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# ZX

Dec/Jan '84

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# ZX COM

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# COMPUTING

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28 Computing is necessary on the low-cost for editorial articles and programs. If you have the time, please send your programs, ideas for how to improve your work to us for consideration.

All material received should be typed (please do not use a typewriter) and all correspondence must be accompanied by a return address. All programs must be accompanied with a copy of the source code and a copy of the program. All programs must be accompanied with a copy of the program. All programs must be accompanied with a copy of the program. All programs must be accompanied with a copy of the program.

All material received for consideration and you published work will be sent to an appropriate editor. All work for consideration should be sent to the Editor at the following New York address.

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# Welcome



Welcome to our Christmas edition of ZX Computing. And here we get all about for you — as well as all the usual features and programs, there are some special features which you may find useful when doing your Christmas shopping for yourself or as a treat yourself — after all Christmas comes but once a year.

And speaking of events that happen once a year, did any of you get up to the States to see the PCW show. Although not based solely on my own views, there were many ZX-related stands in evidence. There were also some very important people wandering around amongst the stands — one, Dr Clive Sinclair, caught me eye, leading from stand to stand looking at the new products on the stands.

The Sinclair Research stand was having especially a lot of the lunch-ers of their ZX Spectrum. It was as well as a dazzling array of new software for the ZX Spectrum. With a number of people Spectrums lined up and ready to play, there were a great number of prospective users trying their hand at the new games.

Other stands included Quixotes who were also looking in the glory of having received five nominations for the

ZX Spectrum. Huggard of all seemed Mark Eyles who's (he thinks) ZX took over to demonstrate some of the new software. He's joking really — he was having the time of his life even if he won't be part of the general but for more information on Quixotes's new releases have a look at the Software news pages.

Also at the show was Tim Harwell, showing the terrific Polystar, more Spelling soon — as it has taken on the name Tim was very excited about them, as his new publications are particularly good and with learning numbers and with learning numbers and on the Spectrum — maybe we'll have a chance to review them in a future Spectrum.

## Within these pages.

Just to give you a flavour of the contents of this issue I'll try and what you expect. Perhaps the new, there is a night concentration on games programs, although there is the odd sprinkling of business and utility programs. As for games, go there's a great game called Nuclear Attack. Based on the classic game of

Master Attack, there's a spin-off adaptation for the ZX Spectrum.

Complete with great music and graphics trying all over the screen, the program should keep you busy for hours and hours over the holidays. And speaking of such an awesome subject have you ever the film War Games which is currently on general release in your local cinema? If you haven't, I can thoroughly recommend it as a very interesting film and one with a very thought provoking ending. A film that will definitely make you think more about the games which are so popular on home computers.

There are of course a large number of great programs for you to try in this issue including a wide selection of 16,400 programs for your ZX Spectrum and 1,120 letters for your ZX81. I hope you enjoy them.

## And the rest . . .

I have included a large number of reviews in this issue and have chosen upon the talents of all our regular reviewers for the task. James White has been asking through a wide selection of Spectrum software for The Ark, Jason and Nick Pascoe have been equally busy with the ZX81 software section. And together they have picked three software packages for the Spectrum and ZX81 which they think have been outstanding. If you were successful in 1983. You'll find that thoughts in an article called The best three of '83.

Peter Shaw has also been doing a little overview on the issue so that is welcome to his helpful hints in Problem page for has looked at two aspects of the Spectrum software that we have not really touched on so closely in the past. The First Encouraging Page? discuss the educational bits, is a look at personal software. And the other article, Mike! Seriously other looks at a number of serious software packages. It's also like to welcome back Paul Holmes who has taken a look

at some software to help you choose some suitable gifts for the Christmas stocking.

## Speciality . . .

There are two special features this edition. The first is a continuation from the last issue is a list of Spectrum software available on the market. The list is supported by an index of addresses of suppliers for all the titles featured in the spreadsheet. If you can't manage to find a package there that will suit you for the Christmas holidays or a suitable present for a friend, then please let me know, then please let me know, then please let me know, then please let me know.

The other feature this issue is concerned with hardware and one for the ZX81 and ZX Spectrum. Providing a snap window, it will hopefully give you a rough idea of how you can improve your micro system without giving your wallet too much of a shock.

## Contributions

We are always on the lookout for good programs and articles for future issues of ZX Computing and where better to look than to our own readers. If you're reading through the magazine you think you can write programs to send or let us know our present contributors then let's hear from you.

All contributions are of course sent for at very competitive rates. So if you've got you eye on a new ZX add on or you'd just like to supplement your pocket money, get writing! It's vital though that all the programs you send are well typed original and not borrowed or stolen. Don't other magazines or books unless you've had written in the Editor's chair, he can't remove original contributions if printed but written for his own book.

Any kind of program featuring obscene, abusive, racial or just foul will be welcomed, but particularly those which use ZX BASIC in clever and efficient ways to



those which employ certain routines which can be reused on other programs.

Program listings are vital along with a clear explanation of how the program is constructed, what it does and what the user can expect to see once the program is RUN. It is most helpful if particularly suitable in this respect. When submitting instructions, programs, it is very important to remember to enclose a cassette of the program as well as the listing. In this way allow us to check the program before publication.

## And so . . .

It is Christmas as the old man said John Lennon should sing. I hope you all have a marvellous time over the holiday but don't forget now — make sure of your issue with ZX Computing and if it doesn't seem to have ting — see you all in 1984.  
Roger Munked

## Play your cards wrong?

Dear ZX Computing  
I typed in the program in the Aug/Sept issue of your magazine called Play your cards right. Great game theme about the SDI.

Unfortunately it seems not part of the file was downloaded and so becomes impossible to load into the computer. However, I managed to find the problems which is nothing more than a missing device sign, and the line should read:

```
SDI LEFT side = 101
int(101) = 101;int(101)
SDI = 1
```

I hope this clears up any problems some of your readers might have been having with the program.

See Dennis,  
London SW18

## Bug alert

Dear ZX Computing  
I have now been the proud owner of a ZX81 with 128K RAM for just over a month now and two weeks ago I bought my first ever issue of ZX Computing — the Aug/ Sept issue at last!

Since then I have had more fun than hours of watching Game photos any place in the UK — and I'm proud of Stephen Smith's Bacon restaurant story. But I could not understand why I kept getting a great deal of errors myself on the screen at once. You see the empty left-hand shadows of themselves on the screen.

Eventually I managed to trace the error to line 415 in which the TD+D should be added but be altered to read TD+D. This then gives me pixels which take itself out of it (more instead of leaving a trail of exact 1-pixels behind).

I hope my small correction helps to make the enjoyment of a superb game even better.

Yours faithfully  
Neil Wright,  
Ruislip



## The generation game

### Dear ZX Computing

Whether if any of your readers are interested in a small pattern generator I write you my ZX81. The program shown in Fig. 1 produces random patterns such as that shown in Fig. 2.

You can, however, modify the program to produce a more specific style of pattern and the program is shown in Fig. 3. You can alter the type of pattern produced by varying

the values of A1, Y or X. Also if you want to make a copy of the patterns you make you should add the following two lines to your program:

```
300 IF NOT(Y) = "" THEN
  GOTO 330
330 R-RAND(Y) +12 THEN
  COPY
```

Hope your readers have some fun with these listings.  
Yours faithfully

Stewart  
Wentford

Fig. 2



Fig. 3

Fig. 1

```
1  REM "PATTERN"
2  GOTO 100
3  LET A1 = 10
4  LET C1 = 10
5  LET C2 = 10
6  LET C3 = 10
7  LET C4 = 10
8  LET C5 = 10
9  LET C6 = 10
10 LET C7 = 10
11 LET C8 = 10
12 LET C9 = 10
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92 LET C89 = 10
93 LET C90 = 10
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95 LET C92 = 10
96 LET C93 = 10
97 LET C94 = 10
98 LET C95 = 10
99 LET C96 = 10
100 GOTO 100
```

```
1  REM "PATTERN"
2  GOTO 100
3  LET A1 = 10
4  LET C1 = 10
5  LET C2 = 10
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91 LET C88 = 10
92 LET C89 = 10
93 LET C90 = 10
94 LET C91 = 10
95 LET C92 = 10
96 LET C93 = 10
97 LET C94 = 10
98 LET C95 = 10
99 LET C96 = 10
100 GOTO 100
```



## Getting in tune

Dear ZX Computing:  
Referring to your Center chord program in the April/May issue of ZX Com, jumping when you tap now if only someone could write a program to tune the guitar — how do further?

I have written a program available for Laserword 130 which uses the Spectrum's sound and graphics to help you tune your guitar. In addition 48 chords can be displayed in a similar way to the single screen shown to illustrate the program in your magazine.

You can also receive a table of hand, sub-octave, compound and relative notes, and transcribe it into the key of your choice. Finally, there are a selection of traditional folk songs for you to learn fully.

My program works on both the 128K and 48K Spectrums (Spectrum+) and is available for £6.00 from Laserword Ltd, Stonefox Workshops, Burford Road, London E11, Yours faithfully

J Douglas Ben  
Paxley  
Scotland



## Bug bound

Dear ZX Computing:  
I have just purchased a copy of the Accu-Rep edition of ZX Computing and, like all but

one that you had published the 10 disc program as part of the 10 Com!

However, there is a mistake in these lines as published — you have managed not to miss out all the graphics. Also there is a serious mistake missing from line 10.

Here follow are the three relevant lines, all they should have been published:

```
5 PRINT AT ST P
   | Graphics shifted 3 3 |
   | Graphics shifted 5 |
   | PRINT AT
   | 5 - ST P |
   | |
   | | Graphics shifted 3 3 |
   | Graphics shifted 5 |
   | 10 PRINT AT ST P
   | AND 5 2 INT 15/2 AT
   | 10 1 | AND 5 1 AT
   | 12 1 2 | AND 5 1 AT
   | 10 1 2 | AND 5 P AT
   | 12 1 | AND 5 P AT
   | 11 1 2 | AND 5 P
   | 11 1 2 | AND 5 P
   | 11 1 2 | AND 5 P
   | 11 1 2 | AND 5 P
```

With the graphics in correctly plus the same color, the program should run perfectly. Yours faithfully

Colin James  
Gloucester



## What a load of rubbish!

Dear ZX Computing:  
I am writing to tell you what I think is a bug in the ZX Spectrum TV tuner. This is:

```
10 PRINT "long amount of
  characters you like"
20 GO TO 10
```

When asked 'input' press Caps Shift and Symbol Shift together. The word 'RUN' appears. Now press Enter. The whole screen will fill with rubbish (big letters).

If you follow the same procedure, the same thing happens each time — but if you press another key, the screen prints another half page and stops with more rubbish outside. Also whatever state the cursor was in will spill on the screen like E, L, I, S or C. The screen will be full of letters if you press a null string in the above program.

I would be very interested if any of your readers could let me know explanation for this

massive problem. Yours faithfully

Raymond Clune  
Essex



## Service with a smile

Dear ZX Computing:  
I recently bought a Hitachi 54 inch colour TV being already in possession of a 48K Sinclair Spectrum and was most surprised and delighted to receive early, quick and polite service. The retailer, London Mac (son of Sutton) was contacted. The young salesman walked me to their television shop several doors down the High Street. He then:

- (a) Checked my Spectrum with a similar T.V. in the shop.
- (b) Checked a new Spectrum with the T.V. in all cases re-adjusted.
- (c) Used a new remote adaptor.

He then walked off the shop and back to the shop and returned with that of 1 or more Spectrum. He looked two or three times and suggest we had not. He re-arranged the logic from and return, except for the latter Spectrum and suggest for me at no charge and as I walked out of the shop he made the parting remark that I should be OK now but if not to come back and he would fix some more machines.

What after sales service I had to bring it to your attention and hope that you can see fit to publish the letter. Yours faithfully

UJ Pinner  
Barnet

## Serially . . .

Dear ZX Computing:  
Here is a programming method for putting a serial number to one of a set of strings. The first string in your letters in the form of something a string C1 = 3 or 0 or 8 or T or J or Q or R or A, representing a string

and to a number C from 2 to 14. Here is a test program to illustrate an efficient method.

```
10 INPUT C1
20 FOR C=2 TO 14
30 IF C=C1 THEN GOTO 10
40 PRINT C1
```

If C1 does not represent a case C, take the value 15. There is a similar modification to the value of ADV before (AdvRep 53) but this is checked.

The technique here runs up positions A more efficient example gives M the month in figures (1 12) from M5 the zero of the month, also translated if desired to its full three letters.

```
10 INPUT M5
20 FOR M=3 TO 36 STEP 3
30 IF ADV(15) IS C1 THEN GOTO 10
40 ADV(15) IS C1
50 PRINT M5
```

A top excellent month' print M=12  
Yours faithfully

WE Thomson  
Sutton



## Strange . . . but useful

Dear ZX Computing:  
In response to Tony Pinner's letter in your June/July issue concerning the quest for an entering letter, I had 128K instructions on the 128K (255). I typed them in. Needless to say the stated strange order occurred but I couldn't help wondering as to what use these could be put to but about finding some which would be more useful than to a machine code programmer.

Here are the machine code with their decimal values and also their BASIC equivalent if any.

```
2575 FAST
2581 SCROLL
2582 EQUIVALENT to SORT
2583 EQUIVALENT to TRIM
2584 SPLIT
2585 LOAD
2586 EQUIVALENT to PRINT
```

A note by the number indicates that the computer must be in MS-DOS mode to be invoked. The LOAD instruction in the one I find most useful as it allows me to make back up tapes so off any of my friend's games so I could check out how they ended.

Yours faithfully,  
Gary Threlkeld  
Cleveland



## Calculating confusion

**Dear ZX Computing**  
When the question of calculating memory addresses from binary is discussed, most books suggest the use of a small calculator or a computer to do the calculation, or multiplying the most (least) significant bits in binary by 256. I used to keep a string pad for the calculations, but found it was too distracting, particularly when time had to be conserved on details when assembling or disassembling machine code and disassemblies can be fatal to the program.

I found a much more reliable way to write a 256 times table giving the most values for one to 256 times 256. Since it was essential to get it right, I checked it on a 1086 Spectrum with the following program:

```
10 LIST = 256
20 FOR N = 0 TO 256
  PRINT N * N
30 NEXT N
```

The program is easily converted for almost all other home computers.

Yours faithfully,  
JD Garcia  
Cleveland

## Very interesting . . .

**Dear ZX Computing**  
One night when I was playing with my ZX81, I discovered something very interesting on my computer.

I had accidentally pressed the V, B, and SHFT keys at the same time and the computer gave the report code 1015. I kept pressing the same keys again but with a different program, but again I got a report code giving I had pressed the Break key.

So if you want to trap a program without pressing the

Break key, try pressing the V, B, and SHFT keys together.

Yours faithfully,  
Stephen Mould  
Sunderland

## Pen pal?

**Dear ZX Computing**  
Having just obtained my first copy of ZX Computing, I read the Data center column and was: What an abundance! I'm not a member of any ZX clubs over here, mainly because there aren't any.

However, I would very much like to correspond with some of your readers to see change programming tips into programs, etc.

I operate a ZX81 with ZXK and ZX Printer. Any interested parties please let me know.

Tony Laffoy  
2345 Northfield  
Trpton, MI 48183  
USA.



## Ghost in the machine?

**Dear ZX Computing**  
While writing a machine code program using ZX81 I noticed a 'bug' in the part of the interpreter concerning the function KEY's INKEY's process the operation of the key possibly being depressed. However, if more than one key is being depressed, the interpreter gets confused and returns an empty string. So, when I used the

```
10 IF INKEY<>="" THEN
  PRINT INKEY
```

The system crashed if more than one key was being depressed.

Further investigations

revealed that the ZX81 returns information from the keyboard via two 'networks' shown in figs 1 and 2. The interpreter works by looking the result of its keyboard scan into bytes 18421 and 18422, the system variable LAST\_B is byte 18423, the first byte is equal to 255, then all bits are on and no key is depressed. If not, then it looks up which bit in 18422 is off. It then checks if a bit in the low byte is off, and decides which key is depressed since the result is unique to that particular key. However, if more than one key is depressed then the bit situation is mixed up and the method normally used does not work. It is then impossible to tell which keys are depressed, the interpreter gets just the 'sticky' situation for returning an empty string.

It is therefore possible to tell whether the single string represents no keys being pressed or more than one key being pressed by checking the

byte 18422 for 255 which means all bits are on and no key is being pressed. An replacement for line 10 is

```
10 IF PEEK 18422<>255 THEN GOTO 10
```

One other problem is that of the Shift key when being pressed. Normally, this is as possible to detect, but this can be solved using

```
10 IF PEEK 18422=254 THEN PRINT SHIFT IS PRESSED ON ITS OWN
```

Note that although it is impossible to distinguish keys if more than one key is depressed, it is still possible to detect if a particular key is being pressed. This is put to good use in Peter Greenaway's 3D Tetris-like game.

Yours faithfully,  
Alexander McKeown  
County Dublin  
Ireland

Fig 1

High Byte (PEEK 18422)

Section	Keys
1	Q, W, E, D, F, G, H, J, K, L, M, N, O, P, R, S, T, U, V, X, Y, Z
2	W, R, T, Y, U, I, O, P
3	Q, W, E, D, F, G, H, J, K, L, M, N, O, P, R, S, T, U, V, X, Y, Z
4	A, R, F, C, T, U, J, N
5	Q, W, E, R, Y, U, I, O

RESULT

	WITHOUT SHIFT	WITH SHIFT
No Key	01111111	11111110
Section 1	11111101	11111100
Section 2	01111011	11111010
Section 3	01110011	11110010
Section 4	11101111	11100110
Section 5	11011111	11011110

Fig 2

Low Byte (PEEK 18421)

Section	Keys
0	Z, X, C, V
1	A, S, D, F, G
2	Q, W, E, R, T
3	T, U, I, O, P
4	R, Y, U, I, O, P
5	T, U, I, O, P
6	H, J, K, L, M, N, O, P, R, S, T, U, V, X, Y, Z
7	R, N, M, Space

RESULT

	BINARY
No Key	11111111
Section 0	11111101
Section 1	11111100
Section 2	11111011
Section 3	11110111
Section 4	11101111
Section 5	11011111
Section 6	10111111
Section 7	01111111

# ORDER FORM

For advertisement appearing on page number 454.

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# Nuclear attack



## Defend the cities from the enemy missiles in this fabulous Spectrum simulation from Mathew Homer of Port Headland, Australia.

In this program, you are in charge of a nuclear missile unit which has been mobilised to defend six cities from sudden nuclear attack. And you are entrusted as usual to do things of the magnitude that the cities can't do itself.

There are six cities in all to save and each with a nuclear base you have 300 systems to fire missiles which you can launch at the on coming enemy. However, watch out for you lose because if that gets hot you will lose all of your missiles.

You fire a missile by manoeuvring an 'X' around the screen and hitting the fire button. All the keys required to move the 'X' in any one of eight directions and fire your missiles are given at the end of the instruction routine within the program.

Manage to save any of your cities after a barrage of missiles you receive before panic. Once you surpass 50,000 and 100,000 points you get a bonus 5% to save.

It's a only after you win every city that really hot and then an explosion will occur across the screen and about a million of missiles (however, the price is considerably lower) than the enemy missiles usually start at. As it is hard to miss out the price just as soon as you can - especially before it exceeds its deadly cargo!

One other small tip that we'll mention is that if you can't get the hang of it, well it's best to see your missile a little before the enemy missiles so that they actually pass into the explosion!

Okay, for a game fun - but certainly anything has got to be more fun than the real thing!

### Point to point

For each missile you shoot out of the sky you'll receive 1,000 points and if you

### Line by line

Here follows a breakdown of the program. Nuclear attack so that you should save more of an insight into the program.

Lines 2-82  
Lines 83-85

Initialisation of the screen and variables. Specifies the colour and legibility of the new missile.

Lines 100-888

Scan the keyboard and determine the movement of the missiles.

```

0 LET W=0, LET A=0, LET S=0, LET P=
10 INR D: P=PRN D: S=SCREEN S: PR
20 SHT 0: G=0: S=0: INVERSE 0: FLASH
30 0: OLD: RECP: J=0:0
40 S: D=H: G17: LET W=0? LET W=
5 LET G15:000: LET G16:000: LET
6 131:00: LET G14:100: LET G13:
7 104: LET G18:100: LET G17:000

```

Lines 1000-2080

Control the movement of the sites and determine if the defence missiles are to be fired.

Lines 2100-2300

Determine the rate of the damage against the cities, determine whether the attack has finished or if all the cities have been destroyed.

Lines 2310-2435

Lines 2436-2782

Lines 3000-3170

From the scoreboard routine, show the lowest scoring missile.

Control the bomber and involve the bomber's missiles.

Lines 4000-4130

Lines 6000-6200

Content of the user defined graphics. From explosions on the screen, when missiles or bombers are hit by the defence's missiles.

Lines 6000-6049

Control the firing of the defensive missiles.

Lines 6050-6075

Lines 6076-6120

Contains the instructions for the game. The initial display which you see when the program is first run.

Lines 6130-6310

Control the writing up of the screen and the setting up of the missile sites, when stocks are not all used up.

Lines 6320-6600

Control the drawing of the missile storage on the bottom of the screen.

Lines 7000-7180

Control the explosion of the defence's missiles.

Lines 7200-7620

From the nuclear explosions and the mushroom cloud.

Lines 7650-8200

Generate the elements (light and/or the bomb, balloons, etc.) and that any new missiles will not aim at locations already destroyed or so. These lines also produce the loss of missiles if the defence site is hit.

Line 9000

The scoring routine. To save the program an tape, simply type GO TO 9000.

### Typing tips

The following lines are ones which can be left out or typed in should you wish to type in the program at stages. Go to end, REM statements can

be left out, but if you open more of and you may well be better off creating a line here and there to give you an idea of how the program operates. Anyway, here are the areas of code, REM statements can be left out, but if you open more of and you may well be better off creating a line here and there to give you an idea of how the program operates. Anyway, here are the areas of code, REM statements can

Lines 2210-2435

This routine from the intro routine, but could always be replaced by a STOP statement. The scoreboard routine could also be used in other programs using GO to the score routine.

Lines 6000-6120

The display when the program is first run.

Lines 7200-7620

The nuclear explosion and mushroom cloud. These lines may be replaced by the far less spectacular routine shown on p. 7.

```

-000 FLASH 1: PRINT AT 10,11
-001 GO TO 10,11: PRINT AT 10,11
-002 FOR G=0 TO 10: GO TO 10,11: G=0
-003 G=0: G=0: G=0: G=0: G=0: G=0
-004 G=0: G=0: G=0: G=0: G=0: G=0
-005 G=0: G=0: G=0: G=0: G=0: G=0
-006 G=0: G=0: G=0: G=0: G=0: G=0
-007 G=0: G=0: G=0: G=0: G=0: G=0
-008 G=0: G=0: G=0: G=0: G=0: G=0
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-016 G=0: G=0: G=0: G=0: G=0: G=0
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```

Fig 7

```

4 LET G=0:00: LET G=0:0: DIM G
10,11: DIM G:10: LET G11=0:0:
20 G=0:0: LET G10=0:0: GO TO 6000
30 REM Variables: G, G, G, G, G,
40 G, G, G, G, G, G, G, G, G, G,
50 G, G
60 REM Variables: G, G, G, G, G,
70 G, G, G, G, G, G, G, G, G, G,

```

## SPECTRUM GAME

```

0000 99,99,7,2,11,00,0,0,0,0,0,0,0
0001 REM Variables: a,b,c,d,e,f,
0002 a TO 4200
0003 OVER 0 PAPER 0 PAPER 0 BOR
0004 INVERSE 0 FLASH 0 BRIGHT
0005 GO TO 6000
0006
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```

0000 PLOT 0,0:30 DRAWM 0,0
0001 PLOT 0,0:30 DRAWM 0,0
0002 PLOT 0,0:30 DRAWM 0,0
0003 PLOT 0,0:30 DRAWM 0,0
0004 PLOT 0,0:30 DRAWM 0,0
0005 PLOT 0,0:30 DRAWM 0,0
0006 PLOT 0,0:30 DRAWM 0,0
0007 PLOT 0,0:30 DRAWM 0,0
0008 PLOT 0,0:30 DRAWM 0,0
0009 PLOT 0,0:30 DRAWM 0,0
0010 NEXT
0011 IF 001 THEN INVERSE 1
0012 IF 001 THEN INVERSE 1
0013 IF 001 THEN INVERSE 1
0014 IF 001 THEN INVERSE 1
0015 INVERSE 0
0016 IF 001 THEN LET 001=0
0017 LET 001=0
0018 IF 001 THEN GO TO 0000
0019 OVER 1
0020 LET 0000=001-001 LET 0010=0
0021 LET 0010=0
0022 PLOT 00:30 DRAWM 0,0
0023 PLOT 00:30 DRAWM 0,0
0024 OVER 0
0025 INVERSE 1 PLOT 00:30 OR
0026 PLOT 00:30 DRAWM 0,0
0027 IF 0000 THEN LET 001=0
0028 IF 0000 THEN LET 001=0
0029 IF 0000 THEN LET 001=0
0030 IF 0000 THEN LET 001=0
0031 LET 001=0
0032 LET 0000=0
0033 LET 0000=0
0034 LET 0000=0
0035 IF 0000 THEN GO TO 0000
0036 INVERSE 0
0037 INVERSE 0
0038 INVERSE 0
0039 INVERSE 0
0040 INVERSE 0
0041 INVERSE 0
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0097 INVERSE 0
0098 INVERSE 0
0099 INVERSE 0
0100 INVERSE 0

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0000 PRINT INVERSE 1
0001 PRINT INVERSE 1
0002 PRINT INVERSE 1
0003 PRINT INVERSE 1
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0096 PRINT INVERSE 1
0097 PRINT INVERSE 1
0098 PRINT INVERSE 1
0099 PRINT INVERSE 1
0100 PRINT INVERSE 1

```



The screen display you will be greeted with when you first load the game.

```

0000 FOR 001 TO 000 NEXT 0
0001 PRINT "PRESS ANY KEY TO C"
0002 PRINT "PRESS 0"
0003 PRINT "PRESS 0"
0004 PRINT "PRESS 0"
0005 PRINT "PRESS 0"
0006 PRINT "PRESS 0"
0007 PRINT "PRESS 0"
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0090 PRINT "PRESS 0"
0091 PRINT "PRESS 0"
0092 PRINT "PRESS 0"
0093 PRINT "PRESS 0"
0094 PRINT "PRESS 0"
0095 PRINT "PRESS 0"
0096 PRINT "PRESS 0"
0097 PRINT "PRESS 0"
0098 PRINT "PRESS 0"
0099 PRINT "PRESS 0"
0100 PRINT "PRESS 0"

```





```

7075 PRINT AT 8(1):8(1)-1." "
7076 IF 8(1):8(1)-1." " THEN AT 8(1):1
7077 LET I:=I+1
7078 NEXT I
7079 LET I:=I+1
7080 IF 8(1):8(1) THEN GO TO 7084
7081 INK 0 OVER 0 GO SUB 100
7082 OVER 0
7083 OVER 0
7084 PRINT AT 8(1):8(1)-1." "
7085 AT 8(1):1
7086 AT 17(1):1." "
7087 OVER 0
7088 PLOT UU-7.0 DRAW 13.0 PLO
7089 UU-13.0 DRAW 13.0 PLOT UU-3.0
7090 UU-13.0 PLOT UU-10.0 DRAW 1
7091 PLOT UU-0.0 DRAW 0.0 PLOT
7092 UU-0.0 DRAW 17.0 PLOT UU-3.0
7093 DRAW 0 PLOT UU-13.0 DRAW 20
7094 PLOT UU-1.10 PLOT UU.10
7095 PLOT UU-0.7 DRAW 1.0 PLOT
7096 UU-0.7 DRAW 1.0 PLOT UU-0.0
7097 PLOT UU-0.0 DRAW 1.0 DRAW 1.0
7098 PLOT UU-0.0 DRAW 0.0 PLOT UU+
7099 PLOT UU-0.0 DRAW 1.0 PLOT
7100 UU-7.0 DRAW 1.0 PLOT UU-7.0
7101 DRAW 15.0 PLOT UU-7.10 DRAW 10
7102 PLOT UU-0.11 DRAW 11.0 PLO
7103 UU-11.0 DRAW 1.0
7104 PLOT UU-0.0 DRAW 1.0 PLOT
7105 UU-10.0 DRAW 0.0 PLOT UU-10.0
7106 UU-10.0 PLOT UU-10.0 DRAW 1
7107 PLOT UU-10.0 DRAW 3.0
7108 PLOT UU-10.0 DRAW 1.0 PLO
7109 UU-0.0 DRAW 1.0 PLOT UU-0.0
7110 UU-1.0 PLOT UU-7.10 DRAW 10
7111 PLOT UU-1.0 PLOT UU-0.11
7112 DRAW 11.0 PLOT UU-0.11
7113 PLOT UU-0.0 DRAW 1.0 PLO
7114 UU-1.0 PLOT UU-10.0 DRAW 1.0
7115 PLOT UU-10.0 DRAW 1.0 PLO
7116 UU-10.0 PLOT UU-10.0 DRAW 2
7117 UU-0.0 PLOT UU-1.0 DRAW 1.0
7118 PLOT UU-1.0 DRAW 0.1
7119 INVERSE 0 PLOT UU-10.0 DR
7120 UU-0.1 DRAW 1.0 DRAW 0.0 PLO
7121 UU-0.0 DRAW 0.1 DRAW 0.0
7122 UU-0.0 DRAW 0.1 DRAW 1.0
7123 PLOT UU-0.0 DRAW 1.0 DRAW 0.1
7124 INVERSE 0 PLOT UU-10.10 D
7125 UU-0.1 DRAW 1.0 DRAW 0.0 PLOT
7126 UU-0.10 DRAW 0.1 DRAW 1.0
7127 UU-0.0 DRAW 0.1 DRAW 0.0
7128 UU-0.0 DRAW 1.0 DRAW 0.1 DR
7129 UU-0.0
7130 PLOT UU-0.10 DRAW 10.0 PL
7131 UU-10.0 DRAW 13.0 PLOT UU-0
7132 UU-0.0 PLOT UU-0.10 DRAW
7133 INVERSE 0 PLOT UU-10.11 D
7134 UU-0.1 DRAW 1.0 DRAW 0.0
7135 UU-1.0 DRAW 0.1 DRAW 0.0 PL
7136 UU-0.0 DRAW 0.1 DRAW 1.0
7137 UU-0.0 DRAW 0.0 DRAW 1.0 DRAW 0.
7138 PLOT UU-0.0 DRAW 0.0 PLOT
7139 UU-0.0 DRAW 3.0
7140 INVERSE 0 PLOT UU-10.13 D
7141 UU-0.1 DRAW 1.0 DRAW 0.0
7142 UU-1.0 DRAW 0.1 DRAW 0.0 PLO
7143 UU-0.10 DRAW 0.1 DRAW 1.0
7144 UU-0.0 DRAW 0.1 DRAW 0.0
7145 PLOT UU-0.10 DRAW 10.0 PL
7146 UU-10.0 DRAW 13.0
7147 PLOT UU-0.0 DRAW 0.0 PLO
7148 UU-0.0 PLOT UU-0.0 PLOT
UU-0.0

```

Now we have a screen illustration of the scoreboard

## SCOREBOARD

	SCORE	NAME
1	32000	Anonymous
2	21000	Low-Score FRED
3	0	

YOUR SCORE... 0000

You have the highest score.

Please enter your name.....(up to 14 letters)

```

7070 INVERSE 1 PLOT UU-10,14 C
DRAW 1.-1 DRAW 1.0 DRAW 2.-2
DRAW 2.-1 DRAW 2.-1 DRAW 2.0 PLO
7071 PLOT UU-14 DRAW 2.-1 DRAW -1.
DRAW 1.0 DRAW 2.0 DRAW -1.0 DRAW 2.
7072 INVERSE 2 PLOT UU-10,18 D D
DRAW 2.1 DRAW 1.0 DRAW 2.0 PLO
DRAW -1.3 DRAW 2.1 DRAW 2.0 PLO
DRAW 1.0 DRAW 2.1 DRAW -1.0
DRAW 2.0 DRAW -1.0 DRAW 2.1
7073 PLOT UU-8,11 DRAW 18.0 PLO
DRAW 13.0 DRAW 13.0
7074 PLOT UU-8,13 DRAW 3.0 PLO
DRAW 2.0 DRAW 2.0 PLOT UU-1.0
DRAW 2.1 PLOT UU-8.0 DRAW -1.0
7075 INVERSE 3 PLOT UU-10,17 D
DRAW 2.01 DRAW 1.0 DRAW 2.0
DRAW 1.0 DRAW 2.0 DRAW 2.0 PLO
DRAW 2.0 DRAW -1.0 DRAW 2.0
7076 PLOT UU-8,12 DRAW 3.0 PLO
DRAW 1.0 DRAW 1.1 PLOT UU-7,11
DRAW 13.0 DRAW 1.1 DRAW -10.0
DRAW 1.1 DRAW 10.0
7077 INVERSE 0 PLOT UU-10,19 D
DRAW 2.1 DRAW 1.0 DRAW 2.0
DRAW 2.0 DRAW 2.0 PLOT
UU-10,19 DRAW 2.1 DRAW 1.0
DRAW 2.0 DRAW -1.0 DRAW 2.1
7078 INVERSE 0 PLOT UU-10,22 D
DRAW 2.1 DRAW 1.0 DRAW 2.0
DRAW 2.0 DRAW 2.0 PLOT
UU-10,22 DRAW 2.1 DRAW 1.0
DRAW 2.0 DRAW -1.0 DRAW 2.1
7079 PLOT UU-8,17 DRAW 18.0 PLO
DRAW 13.0 DRAW 13.0
7080 PLOT UU-8,20 DRAW 3.0 PLO
DRAW 2.0 DRAW 2.0 PLOT UU-1.0
DRAW 2.1 INVERSE 1 PLOT
UU-8,20 DRAW 2.0 PLOT UU-10,18
PLOT UU-8,14 DRAW 3.0
7081 PLOT UU-0,10 PLOT UU-4,7
DRAW 0.-1 DRAW 0.-0 DRAW -1.1
DRAW 1.1 DRAW 1.-1 DRAW 1.1
DRAW 1.-1 PLOT UU-3,7 DRAW 2.1
DRAW 3.0 DRAW 1.1 DRAW -1.1
DRAW -1.-1 DRAW -1.1 DRAW -1
DRAW 1.1 DRAW -2.0 PLOT
UU-0,11 DRAW -2.0
7082 PLOT UU-4,11 PLOT UU-3,11
7083 INVERSE 1 PLOT UU-3,13 D
DRAW 2.1 DRAW 1.0 DRAW 1.-1
DRAW 1.-0 PLOT UU-10,12 DRAW 1.1
DRAW 1.0
7084 PLOT UU-8,8 DRAW 8.0 PLO
DRAW 4.0 PLOT UU-2,4
DRAW 8.0 PLOT UU-8,8
7085 PLOT UU-8,4 DRAW 1.0 PLO
UU-4,4 DRAW 1.0 PLOT UU-8,4
PLOT UU-10,3 DRAW 10.0
7086 FOR END TO 0
7087 END THEN GO TO 7080

```

```

NEW PARAGRAPH FOR THIS PENDING
LINES...

```

```

...

```

# Seriously now . . .

A look at some 'serious' software packages for the ZX Spectrum by Peter Shaw.

The packages reviewed here have no cheap connections — they only connect there as "serious" programs. I will deal with the character designers and character enhancements last.

## Multifont 16/48K Spectrum Image Systems

This program, as the literature supplied with the cassette says: "For the first time ever allows the user an instant choice of six specially designed fonts. Well, I would hardly call it "instant" as the code has to be loaded from tape — but the six fonts included are quite well designed.

The six sets include "the limited field", which also has a full lower case set, and can be used as an alternative to the Sinclair set. This, the unique font set demonstrates that font designers are possible on the Sinclair. The other sets are "Modern", a square typeface which will match most applications; "Real", a spaced format and style (uppercase — can be in style to that used in the Computer Times data) — a rectangular style (although I know of no computer which uses it) and "Specialised". This last style is one of my favourites (the other is "Real") — it is chunky and very neat. It is quite readable and has many 48K pleases. The last set "Greek" can only really be used for equations, etc. I think this package would have been greatly complemented by a "Greek" definition style like "Simple" or "Gothic" — but this is provided (near) to a useful end.

All six sets can be stored in the computer at the same time and can be called by two PCRs. The demonstration cassette unfortunately didn't work — a CLEAR command had been omitted which made the flow from page 1 but I think this will be corrected in commercial versions. After a few adjustments I got the program to work and transferred it easily to the ZX Microdrive. It is very pleasing to program in such an

elementary typeface, but perhaps £4.95 is just a little high for the luxury.

Image Systems 166 Elm Road New Malden Surrey KT 33U Tel 01 942 3130

## Character Designer 48K Spectrum Procom

The second character enhancement which also uses the whole character set was not without its problems. The software supplied like Multifont had some bugs and some pretty big bugs at that.

The instructions helped me in no great way, and I had very little idea as to what I was supposed to be doing. I soon realised that the program sets an unprogrammed edition of the character generator you get with the Sinclair product but tape improved because it enables you to redefine the letters set not just the user-defined graphics when I say "improved" I don't mean the program itself is better. Apart from the bugs the program is slow and messy — if the programmer had spent a little

more time with the program, Program might have a good product.

Having already written a character generator program myself I find it hard to understand how they made it so slow.

Procom Management Ltd, 309 High Road, Loughton Essex Tel 01 808 1216

## Sales Ledger 48K Spectrum Kemp Limited

Of all the programs reviewed this was by far the best presented. It was contained in a smart, video cassette type box which held the manual, tape and tape plus an extra space for your own typed file.

The program itself had a very professional feel, allowing for full manipulation of your accounts. The screen display was given an "old school" look, trying to simulate the green-screen display of the larger machines. It only had a few borders.

The Sales Ledger had all the usual screens of Display or Screen Update screen, Get next account, Create one plus full use of a printer. I say a printer and not the ZX Printer because with Sinclair's new PROCOM interface you could get an Epson or a similar or Tandy or cheapish. Unfortunately, the way the software printed was a little confusing, all crunched together like the example given in Fig. 1.

The file handling was fast and the program itself had very well written and explained to other instructions. Because this was very extremely well put together with a good printer attached to the Spectrum, this program is fast, makes business software usable on the Sinclair.



022830

Fig 1 An example of the output from the program  
Sales Ledger: Acme Kimp Ltd

0001 ZX Computing

DATE REFU. A. T. NET

3.9.83x1 7.5858.88

3.9.83x2 758.885888.88

Total 5887.58757.585858.88

TOTAL DUE 5887.58

NOTE-D/F TOTALS INCLUDE V.A.T.

If you don't pay up within 10 days  
I'll send the boys round.

END OF FILE

BANK ACCOUNT  
SYSTEM© K. J. Gouldstone 1983  
Bank Account System, 488K SpectrumMASTER  
FILE  
BUSINESS DOMESTIC  
FILING  
ON THE ZX SPECTRUMThe price of Kimp's Sales  
Ledger package is 14.95Kimp Limited, 43 Moorwood  
all London N10 3PH Tel  
01 448 5490**Masterfile  
48K Spectrum  
Campbell Systems**Masterfile, as its name sug-  
gests, is a comprehensive filingsystem which will store  
anything you choose and  
retrieve in the manner you wish.  
The example program supplied  
was a personal file, which  
supplied the simplest details  
about SA Campbell's shoe  
shop.Masterfile lets a user  
display the files in any way he  
or she wants: the example pro-  
gram had four different  
displays, but by the look of  
it, it is possible to have 38displays, in full colour using  
high resolution displays. The  
file itself is very fast, one of  
the few to be really written  
nicely in machine code.The program is completely  
versatile (which is a great  
help if you have a memory file  
and can store 30 items  
per record with 120  
characters per item).Masterfile is based on the  
Z80 program, The First  
One, which is used by many  
BT owners all over the world.  
Masterfile is designed to ease to  
enter in with the price of the  
package is 14.95.Campbell Systems, 15 Ross  
Road, Buckhurst Hill, Essex  
SS6 2BA.**Bank Account  
System  
48K Spectrum  
K.J. Gouldstone**By the way, this file was  
presented (the user manual is  
photocopied) with a "Service  
Program" on the floppy and in  
the manual. I wasn't expecting  
anything great, but to my sur-  
prise, the program is, in fact,  
pretty good. It will store all  
bank transactions, standing  
orders and so well as cope  
with Cash cards, cheques, and  
mail pay etc. Quite a useful  
little really!Unfortunately, there seems  
to be something wrong with  
the tape. I removed it from it  
cannot add up, so the program  
has a major bug along the line.  
I labourously entered all my  
bank transactions, once they  
were in the program, updated  
the file and then asked for a  
printout of my statements from  
June 83. All I got wasDATE OF TRANSFER 04/06/83  
DATE OF PAY VALUE 04/06/83  
CREDIT BALANCE 00  
CREDIT BALANCE 00 00Now I know how much I have  
in my account, and I still  
anything like £0 but at least I  
hope read a little more as  
what I got showed me that of  
my transactions were not yet  
entered in the main file.I saved the file just a case I  
needed it, then returned to the  
program. Behold! Somehow  
half of the transactions were  
now in the main file. This was  
still a bit strange, unless I  
wanted to know the state of  
my account two months ago.  
At the time of writing this I  
have not had returned and  
whether it is or of the pro-  
gram that isn't working cor-  
rectly, but after a few phone  
calls, I shall figure it out!The price of the package is  
£9.95.Mr. K. J. Gouldstone, 45  
Burlington Avenue, Wellington,  
Sussex BN2 7JG.

# JUST AROUND THE CORNER, A NEW

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DEALERS: Contact us for your nearest wholesaler

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You will need (that's an) excellent 3D graphics, so the fun, action-packed 3D game, *Wrath of Magra*, is a production and design masterpiece. The first setting of *Wrath of Magra* will be a 3D horse simulation, the ultimate in 3D horse racing.

*The Wrath of Magra* comes in three 3D or 2D versions of horses based with realistic movement. The *Wrath of Magra* has by of the *Wrath of Magra* and the many other 3D horse racing simulation games.

**NOTE:** The *Wrath of Magra* is a 3D horse simulation. You can find the *Wrath of Magra* on the *Wrath of Magra* CD-ROM.



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# Club corner



## ZX User Group

Dear ZX Computing,  
When the committee of the International Scientific Research Verein Zur Fortwring Westschweizerischer für Software 'V' a computer club being supported, which specialises in Sinclair computers.

The Sinclair User publishes a monthly magazine, the ZX (USA), which contains information about ZX hard and software products, programs and events and offers the club members the possibility of advertisement free of charge.

For club members we are also offering package orders, which include the cost of ZX products.

We established a telephone "hot line" for technical problems — telephone: Austria, 0032 944 30 00.

The ZX User Club holds monthly meetings in Vienna every first Friday of the month. Please call for information regarding location and time. Yours faithfully,

Thomas Christian  
c/o Wissenschafts Park 1 V,  
Postbox 141,  
A 1180 Vienna Austria

## ZX Micro Club

Dear ZX Computing,  
We are very proud to announce to you the creation of our microcomputer club called ZX-Micro Club. It will be open to all Belgian Spectrum owners.

Our members will enjoy many profits such as a monthly contact bulletin, in-house courses in BASIC or other programming and weekly meetings are also planned.

We presently have five Spectrum 480K, three TV monitors, an Alphaform 32 printer and a range of hardware, as well as several hundred members of various computer systems.

Should any of your readers

wish to find out more information about our club, please contact me at the address given below.

Yours faithfully,

Michel Huet,  
5 Boulevard Leopold II,  
Bte 15,  
B 1000 Brussels,  
Belgium

## Boncaster And District Sinclair User Group

Dear ZX Computing,  
May we introduce ourselves to your readers as a newly formed user group for Boncaster and surrounding district.

New members will be well served at our Wednesday meetings (note that there is no meeting on the first Wednesday of each month). The meetings are held between 7 and 9 PM in the St Andrews Hall, Meeting Road, Wharfedale, Gossendale.

Our present membership includes a good cross-section of users of various ages and programming ability. There fore no-one, be they male, female, child or pensioner, novice or expert, should feel out of place.

You can either contact me at the address given at the bottom of this letter, or can call the Software Secretary, Tony Cooper, on District Secretary Russell Ward, on 01924 612324.

Yours faithfully,  
John Woods (Chairman),  
40 Swales Road,  
Wharfedale  
Doncaster  
Tel Doncaster 29967

## Birmingham

Dear ZX Computing,  
I own a 48K ZX Spectrum and would like to join a user group in my area. Please could you let anyone who is already a

member of a club in my area to contact me at the address given below. Thank you.

Yours faithfully,

Nathan Currie,  
27 Windfield Crescent,  
Mossley,  
Birmingham B13 9TL

## NSW Spectrum Users Group

Dear ZX Computing,  
I am endeavouring to set up a Spectrum computer club in the Sydney region of Australia and I am wondering if you would please direct the user in Club corner so that I can Australian readers, vice versa. The club meets once a month and exchanges ideas, programs, documents and new software and hardware, etc.

At the moment there is not very many members of the club but we do hope to have many more. We also occasionally publish a small newsletter, with the latest Australian computer news, software reviews and programs.

I think if anybody interested in joining our club could they please ring me on:

021 477 4009

or write to us at the address below.

Yours faithfully,

Reginald Walker,  
R 5/80 Spectrum Users Group,  
35 Old Swansons Road  
Narsley, N S W.  
2077,  
Australia

## Beaconsfield and District Computer Club

Dear ZX Computing,  
I have just formed the Beaconsfield and District Computer Club. The first meeting having just taken place on 26 January 1984.

I had over 150 enquiries in general, the result of the co-operation of the local Mears and small shops. Fifty of the enquiries filled in the questionnaire I had prepared and from these I am happy to report that 30 have decided to join the club.

ZX Spectrum dominates, but BBC Micros came a close second with 40% of the following. The main age group of the club is between 14 and 17 although we do have a number of interested adults who come along to meetings. The majority of members are interested in learning to program effectively as they will be one of our priorities which we begin to structure the club's operations.

Although we have had three spare premises our local paper is not so very grateful if you could give us some extra publicity in any of your readers would like to find out more about our club, could they please send an SAE to me at the address below.

Yours faithfully,  
James Miles,  
2 Wilson Road,  
Beaconsfield,  
Bucks HP8 2BP

If you still do not have a member of a user club which caters for the Sinclair user, why not get your club on the map by writing to us at:

Club Corner,  
ZX Computing,  
145 Charing Cross Road,  
London WC2H 9HS

All you have to do is send us a list of your club's activities, times of meetings, addresses of who to contact and we'll do the rest if you publish a newsletter or club magazine we'd very much like to see that too.

And if you don't see a club in your area, why not start one as we're willing to ZX Computing and seeing if any like-minded enthusiasts wish to join you.



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## Sinclair Spectrum

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PICTURES IN A PICTURE  
PICTURES IN A PICTURE  
PICTURES IN A PICTURE

# Smaug's lair

Can you destroy the dragon's lair in this program written for us by Norman Brooks of Kent.



You are the Gunter Captain on a mission to destroy the dragon's castle.

You have five cannon and 12 shells (shown at your disposal) — but — beware — the usual of your guns will make the dragon. When he flies into the side and although he has poor eyesight he will be able to find by the way of all your weapons. The dose will be your life!

To choose the most tricks, let the castle as high as you can try carefully choosing how much gunpowder to use and what angle to set the cannon at. If 8 000 shells fall then the castle is in ruins and Smaug must seek a new residence. Good luck!

## Cannon and ball

When you hit RUN the program you are asked if you require instructions in the usual way. If you reply yes (Y) you are given a brief introduction to the program to get the machine up.

Then the 'Battle Status' screen is shown and is referred to throughout the game. You are shown the current scores, and the castle will be described in proportion to the number of blocks you have knocked out. At the top of the screen you can look for the computer has set the cannon from the castle side for your first shot (this is random but will be 800 and 2 300 metres). You are then invited to enter the size of the gunpowder charge (0-5 to 30lbs) and what angle of elevation you wish the

cannon to be set to (0 to 90 to 90 degrees).

The main gunpowder also sets the initial cannonball velocity (the cannon will fly 200 lbs) the angle of elevation of both the angle (I have used Newton's formulae for the no. of projectiles from the old A level Maths notes for this part of the program) and have formulated basic equations for choice of range and change to make the computer aspect of the program as accurate as possible.

A graphic display of the cannon being adjusted to the angle chosen is shown next, it may not appear for the moment at the start of the program as it is invited to be loaded. The concept of angles is my young family. Asking him 2200 FAST and 2010 SLOW will almost any location!

## Into battle

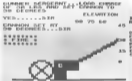
The main action comes on the 'Battlefield' screen which follows on from the previous screen automatically. The cannon is displayed at the computer selected distance from the castle and the cannonball is fired from 1000 yds out of the cannon. The dragon flies from the castle. Unknown to the player, it has chosen at random whether to attack the cannon or the cannonball. If the dragon chooses the cannon there is a 50% chance of a hit if the cannonball is hit, then the odds of a hit are only 20%.



The battle status screen at the start of play.

Should the cannonball reach its target (the castle is 400 metres high) then the 1 000 metre of the cannonball will determine how many blocks are knocked out. (This program has 100 1 to 10 75 1) When in flight the dragon may obscure the ball

but it will always reappear at the same position after the dragon has passed — unless, of course, it turns the cannon ball to a cannon. This can be easily asked if you wish to see the 'ball' (just) — if you wish to see the 'ball' you can 'enter' and the



At 021004.

The display showing the cannon set to a chosen angle.



At 04 0000.

The battlefield display with the cannonball fired and the dragon in flight.

## Dragon Wars

At the end of the game neither side's 5000 bricks out of the castle or no cannon fire remains and there is an 80 percent chance to show to ensure which I leave you to discover.

The scale slightly favour the Green Gophers once an 80 percent of damage and angle has been gained. Best is to wait that an angle of 45 degrees where the ball the two meet distance for city streets at

change list at which the cast is a soldier damaged position left and an angle of 45 degrees will result in the same field range as that of 30 degrees in each 15 degree angle side of 45 degrees. However, the cards presents a smaller target when viewed on from above rather than for distance on so for a more of this game its cheating cheating angles over 45 degrees I have put to rest doing this!

## Variables on a theme

Let's have a look at the main variables used throughout the game.

- BK** The number of bricks knocked out of the castle  
**BR** 5000 bricks to be knocked out will win the game for you  
**BALL** The number of bricks left remaining (zero cannon fire left will result in you losing the game)  
**GNRD** The number of cannon you have (remaining zero you lose left will result in you losing the game)  
**BOLT** The I give up state  
**M** The distance between the cannon and the castle  
**S** The weapon number used to generate the velocity  
**S** 0 if equal to one, the dragon attacks the person left side  
**S and Y** The coordinates of the cannonball  
**A** The input for the angle of the cannon in radians  
**B** The angle generated into radians  
**V** The input for the amount to use of gunpowder  
**and**

Other variables are used but this only need to see the running of the program.

