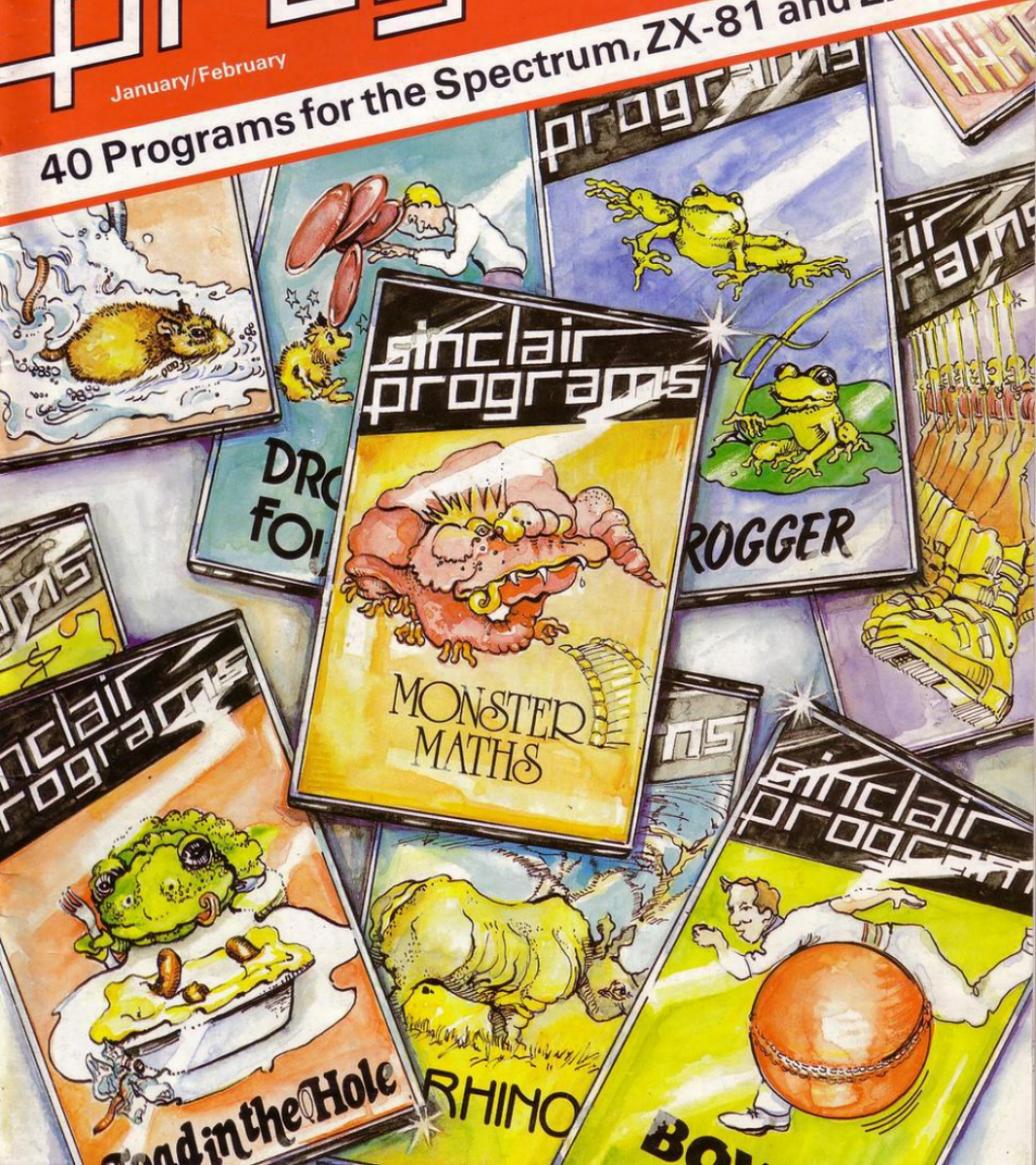


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# sinclair programs

January/February

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



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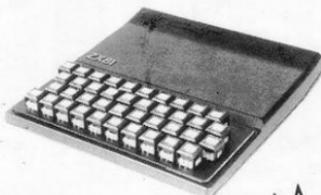
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Sinclair Programs is published monthly by ECC Publications Ltd. It is not in any way connected with Sinclair Research Ltd.

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Sinclair Programs  
ISSN No. 0263-0265

Printed and typeset by  
Bournehall Press Ltd,  
Welwyn Garden City,  
Herts.

Distributed by  
Spotlight Magazine Distribution Ltd,  
1 Benwell Road  
Holloway,  
London N7  
01-607 6411

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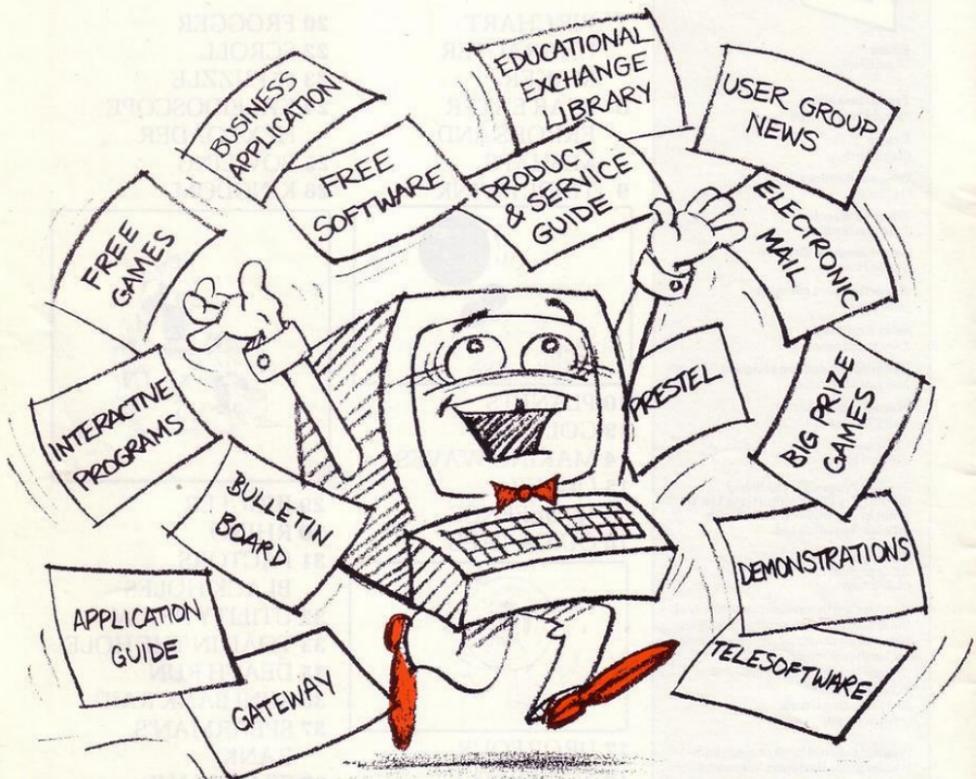
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# MORE IDEAS THAN MORE PROGRAMS THAN LESS MONEY THAN



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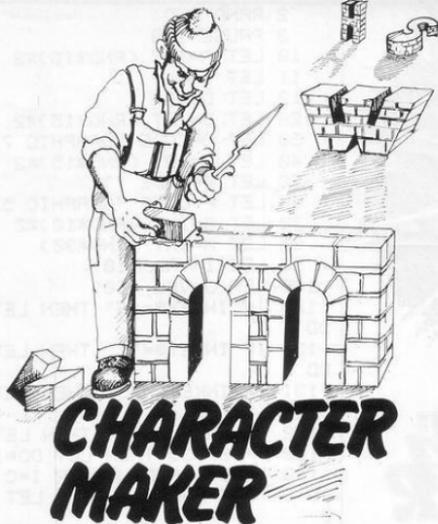
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**C**HARACTER MAKER changes the character set of the 1K ZX-81. It will even change the letters in program listings into blocks of strange patterns.

The main program is a machine code routine set up using the POKE command. After running the main routine remove it line by line but do not use NEW.

When the program is in memory, type-in one of the demonstration programs. They will show continuous patterns on the screen. You can also make your own programs which create patterns on the screen which change at random.

The program was sent by Allister London, of Sleaford, Lincs.

```
10 POKE 17000,62
20 POKE 17002,237
30 POKE 17003,71
40 POKE 17004,201
50 POKE 17001,-122
60 LET Z=USR(17000)
```

```
1 REM DEMO PROGRAMS
10 FOR A=0 TO 255
20 PRINT CHR$ A;
30 NEXT A
```

```
10 LET A=RND*255
20 PRINT CHR$ A;
30 GOTO 10
```

**P**IE CHART will provide you with a means of displaying your percentages in a really professional way. A circle is shown on screen; you are asked to input your percentages and the computer will slice the pie into appropriately-sized

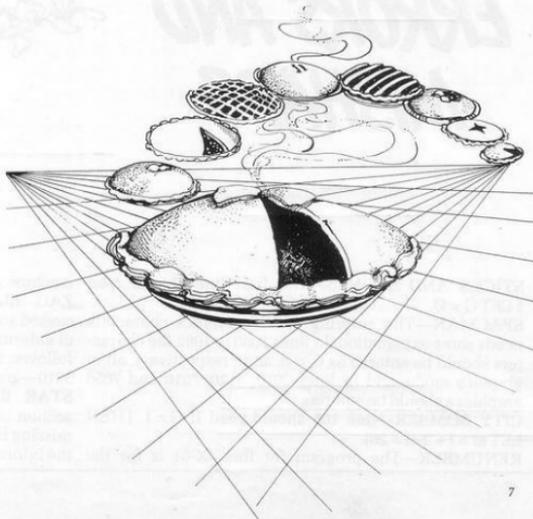
pieces. When you have finished, INPUT "-1" and the program will move to labelling the different slices. A grid is drawn around the screen and you enter your label and then its x and then its y co-ordinates. An entry of 32 for the

y co-ordinate will move you to the next stage of the routine, which enables you to title your display.

This useful program was submitted by Paul Smith of North Harrow for the 16K Spectrum.

# PIE CHART

```
10 CIRCLE 120,80,79: PLOT 120,
20: 0:0:0: 0.75
20 LET I=0
30 INPUT "Percentage of circle
7: P:
40 IF P=1 THEN GO TO 200
50 IF P=100 THEN PLOT OVER 1;1
20,80: DRAW OVER 1,0,70: GO TO 2
60
60 IF P<0 OR P>(100-I) THEN GO
TO 30
70 LET I=I+P
80 LET #=360*I/100
90 PLOT 120,80: DRAW (70)*$SIN
(I*100/PI): (70)*$COS (I*100/PI)
100 GO TO 30
200 PLOT 0,0: DRAW 255,0: DRAW
0,175: DRAW -255,0: DRAW 0,-175
210 FOR L=0 TO 255 STEP 0: PLOT
(L/175): NEXT L
220 FOR L=175 TO 0 STEP -0: PLO
T 254,L: NEXT L
230 FOR B=205 TO 0 STEP -0: PLO
T B,L: NEXT B
240 FOR L=0 TO 175 STEP 0: PLOT
L,L: NEXT L
250 INPUT "Label? "; LINE $;
POSITION "X";X;"Y": IF Y=32 THE
N GO TO 400
260 PRINT AT X,Y,$
270 GO TO 250
400 FOR L=0 TO 31: PRINT AT 0,L
";": NEXT L
410 FOR F=0 TO 21: PRINT AT F,3
1;": NEXT F
420 FOR B=31 TO 0 STEP -1: PRIN
T AT 21,B;": NEXT B
430 FOR L=21 TO 0 STEP -1: PRIN
T AT L,0;": NEXT L
440 INPUT LINE Z$
450 PRINT AT 0,(32-LEN Z$)/2;Z$
```





**T**HE IDEA of *Star Eater*, a game for the unexpanded ZX-81, is to land your 'Y' ship on one of the stars shown on the screen and stay there for as long as possible.

Another ship, represented by 'M', will chase you and make your job of staying on the stars for any length of time an impossibility. If you are moving from star to star the ship will just bounce off you but if you have landed on a star it will destroy you. When the game is completed the computer will indicate your score.

To control your ship you must use the cursor keys. As the game continues it will become more difficult.

It is from Adrian Mansell of Birmingham.

# STAR EATER

```

2 RAND RND
3 PAUSE 100
10 LET A=INT (RND*10)*2
11 LET S=0
12 LET DD=2
20 LET D=INT (RND*15)*2
30 LET C=CODE "GRAPHIC 7"
40 LET B=INT (RND*15)*2
50 LET E=CODE "?"
60 LET F=CODE "GRAPHIC 3"
70 LET G=INT (RND*10)*2
80 LET H=INT (RND*30)
90 LET I=VAL "10"
100 LET J=VAL "10"
120 IF INKEY#="6" THEN LET I=I+
DD
130 IF INKEY#="7" THEN LET I=I-
DD
131 IF INKEY#="5" THEN LET J=J-
DD
132 IF INKEY#="8" THEN LET J=J+
133 IF S>=30 THEN LET DD=1
140 IF I=A AND J=B OR I=C AND J
=D OR I=E AND J=F THEN LET S=S+1
0
150 IF I=G AND J=H THEN GOTO 10
00
160 LET G=G-1
170 LET H=H-1
180 IF I>G THEN LET G=G+2
190 IF J>H THEN LET H=H+2
200 CLS
201 PRINT AT A,B;"*";AT C,D;"*";
;AT E,F;"*";AT G,H;"M";AT I,J;"Y
"
210 GOTO 110
1100 PRINT AT I,J,S

```

## ERRORS AND MISHAPS



**STICKS AND STONES**—The first line should read 1 LET G=0.

**SPACMAN**—The entering of the graphics characters needs some explanation. In lines 1060 to 1063 the characters should be entered as u, r, d, and i respectively, all in graphics mode, and in lines 2010, 3120, 7010 and 7050 graphics a should be entered.

**CITY BOMBER**—line 101 should read IF s=1 THEN LET m=j+2-(j=20).

**RENUMBER**—The program for the ZX-81 is for the

machine with the 16K RAM pack.

**ZAG BLASTER**—Entering the graphics may have caused some confusion. That can be overcome by instead of entering the graphics characters direct, enter letters as follows: 190 and 400—e in graphics mode; 230, 470 and 5010—graphics f; 260—graphics g.

**STAR BATTLE**—Unfortunately we omitted a large section of the listing. We have been trying to find the missing lines, without success as yet, but we hope to have the information for our next edition.



**T**IDDLY WINKS is a flipping game where a knowledge of aerodynamics will get you nowhere. The object is to wink your tiddles into the container in the middle of the screen. Translated loosely, that means you must flip your play counters into the dish. The counters are numbered from one to three and you take your turn by entering the counter number and then entering the amount of flip force.

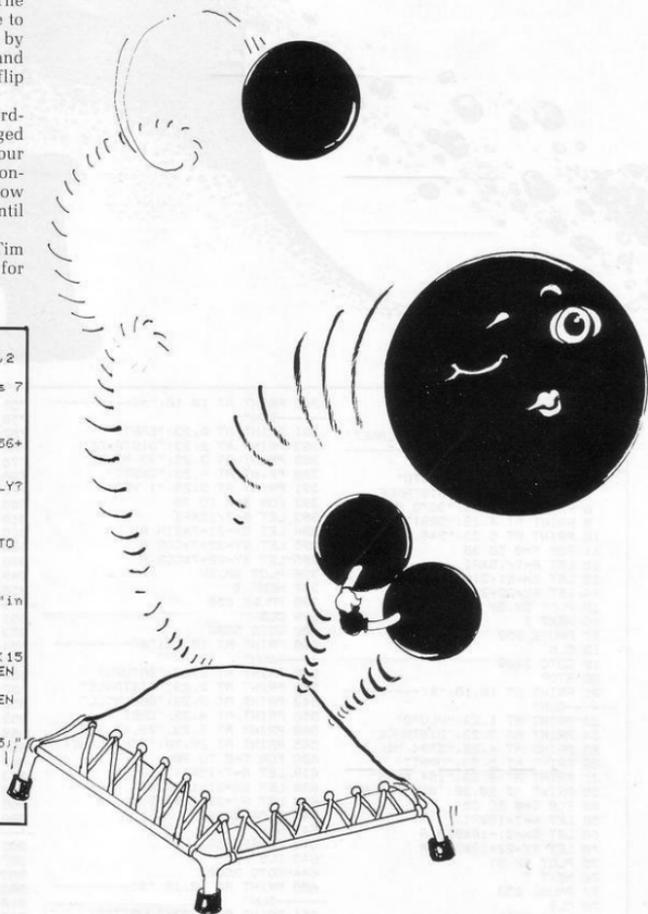
The wink will move with according velocity and if you have judged distance and velocity correctly your counter should fall into the container. The computer counts how many attempts you have taken until all the counters are in the pot.

The program was written by Tim Grubb of Leicestershire and is for the 1K ZX-81.

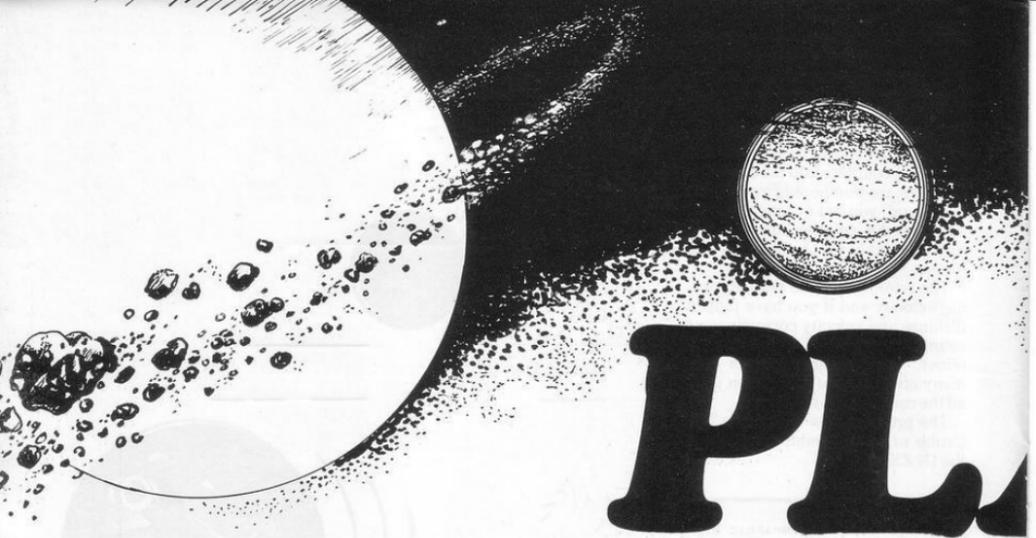
```

20 PRINT AT 12,A: "Graphic 0,2
spaces,graphic 5"
30 PRINT AT 13,A: "4 Graphics ?
"
35 FOR N=SGN PI TO X
40 LET B(N)=INT (RND*PI*PI)
43 PRINT AT 12,B(N):CHR# (156+
N)
45 NEXT N
50 PRINT AT 0,0: "WHICH TIDDLY?"
"
55 INPUT I
56 IF I>3 THEN GOTO 30
60 PRINT AT 1,0: "POWER? (1 TO
15)"
65 INPUT U
67 FOR P=SGN PI TO U
70 PRINT AT 11,B(I)+SGN PI: "in
verse space"
80 LET B(I)=B(I)+1
90 NEXT P
100 PRINT AT 12,B(I)+1:CHR# (15
110 IF B(I)=13 OR B(I)=12 THEN
PRINT AT 21,0: "WHAT A WINK!"
120 IF B(I)=12 OR B(I)=13 THEN
LET X=X-1
125 LET M=M+SGN PI
130 IF X=0 THEN PRINT AT 12,5: "
FINISHED IN ":M:JJ
135 PAUSE 60
140 GOTO 4

