

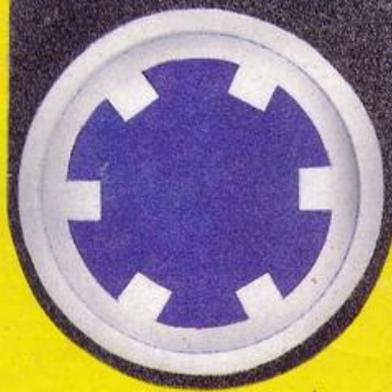
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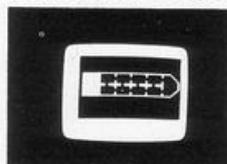
Cassette Two contains Reversi, Awari, Laser Bases, Word Mastermind, Rectangles, Crash, Roulette, Pontoon, Penny Shoot and Gun Command.

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CASSETTE 3

8 programs for 16k ZX81

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KALABRIASZ World's silliest card game, full of pointless complicated rules.

CUBE Rubik Cube simulator, with lots of functions including 'Backstep'.

SECRET MESSAGES This message coding program is very txlp qexi jf.

MARTIAN CRICKET A simple but addictive game (totally unlike Earth cricket) in machine code. The speed is variable, and its top speed is very fast.

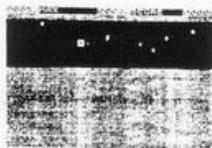
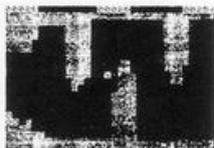
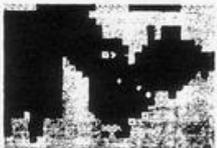
Cassette 3 costs £5.

CASSETTE 4

8 games for 16k ZX81

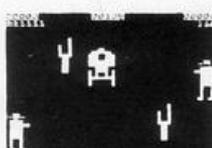
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(machine code)



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A ZX81 version of the well known game.

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Played on a 4 x 4 x 4 board, this is a game for the brain. it is very hard to beat the computer at it.

7 of the 8 games are in machine code, because this is much faster than Basic. (Some of these games were previously available from J. Steadman). Cassette 4 costs £5.

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CONTENTS

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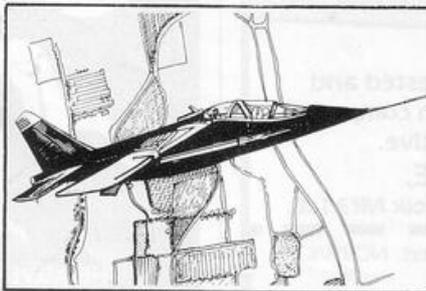
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- 7 KEYBOARD
STICKS & STONES
- 10 HOT PURSUIT
FRUIT GUARD



- 8 SPACMAN
- 11 DETECTIVE
- 12 LONG OR SHORT
- 13 SPIROGRAPH
SCREEN WRITER
- 14 PHYSICS
- 16 HANGMAN



- 17 SPYPLANE
- 18 CLOCKMAN
- 19 BINOMIAL
DISTRIBUTION
- 20 3D HUNT
- 21 SPACE RESCUE
- 22 HORSE RACE
- 24 BIO-RHYTHMS
- 25 DOODLE

- 26 GHOST TREKKER
- 27 DAMBUSTERS
- 28 SPOTSWAT
SKI SLOPE
- 29 MEMORY
- 31 CITY BOMBER
- 32 MUSIC MACHINE
- 33 ONE-ARM BANDIT



- 34 STOPPING
DISTANCES
- 35 STAR BATTLE
- 36 RENUMBER
- 37 U.K. MAP
- 38 PRIME NUMBERS
- 39 POSTMAN



- 40 OUTLAW
- 42 SKY SHOOT
- 43 SCOFFER
- 44 SURROUND
- 45 SOLITAIRE
- 48 LINEAL REGRESSION

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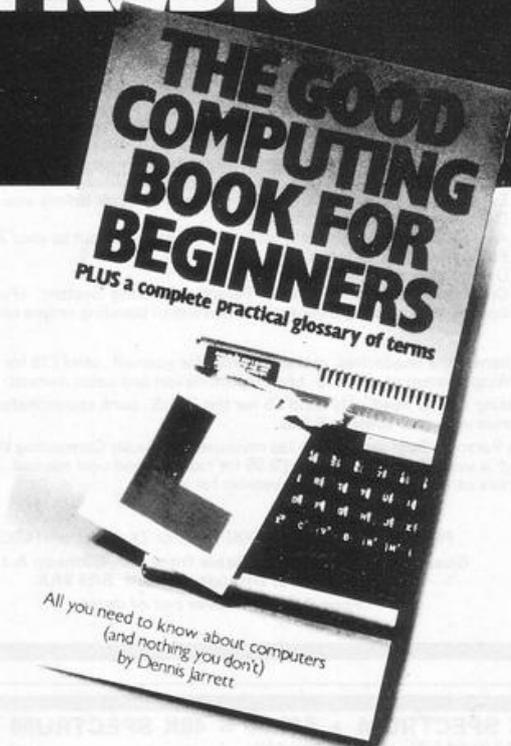
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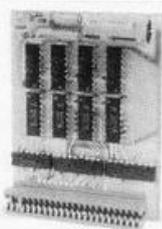
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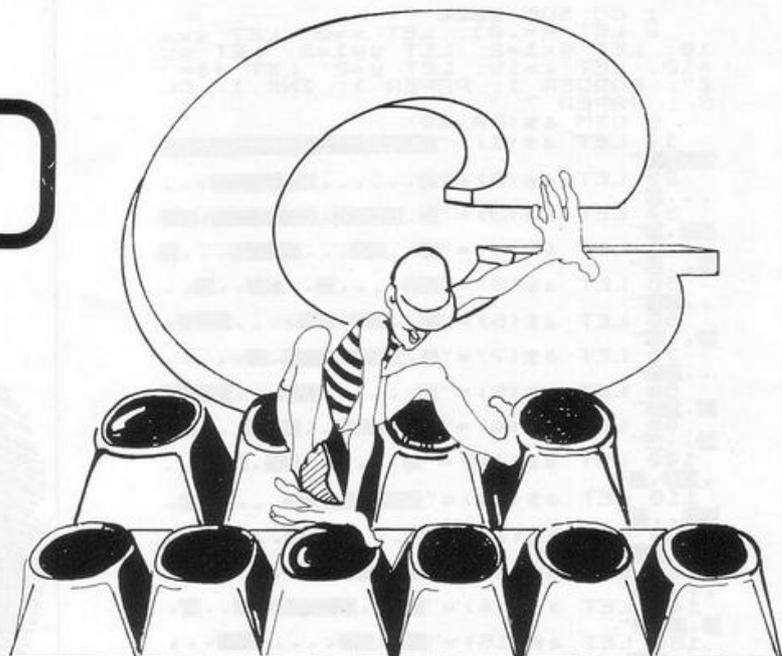
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KEYBOARD

KEYBOARD is a test for all sharpshooters of the computer keyboard. A letter will appear on the screen heading full tilt for self-obliteration in an inverse space at stage left. Your task is to hit the appropriate key before the letter auto-destructs. Your flying-fingered reviewer managed only five in fast mode.

Submitted by Graham Woods of Redhill, Surrey for the 1K ZX-81.



```

1 PRINT "ENTER LEVEL; 1 (HARD)
OR 2 (EASIER):"
5 INPUT A
10 IF A=1 THEN LET P=15
15 IF A=2 THEN LET P=22
16 CLS
17 LET S=0
18 LET N=0
20 LET M%=CHR$(INT (RND*26) +3)
8) 25 PRINT AT 11,0,"■"
30 FOR X=P TO 0 STEP -1
35 PRINT AT 11,X:M%:" "
37 IF INKEY$("<>") THEN GOTO 50

```

```

40 NEXT X
42 PRINT "NOT FAST ENOUGH"
45 GOTO 100
50 LET N%=INKEY$
55 IF N%=M% THEN PRINT "YES"
57 IF N%=M% THEN LET S=S+1
60 IF N%<>M% THEN PRINT "WRONG"
"
100 FOR Z=0 TO 50
105 NEXT Z
107 CLS
108 LET N=N+1
109 IF N=10 THEN GOTO 111
110 GOTO 20
111 PRINT S

```

THE DISPLAY of **Sticks and Stones** will show you three sticks lying horizontally in the middle of the screen. You are required to move each of them so that the holes in them line up and allow the stone—"O"—to pass through them. After 10 attempts your score is displayed.

Manoeuvre the top stick with keys

1 and Ø, the middle stick with Q and P, and the bottom one with A and NEWLINE. A small but exasperating routine for the 1K ZX-81 from Timothy Taylor, of Perterfield, Hampshire. Graphics notes:

20-LET E=INT (RND×4)+12
40-Inverse spaces; graphic inverse As; inverse spaces.
104-FOR J=9 TO 11

STICKS AND STONES

```

1 LET G=0
4 LET A=12
5 LET B=A
6 LET C=A
10 FOR D=1 TO 10
20 LET E=INT (RND*4)+12
30 FOR F=2 TO 12
40 PRINT AT 9,A,"■";AT 10,
B,"■";AT 11,C,"■";AT F,E
";"O"
50 LET A=A+(INKEY$="Ø")-(INKEY
$="1")
60 LET B=B+(INKEY$="P")-(INKEY
$="Q")
100 LET C=C+(INKEY$=CHR$ 118)-(
INKEY$="A")
104 FOR J=9 TO 11
105 IF F=J AND E=A+3 AND E=B+1
AND E=C+2 THEN LET G=G+1
106 NEXT J
110 PRINT AT F,E;" "
120 NEXT F
130 NEXT D
140 PRINT "SCORE=";INT (G/3)

```



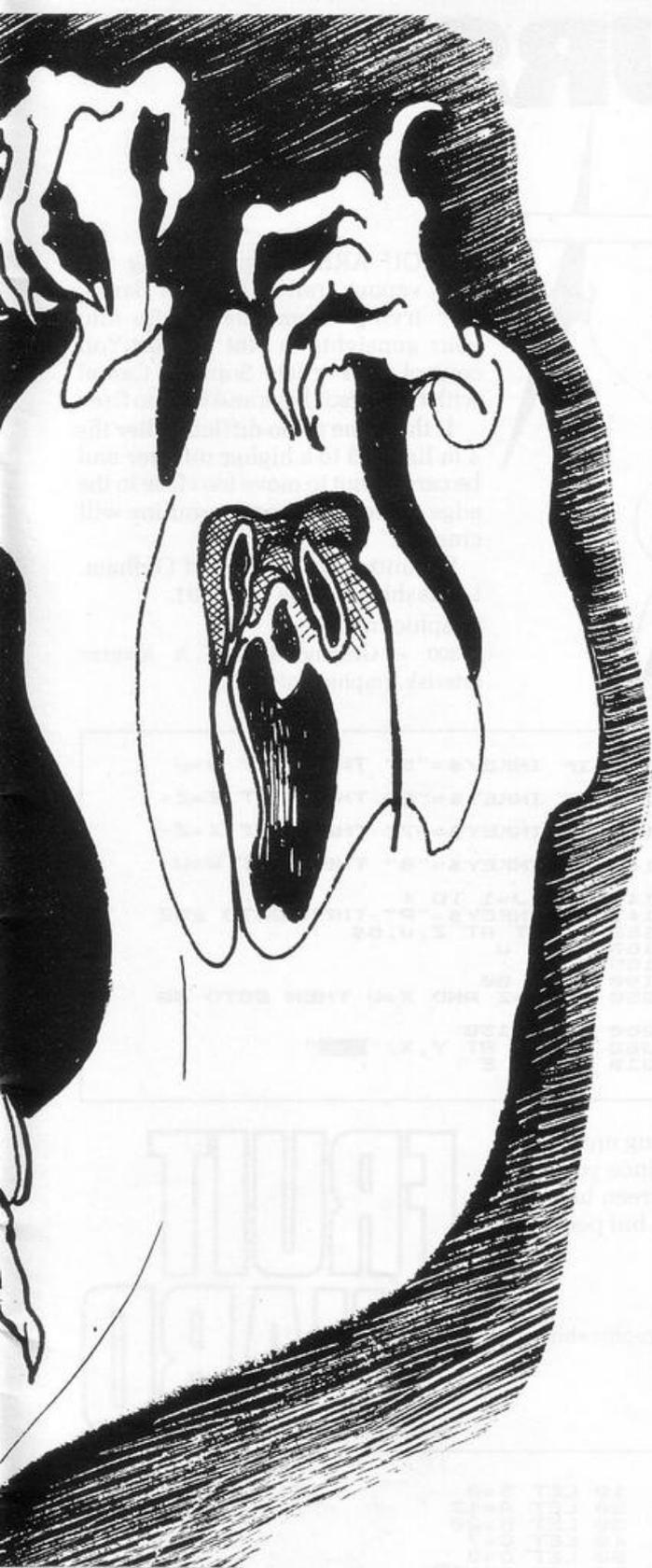
```

1 GO SUB 9000
2 LET R=.01: LET S=0: LET GX=
10: LET GX1=0: LET GX2=2: LET GX
=10: LET X=19: LET Y=0: LET D#=#
$": BORDER 1: PAPER 1: INK 1: CL
S: PAPER ?
9 DIM A$(20,20)
10 LET A$(1)="
20 LET A$(2)="
30 LET A$(3)="
40 LET A$(4)="
50 LET A$(5)="
60 LET A$(6)="
70 LET A$(7)="
80 LET A$(8)="
90 LET A$(9)="
100 LET A$(10)="
110 LET A$(11)="
120 LET A$(12)="
130 LET A$(13)="
140 LET A$(14)="
150 LET A$(15)="
160 LET A$(16)="
170 LET A$(17)="
180 LET A$(18)="
190 LET A$(19)="
200 LET A$(20)="
210 PRINT ": FOR I=1 TO 20: PRI
NT "A$(I): NEXT I
1000 LET A$(X,Y)="
1001 IF S=180 OR S=460 OR S=740
THEN LET S=S+100: PAPER 1: CLS:
GO SUB 7000: PAPER 1: CLS: PAP
ER 7: GO TO 10
1010 IF INKEY$="" THEN GO TO 105
5
1020 IF INKEY$="E" THEN LET D#="
1030 IF INKEY$="6" THEN LET D#="
1040 IF INKEY$="7" THEN LET D#="
1050 IF INKEY$="8" THEN LET D#="
$
1055 PRINT AT X,Y: "
1060 IF D#="E" AND A$(X-1,Y)("<
" THEN LET X=X-1
1061 IF D#="6" AND A$(X,Y+1)("<
" THEN LET Y=Y+1
1062 IF D#="7" AND A$(X+1,Y)("<
" THEN LET X=X+1
1063 IF D#="8" AND A$(X,Y-1)("<
" THEN LET Y=Y-1
1064 PRINT AT X,Y: INK 0; D#
1070 IF A$(X,Y)=" " THEN LET S=S
+1: PRINT AT 0,0; S: BEEP .1,-10
1080 PRINT AT GX,GY: A$(GX,GY): I
F INT (RND*2)+(GX>X) AND A$(GX-1
,GY)("<
" THEN LET GX=GX-1
1090 IF INT (RND*2)+(GX<X) AND A
$(GX+1,GY)("<
" THEN LET GX=GX+1
2000 IF INT (RND*2)+(GY>Y) AND A
$(GX,GY-1)("<
" THEN LET GY=GY-1
2010 IF INT (RND*2)+(GY<Y) AND A
$(GX,GY+1)("<
" THEN LET GY=GY+1
2015 PRINT AT GX,GY: INK 0; "
2020 IF (GX=X AND GY=Y) OR (GX1=
X AND GY1=Y) THEN PRINT AT X,Y:
FLASH 1; D#: STOP
3000 PRINT AT GX1,GY1: A$(GX1,GY1
): IF INT (RND*2)+(GX1>X) AND A$(
GX1-1,GY1)("<
" THEN LET GX1=GX1-1
3090 IF INT (RND*2)+(GX1<X) AND
A$(GX1+1,GY1)("<
" THEN LET GX1=
GX1+1
3100 IF INT (RND*2)+(GY1>Y) AND
A$(GX1,GY1-1)("<
" THEN LET GY1=
GY1-1
3110 IF INT (RND*2)+(GY1<Y) AND
A$(GX1,GY1+1)("<
" THEN LET GY1=
GY1+1
3120 PRINT AT GX1,GY1: INK 4; "
3130 GO TO 1000
7000 FOR F=0 TO 25
7001 PRINT AT 10,29: INK 7; "0"
7010 PRINT AT 10,F: INK 0; "
: INK 6; "$"
7020 BEEP .1,-15
7030 NEXT F

```



SPA



```
7035 BEEP 2,-20
7040 FOR F=25 TO 0 STEP -1
7050 PRINT AT 10,F:INK 5;" "
INK 6:" "
7055 BEEP 0,1,0
7060 NEXT F:CLS:RETURN
8999 STOP
9000 DATA 0,BIN 1000010,BIN 1110
0111,255,255,BIN 111110,BIN 111
100,BIN 11000
9010 DATA BIN 000011100,BIN 1111
10,BIN 1111100,BIN 1111000,BIN 1
111000,BIN 1111100,BIN 111110,BI
N 11100
9020 DATA 0,BIN 00011000,BIN 001
11100,BIN 01111110,255,255,BIN 1
1100111,BIN 01000010,0
9030 DATA BIN 001110000,BIN 0111
11000,BIN 001111100,BIN 00011111
0,BIN 000111110,BIN 001111100,BI
N 011111000,BIN 001110000
9035 DATA 24,50,120,219,219,255,
219,145
9040 RESTORE 9000
9045 FOR f=0 TO 7: READ a: POKE
USR "u"+f,a: NEXT f
9050 FOR f=0 TO 7: READ a: POKE
USR "r"+f,a: NEXT f
9060 FOR f=0 TO 7: READ a: POKE
USR "d"+f,a: NEXT f
9070 FOR f=0 TO 7: READ a: POKE
USR "l"+f,a: NEXT f
9075 FOR f=0 TO 7: READ a: POKE
USR "a"+f,a: NEXT f
9080 RETURN
```

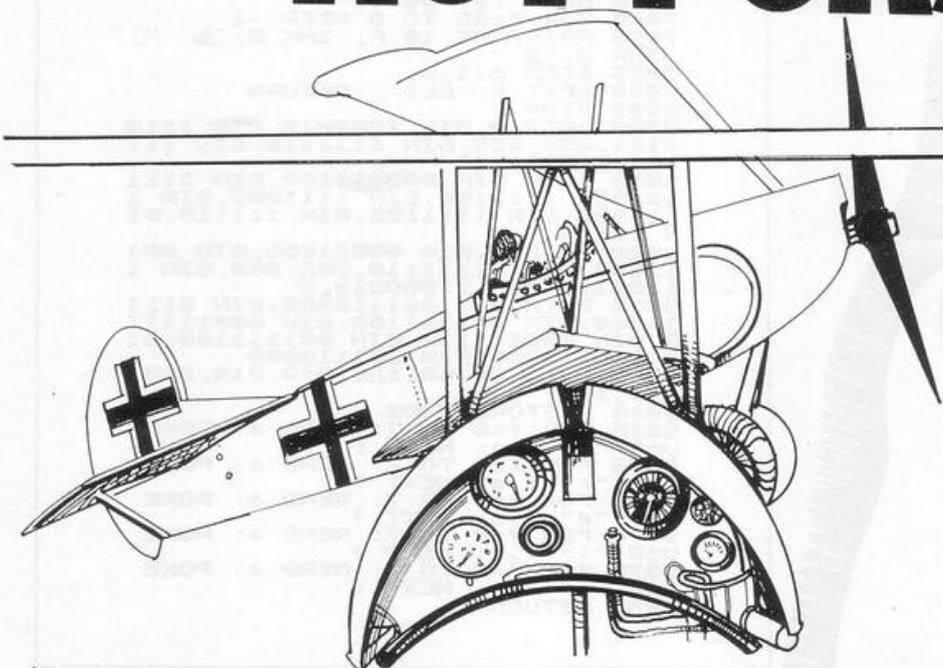
SPACMAN is a good version of the perennial Pacman from S J Stearn of Harpenden, Herts, for the 16K Spectrum.

Naturally it suffers in any comparison with arcade machines; there are no power pills, no exit, and the two ghosts are decidedly more dumb than their cousins in the amusement halls, though still fast enough to catch you more often than not.

This listing is a big leap forward in our quest for an arcade-quality Pacman and provides a good basis for anyone wanting to do further work on the project; providing exits, for example, would probably not be too difficult.

PACMAN

HOT PURSUIT



YOU ARE bumping along the vapour trail of the Red Baron, trying to manouvre him into your gunsights in **Hot Pursuit**. You control your trusty Sopwith Camel with the cursor keys and hit P to fire.

If the game is too difficult alter the 4 in line 143 to a higher number and be careful not to move too close to the edge of the screen or the routine will crash.

Submitted by S Wild, of Oldham, Lancashire, for the 1k ZX-81.

Graphics notes:

300 - Graphic shifted A inverse asterisk, graphic shifted A.

```

5 LET A$="███"
10 LET X=4
20 LET Y=11
25 LET B$="--"
30 LET Z=0
35 LET U=0
40 LET E=0
50 LET P=INT (RAND*4)
55 LET E=E+1
57 IF X>23 THEN GOTO 70
60 IF P=0 THEN LET X=X+1
65 IF X<4 THEN GOTO 80
70 IF P=1 THEN LET X=X-1
75 IF Y>18 THEN GOTO 80
80 IF P=2 THEN LET Y=Y+1
85 IF Y<3 THEN GOTO 100
90 IF P=3 THEN LET Y=Y-1
100 PRINT AT Y,X;A$

110 IF INKEY$="S" THEN LET W=W-1
120 IF INKEY$="8" THEN LET Z=Z+1
130 IF INKEY$="7" THEN LET Z=Z-1
140 IF INKEY$="8" THEN LET W=W+1
143 FOR J=1 TO 4
145 IF INKEY$="P" THEN GOTO 250
150 PRINT AT Z,W;B$
160 NEXT J
185 CLS
190 GOTO 50
250 IF Y=Z AND X=W THEN GOTO 30
260 GOTO 150
300 PRINT AT Y,X;"███"
310 PRINT E
    
```

FRUIT GUARD is a game for the 1K ZX-81, submitted by C Regaud of London SW7. The object is for you (graphic shifted M) to fetch the fruit (graphic shifted U) and take it home (inverse H) by evading the monster (graphic shifted P).

The best way to make sure you are

munching instead of being munched is to keep to the sides, since you can use them to cross the screen but the monster cannot. It is fun but perhaps a little too easy.

Graphics notes:

60 - Graphic shifted U

70 - Graphic shifted M, graphic shifted P, inverse H.