```

100 REM "BRICKS LEFT"
101 PRINT TAB 4, "██████████████"
102 PRINT "0"
103 PRINT "DO YOU WANT INSTRUCT"
104 GOTO 2000
105 IF INKEY="" THEN GOTO 10
106 LET B=INKEY
107 IF B="Y" THEN GOTO 2000
108 LET BR=BR-B
109 LET BR=0
110 LET BR=5000
111 LET BR=0
112 LET BR=0
113 CLS
114 GOTO 100
115 LET B=INT (BR/100)
116 LET B=4+100+BR
117 LET B=0
118 GOTO 2000
119 INPUT B
120 IF B=0 THEN GOTO 2000
121 GOTO 2000
122 REM "CANNON PROGRESS"
123 CLS
124 PRINT TAB 4, "██████████████"
125 REM "BRICKS LEFT"
126 LET BR=5000
127 PRINT AT 10,0, "0"
128 PRINT AT 10,0, "0"
129 PRINT AT 10,0, "0"
130 PRINT AT 10,0, "0"
131 PRINT AT 10,0, "0"
132 PRINT AT 10,0, "0"

```

```

133 PRINT AT 10,0, "0"
134 GOTO 2000
135 LET X1=0
136 LET Y1=0
137 FOR X=100 TO 1+100 STEP 100
138 LET Y1=Y1+X
139 IF Y1=0 THEN X=X+100 AND X=X+100
140 IF Y1=0 AND X=X+100 THEN G
141 GOTO 1000
142 FOR X=100 TO 1+100 STEP 100
143 LET Y1=Y1+X
144 IF Y1=0 THEN GOTO 1000
145 IF Y1=0 AND X=X+100 THEN G
146 GOTO 1000
147 FOR X=100 TO 1+100 STEP 100
148 LET Y1=Y1+X
149 IF Y1=0 THEN GOTO 1000
150 IF Y1=0 AND X=X+100 AND Y
151 THEN GOTO 1000
152 NEXT X
153 PRINT AT 10,0, "CANNONBALL"
154 PRINT AT 10,0, "CANNONBALL"
155 GOTO 1000
156 PRINT AT 10,0, "WHITE", AT
157 10,0, "00000", AT 17,0, "0000
158
159 IF Y1=100 AND Y1=100 THEN LE
160 LET BR=BR-1+100
161 IF Y1=100 AND Y1=100 THEN LE
162 GOTO BR+100
163 IF Y1=100 AND Y1=100 THEN LE
164 GOTO BR+100
165 IF Y1=100 AND Y1=100 THEN LE
166 GOTO BR+100
167 IF Y1=100 THEN LET BR=BR-1
168
169 PRINT AT 10,0, "BALL STRUCK"
170 INT Y1, "HITTED UP"
171 GOTO 1000
172 PRINT AT 10,0, "CANNONBALL"
173 GOTO 1000
174 LET BR=BR-1
175 PRINT AT 10,0, "DO YOU WANT"
176 PRINT AT 10,0, "INSTRUCT?"
177 IF INKEY="" THEN GOTO 100
178 IF INKEY="N" THEN LET BR=0
179 GOTO 20
180 REM "PERCENT CANNONS"
181 CLS
182 PRINT "CANNON SERGEANT...LO"
183 PRINT "OF 'U. - LES AND SET"
184 GOTO 2000
185 PRINT "PERCENT CANNONS"
186 PRINT AT 10,0, "0"
187
188 PRINT AT 17,0, "0"
189
190 PRINT AT 17,0, "0"
191 PRINT AT 10,0, "0"
192
193 PRINT AT 10,0, "0"
194 PRINT AT 10,0, "0"
195 PRINT AT 10,0, "0"
196 GOTO 2000
197 LET B=0
198 FOR X=1 TO 20
199 LET Y=X*700 IN (100+PI)
200 UNPLOT X+0.1, Y+0.1
201 UNPLOT X+0.1, Y+0.1
202 GOTO 2000
203 LET B=0
204 FOR X=1 TO 20
205 LET Y=X*700 IN (100+PI)
206 UNPLOT Y+0.1, X+0.1
207 UNPLOT Y+0.1, X+0.1

```

```

0700 PLOT X+20,Y+11
0705 PLOT X+20,Y+11
0710 NEXT Y
0715 LET R=20-R
0720 GOSUB 2000
0730 PRINT AT 0,0,"DANNON SET AT
0740 PRINT R," DEGREES...SER"
0745 PRINT
0750 GOSUB 2000
0755 PRINT "+++++++"
0760 GOSUB 2000
0765 PRINT "+++++++"
0770 GOSUB 2000
0775 RETURN
0780 FOR R=1 TO 25
0785 NEXT R
0790 RETURN
0800 REM B+FLY SHROUDES
0810 LET G=INT (RND*2)
0820 IF G=1 THEN LET G=1
0830 IF G=2 THEN LET P=M+4+INT (
ND+4)
0840 IF G=1 THEN LET P=25-INT (1
ND+5)+43-13+R*1/2+INT (RND*5)
0850 IF P=2 THEN LET P=INT (RND+
P)
0860 IF P=4 THEN LET P=24-INT (
RND*4)
0870 FOR D=1 TO 5
0880 PRINT AT 25-R,25," "
0890 PRINT AT 25-R,25," "
0900 PLOT (X/50)+43-D*4,(Y/50)+5
ND
0910 NEXT D
0920 FOR R=1 TO 4
0930 PRINT AT 20-R,20," "
0940 PRINT AT 20-R,20," "
0950 PRINT AT 20-R,20," "
0960 PRINT AT 20-R,20," "
0970 PLOT (X/50)+43-D*4,(Y/50)+5
ND
0980 NEXT R
0990 FOR G=25 TO 25-P-STEP -1
1000 PRINT AT G,25," "
1010 PRINT AT G,25," "
1020 PRINT AT G,25," "
1030 PRINT AT G,25," "
1040 PRINT AT G,25," "
1050 PRINT AT G,25," "
1060 PRINT AT G,25," "
1070 PRINT AT G,25," "
1080 PRINT AT G,25," "
1090 PRINT AT G,25," "
1100 PRINT AT G,25," "
1110 PRINT AT G,25," "
1120 PRINT AT G,25," "
1130 PRINT AT G,25," "
1140 PRINT AT G,25," "
1150 PRINT AT G,25," "
1160 PRINT AT G,25," "
1170 PRINT AT G,25," "
1180 PRINT AT G,25," "
1190 PRINT AT G,25," "
1200 PRINT AT G,25," "
1210 PLOT (X/50)+43-D*4,(Y/50)+5
ND
1220 NEXT G
1230 FOR R=7 TO 10
1240 PRINT AT R,0+1," "
1250 PRINT AT R,0+1," "
1260 NEXT R
1270 IF G=0 AND (0+1-21-N OR 0+1
-25-N) THEN GOSUB 2000
1280 IF G=1 THEN INT (111/50)+43-12+N
ND
1290 FOR D=1 TO 5
1300 PRINT AT R,0+1," "
1310 PLOT (X/50)+43-D*4,(Y/50)+5
ND
1320 NEXT D
1330 RETURN
1340 REM B+HALLS UP (REJECTORY)
1350 FOR D=1 TO 5
1360 PRINT AT 10-R+0,25,R+25
1370 NEXT D
1380 PRINT AT 8,25,45
1390 FOR D=2 TO 5
1400 PRINT AT 0,15+17-R*21,25+R+
15
1410 NEXT R
1420 PRINT AT 3,15,"ELEVATION"
1430 LET M=" IN DEGREE"
1440 FOR D=1 TO 11
1450 PRINT AT 0+0,05,25(D)
1460 NEXT R
1470
1480 RETURN
1490 REM B+TDC
1500 LET M=" BOON"
1510 LET M=" "
1520 FOR R=1 TO 5
1530 PRINT AT 10,21-N+R,25
1540 NEXT R
1550 RETURN
1560 REM B+DANNON DESTROYED
1570 LET M="SUN"
1580 PRINT AT 21,5,"SUN HAS D
ESTROYED THE CHRONO"
1590 LET G=3
1600 RETURN
1610 LET BALL=BALL-1
1620 PRINT AT 12,5,"SUN HAS D
ESTROYED THE CHRONO"
1630 GOTO 130
1640 REM B+WIN-LOSE ROUTINE
1650 PRINT AT 14,19,""
1660
1670 PRINT AT 15,19,"THE CASTLE
IS
DESTROYED"
1680 PRINT AT 17,20,"SUN HAS DEST
ROYED THE CHRONO"
1690 PRINT AT 18,21,"SUN HAS DEST
ROYED THE CHRONO"
1700 FOR D=13 TO 2 STEP -1
1710 PRINT AT 0,25," "
1720 PRINT AT 0,25," "
1730 NEXT R
1740 FOR D=24 TO 2 STEP -1
1750 PRINT AT 0,0," "
1760 PRINT AT 0,0," "
1770 NEXT R
1780 FOR R=10 TO 25
1790 IF R=10 THEN PRINT AT 0,0,"
IF R=10 THEN PRINT AT 0,0,"
2000 IF R=10 THEN PRINT AT 0,0,"
2010 PRINT AT 0,0," "
2020 STOP
2030 GOTO 7440
2040 IF G=0 THEN GOTO 7410
2050 IF G=1 THEN GOTO 7420
2060 PRINT AT 14,19,"YOU ARE OUT
OF THE CASTLE"
2070 PRINT AT 15,19,"DANNON HAS
DESTROYED THE CHRONO"
2080 GOTO 7440
2090 PRINT AT 14,19,"YOU ARE BE
ING DESTROYED"
2100 PRINT AT 15,19,"SUN IS RETR
YING"
2110 GOTO 7440
2120 PRINT AT 14,19,"ALL THE CA
STLES ARE DESTROYED"
2130 PRINT AT 17,19,"+++++++"
2140 PRINT AT 18,19,"FLEE FOR
YOUR LIFE"
2150 PRINT AT 19,19,"FOR YOUR LI
VE"
2160 PRINT AT 20,19,"+++++++"
2170 PRINT AT 11,24," "
2180 PRINT AT 11,24," "
2190 FOR D=1 TO 5
2200 PRINT AT 10-R,17-25D," "
2210 PRINT AT 10-R,17-25D," "
2220 NEXT R
2230 GOTO 7440

```

```

6288 LET B=111
6289 LET B=121
6290 LET B=131
6291 LET B=141
6292 LET B=151
6293 LET B=161
6294 LET B=171
6295 FOR R=1 TO 7
6296 PRINT AT B1-R,1,B#10-B#
6297 NEXT R

```

```

6298 FOR B=110,100
6299 LET B=110
6300 LET B=120
6301 LET B=130
6302 LET B=140
6303 LET B=150
6304 LET B=160
6305 LET B=170
6306 LET B=180
6307 LET B=190
6308 LET B=200
6309 LET B=210
6310 LET B=220
6311 LET B=230
6312 FOR R=1 TO 50
6313 PRINT AT B1-R,1,B#114-R#
6314 NEXT R

```

```

6315 FOR B=120,10
6316 LET B#111

```

```

6317 LET B#120

```

```

6318 LET B#130

```

```

6319 LET B#140

```

```

6320 LET B#150

```

```

6321 LET B#160

```

```

6322 LET B#170

```

```

6323 LET B#180

```

```

6324 LET B#190

```

```

6325 LET B#200

```

```

6326 LET B#210

```

```

6327 LET B#220

```

```

6328 LET B#230

```

```

6329 LET B#240

```

```

6330 LET B#250

```

```

6331 LET B#260

```

```

6332 FOR R=1 TO 50
6333 PRINT AT B2-R,B#B#121-R#
6334 NEXT R
6335 STOP

```

```

6336 FOR B=100,110
6337 PRINT AT B,0,0

```

```

6338 PRINT AT B,0,0

```

```

6339 PRINT AT B,0,0

```

```

6340 PRINT AT B,0,0

```

```

6341 PRINT AT B,0,0

```

```

6342 PRINT AT B,0,0

```

```

6343 PRINT AT B,0,0

```

```

6344 PRINT AT B,0,0

```

```

6345 PRINT AT B,0,0

```

```

6346 PRINT AT B,0,0

```

```

6347 PRINT AT B,0,0

```

```

6348 PRINT AT B,0,0

```

```

6349 PRINT AT B,0,0

```

```

6350 IF B#10000 THEN GOTO 6100

```

```

6351 LET B#

```

```

6352 LET B=INT (RND*10000)
6353 LET P=INT (RND*E+1000)/50

```

```

6354 FOR B=0 TO E
6355 PRINT AT B+D,B#E#
6356 NEXT B

```

```

6357 FOR B=0 TO F
6358 PRINT AT B+E,B#R#E#11
6359 NEXT B

```

```

6360 PRINT AT B,0,0

```

```

6361 PRINT AT B,0,0

```

```

6362 PRINT AT B,0,0

```

```

6363 IF B#10000 THEN GOTO 6100

```

```

6364 IF B#10000 THEN GOTO 6100

```

```

6365 IF B#10000 THEN GOTO 6100

```

```

6366 IF B#10000 THEN GOTO 6100

```

```

6367 IF B#10000 THEN GOTO 6100

```

```

6368 IF B#10000 THEN GOTO 6100

```

```

6369 IF B#10000 THEN GOTO 6100

```

```

6370 IF B#10000 THEN GOTO 6100

```

```

6371 IF B#10000 THEN GOTO 6100

```

```

6372 IF B#10000 THEN GOTO 6100

```

```

6373 IF B#10000 THEN GOTO 6100

```

```

6374 IF B#10000 THEN GOTO 6100

```

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6375 IF B#10000 THEN GOTO 6100

```

```

6376 IF B#10000 THEN GOTO 6100

```

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6377 IF B#10000 THEN GOTO 6100

```

```

6378 IF B#10000 THEN GOTO 6100

```

```

6379 IF B#10000 THEN GOTO 6100

```

```

6380 IF B#10000 THEN GOTO 6100

```

```

6381 IF B#10000 THEN GOTO 6100

```

```

6382 IF B#10000 THEN GOTO 6100

```

```

6383 IF B#10000 THEN GOTO 6100

```

```

6384 IF B#10000 THEN GOTO 6100

```

# The soft touch

The latest releases for the ZX Spectrum — James Walsh gives us his opinions!

## Invasion Of The Body Snatchers — Crystal Computing

Contrary to expectation, there have been very few imitations of the popular arcade game Defender for the Spectrum. This has had little to do with the actual marketability of the game, as can be seen from the quality of copies made in those markets. The lack of competition has been to the disadvantage of the games player.

It'll have to wait with the introduction of the Invasion of the Body Snatchers, from Crystal (0 8 8 5), which is a full on implementation of the arcade game replicating all the Hall of Fame arc. Obviously few points can be awarded for originality, but on the other hand it is the quality of the implementation which puts it so far above the rest. The graphics are superb, especially those of the alien and especially the tanks — not the original Movement of objects, the enemy and the bases, is not just smooth, but very smooth

and fast, very fast.

As more and more alien submarines on the screen, the winner game gets harder in detail. All the normal functions are available — forward, reverse, fire and smart bombs. Fire is not quite repetitive which makes the game more difficult still. Scoring is consistent with bonuses added for the number of bases left after each wave of attackers. It of course you manage to score one of the top scores you can enter your name (or message) on the Hall of Fame.

Bound on the Spectrum could hardly do justice to such an expensive program, so Crystal have opted to support the Plus1 Model B as well. This is a rather awkward for those who do not own one, but another addition which would have to be made when using the Spectrum's own video is that of speed. The Spectrum does not allow you to speed a sound to the same intensity and let it get on with the production which you get on with the rest of the program — the Plus1 does allow slowing the game to a crawl, but surprisingly the sound effects



produced are very good, a credit to both Crystal and Plus1.

As often is the case, life is made a great deal easier with the use of a joystick, and the game is no exception. Fast and precise actions are the name of the game, a very capable and well done game, highly recommended.

## Transam — Ultimate

Transam is one of the latest offerings from Ultimate — a specialist in Pac-Man and Shoot 'Em Ups. Transam follows the tradition of quality graphics and simple but thoroughly original ideas. The scenario is in the year 2472 and all that remains on Earth are remnants of a once great continent — a barren land, grim with the Super Brown Red Planet equipped with advanced technology, is to regain the right to life from the Deadly Black Turbos.

The scenario is done, but when it to the game itself. You have four car controls either available from the keyboard or via a joystick. They are acceleration, reverse, rotate, clockwise, brake and accelerator. There is also Pause temporarily to fast the game. The actual aim of the game is plain English, the time is to travel over America searching for the right Great Gups of Ultimate. Along the way it will be necessary to keep filled up with petrol. It is not easy, there are petrol pumps in five desolate places of sand, water and rocks etc. Various objects will appear in your path and of course the Deadly Black Turbos will attempt to make you crash.

The display is 256 with your car starting in the centre of the screen, rotating, and with the

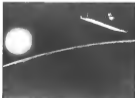
alien level etc, moving past. On the left hand side of the screen is a Real Time Clock, in one that has left the real time, a car's accuracy — a substitute is complete map of the U.S.A., showing the positions of fuel pumps, etc, etc, and you, the Red Planet, is a floating alien-like. Move down to the second half of the display is a speedometer, fuel gauge and temperature gauge. There is also a alarm range meter showing the positions of fuel and the Black Turbos. Finally, the number of eggs found and the number of lives left.

The graphics are smooth, fast and of a high quality — just like the other Ultimate games. One in some respects is one of its main qualities about Transam — it is very Ultimate in that no rare treasures have been prepared or rare ideas used. The game is very professionally written with only one major bug — the fact that when you reach the boundaries of the U.S. your car is simply flipped round without notice which can cause problems if a Black Turbo is at close pursuit. Overall Transam is fun, though less original than Ultimate's previous two. The presentation is excellent, intuitive and well recommended.

## Cricket — Cambridge Micro Centre

Cricket from Cambridge Microcomputer Centre comes complete with a 5 disc. Data comprising really getting the show back. Both games are BASIC, in language and in playing.

The screen is set up with two wickets and 12 men on





center. Each man takes up a large chessman square, hence the graphic definition at the top: *warriors*. *Baltes* seeks full or broader; the *spirit* must be entered in stone and cast out. The full is shown receding towards the *center* and then away again. You may control the man (release the left) to try and stop or catch it. This I found to be a lot harder than expected. A full *screen* and information board is continuously updated and available. *Sound effects* are excellent but rather basic, and not surprising for the Spectrum standard.

Unfortunately, there is little still required on the part of the player and little resistance from a novel but rather unexciting game.

There is very much a B side. You pick a target, the computer throws and hits (accuracy of full area). There is still a required. No more need to be said about this or the game cassette as a whole.

### Maziacs — dktronics

The *Maziacs* is a maze game in the title suggests, but it is not a typical *Pacman* (ugh of retail) situation, who have produced other quality products. Have done one large step forward from *Pacman*.

To start, the maze is bigger, in fact it has no edges, but

hundreds of *treasures*. Only about one-fifth of the total maze is revealed at once on the screen with a full one-twelfth being displayed by the pressing of the appropriate key. A fairly slow maze is generated on each go so missing for a very varied game.

Doped all over the maze are *treasures*, all set into the walls until you collect them. Only one *award* may be held at a time, and just one *Maziac* can be killed with a *Maziac* it is

horrible monster that has a tendency to attack you. There are an enormous number of *Maziacs* milling around all over the maze. If you are sitting down, they will attack and kill if you are sitting, without a *shield* then you are most likely going to be killed. On the other hand, if you are walking without a *shield*, the *Maziacs* will die. One of the most like things about *Maziacs* is the *floral* lights which they will put up. The aim of the game is to find the *treasure*. This is a

very easy job when you are in a maze of such size. Fortunately the *treasures* will light the way for a short distance. Once the *treasure* is found, getting it back is far from easy as it would only be for *treasures* on the *treasures* that is dropped before *treasures*.

On the right-hand side of the screen is an energy level indicator which can drop very rapidly at times, if it gets too low you die. To keep energy up it is necessary to eat food also found in the walls.

*Maziacs* is one of the most exciting games I have played for a while. The graphics are very good, they are smooth and fast. With these levels of play it will be a long time before the game becomes too easy.

A great game and highly recommended.

### Terror-Daktill — Melbourne House

Melbourne House have a string of excellent titles as their name. The *Maziacs* is probably being the most well known. Just from the cover the looks as if it could be a winner.

On loading a stunning intro screen is displayed — an outline version of the cover. In fact, once the whole game has loaded the screen just stands still and gives no indication that it has successfully loaded.



By pressing a key the next display is shown with the key pressed in the middle. By pressing another key the game begins. If left for three seconds it will enter a locked demo routine.

Now the introductory program begins. Because it is relatively long and needs to be stored, it can be loaded by pressing the appropriate key. During this routine the display becomes the window of an airplane flying through the clouds. Then, at trouble status, it is possible to see the volcanoes over which you are flying. Finally after attempts at landing have failed your plane crashes. Next day you wake to see your Dakota flying in the distance.

There are three missions in a nearby valley. You drop a bomb over level ground for the onslaught. In the distance the Tower Dakota look like space rockets moving from left to right and back again at a jerky motion. As they suddenly fly in together they are destroyed by a shot hit from the cannon — for this state lead them down if you survive the first wave of Dakotas then night falls and day breaks for the next day. If you survive six days a rescue plane will arrive. The Dakotas have an affinity for landing on you, hence starting you off

the next day and damaging the cannon beyond repair.

The graphics are quite superb, though just at times the sound is good, though rather crude. At times Tower Dakota is a fast, tight, addictive and a difficult game to master. The quality of the program itself is up to the best around the Spectrum. It may be thought of as too hard hence not recommended for most young children.

Melbourne House have succeeded in contrasting the tradition with another excellent game.

### Luna Crabs — Micromega

You have been sent to one of Saturn's moons to gather data and samples of materials much needed on the planet Earth. A simple and tedious exercise with the best sound effects available following you. Suddenly, they start to spit deadly acid balls. You have no alternative but to stop and fight. One helicopter track on your land crawler has been so you may rotate left or right and fire.

The game is in 2D. The screen shows the lateral view from inside your crawler. The target of your gun is shown at the bottom of the screen — if

this is hit you die. As the crawler rotates the display shows in one direction or the other. When firing your photos can be guided to hit one of the latter features. Luna Crabs.

Technically the game is good. The movement though rather jerky in the case of the outer dimensions. The controls graphics are pleasant and enjoyable to look at. It is fast whilst still being relatively easy even for the less keen. Melbourne House have followed a very noticeable policy of showing screen photos of the game on the cassette only as it is to give you, the potential customer, a better idea of the game before buying. On the whole the game is surprisingly easy to finish, though still a challenge after playing a while.

Though it is not up to the top professional standard of such companies as Leisure Creations, it is so enjoyable and surprisingly addictive game to play.

### Championship Darts — Shadow Software

Darts is not a game readily associated with computer computers hence it was just that he went to design and

market a version which compares with the 1980 computer orientated game. Have Shadow Software managed this?

On loading a reasonably good introductory screen is displayed — a good start. To play the game first a standard board is displayed on the screen with a line from the centre of the board to the number 20. It then goes to your judgement as to stopping the line on the desired value. Once the line has been stopped another display comes into use. A small table runs backwards and forwards along a line with double marks off the board and 25 shown on it. By pressing a key at the right moment the desired type is selected, with the year score as determined and subtracted from the start value. Obviously there is provision for two players but not for the computer to play. The graphics though not complicated, are quite pleasant, but nothing exciting. Instructions are limited, being just clear enough to get on, but really they should have been rather more comprehensive.

In conclusion it can be said that Championship Darts is really put together, quite fun to play, but technically limited by a relatively average price.

### Cyberzone — Crystal Computing

Crystal seems, unfortunately, to be searching between adventure and arcade style games. One of these first games. Most of it seems to be an adventure/strategy type game, but with moving graphics. Cyberzone is an arcade game. Cyberzone is an adventure, called Halo of the Things is an arcade game but with an adventure type scenario. Cyberzone is a pure arcade game. Unlike Halo of the Things it is not a true arcade game, but rather a mix up of many different games.

At the top of the screen at a blue green man, accessed in a special ship with a swiveling floor. By firing at the space ship's floor it will slowly but surely disintegrate. Once it has to a large enough amount, then you must shoot the ship's left leg.

There must be some hidden meaning behind this!





Fortunately the game is not quite that easy. Whilst your boss runs along the bottom of the screen, the alien ship also has its own laser fighting along its own. This is it less on all but the lower of the five levels. Once a little tighter and it will be sent out by the alien. These waves then vary across and down the screen, occasionally dropping bombs, which must be avoided at all costs. If a fighter successfully it will spin over and then towards the earth. From time to time the alien ship will drop a missile ship into the battle. You cannot shoot them, but the fighter screen can be entered into taking them as on the alien or a own gun. These alien ships do not fire at you, but rather at whatever you fire. Hence blocking your fire will destroy or remove the alien ship.

## PITMAN 7 — Visions Software Factory

Pitman 7 is a new game, a country formed company. It is a...

Two levels of adventure are trapped on the first level of an underground maze. Your task is to go to each one to the end, but through the many tunnels and shafts. Just to make things a little more interesting rocks are scattered towards you at a lightning velocity.

There are a number of ways to avoid these to jump over them, go through a hole, heavy and another level on jump and hang on to the lowest parts of the tunnels. If this is not enough, it is then necessary to push the other level through tunnels using its own power. You can push and avoid, but getting them can be a problem.

Though the screen may be different, the screen display and layout of the game are the same as Dandy King. It is, fortunately a number of additions have been made to make it rather more varied and exciting game than Dandy King itself. The quality of graphics is quite good, though a little grey and not as detailed as some of the other games I have seen.

It is also nice to come to an advanced version of Dandy King which will support Dandy King software, but with a new story line which gives it a new life.

Pitman Seven must rate as one of the better games of British games. Fortunately, the extended scenario puts it



## SUMMARY CHART

Games	Strategy/Adventure	Simulation/Action	Adventure/Quality	Graphics	Programming/Screenplay	Length/Value	Value
Maniac	4/4	4/4	4/4	4/4	4/4	4/4	4
Traveller	1/4	4/4	2/4	2/4	2/4	2/4	3 1/2
Championship Days	1/2	3/4	3/4	3/4	3/4	3/4	3
Pitman 7	4/4	3/4	4/4	3/4	4/4	4/4	4
Terra Dakti	4/4	4/4	4/4	4/4	4/4	4/4	4 1/2
Luna Crab	1/4	4/4	4/4	4/4	4/4	4/4	4 1/2
Invasion of the Body Sustainers	4/4	4/4	4/4	4/4	4/4	4/4	4 1/2
Crisis	4/4	4/4	2/4	3/4	3/4	3/4	3
Cyberzone	1/4	4/4	4/4	4/4	4/4	4/4	4

## Addresses

Cambridge Microcomputer Centre, 163 E. East Road, Cambridge.

Ultimate, The Green, Abbey de la Zouche, Leicestershire LE16 5JL.

Visions Software Factory Ltd., 1 Pelgrave Manor, Stulland Street, London W6 6JF.

MS Games Ltd, One Hill Industrial Estate, Sutton Walden, Essex.

Melbourne House, 131 Trobridge Road, London SW10.

Microzone, 233-235 Lonsdale Hill, London SW11 1LE.

Crestal Computing, 3 Ashton Way, East Hampton, Sunderland SR2 2AA.

Shadow Software, 3 Halgate Thurston or Rotherham 5, Yorkshire S63 0TU.

not as a great game in its own right, and a very good one at that!

## \* Stop Press \*

Late news from Crystal Computing. They are to launch a new game called Revenge of the Revenge. So what I then you say. Revenge is a 'Battle Zone' clone to best of arcade game clones. As yet I have only seen a pre-production version, but with stunning 3D graphics, blocky graphics, continuously rotating radar towers tanks, as well as some ships and robotically scanning radar. We are talking about a very special piece of software. It will be beating its way on to the market during November. Watch this space for a full review in the next edition.

Two editions ago I reviewed Dungeon Master by Crystal. It came out very well. Since then vast improvements have been made with the addition of a number of new game aids, sources and new facilities.

# Block deletion

A useful utility for the Spectrum, courtesy of Rodney Francis of Essex.



The program in machine code with a BASIC starter has been written to provide a very fast method of deleting a block of BASIC program. It saves all the addresses of deleting one line at a time.

The machine code is compatible with the address listings for the demonstration program. It starts at address 20000 (20000 Hex) if it is located the last line of the BASIC program must be stored accordingly.

The BASIC program which has been defined fully numbered (as at the end of your last program) and is defined by a GO TO 8880 command. Starts by asking for the starting numbers. These are checked for obvious inconsistencies and are then stored in a temporary store in the printer buffer for use by the

machine code routine. The machine code routine is then run. All that is now necessary is to delete the last line number of the block in the normal way.

Care should be taken to ensure that both the first and last line numbers exactly exist in the program. If the last line deleted is not the last line, you will have to delete the next printing line number in the normal way to complete the deletion. However, those critical to be warned a last line which does not exist. Because the machine deletion would include the last printing line following the line entered.

The BASIC starter is shown in Fig. 1. The addresses and description of the machine code routine are shown in Fig. 2.

```

2001 STOP
2002 INPUT "Enter first line no.
  : LINE1
2003 INPUT "Enter last line no.
  : LINE2
2004 IF LINE1>LINE2 OR LINE1< 0
  : LINE2<0000 THEN GO TO 2002
  
```

```

2005 POKE 20000,LINE1-20000:INT (
  : (LINE1/2000)
2006 POKE 20007,INT (LINE2/2000)
2007 POKE 20008,LINE2-20000:INT (
  : (LINE2/2000)
2008 POKE 20009,INT (LINE2-2000)
2009 PRINT:GOTO 2002
  
```

Fig. 1 The BASIC starter program

```

4000 (2000)
4001 (4000)
4002 (4000)
4003 (4000)
4004 (4000)
4005 (4000)
4006 (4000)
4007 (4000)
4008 (4000)
4009 (4000)
4010 (4000)
4011 (4000)
4012 (4000)
4013 (4000)
4014 (4000)
4015 (4000)
4016 (4000)
4017 (4000)
4018 (4000)
4019 (4000)
4020 (4000)
4021 (4000)
4022 (4000)
4023 (4000)
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4087 (4000)
4088 (4000)
4089 (4000)
4090 (4000)
4091 (4000)
4092 (4000)
4093 (4000)
4094 (4000)
4095 (4000)
4096 (4000)
4097 (4000)
4098 (4000)
4099 (4000)
4100 (4000)
  
```

Fig. 2 The addresses and description of the machine code routine

The deletion of the first line blocks the deleted area the whole routine has altered. It is no longer possible to delete all the following lines which it is to be removed. The addresses now from 4000 to the

address of the block extends to the end of the last line.

It can be built the smallest and the most useful. The machine code listing for both are given in Fig. 3.

200000	40	200000	00
200001	00	200001	00
200002	00	200002	00
200003	00	200003	00
200004	00	200004	00
200005	00	200005	00
200006	00	200006	00
200007	00	200007	00
200008	00	200008	00
200009	00	200009	00
200010	00	200010	00
200011	00	200011	00
200012	00	200012	00
200013	00	200013	00
200014	00	200014	00
200015	00	200015	00
200016	00	200016	00
200017	00	200017	00
200018	00	200018	00
200019	00	200019	00
200020	00	200020	00
200021	00	200021	00
200022	00	200022	00
200023	00	200023	00
200024	00	200024	00
200025	00	200025	00
200026	00	200026	00
200027	00	200027	00
200028	00	200028	00
200029	00	200029	00
200030	00	200030	00
200031	00	200031	00
200032	00	200032	00
200033	00	200033	00
200034	00	200034	00
200035	00	200035	00
200036	00	200036	00
200037	00	200037	00
200038	00	200038	00
200039	00	200039	00
200040	00	200040	00
200041	00	200041	00
200042	00	200042	00
200043	00	200043	00
200044	00	200044	00
200045	00	200045	00
200046	00	200046	00
200047	00	200047	00
200048	00	200048	00
200049	00	200049	00
200050	00	200050	00
200051	00	200051	00
200052	00	200052	00
200053	00	200053	00
200054	00	200054	00
200055	00	200055	00
200056	00	200056	00
200057	00	200057	00
200058	00	200058	00
200059	00	200059	00
200060	00	200060	00

Fig. 3 The decimal and hexadecimal listing of the machine code listing

# Sinclair Special

5



*Inside...  
New Interface 2  
and ROM cartridges!  
New Software!*

## TAKING NEW DIRECTIONS IN NEW DIRECTIONS

You think that the issue of Sinclair Spectrum-compatible cassette tapes is software. Why, when we've so much to say about hardware and peripherals? Simply because at Sinclair we believe in supporting first class hardware with first class software.

This month sees the start of a new commitment to education in our catalogue. Both for adults and children. In the field of audio therapy we've programs like *Depono* (BASIC) and *Make a Chip*, which take you from the creation of simple ZX Spectrum cassette subjects to exercises about design objects.

There's also computer music as you make technology your refuge and inspiration.

And if you're keen to test your Spectrum at chess, check it out for itself, you'll certainly want to try *Chess Tutor 1*, the first program in a complete chess instruction.

### Coming soon...

In the pipeline are many new releases, some 20 which look promisingly like you'll get LOGO and BASIC, PASCAL, COBOL initiatives. They're fifth generation languages which will take you, and your Spectrum, places that you've before, to the great '80s and exploration of artificial intelligence.

After the agreement between Sinclair and Morrison Education has been announced, the 7 releases of which we've published the subjects. These consist of ten programs in a complete early reading course for year 1 to year 4 of a national program based on Morrison's top-selling *Search Horizon* Scheme. All programs are designed for use in schools or at home.

And with educational software we're publishing the many home education programs for primary school children. Covering storage, spelling and punctuation as well as literature programs in 11 languages, and featuring key-boards. Even for adults!

Remember that there's now plenty of room for a major address in software aimed software for the home.

### New ROM software too!

You may well have noticed it was of ZX Interface 2's and ROM cartridge and programs. You'll find both details of the software and its software on the facing page (and there's an index from on the back page too). These offer an exciting career opportunity in employment, where you expand the possibilities of using your Spectrum to yet another direction.

*Simon Maguire*

Simon Maguire  
Applications Software Manager

# SOFTWARE UPDATE

## The latest cassette software for ZX<sup>+</sup> Computers



### Chess Tutor 1 For 48K RAM Spectrum £9.95.

Chess Tutor is a new way of learning about chess—using your ZX Spectrum.

It starts from the beginning by teaching you about the chess pieces and the way they move—including casting, an enpassant, promotion, check, checkmate, stalemate and draw/mate.

Then it teaches you the basic tactics—pins, forks, double attack and castles.

There's also over 120 exercises and over 200 questions for you to answer—all with complete hints and help from your ZX Spectrum when you need them.

You can always check parts of the course you want—and a self-test on all players may be supervised what they can learn from Chess Tutor.



### Musicmaster For 48K RAM Spectrum £9.95.

Musicmaster takes your ZX Spectrum into a musical instrument which will not only play tunes, but will also demonstrate why it plays certain sections of notes and scales.

You can write your own tunes—in a key—play them over and over again, save them on tape, modify them.

You can either write your music on a music synthesizer or simply directly on your Spectrum for a 17-note synthesis!



### Make a Chip For 48K RAM Spectrum £9.95.

Make a Chip teaches you the basic elements of circuit design, shows you how they fit together, and then lets you design and test your own circuits.

When you have designed a circuit, you can give it inputs and outputs and your ZX Spectrum will check it for you. Then it will run it or test you where wrong so that you can modify it.

Make a Chip is a fascinating way of finding out how computer logic works.



### Print Utilities For 16K and 48K RAM Spectrum £9.95

Improve the printing and display facilities of your ZX Spectrum with the Print Utilities program.

Print Utilities enables you to change your program by generating characters through different ports which you can place anywhere on your screen.



### Beyond BASIC For 48K RAM Spectrum £9.95

Take the agony out of assembling! Tames the mystery out of machine code.

Beyond BASIC gives you a deeper insight into the workings of your ZX Spectrum—it explains what happens inside your micro when you run a program, and it teaches you simple 286 machine code programming.

A unique feature of Beyond BASIC is that it enables you to write your own 286 assembler programs—so that you can actually see (in your screen) how they affect the ZX Spectrum.

# ZX INTERFACE 2

## The New ROM Cartridge/Joystick Interface

**Loads programs instantly!  
Takes two joysticks!  
Just plug-in and play!**

The ZX Interface 2 is the latest new peripheral for the ZX Spectrum™ system. It enables you to use new ZX™ ROM cartridge software, plug-in programs that load instantly. It allows you to use two standard joysticks, without the need for separate, special interfaces.

To use new ZX ROM cartridge programs, just connect Interface 2 to the rear of your Spectrum or Interface 1 and plug in the cartridge of your choice. The program is then loaded, ready to run!

You can use any joystick that has a 5-way D plug. Use one or two of them for extra fun with ZX ROM cartridge or Sinclair cassette programs – or with dozens of other Spectrum-compatible programs!



## ...AND BRAND NEW ROM CARTRIDGE SOFTWARE!

There's already plenty of choice of ZX ROM cartridge programs for your Spectrum. Some are old favourites, in an exciting new form. Others are new.

And now thanks to ROM cartridge technology, you can run them all on a 16K RAM Spectrum, even if they were originally written only for 48K machines!

Every ROM cartridge program loads fast and faultlessly. No wires, no waiting, no worries about loading errors! All at them are affordably priced too, at £14.95.

### New! PMSST



Follow the PMSST set in the garden. Help them catch up to activate the code. Try to get the Magic Crystal. Help.

Use the code right and use of periods to ward off obstacles. Stop the insects breathing to convert them before. Run to get the code. PMSST is a fantastic with a wonderful plot.

One and two joystick with a host of features including sound effects.

### New! Three Am



Set in a future time. Use the code and joystick. It is a land where you can be a hero. Use the code and joystick to get the code. Three Am is a fantastic with a wonderful plot.

A program with outstanding graphics. Use the code and joystick to get the code. Three Am is a fantastic with a wonderful plot.

### Chess



This enhanced program does everything you'd expect of board game. It's fast and fun. It's a great way to spend your time. It's a great way to spend your time. It's a great way to spend your time.

### Horse and the Spider



Use the code and joystick to get the code. Horse and the Spider is a fantastic with a wonderful plot. Use the code and joystick to get the code. Horse and the Spider is a fantastic with a wonderful plot.

### Backgammon



Everything you need to play the classic board game. It's fast and fun. It's a great way to spend your time. It's a great way to spend your time.

### Plexitoid



Use the code and joystick to get the code. Plexitoid is a fantastic with a wonderful plot. Use the code and joystick to get the code. Plexitoid is a fantastic with a wonderful plot.

### New! Cookies



Use the code and joystick to get the code. Cookies is a fantastic with a wonderful plot. Use the code and joystick to get the code. Cookies is a fantastic with a wonderful plot.

### Space Raiders



Use the code and joystick to get the code. Space Raiders is a fantastic with a wonderful plot. Use the code and joystick to get the code. Space Raiders is a fantastic with a wonderful plot.

### Hungry Horace



Use the code and joystick to get the code. Hungry Horace is a fantastic with a wonderful plot. Use the code and joystick to get the code. Hungry Horace is a fantastic with a wonderful plot.

### New! Jet Pac



Use the code and joystick to get the code. Jet Pac is a fantastic with a wonderful plot. Use the code and joystick to get the code. Jet Pac is a fantastic with a wonderful plot.

# ZX MICRODRIVE



## NOW ON RELEASE

The ZX Microdrive System - as you'd expect from Sinclair - is unique to the world of computing. It's a compact, expandable add-on system which provides high-speed access to massive data storage. With just one Microdrive alone (and Interface 1), you'll have at least 65K bytes of storage. The ability to LOAD and SAVE in mere seconds, the beginning of a local area network of up to 64 Spectrums, and a built-in RS232C interface! The cost? Less than £50 for each Microdrive.

**How to get ZX Microdrive**  
Spectrum owners who bought direct from us by mail order have been

sent full details. Order forms are being mailed in strict rotation, so if you haven't yet received your order form please bear with us. We're making good progress in meeting the huge demand.

If you didn't buy your Spectrum by mail order, don't worry. Send us the form from the bottom of this page. We'll add your name to the waiting list, and send you by return.

The new ZX Microdrive System. Each Microdrive: £49.95 (interface 1 costs £69.95, but just £29.95 if purchased with a ZX Microdrive). Extra ZX Microdrive cartridges: £4.95.

### How to order

Simply fill in the relevant sections on the order form below. Note that there is no postage or packing to pay on some purchases. Orders may be sent FREEPOST (no stamp needed). Credit card holders may order by phone, calling 01-200-0200, 24 hours a day. 14-day money-back option, of course.

\*UK, ZX Spectrum, ZxInterface and ZX Microdrive are registered trademarks of Sinclair Research Ltd.

# sinclair

Sinclair Research Ltd, Sinclair Road, Camberley, Surrey GU10 3PH, Telephone: 01256 80201

To Sinclair Research Ltd FREEPOST Cambridge Science 9955 000

#### Section A: Hardware

Qty	Item	Code	Unit Price	Subst
	ZX Interface 1	8421	159.00	
	ZX Microdrive - 65K	3000	129.00	
	ZX Microdrive - 128K	3000	99.00	
	Postage and packing	0000	4.95	
<b>TOTAL:</b>				

#### Section B: Software

Code	Item	Price	Subst
0000	Platinum 1	14.95	
0000	Space Raiders	14.95	
0000	Energy Express	14.95	
0000	Warrior and the Wizard	14.95	
0000	Planet	14.95	
0000	Cookie	14.95	
0000	Traveller	14.95	
0000	Warrior	14.95	
0000	Rocky Mountain	14.95	
0000	Grail	14.95	

#### ORDER FORM

#### CHECK THE PROGRAMS for ZX Spectrum

Code	Program	Price	Subst
0000	Platinum 1	14.95	
0000	Energy Express	14.95	
0000	Warrior and the Wizard	14.95	
0000	Planet	14.95	
0000	Cookie	14.95	
0000	Traveller	14.95	
0000	Warrior	14.95	
0000	Rocky Mountain	14.95	
0000	Grail	14.95	
<b>TOTAL:</b>			

\*I enclose a cheque/postal order made payable to Sinclair Research Ltd to £

£

I enclose

My cheque

Address:

124 412  
1984-1985

## ZX Microdrive information request

Please add my name to the Microdrive Mailing List, and send me a colour brochure with full specifications of ZX Microdrive Interface 1 (link here). You can use the above form to send us your name and address.

# Minefield

## Watch your step in this program by Stan Hatton of Pontefract.

All you have to do in this game for your ZX81 is to establish a safe route through a minefield via mines to be cleared with 13 death mines.

### To the death

Your mission is at the suicide mine and at the poison mine (mine - vital to the war effort is the war you have triggered on. And that is why to a certain degree your fate was inexor-

able. You establish three mine and their track is to test a path through the minefield - a secret one of your mine that get through all these explosives will alert the mining that someone is trying to break these defences and your mission will be over.

You move your mine across using the cursor keys. No clear advantage game allows where the mines have been hidden - you must manoeuvre your mine pure is an instant. Goodluck!

### Line by line

Here follows a brief breakdown of the program line by line:

- Line 0 35 Set up the variables used throughout the program.
- Line 40 55 Provide the geographic parameters of the minefield in which repositions the random deployment of mines.
- Line 60 75 The random deployment of the mines in the minefield.
- Line 80 130 Control the movement of the mine. Lines 100 120 compare the next movement with the 13 mine positions.
- Line 135 225 Control the end of the game and the re-start of regard.
- Line 1000 1030 Control the code for the word "START" to flash on the screen at the start of the game.
- Line 2000 2030 Control the screen for what happens: explosion etc. when one of your characters steps on one of the hidden mines.
- Line 3000 3030 Control the code for the word "HOME" to flash on the screen when you have managed to cross the minefield without one of your characters.

### 1 REM SET UP VARIABLES ETC.

