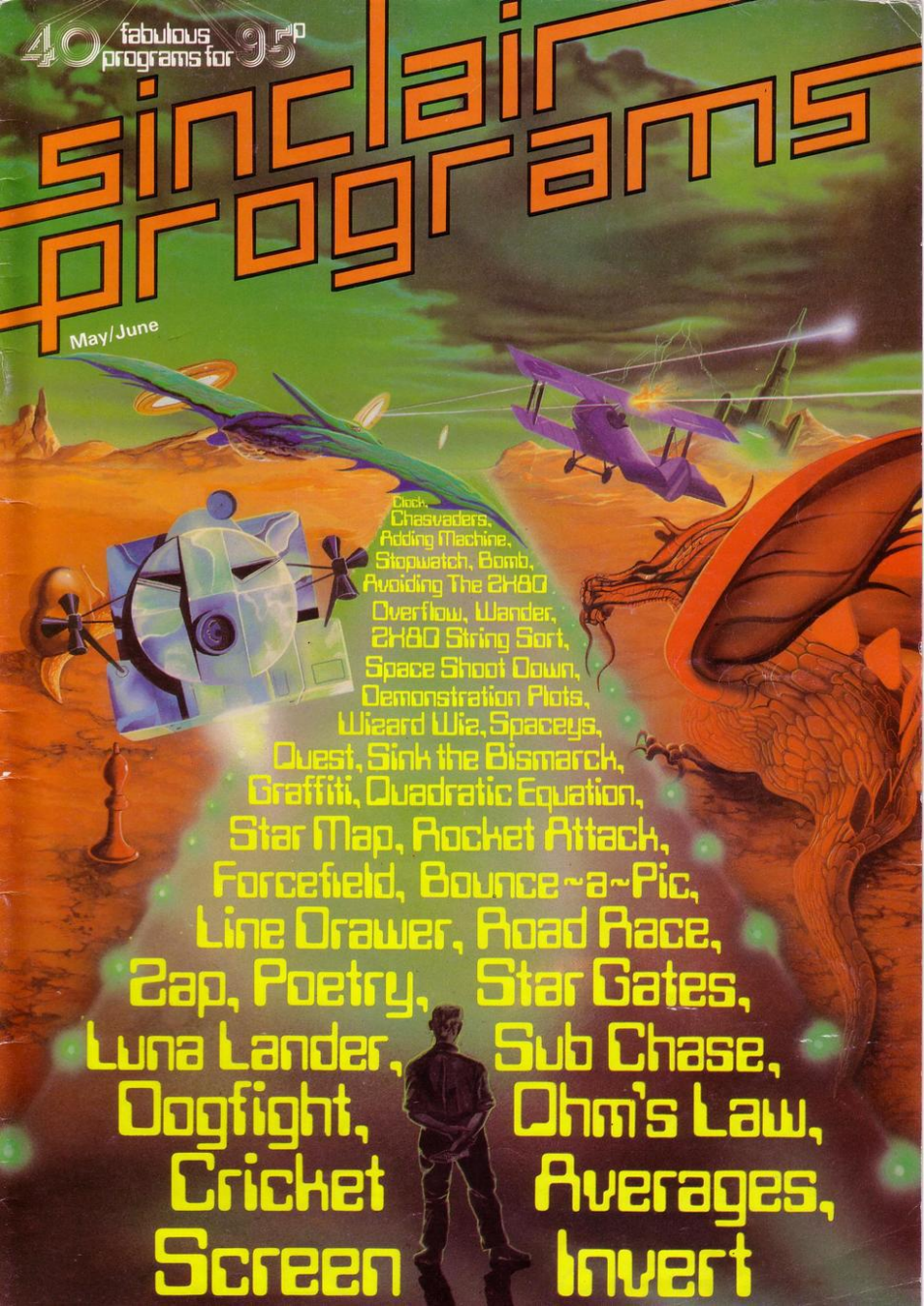


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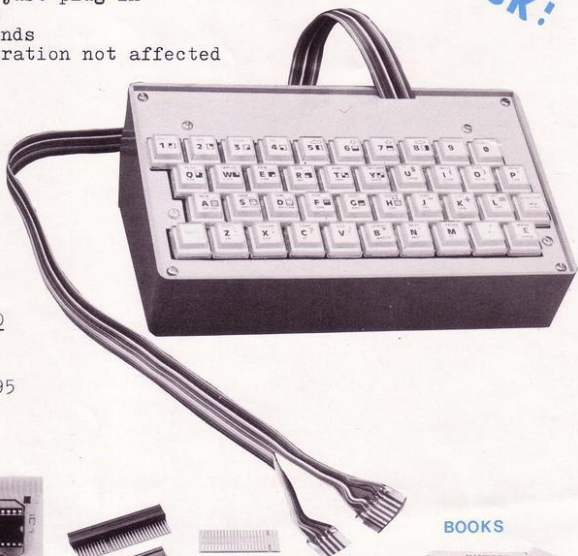
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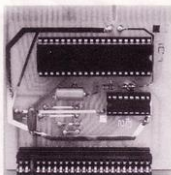
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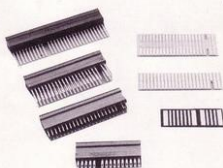
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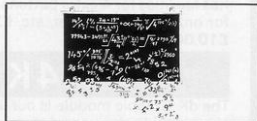
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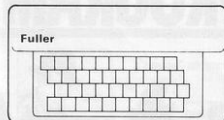
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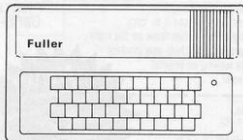
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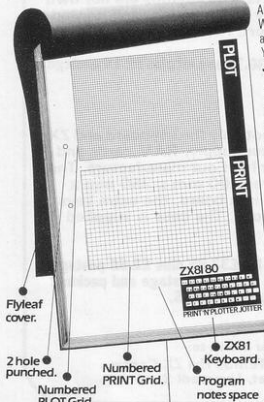
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 S S S

FROM 15-year-old Charles King-Cox of Appleby is a self-titled version of 1K ZX-80 *Space Invaders*. Five Chasvaders are landing on earth and you—equipped with the best technology earth can muster, a 1K, old ROM ZX-80—must stop them. Unfortunately, the game is impossible to win, because if you destroy them all they produce another five. That continues until you are blown up or the Chasvaders land.

You have two missile bases—earth has spared no expense in its defense. One of the bases is positioned somewhere beneath the invader on the right and you have to wait until it is directly above you to fire, which you do by pressing F. You have only five shots for each brace of Chasvaders.

The plucky player scores 200 for every Chasvader destroyed, although you lose 10 points for every shot you fire. There is a bonus of 50 if you shoot all five invaders, making a grand total for the round of 1,000. The highest score we could obtain playing the game in office was 3570. Try to beat that.

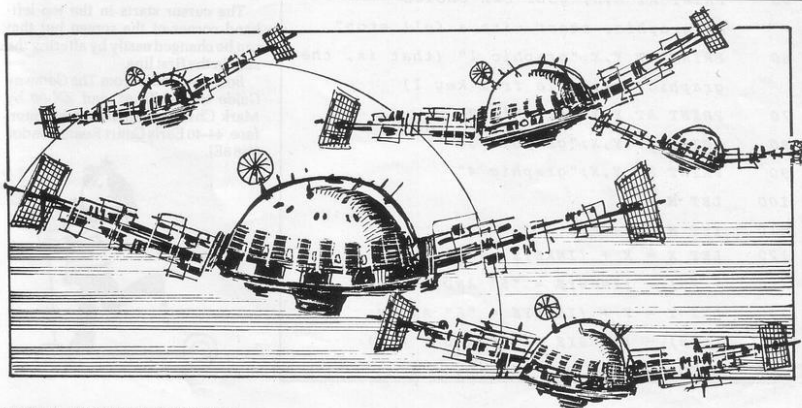
Keeping pressing NEWLINE over and over again to keep the invasion under way, unless you want to fire, when you press F before NEWLINE.

```

10 LET A=0
20 LET B=0
30 LET C=0
40 LET D=0
50 LET E=0
60 LET B=B+1
70 LET F=15
80 LET G=5
90 GOTO 160
100 IF G>0 THEN PRINT "2 spaces shift G D
    shift G";
110 RETURN
120 FOR H=1 TO 16
130 PRINT "2 shift G";
140 NEXT H
  
```

```

150 RETURN
160 PRINT
170 FOR I=1 TO E
180 IF E>0 THEN PRINT
190 NEXT I
200 LET J=RND(4)
210 FOR K=1 TO J
220 PRINT "(single space)";
230 NEXT K
240 FOR L=1 TO G
250 GOSUB 100
260 NEXT L
270 FOR M=1 TO F
280 IF D>0 THEN PRINT
290 NEXT M
300 IF RND(15)=5 THEN GOTO 590
310 FOR N=1 TO G
320 PRINT "5 spaces";
330 NEXT N
340 PRINT "Shift F Shift A Shift D"
350 GOSUB 120
360 PRINT
370 IF A=0 THEN PRINT "Shift F Shift A
    Shift D"
380 INPUT O$
390 IF D=5 THEN GOTO 410
400 IF O$="F" THEN GOSUB 540
410 IF F=1 THEN GOTO 460
420 LET E=E+1
430 LET F=F-1
440 CLS
450 GOTO 160
460 PRINT "HARD LUCK."; G;"* OF THEM
    LANDED"
470 PRINT "(B*1000)-(G*200)-(10*D);**
    POINTS"
480 STOP
490 PRINT "WELL DONE, YOU"
500 PRINT "GOT THEM ALL"
510 INPUT P$
520 CLS
530 GOTO 30
540 IF J=3 THEN LET G=G-1
550 IF J=3 THEN LET C=C+1
560 IF C=5 THEN GOTO 490
570 LET D=D+1
580 RETURN
590 FOR Q=1 TO G
600 PRINT "5 spaces";
610 NEXT Q
620 PRINT "Shift M Shift H Shift N"
630 GOSUB 120
640 LET A=A+1
650 PRINT "YOU GOT BLOWN UP"
660 IF A=2 THEN GOTO 470
670 INPUT R$
680 CLS
690 GOTO 170
  
```





Bounce-a-Pic

```

10  LET X = 0
20  LET N = X
30  LET Y = X
40  LET M = X
50  PRINT AT M,N;"your own choice
    of graphic, start with a full stop"
60  PRINT AT Y,X;"graphic 1" (that is, the
    graphic available from key 1)
70  PRINT AT Y,X;"graphic 2"
80  PRINT AT Y,X;"graphic 3"
90  PRINT AT Y,X;"graphic 4"
100 LET M = Y
110 LET N = X
120 LET X = X + (INKEY$ = "8" AND X
    < 29) - (INKEY$ = "5" AND X > 2)
130 LET Y = Y + (INKEY$ = "6" AND Y
    < 18) - (INKEY$ = "7" AND Y > 2)
140 GOTO 50
  
```

BOUNCE-A-PIC, written to run on a 1K ZX-81, draws pictures with a difference as the cursor is already bouncing and dancing over the screen before you input anything. Its direction can be controlled using the cursor keys—5, 6, 7, 8.

The cursor starts in the top left-hand corner of the screen but that can be changed easily by altering the zero in the first line.

Bounce-a-Pic is from *The Gateway Guide to the ZX-81 and ZX-80* by Mark Charlton. Published by Interface, 44-46 Earls Court Road, London W8 6EJ.



SPACEYS

ANOTHER game for 1K ZX-81 is Spaceys, in which a space ship cruises overhead. Using the 1 key will fire a missile, represented by an asterisk, which can then be guided using the 8 key for left movement and the 0 key for right movement.

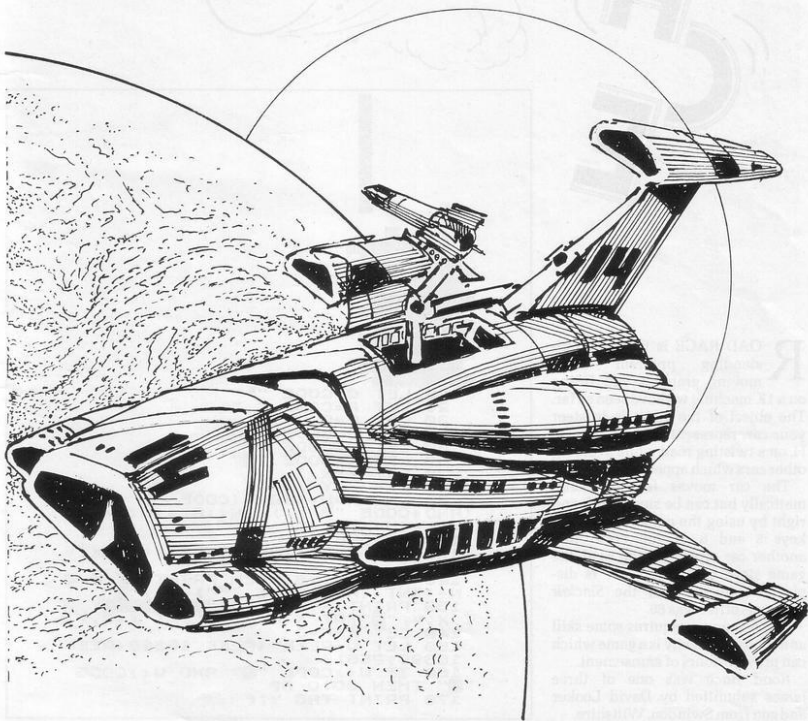
When 200 ships have passed overhead your score and the best score so far are displayed. Hitting the middle of the ship scores 25 points, while clipping the ends rates 10. The missile can be guided both on the ground and in the air.

Spaceys is from The Gateway Guide to the ZX-81 and ZX-80 by

Mark Charlton. Published by Interface of 44-46 Earls Court Road, London W86EJ.

```

10 LET T = 0
20 LET S = 0
30 GOSUB 250
40 LET P = 15
50 FOR Z = 1 TO 20
60 LET H = INT(RND*8) * 5
70 FOR N = 0 TO 29
80 LET F = P * (1 AND INKEY$ = "0" AND
  P < 32) - (1 AND INKEY$ = "8" AND
  P > 0)
90 IF INKEY$ = "1" THEN LET CE = "C" - 1
100 LET C = VAL CE
110 IF C = 0 THEN GOSUB 250
120 CLS
130 PRINT AT H,N;"graphic shift W graphic
  shift B graphic shift W";AT C,P;"**"
140 GOTO 180 + (60 AND C = H AND P >= H
  AND F <= N + 3)
150 NEXT N
160 NEXT Z
170 IF S > T THEN LET T = S
180 PRINT "SCORE: ";S;"BEST: ";T;"N/L
  TO START"
190 INPUT A$
200 GOTO 280 - (260 AND A$ = "")
210 PRINT AT H - 1, N + 1;"**";TAB H;"****";
  TAB N + 1;"**"
220 LET S = S + 10 + (15 AND P = N + 1)
230 GOSUB 250
240 GOTO 160
250 LET C = 19
260 LET CE = "C"
270 RETURN
  
```



ROAD RACE

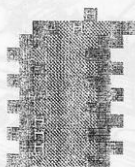


ROAD RACE is the most outstanding program using moving graphics and fitting on a 1K machine we have seen so far. The object of the game is to steer your car, represented by an inverse H, on a twisting road while avoiding other cars which appear at random.

The car moves forward automatically but can be steered left and right by using the cursor controls—keys 5 and 8. If you crash into another car or run off the road, the game stops and your score is displayed—top score in the Sinclair Programs office was 66.

To keep going requires some skill and for once it really is a game which can provide hours of amusement.

Road Race was one of three games submitted by David Looker and son from Swindon, Wiltshire.



```

10 LET C=CODE "H"
20 LET A=CODE " "
30 LET F=A
40 LET B=CODE "+"
50 LET N=CODE "H"
60 LET X=CODE "H"
70 LET Y=X
80 LET Z=Y
90 LET N=N+(SGN (CODE "H"-INT
(RND*CODE "H")))*(N<>A)*(N<>X)+(
N=A)-(N=X)
100 SCROLL
110 LET Y=Y-(INKEY$="5")+(INKEY
$="8")
120 IF RND>.8 THEN PRINT AT B-C
N+(INT (RND*CODE "H")+C);"H"
130 PRINT AT B,N-C;"H";A
T X,Y;"H";AT X-C,Z;"H";AT X+C,Y
140 LET F=F+C
150 LET U=PEEK (PEEK 16398+PEEK
16399*256)
160 IF U<CODE "H" AND U<CODE
" " THEN GOTO 80
170 PRINT TAB Y;F

```

ROCKET ATTACK

IN *Rocket Attack* for 1K machines the player is in control of a guided missile launcher defending the shores from air attack. A rocket launcher is situated at the bottom left-hand corner of the screen, while enemy planes approach at random height from the right.

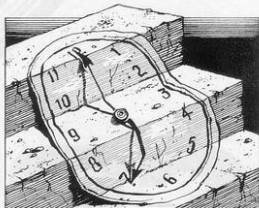
To fire, the P key is used and, when depressed, a rocket is launched, rising at 45 degrees. The rocket will continue its advance only as the key is depressed, so there is a measure of control over its progress. Aircraft can be destroyed either by scoring a direct hit or by leaving the rocket in the path of the aircraft.

Rocket Attack was submitted by D E Healey of Coseley, West Midlands.

```

100 LET P=0
110 LET B=0
120 LET T=0
130 LET C=0
140 LET D=0
150 PRINT AT 21,B;
160
170 PRINT AT 20,B;
180 LET Y=INT(RND*15)+4
190 PRINT AT Y,B;
200 IF INKEY$="P" THEN PRINT
210 IF Y=C AND E=D THEN GOT
220 PRINT AT C,D;
230 IF INKEY$="P" THEN LET C
240 IF C=4 THEN GOTO 410
250 LET E=E-R
260 IF E=0 THEN GOTO 410
270 GOTO 100
410 CLS
420 IF T<0.5 THEN GOTO 100
430 PRINT AT 10,11;"SCORE =";
440 PRINT AT 12,11;"SCORE =";
450

```



CLOCK

CLOCK uses a FOR and NEXT loop in which to keep the time accurate to the more conventional PAUSE statement, resulting in a clearer screen display.

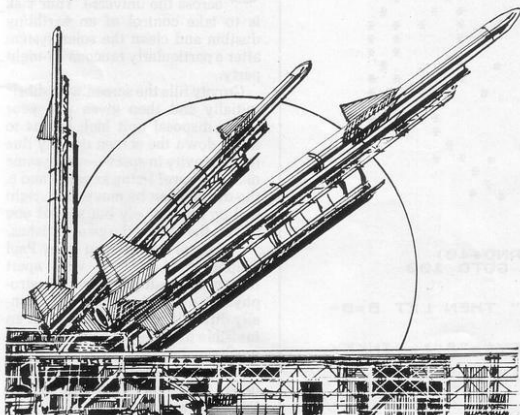
Running in slow mode, the program does not include seconds and, because of zero suppression, the time entered as 10.09 will appear as 10.9.

