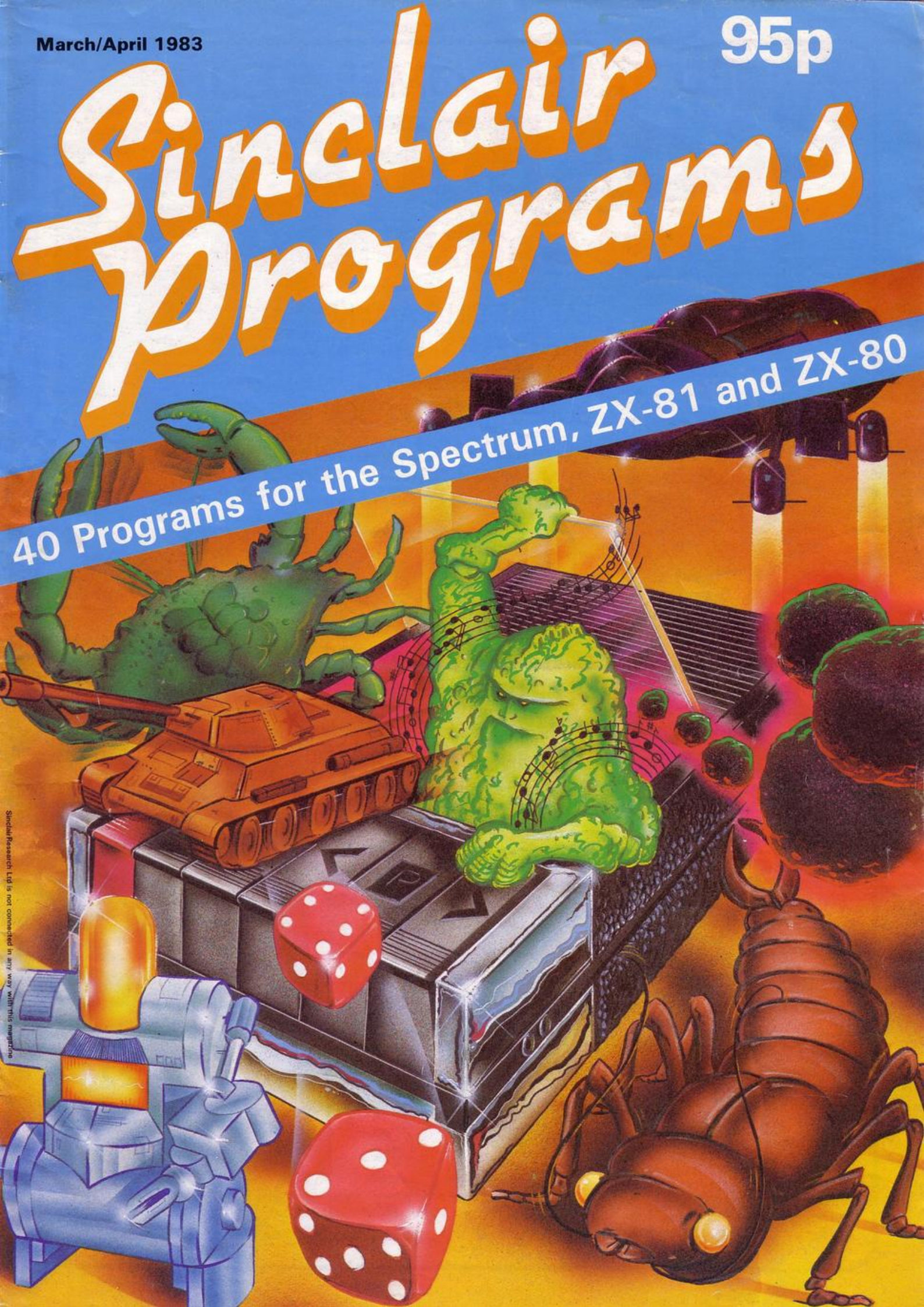
March/April 1983

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Sinclair Programs

40 Programs for the Spectrum, ZX-81 and ZX-80



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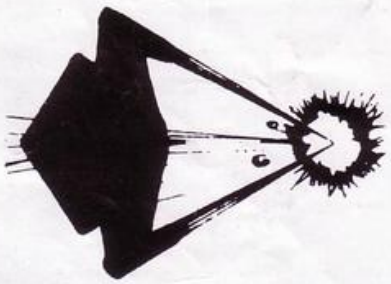
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Sinclair Programs is published bi-monthly by ECC Publications Ltd.

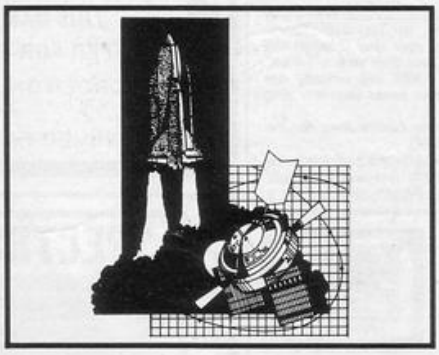
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Sinclair Programs
ISSN No 0263-0265
Printed and typeset by
Cradley Print PLC,
Warley,
West Midlands
Distributed by
Spotlight Magazine Distribution Ltd,
1 Benwell Road,
Holloway,
London N7
01-607 6411
Cover Illustration
Ivan Hissey

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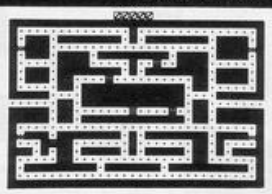
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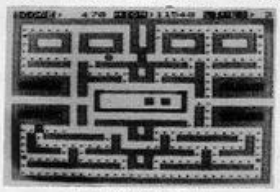
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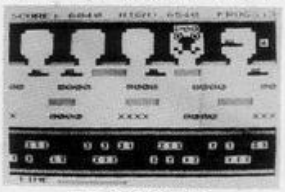


ZUCKMAN ZX81 (16K)

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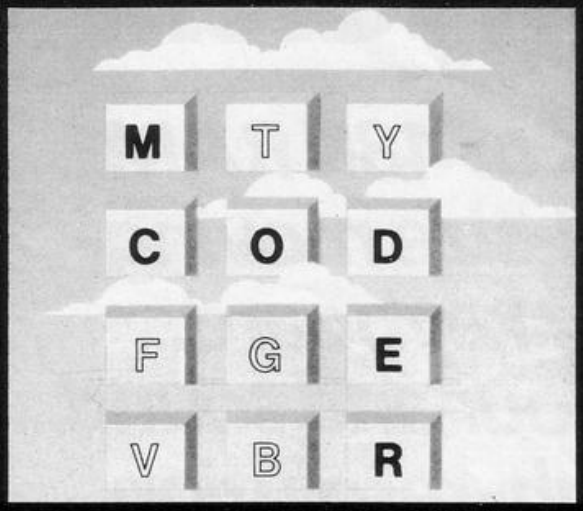
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Then, the ZX81. With up to 16K RAM available, and the ZX Printer. Giving more power and more flexibility. Together, they've sold over 500,000 so far, to make Sinclair world leaders in personal computing. And the ZX81 remains the ideal low-cost introduction to computing.

Now there's the ZX Spectrum! With up to 48K of RAM. A full-size moving-key keyboard. Vivid colour and sound. High-resolution graphics. And a low price that's unrivalled.

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The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

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You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM). 16K of RAM (which you can uprate later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £60.

Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232 / network interface board.



Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum



The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrive – coming soon

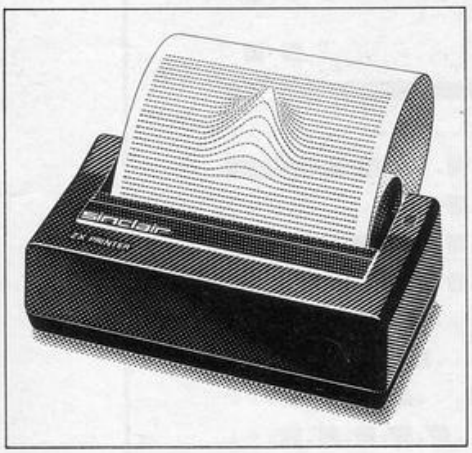
The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing.

Each Microdrive is capable of holding up to 100K bytes using a single interchangeable microfloppy.

The transfer rate is 16K bytes per second, with average access time of 3.5 seconds. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum.

All the BASIC commands required for the Microdrives are included on the Spectrum.

A remarkable breakthrough at a remarkable price. The Microdrives are available later this year, for around £50.





How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

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To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

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	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
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RS232/network interface board

This interface, available later this year, will enable you to connect your ZX Spectrum to a whole host of printers, terminals and other computers.

The potential is enormous. And the astonishingly low price of only £20 is possible only because the operating systems are already designed into the ROM.

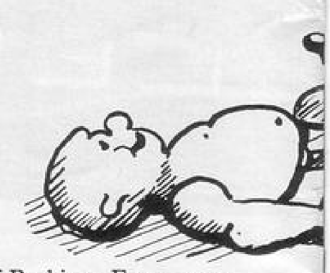
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JELLYM

```
   2 GO SUB 9000: LET a=0: LET b
=10: LET c=4: LET d=18: LET e=4:
 LET f=14: LET g=10: LET h=18: L
ET i=3: LET V$="●": LET j$="€":
BORDER 2: PAPER 2: INK 2: CLS :
PAPER 6
   3 FOR l=1 TO 20 STEP 2: BEEP
.1,l: NEXT l: FOR l=20 TO 1 STEP
 -2: BEEP .1,l: NEXT l
   9 DIM k$(20,27)
  10 LET k$(1)="                ■ ■
"
  20 LET k$(2)=" ■■■■■■■■■■■■ ■■
■■■■■■■■■"
  30 LET k$(3)=" ■....•.........
........•■"
  40 LET k$(4)=" ■.■...■■■■■■■■■
■■■■■■■■.■"
  50 LET k$(5)=" ■.■•............
.......■.■"
  60 LET k$(6)=" ■.■.■■■■•.■■■■■
■.•■.■.■.■"
  70 LET k$(7)=" ■.■.■.....■....
...■.■.■.■"
  80 LET k$(8)=" ■...■...■■■....
■■■■.■.•.■"
  90 LET k$(9)=" ■...■.■.■...■..
■.•..■...■"
  95 LET k$(10)="■■...■.■.■.■...
.■....■...■■"
 110 LET k$(11)="    .■.■.■.■.■.•.
.■.■■■■.■. "
 120 LET k$(12)="■■.■.■.■...■.■■
■■.■...■.■.■■"
 130 LET k$(13)=" ■.■.■.■■■.■...
.•...•.■.■.■"
 140 LET k$(14)=" ■...■...■.■■■■
■■■■...■...•■"
 150 LET k$(15)=" ■...■.■.■.....
.......■....■"
 160 LET k$(16)=" ■.■.■■■.■■■■■■
.•.■■■■■.■.■"
 170 LET k$(17)=" ■.■..•.........
.■....•...■.■"
 180 LET k$(18)=" ■...........•..
............■"
 200 LET k$(19)=" ■■■■■■■■■■■■ ■
■■■■■■■■■■■"
 210 LET k$(20)="               ■ ■
"
 220 PRINT : FOR l=1 TO 20: INK
2: PRINT "■";k$(l): NEXT l
 300 LET k$(h,i)=" "
 305 IF A>=978 THEN CLS : LET a=
0: BORDER 2: PAPER 2: INK 2: CLS
 : PAPER 6: GO TO 3
 310 IF INKEY$="" THEN GO TO 355
 315 IF INKEY$="5" THEN LET j$="
➤"
 320 IF INKEY$="6" THEN LET j$="
♠"
 325 IF INKEY$="7" THEN LET j$="
♥"
 330 IF INKEY$="8" THEN LET j$="
€"
 355 PRINT AT h,i;" "
 360 IF j$="♥" AND k$(h-1,i)<>"■
" THEN LET h=h-1
 370 IF j$="€" AND k$(h,i+1)<>"■
" THEN LET i=i+1: IF i>26 THEN L
ET i=2
 375 IF j$="♠" AND k$(h+1,i)<>"■
" THEN LET h=h+1: IF h>19 THEN L
ET h=2
 380 IF j$="➤" AND k$(h,i-1)<>"■
" THEN LET i=i-1: IF i<2 THEN LE
T i=26
 385 IF h<2 THEN LET h=20
 390 PRINT AT H,I; INK 0;v$
 395 IF k$(h,i)="." THEN LET a=a
+1: PRINT AT 0,0;"Score ";a: BEE
P .001,50
 400 IF k$(h,i)="•" THEN LET a=a
+50: PRINT AT 0,0;"Score ";a: GO
 SUB 7000
 405 PRINT AT b,g;k$(b,g): IF IN
T (RND*2)+(B>H) AND k$(b-1,g)<>"
■" THEN LET b=b-1
```

```
 410 IF INT (RND*2)+(B<H) AND k$
(b+1,g)<>"■" THEN LET b=b+1
 420 IF INT (RND*2)+(G>I) AND k$
(b,g-1)<>"■" THEN LET g=g-1
 425 IF INT (RND*2)+(G<I) AND k$
(b,g+1)<>"■" THEN LET g=g+1
 430 PRINT AT b,g; INK 1;"♠"
 435 PRINT AT H,I; INK 0;j$
 440 IF (b=h AND g=i) OR (c=h AN
D e=i) OR (d=h AND f=i) THEN PRI
NT AT h,i; FLASH 1;j$: FOR l=-20
 TO -40 STEP -1.5: BEEP .1,l: NE
XT l: STOP
 445 PRINT AT c,e;k$(c,e): IF IN
T (RND*2)+(C>H) AND k$(c-1,e)<>"
■" THEN LET c=c-1
 450 IF INT (RND*2)+(C<H) AND k$
(c+1,e)<>"■" THEN LET c=c+1
 455 IF INT (RND*2)+(E>I) AND k$
```



R BUNET of Barking, Essex, sent **Jellymen,** which bears some resemblance to a Spacman routine but has a character of its own.

Your monster is controlled by the usual cursor keys and must travel round the maze consuming food pellets, with a bonus of 50 points for the larger pellets. Jellyman ghosts wait to attack you, though occasionally a bold frontal attack on them will enable you to survive.

A running score is kept and the game stops when a monster catches you. (16K Spectrum). Graphics notes:

2-Graphic G; graphic A.
30—Larger dots should be entered as graphics.
315—Graphic B.
320—Graphic C
325—Graphic D
430—Graphic E

EN



```
(c,e-1)<>"■" THEN LET e=e-1
 460 IF INT (RND*2)+(E<I) AND k$
(c,e+1)<>"■" THEN LET e=e+1
 465 PRINT AT c,e; INK 2;"■"
 470 PRINT AT d,f;k$(d,f): IF IN
T (RND*2)+(D>H) AND k$(d-1,f)<>"
■" THEN LET d=d-1
 475 IF INT (RND*2)+(D<H) AND k$
(d+1,f)<>"■" THEN LET d=d+1
 480 IF INT (RND*2)+(F>I) AND k$
(d,f-1)<>"■" THEN LET f=f-1
 485 IF INT (RND*2)+(F<I) AND k$
(d,f+1)<>"■" THEN LET f=f+1
 490 PRINT AT d,f; INK 3;"■"
 495 GO TO 300
7000 BEEP .1,-8
7001 RETURN
8999 GO TO 1
9000 DATA 0,BIN 01000010,BIN 111
00111,BIN 11111111,BIN 11111111,
BIN 11111111,BIN 01111110,BIN 00
111100
9010 DATA BIN 00111100,BIN 01111
110,BIN 11111100,BIN 11111000,BI
N 11111000,BIN 11111100,BIN 0111
1110,BIN 00111100
9020 DATA BIN 00111100,BIN 01111
110,BIN 00111111,BIN 00011111,BI
N 00011111,BIN 00111111,BIN 0111
1110,BIN 00111100
9025 DATA BIN 00111100,BIN 01111
110,BIN 11111111,BIN 11111111,BI
N 11111111,BIN 11100111,BIN 0100
0010,0
9030 DATA BIN 01111100,BIN 11111
110,BIN 10010010,BIN 10010010,BI
N 11111110,BIN 11111110,BIN 1111
1110,BIN 10101010
9032 DATA 0,0,BIN 00011000,BIN 0
0111100,BIN 00111100,BIN 0001100
0,0,0
9034 DATA BIN 00111100,BIN 01111
110,BIN 11111111,BIN 11111111,BI
N 11111111,BIN 11111111,BIN 0111
1110,BIN 00111100
9035 DATA 24,60,126,219,219,255,
219,145
9040 RESTORE 9000
9045 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9050 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9060 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9065 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9070 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9075 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9078 FOR f=0 TO 7: READ a: POKE
USR "■"+f,a: NEXT f
9080 RETURN
```

V.A.T



VAT CALCULATOR should be an ideal aid for all small businesses. It allows you to input the name of the item, its cost and the VAT payable. The program will then give you the total and the running total.

Options available are copy to printer and continue, i.e., for customer copy or shop copy; copy to printer and stop; keep running total and continue, e.g., copy not required but total kept; keep running total and stop, i.e., end of particular transaction; start again.

Line 2000 saves the program and runs its automatically on loading. This very useful program was submitted by D G Price of Caerphilly, Glamorgan. (16K Spectrum). Graphics note: 130—extended.

```
ITEM       COST      VAT%  TOTAL
-----------------------------------
ZXSPEC    |£152.17   |15  |£175
BIKE      |£99.35    |15  |£114.94
SHED      |£101.45   |25  |£126.81
LOCK      |£2.78     |15  |£3.2
TAPES     |£3.33     |15  |£3.83
OIL       |£5.76     |25  |£7.03
PETROL    |£12.35    |15  |£14.21
FOOD      |£45.73    |0   |£45.73
DOOR      |£67.78    |15  |£77.95
NAILS     |£3.91     |15  |£4.5
PUTTY     |£4.13     |8   |£4.46
SAW       |£7.78     |15  |£8.95
SWEETS    |£1.02     |15  |£1.17
PAPERS    |£3.36     |0   |£3.36
PAINT     |£9.99     |15  |£11.49
MAGS.     |£6.23     |15  |£7.16
PIPES     |£6.69     |25  |£8.61
CARPET    |£89.56    |15  |£102.99
          |          |    |
-----------------------------------
      TOTAL = 618.65
```

```
  5 BORDER 2: CLS
  6 POKE 23609,100
 10 PRINT AT 0,8; INK 2;"VAT CA
LCULATOR": PRINT AT 2,0;"Full in
structions are contained";AT 4,0
;"within the programme";AT 6,6;
INK 4;"© DAVID PRICE 1982"
 20 PRINT AT 18,4; INK 1; FLASH
 1;"PRESS ANY KEY TO BEGIN"
 25 PAUSE 0: BORDER 6: CLS
 40 LET cf=0
 50 LET l=1
 100 PRINT AT 0,0; INK 1;"ITEM";
AT 0,10; INK 2;"COST";AT 0,18; I
NK 3;"VAT%";AT 0,24; INK 4;"TOTA
L"
 120 PRINT INK 2;AT 1,0;"-------
-------------------------"
 125 PRINT INK 2;AT 20,0;"_______
_________________________"
 130 FOR f=2 TO 20: PRINT AT f,5
;"|": PRINT AT f,17;"|": PRINT A
T f,21;"|": NEXT f
 190 LET l=l+1
 200 INPUT "item ? ";a$
 205 LET len=LEN a$
 206 IF LEN a$>6 THEN GO TO 200
 210 PRINT AT l,0; INK 1;a$
 300 INPUT "cost ? ";a
 310 PRINT AT l,7; INK 2;"£";a
 400 INPUT "vat ? ";v
 410 PRINT AT l,18; INK 3;v
 500 LET total=INT (a*v+.5)/(100
)+a
 510 PRINT AT l,22; INK 2;"£";to
tal
 515 IF l=19 THEN GO TO 1000
 520 IF l=2 THEN LET sum=total
 540 IF l>2 THEN LET sum=sum+tot
al
 560 PRINT AT 21,5; INK 2;"TOTAL
 = ";sum+cf;"  "
 565 BEEP .3,10: INPUT FLASH 1;
INK 2; BRIGHT 1;"Any key to Cont
.(S) to Stop";s$
 570 IF s$="s" OR s$="S" THEN GO
 TO 1000
 600 GO TO 190
1000 INPUT BRIGHT 1; INK 1; PAPE
R 7;"Copy to Print and cont.Y/N?
";a$
1010 IF a$="y" OR a$="Y" THEN CO
PY : LET cf=cf+sum: CLS : LET l=
1: CLS : PRINT AT 21,5; INK INT
(RND*7);"TOTAL = ";cf;"
": GO TO 100
1020 INPUT BRIGHT 1; INK 2; PAPE
R 7;"Copy to print and stop Y/N?
";a$
1030 IF a$="y" OR a$="Y" THEN CO
PY : STOP
1040 INPUT BRIGHT 1; INK 3; PAPE
R 7;"Keep total and cont.Y/N?";a
$
1050 IF a$="y" OR a$="Y" THEN LE
T cf=cf+sum: CLS : LET l=1: CLS
: PRINT AT 21,5; INK INT (RND*7)
;"TOTAL = ";cf;"                 ": GO
TO 100
1060 INPUT BRIGHT 1; INK 1; PAPE
R 7;"Keep total and stop.Y/N?";a
$
1065 IF a$="y" OR a$="Y" THEN ST
OP
1070 INPUT "Start again Y/N? ";a
$
1075 IF a$="y" OR a$="Y" THEN CL
S : PAUSE 50: RUN
1080 STOP
2000 SAVE "vat" LINE 5
```



The Sight of Music

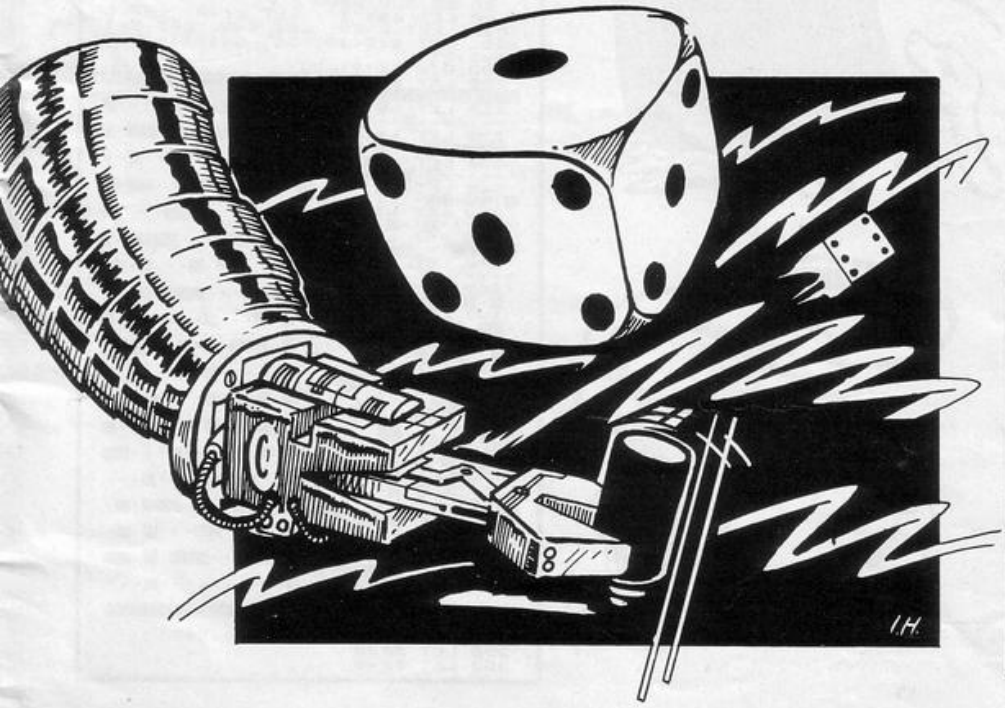
```
  10 FOR X=1 TO 5
  20 GOSUB 500
  30 NEXT X
  40 FOR Z=1 TO 31 STEP 2
  50 INPUT A$
  60 IF A$="" THEN GOTO 110
  70 IF A$="S" THEN STOP
  80 IF A$>"G AND " OR A$<"A" TH
EN GOTO 600
  90 GOSUB 700
 100 PRINT AT N,Z;"(inverse SPAC
E)"
 110 NEXT Z
 120 FOR X=1 TO 200
 130 NEXT X
 140 CLS
 150 RUN
 500 PRINT
 510 PRINT "(thirty two graphic
As)"
 520 RETURN
 600 FOR P=1 TO 10
 610 PRINT AT 18,0;"CANNOT USE"
 620 NEXT P
 630 PRINT AT 18,0;"           "
 640 GOTO 50
 700 IF LEN A$=1 THEN LET N=44-C
ODE A$
 710 IF LEN A$=2 AND A$(2 TO )="
1" THEN LET N=51-CODE A$
 720 IF LEN A$=2 AND A$(2 TO )="
2" THEN LET N=58-CODE A$
 730 RETURN
```

THE SIGHT OF MUSIC was written for beginners studying music who want to know what a tune will look like on paper or who want to learn the note positions on a stave.

When a string is entered, the program prints, one at a time, up to 16 notes along the stave as black squares in the correct places. The program is set up to cover the open bass strings on a guitar and up to G on the top E string. Lower octaves may be entered according to the pattern "GI" or "A2".

The authors of the program, David and Peter Fox, of Gosport, Hampshire, say that the routine could be adapted, with an expanded machine, to read whole strings of notes. (1K ZX-81).

81 DICE ROLLER



AS PART of our useful subroutines service, we present a dice-shuffling routine for the ZX-81.

It was submitted by C Stitch of Sutton Coldfield, who says that many of his friends have found the sub-routine useful while writing programs of their own. (1K ZX-81).

```
  5 REM "DICE"
 10 PRINT AT 7,12;"(5*IS;27*S;I
S;3*S;IS;27*S;IS;3*S;IS;27*S;IS;
27*S;IS;3*S;IS;27*S;5*IS)"
 20 LET X=INT (RND*6)+1
 30 IF X=1 THEN PRINT AT 9,14;"
O"
 40 IF X=2 THEN PRINT AT 8,15;"
O";AT 10,13;"O"
 50 IF X=3 THEN PRINT AT 8,15;"
O";AT 9,14;"O";AT 10,13;"O"
 60 IF X=4 THEN PRINT AT 8,13;"
O O";AT 10,13;"O O"
 70 IF X=5 THEN PRINT AT 8,13;"
O O";AT 10,13;"O O";AT 9,14;"O"
 80 IF X=6 THEN PRINT AT 8,13;"
O O";AT 9,13;"O O";AT 10,13;"O O
"
```



SP

WE FEEL as if we are lost in a trackless maze, pursued by vengeful ghosts and forced to consume endless quantities of your Spacman programs — but we like it.

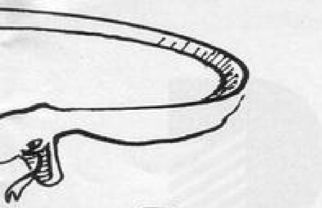
The latest breakthrough is from Duncan Anderson of Bishops Frome, Worcester, who has managed to incorporate power pills and intelligent ghosts, which pursue you alternately with carnivorous cunning or flee from you with the agility born of terror. The maze is suitably spaghetti-like, Mr Pacman's jaws face forward, there are exits, and a novel feature is the bomb you can leave behind you if the ghost's icy breath is too close on your collar.

You have only one life in **Spacman III** and there are only two ghosts which do not return to the centre when killed. An additional problem is that the ghost's direction finder becomes confused by corners. A possible way round the problem is to use only straight lines to form the walls of the maze, as do some of the commercial versions of the game.