```

0 35 DIM M(3)
0 40 DIM L(10)
0 45 DIM C(10)
0 50 LET C=1
0 55 LET S=1
0 60 LET M=127
0 65 LET R=10
0 70 LET O=0
0 80 LET D=1
0 90 LET S=0
0 95 REM - SECRET RANDOM DEPLOYHE
BT OF MINES
80 FOR M=1 TO 13
85 LET L(IN)=INT (RAND*(R-S+1))+S
75 LET C(IN)=INT (RAND*(O-S+1))+S
70 NEXT M
75 REM -MINEFIELD SCREEN DISPL
BT
88 PRINT AT 0,0,"HOME"
89 PRINT AT 0,0,"XXXXXXXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX
88 PRINT AT 11,11,"MINEFIELD"

```

```

88 PRINT AT 10,0,"XXXXXXXXXXXX
XXXXXXXXXXXXXXXXXXXXX
88 PRINT AT 21,21,"START"
124 REM PRESS KEYPAD TO RESTART
AT 20,20"XXXXXXXXXXXXXXXXXXXXX
130 INPUT P
135 GOSUB 1000
140 PRINT AT 21,21," ",AT 21,1,
CHR$(M)
145 REM MOVE AND CONTROL MEN
150 IF INKEY$="S" THEN LET S=S+1
155 IF INKEY$="S" THEN LET S=S+1
160 IF INKEY$="S" THEN LET L=L+1
165 IF INKEY$="S" THEN LET L=L+1
170 IF INKEY$="S" THEN LET C=C+1
175 IF L=L1 AND C=C1 THEN GOTO 1
180 IF M=0 THEN GOTO 100
185 FOR M=1 TO 13
190 LET L1=L AND C1=C THEN G
195 GOTO 1000
200 NEXT M
205 PRINT AT 21,1," "
210 FOR T=1 TO 10
215 NEXT T
220 PRINT AT L,C,CHR$(M)
225 GOTO 135
230 REM -CLOSE OF GAME AND RESTART
BT
240 FOR M=1 TO 13
245 PRINT AT L1,C1," "
250 NEXT M
255 GOSUB 1000
260 STOP
265 REM PRESS CONT FOR ANOTHER
GAME AT YOUR OWN RISK.
270 CLR
275 GOTO 0
280 REM GOSUB 1000 "START" MAC
E TO FLASH FOR EFFECT.
1000 FOR M=1 TO 10
1005 PRINT AT 21,21," "
1010 FOR T=1 TO 10
1015 NEXT T
1020 PRINT AT 21,21,"START"
1025 NEXT M
1030 RETURN
1000 REM GOSUB 2000 WHAT HAPPEN
S WHEN YOU STEP ON A MINE.
2000 FOR T=1 TO 50
2005 POST
2010 NEXT T
2015 SOUND
2020 PRINT AT 11,11,"MAN DEAD"
2025 FOR T=1 TO 50
2030 NEXT T
2035 PRINT AT L1,C1," "
2040 LET M=M+1
2045 IF M=127 THEN LET M=0
2050 LET D=D+1
2055 LET L1=INT(21)
2060 LET C1=INT(21)
2065 REM -PRESS KEYPAD AT YOUR
OWN RISK TO CALL UP NEXT REM.
2070 INPUT P
2075 PRINT AT 11,11,"MINEFIELD"
2080 PRINT AT 21,1,CHR$(M)
2085 PRINT AT 21,1,CHR$(M)
2090 GOTO 135
2095 REM GOSUB 3000 "HOME" MADE
TO FLASH FOR EFFECT.
3000 FOR M=1 TO 10
3005 PRINT AT 0,0," "
3010 FOR T=1 TO 10
3015 NEXT T
3020 PRINT AT 0,0,"HOME"
3025 NEXT M
3030 RETURN
4000 REM END OF PROGRAMME.
4001 REM GOOD LUCK.....
4002 REM .....YOU'LL NEED IT.

```



**THE TRICKSTICK.  
A REVOLUTION THAT RUI  
AROUND ORDINARY JO**



You know what it's like when there's someone closing in fast and you joystick won't do what your brain wants it to

It won't let you loop or curve the way you'd like, or arc and spin at the speed you want.

You can't get away quick enough so what happens? BAP!

For just £28.00 (+ postage), the Trickstick responds at the speed of light, with revolutionary light sensitive controls and own interface: the Trickstick lets you go where you want, at the speed you want.

Not just up and down or side to side, but round and round in any sense, curve or loop you need to build up really big scores.

And the Trickstick is easy to use. All you do is pass your thumb or finger over the controls and your craft responds.

Immediately.

And because the only moving parts are the firing buttons, the new Trickstick will last far longer than old fashioned joysticks.

Best of all for £28.00 (+ postage), you get a Trickstick, a special training program and a chance to enter The National Trickstick Championships.

Up to eight people can play simultaneously!

For the very first time, you can now play with up to seven of your mates.

With our specially written game, you can either play against the computer, against one friend, in teams of two or three or however you want.

Just by plugging in extra interfaces to each

K  
UIS RINGS  
OSTICKS.



**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

**Illustrations used plus extensively with the 4000 Spectrum edition plus more. Additional features value £27.95 including postage. £28.00 inc. V.A.T.**

...let it out. All at the same time. Really exciting, wait until you get

**Trickstick**  
Trickstick 2K, Spectrum and fully compatible. Trickstick makes your existing

...really made possible a whole new  
...a brand new game which really is available for only £7.50 when

...rings around your master before

...releases at £7.50  
...£8.00 (without Trickstick)  
...available to First London Publishers Ltd

...£8.00 (without Trickstick)  
...available to First London Publishers Ltd  
**NOBITICS**

# Competition

Win some Spectrum software in this easy-to-enter competition...

After drawing as much as your conscience might on past gaming partitions of ZX Computing, here's a fairly easy test for you to carry out.

All you have to do is to search the advertisements (shown for the titles of some of the most popular software on the market). And to make it really easy for you, we've provided the names of the packages included in the advertisements (obviously for you, though, not all the names on the list are included in the advertisements — you'll have to find out where many actually are included).

To enter the competition simply ring around the software titles you have found and send them. Then fill in the

coupon and send it off to us complete with your name and address. But please remember to put the number of software titles you have found on the back of the envelope.

## The prizes

There will be six winners to the competition each week at random from the Editor's hat.

Each of the six prize winners will receive a special T shirt with the Wirgin Software History logo on the front and the ZX Computing logo on the

back. These T shirts are being specially manufactured for the competition — so, you can wear your special T shirt with pride!

Along with a unique T shirt you will also receive one of each of the following Wirgin software packages for the ZX Spectrum:

**Pleasin' T**  
**Sheer Pinks**  
**Popstar**  
**Secrets**  
**Star Wars**  
**Orpheus**  
**Snuff**

So, good luck and please remember to put the number of titles you find on the back of the envelope.

## Rules

The competition is open to all UK and Northern Ireland readers of ZX Computing, except employees of Amiga Specialised Publications Ltd their partners and distributors, employees of the Wirgin Software Factory or anyone associated with the competition.

As long as the name address is used for each entry, there is no limit to the number of entries from each individual.

All entries must be accompanied before January 31st, 1984. The prizes will be awarded to the first six entries posted at random when they have been received. The decision to be made by the Editor of ZX Computing. All correspondence will be entered into with regard to the results and it is a condition of entry that the Editor's decision is irrevocable as final.

The winners will be notified by post and the results will be published in a future issue of ZX Computing.

Address your entries to:

ZX Computing — Woodhouse  
148 Glebe Way  
London WC2H 9JL

## Results

Congratulations to Ian Foster of Hollow, Roy Lane of Poplar and Paul Russell of Durbastonia for you have won the competition set at the April 5th issue of ZX Computing. Next issued your Amiga Hardware, physical package is on its way to you.

Thank you to everyone else who entered the competition — better luck next time!

- ✓ MARIO WARS
- ✓ THE POWER!
- ✓ BATTLE OF THE TITANS
- ✓ ACADEM
- ✓ ASTRONOID
- ✓ BLADE CHIVALRY
- ✓ BOMBERS
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100c, **100c** (over and  
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**Refrigerator**  
Earth is under attack  
by an alien force as  
an alien  
force invades a lot of  
new worlds. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



**Graveyard**  
Some of the  
most interesting  
and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



**Space**  
A lot of interesting  
and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



**Transport**  
A lot of interesting  
and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



**100c**  
A lot of interesting  
and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



**100c**  
A lot of interesting  
and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



**100c**  
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01 September 02.00



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01 September 02.00



**100c**  
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**100c**  
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**100c**  
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01 September 02.00



**100c**  
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and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
out of **100c**).  
01 September 02.00



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and most interesting  
of an alien force  
force. **100c**  
and **100c** (over and  
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GALACTIANS

# The 1K Corral

A galaxy of great programs rounded up for your 1K ZX81.

Although sometimes frustrating to work within the limited confines of 1K, if you're lucky you may find it worthwhile to study how programmers have managed to utilize the meager space — or something else they had ahead of you. Find useful even when

working within 1K is a bit. If you would like to contribute material to this feature please try to explain the techniques you have employed so you can get your programs into 1K. And now... on with the show.



**Snake**  
Andrew Ford

In this program, you must guide a snake's head (represented by an 'S') to catch the flies represented by the 'F' characters. There is a time limit and you must use the 'L' and 'R' keys to move left and right respectively.

When the program is run, your snake is printed in the

middle of the screen. The flies travel from the bottom of the screen to the top, and it is your task to eat as many flies as possible in the time limit. When you time has run out, your score will be displayed by the head of the snake.

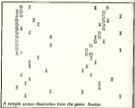
**Program (pressures):**

Here is a brief guide to the keypad: L=Left, R=Right.

Lines 10-20	Set the time limit and also the score.
Lines 20-40	Set L and R as variables for use within the program.
Lines 50-60	Set the X and Y co-ordinates.
Line 70	Set a random number between 10 and 20 for the position of the flies.
Line 80	Prints the display head.
Line 90	Prints the fly at the bottom of the screen.
Line 100	Controls the movement of the snake's head.
Lines 110-120	Checks the display file to see if a fly has been eaten, and if it has add one to the score.
Lines 130-140	Reduce the time by one unit and check to see if the time has reached zero.
Line 150	Shows the score.
Line 170	Prints the score.
Lines 180-200	Wait for a key to be pressed — if a key is pressed the screen is cleared and the program is run.

```
10 LET S=0:PI=100
50 LET Y=PI-PI
```

```
40 LET J=CODE:IF=""
50 LET X=X+J
60 LET Y=Y-J
70 LET S=S+INT (RAND*10)
80 PRINT AT X,Y:CHR S
90 PRINT AT X,Y:CHR S:CHR S:CHR S:CHR S:CHR S:CHR S
100 LET Y=Y+1:INKEY S="L" AND Y=0
110 PRINT AT X,Y
120 IF CODE (INKEY) THEN S=S+INT (RAND*10)
130 PRINT SCORE:IF="" THEN LET S=0+0
140 LET S=S+1
150 IF S=PI-PI THEN GOTO LVL:IF=""
160 GOROLL
170 GOTO LVL:IF=""
180 PRINT S
190 PRINT 4004
200 CLR S
210 RUN
```



A sample screen illustration from the game Snake.

## Ghost hunt

A Murray

In the game, you must try and stop the ghost from reaching you — not an easy task as you will soon find out.

You can manoeuvre your character up and down using the 'U' and 'D' keys respectively, and you can fire at the

ghost using the 'F' key as you see.

You will score one point for each ghost you destroy, the score being displayed when you are notified by the ghost. To make sure of destroying a ghost you must aim your fire at the ghost's head, and be sure not to keep your finger on the 'F' key for too long.

```
5 LET S=0
10 LET A=5
15 LET B=0
20 LET C=10
25 LET D=25
30 LET X=INT (RND * 3)
40 PRINT AT C,C: "ghost, reverse quotation mark"
AT C+2 B: "ghost 1, reverse quote, quoted 'F'"
AT C+3 B: "ghost 2, ghostic 7, ghostic 4"
50 REPEAT AT A,B: "score 2"
60 LET D=D-1
70 IF X=0 AND D>25 THEN LET C=C+1
80 IF X=0 AND D>21 AND D<25 THEN LET C=C-1
90 IF X=1 AND D=25 THEN LET C=C+1
100 IF X=2 AND D=25 THEN LET C=C+1
110 IF X=3 AND D=25 THEN LET C=C+1
120 IF B=0 THEN "F" AND A=C THEN LET S=S+1
130 LET A=A+INKEYS="A":A=INKEYS="I"
140 IF B=0 THEN "F" AND A=C THEN GOTO 10
150 IF D=1 THEN GOTO 180
160 CLR
170 GOTO 40
180 PRINT AT 10,20 "SCORE=" S
```

04 40  
0 5 10  
0

0 0 0  
0 0 0

0 0 0

0

0

0

0 0 0

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0 0 0

0 0 0

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## Happy landings Christopher Dawber

In this program you must land your aircraft on the runway ahead of you and bring it to a halt. It is advisable to take as much speed as you can but the height you start at because you will decrease by the amount of the number (later speed) below the runway ahead. You can decrease your speed by pressing the 'S'

key. Do not lose too much speed above half height or you will inevitably crash.

Once you see below half height, you must land on the runway, but do not decrease your speed after the takeoff or before the Graphic 2.

To land your aircraft, you must press the 'R' key — but take care as you cannot make the aircraft go up again if you don't land and you pass the takeoff; you will come to a sticky end.

```

1 LET S=100
2 LET S=R*F
3 LET H=2
4 LET S=CODE "graphic shifted S"
5 LET F=CODE "graphic space"
6 LET L=K
7 LET A8="10 graphic shifted A, graphic R, 10 graphic shifted A, graphic 2, 5 graphic 10 graphic R"
100 PRINT AT H:R;"3 spaces" AT H:K;"graphic shifted W"graphic shifted F, graphic shifted S"
110 PRINT AT CODE "graphic shifted S" X A8: TO CODE "graphic shifted S"
```

```

115 IF S=K THEN GOTO 130
120 LET A8=A8Z+Z TO 1
130 LET F=F-S
135 IF H=CODE "graphic shifted S" AND S=CODE "graphic shifted S" THEN GOTO 210
140 LET H=H-(S*F)*F*F*F*F*F
150 LET S=S-(S*F)*F*F*F*F*F AND S=0
160 IF H=CODE "graphic shifted D" AND S<K THEN GOTO 210
165 IF H>CODE "graphic shifted S" THEN GOTO 210
167 PRINT AT CODE "R" X S: "space"
168 IF A8=CODE "graphic 2" THEN LET L=L+2
170 IF A8=CODE "graphic 10"
175 IF A8=CODE "reverse R" THEN GOTO 210
180 IF H=K AND L=Z AND S=K THEN GOTO 260
200 GOTO 100
210 PRINT AT H:R;"3 spaces" X A8: " "
220 PRINT "WELL DONE"
230 PRINT AT H:R;"3 spaces" TAB X: "graphic shifted W"graphic shifted F, graphic shifted S"
```

## Click Brian Buckley

When you have entered the program, press the RUN key and then the Navette key. You

will be greeted with a prompt to enter the hour. Once you have done this, you will be presented with a further prompt to enter the minutes. The clock display should then ap-

part of the top centre of the screen.

Here is an example of how you would set the clock to read 12:18.

- 1 Push the program.
- 2 Press "1" followed by "2" followed by Move/In.
- 3 Press Move/In for any key except Break.

The display will now appear showing "12:00".

- 4 Press Move/In for or above any key but Break; 15 times.

The display will now be advanced by one minute after each depression of the key until it reaches 12:18.

#### Program Description

This is how the program works, line by line. After responding to the screen prompts contained in lines 20 and 30, the clock display is printed by the PRINT statement in line 100 but only if the input for line 20 is greater than zero (12:00) or if the input is less than 10 (also to reset, this display is printed by line 120, which clears a zero in front of the hour digit).

The minutes are counted, printed and updated by the loop between lines 130 and 200. If the minutes are greater than nine, line 180 prints them after the colon which resets the hour digits here.

## Races

### Guy Jones

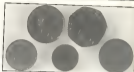
The idea of this game is to choose the horse you think is going to win the race out of a field of three. All you have to do is choose your horse is to input a number either "1", "2", or "3". After doing this, you will see a variable bet — you start

the minute digits, however, if the minutes are in the range zero to nine then line 180 prints a zero in front of the minute digit. The PAUSE statement in line 190 controls the timing to an accuracy of greater than one second per hour. Line 210 increases the hour digit(s) by one after leaving the minutes loop if the time is greater than 23. The displayed hours will change to 00:00 because of line 230. Line 260 keeps the program running by returning control to line 60.

```
10 REM "CLOCK"
20 PRINT AT 20,0: "INPUT HOUR"
30 INPUT H
40 CLS
50 PRINT AT 30,0: "PRESS N1, 10 ADVANCE SERVICES BY 1"
60 INPUT A$
70 IF A$="" THEN CLS
80 IF H<10 THEN GOTO 120
90 IF H<10 THEN GOTO 120
100 PRINT AT 0,10: "H:"
110 GOTO 130
120 PRINT AT 0,10: "0:"
130 FOR N=0 TO 59
140 IF N=0 THEN GOTO 180
150 IF N<10 THEN GOTO 180
160 PRINT AT 0,10: "0:", N
170 GOTO 180
180 PRINT AT 0,10: M,
190 PAUSE 3000
200 INPUT A
210 LET H=H+1
220 IF H>23 THEN LET H=0
230 GOTO 60
```

off with the sum of \$100. Once you have input your bet, the race is run and you are told whether you have won or lost. Your total money is then either decremented or incremented and you are invited to take part in another race. The game ends when you have run out of money.

```
90 SAVE "RACES"
20 LET M=100
110 LET H=INT RND*(3)+1
115 CLS
117 IF M<0 THEN GOTO 300
120 PRINT "BETTER AT 20,0 FROM STARTER AT 30,0 ABSOLUTELY AT 40,0 3 COLON 50,0 AT 60,0 ENTER HORSE (1,2 OR 3)"
130 INPUT A
140 PRINT AT 30,0: "ENTER YOUR SETUP TO 27,0:"
145 INPUT B
147 IF B=0 THEN GOTO 140
147 IF A=H THEN LET B=B*3
150 IF A=H THEN LET M=M+B
155 IF A<>H THEN LET M=M-B
160 IF A=H THEN PRINT AT 10,0: "YOU WIN"
165 IF A<>H THEN PRINT AT 10,0: "YOU LOSE"
170 PAUSE 30
200 GOTO 110
300 PRINT "YOU HAVE NO MONEY"
```



## Currency Conversion

### J Howard

This is a short and simple program which will convert English sterling into four other currencies.

When you run the program, you will be greeted with some short instructions asking you to enter an amount in sterling. The program will then present you with the amounts in American dollars, Deutsch marks, Swiss francs and French francs. The figures will be held for 15 seconds while you make a note of them. The

screen will clear and you will be invited to enter a date (shown) if you wish the amount to be left on the screen for longer you can always enter the PAUSE in line 80.

The amounts calculated are given in line 70 so you will have double sure there are accurate by the way you make the calculation so that your conversions are correct.

To get the copy displayed properly on the screen, you should leave four spaces after the word \$0 in line 20 and the word "CONVERSION" in line 40.

```
10 REM Currency Conversions
20 PRINT "ENTER STERLING AMOUNT TO BE CON"
30 INPUT S
35 CLS
40 PRINT "THIS IS A CONTINUOUS CALCULATION AND GRAB AFTER EACH CONVERSION ENTER A NEW STERLING AMOUNT"
50 PRINT AT 20,0: "POUNDS", "DOLLARS", "DMARKS", "SWY FRCS", "FRCS"
60 INPUT F
70 PRINT AT 10,10: F, F*1.84, F*3.81, F*3.22,
80 PAUSE 150
90 PRINT 20
95 CLS
100 GOTO 40
```

## Pedestrian

### Martin Bradburn

This is a fast action game for the unexperienced ZX01.

Your mission is to guide your pedestrian across a busy road, designed at the vehicle

which obstruct your way. You must use the "0" and "1" keys to make decisions and to switch respectively.

The "0" in line 4 and line 10 and the "1" in line 8, should be entered in Graphics mode.

```
1 LET A=VAL "10"
2 LET B=CODE "0"
3 LET S=0
4 PRINT AT CODE "0" (AT (RND*30)) "A"
5 SCROLL
6 PRINT AT A,B,"0"
7 PRINT AT A,B,"1"
8 IF B=VAL "00" THEN GOTO 12
9 LET S=S+ORND*(4)-1-(ORND*(4)-1)
10 IF ABS (RND*10000+200-6000*10000-CODE "A") THEN LET S=S+1
11 GOTO VAL A
12 PRINT "YOU GOT SUM OVER "S" TIMES"
13 PAUSE VAL "3000"
14 CLS
15 RUN
```



## Tower attack Gregory Briggs

You control a tank which is situated in the west of the screen. You can control tower. You can judge the amount of powder required to project the shell to the tower and thus

destroy it. In line 10 you will need to enter a Graphics shifted '7', line 28 contains a Graphics shifted '7', line 30 includes a Graphics space and a Graphics shifted '7', and finally, line 50 contains a space and a full stop within the double quotes.

```

1 REM "ATTACK"
2 CLS
3 LET L=1
4 LET S=INT (RND * 11)+17
5 FOR P=1 TO 30
6 PRINT AT +0 P; " "
7 NEXT P
8 PRINT AT 10 0; " "
9 PRINT AT 10 L; " "
10 PRINT AT 0 0; "ENTER AMOUNT OF GUN POWDER!"
11 GOTO 28
12 INPUT C
13 FOR B=1 TO C
14 LET L=L+1
15 PRINT AT 10 L; " "
16 NEXT B
17 IF C>=3 THEN GOTO 300
18 PRINT AT 12 0; "TOWER DESTROYED" AT
19 L: L=1
20 PRINT AT 14 0; "ANOTHER BOUNDARY!"
21 INPUT A$
22 IF A$="Y" THEN GOTO 2
23 STOP
24 PRINT AT 12 0; "YOU MISSED"
25 GOTO 10

```

## U-boat

Neil Stevens

There is a 14,2881 game, which party is inactive code is used up the game and save memory. The machine code's use is the listing is to print the row taken about the top line are to repeat a last on the 50 line.

You should first enter the machine code begin shown in Fig. 1. After starting the program, you should choose lines 10, 20 and enter the main program.

Fig 2

```

1 REM "U-boat"
2 LET A$="00000100 F1 0F020E1 030F0E0 00000"
3 0000000001 1DF020 000E 700 F1 0F0E0 000E 000E 0000
4 001 00 1 F0F0E0 00 000E 000E 1 00 0000 10F0E 000E
5 1 000E0000

```

```

20 FORK 10010 0
30 LET B=10014
40 FORK X 10 CODE A4+CODE A03)-470
50 LET S=A+1
60 LET A4=A4 (2 70)
70 GOTO 40

```

Fig 3

Print screen

```

70 00 10 A 0 print top line
00 10 10 B 00
07 10 10 10
10 00 0000 - 3
20 01 10 10 100 Print level
07 10 10
30 00 10 10 101
00 10 10 10
30 00 10 10
07 10 10 10
00 00 10 10 100
07 10 10 10
10 00 0000
20 00 10 10 100 Print level
00 20 10 10 10
10 00 10 10 10
00 10 10

```

Top line code:

```

24 00 40 10 HL (D-FLE)
04 10 0 D R
00 10 0 EL
20 10 0 HL
20 10 0 HL
10 10 0 HL
01 10 00 10 00 01
02 00 10 1000000 line
00 10 10

```

Re-print the text

```

24 00 40 10 HL (D-FLE)
00 10 10 B: 20
20 10 0 HL
30 00 10 0000
10 00 0000 - 5
20 10 0 HL
20 01 10 00 1 100
10 10 0 HL
20 00 10 00 1 101
00 10 10

```

Fig 3

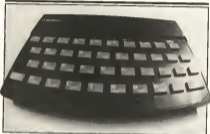
```

0 REM (inactive code)
10 LET S=NOT P
20 LET L=USR 10014
30 LET A=INT(RND * 30)
40 PRINT AT A, A; "graphics S: graphics 0"
50 FOR P=20 TO -3 STEP -1
60 IF INKEY$<>" " THEN GOTO 200
80 LET L=USR 10000
90 NEXT P
100 LET S=S-1
120 PRINT AT P+A*P*NOT P; "spaces"
130 LET L=USR 10000
135 PRINT AT VAL "S", A; "graphics A"
140 GOTO 100 100
200 FOR D=VAL "0" TO P: PRINT D; -1
210 PRINT AT D+A*1; " " AT D, A+1 "graphics A"
220 NEXT D
225 LET S=S-3
230 IF A=FOR A=P-1 THEN LET S=S+3
240 PRINT AT P; "NOT P; " spaces
270 GOTO VAL "0"

```

# Structured Programming

Sketching an outline, an approach to structured programming on the Spectrum by Tim Hartnell.



Many times I've written articles, and chapters of books, which are supposedly going to improve the programming skill of those who read them. But every time I produce such a lot of things you really should be doing when you program, or explain the same material to someone, I am reminded of an old story about a farmer.

He was approached by a young man asking considerable counsel in "Effective Farming". "Don't you see," the young gentleman said as part of his pitch, "that if you take the course you'll know so much more about farming?" The farmer replied, "I don't even farm now so how do I know how?"

So it goes, I suggest, for those on programming. I know full well that I do not programme as good as I know how! Many times I sneak all the rules, wisdom, straight into coding a complex program without even a thought for the

details and structure of structured programming.

So I suggest you keep in mind, when reading the article, that I do not really believe that you — or anyone else — is really going to take them as final gospel from the great master — unless which must be offered if your mental tool is not going to be put into use just! The best way to approach this — and any other material in a similar vein which you come across — is to read it carefully and make your own assessment, as each suggestion gives. Then just apply the things which seem OK to you.

## Basically...

The basic idea follows the outline in this article in that as approaching structured programming with the idea of sketching an outline!

The idea is simple, but very valuable in order to help you

write complicated and involved programs. Of course you may well be already answering very complex programs without using anything like the idea I'm about to outline. Even if you are, I suggest you think carefully about these ideas so that you can see that they may make your job easier.

The fundamental idea of structured programming lies hidden in the phrase "top down programming". This suggests that you start the process of programming by first stating in words the broad aim of the program, you are about to write. You follow this up by writing a series of notes — each of which will eventually list a sub-routine — which cover each of the main tasks which the computer will carry out. To clarify this last paragraph, I'll give you a concrete example. Here are the ideas you could follow when trying to write a

"Thoughts and Crosses" program. I shall point out the structured programming processes being which in each longer than most otherwise in the class. However, the greater length is more than offset by the fact that programs built up in the way are very simple to debug and improve, and that structure can be easily understood by other programmers — a claim which you are unlikely to be able to make with confidence about some of your current programs!

```

SET UP INITIAL BOARD
COMPUTER MOVE
00 CHECK IF MIDDLE
SQUARE IS EMPTY, IF
NOT, MOVE HERE
01 CHECK IF THERE IS A
COMPUTER WOODMAN
MOVE, IF SO MAKE IT
02 CHECK IF WOODMAN WILL
WIN ON NEXT MOVE, IF
SO BLOCK
IF NOT, BLOCK
03 CHECK TO SEE IF A
RANDOM MOVE CAN
BE MADE, IF SO MAKE
IT, IF NOT DECLARE A
DRAW
PRINT BOARD
ACCEPT PLAYER MOVE
PRINT BOARD
CHECK IS PLAYER HAS WON
IF SO STOP
GOTO COMPUTER MOVE
  
```

As you'll see if you take a few minutes to study the structured outline, the code tells you exactly which area the computer will follow in its decisions. It will be called to make, and the alternative results of those decisions.

You have already completed the first steps towards writing a "Thoughts and Crosses" program. You'll see, to be sure, that it doesn't include all of what do not yet know how you are going to get your Spectrum to carry out the various steps — all the material in that you have some awareness that the steps exist, in some fashion as illustrated in this course.

## Secondly...

The second aim of the process consists of turning the sketch, or outline into a series of sub-routine calls in language which are more structured than Spectrum BASIC (such as FORTRAN, or Pascal, which the BASIC-like languages are relatively easy to use) a number of sub-routines within an endless loop with a stop.

form like **GO WHILE** or **REPEAT UNTIL**. These allow you to repeat a series of program steps indefinitely until a certain condition is satisfied, or the state of pointer to the stream.

In Spectrum BASIC, you have to be content with the built-in and multi-designed **GO TO** block of the reaction point **GO TO** which really means program, as the greatest means to the art of program programming ever developed, better than early and relatively primitive means of BASIC, in which you could only follow an **IF THEN** with a **GO TO**. The rest of the program kept all the same, leading to explain code which is not immediately obvious to interpret. The BASIC supplied with the standard TI 82BASIC always a **GO TO** after an **IF THEN** producing some extraordinarily sophisticated means as you'll see if you look at looks at TI program. One of course we can do great anything after an **IF THEN** (including such things as loop) and takes the next instruction, so the judgement of the programmer against **GO TO** is not to continue. This should not bother us, as we are programming to produce programs that do well and do it clearly structured, and **GO TO** is not necessarily in line with these aims.

Answer to get back to the second stage of **GO TO** instruction is structured programming. We can convert the sketch before you before into a series of subroutines and entirely coded by a **GO TO**, as follows:

```

10 NEW HEIGHTS AND CROSSING
20 GOSUB 3000 REM INITIALISE
30 GOSUB 1000 REM COMPUTER MOVE
40 GOSUB 5000 REM PRINT BOARD
50 GOSUB 3000 REM ACCEPT USER MOVE
60 GOSUB 7000 REM PRINT BOARD
70 IF HUMAN HAS WON THEN AND COMPUTER HAS NOT WON THEN GO TO 30
80 PRINT
90 PRINT A TALE TALE TO DIMS OR OTHER MESSAGE

```

Now as you can see, we have the framework for a structured program. The program is not yet complete, but we do not have a clue how the pro-

gram will actually work. We can now set about writing the program from first principles.

There are two further advantages of this outline approach if there is something we cannot, at this stage, do easily program. Big the boss upon which the computer lives out who has said we can simply put in a PRINT statement within the subroutines like **PRINT "CHECKING FOR WIN"** and continue to use the program, as we work on it. This each time the computer should be checking for a win if we just go **"CHECKING FOR WIN"**. This means that you can continue working a minor subroutines section which you may find, for the moment, advise the programmer, after it comes towards the end of the program development stage, the debugging stage is always find this. The more interesting, and in many ways, the least rewarding aspect of programming. Although I can get a program working reasonably well fairly quickly (although we feel that in BASIC took nearly six months), to get the program from working reasonably well to producing what the programmer writes of conditions can take as long as it took to get the first version even working at all. However, when you set up the program in the way described in the article, you'll see that the debugging stage can be considerably simplified.

You may find for example in your thoughts and Crosses program, that the computer tends to ignore the bottom right hand corner when a move into this position would enable it to win, or to block the win from the human, both the "subroutine loop" we set up before, we know the computer's move must be made somewhere between lines 1000 and 1900. This immediately narrows down the search if you have been clever and have made each subroutine a series of further subroutines, each constructed in a similar way to our major subroutines. It would be even easier to break down the loop.

### Difficult?

Let's look at this also — making each subroutine a series of further subroutines — a little more closely. We'll look at the subroutine starting at line 1000, the one in which the computer usually makes its move, as this is the most important, least difficult to

program of all those in the program. The subroutine could begin as follows:

```

2000 REM COMPUTER MOVE
2010 LET MOVE=0 REM IF THIS BECOMES 1 A VALID MOVE HAS BEEN FOUND
2020 GOSUB 2000 REM CHECK IF MIDDLE SQUARE EMPTY
2030 IF MOVE=1 THEN RETURN
2040 GOSUB 2000 REM CHECK IF A POSSIBLE WINNING MOVE EXISTS
2050 IF MOVE=1 THEN RETURN
2060 GOSUB 3000 REM CHECK IF A POSSIBLE HUMAN WIN CAN BE BLOCKED
2070 IF MOVE=1 THEN RETURN
2080 GOSUB 3000 REM CHECK IF ANY MOVE IS AVAILABLE
2090 IF MOVE=1 THEN RETURN
2100 REM A RETURN WITH MOVE=0 MEANS NO FURTHER MOVES POSSIBLE
2110 RETURN

```

As I said earlier, programs constructed using the "trickiest loop of subroutines" coupled with subroutines within subroutines, makes things which may be far longer than usual. However, there is usually little need to worry about burning out of memory on the Spectrum unlike the TR 8085, when counting bytes became the dominant feature of our programming level. Therefore, the longer loops will be amply repaid by the extra clarity your programs obtain, and the much shorter time it will take to produce a debugged masterpiece of which you can be proud.

### Finally...

Finally, I'd like to give you a few more sketchy outlines which you may wish to try and turn into complete programs. Give you've done this, you'll have a much better idea of how the whole process works. First we'll look at **UPDATING COLONY** a famous life program which imitates the life birth and death of a colony of cells. The structured outline could be as simple as:

```

INITIALISE
PRINTOUT COLONY
UPDATE COLONY
GOTO PRINTOUT

```

This might be seen as cheating, as if given little else as to how the program can be implemented. However, assuming you know the rules (which are given as a moment) you could produce a perfectly adequate program, starting with a simple routine like this: (The rules, so you can work out your own life program, assume that the cells are on a grid, and the future state of each cell is determined by reference to the eight cells surrounding each cell on the grid. If the cell at the center of the eight is empty, and there are exactly three cells occupying surrounding positions, a new cell born in that position the next time the colony is printed. If there are four cells in the surrounding squares, and the position being used for reference contains a cell that cell dies in the next generation. If the position being checked contains a cell, but the surrounding positions are all empty, the cell dies in the next generation. If there are two cells in the grid positions around that being checked, the entire pattern remains unchanged.)

Now we'll look at a sketchy outline of a "breakout" type game, which you can use as a framework for building your own program.

```

INITIALISE
PRINT BAT, BALL, BRICKS
MOVE BAT
MOVE BALL, BOUNCE IF NECESSARY
IF BALL HAS HIT BRICK REMOVE BRICK, UPDATE SCORE
IF BALL IS IN LINE WITH THE BAT CHECK TO SEE IF BAT WILL COLLIDE IT IF SO GO TO PRINT BAT, BALL, BRICKS. IF NOT GO TO REDUCE BALL TOTAL SUBSTRACTION
IF NUMBER OF BALLS IS GREATER THAN ZERO THEN GOTO PRINT BAT, BALL, BRICKS

```

You'll find that if you start like this, the whole process of constructing a major program is much much simpler than might otherwise be the case. You'll also find that the time involved will be much more constructively spent than it would have been if you'd just waded into the programming without taking the time to study your outline first.

Ignore the young statement, and try now to program as good as you know how.

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# Burglars

Steal away a few quiet moments and play this great little game by Andrew Brydon of Sunderland.



In this game you play the part of a burglar who has decided to burgle the safe from the Arch household. You are restricted by the 10 whistles and you move about the house using the cursor keys on the ZX81.

Your occupation in this game can be found inside the room and has provided you with an idea of what to expect in the rooms, including the fact that the safe is surrounded by pressure pads. Your occupation has even managed to deactivate some of the pads, but has neglected to tell you which ones — good computers are so hard to find these days!

To get to the safe you must

move carefully around the chairs and tables in the rooms, so as to keep the noise down. Then you must make your way to the safe, keeping clear of the alarm pads, if possible. You must then lead on the 7 symbols between the safe to steal the loot.

You'll have to busy though, as the watchmen check the alarm every now and then and you wouldn't want to get caught would you?

## Line by line

Here follows a brief look at the program which should help you understand the boring parts of it.

Lines 10-46	Read the instructions.
Lines 48-75	Set up the variables.
Lines 80-140	Move your character about the house.
Lines 150-190	See if your character is caught or has reached the safe.
Lines 200-999	Set up the alarm pads.
Lines 1000-1030	Set up the house display.
Lines 1030-1050	Tell you that your character has been caught.
Lines 2000-9999	Tell you that your character has reached the safe.

## Variables

Here is a list of the main variables used throughout the program.

N1	= INKEYS
A#	= The target
X	= The burglar's X co-ordinate (west-east)
Y	= The burglar's Y co-ordinate (down-up)
N	= Time in the house before the watchmen comes round
A	= Watched for entrance position
B	= Used in setting up the alarm pads
V	= Used in setting up the alarm pads
M	= Used in setting up the alarm pads
N	= The house plan

```

10 REM BURGLARS BY ANDREW BRYDON
11 ON
12 REM *****
13 PRINT AT 0,0,"YOU ARE A BUR
14 GLAR AND YOU HAVE TO TRY TO STE
15 AL FROM A SAFE IN ARCH HOUSEHOL
16 D."
17
18 PRINT "THESE WILL BE THE
19 LES RAC CHAIRS IN THE ROOM."
20 PRINT " ALSO UNDER THE CAR
21 PET ARE SOME SUPERMAN ALARM PADS
22 IN THE HOUSE. WAGGLE TO LOCATE
23 AND DEACTIVATE SOME, BUT NOT ALL
24 OF THE PADS."
25 PRINT "YOU ARE BROWN AS ""O
26
27 PRINT "TO TAKE THE LOOT YOU
28 MUST LAND ON THE ""- BELOW T
29 HE SAFE."
30 PRINT "YOU HAVE A SET TIME
31 BEFORE THE WATCHMAN COMES ROUND."
32
33 PRINT "
34 *****
35 PRG# 1000
36 CLS
37 REM *****
  
```

```

38 LET S=INKEY#
39 DIM A(200,200)
40 DIM S(200)
41 GOTO 2000
42 LET A#="D"
43 LET X=0
44 LET Y=0
45 FOR N=1 TO 91
46 PRINT AT 0,Y,0
47 REM *****
48
49 PRINT AT 20,0,"TO MOVE BURGL
50 AR TYPE S FOR LEFT, S FOR RIGHT,
51 FOR UP, S FOR DOWN."
52
53 PRINT AT X,Y
54 LET A#="INKEY#
55 LET A#="(S-1)*10+(S%10)
56 LET Y#="(S%10)*10+(S%10)
57 DO UNTIL AT X# Y#
58 REM *****
59
60
61 IF X#4 AND Y#20 THEN GOTO 2
62
63 IF X#4 AND Y#24 OR X#6 AND
64 Y#28 OR X#8 AND Y#32 THEN GOTO 1
65
66 IF D(X,Y)=7 THEN GOTO 1000
67 NEXT N
  
```

```

1000 GOTO 1000
1001 FOR
1002 PAST
1003 FOR 3=0 TO 17
1004 FOR T=0 TO 34
1005 LCV PRINT 1000+10+11
1006 IF N17 THEN PRINT AT 0.7,"a"
1007 IF N10 THEN LET A10,T10+7
1008 PRINT 1
1009 PRINT AT 0.9,"" AT 1
1010 AT 11.0,"" AT 10.1

```

```

1000 RED
1001 LEV
-----
1002
1003
1004
1005
1006
1007
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1000 PRINT AT 0.1,20
1001 PRINT AT 0.00,"a"
1002 RETURN
1003 GOTO 1000
1004 GOTO 1000
1005 PRINT " YOU HAVE"
1006 PRINT " BEEN BLIGHT"
1007 PRINT " AND STUCK"
1008 PRINT " A LIP TO"
1009 PRINT " SENTENCE"
1010 PRINT "ANOTHER GOT" (Y/N)
1011 INPUT 00
1012 IF 00="Y" AND 00="N" THEN
GOTO 1070
1013 IF 00="N" THEN STOP
1014 IF 00="Y" THEN CLS
1015 IF 00="Y" THEN GOTO 10
1016 GOTO 1000
1017 CLS
1018 PRINT " YOU HAVE"
1019 PRINT " STOLEN"
1020 PRINT " THE CASH"
1021 INPUT 00
1022 PRINT AT 10.10,""
1023 PRINT 00
1024 PRINT AT 10.0,"ANOTHER GOT"
(Y/N)
1025 INPUT 00
1026 IF 00="Y" AND 00="N" THEN
GOTO 1000
1027 IF 00="N" THEN STOP
1028 IF 00="Y" THEN CLS
1029 IF 00="Y" THEN GOTO 40
1030 STOP

```

## WE HAVE SOUND ... COLOUR ... ACTION ... ... WE HAVE R&R SOFTWARE



More information from R&R Software can be obtained from their office:  
R&R Software, 100, The Arcade, London, E1 1AA. Tel: 01-253 4444.  
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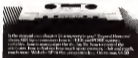
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Tel: 01-253 4444

SPECTRUM GOLD  
CHANGING WITH  
TECHNIQUE

NEW PRODUCT  
48/80 FORTH

# Extend your 16k Spectrum to 48k for just £23.00.

# And get a Free program worth £4.50 into the bargain.



Is the standard 16k Spectrum 20 a memory hog? "Beyond Memory" allows 48K Spectrum memory from the 11K and 16K Spectrum models. It also manipulates the timing for those external the add-ons. Free software from such a source. 1st and 2nd, 3rd and 4th, 5th and 6th, 7th and 8th, 9th and 10th, 11th and 12th, 13th and 14th, 15th and 16th, 17th and 18th, 19th and 20th.

## 81K, 12K Memory Extension with Program — £23.00

Now you can extend your Spectrum 16k to 81k and 12k. It's the only way to extend your 16k Spectrum to 81k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 81k and 12k.

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## 128K Page Memory Extension — £48

It's the only way to extend your Spectrum 16k to 128k. It's the only way to extend your 16k Spectrum to 128k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 128k and 12k.

Now you can extend your Spectrum 16k to 128k. It's the only way to extend your 16k Spectrum to 128k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 128k and 12k.

## 48/80 FORTH — £14.95

It's the only way to extend your Spectrum 16k to 48k. It's the only way to extend your 16k Spectrum to 48k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 48k and 12k.

Now you can extend your Spectrum 16k to 48k. It's the only way to extend your 16k Spectrum to 48k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 48k and 12k.

It's the only way to extend your Spectrum 16k to 48k. It's the only way to extend your 16k Spectrum to 48k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 48k and 12k.

## ZK Slowdown — £10

It's the only way to extend your Spectrum 16k to 48k. It's the only way to extend your 16k Spectrum to 48k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 48k and 12k.

It's the only way to extend your Spectrum 16k to 48k. It's the only way to extend your 16k Spectrum to 48k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 48k and 12k.

81K (new) 12K (new) £23.00  
 128K (new) 12K (new) £48.00  
 48/80 FORTH £14.95  
 ZK SLOWDOWN £10.00  
My name is \_\_\_\_\_  
My address is \_\_\_\_\_  
My telephone is \_\_\_\_\_  
My post code is \_\_\_\_\_

Now you can extend your Spectrum 16k to 48k. It's the only way to extend your 16k Spectrum to 48k, and to add 12k to the Spectrum 16k. It's the only way to extend the Spectrum 16k to 48k and 12k.



# Sales report

**A user-friendly sales records program for your Spectrum written by David Rands of Harlington.**



Sales Report is a menu-driven program which was written to keep records of individual sales results on a weekly basis over the period of a year.

The main features available are:

1. Record of weekly results for each employee during each month.
2. Summary of individual results by month.
3. Summary of individual results by year to date.

A total of 12 employees (or departments) (less shops etc.) are provided for and there is also provision for adding or deleting these during the year. If all 12 addresses are in use and an

employee leaves, a new name can be entered in the ex-employee's position. In this event, the results of the ex-employee are automatically transferred to a separate store and are represented in the monthly analysis by data markers.

End-of-month at the end of each week, and also on the last day of the month, so that live results, where are provided for within each month.

The program has been designed to be user-friendly and all commands are in plain English.

If it is desired to construct the program yourself, it is important to consult the program description file (input file) to obtain the correct LD113 400 which will ensure that the inputs are protected.

## Variables

Here follows a list of the main variables used throughout the program.

m and n	Used in loops
W	Week's balance, three dimensional array (employee, month, and week)
V	Month's notes, two dimensional array (employee and month)
W	Month's totals for all employees, five dimensional array (employee and month)
p	Monthly total for all employees
S	Monthly total for all employees
L	Annual total for all employees
Z	Temporary monthly total used in addition calculation
C, D, F	Used in various INPUT statements (C = employee, D = month and F = week)
MM	Month of the year
MM	Employee's name
L1	Stores a line
Q1	Used in various INPUT statements

## SALES REPORT - MAIN MENU

- 1 INITIALISE REPORT
- 2 ALTER/ADD NAMES
- 3 MAKE ENTRIES
- 4 SUMMARISE MONTHS
- 5 SUMMARISE YEARS
- 6 SAVE REPORT

The initial MENU page you see printed out:

## Program description

A list by line breakdown of the program follows:

Lines 1-20	Set up the month of the year
Lines 100-250	Dimension the main arrays. Let the user set up the names of the employees
Lines 260-350	Enable user to correct any errors in the initial set up of the names of the employees. Also menu and choice routine
Lines 400-545	Modify the main array with a spin-out routine
Lines 600-700	Enable the user to delete an existing name and add a name of a previously entered address
Lines 710-730	Transfer the monthly balance of an employee onto a new array
Lines 740-780	Delete an employee's sales from a previous address position
Lines 800-810	Enable the user to choose employee and month to compare a total
Lines 820-1050	Display the monthly name and any balances against particular week number
Lines 1060-1100	Enable the user to choose total number against which entries are to be made
Line 1110	If the user chooses a week where there is already a balance, the program jumps to line 1150
Lines 1120-1140	Allow the user to make an entry
Lines 1150-1160	Allow the user to have the option of deleting the balance or returning to the MENU
Lines 1170-1240	Balance is deleted and the display is closed and expanded. Program returns to INPUT state menu
Lines 1300-1340	The user chooses month to be summarised
Lines 1350-1410	The results of current employees are displayed
Lines 1420-1460	The results of an employee are displayed
Lines 1480-1520	The user has the option of summarising other months or returning to the MENU
Lines 1530-1580	The heading for the annual summary is displayed
Lines 1600-1670	Calculate the year to date total for employees and an employee
Line 1680	When the first employee's results are calculated, the line marker is GO SUB routine
Lines 1710-1780	GO SUB routine. Print results of each employee as they are calculated. When all results are known it then calculates and displays the year to date result of current employees, all employees and the grand total
Lines 1800-1850	GO SUB and GO INPUT routines. Loads program and statistics and will run automatically from line 400

## RESULTS BY YEAR

Name	Total	V.T.O
LAURIE, K	4870	
MORRIS, A	15077	
SINGH, B	12982	
JONES, T (HRS)	12584	
DAVIS, R	10100	
LITTLE, P	10010	
EXPORT DIV.	86000	
Sub Total= 166000		
Ex-Employees= 8400		
TOTAL= 112600		

Press Any key to Continue

The results of the various categories throughout the year complete with the total value for the year.

EMPLOYEEs SINGH, B

Month= NOV

RESULTS BY MONTH COLLECTED BY THE end of each week & end of month

Week No.1=	500
Week No.2=	1400
Week No.3=	500
Week No.4=	300
Week No.5=	300

TOTAL= 2600

An individual report showing the value made by one particular employee over a specified period

Month= JANUARY

1	LAURIE, K	0
2	MORRIS, A	4000
3	SINGH, B	4300
4	JONES, T (HRS)	3100
5	DAVIS, R	2700
6	LITTLE, P	2000
7	EXPORT DIV.	6400
8		0
9		0
10		0
11		0
12		0

Sub Total= 18001

Ex-Employees= 3000

TOTAL= 15001

A page showing each employee's record throughout a particular month

B RM \*\*\*\*\* REPORT \*\*\*\*\*  
 10 DIR 08/12/83 RM MONTHLY  
 20 FOR NAME TO 12  
 30 STRD 05(M)  
 40 MOUT 0  
 50 DATA JANUARY, FEBRUARY, MARCH, APRIL, MAY, JUNE, JUL

AUGUST, SEPTEMBER, OCTOBER, NOVEMBER, DECEMBER  
 60 LET L=4

```

70 GO TO 420
100 RM ***** REPORT *****
110 CLS
120 PRINT AT 5.5, "ENTER NAME OF"
    "EMPLOYEE", AT 1.0, "*****"
    " "
130 PRINT L$
140 DIR 08/12/83 RM MONTHLY
150 DIR 01/12/83 RM WEEK 0
*****
160 LET M=1
170 DIR 01/12/83 RM EX-EMPLOY
*****
180 LET M=1
190 INPUT "Enter name of Sales"
    " " M, " " M+1, " " M+2, " " M+3, " " M+4, " " M+5, " " M+6, " " M+7, " " M+8, " " M+9, " " M+10
200 PRINT TAB 5, M, TAB 5, M+1,
    " " M+2, " " M+3, " " M+4, " " M+5, " " M+6, " " M+7, " " M+8, " " M+9, " " M+10
210 LET M=M+1
220 INPUT "Are entries correct"
    " " M
230 IF CODE M=70 OR CODE M=11
    THEN GO TO 260
240 IF CODE M=100 AND CODE M=1
    THEN GO TO 220
250 GO TO 130
260 INPUT "Are entries correct"
    " " M
270 IF CODE M=70 OR CODE M=11
    THEN GO TO 260
280 IF CODE M=100 AND CODE M=1
    THEN GO TO 220
290 INPUT "Enter number for Exp"
    " " M, " " M+1, " " M+2, " " M+3, " " M+4, " " M+5, " " M+6, " " M+7, " " M+8, " " M+9, " " M+10
300 INPUT "Enter name of Sales"
    " " M, " " M+1, " " M+2, " " M+3, " " M+4, " " M+5, " " M+6, " " M+7, " " M+8, " " M+9, " " M+10
310 CLS
320 FOR M=1 TO M-1
330 PRINT TAB 5, M, TAB 5, M+1,
    " " M+2, " " M+3, " " M+4, " " M+5, " " M+6, " " M+7, " " M+8, " " M+9, " " M+10
340 NEXT M
350 GO TO 260
400 RM ***** RESULTS *****
410 RM *****
420 CLS
430 PRINT AT 5.5, "*****"
    "REPORT", AT 1.0, "MAIN MENU"
440 PRINT AT 4.5, "1. MONTHLY RE"
    "PORT"
450 PRINT AT 7.5, "2. ALTER/RM N"
    "AMES"
460 PRINT AT 10.5, "3. MAKE ENTRI"
    "ES"
470 PRINT AT 13.5, "4. SUMMARISE"
    "MONTH"
480 PRINT AT 16.5, "5. SUMMARISE"
    "YEAR"
490 PRINT AT 19.5, "6. MAKE REPOR"
    "T"
500 INPUT FLASH 1, "ENTER CHOICE"
    " " TO M, C
510 IF C=1 OR C=6 THEN GO TO 40
520 CLS
530 IF C=1 THEN GO TO 580
540 IF C=2 THEN GO TO 580
550 IF C=3 THEN GO TO 580
560 IF C=4 THEN GO TO 530
570 IF C=5 THEN GO TO 530
580 RM ***** REPORT *****
590 PRINT AT 5.1, "INS 1. " M, " " M+1, " " M+2, " " M+3, " " M+4, " " M+5, " " M+6, " " M+7, " " M+8, " " M+9, " " M+10
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    " " M+81, " " M+82, " " M+83, " " M+84, " " M+85, " " M+86, " " M+87, " " M+88, " " M+89, " " M+90
    " " M+91, " " M+92, " " M+93, " " M+94, " " M+95, " " M+96, " " M+97, " " M+98, " " M+99, " " M+100
600 INPUT M
610 IF CODE M=70 OR CODE M=11
    THEN GO TO 400
620 IF CODE M=100 AND CODE M=1