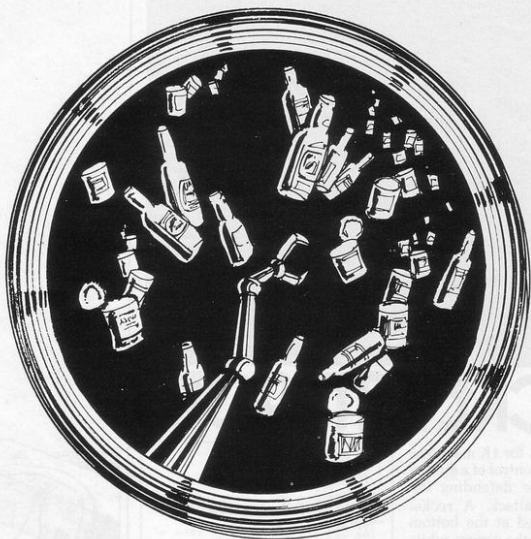
According to author Chris Hutchin of Cirencester the clock is accurate to a few seconds a day. To start, type the usual RUN and, when prompted, put in the hour and then the minutes. Use BREAK to get out of the program. It will run on 1K machines.

```

4 LET H=1
5 PRINT "HOUR ?"
10 INPUT H
15 PRINT "MINUTE ?"
20 INPUT H
25 CLS
30 IF H=60 THEN GOTO 100
35 PRINT AT 10,10;"H=";H;":M=";H
40 LET H=M+L
45 FOR F=L TO 2732
50 NEXT F
60 GOTO 30
100 LET H=0
105 LET M=M+L
110 IF M=12 THEN LET H=L
120 CLS
130 GOTO 30

```





GRAVITY

```

100 LET A=0
200 LET B=0
300 LET C=0
400 PILOT A,INT (RND*40)
500 IF A=60 THEN GOTO 100
600 LET A=A+1
700 GOTO 400
800 IF INKEY$="7" THEN LET B=B-1
900 IF INKEY$="8" THEN LET C=C+1
1000 PRINT AT B,C;" "
1100 PRINT AT B,C;"*"
1200 GOTO 100

```

GRAVITY for 1K ZX-81s envisages aliens spreading rubbish across the universe. Your task is to take control of an earthling dustbin and clean the solar system after a particularly raucous all-night party.

Gravity fills the screen with debris initially and then gives you your waste disposal unit which begins to move down the screen quickly due to the gravity in space—surely some mistake there? Using keys 6, 7 and 8, the dustbin can be moved left, right and up respectively but should you run off the screen, the game finishes.

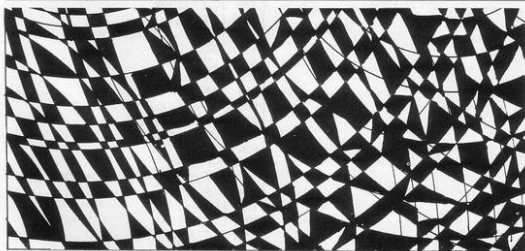
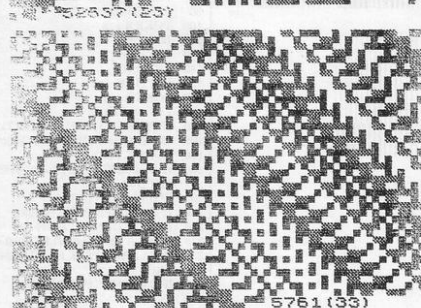
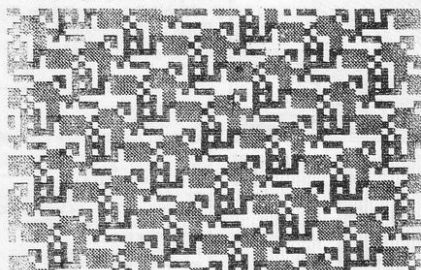
The program was sent in by Paul Ralphs of Manchester who, apart from re-designing the laws of astrophysics, made the game exceptionally difficult by giving the player an invisible dustbin. To help beginners we have inserted an asterisk but when you feel sufficiently confident delete the asterisk from line 130 but leave the two spaces.

UNIVERSAL PATTERNER

```

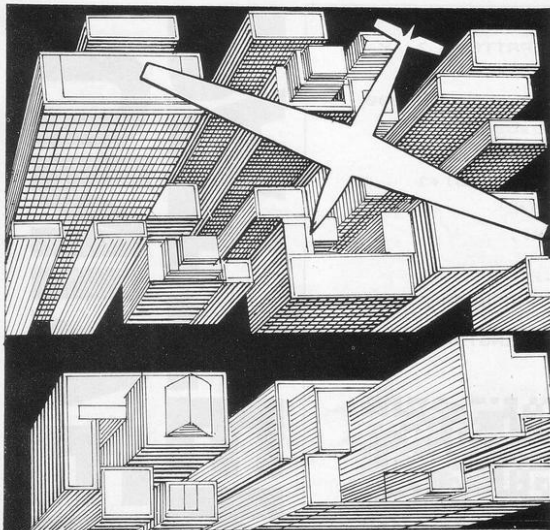
10 DIM A(33)
20 GOTO 100
30 PRINT "RANDOM PATTERN ? (Y
OR N)"
40 INPUT A$
50 IF NOT A$="Y" THEN GOTO 200
60 LET L=INT (RND*33)+1
70 LET X=INT (RND*65535)+1
80 PRINT X
90 FOR J=1 TO L
100 LET A(J)=INT (RND*10)+1
110 NEXT J
120 FOR J=1 TO 660/L
130 FOR K=1 TO L
140 PRINT CHR$(A(K));
150 NEXT K
160 PRINT X;"(";L;")"
170 STOP
180 INPUT "PATTERN-NUMBER-?"
190 INPUT X
200 CLS
210 PRINT "STRING LENGTH ?"
220 INPUT L
230 CLS
240 GOTO 80

```



UNIVERSAL PATTERNER is for 16K ZX-81 users and produces patterns at random. Author W. S. Hearn, of Ilford, Essex, states that more than two million designs can be printed on the screen.

Each pattern has a number and string length printed at the bottom, so can be recalled and adjusted using those numbers. Answer N for No when asked if a random pattern is required and then input the numbers.



NIGHTFALL requires 4K RAM and involves blowing-up sky-scrapers from a glider flying over a city. You start by entering a number between zero and 10 to define how high you want the sky-scrapers built. The glider is represented by an inverse plus sign and flies from left to right, getting lower each time it goes across the screen.

Because of the gradual loss of height it is imperative to eliminate the more protruding buildings before you crash into them.

Pressing O will release a bomb and only one bomb may be in the air at a time. Points are scored for each portion of building destroyed. To start the game again after reducing the city to ruins and landing or crashing, enter a new level of difficulty to the display file.

Nightfall was sent in by Tim Rogers of Richmond, Surrey.

Nightfall © Tim D. Rogers 1982



```

1 LET T=0
2 GOSUB 1000
10 LET A=PEEK 16396+256*PEEK 16397
  +1
20 LET A1=A+724
30 FOR B=A TO A+31
40 LET C=(INT(RND*10)+E)*33
45 IF B=A OR B=A+31 THEN LET C=660
50 FOR D=B TO B+C STEP 33
60 POKE D,128
70 NEXT D
80 NEXT B
90 FOR B=A1-31 TO A1
100 POKE B,128
110 NEXT B
130 LET F=A
140 LET D=0
150 LET H=F
160 POKE F,128
170 LET F=F+1
180 IF PEEK F=118 THEN GOTO 170
185 IF PEEK F=0 THEN GOTO 600
190 POKE F,149
200 IF D=0 AND INKEYS="O" THEN
  LET D=1
205 IF D=0 THEN LET H=F
210 IF D=1 THEN POKE H,128
220 IF D=1 THEN LET H=H+33
225 IF H>A+693 THEN LET D=0
230 IF D=1 AND PEEK H=0 THEN GOSUB
  500
240 IF D=1 THEN POKE H,155
250 GOTO 160
500 FOR G=H TO A+693 STEP 33
510 POKE G,128
515 LET S=S+1
520 IF RND>.9 THEN GOTO 540
530 NEXT G
540 LET H=F
550 LET D=0
560 RETURN
600 PRINT AT 0,0;"SCORE:";S,
605 IF T<S THEN LET T=S
610 PRINT"HI-SCORE:";T
620 GOTO 2
1010 INPUT E
1020 IF E<0 OR E>10 THEN GOTO 1010
1030 CLS
1035 LET S=0
1040 LET E=10-E
1050 RETURN
  
```

Star Map is another display program which draws pictures on your screen, if left to run for long enough. It sets up a black rectangle and proceeds to PRINT AT and unPRINT AT stars into a black void.

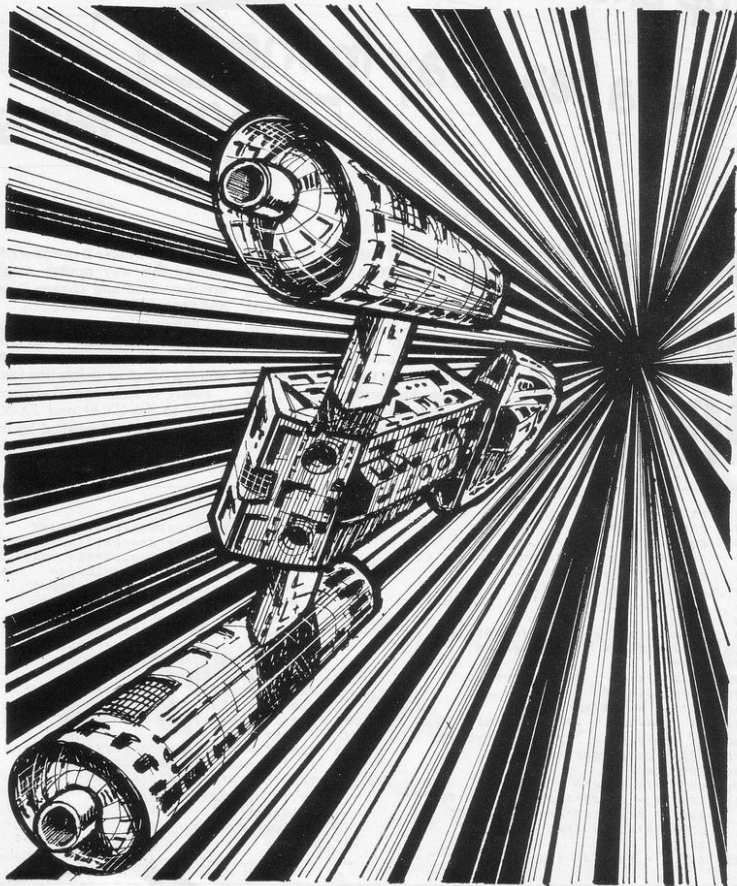
The programs are from *Getting Acquainted with your ZX-81* by Tim Hartnell. It is published by Interface of 44-46 Earls Court Road, London W8 6EJ, and costs £4.95.

```

10 SLOW
20 FOR A = 1 TO 10
30 FOR B = 1 TO 32
40 PRINT "inverse space";
50 NEXT B
60 NEXT A
70 PRINT AT RND* 9, RND*31;"inverse asterisk"
80 PRINT AT RND* 9, RND*31;"inverse space"
90 } - these two lines are the same as line 80
100
110 PRINT AT 1,1;"inverse space"
120 PRINT AT 1,1;"non-inverse asterisk"
130 GOTO 70

```

STAR MAP



There was a young lady
Twinkle, twinkle
He hadn't used waterproof glue
up the clo
like a tea-tray in the sky
Short, fat a

POETRY POETRY POETRY

A VALIANT attempt to write poetry within 4K is made by Poetry. It is very slow, taking up to five minutes to write a single poem, which fills the screen. The words used are stored in four long strings and the computer searches the string until it finds an asterisk; it then uses the word which follows that randomly-selected asterisk. From time to time the ZX-80 will stop writing to let you admire what it has written. A tap on NEWLINE will

re-start it. To make it run on a ZX-81, change the way random numbers are generated and change lines 70 and 140 to LET A\$ = A\$(2 TO).

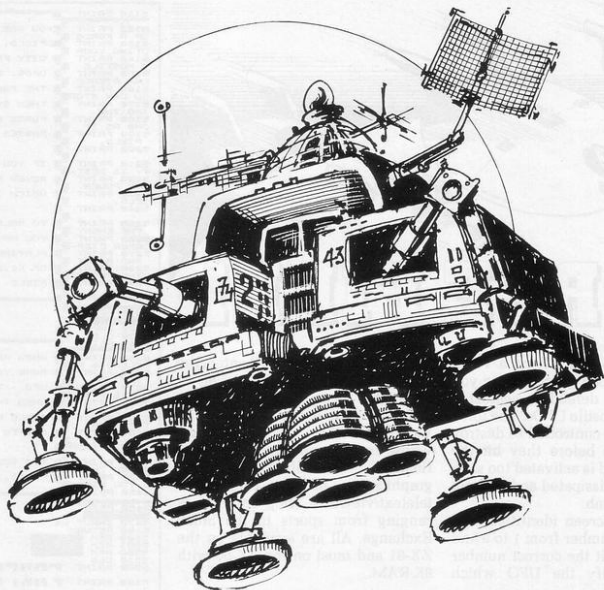
Change all the asterisks in the strings into the letter X and change the 222 in lines 90 and 150 into 63. If you run it in slow, delete line 120.

Poetry is from the The Gateway Guide to the ZX-81 and ZX-80 by Mark Charlton. Published by Interface of 44-46 Earls Court Road, London W-6EJ.

```

10 RANDOMISE
20 FOR D = 0 TO 3
30 GOSUB 200
40 IF RND(3) = 1 THEN GOSUB 200
50 LET N = 3 * C / 4
60 FOR D = N TO C
70 LET A$ = T$(A$(A$))
80 NEXT D
90 IF CODE(A$) = 222 THEN GOTO 140
100 IF RND(20) = 19 THEN PRINT
110 NEXT B
120 IF RND(4) = 2 THEN INPUT B$
130 GOTO 20
140 LET A$ = T$(A$(A$))
150 IF CODE(A$) = 222 THEN PRINT "
160 IF CODE(A$) = 222 THEN GOTO 100
170 PRINT CHR$(CODE(A$));
180 GOTO 140
200 GOTO 210 + 10 * B
210 LET A$ = "THEN*AND*BOTH*FOR*TO*
    BUT*IF ONLY*YET*AFTER*BEFORE*
    HOWEVER*SO*IN CASE OF*AS IF*
    IF*"
215 LET C = RND(73) + 3
217 RETURN
220 LET A$ = "EYES*FERNS*LOVERS*LOVE
    *PARTING*TWILIGHT*VERDANT PASTURES
    *THE FIRE*STREAM*PEBBLES*SUNLIGHT
    *MORNING*FOREST*GLADES*CLOUDS*
    EVENING*DAWN*FRIENDS*PATH*VISTA*"
225 LET C = RND(134) + 3
227 RETURN
230 LET A$ = "GLANCED*APPEARED*
    SHARING*SHADOWED*ASKING*FEARING*
    HOPING*SIGHING*STROLLING*
    OVERHEAD*LOOKING*LANGUISHED*
    CRYING*PASSING*DREAMED*BEGINNING*
    TURNED*MOVING*RETURNING*"
235 LET C = RND(138) + 6
237 RETURN
240 LET A$ = "SMILING*GENTLY*QUICKLY*
    IN FEAR*SADLY*WITH SORROW*
    PEACEFULLY*TOGETHER*SLOWLY*
    BRIGHT*EARLY*AWAY*ALWAYS*
    SILVER*"
245 LET C = RND(94) + C
247 RETURN

```



LUNAR LANDER

LUNAR LANDER is yet another 1K program from Looker and son. This is a superior version of the lunar landing game. Your spacecraft is 600ft. above the lunar landing pad and descends automatically at a velocity of 20 feet per second.

The initial fuel reserve is 130 gallons and to achieve a safe landing you must fire your retro-rocket thrusters—by pressing the T key—to slow the machine and, allowing for the random drift of the spacecraft, attempt to land on the landing pad displayed.

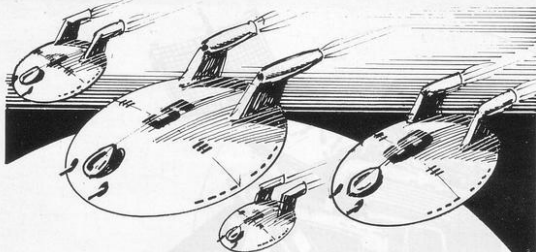
Lunar Lander displays remaining fuel, altitude and velocity in the top right-hand corner of the screen, while the spacecraft descends on the left-hand side. Too much thrust and the spacecraft begins to ascend, shown by a negative velocity reading, while too great a speed in landing causes a crash.

FUEL 110
ALT 300
VEL 35

```

1 LET N=PI/PI
2 LET N=N/2
3 LET R=CODE "E"
4 LET R=CODE "E"
5 LET R=CODE "E"
6 LET R=CODE "E"
7 LET R=CODE "E"
8 LET R=CODE "E"
9 LET R=CODE "E"
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200 LET R=CODE "E"

```



FORCE FIELD

AS COMMANDER of a Force Field which guards a city you have to defend it against a squadron of hostile UFOs. The force field has to be controlled to destroy enemy bombs before they hit the city. If the field is activated too soon the power is dissipated and will not destroy the bomb.

The radar screen identifies each UFO with a number from 1 to 9 and you have to hit the correct number key to identify the UFO which

dropped the bomb when it enters the force field. There are four levels of difficulty.