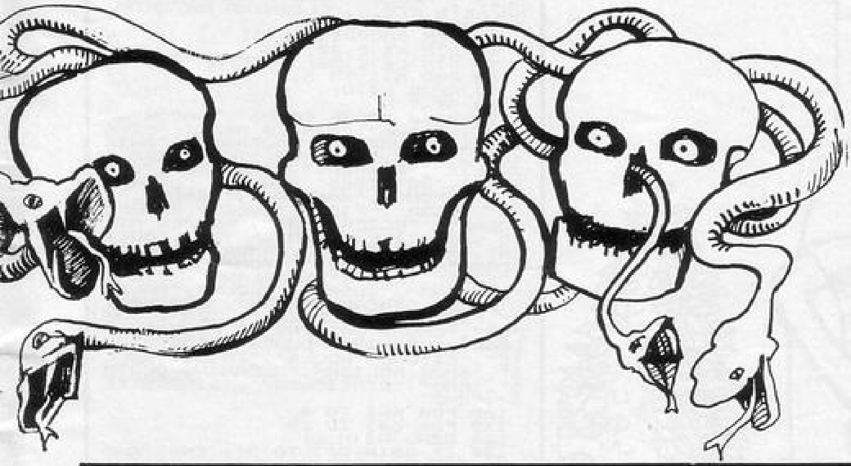
We would say this listing is a big leap forward and we feel sure that there must be some Clive Sinclair clone who can put all the pieces together and supply us with the real thing (48K Spectrum).

Graphics notes:
88,540 etc—Graphic R.
110—Dots are graphic.
420, etc—Graphic P.
510, etc—Graphic L.
520, etc—Graphic D.
530, etc—Graphic U.
2740, etc—Graphic G.

```
  5 LET logo=0
  10 RESTORE : DATA 0,0,0,BIN 00
011000,BIN 00011000,0,0,0,0,BIN
1000010,BIN 11100111,255,255,BIN
 11111110,BIN 111100,BIN 11000,BI
N 00001100,BIN 111110,BIN 11111
00,BIN 11111000,BIN 1111000,BIN 1
111100,BIN 111110,BIN 11100
  12 DATA 0,BIN 00011000,BIN 001
11100,BIN 01111110,255,255,BIN 1
1100111,BIN 01000010
  14 DATA BIN 00111000,BIN 01111
100,BIN 00111110,BIN 00011110,BI
N 00011110,BIN 00111110,BIN 0111
1100,BIN 00111000
  16 DATA BIN 00011110,BIN 00111
100,BIN 01111110,BIN 10010011,BI
N 10010011,255,255,BIN 11010101
  18 DATA 0,BIN 01111110,BIN 010
00010,BIN 01011010,BIN 01011010,
BIN 01000010,BIN 01111110,0
  20 FOR n=0 TO 7: READ x: POKE
USR "o"+n,x: NEXT n
  30 FOR n=0 TO 7: READ x: POKE
USR "u"+n,x: NEXT n
  40 FOR n=0 TO 7: READ x: POKE
USR "r"+n,x: NEXT n
  50 FOR n=0 TO 7: READ x: POKE
USR "d"+n,x: NEXT n
  60 FOR n=0 TO 7: READ x: POKE
USR "l"+n,x: NEXT n
  70 FOR n=0 TO 7: READ x: POKE
USR "g"+n,x: NEXT n
  80 FOR n=0 TO 7: READ x: POKE
USR "p"+n,x: NEXT n
  85 GO SUB 9800
  88 LET m$="€": LET sc=0: LET b
on=0: LET x=20: LET y=2: LET gx1
=10: LET gx2=10: LET gy1=11: LET
 gy2=21
  90 DIM b$(21,31)
 100 LET b$(1)="
 110 LET b$(2)="
 120 LET b$(3)="
 130 LET b$(4)="
 140 LET b$(5)="
 150 LET b$(6)="
 160 LET b$(7)="
 170 LET b$(8)="
 180 LET b$(9)="
 190 LET b$(10)="
 200 LET b$(11)="
 210 LET b$(12)="
 220 LET b$(13)="
 230 LET b$(14)="
 240 LET b$(15)="
 250 LET b$(16)="
 260 LET b$(17)="
 270 LET b$(18)="
 280 LET b$(19)="
 290 LET b$(20)="
 300 LET b$(21)="
340 LET bx=999: LET by=999
350 LET pp=0
355 LET ex=0
```

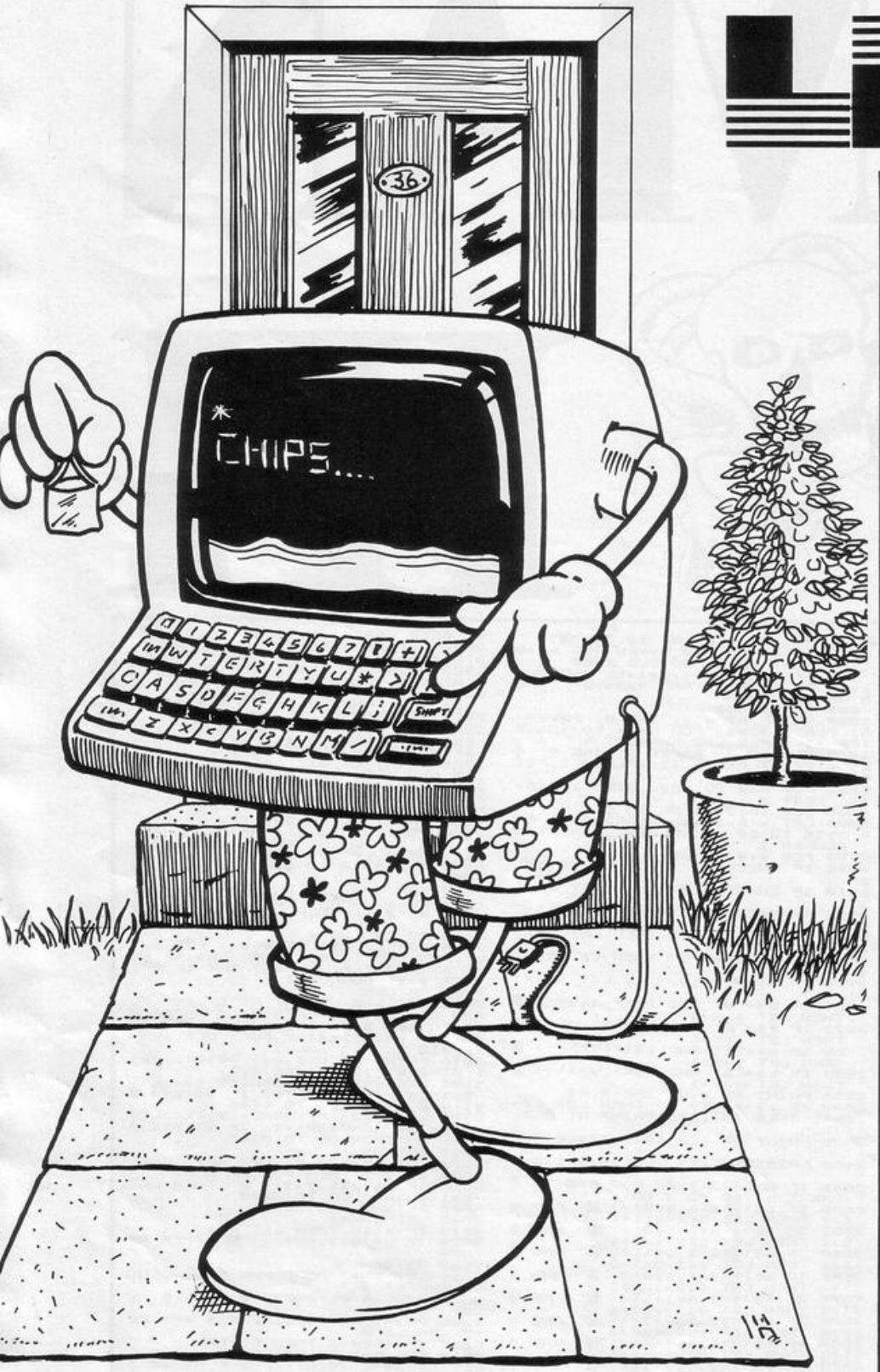


PACMAN III



```
 360 LET b=0
 370 LET ppx=INT (RND*20+1): LET
 ppy=INT (RND*30+1)
 380 IF b$(ppx,ppy)="■" THEN GO
TO 370
 400 BORDER 1: PAPER 7: INK 1: C
LS
 410 PRINT "■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■": FOR n=1 TO 21: PR
INT "■";b$(n): NEXT n
 420 PRINT AT ppx,ppy; INK 2;"◘"
;AT 10,1; INK 6; PAPER 1;"◘";AT
10,31; INK 6; PAPER 1;"◘"
 500 IF INKEY$="" THEN GO TO 550
 510 IF INKEY$="5" THEN LET m$="
◗"
 520 IF INKEY$="6" THEN LET m$="
♠"
 530 IF INKEY$="7" THEN LET m$="
♥"
 540 IF INKEY$="8" THEN LET m$="
◖"
 545 IF b=0 AND INKEY$="0" THEN
GO SUB 7000
 550 PRINT AT x,y;" ": LET b$(x,
y)=" "
 560 IF m$="♥" AND b$(x-1,y)<>"■
" THEN LET x=x-1
 570 IF m$="♠" AND b$(x+1,y)<>"■
" THEN LET x=x+1
 580 IF m$="◖" AND b$(x,y+1)<>"■
" THEN LET y=y+1
 585 IF m$="◗" AND b$(x,y-1)<>"■
" THEN LET y=y-1
 590 PRINT INK 0;AT x,y;m$;
 600 IF b$(x,y)="·" THEN LET sc=
sc+1: BEEP .015,5: PRINT AT 0,2;
sc+bon
 610 IF sc=342 OR sc=784 OR sc=1
226 OR sc=1668 THEN GO TO 4000
 620 IF gx1=gx2 AND gy1=gy2 THEN
 GO SUB 9000
 635 PRINT AT gx2,gy2;b$(gx2,gy2
)
 640 PRINT AT gx1,gy1;b$(gx1,gy1
)
 641 IF RND<.2 THEN FOR n=0 TO 1
0: NEXT n: GO TO 700
 650 IF b$(gx1+1,gy1)<>"■" AND g
x1<x THEN LET gx1=gx1+1
 655 IF b$(gx2+1,gy2)<>"■" AND g
x2<x THEN LET gx2=gx2+1
 660 IF b$(gx1-1,gy1)<>"■" AND g
x1>x THEN LET gx1=gx1-1
 665 IF b$(gx2-1,gy2)<>"■" AND g
x2>x THEN LET gx2=gx2-1
 670 IF b$(gx1,gy1+1)<>"■" AND g
y1<y THEN LET gy1=gy1+1
 675 IF b$(gx2,gy2+1)<>"■" AND g
y2<y THEN LET gy2=gy2+1
 680 IF b$(gx1,gy1-1)<>"■" AND g
y1>y THEN LET gy1=gy1-1
 685 IF b$(gx2,gy2-1)<>"■" AND g
y2>y THEN LET gy2=gy2-1
 740 PRINT AT gx1,gy1; INK 3;"ᗣ"
 745 PRINT AT gx2,gy2; INK 3;"ᗣ"
 746 IF pp=0 THEN PRINT AT ppx,p
py; INK 2;"◘"
 748 IF b=1 THEN PRINT AT bx,by;
 INK 4;"◘"
 750 IF (gx1=x AND gy1=y) OR (gx
2=x AND gy2=y) THEN GO TO 1000
 760 PRINT AT 0,2;sc+bon
 765 IF ex>5 THEN GO TO 780
 770 IF x=10 AND y=2 AND m$="◗"
THEN PRINT AT x,y;" ": BORDER 6:
 BEEP .1,24: LET y=30: BORDER 1:
 GO TO 779
 775 IF x=10 AND y=30 AND m$="◖"
THEN PRINT AT x,y;" ": BORDER 6
: BEEP .1,24: LET y=2: BORDER 1:
 GO TO 779
 778 GO TO 780
 779 LET ex=ex+1: IF ex>5 THEN P
RINT AT 10,1;"■";AT 10,31;"■"
 780 IF x=ppx AND y=ppy AND pp=0
 THEN LET pp=1: GO SUB 2000
 790 IF b=1 AND ((gx1=bx AND gy1
=by) OR (gx2=bx AND gy2=by)) THE
N GO SUB 8000
 800 GO TO 500
1000 PRINT AT x,y; INK 0; PAPER
6; FLASH 1;m$: FOR n=24 TO -24 S
TEP -1: BEEP .05,n: NEXT n
1002 BORDER 0: PAPER 0: INK 6: C
LS : PRINT AT 10,11; FLASH 1;"SC
ORE: ";sc+bon
1004 FOR n=0 TO 100: BEEP .01,n-
50: NEXT n
1005 LET logo=1: GO TO 6
2000 LET bon=bon+5: BORDER 2: FO
R n=10 TO 20: BEEP .05,n: NEXT n
: BORDER 1
2100 FOR w=0 TO 20
2500 IF INKEY$="" THEN GO TO 255
0
2510 IF INKEY$="5" THEN LET m$="
◗"
2520 IF INKEY$="6" THEN LET m$="
♠"
2530 IF INKEY$="7" THEN LET m$="
♥"
2540 IF INKEY$="8" THEN LET m$="
◖"
2550 PRINT AT x,y;" ": LET b$(x,
y)=" "
2560 IF m$="♥" AND b$(x-1,y)<>"■
" THEN LET x=x-1
2570 IF m$="♠" AND b$(x+1,y)<>"■
" THEN LET x=x+1
2580 IF m$="◖" AND b$(x,y+1)<>"■
" THEN LET y=y+1
2585 IF m$="◗" AND b$(x,y-1)<>"■
" THEN LET y=y-1
2590 PRINT AT x,y; INK 2;m$
2600 IF b$(x,y)="·" THEN LET sc=
sc+1: BEEP .01,20: PRINT AT 0,2;
sc+bon
2635 PRINT AT gx2,gy2;b$(gx2,gy2
)
2640 PRINT AT gx1,gy1;b$(gx1,gy1
)
2641 IF RND<.3 THEN FOR n=0 TO 1
0: NEXT n: GO TO 2700
2650 IF b$(gx1+1,gy1)<>"■" AND g
x1>x THEN LET gx1=gx1+1
2655 IF b$(gx2+1,gy2)<>"■" AND g
x2>x THEN LET gx2=gx2+1
2660 IF b$(gx1-1,gy1)<>"■" AND g
x1<x THEN LET gx1=gx1-1
2665 IF b$(gx2-1,gy2)<>"■" AND g
x2<x THEN LET gx2=gx2-1
2670 IF b$(gx1,gy1+1)<>"■" AND g
y1>y THEN LET gy1=gy1+1
2675 IF b$(gx2,gy2+1)<>"■" AND g
y2>y THEN LET gy2=gy2+1
2680 IF b$(gx1,gy1-1)<>"■" AND g
y1<y THEN LET gy1=gy1-1
2685 IF b$(gx2,gy2-1)<>"■" AND g
y2<y THEN LET gy2=gy2-1
2740 PRINT AT gx1,gy1; INK 0;"ᗣ"
2745 PRINT AT gx2,gy2; INK 0;"ᗣ"
2750 IF (gx1=x AND gy1=y) OR (gx
2=x AND gy2=y) THEN GO TO 3000
2770 IF x=10 AND y=2 AND m$="◗"
THEN PRINT AT x,y;" ": BEEP .01,
24: LET y=30
2775 IF x=10 AND y=30 AND m$="◖"
 THEN PRINT AT x,y;" ": BEEP .05
,24: LET y=2
2800 NEXT w
2900 BORDER 0: FOR n=0 TO 3: BEE
P .1,0: BEEP .1,1: NEXT n: BORDE
R 1
2910 RETURN
3000 PRINT AT x,y; BRIGHT 1; FLA
SH 1; INK 2; PAPER 0;"ᗣ"
3010 FOR m=1 TO 3: FOR n=12 TO 2
4: BEEP .05,n: NEXT n: NEXT m
3020 LET bon=bon+25: PRINT AT 0,
2;sc+bon
3021 PRINT AT gx1,gy1;b$(gx1,gy1
);AT gx2,gy2;b$(gx2,gy2)
3022 LET gx1=INT (RND*20+1): LET
 gy1=INT (RND*30+1): IF b$(gx1,g
y1)="■" THEN GO TO 3022
3026 LET gx2=INT (RND*20+1): LET
 gy2=INT (RND*30+1): IF b$(gx2,g
y2)="■" THEN GO TO 3026
3028 PRINT AT gx1,gy1; INK 3;"ᗣ"
;AT gx2,gy2; INK 2;"ᗣ"
3030 RETURN
4000 LET sc=sc+100: BORDER 6: PA
PER 6: INK 1: CLS
4010 PRINT AT 10,30; INK 2;"◘"
4020 FOR j=1 TO 27: PRINT AT 10,
j; INK 3;" ᗣ";AT 10,j+3; INK 0;"
◖": BEEP .05,j: NEXT j
4030 FOR n=12 TO 24: BEEP .01,n:
 NEXT n
4040 FOR j=27 TO 1 STEP -1: PRIN
T AT 10,j; INK 0;"ᗣ ";AT 10,j+3;
 INK 2;"◗ ": BEEP .05,50-j: NEXT
 j
4050 GO TO 100
7000 BORDER 4: LET bx=x: LET by=
y: FOR n=0 TO 20: BEEP .01,n: NE
XT n: PRINT AT bx,by; INK 4;"◘":
 LET b=1: BORDER 1
7100 RETURN
8000 LET b=2: PRINT AT bx,by; FL
ASH 1; INK 4; PAPER 0;"ᗣ": FOR n
=0 TO 40: BEEP .01,n: NEXT n: PR
INT AT bx,by;b$(bx,by): LET bon=
bon+15
8010 PRINT AT gx1,gy1;b$(gx1,gy1
);AT gx2,gy2;b$(gx2,gy2)
8100 LET gx1=INT (RND*20)+1: LET
 gy1=INT (RND*30)+1: IF b$(gx1,g
y1)="■" THEN GO TO 8100
8108 LET gx2=INT (RND*20)+1: LET
 gy2=INT (RND*30)+1: IF b$(gx2,g
y2)="■" THEN GO TO 8108
8200 RETURN
9000 LET gx1=20-x: LET gy1=30-y
9005 IF y=1 THEN GO SUB 9600
9010 IF b$(gx1,gy1)="■" THEN LET
 gy1=gy1-1: GO TO 9005
9500 RETURN
9600 LET x=x+1
9610 IF x>19 THEN LET x=1
9620 IF b$(gx1,gy1)<>"■" THEN RE
TURN
9640 RETURN
9800 LET a$="  SPACMAN 3 by DUNC
AN ANDERSON "
9801 BORDER 0: PAPER 0: INK 6: C
LS
9802 PRINT AT 10,8;"PRESS ANY KE
Y": PAUSE 0
9805 IF logo=1 THEN RETURN
9810 FOR n=1 TO 31: BEEP .01,n:
LET b$=a$(1 TO n): PRINT AT 10,3
1-LEN b$;b$: NEXT n
9815 FOR n=0 TO 100: NEXT n
9820 FOR n=0 TO 30: PRINT AT 10,
n;" ";AT 10,n+1; INK 3; BRIGHT 1
;"◖": BEEP .1,10+n: NEXT n
9830 PRINT AT 10,31;" "
9840 PRINT AT 2,9;"INSTUCTIONS:"
;AT 5,6; INK 7;"◖";AT 7,6; INK 3
;"ᗣ";AT 9,6; INK 2;"◘";AT 11,6;
INK 6;"◘";AT 13,6; INK 4;"◘"
9850 FOR n=0 TO 4: PRINT AT 5+2*
n,8;"···· ": NEXT n
9860 PRINT AT 5,14;"YOU";AT 7,14
;"GHOST";AT 9,14;"POWER PILL";AT
 11,14;"EXIT";AT 13,14;"BOMB (PR
ESS 0)"
9870 FOR n=-10 TO 40: BEEP .1,n:
 NEXT n
9900 RETURN
```

SHOPPING LIST




```
  10 REM SHOPLIST © 1982 N COPAG
E
  20 DATA "MEAT","FRUIT & VEGETA
BLES","FROZEN FOOD","CANS,JARS,
PACKETS ETC.","CLEANING MATERIAL
S","SUNDRY ITEMS"
  30 REM SHOPPING LIST
  40 DIM A$(6,20,20)
  50 DIM L$(6,32)
  60 FOR N=1 TO 6
  70 READ L$(N)
  80 NEXT N
  90 DATA "PORK CHOPS","BACON","
HAM","STEAK","MINCED MEAT","LIVE
R","LAMB CHOPS","SAUSAGES","CHIC
KEN","END","ONIONS","TOMATOES","
GARLIC","PEPPERS","CABBAGE","CAR
ROTS","POTATOES","SALAD","ORANGE
S","LEMONS","BANANAS","PEARS","E
ND","FISH","FISH FINGERS","HAMBU
RGERS","FROZEN PEAS","FROZEN MIX
ED VEG","ICE CREAM","MILK","BUTT
ER","MARGARINE","YOGHURT","END",
"CANNED TOMATOES","TOMATO PUREE"
,"SOUP","JAM","MARMALADE","OIL",
"VINEGAR","SUGAR","FLOUR","SALT"
,"RICE","BREAD","RICE","SPAGHETT
I","BREAKFAST CEREAL","TEA","COF
FEE","END","WASHING UP LIQUID","
SOAP","WASHING POWDER","TOOTHPAS
TE","KITCHEN ROLLS","TOILET ROLL
S","SHOE POLISH","CLEANING CLOTH
S","END","STATIONERY","CIGARETTE
S","END"
 100 FOR N=1 TO 6
 110 FOR C=1 TO 20
 120 READ A$(N,C)
 130 IF A$(N,C)( TO 3)="END" AND
N(=5 THEN NEXT N
 140 IF A$(N,C)( TO 3)="END" AND
N=6 THEN GO TO 160
 150 NEXT C
 160 GO SUB 570: REM BORDER/INTR
O
 170 FOR N=1 TO 6
 180 CLS : PRINT TAB 5;">>>";L$(
N)
 190 FOR C=1 TO 20
 200 IF A$(N,C)( TO 3)="END" AND
n(=5 THEN GO TO 750
 210 IF A$(N,C)( TO 3)="END" AND
n=6 THEN GO TO 320
 220 PRINT AT C,5;A$(N,C)
 230 IF INKEY$="" THEN GO TO 230
 240 FLASH 0
 250 LET X$=INKEY$
 260 IF X$<>"y" AND X$<>"n" THEN
GO TO 230
 270 IF X$="y" THEN LET A$(N,C)=
"X"+A$(N,C)
 280 IF X$="y" THEN GO SUB 700
 290 IF X$="n" THEN GO SUB 730
 300 NEXT C
 310 NEXT N
 320 LPRINT INVERSE 1;"S H O P P
I N G   L I S T "
 330 LPRINT
 340 FOR N=1 TO 6
 350 LPRINT ">>>";L$(N)
 360 FOR C=1 TO 20
 370 IF A$(N,C)(3 TO )="END" THE
N NEXT N
 380 IF A$(N,C)(1)="X" THEN LPRI
NT A$(N,C)(2 TO )
 390 NEXT C
 400 LPRINT
 410 NEXT N
 420 PRINT AT 10,5;"ANYTHING ELS
E?"
 430 PRINT  AT 12,5;"TYPE IN & E
NTER"
 440 PRINT AT 14,5;"OR PRESS N T
O STOP"
 450 LPRINT "+ + + +": LPRINT
 460 INPUT W$
 470 IF W$<>"" AND W$<>"N" THEN
LPRINT W$
 480 IF W$="" THEN GO TO 500
 490 GO TO 460
 500 FOR K=1 TO 4
 510 LPRINT " "
 520 NEXT N
 530 CLS
 540 STOP
 550 SAVE "SHOPLIST"
 560 RUN
 570 REM BORDER ETC
 580 BORDER 1: PAPER 6: INK 0: C
LS
 590 PRINT AT 0,9;"SHOPPING LIST
"
 600 OVER 1: PRINT AT 0,9;"_____
_____": OVER 0
 610 PRINT : PRINT TAB 1;"I WILL
 TRY TO REMIND YOU WHAT"
 620 PRINT TAB 1;"YOU NEED. PRES
S Y (FOR YES) OR"
 630 PRINT TAB 1;"N (FOR NO)."
 640 PRINT
 650 PRINT TAB 1;"PRESS ENTER TO
 START"
 660 INPUT X$
 670 FOR N=-30 TO 35: BEEP .03,N
: NEXT N
 680 CLS
 690 RETURN
 700 REM SOUNDEFFECTS
 710 BEEP .1,17: BEEP .2,14
 720 RETURN
 730 FOR J=1 TO 3: BEEP .1,-30:
NEXT J
 740 RETURN
 750 CLS : NEXT n
9998 PRINT USR 64000
```

SHOPPING LIST is a program for the 16K Spectrum with printer which enables the user quickly and efficiently to compile a list of items to be purchased.

The possible items are displayed one by one and you must hit the Y or N key as appropriate. At the end of the routine the chosen goods are listed through the printer, with the option of adding extra requirements.

It is a genuinely-useful memory aid and provides a rare practical use for the printout. The listing was supplied by Nigel Copage of Abu Dhabi. (16K Spectrum).

THINK OF A WORD



YOU ARE required to enter a word of nine letters or fewer. That will be displayed. Then think of a word of the same length and ending in the same letter and enter all the letters of the word except the last.

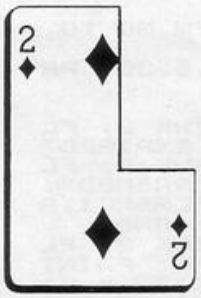
Repeat the operation, reducing your entry each time, until you are at nought. If your first word is "fort", you could then enter "las", then "te", then "b".

Think of a word becomes clearer as you play, we promise. It was submitted by Clive Tietjen of Horsham, West Sussex. (1K ZX-81).

```
   3 PRINT "FIRST WORD? (<=9 LET
TERS)"
   4 INPUT A$
   5 LET A=LEN A$
   6 IF A>9 THEN GOTO 4
   7 CLS
  10 PRINT AT 5,0;"PREVIOUS GOES
:"
  13 FOR K=A TO 1 STEP -1
  15 IF K=A THEN GOTO 40
  17 PRINT AT 19,0;"NEXT ";K;" L
ETTERS?"
  20 INPUT A$
  30 IF LEN A$<>K THEN GOTO 20
  35 PRINT AT 19,0;"
                   "
  40 LET N=VAL "0"
  50 FOR J=1 TO 20
  60 PRINT AT VAL "2";N;" ";A$
  70 LET N=N+1
  80 NEXT J
  90 PRINT AT 16-K,VAL "0";A$
```



HIGHER LOWER



PHILIP DOBSON of Crawley, Sussex has sent a 1K ZX-81 version of **Higher Lower,** the game hosted by Bruce Forsyth under a different title. You start with a stake of 200 and are told your first card. You must then bet at least 50 on whether the next card will be higher or lower than the first.