FRUIT GUARD



```

10 LET S=0
20 LET A=12
30 LET B=20
40 LET C=7
50 LET D=3
60 LET A$="█"
70 PRINT AT A,B;"█";AT C,D;"█"
;AT 12,20;"█";AT 7,3;A$
80 LET A=A+(INKEY$="6")-(INKEY$="7")
90 LET B=B+(INKEY$="8")-(INKEY$="5")
100 LET C=C+(A>C)-(A<C)
110 LET D=D+(B>D)-(B<D)
120 IF A=0 THEN LET A=20
130 IF A=21 THEN LET A=1
140 IF B=0 THEN LET B=30
150 IF B=31 THEN LET B=1
160 CLS
170 IF A=12 AND B=20 AND A$="" THEN GOTO 210
180 IF A=C AND B=D THEN PRINT AT A,B;"MUNCH";AT 0,0;S;X
190 IF A=7 AND B=8 THEN LET A$="█"
200 GOTO 70
210 LET S=S+1
220 GOTO 60
    
```



DETECTIVE

THIS INTERESTING concept for the 1K ZX-81 requires you to play the **Detective**, cross-questioning a series of murder suspects. You must first enter their names with the following short routine:

```
10-DIM A$(8,8)
20-FOR A=1 TO 8
30-INPUT B$
40-LET A$(A,1 TO 8)=B$
50-NEXT A
```

That should be RUN and eight names of five letters or fewer should be entered. That routine should then be deleted—by typing-in the line numbers only—and the complete program entered.

Note that there is no need to enter the names again after the program has been taped, as the names are also saved. To run the program you must press GOTO 0—not RUN. The computer then takes a few seconds to establish the position of the suspects, who can be in towns A or B, in the N or S and E or W of that town.

You are then given the position of the murderer and must establish his identity. Do that by entering a number between 1 and 8 to choose a suspect. Inputting 1 will reveal the town where the suspect was at the time of the murder and 2 and 3 will discover his position in the N or S, E or W. After 12 questions you must make an accusation by entering the number of a suspect. If you want to arrest someone early, enter 9.

A diverting idea from Colin Cushings, of Harlow, Essex.

```
10 FOR N=1 TO 8
20 LET A$(N,6)=CHR$(INT (RND*
2)+38)
30 LET A$(N,7)=CHR$( (INT (RND
*2)*5)+51)
40 LET A$(N,8)=CHR$( (INT (RND
*2)*18)+42)
50 NEXT N
60 LET M=INT (RND*8)+1
69 FOR A=1 TO 12
70 PRINT AT 18,13;A$(M,6);" ";
A$(M,7);" ";A$(M,8)
90 INPUT C
95 IF C=9 THEN GOTO 155
110 PRINT AT 9,13;A$(C,1 TO 5)
120 INPUT B
130 PRINT AT 11,15;A$(C,8+5)
135 PAUSE 200
140 CLS
150 NEXT A
155 PRINT "WHO DO YOU ACCUSE"
160 INPUT A
165 PRINT AT 11,13;"*****"
170 IF A=M THEN PRINT AT 11,13;
"*****"
180 PRINT A$(M,1 TO 5);" DID IT
```

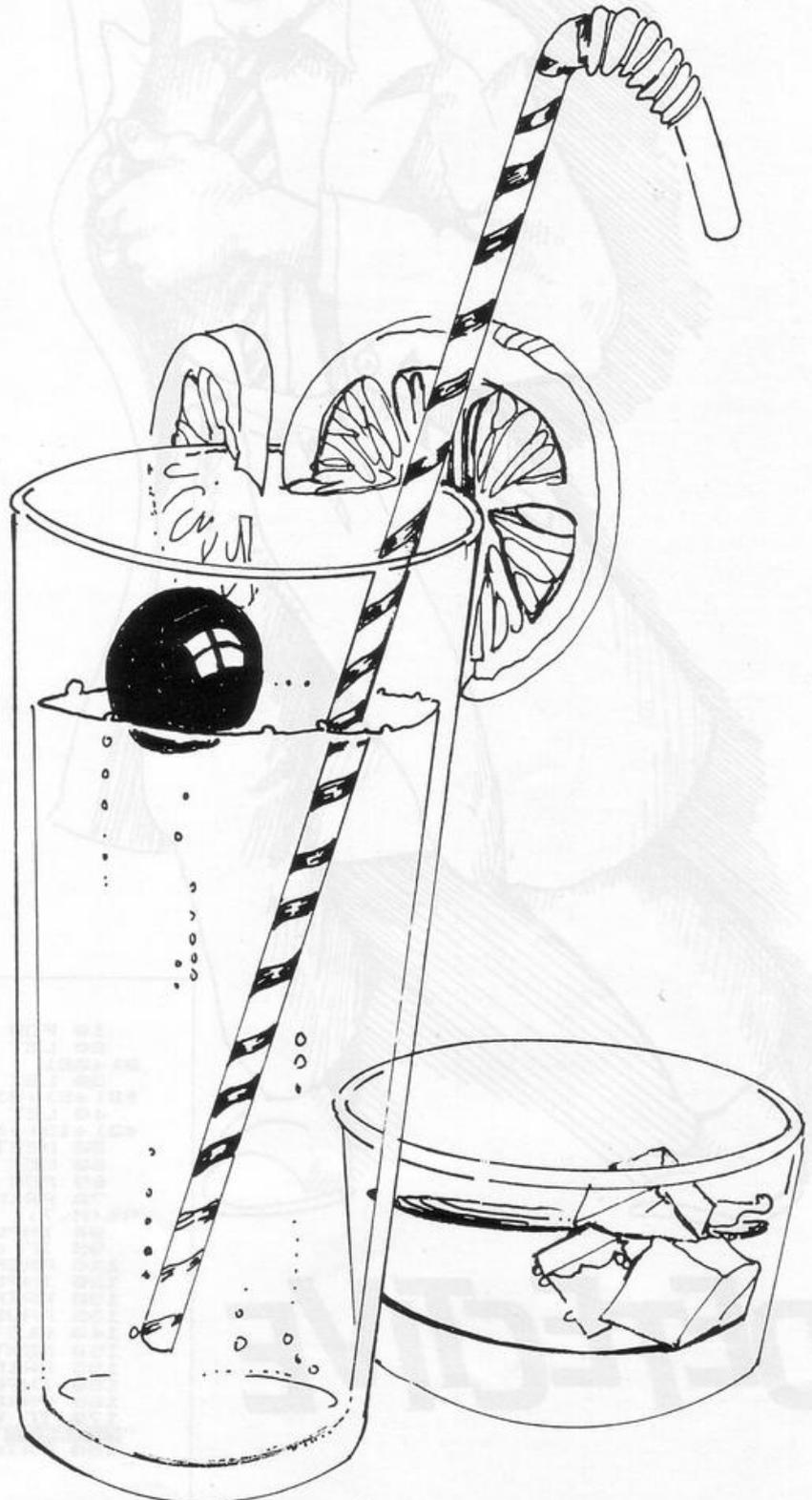
LONG OR SHORT

LONG OR SHORT is a game for the unexpanded ZX-80 and is a variation of the game Hi-Lo. The random number generator of the machine produces a number between 1 and 100. You have to guess that number but instead of telling you in figures how near your guess was to the answer, the ZX-80 will display a line.

The shorter the line the closer you are to the correct answer. When the game is finished the machine will tell you what it thought of your effort to guess the number.

The program was written by G Gill of Westerham, Kent.

```
5 LET C=0
10 PRINT "SHORT OF LONG"
15 PRINT
20 PRINT "I,M THINKING OF A
NUMBER (1-100)"
25 PRINT
30 PRINT "AS A CLUE , I,LL DRAW
A LINE"
35 PRINT
40 PRINT "THE SHORTER IT IS,
THE NEARER"
45 PRINT
50 PRINT "YOU ARE"
55 LET A=RND(100)
60 PRINT, "YOUR GUESS?"
65 INPUT B
70 LET C=C+1
80 IF A=B THEN GOTO 200
85 LET D=ABS((A - B)/2)
90 FOR G=1 TO D
95 PRINT "INVERSE SPACE"; (shift
A)
100 NEXT G
105 PRINT B
110 PRINT
115 GOTO 65
200 IF C< 5 THEN PRINT
"EXCELLENT";
205 IF C> 4 AND C<10 THEN
PRINT "NOT BAD";
210 IF C> 9 THEN PRINT "WAKE
UP";
215 PRINT "THAT TOOK
";C;"GOES"
220 POKE 16421, 24
225 STOP
```





SCREENWRITER

SCREENWRITER is not a program for would-be employees of MGM but a neat routine for producing the kind of large-scale graphics shown in our listing.

A maximum of four lines of eight characters can each be displayed on the screen at one time. The prompt for a string entry is given and a maximum of seven characters can then be entered.

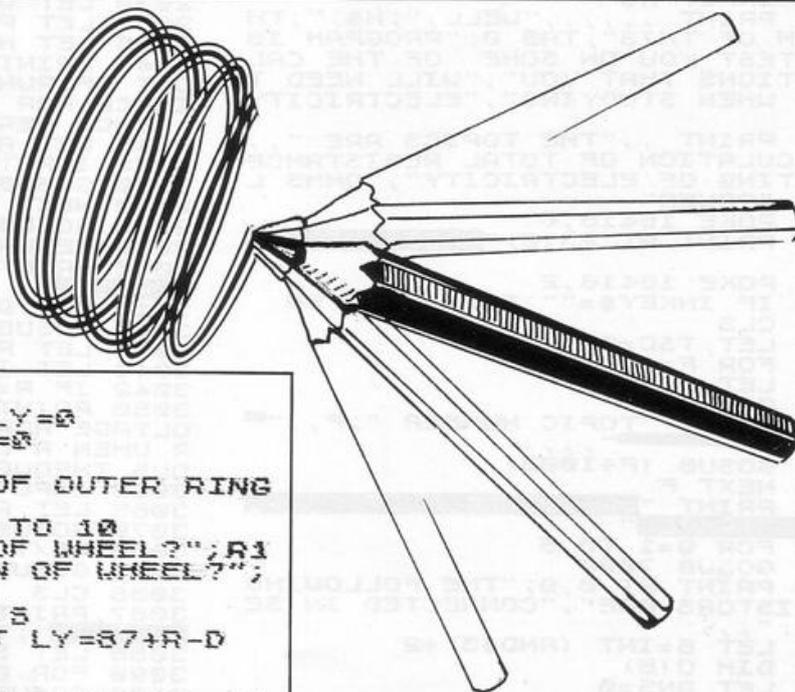
The enlarged string is then displayed and will scroll up to make way for a new string. With a COPY command, the program could be used with the ZX-81 printer.

```

10 INPUT A$
20 FOR L=SGN PI TO LEN A$
30 LET X=VAL "7681"+CODE A$(L)
+CODE " "
40 FOR Y=NOT PI TO CODE " "
50 LET P=PEEK (X+Y)
60 FOR G=7 TO 0 STEP -1
70 IF P<2**G THEN GOTO 100
80 PLOT 8*L-G,6-Y
90 LET P=P-2**G
100 NEXT G
110 PAUSE CODE " ; "
120 NEXT Y
130 NEXT L
140 SCROLL
150 SCROLL
160 SCROLL
165 SCROLL
170 GOTO SGN PI
  
```

SPIROGRAPH, from Martin Richards, of Stevenage, Herts uses the hi-res graphics of the Spectrum to fascinating effect.

The program produces graphics in the style of those line-drawing machines with the swinging weights and turning tables. On the Spectrum, too, it is fun to watch and you have good pictures.



SPIROGRAPH

```

0 LET LX=0: LET LY=0
1 LET X=0: LET Y=0
2 CLS
3 INPUT "RADIUS OF OUTER RING"
4 IF R=0 THEN GO TO 10
5 INPUT "RADIUS OF WHEEL?";R1
6 INPUT "POSITION OF WHEEL?";
7
8 INPUT "SPEED?";S
9 LET LX=127: LET LY=87+R-D
10 PLOT LX,LY
11 LET A=0
12 LET X=(R-R1)*SIN (A)+(R1-D)
13 LET Y=(R-R1)*COS (A)+D
14 LET X=LX+X: LET Y=LY+Y
15 LET A=A+S
16 IF INKEY#="" THEN GO TO 100
17 GO TO 0
  
```

DO YOU teach physics or study it? **Physics** is a program for the 16K ZX-81 which tests you on some of the calculations necessary in basic electrical physics.

There are four topics in the listings but two of them are divided into subsections giving a total of seven types of problem. After each question you are told whether you

are correct, incorrect or close enough and your score is displayed at the end of every section.

As each new topic is introduced every 1,000 lines, new sections could easily be included by changing the 5 in line 110 and by moving lines 4225-4270 to the end of the last topic.

Sent by Michael Coombes, of Newport, Gwent.

PHYSICS



```

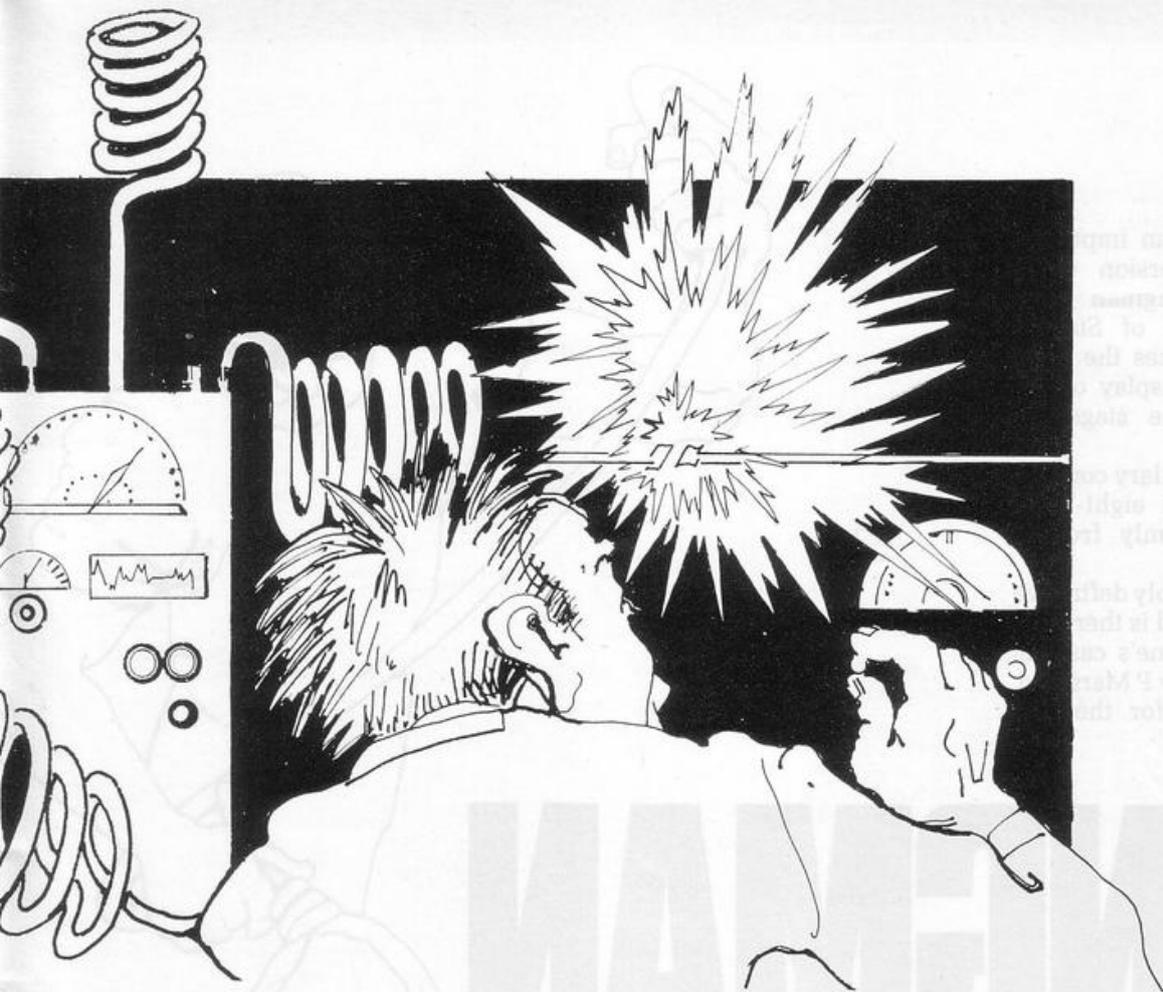
10 REM "PHYSICS"-M. COOMBES, AUG
.1982
20 PRINT TAB 12; "PHYSICS"
30 PRINT "HELLO, WELCOME
TO "PHYSICS""; AT 8,0; "PLEASE T
YPE IN YOUR NAME"
40 INPUT N$
50 PRINT "WELL, "; N$; ", TH
E AIM OF THIS"; TAB 8; "PROGRAM IS
TO TEST YOU ON SOME OF THE CAL
CULATIONS THAT YOU"; "WILL NEED T
O DO WHEN STUDYING"; "ELECTRICITY
".
60 PRINT "THE TOPICS ARE: ";
"CALCULATION OF TOTAL RESISTANCE";
"COSTING OF ELECTRICITY"; "OHMS L
AW"; "POWER"
70 POKE 16*16,0
80 PRINT AT 23,0; "PRESS WELL IN
";
85 POKE 16*16,2
90 IF INKEY$="" THEN GOTO 98
100 CLS
105 LET TSC=0
110 FOR F=1 TO 5
115 LET SC=0
117 CLS
120 PRINT "TOPIC NUMBER "; F; " "
130 GOSUB (F*1000)
140 NEXT F
1000 PRINT "CALCULATION OF TOTAL
RESISTANCE"
1015 FOR Q=1 TO 5
1017 GOSUB 7000
1020 PRINT AT 8,0; "THE FOLLOWING
RESISTORS ARE"; "CONNECTED IN SE
RIES: ";
1025 LET B=INT (RAND*3)+2
1027 DIM O(B)
1028 LET ANS=0
1030 FOR G=1 TO B
1040 LET O(G)=INT (RAND*5)+1
1045 LET ANS=ANS+O(G)
1050 NEXT G
1060 FOR G=1 TO B
1070 PRINT " "; O(G); " OHMS"
1080 NEXT G
1090 PRINT "WHAT IS THE TOTA
L RESISTANCE?";
1100 INPUT T
1120 GOSUB 8000

```

```

1130 NEXT Q
1140 GOSUB 9500
1900 RETURN
2000 PRINT TAB 4; "COSTING OF ELE
CTRICITY"
2010 FOR Q=1 TO 5
2020 GOSUB 7000
2030 LET WA=(INT (RAND*9)+10)+50
2032 LET P=INT (RAND*4)+2
2035 LET H=INT (RAND*5)+2
2040 PRINT AT 8,0; "WHAT IS THE C
OST OF RUNNING A"; WA; " WATT APPL
IANCE, FOR "; H; " HOURS"; "AT "; P; "
PENCE PER UNIT?"
2045 LET ANS=(WA/1000)*H*P
2050 INPUT T
2060 GOSUB 8000
2070 NEXT Q
2080 GOSUB 9500
2090 RETURN
3000 PRINT TAB 5; "THE OHMS LAW E
QUATION"
3010 FOR Q=1 TO 5
3020 GOSUB 7000
3030 LET R=INT (RAND*9)+1
3040 LET I=INT (RAND*5)+1
3042 IF R=8 THEN GOTO 3030
3050 PRINT AT 8,0; "WHAT IS THE V
OLTAGE ACROSS A"; R; " OHM RESISTO
R WHEN A CURRENT OF"; I; " AMPS FL
OWS THROUGH IT?"
3060 INPUT T
3065 LET ANS=R*I
3070 GOSUB 8000
3080 NEXT Q
3085 GOSUB 9500
3086 CLS
3087 PRINT TAB 5; "THE OHMS LAW E
QUATION"; TAB 5; "(PART 2)"
3088 LET SC=0
3090 FOR Q=1 TO 5
3100 GOSUB 7000
3110 LET R=INT (RAND*9)+1
3120 IF R=8 THEN GOTO 3110
3130 LET U=INT (RAND*19)+1
3135 IF R>4 THEN GOTO 3110
3140 PRINT AT 8,0; "WHAT CURRENT
FLOWS THROUGH A"; R; " OHM RESISTO
R, WITH "; U; " VOLTS"; "ACROSS IT?"
3150 LET ANS=U/R
3160 INPUT T
3170 GOSUB 8000
3180 NEXT Q

```



```

3190 GOSUB 9500
3200 CLS
3210 PRINT TAB 5;"THE OHMS LAW E
QUATION";TAB 5;"(PART 3)"
3215 LET SC=0
3220 FOR Q=1 TO 5
3230 GOSUB 7000
3240 LET I=INT (RND*5)+1
3250 LET V=INT (RND*10)+10
3260 LET ANS=V/I
3270 PRINT AT 8,0;"WHAT VALUE OF
RESISTOR GIVES A";"CURRENT OF "
;I;" AMPS WHEN ";V;" VOLTS ARE A
PPLIED ACROSS IT."
3280 INPUT T
3290 GOSUB 8000
3300 NEXT Q
3310 GOSUB 9500
3320 RETURN
4000 PRINT TAB 13;"POWER"
4010 FOR Q=1 TO 5
4020 GOSUB 7000
4030 LET I=INT (RND*5)+1
4040 LET V=INT (RND*20)+2
4050 LET ANS=V*I
4060 PRINT AT 8,0;"WHAT IS THE P
OWER OF A LIGHT "BULB IF ";I;"
AMPS FLOW THROUGH IT","WHEN THE
E ARE ";V;" VOLTS","ACROSS IT?"
4070 INPUT T
4080 GOSUB 8000
4090 NEXT Q
4100 GOSUB 7000
4102 GOSUB 9500
4105 CLS
4110 PRINT TAB 13;"POWER";TAB 12
;"(PART 2)"
4115 LET SC=0
4120 FOR P=1 TO 10
4125 NEXT P
4130 GOSUB 7000
4140 LET V=240
4150 LET I=INT ((RND*10)+10)+50
4160 LET ANS=I/V
4170 PRINT AT 8,0;"WHAT CURRENT
FLOWS THROUGH A";"I;" WATT APPLIA
NCE WHEN WITH A";"240 VOLT SUPPL
Y?"
4180 INPUT T
4190 GOSUB 8000
4200 NEXT Q
4210 GOSUB 7000

```

```

4215 FOR Q=1 TO 10
4220 NEXT Q
4222 GOSUB 9500
4225 CLS
4230 PRINT AT 2,0;"WELL, ";N$;" Y
OU HAVE NOW";TAB 0;"TRIED ALL TH
E CALCULATIONS.";"YOUR FINAL
SCORE IS ";TSC
4240 PRINT ;;"DO YOU WISH TO
START AGAIN?"
4250 IF INKEY$="Y" THEN GOTO 100
4260 IF INKEY$="N" THEN STOP
4270 GOTO 4250
7000 FOR A=8 TO 21
7010 PRINT AT A,0;"
7020 NEXT A
7030 RETURN
8000 IF T=ANS THEN PRINT ;;"WE
LL DONE ";N$;"";TAB 0;"THAT IS
CORRECT."
8005 IF T<>ANS AND INT ANS=INT T
THEN PRINT ;;"CLOSE ENOUGH ";
N$;TAB 0;TAB 0;"THE EXACT ANSWER
WAS ";ANS
8010 IF T=ANS OR INT ANS=INT T T
HEN LET SC=SC+1
8015 IF INT ANS=INT T THEN GOTO
8040
8020 IF T<>ANS THEN PRINT ;;"NO
";N$;" THAT IS WRONG.";"THE ANSW
ER WAS ";ANS
8040 GOSUB 9000
8050 RETURN
9000 FOR P=1 TO 20
9010 NEXT P
9020 RETURN
9500 CLS
9505 PRINT "YOUR SCORE FOR THIS
SECTION IS";SC;" OUT OF ";Q-1
9510 LET TSC=TSC+SC
9520 PRINT ;;"YOUR TOTAL SCO
RE SO FAR IS ";TSC
9530 FOR Y=1 TO 3
9540 GOSUB 9000
9550 NEXT Y
9552 FOR P=1 TO 5
9554 SCROLL
9556 NEXT P
9560 RETURN
9900 SAVE "PHYSICS"
9910 RUN

```

HANGMAN II is an improved and updated version of Gill's ZX-80 Hangman game the July/August issue of Sinclair User. This version makes the giant stride of showing a display of the gallows, advanced one stage for every incorrect guess.