The program has been supplied by Video Software of Stourbridge, whose ambitious products include a financial modelling package, graphics, a private version of teletext/viewdata (sic), and games ranging from sports to the Stock Exchange. All are available on the ZX-81 and most on the ZX-80 with 8K RAM.

```
5110 PRINT "YOU ARE IN COMMAND
5120 PRINT "OF A FORCE
5130 PRINT "FIELD. IT IS PROTE
5140 PRINT "CITY FROM ATTACK B
5150 PRINT "Y HOSTILE
5160 PRINT "UFOs. THEIR BOMBS
5170 PRINT "THE FORCE FIELD. Y
5180 PRINT "THEY BY CONCENTRAT
5190 PRINT "THE FORCE AROUND THE B
5200 PRINT "THEY PASS THROUGH THE
5210 PRINT "IF YOU FAIL THE CI
5220 PRINT "ROYED AND WITH IT
5230 PRINT "WHICH DRIVES THE F
5240 PRINT "
5250 PRINT "TO HELP YOU DEFEAT
5260 PRINT "THE ENEMY
5270 PRINT "YOU HAVE A RADAR S
5280 PRINT "GREEN DISP
5290 PRINT "PLAYING THE BATTLE
5300 PRINT "AND A SET
5310 PRINT "OF KEYS TO CONTROL
5320 PRINT "THE FORCE
5330 PRINT "FIELD.
5340 PRINT "
5350 PRINT "
5360 PRINT "
5370 PRINT "
5380 PRINT "
5390 PRINT "
5400 PRINT "
5410 PRINT "
5420 PRINT "
5430 PRINT "
5440 PRINT "
5450 PRINT "
5460 PRINT "
5470 INPUT L$
5480 REM
5490 REM
5500 REM
5510 REM
5520 REM
5530 REM
5540 PRINT "
5550 PRINT "
5560 PRINT "
5570 PRINT "
5580 RETURN
5590 REM
5600 REM
5610 REM
5620 REM
5630 PRINT "
5640 PRINT "
5650 PRINT "
5660 PRINT "
5670 PRINT "
5680 PRINT "
5690 PRINT "
5700 PRINT "
5710 PRINT "
5720 PRINT "
5730 PRINT "
5740 PRINT "
5750 PRINT "
5760 PRINT "
5770 PRINT "
5780 PRINT "
5790 PRINT "
5800 PRINT "
5810 PRINT "
5820 PRINT "
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5840 PRINT "
5850 PRINT "
5860 PRINT "
5870 PRINT "
5880 PRINT "
5890 PRINT "
5900 PRINT "
5910 PRINT "
5920 PRINT "
5930 PRINT "
5940 PRINT "
5950 PRINT "
5960 PRINT "
5970 PRINT "
5980 PRINT "
5990 PRINT "
6000 PRINT "
6010 INPUT DIFF
6020 IF DIFF<1 OR DIFF>4 THEN GO
6030 TO 6080
6040 CLS
6050 RAND
6060 REM
6070 REM
6080 REM
6090 REM
6100 REM
6110 REM
6120 REM
6130 REM
6140 REM
6150 REM
6160 REM
6170 REM
6180 REM
6190 REM
6200 REM
6210 REM
6220 REM
6230 REM
6240 REM
6250 REM
6260 REM
6270 REM
6280 REM
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7980 REM
7990 REM
8000 REM
8010 REM
8020 REM
8030 REM
8040 REM
8050 REM
8060 REM
8070 REM
8080 REM
8090 REM
8100 REM
8110 REM
8120 REM
8130 REM
8140 REM
8150 REM
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8170 REM
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8200 REM
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10 CLS
20 INPUT A$
30 LET A=0
40 LET B=0
50 GOTO 80
60 INPUT A$
70 RETURN
80 IF INKEY$="S" AND A<>20 THEN
N LET A=A+1
90 IF INKEY$="5" AND A<>0 THEN
LET A=A-1
100 IF INKEY$="7" AND B<>0 THEN
LET B=B-1
110 IF INKEY$="6" AND B<>20 THEN
N LET B=B+1
120 IF INKEY$="1" THEN GOSUB 50
130 IF INKEY$="Z" THEN RUN
140 PRINT AT B,A;A$
150 GOTO 80

```

LINE DRAWER provides free-format drawing with any character or characters you wish to select. Having entered your chosen symbol, use the cursor controls—keys 5, 6, 7, 8—to draw pictures on a square slightly smaller than the screen. To change characters, press key 1.

The program will run on 1K machines and was sent by 16-year-old Stephen Adams.



LINE DRAWER

BOMB

THE IDEA of *Bomb* is to blow up undefined enemies, represented by an inverse space. Your bomb moves across the top of the screen and pressing any key will release it. Only one bomb can be in the air at any time, limiting the attraction of the game, but it will run on 1K machines.

For those with slow mode the PAUSE and POKE may be removed by deleting lines 100 and 110. *Bomb* was submitted by David Goodup.

```
5 LET B$="(PEEK (PEEK 16398+2
55*PEEK 16399))=128"
6 LET C=VAL "0"
7 LET D=C
8 LET S=C
10 LET K=VAL "9.5"
20 FOR X=VAL "1" TO VAL "5"
30 CLS
40 FOR A=VAL "1" TO VAL "5"
50 PRINT AT VAL "9",RND*VAL "3
1","█"
60 NEXT A
70 LET B=RND*K
80 FOR A=VAL "0" TO VAL "30"
90 PRINT AT B,A;">"
100 PAUSE VAL "50"
110 POKE VAL "16437",VAL "255"
120 LET D=D*(C<K)+A*(NOT SGN D
AND INKEY$(">"))
130 LET C=(C+VAL "1")*SGN D+B*(
NOT SGN D)
140 PRINT AT C-VAL "1",D;" ";AT
C,D;
150 LET S=S+VAL B$
160 LET D=D*(C<K)
170 PRINT CHR$(VAL "23"*SGN D)
;AT B,A;" "
180 NEXT A
190 NEXT X
220 PRINT S;" POINTS"
```

ADDING MACHINE

ENGLAND
TO PAY THE BEARER ON DEMAND THE SUM OF



D. H. F. Saunders

CHIEF CASHIER

AN56 144747

ADDING MACHINE allows you to keep a running total of your expenditures and income—income is entered as a negative figure. First enter the amount of money involved—press **NEWLINE** and then enter a description of the item. As it stands the program will off-load each item automatically to a printer with a running total, though those lines can easily be deleted and the same information is displayed automatically on the screen.

Adding Machine is from Mike Salem of Hilderbay Ltd.

```

10 REM ADDING MACHINE.
20 REM HILDERBAY LTD 1982
30 REM
40 REM SOMETIMES EVEN VERY SIM
PLE PROGRAMS CAN BE REALLY USEFUL.
50 REM
60 REM
70 CLS
80 PRINT "ADDING MACHINE, BY M
ILDERBAY LTD."
90 PRINT
100 PRINT
110 PRINT "ENTER NUMBERS TO ADD
FOLLOWED BY NEWLINE. PRECEDE NU
MBER BY MINUS SIGN '-' TO SUBT
RACT IT."
112 PRINT
114 PRINT "AFTER ENTERING EACH
NUMBER YOU MAY (OPTIONALLY) ENTER
A FEW CHARACTERS WHICH WILL BE
PRINTED. THEN PRESS NEWLINE AGA
IN."
120 PRINT
130 PRINT "ENTER SUM NEWLINE A
FTER LAST NUMBER."
132 PRINT "AT 21,0;"PRESS A KEY
TO START."
134 PAUSE 4E4
140 REM
150 REM ALL STATEMENTS WITH NUMB
ERS BELOW 170 CAN BE DELETED.
160 REM
170 CLS
180 SCROLL
190 LPRINT "RUNNING"
210 SCROLL
220 PRINT "ADDENDS", "SUM"
230 LPRINT "ADDENDS", "SUM"

```

```

240 SCROLL
250 PRINT
260 LPRINT
270 LET SUM=0
280 INPUT X
290 LET SUM=SUM+X
300 SCROLL
310 PRINT X;" "0%;SUM
320 LPRINT X;" "0%;SUM
330 GOTO 280
500 SAVE "ADDEN"
501 RUN

```

ADDENDS

RUNNING
SUM

```

86 RENT
43 FOOD
97 ELECTRICITY
-480 SALARY
52 PHONE
256 ACCESS

```

```

86
131
166
-312
-250
8

```

ADDENDS

SUM

```

86 RENT
43 FOOD
97 ELECTRICITY
-480 SALARY
52 PHONE
256 ACCESS
-523000 POOLS WIN

```

```

86
131
166
-312
-250
8

```

FOR THOSE struggling with mathematics homework, Quadratic Equation may provide a little relief. Both roots are printed if there are two real roots, while one root is printed if they are equal and both the real and imaginary parts of imaginary roots. It is clear from the output which roots are printed.

Quadratic Equation is from *Getting Acquainted with your ZX-81* by Tim Hartnell. Published by Interface, 44-46 Earls Court Road, London W86EJ.

QUADRATIC EQUATION

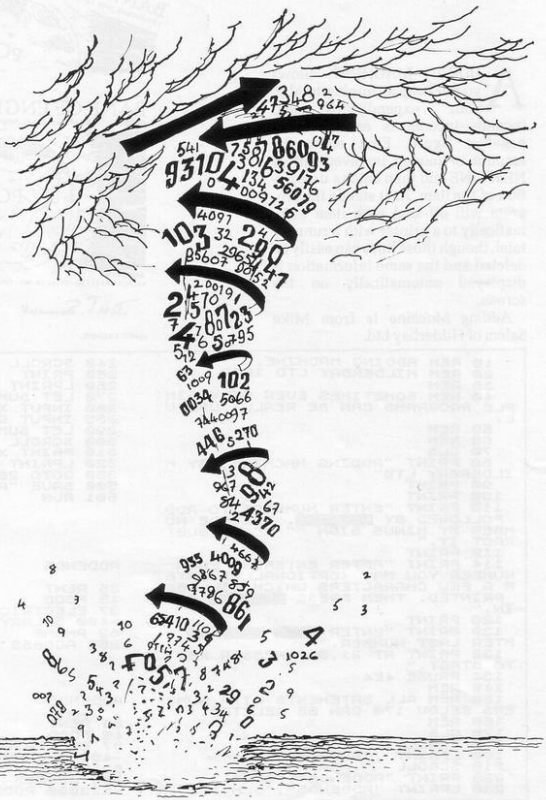
```

5  PRINT "ENTER A"
10 INPUT X
15 PRINT X, "ENTER B"
20 INPUT Y
25 PRINT Y, "ENTER C"
30 INPUT Z
35 CLS
40 LET Y = - Y/2/X
45 LET Q = Y*Y - Z/X
50 IF Q = 0 THEN GOTO 200
55 IF Q > 0 THEN GOTO 300
60 LET L = SQR (-Q)
65 PRINT "IMAGINARY ROOTS:"
70 PRINT "REAL" ROOT * ";Y
75 PRINT "IMAGINARY ROOT * ";L
80 STOP

200 PRINT "EQUAL ROOTS: * ";Y
210 STOP

300 PRINT "REAL ROOTS:"
310 PRINT ,Y + SQR Q
320 PRINT ,Y - SQR Q

```





Quest

QUEST is an adventure program based on a journey through a cave system, the objective being to amass a personal sum of £100. Money is gained by killing monsters and you start with a strength rating of 20. On being attacked by a resident monster, any instruction which takes the fancy may be entered, so long as it does not begin with the letters R or G.

Thus, instructions such as shoot, hit, stab, bash or, for the gentler among you, perhaps even tickle, may be entered and a random score is

assigned to tell you how you fared.

Weaker monsters can be killed by one action but each attempt reduces your strength rating and when it equals zero you are unfortunately extinct.

Having killed a monster you may rest (key R), which gives you two strength points, or continue (key G) but resting involves the danger that another monster sneaks up on you. Finding a magic ring makes you invisible and you can run away in the middle of a battle. A magic staff (key G) doubles fighting power for the rest of the game, while a magic

potion doubles strength only for that attempt.

If strength diminishes during a battle, a sum of money can be traded for strength by typing Change as a course of action—£1 equals three strength points. To clear the program, press Stop.

The program is from a tape of programs produced by Richard Sheperd Software of Maidenhead, Berkshire. Called Bargain Bytes 1, it comprises eight programs—five games and three covering bank accounts, working-out loans and foreign exchange conversion. It costs £5.

The Program



UNFORTUNATELY, THE DEADLY RATTLESNAKE
NAKE HAS JUST KILLED YOU.



HOWEVER, I LIKED THE WAY YOU
PLAYED SO I AM GOING TO OFFER TO
REINCARNATE YOU
PRESS NEWLINE TO CONTINUE

```

1 REM "COPYWRITE R.J.SHEPHERD
1982
75 LET K$="UNEXPECTEDLY"
80 LET O=0
85 LET F=0
90 LET C=0
95 LET C$="G"
95 LET L=0
96 LET J=0
100 LET D=20
101 GOTO 3000
103 LET M=0
104 LET L=0
105 CLS
106 PRINT "THERE IS NO DANGER.W
ILL YOU REST OR GO ON?"
107 INPUT C$
108 IF J=1 AND C$(1)="O" THEN P
RINT "YOU CANNOT GO ON BECAUSE O
F
A";H$
109 IF C$(1)="R" THEN LET D=D+2
110 IF C$(1)="R" AND INT (RND*1
0)>5 THEN GOTO 103
111 IF J=1 AND C$(1)="G" THEN G
OTO 8020
112 IF C$(1)="R" THEN LET K$="W
HILST RESTING"
113 IF C$(1)="G" THEN LET K$="U
NEXPECTEDLY"
114 LET X=INT (RND*10)
115 CLS
116 LET M=0
117 IF C>=100 THEN GOTO 2500
118 IF C$(1)="R" THEN GOTO 120
119 IF INT (RND*10)>5 THEN GOTO
8000
120 GOSUB 1000+(100*X)
122 LET C$=""
127 IF M>=1 THEN GOTO 140
130 PRINT "YOU ARE ATTACKED ";K
$
131 PRINT "BY THE ";M$
133 LET K$="UNEXPECTEDLY"
140 PRINT "WHAT ARE YOU GOING T
O DO?"
145 PRINT "YOU HAVE A RESISTANC
E OF ";D
147 PRINT "YOU HAVE 2";C
150 INPUT B$
151 LET M=M+1
152 LET L=L+1

```

```

154 IF B$="CHANGE" THEN GOTO 97
00
155 IF B$(1)="G" AND F=1 AND J=
0 THEN GOTO 105
157 IF B$(1)="G" AND J=1 THEN P
RINT "YOU CANNOT GO ON BECAUSE O
F
A";H$
160 IF B$(1)="G" AND J=0 THEN P
RINT "YOU DO NOT HAVE A MAGIC RI
NG"
162 IF B$(1)="G" THEN GOTO 140
169 GOTO 6500
172 IF R<1 THEN PRINT "THE ";M$
"
IS DEAD"
173 IF R<1 THEN PRINT 100
174 IF R<1 THEN LET C=C+CASH
175 IF R<1 THEN GOTO 103
176 LET D=D-INT (RND*8)
177 IF D<1 THEN GOTO 4000
178 IF D>50 THEN LET D=D-3
185 IF L=3 THEN PAUSE 50
186 IF L=3 THEN CLS
188 PRINT "YOU ";B$," THE ";M$
190 IF L=3 THEN LET L=0
191 PRINT "THE ";M$," HITS BACK

195 GOTO 127
1000 LET M$="DEADLY RATTLESNAKE"
1010 LET R=8
1015 IF C>50 THEN LET R=12
1020 LET CASH=5
1030 RETURN
1100 LET M$="TARANTULA SPIDER"
1105 LET R=10
1110 IF C>50 THEN LET R=15
1120 RETURN
1200 LET M$="GIANT CENTIPEDE"
1210 LET R=7
1215 IF C>50 THEN LET R=11
1220 LET CASH=7
1230 RETURN
1300 LET M$="POISONOUS SNAIL"
1310 LET R=2
1315 IF C>50 THEN LET R=4
1320 LET CASH=1
1330 RETURN
1400 LET M$="CAVE BEAR"
1410 LET R=10
1415 IF C>50 THEN LET R=15
1420 LET CASH=9
1430 RETURN
1500 LET M$="VAMPIRE BAT"
1510 LET R=5
1515 IF C>50 THEN LET R=8
1520 LET CASH=4
1530 RETURN
1600 LET M$="GIANT RAT"
1610 LET R=7
1615 IF C>50 THEN LET R=11
1620 LET CASH=7
1630 RETURN
1700 LET M$="SABRE TOOTHED TIGER"

1710 LET R=9
1715 IF C>50 THEN LET R=18
1720 LET CASH=7
1730 RETURN
1800 LET M$="FIERCE UNICORN"
1810 LET R=5
1815 IF C>50 THEN LET R=8
1820 LET CASH=7
1830 RETURN
1900 LET M$="ANGRY GORILLA"
1910 LET R=9
1915 IF C>50 THEN LET R=15
1920 LET CASH=3
1930 RETURN

```

```

0000 LET M$="CREEPING FUNGUS"
0010 LET R=6
0015 IF C>50 THEN LET R=9
0020 LET CASH=5
0030 RETURN
0040 CLS
0050 PRINT "*****"
0060 PRINT "*****"
0070 PRINT "*****"
0080 PRINT "*****"
0090 PRINT "*****"
0100 PRINT "*****"
0110 PRINT "*****"
0120 PRINT "*****"
0130 PRINT "*****"
0140 PRINT "*****"
0150 PRINT "*****"
0160 PRINT "*****"
0170 PRINT "*****"
0180 PRINT "*****"
0190 PRINT "*****"
0200 PRINT "*****"
0210 PRINT "*****"
0220 PRINT "*****"
0230 PRINT "*****"
0240 PRINT "*****"
0250 PRINT "*****"
0260 PRINT "*****"
0270 PRINT "*****"
0280 PRINT "*****"
0290 PRINT "*****"
0300 PRINT "*****"
0310 PRINT "*****"
0320 PRINT "*****"
0330 PRINT "*****"
0340 PRINT "*****"
0350 PRINT "*****"
0360 PRINT "*****"
0370 PRINT "*****"
0380 PRINT "*****"
0390 PRINT "*****"
0400 PRINT "*****"
0410 PRINT "*****"
0420 PRINT "*****"
0430 PRINT "*****"
0440 PRINT "*****"
0450 PRINT "*****"
0460 PRINT "*****"
0470 PRINT "*****"
0480 PRINT "*****"
0490 PRINT "*****"
0500 PRINT "*****"
0510 PRINT "*****"
0520 PRINT "*****"
0530 PRINT "*****"
0540 PRINT "*****"
0550 PRINT "*****"
0560 PRINT "*****"
0570 PRINT "*****"
0580 PRINT "*****"
0590 PRINT "*****"
0600 PRINT "*****"
0610 PRINT "*****"
0620 PRINT "*****"
0630 PRINT "*****"
0640 PRINT "*****"
0650 PRINT "*****"
0660 PRINT "*****"
0670 PRINT "*****"
0680 PRINT "*****"
0690 PRINT "*****"
0700 PRINT "*****"
0710 PRINT "*****"
0720 PRINT "*****"
0730 PRINT "*****"
0740 PRINT "*****"
0750 PRINT "*****"
0760 PRINT "*****"
0770 PRINT "*****"
0780 PRINT "*****"
0790 PRINT "*****"
0800 PRINT "*****"
0810 PRINT "*****"
0820 PRINT "*****"
0830 PRINT "*****"
0840 PRINT "*****"
0850 PRINT "*****"
0860 PRINT "*****"
0870 PRINT "*****"
0880 PRINT "*****"
0890 PRINT "*****"
0900 PRINT "*****"
0910 PRINT "*****"
0920 PRINT "*****"
0930 PRINT "*****"
0940 PRINT "*****"
0950 PRINT "*****"
0960 PRINT "*****"
0970 PRINT "*****"
0980 PRINT "*****"
0990 PRINT "*****"