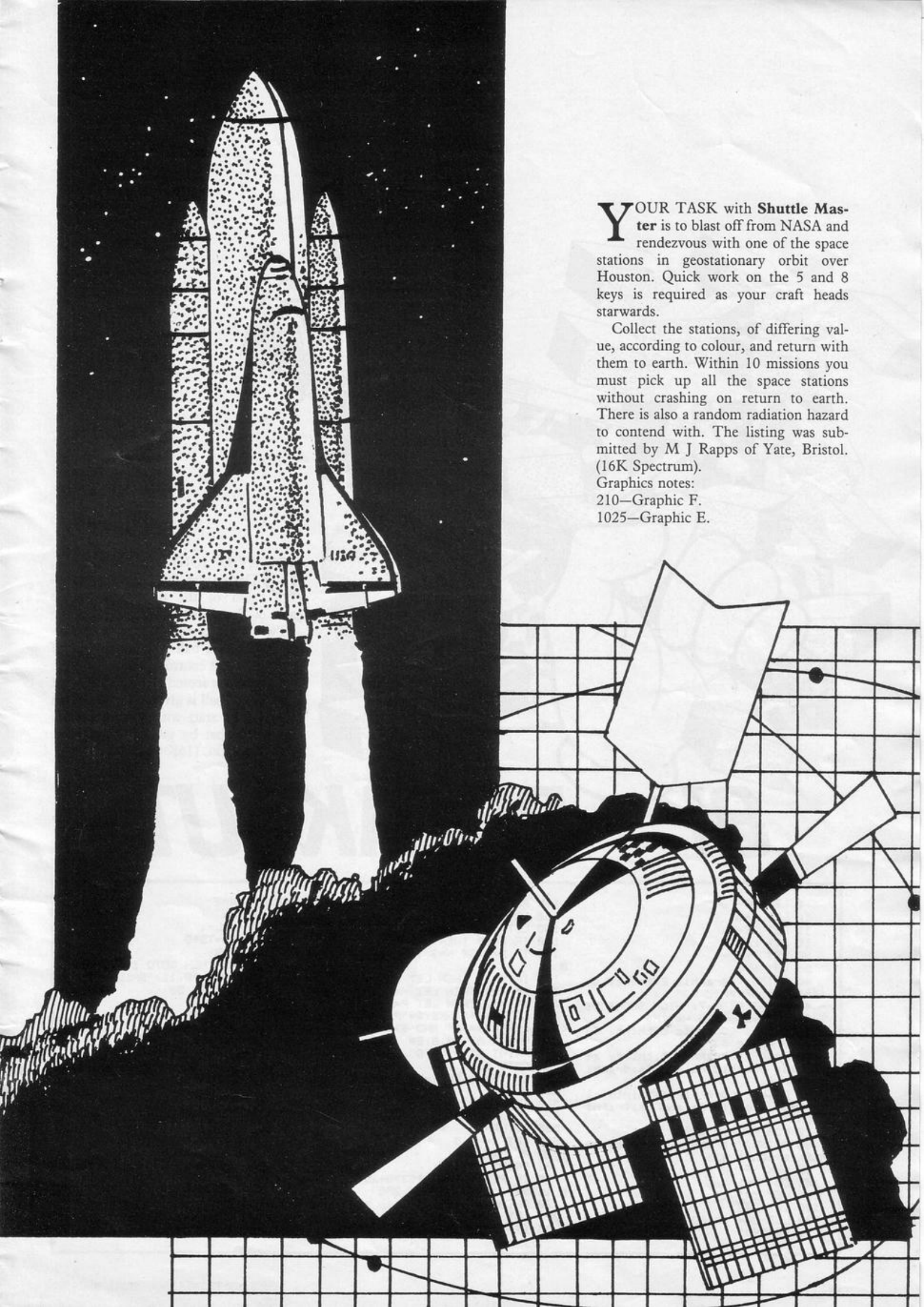
If you reach 4,000, you win the car and the game ends. Cards are represented by the numbers 1 to 13.

If your score drops below 50 you have lost

```
   5 LET S=VAL "200"
  10 PRINT "PLAY YOUR CARDS RIGH
T"
  20 LET A=INT (RND*VAL "13")
  30 LET B=INT (RND*VAL "13")
  32 PRINT
  33 IF S<VAL "50" THEN PRINT "Y
OU HAVE LESS THAN 50 POINTS.YOU
LOSE"
  34 IF S<VAL "50" THEN STOP
  35 PRINT "SCORE";S
  36 PRINT
  37 IF S>=VAL "4000" THEN PRINT
 "YOU WIN THE CAR"
  38 IF S>=VAL "4000" THEN STOP
  40 PRINT "FIRST CARD ";A
  41 PRINT
  42 PRINT "BET?";
  43 INPUT BET
  44 IF BET>S OR BET<VAL "50" TH
EN GOTO VAL "42"
  45 PRINT BET
  46 PRINT
  50 PRINT "HIGHER OR LOWER? (HI
/LO)"
  60 INPUT A$
  62 PRINT
  65 PRINT "FIRST CARD ";A,"SECO
ND CARD ";B
  70 IF A$="HI" AND B>A OR A$="L
O" AND B<A THEN GOTO 1000
  80 IF A$="HI" AND B<=A OR A$="
LO" AND B>=A THEN GOTO 2000
1000 PRINT "RIGHT"
1010 LET S=S+BET
1014 PAUSE VAL "200"
1015 CLS
1020 GOTO VAL "20"
2000 PRINT "WRONG"
2020 LET S=S-BET
2030 PAUSE VAL "200"
2035 CLS
2040 GOTO VAL "20"
```

SHUTTLE MASTER

```
  1 REM © M.J.Rapps 1982
  10 LET h=0
  20 FOR j=1 TO 2: READ a$: FOR
k=0 TO 7: READ a: POKE USR a$+k,
s: NEXT k: NEXT j
  30 DATA "e",BIN 00011000,BIN 0
0011100,BIN 00111110,BIN 00111111
0,BIN 01111100,BIN 00011110,BIN
00011000,BIN 00001000
  40 DATA "f",BIN 00011000,BIN 0
0111100,BIN 01111110,BIN 11111111
,BIN 11111111,BIN 11111111,BIN
11111111,BIN 00111100
  50 BORDER 6: PAPER 6: INK 2
  55 FOR p=7 TO 23: PRINT ; FLAS
H 1;AT 4,p;"*": NEXT p
  60 FOR p=5 TO 9: PRINT ; FLASH
 1;AT p,7;"*";AT p,23;"*": NEXT
p
  65 FOR p=7 TO 23: PRINT ; FLAS
H 1;AT 10,p;"*": NEXT p
  70 PRINT INK 2;AT 6,11;"S P A
C E";AT 8,9;"S H U T T L E"
  75 PRINT INK 0;AT 15,0;"Do you
 want instructions? (y/n) ": INP
UT b$
  80 IF b$="y" THEN GO SUB 5000
  100 LET s=0
  105 LET c=0: LET r=0
  110 PAPER 0: INK 7: BORDER 1: C
LS
  120 FOR f=1 TO 50: PLOT INK 7,2
55.5*RND,159.5*RND: NEXT f
  130 LET m=10: LET w=5: PRINT PA
PER 6; INK 2;AT 20,14;"NASA"
  140 FOR a=5 TO 25 STEP 5: PRINT
 INK INT (RND*3)+2;AT 1,a;"*": N
EXT a
  150 PRINT AT 21,0;"SCORE=";s;TA
B 21;"MISSIONS=";m;AT 0,0;"HI-SC
ORE=";h
  200 LET x=19: LET y=15
  210 PRINT AT x,y;"♠"
  220 IF INKEY$<>CHR$ 13 THEN GO
TO 220
1000 LET v=y: IF INKEY$="5" AND
y>0 THEN LET y=y-1
1005 IF INKEY$="8" AND y<31 THEN
 LET y=y+1
1010 LET z=x: LET x=x-1
1020 PRINT AT x,y;"♠";AT z,v;" "
1025 IF x<18 THEN PRINT AT z+1,v
;" ": IF x>2 THEN PRINT BRIGHT 1
; INK 2;AT x+1,y;"♣"
1028 IF x=6 THEN LET r=r+INT (RN
D*22)
1029 IF r>100 THEN LET c=3: GO T
O 3000
1030 IF ATTR (x-1,y)=2 THEN LET
s=s+10: GO TO 1070
1040 IF ATTR (x-1,y)=3 THEN LET
s=s+20: GO TO 1070
1050 IF ATTR (x-1,y)=4 THEN LET
s=s+30: GO TO 1070
1060 GO TO 1080
1070 PRINT AT x-1,y;" ": LET w=w
-1: BEEP .2,50
1075 IF h<s THEN LET h=s
1080 PRINT AT 21,6;s;AT 0,9;h: I
F x=2 THEN GO TO 2000
1090 GO TO 1000
2000 LET v=y: IF INKEY$="5" AND
y>0 THEN LET y=y-1
2005 IF INKEY$="8" AND y<31 THEN
 LET y=y+1
2010 LET z=x: LET x=x+1
2020 PRINT AT x,y;"♠";AT z,v;" "
2030 IF x=19 THEN LET m=m-1: PRI
NT AT 21,30;m: IF m<10 THEN PRIN
T AT 21,31;" "
2040 IF x=19 AND ATTR (x+1,y)<>5
0 THEN LET c=2: GO TO 3000
2043 IF m=0 AND w>0 THEN LET c=1
: GO TO 3000
2045 IF x=19 AND w=0 THEN GO TO
4000
2048 IF x=19 THEN BEEP .5,30: PA
USE 50: GO TO 1000
2050 GO TO 2000
3000 IF c=1 THEN PRINT INK 2; FL
ASH 1;AT 0,16;"MISSIONS EXPIRED"
3010 IF c=2 THEN PRINT INK 2; FL
ASH 1;AT 0,17;"SHUTTLE CRASHED":
 PRINT PAPER 6; INK 2; FLASH 1;A
T x,y-1;"**": BEEP 2,-25*RND
3020 IF c=3 THEN PRINT INK 2; FL
ASH 1;AT 0,23;"RADIATION": PRINT
 PAPER 6; INK 2; FLASH 1;AT x,y;
"*";AT x+1,y;"*": BEEP 2,-25*RND
3030 PRINT AT 10,6;"ANOTHER GAME
? (y/n)": INPUT a$
3040 IF a$="y" THEN CLS : GO TO
50
3050 STOP
4000 PRINT FLASH 1;AT 10,9;"CONG
RATULATIONS";AT 11,1;"PLEASE AWA
IT NEXT TOUR OF DUTY."
4010 LET s=s+(50*m)+50: IF h<s T
HEN LET h=s
4020 FOR j=1 TO 500: NEXT j
4030 GO TO 105
5000 CLS : INK 0
5010 PRINT INK 0;AT 0,0;"Press E
NTER to blast-off"''"Steer shuttl
e using keys:"'"      5-left   8-ri
ght"
5020 PRINT AT 4,0;"To score coll
ect satellites"''"These have diff
erent values:"'"  Red      =10"'"
 Magenta=20"'"  Green    =30"
5030 PRINT AT 9,0;"You also get
a bonus for"'"completing a tour
of duty"'"A tour means collectin
g all"'"satellites within 10 mis
sions"
5040 PRINT AT 13,0;"After each m
ission you must"'"return to NASA
 base or you will"'"crash"'"Bew
are the radiation!"
5050 PRINT AT 21,0;"Press ENTER
to continue"
5060 IF INKEY$<>CHR$ 13 THEN GO
TO 5060
5070 CLS : RETURN
```



YOUR TASK with **Shuttle Master** is to blast off from NASA and rendezvous with one of the space stations in geostationary orbit over Houston. Quick work on the 5 and 8 keys is required as your craft heads starwards.

Collect the stations, of differing value, according to colour, and return with them to earth. Within 10 missions you must pick up all the space stations without crashing on return to earth. There is also a random radiation hazard to contend with. The listing was submitted by M J Rapps of Yate, Bristol. (16K Spectrum).

Graphics notes:
210—Graphic F.
1025—Graphic E.



81 BREAKOUT

DAVID JOHNSON of Belper, Derbyshire, has sent a new version of the traditional arcade game of **Breakout.**

Two layers of bricks have to be pulverised using a ball which bounces off walls and a bat controlled by the player. Ten points are scored for every brick hit and a bonus ball is given for each screen cleared. You start with three balls and control the bat by pressing Q for left and P for right. (16K ZX-81).

```
   5 LET H$="0"
  10 LET S=0
  11 LET TS=0
  15 LET L=3
  20 LET P=2
  30 LET N=2
  40 PRINT "(graphic E)thirty gr
aphic 7s)graphic R)"
  41 PRINT AT 0,7;"HIGH SCORE 00
000";AT 0,23-(LEN H$);H$
  45 PRINT "(graphic 5)thirty SP
ACEs)graphic 8)"
  50 PRINT "(graphic 5)thirty al
ternate graphic Fs and Gs)graphi
c 8)"
  60 PRINT "(graphic 5)thirty al
ternate graphic Gs and Fs)graphi
c 8)"
  70 FOR F=4 TO 20
  80 PRINT "(graphic 5)thirty SP
ACEs)graphic 8)"
  90 NEXT F
 100 LET X=1
 110 LET Y=1
 120 LET B=0
 130 LET B$="(SPACE)three graphi
c 7s)SPACE)"
 140 PRINT AT X,Y;" "
 150 LET X=X+N-1
 160 LET Y=Y+P-1
 170 IF X=19 THEN GOSUB 500
 180 IF X=2 OR X=3 THEN GOSUB 70
0
 190 IF Y=30 THEN LET P=0
 200 IF X=1 THEN LET N=2
 210 IF Y=1 THEN LET P=2
 220 LET B=B+(INKEY$="P" AND B+4
<31)-(INKEY$="Q" AND B>0)
 230 PRINT AT 20,B;B$
 240 PRINT AT X,Y;"O"
 250 GOTO 140
 500 IF Y=B+1 OR Y=B+3 THEN GOTO
 600
 510 IF Y<>B+2 THEN GOTO 1000
 520 LET N=0
 530 RETURN
 610 LET N=-0.5
 620 RETURN
 700 PRINT AT X,Y;
 710 IF PEEK (PEEK 16398+256*PEE
K 16399)<>0 THEN GOTO 750
 720 RETURN
 750 LET S=S+10
 755 IF S>590 THEN GOTO 2000
 760 LET N=2
 770 RETURN
1000 LET L=L-1
1001 LET TS=TS+S
1002 LET S=0
1010 IF L=0 THEN GOTO 1100
1020 PRINT AT 10,11;"BALL LOST"
1030 FOR F=1 TO 50
1040 NEXT F
1050 PRINT AT 10,11;"          "
1060 LET X=1+L
1070 LET Y=1+L
1080 GOTO 140
1110 PRINT AT 10,11;"GAME OVER "
;AT 11,11;"SCORE ";TS
1120 IF TS>VAL H$ THEN LET H$=ST
R$ TS
1130 PAUSE 4E4
1135 CLS
1140 GOTO 10
2000 PRINT AT 11,10;"BONUS BALL"
2010 LET TS=TS+S
2020 LET S=0
2030 FOR F=1 TO 50
2040 NEXT F
2050 LET L=L+1
2060 GOTO 20
```



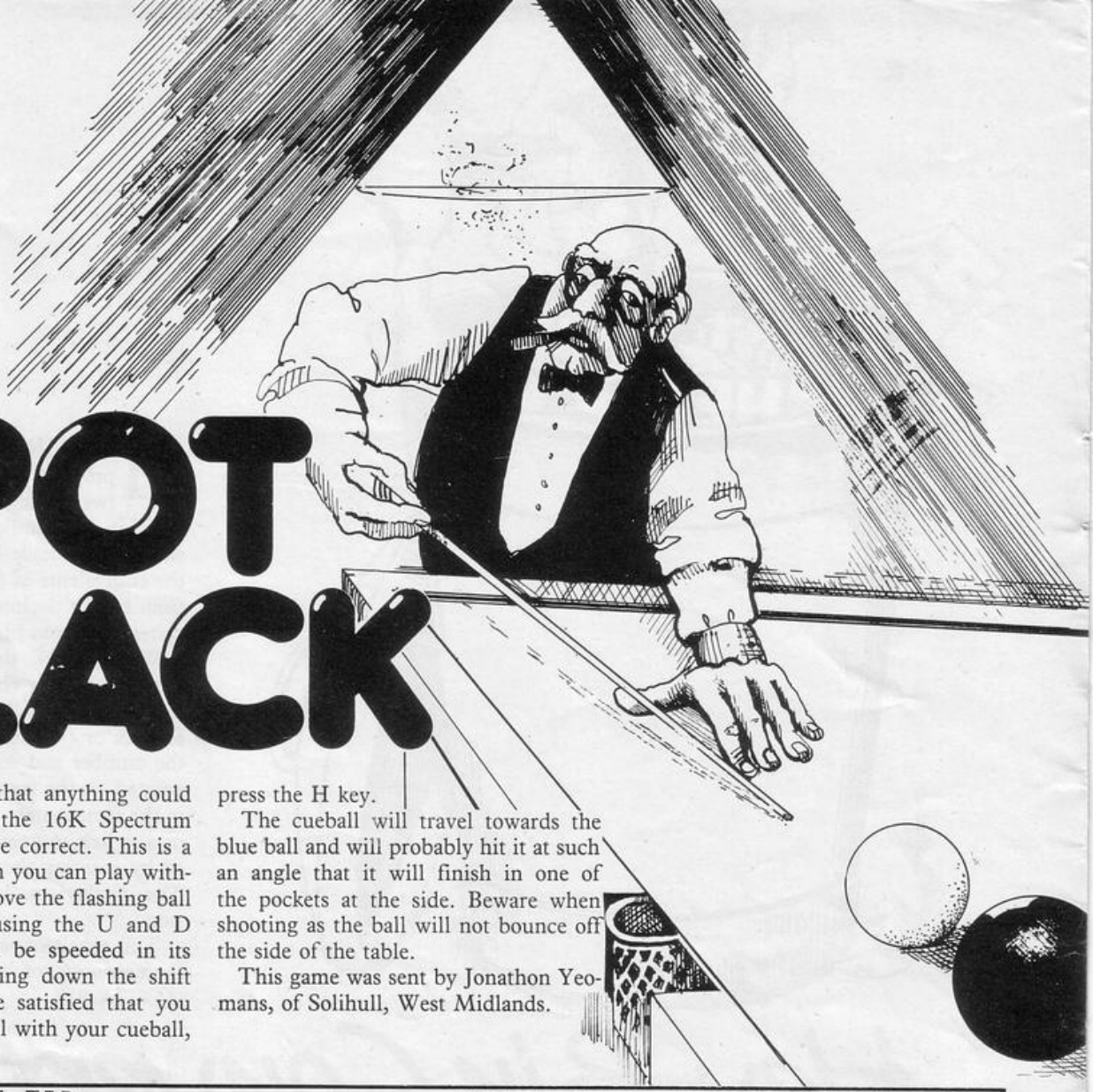
Hex Bin Converter

HEX BIN CONVERTER is a program for conversions between the hexadecimal, decimal and binary number systems. Conversions can be made for numbers between the equivalents of 0 and 65535 decimal from hex or decimal into the other two systems or from binary into hex.

When RUN, the program will ask the user for his choice of number system input; enter "$" for decimal, "**" for hex or "*" for binary. Then enter the number and its conversions will be printed on the screen. Another number in the same system may then be entered, or a switch to another system be effected by entering the appropriate symbol. The display scrolls after every conversion.

This excellent routine was sent by Dr B Thornton of Salisbury, Wiltshire. (16K ZX-81).

```
  20 PRINT AT 1,3;"DECIMAL-HEXAD
ECIMAL-BINARY";AT 3,8;"INTERCONV
ERSION"
  30 PRINT AT 6,9;"SELECT INPUT"
  40 PRINT AT 9,6;"($)= DECIMAL"
;AT 11,6;"(**)= HEXADECIMAL";AT
13,6;"(*)= BINARY"
  50 REM initialise
  60 DIM Y$(16)
  70 LET Z$="0000000000000000"
  80 LET Q$=""
  90 LET C$="1248"
 100 LET C=19
 110 DIM B(4)
 120 LET B(1)=4096
 130 LET B(2)=256
 140 LET B(3)=16
 150 LET B(4)=1
 160 REM select
 170 INPUT A$
 180 CLS
 190 LET Q$=A$
 200 IF Q$="$" THEN GOTO 230
 210 IF Q$="**" THEN GOTO 440
 220 IF Q$="*" THEN GOTO 630
 230 REM dec-bin
 240 PRINT AT 21,0;"DEC"
 250 SLOW
 260 INPUT A$
 270 FAST
 280 IF LEN A$>5 THEN GOTO 250
 290 IF A$="*" OR A$="**" OR A$=
"$" THEN LLIST 190
 300 PRINT AT 21,0;"    "
 310 SCROLL
 320 PRINT AT C,5-LEN A$;A$
 330 LET X=VAL A$
 340 FOR N=1 TO 16
 350 LET Y$(17-N)=STR$ (X/2<>INT
 (X/2))
 360 LET X=INT (X/2)
 370 IF X=0 THEN GOTO 390
 380 NEXT N
 390 IF X=0 THEN LET Y$=Z$( TO 1
6-N)+Y$(17-N TO )
 400 LET A$=Y$
 410 PRINT AT C,15;A$( TO 8);" "
;A$(9 TO )
 420 IF Q$="**" THEN GOTO 440
 430 IF Q$="$" THEN GOTO 740
 440 REM hex-dec
 450 PRINT AT 21,0;"HEX"
 460 SLOW
 470 INPUT A$
 480 FAST
 490 IF LEN A$>4 THEN GOTO 460
 500 IF A$="*" OR A$="**" OR A$=
"$" THEN GOTO 190
 510 PRINT AT 21,0;"    "
 520 SCROLL
 530 IF LEN A$<4 THEN LET A$=Z$(
TO 4-LEN A$)+A$
 540 PRINT AT C,8;A$
 550 LET S=0
 560 FOR N=1 TO LEN A$
 570 IF A$(N)<>"0" THEN LET S=S+
(CODE A$(N)-28)*B(N)
 580 NEXT N
 590 LET A$=STR$ S
 600 PRINT AT C,5-LEN A$;A$
 610 IF Q$="*" THEN GOTO 630
 620 IF Q$="**" THEN GOTO 330
 630 REM bin-hex
 640 PRINT AT 21,0;"BIN"
 650 SLOW
 660 INPUT A$
 670 FAST
 680 IF LEN A$>16 THEN GOTO 650
 690 IF A$="*" OR A$="**" OR A$=
"$" THEN GOTO 190
 700 PRINT AT 21,0;"    "
 710 SCROLL
 720 IF LEN A$<16 THEN LET A$=Z$
( TO 16-LEN A$)+A$
 730 PRINT AT C,15;A$( TO 8);" "
;A$(9 TO )
 740 LET D$=""
 750 FOR M=4 TO 1 STEP -1
 760 LET L=M*4
 770 IF VAL A$( TO L)=0 THEN GOT
O 850
 780 LET S=0
 790 FOR N=1 TO 4
 800 IF A$(L-N+1)="1" THEN LET S
=S+VAL C$(N)
 810 NEXT N
 820 LET D$=CHR$ (S+28)+D$
 830 LET A$=A$( TO L-4)
 840 NEXT M
 850 IF LEN D$<4 THEN LET D$=Z$(
TO 4-LEN D$)+D$
 860 PRINT AT C,8;D$
 880 IF Q$="$" THEN GOTO 230
 890 IF Q$="*" THEN GOTO 550
 900 SAVE "CONVERT"
 910 GOTO 10
```



POT BLACK

THEY SAID that anything could be done on the 16K Spectrum and they were correct. This is a game of **Pool** which you can play without a table. You move the flashing ball up and down by using the U and D keys. The ball can be speeded in its movement by holding down the shift key. When you are satisfied that you will hit the blue ball with your cueball, press the H key.

The cueball will travel towards the blue ball and will probably hit it at such an angle that it will finish in one of the pockets at the side. Beware when shooting as the ball will not bounce off the side of the table.

This game was sent by Jonathon Yeomans, of Solihull, West Midlands.

```
   5 GO TO 590
  10 BORDER 4: PAPER 4: CLS : IN
K 7
  20 PLOT 0,0: DRAW 240,0: PLOT
240,175: DRAW -240,0: DRAW 0,-17
5
  30 FOR n=140 TO 142: PLOT 247,
n: DRAW -20,30,PI: NEXT n
  40 FOR n=5 TO 3 STEP -1: PLOT
223,n: DRAW 21,36,PI: NEXT n
  50 PLOT 245,40: DRAW 0,100
  90 LET a2=RND*70+100: LET b2=R
ND*10+50: CIRCLE INK 0;a2,b2,10
 100 LET a1=24: LET b1=87
 110 CIRCLE INK 7;a1,b1,10
 120 BEEP .01,25: CIRCLE INVERSE
 1;a1,b1,10
 130 IF INKEY$="u" AND b1<155 TH
EN LET b1=b1+3
 135 IF INKEY$="U" AND b1<150 TH
EN LET b1=b1+10
 140 IF INKEY$="d" AND b1>20 THE
N LET b1=b1-3
 145 IF INKEY$="D" AND b1>25 THE
N LET b1=b1-10
 150 IF INKEY$="h" THEN GO TO 17
0
 160 GO TO 110
 170 CIRCLE a1,b1,10: LET s=8: C
IRCLE INVERSE 1;a1,b1,10
 175 IF s>15 OR s<1 THEN GO TO 1
70
 180 LET a1=(a1+s)
 190 CIRCLE INK 7;a1,b1,10
 200 IF a1>=(a2-25) AND b2<b1 TH
EN GO TO 250
 210 IF a1>(a2-25) AND b2>b1 THE
N GO TO 350
 220 GO TO 180
 252 LET c1=a2-a1: LET c2=b2-b1
 254 CIRCLE INVERSE 1;a2,b2,10
 255 CIRCLE INK 7;a1,b1,10
 256 INK 7
 260 LET a2=a2+(c1/2): LET b2=b2
+(c2/2)
 270 CIRCLE INK 0;a2,b2,10
 275 IF ATTR (19,29)<>39 THEN GO
 TO 500
 280 CIRCLE INK 0;a2,b2,10
 290 IF a2>230 THEN GO TO 550
 300 IF b2<20 THEN GO TO 550
 310 GO TO 260
 350 IF b2-b1>12 THEN GO TO 550
 360 LET c1=a2-a1: LET c2=b2-b1
 370 CIRCLE INVERSE 1;a2,b2,10:
CIRCLE INK 7;a1,b2,10
 380 INK 7
 390 LET a2=a2+(c1/2): LET b2=b2
+(c2/2)
 400 CIRCLE INK 0;a2,b2,10: BEEP
 .01,20
 410 IF ATTR (2,29)<>39 THEN GO
TO 500: CIRCLE INK 0; OVER 1;a2,
b2,10
 420 IF a2>230 THEN GO TO 550: I
F b2>155 THEN GO TO 550
 430 GO TO 390
 499 STOP
 500 PRINT AT 10,5; INK 7; PAPER
 0;"  A perfect pot  "
 520 GO TO 560
 540 STOP
 550 PRINT AT 10,4;"  Missed com
pletely  "
 560 FOR n=0 TO 3: FOR m=0 TO 25
: BEEP .01,m: NEXT m: NEXT n
 570 INPUT "Again ?";g$: IF g$="
y" THEN GO TO 6
 580 GO TO 580
 590 BORDER 1: PAPER 1: INK 7: C
LS
 600 PRINT AT 0,4;"Pot Black"
 610 PRINT AT 3,0;"You are now a
bout to play Pot";AT 5,0;"Black"
;AT 10,0;"Control the cue ball w
ith ";AT 12,0;"U for up and D fo
r down";AT 14,0;"When you are re
ady to press the ";AT 18,0;"H ke
y and watch the balls move."
 620 FOR n=0 TO 7: FOR m=0 TO 50
: BEEP 0.006,m: NEXT m
 630 NEXT n: CLS : GO TO 6
```

REM CHANGE

REM CHANGE converts any worded REM statements in a listing to inverse video. Therefore it can be used to highlight program divisions during or after development. It is best run in FAST mode.