The 120-word vocabulary consists of 40 six-, seven- and eight-letter words selected randomly from a dimensioned string.

This seems a reasonably definitive listing for this game and is therefore worth a place in anyone's cassette collection. It was sent by P Marsland, of Tamworth, Staffs, for the 16K ZX-81.



HANGMAN

II

```

4 LET S=0
5 LET F=410
6 DIM A$(3,320)
8 LET B=INT (RAND*4)
10 LET A=INT ((RAND*40)-1)*(B+S)
)
13 LET A$(1)="ACROSSAROUNDALM
YSANIMALARRIVEBURROWBRANCHSCHOOL
BRIDGECAUGHTMOTHEREAFNUTPLEASEDE
SERTDRAGONDERIVESECRETSORROWINSC
THOLLOWAVENGESWEAPONDETACHDEVISED
ESIGNTOMATOSCRAPESQUEASYSSQUEALDIS
TILMURDERLETTERNORMALBATTLEVISIO
NMUTINYBARRELVOYAGERRETURNDEVOID"
14 LET A$(2)="DEGRADEANXIOUS
ROUGHBELIEVEBENEATHRELIEVEBICYCL
ECRICKETEXCITECKITCHENBNOIWMANBAR
THERCHICKENTLEUNHAPPYALREADYOUTS
INSTANTUHISTLEUNHAPPYALREADYOUTS
IDESOMEONESTOPPEDFEATHERDRIZZLEC
ABBAGEBECAUSEDIALECTBLANKETAGAIN
STHINSELFRACCDONTROUBLEBLOSSOMPA
RADOXPOPULARBAFFLEMASSIVETRAFFIC
TRACTOR"
16 LET A$(3)="FOLLICLEACCIDENT
ALTHOUGHIRTHDAYBUSINESSSCHEERFUL
COMPLETECONTINUEDARKNESSDAYDREAM
DISCOVERDISTANCEELECTRICRESPONSE
PERIODICORNAMENTPACEMENTSOMETIME
ENORMOUSMOUNTAINMOTORISTLEMONADE
ENDANGERVIOLENCEREVERENTTAPESTRY
REMBERSURPRISETOMORROWYOURSELFHA
NDSOMEJECTIONTOGETHERFRIGHTENFR
IENDLYFOUNTAINLECTIONDESTRUCT30
UIRRELGOODNESS"
18 IF B<1 THEN GOTO 8
20 LET B#=A$(B)
30 LET B$=B#(A+1 TO A+(B+S))
34 PRINT AT 0,10;"XXXXXXXXXX"
)
35 PRINT AT 2,0;"ENTER YOUR GU
ESS LIVES LEFT: 10"
37 FOR N=10 TO B+14
38 PRINT AT 12,N;"-"
39 NEXT N

```

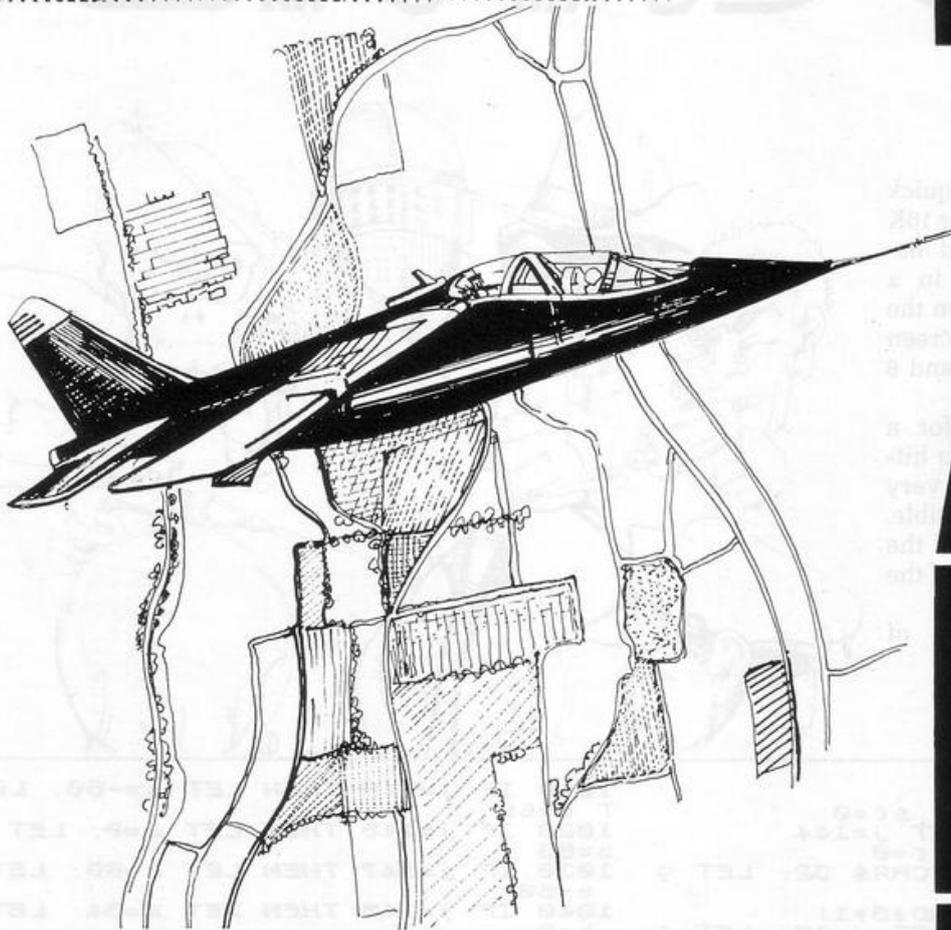
```

40 FOR Z=1 TO 10
45 LET K=0
50 INPUT H$
55 PRINT AT 2,30;" "
60 PRINT AT 2,30;10-Z
70 FOR D=1 TO B+S
75 IF H$=B$(D) THEN LET K=K+1
80 IF H$=B$(D) THEN LET S=S+1
85 IF H$=B$(D) THEN PRINT AT 1
2,9+LEN B$( TO D);H$
90 NEXT D
95 IF K>0 THEN GOTO 105
96 GOSUB F
100 LET F=F+10
105 IF K>0 THEN LET Z=Z-1
106 IF S=B+S THEN GOTO 150
110 NEXT Z
120 GOTO 500
150 PRINT AT 10,0;"YOU GUESSED
IT IN ";Z
160 STOP
410 PRINT AT 10,11;"-----"
415 RETURN
420 FOR N=9 TO 4 STEP -1
424 PRINT AT N,11;" "
425 NEXT N
426 RETURN
430 PRINT AT 3,11;"-----"
435 RETURN
440 PRINT AT 4,11;" I"
445 RETURN
450 PRINT AT 5,11;" O"
455 RETURN
460 PRINT AT 6,11;" "
465 RETURN
470 PRINT AT 6,11;" "
475 RETURN
480 PRINT AT 6,11;" "
485 RETURN
490 PRINT AT 7,11;" "
495 RETURN
500 PRINT AT 7,11;" "
510 PRINT AT 4,18;"YOU ARE HANG
ED";AT 6,18;"IT WAS";AT 8,18;B$

```

SPY

PLANE



```
10 LET S=VAL "5"
20 LET X=VAL "11"
30 CLS
40 LET A=VAL "15"
50 FOR B=VAL "10" TO VAL "50"
60 LET A=A+(A>VAL "10" AND AND
>VAL ".4")-(A>VAL "13" AND AND<V
AL ".5")
70 FOR C=VAL "13" TO A
80 PLOT B,C
90 NEXT C
100 IF AND>VAL ".8" AND B>VAL "
12" THEN PLOT B,A+VAL "AND*6"
110 NEXT B
120 FOR A=VAL "4" TO VAL "25"
130 LET X=X+(INKEY$="6")-(INKEY
$="7")
140 PRINT AT X,A;
150 GOSUB VAL "250"
160 IF M>VAL "8" AND M<VAL "8"
OR M>VAL "127" AND M<VAL "136" T
HEN PRINT S;0
170 PRINT AT X,A; "1"
180 PRINT AT X,A+VAL "2";
190 GOSUB VAL "250"
200 IF M>VAL "8" AND M<VAL "8"
OR M>VAL "127" AND M<VAL "136" T
HEN LET S=S+PI/PI
210 PRINT AT X,A; "."
220 NEXT A
230 PRINT S+PI/PI
240 STOP
250 LET M=PEEK VAL "PEEK 16398+
256*PEEK 16399"
260 RETURN
```

SPY PLANE is a quick program for the 1K ZX-81 in which you are the pilot of a reconnaissance aircraft swooping over enemy territory.

You can photograph the installations successfully only by getting them less than two print positions in front of the nose camera. Gain or lose height with keys 6 and 7 and beware of crashing.

Submitted by J Corney, of Braintree, Essex, who reckons that 10 photographs or more is the mark of a real daredevil.

CLOCKMAN

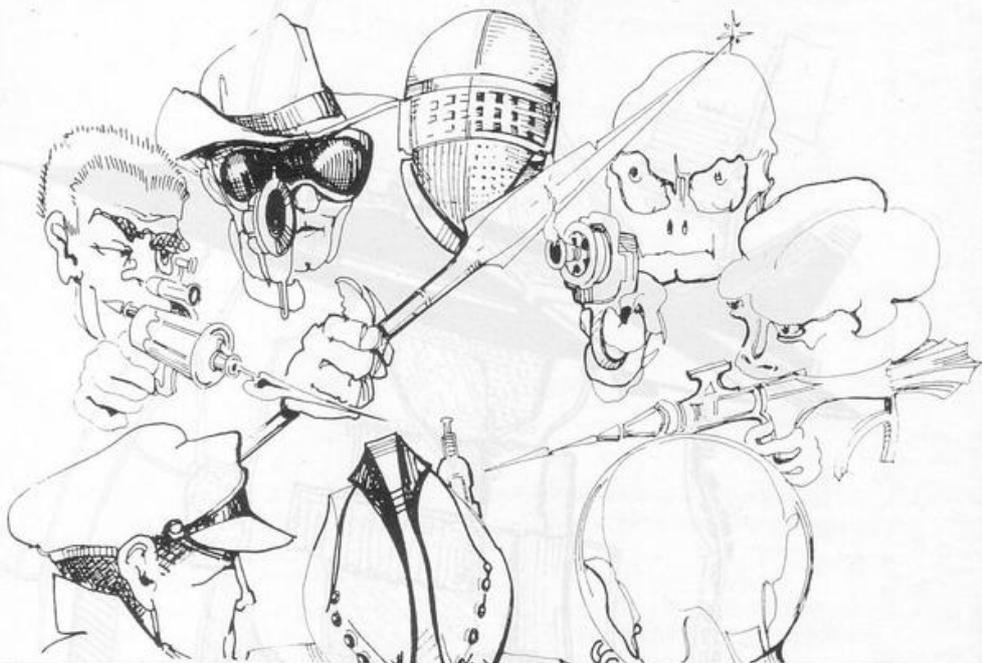
CLOCKMAN is a very quick reaction-type game for the 16K Spectrum. It is so-called because your enemies appear in a circle around the screen as if on the face of a clock. Your gun, at screen centre, is rotated with keys 5 and 8 and fired with 1.

Men stay on the screen for a shorter time after every hit, so hitting more than 40 out of 50 is very good. Fifty out of 50 is impossible. You can adjust the difficulty of the program by altering the length of the BEEP in line 180.

Sent by Arthur Douglas, of London E4. Graphics notes:

70, 80 etc—k.

1000, 1010 etc—j, a, b.



```

20 GO SUB 9000
30 LET q=0: LET sc=0
40 LET q=100: LET j=144
50 LET d=0: LET c=0
60 PRINT AT d,c:CHR$ 32: LET q
  =q+1
70 LET k=INT (RND*8+1)
80 IF k=1 THEN LET d=10: LET c
  =5
90 IF k=2 THEN LET d=3: LET c=
  8
100 IF k=3 THEN LET d=0: LET c=
  15
110 IF k=4 THEN LET d=3: LET c=
  22
120 IF k=5 THEN LET d=10: LET c
  =25
130 IF k=6 THEN LET d=17: LET c
  =22
140 IF k=7 THEN LET d=20: LET c
  =15
150 IF k=8 THEN LET d=17: LET c
  =8
160 PRINT INK 1: AT d,c:CHR$ 152
170 FOR x=1 TO q
180 BEEP 2,21,5
190 PRINT INK 2: AT 10,15:CHR$ j
200 IF INKEY$="8" THEN LET j=j+
  1: IF j=152 THEN LET j=144
210 IF INKEY$="5" THEN LET j=j-
  1: IF j=143 THEN LET j=151
220 IF INKEY$="1" THEN GO SUB 1
  000
230 NEXT x
240 IF q=50 THEN GO TO 260
250 GO TO 60
260 PRINT AT 10,0:"YOU HAVE 500
  red :sc: out of 50"
270 PRINT AT 20,0:"Hi! ""y"" fo
  r another 50, or ""n"" to stop"
280 IF INKEY$="y" AND INKEY$()
  "n" THEN GO TO 230
290 IF INKEY$="n" THEN STOP
300 RUN
1000 IF j=144 THEN LET b=-34: LE
  T b=0
1010 IF j=145 THEN LET b=-50: LE
  T b=60
1020 IF j=146 THEN LET b=0: LET
  b=83
1030 IF j=147 THEN LET b=50: LET
  b=50
1040 IF j=148 THEN LET b=34: LET
  b=0
1050 IF j=149 THEN LET b=50: LET
  b=-60
1060 IF j=150 THEN LET b=0: LET
  b=-34
1070 IF j=151 THEN LET b=-50: LE
  T b=-60
1080 PLOT 124,92: DRAW INK 4;b,b
1090 IF k=j-140 THEN PRINT AT d,
  c:"*": BEEP 9,1,k*2: PLOT 124,92
  : DRAW OVER 1;a,b: LET sc=sc+1:
  LET q=q-2: GO TO 60
1100 PAUSE k*2: PLOT 124,92: DRA
  W OVER 1;a,b
1110 RETURN
9000 FOR j=144 TO 152: FOR k=0 T
  O 7
9010 READ ud9: POKE USA CHR$ j+k
  ud9
9020 NEXT k: NEXT j
9030 DATA 2,13,50,196,196,50,13,
  0
9040 DATA 192,176,76,67,44,42,16
  ,16
9050 DATA 24,24,36,36,56,90,156,
  196
9060 DATA 3,13,50,194,52,20,3,0
9070 DATA 192,176,76,34,34,76,17
  6,192
9080 DATA 8,8,28,52,194,58,13,3
9090 DATA 195,155,90,66,36,26,24
  ,24
9100 DATA 16,16,40,44,67,76,176,
  192
9110 DATA 24,50,90,126,24,36,56,
  129
9120 RETURN
9999 SAVE "clockman" LINE 10
  
```



BINOMIAL DISTRIBUTION

BINOMIAL DISTRIBUTION might be the first of a new style of program. It was submitted by P R Scott, of Goldalming, Surrey, who believes that there are many fundamental scientific principles which could profitably be illustrated on Sinclair machines.

This program for the 16K ZX-81 serves to illustrate the principle of

binomial distribution. The display shows a ball falling through a triangular matrix of pegs. When the ball hits one of the pegs it rebounds to the left or right, entirely at random.

Its final position is recorded and a further ball produced. The distribution of final positions is the binomial distribution, familiar to most O level mathematics candidates. You may

not know that this characteristic pattern is also of importance in spectral intensities and polymer conformations.

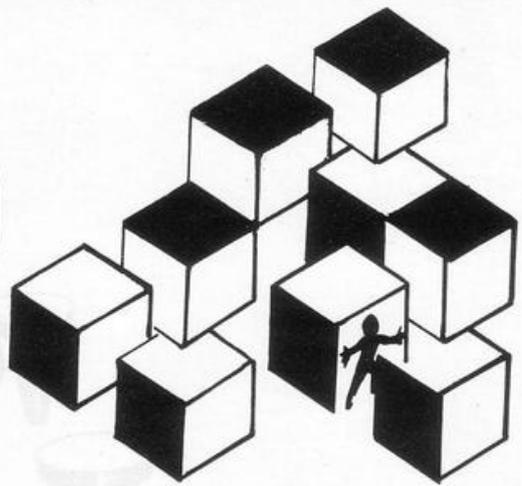
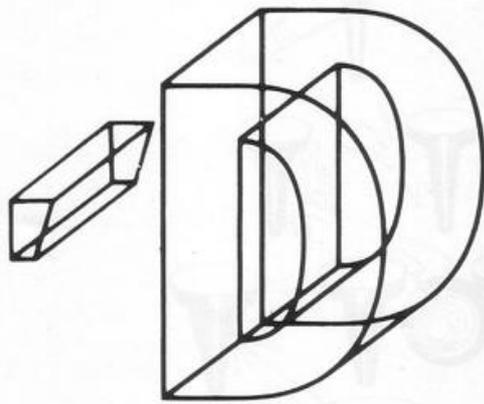
An excellent program, likely to prove of immediate use to teachers and students of mathematics. Graphics notes:

120—Minus, Four spaces, minus and so on.

```

10 DIM A(7)
20 FOR X=1 TO 7
30 LET A(X)=0
40 NEXT X
50 PRINT AT 0,5;"BINOMIAL DIST
RIBUTION"
60 PRINT AT 5,15;"|||||
70 PRINT AT 7,14;"|||
80 PRINT AT 9,13;"||
90 PRINT AT 11,12;"|
100 PRINT AT 13,11;"
110 PRINT AT 15,10;"
120 PRINT AT 17,9;" - - -
130 PRINT AT 19,11;" - - -
200 PRINT AT 3,15;"0"
210 LET X=15
220 LET Y=3
230 LET XP=X
240 GOSUB 400
250 IF Y=15 THEN GOTO 490
260 LET R=RND
270 IF R<0.5 THEN LET X=X+1
280 IF R>=0.5 THEN LET X=X-1
290 GOSUB 400
300 GOTO 230
400 PRINT AT Y,XP;" "
410 LET Y=Y+1
420 PRINT AT Y,X;"0"
430 RETURN
490 PRINT AT 15,X;" "
500 LET Z=(X-7)/2
510 LET A(Z)=A(Z)+1
520 LET P=17
530 IF Z/2=INT(Z/2) THEN LET P
=18
540 LET Q=X
550 IF A(Z)>=10 THEN LET Q=Q-1
560 PRINT AT P,Q;A(Z)
570 IF A(Z)=50 THEN INPUT Z#
580 GOTO 200

```



HUNT

WE HAVE received many programs for finding something hidden in a grid. **3-D Hunt** is the first we have had requiring a search in a cube.

The display is of a 9 by 9 numbered board representing the front of the cube. Beneath it is a strip representing depth, the right-hand end of the strip being the front of the cube. The computer has a choice of 729 positions in which to hide itself.

Enter a number for the line, another for the column, and a third for the depth. Your position will be displayed and so will three letters to show the relative position of the computer.

A report of NWF, for example, would indicate that your first and second numbers should be less, and your third should be greater. The last F indicates "in front of".

If one of the report figures does not appear, assume that you have hit the correct value. A black square shows you have found the fugitive and the number of attempts you required is displayed.

An interesting game for the 1K ZX-81 from Paul Allen of Wigan, Greater Manchester. Graphics notes.