```

```

0520 IF INKEY$="" THEN GOTO 2520
0530 IF INKEY$="A" THEN NEW
0540 GOTO 10
0550 PRINT TAB 10;"ADVENTURE"
0560 PRINT
0570 PRINT "YOU ARE MAKING YOUR
0580 WAY THROUGH A CAVE SYSTEM.YOUR O
0590 BJECTIVE IS TO GAIN £100. VARIO
0600 US MONSTERS WILL ATTACK YOU AND
0610 YOU WILL BE PAID IF YOU KILL THE
0620 M."
0630 PRINT "THERE ARE ALSO PHYSI
0640 CAL HAZARDS WHICH WILL DEplete Y
0650 OUR STRENGTH "
0660 PRINT
0670 PRINT
0680 PRINT "PRESS NEWLINE TO CON
0690 TINUE"
0700 PRINT "GOOD LUCK"
0710 IF INKEY$="" THEN GOTO 3050
0720 GOTO 5000
0730 CLS
0740 PRINT "UNFORTUNATELY,THE " ;
0750 M$;" HAS JUST KILLED YOU."
0760 PRINT AT 10,10;"YOU "
0770 PRINT AT 11,10;" "
0780 PRINT AT 12,10;" "
0790 PRINT AT 13,10;" "
0800 PAUSE 100
0810 PRINT AT 17,0;"HOWEVER,I LI
0820 KED THE WAY YOU PLAYED SO I
0830 AM GOING TO OFFER TO REINCARNATE
0840 YOU"
0850 PRINT "PRESS NEWLINE TO CON
0860 TINUE"
0870 IF INKEY$="" THEN GOTO 4022
0880 IF INKEY$="A" THEN NEW
0890 CLS
0900 LET D=20
0910 LET C=0
0920 LET L=0
0930 LET M=0
0940 GOTO 10
0950 LET U=INT (RND*10)
0960 IF C>=100 THEN GOTO 2500
0970 IF U>5 THEN GOTO 314
0980 IF U<5 THEN GOTO 103
0990 GOTO 9200
1000 LET R=R-INT (RND*4)
1010 IF R<0 THEN LET R=R-INT (RN
1020 D*4)
1030 IF M>3 THEN GOTO 7000
1040 IF B$(1)="H" THEN PRINT "HE
1050 BALLY BOY"
1060 IF B$(1)="S" THEN PRINT "S
1070 HAD A BALLY BOUNCER"
1080 IF B$(1)<>"H" AND B$(1)<>"S
1090 THEN PRINT "REGS TR"
1100 GOTO 170
1110 IF M=4 THEN PRINT "YOU ARE
1120 NOT DOING TOO WELL"
1130 IF M=5 THEN PRINT "YOUR STR
1140 ENGTH IS LOW"
1150 IF M=6 THEN PRINT "E SHOULD
1160 HAVE BEEN"
1170 IF M=7 THEN PRINT "NEEDING
1180 MORE"
1190 PAUSE 50
1200 GOTO 170
1210 GOSUB 8000+(100*X)+100
1220 PRINT "YOUR PROGRESS IS IMP
1230 EDED"
1240 PRINT "BY A":M$
1250 PRINT "WHAT ARE YOU GOING T
1260 O DO?"

```

```

8021 LET J=1
8025 INPUT I$
8030 LET I=INT (RND*10)
8035 IF I$(1)="R" THEN GOTO 103
8040 PRINT "IF YOU "I$;" IT WILL
8045 REDUCE YOUR STRENGTH BY "I
8050 PRINT "YOUR AVAILABLE STREN
8055 GTH IS "D
8060 PRINT "WOULD YOU RATHER DO
8065 SOMETHING ELSE?"
8070 INPUT T$
8075 CLS
8080 IF T$(1)="R" THEN GOTO 103
8085 IF T$(1)="Y" THEN GOTO 8010
8090 IF D<I THEN PRINT "YOUR STR
8095 ENGTN IS NOT ENOUGH"

```

```

8042 IF D<I THEN PRINT "WHAT ARE
8045 YOU GOING TO DO?"
8050 IF D<I THEN GOTO 8037
8055 LET D=D-I
8060 LET J=0
8065 GOTO 5000
8070 LET H$=" ROOF FALL"
8075 RETURN
8080 LET H$=" WIDE CHASM"
8085 RETURN
8090 LET H$="N UNDERGROUND RIVER"
8095 RETURN
8100 LET H$=" SHARP FALL"
8105 RETURN
8110 LET H$=" DEAD END"
8115 RETURN
8120 LET H$=" PRECIPICE"
8125 RETURN
8130 LET H$=" FLOODED PASSAGEWAY"
8135 RETURN
8140 LET H$=" ROCK SLIP"
8145 RETURN
8150 LET H$=" SHEER ROCK FACE"
8155 RETURN
8160 LET H$=" WATERFALL"
8165 RETURN
8170 LET H$="N UNDERGROUND LAKE"
8175 RETURN
8180 LET G=INT (RND*4)
8185 CLS
8190 IF G=0 AND F=1 THEN GOTO 92
8200
8210 IF G=1 AND G=1 THEN GOTO 92
8220
8230 GOSUB 9300+(G*100)
8235 PRINT "PRESS NEWLINE TO CON
8240 TINUE"
8245 IF INKEY$="" THEN GOTO 9231
8250 CLS
8255 GOTO 5000
8260 PRINT "YOU FIND A MAGIC POW
8265 ER WHICH DOUBLES YOUR FIGHT
8270 ING"
8275 LET F=F+1
8280 PRINT "THIS ALLOWS YOU TO
8285 ESCAPE FROM MONSTERS IN THE MID
8290 DLE OF A BATTLE"
8295 RETURN
8300 PRINT "YOU FIND A MAGIC POW
8305 ER WHICH DOUBLES YOUR FIGHT
8310 ING"
8315 LET Q=1
8320 RETURN
8325 PRINT "YOU FIND A POW
8330 ER WHICH DOUBLES YOUR FIGHT
8335 ING"
8340 LET C=C+20
8345 RETURN
8350 PRINT "YOU FIND A MAGIC POW
8355 ER WHICH DOUBLES YOUR FIGHT
8360 ING"
8365 LET D=D*2
8370 RETURN
8375 CLS
8380 PRINT "ENTER MONEY TO BE CO
8385 NVERTED TO STRENGTH"
8390 INPUT S
8395 IF C<S THEN GOTO 9720
8400 LET C=C-S
8405 LET D=D+(3*S)
8410 CLS
8415 GOTO 191
8420 SAVE "QUEST"
8425 RUN

```

ZX BANNERS

IF YOU are wondering what to do with your printer why not try ZX Banners which will print out banners of as many letters as you want each three inches high. Letters are printed sideways, so the length of a banner is restricted only by the amount of paper in the printer.

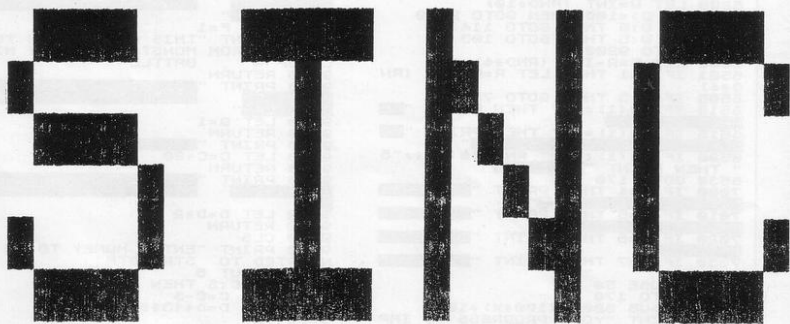
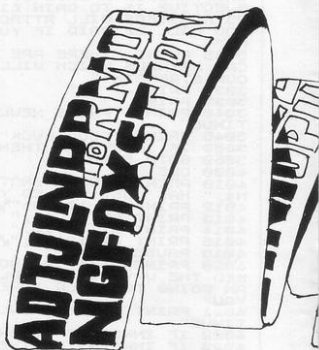
While letters and graphics will work, functions will not. The width of a letter can be changed by altering line 910—e.g., by inserting FOR F=1 to 4 would double the width.

ZX Banners was sent by Christopher Holt, of Gravesend, Kent.

```

1 REM "BANNERS"
10 DIM D$(64)
20 INPUT M$
30 FAST
40 FOR C=1 TO LEN M$
50 LET A$=M$(C)
60 IF CODE A$>63 THEN LET A$=C
70 LET Z=PEEK (7680+N*8*CODE A
  $)
80 FOR X=1 TO 8
90 LET Z=Z/2
100 IF Z<>INT Z THEN GOTO 500
110 LET D$(N*8+X)="0"
115 IF CODE M$(C)>63 THEN LET D
$(N*8+X)="1"
120 IF N*8+X=64 THEN GOSUB 900
130 LET Z=INT Z
140 NEXT X
150 NEXT C
160 NEXT C
170 SLOW
180 GOTO 1010
500 LET D$(N*8+X)="1"

```



BANNERS

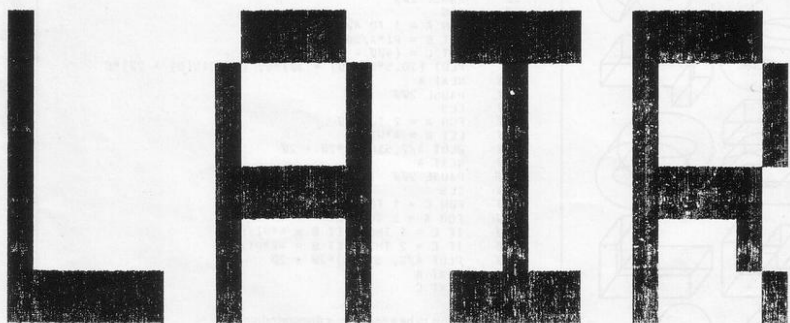


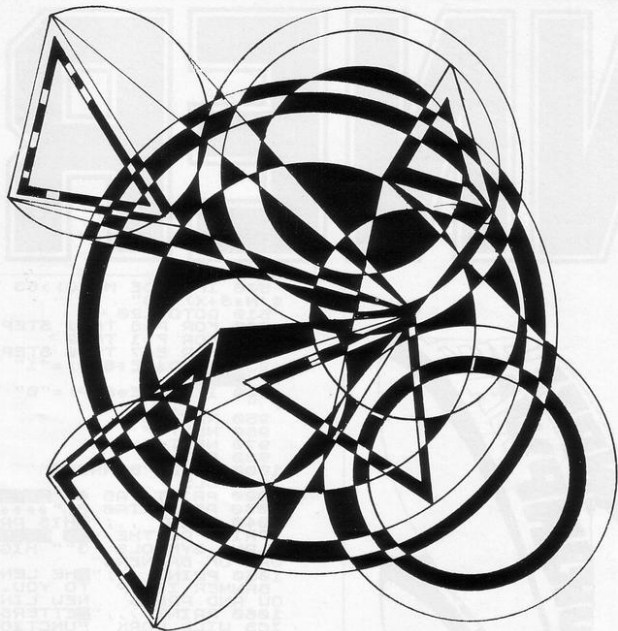
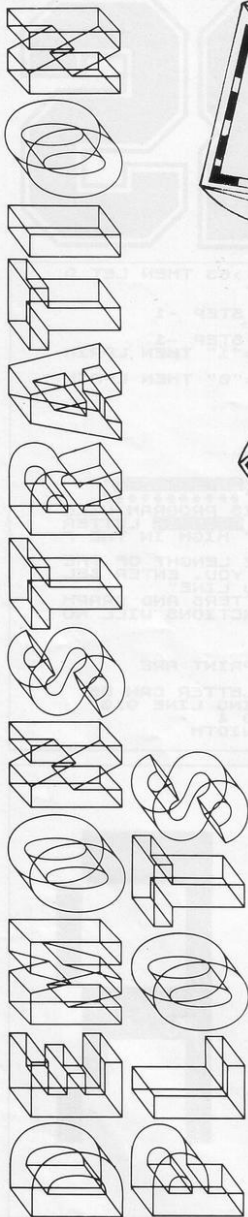
```

505 IF CODE M$(C)>63 THEN LET D
$(N+8+X)="0"
510 GOTO 120
900 FOR P=8 TO 1 STEP -1
910 FOR F=1 TO 2
920 FOR E=7 TO 0 STEP -1
930 IF D$(E+8+P)="1" THEN LPRIN
T " ";
940 IF D$(E+8+P)="0" THEN LPRIN
T " ";
950 NEXT E
960 NEXT F
970 NEXT P
980 RETURN
1000 SAVE "BANNER"
1010 CLS
1020 PRINT TAB 8;"ZX BANNERS"
1030 PRINT TAB 8;"*****"
1040 PRINT "THIS PROGRAM WILL
PRINT ON THE ZX PRINTER LETTER
S AND SYMBOLS 3" HIGH IN THE F
ORM OF BANNERS"
1050 PRINT "THE LENGHT OF THE
BANNER IS UP TO YOU. ENTER BEL
OW AND PRESS NEW LINE
1060 PRINT "LETTERS AND GRAPH
ICS WILL WORK FUNCTIONS WILL NO
T"
1090 GOTO 10

```

EXAMPLES OF THE PRINT ARE
 ENCLOSED
 THE WIDTH OF THE LETTER CAN BE
 ALLTERED BY CHANGING LINE 910
 EG. 910 FOR F=1 TO 4
 WOULD DOUBLE THE WIDTH





DEMONSTRATION PLOTS uses some of the extra functions available on the ZX-81. Using spirals and sines, the program can create an effective demonstration program if you have sufficient memory. Run it in slow mode.

```

10  FOR A = 1 TO 100
20  LET B = PI*A/50
30  PRINT AT 9*COS(B) + 10, 14*SIN(B) + 15;"inverse
    space"
40  NEXT A
50  PAUSE 200
60  CLS
70  FOR A = 1 TO 400
80  LET B = PI*A/50
85  LET C = (400 - A)/400
90  PLOT (20.5*COS(B) + 30)*C, (20*SIN(B) + 20)*C
100 NEXT A
110 PAUSE 200
120 CLS
130 FOR A = 2 TO 120
140 LET B = A*PI/30
150 PLOT A/2, SIN(B)*20 + 20
160 NEXT A
170 PAUSE 200
180 CLS
190 FOR C = 1 TO 2
200 FOR A = 2 TO 120
210 IF C = 1 THEN LET B = A*PI/60
220 IF C = 2 THEN LET B = -A*PI/60
230 PLOT A/2, SIN(B)*20 + 20
240 NEXT A
250 NEXT C

```

If you wish this to be a continuous demonstration, add:

```

260 PAUSE 200
270 CLS
280 RUN

```

Ohm's Law

OHM'S LAW, by Ken North, allows you to use Ohm's law to work out the value of volts, amps or ohms when you know two but not the third. Enter the known values when prompted, using zero for the unknown value. The display is particularly effective.

```

5 REM OHMS LAW KEN NORTH
10 LET I=0
20 LET U=0
30 LET R=0
40 PRINT AT 2,10;"OHMS LAW"
50 PRINT AT 4,0;"INPUT VALUES"
AND 0 FOR UNKNOWN
60 PRINT AT 6,0;"VOLTS ";
80 INPUT U
90 PRINT U
100 PRINT AT 10,4;"AMPS ";
110 INPUT I
120 PRINT I
130 PRINT AT 14,8;"OHMS ";
140 INPUT R
150 PRINT R
160 IF U=0 THEN GOTO 300
170 IF I=0 THEN GOTO 400
180 LET R=U/I
190 PRINT AT 14,13;R
2000 PAUSE 4E4
2010 CLS
2020 RUN
300 LET U=I*R
310 PRINT AT 6,6;U
320 GOTO 200
400 LET I=U/R
410 PRINT AT 10,9;I
420 GOTO 200

```

OHMS LAW

INPUT VALUES /AND 0 FOR UNKNOWN

VOLTS 240

AMPS 7.05556235

OHMS 34



THE ZX-80 String Sort routine, which occupies only 306 bytes, was written by John Edwards of Coventry. He writes: "The only place to store strings in the ZX-80 is in the VARS store, there being no DIM A\$. So to sort strings into alphabetical order, it is necessary to work in that section".

Lines 7 to 18 allow you to enter eight strings, each called A\$ at first and then POKEd to H\$ to A\$. Subroutine 48 looks through 110 bytes of VARS to find the address of A\$ to H\$ (134 to 141) and stores that numerical information in A (0 to 7). Subroutine 30 swaps the names of two adjacent strings.

Lines 71 to 80 are a bubble sort. The POKEs change the A and B in line 75 to BC, CD, DE and the like and I changes. That saves a good deal of space—and typing; 16675/8 is the number of bytes from the start of the program (+16424).

To search all the VARS section, use:

```
40 LET L = PEEK (16394) + PEEK
(16395)*256
```

```
48 FOR Q = 0 TO L - V
```

Lines 73 and 74 will also need altering.

THE ZX80 STRING SORT

```
5 DIM A(7)
7 FOR J = 0 TO 7
8 LET V = PEEK (16392) + PEEK (16393)*256
10 INPUT A$
12 PRINT A$
14 GOSUB 48
16 POKE A(0), 141 - J
18 NEXT J
19 PRINT
20 GOTO 70

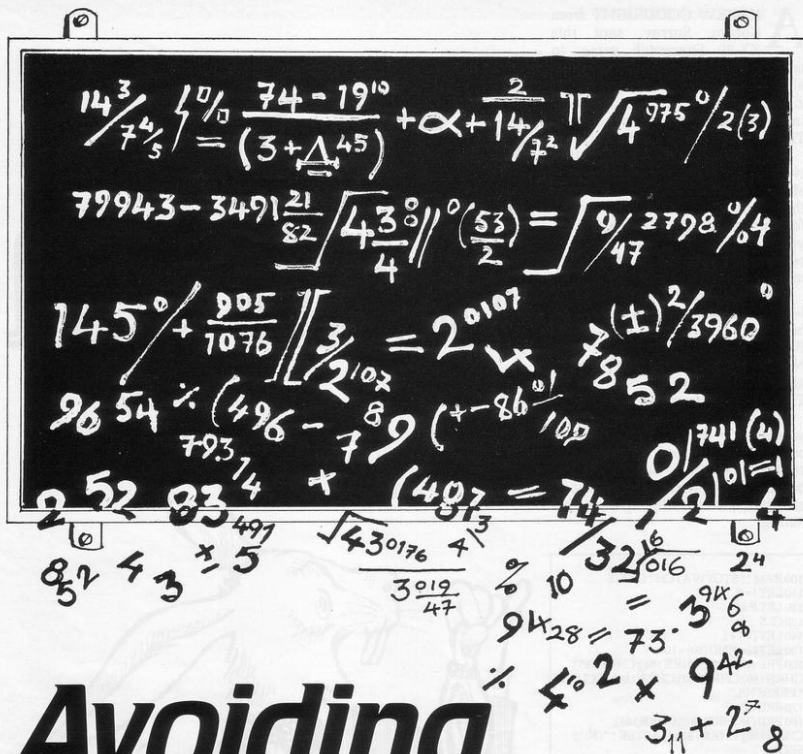
30 POKE A(I), 135 + I
32 POKE A(I + 1), 134 + I
33 GOSUB 48
35 RETURN

48 FOR Q = V TO V + 110
50 LET Z = PEEK(Q)
51 IF Z > 133 AND Z < 142 THEN LET A(Z
-134) = Q
60 NEXT Q
65 RETURN

71 FOR J = 0 TO 6
72 FOR I = 0 TO 6 - J
73 POKE 16675, 84 + I
74 POKE 16378, 85 + I
75 IF A$ > B$ THEN GOSUB 30
79 NEXT I
80 NEXT J

100 PRINT A$, B$, C$, D$, E$, F$, G$, H$
```





Avoiding the ZX-80 Overflow

WITH MOST mathematical operations on the ZX-80, care must be taken to avoid arithmetic overflow. That can be done by defining input limits to avoid a program crash but it can involve a good deal of calculating.