Ian Turtly of Scunthorpe, South Humberside, who submitted the program, reports that in a trial run it took just over a minute to invert 17 REM statements in a 4K program.

If the first line of the listing is a REM statement containing machine code, change line 9000 to "For I=16514 to . . ." (ZX-81).

```
9000 FOR I=16513 TO PEEK 16396+2
56*PEEK 16397
9010 IF PEEK I<>234 THEN GOTO 90
80
9020 LET I=I+1
9030 IF PEEK I=118 THEN GOTO 908
0
9040 LET P=PEEK I
9050 IF P>63 THEN GOTO 9020
9060 POKE I,P+128
9070 GOTO 9020
9080 NEXT I
9090 LIST
```

DECISION MAKER

ARE YOU worried about love? Or money? Or the meaning of life? Or about how to impress your friends with the deathless wisdom of your new ZX-81?

Help with those problems and many others is available from **Decision Maker** from Christopher Kent, of Daventry, Northamptonshire.

The advice is incisive, oracular and is dispensed with the rich randomness of life itself. (1K ZX-81).



```
  10 PRINT "WHATS YOUR PROBLEM"
  11 PRINT "ONLY USE LETTERS"
  20 INPUT A$
  30 CLS
  40 IF A$<CHR$ 38 THEN RUN
  45 IF A$>CHR$ 63 THEN RUN
  50 LET A=INT (RND*10)+1
  60 IF A=1 THEN PRINT A$;" NO"
  70 IF A=2 THEN PRINT A$;" YES"
  80 IF A=3 THEN PRINT A$;" MAY
BE"
  90 IF A=4 THEN PRINT A$;" WELL
 IT DOESNT SOUND TO GOOD"
 100 IF A=5 THEN PRINT A$;" OK T
HEN BUT ITS A BIT RISKY"
 102 IF A=6 THEN PRINT A$;" DEFI
NITELY NOT"
 120 IF A=7 THEN PRINT A$;" BRIL
LIANT IDEA"
 130 IF A=8 THEN PRINT A$;" NO W
AY WHAT SO EVER"
 140 IF A=9 THEN PRINT A$;" NOT
 140~IF A=9 THEN PRINT A$;" NOT
VERY ADVISABLE"
 150 IF A=10 THEN PRINT A$;" FOR
GET IT MATE"
 160 PAUSE 9999
 170 CLS
 180 GOTO 10
```

```
   5 REM DIRECTION
   8 CLS
  10 PRINT AT 0,8;"SUPER SKETCHP
AD"
  20 PRINT AT 3,3;" KEYS 1 TO 4
AS SHOWN BY ARROW HEAD ON KEY (I
.E KEY 1=S.E. DIRECTION)"
  30 PRINT AT 7,3;"KEYS 5 TO 8 D
IRECTION AS SHOWN ON KEY"
  40 PRINT AT 10,3;"KEY""+"" TO
INCREMENT -->"
  50 PRINT AT 12,3;"KEY""-"" TO
INCREMENT <--"
  60 PRINT AT 14,3;"KEY ""W"" TO
 CHANGE SYMBOL/WORD"
  70 PRINT AT 16,3;"KEY ""R"" TO
 RUN"
  80 PAUSE 800
  90 CLS
  95 REM
 100 INPUT A$
 110 LET A=0
 120 LET B=0
 130 LET L=0
 140 GOTO 180
 150 INPUT A$
 160 RETURN
 170 LET L=LEN A$
 175 REM DRAW DIRCTIONS
 180 IF INKEY$="8" AND A<=(32-2*
L) THEN LET A=A+L
 190 IF INKEY$="K" AND A<=(32-L)
 THEN LET A=A+L
 200 IF INKEY$="J" AND A<>0 THEN
 LET A=A-L
 210 IF INKEY$="5" AND A>=L THEN
 LET A=A-L
 220 IF INKEY$="7" AND B<>0 THEN
 LET B=B-1
 230 IF INKEY$="6" AND B<>20 THE
N LET B=B+1
 240 IF INKEY$="1" AND A<>30 THE
N LET A=A+1
 250 IF INKEY$="1" AND B<>20 THE
N LET B=B+1
 260 IF INKEY$="2" AND A<>0 THEN
 LET A=A-1
 270 IF INKEY$="2" AND B<>20 THE
N LET B=B+1
 280 IF INKEY$="3" AND A<>0 THEN
 LET A=A-1
 290 IF INKEY$="3" AND B<>0 THEN
 LET B=B-1
 300 IF INKEY$="4" AND A<>30 THE
N LET A=A+1
 310 IF INKEY$="4" AND B<>0 THEN
 LET B=B-1
 320 IF INKEY$="W" THEN GOSUB 15
0
 330 IF INKEY$="R" THEN RUN
 335 REM PLOT
 340 PRINT AT B,A;A$
 350 PRINT AT B,A;"."
 360 PRINT AT B,A;A$
 370 IF INKEY$="Q" THEN SAVE INK
EY$
 380 GOTO 170
```



SUPER SKETCH PAD

RO BRADFIELD of Cambridge sent a program enabling the user quickly and easily to construct the kind of word patterns shown in our listing.

When the word is displaced, the computer shifts the next print position the length of the word so that there is no overlap. The listing can also be used with symbols.
(Expanded ZX-81).



Bills!

MLEAVER of Halifax thinks that the magazine lacks utility programs, so he has sent his method of calculating quarterly electricity and gas bills.

The program is very user-friendly, posing a series of questions to be answered, and is self-explanatory as it runs. (16K Spectrum).

```
  0>REM © M.Leaver 1982
  10 REM gas & electric
  20 PRINT AT 3,0;"  This progra
m is designed to"''"calculate yo
ur quarterly gas &"''"electricit
y bills."
  30 PRINT ''''"  Please follow th
e instructions"''"carefully, ent
ering figures as"''"they are sho
wn on the meter and"''"the previ
ous bill."
  40 FLASH 1: PRINT ''''"    Press
 ""ENTER"" to continue   "
  50 IF INKEY$<>CHR$ 13 THEN BEE
P .05,RND*6: GO TO 50
  60 FLASH 0: CLS
  70 PRINT AT 10,0;"  Do you req
uire gas or"''"electricity?"''"If
 GAS is required, press ""G"";"'
'"If ELECTRICITY,then press ""E"
"."
  80 IF IN 65022=239 THEN GO TO
200
  90 IF IN 64510=251 THEN GO TO
300
 100 GO TO 70
 200 REM Gas calculation
 205 CLS : PRINT "GAS CALCULATIO
N"
 210 INPUT "Enter PRESENT meter
reading;       e.g.""4321""",a
 220 INPUT "Enter PREVIOUS meter
 reading;       e.g.""1234""",b
 230 CLS : LET c=a-b: PRINT "Cub
ic feet used= ";c
 240 INPUT "Enter B.t.u.'s per c
u. ft.;        e.g.""1021""",d: LET
 e=d/1000
 250 INPUT "Enter PENCE PER THER
M;e.g.""30.5""",f: LET h=f/100
 260 INPUT "Enter STANDING CHARG
E;e.g.""8.40""",g
 270 LET i=c*e: PRINT "Therms us
ed      =";i
 280 LET j=(i*h)+g: LET j=(j*100
)+0.5: LET j=INT j: LET j=(j/100
)
 290 PRINT AT 10,0;"The total am
ount of this gas""bill is £";j:
 STOP
 300 REM Electricity calculation
 305 CLS : PRINT "ELECTRICITY CA
LCULATION"
 310 INPUT "Enter PRESENT meter
reading;e.g.""4321""",a
 320 INPUT "Enter PREVIOUS meter
 reading;e.g.""1234""",b
 330 CLS : LET c=a-b: PRINT "Tot
al units= ";c
 340 INPUT "Enter PENCE PER UNIT
;e.g.""5.10""",d: LET e=d/100
 350 INPUT "Enter FIXED CHARGE;e
.g.""6.35""",f
 360 LET g=(c*e)+f: LET g=(g*100
)+0.5: LET g=INT g: LET g=(g/100
);
 370 PRINT AT 10,0;"The total am
ount of this""electricity bill
is £";g: STOP
```



TOWERS OF HANOI

```
   3 LET Y=SIN PI
   4 LET Z=SGN PI
   5 DIM A(3,6)
   6 FOR I=Z TO 5
   7~LET A(Z,I)=6-I
  10 NEXT I
  11 LET A(Z,6)=5
  12 LET A(2,6)=Y
  13~LET A(3,6)=Y
  14 PRINT AT Z,Y;"154321";AT 2,
Y;"2";AT 3,Y;"3"
  20 INPUT A$
  21 IF LEN A$<>2 THEN GOTO 20
  22 LET F=VAL A$(Z)
  23~LET T=VAL A$(2)
  24 IF A(T,6)=Y THEN GOTO 30
  25~IF A(F,A(F,6))>A(T,A(T,6))
THEN GOTO 20
  30 LET A(T,A(T,6)+Z)=A(F,A(F,6
))
  32 LET K=A(F,A(F,6))
  35 LET A(F,A(F,6))=Y
  40 LET A(T,6)=A(T,6)+Z
  45 LET A(F,6)=A(F,6)-Z
  50 PRINT AT F,A(F,6)+Z;" ";AT
T,A(T,6);K
 100 GOTO 20
```

WE HAVE published a **Towers of Hanoi** program previously but this has the distinction of fitting into 1K. The display, as you can imagine, is very skeletal but it conveys the essentials of the game.

Three lines, numbered one to three, appear on screen. The first line contains the numbers 5 to 1 and those numbers must be re-assembled in the correct order on one of the other two lines. The numbers can be moved only one at a time and the listing will prevent you placing a higher on to a lower number. Enter your move in the form of "xy", where "x" is the line from which you are moving and "y" the line to which you are adding.

The program was submitted by R J Zealley of Levenshulme, Manchester. (1K ZX-81).

ALIENS

ALIENS is a quick 1K game for the ZX-81. The monsters balloon down towards you and you must manoeuvre yourself left and right with keys 1 and 3 until you are directly beneath them and then zap them with 0.

If you are on target, the aliens will become frozen ghosts and a new monster will appear. The earlier you can nab the creatures, the higher will be your score. **Aliens** was submitted by D M Brett of Cambridge.

```
   1 PAUSE CODE " FAST "
   2 RAND
   3 CLS
   4 GOTO CODE "5"
   5 IF Y+1<>A THEN RETURN
   6 PRINT AT B,A;"(graphic A)"
   7 LET S=S+CODE "(graphic D)"-
B
  10 GOTO 38
  33 LET X=CODE "(graphic A)"
  35 LET Y=CODE "(graphic 4)"
  37 LET S=CODE " "
  38 LET A=INT (RND*CODE "(graph
ic A)")+CODE "(graphic 1)"
  40 FOR B=1 TO 9
  41 PRINT AT X,Y;" I ";AT B,A;"
(inverse quotation mark)";AT B-1
,A;" "
  50 LET Y=Y+(INKEY$="3")-(INKEY
$="1")
  51 IF INKEY$="0" THEN GOSUB 5
  52 LET Y=Y+(Y<0)-(Y>7)
  60 NEXT B
  70 PRINT "SCORE=";S
  75 GOTO 1
```





NEUTRON BOMB

J K LASKOWSKI of London SE6 has submitted another excellent listing to follow his highly original London Bridge routine in the December issue of *Sinclair User*.

The display shows a neutron bomb, nose buried in the ground, with part of its casing removed to reveal its internal elements. Those elements comprise a random array of the numbers 1 to 9, plus one space. The space enables the elements to be moved around; press the appropriate cursor key, followed by NEWLINE, to move one of the adjacent elements into the space. An invalid move will detonate the bomb.

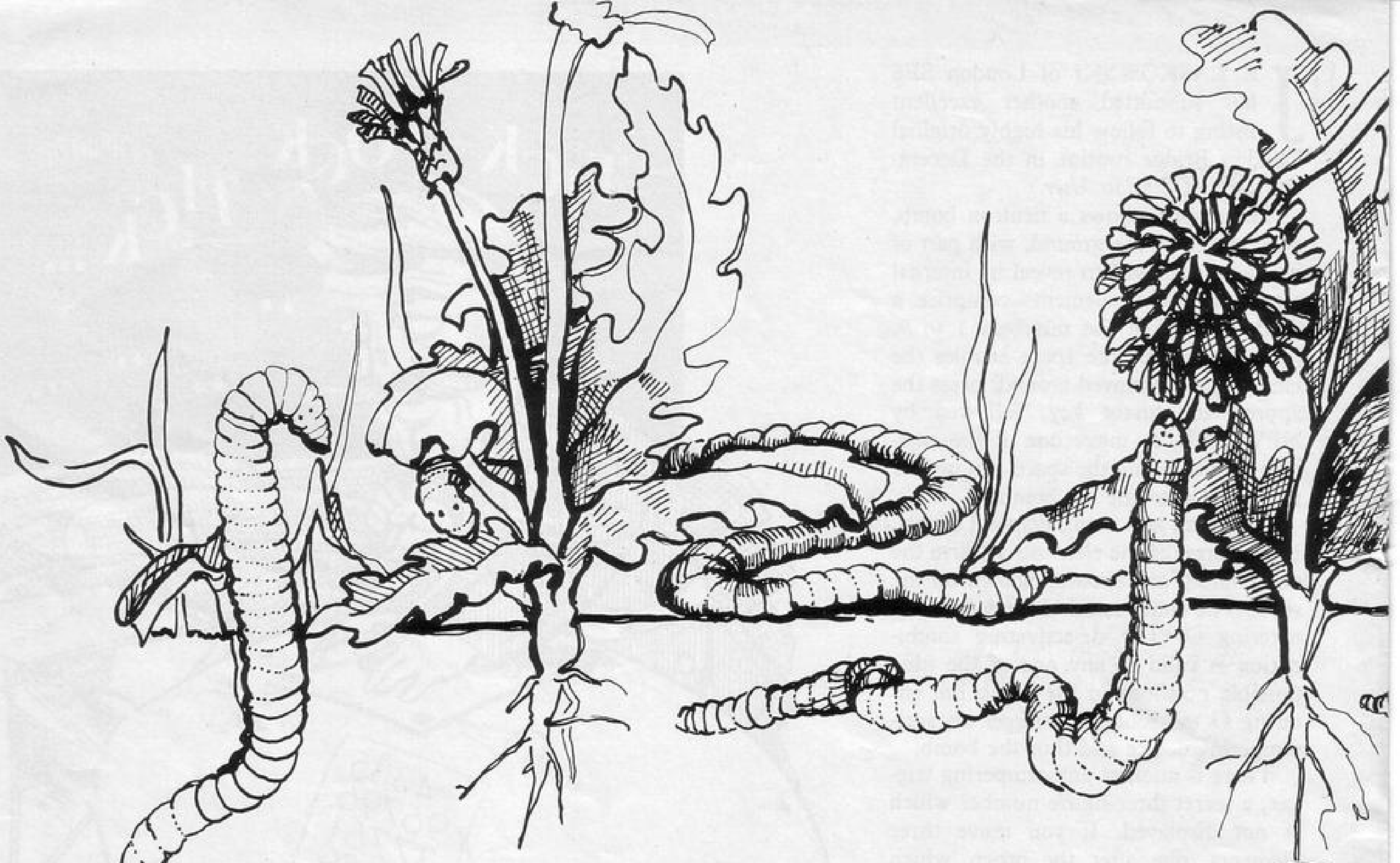
Your aim, as a bomb disposal expert, is to re-arrange the elements to form the deactivating combination shown on the right. The bomb can then be defused by entering O. The de-activating combination is valid in any one of the nine possible positions in the bomb but entering O too soon will trigger an anti-tampering device and thus the bomb.

There is another anti-tampering trigger, a secret three-figure number which is not displayed. If you move three elements, one after the other, which make up that number, the bomb will detonate. You can do nothing against that threat except cross your fingers.

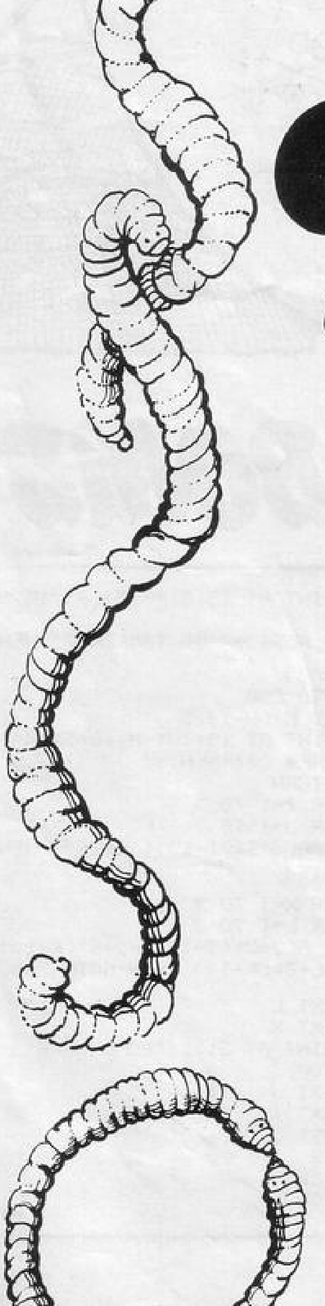
The most dangerous triggering device, however, is the tamper register displayed on the left of the screen. Every time you move an element the register drops by an equivalent amount. The bomb will explode if the register drops below zero. As your skill improves, lower the values in lines 25 and 40.

Neutron Bomb is another well-thought-out routine requiring caution and tactical thinking. In our listing, the numbers and single letters in brackets should be entered in graphics mode. (16K ZX-81).

```
  5 FAST
 10 RAND 0
 20 DIM A(36)
 25 LET TAMPER=10
 30 PRINT AT 2,1;"NEUTRINO";TAB
 1;"BOMB"
 40 PRINT AT 17,1;"TAMPER 10"
 50 PRINT AT 20,18;"(8;three in
vese SPACES;5)";TAB 15;"(four*H;
three*G;four*H)"
 55 LET S=INT (RND*1000)
 60 FOR I=1 TO 17
 70 PRINT AT 1+I,17;"(8)";TAB 2
3;"(5)";TAB 18;"(five inverse SP
ACES)"
 80 FOR J=1 TO 10
 90 PLOT 33+I,27+I-J
100 PLOT 48-I,27+I-J
110 NEXT J
120 NEXT I
130 PRINT AT 13,1;"MOVE 0";TAB
18;" ";TAB 26;"DEACT.";TAB 26;"C
OMB."
140 FOR N=2 TO 25
150 LET A(N)=INT (RND*10+1)
160 GOSUB 500
170 NEXT N
180 FOR I=1 TO 9
190 LET N=INT (RND*24+2)
200 IF A(N)<0 THEN GOTO 190
210 LET M=(I-1)/3
220 LET A(I+25)=A(N)
230 PRINT AT 15+INT M,27+3*(M-I
NT M);A(I+25)-1
240 LET A(N)=-A(N)
250 NEXT I
260 LET N=1
270 SLOW
280 LET M=0
290 INPUT DIR
300 IF DIR=0 THEN GOTO 600
310 LET PSTN=N+INT ((ABS (DIR-6
.5)-0.5)*-4+5.5)*SGN (DIR/2-INT
(DIR/2)-0.25)
320 IF DIR<5 OR DIR>8 OR PSTN<1
 OR PSTN>25 OR DIR-1.5<5*(M-INT
M) OR DIR-7.5>5*(M-INT M) THEN G
OTO 800
330 LET A(N)=ABS (A(PSTN))
335 LET A(36)=10*A(36)+A(N)-1
340 LET A(36)=INT (1000*(A(36)/
1000-INT (A(36)/1000))+0.5)
345 GOSUB 500
350 LET TAMPER=TAMPER-A(N)+1
360 LET A(PSTN)=-27
370 LET N=PSTN
380 GOSUB 500
390 LET A(35)=A(35)+1
400 PRINT AT 13,6;A(35);AT 17,8
;TAMPER;" "
410 IF A(36)=S OR TAMPER<0 THEN
 GOTO 800
420 GOTO 290
500 LET M=(N-1)/5
510 PRINT AT 13+INT M,18+5*(M-I
NT M);CHR$ (27+A(N))
520 RETURN
600 FOR I=1 TO 3
610 FOR J=1 TO 3
620 IF A(J+5*(I-1))<>A(26) THEN
 GOTO 700
630 FOR K=1 TO 3
640 FOR L=1 TO 3
650 IF A(J+5*(I-1)+L-1+5*(K-1))
<>A(25+L+3*(K-1)) THEN GOTO 700
660 NEXT L
670 NEXT K
680 PRINT AT 21,1;"BOMB SAFE"
690 STOP
700 NEXT J
710 NEXT I
800 FAST
810 CLS
820 SLOW
830 STOP
```



The Wo



```
   1 LET h=0: LET w$="▓▓▓▓": GO SUB 8000: GO SUB 8500
   2 BORDER 0: PAPER 0: CLS : PRINT AT 21,0; INK 7; BRIGHT 1;" © Michael Andreasen 1982": FOR n=0 TO 21 STEP 3: FOR m=0 TO 31: PRINT AT n,m; INK 6;"▓";AT n,m; INK 3;"●": NEXT m: NEXT n: BEEP .3,0: BEEP .3,2: BEEP .3,5
   3 LET l=1: LET b=0: LET s=0: LET w=3
   4 LET g=4: PAPER 7: INK 0: BORDER 7: GO SUB 100: LET b=0: FOR n=1 TO 20: BEEP .03,0: BEEP .03,3: NEXT n: BORDER 6: PAPER 1: INK 7: CLS : LET x=11: LET y=15: GO SUB 300
   5 GO SUB 400: PRINT AT x1,y1;"●";AT x,y; INK 6;w$(d): BEEP .01,0: BEEP .01,-8: IF RND>.9 THEN PRINT AT x1,y1; INK 6;"◎": IF RND<.3 AND l<5 THEN PRINT AT x1,y1; FLASH 1; INK 5;"@"
   6 IF a=14 THEN LET s=s+100: LET b=b+1
   7 IF a=141 OR b=10 THEN GO TO 1000
   8 IF a=15 AND s$="" THEN GO TO 9000
   9 GO TO 5
 100 CLS : PRINT AT 7,9;"SCORE:";s;AT 9,9;"BONUS:";b;AT 11,9;"WORMS";"▓▓▓▓▓▓▓▓"( TO w+1);AT 13,9;"LAP:";l: LET s=s+b: PRINT AT 16,9;"SCORE:";s: RETURN
 300 FOR d=1 TO 4: PRINT AT x,y;w$(d): BEEP .3,0: BEEP .3,-8: IF INKEY$<>"" THEN RETURN
 310 NEXT d: GO TO 300
 400 LET x1=x: LET y1=y: LET x=x+(d=2)-(d=3): LET y=y+(d=4)-(d=1): IF x=-1 OR x=22 OR y=32 OR y=-1 THEN GO TO 9000
 401 LET a=ATTR (x,y): LET s$=SCREEN$ (x,y): LET b$=INKEY$: IF b$>"4" AND b$<"9" THEN LET d=VAL b$-4
 402 RETURN
1000 BORDER 0: PAPER 2: INK 6: LET b=b+500: GO SUB 100: FOR n=1 TO 10: BEEP .05,RND*10-10: NEXT n: BEEP .5,-10: CLS : LET g=1000: LET b=0: LET m=6+4*l: FOR n=1 TO 20: PRINT AT RND*20,RND*30; INK 7;"❁": NEXT n: FOR n=1 TO m
1001 LET x=INT (RND*22): LET y=INT (RND*32): IF SCREEN$ (x,y)="" OR (x=11 AND y=15) THEN GO TO 1001
1002 PRINT AT x,y; INK 6;"♀": NEXT n: LET x=11: LET y=15: GO SUB 300
1003 GO SUB 400: PRINT AT x1,y1; INK 7;"●";AT x,y; INK 0;w$(d): BEEP .03,-15: BEEP .03,-20: IF a=22 AND s$="" THEN LET b=b+1: LET s=s+100: BEEP .03,0: IF b=m THEN GO TO 2000
1004 IF a=23 THEN GO TO 9000
1005 GO TO 1003
2000 LET b=b+500: BORDER 6: PAPER 6: INK 0: GO SUB 100: FOR n=1 TO 20: BEEP .01,n: BEEP .01,-n: NEXT n: CLS : PRINT AT 0,0;"□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□": FOR n=1 TO 17 STEP 2: PRINT AT n,0;"□                              □";AT n+1,0;"□ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □": NEXT n
2001 PRINT "□□□□□□□□□□□□□□□□     □□□□□□□□□□□□□□□□□□□□□□□□□□": FOR n=1 TO 17 STEP 4: FOR m=1 TO 27 STEP 4: PRINT AT n,m; INK 1;"♣": NEXT m: NEXT n
2002 LET b=0: LET x=11: LET y=15: GO SUB 300: LET g=2000
2003 GO SUB 400: PRINT AT x1,y1; INK 3;"●";AT x,y; INK 2;w$(d): BEEP .03,-11: BEEP .03,-13: BEEP .03,-15
2004 IF a=49 THEN BEEP .02,-35: LET b=b+1: IF b=35 THEN LET b=7000: GO TO 3000
2005 IF s$<>" " AND a<>49 THEN GO TO 9000
2006 GO TO 2003
3000 BORDER 0: PAPER 0: INK 7: GO SUB 100: FOR n=1 TO 10: BEEP .1,RND*10: NEXT n: POKE 23692,-1: FOR n=1 TO 20: PRINT : NEXT n: LET x=11: FOR y=0 TO 31
3001 PRINT AT x,y; PAPER 4;"□": IF RND<.2 THEN GO TO 3010
3002 NEXT y
3003 LET x=11: LET y=0: GO SUB 300: LET g=3000: PAUSE 300: IF d=1 THEN GO TO 9000
3004 GO SUB 400: PRINT AT x1,y1; INK 5;"●";AT x,y; INK 7;w$(d): BEEP .08,-11: BEEP .08,-30: BEEP .08,-0
3005 IF s$<>"" THEN GO TO 9000
```



THE WORM GAME for the 16K Spectrum was just too difficult for your thick-fingered reviewer, who could reach only the sixth of its seven stages. The game is of the Surround type but there is only one player and you must avoid not only your own tail but also aim to hit certain objects in the field of play.

In the first section, for example, your targets are contained in the tail you leave; in the second they are the dandelions among the deadly rocks. In the third, fourth, fifth, sixth and—we suppose—seventh, they are different again.

This listing represents an original concept in computer games, brilliantly executed. Michael Andreason, of Alloway, Ayr, who wrote the program, reports a staggering best score of 150,490. We wonder if he has considered marketing the game commercially?

Control is by the usual cursor keys; there is a high score facility and list of instructions.

Graphics notes:
1—Graphic D, graphic C, graphic E, graphic B
2—Graphic A
5—Graphic A, graphic H, graphic F
1000—Graphic I
1002—Graphic G
2000—Graphic J.