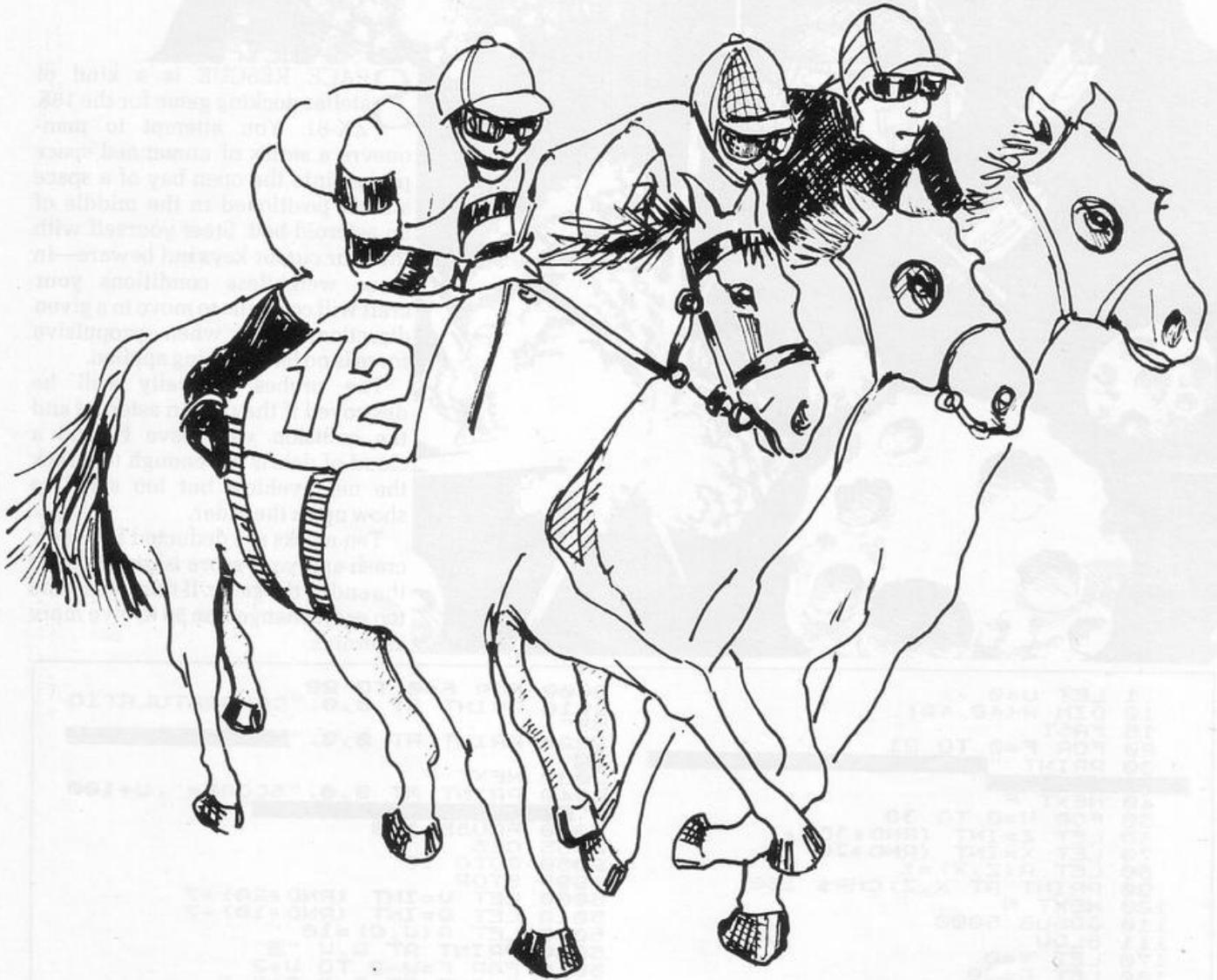
- 6—Inverse hyphen
- 7—Nine graphic As
- 8—Graphic D
- 100—Inverse O
- 180—Inverse space

```

10 LET J=CODE " "
11 LET X=CODE "X"
12 LET Y=CODE "Y"
13 LET Z=CODE "Z"
14 LET T=K
15 LET R=O
16 LET P=CODE "P"
17 LET Q=CODE "Q"
18 LET G=CODE "G"
19 PRINT
20 FOR I=0 TO 9
21 PRINT Q;Q#
22 LET Q=Q+R
23 NEXT I
24 PRINT N;"12345678",G,,N;Q#
25 GOSUB T
26 LET L=O
27 GOSUB
28 LET C=O
29 GOSUB P
30 INPUT T
31 INPUT T
32 INPUT T
33 LET X=X+T
34 LET R=R+T
35 LET G=G+T
36 LET Q=Q+T
37 IF M=L AND N=C AND F=O THEN
38 GOTO CODE "Q"
39 IF M<L THEN LET
40 IF M>L THEN LET
41 IF N<C THEN LET
42 IF N>C THEN LET
43 IF F<O THEN LET
44 IF F>O THEN LET
45 PRINT AT T;C;R;G;O;AT N,
46 N;CHR# T;AT T;T;X
47 GOTO 20
48 LET D=INT (RND*J)
49 IF D<R OR D>G THEN GOTO P
50 RETURN
51 PRINT AT M;N;" "X

```


HORSE



```
1 DIM R(5)
2 DIM P(5)
3 LET P=10
4 FOR N=1 TO 5
5 LET R(N)=10.00
6 NEXT N
7 LET S=0
8 LET Y=1
9 DIM A$(5,10)
10 FOR N=1 TO 5
11 PRINT "TYPE NAME OR INITIAL
12 "
13 PRINT "OF PLAYER NO.":N
14 PRINT "OR IF NONE TYPE #:"
15 INPUT A$(N)
16 CLS
17 IF A$(N)(1)="#" THEN GOTO 2
18 NEXT N
19 PRINT AT 1,1:"HORSE NO. 0
20 RACE NO. "Y
21 LET Y=Y+1
```

NOW YOU can watch a horse race without having to listen to Peter O'Sullivan tying himself in knots for the last furlong. It is a race game for up to six players. Each punter enters his initials and then inputs the number of the horse he has selected and whether he wants to bet each way or to win.

The players start with 10 points' worth of capital and score according to the odds on each horse and the type of bet laid. The game ends when one of the punters finds himself without cash.

Sent by C Winn for the expanded ZX-81.

RACE

```

210 LET P$=" 1 2 3 5 7101216"
220 FOR N=1 TO 8
230 LET B=N*2
240 LET A=B-1
250 LET X=N+1
260 PRINT AT X,5;N;" "P$
270 NEXT N
280 PRINT AT 11,1;"EACH PLAYER
TYPE IN NO. OF"
290 PRINT AT 12,1;"HORSE SELECT
ID"
300 PRINT AT 14,1;"E.G. TYPE IN
2W FOR NO.2 TO WIN"
310 PRINT AT 15,1;"OR SE FOR NO
5 EACH WAY"
320 DIM B$(5,5)
330 DIM H(6)
340 DIM E$(5)
350 FOR N=1 TO 5
355 IF A$(N,1)="*" THEN GOTO 5
360 PRINT AT 17,5;A$(N);""
365 PRINT AT 19,6;"TYPE IN NOW"
370 INPUT B$(N)
380 LET H(N)=VAL B$(N,1)
385 IF B$(N,2)="E" THEN LET P=1
390 NEXT N
500 DIM D(8)
505 CLS
510 LET D$="=====
515 PRINT D$;
520 PRINT D$;
530 FOR N=1 TO 8
535 LET D(N)=29
540 PRINT TAB 29;" ";N;" "
545 PRINT
550 NEXT N
555 PRINT D$;
570 PRINT D$;
600 LET F=INT (RND*15)+1
610 IF F<5 THEN GOTO 700
620 IF F<8 THEN GOTO 710
630 IF F<11 THEN GOTO 720
640 IF F<13 THEN GOTO 730
650 LET G=F-5
660 GOTO 800
700 LET G=1
705 GOTO 800
710 LET G=2
715 GOTO 800
720 LET G=3
725 GOTO 800
730 LET G=4
800 LET F=2*G-1
805 IF D(G)=500 THEN GOTO 500
810 LET K=INT (RND*3)+1
815 LET K=K+INT G/2
820 PRINT AT F,D(G);
830 LET D(G)=D(G)-K
835 IF D(G)<1 THEN GOTO 570
840 PRINT AT F,D(G);";G;"
850 IF D(G)<0 THEN GOTO 900
860 GOTO 500
870 PRINT AT F,0;" ";G;" "
871 GOTO 500
900 IF P<2 THEN LET W(G)=1
901 LET D(G)=500
910 PRINT AT F,0;G;" "
915 IF W(G)=1 THEN PRINT AT 17,
10;"FIRST NO. ";G
920 IF P=0 THEN GOTO 1000
930 LET P=P+1
940 IF P=2 THEN GOTO 500
950 LET W(G)=P-1
955 IF W(G)=2 THEN PRINT AT 18,
10;"SECOND NO. ";G
965 IF W(G)=3 THEN PRINT AT 19,
10;"THIRD NO. ";G
969 PAUSE 100
980 IF P=4 THEN GOTO 1000
970 GOTO 500
1001 CLS
1005 IF P=0 THEN GOTO 1200
1010 FOR N=1 TO 5
1020 IF B$(N,2)="E" THEN GOTO 10
40
1030 GOTO 1090
1040 FOR G=1 TO 5
1050 IF W(G)>0 AND H(N)=G THEN C
OTO 1080
1060 NEXT G
1065 LET R(N)=R(N)-1
1066 GOTO 1090
1080 GOSUB 1261
1081 LET R(N)=R(N)+0.2*5
1090 NEXT N
1200 PRINT AT 1,1;"PLAYERS SCORE
5 ARE :-"
1201 FOR N=1 TO 5
1205 IF A$(N,1)="*" THEN GOTO 13
00
1210 FOR G=1 TO 5
1220 IF H(N)=G AND W(G)=1 THEN G
OTO 1260
1230 NEXT G
1235 LET R(N)=R(N)-1
1240 PRINT AT N+N+1,1;A$(N);"
";R(N)
1245 NEXT N
1250 GOTO 1300
1261 IF G=8 THEN LET S=15
1262 IF G=7 THEN LET S=12
1263 IF G=6 THEN LET S=10
1264 IF G=5 THEN LET S=7
1265 IF G=4 THEN LET S=5
1266 IF G<4 THEN LET S=0
1267 RETURN
1268 GOSUB 1261
1269 LET R(N)=R(N)+S
1270 GOTO 1240
1300 LET P=0
1305 PAUSE 400
1310 FOR N=1 TO 8
1320 LET W(N)=0
1330 NEXT N
1340 FOR N=1 TO 5
1350 IF R(N)<0.01 THEN GOTO 1400
1360 NEXT N
1365 CLS
1370 GOTO 200
1400 PRINT AT 14,1;"PLAYER NO. ";
N;" IS OUT OF MONEY"
1405 PAUSE 400
1410 FOR N=1 TO 5
1415 LET R(N)=10
1420 NEXT N
1430 PRINT AT 15,1;"END OF GAME"
1435 PAUSE 500
1440 CLS
1500 GOTO 90

```

SINCE WE loaded **Bio-rhythms** we have not been able to see the TV screen for interested parties. Everyone in the office is becoming a bio-rhythm bore.

The program requires your date of birth and the current date and then displays a neat chart of the month, with curves for the physical, mental and emotional cycles.

Your physical state varies over a 23-day cycle and relates to your endurance, strength and aggressiveness. The emotional cycle lasts 28 days and governs anger, moodiness and optimism/pessimism. Mentally, you oscillate between Einstein and ape over a 33-day cycle.

The program was submitted by R Clark, of Saltash, Cornwall.

```

1 RESTORE
2 PRINT AT 0,0: "          BIO-R
HYTHM
10 INPUT "Enter Date Of Birth"
:"Day ";a;" Month ";b;" Year
";c
20 INPUT "Enter Date Now ";d;"M
onth ";e;" Year ";f
25 CLS
30 LET t=INT ((f-c)*365.25)+((
(d-b)*30.35)-a)
300 FOR r=0 TO 255
310 PLOT r,10
315 IF r=INT (r/B)*B THEN FOR u
=10 TO 20: PLOT r,u: NEXT u
320 NEXT r
330 PRINT AT 21,0: "1st      10th
      20th      30th"
340 PRINT AT 0,0: INK 1: "physic
al"; INK 2: "mental "; INK 4: "
emotional"
350 FOR r=1 TO 3
360 READ u
370 LET l=2*PI*(t-(INT (t/u)*u)
)/u
380 LET k=2*PI*(33-u)*.03
1000 FOR a=l TO k+(2*PI) STEP
.1
1010 PLOT INK ((1 AND u=20)+(2 AND
u=28)+(4 AND u=33));(a-1)*(35
-28+u),90+SIN a*50
1020 NEXT a
1030 NEXT r
1040 DATA 23,25,33
1050 INPUT "Another Go ? ";a#: I
F a#(1)="y" THEN GO TO 1

```

BIO- RHYTHMS



DOODLE

```

1000 LET A=0
2000 LET B=0
3000 LET C=0
4000 PLOT C,0
5000 IF C=0 THEN UNPLOT A,B
6000 LET C=C+1
7000 OR C=C#0:IF C#0:GOTO 4000:OR C=C#1:
OR C=C#2:IF C#2:GOTO 4000:OR C=C#3:
OR C=C#4:IF C#4:GOTO 4000:OR C=C#5:
OR C=C#6:IF C#6:GOTO 4000:OR C=C#7:
8000 IF C#0 THEN COPY
9000 IF C#1 THEN LET C=C#1
1000 IF C#2 THEN LET C=C#2
1100 IF C#3 THEN LET C=C#3
1200 UNPLOT A,B
1300 GOTO 40

```



DOODLE is one of the most useful programs we have received for the ZX-81 tinkerer.

It provides a way of drawing in eight directions under cursor control. Keys 5 to 8 give the usual four points of the compass, while I, O, K and L give the points between.

Key W gives UNPLOT and you can return to PLOT with Q. If you have a printer you can input Z for an instant COPY; if not, omit line 85. Key Ø clears the screen.

As listed, the routine is set up for the 1K machine and will let you draw only over a part of the screen. If a RAM pack is used you can work on the whole screen by changing the listing as follows:

In line 70, where "A is less than 53" and "A is greater than 10", change to "A is less than 63" and "A is greater than Ø respectively. In line 80, "B is less than 35" and "B is greater than 8" become "B is less than 43" and "B is greater than Ø".

Thanks to Peter Wylie, of Christchurch, Dorset, for this very worthwhile routine.



GHOST TREKKER is a genuinely challenging game requiring quick thinking and quick cursor fingers as you chase a ghost around the haunted house.

You begin as an inverse V in the top left of the screen and change direction anti-clockwise with 1 and clockwise with 0. Both you and the ghost leave a trail which you are not allowed to cross in your attempt to corner the wayward wraith.

If you have sufficient luck and animal cunning to corner the fugitive phantom, you will be congratulated and your time displayed. A demanding game for the expanded ZX-81 from Alistair Crowe, of Llandudno, Gwynedd. Graphics notes:

- 110—Thirty-two inverse full stops.
- 130—Inverse A, graphic shifted M, inverse V, graphic shifted N.
- 350 & 400—Inverse full-stop.
- 410—Graphic A.
- 530—Inverse "Congratulations, you have caught the ghost. It took you time units.
- 550—You hit a trail and have been killed.
- 560—For another go, press any key.

GHOST TREKKER

```

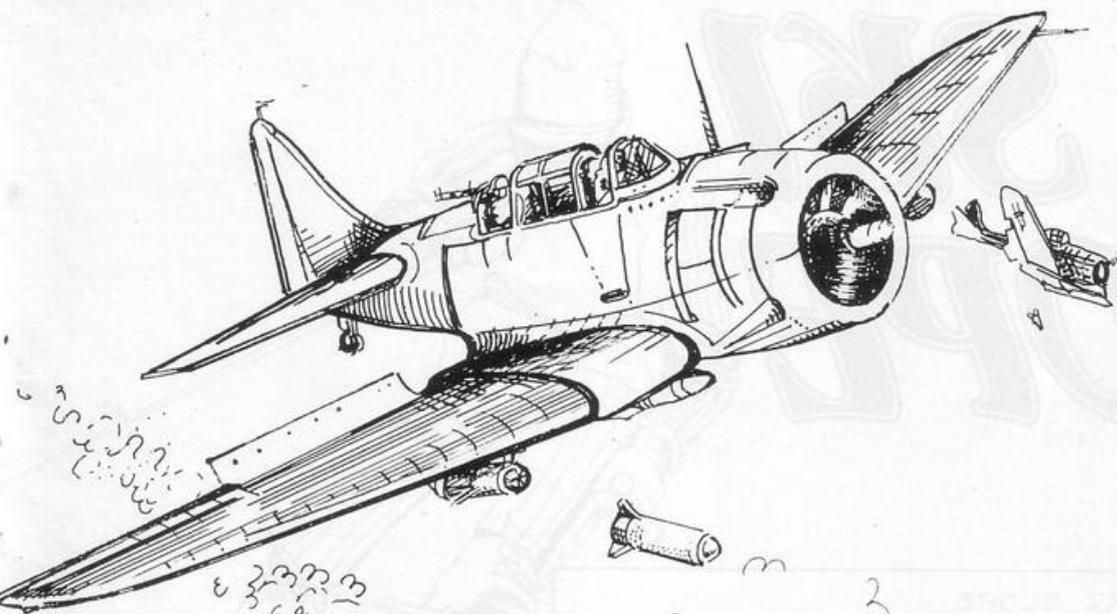
10 FOR A=0 TO 21
110 PRINT AT A,0;"
120 NEXT A
130 LET A$=" "
140 LET X=1
150 LET Y=1
160 LET P=1
170 LET P=INT (RND*18)+2
180 LET Q=0
190 LET DIR=INT (RND*4)+1
200 LET T=0
210 GOTO 370
220 LET A=A+(INKEY$="0")-(INKEY
$="1")
10 FOR A=0 TO 21
110 PRINT AT A,0;"
120 NEXT A
130 LET A$=" "
140 LET X=1
150 LET Y=1
160 LET P=3
170 LET P=INT (RND*18)+2
180 LET Q=0
190 LET DIR=INT (RND*4)+1
200 LET T=0
210 GOTO 370
220 LET A=A+(INKEY$="0")-(INKEY
$="1")
230 IF A<1 THEN LET A=4
240 IF A>4 THEN LET A=1
250 LET X=X+(A=3)-(A=1)
260 LET Y=Y+(A=2)-(A=4)
270 IF X>20 THEN LET X=1
280 IF X<1 THEN LET X=20
290 IF Y>30 THEN LET Y=1

```

```

300 IF Y<1 THEN LET Y=30
310 PRINT AT XX,YY;"
320 PRINT AT X,Y
330 LET C=PEEK (PEEK 16395+256*
PEEK 16399)
340 IF C=11 THEN GOTO 530
350 IF C<>CODE " " THEN GOTO 55
5
360 PRINT AT X,Y:(A$(A))
370 LET XX=X
380 LET T=T+1
390 LET YY=Y
400 PRINT AT INT (RND*22),INT (
RND*32);"
410 PRINT AT P,0;"
420 LET P=P+(DIR=1)-(DIR=2)
430 LET Q=Q+(DIR=3)-(DIR=4)
440 IF P<1 THEN LET P=20
450 IF P>20 THEN LET P=1
460 IF Q<1 THEN LET Q=30
470 IF Q>30 THEN LET Q=1
480 PRINT AT P,0;"
490 IF RND<.5 THEN GOTO 220
500 LET ZEE=INT (RND*4)+1
510 LET DIR=ZEE
520 GOTO 220
530 PRINT AT 0,0;"CONGRATULATIONS
YOU HAVE CAUGHT THE GHOST
IT TOOK YOU "T" TIME UNITS
540 GOTO 560
550 PRINT AT 0,0;"YOU HIT A TRAIL
AND HAVE BEEN KILLED
560 PRINT "
570 PAUSE 100
580 IF INKEY$="" THEN GOTO 560
590 GOTO 1

```



DAM BUSTERS

```

70 LET A=0
75 LET B=0
80 CLS
85 IF A=10 THEN GOTO 500
90 LET D=0
95 LET F=INT (RND*15)+15
100 LET E=F*2
105 LET A=D+1
110 PRINT AT 4,4;"DAM ";A;TAB 1
115 PRINT AT 4,4;"DESTROYED";
120 PRINT AT 20,0;
130 PRINT AT 10,F;CHR$ 100
140 GOSUB 400
150 FOR Z=1 TO 12
160 NEXT Z
200 IF INKEY#="" THEN GOTO 120
205 LET G=D+10
300 FOR H=INT G TO 63 STEP 2
310 IF H>63 THEN GOTO 80
320 LET I=INT (8+4*COS (H/(16-4)
*PI))
330 PLOT H,I
340 IF I=4 OR I=5 THEN GOSUB 60
360 GOSUB 400
370 UNPLOT H,I
380 NEXT H
390 GOTO 80
400 PRINT AT 12,0;" "
410 LET D=D+1
420 IF D>20 THEN GOTO 80
430 RETURN
510 PRINT AT 4,4;"TOTAL DAMS DE
STROYED ";B
520 PRINT AT 0,0;"PRESS NEWLINE
FOR NEXT GAME"
530 IF INKEY#="" THEN GOTO 530
540 RUN
550 PRINT AT 10,F;" "
610 LET B=B+1
620 FOR Z=1 TO 24
630 NEXT Z
700 GOTO 80
800 IF H=E OR H=E+1 THEN GOTO 6
80
810 RETURN

```

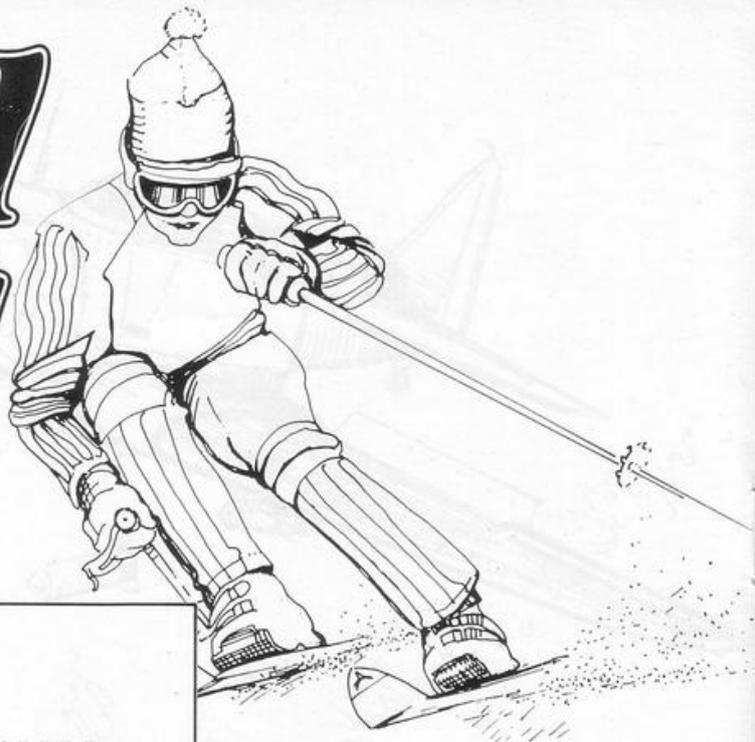
A DAMBUSTERS game for the ZX-81. Droning over Hamburg in the flak-riddled Lancaster, the bomb-aimer tensed over his sights, the Barnes-Wallace special already spinning in the bomb bay—and everybody humming the tune.

You have 10 dams to bust and the bombs are bounced by the novel cosine-controlled routine in line 320. The position of the dam is randomised and the bomb is released with any key.

The program uses only 2K and there should be plenty of room for elaboration of the graphics.

Submitted by R Larham, of Chatteris, Cambridgeshire. The reviewer managed to account for only seven. Graphics notes: 600—Graphic shifted A inverse asterisk, graphic shifted A.

SKI SLOPE



```

1 REM SKI SLOPE
2 LET S=0
3 LET T=10
4 LET C=10
5 FOR N=0 TO 200
6 PRINT AT 7,0: "*****"
7 PRINT AT 7,C: " "
8 LET C=C+INT (RND*3)-1
9 IF C>=30 THEN LET C=C-2
10 PRINT AT 0,C: " "
11 IF PEEK (PEEK 16398+256*PEEK
12 16399)=20 THEN LET S=S+1
13 PRINT " "
14 LET P=P+(INKEY$="8")-(INKEY
15 $="5")
16 IF N=194 THEN PRINT AT 7,C-
17 1: " "
18 SCROLL
19 NEXT N
20 PRINT AT 10,0: INT (N/S)*10

```

IN SKI SLOPE for the unexpanded ZX-81 you slalom down the freshly-fallen whiteness of the screen, dabbing frantically at the 5 and 8 keys to avoid the forests of coniferous asterisks racing towards you.