```



# TIDDLY WINKS

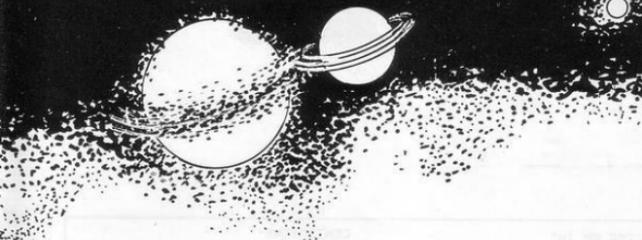


# PLANETS

```

1 REM "PLANETS"
2 GOTO 1000
3 PRINT AT 20,20;"9TH PLANET"
4 PRINT AT 10,10;"*K-----"
5 PRINT AT 0,23;"PLUTO"
7 PRINT AT 2,23;"DISTANCE"
8 PRINT AT 3,23;"3670 MILL"
9 PRINT AT 4,23;"ORBIT"
10 PRINT AT 5,23;"248.4YRS"
11 FOR T=0 TO 30
12 LET A=T/15*PI
13 LET SX=21+21*SIN A
14 LET SY=22+21*COS A
15 PLOT SX,SY
16 NEXT T
17 PAUSE 250
18 CLS
19 GOTO 2000
20 STOP
21 PRINT AT 10,10;"*K-----"
22 PRINT AT 1,23;"PLUTO"
24 PRINT AT 3,23;"DISTANCE"
25 PRINT AT 4,23;"2794 MILL"
26 PRINT AT 5,23;"ORBIT"
27 PRINT AT 6,23;"164.8YRS"
28 PRINT AT 20,20;"8TH PLANET"
40 FOR T=0 TO 30
50 LET A=T/15*PI
60 LET SX=21+18*SIN A
70 LET SY=22+18*COS A
75 PLOT SX,SY
76 NEXT T
77 PAUSE 250
78 CLS
79 GOTO 2500
80 PRINT AT 10,10;"*K-----"
81 PRINT AT 0,23;"URANUS"
83 PRINT AT 2,23;"DISTANCE"
84 PRINT AT 3,23;"1783 MILL"
85 PRINT AT 4,23;"ORBIT"
86 PRINT AT 5,23;"84.32 YRS"
87 PRINT AT 20,20;"7TH PLANET"
98 FOR T=0 TO 30
99 LET A=T/15*PI
100 LET SX=21+15*SIN A
110 LET SY=22+15*COS A
120 PLOT SX,SY
125 NEXT T
130 PAUSE 250
140 CLS
140 GOTO 3000
379 PRINT AT 20,20;"3RD PLANET"
380 PRINT AT 10,10;"*K-----"
381 PRINT AT 0,23;"EARTH"
383 PRINT AT 2,23;"DISTANCE"
389 PRINT AT 3,23;"93 MILL"
390 PRINT AT 4,23;"ORBIT"
391 PRINT AT 5,23;"1 YEAR"
392 FOR T=0 TO 30
393 LET A=T/15*PI
394 LET SX=21+7*SIN A
395 LET SY=22+7*COS A
396 PLOT SX,SY
397 NEXT T
398 PAUSE 250
399 CLS
400 GOTO 5500
500 PRINT AT 10,10;"*K-----"
510 PRINT AT 0,23;"SATURN"
530 PRINT AT 2,23;"DISTANCE"
540 PRINT AT 3,23;"866 MILL"
550 PRINT AT 4,23;"ORBIT"
560 PRINT AT 5,23;"29.46 YRS"
565 PRINT AT 20,20;"6TH PLANET"
600 FOR T=0 TO 30
610 LET A=T/15*PI
620 LET SX=21+13*SIN A
630 LET SY=22+13*COS A
640 PLOT SX,SY
641 NEXT T
642 PAUSE 250
643 CLS
644 GOTO 3500
650 PRINT AT 10,10;"*K-----"
651 PRINT AT 0,23;"JUPITER"
653 PRINT AT 2,23;"DISTANCE"
654 PRINT AT 3,23;"483 MILL"
655 PRINT AT 4,23;"ORBIT"
656 PRINT AT 5,23;"11.06 YRS"
657 PRINT AT 20,20;"5TH PLANET"
700 FOR T=0 TO 30
710 LET A=T/15*PI
720 LET SX=21+10*SIN A
730 LET SY=22+10*COS A
735 PLOT SX,SY
740 NEXT T
745 PAUSE 250
746 CLS
747 GOTO 4000
750 PRINT AT 10,10;"*K-----"
751 PRINT AT 0,23;"MARS"
753 PRINT AT 2,23;"DISTANCE"
754 PRINT AT 3,23;"141 MILL"
755 PRINT AT 4,23;"ORBIT"
756 PRINT AT 5,23;"1.88 YRS"
757 PRINT AT 20,20;"4TH PLANET"
760 FOR T=0 TO 60
770 LET A=T/30*PI
780 LET SX=21+8*SIN A
790 LET SY=22+8*COS A
800 PLOT SX,SY
810 NEXT T
815 PAUSE 250
820 CLS
830 GOTO 5000
849 PRINT AT 20,20;"2ND PLANET"
850 PRINT AT 10,10;"*K-----"
851 PRINT AT 0,23;"VENUS"
853 PRINT AT 2,23;"DISTANCE"
854 PRINT AT 3,23;"67.2 MILL"
855 PRINT AT 4,23;"ORBIT"
856 PRINT AT 5,23;"225 DAYS"
857 FOR T=0 TO 30
858 LET A=T/15*PI
859 LET SX=21+4*SIN A
860 LET SY=22+4*COS A
861 PLOT SX,SY
862 NEXT T
863 PAUSE 250
864 CLS
865 GOTO 7000
900 PRINT AT 10,10;"*K-----"
905 PRINT AT 0,23;"MERCURY"
907 PRINT AT 2,23;"DISTANCE"
908 PRINT AT 3,23;"36 MILL"
909 PRINT AT 4,23;"ORBIT"
910 PRINT AT 5,23;"88 DAYS"
915 PRINT AT 20,20;"1ST PLANET"
920 FOR T=0 TO 30
925 LET A=T/15*PI
930 LET SX=21+2*SIN A
940 LET SY=22+2*COS A
950 PLOT SX,SY
955 NEXT T
960 PAUSE 250
970 CLS
980 GOTO 8000
999 STOP
1000 PRINT "THE PLANETARY SYSTEM"
1020 PRINT
1030 PRINT "THIS COMPUTER PROGRA"
1040 PRINT "MME GIVES"
1040 PRINT "DETAILS OF THE SOLAR"
1050 PRINT "AND INCLUDES AN ANIM"
1060 PRINT "ATED"

```



**D**ESPITE its title, *Planets* is not an invaders game. It is an educational routine which provides the user with a semi-educational description of each planet, followed by an animated graphic presentation of each planetary orbit.

We are sure that it will prove useful to science students and teachers. It was sent by K F Williams of New South Wales, Australia (16K ZX-81).

# PLANETS

```

1060 PRINT "REPRESENTATION OF THE PLANETARY"
1070 PRINT "ORBITS OF OUR SOLAR SYSTEM."
1075 PRINT
1100 PRINT "PRESS ""NEWLINE KEY"" TO START"
1110 PRINT "YOUR JOURNEY THROUGH TIME AND"
1120 PRINT "S P A C E."
1121 PRINT
1122 PRINT
1123 PRINT ""PLUTO"" ""NEPTUNE"" ""URANUS"" ""MARS""
1125 PRINT
1126 PRINT ""SATURN"" ""JUPITER"" ""MARS""
1128 PRINT
1129 PRINT ""EARTH"" ""VENUS"" ""MERCURY""
1135 CLS
1132 INPUT A$
1140 IF A$="" THEN GOTO 1200
1200 PRINT "PLUTO"
1220 PRINT "THE NINTH PLANET OF THE SOLAR"
1230 PRINT "SYSTEM,ORBITING THE SUN AT A"
1240 PRINT "MEAN DISTANCE OF 39.53AU IN"
1250 PRINT "248.4 YEARS,PLUTO WAS DISCOVERED"
1260 PRINT "IN 1930 FOLLOWING OBSERVATIONS"
1270 PRINT "OF PERTURBATIONS IN NEPTUNES"
1280 PRINT "ORBIT,PLUTOS MASS IS PROBABLY"
1290 PRINT "LESS THAN 0.1 OF THAT OF EARTH."
1295 PRINT "DIAMETER IS PROBABLY 5000 TO"
1296 PRINT "6000 KILOMETRES AND THE ORBIT IS"
1297 PRINT "VERY ECCENTRIC"
1298 PRINT
1299 PRINT
1300 PRINT "PRESS ""NEWLINE TO SEE ORBIT"
1302 INPUT A$
1303 CLS
1304 IF A$="" THEN GOTO 3
2000 PRINT "NEPTUNE"
2011 PRINT
2012 PRINT
2013 PRINT "THE FOURTH LARGEST PLANET AND"
2014 PRINT "THE EIGHTH PLANET FROM THE SUN."
2015 PRINT "NEPTUNE WAS FIRST DISCOVERED IN"
2016 PRINT "1846 BASED ON PERTURBATIONS IN"
2017 PRINT "THE ORBIT OF URANUS. NEPTUNE HAS TWO MOONS, ""TRITON"" AND ""NEREID""
2018 PRINT "NEPTUNES ""YEAR"" IS 164.8 TIMES"
2019 PRINT "THAT OF EARTH.ITS DIAMETER IS"
2020 PRINT "ABOUT 51 M/M AND ITS MASS ABOUT"
2021 PRINT "17.45 TIMES THAT OF THE EARTH"
2022 PRINT
2023 PRINT
2024 PRINT "PRESS ""NEWLINE"" TO SEE ORBIT"
2025 INPUT A$
2026 CLS
2027 IF A$="" THEN GOTO 21
2500 PRINT "URANUS"
2514 PRINT
2520 PRINT "THE THIRD LARGEST PLANET IN THE"
2530 PRINT "SOLAR SYSTEM AND SEVENTH FROM"
2540 PRINT "THE SUN,PHYSICALLY VERY SIMILAR"
2550 PRINT "TO NEPTUNE,BUT RATHER LARGER"
2560 PRINT "53 M/M +/- 5 0/0.ITS DISTANCE"
2570 PRINT "FROM THE SUN IS 19.2 AU AND IT"
2580 PRINT "ORBITS THE SUN IN 84.82 YEARS."
2590 PRINT "URANUS HAS FIVE MOONS IN ORBITS"
2591 PRINT "THAT ARE RETROGRADE."
2592 PRINT
2593 PRINT
2594 PRINT "PRESS ""NEWLINE"" TO SEE ORBIT"
2595 INPUT A$
2596 CLS
2597 IF A$="" THEN GOTO 80
3000 PRINT "SATURN"
3015 PRINT
3020 PRINT
3025 PRINT "THE SECOND LARGEST PLANET IN THE"
3030 PRINT "SOLAR SYSTEM AND THE SIXTH FROM"
3035 PRINT "FROM THE SUN.IT ORBITS THE SUN"
3040 PRINT "IN 29.46 YEARS AT A DISTANCE OF"
3045 PRINT "9.54AU.SATURN HAS THE LOWEST"
3050 PRINT "DENSITY OF ALL OF THE PLANETS,"
3055 PRINT "LESS THAN THAT OF WATER,AND MAY"
3060 PRINT "CONTAIN OVER 60 0/0 HYDROGEN BY"
3065 PRINT "MASS.ITS TOTAL MASS IS 95 TIMES"
3070 PRINT "THAT OF EARTH.SATURN HAS TEN"
3075 PRINT "MOONS AND ITS MOST STRIKING"
3080 PRINT "FEATURE ARE THE SYSTEM OF RINGS"
3090 PRINT "16 KM THICK AND THOUGH TO BE"
3095 PRINT "COMPOSED OF TINY ICE PARTICLES"
3100 PRINT
3110 PRINT
3125 PRINT "PRESS ""NEWLINE"" TO SEE ORBIT"
3130 INPUT A$
3135 CLS
3140 IF A$="" THEN GOTO 500
3500 PRINT "JUPITER"
3520 PRINT
3530 PRINT
3535 PRINT "JUPITER IS THE LARGEST AND MOST"
3540 PRINT "MASSIVE IN THE SOLAR SYSTEM AND"
3545 PRINT "IS FIFTH FROM THE SUN. MASS IS"
3550 PRINT "317.8 TIMES THAT OF THE EARTH."
3555 PRINT "JUPITER IS 5.20AU FROM THE SUN"
3560 PRINT "AND HAS AN ORBIT OF 11.86 EARTH"
3565 PRINT "YEARS.ATMOSPHERE CONSISTS MAINLY"
3570 PRINT "OF METHANE,AMMONIA AND HYDROGEN"

```



```

3575 PRINT "JUPITER HAS 13 MOON
S,THE TWO"
3580 PRINT "LARGEST BEING ""GANE
YMEDE"" AND"
3585 PRINT ""CALLISTO.JUPITER H
AS A VERY"
3590 PRINT "PROMINENT FEATURE CA
LLED ""THE"
3595 PRINT "RED SPOT"" THAT HAS
BEEN STUDIED"
3600 PRINT "FOR OVER 150 YEARS"
3610 PRINT
3620 PRINT
3630 PRINT "PRESS ""NEWLINE"" TO
SEE ORBIT"
3635 INPUT A#
3640 CLS
3650 IF A#="" THEN GOTO 650
4500 PRINT "MARS"
4520 PRINT
4530 PRINT
4535 PRINT "MARS IS THE FOURTH P
LANET FROM"
4540 PRINT "THE SUN,WITH AN ORBI
T OF 687"
4545 PRINT "EARTH DAYS,AND IS 1.
52AU FROM"
4550 PRINT "THE SUN,THE HIGHEST
TEMPERATURE"
4555 PRINT "AT THE EQUATOR IS AB
O 50 DEG."
4560 PRINT "AND THE LOWEST ABOUT
-100 DEG."
4565 PRINT "CENTIGRADE.MARS HAS
A MEAN DIAM."
4570 PRINT "OF 6750 KM,AND HAS D
ISTINCTIVE"
4575 PRINT "POLAR ICE CAPS WITH
SEASONAL"
4580 PRINT "RECESSION.MARS HAS T
WO MOONS"
4585 PRINT ""PHOBOS"" AND ""DEI
MOS"" AND"
4590 PRINT "IT IS UNSURE IF MARS
CAN SUPPORT"
4595 PRINT "LIFE AS KNOWN ON PLA
NET EARTH."
4598 PRINT
4599 PRINT "PRESS ""NEWLINE"" TO
SEE ORBIT"
4595 INPUT A#
4596 CLS
4597 IF A#="" THEN GOTO 750
5000 PRINT "EARTH"
5020 PRINT
5030 PRINT
5040 PRINT "PLANET EARTH IS THE
THIRD PLANET"
5050 PRINT "FROM THE SUN,AND AT
THIS TIME"
5060 PRINT "THE ONLY PLANET KNOW
N TO SUPPORT"
5070 PRINT "LIFE AS WE KNOW IT.T
HE EARTH IS"
5080 PRINT "RATHER LARGER THAN V
ENUS,AND HAS"
5090 PRINT "AN ORBIT OF APPROX.O
NE YEAR ON"
5100 PRINT "ITS JOURNEY AROUND T
HE SUN,EARHT"
5120 PRINT "IS SLIGHTLY FLATTENE
D AT THE"
5130 PRINT "POLES AND IS ABOUT 1
2756 KM IN"
5140 PRINT "DIAMETER,AS WE ALL K
NOW,EARHT"
5150 PRINT "HAS ONE MOON,THE EAR
TH WAS"
5160 PRINT "FORMED ABOUT 4550 MI
LION YEARS"
5170 PRINT "AGO AND HAS SUPPORTE
D MAN FOR"
5180 PRINT ".009 8/8 OF THIS TIM
E"
5190 PRINT
5195 PRINT
5195 PRINT "PRESS ""NEWLINE"" TO
SEE ORBIT"
5200 INPUT A#
5210 CLS
5220 IF A#="" THEN GOTO 379
5500 PRINT "VENUS"
5520 PRINT
5530 PRINT
5540 PRINT "VENUS IS THE SECOND
PLANET FROM"
5550 PRINT "THE SUN AND IS ABOUT
THE SAME"
5560 PRINT "SIZE AS THE EARTH,AN
D IS .72AU"
5570 PRINT "DISTANT FROM THE SUN
,AND ORBITS"
5580 PRINT "THE SUN IN 225 DAYS,
ABOUT TWO"
5590 PRINT "THIRDS OF AN EARTH Y
EAR."
5600 PRINT "THE SURFACE TEMPERAT
URE IS ABOUT"
5610 PRINT "750 DEGRESS K,THE SU
RFACE IS"
5620 PRINT "COMPLETELY OBSCURED
BY DENSE"
5630 PRINT "CLOUDS CONTANING SUL
FURIC ACID"
5640 PRINT "LIFE AS WE KNOW IT C
OULD NOT"
5650 PRINT "EXIST UNDER THESE CO
NDITIONS"
5660 PRINT
5670 PRINT
5680 PRINT "PRESS ""NEWLINE"" TO
SEE ORBIT"
5690 INPUT A#
5691 CLS
5695 GOTO 849
6000 PRINT "STANDBY"
7070 PRINT "MERCURY"
7080 PRINT
7090 PRINT
7090 PRINT "PRESS ""NEWLINE"" TO
SEE ORBIT"
7090 PRINT "LIFE AS WE KNOW IT O
N EARTH"
7100 PRINT "MERCURY HAS LITTLE O
R NO KNOWN"
7120 PRINT "ATMOSPHERE,AND HAS N
O MOONS"
7130 PRINT "THE PLANETS AVERAGE
DENSITY IS"
7140 PRINT "5.2 GRAMS PER CUBIC
CENTIMETRE"
7150 PRINT
7160 PRINT
7170 PRINT "PRESS ""NEWLINE"" TO
SEE ORBIT"
7180 INPUT A#
7190 CLS
7195 IF A#="" THEN GOTO 900
8000 PRINT ""ZX-81 MICRO-COMPU
TER""
8020 PRINT
8030 PRINT "TRUSTS YOU HAVE ENJO
YED THIS"
8035 PRINT
8040 PRINT "LITTLE TRIP THROUGH
THE SOLAR"
8045 PRINT
8050 PRINT "SYSTEM AND THAT IT H
AS GIVEN YOU"
8055 PRINT
8060 PRINT "FOOD FOR THOUGHT AND
A BETTER"
8065 PRINT
8070 PRINT "UNDERSTANDING OF OUR
UNIVERSE"
8080 PRINT
8090 PRINT
8091 PRINT
8092 PRINT "*****"
8093 PAUSE 800
8094 CLS
8095 PRINT "AS A SOBERING THOUGH
T HERE ARE"
8100 PRINT "THE DISTANCES FROM T
HE SUN IN"
8200 PRINT "MILES OF EACH OF OUR
9 PLANETS"
8300 PRINT
8400 PRINT "PLUTO....3670 MILLI
ON MILES"
8500 PRINT "NEPTUNE...2794 MILLI
ON MILES"
8510 PRINT "URANUS....1783 MILLI
ON MILES"
8520 PRINT "SATURN...866.2 MILL
ION MILES"
8530 PRINT "JUPITER...483.3 MILL
ION MILES"
8540 PRINT "MARS.....141.5 MILLI
ON MILES"
8550 PRINT "EARTH....93 MILLION
MILES"
8560 PRINT "VENUS....67.2 MILLI
ON MILES"
8570 PRINT "MERCURY...36 MILLION
MILES"
8580 PRINT "IT TAKES SUNLIGHT 8.
33 MINUTES"
8595 PRINT "TO REACH EARTH AT 18
6000 MILES"
8600 PRINT "PER SECOND....."
8610 PRINT "IT WOULD TAKE A ""JU
MBO"" JET 645"
8620 PRINT "DAYS AT 600 MPH NON-
STOP....."
8630 PRINT
8640 PRINT ".....THINK ABOUT
IT"
9000 STOP
9001 SAVE "PLANETS"
9002 GOTO 1

```

# GOLF 80

IT IS DIFFICULT playing a game of golf inside a ZX-80. The version submitted by S Hughes of Bushey, Hertfordshire, is entertaining but obviously very much condensed.

You are told the number of the hole, its distance and par, and asked to select a club. At the end of the game, the course par and your score are displayed. The program is set for nine holes but can be changed to 18 by replacing line 815 with "A=19 THEN GO TO 830".

```
1 LET X = 0
2 LET A = 1
3 LET F = 0
4 LET H = 0
5 LET B = 0
9 RAND
50 LET D = RND(245) + 175
51 LET P = 4
52 IF D < 276 THEN LET P = 3
53 IF D > 350 THEN LET P = 5
61 PRINT
65 PRINT "HOLE,";A;" "D";D;" YARD(S)
TO PLAY"
100 PRINT
110 PRINT "PAR";P
120 PRINT
135 IF NOT D = 0 THEN PRINT B;" "
STROKE(S) PLAYED"
138 IF NOT H = 1 THEN PRINT "CLUB? 5 TO
9"
139 IF H = 1 THEN PRINT "PUTTER? 1 TO 4"
140 INPUT W
141 CLS
150 LET T = 1
160 IF W = 2 THEN LET T = W
170 IF W = 3 THEN LET T = RND(2) + 4
180 IF W = 4 THEN LET T = RND(4) + 8
190 IF W = 5 THEN LET T = RND(6) + 20
200 IF W = 6 THEN LET T = RND(9) + 45
201 IF W = 7 THEN LET T = RND(8) + 96
220 IF W = 8 THEN LET T = RND(9) + 135
230 IF W = 9 THEN LET T = RND(15) + 195
240 LET D = D - T
245 PRINT "STROKE,";T;" YARD(S)"
246 LET B = B + 1
250 IF D > -1 THEN GOTO 260
255 LET D = -D
256 PRINT D;" PAST HOLE"
268 IF D = 0 THEN GOTO 800
269 IF D < 18 AND D > -19 THEN PRINT "ON
GREEN"
270 IF D < 18 AND D > -19 THEN LET H = 1
280 GO TO 60
800 IF B > P THEN PRINT "BOGIE";B;.B;.P;.
"COVER"
801 IF B = P THEN PRINT "PAR";B
802 IF P-1 = B THEN PRINT "BIRDIE";B
803 IF P-2 = B THEN PRINT "EAGLE";B
805 LET X = X + B
807 LET F = F + P
810 LET A = A + 1
815 IF A = 10 THEN GOTO 830
820 GOTO TO 4;839 PRINT "C/PAR";F
840 PRINT "Y/SCORE";X
□ IS A SPACE
```



```

100 BORDER 1: CLS
120 PRINT AT 0,11; INK 2; BRIGH
T 1; "SINE WAVE"
130 PRINT AT 1,2; "PEAK R.M.S. a
nd AVERAGE VALUES."
200 PLOT 0,110: DRAW 255,0
210 FOR Q=0 TO 255
220 PLOT 0,110+40*SIN (Q/64*PI)
230 IF Q=255 THEN GO TO 300
240 NEXT Q
300 PRINT AT 15,8; INK 1; "SELEC
T FUNCTION"
310 PRINT AT 16,2; "1---PEAK VAL
UE"; AT 17,2; "2---RMS. VALUE"; AT
18,2; "3---AVERAGE VALUE"
320 INPUT "Select 1, 2 or 3"; R
330 IF R<1 OR R>3 THEN GO TO 32
0
340 IF R=1 THEN GO TO 400
350 IF R=2 THEN GO TO 500
360 IF R=3 THEN GO TO 600
400 GO SUB 1000
410 PRINT AT 14,10; "PEAK VALUE"
420 PRINT AT 15,7; "INPUT RMS. V
ALUE"
430 INPUT "RMS. VALUE "; R
440 LET Q=R*1.414
450 PRINT AT 18,4; INK 2; BRIGH
T 1; "PEAK VALUE = "; Q
460 GO SUB 1020
470 GO TO 300
500 GO SUB 1000
510 PRINT AT 15,7; "INPUT RMS. V
ALUE"
520 PRINT AT 15,7; "INPUT PEAK V
ALUE"
530 INPUT "PEAK VALUE "; P
540 LET Q=P*0.707
550 PRINT AT 18,4; INK 2; BRIGH
T 1; "RMS. VALUE = "; Q
560 GO SUB 1020
570 GO TO 300
590 GO SUB 1000
610 PRINT AT 14,10; "AVERAGE VAL
UE"
620 PRINT AT 15,6; "INPUT PEAK V
ALUE"
630 PRINT "PEAK VALUE "; P
640 LET Q=P*0.537
650 PRINT AT 18,4; INK 2; BRIGH
T 1; "AVERAGE VALUE = "; Q
660 GO SUB 300
1000 FOR Q=14 TO 21: PRINT AT Q,
0; PAPER 2; ": NEXT Q
1010 RETURN
1020 PAUSE 200: FOR Q=14 TO 21:
PRINT AT Q,0; ": NEXT Q
1030 RETURN
2000 SAVE "sine" LINE 10

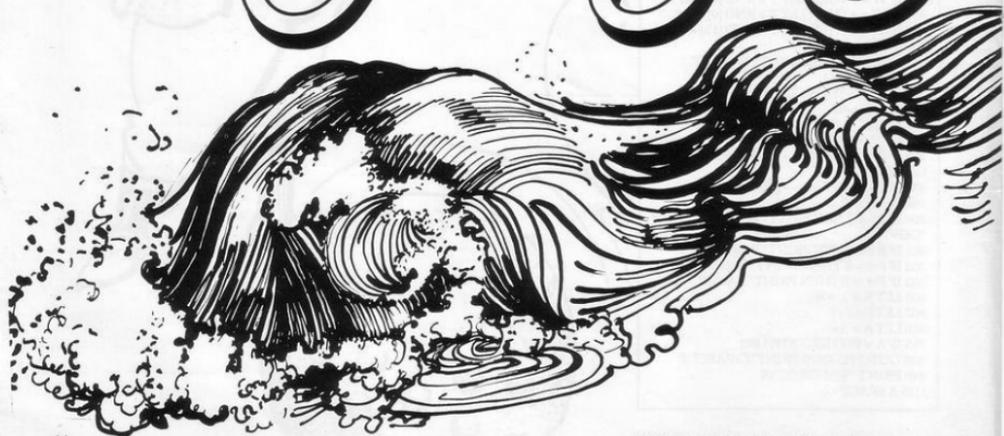
```

**M**AKING WAVES for the 16K Spectrum will work out the average RMS and peak values of an alternating sine wave. A menu is displayed and you must select one of the functions. If you

want to find the peak value the program will ask you to enter the known RMS value; it is the other way round to find the RMS value and if you want to find the average value no input is required.