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101 THEN GO TO 570
102 GO TO 100
103 SCH =ALTER,ADD NAMES:
104 PRINT AT 0.3,"SALES STAFF"
105 PRINT L4
106 FOR N=1 TO 12
107 PRINT TAB 0.0;TAB 0.5;TAB
108 NEXT N
109 PRINT AT 0.3, INK 1,"TO AL
110 TCR 0.5,"ID Cards enter",OT 0.5;
111 SWP 0.5,"Number",AT 1.0;C,"TO 75
112 LUCD TO MENU Press ENTER"
113 INPUT Z3
114 IF Z3=0 THEN GO TO 400
115 LET N=Z3
116 INPUT "Enter name of Sales
117 rson" (max 12 letters & spaces
118 )
119 FOR S=1 TO 12
120 LET U(S)=T(R,S)
121 NEXT S
122 FOR S=1 TO 12
123 FOR N=1 TO 5
124 LET MIC,S,N=Z
125 NEXT N
126 NEXT S
127 CLS GO TO 610
128 REM MAKE ENTRIES:
129 IN PRINT AT 0.3,"SALES STAFF"
130 PRINT L4
131 FOR S=1 TO 12
132 PRINT TAB 0.0;TAB 0.5;TAB
133 NEXT S
134 PRINT AT 21.0, FLAGN 1; INK
135 1,"Enter Code 1 to 12"
136 INPUT C1
137 IF C1=0 OR C1=12 THEN GO TO 6
138 CLS
139 INPUT "Enter Month as a Num
140 ber"
141 IF 0=1 OR 0=12 THEN GO TO 9
142 PRINT AT 0.3,"EMPLOYEE=";Z
143 PRINT AT 2.3,"Months ";Z
144 PRINT L4
145 PRINT AT 4.3,"Results to be
146 entered at the",AT 5.1,"end of
147 week & end of month"
148 PRINT L4 PRINT
149 LET S=0
150 FOR S=0 TO 12 STEP 2
151 PRINT AT 0.3,"Less No. ";S
152 INK 0.5;MIC,0,S
153 LET S=S+1 NEXT S
154 LET TIC,0=S
155 FOR S=1 TO 5
156 LET TIC,0=MIC,0,S+TIC,0
157 NEXT S
158 PRINT AT 10.7,"TOTAL="; IN
159 1;C,"
160 INPUT "Are Entries? Y/N ";Z
161 IF CODE 99=70 OR CODE 99=11
162 S THEN GO TO 400
163 IF CODE 99=100 AND CODE 99
164 THEN GO TO 1600
165 INPUT "Enter Work Number ";
166 Z
167 IF P=1 OR P=2 THEN GO TO 10
168 IF MIC,0,P=0 THEN GO TO 11
169 INPUT "Enter Results";Z
170 GO UP TO the nearest 0.5;MIC,
171 P
172 STOP .15;Z
173 GO TO 570
174 PRINT AT 10.1, INK 1,"There
175 is already a balance on",AT 0.5,
176 1,"Less ";Z,"Enter ";Z,"at
177 AT 0.3,"Balance Press ENTER
178 END"
1150 INPUT Z4
1151 IF Z4=0 THEN GO TO 400
1152 IF CODE Z4=100 THEN GO TO 1
1153 LET MIC,0,P=0
1154 FOR S=1 TO 12 STEP 2
1155 PRINT AT 0.3,"
1156 REM 10 SPACES
1157 PRINT AT 0.5,"
1158 REM 01 500
1159 NEXT S
1160 NEXT S GO TO 570
1161 LET P=Z4
1162 LET P=Z4
1163 CLS PRINT AT 0.3,"RESULTS
1164 BY MONTH"
1165 INPUT "Enter Month as a Num
1166 ber"
1167 IF 0=1 OR 0=12 THEN GO TO 1
1168 PRINT "Month=";Z
1169 PRINT L4
1170 FOR S=1 TO 12
1171 PRINT TAB 0.0;TAB 0.5;TAB
1172 INK 0.5;C,"
1173 LET P=Z4
1174 NEXT S
1175 PRINT "Tab 7,"Sub Total=";
1176 Z
1177 LET S=0
1178 FOR S=1 TO 12
1179 LET S=S+Z
1180 NEXT S
1181 PRINT "Tab 4,"Ex-Employee=";
1182 INK 0.5;Z
1183 LET P=Z4
1184 PRINT "Tab 11,"TOTAL="; IN
1185 1;C,"
1186 INPUT "Overwrite Other Men
1187 us?"
1188 IF CODE 99=70 OR CODE 99=11
1189 S THEN GO TO 400
1190 IF CODE 99=100 AND CODE 99
1191 THEN GO TO 1400
1192 REM OVERWRITE YEARS
1193 CLS PRINT AT 0.3,"RESULTS
1194 BY YEAR"
1195 PRINT L4
1196 PRINT AT 0.3,"Name",AT 3.10
1197 "Total Y.T.O."
1198 PRINT L4
1199 LET Y=0 LET M=0
1200 FOR Y=1970
1201 FOR S=1 TO 12
1202 LET Y=Y+1
1203 LET MIC,0,S+TIC,0
1204 LET TIC,0=S
1205 IF S=12 THEN GO SUB 1710
1206 NEXT S
1207 PRINT AT 21.3,"Press Any Ke
1208 y to Continue"
1209 PRINT L4
1210 GO TO 400
1211 PRINT TAB 0.5;TAB 10.1, I
1212 NK 0.5;Z
1213 LET Y=Y+1
1214 LET MIC,0,S
1215 IF S=12 THEN PRINT TAB 0.5,"S
1216 ub Total="; INK 0.5;Z
1217 IF S=12 THEN PRINT TAB 0.5,"E
1218 x-Employee="; INK 0.5;Z LET Y=Y
1219 +1
1220 IF S=12 THEN PRINT TAB 0.5,"T
1221 OTAL="; INK 0.5;Z;PRINT L4
1222 REM MAKE REPORTS
1223 CLS PRINT "Sales" LINE 40
1224 PRINT AT 10.0, INK 1,"REVEN
1225 ue",AT 10.5, INK 1,"VERIFY"
1226 CLS PRINT AT 10.0, INK 1,
1227 "REPORT VERIFIED"

```



# The ZX81 soft selection



## ZX81/TS 1000 Programs for Young Programmers — Linda Hurley and Stuart Nicholls

Programming for Young Programmers is a very well presented book containing some 40 programs for the complete beginner. It is complemented by a cassette containing some additional games and extended lessons for six of the programs in the book.

Take up the book first. This tells it for the novice and explains about a fairly rich knowledge of computing or the BASIC language. The only part of the cassette manual which needs to be read are the setting up instructions.

The book will be particularly useful as a means of familiarising the young user with the ZX81 keyboard. Programs are in the main about three or four lines long and are clearly set out with columns used of colour to highlight the Shift Graphics Keys. Specialised keyboard codes are used to assist in locating keys the first time they are encountered.

The programs are all very good, some of them are only a few lines long and the user is able to run some efficacious and interesting programs immediately with the minimum of typing. Just right for the young beginner! The book follows a logical sequence

## In which Nick Pearce scrutinises the latest software packages for the ZX1.

starting with programs which reassemble and display words through drawing with the computer and pattern drawings, and on to movement and games. There is even a 'help' section at the end to assist 'teaching' of the user a given initial programming attempt.

The book contains a host of good ideas for the budding programmer although there is little in the way of explanation of how the programs work. The cassette takes things a little further and leads on to the Zapper manual and more advanced projects.

The author has struck the right balance with this book when it likely to prove a favourite and a valuable teaching aid.

The cassette contains a good range of programs. 'Bomber and Mizer' are both 142 games written entirely in machine code. Bomber is particularly good — you have to distribute the clay before you crash into any of its buildings — and compares well with 148 versions on the market. 'Mizer' is a maze game in which you are chased by five ghosts; you score each time your character moves and the



object is to avoid being captured for as long as possible.

Galaxy is a basic adventure type game which performs well although the screen is rather slow. It is written almost entirely in BASIC and is easily adapted with the intention of introducing the user to the rudiments of computer programming. REM statements are liberally dispersed throughout the listing to guide the user through the programs. An eight page booklet provided with the cassette contains an explanation of some aspects of the 'Galaxy' listing.

The remaining six programs extend some of the listings given in the book and each requires a little more than 1K. The book also draws attention to some of the lessons which can be learnt from the listings and indicates ways in which they might be extended and enhanced.

The book and cassette together provide a very useful learning package and are highly commended. They will undoubtedly be a source of ideas and inspiration for many young ZX81 and TS 1000 owners.

The book and cassette are published by McGraw Hill Book Co (UK) Ltd, Group Publications, Alden, Maidenhead, Berkshire.

## City Patrol/Snobotaur — Macronics

City Patrol is a superb high speed action game set in a futuristic city which you have to defend from alien outside ships.

The moving screen displays in first class. The city consists of four streets of skyscraper blocks giving a 3D effect and although use of the control keys allows you to move slowly by, or at maximum speed, in either direction as you search out the aliens. They are notoriously difficult to capture as they pass behind buildings and

descend to ground level if they reach the ground, this mission is accomplished and they set off a series of explosions which has destroyed a large portion of your beloved city. There is a scoring system but it is less useful than absorbed in chasing the stars to worry about my score — more often than not it seemed to be negative. All in all, City Patrol is a very impressive game.

**Solitaire** is another novel game from Melbourne for the ZX81 but not in the opinion of this reviewer. In City Patrol NeverFalls, it is based on a good idea and runs faultlessly. In this game the screen represents a plan of a city, several containing randomly placed pieces of infrastructure. You can order to the guard who has to protect the entrance of the subterranean who must take up on each of 4 to 8 levels can walk the computer taking the opposing character.

Your character is moved around the computer in the usual way. If you see the subterranean you must find a suitable place to plant your charges and repeat a safe distance before it explodes. If you get to take the risk of the guard, you can adopt one of two alternative strategies: try and guess where the subterranean will go, and get there first, or attempt to trap the subterranean in a corner.

Both 'City Patrol' and 'Solitaire' are written largely in machine code, but the programs can be LISTed indeed the parameters of Solitaire can be stored using POKE commands to make the game more difficult — I must admit I found it hard enough as it was.

Both games require 12K of RAM.

These Melbourne creations are attractively boxed and well presented with full instructions on the cassette insert cards.

City Patrol and Solitaire cost £5.00 each from Melbourne Systems Ltd, 29 South Cross, 52d Ave, Brixton, West London.

### Stones & Open Patience — Geoff Lee

Stones is a board game which has the potential to draw you in after dinner as you try to anticipate where your last stone will land. The board, which is designed on screens throughout each partition consists of eight pairs of cups. You set up against your opponent's. At the start each cup contains an equal number of stones (from one — not too hard on the poor merrier — to six — impossible) to make you secretly one of the pairs of cups, the stones in that cup are taken out and distributed one at a time in cups going in sequence around the board.

As you add your last stone has no land in an empty cup and your score gains according to the number of stones in your opponent's cup opposite that empty cup — otherwise movement around the board continues with your last stone plus those in the cup your last stone landed being distributed anticlockwise, and so on.

You can play against a human opponent, or against the computer (playing as the

OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH	OH
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

A sample screen illustration from Geoff Lee's game of Patience.

THE GREAT GRANK OF ZIG  
SCORE: 0

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

OH SCORE  
SCORE: 4

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----

A sample screen display from Stones.

Great Grank of Zig' or Jeremy the Jiving Quack, or almost any other unlikely character). Luckily the computer does not limit to unit up on settings and it really begins providing you play with only a few stones at each cup so as not to confuse yourself unduly.

The ZX81 keeps score perfectly indeed, the game is well suited to a computer — it could be very difficult to keep track of moves and scores otherwise had to with Open Patience on the 'B' side of the cassette. This is a simulation of the card game of that name which I think I would prefer to play with a real pack of cards. The display is good, but why play a game such as this using a computer, except maybe to prevent cheating? Typically the game performed well and does not permit legal moves.

The pack of cards is displayed but does not flip up words in eight columns. The

object is to get the cards onto the suit stacks in ascending order. You can select either four or five dealt cards. The link of playing card figure is the 'OH' subprogramme in card game comparisons, as it finds the problem solving the first solution adopted by Geoff Lee.

For games which will not find adequate an opener or a substitute. They require 12K RAM and take about an minute to LOAD.

Stones and Open Patience costs £4.50 from Geoff Lee 1 Waltham Road, Islington, London N7.

### Eight's — Hardy Software

Also a card game, Eight's is designed to the traditional game of the same name in which your opponent's to



The opening display from the game City Patrol.

2881 The computer displays and manipulates the cards and keeps both scores.

It is a game in which strategy is important. The program is supposedly based on equations developed by developers for a TRS-80 by 1884 (achieved?) version of the game whatever it is certainly had to test the computer for its advantage; of course, its electronic memory can remember the played cards much more readily than the tortle human. As expected, the program obeys all the rules of lights and will not commence playing. The program is long and uses most of the expanded 2881's RAM.

Single costs £4.95 and is available from Merit Software, 16 Watney Place, West Essex, CM9 3PW.

### Tarot — MP Software

This, by MP Software, is a well-contained tarot reader intended to enable the user to receive enlightenment using the ancient method of fortune

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What do the tarot cards tell you in advance for you — check out the best readings from MP Software

telling. For the uninitiated, the tarot uses a pack of 78 cards made up of two sections, known as the major and minor arcana. The major arcana is similar to an ordinary pack of playing cards, with four suits (wands, swords, cups, discs) and numbers with an extra card, the page, at each end. The pack is shuffled and dealt out face down in an image, more known as a lay. The cards are revealed and from

their position and meanings in tarotology are made which are intended to enlighten the user on aspects of his or her problems or query.

MP's simulation is written in BASIC and takes a little over four minutes to LOAD. To start, user instructions are planned flow to use the program and guide on cards. A printing option under various operating settings — the title of card and body, name, etc.

etc. each comprising three cards together with their interpretation.

To benefit from a reading it is important to have a specific problem in mind and to concentrate on that problem as the reading continues. Whether it leads to a solution will depend on how accurately you take the time on a form of psychology and whether you believe your state of mind can influence the random selection of a computer. Some of the mysticism of the tarot may be lost by having readings readily available on your 2881.

Tarot has apparently been written with the aid of a game being played called MP Software claim the subject is descended from an 18th century mystic, William Blake. The £15 one is entitled to a high level of expert input although at that high price this appears a likely to occur more to the strictly enlightened of tarot than this as mentioned £49.95 version. I cannot see it converting easily into

Single costs £15 from MP Software, 3 Park Lane Club, Harrogate, North YO17 2PL.

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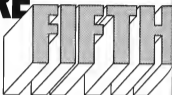
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Object, Print, Put, Replace Remove,  
Screen, Sound, Speed, Status, Temps,  
Use, Vector, Velocity

**\*Personal Computer News  
said:**

"Fifth provides an excellent set of commands for programming arcade type games and makes it easy for you to write fast moving games in Basic."

The packages come with an extensive manual, a demonstration program and the fifth interpreter. The commands are entered as words into your program and give you INTERRUPT driven, fast, high resolution SPRITE graphics without losing the simplicity of Basic.



# Sinclair On Television



No other had the excitement of the long awaited ZX Microdrive deal done, but Sinclair was one of his other long standing projects — the flat screen television.

The Sinclair 2" Flat Screen television incorporating just a single chip was introduced to a "suspecting" public following a six year, £4 million development programme. Priced at £79.95, the package is just slightly smaller than the average paperback book, measuring 5.5" by 3.5" by 1.5" and weighs in at 2½ pounds.

Featuring high-quality video reception and extremely low power consumption, the flat screen television includes only two controls on/off volume and tuner. A special Polaron battery provides power for up to 18 hours of viewing. It has also been designed so that it can be used in most countries around the world — one of the

notable exceptions is the standard — the UHF transmissions from France.

There are two key design features which make the Sinclair flat screen television possible — the first being the cathode ray tube (CRT). The CRT provides up to three times the brightness seen between one quarter and one tenth the power and, by positioning the electron gun to the side and not the rear, eliminates most of the glare of a conventional CRT. Manufacture of the tube is subcontracted to the Texas facility in Dallas.

The other amazing breakthrough has been the single integrated circuit designed by Sinclair Research and Farvatt Ltd, which handles almost all of the circuitry requirements. Employing Farvatt's extremely advanced FAM2 C20 process, the IC uses innovative digital technology to monitor automatically video and audio

inputs and to adjust the receiver circuitry for local broadcast standards.

Special features of the IC include integrated sound synchronising video processors to eliminate image problems in the UHF channel and an advanced synthesised wave generator to control the complex waveforms needed to scan the flat CRT. It runs a clock 50 times a second to ensure picture hold.

Sinclair Research have also designed a specially sensitive tuner, with up to 90% power saving.

The television will be available at first only by mail order. Sinclair Research have already made the announcements that initial stocks will be limited but as production builds up they are hoping to soon manufacture 10,000 units per month. UK retail and export sales are expected to take place in the first half of 1986.

Complete with fold-down stand, a personal software soft-carrying case and battery, the new television is priced at £79.95. Polaron 60000 batteries are available separately for a peak of three and a spare detector will be offered at £7.95.

Soil So Close at the flat screen a press launch "I believe it, and its successors, can advance far television what the traditional radio did for wireless, and create a new life-giving product". It could also be used for an on-board screen if one was thinking of producing — a business computer which would need some kind of on-board screen but enough of the 2800 subscribers.

For more information on the flat screen television you can contact the TV Division Sinclair Research Limited, Stranoke Road, Corby, Northants, NN16 9PB or phone 0370 621111.

## Profiting From Experience

Spencer Research announced sharply increased profits before taxation and exceptional sales of £14.03 million for the year ended 31 March 1983. The company's turnover totalled £16.63 million. Last year it was £12.17 million and earnings per share were 20p against 150p previously.

Writing in Spencer's annual report company chairman Cyril Spence called the figures 'impressive' and noted that Spencer's ZX Spectrum personal computer introduced in 1982 'had become easily the best selling machine in the UK and in a number of overseas markets'.

Attributing Spencer's strong position in the personal computer market to its technical and marketing leadership he added that 'there is no real scope for competition in the field and I believe we will continue to lead the world with future products'.

However we will never be free from competition we plan to introduce products that we make sure to regard the company and market our products in particular we expect to be leaders in the fast action television field where we are confident that we have the best technology.

We wish Sir Clive well for the coming year — as now about the 20000th unit!

## 'Woolies' Move Into The Micro Market

In a major move into the mass market, Woolworths have become the largest chain to stock computers in the UK.

Initially over 150 Woolworth stores will stock a wide range of micro-computers including the ZX Spectrum (the Alan 8300K), the Commodore VIC 20 and the Commodore 64. A less extensive selection of home computers is to be marketed through other large Woolworth stores. However, due to the popularity of the ZX Spectrum, you should be able to buy either the 128 or 48K version or no less than 500 machines at Woolworth.

All the computers will be backed by a comprehensive range of games and additional software.



# Second Edition

ZX Spectrum owners can now benefit from the interface 2 and a new ROM set from Sinclair Research which allows users to attach standard cassette and fast-loading ROM cartridge software.

Priced at £16.95, ZX Interface 2 plugs directly into the Spectrum's rear expansion port and the expansion part of the ZX Interface 1 unit. The top of the interface 2 unit houses a port for ROM cartridges and two sockets with connecting standard 5-pin D plugs. Everything needed to attach cassettes to Spectrum (and the software) is built into the interface 2. Also

fully completed, the package will work with either ROM cartridge software cassette or ZX Microdrive programs. The unit also includes an expansion port at the rear so that the ZX Printer can be attached.

Comprising only the ZX Interface 2 unit, Sinclair Research have made available 10 programs on ROM cartridge 64 of which were previously available on cassette. In addition, the offer on ROM cartridge will work on the 100K computer as well as the 48K version even if the original programs were written in 80K.

Priced at £16.95, the ex-

tra programs released on ROM cartridge are Space Raiders, Planescape, Hungry Horrors, Horrors and the 3000s, Chess and Galgamorin. A further four programs are now available pulled from the software house Ultrawave Play the Game, Threes and Pagan Jet Set.

The ZX Interface 2 unit and the ROM cartridge are initially available by mail order only. For further information get in touch with Sinclair Research, Southgate Road, Camberley, Surrey GU15 3PS. Telephone enquiries can be made on 0275 855211.

## Six Of The Best

Sinclair Research have selected a range of software with six new cassette applications for the ZX Spectrum and ZX2.

Feel up there are two programs that will help you with the ZX Spectrum. Both written by Crystal Computing these are Micro Memoir and GameMaster (for the 16K/48K) and Zaxx Assembler (for the 48K model). Memoir and GameMaster provides a powerful assembler so that you can translate code into machine code automatically using a menu-driven language translator. These will be able to run from the BASIC ROM in your Spectrum and also analyse your own machine code routines. The Memoir provides the user with an extensive set of topics to aid the entry, manipulation and debugging of your programs.

The Zaxx Assembler package has been designed to

simplify the process of producing machine code programs, enabling the user to write in assembly language instructions. Both packages are priced at £12.95.

Sinclair Research have also produced a package designed to frustrate in much the same way as the 'cable puzzle' boxes done. These games, PlayIt, looks simple but involves the same kind of patience you need for the cube, in this game for your 16/48K Spectrum, you have to manoeuvre one PlayIt piece in a section of the eleven stage square. Written by Iain Fenwick, this cassette is priced at £9.95.

Of great interest to Sir Clive and other Memoir enthusiasts comes a package written by Walter Strömbergoff, International President of Memoir, called Detail IQ Test. Designed to operate on the 48K Spectrum, this program will refreshen your IQ

according to the Cattel Bed IIIA test which is then linked to a standard IQ test and the marks standardized against your age. The package is priced at £12.95.

Last for the ZX Spectrum comes an advice game called Chopped-Up Frog. Written by Peter for the 48K computer, this program puts you in the position of being a Froggie. One racing driver. With a choice of three different cars and 10 different routes, you are in control of a whole team of motorists. So it's a case of keeping one eye on the road and one on the instrument panel if you don't want to end up in a ditch! This program is available for £8.95.

Only one new cassette is available for the 48K version, 128K memory titled Mathematics. The program offers a three dimensional space adventure. The package is priced at £4.95.

## Software . . . . . In Brief

■ **Software Cottage** is a software feature producing programs with a definite multicultural bias. But you don't have to be a musical genius to be able to use them — all you need is a Spectrum or ZX Spectrum. For the Spectrum, there are two packages titled *First-Work Music* and *Tunes*, both written for the latter version of the Spectrum. *First-Work Music* contains two programs, one each for the treble and bass clefs, and both help beginners learn and read notes names. *Tunes* is a general music game for the general user with a general musical mix. You have to tune notes correctly — it's similar to 12 Tunes a Guitar. There are also four packages for the ZX Spectrum. *First-Work Music*, similar to the Spectrum version, *Musik Education 1*, has programs to help the beginner learn notes names in the treble and bass clefs. *Musik Education 2*, similar to ME 1 but for the alto and tenor clefs, and *Musik Education 3*, which concentrates on rhythm and note time values. All the tapes are priced at £5, but if you buy three or more you only pay 14 per package. Further enquiries should be made to Software Cottage, 18 Woodfield Drive, Loughtonough, Leicester LE11 3UJ.

■ **Bug-Byte** have, after some weeks of negotiation, agreed a major distribution deal with the multinational CDS company. This will mean that distribution of Bug-Byte software will be eased — in the words of Bug-Byte's John Phillips "This deal means that whether the customer orders one tape or 1,000, the order can be processed and dispatched within 48 hours. Furthermore, it represents an important step forward in our worldwide expansion plans". So, without too much emphasis on Bug-Byte's plea to take over the world, it means that if you're desperately trying to get hold of their amazing *Master Mixer* game for your Spectrum, you shouldn't have too much problem!

■ If you're a ZX Spectrum user and live in a rural area with no user club and you crave the kind of information and news you would normally get from a club, why not check out the ZX Broadsheet. Offering informal contact by post with 2000 users throughout the world and the UK, ZX Broadsheet also contains a number of programs and the new issue includes a 'members' book at its back cover. So, if you're interested in broadening your programming experience or you'd just like to write to a fellow user in a far distant clime, you can find out more details on the ZX Broadsheet from Nick Godwin, 4 Hurker Crescent, Eynsham, Warwickshire CV21 6AP, Great Britain. The price of each issue of ZX Broadsheet is 50p (four international reply coupons).

■ As from 10 September 1983, **Quark-Media Software** will continue trading under the name of **Fantasy Software**. The new company will market all the software currently produced by Quark, mainly the Back Issue and Wizards Libraries — all new software will bear the Fantasy Software label. It is the intention of Fantasy Software to publish a maximum of eight titles per year. The first of these new packages is going to be released and is called *The Phoenix*. Written for the ZX Spectrum, the price of the program will be £3.50. As yet, I don't know what the package will be about — but with these pages for more information. If you can't wait that long you can try getting information straight from the Phoenix mouth by phoning 0224 862661 or writing to the people at Fantasy Software, Fensmore Ridge, 22A St Georges Road, Chalfont-st Giles, Bucks HP8 3BT.

■ From October, the program from Alan Furringer called *ALL SORTS* 5-1 has been released in price to £9.95. Released in March 1982, this generator program gives you a wide range for use in BASIC on a ZX Spectrum. The price reduction is possible because the expected high level of alternative software was not required — customers happily bought the product and managed to use the complex program without any problems. For more information on *ALL SORTS* 5-1, write to Alan Furringer, 171 Haver Hill, London SE24 5UR.

## The Sky's The Limit?

Following the successful development of *Bindge*, Software's 8-bit *Eightmers* programme which was released for the ZX81 and Spectrum, comes a new software package called *The Night Sky*.

For both the professional and amateur astronomer, this package for the 16-bit ZX Spectrum is an absolute gem to the stars visible from the UK from 40 degrees to 60 degrees North. Although its alternative features include over 200 stars, five magnitudes distributed, 50 constellations identifiable and over four million different objects. You can also COPY the objects onto your ZX Printer.

You can use your Spectrum

to create brilliant 4-line star charts — a different one for every minute of every night of the year. All you have to do is input the month, date and time and a part of the southern extent of the sky will come up on the screen. If you press the W, N and E keys you will get the star chart for the western, northern and eastern aspects of the screen respectively.

Priced at £6.95 for the cassette and manual, *The Night Sky* is available from Bridge Software, 26 Fensmore Ridge, Chalfont St Giles, Bucks HP8 3BT. You should always ask them for a catalogue of their ZX81 and Spectrum software — they have a great selection.



## On The Buses

Virgin Games have announced the first-ever computer games tour — by bus.

Virgin Games have bought a double-decker bus which has been completely refitted and furnished with 12 computers and screens comprising the ZX Spectrum, Orage 30, VIC 20, Citi 180, Atari, Commodore 64 and TI 99/4A. There are plans to tour the bus to major towns from October to Christmas playing youngsters (and adults!) the opportunity to see computers in action playing games and the chance to meet some of Virgin's programmers on tour.

■ **Virgin Games' Managing Director, Nick Alexander** "We were very pleased with the launch of the first Virgin Games 8-bit, but we wanted to do something more innovative

the next. The bus would also be general enough to provide who haven't yet bought a computer and were wondering what to do with it."

To coincide with the tour of the bus, Virgin Games are launching eight new computer programs, two of which are designed to run on the Spectrum computer. The two programs appear to be *Football Manager* and *Lyle*. There is also a live competition for publishers of the new games to enter.

For more information on the price in the competition and the price of the new software packages contact: Virgin Games, 2100 Woodside Road, London W11 3BB. List all the groups interested in a visit from the Virgin Games bus should contact Angela Ho (01-271 7920).



## Spectrum Teacher

A new range of educational software is available from Griffin & George, which should help your child learn essential word and number skills.

Available from WH Smiths stores nationwide, these packages will run on the 486 Spectrum. All the programs use appropriate teaching methods already used in schools, and are produced and written in full consultation with experienced primary teachers.

The first four titles in the new range include Wordcraft, which is for children aged five years upwards. With 118 separate word cards, each containing seven words, the package provides a comprehensive introduction to the key rules of English spelling. The program can also be tailored to suit your own child's ability using a very versatile writing aid.

Great is designed for chil-

dren of four years and upwards. In this package there are five programs which introduce the idea of grouping objects into sets. Manipulation of objects should help the user to grasp the concept of addition and subtraction.

Numbers is an addition and subtraction package for children of five years upwards. For Children's Acids, answers to correct answers and a range of objects within the program's menu the package offers flexible learning aid.

The last package is called Testaments and is designed to teach children of six to seven years and upwards. Using colorful displays, three test programs show how multiplication tables are easy to learn.

Priced at £7.95, you can find out more about these packages from Griffin & George, 285 Culling Road, Alnwick, Wansley, Middlesex HA6 1HU.

## New From Artic

One of programs Artic Computing have released, 15 of them are designed for the Spectrum and Z801. So, with a choice like that there must be something there for you?

There are five new packages for the Z801, two of which are games and three moving into the educational world. The two games are Alpha Probe and Gemworld. Gem, priced at £3.95 and £4.95 respectively, are Alpha Probe makes you dig around from planet to planet, exploring as you go. Gemworld's Chess is a 'Miniclip' type game in which you have to put your wits against the computer.

The three educational tapes are called Vocabulary 1 through 3. The language tapes are based on the French, German and Spanish and have been compiled by language teachers. The titles are priced at £4.95 each or all three for £12.

Moving onto the Spectrum there are 10 new packages for you to peruse, all games except for one. Dating itself as the best it is an educational title for the 486 version and called A.B.C. Priced at £6.95, the program is targeted towards primary school children of five to eight year old. Great! The child reads press any key on the keyboard and an object appearing with that from it draws on the screen and the child is invited to spell

the word.

Of the remaining nine games, seven are designed to work on the 1M486 version of the Spectrum. Three include Road Racers a racing car game, Science Probe a Spectrum version of the Alpha Probe program released for the 486 Spectrum, in which you must guide a proton as around a maze of government main rooms, Billions, in which you must kill the Million and a host of other insects using your laser beam. Reflections, is which you are trapped in a maze of mirrors. Revents, a version of the popular board game in which you get to play the computer, and Snooker, the pool game available now for the architect athletes. These games are priced at £4.95 except for the last three mentioned which retail at £3.95.

Two 486 games have also been released by Artic and these are 3D Archery and Jig Saw. Both priced at £6.95, the first package provides a thrilling game of just repositioning all darts on the old course of 3D Archery, while the second program allows the user to put together two jigsaw puzzles.

For further information on Artic's new range of software you can write to Artic Computing Ltd, Main Street, Brandyford, Duffield YO26 6HD. Telephone enquiries can be made on 0441 43882.

## The Game Lords

Quintessence have come up with a very impressive new batch of software releases for the Spectrum which should be well worth the sleep for the Christmas season.

Perhaps their most impressive package to date is the first product to come from their software studio. Titled Gatekeepers in Hampshire, written by John Healy, the package is designed for the 486 Spectrum and is priced at £14.95.

The package, called Game Lords, comes complete with eight games already programmed into it — and it's up to you to change any aspect of them to suit your own taste. There are four game formats for the eight games: Invaders/Galaxies, Defender/Scorers, Action/Adventure, and Strategy. Having chosen the game you wish to play, you can then design your own animated graphics characters, such as aliens, ships, missiles, explosions, etc. You can also alter the sound generation, scoring mechanism, control, moving background and which level design to start, you have a smooth readable quality screen of games which, when viewed by the user, can include a long long number of games.

The second package worthy of note is Quintessence's new selection at 3D Archery Priced at £6.95 and designed for the 486 Spectrum this game involves you controlling a character walking around the walled city of Archery. The walled city is shown on the screen as a number of solid 3D blocks which can be viewed from any angle as you move your figure around.

In amongst the two, you will come across a number of 'Killer' Arts which you avoid if possible by the way you move. However, it must be said that the package is rather different from the game — because they are so good that you end up forgetting of the graphics and ignoring the fact that you are trying to see who will win!

Quintessence are using the tape from the author Sandy

White, are supposed to have been impressed that they have Sandy down from Scotland and signed contracts within 24 hours. Sandy White has applied for a patent for the graphics techniques used throughout the program.

Another game amongst the new releases is a definite fan game. Called Bugaboos for the First, you play the part of a flea trapped down a colourful cave full of warts and water vapour. The game is simple to play using only two keys and adding to say the least. The game, designed for the 486 Spectrum and priced at £6.95, uses Spanish software from Interphase and has been written by Pico and Pico.

Quintessence are also marketing two other games they themselves describe as 'top spiritual' written for the 486 Spectrum comes Endrunner, the best selling arcade game in the States and for the 486 Spectrum, too. Both games, priced at £6.95, were designed by Jeff Marner of Marner and programmed by Spinnaker Software.

Quintessence have also launched the Game Lords Club for gamers and computer enthusiasts. A £1 membership fee (which includes a special mail order purchase) will give members a regular Club Faxline, competitions, games at special prices, preview of games and software, a subscription to magazines and a library.

The address for direct mail order of Quintessence goods is Quintessence Media Order, 66 Mansfield Road, Farnborough Industrial Estate, Farnborough, Dorset BH21 7PY and the phone number 07535 26788. For any other enquiries you could always write to Quintessence at 13 Palmerston Road, Southampton, Hampshire SO9 1LL.



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Postcode \_\_\_\_\_

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Source: \_\_\_\_\_

Order reference no: \_\_\_\_\_

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# Naval manoeuvres



Written by the Top ZX81 software developer, this version of Battleships is a fast-paced computer naval war.

## In the swim

In this game we all know and the idea of the game is to sink your opponent's fleet before they manage to sink yours.

When you first run the program the computer first asks you with a few brief instructions on how to play the game. When you are done you understand the workings of the

## A ZX81 version of the popular board game from MJ Downie of North Yorkshire.

game. The computer sets up its fleet on the right-hand playing area. Once that has been done you position your own fleet.

This is the order of play: you fire from the computer which reveals you hit grid (ie co-ordinates) of each ship in your fleet. You must position one battleship

represented by four squares (two squares three squares and four submarines) (one square each). You position your fleet by first inputting the co-ordinates followed by the column co-ordinates of your 10 by 10 playing grid on the left-hand

part of the screen.

You begin the game by having three shots at the computer's fleet. This is done in a similar manner to how you positioned your fleet in that the computer asks you first for the row co-ordinates followed by the column co-ordinates. The computer will then have three shots at your fleet and so on. All shots made are immediately on the screen, and the winner is the one who destroys the other's fleet first.

The game has the same choice of winning as the computer to have fun!

## ZX81 GAME

```

1  REM
2  REM
3  REM
4  REM
5  CLS
6  SOUND 7500
7  PLAY
8  SOUND 8000
9  SOUND 7000
10 SOUND 7500
11 SOUND 8000
12 SOUND 7000
13 SOUND 8000
14 LET HIT=0
15 LET HIT=0
16 LET H=0
17 LET H=0
18 SOUND 8000
19 FOR U=1 TO 5
20 PRINT AT U,0,"
21 NEXT U
22 FOR U=1 TO 100
23 NEXT U
24 SOUND 8000
25 FOR F=1 TO 5
26 PRINT AT F,0,"
27 NEXT F
28 GOTO 50
29 SOUND 8000
30 PRINT AT 21,0,"HIT 0 FOR AN
OTHER 2 TO STOP"
31 LET C=INKEY$
32 IF C=1 OR C=2 THEN IF C=1 THEN
GOTO 170
33 IF C=3 OR C=4 THEN GOTO 1
34 PRINT AT 10,0,"
35 FOR U=1 TO 3
36 LET PLM=PL0+1
37 PRINT AT 21,0,"
38 PRINT AT 21,0,"SHOT NO. ",P
L0,". FEED COL."
39 INPUT R
40 IF R=0 THEN LET S=10
41 IF S=10 THEN GOTO 510
42 PRINT AT 21,0,"
43 PRINT AT 21,0,"SHOT NO. ",P
L0,". FEED COL."
44 INPUT R
45 IF R=0 THEN GOTO 520
46 IF R=1 THEN LET S=10
47 IF S=10 THEN GOTO 51
48 PRINT AT 21,0,"
49 IF R=10 OR S=10 THEN PRINT AT 21,0,"
500 FOR F=1 TO 20
510 NEXT F
520 NEXT R
530 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
540 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
550 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
560 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
570 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
580 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
590 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
600 IF R=10 OR S=10 THEN PRINT AT
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610 IF R=10 OR S=10 THEN PRINT AT
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700 IF R=10 OR S=10 THEN PRINT AT
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710 IF R=10 OR S=10 THEN PRINT AT
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720 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
730 IF R=10 OR S=10 THEN PRINT AT
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790 IF R=10 OR S=10 THEN PRINT AT
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2,0,"HIT=0"
810 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
820 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
830 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
840 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
850 IF R=10 OR S=10 THEN PRINT AT
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860 IF R=10 OR S=10 THEN PRINT AT
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870 IF R=10 OR S=10 THEN PRINT AT
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880 IF R=10 OR S=10 THEN PRINT AT
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890 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
900 IF R=10 OR S=10 THEN PRINT AT
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910 IF R=10 OR S=10 THEN PRINT AT
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930 IF R=10 OR S=10 THEN PRINT AT
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950 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
960 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
970 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
980 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"
990 IF R=10 OR S=10 THEN PRINT AT
2,0,"HIT=0"

```

```

T 2=0,10=0,"X"
240 LET R=IN,0
250 IF HIT=20 THEN GOTO 100
260 NEXT U
270 RETURN
280 REM
290 REM
300 REM
310 REM
320 REM
330 REM
340 REM
350 REM
360 REM
370 REM
380 REM
390 REM
400 REM
410 REM
420 REM
430 REM
440 REM
450 REM
460 REM
470 REM
480 REM
490 REM
500 REM
510 REM
520 REM
530 REM
540 REM
550 REM
560 REM
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730 REM
740 REM
750 REM
760 REM
770 REM
780 REM
790 REM
800 REM
810 REM
820 REM
830 REM
840 REM
850 REM
860 REM
870 REM
880 REM
890 REM
900 REM
910 REM
920 REM
930 REM
940 REM
950 REM
960 REM
970 REM
980 REM
990 REM

```

## ZX81 GAME

```

0040 IF B=10,B1="0" THEN IF B=
0,0,"0" THEN GOTO 0040
0040 PRINT AT B1,0.
0045 PRINT AT B1,0. "SHOT NO.",M=
M+1,"0".
0070 IF B=10,B1="0" OR B=0,B1="
0" OR B=10,B1="0" OR B=10,B1="0"
THEN GOTO 0080
0080 IF ZX=1 THEN GOTO 0100
0100 PRINT AT B1,0.
0110 GOTO 0120
0120 NEXT U
0117 PRINT AT B1,0.
0120 LET B=10,B1="X"
0121 PRINT AT B+1,1+1,"X".
0125 NEXT T
0130 RETURN
0135 GOTO 0140
0140 GOTO 0140
0145 GOTO 0145
0150 PRINT AT B+1,1+1,"X"
0155 LET B=10,B1="X"
0160 LET B=10
0165 IF B=10 THEN LET B=0
0170 IF B=10+1,B1="0" THEN LET
B1=10,B1="X"
0175 IF B=10+1 THEN GOTO 0080
0180 IF B=10+2,B1="0" THEN LET
B1=10+2,B1="X"
0185 LET B=10
0190 IF B=10 THEN LET B=0
0195 IF B=10+1,B1="0" THEN LET
B1=10+1,B1="X"
0200 IF B=10+2,B1="0" THEN LET
B1=10+2,B1="X"
0205 IF B=10 THEN LET B=0
0210 IF B=10+1,B1="0" THEN LET
B1=10+1,B1="X"
0215 IF B=10+2,B1="0" THEN LET
B1=10+2,B1="X"
0220 PRINT AT B1,0.
0225 LET T=1
0230 LET B1=10+1
0235 IF B=10 THEN GOTO 100
0240 FOR M=1 TO 30
0245 NEXT U
0250 PRINT AT B1,0.
0255 RETURN
0260 LET B=
0265 LET B=
0270 LET B=
0275 LET B=
0280 LET B=
0285 LET B=
0290 LET B=
0295 LET B=
0300 LET B=
0305 LET B=
0310 LET B=
0315 LET B=
0320 LET B=
0325 LET B=
0330 LET B=
0335 LET B=
0340 LET B=
0345 LET B=
0350 LET B=
0355 LET B=
0360 LET B=
0365 LET B=
0370 LET B=
0375 LET B=
0380 LET B=
0385 LET B=
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0400 LET B=
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0470 LET B=
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0480 LET B=
0485 LET B=
0490 LET B=
0495 LET B=
0500 LET B=
0505 LET B=
0510 LET B=
0515 LET B=
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0525 LET B=
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0580 LET B=
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0605 LET B=
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0645 LET B=
0650 LET B=
0655 LET B=
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0665 LET B=
0670 LET B=
0675 LET B=
0680 LET B=
0685 LET B=
0690 LET B=
0695 LET B=
0700 LET B=
0705 LET B=
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0755 LET B=
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0790 LET B=
0795 LET B=
0800 LET B=
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0825 LET B=
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0835 LET B=
0840 LET B=
0845 LET B=
0850 LET B=
0855 LET B=
0860 LET B=
0865 LET B=
0870 LET B=
0875 LET B=
0880 LET B=
0885 LET B=
0890 LET B=
0895 LET B=
0900 LET B=
0905 LET B=
0910 LET B=
0915 LET B=
0920 LET B=
0925 LET B=
0930 LET B=
0935 LET B=
0940 LET B=
0945 LET B=
0950 LET B=
0955 LET B=
0960 LET B=
0965 LET B=
0970 LET B=
0975 LET B=
0980 LET B=
0985 LET B=
0990 LET B=
0995 LET B=

```



# On the side

A short utility allowing you to print sideways, courtesy of James Southgate of Colchester.



This program will run on a 128K or 48K ZX Spectrum with a printer attached. The library first creates the user-defined characters, prints them sideways, enlarges them and then prints them up on the printer. You can then print up messages, many indeed long enough to fill the width of the printer paper.

## Best of three

The program is divided into three sections. The first section, code printing lines 150 to 300, reads the decimal numbers which make up the user-defined characters and converts them into binary numbers. Lines 170 to 185 check that the message entered contains the user-defined program characters. The second section, lines 220 to 410, turn the characters on their side.

The final section, contained on lines 430 to 500, takes the sideways characters, enlarges them and sends them to the printer.

This version of the program only accepts user-defined characters of A to U plus the facility of being able to use spaces. Should you wish to use the remaining letters of the alphabet or symbols of your own choice, then you will have to define them yourself — see chapter 14 of the Spectrum Spec

trum manual — and then load this program. This should, however, be able to contain a wide variety of messages with the letters simply defined as the program gives.

## In use

To use the program, enter a **SAVE** message and then **RUN**. Next input your message — your message may be of any length, but remember that as well as taking time to print out, you will also use a lot of printer paper so make sure your message is well controlled! Characters may be used more than once within the same message. Once the print out has been completed, **RUN** the program again and enter the next message you wish to be printed out.

The listing provided shows the complete program. However, if you wish to enter parts of the program for use in other listings, lines 180 to 300 could be modified to form a decimal to binary converter program. Also lines 180 to 410 could be used to turn user-defined characters sideways, retaining their original size. For inclusion in your own programs to improve presentation in some way.

To find the library numbers which make up the sideways characters, you can define lines 530 to 600 and add the lines shown in Fig 1.

```

150 DIM a(26) LET a(1)=128 LET
a(2)=134 LET a(3)=132 LET a(4)=
136 LET a(5)=138 LET a(6)=140 LET
a(7)=142 LET a(8)=144
155 INPUT "ENTER MESSAGE: "; m
160 FOR n=1 TO LEN m: IF a(n)
= " " THEN GO TO 158
165 IF CODE a(n)=128 OR CODE a(n)
=132 AND CODE a(n)=136 OR CODE
a(n)=138 AND CODE a(n)=140 OR CODE
a(n)=142 THEN PRINT a(n);
168 IF a(n) <> USER GRAPHIC CHARACTE
R THEN
170 GOTO 158 STOP
175 NEXT n
180 FOR n=1 TO LEN m
185 IF a(n)=128 THEN CLS: COP
Y GO TO 430
190 LET b=USR a(n)
195 DIM c$(10,0)
200 FOR i=0 TO 7
205 LET c$(i)=1+"";
210 LET c$(i)=CHR$(i+1)
215 FOR n=1 TO 8
220 IF a(n)=128 THEN LET b(i)=c$(i)
225 NEXT n
230 NEXT n
235 REM "TURN LETTER SIDWAYS"

```

```

370 REM
420 DIM c$(10,0)
430 LET b=1
435 FOR i=1 TO 8
440 LET i=c$(i)
445 FOR n=1 TO 8 STEP -1
450 FOR i=1 TO 8: c$(i)=CHR$(i);
455 LET i=c$(i)
460 NEXT n: PRINT c$(i);
465 REM "PRINT LARGE LETTERS"
470 REM
475 FOR i=1 TO 8
480 LET c$(i)=CHR$(i) AND a(n)=128
485 NEXT n: PRINT c$(i);
490 NEXT n
495 STOP

```

The main part of the BASIC listing

```

430 FOR n=1 TO 8: PRINT "BIN ";
c$(n); NEXT n
440 PRINT: NEXT p
450 STOP

```

Fig 1. If you want to find the library numbers which make up the sideways characters, define lines 430 to 500 and insert the above

# Educating, Peter?

Peter Shaw takes a look at some educational software packages for the Spectrum.

It was only a few months ago that I heard someone say: 'There's a big gap in the software market for Educational titles.' Looking around now, there seems to be a very growing collection of companies writing educational software for the Spectrum.

Here are a selection of some of the software packages available.

## Adding And Subtracting 16 / 64K Spectrum Widget Programmes

These three programs in the top are brilliant. Great use of graphics, code and Hi res graphics.

In *Adding*, you count the number of blocks just onto the two columns of a cross, then you add them together. If you get your sum wrong, the cross moves off in a Hi res world, puffing smoke as it goes. *Subtracting* shows you a graphical picture of a boat. You then type in the number of rows you can see on the boat. If you get the right, a little man runs down and takes some of the oars off — you then type in the number he has taken off, followed by the number left.

*Multiplication* the last program in the top, is a combination of an *Arithmetic* and *Subtraction* by favorite educational topic.





## Counting 16/48K Spectrum Widget Programmes

Wider than you also expect total software in a big way - they have bright, colourful, and well-aimed simple instructions will really help.

Counting includes four programs: Count, where you must count the number of animals on the screen; Count One, in which you have to count how many of one object is contained within the other; Count 100, where you have to count the number of seconds in the minutes and half; Count 100, where you must count the number of minutes contained inside one hour, up to a maximum of 100.

All four programs are well worth a try and worth a look.



## Shape Sorter 16/48K Spectrum Widget Programmes

These programs are that easy to use: Shape Sort, Flowers and Sea Sort.



Shape Sort and Sea Sort are just what the name implies: Flowers is a spot the difference game. On level two it gets pretty difficult. Agree purchase of colour and graphics.



## Alphabet 48K Spectrum Widget Programmes

This program is similar to the Bookie which has a different picture for every letter. The program also has a lower case tracing mode which draws a lower case letter on the screen (great for kids) then draws the shape to go with.

I'm surprised this found more for the program in 48K.



## Identikik 48K Spectrum Stell Software

The reminds me a great deal of the ATC 3.0 program. Identikik! You can adjust the font type, size, bold, shadow and color then as an extra feature, wiggle parts of the face.

There is a sub-range of colour graphics in the program, as well as a good spreading of machine code.

## Time 48K Spectrum Stell Software

The program displays a large graphic clock, and then asks: "Stop the clock at 10 o'clock". It takes quite a while for the hands to get around to the proper time; on your page this took almost an hour.

There are many other ones it displays a cartoon which teaches minutes past, etc. Not a bad package, but perhaps a little bit slow.



## Eiffel Tower 48K Spectrum Chalksoft

Unfortunately my review copy constantly crashed. The three five level program I had tried to run, it crashed, at least it was closed up. What I do know about the program is that it is a variation on French language, where you must remember between English and



French to build the Eiffel Tower. Definitely out of the norm, but worth a try for the French language!

## Telling The Time & Money 16K Spectrum Poppy programs

In 'Telling The Time', you have to work the time displayed in words. It can pass six or twenty to five. Unfortunately, the program is painfully slow, and even the Star Trek is faster.

Money has a timer. You can show the coins you can choose from and counts 100 large for the computer a certain amount. Printing the 100 counting boys will make the coins printed so you can further down the screen and my added to your timing total. If you see the computer the right money the same amount get harder. I had Money, but I must say that Telling the time was a bit of a tedious element.

Program name	Price	Company	Address	Marks out of 10
Counting	£5.00	Widget 48 Durham Road, London N2		8
Adding & Subtracting	£5.00	Widget 48 Durham Road, London N2		10
Shape Sorter	£5.00	Widget 48 Durham Road, London N2		5
Alphabet	£5.00	Widget 48 Durham Road, London N2		9
Time	£5.00	Stell, 38 Limesfield Avenue, Whitley, London S20 9SL		6
Mental	£5.00	Stell, 38 Limesfield Avenue, Whitley, London S20 9SL		8
Eiffel Tower	£5.00	Chalksoft, Lower Moor Cottage, Thimbleton, Wellington Somerset TA21		6
Telling Time & Money	£5.50	Poppy Programs, 616 Vero Sampson, Richmond House, Langford, Cambridgeshire, Lincoln LN8 3AN		7

# Off the wall

An interesting variation on the 'maze' theme from C Elliston of Suffolk.



This is a simple game for your ZX Spectrum — simple, but extremely difficult to play!

You control the flow of bricks around the playing area of the screen using the four arrow keys on the Spectrum. The stream of bricks usually be stopped if you run into another wall or you change direction.

The idea of the game is to manoeuvre the stream of bricks which leaves a trail behind it. Try not to lose yourself in it! However, it's not so easy as you might first think as there are a random number of bricks scattered throughout the playing area which get in your way.

You score points when you keep the stream of bricks in motion, and if you manage to remove a score of 50 you qualify for another screenful. Of course, the more it gets there difficult as there are more random bricks scattered about. The top score so far is 513 — see if you can beat it!

If you're looking for one word to describe this game, by additive! — try it in and you'll see what I mean.

## Line by line

Here follows a breakdown of the listing with a suggestion for changing the game's variables to suit your own requirements.

Lines 11-14	Set up the user defined screen.
Line 22-26	Print the border walls.
Line 28	Print the score on the border wall.
Lines 40-50	Place the random bricks in the playing area.
Lines 100-5000	Control the main game loop.
Line 481	Test to see if you are 'locked' in.
Lines 5500-6000	Calculate the score.
Line 6005	Converts the number of bricks into a percentage of the screen covered.
Line 6063	This line can be changed to lower the score required to move on up to another screen. For example, if you wanted to get another screen after 50 points, you would have to make line 6063
6063 IF PC=>= 50	
Lines 8000-7000	Continue the instructions for the game.



The above screen distribution shows your character at the top and the bricks, the scoring information etc. It shows how easy it is to get yourself 'locked' in!