A score based on the number of trees you managed to hit is displayed when you cross the finishing line. Submitted by John Plunket, of Wetherby, North Yorkshire.

SPOTSWAT is very simple game for the unexpanded ZX-81. When the program is run, nine spots will appear on the screen in a 40 by 40 square. Your flashing spot is manoeuvred with the usual cursor keys to wipe them away.

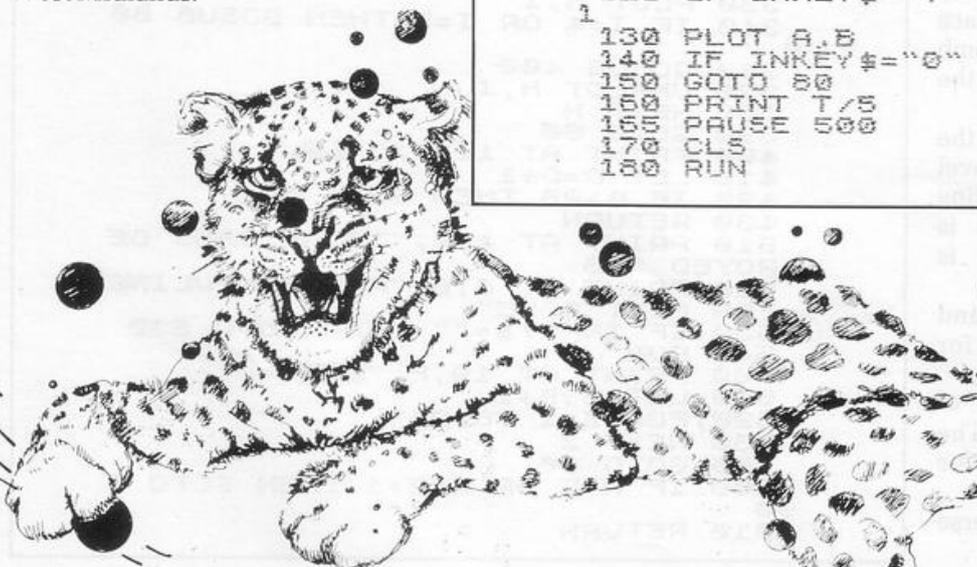
When the screen has been cleared, press 0 and your time will be displayed. After a few moments a new game will begin.

Sent by J R Oakley, of Sandwell, West Midlands.

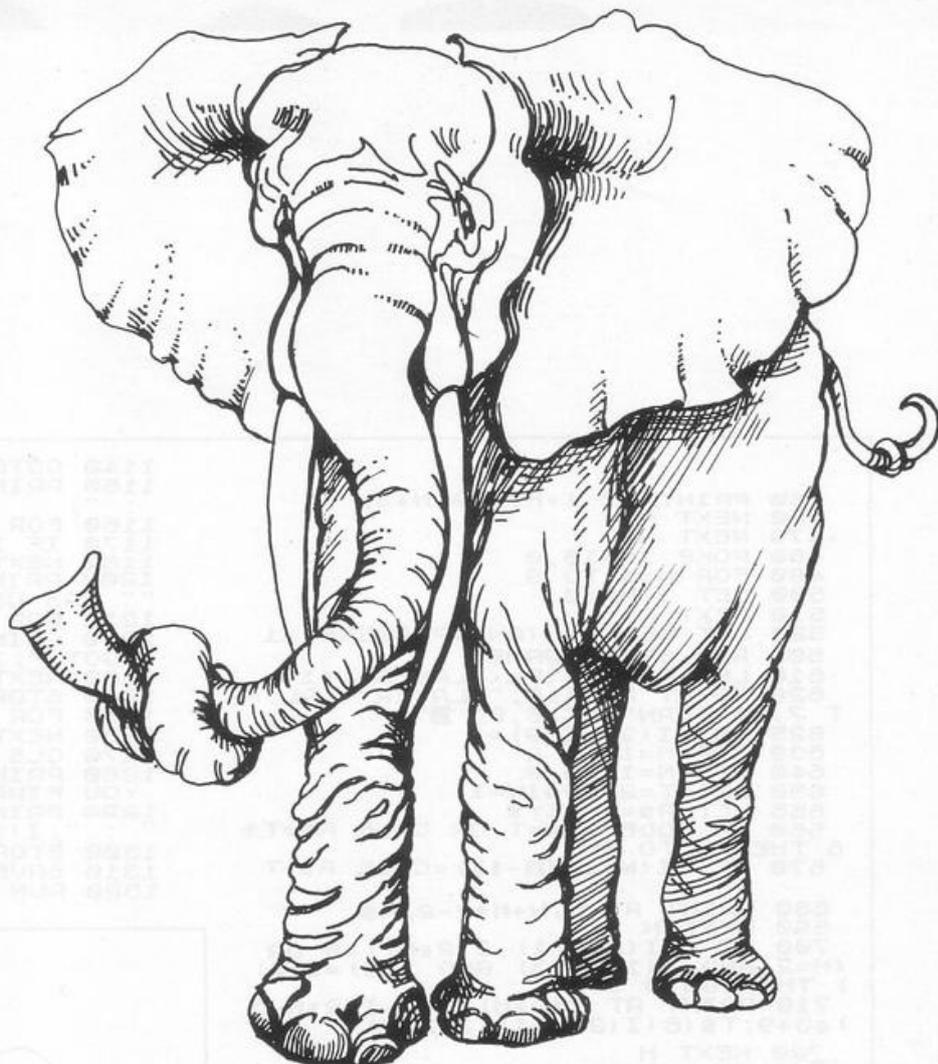
```

5 LET A=10
10 LET B=10
20 LET T=0
30 FOR N=1 TO 9
40 LET C=INT (RND*40)+1
50 LET D=INT (RND*40)+1
60 PLOT C,D
70 NEXT N
80 UNPLOT A,B
85 LET T=T+1
90 IF INKEY$="5" THEN LET A=A-
1 100 IF INKEY$="8" THEN LET A=A+
1 110 IF INKEY$="6" THEN LET B=B-
1 120 IF INKEY$="7" THEN LET B=B+
1 130 PLOT A,B
140 IF INKEY$="0" THEN GOTO 150
150 GOTO 80
160 PRINT T/S
165 PAUSE 500
170 CLS
180 RUN

```



SPOT SWAT



WE HAVE had total recall since we started playing **Memory**. It is a memory-testing routine for the 16K ZX-81 which invites you to try to recollect the positions of various symbols in a six by six grid.

The program first displays the grid and the 36 characters enclosed in it. You have very few seconds in which to absorb the display and are then required to input the positions of matching pairs of the symbols. Up to four players can compete and a running score is kept of your successes.

Submitted by Jack Anderson, of Svenstrup, Denmark.

MEMORY

```

30 DIM B(6,6)
40 DIM I(18)
50 DIM T$(18)
60 PRINT "MEMORY"
65 PRINT
70 PRINT "THE IDEA OF THIS GAME
E IS TO"
80 PRINT "IMPROVE YOUR MEMORY."

90 PRINT "IN AN ATTEMPT TO FIND
D MATCHING"
100 PRINT "PAIRS OF CHARACTERS,
YOU "TURN"
110 PRINT "TWO PIECES. IF THE T
WO PIECES"
120 PRINT "MATCH, THEY ARE YOUR
S TO KEEP."
130 PRINT "AND YOU HAVE ANOTHER
"TURN"
140 PRINT "OTHERWISE, THE NEXT
PLAYER HAS AGO."
150 LET T$="#+=?E/;@<>_~^`"
160 FOR N=1 TO 6
170 FOR M=1 TO 6
180 LET S=INT (RAND*18+1)
190 IF I(S)=2 THEN GOTO 130
200 LET I(S)=I(S)+1
210 LET B(N,M)=S
220 NEXT M
230 NEXT N

```

```

240 PRINT "INPUT NUMBER
OF PLAYERS (MAX 4)"
250 LET A$=INKEY$
260 IF CODE A$<29 OR CODE A$>32
THEN GOTO 250
270 LET PLAYERS=VAL A$
280 CLS
290 PRINT
300 PRINT "
310 FOR N=1 TO 6
320 PRINT "
330 PRINT "
340 PRINT "
350 NEXT N
360 PRINT "
370 FOR N=1 TO 6
380 FOR M=1 TO 6
390 PRINT AT 1+M*3,9+N*3;T$(B(N
,M))
400 NEXT M
410 NEXT N
420 PAUSE 100
430 FOR N=1 TO 6
440 FOR M=1 TO 6

```

```

450 PRINT AT 1+M*3,2+N*3;" "
460 NEXT M
470 NEXT N
480 POKE 16410,0
490 FOR N=1 TO 9
500 LET I(N)=0
510 NEXT N
520 LET PL=INT (RND*PLAYERS)+1
600 REM START GAME
610 LET PL=PL+(RND*PLAYERS)+1
620 PRINT AT 4,0;"PLAYER ";PL;"
T 7,0;"TURN";AT 5,0;" "
625 LET I(9)=I(9)+1
630 FOR M=1 TO 9
640 FOR N=1 TO 9
650 LET T=20+9*(M-1)
655 LET A$=INKEY$
660 IF CODE A$=T OR CODE A$=T+
5 THEN GOTO 655
670 LET I(N+2*(M-1))=CODE A$-T

```

```

680 PRINT AT 6,N+M*2-2;A$
690 NEXT N
700 IF B(I(2*M-1),I(2*M))=0 OR
(M=2 AND I(1)=I(3) AND I(2)=I(4))
THEN GOTO 950
710 PRINT AT I(2*M)*3+1,I(2*M-1)
)*3+9;T$(B(I(2*M-1),I(2*M)))
720 NEXT M
730 IF B(I(1),I(2))=B(I(3),I(4))
THEN GOTO 600
740 PRINT AT 10,0;"YOU MISSED";
AT 11,0;"IT.....";AT 23,20;"
750 IF INKEY$="" THEN GOTO 750
760 PRINT AT 8,0;" ";AT 10,
2;" ";AT 11,0;" ";AT 10,
2)*3+1,I(1)*3+9;" ";AT I(4)
I(3)*3+9;" "
770 GOTO 600
800 PRINT AT 10,0;"YOU GOT";AT
11,0;"IT.....";AT I(2)*3+1,I(1)*3
+9;PL;AT I(4)*3+1,I(3)*3+9;PL
810 LET B(I(1),I(2))=0
820 LET B(I(3),I(4))=0
830 LET I(4+PL)=I(4+PL)+1
840 LET M=0
850 FOR N=1 TO PLAYERS
860 LET M=M+I(N+4)
870 NEXT N
880 IF M=18 THEN GOTO 1000
890 PRINT AT 23,20;"

```

```

900 IF INKEY$="" THEN GOTO 900
910 PRINT AT 5,0;" ";AT 10,
0;" ";AT 11,0;" "
920 GOTO 620
950 PRINT AT 8,2*M-1;" "
960 GOTO 640
1000 PRINT AT 12,0;"END OF";AT 1
3,0;"GAME....."
1005 IF PLAYERS=1 THEN GOTO 1250
1010 LET M=5
1020 FOR N=5 TO PLAYERS+4
1030 IF I(N)+I(N) THEN LET M=M
1040 NEXT N
1050 FOR N=5 TO PLAYERS+4
1060 IF I(N)=I(M) THEN LET I(N-4)
)=0
1065 NEXT N
1070 LET M=0
1080 FOR N=1 TO PLAYERS
1090 LET M=M+(I(N)=0)
1100 IF I(N)=0 THEN LET WIN=N
1105 NEXT N
1110 CLS
1120 IF M>1 THEN GOTO 1150
1130 PRINT "PLAYER ";WIN;" WINS.

```

```

1140 GOTO 1200
1150 PRINT "DRAW BETWEEN PLAYERS
";
1160 FOR N=1 TO PLAYERS
1170 IF I(N)=0 THEN PRINT N;" "
1180 NEXT N
1200 PRINT AT 5,0;I(9);" "TURNS
" " WAS USED.. "
1210 FOR N=1 TO PLAYERS
1220 PRINT AT 6+N,0;"PLAYER ";N;
" GOT ";I(N+4)
1230 NEXT N
1240 STOP
1250 FOR N=1 TO 20
1260 NEXT N
1270 CLS
1280 PRINT "CONGRATULATIONS..
YOU FINALLY MADE IT.. "
1290 PRINT "NUMBER OF "TURNS"
";I(9)
1300 STOP
1310 SAVE "MEMOR"
1320 RUN

```

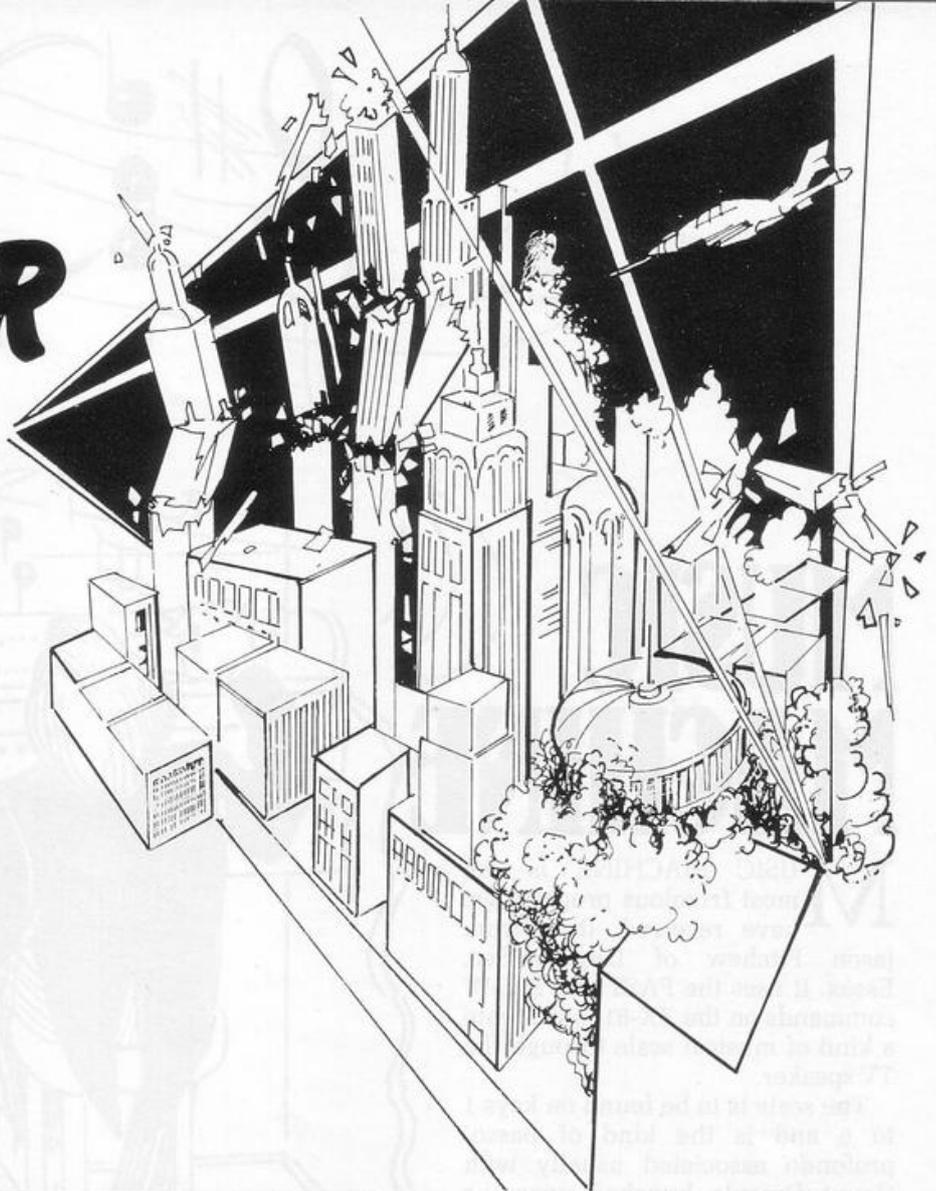


CITY BOMBER

CITY BOMBER this is a version of the well-known arcade game, written by E Wrigley of Bury, Lancashire, for the Spectrum. As you would expect, it is in glorious colour and complete with all relevant explosions.

Lines 2 to 16 set up the user-definable graphics and should be RUN before the rest of the program is typed-in. They provide a city of coloured skyscrapers which you must blast away before you crash into them. Only one bomb can be in the air at a time and five levels of difficulty enable you to select the speed of the aircraft. Graphics notes:

- 34—Graphics shifted R, graphics shifted S.
- 58—Graphics shifted P, graphics shifted Q.
- 104—Graphics shifted O.
- 122—Graphics shifted 8.



```

1 PAPER 0: BORDER 0: CLS
2 DATA 0,0,BIN 00010010,BIN 0
0011110,BIN 00001100,BIN 00001100
0,BIN 00001100,0
3 DATA 0,0,0,BIN 00111111,055
.1,0,0
4 DATA 1,0,7,055,055,BIN 1111
1100,BIN 11111100,BIN 01111100
5 DATA 0,0,0,0,BIN 00011000,0
IN 00111100,BIN 01111110,BIN 111
11111
6 DATA 255,255,BIN 01100110,0
55,255,BIN 01100110,255,255
7 FOR I=111 TO 115: FOR D=0 T
0
14 READ X: POKE USR CHR$(1+D),X
16 NEXT D: NEXT I
19 LET SC=0
20 PRINT AT 9,5: INK 4:"CITY B
OMB - F DROPS BOMB. AT 11,7: BR
IGHT 1: INK 3:"DIFFICULTY ? (1 T
0 5)": INPUT D: LET D=6-D
28 PAPER 0: CLS: BORDER 0
29 LET S=-1
30 FOR J=5 TO 25
32 INK 1+INT (RND*7): PAPER 1+
INT (RND*7): LET G=11+INT (RND*9
34 PRINT AT G,J: PAPER 0:" "
FOR K=G+1 TO 21: PRINT AT K,J:"
": NEXT K
36 NEXT J
38 FOR J=1 TO 21
52 PAPER 0: INK 1+INT (RND*7)
54 LET D=(21-J)
55 FOR K=26 TO 1 STEP -1
56 PRINT AT J,K:" " : BEEP .0
1,0
60 FOR L=0 TO d
62 LET S=S+2*(INKEY$="F")+ (S=1
): GO SUB 100
64 NEXT L
68 IF SCREEN$(J,K-1) <> " " THE
N GO TO 140
70 NEXT K: PRINT AT J,1:" "
74 NEXT J

```

```

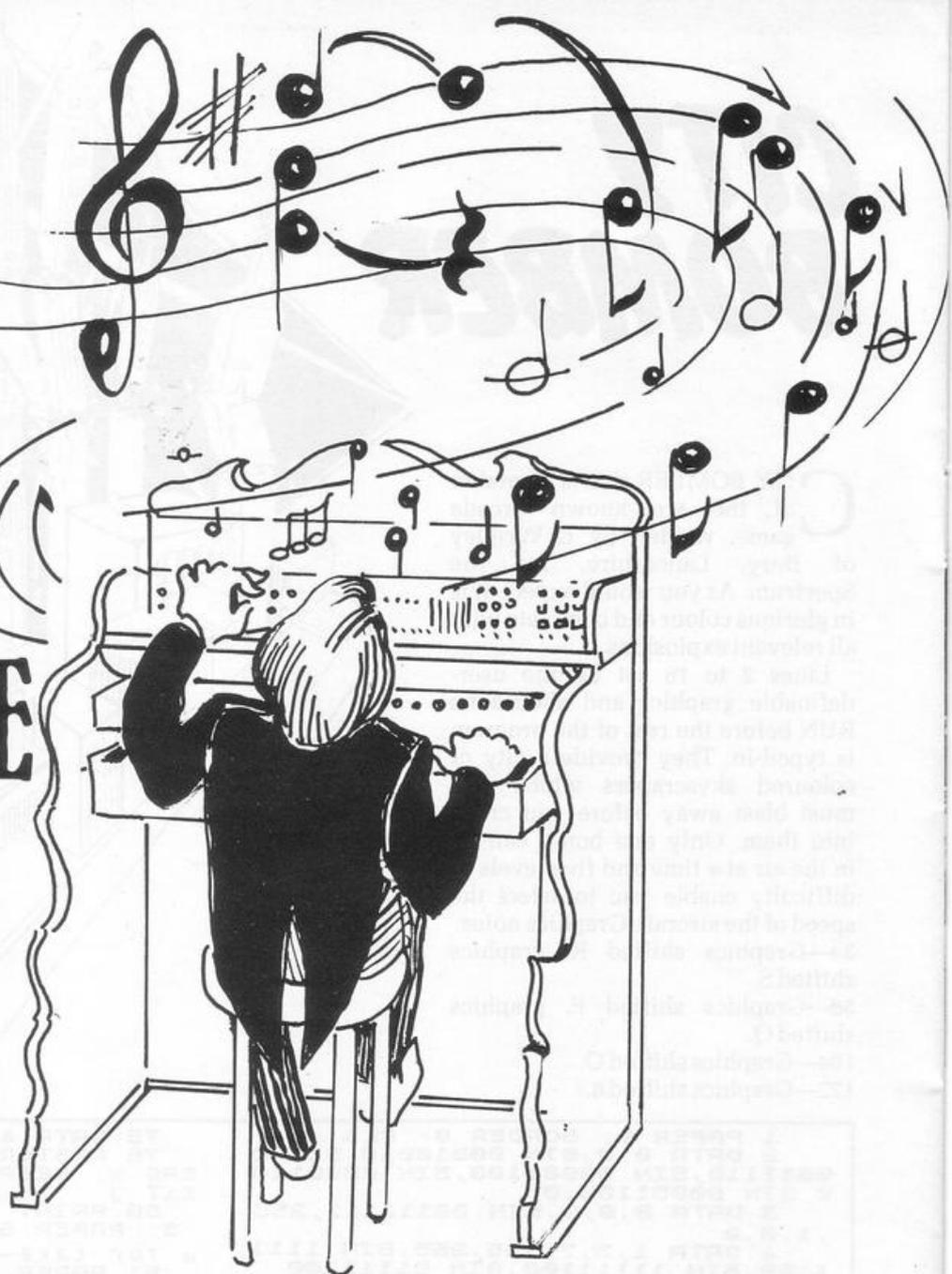
75 DATA 4,4,4,0
76 RESTORE 75: FOR J=1 TO 4: X
END X: BEEP .05*(1+J)*(J=4),X: X
EXT J
80 PRINT AT 21,0: FLASH 1: INK
3: PAPER 5:"SCORE: ";SC:" STARS
4 FOR TAKE-OFF": PAUSE 300
81 PAPER 0: FOR J=20 TO 0 STEP
-1
82 PRINT AT J+1,J+1:" " AT J,
J: INK 1+INT (RND*8): " " AT J,
84 NEXT J: GO TO 20
100 IF J=01 THEN RETURN: IF S=
1 THEN LET S=J+1
101 IF S=1 THEN LET S=J+2-(J=20
)
102 IF S=1 THEN LET H=K+2: IF S
=1 THEN LET D=D/2
103 IF S<0 THEN RETURN
104 PRINT AT S-1,H:" " AT (S,H):
": BEEP .005,21-S: LET S=S+1
105 IF SCREEN$(S,H) <> " " THEN
GO TO 119
106 IF S<01 THEN RETURN: IF S>
21 THEN LET S=21: GO TO 120
119 LET SC=SC+10
120 IF S>21 THEN LET S=21
121 PRINT AT S-1,H: PAPER 0:" "
: FOR D=7 TO 0 STEP -1
122 PRINT AT S,H: INK D:" " : B
EEP .02,D-12
124 NEXT D
126 LET S=-1: LET D=D*2: RETURN
140 PRINT AT J,K-2:" "
142 DATA 0,0,0,15,-5,-5,0
144 RESTORE 142: INK 0
146 FOR D=1 TO 7: READ X: CIRCL
E K*8+4,(21-J)*8,D: BEEP .05*(1+
D*(D=7)),X: NEXT D
148 PRINT AT 11,10: PAPER 6: IN
K 1:"SCORE: ";SC
9996 STOP
9997 REM citybomb
9998 REM © E.WRIGLEY 29/7/82
9999 SAVE "citybomb": RUN

```

MUSIC MACHINE

MUSIC MACHINE is the most frivolous program we have received. It is from Jason Fitchew of Leigh-on-Sea, Essex. It uses the FAST and SLOW commands on the ZX-81 to generate a kind of musical scale through the TV speaker.