The graphics of the program are good and make this a fine educational program and mathematical aid. The program was sent by David Price, of Caerphilly, Glamorgan.

# making WAVES



# QUEUE

**Q**UEUE is for the unexpanded ZX-81 and presents a simulation of a queueing system in a post office. There are five servers at the windows and the customers form a single queue. Customers are represented by M and F and a full-stop signifies that a server is free.

Underneath the queue is a single figure from zero to nine which can be changed by pressing one of the corresponding characters on the keyboard. That shows the average rate at which customers arrive. An arrival rate of fewer than five means that the servers are underloaded, and more than five overloaded. The author, W E Thompson of Aldeburgh, Suffolk, says that theory predicts average queue lengths of 1, 0.001; 2, 0.04; 3, 0.4; 4, 4.2; 5, 15; 6, 27; 7, 39; 8, 30; 9, 31. The model shows that the queue can be far from its average for long periods, 1K ZX-81.



```

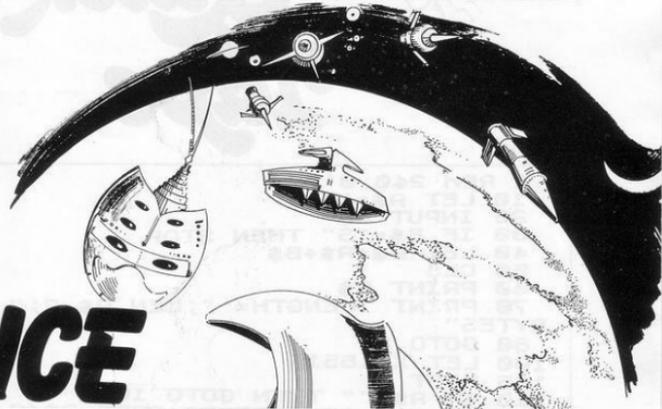
10 DIM Q$(32)
20 LET S$="....."
30 LET U=SGN PI
40 LET Z=NOT U
50 LET Q=U
60 LET A=Z
70 RAND
80 IF "0"<=INKEY$ AND INKEY$<=
"9" THEN LET A=VAL INKEY$
90 PRINT AT 5,Z;A
100 LET R=RNDC(5+A)
110 IF R<5 THEN GOTO 210
120 IF Q>32 THEN GOTO 80
130 LET R=INT (RND*2)
140 LET C$="(M" AND R)+("F" AND
NOT R)
150 LET Q$(Q)=C$
160 FOR I=31 TO Q-U STEP -U
170 PRINT AT U,I;C$; " "
180 NEXT I
190 LET Q=Q+U
200 GOTO 230
210 LET S$(INT R+U)="."
220 PRINT AT 3,Z;S$
230 IF Q=U THEN GOTO 80
240 FOR I=U TO 9
250 IF S$(I)>X" THEN NEXT I
260 IF I=6 THEN GOTO 80
270 LET S$(I)=Q$(U)
280 LET Q=Q-U
290 PRINT AT U,Z;" "JAT 3,Z;S$
300 LET Q$=Q$(2 TO )
310 FOR I=U TO Q
320 PRINT AT U,I-U;Q$(I); " "
330 NEXT I
340 GOTO 80
    
```

# 1K DEFENCE

**D**EFENDERS is a conventional Earth defence game but is fast enough to be genuinely challenging. A succession of aliens appear at screen-left and skim across the surface of the planet towards your craft.

Go up with 7 and down with 6 and trigger your blaster-beam with 0. The planet surface in line 5 could be made more rugged with graphic Ts, Ys and 7s.

**1K Defenders** was sent by Simon Cox of Dunstable, Bedfordshire (1K ZX-81).



```

1 FOR Z=PI/PI TO CODE "(graph
ic T)"
2 PRINT AT RND*CODE "(graphic
S)",RND*CODE "<"CHR# 27
3 NEXT Z
4 LET T=PI-PI
5 PRINT AT CODE "(graphic S)"
,PI-PI;"(thirty two graphic 6s)"
6 SLOW
10 LET A=PI/PI
20 LET B=CODE "J"
30 LET C=INT (RND*CODE "(graph
ic D)")
40 PRINT AT A,T;CHR# 18;AT C,B
;"(graphic 4)SPACE";AT A,T;CHR#
0
50 IF B=T THEN GOTO VAL "200"
55 IF INKEY$="0" THEN GOSUB VA
L "100"
70 LET B=B-PI/PI
80 LET A=A+(INKEY$="6")-(INKEY
S="7")
90 GOTO CODE "C"
100 FOR N=CODE "(graphic 2)" TO
B
101 PRINT AT A,N;CHR# 131;AT A,
T;CHR# 19
102 NEXT N
103 PRINT AT C,B;CHR# 23
106 PAUSE CODE "="
107 FAST
108 CLS
109 GOTO CODE "(graphic 1)"
200 PRINT "GAME OVER"
    
```



**Q**UICK TAPE, a machine code tape routine, will allow you to save and load 16K programs on the ZX-81 in less than a minute. In technical terms the program increases the machine baud rate to 1,500. To put in the program for the first time, type-in and run the hex loader, which is the first program in the listing. In answer to the program prompt, type-in the machine code listing line by line. When you have finished the listing, type 'S' and the machine code will be transferred to the REM statement in line 1. Then delete the loader, line by line, keeping the REM intact.

Type-in the second program, starting at line 10. The REM in line 1 should look like the REM statement which you have just created. When you run this program it will SAVE itself on to tape and then NEW automatically. The machine code routine is then stored above RAMTOP ready for use.

To SAVE a program, type RAND USE 32512 and to LOAD, type RAND USR 32525. When you want to use the program LOAD it normally and RUN. The Basic will destroy itself after transferring the machine code above RAMTOP. The routine will then be ready to use on your faster computer.

Quick Tape was sent by K S Beddoe of Botley, Southampton and is proving very useful.

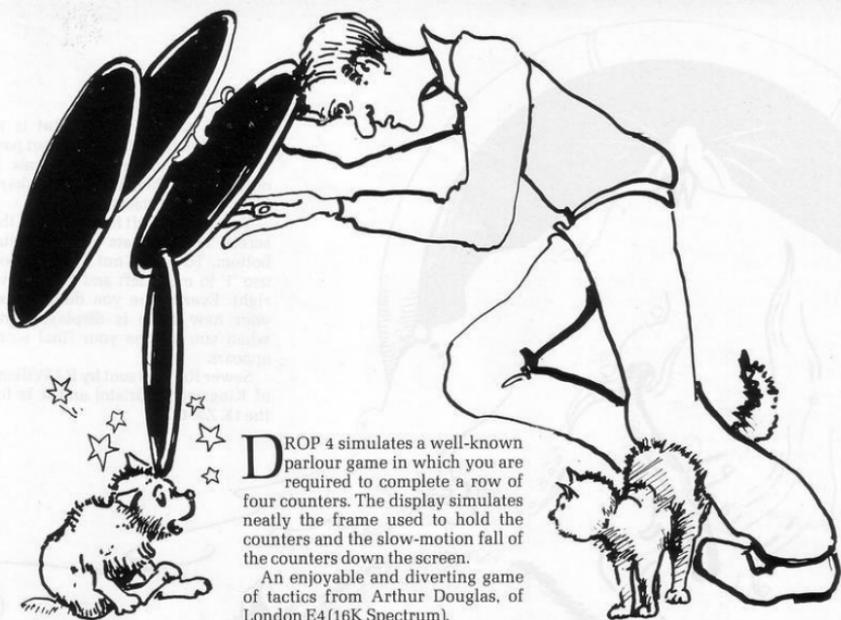
```

1 REM 240 Q'S
10 LET A$=""
20 INPUT B$
30 IF B$="S" THEN STOP
40 LET A$=A$+B$
50 CLS
60 PRINT A$
70 PRINT "LENGTH= ";LEN A$/2;"
  BYTES"
80 GOTO 20
100 LET X=16514
105 FAST
110 IF A$="" THEN GOTO 160
120 POKE X,16+CODE A$+CODE A$(2
) -476
130 LET A$=A$(3 TO )
140 LET X=X+1
150 GOTO 110
160 SLOW
170 STOP

10 SAVE "FAST TAPE ROUTINE"
20 PRINT "FAST TAPE ROUTINE"
30 PRINT "TO SAVE RAND USR 325
1.2"
40 PRINT "TO LOAD RAND USR 325
25"
50 PAUSE 150
60 RAND USR 16738
  
```

Machine code listing												
16514	CD	23	0F	11	06	7F	CD	2B	0F			
16522	7F	CD	2B	0F	C9	CD	23	0F				
16530	21	1D	7F	22	16	40	CD	70				
16538	7F	CD	2B	0F	C9	0B	0B	0B				
16546	00	00	00	00	00	00	CD	CD	AB			
16554	03	38	F9	EB	11	CB	12	CD	A8			
16562	46	0F	30	2E	10	FE	1B	7A				
16570	B3	20	F4	CD	4E	7F	CB	7E				
16578	23	28	F8	21	09	40	CD	4E				
16586	7F	CD	FC	01	18	F8	5E	37				
16594	CB	13	C8	9F	E6	02	C6	01				
16602	4F	D3	FF	06	23	10	FE	CD				
16610	46	0F	30	72	06	1E	10	FE				
16618	0D	20	EE	C3	D8	7F	18	FE				
16626	CD	A8	03	CB	12	CB	0A	CD				
16634	7C	7F	18	FB	0E	01	06	00				
16642	3E	7F	DB	FE	D3	FF	1F	30				
16650	49	17	17	38	28	10	F1	F1				
16658	BA	D2	E5	03	62	6B	CD	7C				
16666	7F	CB	7A	79	20	03	BE	20				
16674	D6	23	17	30	F1	FD	34	15				
16682	21	09	40	50	CD	7C	7F	7F				
16690	CD	FC	01	18	F8	D5	1E	31				
16698	06	0E	1D	DB	FE	17	CB	7B				
16706	7B	38	F5	10	F5	D1	20	30				
16714	FE	56	30	B2	3F	CB	11	04				
16722	AD	C9	7A	A7	28	BB	CF	0C				
16730	A7	06	30	10	FE	C3	6E	7F				
16738	21	82	40	11	00	7F	01	0E				
16746	00	ED	B0	21	FF	7E	22	04				
16754	40	C3	C3	03								





**D**ROP 4 simulates a well-known parlour game in which you are required to complete a row of four counters. The display simulates neatly the frame used to hold the counters and the slow-motion fall of the counters down the screen.

An enjoyable and diverting game of tactics from Arthur Douglas, of London E4 (16K Spectrum).

# DROP4

```

100 LET X=1: LET I$="XXX": INK
0: PAPER 7: CLS: DIM A(12,13)
110 LET S$=CHR$ 144+CHR$ 145+CH
R$ 146
120 LET T$=CHR$ 147+CHR$ 95+CHR
$ 148
130 LET U$=""
140 DATA 0,127,127,127,127,127,
127,127
150 DATA 0,255,255,255,255,255,
255,255
160 DATA 0,254,254,254,254,254,
254,254
170 DATA 128,128,128,128,128,12
8,128,255
180 DATA 1,1,1,1,1,1,1,255
190 FOR J=144 TO 148: FOR K=0 T
O
200 READ A: POKE USR CHR$ J+K,A
210 NEXT K: NEXT J
220 FOR J=2 TO 17: STEP 3
230 FOR K=2 TO 26: STEP 4
240 PRINT INK 6; PAPER 0; AT J,K
:
250 PRINT PAPER 6; AT J+1,K; T$
260 NEXT K: NEXT J
270 PRINT INK 3; AT 0,3; " 1 2
3 4 5 6 7"
280 PRINT INK 7; PAPER X; AT 20
,11; "PLAYER "X
290 INPUT "WHICH COLUMN I 1 TO
7 "A
300 IF A<0 OR A>7 OR A<=0
THEN GO TO 290
310 LET C=(A-1)*4+2
320 IF ATTR(12,C)<=6 THEN PRINT
FLASH 1; AT 21,7; "COLUMN ";A; " I
S FULL": GO TO 290
330 PRINT AT 21,7; U$
340 FOR J=0 TO 48
350 LET Z=ATTR(J,C)
360 PRINT AT J,C; PAPER X; INK
7:
370 IF J=2 THEN PRINT INK 3; AT
J-2,C; CHR$ 32; A; CHR$ 32
380 IF J>2 AND Z=6 THEN PRINT P

```

```

APER 6; AT J-2,C; T$
390 IF J>2 AND Z=48 THEN PRINT
AT J-2,C; " "
400 IF J>2 AND Z=56 THEN PRINT
INK 6; PAPER 0; AT J-2,C; S$
410 IF J=18 OR ATTR(J+2,C)=23
OR ATTR(J+2,C)=15 THEN BEEP 0.1
:
420 IF Z=48 THEN FOR P=1 TO 4:
BEEP 0.05,(20-2*J)+P: NEXT P
430 NEXT J
440 LET L=J/3+3: LET C=A+3
450 FOR J=-3 TO 0
460 IF A(L+J,C)=X AND A(L+J+1,C)
=X AND A(L+J+2,C)=X AND A(L+J+3
,C)=X THEN GO TO 550
470 IF A(L,C+J)=X AND A(L,C+J+1)
=X AND A(L,C+J+2)=X AND A(L,C+J
+3)=X THEN GO TO 550
480 IF A(L+J,C+J)=X AND A(L+J+1
,C+J+1)=X AND A(L+J+2,C+J+2)=X A
ND A(L+J+3,C+J+3)=X THEN GO TO 5
50
500 IF A(L-J,C+J)=X AND A(L-(J-1
,C+J+1)=X AND A(L-(J-2,C+J+2)
=X AND A(L-(J-3,C+J+3)=X THEN G
O TO 550
510 NEXT J
520 LET I$="000": IF X=2 THEN L
ET I$="XXX"
530 LET X=X+1: IF X=3 THEN LET
X=1
540 GO TO 280
550 PRINT OVER 1; FLASH 1; AT 20
,11; U$(TO 8)
560 PRINT AT 20,9; FLASH 1; INK
X; "PLAYER "A; " WINS"
570 INPUT "ANOTHER GAME "; A$: I
F A$(1)(">") THEN STOP
580 PRINT AT 20,9; "
": GO TO 220
590 PRINT AT 21,0; U$; AT 21,16; U
$
600 DIM A(12,13): GO TO 220
9999 SAVE "drop four"

```



**T**HE AIM of **Sewer Rat** is to dodge the rats which float past you down the sewer canals. If one of them hits you, those sharp teeth will take a tasty snack.

Your sewer craft is at the top of the screen and the rats rise from the bottom. To dodge out the way you use '1' to move left and '0' to move right. Every time you dodge a rat your new score is displayed and when you hit one your final score appears.

Sewer Rat was sent by R J Wilkins of Kingswood, Bristol and it is for the 1K ZX-81.

# SEWER RAT

```

5 LET DD=PI/PI
10 LET S=PI-PI
15 LET A=VAL "4"
20 FOR B=VAL "1" TO VAL "20"
25 PRINT "aSpace,graphic A,S sP
aces,graphic A"
30 NEXT B
35 LET D=INT (RND*VAL "5")+VAL
"2"
40 FOR C=VAL "19" TO PI/PI STE
P -DD
50 LET E=INT (RND*3)+1
60 IF E=2 AND D>2 THEN LET D=D
-1
63 IF C<=VAL "5" THEN LET D=A
65 LET A=A+<INKEY#="0" AND A<V
AL "6">-<INKEY#="1" AND A>VAL "2
")
70 IF C=VAL "1" AND D=A THEN G
OTO VAL "200"
80 PRINT AT VAL "1",A;"inverse
V";AT C,D;"inverse *";AT VAL "1
100~PRINT AT VAL "1",A;"inverse
sSpace";AT C,D;"inverse sSpace"
105 NEXT C
110 LET S=S+PI/PI
115 PRINT AT PI/PI,VAL "8";"SCO
RE=";S
120 IF S>VAL "5" THEN LET DD=VA
L "2"
125 IF S>VAL "10" THEN LET DD=V
AL "3"
130 GOTO VAL "35"
200 PRINT AT PI-PI,VAL "8";"FIN
AL"
220 STOP

```

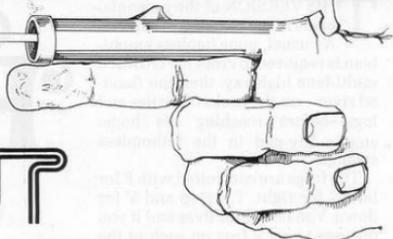
# TIMED

IN SOME games programs it is useful to allow the player only a limited amount of time to respond. **Timed Inputs**, by A F Olivera of Gibraltar, is a subroutine for the ZX-81 which can be added to a program to allow the player a certain amount of time to reply.

That depends on the values put into the POKE statements at lines 500 and 510. The numbers are POKED into the FRAMES counter which controls the ZX-81 control clock. The values in the program already will set the FRAMES counter to 32767/50ths of a second. It can be re-set by altering the POKE numbers.

The program will return the keys pressed by the player in the IS variable. That can then be checked by the programmer's own control program.

# INPUT



```

500 POKE 16436,255
510 POKE 16437,127
520 LET I$=""
530 CLS
540 PRINT AT 21,0;I$
550 IF PEEK 16436+PEEK 16437*25
6<32767-5*50 THEN RETURN
560 IF INKEY$<" THEN GOTO 550
570 IF PEEK 16436+PEEK 16437*25
6<32767-5*50 THEN RETURN
580 IF INKEY$="" THEN GOTO 570
590 IF CODE INKEY$=118 THEN RET
URN
600 LET I$=I$+INKEY$
610 IF CODE I$(LEN I$)=119 THEN
LET I$=I$( TO LEN I$-2)
620 GOTO 530

```

# Mince Pounce



```

10 PRINT "ENTER TIME REQUIRED"
20 INPUT A
30 CLS
40 LET A$="" 000000000
0000"
50 FOR B=0 TO 13
60 PRINT A$
70 NEXT B
80 LET Y=9
90 LET Z=0
100 FOR E=0 TO A
110 PRINT AT Z,Y;"<"
120 IF INKEY$="8" THEN LET Y=Y+
1
130 IF INKEY$="5" THEN LET Y=Y-
1
140~IF INKEY$="6" THEN LET Z=Z-
1
150 IF INKEY$="7" THEN LET Z=Z+
1
160 PRINT AT Z,Y;">"
170 NEXT E

```

IF THE TASTE of mince pies is still in your mouth you might like to try **Mince Pounce**, which is a pie addicts' paradise. The aim of the 1K game for the ZX-81 is to eat your way through a table of mince pies in as short a time as possible.

At the start, you are asked to enter a time code. The codes quoted by the author, Andrew Blight of Fleet, Hampshire, include 400 for one minute and 1,000 for two-and-a-half minutes. You can increase the time but the idea is to reduce your time.

The arrow is your mouth and it can be moved around the table using the cursor keys. When the time has expired the game stops and reports code 0/10. There are 169 pies on the table.

There are 10 spaces and 13 Os in line 40.

THIS VERSION of the perennial game must surely be definitive. As usual, your hapless amphibian is required to cross the crowded multi-lane highway, then the flooded river—on the backs of turtles and logs—before reaching his home atop a lily-pad in the fathomless swamp.

The frogs are controlled with F for left, G for right, T for up and V for down. You have four lives and if you manage to get a frog on each of the lily-pads you receive a bonus frog, up to a maximum of four. Remember, though, only one frog per pad is allowed. There is a timer and a high-score facility.

