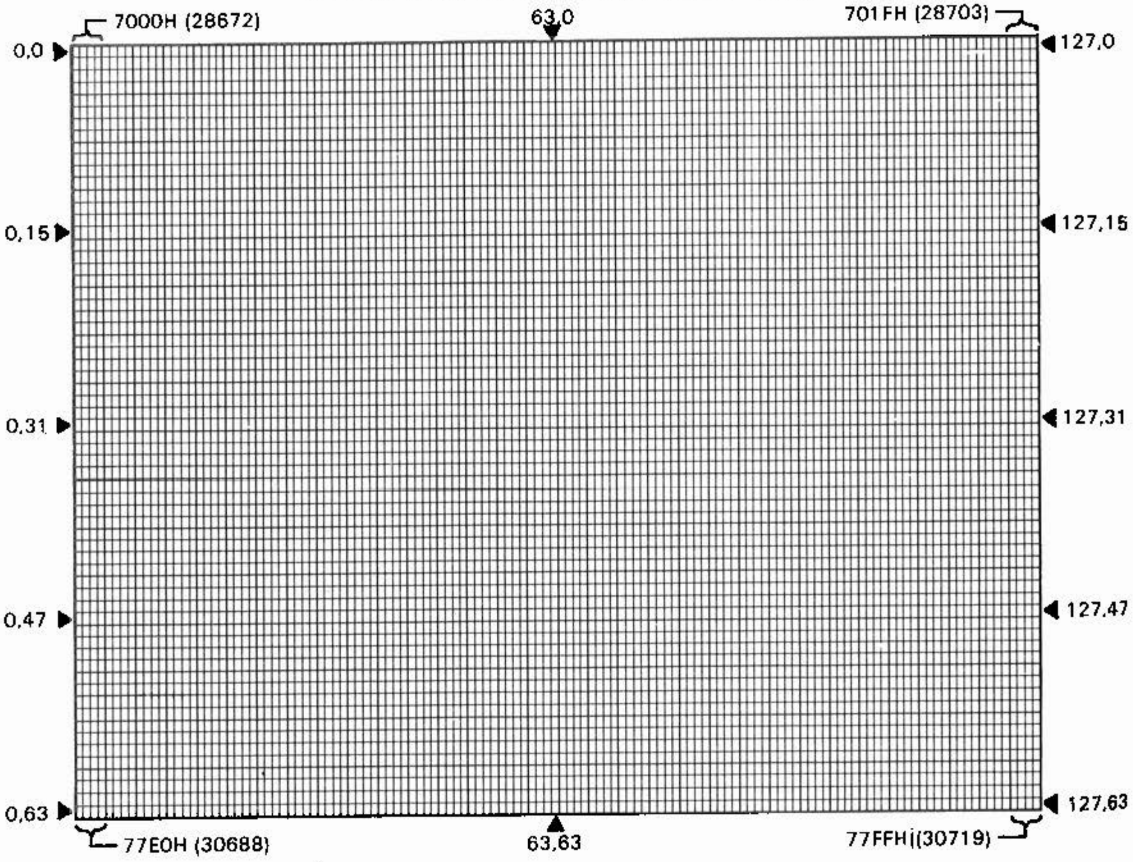
Word processor—a dedicated computer (or a computer operating a word processing program) which gives access to an "intelligent typewriter" with a large range of correction and adjustment features

□ REFERENCE

VIDEO DISPLAY WORKSHEET (MODE 0)



VIDEO DISPLAY WORKSHEET (MODE 1)



ASCII CODE TABLE

ASCII CODE	CHARACTER	ASCII	CHARACTER
32	(Space)	64	@ (at sign)
33	! (exclamation point)	65	A
34	" (quote)	66	B
35	# (number or pound sign)	67	C
36	$ (doloar)	68	D
37	% (percent)	69	E
38	& (ampersand)	7Ø	F
39	' (apostrophe)	71	G
4Ø	((open parenthesis)	72	H
41	) (close parenthesis)	73	I
42	* (asterisk)	74	J
43	+ (plus)	75	K
44	, (comma)	76	L
45	– (minus)	77	M
46	. (period)	78	N
47	/ (slant)	79	O
48	Ø	8Ø	P
49	1	81	Q
5Ø	2	82	R
51	3	83	S
52	4	84	T
53	5	85	U
54	6	86	V
55	7	87	W
56	8	88	X
57	9	89	Y
58	: (colon)	9Ø	Z
59	; (semicolon)	91	[(open square bracket)
6Ø	< (less than)	92	\ (back slash)
61	= (equals)	93	] (close square bracket)
62	> (greater than)	94	↑ (up arrow)
63	? (question mark)	95	← (back arrow)

CHARACTER CODE

Relative Offset \ NO.	Ø	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
+Ø	@	P		Ø	@	P		Ø								
+1	A	Q	!	1	A	Q	!	1	▗	▗	▗	▗	▗	▗	▗	▗
+2	B	R	"	2	B	R	"	2	▖	▖	▖	▖	▖	▖	▖	▖
+3	C	S	#	3	C	S	#	3	▄	▄	▄	▄	▄	▄	▄	▄
+4	D	T	$	4	O	T	$	4	▝	▝	▝	▝	▝	▝	▝	▝
+5	E	U	%	5	E	U	%	5	▐	▐	▐	▐	▐	▐	▐	▐
+6	F	V	&	6	F	V	&	6	▞	▞	▞	▞	▞	▞	▞	▞
+7	G	W	'	7	G	W	'	7	▟	▟	▟	▟	▟	▟	▟	▟
+8	H	X	(	8	H	X	(	8	▘	▘	▘	▘	▘	▘	▘	▘
+9	I	Y	)	9	I	Y	)	9	▚	▚	▚	▚	▚	▚	▚	▚
+10	J	Z	*	:	J	Z	*	:	▌	▌	▌	▌	▌	▌	▌	▌
+11	K	[	+	;	K	[	+	;	▙	▙	▙	▙	▙	▙	▙	▙
+12	L	\	,	<	L	\	,	<	▀	▀	▀	▀	▀	▀	▀	▀
+13	M	]	–	=	M	]	–	=	▜	▜	▜	▜	▜	▜	▜	▜
+14	N	^	.	>	N	^	.	>	▛	▛	▛	▛	▛	▛	▛	▛
+15	O	←	/	?	O	←	/	?	█	█	█	█	█	█	█	█
	NORMAL				INVERSE				G	Y	B	R	BF	CN	M	O

G	–	GREEN
Y	–	YELLOW
B	–	BLUE
R	–	RED

BF	–	BUFF
CN	–	CYAN
M	–	MAGENTA
O	–	ORANGE

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