The scale is to be found on keys 1 to 6 and is the kind of basso-profondo associated usually with Count Dracula hunched over the organ keys in the crypt at midnight. Tune the dial slightly off-station to start the background hum, turn up the volume and shake to that vampire beat. Graphics notes: 68, 180 and 243—Inverse.

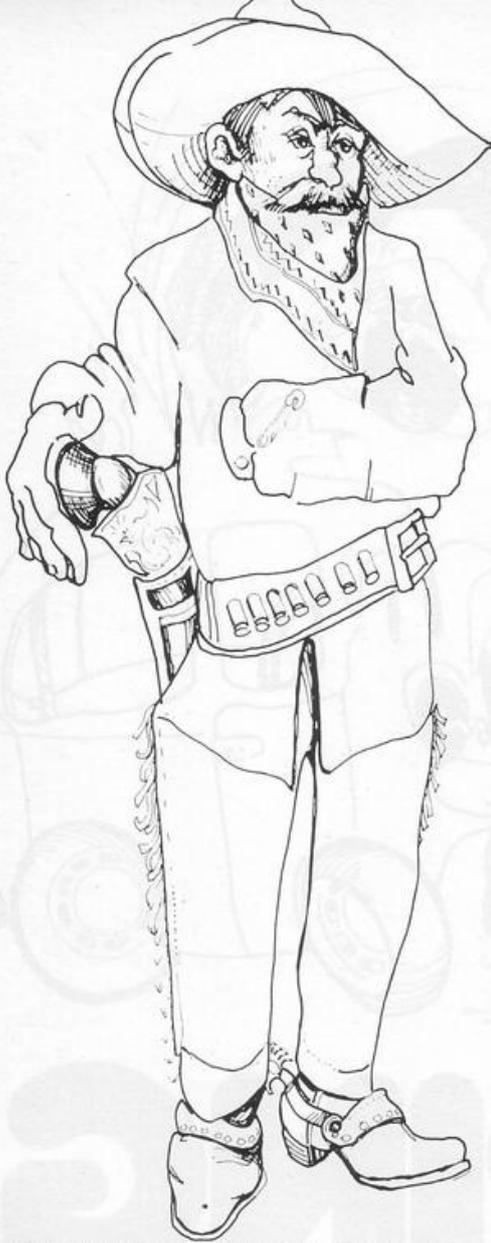


```

5 FAST
6 SLOW
7 FAST
85 IF INKEY#="3" THEN GOTO COD
87 IF INKEY#="4" THEN GOTO VAL
89 IF INKEY#="5" THEN GOTO COD
91 IF INKEY#="6" THEN GOTO VAL
93 GOTO CODE "A"
94 FAST
95 SLOW
96 SLOW
97 FAST
98 IF INKEY#="2" THEN GOTO COD
100 IF INKEY#="4" THEN GOTO VAL
102 IF INKEY#="5" THEN GOTO COD
104 IF INKEY#="6" THEN GOTO VAL
106 GOTO CODE "C"
107 FAST
108 FAST
109 SLOW
110 SLOW
111 SLOW
112 FAST
113 IF INKEY#="2" THEN GOTO COD
115 IF INKEY#="3" THEN GOTO COD
117 IF INKEY#="4" THEN GOTO VAL
119 IF INKEY#="5" THEN GOTO COD
121 IF INKEY#="6" THEN GOTO VAL
123 GOTO VAL "200"
127 IF INKEY#="6" THEN GOTO VAL
128 GOTO VAL "80"
129 FAST
130 SLOW
131 SLOW
132 SLOW
133 FAST
134 IF INKEY#="4" THEN GOTO VAL
135 IF INKEY#="2" THEN GOTO COD
136 IF INKEY#="3" THEN GOTO COD
137 IF INKEY#="6" THEN GOTO VAL
138 GOTO CODE "B"
139 FAST
140 FAST
141 SLOW
142 SLOW
143 SLOW
144 SLOW
145 FAST
146 IF INKEY#="2" THEN GOTO COD
147 IF INKEY#="3" THEN GOTO COD
148 IF INKEY#="4" THEN GOTO VAL
149 IF INKEY#="5" THEN GOTO COD
150 GOTO VAL "200"

```

ONE-ARMED BANDIT



IF YOU are too lazy to stand up and gamble, **One-armed Bandit** is a fruit machine simulator for the 16K ZX-81, submitted by Andrew Jackson and Paul Jenner of Warrington, Cheshire.

The aim is to line-up the letters displayed on the three 'reels'. If you manage a jackpot, you are given the chance to take a fifty-fifty gamble with your winnings (Y/N). You can win five pence, or lose 10. Five points can also be won for a diagonal line.

Occasionally you are given a "nudge" option—i.e.,—the chance to change three letters. To move up the reel one place, press 1; for reel two, press 2; and press 3 for reel three. To move a reel down one place, press Q, W or E. If you do not wish to nudge, hit N.

The program usually will wait for some kind of input, so if in doubt hit a key; in desperation, hit RUN. Graphics notes:

1000—Inverse ABCDEABCDEABCDE.
DE.

1005—All inverse spaces, except for inverse hyphens after AS(A) and AS(B).

```

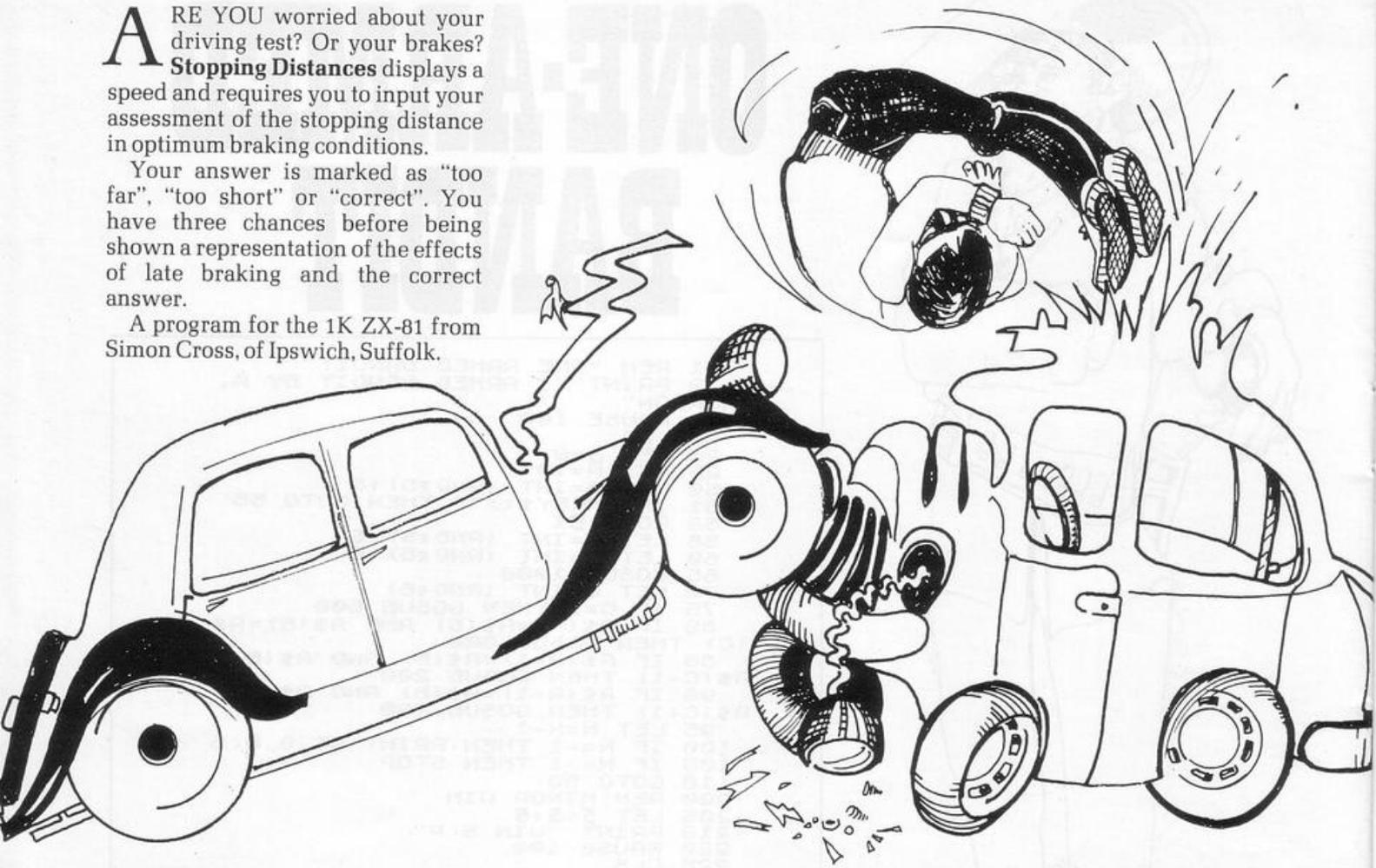
1 REM "ONE ARMED BANDIT"
2 PRINT "1 ARMED BANDIT BY A. JACKSON"
5 PAUSE 100
10 CLS
20 LET S=5
25 LET N=10
50 LET A=INT (RND#5)+6
51 IF INKEY#="" THEN GOTO 55
52 GOTO 51
55 LET B=INT (RND#5)+6
60 LET C=INT (RND#5)+6
55 GOSUB 1000
70 LET G=INT (RND#6)
75 IF G=1 THEN GOSUB 500
80 IF A$(A)=A$(B) AND A$(B)=A$(C) THEN GOSUB 300
85 IF A$(A+1)=A$(B) AND A$(B)=A$(C-1) THEN GOSUB 200
90 IF A$(A-1)=A$(B) AND A$(B)=A$(C+1) THEN GOSUB 200
95 LET N=N-1
100 IF N=-1 THEN PRINT AT 0,0;S
105 IF N=-1 THEN STOP
110 GOTO 50
200 REM MINOR WIN
205 LET S=S+5
210 PRINT "WIN 5 P"
220 PAUSE 100
225 CLS
230 RETURN
300 REM JACKPOT
305 PRINT AT 0,0;"JACKPOT"
310 LET K=10
320 PRINT AT 0,30;K
325 PAUSE 200
330 PRINT AT 0,0;"GAMBLE ?"
331 PRINT AT 0,30;K
335 IF INKEY#="N" THEN LET S=S+K
340 IF INKEY#="Y" THEN RETURN
345 IF INKEY#="Y" THEN GOTO 350
350 GOTO 300
355 LET L=INT (RND#2)
365 IF L=1 THEN LET K=K+5
370 IF L=0 THEN LET K=K-10
371 IF L=0 THEN LET S=S+K
375 IF L=0 THEN RETURN
380 IF K>=50 THEN LET S=S+K
385 GOTO 300
600 REM START OF NUDGE
603 LET H=0
605 PRINT AT 0,0;"NUDGE ?"
606 IF INKEY#="N" THEN CLS
610 IF INKEY#="N" THEN RETURN
615 IF INKEY#="1" THEN LET A=A+1
616 IF INKEY#="0" THEN LET A=A-1
617 IF INKEY#="W" THEN LET B=B-1
618 IF INKEY#="E" THEN LET C=C-1
620 IF INKEY#="2" THEN LET B=B+1
625 IF INKEY#="3" THEN LET C=C+1
630 IF INKEY#="" THEN LET H=H+1
645 IF INKEY#="" THEN GOSUB 1000
650 IF H>=3 THEN RETURN
655 GOTO 604
661 IF K>=50 THEN RETURN
1000 LET A$="ABCDEABCDE"
1001 CLS
1005 PRINT AT 7,16;"1 2 3"
A$(A-1) " " A$(B-1) " " A$(C-1)
A$(A) " " A$(B) " " A$(C)
A$(A+1) " " A$(B+1) " " A$(C+1)
1006 PRINT AT 0,0;N,S
1010 RETURN

```

ARE YOU worried about your driving test? Or your brakes? **Stopping Distances** displays a speed and requires you to input your assessment of the stopping distance in optimum braking conditions.

Your answer is marked as "too far", "too short" or "correct". You have three chances before being shown a representation of the effects of late braking and the correct answer.

A program for the 1K ZX-81 from Simon Cross, of Ipswich, Suffolk.

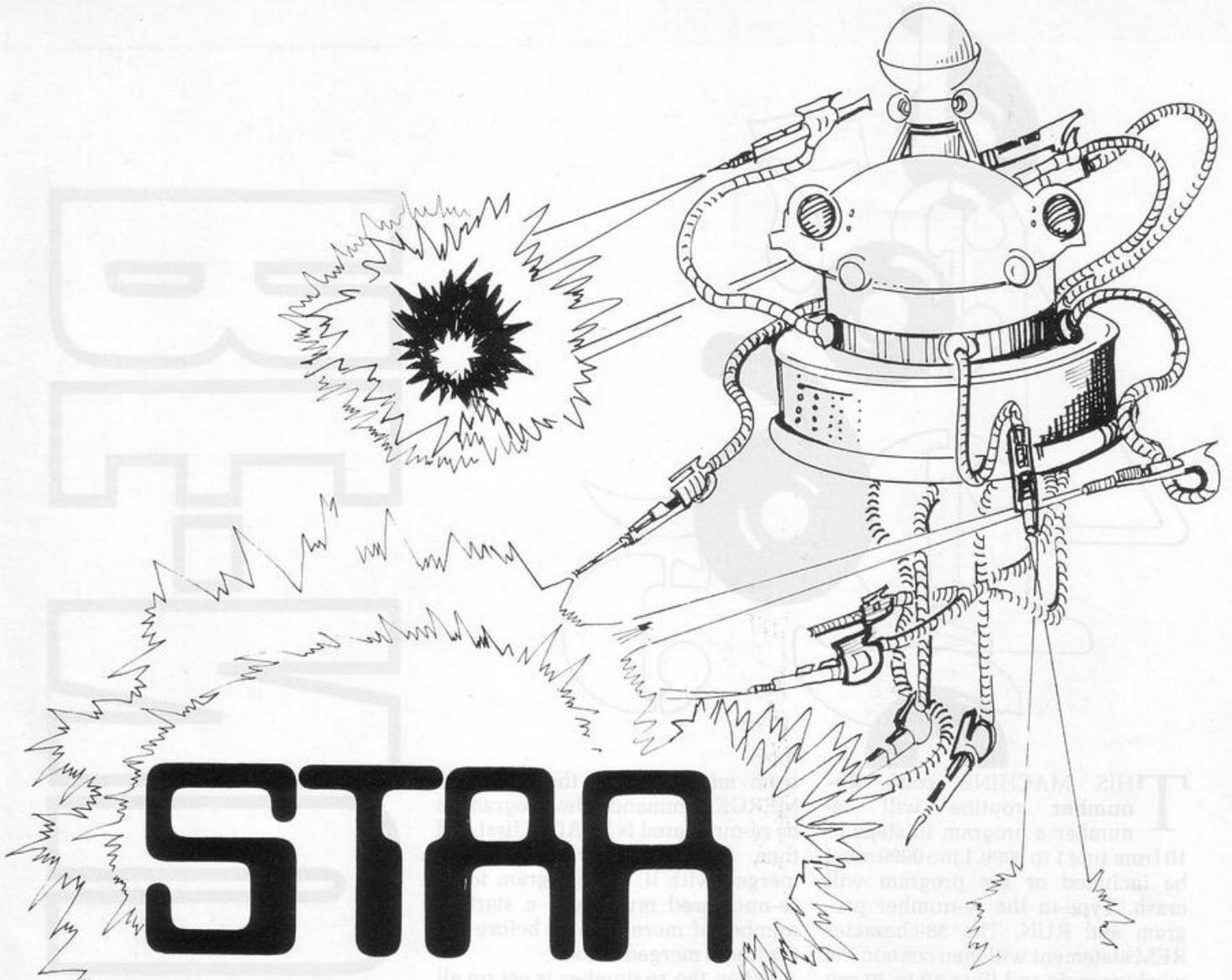


STOPPING DISTANCE

```

5 CLS
10 LET A=0
20 LET B=10*INT (RND*7)
30 IF B<20 THEN GOTO 20
40 LET C=B+(6-20)/10*.5*B+B
50 PRINT "WHAT IS THE MINIMUM
STOPPING"
60 PRINT "DISTANCE IN FEET FOR
A CAR"
70 PRINT "TRAVELLING AT ";B;"
M.P.H.?"
80 INPUT D
90 FOR N=5 TO 7
100 PRINT AT N,0;"
110 NEXT N
120 PRINT AT 5,0;D;" FEET"
130 LET A=A+1
140 IF C=D THEN GOTO 300
150 PRINT AT 7,0;"WRONG-";
160 IF D>C THEN PRINT "TOO FAR,
170 IF D<C THEN PRINT "TOO SHOR
T"
180 IF A=3 THEN GOTO 210
190 PRINT " TRY AGAIN"
200 GOTO 80
210 LET A$=""
220 LET B$=""
230 PRINT AT 9,17;A$;AT 10,15;B
$;AT 9,1;A$;AT 10,0;B$;
240 FOR N=0 TO 40
250 NEXT N
260 PRINT AT 9,3;A$;AT 10,2;B$;
AT 9,5;A$;AT 10,4;B$;AT 9,7;A$;A
T 10,6;B$;AT 9,9;A$;AT 10,8;B$;A
T 9,11;A$;AT 10,10;B$;AT 9,13;A$
;AT 10,12;B$;AT 9,15;A$;AT 10,14
;B$;AT 9,17;"
270 PRINT " CRUNCH"
280 PRINT "CORRECT ANSWER = ";C
;" FEET"
290 GOTO 330
300 IF A>1 THEN LET A$=" TRIES"
310 LLIST A=1 THEN LET A$=" TRY
320 PRINT AT 10,0;"CORRECT. YOU
NEEDED ";A;A$
330 PRINT AT 13,0;"PRESS N/L FO
R ANOTHER GO"
340 INPUT A$
350 RUN

```



STAR BATTLE

```

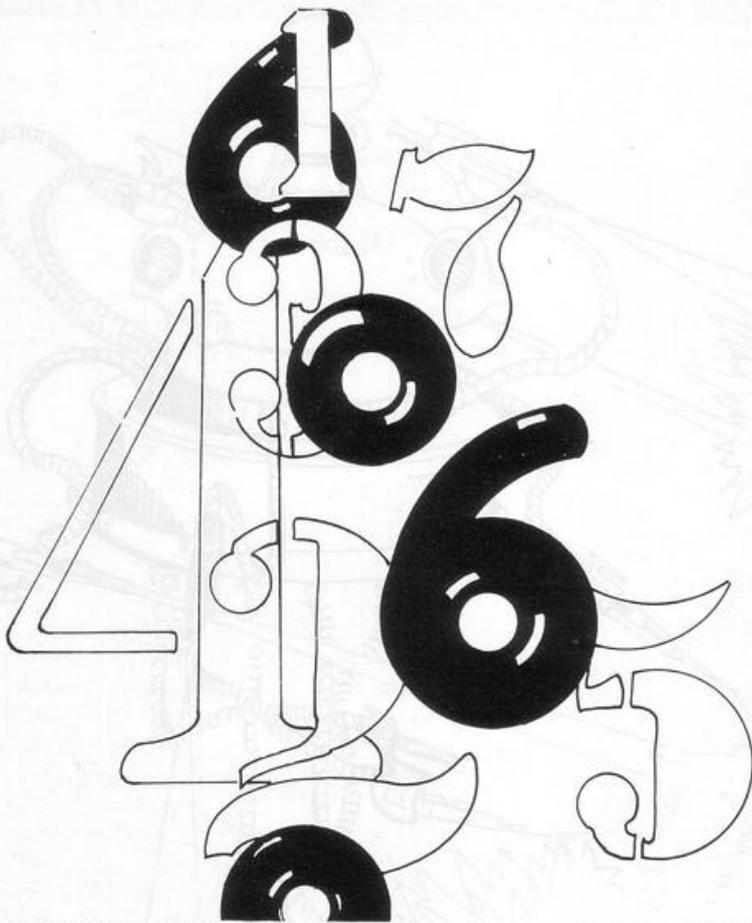
1 PRINT AT 21,0; "██████████"
2 PRINT AT 20,0; "AAAAAAAAAAAA"
  AAAAAAAAAAAAAAAAAAAAAA
3 LET Q=161
4 LET U=161
10 REM "STAR BATTLE"
20 LET A=10
30 LET B=INT (RND*21)
35 PRINT AT A-1,5; " "
40 PRINT AT A,5; CHR# 6; CHR# 6;
  CHR# 134
45 PRINT AT A+1,5; " "
49 PRINT AT B-1,23; " "
50 PRINT AT B,23; CHR# 6; CHR# U
  ; CHR# 134
55 PRINT AT B+1,23; " "
60 LET C=INT (RND*5)
70 IF C=2 THEN GOSUB 260
80 IF INKEY#="0" THEN GOSUB 19
0
1 90 IF INKEY#="7" THEN LET A=A-
1
100 IF INKEY#="6" THEN LET A=A+
1
110 IF C=0 THEN LET B=B-1

```

FIGHT the dreaded Ganglions in **Star Battle**. It is desperate hand-to-tentacle combat, an eyeball-to-eyestalk confrontation, fighting tooth and claw.