After the program has been entered it should be started with "RUN 2000" to define the graphics, after which the normal RUN can be used.

Andrew Pennel of Cliftonville, Kent, who sent the program, says that Frogger was written for the 48K Spectrum but that owners of the 16K machine can use it by splitting it into two parts, 2000-2660 first, and 5-1580 second.

This listing is probably unbeatable for the Spectrum. It is certainly the best we have seen. (48K or 16K Spectrum).

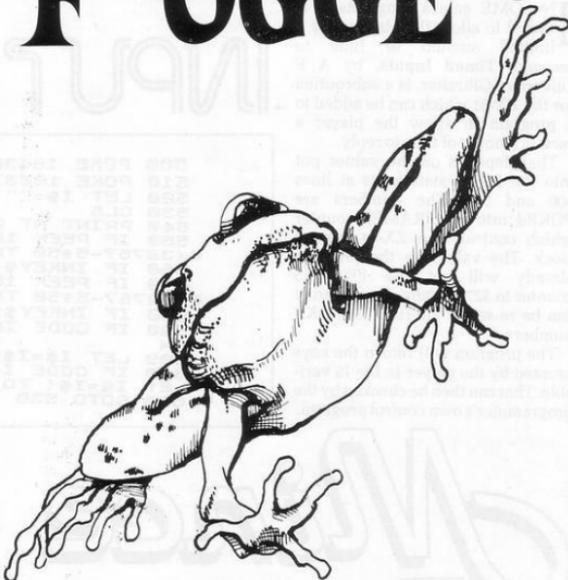
Graphics notes:

110, 180, etc.—Graphic B

310—Graphic H, graphic I; graphic

K, graphic L.

# FROGGER



```

1 REM FROGGER
2 REM by Andrew Pennell
3 POK 235,S
10 GO TO 900
20 FOR I=1 TO 6
30 LET X(I)=5+INT (RAND*31)+1
40 NEXT I
50 PRINT VAL$ Q$
60 LET A=20
100 LET X=15: LET Y=19
110 PRINT AT Y,X; INK 4;"W"
120 PAUSE 20
130 PRINT VAL$ Q$
140 FOR I=1 TO 5: LET X(I)=X(I)
-15*(I/2-INT (I/2))+5
150 LET X(I)=X(I)-160*(X(I)>160)
+160*(X(I)<5): NEXT I
160 PRINT VAL$ Q$: IF Y>9 THEN
GO TO 200
170 LET X=X+(A=40)-(A=43): IF X
<0 OR X>31 THEN GO TO 400
180 PRINT AT Y,X; PAPER 5; INK
4;"W"
200 LET B=ATTR (Y,X): IF B=5 OR
B=6 THEN GO TO 400
205 LET T=T-1: PLOT OVER 1,32+T
,12
210 IF T=0 THEN LET F=1: GO TO
400
210 LET XX=X: LET YY=Y: LET K$=
INKKEY$
220 IF K$="" THEN PRINT AT Y,X;
PAPER 5; INK 4;"W": GO TO 140
225 BEEP ,80,-10
230 LET X=X+(K$="G")-(K$="F"):
IF Y=21 THEN LET Y=19
240 IF X<0 OR X>31 THEN GO TO 4
00
250 LET Y=Y+2*(K$="V")-2*(K$="T
")
IF Y=21 THEN LET Y=19
260 IF K$="S" THEN LET S=S+5: P
RINT AT 0,6;S
270 LET A=ATTR (Y,X): IF YY=11
OR YY=19 THEN PRINT AT YY,XX; BR
IGHT 1
280 IF A=160 OR A=47 OR A=5 OR
A=6 OR A=8 THEN GO TO 400
290 PRINT AT Y,X; PAPER 5; INK
4;"W"
300 IF A<>55 THEN GO TO 140
305 PRINT VAL$ Q$
310 LET I=5+INT (X/9)+3: PRINT
AT 2, I: INK 4;"W": AT 3, I;"X"
315 LET S=5+50:"PRINT AT 0,6;S
320 BEEP 2,10
330 LET FF=FF+1: IF FF=4 THEN G
O SUB 500
340 GO TO 20
400 PRINT VAL$ Q$
405 PRINT AT Y,X+(X<0)-(X>31);
INK 5; PAPER 5; FLASH 1; OVER 1;
"W"
410 PRINT AT 0,10+2*F;" ": BEEP
3,-10
415 LET F=F-1
420 IF F=0 THEN GO TO 500
430 PRINT AT Y,X+(X<0)-(X>31);
INK 5; PAPER 5; OVER 1;"W"
440 GO TO 20
500 FOR I=3 TO 30: STEP 8
510 PRINT AT 2, I; " ": AT 3, I;"
"
NEXT I
520 LET FF=0: IF F=4 THEN GO TO
525
525 LET F=F+1: PRINT AT 0,10+2*
F; INK 4;"W"
525 FOR T=T TO 120: PLOT 32+T,1
2: BEEP ,01,T/10: NEXT T
540 PRINT AT 12,6; " YOU SCORED
",S;" "
550 IF S<=5 THEN GO TO 700
560 PRINT AT 11,6; " YOU SCORED
",S;" "
570 IF S<=5 THEN GO TO 700
580 PRINT AT 11,20; FLASH 1;S
590 PRINT AT 12,6; " A NEW HIGH
SCORE!!!"
645 FOR I=1 TO 5: FOR J=5 TO 10
: BEEP ,05,J,I: NEXT J: NEXT I
650 DIM N$(5): INPUT "Enter you
r name (max 5 letters):";N$
660 POKE USR "0",S-256*INT (S/2
5): POKE USR "0"+1,INT (S/256)
670 FOR I=1 TO 5
680 POKE USR "0"+1,CODE N$(I)
690 NEXT I
700 PRINT AT 19,0; FLASH 1;"
Enter RUN for another game. "
GO TO 10000
900 INK 0: PAPER 7: BORDER 7: C
L$

```

```

905 PRINT AT 1,0; PAPER 1;TAB 3
1;"
910 FOR I=2 TO 3: PRINT AT I,0;
PAPER 1;"
920 PRINT AT 1,13; PAPER 1;"
;AT I,21;" ;AT I,29;"
; NEXT I
930 PRINT AT 0,0;"SCORE:0"
940 PRINT AT 0,12; INK 4;"美 美 美"
950 FOR I=4 TO 10: PRINT AT I,0
; PAPER 5;TAB 31;" ; NEXT I
960 FOR I=12 TO 18: PRINT AT I
; PAPER 0; INK 7;TAB 31;" ; NE
XT I
965 PRINT AT 11,0; BRIGHT 1;TAB
31;" ;AT 19,0;TAB 31;"
970 FOR I=76 TO 288 STEP -16
975 FOR J=0 TO 249 STEP 6
980 PLOT J,I; DRAW INK 7;S,0
985 NEXT I; NEXT I
990 LET T=0; LET S=0; LET F=4
995 LET HS=PEEK USR "0"+255*PEE
K (USR "0"+1)
1000 DIM N$(6); FOR I=1 TO 6: LE
T N$(I)=CHR$(PEEK (USR "0"+1+I));
NEXT I
1005 PRINT AT 20,0;"TIME":AT 21,
0;"HIGH SCORE:";HS;" b";N$
1010 DIM A$(13,3); DIM X(6); DIM
Y(6); DIM P$(16,160)
1020 FOR I=1 TO 13
1030 READ J,K: LET A$(I)=CHR$(16
+CHR$(J+CHR$(K
1040 NEXT I
1050 FOR I=1 TO 6
1055 LET P=5: IF I>3 THEN LET P=
0
1060 FOR J=1 TO 32
1070 READ A: LET P$(I,J)=5-4 TO J
*(5)=CHR$(17+CHR$(P+A$(I)
1075 BEEP .01,(I+32*I)/10
1080 NEXT J: LET Y(I)=2*I+3+2*(I
I)
1090 NEXT I
1120 LET Q$=""
1130 FOR I=1 TO 6
1135 BEEP .3,I*3
1140 LET Q$=Q$+CHR$(20+CHR$(5
TR$(Y(I)+CHR$(Q$+P$(I)+STR$(I+
X(I)+STR$(I) TO )+(5+STR$(I+
; TO X(STR$(I)-1))
1150 IF I<>6 THEN LET Q$=Q$+"
1160 NEXT I
1165 GO SUB 500
1170 GO TO 20
1500 DATA 5,144,6,146,0,147,0,14

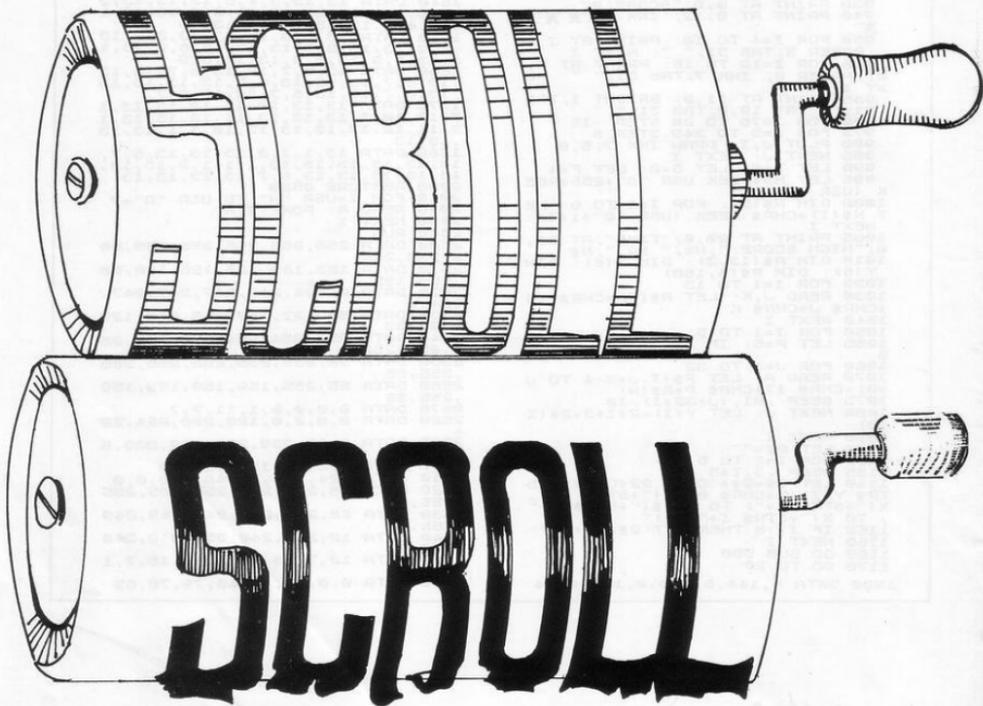
```

```

1,0,145
1510 DATA 6,149,6,150,3,159,3,15
5
1520 DATA 6,153,6,157,6,156,7,32
3,13,13,6,9,13,13,6,9,13,13
,13,13,13,6,9,13,13,6,9,13,13,13
,9,13,13,13,6,9,13,13,13,13
1540 DATA 13,13,13,13,4,6,13,13,13,3
4,4,4,5,13,13,13,13,5,5,13,13,1
5,3,4,5,13,13,5,4,5,13,13
1550 DATA 13,6,9,13,13,13,6,9,13
6,9,13,13,6,9,13,13,13,6,9,13,1
1560 DATA 13,6,7,13,13,6,7,13,13
,13,6,7,13,13,13,6,7,13,13,13,13
1570 DATA 13,16,7,13,13,6,12,13,1
3,13,10,1,13,13,13,11,12,13,13,1
3,11,12,13,13,13,13,11,1,13,13
1580 DATA 13,1,1,2,13,13,13,6,7,
13,13,13,13,13,13,1,1,2,15,15,
13,13,13,13,13,6,7,13,13,13,13
1600 RESTORE 2500
16010 FOR I=USR "A" TO USR "0"+7
16020 READ A: POKE I,A
16030 NEXT I
16040 RUN
160500 DATA 255,255,255,255,255,25
5,255,255
1610 DATA 153,169,126,126,126,60
165,195
16520 DATA 0,124,247,247,247,247,
124,0
16530 DATA 63,127,127,255,255,127
,127,63
16540 DATA 252,254,254,255,255,25
4,254,252
16550 DATA 56,255,255,255,255,255
,255,56
16560 DATA 56,255,159,159,159,159
,1255,56
16570 DATA 0,0,0,0,1,11,7,7
16580 DATA 0,0,0,0,126,206,224,22
4,0
16590 DATA 0,62,239,239,239,239,5
,0
16600 DATA 7,3,10,12,0,0,0,0
16610 DATA 224,192,60,48,0,0,0,0
16620 DATA 28,255,255,255,255,255
,255,28
16630 DATA 28,255,249,249,249,249
,255,28
16640 DATA 12,206,240,252,240,240
,255,12
16650 DATA 12,7,15,127,127,15,7,1
16660 DATA 0,0,78,79,45,79,78,69

```





**S**croll is a machine code program to move the display across the screen in any one of eight directions. Enter Listing 1, keying 126 characters in the REM statement in line 1. The variables S1 to S9

correspond to the compass points NW, N, NE, W, E, SW, S and SE. RUN the program and the machine code will be POKEd into the REM statement. Then delete lines 10 to 70 and replace them with the demon-

stration routine in Listing 2. If the direct command "GOTO 10" is then entered, the versatility of this scroll program will be demonstrated. Submitted by Stephane Crainic, of Paris. (16K ZX-81)

LISTING 1

```

1 REM 11111111111222222222222333
333333344444444445555555566666
666667777777777888888889999999
99999000000001111111222222222
2333333
2 LET S1=16526
3 LET S2=16514
4 LET S3=16533
5 LET S4=16560
6 LET S5=16588
7 LET S6=16519
8 LET S7=16529
9 LET S8=16512
10 LET A$="2A0C40F511210019D10
1D502ED90C92B1948114300ED52E5112
100ED52D121B502ED882A0C4006220233
60010FBC92A004011D6021906162B4E3
6002B7EFE762802180310F2C9714F18F
1200C400616234E36000237EFE7628021
80310F2C9714F19F1CDCC40CD9140C9C
D8040CD9140C9CD8040CD8240C9CDCC4
9CD8240C9"
15 FAST

```

```

20 LET I=16514
30 FOR J=1 TO LEN A$ STEP 2
40 POKE I, (CODE A$(J)-26)*16+8
ODE A$(J+1)-26
50 LET I=I+1
55 IF PEEK I=118 THEN GOTO 70
60 NEXT J
70 SLOW

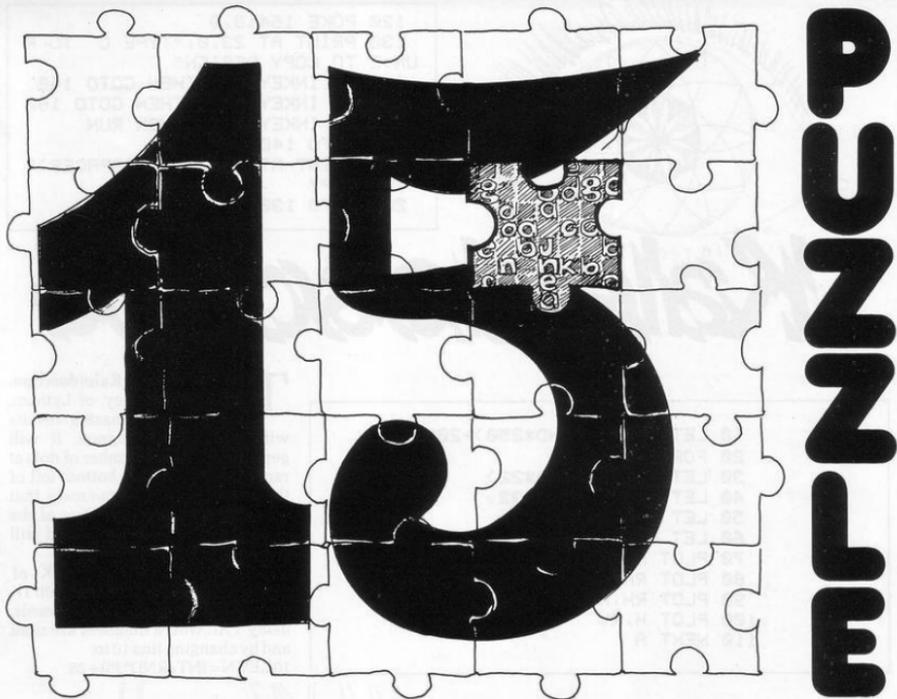
```

LISTING 2

```

100 LET A$="S0"
20 LET A$(2)=STR$(VAL A$(2)+1)
30 IF A$(2)="5" THEN GOTO 20
40 FOR I=1 TO 22
50 PRINT "=="SINCLAIR USER AND
PROGRAMS=="
60 NEXT I
70 FOR I=1 TO 32
80 RAND USR VAL A$
90 NEXT I
100 CLS
110 GOTO 20

```



# P U Z Z L E

THE DISPLAY will show a grid of 16 squares. The grid contains the first 15 letters of the alphabet and one space. Slide the letters around in the grid, using the space,

and the puzzle is solved when the letters are in their correct order.

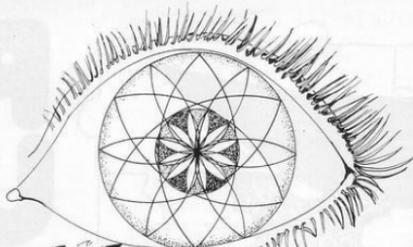
The letters are moved with the usual cursor controls and a count is kept of the moves taken. Your task is

to complete the re-arrangement in as few moves as possible. A diverting little routine, worth having on tape. Submitted by W G Davies of Hereford for the 16K Spectrum.

```

10 REM "15 PUZZLE"
20 REM © W G Davies 1982
100 PRINT AT 8,11;"15 PUZZLE";:A
T 120,6;"Choose your colour/s"
110 LET a$="DEMKLJCGAHFDNIR "
120 LET l:=1000: DIM b$(16)
130 LET c$="ABCDEFGHIJKLMNO "
140 INPUT "Border? ";a:INKEY ">:b
150 BORDER a: INK b: PAPER 7
170 CLS : FOR c=0 TO 175 STEP
24
180 PLOT c,40: DRAW 0,96: NEXT
c
190 FOR d=40 TO 136 STEP 24: PL
OT 20,0: DRAW 96,0: NEXT d
200 LET j=0: LET k=1: LET p=15:
LET q=20
220 FOR n=6 TO 15 STEP 3: FOR m
=11 TO 20 STEP 3: PRINT AT n,m,a
$(k)
230 LET k=k+1: NEXT m: NEXT n
240 GO SUB 400
250 LET r=p: LET s=q: IF INKEY$
=" " THEN GO TO 250
260 IF INKEY$="5" THEN LET s=q+
0: IF s=20 THEN GO TO 250
270 IF INKEY$="8" THEN LET s=q-
3: IF s<11 THEN GO TO 250
280 IF INKEY$="6" THEN LET r=p-
3: IF r<6 THEN GO TO 250
290 IF INKEY$="7" THEN LET r=p+
3: IF r>15 THEN GO TO 250
300 IF INKEY$(">5" AND INKEY$("<
5" AND INKEY$(">8" AND INKEY$("<
8" THEN GO TO 250
310 PAPER 7: BEEP ,1,0: PRINT A
T p,q;SCREEN$(r,s);AT r,s;"
320 GO SUB 400: LET p=r: LET q=
s
330 LET j=j+1: PRINT AT 3,15;:j
350 GO TO 250
400 LET a=1: FOR n=6 TO 15 STEP
3: FOR m=11 TO 20 STEP 3: LET b
$(a)=SCREEN$(n,m)
410 LET a=a+1: NEXT m: NEXT n
420 IF b=c$ THEN GO TO 440
430 RETURN
440 PRINT AT 19,12;"CORRECT": F
OR b=1 TO 15: BEEP ,5,b: NEXT b
450 PRINT AT 21,2;"Press any ke
y to play again:" THEN GO TO 450
460 IF INKEY$="" THEN GO TO 450
470 PRINT AT 21,2;"
480 PRINT AT 19,12;" " : G
O SUB 500: GO TO 200
490 FOR y=1 TO 50
500 LET r=p: LET s=q: LET x=INT
(RND*4) +5
510 IF x=5 THEN LET s=q+3: IF s
>20 THEN GO TO 500
520 IF x=6 THEN LET s=q-3: IF s
<11 THEN GO TO 500
530 IF x=8 THEN LET r=p-3: IF r
<6 THEN GO TO 500
540 IF x=7 THEN LET r=p+3: IF r
>15 THEN GO TO 500
550 PRINT AT p,q;SCREEN$(r,s);
AT r,s
560 LET p=r: LET q=s: NEXT y: B
EEP ,5,0: BEEP ,5,0
570 RETURN
600 IF j<l THEN LET l=j
610 PRINT AT 3,15;"0
5;"Best score so far:";l;" " :
RETURN

```



```

120 POKE 16418,0
130 PRINT AT 23,0;"TYPE C TO R
UN,Z TO COPY DESIGN"
140 IF INKEY#="" THEN GOTO 140
150 IF INKEY#"Z" THEN GOTO 180
160 IF INKEY#"C" THEN RUN
170 GOTO 140
180~PRINT AT 23,0;"(32 SPACES)"
190 COPY
200 GOTO 130
  
```

# Kaleidoscope

```

10 LET N=INT (RND*250)+200
20 FOR A=1 TO N
30 LET V=INT (RND*22)
40 LET H=INT (RND*32)
50 LET RV=21+(22-V)
60 LET RH=31+(32-H)
70 PLOT H,V
80 PLOT RH,V
90 PLOT RH,RV
100 PLOT H,RV
110 NEXT A
  
```

THE AUTHOR of Kaleidoscope, Matthew Calveley, of Lytham, Lancs, claims amazing results with this ZX-81 program. It will generate a random number of dots at random points on the bottom left of the screen and then re-create that pattern on the other quarters of the screen. All the patterns created will be symmetrical.