RM Game

```
3006 IF y=31 THEN LET b=10000: GO TO 4000
3007 GO TO 3004
3010 LET x=x+(RND<.5 AND x<>20)-(RND<.5 AND x<>1): PRINT AT x,y; PAPER 4;"■": IF RND<.3 THEN GO TO 3002
3011 GO TO 3010
4000 LET g=4000: BORDER 1: PAPER 3: INK 7: GO SUB 100: PAUSE 200: FOR n=21 TO 0 STEP -1: PRINT AT n,0; PAPER 1;"                                ": NEXT n: BEEP .3,0: CLS : FOR n=1 TO 30: PRINT AT RND*20,RND*30;"@": NEXT n: LET m=3: LET b=3: LET x=11: LET y=15: GO SUB 300
4001 GO SUB 400: PRINT AT x1,y1;" ";AT x1,y1; INK 6;("●" AND RND<.2);AT x,y; INK 0;w$(d);AT m,b; INK 5; OVER 1;"*": BEEP .01,3: BEEP .04,-3: IF m=x AND y=b THEN LET b=15000: GO TO 5000
4002 PRINT AT m,b; OVER 1; INK 7;"*": LET m=m+(RND<.5 AND m<19)-(RND<.5 AND m>1): LET b=b+(RND<.5 AND b<29)-(RND<.5 AND b>1): IF s$="" THEN GO TO 9000
4003 LET s=s+50: GO TO 4001
5000 LET x=3: BORDER 0: PAPER 0: INK 7: GO SUB 100: FOR n=.3 TO 0 STEP -.05: BEEP n,0: BEEP n,-2: BEEP n,0: BEEP n,-5: NEXT n: FOR n=1 TO 5: BEEP .02,0: BEEP .02,-2: BEEP .02,0: BEEP .02,-5: NEXT n: CLS : PAPER 2: INK 7: FOR n=0 TO 21: PRINT AT n,0;"■                              ■": NEXT n
5001 LET b=0: LET g=5000
5002 LET y=INT (RND*4)+1
5003 LET x=x+(INKEY$="8")-(INKEY$="5"): LET b=b+2: LET s$=SCREEN$ (5,x): PRINT AT 21,0;"■■■■■■■";AT 5,x; INK 0;"♜";AT 21,y;" ": BEEP .05,0: BEEP .05,2: IF s$="" THEN LET y=x: LET x=5: GO TO 9000
5004 PRINT AT 5,x; INK 4;"●": POKE 23692,-1: PAPER 0: PRINT AT 21,0: PRINT : PAPER 2: IF RND<.7 THEN GO TO 5003
5005 FOR n=1 TO 4: LET x=x+(INKEY$="8")-(INKEY$="5"): LET s$=SCREEN$ (5,x): PRINT AT 21,0;"■■";AT 5,x; INK 0;"♜";AT 21,RND*3+1;("@" AND RND<.1): BEEP .04,-2: BEEP .04,0: IF s$="" THEN LET y=5: LET x=5: GO TO 9000
5006 PRINT AT 5,x; INK 4;"●": POKE 23692,-1: PAPER 0: PRINT AT 21,0: PRINT : PAPER 2: LET b=b+5: NEXT n: IF b>1000 THEN LET s=s+25000: GO TO 6000
5007 GO TO 5002
6000 PAPER 2: INK 7: LET g=6000: FOR n=5 TO 21: PRINT AT n,0;"■                              ■": NEXT n: POKE 23692,-1: PRINT "■      ■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■": FOR n=1 TO 13: BEEP .07,-3: BEEP .07,-2: PRINT AT 21,0: PRINT "■                              ■";AT 5,x;"♜";AT 4,x;" ": NEXT n: LET b=INT (RND*10)+18: FOR n=14 TO 21: BEEP .07,-5: BEEP .07,0: PRINT AT 5,x;"♜";AT 4,x;" ";AT 21,0: PRINT "■■■■■■■■■■■■";TAB b;"■■";TAB 31;"■": NEXT n
6001 FOR n=5 TO 13: PRINT AT n-1,x;" ";AT n,x;"♜": BEEP .03,0: BEEP .03,2: NEXT n: PRINT AT 13,x;" ": FOR n=0 TO 21: PRINT AT n,0; INVERSE 1; OVER 1;"                                ": NEXT n: BORDER 4
6002 INPUT "": PAPER 7: LET x=13: LET y=1: INK 0: PRINT AT x,y;"≮": PAUSE 0
6003 LET y=y+1: PRINT AT x,y;"≮";AT x,y-1; INK 1;"●": BEEP .1,-10: BEEP .1,-5: IF SCREEN$ (14,y)=" " THEN GO TO 6050
6004 IF INKEY$="7" THEN GO TO 6010
6005 GO TO 6003
6010 LET x=x-1: LET y=y+1: PRINT AT x,y;"≮";AT x+1,y-1; INK 1;"●": BEEP .1,-15: BEEP .1,-10: IF x=0 THEN GO TO 6050
6011 IF INKEY$="7" THEN GO TO 6010
6012 LET x=x+1: LET y=y+1: PRINT AT x,y;"≮";AT x-1,y-1; INK 1;"●": BEEP .1,-15: BEEP .1,-10: IF y=31 THEN GO TO 6050
6013 IF x=13 THEN GO TO 7000
6014 GO TO 6012
6050 FOR x=x+1 TO 21: PRINT AT x,y;"♜";AT x-1,y; INK 1;"●": BEEP .3,x: NEXT x: GO TO 9000
6009 GO TO 3
7000 IF b=y OR b+1=y THEN LET b=40000: LET l=l+1: LET w=w+1: GO TO 4
7001 GO TO 6050
8000 FOR n=USR "a" TO USR "j"+7
8001 READ x: POKE n,x: NEXT n
8002 RETURN
8023 DATA 60,125,255,255,255,255,126,60,0,99,255,240,240,255,99,0,60,126,126,60,36,36,102,102,0,198,255,15,15,255,198,0,102,102,36,36,60,126,126,60,126,1,121,133,165,153,129,126,66,186,186,84,16,19,20,24,60,102,195,153,153,195,102,60,24,126,114,207,243,78,126,24,255.255,195,195,195,195.255,255
8500 BORDER 5: PAPER 7: INK 0: CLS : PRINT AT 0,12;"WORM"' INK 5;"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■"
8501 PRINT '"Instructions:"''" ■-Eat the ⊙ for points and eat 10 ⊙ or 1 @ to get to next set."
8502 PRINT " ■-Eat the flowers ♣ avoid the rocks @."
8503 PRINT " ■-Eat flowers miss wall ■."
8504 PRINT " ■-Move along windy path."
8505 PRINT " ■-Eat the blue dandelion."
8506 PRINT " ■-Work down to underground cave."
8507 PRINT " ■-Jump the gap, any key begin, 7 for up, take finger off 7 for down."
8508 PAUSE 1000: RETURN
9000 LET b=0: IF x>21 THEN LET x=21
9001 IF x<0 THEN LET x=0
9002 IF y<0 THEN LET y=0
9003 IF y>31 THEN LET y=31
9004 PRINT AT x,y; INK 0; PAPER 7; BRIGHT 1; FLASH 1;w$(d): FOR n=1 TO 10: BEEP .1,-15: NEXT n: PAPER 0: INK 7: BORDER 0: LET w=w-1: GO SUB 100: FOR n=1 TO 10: BEEP .15,-20: NEXT n
9005 LET x=3: IF w>0 THEN GO TO 3
9006 PRINT AT 21,11;"AGAIN ?";AT 0,7;"HIGH SCORE:";h: PAUSE 0
9007 IF INKEY$="n" THEN STOP
9008 IF h<s THEN LET h=s: GO TO
```

MEGA-MASTERMOND

```
    DIM A(5)
    DIM B(5)
    DIM C(5)
 9 CLS
10 PRINT "sMEGAMASTERMIND"
11 PRINT
12 PRINT "sss??????"
14 FOR B=1 to 12
16 LET A=13-B
18 IF A<10 THEN PRINT "s";
20 PRINT A; "-";
22 PRINT "+++++++-::::::"
24 NEXT B
30 FOR I=0 TO 5
31 LET A(I)=RND(10)+27
32 NEXT I
33 LET G=218
35 FOR J=1 TO 12
36 LET E=0
37 INPUT DS
38 IF DS=" " THEN GO TO 78
40 FOR I=0 TO 5
41 LET B(I)=A(I)
42 LET B=CODE(DS)
43 IF B<2 THEN LET B=19
45 LET C(I)=B
46 GO SUB 98
47 POKE B+I, C(I)
48 LET DS=TLS(DS)
50 IF C(I)-B(I) THEN GO TO 58
52 LET E=E+1
53 LET C(I)=-1
54 LET B(I)=-2
56 GO SUB 98
57 POKE B+6+E, 20
58 NEXT I
60 IF E=6 THEN GO TO 78
62 FOR I=0 TO 5
63 FOR K=0 TO 5
64 IF C(K)-B(I) THEN GO TO 72
66 LET E=E+1
67 LET C(K)=-1
68 LET B(I)=-2
70 GO SUB 98
71 POKE B+6+E, 28
72 NEXT K
74 NEXT I
75 LET G=G -17
76 NEXT J
78 FOR I=0 TO 5
80 GO SUB 98
81 POKE B-G+21+I, A(I)
82 NEXT I
85 PRINT "NEWLINE TO REPLAY"
86 INPUT DS
88 IF DS=" "THEN GO TO 9
90 LIST
98 LET B=PEEK(16396)+256 *
PEEK(;6397)+G
99 RETURN
```

FW MANDERS of Lincoln has sent an excellent version of Mastermind for the 1K ZX-80. Six digits are required, giving one million possible combinations to be solved in 12 moves.

To run **Megamastermind,** enter "GOTO 9". When the game board appears, key-in your six numbers (0 to 9) and press NEWLINE. To give in or to call for a new game, enter NEWLINE. To return to program listing, hit any key before NEWLINE.

Note that the first three lines of the listing are entered direct, as there is not sufficient memory to store them in the program. If the arrays are lost due to RUN being entered, they can be re-entered.

Megamastermind is one of the best routines we have had for this machine. (1K ZX-80).



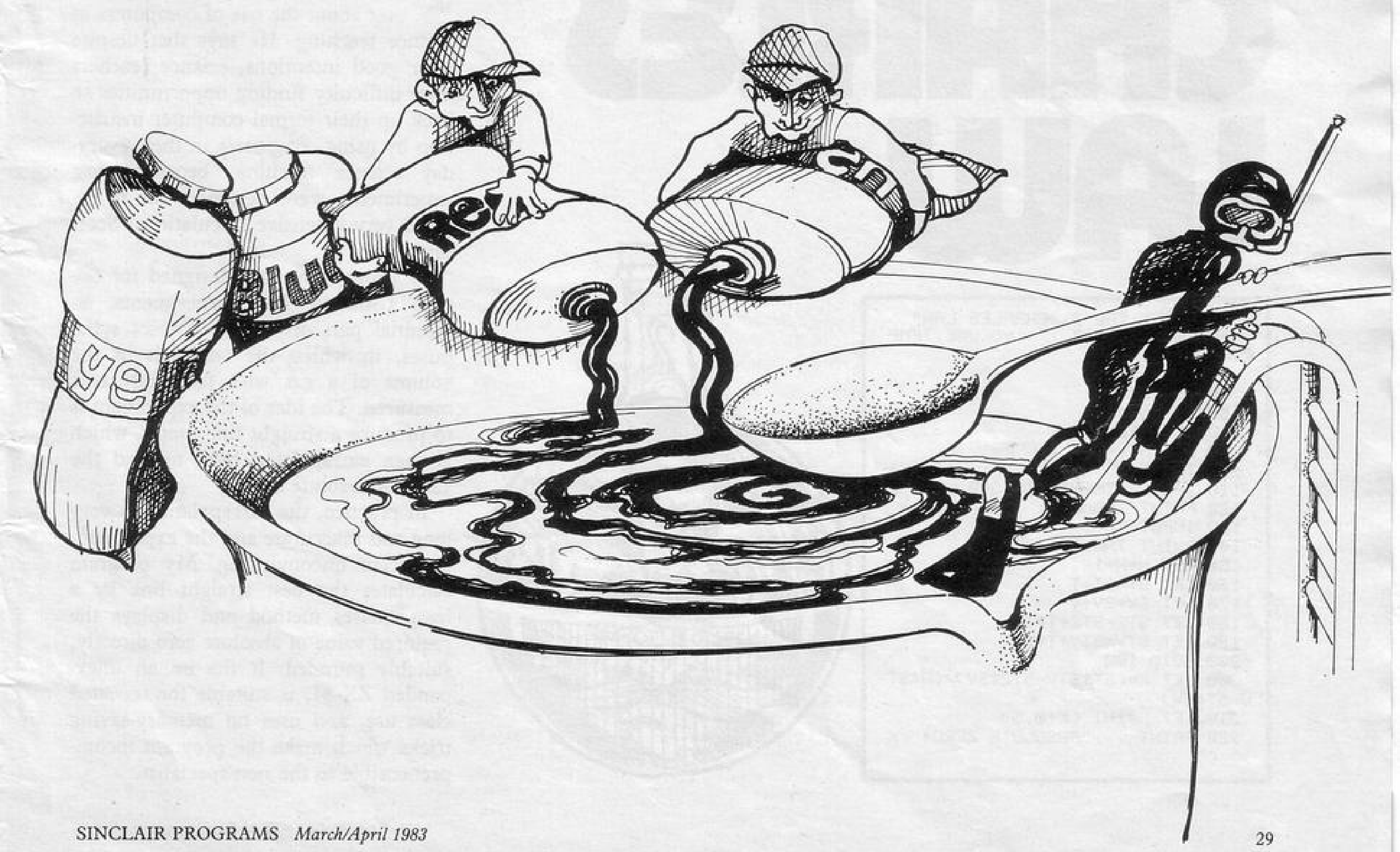
COLOUR MIXER

```
9700 REM Spectrum Colour Mixer
        M.D.Wornham
9710 FOR n=0 TO 7
9720 READ m: POKE USR "A"+n,m
9730 NEXT n
9740 DATA BIN 11111111,BIN 00000
000,BIN 11111111,BIN 00000000,BI
N 11111111,BIN 00000000,BIN 1111
1111,BIN 00000000
9745 REM RUN before typing more
9750 POKE 23609,40: BORDER 0: PA
PER 0: INK 7: CLS
9760 PRINT " Spectrum 64 Shade C
olour Mixer
"
9770 PRINT ,,,,"This program wil
l give a dispiayof 64 shades wit
h their codes.",,,"The code requ
ired will be          requested for
 a whoie page of     that colour."
9780 PRINT ,,"The simple method
to obtain thatcolour will then
be given."
9790 PRINT ,,"This program can b
e used as a    sub routine in, fo
r example,     drawing programs."
9800 INPUT "Press ENTER ";z$: CL
S
9805 PRINT " Spectrum 64 Shade C
olour Chart"
9808 PRINT "
",,,
9810 GO SUB 9950
9820 PRINT a;b;">";: FOR c=0 TO
4: PRINT PAPER a; INK b;"≡";: NE
XT c
9830 IF y=00 THEN GO TO 9845
9840 GO TO 9810
9845 PRINT ,,"Adjust television
colour and     brightness to clar
ify colours"
9850 INPUT "Code of colour requi
red? ";a$
9860 IF LEN a$<>2 THEN GO TO 985
0
9870 IF CODE a$<48 OR CODE a$>55
 OR CODE a$(2)<48 OR CODE a$(2)>
55 THEN GO TO 9850
9880 LET a=VAL a$(1): LET b=VAL
a$(2): CLS
9890 FOR e=1 TO 704: PRINT PAPER
 a; INK b;"≡";: NEXT e
9900 PRINT AT 10,1;" For this co
lour in a program ": IF a$(1)<>a
$(2) THEN PRINT AT 12,1;"PRINT P
APER ";a;";INK ";b;";GRAPHICS A"
9910 IF a$(1)=a$(2) THEN PRINT A
T 12,7;" Use  Colour  ";a$(1);"!
 "
9920 INPUT "Press ENTER to conti
nue ";z$: CLS
9930 GO TO 9805
9950 READ y: LET a$=STR$ y: IF y
<10 THEN LET a$="0"+a$
9960 IF y=00 THEN RESTORE 9980
9970 LET a=VAL a$(1): LET b=VAL
a$(2): RETURN
9980 DATA 22,30,32,14,34,36,26,3
7,04,15,24,35,74,27,66,77,65,67,
75,64,71,61,45,25,60,05,44,21,31
,23,20,01,55,47,63,73,51,41,43,5
3,52,42,50,13,40,03,02,11,62,72,
57,56,46,12,17,54,06,16,76,33,10
,07,70,00
9999 SAVE "colours" LINE 9700
```

COLOUR MIXER enables the user to expand the colours available from the Spectrum to 64 shades. When run, a remarkable display appears like a paint manufacturer's catalogue with 64 numbered boxes and the option to obtain a screen full of the desired shade by entering the appropriate number.

M D Wornham of Droitwich, Worcestershire, who sent the listing, points out that it would be a useful sub-routine in longer programs. (16K Spectrum).

Graphics notes:
9745—REM RUN before typing more.
9820—Graphic A.





BLOB MUNCHER

```
    3 LET T=0
    5 LET X=28
    7 LET Y=22
   10 FOR A=1 TO 25
   20 PLOT INT (RND*44),INT (RND*
34)
   30 NEXT A
   60 IF X>=60 THEN LET X=60
   70 IF Y>40 THEN LET Y=40
   80 IF X<=0 THEN LET X=0
   90 IF Y<=0 THEN LET Y=0
  100 LET X=X+(INKEY$="8")-(INKEY
$="5")
  110 LET Y=Y-(INKEY$="6")+(INKEY
$="7")
  120 PLOT X,Y
  125 LET T=T+1
  130 UNPLOT X,Y
  135 IF T>500 THEN GOTO 150
  140 GOTO 60
  150 PRINT AT 10,10;"GAME OVER"
```

BLOB MUNCHER is a pleasing, adaptable game for the unexpanded ZX-81. You are the flashing spot on screen controlled by the cursor keys and must munch the other spots in an orgy of cannibalistic fratricide before your time explires.

The routine can be altered by adding more or less static blobs in the FOR/NEXT loop or by changing the time limit by tinkering with the variable T.

Blob Muncher was sent by E Hughes of Southampton.

CHARLES LAW

```
   10 PRINT TAB 9;"CHARLES LAW"
   20 PRINT ,,,,"     VOLUME TEMP
ERATURE",,,
   30 LET N=0
   40 LET ST=0
   50 LET SV=0
   60 LET ST2=0
   70 LET STV=0
  100 INPUT V
  110 IF V<0 THEN GOTO 300
  120 PRINT TAB 6;V;
  130 INPUT T
  140 PRINT TAB 17;T;
  150 LET N=N+1
  160 LET ST=ST+T
  170 LET SV=SV+V
  180 LET ST2=ST2+T*T
  190 LET STV=STV+T*V
  200 GOTO 100
  300 LET K=(ST*STV-ST2*SV)/(N*ST
V-ST*SV)
  310 LET K=INT (K+0.5)
  320 PRINT ,,,"ABSOLUTE ZERO=";K
;" C"
```



PR Scott of Godalming, Surrey, has written a very interesting letter about the use of computers in science teaching. He says that despite their good intentions, science teachers have difficulty finding opportunities to back up their formal computer instruction by using computers in their everyday science teaching, because most experiments were designed not to require very extensive calculations. Scott says:

"My programme was designed for use with **Charles' Law** experiments, an essential part of O-level physics syllabuses, in which the variation in the volume of a gas with temperature is measured. The idea of the experiment is to produce a straight line graph, which is then extrapolated back to find the value of absolute zero.

In practice, the extrapolation is very long and inaccurate and the experiment can seem unconvincing. My program calculates the best straight line by a least-squares method and displays the required value of absolute zero directly, suitably rounded. It fits on an unexpanded ZX-81, is suitable for repeated class use, and uses no memory-saving tricks which make the program incomprehensible to the non-specialist.

```
  5 LET h=3: LET s=0: LET l=3: LET hs=0
  10 LET m=0: DIM x(2): DIM y(2): LET y(1)=1: LET x(1)=16: LET x(2)=16: LET y(2)=20
  15 IF l<=0 THEN GO TO 800
  20 CLS : OVER 0: BORDER 3: INK 0: PAPER 9
  30 FOR a=3 TO 18
  40 FOR b=4 TO 28 STEP 4
  50 PRINT INVERSE 1; PAPER 6; INK 0;AT a,b,"#"
  60 NEXT b
  70 FOR n=6 TO 28 STEP 4
  80 PRINT INVERSE 0; INK 1; PAPER 7;AT a,n;"."
  85 NEXT n
  90 NEXT a
  95 PRINT AT 0,0; PAPER 3;"                                ";AT 21,0;"
 100 LET b=1
 101 IF x(b)>=31 THEN LET x(b)=31
 102 IF x(b)<=0 THEN LET x(b)=0
 103 IF y(b)<1 THEN LET y(b)=1
 105 IF y(b)>=20 THEN LET y(b)=20
 106 IF y(b)<=0 THEN LET y(b)=0
 107 LET b=b+1: IF b<=2 THEN GO TO 101
 108 IF SCREEN$ (y(2),x(2))="©" THEN LET s=s+100: GO SUB 700
 109 IF SCREEN$ (y(1),x(1))="©" THEN GO TO 330
 110 IF SCREEN$ (y(1),x(1))="." THEN LET s=s+10: LET m=m+1
 120 PRINT INK 2;AT y(1),x(1);"⁂";AT y(2),x(2); INK 1;"⁂"
 123 IF s>hs THEN LET hs=s
 124 IF h=-1 THEN PRINT INK 7;AT 21,0;"          You Ran Out Of Holes          ": GO TO 600
 125 PRINT PAPER 7; INK 3; INVERSE 1;AT 0,4;"SCORE=";s;"   HI=";hs;" LIVES=";l;AT 21,0;" HOLES LEFT=";h;"  ENERGY=";m;" "
 130 IF x(2)=x(1) AND y(2)=y(1) THEN GO TO 600
 200 LET a$=INKEY$
 205 IF INKEY$<>"" THEN BEEP .00 21266,47
 210 IF a$="p" THEN GO TO 267
 220 IF a$="o" THEN GO TO 277
 230 IF a$="q" THEN GO TO 287
 240 IF a$="a" THEN GO TO 297
 250 IF a$="m" AND m>=20 THEN GO TO 310
 260 GO TO 400
 267 PRINT AT y(1),x(1);" "
 270 IF SCREEN$ (y(1),x(1)+1)<>" " THEN LET x(1)=x(1)+1
 275 GO TO 400
 277 PRINT AT y(1),x(1);" "
 280 IF SCREEN$ (y(1),x(1)-1)<>" " THEN LET x(1)=x(1)-1
 285 GO TO 400
 287 PRINT AT y(1),x(1);" "
 290 IF SCREEN$ (y(1)-1,x(1))<>" " THEN LET y(1)=y(1)-1
 295 GO TO 400
 297 PRINT AT y(1),x(1);" "
 300 IF SCREEN$ (y(1)+1,x(1))<>" " THEN LET y(1)=y(1)+1
 305 GO TO 400
 310 IF SCREEN$ (y(1),x(1)+1)<>" " THEN PRINT AT y(1),x(1)+1;"©": LET h=h-1: LET m=m-20
 320 GO TO 100
 330 GO TO 605
 340 IF l=0 THEN STOP
 345 FOR f=1 TO 100: NEXT f
 350 GO TO 10
 400 IF x(2)<x(1) THEN GO TO 500
 410 IF x(2)>x(1) THEN GO TO 510
 420 IF y(2)<y(1) THEN GO TO 520
 430 IF y(2)>y(1) THEN GO TO 530
 440 GO TO 100
 500 PRINT AT y(2),x(2);" "
 503 IF SCREEN$ (y(2),x(2)+1)<>" " THEN LET x(2)=x(2)+1: GO TO 537
 505 GO TO 420
 507 GO TO 100
 510 PRINT AT y(2),x(2);" "
 513 IF SCREEN$ (y(2),x(2)-1)<>" " THEN LET x(2)=x(2)-1: GO TO 517
 515 GO TO 420
 517 GO TO 100
 520 PRINT AT y(2),x(2);" "
 523 IF SCREEN$ (y(2)+1,x(2))<>" " THEN LET y(2)=y(2)+1
 525 GO TO 430
 527 GO TO 400
 530 PRINT AT y(2),x(2);" "
 533 IF SCREEN$ (y(2)-1,x(2))<>" " THEN LET y(2)=y(2)-1
 537 GO TO 100
 600 IF x(1)<>x(2) AND y(1)<>y(2) THEN GO TO 100
 605 PRINT ;AT y(1),x(1);"±": LET l=l-1: FOR f=-2 TO -5 STEP -1: FOR a=1 TO 3: BEEP .5,f: NEXT a: NEXT f: LET h=3: GO TO 620
 610 GO TO 100
 630 GO TO 10
 700 PRINT AT y(2),x(2);"@": FOR f=10 TO 20: FOR a=-5 TO 5: BEEP .01,f+a: NEXT a: NEXT f: LET h=3: GO TO 10
 800 FOR f=1 TO 100: NEXT f: CLS : PRINT AT 5,0;"          Score=";s;AT 10,0;"          PRESS y TO GO AGAIN";
 805 IF INKEY$="y" THEN LET l=3: LET s=0: GO TO 10
 810 IF INKEY$="" THEN GO TO 805
 820 IF INKEY$<>"y" THEN STOP
 830 STOP
9000 FOR f=1 TO 4: READ a$
9010 FOR n=0 TO 7: READ a: POKE USR a$+n,a
9020 NEXT n: NEXT f
9030 DATA "a",60,16,60,90,153,24,36,66
9040 DATA "b",48,16,240,48,60,50,81,72
9050 DATA "c",0,60,66,90,90,66,60,0
9060 DATA "d",24,24,126,24,24,60,126,0
9999 RUN
```

LURE



LURE is a game in which you, bipedal mammal with the opposable thumb and wrinkled cortex, attempt to prove your evolutionary superiority over a dumb dinosaur.

You are trapped in a maze with the beast, whose minimal intelligence is sufficient to track you down. As you flee the creature you are able to consume power pills; 20 of them give you sufficient energy to dig a trap. Then employ that over-developed fore-brain to lure the muscle-head into the hole.

Q and A send you up and down; O and P manoeuvre you left and right and you dig with M. You have three holes per monster but your supply of holes and pills is renewed if you can trap the beast. If the dinasaur catches you he will erect a little cross and you lose one of your three lives.

The game was sent by A Ward of Aldridge, West Midlands. (16K Spectrum). Graphic notes:
120—Graphic A, graphic B
605—Graphic D.
700—Graphic C.