On the right is your omnivorous opponent, every pulsing pseudopod clutching a laser. You and it can sustain five hits before imploding in airless outer space. Go up with 7, down with 6, and fire the laser with 0.

Sent by Michael Jennings, of Barnsley, Yorkshire for the expanded ZX-81.



RE-NUMBER

THIS MACHINE code **Re-number** routine will re-number a program in steps of 10 from line 1 to 9999. Line 9999 must be included or the program will crash. Type-in the re-number program and RUN. The 38-character REM statement will then contain the machine code and lines 10 to 40 can be deleted.

Then you can type-in your program, not forgetting to put in line 9999 as the last number. Any time you want to re-number, type-in as a direct command PRINT USR 16514.

The routine for the ZX-81 was sent in by J. Stephenson of Bolton.

A similar program for the Spec-

trum makes use of the Spectrum MERGE command. The program to be re-numbered is LOADED first and then the re-number program is merged with it. The program to be re-numbered must have a starting number of more than 10 before the routine is merged with it.

When the re-number is set up all you have to do is run it. You will be asked to enter the start line you want and the required increment. When it has finished re-numbering, the program will STOP.

The program, submitted by W J Steen, of Halesowen, West Midlands, will not re-number GOTOs or GOSUBs.

ZX81

```

1 REM 12345678901234567890123
456789012345678
10 LET A$="217D40110A0046234E2
B3E27B820043E0DB9C8722373234E234
62309B73E0A8B3001145F18E0"
20 FOR A=0 TO 37
30 POKE 16514+A,16*CODE A$(A*2
+1)+CODE A$(A*2+2)-476
40 NEXT A

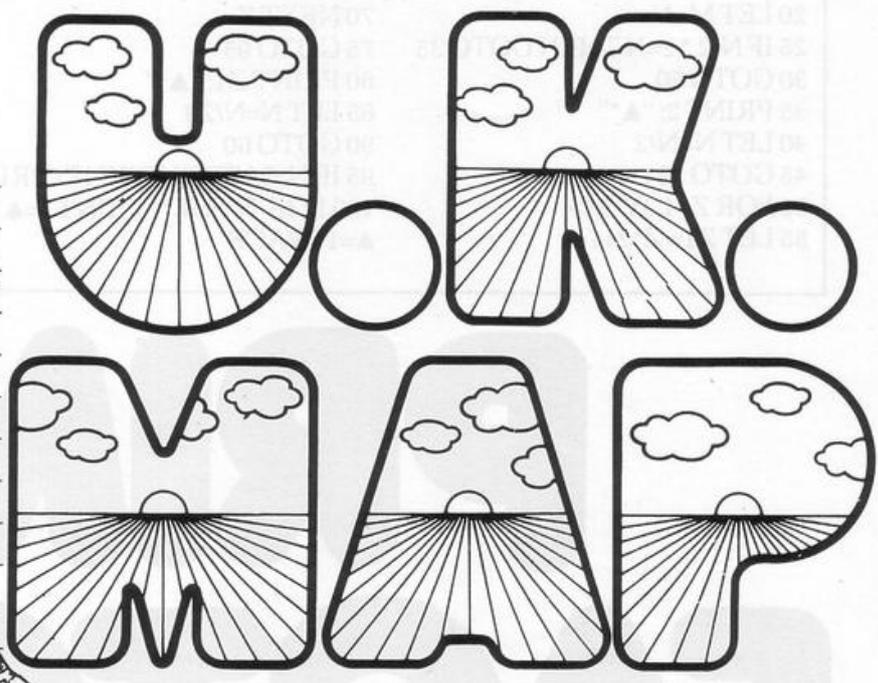
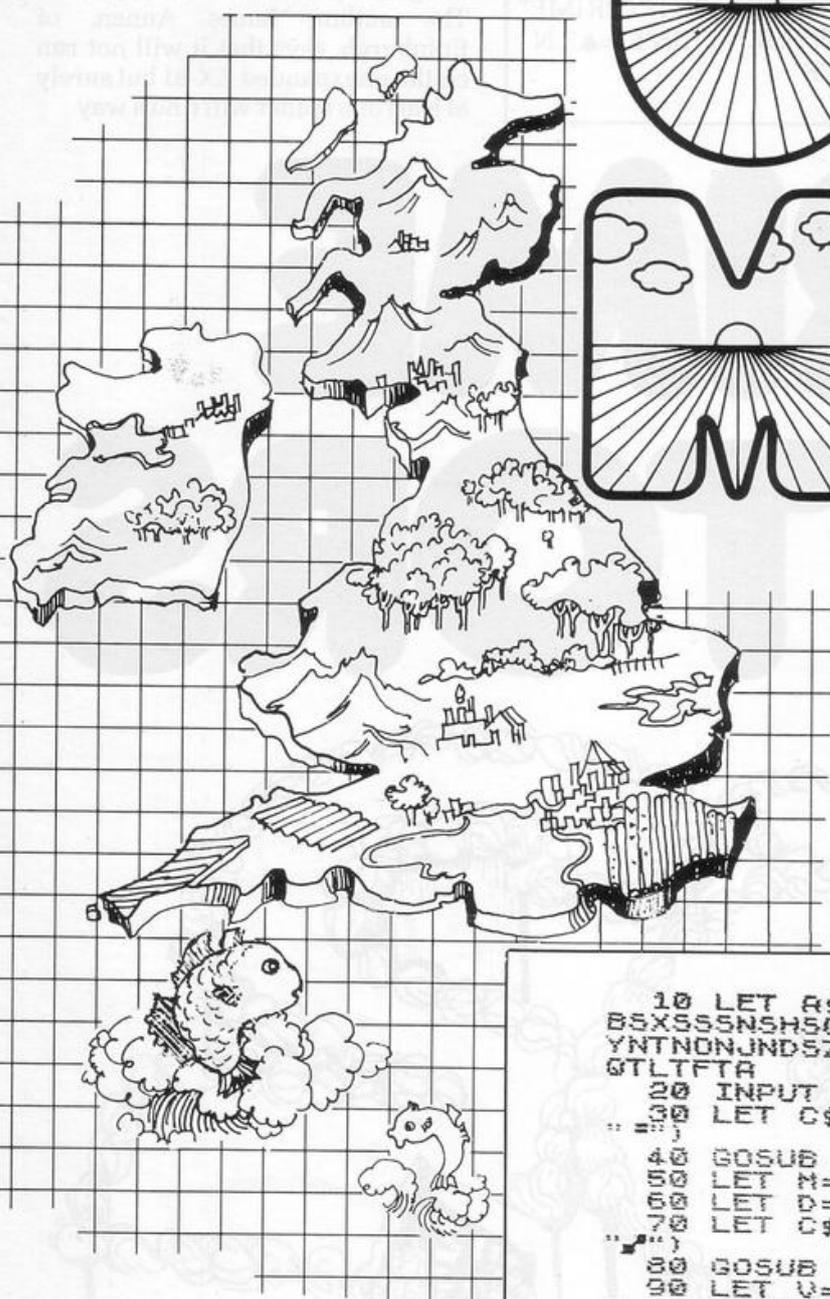
```

SPECTRUM

```

1 INPUT " start line and inc
rebase ? ";SL,IN: LET A=PEEK
23635+256*PEEK 23636
2 IF (256*PEEK A+PEEK (A+1))=
SL THEN GO TO 4
3 LET A=A+4+PEEK (A+2)+256*PE
EK (A+3): GO TO 2
4 LET A=A+4+PEEK (A+2)+256*PE
EK (A+3): LET SL=SL+IN
5 IF A=(PEEK 23627+256*PEEK
23628) THEN STOP
6 POKE A,INT (SL/256): POKE (
A+1),SL-INT (SL/256): GO TO 4

```



A USEFUL program for helicopter pilots and long-distance crows, is how D G Chapman describes his **U.K. Map** routine for the 1K ZX-81. AA handbooks and the like generally list towns with a four-figure reference number which refers to the 10-kilometre squares which make up the National Grid.

Input a pair of those numbers—e.g., SK57NW32—and the computer will calculate the distance in miles between the south-west corners of the relevant squares.

```

10 LET A$="5USRSM      NUNRNHNGN
BSXSSNSHSCNXNSNNHNGSYST5OSJSDN
YNTNONJNDSZSUSPSKSENZNU  NK  TVT
GTLTFTA      TRTHTG"
20 INPUT B$
30 LET C#=B$(CODE "=" TO CODE
40 GOSUB CODE "COS "
50 LET N=N
60 LET D=C
70 LET C#=B$(CODE "=" TO CODE
80 GOSUB CODE "COS "
90 LET V=ABS ((N-N)*CODE "="+V
AL B$(CODE "=")-VAL B$(CODE "=")
100 LET H=ABS ((C-D)*CODE "="+V
AL B$(CODE "=")-VAL B$(CODE "=")
110 PRINT INT (5OR (V**2+H**2))
#6.21;" M ";B$(1 TO 4);" TO ";
B$(5 TO 8)
120 STOP
200 FOR N=CODE "=" TO 107 STEP
CODE "="
210 IF C#=#A$(N TO N+CODE "=") T
HEN GOTO 230
220 NEXT N
230 FOR C=CODE "=" TO CODE "="
240 IF N<=CODE "=" THEN GOTO 27
0
250 LET N=N-CODE "="
260 NEXT C
270 RETURN

```

```

5 REM PRIME FACTORS: JDA
10 INPUT N
20 LET M=N
25 IF N/2 * 2=N THEN GOTO 35
30 GOTO 50
35 PRINT 2; "▲*"
40 LET N=N/2
45 GOTO 25
50 FOR Z=1 TO M/4
55 LET Z1= Z*2+1

```

```

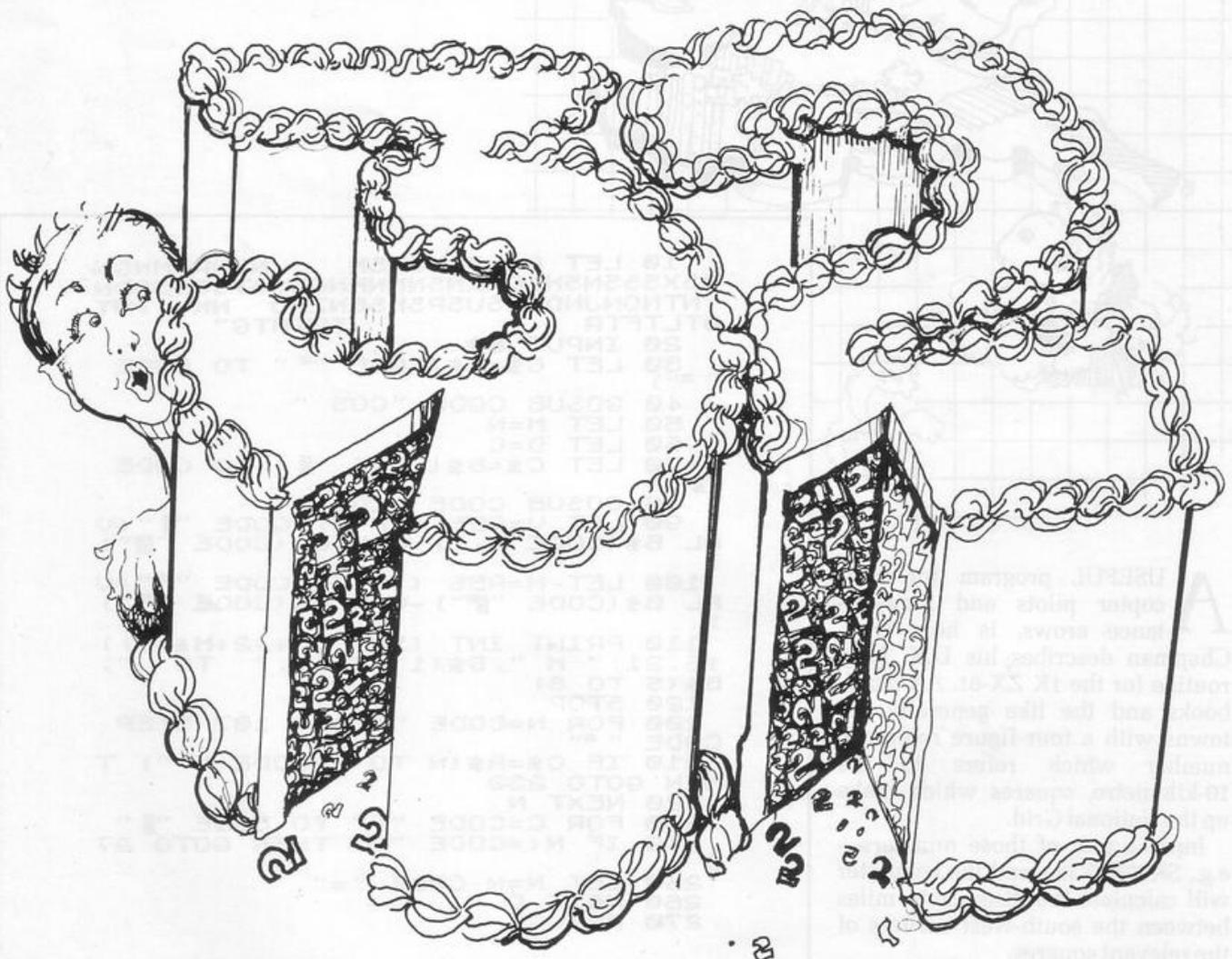
60 IF (N/Z1) * Z1=N THEN GOT 80
65 IF N=1 THEN GOTO 95
70 NEXT Z
75 GOTO 95
80 PRINT Z1; "▲*"
85 LET N=N/Z1
90 GOTO 60
95 IF N=M THEN PRINT "PRIME"
100 IF M-N THEN PRINT "=▲"; N
▲=1 SPACE

```

ALL SCHOOLCHILDREN could do with friendly help with mathematics especially when trying to find the prime factors of a number. **Prime Factors** runs on an unexpanded ZX-80 and, with a few lines changed, will run on a ZX-81.

The ZX-81 version needs an integer statement at lines 25 and 65. The author, James Annan, of Edinburgh, says that it will not run on the unexpanded ZX-81 but surely at least one reader will find a way.

PRIME FACTORS





POST MAN

POST MAN is one of those games which are so silly that they are good. You are a postman collecting mail from a post box at screen centre but obstructed by a hungry hound in the execution of your duty.

Fortunately, you can out-run the carnivorous canine—you are an express deliverer—and are able to score with every collection you collect.

Control the post man with the usual cursor keys and when you are caught, the number of collections made is displayed.

Submitted by Nicholas Sheard, of Prestbury, Cheshire, for a 1K ZX-81. Graphics Notes:

20 - Graphic 8, U, space, space, Graphic 4, 1.

120 - U, graphic 5.

```

10 PRINT "O POSTMAN"
20 PRINT "DOG"
30 PRINT "DOG"
40 PAUSE 200
50 LET S=0
60 LET A=INT (RND*10) + 0
70 LET B=INT (RND*10) + 0
80 LET C=0
90 LET D=0
100 LET D=R
110 PRINT AT 22,10: "O"
120 PRINT AT 22,10: "DOG"
130 PRINT AT 22,10: "DOG"
140 PRINT AT 0,10: "O"
150 PRINT AT 0,10: "DOG"
160 IF A=10 AND B=10 THEN LET S
=S+1
170 IF A=0 AND B=0 THEN PRINT "
GROWL...YOU DELIVERED ";S;" LETT
ERS";K
180 PRINT AT 21,15: "U"
190 LET B=B+0*(INKEY#="S") - 0*(I
NKEY#="S")
200 LET A=A+0*(INKEY#="D") - 0*(I
NKEY#="D")
210 IF C>A THEN LET C=C+1
220 IF C>B THEN LET C=C-1
230 IF C>0 THEN LET C=C-1
240 IF C<0 THEN LET C=C+1
250 CLS
260 GOTO 110

```

SOME OF the best graphics we have seen are the striking feature of this reaction game for the 16K ZX-81.

D G Lomas, of Dukinfield, Cheshire, who submitted **Outlaw**, has managed to achieve something approaching the effect of a slow animated film by drawing and re-drawing the outlaws as they fall dead.

There are five of the villains who reach for their guns in a random order. Your task is to press the appropriate key before they can kill you. The pleasure of shooting first is enhanced by those fine graphics.

Graphic Notes:

359 - Graphic shifted 1, graphic shifted 2.

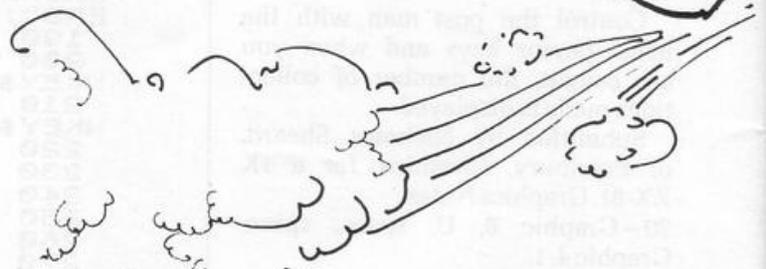
1010 - PRINT AT x(F)+I, Y; A & (I).

OUTLAW

```

1 RAND
5 LET F=0
6 LET N=0
7 DIM X(5)
8 DIM A(5)
10 DIM A$(14,5)
12 LET A$(1,1)="  "
14 LET A$(3,3)="  "
16 LET A$(4,4)="  "
20 FOR Y=2 TO 25 STEP 5
22 LET F=F+1
25 LET X(F)=INT (RAND*17)
30 LET A$(12)="  " + (CHR$( F+156
)) + " "
40 GOSUB 1000
50 NEXT Y
51 LET U=INT (RAND*71)+20
52 FOR S=1 TO U
54 NEXT S
55 LET T=INT (RAND*5)+1
56 FOR A=1 TO 5
58 IF A(A)=0 THEN GOTO 65
64 NEXT A
65 GOTO 162
66 IF A(T)=1 THEN GOTO 68
70 LET A(T)=1
80 LET Q=2+16*(T-1)
90 PRINT AT X(T)+2,0;"  ";TAB
0+3;"  "
100 LET L=INT (RAND*5)+3
105 LET T$=STR$ T
110 FOR A=1 TO L
120 IF INKEY$=T$ THEN GOTO 200
130 NEXT A
132 FOR U=1 TO 5
135 PRINT AT X(T)+2,0-2;"  ";TAB
0+5;"  "
138 PRINT AT X(T)+2,0-2;"  ";TAB
8 0+5;"  "
139 NEXT U
140 FOR U=1 TO 25
141 NEXT U
145 PRINT AT X(T)+2,0;"  ";TAB
0+3;"  "
150 PRINT AT X(T)+3,0;"  ";TAB
0+3;"  "
160 PRINT AT 0,10;"YOUR DEAD"
162 LET P$=""
163 IF N>1 OR N=0 THEN LET P$=""
$
166 PRINT AT 21,5;"YOU KILLED "
;N;" OUTLAW";P$
170 STOP
200 LET D=INT (RAND*4)+3
202 LET N=N+1
205 LET F=F
208 LET Y=2+16*(T-1)
210 GOSUB D+100
220 GOTO 51
300 LET A$(12)="  "
301 LET A$(11)="  "
302 LET A$(3)="  "
303 LET A$(4)="  "
310 GOSUB 1000

```



AW



```
315 LET A$(11)="
316 LET A$(12)="
318 LET A$(13)="
320 LET A$(14)="
322 GOSUB 1000
325 LET A$(11)="
335 LET A$(12)="
337 LET A$(13)="
340 GOSUB 1000
345 LET A$(14)="
350 GOSUB 1000
355 LET XIT=XIT+1
357 LET A$(13)="
359 LET A$(14)="
360 PRINT AT XIT,Y,"
365 GOSUB 1000
370 LET A$(11)="
372 LET A$(12)="
374 LET A$(13)="
376 LET A$(14)="
380 GOSUB 1000
385 LET A$(12)="
387 LET A$(13)="
389 LET A$(14)="
390 GOSUB 1000
398 RETURN
400 LET A$(12)="
401 LET A$(13)="
402 LET A$(14)="
403 LET A$(14)="
410 GOSUB 1000
415 LET A$(12)="
420 LET A$(13)="
422 GOSUB 1000
425 LET A$(13)="
428 LET A$(14)="
430 LET A$(12)="
432 LET A$(13)="
434 LET A$(14)="
435 FOR U=1 TO 6
436 NEXT U
440 GOSUB 1000
450 LET A$(13)="
452 LET A$(14)="
454 LET A$(14)="
456 LET A$(14)="
457 PRINT AT XIT,Y,"
458 FOR U=1 TO 6
459 NEXT U
460 GOSUB 1000
470 RETURN
500 LET A$(11)="
502 LET A$(12)="
504 LET A$(13)="
510 LET A$(13)="
515 GOSUB 1000
520 LET A$(11)="
522 LET A$(12)="
524 LET A$(13)="
526 LET A$(14)="
527 FOR U=1 TO 6
528 NEXT U
530 GOSUB 1000
540 LET A$(12)="
542 LET A$(13)="
544 LET A$(14)="
546 PRINT AT XIT,Y-1,"
550 GOTO 1000
560 RETURN
600 LET A$(12)="
601 LET A$(13)="
602 LET A$(14)="
603 LET A$(14)="
610 GOSUB 1000
615 LET A$(12)="
618 LET A$(13)="
620 LET A$(14)="
621 FOR U=1 TO 6
622 NEXT U
625 GOSUB 1000
630 LET A$(12)="
632 LET A$(13)="
634 LET A$(14)="
636 LET A$(13)="
638 FOR U=1 TO 6
639 NEXT U
640 GOSUB 1000
650 LET A$(11)="
652 LET A$(12)="
654 LET A$(13)="
656 LET A$(14)="
658 PRINT AT XIT,Y+3,"
660 GOSUB 1000
670 RETURN
1000 FOR I=1 TO 4
1010 PRINT AT XIT+I,Y,A$(I)
1020 NEXT I
1030 RETURN
```



SKY SHOOT



SKY SHOOT for the Spectrum is a kind of target shoot against the clock.

You have four targets—which you must destroy in an unreasonably short time.

Move left with 1, right with q and fire with 0.