Kaleidoscope occupies 1.2K of memory but can be squeezed into 1K by removing lines 120 onwards, using VAL where numbers are used and by changing line 10 to:  
10 LET N=INT (RND\*25)+25.

# HEX LOADER

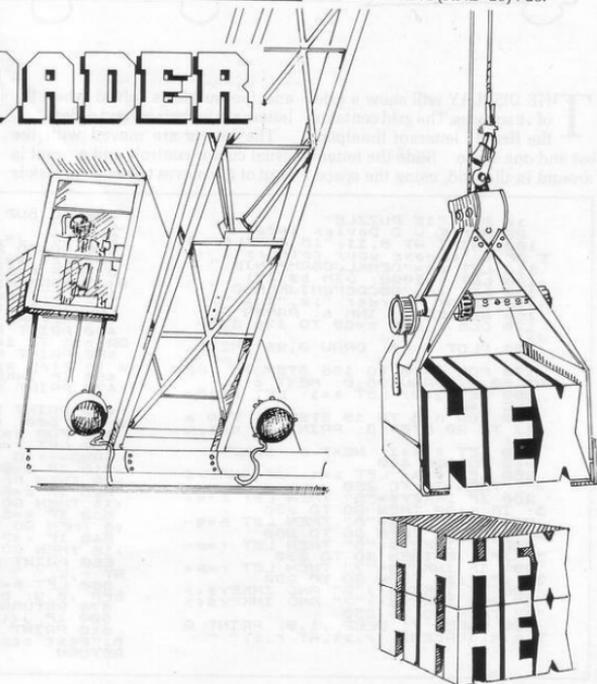
```

1 REMXXXXXXXXXXXXXXXXXXXXXXXXX
10 LET I=16427 15 INPUT AS
20 IF AS="S" THEN STOP
30 PRINT AS;"*":
40 POKE I,16*(CODE (AS)-28)+CODE
(TLS(AS))-28
50 LET I=I+1
60 GOTO 15
  
```

HEXLOADER works on the ZX-80, which is something of a rarity. The REM in line one must contain more characters than there are bytes in the machine code program. The number code 118 must not be used in machine code routines or all kinds of strange things will start to happen to the listing.

To remove the REM statement from line one, POKE 16403, 10. This program will help many people who still own a ZX-80 to obtain more power from it using machine code. Machine code programming is something which has not been entered into any great depth with the ZX-80.

The Hexloader was sent by A Goodright of Sutton, Surrey.





```

1 LET Q=CODE " "
2 LET S=Q
3 LET C=Q
4 LET M=CODE "<graphic 1>"
5 FOR B=M TO CODE "<graphic 4
)"
6 FOR A=M+C TO CODE "<graphic
E>"-C
7 PRINT AT B,A;"T"
8 NEXT A
9 LET C=C+M
10 NEXT B
11 LET X=CODE "<graphic 7>"
20 LET F=M
25 LET Y=CODE "?"
30 LET X=X+<INKEY#="8" AND X<C
ODE "<graphic T>">-<INKEY#="5" A
ND X>CODE " ")
35 PRINT AT Y,X;" 0 "
40 IF F>CODE "<graphic E>" THE
N GOTO CODE "<inverse ->"
45 IF INKEY#="0" THEN GOSUB CO
DE "W"
50 GOTO CODE ";"
60 PRINT AT Y,X+M;
65 IF PEEK (PEEK 16398+VAL "25
6"*PEEK 16399)=CODE "T" THEN LET
Q=Q+M
70 PRINT AT Y,X+M;"0";AT Y,X+M
;"<inverse 0>";AT Y,X+M;" "
75 LET Y=Y-M
80 IF Y=M-M THEN LET F=F+M
90 IF Q>S AND RND<VAL ".5" THE
N LET X=X-M
95 IF Q>S AND RND>VAL ".6" THE
N LET X=X+M
100 LET S=Q
110 IF Y=M-M THEN RETURN
120 GOTO CODE "W"
150 PRINT Q

```

SIXTEEN PINS appear at the top of the screen for **Bowling** and the ball at the bottom. Use keys 5 and 8 to line up the two and press key 0 to bowl. The ball will be deflected by impact with the pins and thus make your task more difficult. For every pin hit you will add one to your score; the score is printed after eight balls and the game ends (1K ZX-81).

# BOWLING



# KINGDOM

```

1 PRINT AT 3.7;"*****
****"
2 PRINT AT 4.7;"*
*"
3 PRINT AT 5.7;"* K I N G D O
M *"
4 PRINT AT 6.7;"*
*"
5 PRINT AT 7.7;"*****
****"
6 PRINT AT 10.0;" YOU HAVE T
O GOVERN A VILLAGE";AT 12.0;"FOR
A PERIOD OF FIVE YEARS.YOU";AT
14.0;"MUST TRY TO KEEP ALIVE AS
MANY"
7 PRINT AT 16.0;"PEOPLE AS PO
SSIBLE.THEY WILL DO";AT 18.0;"ON
E OF THREE JOBS.";AT 20.0;"YOU M
UST PROTECT THEM AGAINST.."
8 PRINT AT 21.5;"TYPE ANY KEY
TO CONT.."
9 IF INKEY="" THEN GOTO 9
10"FOR F=10 TO 21
11 PRINT AT F.0;"
"
12 NEXT F
13 PRINT AT 10.0;"...<A>=FLOOD
DS";AT 11.0;"...<B>=STARVATION"
;AT 12.0;"...<C>=THEIVES";AT 14
.0;"YOU HAVE TO BE AS RICH AS PO
SS.";AT 16.0;"AT THE END OF THE
FIVE YEARS";AT 18.0;"AND THE RIC
HEST WINS."
14 PRINT AT 21.5;"TYPE ANY KEY
TO CONT.."
15 IF INKEY="" THEN GOTO 15
16 FOR F=10 TO 21
17 PRINT AT F.0;"
"
18 NEXT F
19 PRINT AT 10.0;"HOW MANY PLA
YERS? ";
20 INPUT A
21 PRINT A
22"DIM N%(A,11)
23 DIM U%(A)
24 GOSUB 7000
25 PRINT AT 21.5;"TYPE ANY KEY
TO START"
26 IF INKEY="" THEN GOTO 35
27 SCROLL
28 NEXT F
29 GOSUB 8000
30 DIM M%(A)
31 DIM C%(A)
32 DIM Q%(A)
33 FOR F=1 TO A
34 LET M(F)=1000
35 LET Q(F)=1000
36 LET C(F)=2500
37 NEXT F
38 DIM D%(A)
39 DIM N%(A)
40 DIM Z%(A)
41 DIM X%(A)
42"DIM T%(A)
43 FOR F=1 TO A
44 LET Z(F)=0
45 LET Q(F)=0
46 LET C(F)=0
47 NEXT F
48 DIM S%(A)
49 DIM P%(A)
50 DIM R%(A)
51 DIM W%(A)
52 DIM Y%(A)
53 FOR F=1 TO A
54 LET Z(F)=0
55 LET X(F)=0
56 LET T(F)=0
57 NEXT F
58 REM start
59 LET S=0
60 LET Y=0
61 LET S=1
62 IF S=1 THEN LET Y="SPRING"
63 IF S=2 THEN LET Y="SUMMER"
64 IF S=3 THEN LET Y="AUTUMN"
65 IF S=4 THEN LET Y="WINTER"
66 IF S=1 THEN LET Y=Y+1
67 IF S=4 THEN LET S=0
68 FOR P=1 TO A
69 LET N(P)=INT (RND*10)
70 LET Q(P)=Q(P)+N(P)
71 PRINT AT 0.9;Y;" YEAR ";Y
72 IF N(P)<11="M" AND U(P)>1
0 THEN PRINT "KING ";N(P);X TO 1
0
73 IF N(P)<11="F" AND U(P)<=
18 THEN PRINT "PRINCESS ";N(P);X
TO 10
74 IF N(P)<11="M" AND U(P)<=
18 THEN PRINT "PRINCE ";N(P);X T
O 10
75 IF N(P)<11="F" AND U(P)>1
0 THEN PRINT "QUEEN ";N(P);X TO
10
76 PRINT
77 PRINT N(P);" PEOPLE CAME TO
THE VILLAGE."
78 PRINT
79 PRINT TAB 9;"CASUALTIES."
80 PRINT TAB 9;"STARVED . FLOODS .
THEIVES"
81 PRINT TAB 3;X(P);TAB 12;Z(P
);TAB 22;T(P)
82 PRINT "*****
*****"
83 PRINT TAB 10;"YOU HAVE."
84 PRINT TAB 15-<<LEN (STR# M
(P))>>+2);2);"S";M(P);"
"
85 PRINT TAB 15-<<LEN (STR# Q
(P))>>+2);2);Q(P);" PEOPLE."
86 PRINT TAB 15-<<LEN (STR# C
(P))>>+15);2);C(P);" SACKS OF CO
R N."
87 PRINT "*****
*****"
88 PRINT "LABOUR ARRANGEMENT."
89 PRINT "(A) MENDING THE DYKE
"
90 INPUT A1
91 IF INT A1<>A1 THEN GOTO 330
92 PRINT A1
93 PRINT "(B) PLANTING CORN ";
94 INPUT A2
95 IF INT A2<>A2 THEN GOTO 370
96 PRINT A2
97 PRINT "(C) DEFENDING THE VI
LLAGE ";
98 INPUT A3
99 IF INT A3<>A3 THEN GOTO 409
100 PRINT A3
101 IF A1+A2+A3<=0(P) THEN GOTO
420
102 PRINT AT 21.5;"TOO MANY PEO
PLE"
103 FOR F=1 TO 22
104 IF INT A3<>A3 THEN GOTO 410
105 NEXT F
106 GOTO 100
107 IF V<="SPRING" THEN GOTO 4
30
108 PRINT "HOW MANY SACKS OF CO
RN ARE TO BE PLANTED?"
109 INPUT D(P)
110 PRINT D(P)
111 IF D(P)>C(P) THEN GOTO 422
112 LET C(P)=C(P)-D(P)
113 IF D(P)>10;A2 THEN LET D(P)
=RND*10
114 PRINT AT 21.5;"TYPE ANY KEY
TO CONT.."
115 IF INKEY="" THEN GOTO 440
116 SCROLL
117 NEXT F
118 FAST
119 PRINT AT 0.0;M#
120 PRINT AT 8.14;"*****";AT 9
.14;"*";AT 10.14;"*+";AT 11.14;"*
*";AT 12.14;"*****
*"
121 PRINT AT 10.27;"T"
122 LET T(P)=0
123 LET Z(P)=0
124 LET X(P)=0
125 SLOW
126 IF A1<Q(P)/2.2 THEN GOSUB 1
000
127 IF A3<Q(P)/2.2 THEN GOSUB 2
000
128 IF D(P)>Q(P)*2 THEN GOSUB 3
000
129 LET C(P)=C(P)/1.2+D(P)*3
130 IF C(P)>D(P)*2 THEN GO
SUB 4000
131 IF C(P)+D(P)>Q(P)*2 THEN GO
SUB 5000
132 LET Q(P)=Q(P)*1.2
133 LET Q(P)=INT (Q(P))
134 LET C(P)=INT (C(P))
135 LET M(P)=M(P)*1.09
136 LET M(P)=INT (M(P))
137 FOR F=1 TO 22
138 SCROLL
139 NEXT F
140 IF M(P)<0 THEN LET M(P)=0
141 IF C(P)<0 THEN LET C(P)=0
142 IF Q(P)<0 THEN LET Q(P)=0
143 NEXT P
144 IF V<="SPRING" THEN GOTO 115
145 PRINT AT 8.0;"NOW FOR THE W
INNER....."
146 LET W#=""
147 LET W=0
148 FOR F=1 TO A
149 PRINT N%(F);X TO 10);" WITH
";M(F);"

```

**F**IVE-YEAR PLANS, monetarism, the green revolution, laissez faire and the dictatorship of the people. You can try them all.

**Kingdom** gives you a rural realm to regulate and five years in which to increase your personal wealth and protect your people against flood, famine and the depredations of the ruthless local banditry.

You are first given instructions for the game and asked to input your name, age and sex. Depending on the information you supply, you will be dubbed king, queen, prince or princess and then asked to decide how best to divide your available workforce in the season ahead. Consider the crops or your subject will starve. Bear the bandits in mind or your minions are murdered. Delay on the dykes and they will drown.

It is reasonably difficult. Our 1,000 subjects were reduced to single figures after the first year.

Any number can play and you have five years in which to justify your kingship and to amass as much money as possible by the judicious selling of surplus grain.

Good luck, your highness, and thanks to Andrew Johnson of Amer-sham, Bucks, who submitted this excellent listing (16K ZX-81).



```

600 IF M(F)>W THEN LET W=M*(F)
< TO 10)
630 IF M(F)>W THEN LET W=M*(F)
700 NEXT F
705 POKE 16410,0
710 PRINT AT 20,0;"CONGRATULATI
ONS "W";" YOU ARE THE WINN
ER OF THE GAME WITH "W";W
730 GOTO 10000
1000 REM DYKE
1010 IF INT (RND*3)+1=1 THEN RET
URN
1020 LET K=INT (RND*10)+5
1030 FOR F=3 TO K+3
1040 FOR G=0 TO 21
1050 PRINT AT G,F;"(graphic A)"
1060 NEXT G
1070 IF K*10>Q(P) THEN LET K=INT
(Q(P)/10)
1080 LET Q(P)=Q(P)-K*10
1090 IF K>8 THEN LET M(P)=M(P)-<
(K-8)*100)
1095 LET Z(P)=K*10
1100 LET Q(P)=C(P)-K*15
1110 RETURN
2000 REM DEF
2010 IF INT (RND*3)+1=1 THEN RET
URN

```



```

2020 LET K=INT (RND*10)+5
2025 IF KK6>Q(P) THEN LET K=INT
(C(P)/6)
2030 FOR F=27 TO 16 STEP -1
2040 PRINT AT 10,F;"T "
2050 NEXT F
2060 FOR F=1 TO K
2070 PRINT AT 10,16;"(Graphic 4)
"
2080 PRINT AT 10,16;"(Graphic 1)
"
2090 PRINT AT 10,16;"(Graphic 2)
"
2100 PRINT AT 10,16;"(Graphic 3)
"
2110 NEXT F
2120 FOR F=16 TO 27
2130 PRINT AT 10,F;" T"
2140 NEXT F
2150 LET Q(P)=Q(P)-KK6
2151 LET T(P)=KK6
2160 LET C(P)=C(P)-K*25
2170 LET MK(P)=MK(P)-KK15
2180 RETURN
3000 REM STAR
3010 LET K=ABS (C(P)-(Q(P)*2))
3015 IF K>Q(P) THEN LET K=Q(P)
3020 LET Q(P)=Q(P)-(INT (K))
3035 LET X(P)=K
3040 RETURN
4000 REM BUY
4010 LET K=INT (RND*5)+15
4020 FOR F=1 TO 22
4030 SCROLL
4040 NEXT F
4050 PRINT AT 0,0;"YOU HAVEN'T G
OT ENOUGH CORN TO FEED YOUR VIL
LAGE-YOU MUST BUY SOME..."
4060 PRINT
4070 PRINT "CURRENT BUYING RATE
=" ;K
4080 PRINT
4090 PRINT "YOU HAVE #";MK(P)
4100 PRINT
4110 PRINT "THE MOST YOU CAN HAV
E ARE ";INT (MK(P)/K)
4120 PRINT "SACKS"
4140 PRINT "HOW MANY DO YOU WANT
TO BUY?";
4150 INPUT I
4160 IF I>X(MK(P)/K) THEN GOTO 414
0
4170 PRINT I
4180 PRINT
4190 PRINT "THAT WILL COST #";I*
K
4200 LET M(P)=M(P)-(K*I)
4210 LET C(P)=C(P)+I
4220 RETURN
5000 REM SELL
5010 FOR F=1 TO 22
5020 SCROLL
5030 NEXT F
5040 PRINT AT 0,0;"YOU HAVE A SU
RPLUS OF CORN,DO YOU WANT TO S
ELL ANY,IF SO SPECIFY THE
AMOUNT."
5050 INPUT A#
5060 IF A#(1)="N" THEN RETURN
5070 LET K=VAL A#
5071 IF K<C(P) THEN GOTO 5000
5072 PRINT
5073 PRINT "YOU ONLY HAVE ";INT
(C(P)/K) " SACKS."
5074 IF INKEY=" " THEN GOTO 5074
5075 GOTO 5000
5090 LET J=INT (RND*5)+5
5090 PRINT K;" SACKS OF CORN,AT"
5100 PRINT "#";J;" A SACK,WILL M
AKE "
5110 PRINT "#";K*J
5120 LET M(P)=M(P)+K*J
5130 LET C(P)=C(P)-K
7000 FOR F=1 TO A
7010 CLS
7020 PRINT "PLAYER ";F
7030 PRINT
7040 PRINT "YOUR NAME PLEASE: "
7050 INPUT NB(F)
7051 PRINT NB(F)
7052 PRINT
7060 PRINT "YOUR AGE<APROX>? ";
7070 INPUT UC(F)
7080 PRINT UC(F)
7090 PRINT
7100 PRINT "ARE YOU MALE<M>/FEMA
LE<F>? ";
7110 INPUT NB(F)(11)
7120 PRINT NB(F)(11)
7130 PRINT
7140 PRINT "O.K.? ";
7150 INPUT HB
7160 PRINT HB
7170 IF HB="NO" OR HB="N" THEN G
OTO 7010
7180 NEXT F
7190 RETURN
8000 FAST
8005 LET M#=""
8010 FOR F=1 TO 22
8020 LET M#M#+"(three Graphic A
s;inverse SPACE;twenty two SPACE
s;six /s)"
8030 NEXT F
9040 CLS
9050 RETURN
9000 SAVE "KINGDOM"
9010 RUN

```

```

100 REM Juggler @ U G Davies
1010 REM Use 1 & 0 keys to control robot's arms
1020 GO SUB 2000
3000 LET h=0: LET z=0: GO SUB 0
400 LET z=0: PRINT AT 1,5,2
450 PLOT 0,0: GOTO 255,4
500 LET a=4: LET b=353: LET c=3
550 LET l=0: LET s=0: LET n=0
600 LET x=0: LET y=0: LET p=3: LET s=0: LET r=0: LET s=0
700 GO SUB 7000
800 LET s=0
900 INVERSE 1: PRINT AT 0,0: "CU r,Onl Score",AT 0,20:"Best Score",TRVERSE 0
1000 LET k=0: LET y=0
1010 LET x=10-10*000 (1/6*PI)
1020 LET y=10-10*000 (1/6*PI)
1030 PRINT AT 1,1: "C"
1040 INK 0: PRINT AT X,Y: "O": BE EP 0
1050 IF X>=11 THEN GO SUB 1700
1060 GO SUB 2000
1400 LET r=0: LET s=0
1410 LET r=10-0.0000 (1/6*PI)
1420 LET s=10-0.0000 (1/6*PI)
1430 IF r=11 THEN LET r=10
1440 PRINT AT 1,1: "C"
1450 INK 3: PRINT AT r,s: "O": BE EP 0
1470 IF r=11 THEN GO SUB 1000
1480 GO SUB 2000
1500 LET p=0: LET q=0
1510 LET p=10-0.0000 (1/6*PI)
1520 LET q=10-0.0000 (1/6*PI)
1530 PRINT AT p,q
1540 INK 4: PRINT AT p,q: "O": BE EP 0
1550 IF p=11 THEN GO SUB 1000
1560 GO SUB 2000
1570 LET l=10: LET m=0: LET n=0: GO TO 1000
1700 LET u=0
1710 IF SCREENS (10,y)="" THEN GO TO 2000
1720 GO SUB 3000: LET a=0-1: RE TURN
1800 LET v=0
1810 IF SCREENS (10,z)="" THEN GO TO 2000
1820 GO SUB 3000: LET b=0-1: RE TURN
1900 LET w=0
1910 IF SCREENS (10,q)="" THEN GO TO 2000
1920 GO SUB 3000: LET c=0-1: RE TURN
2000 IF INKEYS="" THEN RETURN
2010 GO SUB 7000: RETURN
2020 LET z=z+1: INK 1: PRINT AT 1,1
2030 IF z>10 THEN LET d=0.000
2040 REE 1: RETURN
4000 PRINT AT 10,7: "AT 10,7"
4010 PRINT AT 14,7: "AT 14,22"

```

**W**G DAVIES of Hereford has sent a frivolous but funny game for the 16K Spectrum. It is called **Juggler** and requires you to keep three coloured balls in the air by manoeuvring the juggler's apple arms with keys 1 and 0.

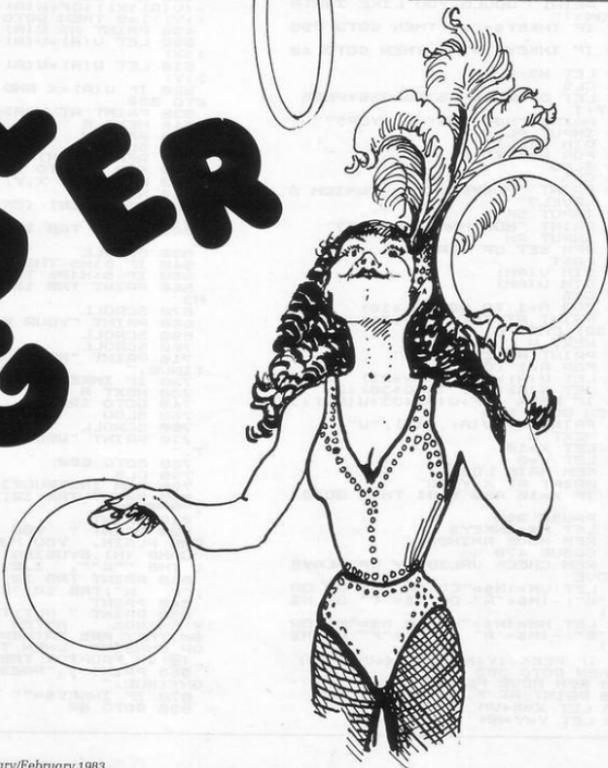
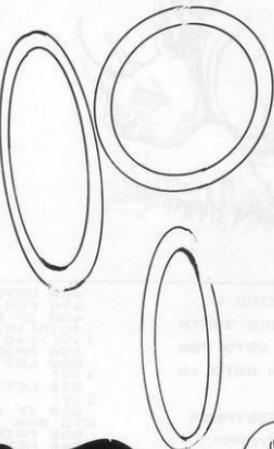
The listing is complete with sound effects and a running score. It would be ideal for keeping children entertained on wet winter afternoons.