```

13 FOR B=0 TO 7: READ S: P=0:
14 S=S*20.2: NEXT B
15 DATA 0,119,119,119,0,200,2
16
17 FOR B=0 TO 7: READ S: P=0:
18 S=S*10.2: NEXT B
19 DATA 24,24,66,66,155,25,24,
20
21 SO SUB 2000
22 LET A=0: LET I=0
23 LET S=0
24 LET SCORE=0
25 LET X=10: LET W=15
26 LET Y=0: LET Z=0
27 PRINT BRIGHT 1, PAPER 7, IN
28 AT 0,0, "SCORE=";SCORE;
29
30 FOR P=1 TO 20
31 PRINT BRIGHT 1, PAPER 7, IN
32 AT 0,0, "AT 0,0, "AT 0,0, "
33 NEXT P
34 PRINT BRIGHT 1, PAPER 7, IN
35 AT 0,0, "AT 0,0, "
36
37 PRINT BRIGHT 1, PAPER 7, IN
38 AT 0,0, "AT 0,0, "
39
40 FOR B=1 TO 8
41 LET C=INT (RND*255)+1
42 IF C=0 THEN GO TO 40
43 LET S=INT (RND*255)+1
44 IF S=1 OR S=155 THEN GO TO
45
46 BEP .01
47 PRINT PAPER 7, INK 0, BRIGH
48 AT 0,0,0: NEXT B
49 FOR B=0 TO 20: BEP .01
50 PRINT AT 0,0, "B"

```

SPECTRUM GAME

```

40 PRINT B
410 IF INKEY$="D" THEN GO TO 10
420 IF INKEY$="E" THEN GO TO 20
430 IF INKEY$="F" THEN GO TO 30
440 IF INKEY$="G" THEN GO TO 40
450 PRINT AT X,Y: "0"
460 IF ATTR (X+1,Y)=32 AND ATTR
470 (X,Y) AND ATTR (X,Y+1)=32
480 ATTR (X,Y)=1:32 THEN GO TO 5
490 GO TO 100
500 REM *****LEFT*****
510 IF ATTR (X,Y)=1:32 THEN GO
520 TO 100
530 PRINT PAPER 7, INK 0, BRIGHT
540 AT 2,0: "0"
550 PRINT #1, PAPER 1, INK 7 AT
560 7,1:INT ((SCORE+100)/1000-11)+
570
580 LET Y=Y-1
590 IF Y<=0 THEN LET Y=0
600 PRINT AT X,Y: "0"
610 DEEP #1,21-0
620 LET SCORE=SCORE+1
630 IF INKEY$="D" THEN GO TO 20
640 IF INKEY$="F" THEN GO TO 30
650 GO TO 1000
660 REM *****DOWN*****
670 IF ATTR (X+1,Y)=32 THEN GO
680 TO 100
690 PRINT PAPER 7, INK 0, BRIGHT
700 AT 3,0: "0"
710 PRINT #1, PAPER 1, INK 7 AT
720 7,1:INT ((SCORE+100)/1000-11)+
730
740 LET X=X+1
750 IF X=31 THEN LET X=31
760 PRINT AT X,Y: "0"
770 DEEP #1,21-0
780 LET SCORE=SCORE+1
790 IF INKEY$="D" THEN GO TO 20
800 IF INKEY$="E" THEN GO TO 30
810 IF INKEY$="G" THEN GO TO 40
820 GO TO 2000
830 REM *****UP*****
840 IF ATTR (X-1,Y)=32 THEN GO
850 TO 100
860 PRINT PAPER 7, INK 0, BRIGHT
870 AT 1,0: "0"
880 PRINT #1, PAPER 1, INK 7 AT
890 7,1:INT ((SCORE+100)/1000-11)+
900
910 LET Y=Y+1
920 IF Y=31 THEN LET Y=31
930 PRINT AT X,Y: "0"
940 DEEP #1,21-0
950 LET SCORE=SCORE+1
960 IF INKEY$="D" THEN GO TO 20
970 IF INKEY$="E" THEN GO TO 30
980 IF INKEY$="F" THEN GO TO 40
990 IF INKEY$="G" THEN GO TO 50

```

```

1000 GO TO 4000
1001 REM *****SCORE*****
1002 LET P=INT ((SCORE+100)/100
1003 -11)
1004 LET I=INT P
1005 IF I=0 THEN LET H=0
1006 PRINT #1, PAPER 1, INK 7:AT
1007 0,1: "SCORE":INT P: " ",AT 0,10
1008 "MI" SCORE=" "
1009 IF P<=99 THEN GO TO 2000
1010 LET I=P/100 LET P=P-I*100
1011 PRINT PAPER 0, INK 0, FLASH
1012 1:AT 1,1: "PRESS ANY KEY TO PLN"
1013 GOTO 2000
1014 GO TO 2000
1015 LET P=P/10 LET P=P-I*10
1016 PRINT PAPER 1, PAPER 0, INK
1017 0,AT 2,0: "Press key for next 7"
1018 -
1019 PAUSE 0
1020 FOR N=1 TO 20
1021 PRINT PAPER 1,AT 0,1: "000"
1022 -
1023 NEXT N
1024 PRINT #1, PAPER 1, INK 7:AT
1025 0,1: "0"
1026 GO TO 10
1027 REM *****INSTR*****
1028 INSTR 0: PAPER 0: CLS
1029 ORIN 200: ORIN 0:170: ORIN
1030 0: ORIN 0:170
1031 FOR N=1 TO 0
1032 PRINT PAPER 7, INK 0, BRIGHT
1033 1,AT 0,1: "XXXXXXXXXXXXXXXXXXXX"
1034 NEXT 0
1035 PRINT PAPER 7, INK 0, BRIGHT
1036 1,AT 10,1: "0"
1037 FOR N=1 TO 20
1038 PRINT PAPER 7, INK 0, BRIGHT
1039 1,AT 0,1: "XXXXXXXXXXXXXXXXXXXX"
1040 NEXT 0
1041 LET A$=""
1042 INSTR 2000 STILL
1043 WILL STOP THE WATCHES BUT 0
1044 BE CAREFUL NOT TO GET TAPPED
1045 XXXXXXXXXXXX
1046 FOR N=0 TO 100
1047 LET A$=A$+10 TO 1+INT(1
1048 DEEP 99: ORIN 0:170: ORIN
1049 1,AT 0,1: PAPER 7, INK 0, BRIGHT
1050 1,AT 10,0:170 TO 0
1051 DEEP
1052 PRINT BRIGHT 1, PAPER 1, IN
1053 7,AT 10,0: "press key to contin
1054 -
1055 PAUSE 0
1056 PAPER 0
1057 PAPER 4: CLS
1058 PRINT PAPER 4, INK 0, AT 0,0
1059 "USE THE CIRCLE KEYS TO STEER"
1060 "WELL AROUND THE BRICK-WALL."
1061 PRINT PAPER 4, INK 0, AT 0,0
1062 "AT THE END OF EACH GAME YOU"
1063 "WILL BE GIVEN THE APPROX"
1064 "PERCENTAGE OF THE VIBES WHICH"
1065 "IS COULDED WITH BRICKS."
1066 PRINT PAPER 4, INK 0, BRIGHT
1067 1,AT 10,4: "PRESS ANY KEY TO ST
1068 -
1069 ORIN 200: ORIN 0:170: ORIN
1070 0: ORIN 0:170
1071 PAUSE 0
1072 FOR N=0 TO 40 STEP 5
1073 DEEP #1,0: ORIN
1074 NEXT 0
1075 CLS
1076 RETURN

```



## THE MOST IMAGINATIVE GRAPHICS PROGRAMMING SOFTWARE FOR YOUR SPECTRUM



There now are prices of software that's a must for every 48K SPECTRUM owner. It's called "PAINTBOX".

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#### UDG EDITOR:

Giving you the facility to define (and re-define) up to 81 graphic characters which can be held in memory — used in your BASIC programs for instant recall from its own built-in machine code!

#### UDG DRAWING BOARD:

A fully integrated UDG Planner for up to 4 Banks of user-defined characters. Planning facilities include MIRROR, IMAGE, ROTATE, INVERSE, and FILE.

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# Hell's angels

Can you save the Earth from impending doom in this program written for us by Akram Malik of Eitham.

In this program, it is your own witty task to erase (and/or kill) the Earth from the alien borders — this time at the stage of angels from Hell and then by a number of demons.

The first wave of aliens are called Hell's angels and are capable of great destruction should they be allowed to pass through your defences. Indeed, should you let more than two of the angels pass, you will find that your mission has failed and Earth will be destroyed. You must shoot 3D of these angels quickly before you get through to the next stage of the game where you will meet the fully fledged demons.

## Demonic danger

The demons are of course much more powerful than the Hell's angels and your task is

once again to stop them passing your defences. However, this time, if you only let two through then Earth will be considered destroyed. Still, if you are managed to get through to this stage of the game you will no doubt have your own shooting eye targeted at an alien. If

you manage to shoot 3D of the demons out of the sky, you can congratulate yourself on having saved the Earth.

One must be taken to make sure your aim is true before you shoot at the aliens as you have 100 laser points to destroy the incoming force. Only partly, if the

Earth is destroyed the game ends with a message informing you of the sad fate of humankind.

The controls used in the game are fairly simple. The right keys 'R' to 'G' to move and 'any key' on the bottom row to fire your laser.



```

1 GO SUB 4000
2 LET A:=0
3 LET X:=0
4 KEY ON=20 GO SUB 1000
5 BORDER 1 PAPER 2 INK 3 C
L3
68 FOR Q=1 TO 21 POINT AT Q,0
7 " AT 9,31,40" NEXT Q
88 FOR Q=1 TO 7 PLOT Q,H ORR
W INK 3,000:0 NEXT H
42 PLOT Q,107 ORR Q,000:0
58 POINT AT Q,0, INK 3,30 "3
E THE 10, INK 2,HELLS ANGELS"
60 LET H=0:0 LET A:=0 LET X
=10 LET Q=00
70 LET I=0: LET Q=INT (RND*17)
80
75 IF Q=0 THEN GO TO 1310
88 POINT INK 3,AT 9,4,00
89 POINT AT Q,1
90 LET I=00 THEN GO TO 370
100 LET Q=INT (RND*30) AND
C:00-10:03400:000 AND I:=0
110 POINT AT Q,C INK 3,0
120 POINT OVER I, INK 3,AT 1,4,
80
130 LET I:=+1
135 LET Q=Q+INT (RND*0)-1+10 RN
C 1-20-10 RND Q:00
140 POINT OVER I, INK 3,AT 1,4,
A:000:0:10
150 IF I=00 RND I<C OR Q+1<0

```

```

384 BEEP 3.10 BEEP 1.00 BEEP
385 IF 3141 THEN LET A=INT
386 FOR BORDER 3 PAPER 7 INK 3 C
387 FOR N=0 TO 48 STEP 8 FOR I
388 TO 8 STEP 18 BEEP .07.5 0
389 .04.1 NEXT I NEXT A
390 PRINT AT 1.10, FLASH 3,"CON
391 TAIN" AT 3.1, FLASH 3,"Part 1"
392 All now be destroyed" AT 10.0,
393 Your score was 1. AT 18.0, His
394 score is
395 388 BEEP 388 GO TO 3
396 BORDER 1 PAPER 1 IN 7 C
397 10
398 PRINT AT 9.10,"HELLS ANGELS
399 OVER 1 AT 9.10,
400 AT 4.3, NAME 1 TO 5-SAVE 1,641"
401 AT 6.3, NAME 1 TO 5-SAVE 1,611"
402 AT 8.3, EDITOR FOR 1,641 START
403 14. 1,641,8,8,8,8,8,8,8,8,8,8
404 198 PRASE 388 OPTION
405 1918 FOR N=0 TO 28 STEP 2: BEEP
406 .04.1 BEEP 2.8 NEXT N
407 1918 BORDER 3 PAPER 1, INK 7, C
408 19
409 PRINT AT 11.10,"STAGE 3" 8
410 1918 FOR P=1 TO 31 PRINT AT P.0
411 "P" AT P.31.7" NEXT P
412 1928 FOR Q=0 TO 7 PLOT 0.6 DRG
413 U INK 4,000.0 NEXT Q
414 1928 PLOT 0.167 DRG0 200.0
415 1928 PRINT AT 8.0, INK 8, "0" -0
416 1.78.18, INK 8, "HELLS ANGELS" 7
417 8.4, INK 4, "11.6"
418 1928 LET A=10 LET C=18: LET B=
419 1928 LET A=2 LET C=INT (280+17.
420 18
421 1928 IF A=0 THEN GO TO 3000
422 1928 PRINT INK 8,AT 1.9,"0"
423 1928 PRINT AT 28.0,
424 1928 IF 1008 THEN GO TO 3278
425 1928 LET C=INT (100+1000) AND
426 1000-1100000+33000 AND C+1
427 1928 PRINT AT 28.0, INK 8, DRIGH
428 1.9"
429 1928 PRINT OVER 1, INK 8,AT 1.9,
430 1.9
431 1928 LET C=C+1
432 1928 LET C=INT (280+30-3+10) AND
433 10-3210 AND 4-321
434 1928 PRINT OVER 1, INK 8,AT 1.9,
435 1.9
436 1928 IF 1008 AND 400 THEN POINT
437 AT 1.0, INK 8,DRGH(31+4,"E" POINT
438 INK 8,AT 10.0, DR GH SEAR" INK 3
439 "WHAT A INK 8, FLASH 1, "HESS
440 " BEEP 3.8 BEEP 3.18 PRASE 3
441 3 GO TO 3000
442 1928 IF 1008 BEEP 1.000 08 IN 307
443 300000 THEN GO 508 1000 LET I
444 1010-1
445 1928 IF 10=0 THEN GO TO 3000
446 1928 GO TO 1000
447 1928 PLOT DRGH(31.0,1.0,1400 BEEP .00
448 1.0 0.0 INVERSE 1.000+4.17. 08
449 04 DRGH 1.0 1.0
450 1928 IF 10=0 AND 1000 AND 400 7
451 1928 LET C=INT (280 PRINT AT 8.3,
452 INK 8,0.0 BEEP .04.18 PRINT 10
453 8.0,AT 1.0, "E" BEEP .08.0 3018
454 7 AT 1.0, "E" LET A=1-1 GO TO
455 1000
456 1928 RETURN
457 1928 PRINT AT 28.0, " LET C=C
458 +280 IF C=0 THEN PRINT AT 8.0
459 10.0 8.0
460 1928 IF C=0 THEN PRINT AT 8.0,
461 " LET A=1-1 IF A=0 THEN GO
462 TO 1000

```

```

1928 PRINT INK 4, FLASH 1,AT 10.
3. "1200", INK 8, FLASH 8, "You
181 INK 8, "0" THEN"
1930 BEEP 3.10 BEEP 1.4 BEEP
1931 1000 GO TO 384 BEEP 1.00
1932 BEEP .00.10 BEEP 2.10 88
1933 .10.15 BEEP .4.28 FOR N=0 7
1934 0.20 STEP 2 BEEP .1.4 BEEP .00
1935 .4 NEXT N BEEP .4.00 BEEP .10
416 1.8 BEEP 3.10 BEEP 0.10 888
1936 BORDER 6 PAPER 6, INK 7, C
1937 10
1938 PRINT AT 10.4, FLASH 1,"YOU
1939 HAVE 33333 PARTS",AT 14.0,"CON
1940 TAIN AT 10.4
1941 1938 PRINT AT 10.4, FLASH 8,"Pro
1942 ce 3 333 to play 333.0"
1943 1940 PRASE 388 IF INKEY="" THE
1944 N STOP
1945 1938 GO TO 3
1946 1938 FOR N=0 TO 7
1947 1938 READ N POKE 256,"B" AND N
1948 AT N
1949 1938 DATA 255,255,192,192,255,25
5,0,0
1950 1938 FOR N=0 TO 7 READ 0 POKE
1951 256,"B" AND N NEXT N
1952 1938 DATA 25,25,25,25,31,31,13,4
1953 1938 FOR N=0 TO 7 READ C POKE
1954 257,"C" AND C NEXT C
1955 1938 DATA 148,227,158,235,228,10
8,85,144
1956 1938 FOR N=0 TO 7 READ 0 POKE
1957 258,"0" AND 0 NEXT 0
1958 1938 DATA 25,25,24,24,25,192,255
1,253
1959 1938 FOR N=0 TO 7 READ 0 POKE
1960 259,"E" AND 0 NEXT 0
1961 1938 DATA 150,0,250,0,219,0,90,10
1
1962 1938 FOR N=0 TO 7 READ F POKE
1963 260,"F" AND F NEXT F
1964 1938 DATA 210,100,210,100,210,10
0,210,100
1965 1938 FOR N=0 TO 7 READ G POKE
1966 261,"G" AND G NEXT G
1967 1938 DATA 100,100,20,125,20,20,0
1,100
1968 1938 FOR N=0 TO 7 READ H POKE
1969 262,"H" AND H NEXT H
1970 1938 DATA 100,20,20,20,188,201,1
00,201
1971 1938 RETURN
1972 PRINT INK 3, AT 10.1,"You ra
1973 e 3 out of 100 power" BEEP 3.0
1974 30: GO TO 300

```

A sample screen illustration from the program. Ref's copyright.

SO 8 HELL'S ANGELS HISSES



# PLAY TIME

## Arcade Action For The ZX Spectrum

PROTEK JOYSTICK INTERFACE  
£8.95  
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# Wild west

**Holster up and get ready to play this Spectrum version of the arcade game from R Page of Liverpool.**

Based on the popular arcade game, this program is designed to be played by two people. Both players have control of a western character, each equipped with a handgun.

Each character is placed to the left and right of the screen display. As time runs down the middle of the screen, an action readout at the top will refer to the distance. Beside this readout is a number of shots which, along with the moving weapon, provides cover for the two cowboy characters as they attack. All characters are trying to get a shot at each other.

## Go for your guns

Each cowboy character can be manipulated around their own half of the screen through the four direction keys. There is also a key to lay your gun, which you press when you think you have a clear view of the other cowboy. All controls are provided on screen as part of the program.

You will find, however, that your shots will not travel the entire width of the screen, so there's no use trying long shots. Targeting the other cowboy will come out into the open and give you a clear shot - that is, no game for cowards!

As I have said, your character will not cross the read which bisects the screen display. However, should you wish to change this, following your character's number along the screen you can also try re-programming with the values of A, B, C and D in lines 620, 625 and 710.

To win the game, you must get five clean shots at your opponent. Once the game's over, the winner's name will be displayed along with the option to have another game.

## Line by line

The program is structured in the following way:

Lines 10-50     Fire a bullet and detect if one of the characters has been hit.  
 Lines 50-200    Provide the instructions for the game.  
 Lines 200-500   Set up the screen display.  
 Lines 610-780    Detect the winner and also customise the main routine for the game.  
 Lines 770-830    Set up the user-defined graphics and variables used in the game.



A screen display from the program (left) next



```

3  GO TO 50
4  SHOOT←[REMOVING]←[REMOVING]←[REMOVING]←[REMOVING]
10 FOR A=1000 TO 10-100
10 IF SCREENS (0,0)="." THEN G
3 TO 50
14 IF ATTR (R,0)=50 OR ATTR (
50 =50 THEN PRINT AT R,A-1," "
30 TO 500
17 PRINT AT 0,A-1," " AT R,A
18 7," " HDVD R PRINT AT A,A
1,0 7 " GO TO 500
38 RETURN
39 FOR R=(0-1) TO (0-1): STEP
-1
40 IF SCREENS (R,0)="." THEN 3
3 TO 40
42 IF ATTR (0,R-1)=50 OR ATTR
40 =11=50 THEN PRINT AT 0,R,"
50 TO 500
45 PRINT AT 0,0," " AT 0,A-1
18 7 " " NEXT R PRINT AT 0,0,
18 7 " GO TO 700
49 PRINT AT 0,0,"PRINT AT 0,0,
LET SCREENS SCREEN 0,00 01
50 0,10 SCREEN 0,10 PRINT DR
7, PAPER 0,AT 0,21:50 PRINT AT
0,0, LET SCREENS 0,10 GO TO 700
52 PRINT AT 0,0,HL"AT 0,1,0,
LET SCREENS 0,10 SCREEN 0,00 01
50 0,10 SCREEN 0,10 PRINT AT 0,
7, PAPER 0,AT 0,21 PRINT AT
0,0, "AT 0,1,0" GO TO 500
58 INK 0 PAPER 0 SCREEN 0, 0
L5

```



```

PAPER 7, AT 8.0, "PRESS ANY KEY TO GO
ON."
PAPER 7, AT 8.0, "PRESS ANY KEY TO GO
ON."
PAPER 7, AT 8.0, "PRESS ANY KEY TO GO
ON."
PAPER 7, AT 8.0, "PRESS ANY KEY TO GO
ON."

```

```

604 RESTORE 005 FOR I=1 TO 8
READ 0, 0, 0, 0, 0, 0, 0, 0
DATA 100, 100, 100, 100, 100, 100, 100, 100
NEXT I

```

```

605 DATA 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
606 DATA 10, 17, 20, 10, 20, 3, 10, 3, 10, 10
607 DATA 10, 0, 10, 3, 14, 5, 0, 10, 7, 0, 2

```

```

608 FOR C=10 TO 1 STEP -1: GOTO 610
PRINT AT 0+1, 10, " AT 0+0, 10, "
AT 0+1, 10, " AT 1, 0, "

```

```

609 PRINT OVER 1, AT 0, 0, CHR$ 14
GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
FOR I=1 TO 10: GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

610 LET A=0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0
1000 AND 0: GOTO 611

```

```

611 LET B=0: IN BASIO=100 AND
FOR I=1 TO 10: GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
1000 AND 0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0

```

```

612 DATA 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

613 IF INKEY="" THEN GO TO 10
GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
GOTO 611, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

614 LET C=0: IN BASIO=100 AND
FOR I=1 TO 10: GOTO 614, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
1000 AND 0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0

```

```

615 LET D=0: IN BASIO=100 AND
FOR I=1 TO 10: GOTO 615, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
1000 AND 0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0

```

```

616 PRINT AT 0, 0, CHR$ 10, AT 0+
1, 0, CHR$ 10

```

```

617 IF INKEY="" THEN GO TO 20
GOTO 616, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
GOTO 616, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

618 DATA 10, 20, 30, 40, 50, 60, 70, 80, 90, 100
619 DATA 10, 17, 20, 10, 20, 3, 10, 3, 10, 10
620 DATA 10, 0, 10, 3, 14, 5, 0, 10, 7, 0, 2

```

```

621 FOR C=10 TO 1 STEP -1: GOTO 623
PRINT AT 0+1, 10, " AT 0+0, 10, "
AT 0+1, 10, " AT 1, 0, "

```

```

622 PRINT OVER 1, AT 0, 0, CHR$ 14
GOTO 624, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
FOR I=1 TO 10: GOTO 624, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```

```

623 LET A=0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0
1000 AND 0: GOTO 624

```

```

624 LET B=0: IN BASIO=100 AND
FOR I=1 TO 10: GOTO 624, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
1000 AND 0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0

```

```

625 LET C=0: IN BASIO=100 AND
FOR I=1 TO 10: GOTO 625, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
1000 AND 0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0

```

```

626 LET D=0: IN BASIO=100 AND
FOR I=1 TO 10: GOTO 626, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
1000 AND 0: IN BASIO=100 AND
WITH IN=1, 0, 0 AND WITH IN=1, 0

```

```

100 PRINT "PRESS ANY KEY TO GO ON."

```

```

110 PRINT AT 2, 1, "THE FIRST GUN
SLINGER TO SHOOT HIS OPPONENT
FIVE TIMES IS THE ONE TO SURVIVE
IN THE GUNFIGHT"

```

```

120 PRINT AT 0, 10, "PRESS ANY KEY TO GO ON."

```

```

130 PRINT AT 0, 4, "PRESS ANY KEY TO GO ON."

```

```

140 PRINT AT 0, 14, "PRESS ANY KEY TO GO ON."

```

```

150 PRINT AT 11, 10, "PRESS ANY KEY TO GO ON."

```

```

160 PRINT AT 10, 0, "UP" AT 10,

```

```

DOWN" AT 10, 0, "LEFT" AT

```

```

10, 0, "RIGHT"

```

```

170 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

180 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

190 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

200 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

210 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

220 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

230 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

240 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

250 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

260 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

270 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

280 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

290 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

300 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

310 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

320 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

330 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```