A challenging game from David Price of Glenfields, Caerphilly, which proved too difficult for your fast-fingered reviewer.

```

1 CLS : BORDER 4: BEEP .25,0:
BEEP .5,4: BEEP .25,0: PRINT IN
K 2:"
100 PRINT AT 1,0:"SHOOT"
101 PRINT AT 2,0:""
2 PRINT AT 5,0: INK 0:"Use 1
to move right", "Use 2 to move le
ft", "Use 0 to fire"
3 PRINT AT 15,1:"PRESS ANY KE
Y TO START"
4 PAUSE 0
5 CLS
9 BORDER 1
10 LET s=10: LET g=0: LET a=1
30 LET b=g: LET c=5: LET d=g
50 LET e=d+d: LET f=e+e: LET g
=f+f: LET h=g+a
70 LET i=17: LET j=g: LET k=a
190 CLS
195 PRINT AT 4,5: INK 2:"
200 PRINT AT c,e,"*" AT c,f,"+"
AT c,g,"*" AT c,h,"+"
210 PRINT AT g+a,b: INK 3:"
220 PRINT AT g,s:"
230 PRINT AT i,s+a:"
240 PRINT AT i,s+a:"
242 LET u=u+1
244 IF i=c AND s+a=e OR i=c AND
s+a=f OR i=c AND s+a=g OR i=c A
ND s+a=h THEN LET j=j+1
245 IF i=c AND s+a=e THEN PRINT
INK 1:AT c,e:"" BEEP .25,1
246 IF i=c AND s+a=f THEN PRINT
INK 1:AT c,f:"" BEEP .25,1
247 IF i=c AND s+a=g THEN PRINT
INK 1:AT c,g:"" BEEP .25,1
248 IF i=c AND s+a=h THEN PRINT
INK 1:AT c,h:"" BEEP .25,1
250 IF i=c THEN GO TO 350

```

```

255 IF j=4 THEN GO TO 1000
256 IF s>=27 THEN LET s=27
257 IF s<=0 THEN LET s=0
260 IF INKEY$="q" THEN LET s=s-
a
270 IF INKEY$="1" THEN LET s=s+
a
280 IF INKEY$="0" THEN LET i=i-
a
290 IF u>=95 THEN GO TO 2000
300 GO TO 210
350 LET g=g+1
400 PRINT AT 21,0:"You have tak
en ",g,"shots"
402 PRINT AT 2,0: INK 0:"
1000 CLS
404 LET i=17
405 FOR w=1 TO 30
406 NEXT w
407 GO TO 210
1000 BORDER 2: PAPER 7: CLS
1001 PRINT AT 1,0: INK 1:"
1002 CLS
1005 PRINT AT 5,0: INK 2:"
1006 CLS
1010 PRINT AT 5,0: INK 1:"
1011 CLS
1015 PRINT AT 10,b: INK 0:"Aro
her targ (c/r)"
1020 INPUT a$
1030 IF a$="q" OR a$="y" THEN GO
TO 5
1035 STOP
2000 PAUSE 100: CLS
2002 PRINT AT 5,0: INK 2:"
2003 CLS
2004 PRINT AT 7,0: INK 0:"
2005 CLS
2006 PRINT AT 15,0: INK 1:"
2007 CLS
2010 INPUT a$
2020 IF a$="q" OR a$="y" THEN GO
TO 5

```



SCOFFER

SCOFFER is a version of the Pac-man game for the unexpanded ZX-81 and it is difficult. Move yourself around with the usual cursor keys to avoid the intelligent spooks which try their best to

corner you. Their best is always good enough.

Sometimes they approach from opposite sides, sometimes they corner you, and sometimes they will merge and chase you in tandem. A

final score is displayed and any key will re-start.

From Mark Blackwood, of Essington, West Midlands. Graphics notes:

6—Thirteen inverse full-stops.

```

1 LET A=INT PI
2 LET L=VAL "12"
3 LET B=VAL "2"
4 LET S=B-B
5 FOR F=S TO L
6 PRINT "          "
7 NEXT F
8 DIM X(A)
9 DIM Y(A)
10 FOR F=B/B TO B
11 LET X(F)=INT (RAND*L)
12 LET Y(F)=INT (RAND*L)
13 NEXT F
14 FOR F=B/B TO B
15 PRINT AT X(F),Y(F);CHR$ 128
16 LET Y(F)=Y(F)+5BN (Y(A)-Y IF
))
17 LET X(F)=X(F)+5BN (X(A)-X IF
))
18 PRINT AT X(A),Y(A);CHR$ 147
19 PRINT AT X(F),Y(F);CHR$ 192
20 IF X(F)=X(A) AND Y(F)=Y(A)
THEN GOTO A**A
21 NEXT F
22 PRINT AT X(A),Y(A);CHR$ 128
23 LET X(A)=X(A)+(INKEY$="6" A
ND X(A)<L)-(INKEY$="7" AND X(A)>
=L)/L)
24 LET Y(A)=Y(A)+(INKEY$="8" A
ND Y(A)<L)-(INKEY$="5" AND Y(A)>
=L)/L)
25 IF INKEY$<>" " THEN LET S=S+
A
26 GOTO VAL "14"
27 PRINT S
28 PAUSE L**A
29 CLS
30 RUN

```

```

1 REM SURROUND BY J.WINCHESTER
R
5 LET SX=0
6 LET SB=0
7 LET Q=PEEK 16396+256*PEEK 1
6397
10 POKE 16418,Q
20 PRINT AT 0,0; "*****"
30 FOR P=1 TO 22
40 PRINT "■"
50 NEXT P
60 PRINT "*****"
70 PRINT AT 2,2;STR$ SX;AT 2,2
8;STR$ SB
80 LET X=12
90 LET Y=3
100 LET B=12
110 LET C=23
120 LET X1=0
130 LET Y1=1
140 LET B1=0
145 LET C1=-1
150 IF PEEK (Q+1+Y+33*X) <> 0 THEN
N GOTO 400
160 IF PEEK (Q+1+C+33*B) <> 0 THEN
N GOTO 300
170 PRINT AT X,Y;"■";AT B,C;"■"

```

```

180 LET A=PEEK 16421
185 IF A=208 OR A=222 OR A=198
OR A=254 OR A=126 THEN LET X1=1
190 IF A=247 OR A=231 OR A=218
OR A=183 OR A=119 THEN LET X1=-1
200 IF X1 <> 0 THEN LET Y1=0
210 IF A=208 OR A=251 OR A=218
OR A=187 OR A=125 THEN LET Y1=1
215 IF A=237 OR A=221 OR A=253
OR A=189 OR A=125 THEN LET Y1=-1
220 IF Y1 <> 0 THEN LET X1=0
230 IF A=231 OR A=239 OR A=239
OR A=237 OR A=238 THEN LET B1=-1
235 IF A=119 OR A=123 OR A=128
OR A=126 OR A=127 THEN LET B1=1
240 IF B1 <> 0 THEN LET C1=0
245 IF A=219 OR A=219 OR A=223
OR A=221 OR A=222 THEN LET C1=1
250 IF A=183 OR A=187 OR A=189
OR A=191 OR A=198 THEN LET C1=-1
260 IF C1 <> 0 THEN LET B1=0
270 LET X=X+X1
280 LET Y=Y+Y1
290 LET B=B+B1
293 LET C=C+C1
295 GOTO 180
300 LET SX=SX+1
310 IF SX<15 THEN GOTO 7
320 STOP
400 LET SB=SB+1
410 IF SB<15 THEN GOTO 7

```

SURROUND



YOU WILL probably recognise **Surround** as soon as you RUN it. It is a version of a fairly standard routine in which you are required to surround your adversary before he can surround you. Both players are in continuous motion and are not allowed to cross their tracks or those of their opponent, or to hit the boundary or the score display.

What will surprise you is the way in which the ZX-81 can recognise two keys when pressed simultaneously. That is not possible using INKEY\$ and is achieved by utilising address 16421. This contains a number which changes as groups of keys are pressed. Lines 185 to 260 translate the number into a series of possible moves.

Black uses keys 1-5 to move up, Z-V to move down, Q-T for right and A-G for left. Grey uses the keys 6-0 for up, Y-P for right, B-M for down, and H-NEWLINE for left. After a crash the other player scores one; the winner is the first to reach 15.

The routine enabling two players to participate can obviously be used in many graphics games. J Winchester of London W13, submitted the program for the 16K ZX-81.

SOLITAIRE

HERE IS a version of **Solitaire** for the 16K ZX-81. The listing is very well done but so many checks are required for illegal moves that there is a lengthy pause between the display for each new position. See if you can condense it.

Line 1 contains the REM statement for the win routine. Enter it as listed, then type "POKE 16521, 126";

"POKE 16523, 118"; "POKE 16528, 119"; "POKE 16530, 120". LET and RETURN are listed by entering and deleting THEN.

Unfortunately we do not know how to win at Solitaire so we could not test the win routine. We have had to trust Mark Harper, of Swindon, Wiltshire, who sent the program.

```

1 REM EERNDR=CHR$ *7? RETURN ?
C=Y??"?COS / LET
2 GOSUB 9999
3 GOTO 1000
4 SLOW
10 PRINT AT 20,0;"MOVE FROM?"
";
15 INPUT F$
17 IF F$="" THEN GOTO 15
20 PRINT AT 20,9;" ";F$(1);","
;F$(2);
25 PRINT " TO?"
30 INPUT T$
32 IF T$="" THEN GOTO 30
34 PRINT AT 20,16;" ";T$(1);","
";T$(2)
36 LET F=VAL F$(1)
37 LET G=VAL F$(2)
38 LET T=VAL T$(1)
39 LET U=VAL T$(2)
40 IF S(F,G)=-1 THEN GOTO 10
50 IF S(T,U)=-1 THEN GOTO 10
60 IF F=G AND T=U THEN GOTO 10
70 IF VAL F$>77 OR VAL T$>77 OR
R VAL F$<11 OR VAL T$<11 THEN GO
TO 10
80 IF ABS (T-F)<>2 AND ABS (U-
G)<>2 THEN GOTO 10
85 IF F<>T AND G<>U THEN GOTO
10
86 LET X$=STR$ ((VAL F$+VAL T$
)/2)
87 IF S(F,G)=0 THEN GOTO 10
88 IF S(T,U)=1 THEN GOTO 10
89 IF S(VAL X$(1),VAL X$(2))=0
THEN GOTO 10
90 FAST
92 LET S(F,G)=0
100 LET S(T,U)=1
110 LET S(VAL X$(1),VAL X$(2))=
0
120 LET C=C+1
127 IF C=32 AND S(4,4)=1 THEN G
OTO 9999
1001 FAST
1002 CLS
1003 PRINT " 1 2 3 4 5 6 7"
1004 PRINT
1010 FOR A=1 TO 7
1020 PRINT A; " ";
1030 FOR B=1 TO 7
1040 IF S(A,B)=-1 THEN PRINT "
";

```



WIRE



```
1050 IF S(A,B)=1 THEN PRINT "O "
1060 IF S(A,B)=0 THEN PRINT "X "
1065 IF B=7 THEN PRINT A;
1070 IF B=7 THEN PRINT
1080 IF B=7 THEN PRINT
1090 NEXT B
1100 NEXT A
1110 PRINT " 1 2 3 4 5 6 7"
1111 PRINT AT 18,16;"MOVES:";C
1112 GOTO 8
8005 POKE 16527,0
8007 RAND USR 16514
8010 FOR X=1 TO 63
8020 POKE 16527,X
8030 RAND USR 16514
8040 NEXT X
8050 POKE 16527,0
8060 RAND USR 16514
8070 PRINT AT 9,0;
8080 PRINT AT 12,16;"CONGRATULAT
IONS"
8090 PRINT AT 21,17;"PRESS NEWLI
NE"
9100 INPUT N#
9110 CLS
9120 RUN
9001 FAST
9002 CLS
9005 LET C=0
9010 DIM S(7,7)
9020 FOR A=1 TO 7
9030 FOR B=1 TO 7
9040 IF A<>1 AND A<>2 AND A<>6 A
ND A<>7 THEN GOTO 9060
9045 IF B<>1 AND B<>2 AND B<>6 A
ND B<>7 THEN GOTO 9060
9050 LET S(A,B)=-1
9055 GOTO 9070
9060 LET S(A,B)=1
9070 NEXT B
9080 NEXT A
9090 LET S(4,4)=0
9100 PRINT AT 10,10;"INSTRUCTION
S? Y/N"
9110 INPUT Z$
9120 IF Z$="N" THEN RETURN
9130 SLOW
9140 CLS
9150 PRINT "
9160 PRINT " THE OBJECT OF TH
E GAME IS
9170 PRINT " TO REMOVE ALL THE
PEGS
9180 PRINT " EXCEPT THE LAST WH
ICH
9190 PRINT " MUST FINISH IN THE
CENTRE
9200 PRINT " SPACE.
9210 PRINT " SPACES ARE (X).
9220 PRINT " YOU TAKE PIECES B
Y HOPPING
9230 PRINT " OVER THEM INTO AN E
MPTY SPACE
9240 PRINT " BEYOND, REMOVING FRO
M PLAY THE
9250 PRINT " PIECE YOU HAVE HOP
PED OVER.
9270 PRINT " EACH MOVE MUST B
E MADE IN A
9280 PRINT " STRAIGHT LINE.
9310 PRINT " THE COMPUTER WILL
NOT
9320 PRINT " ACCEPT ILEGAL MOV
ES.
9330 PRINT "
9340 PRINT AT 21,17;"PRESS NEWLI
NE"
9350 INPUT N#
9360 RETURN
9410 SAVE "SOLITAIRE"
9420 PRINT AT 10,10;"SOLITAIRE"
9430 FOR X=1 TO 100
9440 NEXT X
9450 CLS
9460 RUN
```

LINEAL REGRESSION



```

1 REM "LR"
10 LET A=0
20 LET B=0
30 LET C=0
40 LET D=0
50 LET E=0
60 LET H=0
90 PRINT "HOW MANY PAIRS OF NUMBERS?"
100 INPUT N
105 CLS
110 PRINT "INPUT X THEN Y."
120 INPUT X
130 INPUT Y
135 CLS
140 LET A=A+X
150 LET B=B+Y
160 LET C=C+X*X
170 LET D=D+Y*Y
180 LET E=E+X*Y
190 LET F=A/N
200 LET G=B/N
210 LET H=H+1
220 IF H<N THEN GOTO 110
270 LET I=(N*E-A*B)/(N*C-A*A)
280 LET J=G-I*F
290 PRINT "Y=";J;"+";I;"X"
360 LET K=(N*E-A*B)/(N*D-B*B)
310 LET L=F-K*G
320 PRINT "X=";L;"+";K;"Y"
330 LET P=SQR (D/(N-1)-(B*B/(N*(N-1))))
340 LET Q=SQR (C/(N-1)-(A*A/(N*(N-1))))
350 PRINT "X SIGMA(N-1) = ";Q
360 PRINT "Y SIGMA(N-1) = ";P
370 LET G=SQR (((1/N)*C)-F*F)
380 LET R=SQR (((1/N)*D)-G*G)
390 PRINT "X SIGMA(N) = ";Q
400 PRINT "Y SIGMA(N) = ";R
410 LET S=((1/N)*E-(F*G))/(Q*R)
420 PRINT "CORRELATION COEFFICIENT (R) = "
430 PRINT "R=";S
440 PRINT "STANDARD ERROR OF ESTIMATE"
450 PRINT "S(Y) = ";R*SQR (1-S*S)
460 PRINT "S(X) = ";Q*SQR (1-S*S)

```

IF YOU are struggling with mathematics homework, **Lineal regression** calculates those tricky problems using the ZX-81. It relates both x to y and y to x, as well as giving the probable errors involved.

From Martyn Whitwood, of Rotherham, South Yorkshire.

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Something old, something new

the first

sinclair user annual

**The complete guide
to the last year
of Sinclair computers**

The world of Sinclair computers is fast-moving, with new developments almost daily. During the months since its launch in April, *Sinclair User* has attempted to keep you up-to-date with all that has been happening.

Now, however, we feel it is time to take stock of what has been happening during those months. So we have decided to publish *The First Sinclair User Annual*.

We have asked all our top writers to give their impressions of the last 12 months and chosen the best articles and programs from past issues.

It will allow you to keep abreast of some of the things you may have missed and to assimilate the changes which have overtaken all of us so quickly.

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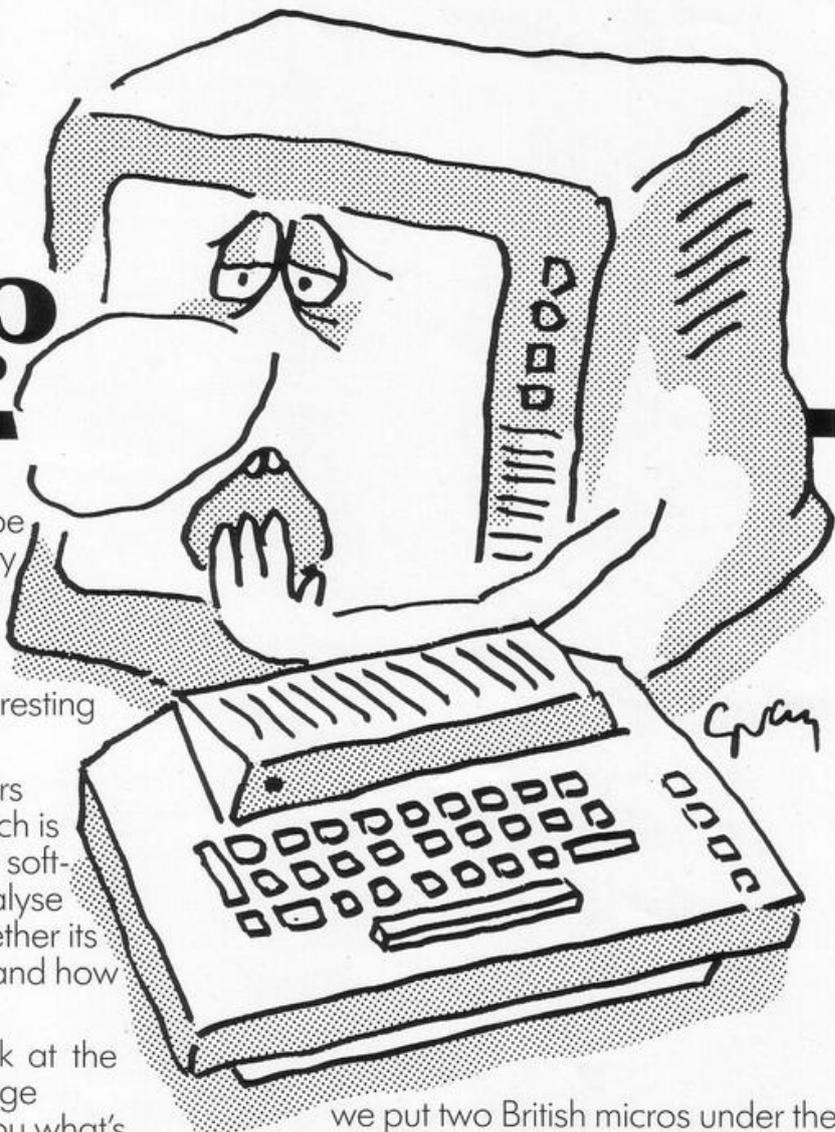
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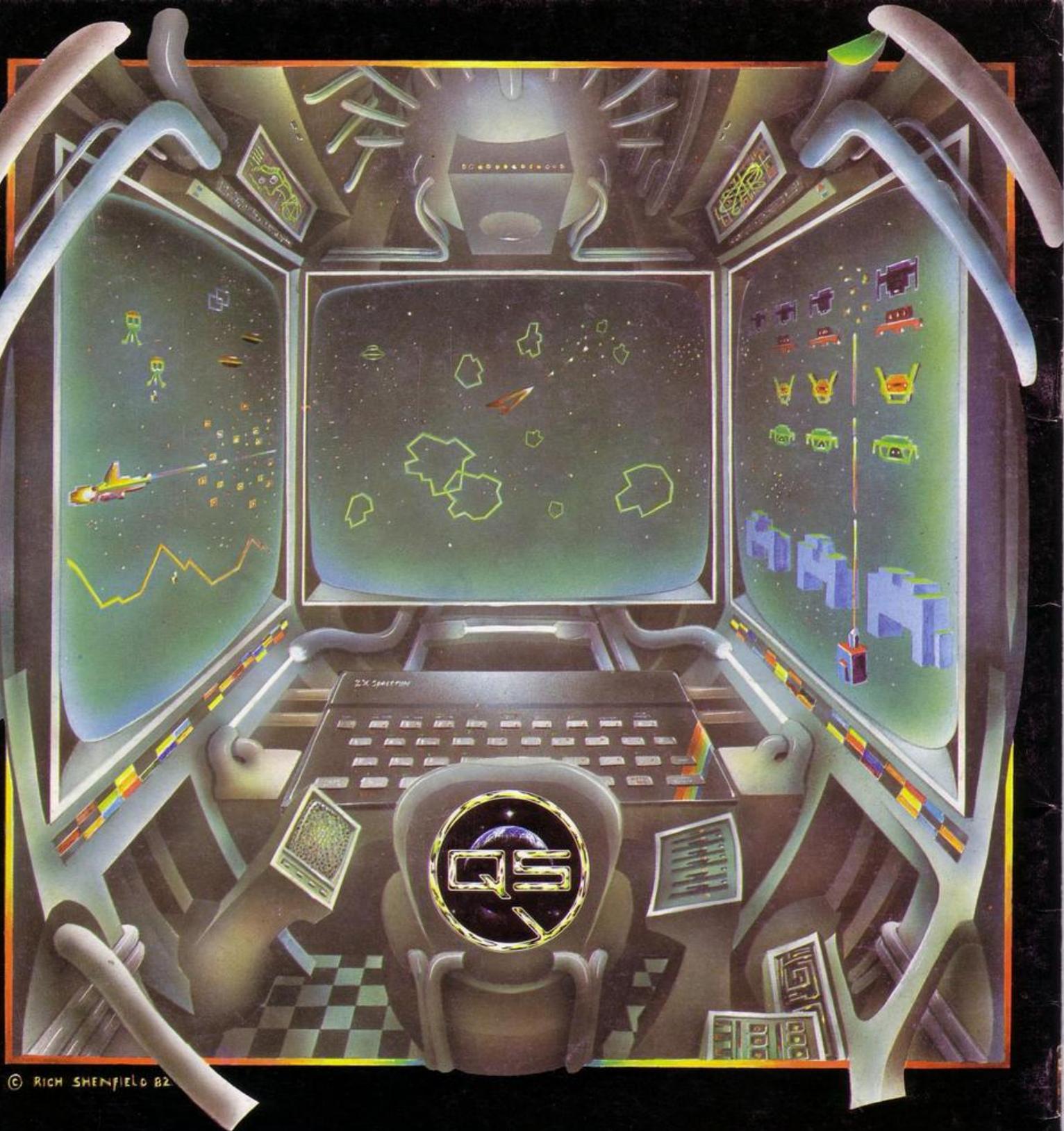


we put two British micros under the microscope – the new 64K MIMI 802, which made us wonder whether British could be best again. And the £89.95 JUPITER ACE which is not only very cheap, it's also the world's first micro to use FORTH. Does that make for speed, versatility and ease of programming – or should it have been left with the mainframes?

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