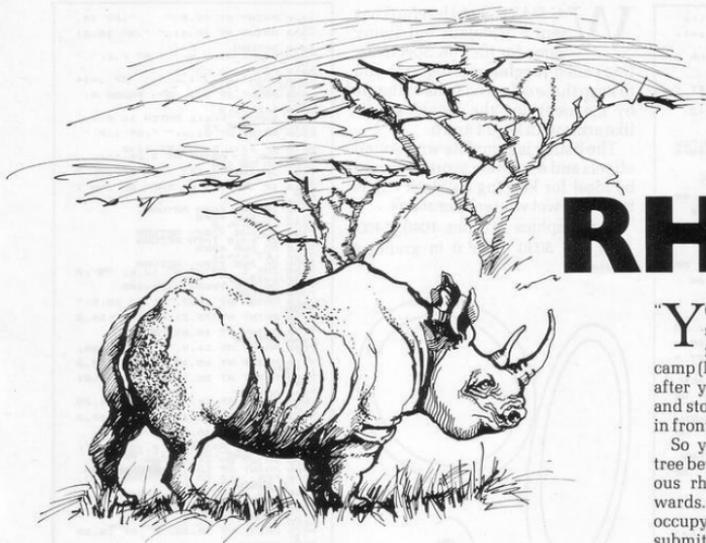
For graphics in lines 1040, 1460, 1640 and 5030 enter 0 in graphics mode.

```

4000 PRINT AT 15,0: "AT 15,22"
4010 PRINT AT 16,11: "AT 16,21"
4020 RETURN
4030 PRINT AT X,Y: "AT r,s:"
4040 FOR j=10 TO 20:
4050 PRINT AT j-1,0: "IF j=14"
4060 PRINT AT J,U,V: "O": PAUSE 8: NEXT
4070 REE 1,0
4080 INVT: Press ENTER to play
4090 PRINT AT 21,0: "AT 1,5:"
4090 RETURN
5070 IF z10 THEN LET z1=2
5080 GO TO 400
5090 IF INKEYS="1" THEN GO SUB 7
5100 IF INKEYS="0" THEN GO SUB 7
5110 RETURN
5120 IF N=0 THEN RETURN
5130 LET h=h-25
5140 GO SUB 4000: RETURN
5150 IF h=10 THEN RETURN
5160 LET h=h+5
5170 GO SUB 4000: RETURN
5200 INK 1: PRINT AT 13,h: "E":A
5210 GO SUB 7000+(h-2)*100
5220 PRINT AT 14,7: "AT 15,0:"
5230 PRINT AT 16,21: "AT 14,2"
5240 PRINT AT 16,21: "E"
5250 PRINT AT 16,0: "AT 14,20:"
5260 PRINT AT 16,10: "AT 14,20:"
5270 PRINT AT 16,13: "E":AT 16,21
5280 RETURN
5290 PRINT AT 14,10: "E":AT 14,25
5300 PRINT AT 15,10: "E":AT 15,2
5310 RETURN
5320 INK 1: PRINT AT 8,15: "AT 9,15"
5330 PRINT AT 11,16: "AT 12,16"
5340 FOR i=15 TO 14: PRINT AT j,12: "E": NEXT
5350 FOR j=15 TO 17: PRINT AT j,j
5360 FOR i=15 TO 20: PRINT AT j,i
5370 PRINT AT 20,13: "AT 16,20"
5380 PRINT AT 15,12: "AT 16,20"
5390 RETURN
5400 STOP
5410 DATA 60,126,255,255,255,255
5420 GO
5430 FOR l=0 TO 7: READ 0
5440 PRINT USR 0+1,0: NEXT l
5450 RETURN

```





# RHINO

YOU ARE on an African plain," say the instructions for this game. "You must get to your camp (H) but there are hungry rhinos after you, although they are stupid and stop chasing when there is a tree in front of them."

So your strategy is clear; keep a tree between yourself and the ravenous rhinos as you hot-foot homewards. A game which grows on you, occupying about 4K of the ZX-81, submitted by John Webster of Wetherby, West Yorkshire.

```

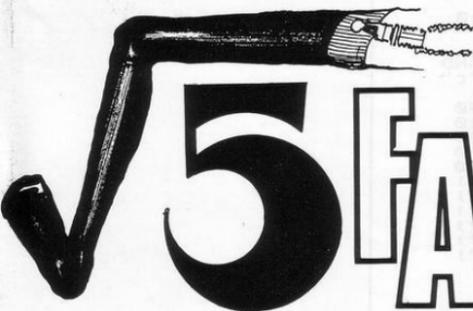
10 PRINT AT 10,9;"U RHINO U"
20 PRINT
30 PRINT "WOULD YOU LIKE INSTR
CTIONS?"
40 IF INKEY$="Y" THEN GOTO 790
0 50 IF INKEY$("<")="N" THEN GOTO 40
30
50 LET HS=0
70 CLS
80 LET DF=PEEK 16396+256*PEEK
16397+1
90 PRINT "HOW MANY PLAYERS?"
100 INPUT A
110 DIM H(PL)
120 FOR P=1 TO PL
130 SLOW
140 CLS
150 PRINT "PLAYER ";P,,"WHICH S
KILL LEVEL?"
160 INPUT SK
170 PRINT "HOW MANY RHINOS?"
180 INPUT RH
185 REM SET UP SCREEN
190 FAST
200 DIM U(RH)
210 DIM W(RH)
220 CLS
230 FOR A=1 TO 90-(SK*10)
240 PRINT AT INT (RND*21),INT (
RND*32);CHR$ 8
250 NEXT A
260 PRINT AT 10,31;"H"
270 FOR A=1 TO RH
280 LET U(A)=INT (RND*21)
290 LET W(A)=INT (RND*30)+2
300 IF PEEK (DF+U(A)*33+W(A))<>
0 THEN GOTO 280
310 PRINT AT U(A),W(A);"U"
320 NEXT A
330 LET X=10
340 LET Y=0
345 REM MAIN LOOP
350 PRINT AT X,Y;"0"
360 IF X=10 AND Y=31 THEN GOTO
750
370 PAUSE 200
380 LET M$=INKEY$
385 REM MOVE RHINOS
390 GOSUB 470
395 REM CHECK VALIDITY OF PLAYE
RS MOVE
400 LET UM=(M$="C" OR M$="U" OR
M$="B")-(M$="R" OR M$="T" OR M$
="Y")
410 LET HM=(M$="Y" OR M$="H" OR
M$="B")-(M$="R" OR M$="F" OR M$
="C")
420 IF PEEK (Y+HM+DF+(X+UM)*33)
=8 THEN GOTO 650
425 REM MOVE PLAYER
430 PRINT AT X,Y;" "
440 LET X=X+UM
450 LET Y=Y+HM

```

```

450 GOTO 350
470 FOR A=1 TO RH
480 IF PEEK ((33*(U(A)+W(A)*X)
-(U(A)*X)+DF+W(A)+U(A)*Y)-(W(A)
)*Y))=8 THEN GOTO 540
490 PRINT AT U(A),W(A);" "
500 LET U(A)=U(A)+W(A)*X-(W(A)
)*X)
510 LET W(A)=U(A)+W(A)*Y-(W(A)
)*Y)
520 IF U(A)=X AND W(A)=Y THEN G
OTO 560
530 PRINT AT U(A),W(A);"U"
540 NEXT A
550 RETURN
560 SLOW
565 REM CAUGHT BY RHINO
570 FOR A=1 TO 10
580 PRINT AT X,Y;"■";AT X,Y;"■"
590 NEXT A
600 LET S=INT (SK*RH*Y/31)
610 SCROLL
620 PRINT TAB 10;"YOU SCORED ";
S
630 SCROLL
640 IF S>HS THEN LET HS=S
650 IF S>H(R): THEN LET H(R)=S
660 PRINT TAB 10;"HIGH SCORE=";
HS
670 SCROLL
680 PRINT "YOUR HIGH=";H(P)
690 SCROLL
700 SCROLL
710 PRINT "PRESS ANY KEY TO CON
TINUE."
720 IF INKEY$="" THEN GOTO 7200
730 NEXT A
740 GOTO 120
750 SLOW
760 SCROLL
770 PRINT "WELL DONE.YOU MADE I
T."
780 GOTO 600
790 CLS
795 REM INSTRUCTIONS
800 PRINT TAB 12;"RHINO";TAB 12
810 PRINT
820 PRINT " YOU ARE ON AN AFRI
CAN PLAIN. YOU MUST GET TO YOUR
CAMP (H) BYUSING THE KEYS AROUN
D THE "G" ". I.E."
830 PRINT TAB 12;"R T Y";TAB 12
840 PRINT "H";TAB 12;"C U B"
850 PRINT " BUT.THERE ARE HUNGR
Y RHINOS. AFTER YOU (U),ALTHOU
GH,THEY ARE RATHER STUPID AND ST
OP CHASING WHEN THERE IS A TREE
(■) IN FRONT OF THEM."
860 PRINT ",,PRESS ANY KEY TO C
ONTINUE."
870 IF INKEY$="" THEN GOTO 870
880 GOTO 60

```



# 5 FACTORS

**J**ASON MINETT of Birkenhead, Merseyside, has sent two programs for calculating factors. The first will find all the factors of a given number and the second will provide its prime factors.

In both cases the machine waits for a number to be input and then prints the appropriate answers (1K ZX-81).

```

5-REM FACTORS
10 FAST
20 INPUT A
30 PRINT A:
40 FOR B=A-1 TO 1 STEP -1
50 IF A/B=INT (A/B) THEN PRINT 150
  " "B:
60 NEXT B
70 PRINT ". "
80 RUN

5-REM PRIME FACTORS
20 INPUT A
30 PRINT A:"=":
40 LET B=2
50 IF A/B<INT (A/B) THEN GOTO
80

60 GOSUB 190
70 GOTO 50
80 FOR B=3 TO A STEP 2
90 FOR C=3 TO B-1 STEP 2
100 IF B/C=INT (B/C) THEN GOTO
110 NEXT C
120 IF A/B<INT (A/B) THEN GOTO
150
130 GOSUB 190
140 GOTO 120
150 NEXT B
160 POKE 16398,(PEEK 16398)-1
170 PRINT ". "
180 RUN
190 PRINT B:"*":
200 LET A=A/B
210 RETURN
  
```

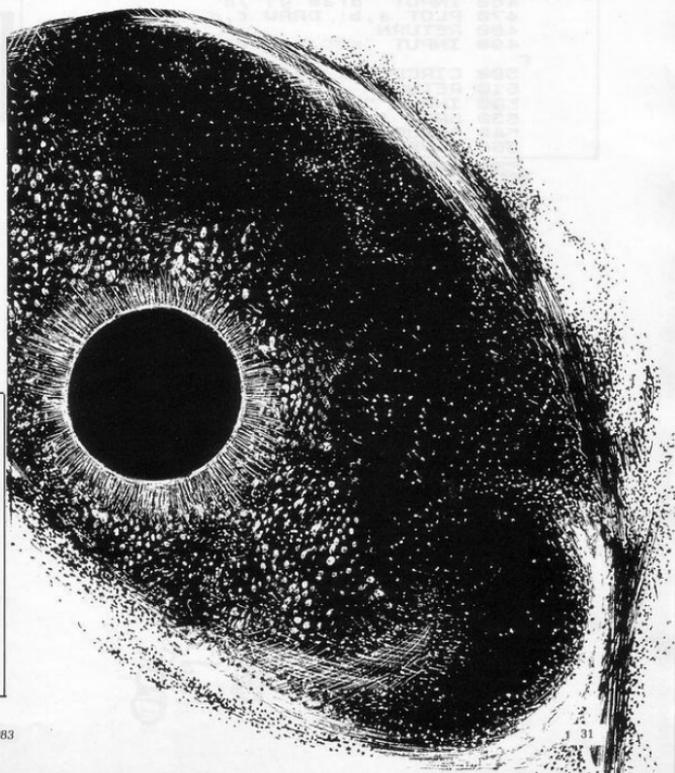
# BLACK HOLES

**B**LACK HOLES is an uncomplicated game for the 1K XZ-81 for which you are required to manoeuvre your speeding spacecraft through a whole cosmos of the omnivorous megastars.

Change course with keys 8 and 5 and when you crash the length of time you survived will be displayed. Sent by James Hatchell of Guildford, Surrey.

```

10 LET A=17300
20 LET D=0
30 LET Y=10
40 LET B=INT (RND*21)
50 PRINT AT 21,B;" "
60 PRINT AT 9,Y-1;" "
70 IF Y=21 THEN LET Y=1
80 IF Y=0 THEN LET Y=20
90 PRINT AT 10,Y;"H"
100 POKE A,B
110 LET D=D+1
120 LET A=A+1
130 LET Y=Y+(INKEY#"8")-(INKEY
#"5")
140 SCROLL
150 IF A=17350 THEN LET A=17300
160 IF PEEK (A-12)=Y THEN GOTO
180
170 GOTO 40
180 PRINT "CRASH "D
  
```



```

100 REM Utility Draw
110 REM © 1982 P Safranek
120 GO SUB 340:CLS:LET x=0:
LET y=0
130 LET a$=INKEY$
140 IF a$<"o" AND a$<"d" AND
a$<"s" AND a$<"r" AND a$<"c"
THEN GO TO 210
150 IF a$="o" THEN GO SUB 390
160 IF a$="d" THEN GO SUB 430
180 IF a$="s" THEN GO SUB 520
190 IF a$="r" THEN GO SUB 410
200 IF a$="c" THEN GO SUB 490
210 LET x=x+(a$="j")-(a$="g")
220 LET y=y+(a$="y")-(a$="n")
230 LET x=x+(a$="u")-(a$="b")
240 LET y=y+(a$="u")-(a$="b")
250 LET x=x+(a$="a")-(a$="m")
260 LET y=y+(a$="t")-(a$="m")
270 IF x<0 THEN LET x=0
280 IF x>255 THEN LET x=255
290 IF y<0 THEN LET y=0
300 IF y>175 THEN LET y=175
310 PLOT x,y: PLOT OVER 1;x,y
320 PLOT x,y: PLOT OVER 0;x,y
330 GO TO 130
340 INPUT "ink [0-7]?";i;"pap
er [0-7]?";p;"border [0-7]?";b
350 IF i<0 OR i>7 THEN GO TO 34
0
360 IF p<0 OR i>7 THEN GO TO 34
0
370 IF b<0 OR b>7 THEN GO TO 34
0
380 BORDER b:PAPER p:INK i
390 INPUT "over [0 or 1]?";o:IF
o<>1 AND o<>0 THEN GO TO 390
400 RETURN
410 INPUT "x?";x;"y?";y
420 RETURN
430 INPUT "x coord";a
440 INPUT "y coord";b
450 INPUT "draw x?";c
460 INPUT "draw y?";d
470 PLOT a,b: DRAW c,d
480 RETURN
490 INPUT "x?";xx;"y?";yy;"r?";
r
500 CIRCLE xx,yy,r
510 RETURN
520 INPUT "Name?";LINE f$
530 SAVE f$SCREEN$
540 RETURN
550 SAVE "ut.draw" LINE 100

```

# UTILITY DRAW



PETER SAFRANEK of Ashford, Middlesex, has sent a very useful graphics program for the 16K or 48K Spectrum. Commands available are "o" to input the over; "d" to draw for inputted x and y and draw x and draw y; "c" to draw a circle around inputted x and y co-ordinates and inputted radius; "s" to save the design on the screen as a SCREENS; and "r" to re-set the flashing pixel cursor to inputted x and y co-ordinates.

The pixel cursor is moved in any one of eight directions using the eight letters around "H" on the keyboard—i.e., T, Y, U, G, J, B, N and M. Once you have entered the program you can SAVE it by entering "RUN 550".

Practice and patience can produce displays like the map of Europe shown; an outline on the screen in washable ink was a help for this, Safranek reports. The advantage of such a saveable display for educational purposes is obvious (16 or 48K Spectrum).





**T**OAD IN THE HOLE is a program to demonstrate vector translations. Its use of strong graphics to illustrate a mathematical concept is reminiscent of the listing on Binomial Distribution in our last issue and should similarly be useful for teachers and students of mathematics.

The program was sent by David Hanson, a mathematics master at Gordonstoun Preparatory School (16K ZX-81).

# ToAD · in · · the HOLE

```

10 PRINT AT 0,8;"TOAD IN THE H
OLE"
20 PRINT AT 1,8;"(sixteen grap
hic 7s)"
30 PRINT AT 2,15;"BY"
40 PRINT AT 3,10;"DAVID HANSON
"
50 PAUSE 100
60 PRINT AT 7,0;"IN THIS GAME,
YOU MAKE THE TOAD MOVE INTO THE
HOLE, BY PRESSING THE CORRECT N
UMBER KEYS.          PRESS NEWLINE

```

```

TO CONTINUE."
70 PAUSE 500
75 CLS
80 LET E=1
90 FOR D=2 TO 19
100 PRINT AT E,D;"(graphic 6)"
110 NEXT D
120 LET E=20
130 FOR D=2 TO 19
140 PRINT AT E,D;"(graphic 7)"
150 NEXT D
160 LET D=1

```



```

170 FOR E=2 TO 19
180 PRINT AT E,D;"(Graphic 8)"
190 NEXT E
200 LET D=20
210 FOR E=2 TO 19
220 PRINT AT E,D;"(Graphic 5)"
230 NEXT E
240 LET E=20
250 FOR D=4 TO 16 STEP 3
260 PRINT AT E,D;"(Graphic R)"
270 NEXT D
280 LET D=1
290 FOR E=5 TO 17 STEP 3
300 PRINT AT E,D;"(Graphic R)"
310 NEXT E
320 PRINT AT 1,1;"(Graphic 3)";
AT 1,20;"(Graphic 4)";AT 20,1;"(
Graphic 2)";AT 20,20;"(Graphic 1
)"
330 PRINT AT 20,0;"0";AT 17,0;"
1";AT 14,0;"2";AT 11,0;"3";AT 8,
0;"4";AT 5,0;"5";AT 2,0;"Y"
340 PRINT AT 21,1;"0 1 2 3
4 5 X"
350 LET A#="(Graphic Y;inverse
ASTERISK;Graphic T)"
360 LET B#="(Graphic 3;inverse
SPACE;Graphic 4)"
370 LET C#="(Graphic Q;SPACE;Gr
aphic W)"
380 LET D#=" "
390 LET E#="(Graphic 3;three Gr
aphic 6s;Graphic 4)"
400 LET F#="(Graphic 8;Graphic
A;Graphic 5)"
410 LET G#="(Graphic 2;three Gr
aphic 7s;Graphic 1)"
500 LET H=INT (RND*3)+2
510 LET I=INT (RND*3)+2
520 LET J=(3*H)+1
530 LET K=3*I
600 PRINT AT 17,2;A#;AT 18,2;B#
;AT 19,2;C#
610 PAUSE 50
650 PRINT AT 20-K,J;G#;AT 19-K,
J;F#;AT 18-K,J;F#;AT 17-K,J;F#;A
T 16-K,J;E#
700 PRINT AT 0,21;"HOW MANY"
710 PRINT AT 1,21;"SPACES "
720 PRINT AT 2,21;"RIGHT ?"
730 INPUT P
735 IF P>5 OR P<0 THEN GOTO 720
740 PRINT AT 4,21;"RIGHT ";P
750 PAUSE 100
760 PRINT AT 2,21;"UP ? "
770 INPUT Q
775 IF Q>5 OR Q<0 THEN GOTO 760
780 PRINT AT 5,21;"UP ";Q
790 PAUSE 100
800 PRINT AT 17,2;D#;AT 18,2;D#
;AT 19,2;D#
810 LET R=(3*P)+1
815 LET S=3*Q
820 PRINT AT 19-S,R+1;C#
830 PRINT AT 18-S,R+1;B#
840 PRINT AT 17-S,R+1;A#
850 PAUSE 100
870 PRINT AT 1,21;" "
880 PRINT AT 2,21;" "
890 PRINT AT 4,21;" "
900 PRINT AT 5,21;" "
910 IF K<>S OR J<>R THEN PRINT
AT 0,21;"HARD LINES"
915 IF K=S AND J=R THEN PRINT A
T 0,21;"WELL DONE"
920 PRINT AT 2,21;"THE TOAD"
930 PRINT AT 3,21;"HAD TO "
940 PRINT AT 4,21;"MOVE "
950 PRINT AT 5,21;"ACCORDING"
960 PRINT AT 6,21;"TO THE "
970 PRINT AT 7,21;"VECTOR"
980 PRINT AT 8,21;"TRANSLATION"
990 PRINT AT 10,24;"(Graphic 8;
SPACE;Graphic 5)"
1000 PRINT AT 11,24;"(Graphic 8;
SPACE;Graphic 5)"
1010 PRINT AT 10,25;H
1020 PRINT AT 11,25;I
1030 PRINT AT 16,21;"PRESS RUN"
1040 PRINT AT 17,21;"AND THEN"
1050 PRINT AT 18,21;"NEWLINE"
1060 PRINT AT 19,21;"FOR ANOTHER
"
1070 PRINT AT 20,21;"TRY"

```

# DEATH RUN



**D**EATH RUN just about fills 1K of the ZX-81. Your speed is displayed in miles per hour, starting at zero and rising in tens. When it reaches 80 your score begins to rise in tens. Be careful; if your speed exceeds 90 and 'OILY ROAD' is displayed in the top left-hand corner you are very likely to add to the accident statistics.

So slow down by pressing 1. You can also increase speed by inputting 0. When you exceed 90mph the variable Q increases by one, and when Q reaches 40 you have finished and your score is displayed, along with high score and the highest speed achieved.