```

340 PRINT AT 10, 0, "PRESS ANY KEY TO GO ON."

```



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One of the many uses on Prestel

# Holmes investigates

## Short Vowel Sounds — Sherston Software

**Short Vowel Sounds** fits the ones in odd letters and also is the subject of the educational cassette from Sherston Software.

The program itself is divided up into three sections which test the young child's skills to recognize an object shown on the screen and then choose the correct vowel sound from a choice, for example, cat and dot (at dot).

In the first section the child is able to identify by a large dot and a beep for the correct answer which is a little dot pointing — a happy cartage character or something of the like would be a bigger mean, too to do well. The second section consists of the child having to complete a sentence, the picture on the screen indicating the correct word. Again the child chooses the correct answer from a selection of possibilities.

Overall the program is good enough for use in primary schools and reasonably priced at £3.

## Firework Music — Software Cottage

The program is another educational package aimed at teaching the rules and their positions on a musical score. It is split into two programs one for the treble clef and the other for bass.

The user is first shown where all the notes lie on the staff then has to commit them to memory for the next. It can work at a musical rate being shown and the user having to name the right note before a burning candle falls into the firework box on the screen and destroys them. The more notes that are named, the

## Paul Holmes inspects a number of new software packages for the ZX Spectrum.

higher the score will be. After naming ten notes there is a new line work display which will probably entertain users in the younger age brackets.

The screen display of the staff, clef and notes is sufficiently large so that if it were displayed on a large TV in a classroom the whole class would be able to see it. The program is not fast so far as I could tell and seems a useful tool for teaching one of the more basic points of music to a fairly young age group — mainly in the Junior and Primary schools.

Overall: very good value for £5.00.

## Music Maker — Bellflower Software

Being somewhat musical myself I looked up the program hoping to find something to lighten up my life. After choosing my key and time signature (that should mean bass and treble lines) I eagerly entered my first tune "how great!". I thought: However, I heard some aspects of the program a little better, so no notes shorter than 2 quaver were allowed and I was restricted to bar seven, middle C and the G as octave and a half above. Two notes were also not entered for which about gave me enjoyment.

The documentation (which included three sample tunes) seemed a little educational in style which may account for the above shortcomings. The feature that I found most annoying though was the fact that I could only delete the most recently entered note which I needed to do more

than just once. One other odd point was that the program seemed to avoid putting its notation on lines instead of preferring the space in between above or below, which looked a little messy.

So, putting the "p" key to play I set back to hear as the first note a melody solo in my ears only to be really awakened. Again, good graphics but the tune! Every time the program drew a bar line there was a very audible

noise. However, when it came time to save the program could not drive them from memory and every time the program loaded up a screen there was a noise of about two seconds while a cleared screen and it drew the three staves. Surely the machine code could have been coded here, or better, but that everyone (even the ZX80) the music could have been printed fast and a point stored along in time. The fact I am sorry to say means the program almost certainly which is a pity considering its graphics and the need for such a program.

In conclusion, the package would not satisfy those who already want to make music



SCREENSHOT OF MUSIC MAKER SOFTWARE:

- Top prompt: **PRESS [KEY] TO STORE NOTE**
- Middle prompt: **PRESS [KEY] TO DELETE NOTE**
- Right prompt: **LONGER SHORTER**
- Bottom keyboard layout: **Q W E R T Y U I O P**

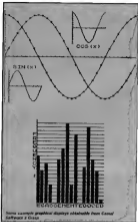
## Graph — Camel Software

I expected this package with a little apprehension — not just because of the rather obscure name (I write I have had limited experience with home-science programs).

It turns out to be a graph editor capable of drawing line graphs, bar-graphs and pie charts. It is also capable of manipulating graphs on the same or different axes, with the facility to expand and contract graphs. Thus plotting non-graphs can be carried out. Moreover, two different types of shading are allowed and with line graphs, you can adjust the length of dashed line between points or you can choose to have a solid line or none at all. Each set of data is called a dataset (uppercase letters) and may contain up to 100 items each and any dataset can be used for either axis.

The documentation is generally good although I found it a little confusing in some places, especially when talking to control characters. The interactive mode more of which later. Another part which I found rather unclear was the section on data entry, which seems to have been fairly staggered over, although none of the instructions are hard and it didn't take long for me to grasp the basic principle of operation. The manual is not suitable for the beginner, whether it contains adequate material but anyone with a small knowledge of maths, especially calculus, will find it a little useful though.

Obviously the best way to review a package of this kind is to try to create some graphs with it. So I'll start with data in hand to try and create my own graphs. After reading the documentation thoroughly, I loaded the program. I found it very easy to use and when I consulted the user manual to find out how to do a little while to be sure everything works properly. In when starting the drawing a graph, by making the "1" key to enter data entry mode, the user is presented with nine options including facilities to set, add, delete, and delete datasets as well as the rather powerful facility to create datasets using all the functions that the graphics can handle, so even curves, logs, etc. There is also of course a straight



Some sample graphical displays obtainable from Camel Software's Graph.

line plot facility for  $y = \sin(x)$  although considering that quite a few scientific calculations will do this for under £25, one might have expected  $y = \sin(x)$  for functions that must pass through the graph as well as fits such as  $y = \sin(x)$  or  $y = \log(x)$  since these are found in quite a few calculators in Physics and Higher Maths. Then again, while programs have been written to do only these few, some do perhaps it is taking too much to see them included in such a general piece of software as this.

Pressing "2" to exit from the data menu, we were returned to the main menu again. After setting up the menu and visual options available to this, eg PAPER, INK, and BORDER colours, position and size on screen, color or dashed line style of plot points, number of ticks on each axis, I pressed the "3" key for DRAW. The graph was drawn tentatively quickly, although when the plot

option was used to fill in the grid on large graphs it could get rather long-winded and there was no facility for breaking into the routine and getting back to the menu in one place which was especially irritating if you needed that you had redisplayed the screen since you had to wait for the graph to be drawn before you could go back and change it.

After something about an hour fiddling away with the package, I found it quite easy to create both graphs and histograms but although I found quite hard, for some reason I couldn't draw get the shadows off a pie chart. In close the next thing, when your dataset has been created, you may go into interactive mode which allows you to move graphs around (great fun and useful tool), change dataset areas, bits, add text and generally play around with your masterpiece and if you are satisfied with it

in conclusion a very well thought program which I highly recommend to anybody who requires such facilities for basic school or business.

## MACRO Construction and Animation — Pinehurst Data Studios

This is one of the most original ideas for a piece of software I have seen yet. It is designed to focus the user into the world of Computer Movies, well that is what they claim, though I would describe them as 'Animated stories' that anything else.

It comes complete with a well written manual and demonstration tape. Move Through the graphics are not up to the latest movie standards but the package is not designed to be the latest video game. It is a fun job that I found quite entertaining to use and on the whole, the program does the task very well.

The operators are built up using a selection of data animals. The most common command in the Camel command which allows you to call up any member of the 'cast' (includes man, woman, dog, a bird, a helicopter and many others) and make it move around or across the screen. It also has a number of other commands allowing the Director to build up objects such as houses or to display their standard sun or a house. An interesting feature is that the movie maker can move rates and play them back at any point in the story. This is a command which allows text to be printed on the screen which is useful for explaining the whole. The program is very versatile and I found it an interesting change from the usual 'shoot em up' game.

The Gazette is produced by Pinehurst Data Studios. It is available, surprisingly like Pinehurst film studios, down at 351 and sells for £7. Good value, with sterling appeal.





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# AGF

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# Window shopping

The familiar range of computer hardware most well equipped line of microcomputers in the world. And not least by Sinclair Research themselves —

especially as they now provide not only the ZX Printer and PLM (as they also the Interface 1, Interface 2 and ZX Modem).

However, alongside those lines of equipment there is a wealth of hardware produced by independent companies which when added to your store can make for a very substantial range.

Obviously it is feature this we are not only really hard to touch the surface of these items. But hopefully, we can provide enough information to help you choose the more you need for expansion your system. It includes the package name of the computer you would like to relate to your choice.

**If you're thinking of adding onto your ZX81 or ZX Spectrum, why look any further than our comprehensive hardware features?**

This feature is not really so much of a review, but more of an expanded checklist. So while some products may only get a small mention, this is no real reflection of the quality of the product. Rather, you should use this article as a springboard for the future expansion of your Sinclair system.

Hopefully, in future issues of ZX Computing, we will be able to take a closer look at some of the more interesting products, but in the meantime, the hardware market has thrown up — without waiting these pages!

In the meantime, have a look through the plethora of choices to offer and learn about your perfect micro system. And then, follow them down up — write or phone the companies mentioned and ask for further information. You'll be surprised how helpful they can be!



## IN ..... Brief

● The Omni Electronics EPROM Card for the ZX Spectrum can be used to provide more facilities for BASIC programs. With the EPROM fitted at the Spectrum's ROM socket you have 10 extra routines for re-numbering, editing, character re-arranging, and enable dumping. Designed EPROM 1, the device is priced at £9.95. For further details contact Omni Electronics, 2 Bampton Road, Cantsams, Carmel, TN14 7DP or phone 0306 715604.

● The MCB-8 is designed to interface with the Z88 and has two functions controlled by on-board DS1 switches. Firstly, it provides storage of up to 16 programs in BASIC and for maximum speed up to a total of 95, and secondly the device provides 5K of static memory. Software is provided as a ZX EPROM and gives a monitoring facility whereby system status is displayed on screen. Priced at £24.90 you can find out more about the MCB-8 from Micro-2 Ltd, PO Box 92, Exeter, Devon EX4 7NP.

● Spacewarrior is a combined four slot motherboard and Z4 line 16 directional programmable port board for the ZX Spectrum. The device plugs directly into the rear connector of the Spectrum and provides facilities for other peripherals to be added. Priced at around £30 for the complete package you are also provided with a software programming aid on cassette. There is room for four additional cards, which the makers are expecting to produce in the future. For more information contact P B Turner, Unit 2, Park Road Industrial Estate, Park Street, Lye, Stourbridge, West Midlands CV9 6DQ.

● You can upgrade your Spectrum, either issue 1 or issue 2, from 128K to 448K using a RAM kit from Data Research Ltd. Priced with each RAM kit comes Data Checkmate, a memory diagnostic cassette providing computer assisted testing of the existing 128K RAM and the 32K extension. The issue 1 RAM kits are priced at £23 and the issue 2 versions are priced at £21. For more information contact Data Research Ltd, 15 Church Street, Bealingside, Herts SG21 1QD or phone 0296 60346.



## Add-on accessories - EPROM Services.

EPROM Services have a wealth of add on devices for both the ZX81 and the Spectrum.

Priced at £15, there is the EPROM board, which can accommodate up to 8K or 2K EPROM or 2K RAM ICs. This memory is lost led as MR-MC but with simple modifications it can be made to relocate the board to the 48K area. This also makes available an Auto Stop unit, priced at £5.95 which gives an automatic jump to location

FOOD lines on switch on.

For the ZX81 there are a plethora of EPROMs available, priced between £3.95 and £99. These can be used for rapid LD A/D/A Y's, 100K X/Y Disassembler, graphics memory character set, monitors and other use.

However, EPROM Services are responsible for much more hardware than can be briefly mentioned here, so it might be worth you going there in person at 3 Wedgwood Drive, Lough L58 1EJ, if you are looking for a particular application.

# Firmware, etc

## Add-ons - Haven Hardware

Haven Hardware have a great selection of add-on boards for your ZX81 or ZX Spectrum.

For the ZX81 there is a programmable character generator priced at £19.95, a repeating key module, priced at £3.95, an image rec module priced at £2.95, a keyboard tester, priced at £5.95, a keyboard entry module, priced at £2.95, an input/output port priced at £11.95, a full size keyboard, priced at £19.95, and

many more. You can also order these kits as fully built up, although you will have to fit about a quarter of the price cost.

Haven Hardware also provide devices for the Spectrum including an I/O port which is eight inputs and eight outputs, available via edge connector on the edge of the job. The priced at £12.95 for the kit or £16 for £19.95.

For further information get in touch with Haven Hardware at Holly Road, Holly, Stourbridge, Gwent CF14 4PP or phone 049-666-627.

## Expansion Bus - U-Microcomputers

U-Microcomputers have introduced two new interface cards for their expansion bus system.

The USP 200D, priced at £24.95, is a powerful dual channel serial interface using the sophisticated Z80 UART chip. Software included comprises U1, U2 and UPRINT ports and dumb terminal emulator. You also get a 58 page manual.

The USP 100 is a power package, parallel interface using the 2048PO chip. It also provides 10K input or output lines and four control lines. Applications include connect to printers, music synthesizer, D/A and A/D converters and a cassette interface. The USP 100 is priced at £22.95.

For more information on the and the further cards available get in touch with U-Microcomputers Ltd, Winterton Industrial Estate, Long Lane, Winterton, Cheshire WA2 6PR or phone 0457-61172.





## FORTH = David Husband

David Husband has come up with an interesting concept for the Spectrum — a FORTH cartridge (see page 124 of Fig FORTH), and the RS 232 interface was an IBM 1642 set 24 bits of parallel I/O via an RS232C.

The BASIC ROM is switched out and replaced by the FORTH ROM which contains all the needed Fig FORTH words. The basic also offers a multi-tasking FORTH operating system, a 256K

assembler for machine code FORTH definitions, a terminal routine to support a terminal crystal controlled baud rate generator for the RS 232C, a machine code monitor, RS 232C and Centronics printer routines and 8K of ROM for future software enhancements.

The retail price of the package is £50 + VAT. For more details contact David Husband, 2 Glastonbury Road, Brighthelm, Poole BH12 1AA. Telephone enquiries can be made on 0202 764124.



## Time Controller = Clamfire Electronics

Feeding of a battery backed real time clock, the Time Controller has eight programmable inputs and eight programmable outputs.

With a one byte on program, it can set a single interval or recurring interval or use the month day date time minutes or seconds. There is also an extension connector should you wish to

add other peripherals onto the board.

Applications for this device include electronic diary with alarm, home control, burglar alarm, exercise effects and precision control.

The price of this device is £24.50 for the 2081 version and £30.00 for the Spectrum model.

For more information on the Time Controller, contact Clamfire Electronics, Wexley House Trinity Avenue, South Hill Park, Brighthelm BN1 1PH. Telephone enquiries can be made on 01 300 3342.

## MURBUS = Microtext

The Microtext MURBUS Card has a Smart plug into the Spectrum's standard connector which buffers the signal lines and connects to the motherboard. With this unit, the Spectrum software should be able to take use of the full range of MURBUS interfaces as well as we feel enjoying card which is used to build any interface a computer project you can think of.

As compatible with the card line, Microtext offer a power

supply module of powering the MURBUS together with a separate floppy disk drive.

The Smart Plug is priced at £20.95 and the power supply is available at £26.95. For more information contact Microtext UK Ltd at High Lane, Macclesfield, Cheshire, SK10 2JN. John St. Luton, Beds or phone them on 0562 478924. You might also like to ask them about their new range of printed circuit cards, including floppy disk RS 232C/centronics, 8K cache video, 84K page mapped memory and for code loader interfaces.

## In Brief

Stephen Adams has come up with a number of expanding devices for the ZX81 and ZX Spectrum. The Straight Adaptor converts the Spectrum to the same expansion port as the ZX81, but does not do any address conversion that providing you with a full 64K of addresses when the pointer is being used. He has also developed the Adren and Evis Adaptors. The Evis Adaptor allows owners of the ZX Spectrum to utilize the wide range of ZX81 peripherals for long as these devices operate in the 0-15K section of the ZX81's memory map. The Adren Adaptor simply allows you to add a Z80 compatible RAM pack to your ZX Spectrum thus boosting your storage if it stands. The Adren II Adaptor, an update of the Adren Adaptor, allows the use of two sets of peripherals at the same time on the ZX Spectrum. All the adaptors are available at £5. For the ZX81, Stephen has developed a programmable type controller, the RZ1. For the Spectrum and ZX81. As well as not having to change the leads as you use BAWLING and LOGGING, the cassette motor is set under program control. The price of the device is £20. For further details contact Stephen Adams at 1 Leman Road, London NW3 7NL or phone him on 01-254 1669.

The interface board from Interceptor Micros is designed to connect a standard Atari type joystick to the ZX Spectrum. There are two ports for joysticks and there is room for further optional expansion. Instructions are provided with the package to help the user check that the board is working up to the correct standards, and a software demonstration tape is also included. Priced at £75.95, you can obtain more information from Interceptor Micros, Linton House, The Green, Tadley, Hants.

JRS Software have on offer a number of ICs which transform your Spectrum from 128K to 496K. The first version Spectrum can be upgraded using a RAM board which is fitted inside the computer. Requiring no soldering, the RAM board is priced at £42.95. For the issue two Spectrums, there are 12 ICs provided, marked A to L which are to be fitted inside the Spectrum, replacing ICs already in position. Installation is carried out simply by following a diagram supplied. The price of the ICs is also £42.95. JRS Software can be contacted on 0933 89281 or by writing to 18 Woodside Avenue, Warrington, Cheshire WA3 3JW.

For issue two Spectrums only, there is a Spectrum upgrade to 496K available for only £24.95. For further details, get in touch with Fountain Computers Ltd, David Road, Ripley, Alfreton, Derbyshire S43R 1SW. You could also ask them for their instructional sheet concerning the way to get the best out of the steps of the Spectrum. Priced at £1. The A4 sheet shows you how you can get a maximum display simply by entering a few internal controls of the Spectrum.



## In ..... Brief

- The Fuller 18K RAM pack is designed to fit onto the back of the ZX81 and is priced at £28.99. You could also investigate the possibility of fitting the PD Motherboard — then you could have a 19K RAM card or a 64K RAM card added to your system. For further details contact Fuller Micro-Systems, The ZX Computer Centre, Dale Street, Liverpool 2 or phone 051 258 9100.
- The 18K RAM pack from Data-swatts is priced at £28.99. You can also purchase a plug-in module for your ZX81, which when used with the RAM pack will expand your memory up to a full 32K. The price of this unit is £28.99. Further information is obtainable from Data-swatts, 44 Shroton Street, London NW11 or you can phone 01 258 0680.
- A floppy-disc controller for the ZX81 offers single or double density compatibility with all Stugart S/N soft drives, the new Japanese 3 inch drives and the Hitagane ANEX 2.5 inch drive. Set to enter the market at around £40, you can find out more from Analogue Information Systems Ltd, 43 Garsion Road, Bellingham 15 or by telephoning 021 567 8980.
- Technology Research Ltd have announced the availability of a floppy disc interface card for use with the Spectrum which will work with any Shugart standard disc drive or with the new Micro Disc 1 drives. Further details are available from Technology Research Ltd, 57 Brookley Place, London W22. Telephone enquiries can be made on 01 565 5352.
- Audio Computers have introduced a RAM pack, priced at £19.95 for the ZX81 to make it up to a full 18K. The unit incorporates feet to make it up to the same height as the micro and has a plastic grip which hangs over the top of the ZX81 holding the RAM pack in place. For more details on the device, get in touch with Audio Computers at 47 Beaumont Park Road, Baulthorpe on Sea, Essex or telephone them on 032 870000.

## Memory

Arab RAM  
— Autofam 7

Here is a device which when fitted between the ZX81 and a RAM pack will provide the user with a complete set of characters, keywords and functions in an Arabic version of BASIC called Daulia.

The new language is an well-designed, three-tier design providing good legibility on the screen. Arabic equivalents to all the keywords, functions, etc.

have all been carefully chosen and special keyboard overlays are available with the device with the various words converted for the new language.

All the ZX81 performance features have been retained even though the writing goes from right to left and decimal numbers are evaluated from left to right. An easy to follow instruction booklet is provided with the package.

The manufacturers of the Arab RAM are International PDC, 143 Jackson Street, Austin.

RAM Packs  
— Stonechip  
Electronics

From Stonechip Electronics comes the ZX Fridge a 18K RAM extension for the ZX81.

Housed in a sturdy box, the pack connects to the rest of the 81 via a simplified edge connector. There is also an LED built into the unit to indicate that power is reaching the RAM pack.

There is no extension indicator at the back of the

device, but it is possible to add further 18K, making the box into a 36K unit at a price of £19.95.

The ZX Fridge is available from Stonechip Electronics, (as yet) at £19.95, at Brook Trading Estate, Gwentlock Lane, Aberystwyth, Haverly, SA11 4DD. Telephone enquiries can be made on 045 242000.

You might like to know more about this other add-on to the Spectrum including a light pen, an auto amplifier, a programmable preset mixer and a keyboard.

RAM Packs  
— Memotech 4

Memotech provide a wealth of hardware add-ons for the ZX81 including a number of memory packs.

Called Memopack, the units fit snugly onto the back of the 81 and can be stacked together to further enhance your 1600K system. To simplify matters the memory capacity of the ZX81 can be set to the 18K, 32K or 64K Memopack, which are priced at

£29.95, £49.95 and £70 respectively.

To extend your 1600K system still further, you could invest in one of the other three Memopack which provide a High Resolution Graphics package, a Commercial Printer Interface, and an RS 232 Printer Interface. These are priced at £28.95.

You could also ask Memotech about their ZX81 keyboard if you're going to 'phone them at 0393 2979. Further enquiries will be directed to Gordon Law, Wotton, Devon EX8 6BA.





### RAM Packs — Cambridge Microelectronics A

Amongst the range of products Cambridge Microelectronics has on offer, there is the 64K RAM extension for the ZX81. Complete with a 1.25 inch-pin connector, the unit comes with its own 64Kbit RAM in the 64Kx8bit CMOS technology and is designed to accept an EPROM as an alternative. The price of this unit is £28.95 + VAT and has been designated the ZX81-1.

### Organic Micro — BASICare Microsystems ▼

The Organic Micro is a series of modules add-on devices for the ZX81 or ZX Spectrum.

Each module plugs freely into the slot giving you a multiple choice of options. The foundation of the system is the Personal Unit which is the direct interface to the computer. Thereafter all the other items plug into the extension slots of the unit. There are many other memory expansions. Cambridge Microelectronics offers a range of other products including a range of ROM options, expandable storage of program or data, graphics facilities. There is even the Z8001 — a new

Another product might of interest and that is the ROM kit which is a memory expansion unit for the ZX81. This enables the user to read useful routines and programs, stored as UPX available PROM. The unit is supplied without EPROMs as these are normally programmed and provided by the user. The price of this device is £17.95.

For more information on these and other products in this range get in touch with Cambridge Microelectronics Ltd, 1 Milton Road, Cambridge CB4 3UJ or phone 0223 210214.

package which comprises a versatile sound synthesiser.

The range of expansion to your computer is now almost endless. The 8454C core brings out more modules. Progress in the planning stage at the moment include a floppy disc interface, system controller and an EPROM programmer.

The original Personal Unit you will need is priced at £28.95, and the other peripheral devices are priced between £25.26 and £45.75. For further details of these packages contact BASICare Microsystems Ltd, 12 Pocket Street, London W1R 0LU or phone 01 246 7030.

### In Brief

● Expanding the memory capacity of your Spectrum is no problem for East London Robotics. They have the 32K which expands your 16K model to 48K, and the 48K which takes your Spectrum to an 80K machine. The 32K expansion costs £20 for issue one machines and £20 for issue two models. Likewise for the 48K expansion, it will cost you £20 for issue one expansion and £20 for issue two models. For more information speak to East London Robotics on 01-471 3085 or write to them at Gate 11 Royal Albert Dock, London E16.

● You can expand your computer's memory, be it Spectrum or ZX81, with equipment from 08, Boston. They make available a 16K and 48K RAM pack for the ZX81 which are priced at £22.95 and £32.95 respectively. Upgrades for your 16K Spectrum to make it up to a 48K model will cost £20 for issue one and £20 for issue two machines. Further details are available from 08 Boston, Unit 2 Shore Hill Industrial Estate, Saffron Walden, Essex CO11 3AQ. Telephone enquiries can be made on 0365 26365.

● For the ZX81, Computer Add-ons have a 16K RAM pack for £15.95 and a 48K model for £44.95. They also provide RAM add-ons for the Spectrum including memory upgrades taking the 16K model up to 48K. These are priced at £24.95 for the issue one Spectrum and £25.95 for the issue two machines. A 60K memory upgrade is available for the issue two Spectrum, bringing it up to 80K, at £44.95. For more details call 01 688 7875 or write to Computer Add-ons, 78 Thorne Works, Thorne Vale, London N7.

● Another firm, Indescope, have produced some new hardware pieces for the Spectrum and ZX81, including some memory devices for the ZX81. There is the 16K, 32K and 48K units and these are priced at £19.95, £21.75 and £23.95 respectively. They are also providing an external expansion unit for the Spectrum making it up to 48K, which is priced at £28.95. For more information on Indescope and the rest of their similar range of hardware, including keyboards, joysticks, sound generators etc., write to them at P.O. Castellana, 176, 177 Market St, Spens.

● Chembit Marketing Ltd have introduced a 32K RAM pack for the 16K Spectrum allowing it to be upgraded to a fully fledged 80K machine. Its expansion module's case has been specifically designed to fit the contours of the Spectrum to also enable it of the RAM pack module's contents. The device is fully compatible with all Spectrum accessories. Priced at £29.95, you can find out more about the unit if you write to Chembit at 269 The Strand, London WC2R 0E5 or phone 01 246 7030.



## In Brief

● Moore Peripherals have put together two interfaces, both priced at £26.95, in one box, with versions for the Spectrum and the ZX81. Each package includes a Centronics parallel and a bidirectional RS 232C interface. With these devices you can print the full length line allowed by the printer you attach your letters to, use the LIST and LPRINT BASIC functions, and use a selection of saved views. The Spectrum version uses a built-in operating system allowing you to use word processing packages. For the ZX81 software will soon be available to allow word processing and graphics to be used. For more information, get in touch with Moore Peripherals Ltd, 23 Baker Road, Caversham, Reading, Berks or phone 0344-428664.

● Hildesley have produced an interface to the Centronics style for the Spectrum as well as the software to run it. Complete with one metre of cable, the package is priced at £26. Software for the Hildesley interface is written in BASIC and machine code, and supports the use of LIST and LPRINT, as well as including a software routine so that you can copy the screen. The software provided also includes a mini-word processor from Rowland - more details of the interface combination can be obtained from Hildesley Ltd, 8-10 Parkway, London NW1 1AA. Telephone enquiries can be made on 01-462 1066.

● A parallel Centronics interface - ZX LPRINT - is available from Euroelectronics for £26. Priced in a solid housing, the one plug into the rear connector of the Spectrum. The device can operate with the Spectrum keywords LIST and LPRINT, but needs additional software to use the COPY command; this can be supplied on a cassette for those that require it. Further information is obtainable from Euroelectronics, 23d Hayes, Oakfield Street, Chesham, Glos GL50 3UJ.

● Cobet Technology have two interfaces for the ZX81 providing connection to either a Centronics printer or an RS 232C printer. The device connects into the back connector of the ZX81 and provide a bidirectional interface under software control. Both units are priced at £26 + VAT. And you can find out more about them from Cobet Technology Ltd, 379 Caledonian Road, Islington, London N1 1QP.

## Spectrum/ Tandy I/F — Softest

The Softest interface allows the ZX Spectrum and ZX81 to be connected to the Tandy micro-intelligent printer - the CDP 115.

The interface allows printing and plotting on the Tandy machine as well as wide range of print sizes and the added

facility of overprinting in different colours. The printer itself has four pen colours, red, green, blue and black, and the printing speed is 30 characters per line horizontal and 30 lines per second.

The interface hardware comes complete with software written in machine code to control the movement of the pens. With this package you can print out text

# Interfaces

## Centronics I/F — Kempston

This interface allows the Spectrum to be connected to any Centronics type printer.

Maximum purchase is £26 and with one metre of cable the interface fits into the rear connector of the Spectrum. Software provided with the package allows the recognition of the BASIC keywords LIST and LPRINT allowing programs and text to be listed and printed directly up to the full length of the printer attached. There is also provision for the screen to be

displayed onto the printer. The software provided is written in machine code and comes for both the ZX81 and ZX80 version.

The interface is fully compatible with Microsoft II, the business word processor and package, and with a few modifications you can also use Prime's Vu-Gol.

The Centronics interface complete with printer cable and supporting software, is priced at £26. For more information contact Kempston Micro Electronics, 180A Bedford Row, Kempston, Bedford MK42 0LJ. You can phone them on 050 862000.



## Centronics I/F — Advanced Digital Systems

Advanced Digital Systems has introduced a Centronics interface for both the ZX81 and the ZX Spectrum.

Complete with one yard of cable and a Centronics plug, the package comes complete with software which recognises LIST and LPRINT using direct protocols from BASIC. This unit is guaranteed for 6 months.

As well as being compatible to both the ZX81 and Spectrum, with additional software and a expensive adaptor card you can also use the interface with the Jupiter Ace.

The complete package is available from Advanced Digital Systems for £24.95 and further information you could write to them at 8 Woodhouse Road, Perthmouth, Herts PG4 8YJ. Telephone enquiries can be made on 0763 623625.





# Keyboards

## Brief

For physically disabled people, there is a special series of keyboards. There is the Delta Top Learning device, the Delta Top Learning model and the Expanded Keyboard model. Each has been designed to help people with certain afflictions. The price of the units is very much dependent on the host device used with the keyboard, so it would be best if you made further enquiries to Pegasus Computers Ltd, Middlemarch Road, Langley, Berks SL3 8DF or (phone 0763 7600).

A new concept in keyboard overlays has been introduced by Tactile aimed at easily educative programmers. The Tactile Overlay lets you press the Spectrum, and a series of keyboard overlays can be attached. The overlays come in all sorts of shapes and colours, and the company produce compatible software which utilises the overlays. For further information contact Tactile, Weybridge, 30 Avenue Road, Kingswood (Bristol BS16 2SS) or (phone 0272 539431).

Consisting of a black ABS resin case, the Push Button keyboard is fitted over the ZX81 keyboard providing a much improved keyboard. Once attached, you have a keyboard entirely with raised keys which provide a positive feel to them when pressed. Priced at £99.95, you can find out more about this impressive keyboard alternative from Hitecology Ltd, 25 Chappinians Mews, London W9 2AN or by telephoning 01-261 3000.

Microdot have produced a keyboard for the Spectrum which is priced at £20.45. The keyboard is clearly marked, comes in five colours, thus denoting their function. The keyboard also incorporates a control colour pad with a 'fire' button and four simply placed directional buttons. For more information contact Microdot UK Ltd, Highgate House, 18-24 John Street, Luton, Beds LU1 2AE or (phone 0582 41888).

The PDQ keyboard has been designed not only to contain the ZX81 or Spectrum, but also to offer a wide range of modification: power supply, RAM cards, as well as more for two keyboards. The case itself houses a 42 keyswitch board, the extra keys can be assigned to a special function. The price of the unit is £29.95, and you may find out more from Future Music Systems, The ZX Computer Centre, Dale Street, Liverpool 2. Telephone enquiries can be made on 051 234 8128.

## Keyboard Case — dk'tronics

A keyboard is now available from dk'tronics which can be used with both the ZX81 and the ZX Spectrum.

The raised keyboard, measuring 8 inches by 15 inches by 2 inches, includes 52 keys 12 of which are used for the numeric keypad. The actual case is coloured black while the keys are grey and red.

To install the computer inside the case, the keys must be taken from an original case

— however, the keyboard case has been engineered for easy fitting. There is also room for the power supply and additional RAM packs should you be using the ZX81.

All the modifications usually found at the back of your computer are suitably repositioned at the back of the keyboard case for easy access.

Priced at £45 (exclusive) you can find more details on this keyboard case from dk'tronics, Unit 2, Stone Hill Industrial Estate, Suffolk, Walsden, Essex CB11 2AQ. You can always phone them on 0206 20300.



## Custom Key Panel Kits — Softech

You can now customise your keyboard to suit all the different pieces of software you use.

For example, in some games the key you need to press to move right and left are often the W and D keys respectively — however, as you all know, other games use for completely different and require a staggering number of keys to

properly play the game. With this kit, you can then place a card over the keys and using sticky labels create individual coded queues for your different software packages.

Softech provide 10 overlays and two sheets of sticky labels (previously available with works like 'left', 'right', 'island', 'fire', 'keypad for', etc, and the other left blank for you to make up your own labels).

The Custom Key Panel Kits are priced at £3.95 a pack. You can get more information from Softech Ltd, 25 College Road, Reading, Berks RG6 1YQ.

## Tactile Keyboard — Steatite Insulations

The keyboard for the ZX81 incorporates full-travel keys and provides the professional appearance for proper touch typing.

The case has a low profile and the keyboard angles to ease

typing. A full complement of inserts is supplied for the ZX81 with clear plastic inserts so that the keypad remains intact over a long life.

Full instructions are provided so to follow the way to fit. You can obtain this keyboard for £20.95 from Steatite Insulations Ltd, Hagley House, Hagley Road, Birmingham B16 6BN. Telephone enquiries can be made on 021-404 9961.



## In Brief

Big Bars and the Characterfont are two sound devices developed for the ZX Spectrum. Using the Big Bars package, priced at £40, you can teach your micro to recognise individual words. The Characterfont system is a nice solid base with symbols built in allowing you to build up phrases and create words. This unit is priced at £40. For more information contact William Stuart Systems, 44 Bedford Gardens, London NW1 7BN.

Techord is a plug-in music and sounds peripheral for the Spectrum and ZX81. Priced at £24.95 and £20.95 for the ZX81 and Spectrum versions respectively, the unit incorporates a PROM which holds many music and sound effects. Further details are available from Pelton Electronics, Courtyard Road, Newton Abbot, Devon TQ12 2JA, or by telephoning 0628-62626.

There are two units available from Trainers called the Zoid Sound Box and the ZX5 Speech Synthesiser, priced at £25.95 and £20.95 respectively. These units are compatible with both the ZX81 and ZX Spectrum. For further information get in touch with Trainers Ltd, 16 Haverhill, London, Easlopp, Essex SS16 9RD. Telephone enquiries can be made on 0266 418127.

More Music Power comes the Spectrum Addition, priced at £19.95. The board, once connected, provides three channel sound effects, includes a 2 Watt amplifier and loudspeaker to amplify the effects, and has room on board for two tapes. These projects can be purchased for £7.40 each. For more details contact Music Power Ltd, 18/18 Regent Street, Chapel Allerton, Leeds LS2 4PS or telephone 0532 662195.

Fulcr Micro offer three units which offer various voice synthesis and sound effects. There are the Orator, priced at £29.95, the Fulcr Base, priced at £25.95, and the Master Unit, incorporating the features of the other two and priced at £34.95. More details are available from Fulcr Micro Systems, The ZX Computer Centre, Deir Street, Liverpool 2.

The 3-Way Talker, available for £24.95, is designed to provide speech synthesis for the ZX81 and ZX Spectrum. The package allows compliance with pronunciation research and instructions on how to use the software system. More details can be obtained from Chess's Marketing Ltd, 200 The Strand, London WC2R 0BS or by phone on 01-240 7900.

With automatic key coding, Microdrive capabilities comes the Microspeech unit at a cost of £25.95. Designed for the Spectrum, the device allows you to build up words using individual sounds. Find out more from Currah Computer Components Ltd, Snythorp Industrial Estate, Hertsport, Cavendish.



# Speech

## ZONX-01 — Bi-Pak Semiconductors ▼

The ZONX-01 is compatible with all domestic computers, although for the Spectrum an adaptor is required that can be bought separately for £5.95 if you are upgrading from 16 to 48K systems. The unit offers a wide range of sound effects, such as pines, bells, helicopters, trains,

explosions etc. The sound circuit has been designed so that the pitch and volume of the three channels and overall attack/decay envelope can be independently BASIC statements.

The ZONX-01 version of the device is priced at £25.95 and the Spectrum Model 6000 compatible with adaptor at £32.95. Detailed these units are available from Bi-Pak Semiconductors, PO Box 5, Ware, Herts or by telephoning on 0928 2642.



## 5-Pack — DCP Microdevelop- ments ▼

This is an upgrade of the Duplicator on 68K speech unit for the ZX81. Also designed for the Spectrum, you can get hold of the 5-Pack for £28.95.

The unit comes supplied with a vocabulary of 71 words, phrase numbers and letters. These can be edited from programs using

simple BASIC statements.

Should you get bored or fed up with the selection of speeches, you can always purchase one of DCP's other popular Word Packs priced at £14.95, which come with a

Further details on the 5-Pack are available from DCP Microdevelopments Ltd, 3 Staines, Chesh., 1 Kingsway, Hoveport, WY10 4AG. A 4000 word phone number 0922 112580 or might like to ask them about the Duplicator unit which provides a replacement bus for the Spectrum.



## Speech Synthesiser — Spirit Instruments ▼

A speech synthesiser for the ZX Spectrum is available from Spirit Instruments.

Measuring only 3 1/2 by 6 1/2 by 1 1/2 inches, the unit provides speech by building up individual sounds and you make complete words and sentences. The unit plugs into the rear connector of the

Spectrum and provides sound through a speaker in the front of the unit. All speech reference to most applications, should you need the sound one back to one should take an output for the unit to an external speaker.

With the unit, you get a unit as to how to form most sounds, but of course it is up to you to be the best one!

For more information, contact Spirit Instruments, Heyfield, Milton, Essex.

## Brief

• **Adaptec** are providing a new joystick system to the market. Their joystick for the Spectrum or ZX81 will be available at £25.95 each. There is also a programmable interface which with the complementary software means you can program the joystick to any key of the board. The programmable interface is priced at £24 although if you buy interface and joystick together you will only pay £37.95. More details are available from **Adaptec Ltd**, The Drive Station, Herts SG2 6EW. Telephone enquiries can be made on 0452 299410.

• Available from **Adaptec Electronics** is the **Adaptec ZX81 joystick** and interface for the Spectrum. Complete with demo program, the package is priced at £18.95 all-inclusive. For more information write to **Adaptec Electronics**, 22 Watling Street East, Twickenham, Norfolk NR12 3JF.

• The **Pickard Controller** is a device allowing you to connect any joystick to the ZX81 or Spectrum. The unit also allows you to specify which keys the joystick is to emulate. The price of the **Pickard Controller** is £20.45, and if you want to buy joystick together you'll have to pay £7.50 each. For further details contact **Sevens Systems**, 104 High Street, Bloxwich, Walsall, West Midlands WS13 3LT.

• **Decomosh** have produced a boxed joystick with three large push-button controls which connects to the 'real' arcade machines. Priced at £48.75, the unit contains a ZX81 joystick and plugs directly into the rear of the Spectrum. If you want to find out more about the **Decomosh Arcade Joystick** at 2 Heath Close, Wymondley, Essex, send or telephone them on 0582 429938.

• The **Protek** interface unit provides the Spectrum with access to any Atari type joystick. Priced at £14.95, the unit simply plugs into the back of the computer. For further details get in touch with **Protek Computing Ltd**, Clydeside Bank Building, High Street, Southquay, Colchester CO3 0JG or phone 021 327 4403.

• The **Analogue Input Device** from **Milwark** comes as a kit to be made up and is priced at £22.95. Provision is made for two joysticks and the unit simply plugs into the back of the Spectrum. More info is available on joysticks at a price of £7.95. Further information is obtainable from **Milwark Computer Company Ltd**, Royal House, Redingham, Suffolk IP22 1BB.

# Joysticks

## Competition Pro Joystick — Kempston v

The **Kempston Competition Pro Joystick** is certainly a solid looking joystick constructed from steel and strong nylon.

With a self-aligning stick, the joystick permits movement in eight directions and has two large fire buttons (the left and right

handed controls). Although compatible with many games on the market, **Kempston** will also offer software packages from **Kempston** which allow even more games to be played with their joystick.

Priced at £25 for interface and joystick, you can find out more about these joysticks from **Kempston Micro Electronics**, 18A Southfield Road, Kettering, Northants NN16 9BL or you can telephone them on 0534 802882.



## Programmable Joystick Interface — ACF Hardware

Upgrading the **Interface Module II** makes the **Programmable Joystick Interface** at £22.95 which is claimed to be compatible with all software.

Plugging into the back of either the ZX81 or Spectrum using quick clip-on connectors you can define which of the 40 Spectrum keys you would like simulated by the joystick. Also included with the package is a

quick reference card which outlines the connections you'll need to make for ten of the most popular games.

As with the interface it makes the interface a complete with Atari type joystick. Two sockets are available. With every order you will also receive a **disconnection program** called **Make Control** which shows you how to implement the joystick right away.

For further details get in touch with **ACF Hardware**, 26 West High Street, Rugby, Northants. Write to **ACF Hardware**, 26 West High Street, Rugby, Northants. Phone 0203 2617 or phone 0203 263307.

## Triga Command — Datal Electronics v

The **Triga Command** looks as though it might be the strike of things to come.

From the makers, the real 'house' of the arcade games, comes this rugged joystick, with a large button in just the right place to fit all these games. The internal

moving parts are made of solid nylon rather than plastic so that it should be stronger.

The joystick comes complete with an interface unit so that it can be plugged into the Spectrum. Price Command is priced at £19.95 for interface and joystick complete.

For more information talk to the people from **Datal Electronics** on 0452 270815 or write to 27 Hope Street, Haringey - Stiles on Top.



## In ..... Brief

● Casio Electronics have introduced a new style printer to the market based on the American version of the Brother printer. Designated the Alpha-8000 and priced at £295.95, the new printer can be fitted with both the Spectrum and ZX81. Using 4.5 inch wide paper, the printer prints at 10 characters per second. The unit incorporates a built-in interface which accepts the BASIC keywords such as COPY, LIST and LPRINT and will also print user defined graphics. For further details get in touch with Data Electronics Ltd, Wembley Park, Farnborough Road, Asant, Farnborough or telephone 0344 886051.

● A tape reader from Eliza Products should help you LOAD and SAVE programs when using the ZX81. The ZX Tape-to-Mem and Mem-to-Tape devices at both elevations, providing a signal perfectly matched for the computer. The unit also incorporates an audio output indicator and signal amplifier to enable you to connect the input signal. Further details on the ZX Tape-to-Mem are obtainable from Eliza Products Ltd, Lynn Works, Copal Green, Sheffield S2 2SL, or by phoning 0742 326774.

● Suitable for the 16K or 64K Spectrum comes the Prime VTX 8000 - a modem which puts you in touch with Microsoft 800, the huge database of information, software and other users. Using the device you can choose from hundreds of free games, educational and business packages, access the whole range of Prime's information and keep in touch via electronic mail with any other Microsoft 800 or Prime user. The Prime VTX 8000 modem is priced at £35.95 and is available from Microsoft 800, Scorpa Court, 155 Farnborough Road, London EC1R 3AD or you can place them on 07-238 3140.

● If you're experiencing loading problems on your ZX81 you may like to consider the Z-Dubler, a loading aid from the Boston. The device interfaces between the cassette recorder and the memo, and the sound is boosted before it reaches the ZX81. You can also convert the Z-Dubler between two channels to get good back up program storage. The unit is priced at £25.95 and is available from Synapse Computer Products, PO Box 21705, Seattle, WA 98111, USA.

● The ZX81 Automatic Tape Controller, priced at £49.95, allows software control of up to four tape recorders, automatic tape copying and tape blank skip without destroying the contents of RAM. The device also provides an RS-232 interface for the ZX81. For more details, contact Data Centre, 41 Straton Street, London N811 or telephone 01 258 0468.

# Adding on

## Executive Case - Treetop Designs

Specifically designed for the Spectrum, the A95 plastic case combines the features of an executive case allowing you to carry your equipment around with you and also act as a console on which to work on.

The console features a raised and inclined support for the Spectrum and a passive housing is provided for the power pack giving access to the air for ventilation. The console contains

4 5 1/4" cassette recorders and external saving. An off-line unit and LOAD/SAVE switch are also provided.

For conversion to a video game unit also fit through in the unit and the lid, as well as use the spring latch, complete a soft foam cushion to keep the equipment secure in transit.

The whole package is priced at £60.45 and is available from Treetop Designs, 41 Wilmote Road, Bromley, Kent. Lists of this working on a new design of incorporate storage of 5" Minidisks and they will be able to convert the old version you be able to carry the Microdisk.

## RAMLOK - Adapt Electronics

If you suffer from an unreliable RAM pack connection on your ZX81 you may like to consider a RAMLOK kit.

Consisting of a high quality, zinc plated metal connector which replaces the computer connector and a mechanical clamping device the RAM pack is clamped to the computer socket. Modelling extensive special tools are required to carry out this modification. Suitable

for connection to most Apple II RAM packs, the RAMLOK kit is priced at £7.50.

There is also a price of RAMLOK II adaptor which fits the RAM pack without any problems and provides an improved edge contact connection for the computer. This kit is available for the Spectrum at the ZX81 and is priced between £2.50 and £6 depending on the materials and when modifications you wish to make.

For more details speak to the people at Adapt Electronics, 7 Salford Close, Salford, Lancashire M6 6BA (061 741 174) or phone direct 01 604 2540.

## Desk Console - Traffic Technology 4

For the ZX Spectrum, the desk console concentrates the heavy gauges. Back A&S pack with a detachable base runs on two 100 feet.

On board the console there is a power supply, Spectrum Printer 80 22 interface pins, a cassette recorder, Minidisk, cassette reader, cassette and parallel etc. The console also has a built in switch unit to assist the user don't have to enter the back when you are LOAD and SAVE.

The price of the desk is £60.15 and is available from Traffic Technology Ltd, PO Box 2, Wymondley, Wembley, Middlesex HA2 2JA.





### Computer Desk - PH Scientific Products \*

PH Scientific Products have created a computer desk made from ABS plastic for both the ZX Spectrum and ZX81.

With recesses for the monitor and printer, there is also support for a television set

rest on top of the unit. The power supply and control wiring can be safely hidden inside.

The price of the Spectrum version is £19 and £7 less for the ZX81 computer desk. For further details get in touch with PH Scientific Products, 3 Southfield, Welwyn Garden City, Herts or phone 07072 20007.

### Monitor - MacQuillan Electronics

Designed to assist users by providing a conveniently constant means of loading and saving programs on tape, the Monitor is priced at £16.95.

The Spectrum model has a better amplifier while both ZX81 and Spectrum models have a power on/off switch. All functions are performed without the need to disconnect from plugs. The internal, high quality components are contained in a purpose-built, plastic moulded case to form a small compact unit.

The available 8" enhanced version model contains a 2 drive amplifier and external cables for connecting a large scale tape speaker. The price for the enhanced model is £16.95.

For further information contact MacQuillan Electronics, 17/18a North Weyburn Magna, Peterborough, Cambs PE3 7BL.

### High Resolution Graphics Pack - Digital Integration \*

This accessory for the ZX81 gives a full 256 by 192 pixel display

### In Brief

- If you're having problems with your main voltage when you're using your Spectrum and ZX81, the Backpack may be the answer. The device comprises a rechargeable 9V Ni-Cad battery pack and transient suppressor, housed in a compact casing to fit the Sordex Power Pack. The backpack ensures that the voltage into your ZX81 and Spectrum never drops below 9V, thereby eliminating program crashes through voltage problems. Priced at £75.95, you can find out more from Adaptors and Peripherals Ltd, 14 Thames Street, Leath, Lincs.
- Keyboard Computer cases have been busy providing stands for the Spectrum and ZX81. The Wobble Strapper comes in three models: small, standard large, and can be used with the ZX81 to stop the RAM pack wobble syndrome as they clamp the RAM pack to the case. These units are priced from £5.25 to £8.75. For the ZX81 and Spectrum, there is the Power Base, which holds the video firmly in place while you use it. The price of these devices are £19 for the ZX81 and £13.95 for the Spectrum version. For more information, you could contact Keyboard Computer Cases, Keyboard Housing Ltd, Goswell Row, Mansfield, Nottingham NG9 2ND or telephone 0459 62042.
- Easily adapted for a variety of uses across the BEEP Amp from Hyperdash. The device comprises an 8-Watt amplifier with a 16 Watt woofer and tweeter in a small speaker unit. The unit is remote operated and plugs into the MIC socket of the Spectrum. Priced at £20.95, you can find out more about the device from Hyperdash, 3 West Vale, Weston, South Wales SA1 6SE.



with full-featured control of every pixel on BASIC.

A 2K EPROM contains the Hyper BASIC monitor offering a range of powerful extensions such as PAGE, PLOT and SCROLL, which can be used for defining your own characters, drawing from plotting complex

functions and a complete lower case character set for word processing.

The pack is compatible with the Sordex Printer and works completely with a comprehensive FontDisk. Alternatively, how you use get the best from the device.

The unit is priced at £39.95, although there is an opportunity for schools to arrange for a discount. For more details get in touch with Digital Integration, 22 Ash Cottages, 8 East Gate, Ackerley, Harrogate GU12 6LR.

## in **Brief**

● If you want to tidy up the wiring you accumulate around the ZX81 or Spectrum, there is a large black tray and stand which you can get from Computech for £21.99. With room for separate provision on top of the stand, the computer can conveniently rest on the sliding wires tucked away inside the unit. Further information is obtainable from Computech, 2 Welbary Road, Heywood Heath, West Sussex RH15 1DU. Telephone enquiries can be made on 0448 45 0288.

● In the cheaper end of the console market comes a coordinated set from Print 'n' Player Products. Priced at £9.95, this is a cleverly used plastic case for a Spectrum, power supply and printer. The package has to be made up, but this is quite simple with the instructions provided. Although not room for peripherals, modifications can easily be made due to the nature of the vinyl covered box. For more details contact Print 'n' Player Products 48 Borough High Street, London SE1 8BA.

● The Mono-Myte 88 answering machine, priced at £69, provides a combination of answering information between compatible systems utilizing the telephone network. The device can be used with the 88K Spectrum and the ZX81, and the micro-driven software provides transmission of either complete programs, defined areas of memory, or complete screen contents. For more information contact Mono-Myte Communications Ltd, Post House, 27 Prince Street, Bristol 1 or telephone 0273 266070.

● The Zed is an add-on which has been designed to stick on the base of the ZX81 or Spectrum to lift the keyboard giving the user better access to the keyboard. Comprising two stainless steelated ABS rings with built in rubber feet, they are available for £3.95. More information is available from Whip Factive Light 11 Parkers Road, Buntingford, West Herts SG11 3DU or by phoning 0330 821541.

● The Spectrum Pad has been designed to keep your ZX81 from being covered the desk as you try and lay your programs out. Made from a strong rubbery substance, the pad holds ZX81 and RAM pack securely. You can get one of these from the Strategic Computers, PO Box 113, Ajax Centre L15 3CS, Canada for £4.50.

● Armed if the business user eager to impress is a custom case for the Spectrum and all its associated peripherals. Looking very much like an executive case, all the equipment is housed in small compartments of shock absorbent foam. Priced at £24.95, you can get further details from Computer Case - Strathgore Road, Colindale, Surrey GU15 3PL.

● From RD Laboratories you can get a very sophisticated drawing instrument for the Spectrum. Using the concepts built of software provided with the package, you can get the Digital Trace to plot individual points, draw lines, draw the background and foreground colours, shading, zooming and editing text on the screen. There is also a co-ordinates program and one that allows you to draw at a very fast speed. Priced at £49.95, further information can be obtained from RD Laboratories, Unit 20, Coast Road Industrial Estate, Cam Bay, Devon PLM 3A5.

● A Spectrum workstation is available from Peter Furlong Products made from durable ABS plastic and priced at £15. There is a slot for the Spectrum and the associated wires are hidden away, space on top of the unit is provided for the television. LOGO/SAVE switches, speaker units and an alloy base are provided for a small extra charge. More details can be obtained from Peter Furlong Products, Unit 7, South Coast Road Industrial Estate, Polesden, West Sussex GU9 8PL.

## EEP Booster - Compusound

The Televised EEP Booster is an upgrade of the TeleSound 84 unit, the new unit can be fitted not only to the main two Spectrums but also to the new One Spectrum.

The EEP Booster allows you to amplify the sound from your Spectrum through the television set so that you can really make the most of the noise.

Many programs available in the market. Missing very good 1 January 1981, it is a classic of the stability modulator in a world.

The EEP Booster, connected inside the Spectrum, can enhance the sound and performance of the computer on a EEP Booster phone 0627 294 or write to Compusound 1, Linsley Close, Redwood, Worcester WR9 0ET.

## Victagraph - Victa Ceramics

If your food was need some help with the FLOTT, GIBCLA and GRAMY calculations on your Spectrum, you can find some advice in the package from Victa Ceramics.

Comprising a white plastic base plate, a clear plastic offset so to create window, 1 clear plastic coloured window and a clear plastic window mask with a plot light in each corner, the

Victagraph also includes a 16 design, comprehensive instructions and a number of style patterns.

Using the victagraph window mask over a text design, it mask will hide all the windows so to create leaving you with a required figure.

The price of the Victagraph package is £7.95 but for more information contact Victa Ceramics, 4A, Saw Street, Rugby, South Warwickshire or telephone 0800 2025.



## Microcase - Micro Aids

The Microcase is part one of the programs available from Micro Aids.

The Microcase designed for both the Spectrum and ZX81, is an executive style case with a fully detachable lid. The inside is lined with foam to recover the equipment, and can contain the computer, cassette recorder and cassette power pack, printer and leads. The price of the

Microcase is £29.95.

There is also a workstation available which has space for a Spectrum, cassette Microaid and cassette. The price is £29.95.

You can also take the Microcase Spectrum Planning Aid, Cost Control and various other devices.

For more information contact Micro Aids, Distribution Centre, Beech House, Hill, Hay Lane, Cullineth, Warrington, Cheshire WA3 4JA. Telephone enquiries can be made on 0567 535 263.



# LONGMAN SOFTWARE

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When we launched our early learning software you were delighted. As last year's programs were available, we've had a very successful publisher that let you see your home computer to help your children learn important basic skills. Now we've added eight exciting new games that cover an even wider range. Early learning is easy so children join in the fun with the Robert Kennedy, Sam Houston, Marco Polo and the more colorful graphics.



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\$29.95  
IBM PC  
MS-DOS



When we launched our early learning software you were delighted. As last year's programs were available, we've had a very successful publisher that let you see your home computer to help your children learn important basic skills. Now we've added eight exciting new games that cover an even wider range. Early learning is easy so children join in the fun with the Robert Kennedy, Sam Houston, Marco Polo and the more colorful graphics.

LONGMAN SOFTWARE

# Time bomb

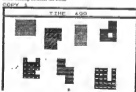
Can you save the city from the hidden time bomb — a great program for your 16K ZX81 from Oliver Fritsch of West Germany.

Somewhere in the city, a time bomb has been hidden which is due to detonate in a very short time. It is up to you to find and defuse the bomb before it goes off and devastates the city.

When you start this program you will first be greeted with an aerial view of the part of the city your intelligence people tell you the bomb is hidden in. In this view of the city you will see a number of buildings the time bomb might be hidden in. You move your character on a 64x64 grid, using the direction keys of the ZX81 — the 8, 6, 7 and 5 keys.

When you touch one of the houses with your character, you will be provided with another aerial view — this time of the house you are preparing to search. The bomb is represented by an inverse 8x8 character and you should look for it appearing in the direction keys. If the house you have entered does not contain the bomb, you will have to exit the house or check another one via the inverse 4 character and return your program focus to wherever your bomb is.

Four first view of the city from above. How good is it to find out which building contains the bomb?



## Time and motion

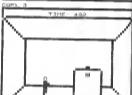
Once you have found the time bomb, you should move your character onto the house. Be careful not to bump into any of the walls of the house or it will be taken to mean that you have bumped your head, thus reducing your life. Don't forget your own 8x8 character, and you will lose valuable time points when you touch the bomb. You will be given the final screen which shows your character standing by the time bomb.

The fuse of the bomb, shown as an inverse 2, flows inside the bomb from top to bottom. All you have to do is to shoot at the fuse using the 8 key to reduce it further. Don't worry if you don't manage to defuse the bomb with your first shot as you 8 time again again. Should you want to quit you'll still be given a chance of hitting the fuse (you could always change the number 2 in line 8128).

Once you have defused the bomb you will be presented with your own score and the current highest score. But don't forget to always remember that time is of the essence!



How wide the building, you must search for the time bomb — as will be revealed by an inverse 8 character.



You have found the bomb! Now all you have to do is to shoot the moving fuse, which is revealed by the inverse 2 character.

1000 LET HIGHSCORE=0 # 142

80 PRINT

100 REM DEFINITION

105 LET P=1

100 LET BOMB=0

120 LET Y=1

130 LET U=1

140 LET D=0

150 LET U=10

160 LET D=1

170 LET U=20

180 LET D=10

190 LET D=5

200 LET K=10

210 LET K=10

220 LET J=10

230 LET J=20

240 LET C=3

250 LET C=3

260 LET C=0





```

8100 PRINT AT 1:0,31-1
8100 PRINT AT 23:3,2
8100 NEXT I
8100 FOR J=0 TO 20
8100 PLOT J,I,I
8100 PLOT J,I,I
8100 NEXT I
8100 FOR I=1 TO 41
8100 PLOT I:3:1,7
8100 PLOT I:15:1,20
8100 NEXT I
8100 FOR I=1 TO 20
8100 LET A=I
8100 LET C=I
8100 LET U=I
8100 GOINT AT 16,16
8107 GOINT AT 17,16
8108 GOINT AT 18,16
8109 GOINT AT 19,16
8110 GOINT AT 20,16
8111 GOINT AT 14,16
8112 GOINT AT 14,17
8113 GOINT AT 15,17
8114 GOINT AT 16,17
8115 GOINT AT 17,17
8116 GOINT AT 18,17
8117 GOINT AT 19,17
8118 GOINT AT 20,17
8119 CLON
8120 FOR I=1 TO 10
8121 IF INKEY="0" THEN GOSUB 91
90
8124 PRINT AT 1:00,10
8125 PRINT AT 1:00,10
8126 NEXT I
8126 LET ZEIT=ZEIT+1
8127 PRINT AT 12,2:ZEIT
8128 IF ZEIT=200 THEN GOTO 9000
8129 GOTO 9070
5100 FOR A=10 TO 20 STEP 2
5110 PRINT AT 17,A,1
5111 PRINT AT 17,A,1
5120 NEXT A
5120 LET MK=PRG1
5130 IF MK=3 THEN GOTO 9000
5130 IF I=10 THEN PRINT AT 9:7,0
CONGRATULATIONS... AT 11:12,"YO
U...WE GOT IT"
5140 IF I=10 THEN GOTO 9010
5150 RETURN
5160 CLS
5160 FOR J=1 TO 20
5170 PRINT AT 11:12,"0 BONG 0"
5180 PRINT AT 11:12,"0 BONG 0"
5190 NEXT J
5200 GOTO 9000
5210 LET SCORE=ZEIT*5
5220 PRINT AT 23:2,"SCORE",SCORE
5230
5240 IF SCORE<HIGHSCORE THEN LET
HIGHSCORE=SCORE
5250 PRINT AT 23:10,"HIGHSCORE",
HIGHSCORE
5260 PRGSE 900
5270 CLS
5280 PRINT ,,TAB 9,"ANOTHER ONE"
5290
5300 PRINT ,,TAB 10,"Y" OR "N"
5310 IF INKEY="N" THEN GOTO 910
5320 IF INKEY="Y" THEN GOTO 92
5330 GOTO 9200
5340 PRINT AT 10 11,"CHERRIO"
5350 STOP
5360 PRGSE 9000
5370 GOTO 1

```

## ZX80 GAME

# Wheeler dealer

Try playing the wheel of fortune in this game for your unexpanded ZX80 written for us by Adrian Marsh of Hampshire.

This is a very simple version of the wheel of fortune type of game you have probably seen at fairs & in the old western movies on the television. Should you have more space on your computer, in terms of RAM add ons, you will find a complexity itself to add a few features and more.

You the program in an expanded and type RUN. You will then be presented with a screen display showing the winning numbers. You are then invited to press any key to start the wheel of fortune.

Once the wheel has been turned you are told whether you have won or not and are told the numbers you get. You then press the "A" key to spin the wheel again.

Should you have more room in memory to add a few lines and there, it would be quite fun to allow the player to have a little flutter on the outcome of the spin of the wheel. You could also start the player off with a set sum and increment and decrement this into a score along to the times they have with the game.

```

10 PRINT "***** WHEELER DEALER *****"
20 PRINT "HERE ARE THE WINNING NUMBERS"
30 PRINT " "
40 PRINT " "
50 PRINT "0 2 0 1"
60 PRINT "0 3 0 1"
70 PRINT "0 4 0 1"
80 PRINT "0 5 0 1"
90 PRINT "0 6 0 1"
100 PRINT "0 7 0 1"
110 PRINT "PRESS A KEY TO START THE WHEEL"
120 INPUT A$
130 IF A$="M" OR A$="M" THEN GOTO 150
140 STOP
150 CLS
160 LET B=RND(6)
170 LET C=RND(6)
180 LET D=RND(6)
190 LET E=RND(6)
200 IF B=0 OR C=0 AND C=E OR C=0 AND D=0 AND D=0
GOTO 500
210 IF B=2 AND C=2 AND D=2 THEN GOTO 600
220 IF B=5 AND C=3 AND D=3 THEN GOTO 600
230 IF B=5 AND C=5 AND D=5 THEN GOTO 600
240 IF B=5 AND C=5 AND D=5 THEN GOTO 600
250 PRINT "UNFORTUNATELY YOU HAVE WON 10"
260 PRINT
270 PRINT "YOUR NUMBERS WERE 1,0,0,0"
280 GOTO 700
290 PRINT "YOU HAVE WON A FREE"
300 PRINT
310 PRINT "YOUR NUMBERS WERE 1,0,0,0"
320 PRINT
330 PRINT "PRESS 5 TO PLAY AGAIN"
340 INPUT B$
350 IF B$="5" THEN GOTO 10
360 STOP

```

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## SPECTRUM GAME

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128 PRINT AT 10.10."F",AT 10.20
129 AT 10.20."H"
130 PRINT AT 17.0."

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131 PRINT AT 0.4."F" FURLONGS"
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710 PRINT AT 33.85."
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993 PRINT AT 48.75."
994 PRINT AT 48.8."
995 PRINT AT 48.85."
996 PRINT AT 48.9."
997 PRINT AT 49.0."
998 PRINT AT 49.05."
999 PRINT AT 49.1."
1000 PRINT AT 49.15."

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300 PAUSE 100 CLS
301 IF Y$="" OR Y$="X" OR Y$="Y"
302 THEN PRINT AT 10.0." NUMBER 0
303 BUT NO ONE BECKED HIM" GO
304 TO 400
305 PAUSE 100 CLS
306 PRINT AT 10.0." THE WINNER
307 IS NUMBER 0 COLLECT YOUR WINNING
308 $"
309 PAUSE 100 GO TO 400
310 PAUSE 100 CLS
311 IF Y$="" OR Y$="X" OR Y$="Y"
312 THEN PRINT AT 10.0." NUMBER 1
313 BUT NO ONE BECKED HIM" GO
314 TO 400
315 PRINT AT 10.0." THE WINNER
316 IS NUMBER 1 COLLECT YOUR WINNING
317 $"
318 PAUSE 100 GO TO 400
319 PAUSE 100 CLS
320 IF Y$="" OR Y$="X" OR Y$="Y"
321 THEN PRINT AT 10.0." NUMBER 2
322 BUT NO ONE BECKED HIM" GO
323 TO 400
324 PRINT AT 10.0." THE WINNER
325 IS NUMBER 2 COLLECT YOUR WINNING
326 $"
327 PRINT AT 10.0."
328 PAUSE 100 GO TO 400
329 IF Y$="" OR Y$="X" OR Y$="Y"
330 THEN GO
331 TO 300
332 STOP
333 REM *** USER DEFINED ***
334 REM
335 FOR J=0 TO 7
336 DIM S(J)
337 FOR I=0 TO 9
338 FOR J=0 TO 7
339 DATA S(I) S(I) S(I) S(I) S(I) S(I) S(I) S(I)
340 S(I) S(I) S(I) S(I) S(I) S(I) S(I) S(I)
341 S(I) S(I) S(I) S(I) S(I) S(I) S(I) S(I)
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350 S(I) S(I) S(I) S(I) S(I) S(I) S(I) S(I)
351 RETURN
352 REM
353 REM *** HORSE CHOICE ***
354 REM
355 CLS PLOT 0.150: DRAW 200.
356 PRINT AT 0.0." NO NAME
357 GO TO 500
358 PRINT AT 4.0." 1 SUPERBA
359 PRINT AT 8.0." 2 FINE TH
360 PRINT AT 12.0." 3 GOLDENT
361 PRINT AT 16.0." 4 BREAK
362 PRINT AT 20.0." 5 STONEY
363 PRINT AT 24.0."
364 PRINT " YOU MAY PICK ANY NO
365 ME ENTER YOUR NAME FIRST IF YOU
366 WANT I GIVE SECOND IF YOU WANT 0
367 I.G.IF YOU DON'T WANT THEM AL
368 L THEN ENTER X.I WANT YOU GET T
369 O THE SET OF BRACKETS YOU WANT."
370 INPUT V$.V$.V$.V$.V$.V$.V$.V$.
371 PRINT
372 PRINT "DO YOU WANT TO RACE
373 Y/N"
374 IF Y$="" OR Y$="Y" OR Y$="N"
375 THEN GO TO 500
376 STOP

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The subroutine will erase the previous image of a car from the screen if one exists and moves the print position one square inch ready to reprint the car having moved forward if necessary. It requires D B for the PRINT AT or coordinates of the starting position of the car.

Line	Machine Code	CALL AT 0E PRINT POSITION LD A, 00 RET 10	Prints car if B is on screen Jump if not on screen
0200	0000	CALL AT 0E	
0201	0000	PRINT POSITION	
0202	0000	LD A, 00	
0203	0000	RET 10	
0204	0000	LD A, 00	
0205	0000	RET 10	
0206	0000	LD A, 00	
0207	0000	RET 10	
0208	0000	LD A, 00	
0209	0000	RET 10	
0210	0000	LD A, 00	
0211	0000	RET 10	
0212	0000	LD A, 00	
0213	0000	RET 10	
0214	0000	LD A, 00	
0215	0000	RET 10	
0216	0000	LD A, 00	
0217	0000	RET 10	
0218	0000	LD A, 00	
0219	0000	RET 10	
0220	0000	LD A, 00	
0221	0000	RET 10	
0222	0000	LD A, 00	
0223	0000	RET 10	
0224	0000	LD A, 00	
0225	0000	RET 10	
0226	0000	LD A, 00	
0227	0000	RET 10	
0228	0000	LD A, 00	
0229	0000	RET 10	
0230	0000	LD A, 00	
0231	0000	RET 10	
0232	0000	LD A, 00	
0233	0000	RET 10	
0234	0000	LD A, 00	
0235	0000	RET 10	
0236	0000	LD A, 00	
0237	0000	RET 10	
0238	0000	LD A, 00	
0239	0000	RET 10	
0240	0000	LD A, 00	
0241	0000	RET 10	
0242	0000	LD A, 00	
0243	0000	RET 10	
0244	0000	LD A, 00	
0245	0000	RET 10	
0246	0000	LD A, 00	
0247	0000	RET 10	
0248	0000	LD A, 00	
0249	0000	RET 10	
0250	0000	LD A, 00	
0251	0000	RET 10	
0252	0000	LD A, 00	
0253	0000	RET 10	
0254	0000	LD A, 00	
0255	0000	RET 10	
0256	0000	LD A, 00	
0257	0000	RET 10	
0258	0000	LD A, 00	
0259	0000	RET 10	
0260	0000	LD A, 00	
0261	0000	RET 10	
0262	0000	LD A, 00	
0263	0000	RET 10	
0264	0000	LD A, 00	
0265	0000	RET 10	
0266	0000	LD A, 00	
0267	0000	RET 10	
0268	0000	LD A, 00	
0269	0000	RET 10	
0270	0000	LD A, 00	
0271	0000	RET 10	
0272	0000	LD A, 00	
0273	0000	RET 10	
0274	0000	LD A, 00	
0275	0000	RET 10	
0276	0000	LD A, 00	
0277	0000	RET 10	
0278	0000	LD A, 00	
0279	0000	RET 10	
0280	0000	LD A, 00	
0281	0000	RET 10	
0282	0000	LD A, 00	
0283	0000	RET 10	
0284	0000	LD A, 00	
0285	0000	RET 10	
0286	0000	LD A, 00	
0287	0000	RET 10	
0288	0000	LD A, 00	
0289	0000	RET 10	
0290	0000	LD A, 00	
0291	0000	RET 10	
0292	0000	LD A, 00	
0293	0000	RET 10	
0294	0000	LD A, 00	
0295	0000	RET 10	
0296	0000	LD A, 00	
0297	0000	RET 10	
0298	0000	LD A, 00	
0299	0000	RET 10	
0300	0000	LD A, 00	
0301	0000	RET 10	
0302	0000	LD A, 00	
0303	0000	RET 10	
0304	0000	LD A, 00	
0305	0000	RET 10	
0306	0000	LD A, 00	
0307	0000	RET 10	
0308	0000	LD A, 00	
0309	0000	RET 10	
0310	0000	LD A, 00	
0311	0000	RET 10	
0312	0000	LD A, 00	
0313	0000	RET 10	
0314	0000	LD A, 00	
0315	0000	RET 10	
0316	0000	LD A, 00	
0317	0000	RET 10	
0318	0000	LD A, 00	
0319	0000	RET 10	
0320	0000	LD A, 00	
0321	0000	RET 10	
0322	0000	LD A, 00	
0323	0000	RET 10	
0324	0000	LD A, 00	
0325	0000	RET 10	
0326	0000	LD A, 00	
0327	0000	RET 10	
0328	0000	LD A, 00	
0329	0000	RET 10	
0330	0000	LD A, 00	
0331	0000	RET 10	
0332	0000	LD A, 00	
0333	0000	RET 10	
0334	0000	LD A, 00	
0335	0000	RET 10	
0336	0000	LD A, 00	
0337	0000	RET 10	
0338	0000	LD A, 00	
0339	0000	RET 10	
0340	0000	LD A, 00	
0341	0000	RET 10	
0342	0000	LD A, 00	
0343	0000	RET 10	
0344	0000	LD A, 00	
0345	0000	RET 10	
0346	0000	LD A, 00	
0347	0000	RET 10	
0348	0000	LD A, 00	
0349	0000	RET 10	
0350	0000	LD A, 00	
0351	0000	RET 10	
0352	0000	LD A, 00	
0353	0000	RET 10	
0354	0000	LD A, 00	
0355	0000	RET 10	
0356	0000	LD A, 00	
0357	0000	RET 10	
0358	0000	LD A, 00	
0359	0000	RET 10	
0360	0000	LD A, 00	
0361	0000	RET 10	
0362	0000	LD A, 00	
0363	0000	RET 10	
0364	0000	LD A, 00	
0365	0000	RET 10	
0366	0000	LD A, 00	
0367	0000	RET 10	
0368	0000	LD A, 00	
0369	0000	RET 10	
0370	0000	LD A, 00	
0371	0000	RET 10	
0372	0000	LD A, 00	
0373	0000	RET 10	
0374	0000	LD A, 00	
0375	0000	RET 10	
0376	0000	LD A, 00	
0377	0000	RET 10	
0378	0000	LD A, 00	
0379	0000	RET 10	
0380	0000	LD A, 00	
0381	0000	RET 10	
0382	0000	LD A, 00	
0383	0000	RET 10	
0384	0000	LD A, 00	
0385	0000	RET 10	
0386	0000	LD A, 00	
0387	0000	RET 10	
0388	0000	LD A, 00	
0389	0000	RET 10	
0390	0000	LD A, 00	
0391	0000	RET 10	
0392	0000	LD A, 00	
0393	0000	RET 10	
0394	0000	LD A, 00	
0395	0000	RET 10	
0396	0000	LD A, 00	
0397	0000	RET 10	
0398	0000	LD A, 00	
0399	0000	RET 10	

The subroutine moves the print position to A T on coordinate D B if this is on the screen. If this is not on the screen, the subroutine does NO CARRY.

Line	Machine Code	CALL AT 0E PRINT POSITION LD A, 00 RET 10	Prints car if B is on screen Jump if not on screen
0300	0000	CALL AT 0E	
0301	0000	PRINT POSITION	
0302	0000	LD A, 00	
0303	0000	RET 10	
0304	0000	LD A, 00	
0305	0000	RET 10	
0306	0000	LD A, 00	
0307	0000	RET 10	
0308	0000	LD A, 00	
0309	0000	RET 10	
0310	0000	LD A, 00	
0311	0000	RET 10	
0312	0000	LD A, 00	
0313	0000	RET 10	
0314	0000	LD A, 00	
0315	0000	RET 10	
0316	0000	LD A, 00	
0317	0000	RET 10	
0318	0000	LD A, 00	
0319	0000	RET 10	
0320	0000	LD A, 00	
0321	0000	RET 10	
0322	0000	LD A, 00	
0323	0000	RET 10	
0324	0000	LD A, 00	
0325	0000	RET 10	
0326	0000	LD A, 00	
0327	0000	RET 10	
0328	0000	LD A, 00	
0329	0000	RET 10	
0330	0000	LD A, 00	
0331	0000	RET 10	
0332	0000	LD A, 00	
0333	0000	RET 10	
0334	0000	LD A, 00	
0335	0000	RET 10	
0336	0000	LD A, 00	
0337	0000	RET 10	
0338	0000	LD A, 00	
0339	0000	RET 10	
0340	0000	LD A, 00	
0341	0000	RET 10	
0342	0000	LD A, 00	
0343	0000	RET 10	
0344	0000	LD A, 00	
0345	0000	RET 10	
0346	0000	LD A, 00	
0347	0000	RET 10	
0348	0000	LD A, 00	
0349	0000	RET 10	
0350	0000	LD A, 00	
0351	0000	RET 10	
0352	0000	LD A, 00	
0353	0000	RET 10	
0354	0000	LD A, 00	
0355	0000	RET 10	
0356	0000	LD A, 00	
0357	0000	RET 10	
0358	0000	LD A, 00	
0359	0000	RET 10	
0360	0000	LD A, 00	
0361	0000	RET 10	
0362	0000	LD A, 00	
0363	0000	RET 10	
0364	0000	LD A, 00	
0365	0000	RET 10	
0366	0000	LD A, 00	
0367	0000	RET 10	
0368	0000	LD A, 00	
0369	0000	RET 10	
0370	0000	LD A, 00	
0371	0000	RET 10	
0372	0000	LD A, 00	
0373	0000	RET 10	
0374	0000	LD A, 00	
0375	0000	RET 10	
0376	0000	LD A, 00	
0377	0000	RET 10	





# 'NOW WIN THE POOLS'

THIS IS MEANT FOR YOU — ESPECIALLY IF YOU USE STELLAR SPECTRUM COMPUTE, or even ANY COMPUTER — OR NO COMPUTER AT ALL

HOW DO YOU FEEL THAT ORIGIN OR EVER WISHED THAT YOU HAD 'WON-ON THE POOLS' — AT LAST YOU CAN TURN IT INTO REALITY

THERE IS A SECRET OF 'HOW TO WIN ON THE FOOTBALL POOLS' — IT CAN BE DONE I DISCOVERED THIS SECRET A LONG TIME AGO — NOW, FOR THE FIRST TIME I'M PREPARED TO SHARE IT WITH YOU

HOW DOES THIS INTEREST YOU — I HAVE DOCUMENTARY EVIDENCE BY WAY OF POOLS WINDINGS (WINDINGS BEING CANCELLED OBJECTS) — SHOWING MY PRESENT WINS ON THE POOLS AS FOLLOWS:

First Division Second Division Third Division Fourth Division Fifth Division Sixth Division  
155 140 200 180 211 15

A GRAND TOTAL OF SIX HUNDRED THOUSAND TWO HUNDRED AND ONE DIVIDENDS — OR [ ]

## I NEED THE UNCLASSIFIED WOMEN KEPT FOR POOLS WINS

I AM MAKING THIS VERY SPECIAL REQUEST FOR YOU TO ASSIST ME IN COMPLETING FOR A LIMITED PERIOD ONLY

Do you by chance still remember a newspaper or magazine or book that you read in the year 1970-1971? If so, please send me a copy of the issue that you read in the year 1970-1971. I will pay you \$100.00 for each copy.

I have challenged that would be the second of your kind and out of the country that I have — NO ONE has been able to accept the challenge — I REQUIRE NO COPY FROM YOU

MY SECRET IS NOW FINISHED-ONE COMPUTER COMPANY FOR YOU

THE METHOD IN THE COMPUTER TRAILER (NAME WINNER IN THE NATIONAL FOOTBALL POOLS) — IT WAS LAST YEAR — BOTH FOR ENGLAND AND AUSTRALIAN FOOTBALL POOLS WITH SPECIAL OFFERS

I have started to put a limited number of people in the category of making out of my request — only one per name and only one per name in the year 1970-1971

You will have a great chance of my request if you send me a copy of the issue that you read in the year 1970-1971

A GRAND TOTAL OF SIX HUNDRED THOUSAND TWO HUNDRED AND ONE DIVIDENDS — OR [ ]

My First Win was in the year 1970-1971. I have a great chance of my request if you send me a copy of the issue that you read in the year 1970-1971

I have started to put a limited number of people in the category of making out of my request — only one per name and only one per name in the year 1970-1971

You will have a great chance of my request if you send me a copy of the issue that you read in the year 1970-1971

I have started to put a limited number of people in the category of making out of my request — only one per name and only one per name in the year 1970-1971

You will have a great chance of my request if you send me a copy of the issue that you read in the year 1970-1971

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Do you by chance still remember a newspaper or magazine or book that you read in the year 1970-1971? If so, please send me a copy of the issue that you read in the year 1970-1971. I will pay you \$100.00 for each copy.

I have challenged that would be the second of your kind and out of the country that I have — NO ONE has been able to accept the challenge — I REQUIRE NO COPY FROM YOU

MY SECRET IS NOW FINISHED-ONE COMPUTER COMPANY FOR YOU

THE METHOD IN THE COMPUTER TRAILER (NAME WINNER IN THE NATIONAL FOOTBALL POOLS) — IT WAS LAST YEAR — BOTH FOR ENGLAND AND AUSTRALIAN FOOTBALL POOLS WITH SPECIAL OFFERS

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A GRAND TOTAL OF SIX HUNDRED THOUSAND TWO HUNDRED AND ONE DIVIDENDS — OR [ ]

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# Bookshelf

## The Sinclair Spectrum in Focus

— Mark Harrison

*The Sinclair Spectrum in Focus* is probably the best of all the books I have looked at in this issue suitable for all Spectrum users. From beginners to those who already have some programming expertise and perhaps too programmers of other hardware.

It is not a simple book and does not belittle difficult parts but its achievements are worthy of a little study rather than a book aimed at students for which Mark Harrison's handling of topics, use of writing flow and illustrations has taken care to include little and the plain language in a professional and understandable form. On completion, the reader should have knowledge of the principles of a computer system, number systems used by computers, flow charts, Spectrum BASIC and logical statements and functions, an understanding of graphics and output and their use in screen displays, to their use only a few. To add to this there is a lot of good quality games and utility programs.

Well illustrated, lightly sized and well expanded throughout its 180 pages. *The Sinclair Spectrum in Focus* is highly recommended.

Published by Sigma Technical Press. *The Sinclair Spectrum in Focus* is written by Mark Harrison and costs £6.25 ISBN 0 905104 3 6 5

## Dynamic Games For The ZX Spectrum

— Tim Hartnell

*Dynamic Games For The Spectrum* by Tim Hartnell is typical of many books of this kind. Where it will appeal to you depends on how many games you already have in your collection and your opinion of the early ones. On completion,

## Looking for something to complement your bookshelves for Christmas? Patrick Cain takes a look at a selection of the latest titles....

they stand up well. Tim Hartnell is undoubtedly the foremost Sinclair author, and he has compiled a good variety of programs in this book. The games subdivide into four categories: arcade games, board games, adventure, simulation games and 'novelty' games. Though I'm afraid some of them are very special.

Each program is supported by introductory text, which

details the highlights and programming techniques employed. Learning this way can be both fun and profitable. There are some great games, but games such as *Chess*, *201*, *Draw* and *Search* (see *More*) are typical although well suited to their degree of complexity to that type of learner. Books of this nature are useful programming aids, but at a price of £5.95 they may well be others that

serve the same purpose more effectively.

*Dynamic Games For The ZX Spectrum* is compiled by Tim Hartnell and published by Interface. ISBN 0 948195 137

## Games For Your ZX Spectrum

— Peter Shaw

This is without doubt a full and lively book. Crammed into its 128 pages there is a section on how to write better programs, a bibliography, a glossary of computer associated terms and as the title suggests, and by far the biggest section, a collection of 23 good quality games.

As the author Peter Shaw points out, he has not included any complex maze-walking games. Those that he has included span a good range of game types — *Acad*, *Fortress*, *Dragon*, *Dark*, *Quest* and *Hungry* are typical. Five of the games are too good to be improved upon and perhaps the hope that the reader adds more to the book's value. All programs are written in BASIC, in a style which is simple to follow and will by example teach good technique. Equally easy to follow are the listings which, while being designed to print to ensure correctness, are clearly printed.

Unfortunately the other sections are of little value and serve only as padding to what is a good collection of software.

*Games For Your Spectrum* is written by Peter Shaw, published by Wipe and is excellent value at £2.95. ISBN 0 907080 947

## 30 Simple Electronic Projects for the ZX81 and Spectrum

— Stephen Adams

Computers can be a source of fun and adventure, suggest, be used when marketed correctly to control



# 20 Simple Electronic Projects for the ZX81 & Spectrum



an endless variety of physical devices. As top chips these full potentials it will extend the experience or maybe about the complexities of such implementations proved most capable users from venturing into the area of application. **20 Simple Electronic Projects for the ZX81 and Spectrum** by Stephen Adams should put an end to any apprehensions. The contents of the 100 or so pages (delivered on the instructions of a larger sheet, a light pen and an analogue-digital converter and a further 17 projects) the theory and techniques learned will provide for countless uses.

Each topic is accompanied by full descriptive text, clear and logical illustrations and background notes where necessary. Stephen Adams' treatment of the subjects should make them both comprehensible and appealing to anyone who has set through a couple of years of school physics.

Now in its second edition **20 Simple Electronic Projects for the ZX81 and Spectrum** was a success the first time around and it may well be for you. Published by Immediate Publications.

## Delving Deeper Into Your ZX Spectrum — Dwyan Jones

Beyond Simple BASIC **Delving Deeper into your ZX Spectrum** is the full title of the new book by Dwyan Jones. Dwyan Jones is one of the veterans of the Spectrum world, author of several books and regular contributor to the computer press, and well qualified to write such a book. Armed as ever with basic theoretical simple BASIC and who wish to further develop their own programming, this book is coloured with useful tips and techniques that will enhance each program.

30 pages over 100 pages, the author has developed a better Spectrum 48K and also to use a and can be that will bring interest and professional to projects. From understanding the system's memory or screen output to screen flicks, each section is described and explained in a clear and friendly way. On completion your own skills should have developed sufficiently to write your own arcade software. Just in case it hasn't, six programs are included to show how it ought to be done.

Published by Immediate as part of the same success in the First Line **Delving Deeper into your ZX Spectrum** is a worthwhile addition to Dwyan Jones' ideas. ISBN 0 907063 24 4.

## Spectacular Games For Your ZX Spectrum — Neil Ranko / Sam Edwards

Any book with a title like **Spectacular Games For Your ZX Spectrum** will always do me to search and deny any claim that this one it wasn't too difficult — few of the games included in the 100 odd pages come close to being masterpiece.

Each game was accompanied by some narrative, but the developer attempted to briefly describe the game and use of no instruction notes. The illustrations were simple and while often funny, their relevance is in question. Of the games 'Kentucky Derby', 'Las Vegas', 'A Go Go', 'Treasure Hunt' are all trading a well won game. Perhaps it is because the authors, Neil Ranko and Sam Edwards,

wrote the book in Finland, at least from the UK, software market that many of the programs while simple are polished and novel and quite fun to play. Not the best book, would not say it is but it certainly are I'm glad to see in my collection.

**Spectacular Games For Your ZX Spectrum** is published by The Addison Wesley Publishing Co. written by Neil Ranko and Sam Edwards and cost £3.95. ISBN 0 901 14602 3.

## Creating Arcade Games On Your ZX Spectrum — Daniel Haywood

**Creating Arcade Games On Your ZX Spectrum** by Dan Haywood is billed as Spectrum's guide with a confident knowledge BASIC and perhaps an understanding of machine code is to allow few games of arcade standard are created. As much it is nothing new, but would should be given to its price approach and the way it develops its topics by theory and examples.

## SPECTACULAR GAMES FOR YOUR ZX SPECTRUM WITH NEIL RANKO / SAM EDWARDS



Beyond simple BASIC  
**DELVING DEEPER**  
into your  
**ZX SPECTRUM**  
Dwyan Jones

Many books of this type go further — few of the games being Spanish or Italian, or possible novels for foreign travelers, as an addition book it does its job well and the author shows an understanding of foreign travel problems when choosing new techniques like PEEK, POKE and Scrolling. Sadly many of the listings are difficult to read and have been more thought could have been given to dividing the book into logical chapters and indexing.

Written by Daniel Hayward  
Creating Arcade Games On  
The ZX Spectrum is published  
in paperback for 190  
pages and all the programs  
covered will run on 128K.  
ISBN 0 907863 287

### First Steps With Your Spectrum — Carolyn Hughes

First Steps With Your Spectrum  
is Carolyn Hughes in a 120  
page reader aimed at getting  
the Spectrum users  
particularly the young, through  
their first few difficult hours  
when everything is so  
intimidatingly complicated, to

an understanding of  
programming technique and a  
familiarity with the computer.  
The book achieves its aims by  
being aware of the readers  
problems, becoming motivated  
and importantly being fun.

From a list that on what  
people are up to the book  
continues to make sure that  
everything goes in the right  
place when the user is  
expected to avoid  
disasters, at the end of  
Spectrum BASIC, it finally  
gives some simple but worthwhile  
games. Each topic is clearly  
and clearly illustrated using  
whenever possible pictures  
instead of words, the effort  
being to make each point  
engaging and more  
memorable.

Suitable for kids of the age  
First Steps With Your  
Spectrum is written by Carolyn  
Hughes, published by Amicus  
and costs £3.25—  
ISBN 0 00 882246 8

### Instant Spectrum Programming — Tim Hartnell

I hope can do no such things as  
instant programming. But if  
there was, there would be no

better person to prepare such  
a package than Tim Hartnell.  
Another of many books of  
Simon and Schuster's Mr Hartnell  
has put together a list  
consisting of a one hour  
creator, tape and  
accompanying book that will  
go a long way to help users gain  
elementary programming  
skills. And after that a  
selection of 30 games utility  
and graphics programs.

The tape is novel but  
effective. It is clearly defined  
and well produced, and  
introduces the listener to each  
of the machine's keys (the  
function) and with short  
programs highlights how they  
can be implemented. The  
dialogue and listings of those  
programs are included in the  
reader. The combination of  
both results in an effective and  
quick programming aid. It is  
regrettable that the program  
listing is clipped from ZX  
Spectrum to ensure accuracy in  
other related and differs  
from a good overall idea.

Published by Instant Instant  
Spectrum Programming is 124  
pages of readable games  
and detailed elementary  
programming, also  
accompanied by an excellent  
C64 instruction tape. It  
is written by Tim Hartnell and  
costs £4.95  
ISBN 0 85954 566 8



### Easy Add-On Projects for Spectrum, ZX81 & ACE — Owen Bishop

Easy Add-On Projects for  
Spectrum, ZX81 & Ace by  
Owen Bishop is one of those  
little pocket size books by  
Sams Publishing that I have  
often heard about in the  
store.

Like the rest, this one is  
packed from cover to cover  
with really useful information  
presented in a fashion that  
is enjoyable to read and has too  
demanding. The aim of the  
book is to assist your friends —  
Spectrum, ZX81 & Ace, each  
is covered to equally well —  
beyond the level of running  
games programs to a small but  
fine computer unit with  
practical applications. Each  
project covers the building of  
personal applications  
and listing, applicable  
programs — each is well  
explained and all the projects  
(Logical to Run Detector)  
should be within the grasp of  
those who has mastered  
BASIC programming.

Easy Add-On Projects for  
Spectrum, ZX81 and Ace is a  
160 page reader of computer  
applications. It is published by  
Sams Books and costs  
£3.75.  
ISBN 085254 566 8



# Five card trick



This program is a version of the card game, poker, for you to type it on your ZX81.

Including all the main features of poker, the program starts you off with £50 to gamble and the game will continue until you run out of cash.

## Twisting the night away

As is the card game, you will be dealt a single card on which you must decide how much you would like to place a bet. Your secretariat will then be dealt to you. Should you be dealt five cards, the program automatically

## Play your cards right in this ZX81 game written for us by Kenneth Law of Dunbartonshire.

assesses the best one to worth one and asks you whether you should use the second one to be worth one or 11.

With two cards in your hand you must decide whether you want to stick with your hand or twist. If you stick in more

you are happy with your hand as it stands and do not require another card. Should you not have enough points in your hand you can twist which means you are dealt another card which will get you closer to the magic number of 21. Should

your cards total more than 21 the computer will tell you the maximum number.

Once you have stuck with your hand, the computer will work out its own hand and you will be told whether you have won or lost. In the event of a draw the computer deals facing hands which total the same. The computer will win - 10 is better in the trade as banker's advantage.

When you decide you have had enough of twisting the computer in its own game, or you've been absolutely finished and you've lost all your money, you will be told your standing in a common phrase.









# Skittles

**A game of skill and judgement  
from Andrew Cook of Wigan.**

This game for the Spectrum was written for my younger daughters who have difficulty manipulating five or five keys at once - select amongst games I have come across to usually an absolute minimum.

When the game is first RUN a bowling alley is printed up on the screen with skittles shown at the far end. An arrow travels at the start of the alley and you have to use your judgement as to when to stop the arrow. Of course, if you're starting off it is best to get the arrow lined up with the centre skittle. Once you have stopped

the arrow using the Z key you see the bowling ball roll down the alley knocking down all or a few of the skittles. Should you not have knocked down all the skittles you will get a second attempt to knock down the remaining skittles. Once you have done this, you will be presented with the score for this frame. There are 10 frames in all.

The game is very suitable for children because although

it is easy to play, it does require a fair amount of co-ordination to stop the arrow in the best place to hit the skittles.

## Line by Line

To help players the most of the program lines follow a line-by-line breakdown of the listing.

Lines 1-13

Select the level of difficulty of the game. Five first the arrow begins moves the rest of the bowling alley. Then set the rest of the first frame for scores. The speed of the moving arrow is determined by the length of the NEP at line 200.

Lines 14-70

Print the bowling alley. Print the skittles at the end of the bowling alley.

Lines 80-800

Control the ball moving. Subroutine 10 is achieved by successively drawing out of descending radii on the same centre. The centre of the circle is determined by where the moving arrow stops. Set the user defined graphics. Contains the loop used to move the arrow to aim the bowling ball.

Lines 800-1000

Contains the print the various conditions of all skittles lying down, depending on where the bowling ball hit them.

Lines 1000-3000

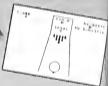
Control the screen and high score subroutines.

Lines 4000-4056

Control the initiation to the program and the instructions for the game.

Lines 5040-5520

Lines 5580-7116