This program, by G A Rooker of Hendon, demonstrates a better method of avoiding arithmetic over-

flow, in this case for an exponentiation calculation.

Lines 80 to 120 test to see if the expression $32767/A^{**}B$ is less than unity. If it is, then $A^{**}B$ is obviously greater than 32767 and the calculation at line 130 is avoided. The principle can be applied to other calculations.

The program fits in 1K.

```

10 PRINT "A TO THE POWER OF B"
20 PRINT
30 PRINT "A", "B", "RESULT"
40 INPUT A
50 PRINT A
60 INPUT B
70 PRINT B
80 LET C=32767
90 FOR D=1 TO B
100 LET C=C/A
110 NEXT D
120 IF C < 1 THEN GOTO 160
130 LET E=A**B
140 PRINT E
150 GOTO 40
160 PRINT "TOO HIGH"
170 GOTO 40

```

© G A Rooker, 1981.

ANDREW GOODRIGHT from Cheam, Surrey, sent this ZX-80 Stopwatch game, in which you have to guess the time elapsed from a starting-point, the ZX-90 naming a time and the playing, starting and stopping the clock. The computer also rates your efforts.

You get 10 points if you are within two seconds of the correct time, eight points for being within two to three seconds of the time, six points for four to six seconds, three points if you are between seven and 10 seconds, and no points if you are more than 10 seconds out.

The variables:

J—The number of tries the player had had.

P—The player's score.

N—The time for which the player is aiming.

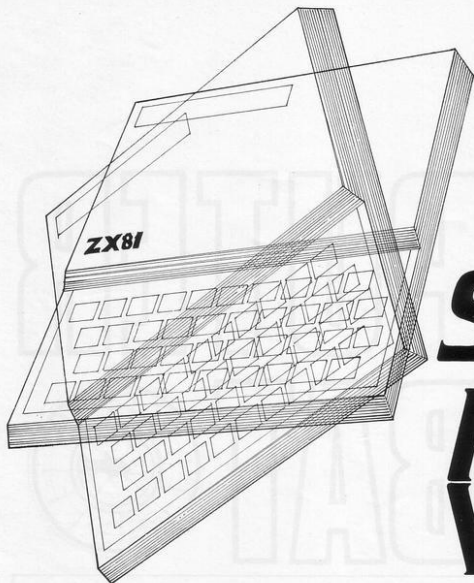
TE—The time the player achieves.

Note that the program works by accessing the ZX-80 frame counter—addresses 16414 and 16415. Goodright has used the popular convention of an underlined asterisk (*) to indicate a space in this listing.

```
100 REM ** STOPWATCH * GAME
110 LET J=0
120 LET P=0
130 CLS
140 LET J=J+1
150 LET N=RND(50)+10
160 PRINT "TO **: CHR$(184);CHR$(185);
CHR$(186);CHR$(183);CHR$(185); " CLOCK
* PRESS N/L"
170 PRINT
180 PRINT CHR$(184);CHR$(185);
CHR$(180);CHR$(181); " AFTER *";N;"*
SEC"
190 INPUT AS
200 POKE 16414,0
210 POKE 16415,0
220 PRINT
230 PRINT "TO **: CHR$(184);CHR$(185);
CHR$(180);CHR$(181); " PRESS * N/L"
240 INPUT AS
250 CLS
260 LET TE=((PEEK(16415)*256+
PEEK(16414)-4)*2)/100
270 LET TD=ABS(N-TE)
280 IF 11>TD AND TD>7 OR TD=7 THEN
LET P=P+3
290 IF 7>TD AND TD>4 OR TD=4 THEN
LET P=P+6
300 IF 4>TD AND TD>2 OR TD=2 THEN
LET P=P+8
310 IF TD>10 THEN PRINT "TERRIBLE"
320 IF 2>TD AND TD>0 OR TD=0 THEN
LET P=P+10
330 PRINT "YOU * STOPPED * THE * CLOCK
* AT **: TE; " SEC. ***";TD; " SEC * FROM
*";N;"* SEC"
340 PRINT "DO * YOU * WISH * TO *
CONTINUE? * (Y/N)"
350 INPUT AS
360 IF AS="Y" THEN GOTO 130
370 IF NOT AS="N" THEN GOTO 350
380 CLS
390 PRINT "YOU * SCORED *";P;" PT * OUT
* OF * A1", " * POSSIBLE *";J*10
400 STOP
```

STOPWATCH





The ZX81 Screen Invert Routine

Z-80 ASSEMBLY LISTING

```

LD HL, (D-FILE)
LD B, 23
DEC HL
NEXT INC HL
LD A, (HL)
CP 118
JR NZ, INV
DJNZ NEXT
RET
INV LD A, 128
LD (HL), A
JR NEXT

```

HEX. DUMP

```

2A 0C 40 06 17 2B 23 7E
FE 76 20 03 10 78 C9 C6
80 77 18 F2

```

```

POKE 16388,127
POKE 16388,188
10 FOR C=32700 TO 32719
20 INPUT N
30 POKE C,N
40 PRINT C;TAB 8;N;PEEK C
50 NEXT C

```

WITH THE FOLLOWING DATA, USE THE ABOVE BASIC PROGRAM TO LOAD THE MACHINE CODE

```

42,12,64,6,23,43,35,126,254,118,
32,3,16,246,201,198,128,119,24,
242

```

(C) JOHN MILLER

FIFTEEN-year-old John Miller, of Farlington, Portsmouth, has written a machine-code routine, *Invert*, to invert the whole screen of the ZX-81 with $\frac{3}{4}$ or more K—or 1K, so long as 22 lines have been PRINTed to the screen. The routine takes 1/50 of a second in the FAST mode and 4/50 of a second in SLOW.

It is a very useful routine for game explosions, advertising displays and the like. The listing shows an Assembly listing, a hexadecimal dump and the Basic loader program.

Use RAND USR 32700 to call the routine. The routine returns the value of the remainder of the result of dividing the address where the routine starts. If loaded to 32700, the routine returns the remainder of 32700/256—that is 188. Therefore, RAND USR 32700 will, as well as inverting the screen, set the RANDOM seed to 188—i.e., RAND 188.

The routine uses only 20 bytes. Miller tried loading the routine to the last 20 bytes of RAM but that crashed the system, even though RAMTOP is set below those bytes. That should not cause the system to crash by a corruption of the Stack. We would be interested in hearing from anyone who can explain why the system crashes in that circumstance.

COMPUTER COMBAT



THE FIRST question often asked about a new machine is "Does it play *Space Invaders*?". Though a 1K machine has considerable difficulty getting anywhere near, *Computer Combat* for 1K ZX-81 is a type of mini space invaders but with only one invader and one base and a much slower rate of firing.

The object of the game is to hit the invader as many times as possible before it lands or you run out of missiles. Twenty-five missiles normally are given but that can be altered by changing the value of B in line 5.

You receive five points for hitting it but lose one if you miss. Use keys 5 and 8 to move left and right respectively and key 0 to fire. The invaders' missiles are shown as an asterisk and yours as a cross. The program is good for beginners, as it is easy to understand the function of each line as there are none of the usual POKES and PEEKS or other complicated functions.

If you want to get more memory, enter in direct mode the following BEFORE entering the program:

POKE 16389,58 followed by NEWLINE
NEW followed by NEWLINE

The program will run continuously until the BREAK key is used.

Computer Combat was sent in by 15-year-old Anthony Wells, of totnes, Devon.

```

5 LET B=VAL "25"
10 LET S=PI-PI
15 LET M=PI-PI
20 LET X=VAL "15"
25 LET Y=PI-PI
30 LET M=M+2
35 IF M>VAL "20" THEN GOTO VAL
"100"
40 CLS
45 LET R=INT (RND*5)
50 IF R=3 THEN GOSUB 155
55 PRINT AT M,Y;"*"
60 LET Y=Y+VAL "2"
65 IF Y=VAL "30" THEN GOTO 25
70 PRINT AT 21,X;"+"
75 LET X=X+(INKEY$="8")*3-(INKEY$="5")*3
80 IF INKEY$="0" THEN GOSUB 11
5
85 IF B<=VAL "0" THEN GOTO VAL
"100"
95 GOTO VAL "40"
100 PRINT AT 12,10;"SCORE=";S
105 PAUSE VAL "300"
110 RUN
115 PRINT AT M,X;"+"
120 IF X+1(>Y THEN LET S=S-1
125 IF X+1=Y THEN PRINT AT M,X-
1;"*"
130 IF X+1=Y THEN LET S=S+5
135 LET S=B-VAL "1"
140 RETURN
145 PAUSE VAL "50"
150 GOTO VAL "40"
155 PRINT AT 21,Y,CHR$ 23
160 IF X=Y THEN GOSUB VAL "170"
165 RETURN
170 PRINT AT 21,Y;"<*>"
175 PAUSE VAL "40"
180 LET S=S-VAL "5"
185 RETURN

```

FIG 1





Cricket Averages

A PROGRAM designed to be useful with other cricket games, e.g., the Video Software Test Match and the Emvive Software Mini Cricket is Cricket Averages, submitted by G Evans of Dartford, Kent.

The program is far too long to input—about three hours—and the description may or may not need to include the listing of variables included by the writer. So it is completely untested.

```

5 REM
10 PRINT TAB 5; "CRICKET AVERAGES"
15 PRINT TAB 5; "YOU WISH TO FIND AVERAGES?"
20 PRINT AT 3,0; "HOW MANY TEAMS?"
30 INPUT TEAMS
35 PRINT TEAMS
40 DIM AS(TEAMS,15)
50 DIM BS(15,TEAMS,0)

```

```

60 DIM I(15,TEAMS)
70 DIM J(15,TEAMS)
80 DIM K(15,TEAMS)
90 DIM L(15,TEAMS)
100 FOR I=1 TO TEAMS
110 INPUT "ENTER TEAM ";L(I);""
120 PRINT "ENTER TEAM ";L(I);""
130 PRINT "NO. OF PLAYERS (MAX. 145)"
140 INPUT PLAYERS
145 PRINT PLAYERS

```

```

150 FOR Z=1 TO PLAYERS
160 CLS
170 PRINT "NAME NO. ";Z;""
180 INPUT BS(Z,L)
190 PRINT BS(Z,L)
200 PRINT "NO. OF INNINGS ?";
210 INPUT I(Z,L)
220 FOR Y=1 TO I(Z,L)
230 PRINT AT 2,0; "SCORE ";Y;""
240 REPRESENTS NOT OUT)
250 INPUT MS
260 PRINT
270 IF MS(LEN MS)=0 THEN LET H=N(I,Z)+1
280 IF MS(LEN MS)=0 THEN LET H=N(I,Z)+1
290 IF Y=1 THEN LET H(I,Z)=0
300 IF UAL MS=H(I,Z) THEN LET H(I,Z)=UAL MS
310 AND UAL MS=10
320 THEN LET F(I,Z)=F(I,Z)+1
330 IF UAL MS=0 THEN LET C(I,Z)=0
340 LET A(I,Z)=R(I,Z)/I(I,Z)-N(I,Z)
350 LET A(I,Z)=INT(A(I,Z)+0.5)
360 NEXT Y
370 NEXT Z
380 GOSUB 950
390 CLS
400 PRINT AS(L)
410 PRINT AT 2,0; "I NO RUNS MS"
420 FOR Z=1 TO PLAYERS
430 PRINT AS(Z);TAB 5;I(Z,L);TAB 10;F(Z,L);TAB 15;R(Z,L);TAB 20;C(Z,L);TAB 25;A(Z,L)
440 NEXT Z
450 PRINT "DO YOU WANT A PRINT-OUT OF THIS TABLE(Y/N)?"
460 INPUT Y
470 PRINT AT 20,0; "43"
480 IF LS="Y" THEN COPY
490 PRUSE 200
500 POKE 16437,255
510 CLS
520 PRINT "DO YOU WANT BOWLING AVERAGES FOR ";AS(L); " (Y/N)?"
530 INPUT LS
540 IF LS="Y" THEN GOSUB 3000
550 NEXT L
560 STOP
570 FAST
580 FOR M=1 TO PLAYERS-1
590 FOR J=1 TO PLAYERS-M
600 IF A(J,L)=A(J+1,L) THEN GOT 0 1040
610 GOSUB 3000
620 NEXT H
630 NEXT L
640 RETURN
650 LET X=R(J+1,L)
660 LET A(J+1,L)=A(J,L)
670 LET R(J+1,L)=X
680 LET X=U(J+1,L)
690 LET F(J+1,L)=F(J,L)
700 LET C(J+1,L)=C(J,L)
710 LET BS(J+1,L)=BS(J,L)
720 LET BS(J,L)=X
730 LET N(J+1,L)=N(J,L)
740 LET X=R(J+1,L)
750 LET A(J+1,L)=A(J,L)
760 LET R(J+1,L)=X
770 LET X=U(J+1,L)
780 LET F(J+1,L)=F(J,L)
790 LET C(J+1,L)=C(J,L)
800 LET BS(J+1,L)=BS(J,L)
810 LET BS(J,L)=X
820 RETURN
830 CLS
840 PRINT "HOW MANY BOWLERS?"
850 INPUT BOWLERS
860 DIM CS(BOWLERS,12)
870 DIM D(BOWLERS)
880 DIM U(BOWLERS)
890 DIM O(BOWLERS)
900 DIM L(BOWLERS)
910 FOR Z=1 TO BOWLERS
920 PRINT "BOWLER NO. ";Z;""
930 INPUT CS(Z)
940 PRINT CS(Z)
950 PRINT "TOTAL NO. OF OVERS"
960 INPUT O(Z)
970 PRINT O(Z)
980 PRINT "TOTAL NO. OF WICKETS"
990 INPUT U(Z)
1000 PRINT U(Z)
1010 PRINT "TOTAL NO. OF RUNS"
1020 INPUT S(Z)
1030 PRINT S(Z)
1040 CLS
1050 LET L(Z)=S(Z)/O(Z)
1060 LET L(Z)=INT(L(Z)+0.5)/10
1070 NEXT Z
1080 FAST
1090 FOR P=1 TO BOWLERS-1
1100 FOR M=1 TO BOWLERS-P
1110 IF L(M)>L(M+1) THEN GOTO 32 120
1120 GOSUB 3500
1130 NEXT H
1140 STOP
1150 PRINT AT 1,12; "0 RUNS U"
1160 RETURN
1170 FOR M=1 TO BOWLERS
1180 PRINT CS(M);TAB 5;O(M);TAB 10;U(M);TAB 15;S(M);TAB 20;L(M)
1190 NEXT M
1200 PRINT AT 20,0; "DO YOU WANT A PRINT-OUT OF THIS TABLE(Y/N)?"
1210 INPUT Y
1220 PRINT AT 20,0; "43"
1230 IF LS="Y" THEN COPY
1240 PRUSE 200
1250 POKE 16437,255
1260 CLS
1270 PRINT "DO YOU WANT BOWLING AVERAGES FOR ";AS(L); " (Y/N)?"
1280 INPUT LS
1290 IF LS="Y" THEN GOSUB 3000
1300 NEXT L
1310 STOP

```

PROGSAVE AND PROGRETRIEVE

PROGSAVE PROGRETRIEVE RAMTOP BASIC ERASE

FOR THE more technically-minded, here are two useful machine code routines for the ZX-81. If you have ever been annoyed at having to lose a program in memory when wanting to load another from tape, even though both could fit easily, then *Progsave* and *Progretrieve* could be the answer.

The routine copies the program presently in RAM to above RAMTOP. Though RAMTOP is relocated to make room, nothing already above RAMTOP is changed. If there is not sufficient memory, the program will return to Basic.

Using the routine, any program can be disassembled—many disassemblers needing to be in RAM, not above RAMTOP. To load programs from tape without losing the program already in RAM, *Progsave* must be used in conjunction with *Progretrieve*. That routine will restore a program from above RAMTOP to address 16509 and thus any program already in memory will be moved up in memory; you may need to re-number after use. The copy above RAMTOP is erased and RAMTOP is re-set to the value it had before running *Progsave*.

To use the routines the following instructions may help:

Write main section of program; run *Progsave*; load subroutines needed from tape; run *Progretrieve*; re-number if necessary.

After completing that the program will be the main program followed by the subroutines. If any line numbers clash, the only method of re-numbering is to use a re-number routine—using the EDIT key will not work.

Progsave and *Progretrieve* were sent by John Hardman, of Welling, Kent.