Some skill is involved, since you must stay between 80 and 90 mph for a high score; the highest score possible if you exceed 90 mph all the time is 410. You have to finish the course for your score to be considered for high score status.

Darren Fleming of Halifax, West Yorkshire, who submitted the program, reports the best high score as 510. (1K ZX-81).

```
1 LET E=0
2 LET H=0
4 LET Q=0
6 LET D=0
10 LET S=0
20 LET J=INT (RND*5)
21~IF S>80 THEN LET D=D+10
22 IF S>90 THEN LET Q=Q+1
23 IF Q=40 THEN GOTO 400
40 LET K=INT (RND*14)
41 LET S=S+10
42 IF INKEY#="1" THEN LET S=S+
5
43~IF INKEY#="0" THEN LET S=S-
15
44 IF S>E THEN LET E=S
50~IF K<6 THEN PRINT AT 0,0;"O
ILY ROAD"
51 IF K>6 THEN PRINT AT 0,0;"
55 IF K<6 AND S>90 AND J=3 THE
N GOTO 300
100 PRINT AT 10,14;"MPH=";S;" "
130 GOTO 20
300 CLS
310 PRINT "***CRASH BANG WALLOP
***";D
315 PAUSE 200
316~CLS
320 GOTO 4
400 CLS
410 IF D>H THEN LET H=D
420 PRINT AT 10,0;"***FINISH***
SCORE=";D;"HIGH SCORE=";H;"HIGH
SPEED=";E
421 PAUSE 200
422 CLS
430 GOTO 4
```

# MINI

**M**INI BANK RAID is the basis of an adventure game for the ZX-80. You are equipped with weapons and can choose to use one of them or to run. If you manage to beat the odds and gain entry to the bank, you must use your torch, T, to look into one of the three vaults. If you have erred you are spotted by the guards and killed.

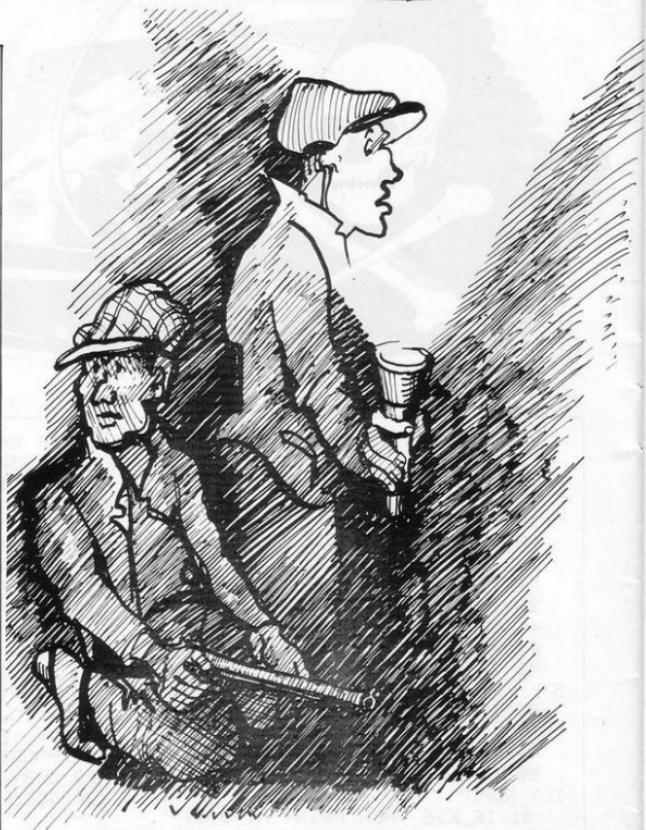
As listed, the odds against success are long but the program is adaptable and provides a basis for readers' ingenuity. Graphics:

5001 and 5003—graphic W twice.

It was sent by Lee Allum of Brentwood, Essex.

# BANK RAID

```
10 RANDOMISE
20 LET A = RND(3)
25 CLS
30 PRINT "MINI BANK RAID"
50 PRINT "WEAPONS ARE (S)HOOT, (R)UN,
(S)MART BOMB, (M)YSTERY."
90 PRINT "YOU ARE ABOUT TO BE SHOT
<S> <R>?"
100 INPUT BS
110 IF BS = "S" THEN GOTO 140
120 IF BS = "R" THEN GOTO 140
130 GOTO 5000
140 IF A = 1 THEN GOTO 5000
150 IF A = 2 THEN GOTO 5000
160 IF A = 3 THEN PRINT "YOU ESCAPED"
170 PRINT "TWO GUARDS APPROACHING
<M> <S>?"
180 INPUT CS
190 IF CS = "M" THEN GOTO 220
200 IF CS = "S" THEN GOTO 220
210 GOTO 5000
215 LET A = RND(3)
220 IF A = 1 THEN GOTO 5000
230 IF A = 2 THEN GOTO 5000
235 IF A = 3 THEN PRINT "YOU ESCAPED"
240 PRINT "YOU ARE IN THE BANK <T>"
250 INPUT DS
260 IF DS = "T" THEN GOTO 280
270 GOTO 5000
280 FOR I = 1 TO 3
290 PRINT I; "<*>"
300 NEXT I
310 INPUT E
320 IF NOT E = RND(3) THEN GOTO 5000
330 IFE = RND(3) THEN GOTO 350
350 CLS
360 LET X = RND(100)
370 LET Z = RND(100)
380 PRINT "WELL DONE, YOU HAVE RUN
AWAY WITH £"; X*Z
990 STOP
5000 CLS
5001 PRINT "□ ■ □ □"
5002 PRINT "□ □ □ □"
5003 PRINT "□ ■ □ □"
5004 PRINT "YOU HAVE BEEN KILLED."
5010 INPUT GS
5020 IF GS = "R" THEN GOTO 25
CIS A SPACE
```



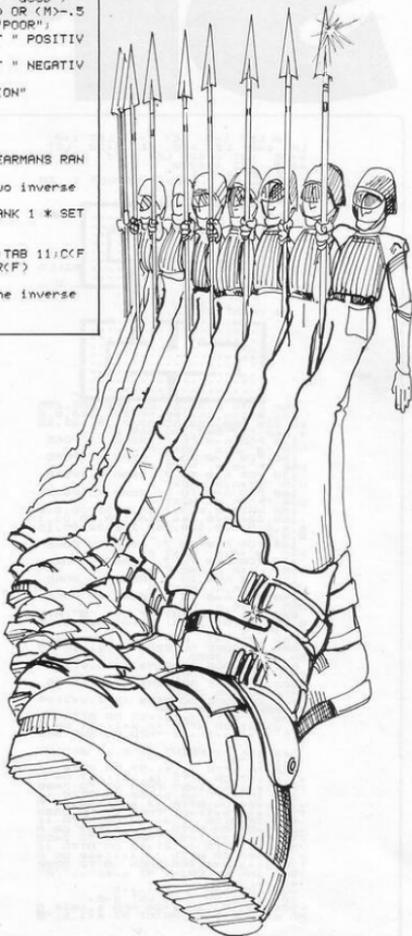
```

1 REM SPEARMAN
50 PRINT AT 21,0;" SPEARMANS
RANK COEFFICIENT"
52 PAUSE 50
55 SCROLL
56 SCROLL
60 PRINT AT 21,0;"NO. OF VALUE
S?"
70 INPUT I
75 SCROLL
76 IF I>=10 THEN PRINT CHR# 15
7:CHR# (<I+146)
77 IF I<10 THEN PRINT CHR# (<I+
156)
78 SCROLL
82 LET J=0
83 LET K=0
85 LET B=0
87 DIM C(I)
88 DIM D(I)
89 DIM S(I)
90 DIM R(I)
95 DIM R(I)
96 PRINT AT 21,0;"GREATEST OR
SMALLEST FIRST?(G/S)"
97 INPUT AB
98 SCROLL
99 IF AB="G" THEN PRINT "GREAT
EST"
100 IF AB="S" THEN PRINT "SMALL
EST"
101 SCROLL
102 SCROLL
103 IF J=0 THEN PRINT AT 21,0;"
FIRST ";I;" VALUES?"
104 IF J=1 THEN PRINT AT 21,0;"
SECOND ";I;" VALUES?"
105 SCROLL
106 SCROLL
107 FOR F=1 TO I
110 INPUT A(F)
115 PRINT AT 21,0;A(F)
116 SCROLL
120 NEXT F
130 FOR F=1 TO I
135 FOR G=1 TO I
140 IF A(F)>A(G) THEN LET B=B+1
145 NEXT G
150 IF AB="G" THEN LET R(F)=B+
I
155 IF AB="S" THEN LET R(F)=B+1
160 LET B=0
165 NEXT F
170 IF J=1 THEN GOTO 300
200 REM re defining variables
210 FOR F=1 TO I
220 LET C(F)=R(F)
230 LET D(F)=A(F)
235 LET J=1
240 NEXT F
241 SCROLL
242 SCROLL
250 GOTO 103
260 REM calculating coeff
310 FOR F=1 TO I
320 LET S(F)=(C(F)-R(F))*C(F)
-R(F))
322 LET M=K+S(F)
323 LET K=S(F)
325 NEXT F
330 LET E=INT ((S**X)/(<I**3-I))
*100+5)
335 LET M=1-E/100
340 GOSUB 500
350 REM correlation
355 PRINT
357 PRINT "SPEARMANS RANK = ";M
358 PRINT
360 IF M=0 THEN PRINT "NO"
370 IF M=1 OR M=-1 THEN PRINT "
PERFECT"
380 IF (M<1 AND M>-.5) OR (M<-.
5 AND M>-1) THEN PRINT "GOOD"
400 IF (M<.5 AND M>0) OR (M>-.5
AND M<0) THEN PRINT "POOR"
410 IF M>0 THEN PRINT "POSITIV
E"
420 IF M<0 THEN PRINT "NEGATIV
E"
430 PRINT "CORRELATION"
440 STOP
500 FOR F=1 TO 21
505 SCROLL
507 NEXT F
510 PRINT AT 0,7;"SPEARMANS RAN
K"
520 PRINT "(thirty two inverse
SPACES)"
530 PRINT "SET 1 * RANK 1 * SET
2 * RANK 2 "
535 FOR F=1 TO I
540 PRINT TAB 2;D(F);TAB 11;C(F)
;TAB 19;A(F);TAB 28;R(F)
545 NEXT F
550 PRINT "(thirty one inverse
SPACES)"
560 RETURN

```

**S**PEARMAN'S coefficient of rank correlation is used to prove hypotheses of relationship between two sets of values. This program calculates **Spearman's Rank** for up to 14 pairs of values; any more will run over the page on the final printout.

The program was sent by Ian Holwill of Richmond, Surrey, who writes that he had trouble with the calculations, since the ZX-81 did not seem to store the numbers correctly. He overcame the problem by using the rounding technique in line 330, then dividing the result by 100 later in the listing. That gives a value to two decimal places. (16K ZX-81).



# SPEAR MAN'S RANK





OUR TIRELESS quest for that arcade-quality Pacman continues, this time led by Nicholas Lock of Faversham, Kent. In our last issue we showed S J Stearn's version, but pointed out that it lacked exits and power pills. The missing items are both supplied here but at the cost of a listing that needs only to be tied around a puppy's middle to look like something out of

an Andrex advertisement. Now the bad news, Pacman's jaws do not move. The maze is rather simple and the ghosts have no hunter-killer capability and can therefore be toyed with in a way which would amount to committing Atari-kiri on the arcade version.

We seek him here, we seek him there—that cursed, elusive Pacman [16K Spectrum].

# MAIL 2

```

3415 PRINT AT a,b;" "JAT a+1,b)
3420 LET t=t+250: LET e=4000
3430 LET k=k+1: PRINT AT 9,29;k
3440 GO TO 313
3450 FOR n=30 TO 50: BEEP .1;n:
NEXT n
3465 PRINT AT c,d;" "JAT c+1,d)
3470 LET t=t+250: LET f=4200
3475 LET k=k+1: PRINT AT 9,29;k
3480 GO TO 340
4000 LET a=9: LET b=15: RETURN
4001 LET a=8: LET b=15: RETURN
4002 LET a=7: RETURN
4003 LET b=14: RETURN
4004 LET b=13: RETURN
4005 LET b=12: RETURN
4006 LET a=8: RETURN
4007 LET a=9: RETURN
4008 LET a=10: RETURN
4009 LET a=11: RETURN
4010 LET a=12: RETURN
4011 LET a=13: RETURN
4012 LET a=14: RETURN
4013 LET a=14: RETURN
4014 LET a=15: RETURN
4015 LET b=13: RETURN
4016 LET b=12: RETURN
4017 LET b=11: RETURN
4018 LET b=10: RETURN
4019 LET a=9: RETURN
4020 LET a=17: RETURN
4021 LET a=18: RETURN
4022 LET a=19: RETURN
4023 LET b=10: RETURN
4024 LET b=11: RETURN
4025 LET b=12: RETURN
4026 LET b=13: RETURN
4027 LET b=12: RETURN
4028 LET b=11: RETURN
4029 LET b=10: RETURN
4030 LET a=9: RETURN
4031 LET b=9: RETURN
4032 LET b=8: RETURN
4033 LET b=7: RETURN
4034 LET b=6: RETURN
4035 LET a=17: RETURN
4036 LET a=16: RETURN
4037 LET a=15: RETURN
4038 LET a=14: RETURN
4039 LET a=13: RETURN
4040 LET a=7: RETURN
4041 LET b=6: RETURN
4042 LET b=9: RETURN
4043 LET a=12: RETURN
4044 LET a=11: RETURN
4045 LET a=10: RETURN
4046 LET a=9: RETURN
4047 LET a=5: RETURN
4048 LET a=7: RETURN
4049 LET b=5: RETURN
4050 LET b=4: RETURN
4051 LET b=6: RETURN
4052 LET a=5: RETURN
4053 LET a=5: RETURN
4054 LET a=4: RETURN
4055 LET a=3: RETURN
4056 LET a=2: RETURN
4057 LET a=1: RETURN
4058 LET b=7: RETURN
4059 LET b=8: RETURN
4060 LET b=9: RETURN
4061 LET b=10: RETURN
4062 LET b=11: RETURN
4063 LET b=12: RETURN
4064 LET b=13: RETURN
4065 LET b=14: RETURN
4066 LET b=15: RETURN
4067 LET b=16: RETURN
4068 LET b=17: RETURN
4069 LET b=18: RETURN
4070 LET b=19: RETURN
4071 LET b=20: RETURN
4072 LET b=1: RETURN
4073 LET a=2: RETURN
4074 LET a=3: RETURN
4075 LET a=4: RETURN
4076 LET b=20: RETURN
4077 LET b=19: RETURN
4078 LET b=18: RETURN

```

```

4079 LET b=17: RETURN
4080 LET a=5: RETURN
4081 LET a=5: RETURN
4082 LET a=7: RETURN
4083 LET b=18: RETURN
4084 LET e=4000: RETURN
4085 LET e=4000: RETURN
4086 LET c=9: LET d=15: RETURN
4087 LET c=8: LET d=15: RETURN
4088 LET c=7: RETURN
4089 LET d=14: RETURN
4090 LET d=13: RETURN
4091 LET c=6: RETURN
4092 LET c=5: RETURN
4093 LET d=4: RETURN
4094 LET e=4000: RETURN
4095 LET e=4000: RETURN
4096 LET c=5: LET d=15: RETURN
4097 LET c=4: RETURN
4098 LET d=14: RETURN
4099 LET d=13: RETURN
4100 LET d=12: RETURN
4101 LET d=11: RETURN
4102 LET d=10: RETURN
4103 LET c=9: RETURN
4104 LET c=8: RETURN
4105 LET c=7: RETURN
4106 LET c=6: RETURN
4107 LET d=10: RETURN
4108 LET d=9: RETURN
4109 LET d=8: RETURN
4110 LET d=7: RETURN
4111 LET d=6: RETURN
4112 LET d=5: RETURN
4113 LET d=4: RETURN
4114 LET d=3: RETURN
4115 LET d=2: RETURN
4116 LET d=1: RETURN
4117 LET d=1: RETURN
4118 LET d=1: RETURN
4119 LET d=1: RETURN
4120 LET d=1: RETURN
4121 LET d=1: RETURN
4122 LET c=5: RETURN
4123 LET c=4: RETURN
4124 LET c=3: RETURN
4125 LET d=10: RETURN
4126 LET d=11: RETURN
4127 LET d=12: RETURN
4128 LET d=13: RETURN
4129 LET d=14: RETURN
4130 LET d=15: RETURN
4131 LET d=16: RETURN
4132 LET d=17: RETURN
4133 LET d=18: RETURN
4134 LET d=19: RETURN
4135 LET d=20: RETURN
4136 LET d=21: RETURN
4137 LET d=22: RETURN
4138 LET d=23: RETURN
4139 LET d=24: RETURN
4140 LET c=2: RETURN
4141 LET c=3: RETURN
4142 LET c=4: RETURN
4143 LET c=5: RETURN
4144 LET c=6: RETURN
4145 LET c=7: RETURN
4146 LET c=8: RETURN
4147 LET c=9: RETURN
4148 LET c=10: RETURN
4149 LET c=11: RETURN
4150 LET c=12: RETURN
4151 LET c=13: RETURN
4152 LET d=20: RETURN
4153 LET d=21: RETURN
4154 LET d=22: RETURN
4155 LET d=23: RETURN
4156 LET d=24: RETURN
4157 LET c=16: RETURN
4158 LET c=15: RETURN
4159 LET c=14: RETURN
4160 LET c=13: RETURN
4161 LET c=12: RETURN
4162 LET c=11: RETURN
4163 LET c=10: RETURN
4164 LET c=9: RETURN
4165 LET d=20: RETURN
4166 LET d=21: RETURN
4167 LET d=22: RETURN
4168 LET d=23: RETURN
4169 LET d=24: RETURN
4170 LET d=25: RETURN
4171 LET d=17: RETURN
4172 LET d=18: RETURN
4173 LET d=19: RETURN
4174 LET d=20: RETURN
4175 LET d=21: RETURN
4176 LET d=22: RETURN
4177 LET d=23: RETURN
4178 LET d=24: RETURN
4179 LET c=14: RETURN
4180 LET c=13: RETURN
4181 LET d=10: RETURN
4182 LET c=10: LET d=15: RETURN
4183 LET f=4200: RETURN

```





HIGHER-LOWER is an excellent gambling routine based loosely on the TV game hosted by Bruce Forsyth. It involves trying to guess if the next card in a series will be higher or lower than the preceding one. In this version you need to have all five in correct order to win the round and the money.

Aces are a sure winner, since they can count as high or low. Two cards the same are decided on suit, and if you win the odds are increased. Also included is a Gamble/Collect routine which will double the odds if you gamble successfully.

The display shows the five cards, face down and up, with appropriately garish flashing instructions. A fine program, well thought-out and presented, from Neil Streeter of Hastings, East Sussex. (16K ZX-81).

Graphics:

210 Four inverse Xs.

# HIGHER



# LOWER

```

5 GOSUB 9000
10 DIM A$(5),S(5)
20 DIM A$(11),S(11)
30 LET A$(1)=" "
35 LET A$(2)=" "
40 LET A$(3)=" "
45 LET A$(4)=" "
46 LET A$(5)=" "
50 LET A$(6)=" "
55 LET A$(7)=" "
56 LET A$(8)=" "
60 LET T$(1)="11112"
65 LET T$(2)="66662"
70 LET T$(3)="76772"
75 LET T$(4)="48842"
80 LET T$(5)="46842"
85 LET T$(6)="48842"
86 LET T$(7)="35842"
87 LET T$(8)="44442"
90 LET T$(9)="43442"
95 LET T$(10)="24342"
96 LET T$(11)="66662"
100 DIM C(5)
105 LET ODDS=1
110 DIM S(5)
120 FOR X=1 TO 5
130 LET C(X)=INT (RND*13+1)
140 LET S(X)=INT (RND*4+1)
150 FOR Y=1 TO X-1
160 IF C(Y)=C(X) AND S(Y)=S(X)
THEN GOTO 130
170 NEXT Y
180 NEXT X
185 PRINT AT 5,9;"ODDS=";ODDS;"
:
:
190 FOR X=1 TO 5
200 FOR Y=1 TO 7
210 PRINT AT 6+Y,(X-1)*6+1;"
220 NEXT Y
230 NEXT X
240 LET X=1
250 GOSUB 1000
260 LET X=X+1
270 PRINT AT 16,8;"HIGHER LOW
ER?"
280 PRINT AT 16,8;"HIGHER
ER?"
290 LET A=CODE INKEY$
300 IF A<>45 AND A<>49 THEN GOT
O 270
310 PRINT AT 16,8;"
320 GOSUB 1000
325 GOTO 2000
330 IF X=5 THEN GOTO 3000
335 GOTO 260
1000 LET C=C(X)
1010 LET S=S(X)
1020 LET C$(:"A" AND C=1)+("T" A
ND C=10)+("J" AND C=11)+("Q" AND
C=12)+("K" AND C=13)+("S" AND C
=14) AND C=C(X)
1025 IF C=1 THEN LET C=14
1026 IF C>10 THEN LET C=1
1027 IF C=14 THEN LET C=11
1030 LET S$(:"H" AND S=1)+("C" A
ND S=2)+("D" AND S=3)+("S" AND S
=4)
1040 PRINT AT 7,(X-1)*6+1;"
1050 PRINT AT 8,(X-1)*6+1;"
;C$
;S$;"
1060 FOR Y=1 TO 5
1070 PRINT AT 8+Y,(X-1)*6+1;A$(Y)
AL T$(C(Y))
1080 NEXT Y
1090 FOR Y=1 TO X-1
1100 IF C(Y)=C(X) THEN LET ODDS=
ODDS+1
1110 NEXT Y
1120 PRINT AT 5,14;ODDS;" : 1 "
1130 RETURN
2000 IF (C(X)=1 OR C(X-1)=1) AND
C(X)<>C(X-1) THEN GOTO 330
2005 IF A=45 AND C(X)<>C(X-1) THE
N GOTO 330
2010 IF A=49 AND C(X)<>C(X-1) THE
N GOTO 330
2015 IF C(X)<>C(X-1) THEN GOTO 2
040
2020 IF A=45 AND S(X)<>S(X-1) THE
N GOTO 330
2030 IF A=49 AND S(X)<>S(X-1) THE
N GOTO 330
2040 PRINT AT 15,11;"
2050 LET STAKE=STAKE+BET*ODDS
2060 PRINT AT 3,13;STAKE;"
2070 IF STAKE=0 THEN PRINT AT 16
,1;"YOU'VE LOST ALL YOUR MONEY.
"
2080 IF STAKE=0 THEN STOP
2090 PRINT AT 16,7;"PRESS ""D""
TO DEAL."
2100 IF INKEY$="D" THEN GOTO 212
0
2110 GOTO 2100
2120 PRINT AT 16,11;"
:
:
:AT 16,7;"
2150 GOTO 100
3000 PRINT AT 16,11;"
3010 PRINT AT 16,8;"
3020 PRINT AT 16,8;"
3030 LET A=CODE INKEY$
3040 IF A<>40 AND A<>44 THEN GOT
O 3010
3050 PRINT AT 16,8;"
3060 IF A=44 AND RND<.5 THEN GOT
O 2040
3070 IF A=46 THEN GOTO 3100
3080 LET ODDS=ODDS*2
3090 PRINT AT 5,14;ODDS;" : 1 "
3095 GOTO 3010
3100 LET STAKE=STAKE+BET*ODDS
3110 GOTO 2060
9000 PRINT TAB 9;"
9010 FOR X=0 TO 63
9020 PLOT X,8
9030 PLOT X,41
9040 IF X<41 THEN PLOT 0,X
9050 IF X<41 THEN PLOT 63,X
9060 NEXT X
9070 LET STAKE=100
9080 LET BET=5
9090 PRINT AT 3,3;"YOU HAVE $";S
TAKE;AT 3,24;"$5 A GO"
9120 RETURN

```



# Monster Maths

**E**DUCATIONAL GAMES are always popular and useful routines for the Sinclair machines. **Monster Maths** is designed to test simple mathematical skills.