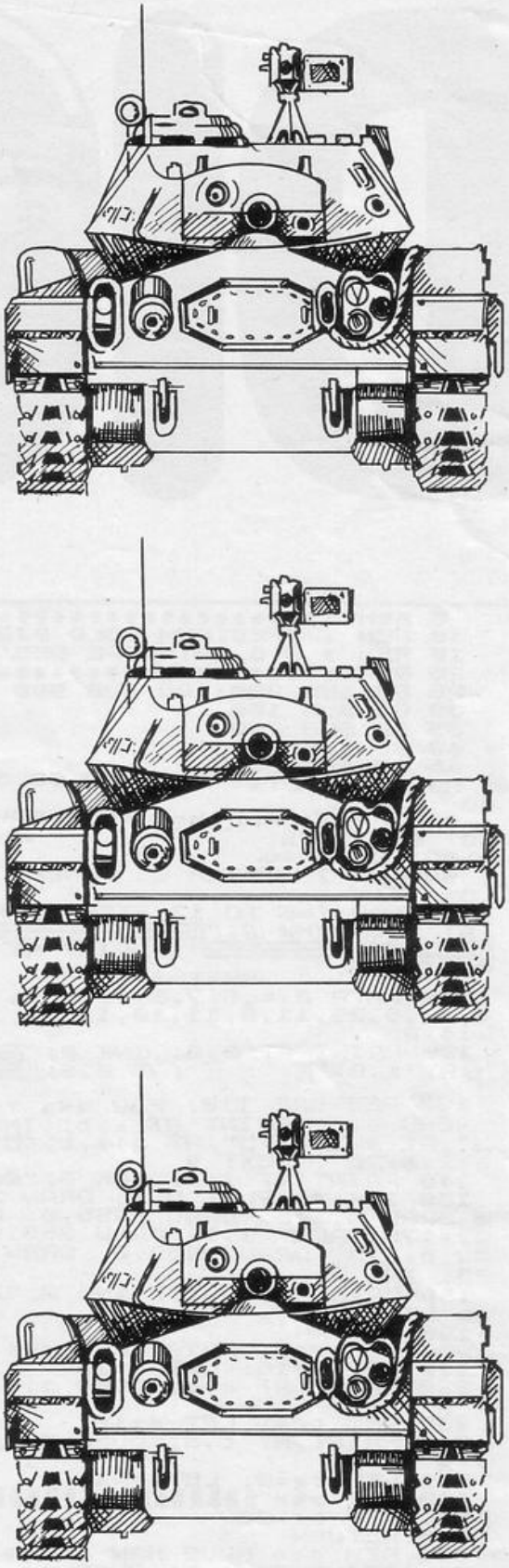
TIRED OF the rat race? **Beachcomber** for the 1K ZX-81 enables you to live a carefree life collecting gold sovereigns washed up on to a South Sea island. Most coins are at the bottom of the beach and therefore your presence will cause your score to increase more rapidly but beware of the turbulent incoming tide.

The beach is replenished after each high tide until you are caught by the sea and drowned. Can you collect more than 250 coins? Beachcomber was submitted by D A Chapman of Worksop, Notts.

BEACHCOMBER

```
  5 REM "BEACHCOMB"
 10 LET A=CODE "(graphic 1)"
 15 LET B=CODE "(graphic 7)"
 20 LET D=CODE "="
 30 LET E=A+D
 40 LET C=A-A
 45 CLS
 50 FOR N=CODE " " TO E*B
 60 PLOT N,N/B
 70 NEXT N
 80 LET X=B*B
 90 FOR Y=D TO CODE "£" STEP -R
ND*CODE "(graphic 5)"
100 FOR M=E TO Y STEP -A
110 LET A$="==========================
=========="
120 PRINT AT M,CODE " ";A$(A TO
(E+A-M)*2.7)
130 PRINT AT D-X,X*B;" ";TAB (X
*B);" "
140 IF INKEY$="8" AND X<B*B THE
N LET X=X+A
150 IF INKEY$="5" AND X>A THEN
LET X=X-A
160 PRINT AT D-X,X*B;"O";TAB (X
*B);"T"
170 IF X+Y<E-B THEN GOTO CODE "
ABS "
180 NEXT M
190 LET C=C+CODE ""-X
195 PRINT AT B,A;C
200 NEXT Y
210 IF X+Y>=D-B AND X=9 THEN GO
TO E+E
230 CLS
240 PRINT ,"0<=",C
```

```
  0~REM TANK ATTACK D.WATTS.
 10 LET B=PI-PI
 20 LET S=PI-PI
 30 LET X=INT (PI*PI)
 40 CLS
 50 PRINT "(graphic 8;three gra
phic 7s;inverse +;three graphic
7s;graphic 5)"
 60 LET A$="(a mix of SPACES, g
raphic Hs and graphic Ds, twenty
 nine characters long)"
 70 LET B$="(graphic 8;seven gr
aphic Fs;graphic 5)"
 80 POKE 16437,VAL "255"
 90 POKE 16436,VAL "255"
100 GOTO VAL "210"
110 PRINT AT PI/PI,PI-PI;"(grap
hic 8)";A$(X TO X+VAL "6");"(gra
phic 5)"
120 PRINT B$
130 IF PEEK 16436+PEEK 16437*25
6<61000 THEN GOTO VAL "260"
140 IF INKEY$="" THEN GOTO VAL
"130"
150 IF INKEY$="P" THEN GOTO VAL
 "180"
160 LET X=X+(INKEY$="8")-(INKEY
$="5")
162 IF X<PI/PI THEN LET X=LEN A
$-VAL "6"
164 IF X>LEN A$-VAL "6" THEN LE
T X=PI/PI
170 GOTO 110
180 IF X<>Y-INT PI THEN GOTO 13
0
190 PRINT AT PI/PI,VAL "4";"*"
200 LET A$(Y)=S$
210 LET Y=INT (RND*(LEN A$-VAL
"7"))+VAL "4"
220 LET S$=A$(Y)
230 LET A$(Y)="(inverse X)"
240 LET S=S+PI/PI
250 GOTO 110
260 IF S>B THEN LET B=S
270 PRINT "SCORE=";S
280 PRINT "BEST =";B
290 INPUT S$
300 GOTO VAL "20"
```



TANK ATTACK

TANK ATTACK

YOUR TANK has been immobilised. The turret can still rotate and the gun fires. Using cursor keys 5 and 8, scan the horizon through your gunslit and zap the attacking tanks — inverse Xs — with key P. See how many of the opposition you can destroy in 90 seconds. The current score and high score are displayed.

Tank Attack is a pleasing routine from D Watts of Bradford. (1K ZX-81).

DIGGE

```
  5 REM ************************
 10 REM * SPECTRUM GOLD DIGGER*
 15 REM * © S.LATHROPE DEC'82 *
 20 REM ************************
 25 GO SUB 900: GO SUB 990
 30 GO SUB 100
 35 GO SUB 200
 40 GO SUB 400
 45 GO SUB 300
 55 IF INKEY$="0" THEN GO SUB 5
00
 60 IF a=c AND b=d THEN PAUSE 3
00: GO TO 25
 80 GO TO 40
 90 INK 7: PAPER 0: BORDER 0: C
LS
 100 FOR f=5 TO 17 STEP 3: PRINT
 AT f,0; INK 2;"▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀
▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀▀": PRINT AT f+1,
0; INK 2;": NEXT f
 110 DATA 2,4,5,7,5,16,5,24,8,2,
8,19,8,29,11,5,11,10,11,19,14,10
,14,25
 120 PRINT AT 0,0; INK 2;"▀▀▀▀▀
";AT 1,0;"▀   ▄";AT 2,0;"▀▀▀▀▀
"
 130 RESTORE 110: FOR q=1 TO 11:
 READ a,b: PRINT AT a,b; INK 4;"
#";AT a-1,b;"#";AT a+1,b;"#";AT
a+2,b;"#": NEXT q
 140 PRINT AT 1,1; INK 6;"●●●"
 150 INK 2: PLOT 0,0: DRAW 255,0
: DRAW 0,175: DRAW -255,0: DRAW
0,-175: PLOT 1,1: DRAW 253,0: DR
AW 0,173: DRAW -253,0: DRAW 0,-1
73: INK 7
 160 PRINT AT 2,10; INK 2;"ZX GO
LD DIGGER"
 190 RETURN
 200 REM *** VARIABLES ****
 210 LET a=16: LET b=15
 220 PRINT AT a,b; OVER 1; INK 4
;"Ж"
 230 LET c=4: LET d=15
 240 PRINT AT c,d; OVER 1; INK 4
;"Ѫ"
 250 LET ca=0: LET s=1
 260 LET o$="▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐▐
▐▐": LET ox=20
 290 RETURN
 300 REM *** MOVE MAN *****
 310 PRINT AT a,b; OVER 1; INK 4
;"Ж"
 330 LET b=b+(INKEY$="8" AND ATT
R (a,b+1)<>2)-(INKEY$="5" AND AT
TR (a,b-1)<>2)
 350 LET a=a+(INKEY$="6" AND ATT
R (a+1,b)=4)-(INKEY$="7" AND ATT
R (a-1,b)=4)
 380 PRINT AT a,b; OVER 1; INK 4
;"Ж"
 390 RETURN
 400 REM *** MOVE BEAST *****
 405 LET ox=ox-.1: GO SUB 800
 410 PRINT AT c,d; OVER 1; INK 4
;"Ѫ"
 430 LET d=d+(d<b AND ATTR (c,d+
1)<>2)-(d>b AND ATTR (c,d-1)<>2)
 450 LET c=c+(c<a AND ATTR (c+1,
d)=4)-(c>a AND ATTR (c-1,d)=4)
 460 GO TO 480
 470 LET d=d+(d<15)-(d>=15)
 480 PRINT AT c,d; OVER 1; INK 4
;"Ѫ"
 483 IF a=16 AND b=1 AND ca=1 TH
EN GO SUB 750
 485 IF ATTR (c+1,d)=6 THEN GO S
UB 600
 487 IF a=1 AND b=4 AND ca=0 THE
N GO SUB 700
 490 RETURN
 500 REM *** DIG HOLE ****
 505 IF a>14 THEN RETURN
 510 PRINT AT a,b; OVER 1; INK 4
;"Ж"
 520 PRINT AT a+1,b; INK 6;" ";A
T a+2,b;" "
 530 LET b=b+1
 540 PRINT AT a,b; OVER 1; INK 4
;"Ж"
 590 RETURN
 600 REM *** BEAST DROP ****
 610 PRINT AT c,d; OVER 1; INK 1
;"Ѫ"
 620 LET c=c+1
 630 PRINT AT c,d; OVER 1; INK 1
;"Ѫ"
 640 IF ATTR (c+1,d)<>2 THEN GO
TO 610
 690 RETURN
 700 REM *** CARRY GOLD ****
 710 PRINT AT 1,10; INK 2; PAPER
 7; FLASH 1;"● CARRYING ●"
 720 LET ca=1
 740 RETURN
 750 LET s=s+1
 760 LET ca=0: PRINT AT 18,s; IN
K 6;"▄"
 770 PRINT AT 1,10;"
"
 790 RETURN
 800 REM *** OXYGEN GAUGE *****
 810 IF ox<=0 THEN PAUSE 300: GO
 TO 25
 840 PRINT AT 19,1; INK 2;"OXYGE
N:"; PAPER 3; INK 5;o$( TO ox);
PAPER 0;"  "
 890 RETURN
 900 REM **** START *****
 910 PAPER 4: CLS : PAPER 0
 920 PRINT AT 10,9; PAPER 7; FLA
SH 1; INK 4;"PUSH ANY KEY"
 930 PRINT AT 5,10; PAPER 7; INK
 4;"GOLD DIGGER"
 940 IF INKEY$="" THEN GO TO 940
 950 CLS
 980 RETURN
 990 RESTORE 1000: FOR q=1 TO 5:
 READ q$: FOR n=0 TO 7: READ r:
POKE USR q$+n,r: NEXT n: NEXT q
1000 DATA "a",187,187,0,221,221,
0,238,238
1010 DATA "b",24,60,24,60,90,24,
36,66
1020 DATA "c",126,153,187,255,12
5,24,36,66
1030 DATA "d",30,12,62,127,127,1
27,126,60
1050 DATA "h",66,66,255,66,66,66
,255,66
1090 RETURN
```

R!



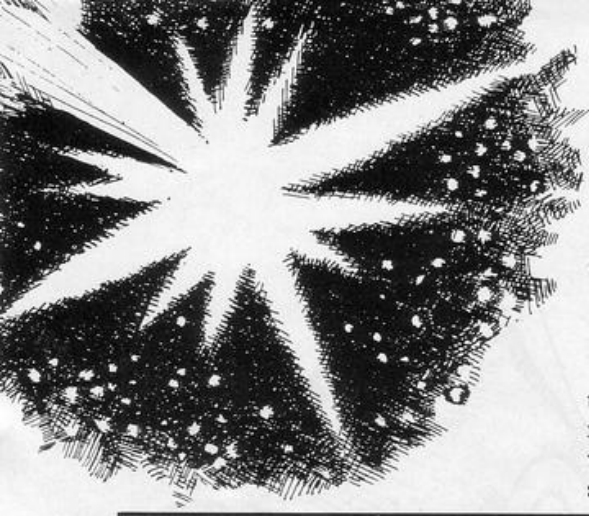
DIGGER is an excellent arcade-style game for the 16K Spectrum. It is based on an already popular routine and requires you to take your user-defined man up several ladders to the treasure chamber on the top floor.

When you arrive, the CARRYING sign will flash, indicating that the man has picked up a bag of gold. There are three bags to retrieve, but it will be a very skilful player who can grab them all, because there is a snag — a hungry but stupid beast concerned to eat you.

Evade the monster if you can, or dig a hole which you can leap, but he cannot, by pressing the 0 key. Meanwhile your oxygen supply is diminishing rapidly.

This is a very professional-looking routine, though there are two possible improvements to keep the tinkerers interested. It was submitted by Stephen Lathrope, of Beaconsfield, Bucks.

Graphics notes:
100—Graphic A.
130—Graphic H.
140—Graphic D.
220—Graphic B.
240—Graphic C.
260—Graphic shifted 5.



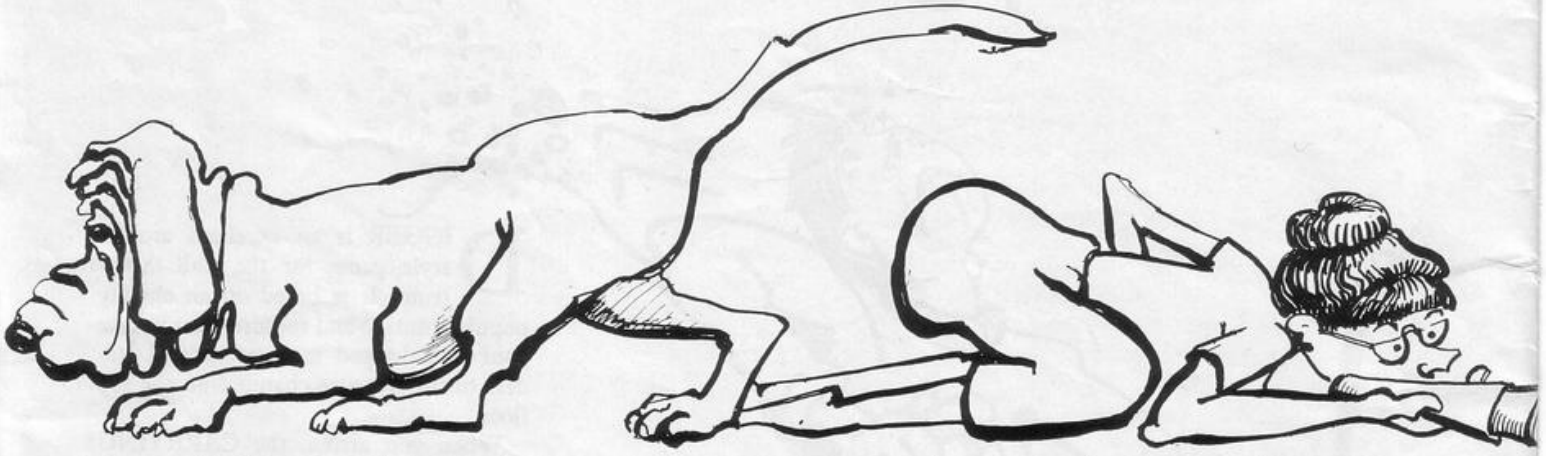
STAR DESTROYER

STAR DESTROYER is a traditional ZX-81 1K game in which your spaceship manoeuvres through a scrolled-up star field by means of the 5 and 8 keys In this version you collect one point for the stars with which you manage to collide.

Also appearing in this unusual galaxy are inverse question marks, which can be either bombs or a bonus of 50 points. Hit them and see. If you manage to score 1,000 points you win the game.

Star Destroyer was sent by Adrian Samler of Didcot, Oxfordshire.

```
  10 LET Z=0
  20 LET A=16
  30 LET A$="*"
  40 IF INT (RND*10)=4 THEN GOTO
 1000
  50 PRINT AT 0,A;
  60 LET X=PEEK (PEEK 16398+256*
PEEK 16399)
  70 IF X=CODE "*" THEN LET Z=Z+
1
  80 IF X=CODE "(inverse ?)" THE
N GOTO 2000
  90 LET A=A+(INKEY$="8")-(INKEY
$="5")
  95 PRINT "V";AT 10,INT (RND*32
);A$
  97 IF Z>=1000 THEN GOTO 9000
 100 SCROLL
 110 GOTO 30
1000 LET A$="(inverse ?)"
1010 GOTO 50
2000 LET H=INT (RND*3)
2100 IF H<>1 THEN LET Z=Z+50
2200 IF H<>1 THEN GOTO 90
2205 PRINT
2300 PRINT "YOU SCORED ";Z
2305 STOP
9000 PRINT "YOU HAVE WON THE GAM
E"
```

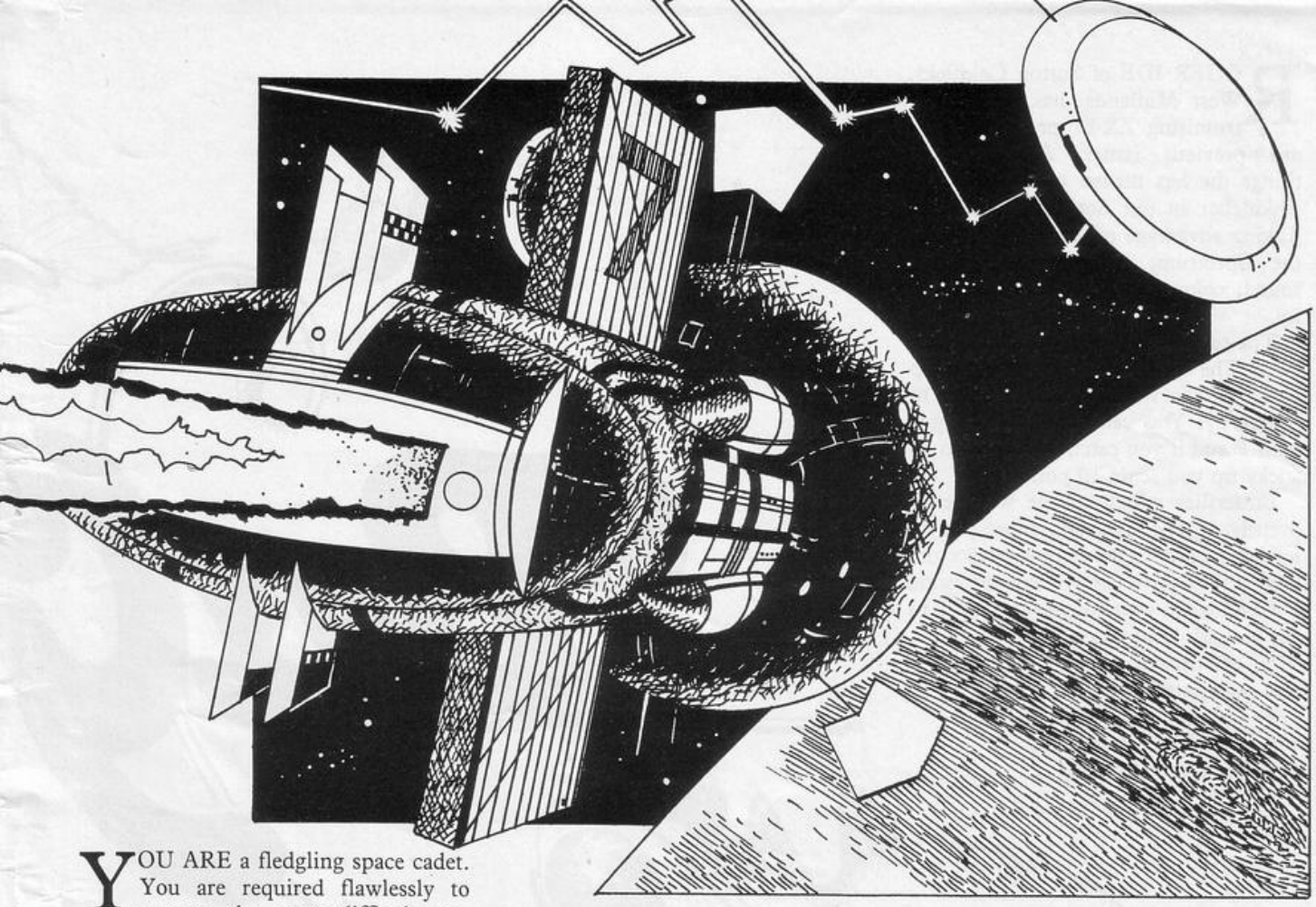


REFERENCE SEARCH

REFERENCE SEARCH will search through an array and print any string containing a given reference. N in line 40 is determined by the number of A$ set up in the array. The input should be any substring of the main string required. Because of the variables set up in the array, the command RUN should not be used. Use GOTO 20 instead.

This useful sub-routine was submitted by M H Stimson of Yate, Bristol. (1K ZX-81).

```
  10 REM "REFERENCE SEARCH"
  20 PRINT "ENTER REFERENCE REQU
IRED"
  30 INPUT B$
  40 FOR N=1 TO 12
  50 LET Y=LEN B$-1
  60 FOR R=1 TO LEN A$(N)-Y
  70 IF A$(N,R TO R+Y)=B$ THEN P
RINT A$(N)
  80 NEXT R
  90 NEXT N
```



SPACE DOCKING

YOU ARE a fledgling space cadet. You are required flawlessly to execute the most difficult manoeuvre in The Spaceway Code, a docking procedure inside the gravitational field of a large planet.

The mothership moves around randomly at the bottom of the screen and there is a time limit of 30 seconds. With each successive game the burn level increases, making completion more difficult.

Your module is steered with the usual cursor keys. Submitted by Guy Wilkinson of Wrexham, Clwyd. (Approximately 4K ZX-81).

```
   1 LET SC=0
   2 LET BU=.42
   3 SLOW
   8 GOTO 1220
   9 LET BU=BU+.112
  11 CLS
 900 LET A$="(SPACE,graphic T,inverse SPACE,graphic Y,SPACE)"
 910 LET B$="(SPACE,graphic T,graphic F,graphic Y,SPACE)"
 920 LET C$="(two SPACEs,inverse SPACE,two SPACEs)"
 930 LET D$="(SPACE,graphic 7,SPACE,graphic 7,SPACE)"
 940 LET E$="(thirty one graphic Ts)"
 950 POKE 16418,0
 960 LET T=(RND*10)+10
 970 LET S=18
 980 LET Y=RND*29
 990 LET X=4
 993 PRINT AT 22,0;E$
 995 FOR A=0 TO 30
1000 PRINT AT (RND*20)+1,RND*30;"."
1001 NEXT A
1010 PRINT AT 0,0;"SCORE :";SC;AT 3,0;"TIME,30";AT 1,0;"BURN :";BU*100;AT 2,0;"GRAV :25.51"
1020 PRINT AT 21,0;"*ANY KEY TO COMMENCE DOCKING**"
1030 IF INKEY$="" THEN GOTO 1030
1040 PRINT AT 21,0;"
                    "
1050 FOR I=30 TO 0 STEP -1
1054 PRINT AT X,Y;
1055 LET PE=PEEK (PEEK 16398+256*PEEK 16399)
1060 PRINT AT 3,6;I
1061 IF I=9 THEN PRINT AT 3,7;"
"
1070 PRINT AT X,Y-2;A$;AT X+1,Y;"Y";AT X+1,Y;" "
1080 PRINT AT S,T;B$;AT S+1,T;C$;AT S+2,T;D$
1085 PRINT AT S+3,T;"      ";AT X,Y-2;"      "
1086 IF X>21 THEN GOTO 1200
1091 IF PE=CODE "(graphic Y)" OR PE=CODE "(graphic T)" THEN GOTO 1200
1095 LET T=T+(RND>.6)-(RND<.6)
1096 LET S=S-.1
1100 LET Y=Y+(INKEY$="8")-(INKEY$="5")
1110 IF PE=CODE "(graphic F)" THEN GOTO 1170
1120 LET X=X+BU
1130 NEXT I
1135 PRINT AT 21,3;"*SORRY NO TIME LEFT*"
1140 PRINT AT 10,8;"NO BONUS"
1150 IF INKEY$<>"" THEN GOTO 9
1160 GOTO 1140
1171 LET CB=INT ((1000+(RND*100))+I*10)
1172 PRINT AT 21,0;"FABULOUS.A BONUS OF:";CB
1180 LET SC=SC+CB
1190 PRINT AT 0,0;"SCORE :";SC
1195 IF INKEY$<>"" THEN GOTO 9
1196 GOTO 1195
1200 LET X=X-1
1201 PRINT AT X,Y;"(graphic Y,SPACE,graphic 5,graphic T)";AT X+1,Y;"(graphic 6,SPACE,graphic 6)";AT X+2,Y;"(two graphic 3s,SPACE,graphic 4)";AT X+3,Y;"(graphic 1,graphic 3,SPACE,graphic 2)"
1205 PRINT AT 21,0;"NO BONUS"
1210 GOTO 1195
1220 PRINT "    *SPACE DOCK*"
1230 PRINT ,,"YOU HAVE JUST COME HOME FROM A SPACE INVASION. YOU MUST DOCK YOUR FIGHTER ONTO THE MOTHER SHIP",
1240 PRINT "KEYS:-",,"5-LEFT",,"8-RIGHT"
1250 PRINT AT 21,0;"***ANY KEY TO START***"
1260 IF INKEY$<>"" THEN GOTO 9
1270 GOTO 1250
2000 SAVE "SPACE DOCK"
2010 RUN
```

BuG

ROGER IDE of Sutton Coldfield, West Midlands, has been Spectrumising ZX-81 programs from our previous issues. Among other things, he has turned his attention to Flycatcher in our September number. Taking advantage of the capabilities of the Spectrum, he has incorporated sound, colour and user-defined graphics.

The essentials of the game remain the same. The famished bug lurks at the top of the screen waiting for butterflies to flutter by. You can extend its tongue with P and if you catch an insect on its sticky tip you score 10 points.