4082	ORG 16514
4082 2A0C40	LD HL, (16396)
4085 117D40	LD DE, 16509
4088 A7	AND A
4089 ED52	SBC HL, DE
408B F8	EX DE, HL
408C D5	PUSH DE
408D 2A0440	LD HL, (16388)
4090 A7	AND A
4091 ED52	SBC HL, DE
4093 EB	EX DE, HL
4094 2A1040	LD HL, (16400)
4097 A7	AND A
4098 ED52	SBC HL, DE
409A D1	POP DE
409L F0	RET P
409C 2A0440	LD HL, (16388)
409F A7	AND A
40A0 ED52	SBC HL, DE
40A2 2B	DEC HL
40A3 2B	DEC HL
40A4 220440	LD (16388), HL
40A7 72	LD (HL), D
40A8 23	INC HL
40A9 73	LD (HL), E
40AA 23	INC HL
40AB 42	LD B, D
40AC 4B	LD C, E
40AD 117D40	LD DE, 16509
40B0 L3	EX DE, HL
40B1 ED80	LDIR
40B3 C9	RET

4082	ORG 16514
4082 2A0440	LD HL, (16388)
4085 46	LD B, (HL)
4086 23	INC HL
4087 4E	LD C, (HL)
4088 23	INC HL
4089 117D40	LD DE, 16509
408C F8	EX DE, HL
408D E5	LABEL: PUSH HL
408E C5	PUSH BC
408F 1A	LD A, (DE)
4090 13	INC DE
4091 D5	PUSH DE
4092 ED30440	LD (16388), DE
4096 D2605	CALL 0526H
4099 D3	POP DE
409A C1	POP BC
409B E1	POP HL
409C 23	INC HL
409D 0B	DEC BC
409E 78	LD A, B
409F D1	OR C
40A0 20EB	JR NZ, LABEL
40A2 C9	RET

```

10 REM "SMAUG"
10 REM C M CORNS
20 LET X=0
30 RND=0
40 PRINT TAB 3; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
50 INPUT Q$
70 IF Q$="Y" THEN GOTO 110
80 IF Q$="N" THEN GOTO 120
90 PRINT AT 10,0;"MAKE UP YOUR
MIND."
100 GOTO 60
110 GOSUB 1000
120 GOSUB 2000
130 SLOW
140 CLS
145 GOTO 3000
150 IF X<0 THEN GOTO 140
160 IF Y#E AND ARK#0 THEN GOTO
7000
170 IF Y#E AND ARK#1 THEN GOTO
170
175 IF Y#E THEN GOTO 200
180 PRINT TAB 4; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
190 INPUT Q$
200 IF Q$="Y" THEN GOTO 120
210 IF Q$="N" THEN GOTO 120
220 STOP
230 CLS
240 PRINT "YOUR AIM IS TO FIND
SMAUG AND KILL HIM. HIM SO THAT Y
OU CAN TAKE "THE ARKENSTONE"
250 PRINT "THE ARKENSTONE IS A
ETUOR OF 20" INTERCONNECTING C
260 PRINT "EACH CAVE HAS 3 EXITS L
EADING FROM IT."
270 PRINT "THERE ARE DANGERS
THOUGH - THOSE CAVES CONTAIN O
RCS WHO CAN "MAGICALLY TRANSPO
RT YOU TO "ANOTHER CAVE AT RANDO
M."
280 PRINT "YOU ONLY HAVE 5 AR
ROWS LEFT. WHICH TO KILL SMAUG
USE "THEN USELY."
290 PRINT "PRESS NEWLINE TO C
ONTINUE."
300 INPUT Q$
310 CLS
320 PRINT "WHEN YOU SHOOT AT
SMAUG YOU "MIGHT BE LUCKY AND K
ILL HIM. OR HE MIGHT "BURN Y
OU (TAKING "THE ARKENSTONE WITH HI
M) OR HE "MAY ATTACK YOU."
330 PRINT "OH, I NEARLY FORGO
T."
340 PRINT "ONE CAVE HAS A BAL
ROG IN IT. "WHICH IS AN "EAT
ING THING", WHICH WILL KILL YOU ON S
EEN."
350 PRINT "PRESS NEWLINE TO C
ONTINUE."
360 INPUT Q$
370 RETURN
380 LET S=0
390 CLS
400 LET B$="SCJDEARDNDCGRGH"
410 LET B$="L5DELEARDNDCGRGH"
420 LET B$="NPPHCHPITCJCKGT"
430 LET B$="RTHOSHPITCJCKGT"
440 LET B$="S"
450 GOSUB 2500
460 LET Y=R
470 GOSUB 2500
480 LET E=R
490 IF E#Y THEN GOTO 2000
500 GOSUB 2500
510 LET ORC1=0
520 IF ORC1#Y OR ORC1#E THEN GOTO
210
530 GOSUB 2500
540 LET BALROG=0
550 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
560 GOSUB 2500
570 LET ORC2=0
580 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
590 GOSUB 2500
600 LET ORC3=0
610 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
620 GOSUB 2500
630 LET SMAUG=0
640 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
650 LET ARK=0
660 IF X#0 THEN
670 RETURN
680 IF Y#E OR Y#BALROG THEN GOT
O 3200
690 IF Y#SMAUG THEN GOTO 3270
700 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
710 PRINT "YOU ARE IN ROOM "Y".
720 GOSUB 2500
730 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
740 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
750 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
760 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
770 GOTO 3000
780 GOTO 3260
790 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
800 INPUT Q$
810 IF Q$="Y" THEN GOTO 5000
820 IF Q$="N" THEN GOTO 5070
830 PRINT "ANSWER QUICKLY."
840 GOTO 5000
850 RETURN
860 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
870 IF Q$#0 THEN GOSUB 6000
880 IF Q$#1 THEN GOSUB 6000
890 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
900 INPUT Q$
910 GOTO 200
920 RETURN
930 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
940 GOSUB 2000
950 LET SMAUG=0
960 LET BALROG=0
970 LET ORC1=0
980 LET ORC2=0
990 LET ORC3=0
1000 LET ARK=0
1010 LET X=0
1020 LET Y=0
1030 LET E=0
1040 LET R=0
1050 LET S=0
1060 LET B$="SCJDEARDNDCGRGH"
1070 LET B$="L5DELEARDNDCGRGH"
1080 LET B$="NPPHCHPITCJCKGT"
1090 LET B$="RTHOSHPITCJCKGT"
1100 LET B$="S"
1110 GOSUB 2500
1120 LET Y=R
1130 GOSUB 2500
1140 LET E=R
1150 IF E#Y THEN GOTO 2000
1160 GOSUB 2500
1170 LET ORC1=0
1180 IF ORC1#Y OR ORC1#E THEN GOTO
210
1190 GOSUB 2500
1200 LET BALROG=0
1210 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
1220 GOSUB 2500
1230 LET ORC2=0
1240 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
1250 GOSUB 2500
1260 LET ORC3=0
1270 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
1280 GOSUB 2500
1290 LET SMAUG=0
1300 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
1310 LET ARK=0
1320 IF X#0 THEN
1330 RETURN
1340 IF Y#E OR Y#BALROG THEN GOT
O 3200
1350 IF Y#SMAUG THEN GOTO 3270
1360 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
1370 PRINT "YOU ARE IN ROOM "Y".
1380 GOSUB 2500
1390 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
1400 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
1410 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
1420 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
1430 GOTO 3000
1440 GOTO 3260
1450 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
1460 INPUT Q$
1470 IF Q$="Y" THEN GOTO 5000
1480 IF Q$="N" THEN GOTO 5070
1490 PRINT "ANSWER QUICKLY."
1500 GOTO 5000
1510 RETURN
1520 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
1530 IF Q$#0 THEN GOSUB 6000
1540 IF Q$#1 THEN GOSUB 6000
1550 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
1560 INPUT Q$
1570 GOTO 200
1580 RETURN
1590 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
1600 GOSUB 2000
1610 LET SMAUG=0
1620 LET BALROG=0
1630 LET ORC1=0
1640 LET ORC2=0
1650 LET ORC3=0
1660 LET ARK=0
1670 LET X=0
1680 LET Y=0
1690 LET E=0
1700 LET R=0
1710 LET S=0
1720 LET B$="SCJDEARDNDCGRGH"
1730 LET B$="L5DELEARDNDCGRGH"
1740 LET B$="NPPHCHPITCJCKGT"
1750 LET B$="RTHOSHPITCJCKGT"
1760 LET B$="S"
1770 GOSUB 2500
1780 LET Y=R
1790 GOSUB 2500
1800 LET E=R
1810 IF E#Y THEN GOTO 2000
1820 GOSUB 2500
1830 LET ORC1=0
1840 IF ORC1#Y OR ORC1#E THEN GOTO
210
1850 GOSUB 2500
1860 LET BALROG=0
1870 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
1880 GOSUB 2500
1890 LET ORC2=0
1900 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
1910 GOSUB 2500
1920 LET ORC3=0
1930 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
1940 GOSUB 2500
1950 LET SMAUG=0
1960 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
1970 LET ARK=0
1980 IF X#0 THEN
1990 RETURN
2000 IF Y#E OR Y#BALROG THEN GOT
O 3200
2010 IF Y#SMAUG THEN GOTO 3270
2020 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
2030 PRINT "YOU ARE IN ROOM "Y".
2040 GOSUB 2500
2050 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
2060 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
2070 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
2080 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
2090 GOTO 3000
2100 GOTO 3260
2110 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
2120 INPUT Q$
2130 IF Q$="Y" THEN GOTO 5000
2140 IF Q$="N" THEN GOTO 5070
2150 PRINT "ANSWER QUICKLY."
2160 GOTO 5000
2170 RETURN
2180 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
2190 IF Q$#0 THEN GOSUB 6000
2200 IF Q$#1 THEN GOSUB 6000
2210 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
2220 INPUT Q$
2230 GOTO 200
2240 RETURN
2250 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
2260 GOSUB 2000
2270 LET SMAUG=0
2280 LET BALROG=0
2290 LET ORC1=0
2300 LET ORC2=0
2310 LET ORC3=0
2320 LET ARK=0
2330 LET X=0
2340 LET Y=0
2350 LET E=0
2360 LET R=0
2370 LET S=0
2380 LET B$="SCJDEARDNDCGRGH"
2390 LET B$="L5DELEARDNDCGRGH"
2400 LET B$="NPPHCHPITCJCKGT"
2410 LET B$="RTHOSHPITCJCKGT"
2420 LET B$="S"
2430 GOSUB 2500
2440 LET Y=R
2450 GOSUB 2500
2460 LET E=R
2470 IF E#Y THEN GOTO 2000
2480 GOSUB 2500
2490 LET ORC1=0
2500 IF ORC1#Y OR ORC1#E THEN GOTO
210
2510 GOSUB 2500
2520 LET BALROG=0
2530 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
2540 GOSUB 2500
2550 LET ORC2=0
2560 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
2570 GOSUB 2500
2580 LET ORC3=0
2590 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
2600 GOSUB 2500
2610 LET SMAUG=0
2620 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
2630 LET ARK=0
2640 IF X#0 THEN
2650 RETURN
2660 IF Y#E OR Y#BALROG THEN GOT
O 3200
2670 IF Y#SMAUG THEN GOTO 3270
2680 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
2690 PRINT "YOU ARE IN ROOM "Y".
2700 GOSUB 2500
2710 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
2720 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
2730 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
2740 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
2750 GOTO 3000
2760 GOTO 3260
2770 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
2780 INPUT Q$
2790 IF Q$="Y" THEN GOTO 5000
2800 IF Q$="N" THEN GOTO 5070
2810 PRINT "ANSWER QUICKLY."
2820 GOTO 5000
2830 RETURN
2840 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
2850 IF Q$#0 THEN GOSUB 6000
2860 IF Q$#1 THEN GOSUB 6000
2870 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
2880 INPUT Q$
2890 GOTO 200
2900 RETURN
2910 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
2920 GOSUB 2000
2930 LET SMAUG=0
2940 LET BALROG=0
2950 LET ORC1=0
2960 LET ORC2=0
2970 LET ORC3=0
2980 LET ARK=0
2990 LET X=0
3000 LET Y=0
3010 LET E=0
3020 LET R=0
3030 LET S=0
3040 LET B$="SCJDEARDNDCGRGH"
3050 LET B$="L5DELEARDNDCGRGH"
3060 LET B$="NPPHCHPITCJCKGT"
3070 LET B$="RTHOSHPITCJCKGT"
3080 LET B$="S"
3090 GOSUB 2500
3100 LET Y=R
3110 GOSUB 2500
3120 LET E=R
3130 IF E#Y THEN GOTO 2000
3140 GOSUB 2500
3150 LET ORC1=0
3160 IF ORC1#Y OR ORC1#E THEN GOTO
210
3170 GOSUB 2500
3180 LET BALROG=0
3190 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
3200 GOSUB 2500
3210 LET ORC2=0
3220 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
3230 GOSUB 2500
3240 LET ORC3=0
3250 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
3260 GOSUB 2500
3270 LET SMAUG=0
3280 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
3290 LET ARK=0
3300 IF X#0 THEN
3310 RETURN
3320 IF Y#E OR Y#BALROG THEN GOT
O 3200
3330 IF Y#SMAUG THEN GOTO 3270
3340 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
3350 PRINT "YOU ARE IN ROOM "Y".
3360 GOSUB 2500
3370 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
3380 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
3390 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
3400 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
3410 GOTO 3000
3420 GOTO 3260
3430 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
3440 INPUT Q$
3450 IF Q$="Y" THEN GOTO 5000
3460 IF Q$="N" THEN GOTO 5070
3470 PRINT "ANSWER QUICKLY."
3480 GOTO 5000
3490 RETURN
3500 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
3510 IF Q$#0 THEN GOSUB 6000
3520 IF Q$#1 THEN GOSUB 6000
3530 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
3540 INPUT Q$
3550 GOTO 200
3560 RETURN
3570 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
3580 GOSUB 2000
3590 LET SMAUG=0
3600 LET BALROG=0
3610 LET ORC1=0
3620 LET ORC2=0
3630 LET ORC3=0
3640 LET ARK=0
3650 LET X=0
3660 LET Y=0
3670 LET E=0
3680 LET R=0
3690 LET S=0
3700 LET B$="SCJDEARDNDCGRGH"
3710 LET B$="L5DELEARDNDCGRGH"
3720 LET B$="NPPHCHPITCJCKGT"
3730 LET B$="RTHOSHPITCJCKGT"
3740 LET B$="S"
3750 GOSUB 2500
3760 LET Y=R
3770 GOSUB 2500
3780 LET E=R
3790 IF E#Y THEN GOTO 2000
3800 GOSUB 2500
3810 LET ORC1=0
3820 IF ORC1#Y OR ORC1#E THEN GOTO
210
3830 GOSUB 2500
3840 LET BALROG=0
3850 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
3860 GOSUB 2500
3870 LET ORC2=0
3880 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
3890 GOSUB 2500
3900 LET ORC3=0
3910 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
3920 GOSUB 2500
3930 LET SMAUG=0
3940 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
3950 LET ARK=0
3960 IF X#0 THEN
3970 RETURN
3980 IF Y#E OR Y#BALROG THEN GOT
O 3200
3990 IF Y#SMAUG THEN GOTO 3270
4000 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
4010 PRINT "YOU ARE IN ROOM "Y".
4020 GOSUB 2500
4030 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
4040 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
4050 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
4060 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
4070 GOTO 3000
4080 GOTO 3260
4090 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
4100 INPUT Q$
4110 IF Q$="Y" THEN GOTO 5000
4120 IF Q$="N" THEN GOTO 5070
4130 PRINT "ANSWER QUICKLY."
4140 GOTO 5000
4150 RETURN
4160 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
4170 IF Q$#0 THEN GOSUB 6000
4180 IF Q$#1 THEN GOSUB 6000
4190 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
4200 INPUT Q$
4210 GOTO 200
4220 RETURN
4230 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
4240 GOSUB 2000
4250 LET SMAUG=0
4260 LET BALROG=0
4270 LET ORC1=0
4280 LET ORC2=0
4290 LET ORC3=0
4300 LET ARK=0
4310 LET X=0
4320 LET Y=0
4330 LET E=0
4340 LET R=0
4350 LET S=0
4360 LET B$="SCJDEARDNDCGRGH"
4370 LET B$="L5DELEARDNDCGRGH"
4380 LET B$="NPPHCHPITCJCKGT"
4390 LET B$="RTHOSHPITCJCKGT"
4400 LET B$="S"
4410 GOSUB 2500
4420 LET Y=R
4430 GOSUB 2500
4440 LET E=R
4450 IF E#Y THEN GOTO 2000
4460 GOSUB 2500
4470 LET ORC1=0
4480 IF ORC1#Y OR ORC1#E THEN GOTO
210
4490 GOSUB 2500
4500 LET BALROG=0
4510 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
4520 GOSUB 2500
4530 LET ORC2=0
4540 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
4550 GOSUB 2500
4560 LET ORC3=0
4570 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
4580 GOSUB 2500
4590 LET SMAUG=0
4600 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
4610 LET ARK=0
4620 IF X#0 THEN
4630 RETURN
4640 IF Y#E OR Y#BALROG THEN GOT
O 3200
4650 IF Y#SMAUG THEN GOTO 3270
4660 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
4670 PRINT "YOU ARE IN ROOM "Y".
4680 GOSUB 2500
4690 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
4700 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
4710 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
4720 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
4730 GOTO 3000
4740 GOTO 3260
4750 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
4760 INPUT Q$
4770 IF Q$="Y" THEN GOTO 5000
4780 IF Q$="N" THEN GOTO 5070
4790 PRINT "ANSWER QUICKLY."
4800 GOTO 5000
4810 RETURN
4820 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
4830 IF Q$#0 THEN GOSUB 6000
4840 IF Q$#1 THEN GOSUB 6000
4850 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
4860 INPUT Q$
4870 GOTO 200
4880 RETURN
4890 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
4900 GOSUB 2000
4910 LET SMAUG=0
4920 LET BALROG=0
4930 LET ORC1=0
4940 LET ORC2=0
4950 LET ORC3=0
4960 LET ARK=0
4970 LET X=0
4980 LET Y=0
4990 LET E=0
5000 LET R=0
5010 LET S=0
5020 LET B$="SCJDEARDNDCGRGH"
5030 LET B$="L5DELEARDNDCGRGH"
5040 LET B$="NPPHCHPITCJCKGT"
5050 LET B$="RTHOSHPITCJCKGT"
5060 LET B$="S"
5070 GOSUB 2500
5080 LET Y=R
5090 GOSUB 2500
5100 LET E=R
5110 IF E#Y THEN GOTO 2000
5120 GOSUB 2500
5130 LET ORC1=0
5140 IF ORC1#Y OR ORC1#E THEN GOTO
210
5150 GOSUB 2500
5160 LET BALROG=0
5170 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
5180 GOSUB 2500
5190 LET ORC2=0
5200 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
5210 GOSUB 2500
5220 LET ORC3=0
5230 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
5240 GOSUB 2500
5250 LET SMAUG=0
5260 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
5270 LET ARK=0
5280 IF X#0 THEN
5290 RETURN
5300 IF Y#E OR Y#BALROG THEN GOT
O 3200
5310 IF Y#SMAUG THEN GOTO 3270
5320 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
5330 PRINT "YOU ARE IN ROOM "Y".
5340 GOSUB 2500
5350 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
5360 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
5370 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
5380 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
5390 GOTO 3000
5400 GOTO 3260
5410 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
5420 INPUT Q$
5430 IF Q$="Y" THEN GOTO 5000
5440 IF Q$="N" THEN GOTO 5070
5450 PRINT "ANSWER QUICKLY."
5460 GOTO 5000
5470 RETURN
5480 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
5490 IF Q$#0 THEN GOSUB 6000
5500 IF Q$#1 THEN GOSUB 6000
5510 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
5520 INPUT Q$
5530 GOTO 200
5540 RETURN
5550 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
5560 GOSUB 2000
5570 LET SMAUG=0
5580 LET BALROG=0
5590 LET ORC1=0
5600 LET ORC2=0
5610 LET ORC3=0
5620 LET ARK=0
5630 LET X=0
5640 LET Y=0
5650 LET E=0
5660 LET R=0
5670 LET S=0
5680 LET B$="SCJDEARDNDCGRGH"
5690 LET B$="L5DELEARDNDCGRGH"
5700 LET B$="NPPHCHPITCJCKGT"
5710 LET B$="RTHOSHPITCJCKGT"
5720 LET B$="S"
5730 GOSUB 2500
5740 LET Y=R
5750 GOSUB 2500
5760 LET E=R
5770 IF E#Y THEN GOTO 2000
5780 GOSUB 2500
5790 LET ORC1=0
5800 IF ORC1#Y OR ORC1#E THEN GOTO
210
5810 GOSUB 2500
5820 LET BALROG=0
5830 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
5840 GOSUB 2500
5850 LET ORC2=0
5860 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
5870 GOSUB 2500
5880 LET ORC3=0
5890 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
5900 GOSUB 2500
5910 LET SMAUG=0
5920 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
5930 LET ARK=0
5940 IF X#0 THEN
5950 RETURN
5960 IF Y#E OR Y#BALROG THEN GOT
O 3200
5970 IF Y#SMAUG THEN GOTO 3270
5980 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
5990 PRINT "YOU ARE IN ROOM "Y".
6000 GOSUB 2500
6010 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
6020 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
6030 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
6040 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
6050 GOTO 3000
6060 GOTO 3260
6070 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
6080 INPUT Q$
6090 IF Q$="Y" THEN GOTO 5000
6100 IF Q$="N" THEN GOTO 5070
6110 PRINT "ANSWER QUICKLY."
6120 GOTO 5000
6130 RETURN
6140 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
6150 IF Q$#0 THEN GOSUB 6000
6160 IF Q$#1 THEN GOSUB 6000
6170 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
6180 INPUT Q$
6190 GOTO 200
6200 RETURN
6210 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
6220 GOSUB 2000
6230 LET SMAUG=0
6240 LET BALROG=0
6250 LET ORC1=0
6260 LET ORC2=0
6270 LET ORC3=0
6280 LET ARK=0
6290 LET X=0
6300 LET Y=0
6310 LET E=0
6320 LET R=0
6330 LET S=0
6340 LET B$="SCJDEARDNDCGRGH"
6350 LET B$="L5DELEARDNDCGRGH"
6360 LET B$="NPPHCHPITCJCKGT"
6370 LET B$="RTHOSHPITCJCKGT"
6380 LET B$="S"
6390 GOSUB 2500
6400 LET Y=R
6410 GOSUB 2500
6420 LET E=R
6430 IF E#Y THEN GOTO 2000
6440 GOSUB 2500
6450 LET ORC1=0
6460 IF ORC1#Y OR ORC1#E THEN GOTO
210
6470 GOSUB 2500
6480 LET BALROG=0
6490 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
6500 GOSUB 2500
6510 LET ORC2=0
6520 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
6530 GOSUB 2500
6540 LET ORC3=0
6550 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
6560 GOSUB 2500
6570 LET SMAUG=0
6580 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
6590 LET ARK=0
6600 IF X#0 THEN
6610 RETURN
6620 IF Y#E OR Y#BALROG THEN GOT
O 3200
6630 IF Y#SMAUG THEN GOTO 3270
6640 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
6650 PRINT "YOU ARE IN ROOM "Y".
6660 GOSUB 2500
6670 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
6680 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
6690 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
6700 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
6710 GOTO 3000
6720 GOTO 3260
6730 PRINT "TAB 5; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
6740 INPUT Q$
6750 IF Q$="Y" THEN GOTO 5000
6760 IF Q$="N" THEN GOTO 5070
6770 PRINT "ANSWER QUICKLY."
6780 GOTO 5000
6790 RETURN
6800 PRINT "TAB 12; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
6810 IF Q$#0 THEN GOSUB 6000
6820 IF Q$#1 THEN GOSUB 6000
6830 PRINT "TAB 6; "DO YOU NEED A
N E-PLANETION OF THE STORY? Y
6840 INPUT Q$
6850 GOTO 200
6860 RETURN
6870 PRINT "YOU MISSED. SMAUG
RAN AWAY." "HE HAS TAKEN THE ARKE
NSTONE" "WITH HIM"
6880 GOSUB 2000
6890 LET SMAUG=0
6900 LET BALROG=0
6910 LET ORC1=0
6920 LET ORC2=0
6930 LET ORC3=0
6940 LET ARK=0
6950 LET X=0
6960 LET Y=0
6970 LET E=0
6980 LET R=0
6990 LET S=0
7000 LET B$="SCJDEARDNDCGRGH"
7010 LET B$="L5DELEARDNDCGRGH"
7020 LET B$="NPPHCHPITCJCKGT"
7030 LET B$="RTHOSHPITCJCKGT"
7040 LET B$="S"
7050 GOSUB 2500
7060 LET Y=R
7070 GOSUB 2500
7080 LET E=R
7090 IF E#Y THEN GOTO 2000
7100 GOSUB 2500
7110 LET ORC1=0
7120 IF ORC1#Y OR ORC1#E THEN GOTO
210
7130 GOSUB 2500
7140 LET BALROG=0
7150 IF BALROG#Y OR BALROG#E OR
BALROG#ORC1 THEN GOTO 2140
7160 GOSUB 2500
7170 LET ORC2=0
7180 IF ORC2#Y OR ORC2#BALROG OR
ORC2#ORC1 OR ORC2#E THEN GOTO 21
10
7190 GOSUB 2500
7200 LET ORC3=0
7210 IF ORC3#Y OR ORC3#E OR ORC3
#BALROG OR ORC3#ORC1 OR ORC3#ORC2
THEN GOTO 2140
7220 GOSUB 2500
7230 LET SMAUG=0
7240 IF SMAUG#Y OR SMAUG#E OR SMA
UG#ORC1 OR SMAUG#ORC2 OR SMAUG#OR
C3 THEN GOTO 2140
7250 LET ARK=0
7260 IF X#0 THEN
7270 RETURN
7280 IF Y#E OR Y#BALROG THEN GOT
O 3200
7290 IF Y#SMAUG THEN GOTO 3270
7300 IF Y#ORC1 OR Y#ORC2 OR Y#OR
C3 THEN GOTO 3200
7310 PRINT "YOU ARE IN ROOM "Y".
7320 GOSUB 2500
7330 PRINT "TUNNELS LEAD TO "R1
"R2" "R3"
7340 IF R1#E OR R2#E OR R3#E THEN
GOTO 3150
7350 PRINT "YOU HAVE BEEN ORC-
PORTED TO "ROOM "R".
7360 IF R#E THEN YOU HAVE THE A
RKENSTONE. "AND HADIC IS NO MORE
NOW."
7370 GOTO 3000
7380 GOTO 32
```