The student is set 20 problems. Each incorrect answer extends a bridge towards a ravenous monster and 10 errors will enable it to cross over and eat you.

Lines can be changed to alter the range of numbers dealt with and the mathematical process required. Submitted by Russell Newby, of Biggin Hill, Kent (1K ZX-81).

```

9 PRINT AT 9,5;"?(twelve SPAC
ES;graphic Q,T,Y,T,Y)"
10~PRINT AT 10,5;"(inverse SPA
CE;ten SPACES;five graphic Fs)"
20 LET S=0
25~LET T=0
30 FOR F=1 TO 20
35 PRINT AT 14,5;"(seventeen S
PACEs)"
40~LET A=INT (RND*50)+10
50 LET B=INT (RND*50)+10
60~PRINT AT 14,5;A;"+";B;"=";
70 INPUT N
80 IF N=A+B THEN PRINT AT 14,1
2;N;" CORRECT"
85 IF N=A+B THEN LET T=T+1

```

```

90 IF N<>A+B THEN PRINT AT 14,
12;" WRONG"
100 IF N<>A+B THEN LET S=S+1
110 IF N<>A+B THEN PRINT AT 10,
5+S;"(graphic S)"
120 IF S=10 THEN GOTO 200
125 PAUSE 50
130 NEXT F
180 PRINT "SCORE ";T
185 STOP
200~FOR G=12 TO 5 STEP -.5
210 PRINT AT 9,G;"(graphics Q,T
,Y,T,Y)"
220 NEXT G
230 PRINT "YOU ARE DEAD"

```

# SIMPLE SIMON

```

5 DIM N(20)
10 LET D=1
20 FOR B=1 TO D
30 LET N(B)=INT (RND*3)
40 GOTO N(B)*50
50 FOR A=1 TO 200
60 SLOW
70 FAST
80 NEXT A
90 GOTO 500
100 FOR A=1 TO 200
110 SLOW
115 FAST
130 NEXT A
140 GOTO 500
150 FOR A=1 TO 200
160 SLOW
170 FAST
175 FAST
180 NEXT A
190 GOTO 500
200 NEXT B
510 FOR C=1 TO D
220 INPUT X
530 IF X<>N(C) THEN GOTO 700
540 NEXT C
550 LET D=D+1
560 GOTO 20
700 PRINT "SCORE=";D-1
710 PRINT "CORRECT SEQUENCE="
720 FOR U=1 TO D
730 PRINT N(U);"-";
740 NEXT U

```



**S**IMON may be simple but this game for the unexpanded ZX-81 is complex; you must increase the volume of your television set to hear the ZX-81 make its noises. Then you must guess, using keys 1 to 4 on the keyboard, the correct pitch and order of the notes played.

You must enter key 1 for the highest note and key 4 for the lowest. When you have guessed which notes have been played, the computer will continue to play the game until you have an incorrect note. When that happens you will be given your score and the proper sequence of the notes which you had incorrect.

# JUDGMENT

```

3 LET Z=0
35 FOR M=1 TO 20
40 CLS
41 LET E=INT (RND*30)+1
44 PRINT AT 21,0;"30 INVERSE S
PACES"
50 PRINT AT 20,E;"GRAPHIC 6"
60 INPUT A
70 PRINT AT 3,A;"INVERSE ."
90 PRINT AT 19,A;"GRAPHICS G"
105 IF A=E THEN GOTO 130
107 PRINT AT 20,E;E
110 PAUSE 100
120 NEXT M
125 GOTO 160
130 LET Z=Z+1
132 PRINT AT 20,E;"*"
140 PAUSE 100
150 NEXT M
160 CLS
170 PRINT AT 11,0;"YOU HAVE KIL
LED ";Z;" ALIENS"
180 PRINT AT 12,0,20-Z;" ARE AL
IVE ON THE GROUND"
190 IF Z=20 THEN GOTO 210
200 STOP
210 PRINT AT 13,0;"YOU MAY NOW
LIVE ON EARTH IN"
220 PRINT AT 14,0;"PEACE.....VE
RY WELL DONE."

```



**J**UDGMENT DAY has arrived for the fearless ZX-81 alien fighter on planet Earth. As a member of the Space Cadet Corps you must stop the aliens from making a permanent base.

The ground is shown at the bottom of the screen and the alien craft is shown as a bump above the landscape. You have 20 shots in your cannon and each one must count. You

fire by entering a number from one to 30, corresponding to positions from left to right on the screen.

When you have entered your guess, your spaceship will travel across the screen and drop its bomb. The number which appears in front of the alien after you have fired is the correct position of the target.

The program was sent by Robert Courtney, of Isleworth, Middlesex.



# RABBIT RUN

A RABBIT is in one of your fields eating your crops and you have to get rid of it by throwing objects at it. The game runs on the 16K Spectrum and uses user-defined graphics to create the field and our little furry friend.

You throw an object at the rabbit by putting into the computer the coordinates of where you think it is on the screen. If you are correct and your object hits the rabbit it will run away but if you are incorrect your crops will continue to disappear.

The user-defined graphics are set up using a subroutine at line 2000. The graphics characters used are: Lines 200, 210 graphic A. Lines 320, 535 graphic B. Line 430, graphic C.

To set up the graphics, type RUN and then to run the game type RUN 50.

The program was sent by David Price, of Caerphilly, Glamorgan.

```

10 CLS : GO SUB 2000
50 POKE 23509,100
100 CLS : PRINT AT 0,10;"COORDI
NATES"
110 PRINT INK 2;AT 5,0;"IN THIS
GAME YOU ARE TRYING";AT 7,0; IN
K 2;"TO HIT THE RABBIT EATING YO
UR";AT 9,0; INK 2;"TO CHASE HIM
AWAY"
120 PRINT AT 12,0; INK 1;"BY SE
LECTING VERTICAL AND";AT 14,0; I
NK 1;"HORIZONTAL COORDINATES"
130 PRINT INK 3; FLASH 1;AT 15,
0;"VERTICAL FROM 1 TO 14";AT 15,
0; INK 3; FLASH 1;"HORIZONTAL FR
OM 1 TO 29"
140 PRINT AT 20,4; INK 7; PAPER
0; FLASH 1;"PRESS ANY KEY TO ST
ART"
150 PAUSE 0
160 CLS
200 FOR 0=0 TO 15: PRINT AT 0,0
: INK 4;"A";PRINT AT 0,30; INK
4;"A";NEXT 0
210 FOR U=1 TO 29: PRINT AT 0,U
: INK 4;"A";AT 15,U; INK 4;"A";
NEXT U
300 LET Z=INT (RAND*14)+1
310 LET X=INT (RAND*29)+1
320 PRINT AT Z,X; INK 1;"B"
330 LET C=B
340 INPUT "Vertical (1-14)";A
350 IF A<1 OR A>14 THEN GO TO 3
40
355 LET C=C+1
360 PRINT AT 17,1;"VERTICAL "
:A;
400 INPUT "Horiz. (1-29)";B
410 IF B<1 OR B>29 THEN GO TO 4

```

```

90
420 PRINT AT 19,1;"HORIZONTAL "
:B;
430 PRINT AT A,B; INK 2;"C"
500 LET U=(Z-A)*(Z-A)+(X-B)*(X-
B)
505 IF U=0 THEN GO TO 500
510 IF U<0 THEN PRINT INK 1; F
LASH 1;AT 20,14;"MISSED";BEEP 0
.2.12:BEEP 0.2.5
530 PRINT AT Z,X;
531 LET Z=INT (RAND*14)+1
532 LET X=INT (RAND*29)+1
535 PRINT AT Z,X;"B"
350 GO TO 340
500 PRINT AT 20,14;"
";
AT 19,0;"
601 PRINT AT 17,0; INK 7; PAPER
0; BRIGHT 1;"YOU GOT ME IN ";C;
" GOES";FOR F=50 TO 1 STEP -1:
BEEP 0.02;F:NEXT F
610 PRINT AT 19,0;"
630 LET S$=INKEY$
635 IF INKEY$="" THEN GO TO 630
640 IF INKEY$<"Y" THEN GO TO 1
000
GO TO 160
1000 STOP
2000 FOR N=0 TO 7: READ A: POKE
USR "A"+N,A: NEXT N
2001 FOR N=0 TO 7: READ A: POKE
USR "B"+N,A: NEXT N
2002 FOR N=0 TO 7: READ A: POKE
USR "C"+N,A: NEXT N: RETURN
32010 DATA 24,124,90,153,60,90,15
,24
4020 DATA 64,64,224,191,255,36,3
630 DATA 0,0,50,60,60,0,0

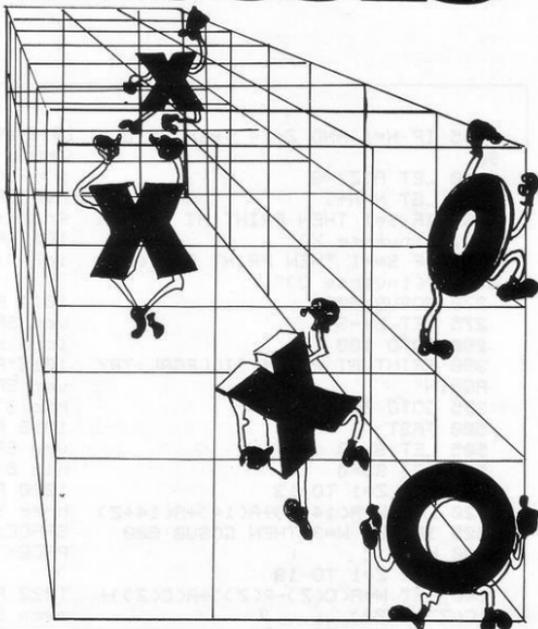
```

# 3-D NOUGHTS, CROSSES

**P**R SCOTT of Goldalming, Surrey, has sent the kind of program Mr Spock plays on long, winter evenings. **3D Noughts and Crosses** displays a cube and 27 possible positions for the Xs and Os. Unlike the 2D version, the game must be continued until all the positions are filled, the object being not to obtain the first completed row but as many as possible.

The player who starts has an advantage, as finally he occupies one space more than his opponent and so, to level matters, the first player is prevented from occupying the centre square on his first attempt.

The program checks for that and other illegal moves, as well as setting-up the board, indicating whose turn is next, and giving the correct score throughout. Moves are entered by keying-in a letter, then a number, then NEWLINE. "A" indicates the front face of the cube, "B" the centre and "C" the rear. Entering "R" will restart the game (16K ZX-81).



```

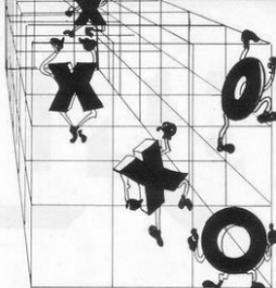
5 DIM A(27)
10 DIM C(18)
15 DIM R(18)
20 DIM X(27)
25 DIM Y(27)
30 LET X#="0208140208140208140
61218061218061218101622101622101
622"
35 LET Y#="0606061212121818180
40404101010161616020202080808141
414"
40 FOR Z=1 TO 27
45 LET X(Z)=VAL X#(2*Z-1 TO 2*
Z)
50 LET Y(Z)=VAL Y#(2*Z-1 TO 2*
Z)
55 NEXT Z
60 LET C#="0204050505050608101
11111111213131313"
65 LET R#="0103010203040301090
10809100903060912"
70 FOR Z=1 TO 18
75 LET C(Z)=VAL C#(2*Z-1 TO 2*
Z)

```

```

80 LET R(Z)=VAL R#(2*Z-1 TO 2*
Z)
90 NEXT Z
100 FOR Z=1 TO 27
105 LET A(Z)=0
110 NEXT Z
115 LET S=1
120 LET N=1
170 CLS
175 GOSUB 1000
180 IF S=1 THEN PRINT AT 2,0;" "
"X" TO GO"
185 IF S=-1 THEN PRINT AT 2,0;" "
"O" TO GO"
190 PRINT AT 20,14;"
"
200 INPUT Z#
205 IF N=28 THEN GOTO 100
210 IF Z#(1)="R" THEN GOTO 100
215 IF Z#(1)="A" THEN LET Z=0
220 IF Z#(1)="B" THEN LET Z=9
225 IF Z#(1)="C" THEN LET Z=18
235 LET Z=Z+VAL Z#(2)
240 IF A(Z)<>0 THEN GOTO 390

```



```

245 IF N=1 AND Z=14 THEN GOTO 3
90
250 LET A(Z)=S
255 LET N=N+1
260 IF S=1 THEN PRINT AT Y(Z),X
(Z);"(inverse X)"
265 IF S=-1 THEN PRINT AT Y(Z),
X(Z);"(inverse O)"
270 GOSUB 500
275 LET S=-S
280 GOTO 180
390 PRINT AT 20,14;"ILLEGAL TRY
AGAIN"
395 GOTO 200
500 FAST
505 LET SX=0
510 LET SO=0
515 FOR Z=1 TO 13
520 LET W=A(14-Z)+A(14)+A(14+Z)
525 IF ABS W=3 THEN GOSUB 800
530 NEXT Z
535 FOR Z=1 TO 18
540 LET W=A(C(Z))-R(Z))+A(C(Z))+
A(C(Z)+R(Z))
545 IF ABS W=3 THEN GOSUB 800
550 LET V=28-C(Z)
555 LET W=A(V-R(Z))+A(V)+A(V+R
(Z))
560 IF ABS W=3 THEN GOSUB 800
565 NEXT Z
570 PRINT AT 20,0;"(inverse X)=
";SX;";(inverse O)= ";SO
575 SLOW
580 RETURN
800 IF W=3 THEN LET SX=SX+1
803 IF W=-3 THEN LET SO=SO+1
810 RETURN
1000 PRINT AT 0,6;"3D NOUGHTS AN
D CROSSES"
1004 PRINT AT 2,10;"1;(five graPh
ic 7s);2;(five graPhic 7s);3"
1006 PRINT AT 3,7;"(graPhic 6;in
verse SPACE;graPhic 7);;(eight
SPACEs;graPhic 6;inverse SPACE;g
raPhic 7);graPhic 8)"
1008 PRINT AT 4,6;"1;(three SPAC
Es);;(SPACE);2;(five SPACEs);3;(t
hree SPACEs;graPhic 8)"
1010 PRINT AT 5,3;"(graPhic 6;in
verse SPACE;graPhic 7;four SPAC
Es);;(four SPACEs;graPhic 6;inve
rse SPACE;graPhic 7;four SPACEs;
graPhic 8)"
1012 PRINT AT 6,2;"1;(five graPh
ic 7s);3;(seven SPACEs;graPhic 8)
"
1014 PRINT AT 7,2;"(graPhic 5;se
ven SPACEs);;(three SPACEs;graPh
ic 8;seven SPACEs;graPhic 8)"
1016 PRINT AT 8,2;"(graPhic 5;se
ven SPACEs);4;(three SPACEs;graPh
ic 8);SPACE;5;(five SPACEs);6"
1018 PRINT AT 9,2;"(graPhic 5;se
ven SPACEs);;(three SPACEs;graPh
ic 8;seven SPACEs;graPhic 8)"
1020 PRINT AT 10,2;"(graPhic 5;t
hree SPACEs);4;(three SPACEs);;(
SPACE);5;SPACE;(graPhic 8;three S
PACEs);6;(three SPACEs;graPhic 8
)"
1022 PRINT AT 11,2;"(graPhic 5;s
even SPACEs);;(three SPACEs;gra
Phic 8;seven SPACEs;graPhic 8)"
1024 PRINT AT 12,2;"4;(five SPAC
Es);5;SPACE;;(three SPACEs);6;(
seven SPACEs;graPhic 8)"
1026 PRINT AT 13,2;"(graPhic 5;s
even SPACEs);;(three SPACEs;gra
Phic 8;seven SPACEs;graPhic 8)"
1028 PRINT AT 14,2;"(graPhic 5;s
even SPACEs);7;(three /s;graPhic
8);;(8;(five /s);9"
1030 PRINT AT 15,2;"(graPhic 5;f
our SPACEs);three /s;four SPACEs;
graPhic 8;four SPACEs;graPhic 6;
inverse SPACE;graPhic 7)"
1032 PRINT AT 16,2;"(graPhic 5;t
hree SPACEs);7;(five SPACEs);8;S
PACE;(graPhic 8;three SPACEs);9"
1034 PRINT AT 17,2;"(graPhic 5;t
hree /s;eight SPACEs;graPhic 8;g
raPhic 6;inverse SPACE;graPhic 7
)"
1036 PRINT AT 18,2;"7;five graPh
ic 6s);8;(five graPhic 6s);9"
1090 RETURN

```

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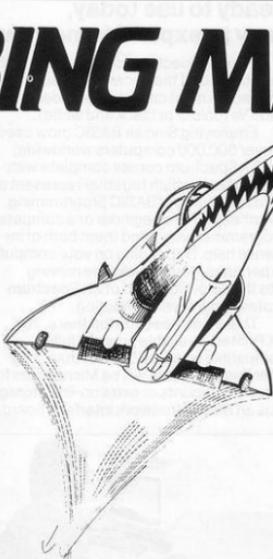
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# BOMBING MISSION

```
10 LET A=SGN PI
20 LET S=A-A
30 LET G=CODE "GRAPHIC S"
40 LET F=INT (RND*(G+G))+CODE
"£"
50 LET Z=A-A
60 LET X=A
70 PRINT AT G,A-A;"TYT6- 6/ TT
TTTTTTTTTTTTTTTTTTT "
80 PRINT AT G,F;CHR# G
90 PRUSE (CHR)
100 FOR B=A-A TO CODE "0"
120 PRINT AT A,B;CHR# (A-A);"T6
T8 T"
130 IF INKEY#="6" THEN LET Z=A
140 IF Z=A THEN LET X=X+A
150 IF Z=A THEN PRINT AT X,B+A;
"£"
160 IF X=G THEN LET Z=A-A
170 IF X=G AND B+A#F THEN GOTO
CODE "ABS"
180 NEXT B
190 LET S=S+A
200 GOTO CODE "W"
210 PRINT AT G-A,F-(A-A);"YBOOM
T";AT G-(A-A),F-A;"Y8 T";TAB G;S
;" BOMB"+(S AND S>A)
```



YOU SIT tensely in the seat of your cockpit, staring anxiously through your viewfinder at the ground. Your mission is to find and destroy the enemy munitions dump as quickly as possible. Your finger stabs at the key with the downward arrow marked on it and the bomb is released. The game runs on the 1K ZX-81; as the aircraft crosses the sky you must release your bomb using the 6 key to bomb the target on the ground marked with a graphic A. The target will appear randomly on each run. Graphics notes:

Line 30, graphic S.  
Line 70, graphics T, Y, T, 6, 2 '—', inverse space, graphic 6, /, space, 21 graphic Ts, inverse space.  
Line 120, graphic T, 6, T, 8, space, graphic T.  
Line 210 graphics graphics Y, 8, space, graphic T.

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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.

## Professional power— personal computer price!

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

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

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 update 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.





Something old, something new

**the first**

# **sinclair user**

**annual**

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

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

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

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

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

*The First Sinclair User Annual* will be available from all the usual newsagents, price £1.50, from the beginning of December.

Order your copy now to avoid being disappointed.

# We've got big ideas about you and your Sinclair



Because we know you're always looking for new ideas to make the most of your Sinclair computer, we're making sure you never run out of steam!

Just announced – and due out in December – is **Sinclair Projects** magazine, full of fascinating schemes to tax your skills and reveal the **practical** potential of your Sinclair in applications like controlling lights, upgrading computer graphics, household security, and many more.

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Now the exciting new Sinclair Projects completes your store of possibilities with a huge increase in computing potential for you to explore.

Sinclair Projects is published on alternate months to Sinclair Programs, so there's **always** something new to test your skill. But here's the best news; when you subscribe to all three Sinclair magazines, you get the first **three** issues of new Sinclair Projects **absolutely free!**



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