Butterflies which escape will perch prettily on the right and cause you to lose one point. You cannot retract the tongue without a captive and the game will end when your tongue gets stuck to the ground. Graphics notes:

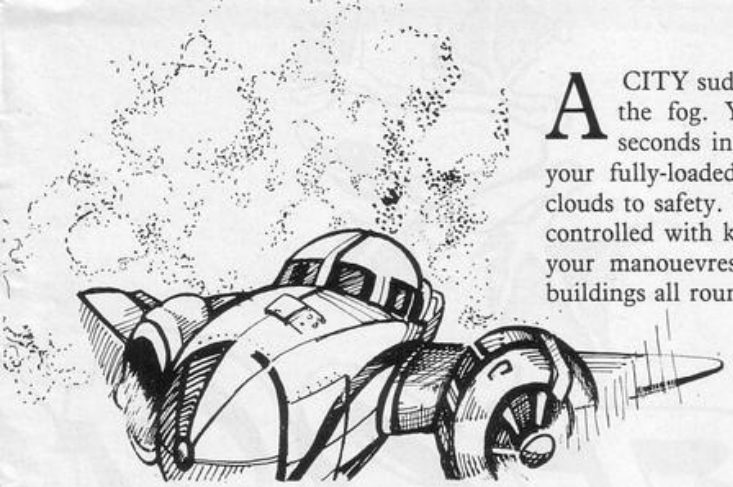
5—149 Spaces
60—Graphic E, graphic F.
70—Graphic C, graphic D.
130—Graphic A, graphic B.
190—Graphic G.



```
  1 BORDER 4
  2 PAPER 7
  5 PRINT "Press P to catch moths with the tip of the predator's tongue.Youscore 10 for every moth caught  but lose 1 point for each moth  which escapes.



                PRESS ANY KEY TO START"
  7 PAUSE 2000
  8 CLS
  9 GO SUB 500
 10 LET s=0
 20 GO TO 50
 30 CLS
 40 LET s=s+11
 50 LET a=2
 60 INK 0: PRINT AT 0,15;"▚▞ "
 70 INK 0: PRINT AT 1,15;"▚▞ "
 80 LET c=INT  (RND*19)
 90 IF c<3 THEN GO TO 80
100 PRINT AT 0,18;s;"  "
110 LET s=s-1
120 LET d=0
128 LET j=INT (RND*6)+1
130 INK j: PRINT AT c,d;" ▚▞"
131 LET g=30-c
132 LET h=g-1
133 BEEP .06,g: BEEP .06,h
140 LET d=d+1
150 IF d>=30 THEN GO TO 80
160 IF INKEY$="p" THEN GO TO 180
170 GO TO 130
180 LET t=2
190 PRINT AT a,16;"| "
200 LET t=t-1
210 LET a=a+1
220 IF t=0 THEN GO TO 130
230 IF c<>a THEN GO TO 250
235 BEEP .4,-15
240 IF d>6 AND d<18 THEN GO TO 30
250 IF a>20 THEN STOP
260 GO TO 190
500 FOR n=0 TO 7
510 READ udg: POKE USR "a"+n,udg: NEXT n
520 FOR n=0 TO 7
530 READ udg: POKE USR "b"+n,udg: NEXT n
540 FOR n=0 TO 7
550 READ udg: POKE USR "c"+n,udg: NEXT n
560 FOR n=0 TO 7
570 READ udg: POKE USR "d"+n,udg: NEXT n
580 FOR n=0 TO 7
590 READ udg: POKE USR "e"+n,udg: NEXT n
600 FOR n=0 TO 7
610 READ udg: POKE USR "f"+n,udg: NEXT n
620 FOR n=0 TO 7
630 READ udg: POKE USR "g"+n,udg: NEXT n
640 RETURN
650 DATA 98,249,255,123,251,243,227,193,70,159,255,222,223,207,199,131
660 DATA 131,127,3,3,31,35,65,131,193,255,192,192,248,196,130,193
670 DATA 1,3,135,79,79,47,23,3,128,192,225,242,242,244,232,192
680 DATA 128,128,128,128,128,128,128,128
```



1K LANDER

A CITY suddenly appears through the fog. You have only a few seconds in which to bring down your fully-loaded aircraft through the clouds to safety. Your landing flaps are controlled with key 6; take care during your manouevres not to hit the high buildings all round the airfield.

1K Lander was sent by Simon Lancaster of Newcastle, Staffs.

In lines 6, 50, 60 and 120 the brackets contain instructions for the graphics; the single letters and numbers should be entered in graphic shifted mode. (1K ZX-81).

```
  1 REM "LANDER"
  5 PRINT AT 20,10;"(twenty two
 inverse SPACEs)"
  6 PRINT AT 19,10;"(Q;SPACE;5;
W;3;5;8;inverse SPACE;3;8;SPACE;
Q;5;3;inverse SPACE;3;3;5;5;8;in
verse SPACE;)"
 10 LET A=10
 20 LET B=0
 30 LET C=INT (RND*20)+10
 40 PRINT AT 19,C;"   ";AT 20,C
;"(F;F;F)"
 50 PRINT AT A,B;"(W;6;-)"
 60 IF A=19 OR B=29 THEN GOTO 1
10
 70 PRINT AT A,B;"   "
 80 LET B=B+1
 90 IF INKEY$="6" THEN LET A=A+
1
100 GOTO 50
110 IF B=C AND A=19 THEN GOTO 1
60
120 PRINT AT A,B;"(Y;2;3)"
130 PAUSE 50
140 CLS
150 GOTO 5
160 PRINT AT 15,0;"YOU HAVE LAN
DED"
170 PAUSE 200
180 CLS
190 GOTO 5
```

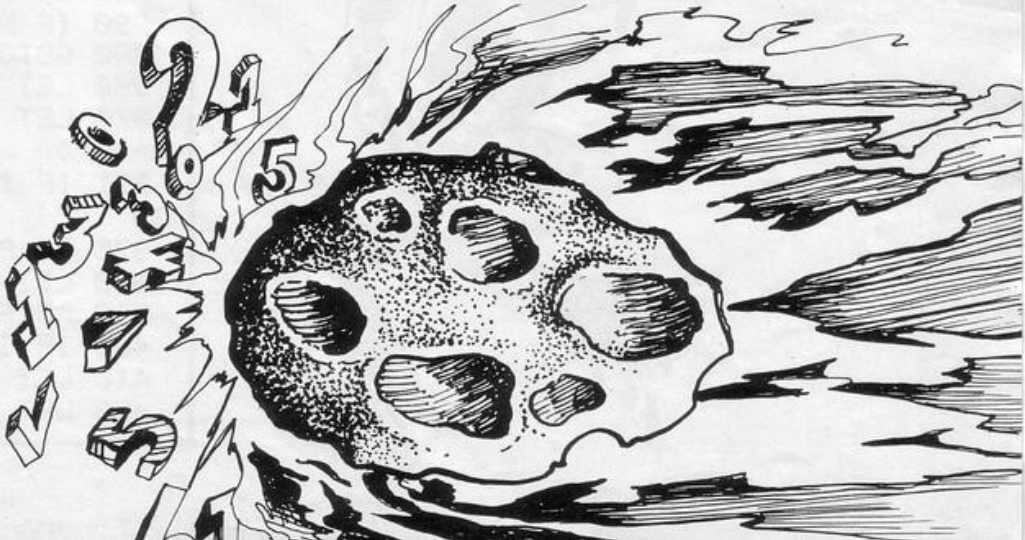
```
  5 LET S=VAL "10"
 10 LET X=INT (RND*20)
 20 LET Y=INT (RND*20)
 30 LET Z=X+Y
 40 PRINT "WHAT IS ";X;"+";Y
 50 INPUT K
 60 IF K=Z THEN GOTO 110
 70 IF K<>Z THEN PRINT "WRONG="
;Z
 80 PAUSE 100
 90 CLS
105 GOTO 10
110 PRINT "CORRECT"
120 PAUSE 100
130 LET S=S+5
140 LET A=VAL "0"
150 LET B=VAL "13"
160 LET C=VAL "10"
170 PRINT AT C,RND*30;"*"
180 LET S=S+2
190 SCROLL
200 IF B>2 THEN LET B=B-1
210 IF INKEY$="M" AND B<26 THEN
 LET B=B+2
220 PRINT AT A,B;"(+)";AT 1,B;
230 LET Q=PEEK (PEEK 16398+256*
PEEK 16399)
240 IF Q=23 THEN PRINT S;W
250 GOTO 170
```

maths meteor

MATHS METEOR is an imaginative 1K education program which rewards the correct answer to a simple addition sum with a shot at a meteor game. The sum can, of course, be adapted according to the ability of the student.

The game requires that you manoeuvre your spacecraft around the oncoming planetoids with the M key. The length of time you survive will be displayed when your complement of lives has been used.

S Smedley-Aston of London W2, who submitted the program, is to be congratulated on an original and adaptable idea. (1K ZX-81).





FROG

MARK BIRCH of Kidderminster, Worcs, has sent a version of **Frogger** for the 16K ZX-81. The idea, as always, is to hop to the top of the screen without being croaked by one of the moving obstacles.

0 moves you up, 5 left and 8 right. You score approximately one point for each leap upwards with a bonus of 100 when have flopped to the top. You must reach the top as many times as you can and the game ends when you are splatted. A high-score routine records your

```
   2 LET Q$="???????"
   5 LET S=0
   6 LET PP=0
   7 LET ZS=PEEK 16396+256*PEEK
16397+35
   8 PRINT AT 0,0;
   9 POKE 16418,0
  10 LET A$="(33*IS;30*SPACE;IS)
"
  20 PRINT A$( TO 32)
  30 FOR F=1 TO 22
  40 PRINT A$(33 TO )
  50 NEXT F
  60 PRINT A$( TO 32)
  65~PRINT AT 0,0;"  score : ";S
;AT 0,18;"high : ";H
  70 LET A=PEEK 16396+256*PEEK 1
6397+742
  80 LET Z$="(IS;30*H;IS)"
  90 PRINT AT 12,0;Z$;Z$
 100 PRINT AT 1,0;"(IS;2*SPACE;T
,7,Y;8*SPACE;T,7,Y;8*SPACE;T,7,Y
;3*SPACE;IS)"
 110 LET A$="(Y,IS,6,5;3*SPACE;Y
,IS,6,5;3*SPACE;Y,IS,6,5;SPACE)"
 111 LET B$="(SPACE;8,6,IS,T;3*S
PACE;8,6,IS,T;3*SPACE;8,6,IS,T)"
 120 LET C$="(SPACE;T,Y,T;4*SPAC
E;T,Y,T;4*SPACE;T,Y,T;SPACE)"
 130 LET D$="(SPACE;Q,E,R;2*SPAC
E;-+-;3*SPACE;=(=;2*SPACE;-;SPAC
E)"
 140 LET E$="(SPACE;(=);3*SPACE;
(,inverse I,);4*SPACE;inverse (,
-,inverse (;2*SPACE)"
 145 LET P$=A$
 150 LET O=1
 160 LET P=-1
 170 LET C=12
 180 LET D=1
 200 POKE A,23
 210 POKE A,PP
 240 LET C=C+P
 250 LET D=D+O
 255 IF C=12 THEN LET P$=A$
 260 IF C=1 THEN LET P$=B$
 270 PRINT AT 3,C;P$;AT 5,D;C$;A
T 7,C;E$;AT 9,D;C$;AT 11,C;E$;AT
 14,D;C$;AT 17,C;E$;AT 20,D;D$
 275 PRINT AT 12,0;Z$;Z$
 276 IF A<(ZS+30) THEN GOTO 1000
 280 LET NN=PEEK A
 281 LET PP=NN
 285 IF NN=136 THEN GOTO 350
 286 IF NN=3 THEN GOTO 1000
 290 IF NN=0 THEN GOTO 350
 300 GOTO 2000
 360 LET K=A
 370 LET K=K-(INKEY$="5")+(INKEY
$="8")
 371 IF INKEY$="0" THEN LET K=K-
33
 375 IF PEEK K=128 THEN GOTO 360
 380 LET A=K
 390 POKE A,23
 400 IF C>1 THEN GOTO 430
 410 LET P=1
 420 LET O=-1
```



FROGGER

name and number.

Graphics notes:

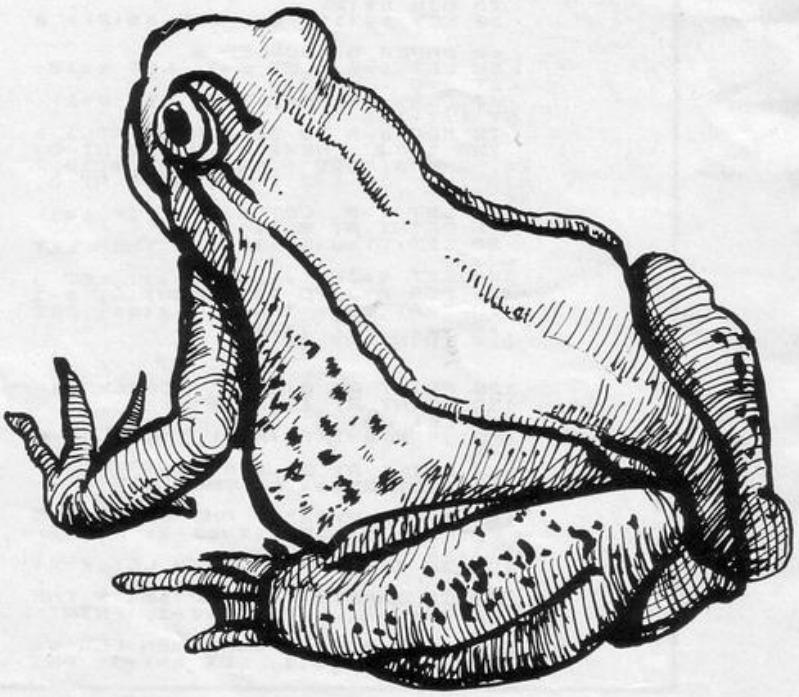
Lower space letters signify inverse video.

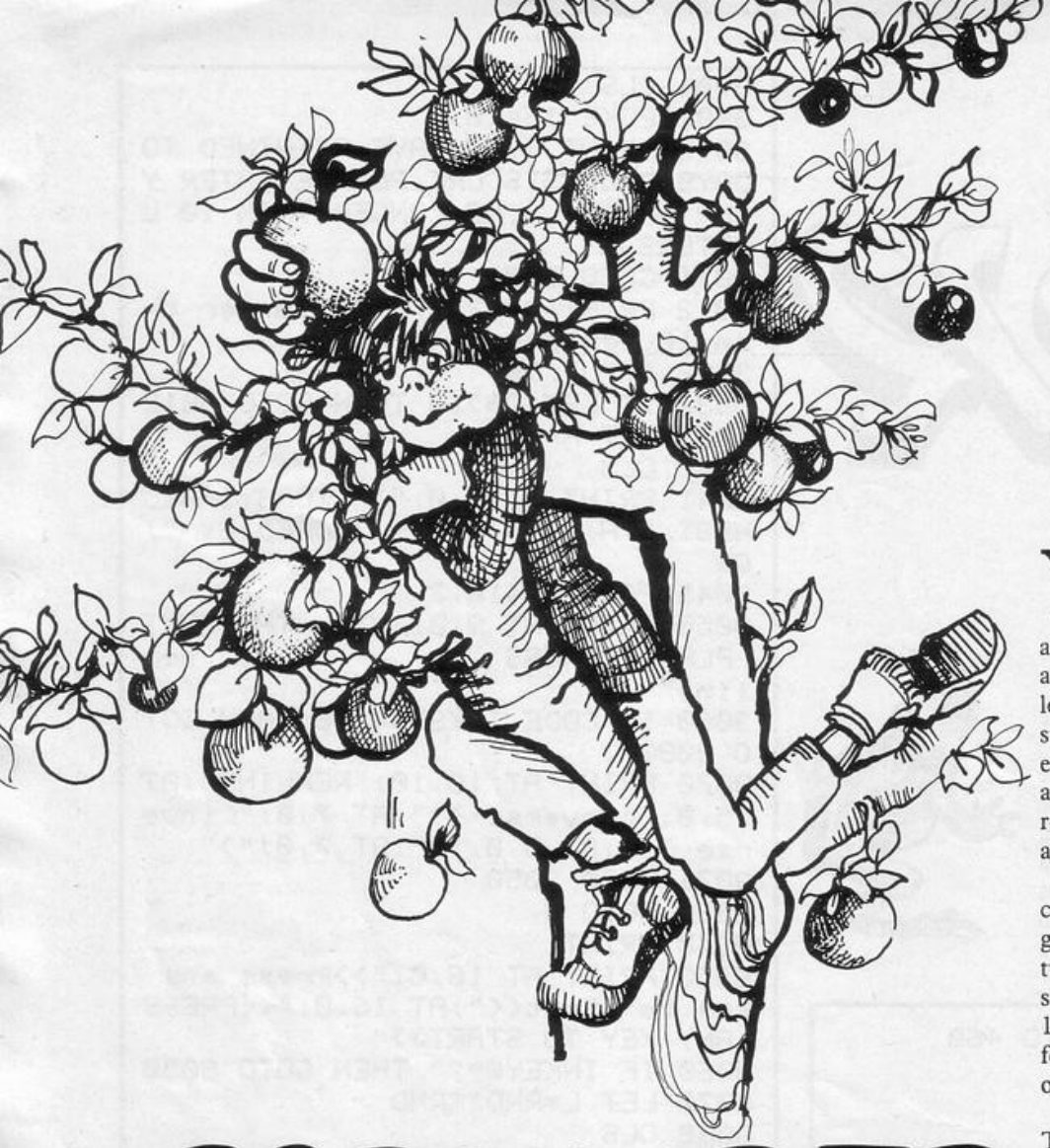
In lines 10, 80, 100 to 140 and 3070, the contents of the brackets are graphic instructions—IS means inverse space; letters and numbers should be entered in graphic shifted mode; and commas and semi-colons are used for clarity to separate instructions and should not be entered.



```
 430 IF C<12 THEN GOTO 460
 440 LET P=-1
 450 LET O=1
 460 GOTO 200
1000 REM frog at finish
1010 FOR F=1 TO 20
1020 PRINT AT 12,8;"you did it";
AT 12,8;"YOU DID IT"
1030 NEXT F
1040 LET S=S+100
1050 LET L=RND**RND**RND
1060 CLS
1070 GOTO 6
2000 REM frog splatted
2002 LET S=S+INT (34-((A-ZS)/20)
)
2010 FOR F=0 TO 10
2020 FOR G=0 TO 10
2030 POKE A,G
2040 NEXT G
2050 NEXT F
2060 FOR F=1 TO 10
2070 PRINT AT 12,8;"SPLAT";AT 12
,8;"splat"
2071 NEXT F
2080 IF S>H THEN GOTO 3000
2085 FOR F=1 TO 25
2090 PRINT AT 15,4;"PRESS ANY KE
Y TO RESTART";AT 15,4;"Press any
 key to restart"
2100 IF INKEY$="" THEN NEXT F
2110 IF INKEY$<>"" THEN GOTO 2
2112 GOTO 3040
3000 REM hi-score
```

```
3001 CLS
3002 POKE 16418,2
3010 PRINT "YOU HAVE ATTAINED TO
DAYS HIGHESTSCORE.PLEASE ENTER Y
OUR NAME.   (NO LONGER THAN 10 L
ETTERS)."
3011~GOTO 3020
3012 PRINT AT 2,0;">no longer th
an 10 letters<"
3020 INPUT Q$
3030 IF LEN Q$>10 THEN GOTO 3012
3039 LET H=S
3040 CLS
3041 PRINT AT 5,0;">- TODAYS HIG
HEST ";H;AT 7,0;">- SCORED BY ";
Q$
3045 POKE 16418,2
3050 PRINT AT 9,0;"WILL THE NEXT
 PLAYER PRESS                 new
line"
3060 IF CODE INKEY$=118 THEN GOT
O 3080
3070 PRINT AT 10,10;"NEWLINE";AT
 5,0;"(inverse >)";AT 7,0;"(inve
rse >)";AT_5,0;">";AT_7,0;">"_ _
3071 GOTO 3050
3080 GOTO 3
8040 PRINT
8050 PRINT AT 16,0;">>Press any
key to start<<";AT 16,0;"<<PRESS
 ANY KEY TO START>>"
8060 IF INKEY$="" THEN GOTO 8050
8070 LET L=RND**RND
8080 CLS
8090 RUN
```





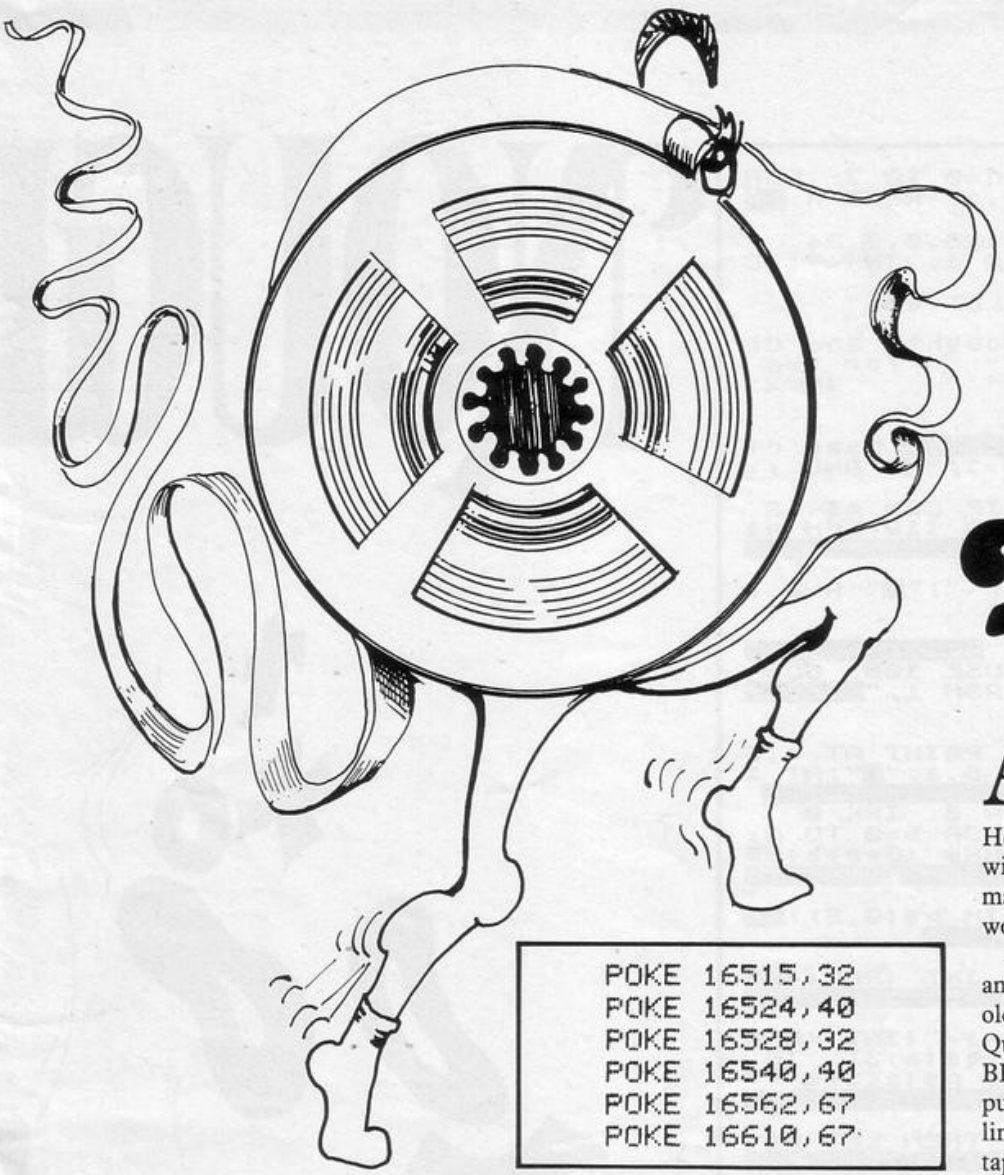
SCRUMPER

YOU ARE scrumping in Mr Smith's orchard. Apples fall unpredictably and three fallen fruit are sufficient to arouse the avariciious agriculturalist to action. Move right and left with keys P aand O and boost your speed with CAPS SHIFT. Beware, the extra speed will tire you extra quickly and if the energy counter at top left reads zero you will be abble to travel only at normal speed.

A bonus is given after you have caught 19 apples, according to the energy reserves remaining. After cleariing two waves of fruit, an exttra man is supplied, and the score is calculated as 10 points for each fruit fielded and 100 for the energy units unused at the end of each wave.

Vegetarian thieves must be careful. The penalty for failure is both barrels from the furious farmer's shotgun. Submitted by S M Wakefield of Retford, Notts. (16K Spectrum). Graphics notes:
30—Graphic A, graphic G
70—Graphic B
140—Graphic C
150—Graphic D
290—Graphic E, graphic F.

```
  10 LET hi=0: GO SUB 350
  20 DIM a$(2)
  30 LET a$(1)="▝": LET a$(2)="▘
▖"
  40 PAPER 6: BORDER 6
  50 LET l=0: LET w=1: LET x=10:
 LET s=0
  60 CLS : IF w=3 THEN LET w=1:
LET l=l-1
  70 FOR a=0 TO 30: PRINT AT 1,a
; INK 1;"▀": NEXT a: PRINT AT 0,
24; INK 3;"ΣΣΣ": PRINT AT 0,16;"
HI=";hi; IF l=2 THEN PRINT AT 0,
24;" "
  80 LET k=0: LET sz=30: IF l=1
THEN PRINT AT 0,24;" "
  90 LET wi=w+3: IF w=2 THEN LET
 wi =2
 100 LET d=INT (RND*30)+1: LET j
=19: FOR e=3 TO 19: PRINT AT e-1
,d;" ";AT e,d; INK wi;a$(w): BEE
P .006,j: LET j=j-1
 110 PRINT AT 19,0;"
                                "
 120 PRINT AT 0,0;"    SCORE=";s
 130 PRINT AT 19,x;"Σ"
 140 LET d$="▟▙"
 150 IF x/2=INT (x/2) THEN LET d
$="▜▛"
 160 PRINT AT 20,x;d$
 170 IF INKEY$="o" THEN LET x=x-
1
 180 IF INKEY$="O" AND sz<>0 THE
N LET x=x-2: LET sz=sz-1: PRINT
AT 1,sz;" "
 190 IF INKEY$="p" THEN LET x=x+
1
 200 IF INKEY$="P" AND sz<>0 THE
N LET x=x+2: LET sz=sz-1: PRINT
AT 1.sz+1:"  "
 210 IF e=19 AND d=x THEN LET s=
s+10: BEEP 0.5,1: LET k=k+1: PRI
NT AT k,0; INK wi;a$(w): IF k=19
 THEN GO SUB 330: GO TO 230
 220 IF e=19 AND d<>x THEN GO TO
 270
 230 IF x<1 THEN LET x=1
 240 IF x>30 THEN LET x=30
 250 NEXT e
 260 GO TO 100
 270 LET l=l+1: BEEP 0.5,-10: PR
INT AT 0,23+l;" ": IF l=3 THEN G
O TO 290
 280 GO TO 230
 290 FOR h=1 TO x: PRINT AT 19,h
;" -": BEEP 0.05,-3: NEXT h: PRI
NT AT 19,x-1; INK 2;" ▛ ";AT 20,
x-1; INK 2;" ▌ ": FOR r=1 TO 190
: NEXT r
 300 CLS : IF s>hi THEN LET hi=s
 310 PRINT AT 10,10;"ANOTHER GO?
": IF INKEY$="y" THEN GO TO 20
 320 GO TO 310
 330 LET w=w+1: RESTORE 380: FOR
 i=1 TO 8: READ g,h: BEEP g,h: N
EXT i
 340 FOR u=sz TO 1 STEP -1: PRIN
T AT 1,u;" ": LET s=s+100: BEEP
 .05,10: PRINT AT 0,4;"SCORE=";s
: NEXT u: GO TO 60
 350 FOR a=1 TO 7: READ a$: FOR
b=0 TO 7: READ c: POKE USR a$+b,
c: NEXT b: NEXT a: RETURN
 360 DATA "▝",200,204,58,127,127
,127,62,78,"Σ",60,255,86,66,90,6
0,24,126,"▟",109,189,189,36,36,3
5,36,231
 370 DATA "▞",189,189,189,36,66,
129,66,231,"▛",24,24,255,255,24,
24,24,24,"▌",24,24,24,24,24,24,2
4,24,"▘",16,8,42,127,127,127,62,
28
 380 DATA .1,11,.1,11,.8,16,.05,
11,.05,11,.05,11,.05,16,1,20
```



Quick Tape

```
POKE 16515,32
POKE 16524,40
POKE 16528,32
POKE 16540,40
POKE 16562,67
POKE 16610,67
```

AN UPDATE of the **Quick Tape** listing in our last issue is provided by D Buon of Shrewsbury. He points out that ZX-81 computers with the old ROM have an in-built malfunction which prevents our routine working.