Wizard-Wiz

WIZARD WIZ, or a plastic version of it, is better known as *Mastermind* marketed by Invicta. The computer picks a three-digit code using the numbers one to nine, without repeating any digits. You enter your guess for the number—as one three-digit number—and then press NEWLINE.

A correct digit in the correct location will give you a 'black'—an inverse digit—while a correct digit in the wrong place will score a 'white'. There are 10 guesses allowed to crack the code but remember not to use the same digit more than once in a single guess.

The program is written for a ZX-80 but will need more memory on a ZX-81 and needs the following changes. In line 40 alter the way the random number is generated and add INT before the brackets on the right-hand side of the equals sign in lines 100, 110, 120, 290, 300 and 310.

Wizard Wiz is from *The Gateway Guide to the ZX-81 and ZX-80* by Mark Charlton, published by Interface of 44-46 Earls Court Road, London W8 6EJ.



```

10 DIM A(3)
20 DIM B(3)
30 FOR Z = 1 TO 3
40 LET A(Z) = RND(9)
50 NEXT Z
60 IF A(1) = A(2) OR A(1) = A(3)
   OR A(2) = A(3) THEN GOTO 30
70 LET A = 100*A(1) + 10*A(2)+A(3)
80 FOR C = 1 TO 10
90 INPUT B
100 LET B(1) = B/100
110 LET B(2) = (B - 100*B(1))/10
120 LET B(3) = B - 100*B(1) - 10*B(2)
130 IF A = B THEN GOTO 360
140 LET D = A
150 LET N = 156
160 LET W = 0
170 FOR E = 1 TO 3
180 IF NOT A(E) = B(E) THEN GOTO 210

190 LET N = N + 1
200 LET A(E) = 0
210 NEXT E
220 FOR F = 1 TO 3
230 IF A(F) = 0 THEN GOTO 280
240 FOR E = 1 TO 3
250 IF NOT B(F) = A(E) THEN GOTO 270
260 LET W = W + 1
270 NEXT E
280 NEXT F
290 LET A(1) = D/100
300 LET A(2) = (D - 100*A(1))/10
310 LET A(3) = D - 100*A(1) - 10*A(2)
320 PRINT B, CHR$(N), W
330 NEXT C
340 PRINT ,A
350 STOP
360 PRINT "YOU GOT IT IN ",C

```



DOGFIGHT

```

1  REM "DOGFIGHT"
2  LET A=32
3  LET B=0
4  LET C=INT (RND*20)
5  LET D=0
10 LET Z=INT (RND*3)
15 PRINT AT 11,15;"<+>"
20 PLOT A,B
25 PRINT AT C,D;"███"
30 LET C=C+Z
35 LET D=D+1
40 IF D=30 THEN GOTO 4
45 IF INKEY$="8" THEN LET C=C-
1  50 IF C=11 AND D=15 THEN GOTO
90 55 IF C>=21 THEN GOTO 4
60 IF INKEY$="7" THEN LET C=C-
2  65 IF INKEY$="0" THEN LET B=B+
20 70 IF B=22 THEN LET B=0
75 IF INKEY$="5" THEN LET D=D-
-2 80 CLS
85 GOTO 10
90 IF A=32 AND B=20 THEN GOTO
105 95 PRINT AT 9,14;"F" " ";AT 1
3,14;" "
100 GOTO 10
105 PRINT AT 11,15;"███"
110 PAUSE 10
115 PRINT AT 11,15;"███HAM";AT 1
0,16;"███";AT 11,12;"███"

```

THE GRAPHICS on *Dogfight* are fairly impressive considering that it will run on 1K machines. The screen becomes the windshield of an aircraft with your gunsights indicated by the symbols. An enemy aircraft files on a random course across the screen, moved inexorably rightwards and downwards.

Using certain cursor keys, e.g., upward arrow, the course of the aircraft can be altered in an attempt to put it in front of the sights. When that is done, pressing the O key will fire your gun.

Program author Robert Graves of London explained that he limited the amount of cursor control deliberately; you cannot move the aircraft downwards. The result is a game which it is not so easy as it sounds.



WANDER

AN ADVENTURE game, Wander, uses limited graphics which will run on 1K machines. It is set in a circular maze with the usual interconnecting square rooms. Only one room—the one you are in—is displayed and alternate rooms contain gold, with your position in the maze being estimated from the amount of gold in nearby rooms.

The object of the game is to amass as much gold as possible and find an exit to the maze but with only 60 units of food—allowing up to 60 moves—you could well starve before finding an exit.

If you are desperate, walls can be clawed through but so exhausting is that operation that it uses 10 food units. One room is dialled at a time, showing the possible direction of exit and inputting, L, R, F, B indicates whether movement is required in a left, right, forward or backward direction.

The letters G, W and F indicate the amount of gold in the room, the total wealth accumulated so far, and the amount of food remaining.

To repeat the same maze in a subsequent game, set R to a particular value between 0 and 1.

Wander was submitted by Michael Orwin of London who intends to include it in a forthcoming book called 1K Wonders. He also sells games cassettes for the ZX-81 and can be contacted at 26 Brownlow Road, Willesden, London NW10 9QL.

```

5 LET R=RND
10 LET J=SGN PI
20 LET F=CODE "W"
30 LET H=J
40 LET T=J+J
50 LET Y=T
60 LET X=T
55 LET Q=R+CODE "M"*Y+X+X
70 CLS
80 LET L=(X+Y<>T*INT ((X+Y)/T)
)
90 PRINT " "
100 PRINT " " AT J,J;" " AND
L
110 PRINT " "
120 PRINT AT J,NOT J;" " AND AB
S (Q-J)**PI-INT (ABS (Q-J)**PI)<
COS J
130 PRINT AT NOT J,J;" " AND AB
S Q**PI-INT (ABS Q**PI)>COS J
140 PRINT AT T,J;" " AND ABS (Q
+CODE "M")**PI-INT (ABS (Q+CODE
"M")**PI)>COS J
150 PRINT AT J,T;" " AND ABS (Q
+J)**PI-INT (ABS (Q+J)**PI)<COS
J
160 LET Q=ABS INT VAL "X*Y*L*(P
I*Q-INT (PI*Q))"
170 LET H=H+Q
180 PRINT AT T+T,NOT J;" " Q;" "
" H;" " F;" " LRFB?"
190 IF X*X+Y*Y>CODE "COS " THEN
PRINT " " TAB -T
200 INPUT I$
210 PRINT AT (I$="L" OR I$="R")
+T*(I$="B"),(I$="F" OR I$="B")+
*I$="R"
220 LET Q=VAL "16398"
230 IF PEEK (PEEK Q+(256*PEEK (
Q+J))<>NOT J THEN LET F=F-CODE
"Z"
240 LET X=X+(I$="R")-(I$="L")
250 LET Y=Y+(I$="B")-(I$="F")
260 LET F=F-J
270 IF F<-J THEN GOTO CODE "Z"

```

SUBJECT INDEX

SUBJECT INDEX sets up a Mini ZX-81 database designed to keep an index of magazine and book articles but it can be changed easily for other applications. The options available are to add a record, delete the last entry, list the records, search for a record and exit from the program.

On running the program, the screen displays a menu of commands, after having asked for a title for the index to be created. Using the Add option allows an item of information to be added to the index and prompts individually for article title, publication name, date and page reference.

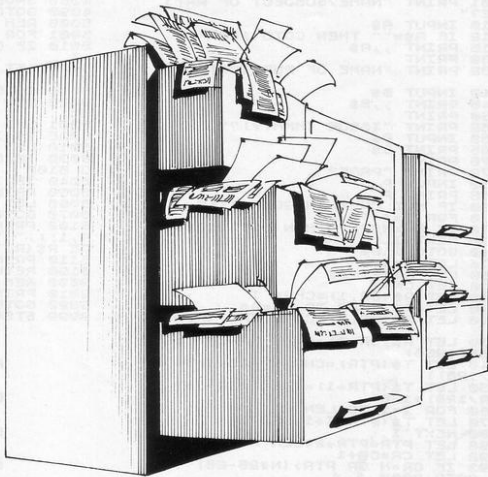
To return to the menu, enter an empty string for the title. When using List to display the contents of a file, the CONT instruction is required each time the screen is full and report code 5 occurs.

Using Exit offers the option of saving the file to cassette or ending the program. The Search option requests a keyword which in this version of the program is the article title. Search will also work on the first character or characters of the title.

The number of items which may be stored is governed by the value of N in line 15. A value of 350 is about the maximum which can be accommodated in 16K of memory but if a smaller number is used saving and loading time will be reduced.

Names of publications are limited to eight characters, so an abbreviation is required for longer names. Titles may be of any length but the array is dimensioned for an average of 25 characters per item.

Subject Index was sent in by Julian Moss of London.



```

1 REM *****
2 REM *   SUBJECT INDEX   *
3 REM * AUTHOR: J. U. MOSS *
4 REM *****
10 REM INITIALISE PROGRAM
15 REM N IS NUMBER OF ITEMS
20 LET N=350
30 DIM T$(N*25)
40 DIM N$(10,8)
44 DIM B$(8)
45 DIM X$(12)
50 PRINT "SUBJECT?"
60 INPUT S$
80 LET PTR=1
82 LET CN=0
84 LET CR=1
100 REM DISPLAY MENU
105 CLS
110 PRINT TAB 8;S$;" INDEX"
120 PRINT AT 3,8;"A - ADD"
130 PRINT AT 3,8;"D - DELETE LA
ST ENTRY"

```

SUBJECT INDEX

```

140 PRINT AT 9,8:"L - LIST"
150 PRINT AT 12,8:"S - SEARCH"
160 PRINT AT 15,8:"X - EXIT"
200 PRINT AT 21,0:"?"
210 INPUT C$
215 CLS
220 IF C$="A" THEN GOTO 1000
230 IF C$="L" THEN GOTO 2000
240 IF C$="S" THEN GOTO 3000
250 IF C$="X" THEN GOTO 4000
260 IF C$="?" THEN GOTO 5000
290 GOTO 100
1000 REM ADD ITEMS
1001 PRINT "NAME/SUBJECT OF ARTI
CLE?"
1010 INPUT A$
1012 IF A$="" THEN GOTO 100
1015 PRINT A$
1030 PRINT
1032 PRINT "NAME OF PUBLICATION?"
1040 INPUT B$
1045 PRINT B$
1050 PRINT
1052 PRINT "ISSUE (MMYY)?"
1055 INPUT D$
1065 PRINT D$
1070 PRINT
1072 PRINT "PAGE?"
1080 INPUT P
1085 PRINT P
1100 IF NOT CN THEN GOTO 1145
1110 FOR I=1 TO CN
1120 IF B$=N$(I) THEN GOTO 1200
1130 NEXT I
1140 GOTO 1150
1145 LET I=1
1150 LET N$(I)=B$
1160 LET CN=I
1200 LET R$(CR,1)=CHR$(I)
1210 LET R$(CR,2 TO 6)=D$
1220 LET R$(CR,7)=CHR$(INT (P/25
6))
1230 LET R$(CR,8)=CHR$( (P-INT (P
/256))*256)
1240 LET T$(PTR)=CHR$(126+INT (
CR/128))
1250 LET T$(PTR+1)=CHR$( (CR-INT
(CR/128))*128)
1260 FOR I=1 TO LEN A$
1270 LET T$(PTR+I+1)=A$(I)
1280 NEXT I
1290 LET PTR=PTR+2+LEN A$
1292 LET CR=CR+1
1293 IF CR=N OR PTR>(N*25-25) TH
EN GOTO 9000
2100 CLS
2105 GOTO 1000
2000 REM LIST ROUTINE
2005 LET I=1
2010 GOSUB 3000
2020 IF I<PTR THEN GOTO 2010
2025 PRINT "PRESS N/L TO RETURN
TO MENU"
2030 PAUSE 4E4
2040 GOTO 100
3000 REM SEARCH ROUTINE
3010 PRINT "KEYWORD?"
3020 INPUT C$
3030 CLS
3040 FOR K=1 TO PTR
3100 IF T$(K)<>C$(1) THEN GOTO 3
190
3120 FOR J=1 TO LEN C$-1
3130 IF T$(K+J)<>C$(J+1) THEN GO
TO 3180
3140 NEXT J
3150 FOR I=K TO 1 STEP -1
3152 IF CODE T$(I)<128 THEN NEXT
I
3160 GOSUB 5000
3165 LET K=I-1
3170 GOTO 3190
3180 LET K=K+J
3190 NEXT K

```

```

3192 PRINT
3193 PRINT "PRESS N/L TO RETURN
TO MENU"
3195 PAUSE 4E4
3198 GOTO 100
4000 REM SAVE/EXIT ROUTINES
4001 PRINT "SAVE (Y/N)?"
4010 INPUT C$
4020 IF C$="N" THEN GOTO 9999
4030 LET X$=S$+"INDEX"
4040 PRINT "TYPE NEWLINE WHEN RE
ADY"
4050 INPUT C$
4055 SAVE X$
4060 GOTO 100
5000 REM DELETE LAST ITEM
5001 FOR I=PTR-1 TO 1 STEP -1
5010 IF CODE T$(I)<128 THEN NEXT
I
5020 LET PTR=I
5030 LET CR=CR-1
5040 GOTO 100
5050 REM SUBROUTINE "PRINT AN IT
EM"
5061 LET R=126*(CODE T$(I)-128)+
CODE T$(I+1)
5070 LET I=I+2
5080 IF CODE T$(I)>=128 THEN GOT
O 8100
5090 IF I>PTR THEN GOTO 8100
5095 PRINT T$(I);
5100 LET I=I+1
5110 GOTO 8030
5120 PRINT TAB 8; "(";N$(CODE R$(
R,1));";";R$(R,2 TO 6);";";P;";CO
DE R$(R,7)*256+CODE R$(R,8);";"
5130 PRINT
5140 RETURN
5000 REM ARRAYS FULL
5010 PRINT "STORAGE FULL"
5020 GOTO 4000
9999 STOP

```

INDEX

A - ADD

D - DELETE LAST ENTRY

L - LIST

S - SEARCH

X - EXIT

NAME/SUBJECT OF ARTICLE?