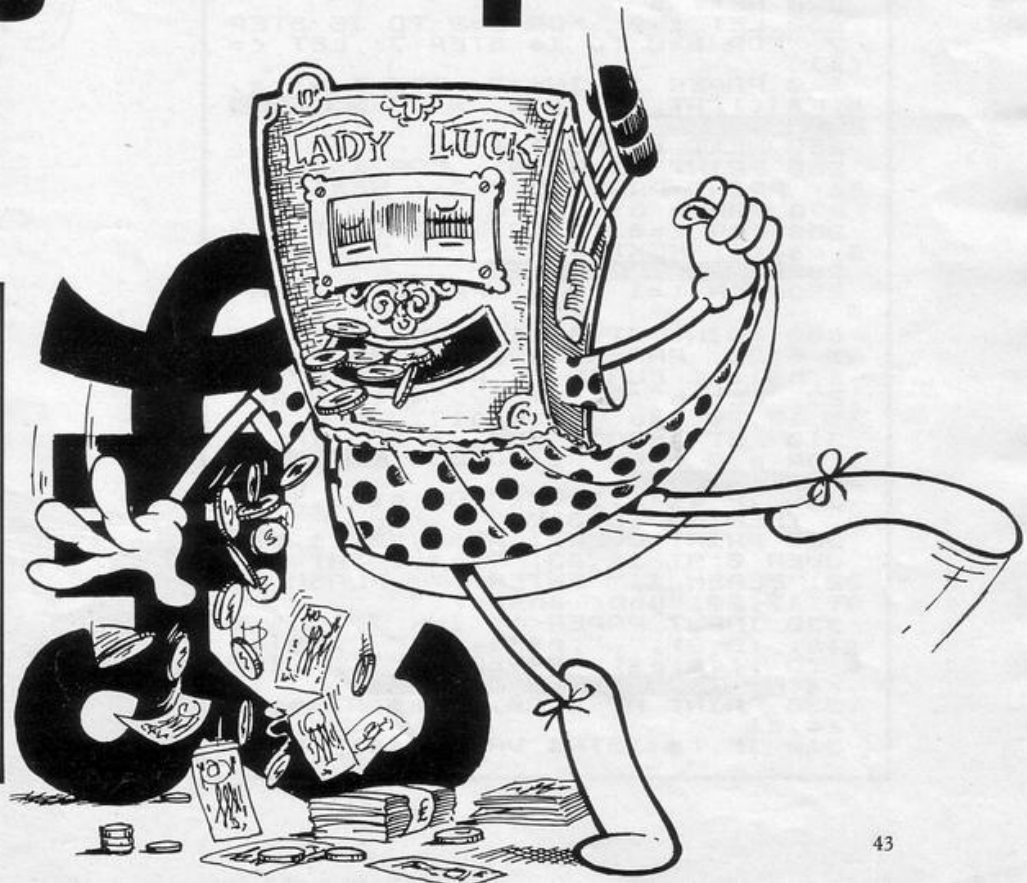
If you enter "RAND USR 32512" and get a report of D/Ø, you have the old ROM machine and should load the Quick Tape program as normal, then BREAK, and then enter the listing published here. Finally, enter the new line "55 POKE 16437,255", start your tape deck recording, and RUN.

Jackpot

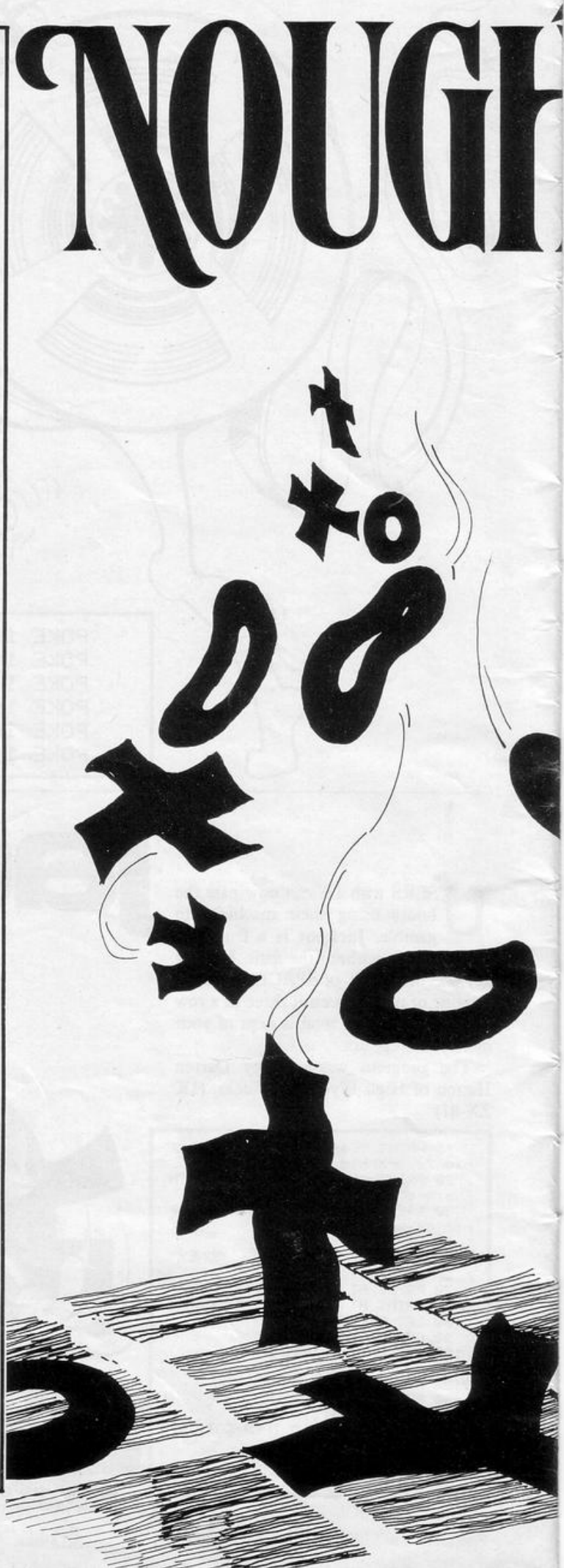
USERS with 1K can now pass the hours using their machines to gamble. **Jackpot** is a fruit machine routine without the fruit. Hit any key except SHIFT or SPACE to change the line of numbers until three in a row appear. A running total is kept of your money and credits.

The program was sent by Darren Hatton of High Wycombe, Bucks. (1K ZX-81).

```
  10 PRINT "(graphic E;five graP
hic 7s;graphic R)"
  20 PRINT "(graphic 5;five HYPH
ENs;graphic 8)"
  30 PRINT "(graphic W;five graP
hic 6s;graphic Q)"
  40 LET F=200
  50 PRINT AT 0,10;"TOTAL MONEY"
  60 PRINT AT 1,12;F;"  "
  70 PRINT AT 3,10;"CREDITS"
  75 PRINT AT 4,12;F/10;"  "
  80 LET B=INT (10*RND)
  90 LET A=INT (10*RND)
 100 LET C=INT (10*RND)
 110 PAUSE 9999
 120 PRINT AT 1,1;A
 130 PRINT AT 1,3;B
 140 PRINT AT 1,5;C
 150 IF A=B AND B=C THEN GOTO 17
0
 160 GOTO 190
 170 LET F=F+40
```



```
  22:RESTORE : FOR n=0 TO 7: REA
D a: POKE USR "A"+n,a: NEXT n: R
EM division sign
  25 DATA 0,24,0,0,126,0,0,24
  30 BORDER 1: PAPER 1: INK 7: C
LS
  40 DIM n$(2,12): LET e$="
"
  50 PRINT TAB 1;"Noughts and Cr
osses Maths Game"''''"    for two
players or teams."''''"      ("X"
" will go first.)"
  60 FOR f=1 TO 2
  70 INPUT "Please ENTER name of
 player ";"X" AND f=1;"O" AND f=
2'' LINE m$
  80 LET n$(f)=m$: IF LEN m$<12
THEN LET n$(f)=e$( TO (12-LEN m$
)/2)+m$: RE" put letters into m
iddle of string
  90 PRINT ''"Player ";"X" AND f
=1;"O" AND f=2,n$(f)
 100 NEXT f
 110 PRINT AT 21,0;"Please wait
while I think.": PAUSE 100: CLS
: PRINT AT 21,0; FLASH 1;" THINK
ING "
 120 INK 5
 130 FOR a=0 TO 19: PRINT AT a,6
;"■";AT a,13;"■";AT 6,a;"■";AT 1
3,a;"■": NEXT a: REM draw board
 140 BORDER 5: PAPER 6: INK 0
 150 FOR a=0 TO 2: FOR b=0 TO 2:
 PRINT AT a*7,b*7;CHR$ (3*a+b+65
): NEXT b: NEXT a: REM letter sq
uares
 160 DIM q$(9,5): DIM p$(9,5): R
EM questions & printout
 170 FOR a=1 TO 9
 180 LET q$(a)=STR$ INT (RND*100
): LET p$(a)=q$(a): REM set 1's
t figure
 190 LET q$(a,3)="+-*/"(INT (RND
*4)+1): LET p$(a,3)=q$(a,3): IF
 q$(a,3)="*" THEN LET p$(a,3)="x"
: REM set operand check for mult
iply
 195 IF q$(a,3)="/" THEN LET p$(
a,3)=CHR$ 144: REM check for div
ide
 200 LET q$(a,4 TO )=STR$ (INT (
RND*99)+(1 AND q$(a,3)="/")): LE
T p$(a,4 TO )=q$(a,4 TO ): REM s
et second figure
 210 IF VAL q$(a)<>INT VAL q$(a)
 OR VAL q$(a)<0 OR VAL q$(a)>100
0 THEN GO TO 180: REM check ques
tion
 220 NEXT a
 230 LET c=0: FOR a=2 TO 16 STEP
 7: FOR b=0 TO 14 STEP 7: LET c=
c+1
 240 PAPER 1: INK 7: PRINT AT a,
b;p$(c);AT a+2,b+2;"= ?": REM pr
int questions
 250 NEXT b: NEXT a
 260 PRINT AT 20,0;: FOR e=1 TO
54: PRINT PAPER 5;" ";: NEXT e
 270 PAPER 6: INK 0
 280 FOR e=0 TO 19: PRINT AT e,2
0;e$;e$: NEXT e
 285 REM start game
 290 FOR t=1 TO 2: PAPER 6: INK
0
 300 PRINT AT 3,21;"Your turn,";
AT 6,20; PAPER t*2; INK 8; FLASH
 1;n$(t); FLASH 0; PAPER 6;AT 11
,23;"Which";AT 14,22;"question";
AT 17,20;"do you want?"
 310 LET a=CODE INKEY$-96: IF a<
1 OR a>9 THEN GO TO 310: REM sel
ect question
 315 IF q$(a,1)="x" OR q$(a,1)="
o" THEN GO TO 310
 320 PRINT OVER 1;AT 6,20;e$;e$;
 OVER 0;AT 11,23;"Please";AT 14,
22; FLASH 1;" ENTER "; FLASH 0;
AT 17,20;"your answer."
 330 INPUT PAPER 1; INK 7;(" ";p
$(a, TO 2);" ";p$(a,3);" ";p$(a,
4 TO );e$;e$); PAPER 5;" "; LINE
 r$: REM reprint question
 335 PRINT AT 3,20;e$;e$;AT 6,20
;e$;e$
 340 IF r$<>STR$ VAL q$(a) THEN
```



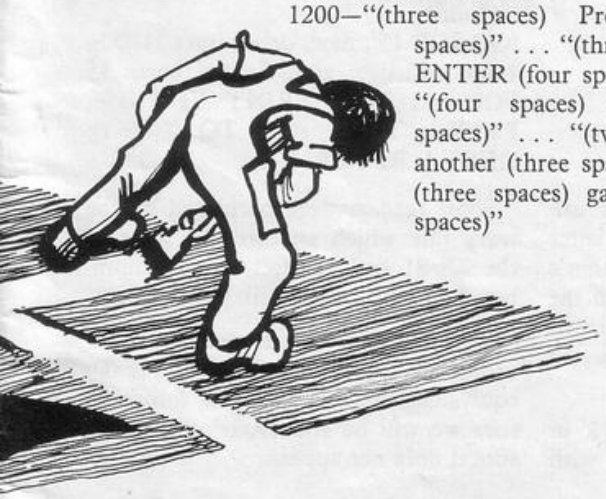
TS & CROSSES

M GROOCOCK of Leicester has sent us a **Noughts and Crosses** game which requires the player to answer a simple arithmetical question before being allowed to make a move. So it is a kind of educational board game. Naturally the difficulty level of the questions can be changed to suit the student. It would probably be a good idea to arrange for the most difficult question to appear in the centre square.

Sinclair Programs has not yet received a noughts and crosses game in which the computer takes part. Can anyone supply one? (16K Spectrum). Graphics notes:

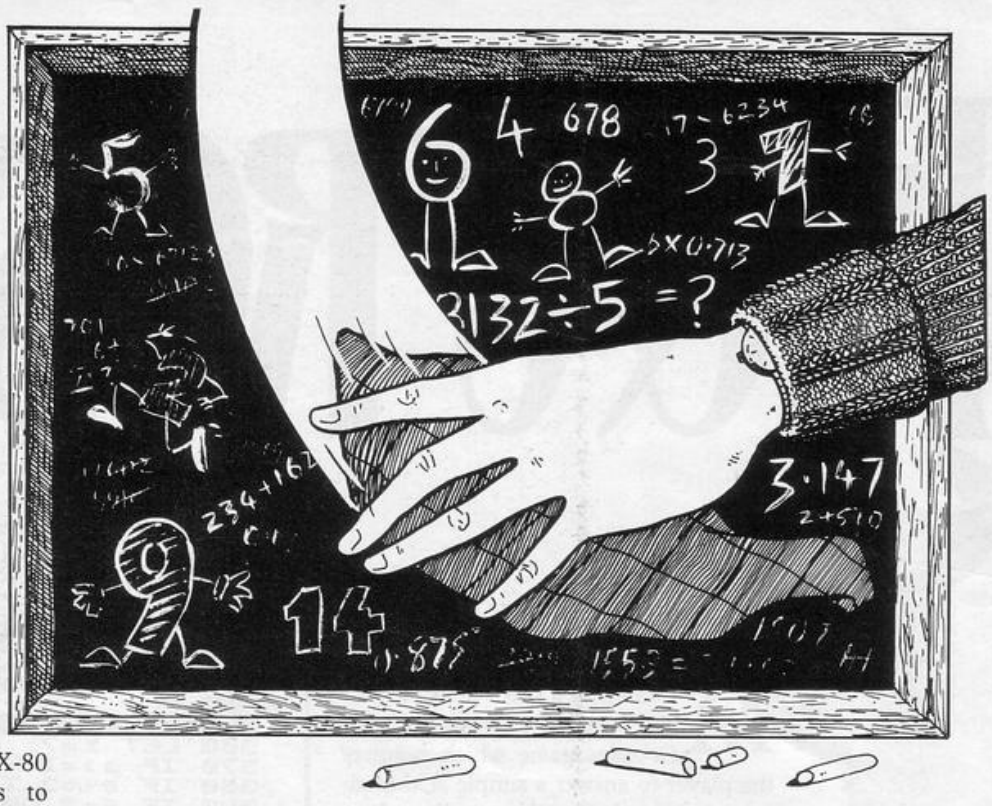
Numbers marked with "S" should be entered in graphic shifted mode; otherwise, simple graphic mode should be used.

1010—S6; four S8s; 6
1020—S8; S6; two 8s; 6; S8
1030—Two S8s; S6; 6; two S8s
1040—Two S8s; 6; S6; two S8s
1050—S8; S6; two S8s; S6; S8
1060—6; four S8; S6
1110—S8; S4; 6; S7
1120—S4; S2; two S8s; S1; 7
1130—6; four S8s; S6
1140—S6; four S8s; 6
1150—S1; S7; two S8s; S4; S2
1160—S8; S1; S6; 2; S8
1200—"(three spaces) Press (four spaces)" . . . "(three spaces) ENTER (four spaces)" . . . "(four spaces) for (five spaces)" . . . "(two spaces) another (three spaces)" . . . (three spaces) game. (four spaces)"



```
PRINT AT 11,23;"Sorry ";AT 14,23
;e$;AT 14,22;r$;AT 17,20;"  is w
rong. ": FOR z=8 TO 0 STEP -.2:
BEEP .1,z: NEXT z: NEXT t: GO TO
 290: REM wrong answer
 350 PRINT AT 11,23;e$;AT 14,23;
e$;AT 14,22;r$;AT 17,20;" is cor
rect."
 355 REM decide where to print
 360 LET x=7: LET y=0
 370 IF a>=7 THEN LET x=14
 380 IF a<=3 THEN LET x=0
 390 IF a=2 OR a=5 OR a=8 THEN L
ET y=7
 400 IF a=3 OR a=6 OR a=9 THEN L
ET y=14
 410 GO TO 100*t+900
 500 REM check for end of game
 510 LET z=0
 520 FOR c=1 TO 3
 530 IF q$(c)=q$(c+3) AND q$(c)=
q$(c+6) THEN GO TO 1200
 540 IF q$(c*3)=q$(c*3-1) AND q$
(c*3)=q$(c*3-2) THEN GO TO 1200
 550 NEXT c
 560 IF q$(1)=q$(5) AND q$(1)=q$
(9) THEN GO TO 1200
 570 IF q$(3)=q$(5) AND q$(3)=q$
(7) THEN GO TO 1200
 580 FOR c=1 TO 9: IF q$(c,1)="x
" OR q$(c,1)="o" THEN LET z=z+1:
 REM check for draw
 590 NEXT c
 600 IF z=9 THEN GO TO 1200
 610 NEXT t: GO TO 290
1000 PAPER 7: INK 2: REM white o
n red background
1010 PRINT AT x  ,y;"    "
1020 PRINT AT x+1,y;"    "
1030 PRINT AT x+2,y;"    "
1040 PRINT AT x+3,y;"    "
1050 PRINT AT x+4,y;"    "
1060 PRINT AT x+5,y;"    "
1070 FOR z=15 TO 20: BEEP .2,z:
NEXT z
1080 LET q$(a)="x": GO TO 500
1100 PAPER 7: INK 4: REM white o
n green background
1110 PRINT AT x  ,y;"    "
1120 PRINT AT x+1,y;"    "
1130 PRINT AT x+2,y;"    "
1140 PRINT AT x+3,y;"    "
1150 PRINT AT x+4,y;"    "
1160 PRINT AT x+5,y;"    "
1170 FOR z=15 TO 20: BEEP .2,z:
NEXT z
1180 LET q$(a)="o": GO TO 500
1200 PRINT INK 1;AT 3,20;"   Pre
ss     ";AT 6,20; FLASH 1;"   ENT
ER     "; FLASH 0;AT 11,20;"     f
or     ";AT 14,20;"  another   "
;AT 17,20;"    game.     ": REM ga
me over
1210 IF z<>9 THEN FOR z=20 TO 50
 STEP 5: BEEP .1,z: NEXT z: INPU
T PAPER 1; INK 7;( FLASH 1;"Well
 done"; FLASH 0;" ";n$(t)); LINE
 g$
1220 IF z=9 THEN INPUT PAPER 7;
INK 1;"That was a draw. Well pla
yed. "; LINE g$
1230 RUN
9998 CLEAR : SAVE "o and x" LINE
 0
9999 CLS : PRINT #0'"Rewind and
play tape to verify.": VERIFY ""
```

NUMBERBOARD



NUMBERBOARD is a 1K ZX-80 program whose subject is to move the inverse plus sign from the top left-hand corner of the screen to the inverse question mark at the bottom right. You move with the usual cursor keys and your final score is the total of all the numbers on which you land in the course of your journey, the lower the better. To start the game, use GOTO 1 instead of RUN.

Numberboard was sent by Robert Bumstead, of Keswick, Cumbria.

```
 10 FOR F=1 TO 479
 20 LET J=RND(5)
 30 PRINT J;
 40 NEXT F
 50 PRINT CHRS(143)
 60 LET Y=0
 70 LET X=0
 80 LET T=0
 90 LET Z=Y*33+X+1+PEEK
(16396)+PEEK(16397)*256
100 IF PEEK(Z)=143 THEN GOTO 180
110 LET T=T+PEEK(Z)-28
120 POKE Z, 147
130 INPUT A
140 POKE Z,0
150 LET X=X+(1 NAD A=8)-(1 AND A=5)
160 LET Y=Y+(1 AND A=6)-(1 AND A=7)
170 GOTO 90
180 PRINT "FINISHED IN"; T
```



ERRORS AND MISHAPS

APOLOGIES to the owners of the unexpanded ZX-81. Hiccups with our new dot matrix printer caused some of the shorter programs in the previous issue to lose characters. Most of the omissions were guessable.

In **Star Eater,** line 132 was short of 'DD'; nine spaces were lost from line 51 of **Death Race;** and in **Sewer Rat** the beginning of line 80 should have been repeated at the end.

Tiddly Winks suffered a more drastic mutilation. The brackets at the end of line 100 should be closed and lines added as follows:

```
1 LET X=INT PI
3 LET M=SIN PI
4 CLS
5 DIM B (INT PI)
6 LET A=CODE "£"
```

Frogger provoked great enthusiasm—and great exasperation, the latter from readers who disputed the author's contention that it could be run on the 16K machine. He has now supplied us with the following memory-saving amendments:

First, replace 'PRINT VAL$ Q$' in lines 50, 130, 160, 305 and 400, with 'GO SUB 15'; next, delete lines 1120 to 1160 inclusive; and, finally, enter 15 FOR I=1 TO 6: PRINT AT Y(I),Ø; P$(I,X(I) TO); P$(I, TO X(I)-1): NEXT I: RETURN

Some readers were perplexed by the wavy line which appeared in some of the ZX-81 listings after the line number. It should be ignored.

As you may be aware we have started using a new printer and the line is the equivalent of the cursor. In future issues we will be endeavouring to make sure it does not appear.

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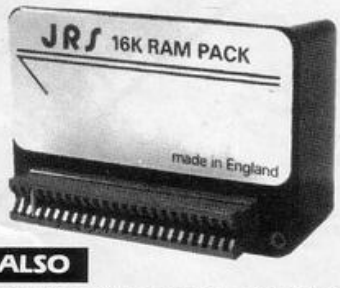
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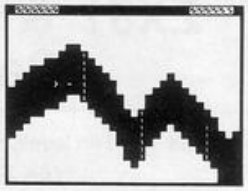
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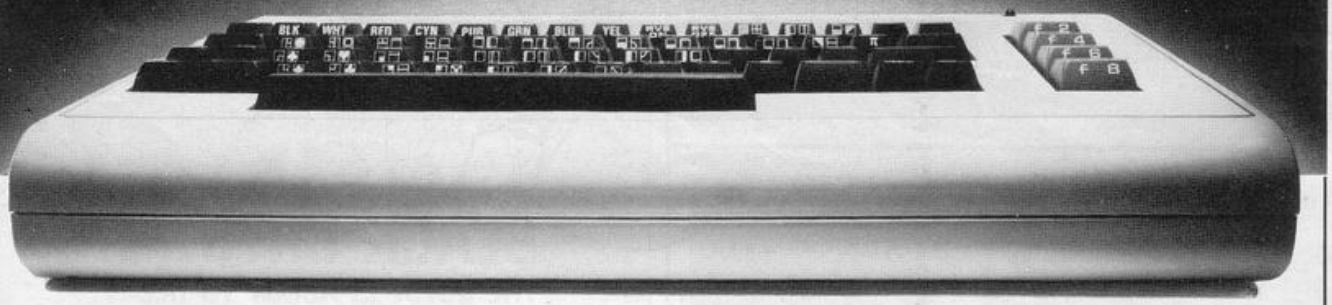
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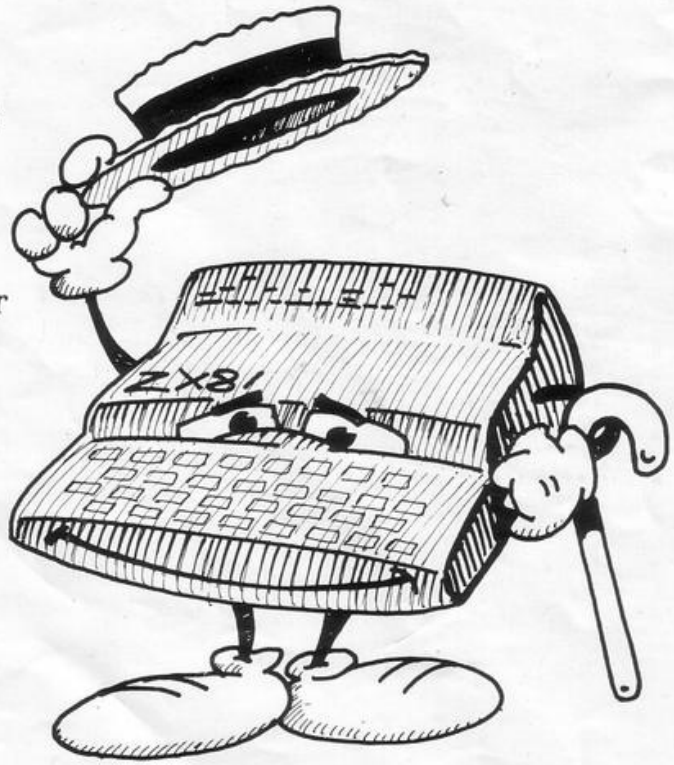
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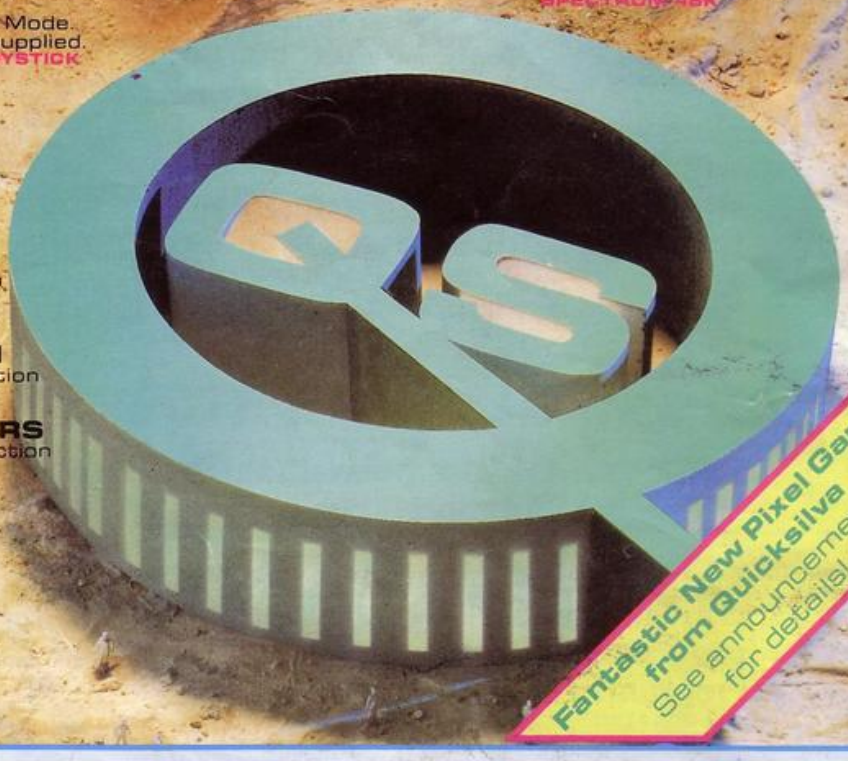
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