ADVENTURE PROGRAM

NAME OF PUBLICATION?

SINCLAIR

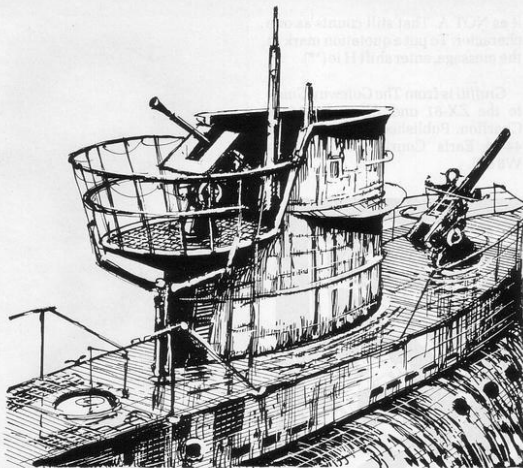
ISSUE (MMYY)? 05/82

PAGE? 34

ADVENTURE PROGRAM

(SINCLAIR 05/82, P.34)

PRESS N/L TO RETURN TO MENU



SUB CHASE SCORE=0 OUT OF 1



0



```

1  LET A=CODE " "
2  LET B=CODE "E"
10  LET C=CODE "E"
15  LET D=CODE "?"
20  LET P=B
30  LET Q=CODE "F"
40  LET S=A
50  PRINT "SUB CHASE"
60  FOR Z=C TO Q+B
70  FOR Y=CODE " " TO B STEP -C
80  PRINT AT B,A;" "
90  IF P>B AND P<D THEN LET P=P
+C
100 IF INKEY$="F" AND P=B THEN
LET P=P+C
110 IF P=D AND Y=0 THEN GOTO CQ
DE "COS "
120 IF P>B THEN PRINT AT P-C,Q;
" ";AT P,Q;"O"
130 IF P=D THEN PRINT AT P,Q;"
140 IF P=D THEN LET P=B
150 NEXT Y
160 GOTO CODE "E"
200 PRINT AT P-C,Q;" ";AT D,Y-B
;"BOOM"
205 LET S=S+C
210 LET P=B
220 PRINT AT D,Y-B;" "
A,D;"SCORE=";S;" OUT OF ";Z
230 NEXT Z
240 PRINT AT D,Q+B;"GAME OVER"

```

SUB CHASE is another 1K program submitted by the Lookers father and son team. In this, you are given a static destroyer in the top left-hand corner of the screen, while an enemy submarine travels from left to right across the screen.

Using the F key drops a depth charge and it must be dropped at precisely the right moment so that it scores a direct hit on the conning tower of the submarine.

Sub Chase gives you 10 submarines before the game ends and your score is displayed on the screen.

SUB CHASE

GRAFFITI is written for a 1K ZX-80 and fills the screen with large letters; a 32-letter message can be fitted on to a 1K machine with four lines of eight characters each.

Messages are entered eight characters at a time and if an inverse letter is wanted, for example A, enter

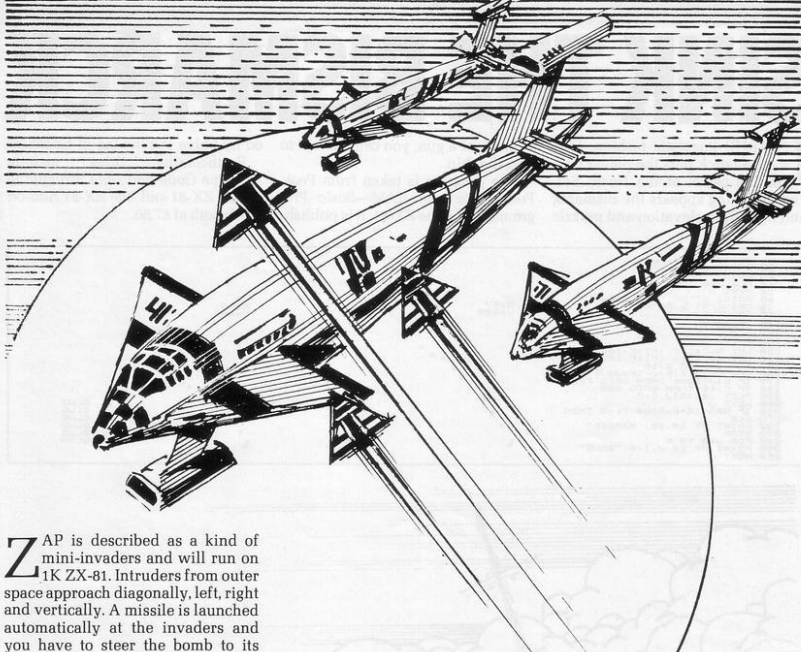
it as NOT A. That still counts as one character. To put a quotation mark in the message, enter shift H ie (**).

Graffiti is from *The Gateway Guide* to the ZX-81 and ZX-80 by Mark Charlton. Published by Interface of 44-46 Earls Court Road, London W8 6EJ.



```
10 REM 00050483078288860608028703848580191A111
   000012131415000116171800014FE
30 FOR I=0 TO 33
40 POKE 16427+I,16*PEEK(16427+2*I)+PEEK(16428+2*I)+36
50 NEXT I
60 POKE 16457,118
RUN this, then enter:
20 INPUT A$
30 POKE 16421,24
40 IF A$="" THEN STOP
50 FOR I=0 TO 3
60 LET C=0
70 FOR J=1 TO 8
80 LET X=0
90 LET C=C+1
100 LET L=PEEK(16719+C)
110 IF L=219 THEN GO TO 140
120 LET X=L28
130 GO TO 90
140 IF L>99 THEN LET L=PEEK(16227+L)
150 FOR K=0 TO 3
160 PRINT CHR$(PEEK(16427+((PEEK(2*I+8*L+3584)
   /4*(3-K) AND 3)+(PEEK(2*I+8*L
   +3585)/4*(3-K) AND 3)*4))+X);
170 NEXT K
180 NEXT J
190 NEXT I
200 RUN
```





ZAP is described as a kind of mini-invasers and will run on 1K ZX-81. Intruders from outer space approach diagonally, left, right and vertically. A missile is launched automatically at the invaders and you have to steer the bomb to its target, using the 5 and 8 keys—left cursor and right cursor.

Ten invaders are launched and then the program tells you how many you stopped. When familiar with the game try changing line 130 to IF C+H AND M=P THEN GOTO 200.

Zap is from The Gateway Guide to the ZX-81 and ZX-90 by Mark Charlton. Published by Interface of 44-46 Earls Court Road, London W8 6EJ.

ZAP

```

10  LET S = 0
20  LET M = 14
30  FOR Z = 1 TO 10
40  LET C = 20
50  LET R = INT(RND*3)
60  LET P = 13 - (12 AND R = 0) +
    (12 AND R = 2) + INT(RND*5)
70  LET P$ = "P" + ("1" AND R = 0)
    + ("1" AND R = 2)
80  FOR H = 4 TO 21
90  LET P = VAL P$
100 LET M = M + (1 AND INKEY$ = "8") -
    (1 AND INKEY$ = "5")
110 CLS
120 PRINT AT 21, M - 1; "graphic shift three
    graphic space graphic shift four"; AT H,
    P - 1; "graphic shift three graphic shift
    seven graphic shift four"; AT C, M; "*"
130 IF C = H AND M > P - 2 AND M < P + 2
    THEN GOTO 200
140 LET C = C - 1
150 NEXT H
160 CLS
170 NEXT Z
180 PRINT AT 10, 0; LANDED: 10, "", STOPPED: S
190 STOP
200 LET S = S + 1
210 PRINT AT H - 1, P; " "; TAB P - 1;
    " "; TAB P; "*"
220 LET Z = Z - 1
230 LET C = 20
240 GOTO 170

```

SINK THE BISMARCK

IN TRUE jingoistic fashion, *Sink the Bismarck* puts the player on a routine patrol of the North Sea. Out of the fog appears the Bismarck and by setting elevation and muzzle

velocity of a gun, you can attempt to sink the ship.

The program is taken from Peek, Poke, Byte and RAM—Basic Programming for the ZX-81. It is publish-

ed by Shiva Publishing of Cheshire.

Forthcoming titles include *Machine Code and Data Structuring for the ZX-81* and *The ZX-81 Add-on Book*, both at £7.50.

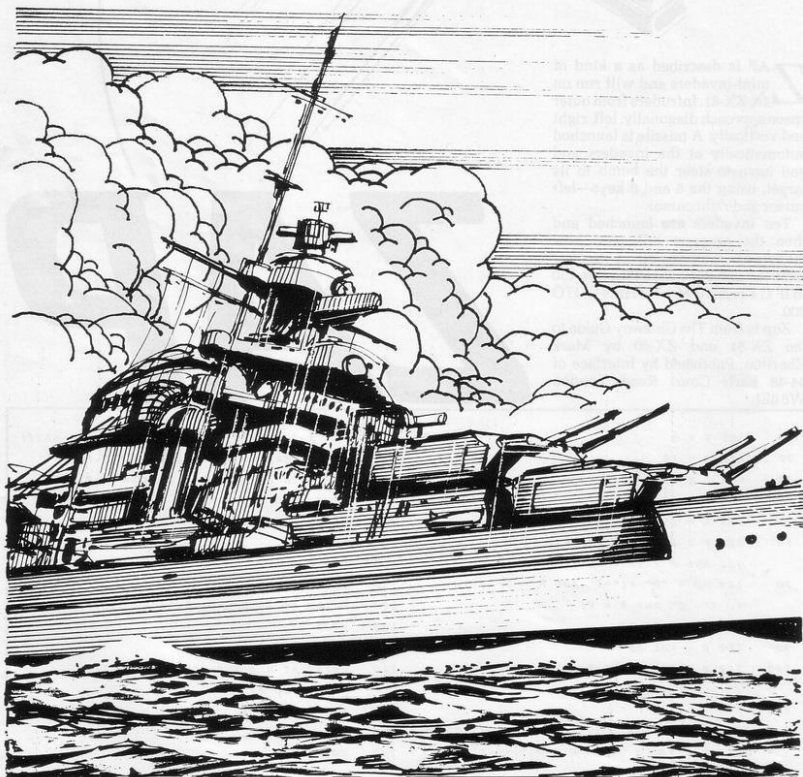
```

10 LET T=25*(1+RND)
20 PRINT AT 20,0;
30 PRINT " "
40 FOR J=0 TO 5
50 NEXT J
60 PRINT AT 20,T-2;" "
70 PRINT AT 2,0;"E=";
80 INPUT E
90 PRINT " "
100 INPUT U
110 PRINT U
120 LET A=V+COS (PI*E/180)
130 LET B=V+SIN (PI*E/180)
140 FOR J=0 TO 8/16
150 LET C=255*(5+J-16*J*J)
160 IF A+J>255 THEN GOTO 220
170 IF C+45 THEN GOTO 200
180 PLOT ,B1:AT J,C:2
190 NEXT J
210 IF ABS (A+B/3200-T) < 3 THEN
GOTO 240
220 PRINT AT 10,20;"MISSED"
230 STOP
240 FOR J=0 TO 5
250 PRINT AT 20-J,T-2;"SLUG"
260 NEXT J
    
```

E=57
U=500

E=56
U=400

SLUG
SLUG
SLUG
SLUG



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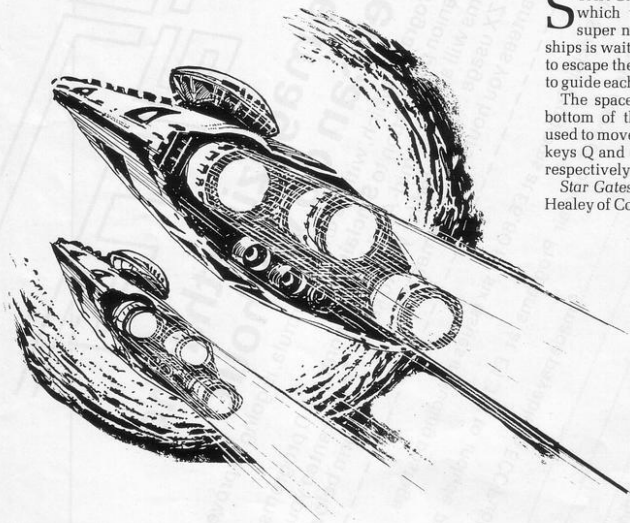
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```

100 LET A=PI-PI
110 LET B=PI-PI
120 LET R=8
130 LET U=500
140 LET S=20
150 LET T=15
160 LET Y=15
170 CLS
180 LET X=INT (RND*25)
190 PRINT AT Y,X;" "
200 PRINT AT S,T;" "
210 PRINT AT S+A,T+A;" "
220 LET U=U-A
230 IF INKEY$="Q" THEN LET T=T-
240 IF INKEY$="P" THEN LET T=T+
250 IF INKEY$="1" THEN LET S=S-
260 IF T<B THEN LET S=S-A
270 IF T>25 THEN LET T=25
280 IF U=0 THEN GOTO 500
290 IF S=B THEN GOTO 350
300 IF T=X AND S=Y-A THEN GOTO
310 IF S=Y-A AND T<X THEN GOTO
320 GOTO 110
330 LET Y=Y-5
340 GOTO 300
350 LET A=A+A
360 GOTO 50
370 CLS
380 PRINT AT 10,11;"STAR GATES"
390 PRINT AT 12,11;"R"

```

STAR GATES

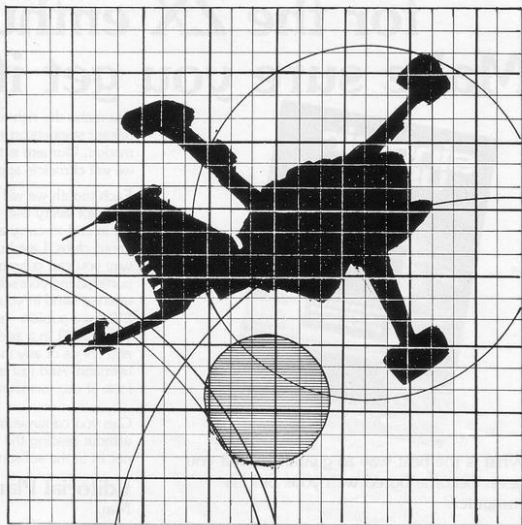


STAR GATES is a 1K program in which the sun is about to go super nova and a fleet of space ships is waiting to depart from Earth to escape the holocaust. The object is to guide each ship through star gates.

The space ship is situated at the bottom of the screen and key 1 is used to move vertically upwards and keys Q and P to move left and right respectively.

Star Gates was submitted by D E Healey of Coseley, West Midlands.

Space Shootdown



```

100 LET C=0
110 LET K=0
120 LET X=INT (RND*50)
130 LET Y=INT (RND*37)
140 PLOT X,Y
150 PRINT AT 21,0;"=====
160 PRINT AT 21,1;"
170 IF K=1 THEN GOTO 270
180 INPUT A
190 LET A=A/180*PI
200 INPUT B
210 LET C=C+1
220 LET X1=INT (A*COS A)
230 LET Y1=INT (A*SIN A)
240 PRINT AT 1,1;"A:";A;"B:";B;"C:";C;"A=180/PI
250 FOR U=-2 TO 2
260 FOR Z=-2 TO 2
270 IF X1+U=X AND Y1+Z=Y OR X1+
Z=X AND Y1+U=Y THEN LET K=1
280 IF K=1 THEN GOTO 60
290 NEXT Z
300 NEXT U
310 UNPLOT X1-1,Y1-1
320 PRINT "
330 GOTO 250
340 UNPLOT X-1,Y-1
350 PRINT " BOOM"

```

This runs on a 1K ZX-81, and the program is
copyright © G Tily, 1981.

SPACE SHOOTDOWN, by G L J Tily, provides a test of your skill in estimating distance and angles. Play the game a few times and you will be amazed at how clever you become at estimating correctly.

Your base is at the bottom left of the screen. The invader is the black piece. Your task is to shoot it down in as few shots as possible. First enter the angle of the ship from your base, or as good a guess as you can estimate, then enter the distance from your base. Remember that the screen is 63 units across. You will get a satisfying BOOM when you get the two figures correct.

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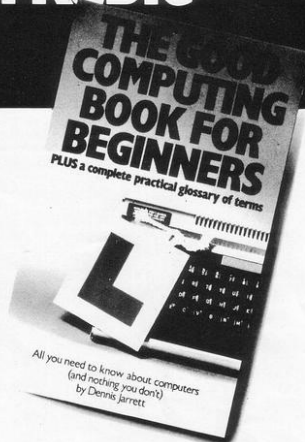
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