```

3  DEF **** SKITTLES ****
4  DEF ***** S.COOK ****
5  CORDER S PAPER 7 Ink 2
10 1010-5000
11 400 810 1010
12 50 CLEAR RESTORE
13 LET H1=0 LET A$="S.Kettle
17 PRINT AT 10.5, "Enter level
18 40 2, "S.Kettle", AT 10.5, "1. Easy"
19 13 1, "2. Harder", AT 14.5, "3. di
19 1011
20 LET A$=INKEY$ IF CODE #44
21 OR CODE #81 THEN GO TO 7
22 IF A$="1" THEN LET B$="0"
23 IF A$="2" THEN LET B$="01
24 IF A$="3" THEN LET B$="00
25 IF A$="3" THEN LET B$="00
26 GOS PLOT 83.0 DRAW 10.10
27 PLOT 170.0 DRAW -10.10
28 PLOT 184.110 DRAW 0.00
29 PLOT 188.110 DRAW 0.00 OR
30 -80.0
31 LET I=1:INP LET C=1:INP
32 LET FLAG=0 LET SCORE=0

```

```

7 FLAG=0 LET FLAG=0 LET FLAG
8 LET FLAG=0
9 LET A$="0" LET B$="000" LET C$
10 0000 LET PATH=0000 LET H1=0
1100 LET T=1:INP=0000
1200 PRINT AT 2.10, INK 0, "Score"
1300 PRINT AT 2.10, INK 0, "Total"
1400 PRINT AT 2.0, INK 0, "Frame"
1500 PRINT AT 3.0, INK 0, "Count"
1600 PRINT AT 3.00, INK 0, "High"
1700 PRINT AT 3.00, INK 0, "Hi"
1800 PRINT AT 4.01, INK 0, "By"
1900 RESTORE
2000 GO SUB C#1
2100 FOR B$=1 TO 10
2200 PRINT INK 0, AT 0.0, "0"
2300 FOR I=10 TO 17 PRINT INK
2400 "0"
2500 PRINT INK 0, AT 10.10, "0"
2600 IF FLAG=0 THEN GO TO COUNT
2700 GO SUB 410

```



# NO LIMIT

Now, a home computer with virtually no limit to its possibilities. The astonishing new Sharp MZ700. A machine with a dazzling array of talents.

First, it's a 'clean' machine. So you are not limited to any one computer language. You have the flexibility to run and write programs in BASIC, FORTRAN, MACHINE CODE, PASCAL, ASSEMBLER and many others. And the MZ700's 512 predefined characters mean you can build up detailed pictures on the screen, without spending time specifying and designing special characters for games and special effects.

Second, it has a memory of 64K. So as your technique improves and develops, you are able to move forward to more and more advanced programming.

All of which makes this the perfect home computer for parents, as well as children.

The MZ700 gives you access to a wide



choice of new software, from only £3.95 per cassette. An additional plotter/printer costing £129.95, can produce high resolution graphics in 4 colours. A data cassette recorder is an extra at £39.95. Both add-ons fit snugly into this easy to carry computer system with no trailing wires. And you get ten exciting games, free on purchase including Super Puckman, Circus Star, Snake v Snake, and Man-Hunt.

The brilliant new MZ700. The no-limit computer £249.95. From Sharp. Where great ideas come to life.



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	Z80A	1
MON	Monitor 4K byte ROM	1
	Character generator 4K byte ROM	1
RAM	64K byte DRAM	6
	4K byte VRAM	2
I/O bus	Expansion I/O bus	1
	Additional printer I/O bus	1
	Cassette READ/WRITE terminals	2
	Joystick terminals	2

MONITOR/VIDEO MONITOR/RF OUTPUTS



Look for this logo on software denoting Sharp Compatible Software.

To: Sharp Electronics (UK) Ltd,  
Home Computer Division  
Sharp House, Thorp Road, Newton Heath,  
Manchester M10 9BE Tel: 061 205 2333

Please send me details of the Sharp MZ700

Name: \_\_\_\_\_  
Address: \_\_\_\_\_

The world of  
**SHARP**  
where great ideas come to life



# Problem page



**Peter Shaw, programming supremo, answers your questions and offers advice on your computing techniques.**

Dear Peter

I am having an increasingly irritating problem with my ZX Spectrum computer. Having to change plugs when loading and saving is not only time-consuming but is making the plugs loose and unreliable. I have found that it is possible to put some kind of resistor in the computer so that both plugs can be left in at the same time. Do you know of this method, and if so could you enlighten me a little?

Wally Reid  
Solving Kent

Dear Wally

You're right, it is possible to use a resistor to achieve what you want. You will need a 220Ω resistor between the signal and earth pins of the EAR plug. As the pack supplied with the Spectrum includes two resistors to allow you another lead or another pack, if you do the latter, please the resistor across the contacts which you connect. If you can get more information from the EAR plug wiring your day the resistor.

Dear Peter

I have my Spectrum linked up to a colour television via a VCR. All the computer club I attend have been told that I could send a composite signal directly into the television and avoid a better picture. Is this true? And if so could you give me the details as to what is required?

David Elton  
Ashford, Kent

Dear David  
It is possible to connect a composite

signal directly into your VCR by passing the modulator. What procedure would you use?

Two weeks or so ago I wrote Two main SINC connecting plugs.

One Aerial, Video, connecting SINC plug.  
A few short lengths of coaxial wire.

Open your Spectrum and find the modulator — it is the silver box on the left-hand side of the system. There is a small hole in the case on the left-hand side. Solder a short length of wire in this being careful not to touch the other board-side plugs with the soldering iron. Solder another length of wire directly onto the aerial lead itself. Don't connect the two wires which you have just soldered to the former SINC plug. Make a lead into a pair ordinary TV output and fit the aerial plug in the lead. Connect the two main SINC plugs together and the aerial cable. Plug one end into the VIDEO OUT socket of your VCR and the other end into the SINC plug on your Spectrum. Select the video channel on your TV and press the A/V button on your VCR. You should observe a standard video picture and the Spectrum coverage logo (not a VCR picture) should be visible.

Dear Peter

I wish to add to Spectrum as a word processor. Can you give me the necessary hardware software I will need to do this?

Stephen Dymall  
London, NW8

Stephen

The software side is easy. I suggest Turbo, as you discuss this in the only word processor programme I look at — I don't quite remember and have had no problems in all the hardware and software I have used. The first job is to get the necessary interface for your Spectrum (one of the latter ones is the Rampden Centronics interface but there are others on the market). The type of printer is the next thing I would suggest something that is within your budget, works with your interface and has the performance you require. At the bottom end of the market are the cheap dot matrix type printers which are quite

cheap and cheap, but are not well at the printer standards and at the same time. I like most experience and the standard which have excellent quality but when you get a quality on your system — the printer is very good — it is a good idea to get a printer that is good. At the top end of the market you can get the dot matrix printers and standard interface only have high quality output but they are not — these are already expensive though.

Dear Peter  
This summer holiday, when I went to Geneva, I brought





letter Spectrum 100. I tried to do the introductory tape at my office, but the computer wasn't loaded with a R Type virus error message and I could not run any programs. I had also tried printing and using with only two disks of code. However, this did not work either. Can you help with this problem?

Wang-Mei  
Farnham, PA  
New York, India

Sam,

As a classic problem among older computer users — how to use Spectrum Advanced modes and the Mini-Disk there has been the "double floppy" code one. Although Sinclair doesn't recommend the option of using with the Spectrum, you can do it in a few ways: you may by purchase only using the original code, using the code introduced and using them; or if it is only after additional code you could create paper reference like the table and using early boot length, computer type and finally changing your tape cassette?

Don Price

I have owned a ZX81 computer with 128K RAM pack for three months now and it really lets me do what I want. Loading and saving never had any trouble to program, the machine had only stopped loading and the user refused to appear to me once the cursor appeared except that it would be loaded if a K. The LOAD and SAVE works fine without the RAMPack. Could you tell me the reason to all my problems?

Robert McLean,  
Barnborough, Scotland

John,

It is quite likely that your RAM Pack Module is a known defective if so, then your computer as a item for sale to all users and try to do to make any other computers at the moment if RAM is not the reason then I would suspect the there is something wrong with one of the chips in your RAM pack. As this chip is either an microcontroller loading, I cannot accept it and the computer separate crash mode if you had this might be the reason why your level of double access read the RAM pack will be noticed.

Don Price

I have had a ZX81 Spectrum for long so would have had I had

to say that it is a fantastic little machine. The only thing that makes me enjoy it is the sound, but I am hoping to connect that by adding the Fuller Music Unit shortly. However, that is not what I am putting pen to paper.

I'm learning BASIC pretty well and I have learned to put a program together to build up a T's picture and then save the resulting T's screens at the end of an evening program to give a nice display while loading the commercial software. And like the commercial software, I have ported the usual "Press any key to begin" but with the commercial software, this does not work! The only way I can run the main program is to break into the screen program and then press RUN as normal. My problem is over the screen program, a sub-alternative it no longer seems to recognize the other levels, as if MEMORY = 0. So, if you could help me to run the main program after the program and screen program have been loaded, I'd be much obliged.

Rayn Christie  
Chalfont, Monmouth



Sam. May I ask you what is the best choice of screen program you have made, I think the Fuller range is definitely the best. To deal with your problem, I feel it is best that your screen is not a saved SCREEN in the screen is saved as SAVE "User" SCREENS, if not, then read Chapter 20 page 108 of version 3.1 of your manual. Most can connect to other computers what is called a Reader, there is a program which is only used to load and run the software. Most of all, write a reader similar to this one.

NO MORE ZX Computing under  
20 LOAD "ZX" SCREENS  
30 PRINT A: 21,0  
40 LOAD "Computing"

Your SCREENS should have the file name "ZX" and saved directly after the Basic Read more program should start on.

NO MORE MAIN PROGRAM  
20 PRINT A: 7, 1, 1, 0  
30 PRINT ANY KEY TO  
BEGIN  
30 IF A=KEY = "" THEN

OTTO 30  
40 END NEXT OF PROGRAM

And should be saved in the following way:

SAVE "Computing" LINE 40

Remember not to include the "Press any key to begin" because in the saved SCREENS — that is printed on the device line at the start of the main program. Also, remember that to store and save change over on the default line of the screen, don't include any of the screen as that line.

Dear Price,

We are writing to inform you of a new feature in the Spectrum base and also its extended numbering problem as brought to your attention by Christopher Hoyle in the July 1981 issue of ZX Computing.

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Mr Lane,

Thank you for that personal introduction, I think you have chosen the right product. To all our readers who find that their machine is really for flying eggs or so scoring away the clock, watch ZX Computing for a full review of this product in the near future.

To all of you who wish to join your computer club, please remember that you can get one at the States and Stamford Computer Club's information sheets on starting your own club by sending an SAE to:

Computer Club into States  
c/o Problem Page  
ZX Computing  
145 Chiswick Green Road  
London W6C 2EE

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# Christmas card

All the season's greetings from Clyde Bish of Exeter.

Have you thought of sending someone a cassette-based Christmas card this year? If you have, you may like to have a look at one I will be sending to someone this year! The program makes use of the Spectrum's high-resolution graphics and user-defined graphics. You'll see first that colour and the much-misused ASCII function have to be extensively utilised.

## Paging Santa

There are four "pages" to this card — that start at lines 3, 50, 200 and 300 in Program 2.

The first screen gives a somewhat garish (in large letters) courtesy of letters for Oliver's Horizon label, with the HORIZON colour worth a line of text that appears between the message and rings out a Christmas cheer.

The program then takes on a more serious note as the screen changes to show the stable at Bethlehem, with a starry sky above. The song "O Little Town Of Bethlehem" can be heard while the stars above twinkle. The interior of the stable can be seen to brighten as the birth takes place, and the Star of Bethlehem appears over the stable. The camera appears to reach down from the star and zooms in as the manger launches into a rendition of "Away In A Manger".

The third screen shows a Christmas tree with candles and a star nestled within its branches. The candles are lit and the star begins twinkling, and "We Wish You A Merry Christmas" is played. Following a series of messages in which you are invited to guess who is about to come on-screen, complete with reindeer and sleigh comes Santa with messages of peace and goodwill.

The final screen gives the message "Greetings" bordered by hills, heaven and berries, and the acknowledgement of the name "Blank name".

## Greetings . . .

To use the program, first load the "write" program from the Horizons tape, then enter NEW. Don't worry; you only want the

machine code routine — and that's why above B4400p Now, type in Program 1, RUN if entering the routine in Fig 3, loading saves the tape. Enter NEW again, and type in Program 2.

Here are some notes to help you type in the program:

1. The capital letters written in the quarters in lines 30, 50, 80, 200, 300, and at the beginning of line 200, are the user-defined graphics and should be entered in graphics mode.
2. In line 400, the variables, *cb* and *yl*, have to be entered using colour control characters. Type in LET *cb* — followed by the following sequence of any presses — don't enter the  $\checkmark$  character as these have only been included to space the different key presses!

```
"H Mode Caps Shift 4/Graphic
Mode 1/ Mode Caps Shift 2/
Graphic Mode 4/ Mode Caps
Shift 4/ Graphic Mode 1/ Mode
Caps Shift 4/ Graphic Mode 1/ Mode
Caps Shift 4/
```

Similarly, after LET *yl* — use the above sequence, but substitute "Graphic Mode 1" for "Graphic Mode 1" and "Graphic Mode 1" for "Graphic Mode 4".

3. Line 440 gives a list of top-end user error messages appearing. You could replace the with STOP or RUN if you wanted the program to keep repeating.

To save the program on tape, use the command:

```
SAVE "xxxx" LINE# 3000
"ig" CODE USE "r", 100 SAVE
"cc" CODE 20000 300
```

When loaded, the program autostarts, finally loading in the user-defined graphics bytes and the machine code before starting the display.

As written the program occupies almost all of the available space in a 10K Spectrum and the program takes about five and a half minutes to RUN.

If you don't like the messages or prefer other tunes in

the program, then change them! I have made the program as general as possible, but if you want to change the messages to make them more

personal then just remember you can only have eight characters for each word. Happy Christmas, even to you!

Fig 1

```
3 0 0 0 0 0 0 4 7
7 14 10 4 00 140 204 200
120 0 0 100 240 240 200 200
0 0 1 0 0 0 0 0
70 100 204 100 100 00 03 05
10 01 00 000 100 00 04 0
340 240 200 200 100 00 04 10
11 10 00 00 200 104 240 200
200 240 104 200 00 00 10 11
0 0 10 0 00 4 0 0
0 00 70 100 70 00 00 0
0 00 04 04 04 04 100 0
3 10 03 000 200 00 10 0
1 7 7 10 01 00 107 200
120 100 204 240 240 200 204 200
0 0 0 0 04 10 04 00
1 1 0 0 000 107 03 01
0 0 0 0 4 2 4 2
100 100 100 100 000 204 200 240
01 00 107 200 0 0 1 1
240 200 204 200 100 100 100 100
```

Program 1

```
10 FOR N=0 TO 167: INPUT A: IF
INT A:;:MORE USE: A=200:;: NEXT N
```

Program 2

```
1 BRIGHT 0: GO TO 0
2 CLEAR: CLR: LOAD "CODE US
3 "S": LOAD "CODE 20000
4 MENDED S: PAPER 0: CLD 10
5 7 LET P0="00000": LET M0=0
6 LET M0=4: LET M0=0: GO SUB 10
70 LET P0="00000": LET M0=0
8 GO SUB 20000
9 PAPER 0
10 FOR N=0 TO 5: FOR A=0 TO 21
11 PRINT AT 1,0, OVER 1, PAPER 0
12 NEXT A: NEXT N
```



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Richard Shepherd



# Slate

David Belchambers of Fareham presents an unexpanded ZX80 version of the popular puzzle game.

Slate is a computer version of that once popular puzzle in which you had to move fifteen tiles around in a four by four matrix until they were all in the correct order. One of the joys

here in the matrix is not duplicated by a tile, and the space is used to move the tiles by sliding any one of the four adjacent tiles into the space. This provides another space

where the tile used to be.

When run, the program displays a grid of randomly mixed letters 'A' to 'G', but jumbled up. One of the four corners contains a space. To move a tile into the space simply enter the letter you wish to move to the cursor. BEWARE! LET THEM! This page will then be moved. To complete the puzzle the top line must read "ABC", the second line must read "BCD", the third line must read "DEF", and the bottom line must read "MNO", with the space in the bottom right-hand corner. The computer checks to see if you have finished after every

move and keeps track of your present score and also the high score. The idea is to complete the puzzle in the fewest number of moves. If you ever move a piece that is not at the board of you type 'Z' for a restart, you will return to game. The only other possible way of cheating is if you try to move a letter that is not directly adjacent to the space a multi-escape.

## Line by line

Here follows a brief summary of the program functions to help you.

Lines 1-3  
Line 4  
Lines 5-8

Lines 9-14  
Lines 15-21  
Lines 22-24  
Lines 25-28

Lines 40-42  
Line 43  
Lines 44-45  
Line 46  
Lines 47-49  
Lines 50-51  
Lines 52-53  
Line 54  
Lines 55-60  
Line 61  
Line 62

### Initialization

#### Reset score

Reset the board full pieces in the writing position.

Scramble the board up.

Display the board.

Have you finished the puzzle yet?

Yes, you have! Well done! Print score and hi score.

Want another go?  
I guess not!

Which letter do you want to move?  
Is it a valid piece?

No, it isn't!

Find the letter in the grid.

Find the space in the grid.

Is it a legal move?

Move the letter and the space word.

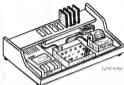
Add one to the current score.

Go back and display the new grid situation.

```
1 RANDOMISE
2 LET N=32000
3 DIM A (15)
4 LET M=0
5 FOR N=1 TO 15
6 FOR M=N+1 TO 37
7 NEXT M
8 LET A (N)=N+37
9 LET A (15)=0
10 FOR N=1 TO 15
11 LET C=A (N)
12 LET A (N)=A (M)
13 LET A (M)=C
14 NEXT N
15 CLS
16 PRINT "SLATE BY
17 D BELCHAMBERS"
18 PRINT "
19 FOR M=0 TO 3
20 PRINT CHR$(30)+CHR$(30)
21 FOR C=1 TO 4
22 PRINT CHR$(RND*(26)+65)+CHR$(RND*(26)+65)
23 NEXT C
24 PRINT "
25 NEXT M
26 PRINT "
27 FOR N=1 TO 4
28 PRINT CHR$(131);
29 NEXT N
30 PRINT "
31 PRINT "
32 FOR N=1 TO 15
33 IF NOT A (N)=N+37
34 THEN GO TO 44
35 NEXT N
36 PRINT "COMPLETED M:
37 M"
38 IF M=H THEN LET H=M
39 PRINT "BEST SO FAR
40 IS: H"
41 PRINT "
42 IF CODE (A)=0 THEN GO TO 5
43 STOP
44 PRINT "WHICH
45 LETTER?"
46 INPUT A$
47 IF A$=" " OR A$="M" AND
48 A$="I" THEN GO TO 40
49 CLS
50 PRINT "CHEATS NEVER
51 WIN"
52 GO TO 37
53 FOR N=1 TO 15
54 IF NOT A (N)=CODE (A$)
55 THEN NEXT N
56 FOR C=1 TO 15
57 IF NOT A (C)=C+1
58 AND NOT A (C)=M+1
59 THEN GO TO 47
60 NEXT C
61 LET A (C)=A (N)
62 LET A (N)=C+1
63 LET M=M+1
64 GO TO 15
```



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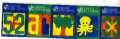
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# Maths maze



At the start of the game, you must select a level of difficulty for you to face. This being the easiest and almost impossible. To adjust all the game is to move around the maze. You be right, maze is a quarter using the arrows, 0 to 8 until you believe of the maze.

At the end of the maze you find out if you are right and simply and if the computer will then show the maze and let you see how you did. You get one point for each correctly answered addition or subtraction question at the start of the game. After the first question you are given a percentage rating depending on how many sums you answered correctly. With the press any key and the ZX81 2001 will put you back to the maze to carry on the game.

## To leave

You may leave the maze at any

**A great game with an educational twist to it from Nick Brown of Burgess Hill.**

time, but obviously the idea is to get as many points as possible. You get one point for each correctly answered addition or subtraction question and two points for each multiplication or division question.

At the end of each game (when you have finished the maze) you are told your score and given three options to play again at the same level, to stop or to play again at a different level.

Your movement around maze is quite fast for a ZX81 program. This is due to the use of the loop lines 100-200 and because the maze data is calculated with a date by calculation.

Type in the program published here before playing the game. Type the following:

POKE 16610 0

## Program description

How follows a breakdown of the program's operation:

Line 1000 3000 Main routine  
Line 1000 3040 Print the maze  
Line 3000 3040 Get the sums, depending which sums you choose  
Line 3070 3160 Get the addition sums  
Line 3170 3260 Get the subtraction sums  
Line 3270 3360 Get the multiplication sums  
Line 3370 3450 Get the division sums  
Line 3500 5140 End of game routine  
Line 6000 6050 Get the values for the sums  
Line 6060 6070 Give the answer, showing the top line  
Line 6080 6500 Variables routine  
Line 6510 6800 Instructions also set level of difficulty  
Line 6810 6900 Load. The program will automatically run an subsequent loadings. If the program is saved using GOTO 9000

```

1 PRINT AT 0,0
2 GOTO 1000
3 GOTO 1000
4 GOTO 1000
5 GOTO 1000
6 GOTO 1000
7 GOTO 1000
8 GOTO 1000
9 GOTO 1000
10 GOTO 1000
11 GOTO 1000
12 GOTO 1000
13 GOTO 1000
14 GOTO 1000
15 GOTO 1000
16 GOTO 1000
17 GOTO 1000
18 GOTO 1000
19 GOTO 1000
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90 GOTO 1000
91 GOTO 1000
92 GOTO 1000
93 GOTO 1000
94 GOTO 1000
95 GOTO 1000
96 GOTO 1000
97 GOTO 1000
98 GOTO 1000
99 GOTO 1000
1000 GOTO 1000

```

1010 PRINT AT 1.0,  
1020 PRINT TWO 3.



1030 PRINT TWO 3.



1040 PRINT TWO 3.



1050 PRINT TWO 3.



```
1000 PRINT AT 0.5, "AT 0.00,"
      AT 4.5, "AT 0.10," AT 8.5, "AT 1.0,"
      AT 12.5, "AT 1.50," AT 16.5, "AT 2.00,"
      AT 20.5
```

```
1000 RETURN
1005 REM *****
1010 LET S1=2+RND*100
1020 FOR S2 TO S1
1030 PRINT AT 0.02,
```

```
0100 NEXT X
0105 CONTINUE AT 4.0,"LEVEL",DIFF
0110 GOTO 1000-1100+100+2000
0115 REM *****
0120 LET COR=COR+1
0130 FOR S2 TO S1
0140 GOSUB 1000
0150 PRINT AT 0.10,
0160 PRINT AT 0.10,
0170 PRINT AT 7*0.01,"",02,""
```

```
0150 INPUT C$
0160 IF C$="" THEN GOTO 0130
0170 IF URL C$=03 THEN PRINT C$.
```

```
0180 IF URL C$=03 THEN GOTO 0157
0190 PRINT C$.
```

```
0200 IF URL C$=03 THEN LET COR=C
0210 NEXT X
0220 LET SCORE=SCORE+COR
0230 PRINT "YOU GOT",COR,"CORRECT",
```

```
"RIGHT", "THAT IS",COR*100,"PERCENT."
```

```
0240 PRINT "PRESS "N/L" TO
```

```
0250 CONTINUE.
```

```
0260 IF INKEY="" THEN GOTO 0240
```

```
0270 GOSUB 1000
```

```
0280 RETURN
```

```
0290 REM *****
```

```
0300 LET COR=0
```

```
0310 FOR S2 TO S1
```

```
0320 GOSUB 1000
```

```
0330 PRINT AT 0.0, *****
```

```
0410 PRINT AT 0.0, *****,
```

```
COR*100,
```

```
0420 PRINT AT 7*0.01,"",02,""
```

```
0500 INPUT C$
```

```
0510 IF C$="" THEN GOTO 0420
```

```
0520 IF URL C$=03 THEN GOTO 0427
```

```
0530 PRINT C$.
```

```
0540 IF URL C$=03 THEN LET COR=C
```

```
0550
```



```
0560 NEXT X
0570 LET SCORE=SCORE+COR
0580 PRINT "YOU GOT",COR,"CORRECT",
```

```
"RIGHT", "THAT IS",COR*100,"PERCENT."
```

```
0590 PRINT "PRESS "N/L" TO
```

```
0600 CONTINUE.
```

```
0610 IF INKEY="" THEN GOTO 0590
```

```
0620 GOSUB 1000
```

```
0630 RETURN
```

```
0640 REM *****
```

```
0650 LET COR=0
```

```
0660 FOR S2 TO S1
```

```
0670 LET S1=INT (RND*(DIFF+1))
```

```
0680 LET S2=INT (RND*(DIFF+1))
```

```
0690
```

```
0700 LET S1=000
```

```
0710 PRINT AT 0.0, *****
```

```
0720 PRINT AT 7*0.01,"",02,""
```

```
0810 INPUT C$
```

```
0820 IF C$="" THEN GOTO 0810
```

```
0830 IF URL C$=03 THEN PRINT C$.
```

```
0840 IF URL C$=03 THEN GOTO 0830
```

```
0850 PRINT C$.
```

```
0860 IF URL C$=03 THEN LET COR=C
```

```
0870 NEXT X
```

```
0880 LET SCORE=SCORE+COR+0
```

```
0890 PRINT "YOU GOT",COR,"CORRECT",
```

```
"RIGHT", "THAT IS",COR*100,"PERCENT."
```

```
0900 PRINT "PRESS "N/L" TO
```

```
0910 CONTINUE.
```

```
0920 IF INKEY="" THEN GOTO 0900
```

```
0930 GOSUB 1000
```

```
0940 RETURN
```

```
0950 LET COR=0
```

```
0960 FOR S2 TO S1
```

```
0970 LET S1=INT (RND*(DIFF+1))
```

```
0980 LET S2=INT (RND*(DIFF+1))
```

```
0990
```

```
1000 LET S1=000
```



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# The best three of '83

Nick Pearce and James Walsh take a fond look back at the three best software packages they've seen during 1983.

## The Spectrum overview

A lot has happened on the home scene during the last few months. The Action Game has at last been tied to art and the Electronic, Superior and Meritline titles have changed. One thing that has steadily held its ground where others come and go is the Spectrum. Not that the Spectrum industry has been standing still. During the last year games has blasted its way into the scene. Imagine how astonished their feet as the creative company with more news and bigger premises. Crystal have risen to be one of the most prestigious software houses in the UK. The list of titles goes on. As for us, we're a convinced '83 and we're proud to be the most standing so far.

For no other computer has been even taken such an effort of better and better quality software. It is definitely a sign that when looking at the titles that I have chosen to include in my 'Halls of Fame '83' that they have all been put on the table during the last half of the year. Much of the software produced between the same time and the summer has been noticeably considered. As the main exceptions being 'The Hobbit' by Melbourne House. This partly being due to its similarity of the look to also to excellent programming.

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## Personally . . .

There is a good chance that you will not agree with my choice of best programs as no pre-definition of a 'good' program exists. For this reason I would like to state the criteria in which I have based my choice.

1. Originality (This applies to the game scenario rather than programming gimmicks or software).
2. The use of the computer, where it can be considered to be the full, this largely means

## HALLS OF THE THINGS



that BASIC programs were not considered.

3. Quality of programming and interface, whether it was fast and smooth, the quality of graphics and sound etc and the ease of use itself.
4. Playability, in that a game is at least as fun even if it is a game requiring no response if no program is served from playing it. Now down to the programs themselves.

### Halls Of The Things

I shall first set the scene.

"I am standing at the bottom of eight flights of stairs leading up and up around the tower. I can see the dungeons at which the key lies, but without the seven rings I cannot enter. I must endeavour to find the rings though I am sure not here — surely it is a long time to wait in the cold. So here goes, up two

flights of stairs, through Hall! There is a 'Thing' waiting for me just inside the entrance, a quiet flash of lightning and he is left considering — does that in fact in fact and through the first door. A hot full bottle of oil on the floor. I could throw a little extra substance after that lightning encounter. Now on with the quest in hand. Through the next door, and there stands the next 'Thing'. A quiet flash of lightning bolts and a rapid exit should on the job. Hengle, that is a feebled he is easily it must be it is following me. I complete in that game. I was lucky this time, one of their own lightning bolts rebounded and hit them. They like stumbling amongst a pile of treasure. Might as well have the treasure which I see here, suppose it could come as handy. I must be getting pretty low on rings. By now I'll have a quick look at my status. Yes right

and I'm wounded — must have taken more of a beating in the last conflict than I thought. The last thing to do is find myself with some of my remaining magic and only an arrow and my sword until I can find enough food to replenish my supplies. This move seems to go on and on, as there are and that the map must be somewhere.

An extract from 'An Addict's Guide to Things' by Arthur and C. Clark.

From the above extract you should have got the small insight into the very intense excitement the 'Halls' involves. The idea of the game is based on the traditional 'Dungeons and Dragons Adventure' scenario. You can bring in make your way through the multi-level maze following the seven rings and killing monsters as you go. Once the seven rings are found you may leave the maze, level down the staircase to the lower level the dungeon. When made you must bravely try and find your way to the city before the enormous number of 'Things' manage to get to you. Getting to the end of 'Halls' is far from an easy business. It is likely to take you weeks and weeks before even getting near.

Each level, except for the dungeons is an enormous maze with hundreds of rooms and corridors. Many of the rooms are enclosed by doors which may be opened or closed by either yourself or a 'Thing'. An assortment of objects may be found in rooms. If you are lucky a bottle of oil will be lying full or partially full on the floor. Unfortunately the 'Things' also have an affinity for it. Do not boost your magic level and allow you to fire more lightning bolts and fireballs as well as healing yourself. Treasure may also be found, this will be collected and so add to your score. But beware! 'Things' may disguise themselves as treasure and suddenly attack you. The only way to defeat them is to find a 'ring' of gold. If a 'Thing' is aware that the light will go on if it is not seen, will be hidden as lightning will, you will find it something it is the general case.

The one aspect which may put people off *Miror* is the first encounter, as the large range of controls available. It will probably take about 10 to 15 minutes before they will become comfortable. Really, the game is very simple to play.

*Miror*'s looks good because of the immense amount of time which the computer would have to spend processing it, so slowing the game down to an unacceptably low level. It is also difficult to control by joystick, unless you have one of the unusual models.

As far as entertainment and sheer fun go, it is a large amount of software over the last year, but in the most exciting and enjoyable computer game I have seen for the Spectrum. So other game fans with such special sensitiveness of action and graphical quality. Crystal Computing have shown just how far it is possible to push the Spectrum making some of the same features expensive micros such as the Beas and Dragon look really rather nice. The question on the tip of my tongue is whether Crystal will be No. 1 next year? It looks possible!

## 3D Tunnel

*3D Tunnel* went on the market back in the beginning of the summer. Written and marketed by Mike Cameron Software it was first reviewed in this magazine back in the June/July edition. Since then *Miror* (Lynx) has also introduced *Keep on 3D!* another 3D title which, which was reviewed in the last edition. *Keep on 3D!* may also have figured in my 'Hall of Fame '82' but it has been for the reason of introduction of 3D 1 user, which just happened in the 3D!

The contents of *3D Tunnel* must be the one of the most graphically ambitious I have yet seen. You are going down to 3D tunnel filled with lots, 2D, 3D, spaces and fogal walls there'll take you way through the tunnel itself you must either avoid or shoot it by controls which some control you. Firstly, you have the task of avoiding a monster Underground low 1985, version only! The graphics for this are incredible. A sheer delight to watch. As for sound, the 3D is very well catered for, this is certainly a surprise considering the extra noise speed at which the game is.

As well as three spaces, you can use the option of 2D, but it is at certain stages of the game as well as a demo mode.

Having played *3D Tunnel* for

some hours I find the fastest mode definitely best, which is a good thing — who wants to be able to beat a game at its top level too quickly?

There may not be much depth to the scenario of the game, but the graphics can only be described as breathtaking. When I first saw it, I could hardly believe it was a mere Spectrum work. The addition of a light by cut down version at 16K is very useful, especially considering that the other two games in the 'Hall of Fame' are both for the 484 only. *3D Tunnel* can be definitely recommended to all ages, especially those who wish to display the real capabilities of the Spectrum — you will especially enjoy *3D!* over its faster sibling.

A truly professional job on of outstanding quality and impact. It is a shame that after many months of use, all fun and excitement have fairly sooned.

## Manic Miror

*Manic Miror* is one of the latest releases by the long-running Bug-Byte. Bug-Byte has been around on the home scene right back since the 'old days' of the ZX80. Over the years they have built up a reputation as a highly sensitive, professional body producing high-quality software in colourful packages, advertised over glossy spreads and be-

ing seldom put about every year. Their releases. Recently there have been some reservations as to the quality and originality of the individual games. For example, *Manic Miror* has some to disagree with. Though the packaging is of the normal professional standard, the game is the real disappointment. I had no hesitation whatsoever when purchasing *Manic Miror* in my hall of Fame.

*Manic Miror* is the star of the show. While preparing, he stumbled over evidence of a low resolution for superior to our's. To maintain such a position it was necessary to try and use amounts of precious minutes. When, many years ago the original was made and the word spread into a dark age, many thought to inform the nice users, who were in fact robots anyway. Many believe that there is a future to be made out of it, but the future is now. You have a top machine through the 3D and control control, collecting the keys as it progresses to the next screen. Each screen is an arcade game in itself. Apart from the problem of *Manic Miror* Robots who are out to get you, there are also Power-ups, Power-ups, Speed-ups. There are way enough to be collecting floors and lots there besides. In each screen, the problem are slightly different but have an aim. Some of the monsters created are incredible.

Each being perfectly defined and controlled.

The introduction to *Manic Miror* actually displays all the bits of the maze, and the look of *Miror*. There is also a graphical keyboard on which the is played with the is precise notes lighting up as proceeds. Over this is a maze, if you have not selected it in the game, a dummy mode will proceed, allowing displays of 3 screens.

The sound is fantastic, it graphics are excellent, while the programming is brilliant. This must be the most colour game I have ever seen. The highly recommended for most friends everywhere. The controls are simple — only left, right or jump — but making it playable by anyone. Though this may have before proceeding past *Manic Miror*, this itself is a game. *Manic Miror* is an absolutely fantastic game, very highly recommended. Have a very happy Christmas. James Walsh

## The ZX81 overview

With 1983 fast drawing to a close, this is the time of year when it is fashionable to look back over the past twelve months and take stock.

I have seen a considerable number of computer magazines, many of them have been good, and a few quite outstanding, either in technical or originality, or because they broke ground in the software market. It must be said that many of the major advances in ZX81 software were made in 1982 — I should 1982 is unlikely to be remembered as a vintage year for software, but that year that is hardly surprising, the ZX Spectrum and a host of other cheap computers have been primarily additions, and its ZX81 introduced nearly three years ago and still extremely popular, is beginning to feel its age in computing terms.

## Spill for choice?

I have chosen my three best programs using the following criteria: longevity, a program which captures the interest and remains as interesting as it started, technical innovation or how well the programmer has used the capabilities of the ZX81 and the limitations of the ZX81's memory, and, probably, the kind of program that a ZX81 user should be happy to find in this Christmas stocking. I have not investigated my





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# INVADE



# ZX81 16K



and fortunately in that some of the games that were in that resolution list in 1984 although their impact on the software market was only felt in 1985. Now I have been unable to resist mentioning more than the standard three (perhaps I will be content to look back at four packages in 88 and feel in 89).

Equally, for fear that this short summary became a little more than a catalogue of ZX81 software I have not made too many references to many other great games which I'm sure you will have come across this year. My selection is very much a personal one, and for the benefit of users of both the suspended and the expanded ZX81 I have chosen a mixture of 16 games in 16K games and for the more experienced programmer Arnie's FORTH environment.

## The name of the game

Being the game for the 16K ZX81 first, Odyssey's Invaders package continues to provide enjoyment and I also use its game to demonstrate to those that high resolution games really can be fun on the ZX81.

As well as the impressive display the action is fast and responsive and as a game a great fun. Only Arnie's Fantastic Madman comes close to being as exciting to play, but this version does not have the same initial display.

Some users of Odyssey's game seem to have had some problems with the 16K res display — it appears not to occur to the manufacturer to use the TV connector necessary to correct the distortion. Personally — you'll find it a worth it.

You could also check out some of Odyssey's other 16K games, which I have heard rumored are equally good.

Someone with just 1K of RAM might appreciate a game such as Selco's 'Maze Guardian' or 'New Christmas Stocking'. (I may prefer a 64K pack, but Selco's offering packs a hell of a punch.) Maze Guardian is one of the best games found on the 16K games are available. The restricted memory has dictated a small screen display, but it is nevertheless a very good game.

On the 8K side of Selco's excellent 16 games offer 'Super Invader'. This is a good 1K version again with a nice, then full version screen display. All Selco's

16K games packages are of a very high standard although they have unfortunately a little bite on the software market to achieve much penetration which is a shame.

Another excellent version of Invaders is Para Games' (formerly's) Gamestage 81 Heron's JB. Give's a Gamestage 81. This uses a full screen display and a fast class game indistinguishable to those found, however, since it was produced well before 1985, it doesn't really qualify for too much of a mention here.

## Go FORTH

So much for games. For the ZX81 programmer who feels like a change from BASIC, how about taking a closer look at Arnie's FORTH package. Originally selling for around £30, this implementation now sells for £14.95 and should help you more than busy over the Christmas holiday.

The manual which comes with the cassette is not really intended for the complete novice, so if you're new to FORTH you will probably need a book on the subject to help you through the learning stages.

I did not find the FORTH package particularly easy to use — no, I mean to add a fault of

Arnie's — because in the slow ZX81 cassette system. The FORTH compiler takes about an minute to load and the four screen editors take a further 20 or so seconds each. Apart from the initial wait to get the FORTH loaded (if you should own the system half way through a programming session, you will have a frustrating wait while you reload the cassette) editor and start all over again.

Various versions of FORTH have been developed, but this version is an implementation of Fig FORTH. Arnie supply a post-tilt keyboard casing which is intended to be used on the ZX81 keyboard. The best alternative to those normally found on the keyboard with a few exceptions such as the FORTH words @ and ! on the 88 and 'D keys. It doesn't have to be used — I didn't use it as I have a File Study keyboard with moving keys — but it does help you get used to the package.

FORTH is considerably faster to run than BASIC, and is powerful in the ability to allow you to define your own words for functional FORTH already has an extensive range of words and the programmer can use these to create additional words to do whatever is required. Once a new word has been defined, it becomes part of FORTH's vocabulary.

The compiler takes up something like 8K of RAM and what with the screen editors the only bytes about 28K left for the user to work with. However, as I mentioned before, FORTH is a very economical language and you can achieve a lot within the limits.

ZX FORTH is a fast class implementation of the language and gives you a good insight into its possibilities. If it takes you a while to achieve any progress on a standard FORTH machine or another FORTH system, Arnie has kept any details to the standard language.

## Xmas adventures

Apart from the software men listed here, I've got plenty to keep me out of mischief over Christmas. I have still got a complete set of Arnie's advent tales — Epilogue listed above should keep me from wandering the food and drink — and I also need a clear head to help you enjoy my living with Peace a Night Selection.

On a last note, Happy Christmas to all ZX Computing readers and good computing! Paul Pearce







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# Coding graphics

Increase your character size with this great utility written for us by P Greenwood of Sevenoaks.



The purpose of the program is to enable screen displays of large characters or user defined graphics to be created quickly and easily by coding the character or graphic from a library of symbols stored in an array. On program termination, the screen display is saved in high memory and is then available for reference in a new program.

The program is entertaining to use and some interesting effects can be achieved by mixing both normal and inverse characters on the screen. The symbol library can hold 54 characters each displayed on a three by five area and is entered in blocks showing the numeric data of 1 to 9999 in 54 possible rows. The program may be run with an alternative library and new characters being added as and when required with the option to define any previously coded character.

## How the program works

Lines 20 to 240 are concerned with searching a graphic character, and storing the associated data in an array. The array subscript *D* is calculated by the subtraction of line 840 after which a check is made at line 100 to see if the character has already been defined. When character definition is completed, press **ENTER** to enter the PLOT routine, which works as follows:

Lines 260 and 270 set the initial printing position for the first character to be plotted. Line 280 requires a character, the subtraction of line 840 converting *C1* into the appropriate location *C* in the

array. The individual bytes stored in the array location are then FORK'd into the first 15 locations of the line 1800 statement. This operation is carried out by lines 300 to 390.

Line 410 copies the screen display to allow RAMTOP. Line 420 puts the chosen character at the start print position. Lines 430 to 470 scan the keyboard for an input with any **XY** moves, underlining or deactivating the values held in addresses 1800-7 and 1808-4. Line 500 copies the screen display back from above RAMTOP, a jump then being made to line 420 when the chosen character is re-plotted. Line 470 permits an

escape from the loop, putting the chosen character to blank. Incorporated into the screen display when line 410 is first executed.

When character plotting is completed, pressing **ENTER** enters the screen routine, is located by line 600. Line 620 stores the screen display above RAMTOP. The final routine is to finish the program by typing **Y**, or **ENTER** to re-enter the plotting routine.

## Creating the program

Reverse some memory for the machine code routine by typing the following direct commands:

```
POKE 16388 0
POKE 16389 128
NEW
```

The sets RAMTOP to 32000. Type in the Hex loader program Fig 1 ensuring that line 1 contains at least 100 characters. Over the next 100 characters as shown in the left hand column of Fig 2, transcribe each line of code with **RAMTOP** if a mistake is made typing, press **ENTER** so as to select **END** mode, indicated by an inverse **C**. Using **CHARACTERS** Now type the correct code and continue to add as required. Transcribe data entry by typing **32** (start of line) except line 1, the print line.

As a direct command type **DIR A:054.5.3** to create a file of 54 characters for which the direct command mode the use of a line number in the program, and to control use of **GO TO** print routine.

tally is 00000000 the array will destroy previously entered data. ROM will also destroy data and so the program should always be restarted using GOTO 1. Add the BASIC line such that the program is now as shown in Fig. 3. Type GOTO 1 and use Fig. 4 to make the alterations required entering a number followed by leading or trailing of the 18 characters per character. The character is built up and displayed as each entry is made. When data entry is complete get out of the routine by pressing Newline. Stop through the options by successful pressing of Newline using 'Y' in response to EXIT PROGRAM?. To save the program on tape, start the cassette recording, then type BOND 0.00.

**Using the program**

Ensure that RAMmap is set to 0000. The program will start automatically when loaded but it is vital to respond to ONBATE BASIC CHARACTER prompt first. The next reply will produce the chosen character in the lower left hand corner of the screen. When the character has disappeared and by using the keys as explained.

The next character selected will be initially superimposed on the previous one, and may be cancelled as before. You can go out of the routine by pressing Newline. For instance press '7'. In response to the prompt 'A' 'Y' response to the next prompt will terminate the program. A screen such as Fig. 5, shows typical characters. The display has not been tested at high memory. To call this display in a new program press Newline and the BASIC shows in Fig. 6. Run the program, and when the reset state 0000 appears, each program line may be stored. The graphics may now be displayed, either by a direct command INVRT 25 or on a cassette tape, as 10 INVRT 25 followed by GOTO 10.

**A load of code**

The machine code routines use the tape addresses as follows:

10000 C UP  
10010 INVT  
10020 C DN  
10030 NEWLINE

To restore C UP and C DN



use the LDR instruction to block-move 123 bytes of code from the address 20000 and use store. The first routine works as follows. The X and Y registers hold the X and Y printing offsets with respect to screen 00. Steps 19 and 20 increment the display file address by an amount equal to the value of register B. Steps 25 and 26 then increment the display file address by an amount equal to 20 times the value in register A.

Having established the printing position, steps 31 to 34 print the first three bytes of the stored character. Steps 35 to 37 then increment the display file address by 30 to point to the corresponding printing position on the next line, and the next three bytes are then printed here. This process is repeated five times to print the complete character at which time the C register (previously loaded with five at step 23) has been incremented to 1800 and a return to BASIC is made.

The INVRT routine loads each printing character in the display file, adds 128 to the current value, then overwrites the old value.

Fig 7 The Newline program

```

1 REM ..... 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 ..... 9 ..... 0 .....
... 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 ..... 9 ..... 0 .....
... 1 ..... 2 ..... 3 ..... 4 ..... 5 ..... 6 ..... 7 ..... 8 ..... 9 ..... 0 .....
10 LET A=ASC(NEWLINE)
20 IF A=0 THEN GOTO INT (LEN A+20)
400 BB=" " THEN GOTO 20
40 SCRN=INT (1-B)/A
50-1,B
50 INPUT C
50 IF INT (LEN C+BB) < LEN C+BB THEN GOTO 20
70 IF A=C THEN GOTO 100
80 BDATA=BT " " THEN GOTO 20
90 GOTO 20
100 SCRN=
110 PCRN=V 1000000 PCRN+LEN BDATA
...
120 LET ADATA
130 LET A=PCRN B TO 1
140 IF A=C THEN GOTO 100
150 IF BDATA THEN GOTO 20
160 LET B=C+28
170 GOTO 40
    
```

Fig 8 The Newline - test routine. See code from the left hand column and then press Newline

00000000	LD HL, 1100000	1	
00000000	LD DE, 200000	2	
00000000	LD BC, 700	3	
00000000		4	
00000000		5	
00000000		6	
00000000	LD HL, 1100000	7	C, 640
100070	LD DE, 200000	8	
000700	LD BC, 700	9	









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# Reader's reviews

## More of your thoughts on the commercial software packages you buy.

This feature provides you space to let your readers (or any software fan) for the 2000, 2001 or Spectrum. If you are not a good or bad experience with any of the commercial software packages available for your money, why not write a card to tell us?

Your reviews should contain our stated thoughts about the software and the relevant details, summarizing the strengths of the package, its price etc. You should put to debate something like 200 to 500 words per package. Depending of course on how enthusiastic you are about the software.

Any reviews published in the section of the magazine will be illustrated with the name of the top one review. So if you buy a cassette and send in a review which gets published, you'll get your software for free!

### 30 Monster Maze New Generation Software John Hall

After a four minute loading time, the program starts up and the message "Welcome John" is sent onto the screen. After a while it said "Well, guess something then." I pressed a key and a cursor appeared on the left of the screen and "Roll up" all we see the screen. There is a mouse bar, located upon the screen, along with instructions if you require them.

Next the message "The route of the maze consists of 30 squares and 30 doors" appears. The maze appears on the screen in 300 square tiles. It is a maze of 10 squares, 10 rows and 10 columns. It is a very simple maze. It is not too long but it is not too difficult. I was automatically awarded 30 points. And there I was back in the maze.

I was very surprised by the price - this is excellent!

All the walls facing you are shown as grey, whereas the wall in an angle to you are coloured black - depending on an arbitrary grid. 300 instructions. And the T Rex! Don't stop for their loveable you, you are more doted of the monster with only its mouth open for reasons you are being eaten alive.

As you travel down corridors, you can meet passages to your left and right, any of which you can choose to go down. The passages of the maze are not open, without the added bonus of the T Rex and the exit.

Ah, did I mention the exit? Yes, it's located in the maze as an exit, but the maze is very complex and the exit is extremely difficult to find. And the exit is split as a different place each time you play the game so it is no use trying to remember a location. You could have a better exit found if it was responsible for the maze, or a random character moving someone from the corner. Quite spectacular really!

If you are told to "Roll" at any time during the program then it is advisable to do so as it is possible to outrun the T Rex. You can alter the speed of the game easily, but beware as it gets very difficult to play the game at the higher speeds.

When you see the words "Roll left" or "Roll right" on the screen, you must be very cautious. This means that the T Rex could literally be just round the corner.

This is definitely not a game for those of a nervous disposition, but for anyone else, it is an entertaining and highly recommended morning puzzle game which at £4.95 is a good value for money and the game is top of the class!

### Astro Blaster Quickliva Mark Stoneman

Quickliva have a reputation

for good quality, relatively priced, original games without blatant graphics and sound. Their offerings, therefore, can expect high criticism for video games.

I have been the victim in Quikliva programming to be able to get a good game into 19K, what with Medicure, Hunt-Pace, managing to get the three excellent Homey games into 19K. Combos have obviously tried to copy their competitors' achievements, but in doing so they have made several crucial errors. I would have been left if they had left it at 48K!

The game loads very quickly in only 43 seconds and having done so the player is then given the option of using the Remington joystick or the keyboard. Once you have selected your means of doing things you are shown the keyboard controls, regardless of the chosen option. They are 1) to start the game itself, 2) to move your ship left, 3) to move your ship right, 4) to fire and 5) to load the game at any point. This is a very useful command as you trigger finger can get very hot during this very fast, but also intense game. Incidentally the area closed out of sighted instructions is not used but a Space Key will select a rather slow.

The score is set by an average from the Rank Of The Day, with Omega on which the game is based. Once the start button is pressed you are shown a message into the face of the screen. You see the ship coloured ship at the bottom of the screen but instead of the enemy being above you, as in random, they are in front of you.

When you see the screen for the first time you are given the main instructions for the first time. The game is set on a background of stars and in most of them scrolling from top to bottom. They appear at random, which adds the of feel considerably. You commence with two ships and the first obstacle is a screen of Colada which fills all over the screen at random dropping Plasma Balls and we are able to shoot from one side of the screen to the other, to left or right or vice-versa although you cannot.

Having destroyed one screen of Colada you find yourself approaching a screen of the previous screen. The coloured stars are however the relative of a machine gun. These red bursts of such that it would randomly run out if

to your ship at the last moment, destroying it if you're not careful.

Should you manage to survive the stars you are notified by a message "game life" which indicates Plasma Balls at a great rate of levels, you are well advised to stay clear of this until a further three, this happens another screen of Colada appears, although they are very difficult to avoid in the Omega and certainly the traditional in order much more. This Plasma Balls, once have seen to side in their approach and, like the Meteor, cut into you at the last minute. This comes a repeat of the previous and that the Meteor, should you manage to survive all this, a screen of Colada will appear to you. This Plasma Balls approach in the same way to that's just a bit different. Although there are two stars and 16 levels of difficulty. However, there are several bad points which should be noted.

- 1) The fact that stars appear at random after they would have top to bottom, as I have already said.
- 2) Having been you been a set of stars you have to survive a Meteor Storm, which gets a lot heavier after a while than random in the game. It really depends on how you feel in the storm.
- 3) There is a Hall of Fame but to enter your name into it you have to get the left right and fire buttons. You can get the other button to do it, but the best score is only registered through the Hall of Fame.

The score, best score and steps left are all shown on screen as well as the title and the name of the author, John Edwards. The game, like all Quickliva ones, is robotically based and priced at £4.95 is very reasonable indeed.

Although the game is certainly an updated Space Invader, Quickliva have tried to introduce some of their own ideas. It might be an idea to modify the screen patterns and make a 48K version.

Available at a price of £4.95 from Quickliva Ltd, 12 Belmorton Road, Southampton SO21 1LA, and is available through all major retailers. I would say it is one of the best arcade games for the 19K Spectrum.

## Spectrum Master-chess Mikro Gen Darren Sargent

If you like playing chess, then this is the cassette for you. If you aren't like waiting for hours, however, then perhaps you should think twice before ordering. This cassette took three weeks and several calls to Mikro Gen before it got good on the computer.

It is unusual not to find the LOADING instructions on the insert card, instead it tells you to LOAD in the usual way. Once you have accomplished the last few attempts, Mikro Gen is loaded first level, you are presented with an elegant graphic chess board, complete with pieces and squares numbered. At the top left of the screen are two mysterious words, You and Me! These turn out to be the column heading for the writing history of moves.

At the bottom of the screen are the options: play, take, undo, take, undo, take, undo. Taking is in order.

**Play** Pressing  $\downarrow$  puts you into play mode. You are asked if you would like to play black or white, and then for the level. If  $\downarrow$  only to  $\uparrow$  probably hard when it eventually moves if you decide to play black the computer will kindly review the board for you so that you are always playing up the chain. Once you have done it all, assuming you are playing white you can key in your opening move, define the move you were about to key in, change the level, set for a recommended move, get a screen dump, save the game, or go back to the play/cannot play business. After that move you are off toward the screen of options.

**Game** This allowed you to get the board, background, list of options, and what type of pieces are used in the display.

**Setup** This allowed you to set a chess position and then play them. You need a cursor over the board, with which you can place any piece at either side of any position on the board. When you have set up in a position you can choose sides, level and black or white to play.

The cassette is excellent value for the chess in it, however, although the instructions say nothing about the rules of chess, even so it supports all

the usual chess moves (excepting cast and a weathered purchase at £4.95).

## Black Crystal Carmel Software MJ Richards

Although it took four weeks for the Black Crystal adventure program from Carmel to arrive, it was very impressively packaged on two tapes with a large manual which reported the history of The Black Crystal and laid the control keys.

The game was in six parts which all loaded in the first tape, although there was a book up cover. The quality of the tape was good and there was very little hiss. I decided to be it myself the first time I played the adventure.

The graphic display is first on the first tape and very early in several parts, possibly more than five and four the graphics is nearly text. However, graphics play a large part in the game. The main drawback is the speed of the graphics display which could be improved using machine code or Pascal. The keyboard needs quickly which is important for the battles as in real time.

Your aim is to collect seven rings of power which are hidden in the six tapes. The objectives in the most tapes from mountains, either controlled by the Lord Chaos or men or dependent but not to count. The game is by no means easy. The greatest difficulty arises from traps and, traps, the end as which are most frequent traps (two and four or less) and four or less in most cases.

Despite the same plot being used in different games, the sheer quantity always means there is always something to see. It may not be the long route very knowingly when he counts your death but because you are introduced by God have a sense of God, he captures you soon. Also the board which you can talk up, however, and the night messenger. The game is tedious because you often have to spend more than one day on one game. I have never played several games at most previous. My favourite is trap one which is the shortest, but still challenging, particularly the second level game of logic. Features that I think of program in this package there is a great deal of variety.

Graphics feature largely in

the game and use of the user defined graphics is very good. However, a keyboard display would be useful as more than 18 keys in addition some parts including those which is speed, look, word commands. Maybe use a very impressive graphic display.

At £7.50 it is a very good buy as it includes an incredible amount of data and is a very good quality. It is highly recommended.

## Airline Cases Computer Simulations J. Whitaker

The main objective of the game is to increase the net assets of £3 million to £30 million. It may sound easy but it is not, because you can have seven years in which to do it.

The game begins with an expert (after taking you that the Civil Aviation Authority has granted you a £3 million loan Atlantic) located in the DC10s from Glasgow. Then you are given a list short estimating payoffs for these DC10s. This game is a long game of character for each quarter of the year. You must then decide on how many DC10s you wish to charter, the date from the previous period of information. Then another decision must be made on levels of price and maintenance. You must then take in the amount of maintenance cost you need. This is usually followed by a disaster, namely a high level of interest, that is why it is usually best to have full insurance cover.

As well as these things happening you can also decide on whether or not to sign a fuel contract with Saudi Arabia, but occasionally this is unwise. Sometimes, like Americans prove unhelpful during that you are not paying sufficient taxes.

At the end of each year you see a share a profit and lost account and then a balance sheet. Then comes a Financial Times report which tells you how well you did or didn't. A year of getting a very good Financial Times report is an indication in the form of buying a DC10 but this is only when £4 while your share is doing well. If you get a really terrible report the company class is not I consider it as.

This is an excellent game which really tests your

business skills and involves but if you buy this expect very good graphics and a deluxe game like *Goal Reader*, you will be very disappointed.

Author details at £8.95.

## Orbiter Silversoft Lawrence Tout

I have been waiting 20 years for about a year now but an attempt to buy the Orbiter Silversoft's Orbiter reviewed. So now I have chance to tell the readers who a fantastic program it is.

It is nearly exactly like the case game *Defender*. To have to travel in your ship across the fully featureless. Making any green stars as points across. The sum of it game is to travel 50 blue dots which is along the bottom of the screen, completely knowledge. You are given fuel at the start of each game so the green stars try to avoid themselves to there and you towards the top of the screen. The aim is to have fuel to clear and then take the fuel, blue object before it is hit ground and is destroyed. Points are given for catching and returning it to the ground safely. However, if you don't stop the star and it moves the top of the screen it changes into a purple star, also its movement is not more slow and they are faster making them difficult to hit.

The layout of the keys is clearly done and they react up again that the ship direction. Independence of most objects is used in their lives. *Orbiter* is everything on the screen, not an impressive flight.

Besides the constant stars there are also, red and purple squares which move slowly by across the screen, they move as well as changing looking yellow, objects which never move slowly when they are hit when a speed of smaller red squares are launched.

The entire collection of stars above are shown on a long range scanner at the top of the screen.

As the program through an attack wave after another you are awarded extra stars as more objects. I've found so after 350,000 points the computer becomes very generous with stars.

One drawback with *Orbiter* is that you are only playing

maximum of three ships and three attack bombs at the start, so if you have more hit, there is an opportunity to lose more ships. One tank, out of curiosity, I lit my ships to destruction and found that I had 58 ships going from those three ships (this was at about 30,000 seconds).

The danger in this additional game is that if the green ships wipe all your blue objects then there is a fairly the landscape disappears and from then on all you have are automatically changed into other people's. The secret to survival is to be at any cost, hit this box, even because if it does you're in trouble. So when down to the last blue object instead of being it down on the ground the taking it from the ship, hit area is - for long as you do so there can't pick it up. Then use try to reach attack score 10, where you see going for first blue objects after very short wave.

At £5.95 I think *Obelix* is well worth the money.

### Computer Scrabble Palm David Howley

Just ten years ago I tentatively considered writing a program to play Scrabble on FSP 3. However I soon realised that the program's vocabulary would be so small that it would probably end up passing on left to right. Now Palm have released a program with a vocabulary of over 100,000 words from the Scrabble dictionary. But being a large vocabulary is not all that is needed to succeed at Scrabble; you need to know the letter values and how to score on take things - as it really is good to be on top of the whole board after your opponent?

In an excellent discussion of the subject as the marketing material said it. The cassette contains a complete manual of how to play the original game plus, as it is instantly accessible inside the box is a professionally produced booklet describing the game to those who are unfamiliar with it and a set of how to cover the program. Although the program contains quite a few instructions, these are all neatly presented and easy to read. The first block of text is to load the program and after a couple of failures it will load. I loaded first time and it has done very well.

On successful loading of the program a number of questions appear:

- 1 Is your television colour or black and white?
- 2 Do you wish to select a previously saved game? (Y for yes or N for no)
- 3 Number of players (1 to 4)
- 4 Name of player type (male or female) (ENTER)
- 5 Whether the player is the computer or not type Y for yes or N for no
- 6 If you then at what level do you wish the computer to play for the player (1 to 4, where 4 is the hardest level)
- 7 Do you wish to use the computer's letter rack (yes Y or no)
- 8 Do you wish to use the computer's change its next guess Y or N

The first option I wanted was to set the computer playing against itself so I opted for level three against level four with the option of seeing the computer's letter rack and seeing if it try to move its rack on the screen with the Scrabble board with different values representing of letter values. For the player currently taking a turn the rack of letters is displayed although not after they are placed on the board. On the right of the screen are the current letters of all players, the letter racks of all players, the number of tiles remaining, and a list of options. This game was made so simple because the letters which come up on the rack were very difficult to score well with, eg an *xywz* or *Q* and an *U* at the same time. However, level 4 ended up with the scores by 289 to 219. What was interesting was to see the computer trying to score. The finishing cursor square dotted all over the board trying out potential words and getting those like *xywz* would score 32. Still, the real test of the program was to play.

As a bonus as the British Scrabble Championship comes near you'll get some help. I set the program level 4 and asked the computer to keep its tiles hidden and not to enable it to put it in. After scoring 32 on my first go I felt confident, but that confidence in-

stantly disappeared. In the computer placed a full word and got on a high word score to score a total of 88. The rest of the game was superb. The first time up with a same good word were placed. The final score was 334 to the computer and 314 to me. Although I might not get the end of the game, to be honest I never liked like was any.

So a victory first time out for the computer. I have beaten level four once but it is not easy. I mentioned earlier that there are a number of options available. When it is a particular player's turn their options may be chosen:

- Synchal shift: V displays the list of tiles of all players.
- Synchal shift: S displays the values of various special value squares.
- Synchal shift: B allows you to exchange some tiles in any word you wish.
- Synchal shift: C allows you to change any number of tiles you wish.
- Synchal shift: J tells the computer to arrange the tiles in a random fashion.
- Synchal shift: G examines the game and gives you the option of saving the game or starting a new one.

It is also possible to quit if you cannot place any letters.

All the letters available in the original game are available here - even keeping the board over can be accomplished by accidentally taking out the power lead. Placing a word on the board is much easier than I thought it would be. You simply type the letters to what you want the word type A if the word is to go across the board or Q if it is to go down and then type the word. The computer then places the word on the board, gives you your score and the option of changing your mind if you wish to play something else instead. When you finally enter the word the computer checks to see if the words formed are present in its vocabulary. If they are the game progresses, if they are not the computer asks you if you're sure about the word. If you answer yes the computer accepts it.

I mentioned the importance of strategy in Scrabble and that it is well known that the different levels appear to have different strategies. Level one seems to make little effort to score its maximum possible each turn, apparently playing

like to score as it finds something they will go and it has a very fast response time. By contrast level four always seems to attempt to get the maximum score possible with one or two exceptions, eg if it has a blank it will not place a vowel. It gets quite a good score with it. For bonus it is a nice run. Dr Peter Tustin who Palm acknowledge as having played a large part in the development of the program and Palm themselves are to be congratulated on the program. For the beginner levels one and two introduce you to the game while level three provides a pleasant surprise from the excellent top of level four for the more experienced player. The program also appears to play in open rather than a defensive game which is much more fun for its opponent.

Are there any criticisms of the program? Only two. The first of which I am pretty sure that for solved only by using other hardware like a pen and paper or a Scrabble set. This problem occurs if you wish to play against the computer and against human players at the same time. While the computer can keep its letters fed in, the other human opponent cannot.

One more Scrabble enthusiasts believe that two games games are much more fun anyway.

The second criticism is the price £19.95. Maybe it reflects the fact the program scores in maybe not but Palm are likely to lose sales to those potential customers who have only played Scrabble a few times and thus not prepared to pay that much. Overall a superb program, particularly if you are a Scab. Its enthusiasts without a regular opponent. But how about a price cut?

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# Worms



## Surround yourself in machine code in this great ZX81 program from Gary Nugent of Churchtown, Dublin.

This is a two-player game. The first to touch a wall or wall left to collide with a wall, your normal opponent wins.

The game uses the full 24 by 32 screen, the walls being the last letters around the screen. One score is made from characters the other is made from characters. The score grows as you move round the screen.

Movement is in four directions: up, down, left, right (or W, Up, A, D, R) or S (right) or (down) for C, when keys D, G, H, L, right) are pressed, and the A, space, B, which is if it hits a wall, hits the screen's screen, (left) will not be moved back on itself. To come also has an screen being for fullplay. Key F starts control to BASIC and stop the program.

### Down the line

Using all the year program, the machine code is in the file (RAM) statements containing 32 characters. These is an one way and a hard way to edit such a RAM statement. The best way is to type in the 32 characters one after other. The easy way is in

allows create the RAM state (start in Fig 1) that is a RAM followed by 100 characters. All the last characters to form lines 2 to 5 and then enter line 6 in RAM followed by two characters as in Fig 2. Next execute the following as direct commands:

```
POKE 16510:0
POKE 16511:33
POKE 16512:2
```

A RAM containing 332 characters has now been created, and the machine code program can use the characters in a few lines like that in Fig. 3. Incidently, 2 PRINT PEEK(16511)+256+PEEK(16512) does not give the answer 332, that you're together the PEEKs wrongly, and you should go through the above procedure again.

After you have entered the machine code program, you can check to see if you have entered it correctly, using the program in Fig. 4. When you are sure you have entered the machine code program correctly, you can now enter the BASIC control program. Save the program for by RUN 300 just in case something goes wrong.

### Too fast?

To increase the speed of the game, type in the following as direct commands:

```
POKE 16513:X
Where X is a value between zero and 255. The greater the value the faster the game.
POKE 16513:0
To slow the game down, type in the following:
```

```
POKE 16513:X
Where X is a value between zero and 255. The greater the value the slower the game.
POKE 16513:Y
Y is 1 or 2, it usually a big enough value for Y.
```

If you would like to change the characters which form the worms, then to change the characters type in the following:

```
POKE 16538:C
POKE 16539:C+128
Where C is
POKE 16510:C
POKE 16580:C
POKE 16595:C
```

where C is the code of the character you want.

To change the screen type in the following:

```
POKE 16590:L
POKE 16575:C
POKE 16590:L
POKE 16510:C
POKE 16510:C+128
```

The program as published will originally set the screen to 2881 although with the box of letters of screen, it will run on a machine with less than 32K of RAM as when the display file is not automatically filled with spaces. To make the program run on 32K, the machine code should be placed in a line 2 RAM statement:

```
10100:0003 21 22:40
10101:0010 30 00
10102:00 38 00
10103:00 08 18
10104:00 08 20
10105:00 18 00:00:00 07
DUNE MEATCHEP 10 70
DRC 00
JH 20 NEXTLN 20 70
RHT 00
L0
```

You should also insert the line in the program:

```
0:RAM:USA:16595
```

The code creates a 24 by 32 display file, which is automatically set up in machine code, but has more than 32K RAM.

```

1  REM ***** 7-8 *****
2  REM *****
3  REM *****
4  REM *****
5  REM *****
6  REM *****
7  REM *****
10 REM *****
20 LET N=10014
30 POKE N,INT (RND*25)+4
40 POKE N+1,INT (RND*25)+4
50 POKE N+2,INT (RND*25)+4
60 POKE N+3,INT (RND*25)+4
70 POKE N+4,INT (RND*25)+4
80 POKE N+5,INT (RND*25)+4
90 IF USR 10014 THEN GOTO 20
100 STOP
200 SNEW "ZX81 LOOPS"
310 PRINT AT 0,0, "DO YOU WANT I
HOLDING DOWN +
320 IF INKEYS="N" THEN GOTO 370
330 IF INKEYS="Y" THEN GOTO 32
340 CLR
350 LET S=0
360 FOR I=1 TO 300
370 CLR
380 FOR
390 FOR
400 FOR
410 FOR
420 FOR
430 FOR
440 FOR
450 FOR
460 FOR
470 FOR
480 FOR
490 FOR
500 FOR
510 FOR
520 FOR
530 FOR
540 FOR

```

THE OBJECT OF THE GAME IS TO FORCE YOUR OPONENTS DOWN TO COLLIDE WITH ONE OF THE WALLS OR WITH YOUR OR HIS OWN DOWN, KEYS U.A.S.X CONTROL KEYS O.R.L.. CONTROL THE GAME. KEY F ENDS THE GAME.

```

1 REM *****
2 REM *****
3 REM *****
4 REM *****
5 REM *****
6 REM *****
7 REM *****
8 REM *****
9 REM *****
10 REM *****

```

```

1 REM *****
2 REM *****
3 REM *****
4 REM *****
5 REM *****
6 REM *****
7 REM *****
8 REM *****
9 REM *****
10 REM *****

```

```

1 REM *****
2 REM *****
3 REM *****
4 REM *****
5 REM *****
6 REM *****
7 REM *****
8 REM *****
9 REM *****
10 REM *****

```

```

1 REM *****
2 REM *****
3 REM *****
4 REM *****
5 REM *****
6 REM *****
7 REM *****
8 REM *****
9 REM *****
10 REM *****

```

```

1 REM *****
2 REM *****
3 REM *****
4 REM *****
5 REM *****
6 REM *****
7 REM *****
8 REM *****
9 REM *****
10 REM *****

```

```

10 LET X=10014
20 LET AS=
30 IF AS=" " THEN INPUT AS
40 IF AS="F" THEN STOP
50 PRINT AS(1 TO 2)
60 POKE X,INT (RND*25)+4
70 LET X=X+1
80 LET AS=AS(1)
90 GOTO 30

```

```

100 FOR I=10014 TO 11045
110 LET A=PEEK I
120 LET B=INT (A/10)
130 LET C=A%10
140 PRINT TAB 5;I - CHR$(B) CHR$(C)
150 NEXT I

```

Fig 1 The BASIC control program which sets up machine code routines

DATA 00 00 00 00 00 00 00 07 03 00	JR NZ,LOOP4		
DATA 03 03 03 03 03 03 03 00 04 00	RET		20PR
DATA 00 00 00 00 00 00 00 00 00 00	LD BC,FFFF	PULSE	01FFFF
DATA 00 00 00 00 00 00 00 00 00 00	DEC BC	LOOPS	00
DATA 00 00 00 00 00 00 00 00 00 00	LD B,0		70
DATA 00 00 00 00 00 00 00 00 00 00	OR C		01
DATA 00 00 00 00 00 00 00 00 00 00	JR NZ,LOOPS		20PR
DATA 70 70 70 70 70 70 70 70 70 70	LD HL,(0-FILE)	CLEAR	00
DATA 70 70 70 70 70 70 70 70 70 70	LD DE,0003		20000
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,DE		10
DATA 00 00 00 00 00 00 00 00 00 00	LD C,10	LOOP7	0010
DATA 00 00 00 00 00 00 00 00 00 00	LD HL,00	LOOPS	0000
DATA 00 00 00 00 00 00 00 00 00 00	INC HL		01
DATA 00 00 00 00 00 00 00 00 00 00	CJNE,LOOPS		10PR
DATA 00 00 00 00 00 00 00 00 00 00	LD HL,00		00
DATA 00 00 00 00 00 00 00 00 00 00	LD DE,0003		00
DATA 00 00 00 00 00 00 00 00 00 00	INC HL		00
DATA 00 00 00 00 00 00 00 00 00 00	DEC C		00
DATA 00 00 00 00 00 00 00 00 00 00	JR NZ,LOOP7		00PR
DATA 00 00 00 00 00 00 00 00 00 00	LD B,0	AND	00
DATA 00 00 00 00 00 00 00 00 00 00	LD D,00		1000
DATA 00 00 00 00 00 00 00 00 00 00	PUSH DE		00
DATA 00 00 00 00 00 00 00 00 00 00	POP HL		00
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,HL		00
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,HL		00
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,HL		00
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,HL		00
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,HL		00
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,HL		00
DATA 00 00 00 00 00 00 00 00 00 00	LD DE,(0-FILE)		00000000
DATA 00 00 00 00 00 00 00 00 00 00	INC DE		10
DATA 00 00 00 00 00 00 00 00 00 00	ADD HL,DE		00
DATA 00 00 00 00 00 00 00 00 00 00	LD HL,DE		10



ZX81 GAME

LD B,80		AND0	JP Z,SCORE1		CO5040
ADD HL,8C		80	LD INLI,10		2010
SET		C0	LD HL,10004		PR0400
LD BC,8001	MOVE	010100	LD R,10007		200740
CP 01		0001	CALL MOVE		CO4041
JR NC,STEP1		0000	LD 10004,HL		000440
INC HL		00	LD R,INLI		0000
SET		C0	JP 00		CO0040
LD 00	STEP1	0000	CP NC,SCORE0		FE17
JR NC,STEP2		0000	CP 07		CO0040
DEC HL		00	JP Z,SCORE0		FE10
SET		C0	LD CHLI,17		CO0040
CP 03	STEP2	0000	LD OF,0100		2017
JR NC,STEP3		0000	LD OF,0100	SEARCH	00
ADD HL,8C		00	LD 00		CO0000
SET		C0	CALL R0000		10
INC HL,8C	STEP3	0040	LD R,0		40
SET		C0	LD R,1		01
LD R,INLI	INC00	70	LD C,0		10
CP 00		0000	INC D		0000
JR NC,STEP4		0000	LD R,80		0000
LD R,8C		0000	LD Z,R0000		0000
INC R	STEP4	0000	CALL F00000		CO0007
CP 00		0000	LD D,INLI		70
JR NC,STEP5		0000	CP 00		FE10
LD INLI,8C		0000	JP NI,CHAR1		0000
DEC HL		00	LD D,80		1041
LD 0000		1007	LD D,0100		FE04
LD INLI,R	STEP5	77	CP 00	CHAR1	0000
SET		C0	JR NC,CHAR2		0000
CALL BORDER		00740	LD R,00		0000
LD SC,0000		0000	JR DIR0		1000
CALL PRINT-AT		0000	CP 00	CHAR2	FE10
LD SC,0000		0000	JR NI,CHAR3		0000
LD D,INLI	LOOP0	70	LD R,00		1001
CP 00		0000	JP DIR1	CHAR3	FE10
JR Z,STEP6		07	LD R,8C		FE10
SET 10		07	LD R,00		0000
DEC HL		00	LD DIR0	CHAR4	FE00
LD V,80	STEP6	1007	CP 00		0000
LD V,80	LOOP0	0041	JR NC,CHAR5		0000
LD D		10	LD R,00		1001
JR NC,LOOP0		0000	LD DIR1	CHAR5	FE10
LD SC,0000		0000	CP 00		0000
CALL PRINT-AT		0000	JR NI,CHAR6		0000
LD R,00		0000	LD R,00		1010
SET 10		07	LD DIR0	CHAR6	FE10
LD R,04		0000	CP 00		0000
SET 10		07	JR NI,CHAR7		0000
LD R,80		0000	LD R,01		FE01
SET 10		07	CP 01	CHAR7	FE10
SET 10		07	LD NI,CHAR8		0000
SET 10		07	LD R,01		FE01
LD C,10		0010	JR DIR1	CHAR8	FE00
CALL PRINT-AT		0000	CP 00		0000
LD R,07		0007	JR NC,NOCHR		0000
SET 10		07	LD SC,0000		0000
LD R,04		0004	LD NOCHR		0000
SET 10		07	LD 10000,R	DIR1	0000
LD R,00		0000	LD NOCHR		0000
SET 10		07	LD 10007,R	DIR2	000740
SET 10		07	CP 00		01
SET 10		07	DEC C		10
SET		00	LD C,0		70
CALL 01000		000041	CP 00		00
LD SC,10000		00100000	JR KC,SEARCH		0000
CALL BND		000041	LD R,0		FE00
LD 10000,HL		000000	CP 00		00
LD CHLI,10		0000	JP NEXT0		C00041
LD SC,10004		000040	LD HL,10-FILE	SCORE1	000040
CALL BND		000041	LD OF,0010		100000
LD 10004,HL		000040	LD HL,00		10
LD INLI,07	NEXT0	000040	CALL INC0		C00041
LD HL,10000		000040	SET		C0
LD R,10000		000040	LD H,10-FILE	SCORE2	000040
CALL MOVE		000041	LD SC,0000		100000
LD 10000,HL		000040	INC HL,00		10
LD R,INLI		70	CALL INC0		C00041
CP 00		0000	SET		C0
JR NC,SCORE1		000040	LD SC,0000		C00041
CP 10		0010	CALL INC0		C0
CP Z,SCORE1		C00040	RET		C0
CP 17		FE17			

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These two books provide a graduated course in machine code programming on the ZX Spectrum. Book one starts off with the basic elements of machine code, followed by an explanation of binary math, hexadecimal and base conversion, leading to quickly and painlessly application code for the code and types of addressing the Spectrum.



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Microcode, Instruction 1, and

32bit Disassembly

Richard Ross Leamy — 44 95

The 170 page reference work

for Spectrum machine code

programming contains a full

disassembly of the Spectrum

80bit with details of the

Microcode and Instruction 1

Features of the characteristic

while 32bit instructions are

used as LDA, SLL instead of MOV, A, B

relates usage show the correct decimal value used for

each hex value are detailed and are printed without notes,

decimal values are preceded by a plus or minus sign, and

some make instructions are followed by data types. The

book's address of all correct machine code errors

reported routine have been named, using where possible

the standard names showing the position. The chapter

includes in the Microcode/Instruction 1 section of the book

include the 32bit instruction Microcode/Character data,

Local Area Network, Network Algorithms, System

Variables and is necessary of functions. This book is a

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# Run, rabbit, run

Could be rabbit stew on the menu today unless you get lucky in this program by Nick McQuaker of Stockport.



In this game, you must avoid running roundside (round all all sides) if the rabbit of the game is to eat itself. So as the maze-solving program for each of your rabbit, the action is the greatest.

The maze also contains a jumping dog which tries to chase the rabbit around the maze. Should the dog catch the rabbit character, the game will end.

There are four different mazes which represent varying levels of difficulty. When you have completed each maze full of code, you will be presented with a maze one.

## Line by line

Here is a brief breakdown of the program highlighting the main text.

- Lines 1-20     Initials the graphics and call the subroutines for the instructions and for defining the maze default graphics.
- Lines 30-200    Draw the maze and call the subroutines for setting the difficulty.
- Lines 240-470   Move the rabbit and the dog.
- Lines 1000-1110   End the game.
- Lines 2000-2060   Set the level of difficulty.
- Lines 3000-3130   Continue the instructions.
- Lines 4000-4120   Define the user-defined graphics.
- Lines 5000-5100   Set some variables. When the program is over, it uses the format: GRAVE "RABBIT" LINE 1.

```

1 BORDER 2 PAPER 1 INK 7: C
-3
2 LET v=0 LET aa=0 LET cc=0
3 GO SUB 1000
4 GO SUB 4000
5 PRINT AT 10,0:"DO YOU WANT
INSTRUCIONS?"
6 LET x=INKEY$ IF x$="" THE
7 GO TO 8
8 IF x$="N" THEN GO SUB 2000
9 CLS PRINT AT 10,0:"WHAT L
EVEL DO YOU REQUIRE?"
10 IF INKEY$="" THEN GO TO 12
11 LET c$=INKEY$
12 IF c$="1" AND c$<"3" AND
c$>"0" AND c$<"4" THEN GO TO 1
13
14 DIM s(100,0)
15 BORDER 2 PAPER 7: INK 8: C
-5
16 LET l=0
17 LET i=10 LET c=00 LET p=0

```

```

LET v=0 LET aa=00 LET s=1
20 LET s=1 LET n=?
25 IF c=00 THEN LET v=1
30 PRINT AT 0,0:
40 PRINT "
50 PRINT "
60 PRINT "
70 PRINT "
80 PRINT "
90 PRINT "
100 PRINT "
110 PRINT "
120 PRINT "
130 PRINT "
140 PRINT "
150 PRINT "
160 PRINT "
170 PRINT "
180 PRINT "
190 PRINT "
200 PRINT "
210 PRINT "
220 PRINT "
230 PRINT "
240 PRINT "
250 PRINT "
260 PRINT "
270 PRINT "
280 PRINT "
290 PRINT "
300 PRINT AT 10,0:
310 PRINT AT 0,0: INK 1:
320 IF v=1 s=1 THEN GO SUB 200
330 PRINT AT 0,25: PAPER 6: INK
340 PRINT AT 1,25: PAPER 6: INK
1: INK 8

```

```

005 PRINT AT 2.5, PAPER 2, INK 4
006 PRINT AT 1.0, INK 1, PAPER 2
007 PRINT AT 5.0: INK 4, "R", AT L.C. INK 4
008 PAUSE 100
009 LET S=ATTC (2,0)
010 IF S=0 THEN PRINT AT 5.0, I
011 S=S+1
012 IF S=1 THEN PRINT AT 5.0, I
013 S=S+1
014 PRINT AT L.C. INK 1, "P"
015 LET S=1 LET W=C
016 LET S=1 LET W=C
017 IF S=0 THEN LET W=1 GO TO 040
018 IF W=1 THEN LET S=0
019 IF S=0 AND C=0 THEN GO TO 1
020 IF INKEYS="0" THEN LET C=C+1
021 IF INKEYS="9" THEN LET W=W+1
022 IF INKEYS="7" THEN LET W=W-1
023 IF INKEYS="8" THEN LET C=C+1
024 IF INKEYS="x" THEN CLS GO TO 1010
025 IF S=0 OR C=0 THEN PRINT AT W, Y, INK 1
026 LET W=SCREENS (1,C)
027 AND ATTC (1,C)=S THEN LET I=I+1
028 IF I=4 THEN LET C=C+1
029 IF C=5 THEN LET C=0
030 IF L=0 AND C=0 THEN GO TO 1
031 LET W=I+1, I=1
032 IF S=0 THEN LET S=C+1
033 S=S+1
034 IF S=10000 THEN LET I=1
035 IF S=10000 THEN LET C=0
036 IF S=10000 THEN LET C=0
037 IF S=10000 THEN LET C=0
038 IF S=10000 THEN LET C=0
039 POINT AT 1.0, 1.0
040 IF L=1 THEN LET S=S+1
041 IF L=1 THEN LET S=S+1
042 LET W=SCREENS (1,C)
043 AND ATTC (1,C)=S THEN LET I=I+1
044 IF S=0 AND C=0 THEN LET S=C
045 LET S=C
046 LET S=C
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096 LET S=C
097 LET S=C
098 LET S=C
099 LET S=C
1000 PRINT AT L.C. INK 4, "R" FO
S=10 TO 0
1001 GOTO 000,P
1002 NEXT P

```

```

1000 CLS PRINT AT 5.0, FLASH 1
1001 PRINT AT 5.0, "PRESS R TO S
1002 PRINT AT 5.0, "PRESS R TO P
1003 PRINT AT 5.0, "PRESS R TO R
1004 PRINT AT 10.10, FLASH 1, "
1005 PRINT AT 10.10, FLASH 1, "
1006 IF INKEYS="R" THEN GO TO 1
1007 IF INKEYS="P" THEN GO TO 1
1008 CLS
1009 PRINT AT 10.10, FLASH 1, "R
1010 PRINT AT 10.10, FLASH 1, "R
1011 STOP
1012 REM Change page "AT 5.17,"
1013 PRINT AT 5.17, "AT 5.17,"
1014 PRINT AT 5.17, "AT 5.17,"
1015 IF S="0" THEN RETURN
1016 PRINT AT 4.14, "... AT 14.14
1017 LET I=I+1
1018 IF S="7" THEN RETURN
1019 PRINT AT 0.0, "AT 0.04,"
1020 LET I=I+1
1021 IF S="x" THEN RETURN
1022 CLS
1023 PRINT AT 0.10, "INSTRUCTIONS
1024 PRINT AT 0.0, "The object
of the game is to get all the
dots in the space without get-
ting eaten by the dog first. There
are four levels of difficulty
1025 PRINT AT 0.2, "THE ADDITION
OF 1+1=2"
1026 PRINT AT 10.2, "THE DOG HAS
A MOUTH...DAN"
1027 PRINT AT 10.2, "CONTROLS"
1028 PRINT AT 14.2, "LEFT....S"
1029 PRINT AT 10.2, "RIGHT....R"
1030 PRINT AT 10.2, "UP.....7"
1031 PRINT AT 17.2, "DOWN....0"
1032 PRINT AT 10.2, "Press x to s-
top any key"
1033 IF INKEYS="R" THEN GO TO 1011
1034 RETURN
1035 FOR N=0 TO 7
1036 READ row POKE USR "P"+N,0
1037 NEXT N
1038 FOR N=0 TO 7
1039 READ row POKE USR "D"+N,0
1040 NEXT N
1041 FOR N=0 TO 7
1042 READ row POKE USR "R"+N,0
1043 NEXT N
1044 DATA 30,40,40,04,06,04,00,0
1045 DATA 0,7,24,00,170,04,100,1
00
1046 DATA 0,0,70,100,240,100,70,
0,0
1047 RETURN
1048 PRINT AT 1.0, INK 1, PAPER
2, FLASH 1
1049 GOTO 000,P
1050 PRINT AT 0.10, FLASH 1, "PRESS
R TO"
1051 PRINT AT 0.20, "BEGIN"
1052 IF INKEYS="R" THEN GO TO 000
1053 CLS
1054 RETURN

```

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# Missile attack

Defend your HQ in this Spectrum program written by Wolfgang Huebl of Austria.



Your aim at this game is to defend the Moonbase HQ against a missile attack from the alien invaders.

When you first run the program you are presented with two sheets of instructions explaining the operation of the game. Then you will be invited to press the **A** key to begin the game.

## Missile madness

When the game is first set up you will see the commander of the Moonbase with a HQ block perched at the top of a mass crater. At the bottom of the screen is a line gun which fires dangerously across the screen. It is your job to be lithe enough to maneuver the missiles which cross the screen from left to right to stop them reaching the HQ.

There are two different types of missile: black and yellow and these can only be destroyed with the right kind of command key from your gun. You must press the **Q** key to fire a death ray to destroy the black missiles and the **A** key to destroy the yellow missiles. You get one shot at each missile so don't waste your shot!

If you manage to hit one of

the missiles, there is one or more BEEP and the word HIT appears on the screen near to where the missile was destroyed. You score one point for each black missile you shoot down and two points for each yellow missile if two missiles are shot down simultaneously. You score ten points although if you miss scores at least you will score no points at all.

Should you miss a missile, it will continue on its path and cause destruction to the HQ if the alien invaders are very tight in the first place. If the HQ is destroyed by using a path for a missile to get through-out hit the commander of the moonbase, the game will end.

There are three goal levels pertaining to the various aliens you must reach before the alien invaders stop firing missiles at your HQ. On level one you must achieve more than 30 points, on level two you must get 50 points and on level three you must destroy missiles worth 70 points before the enemy goes **LO**.

## Line by line

Here follows a breakdown of the program for you to get a better idea of what is going on

Lines 30-80	Contains routine to open the program and to choose the goal level.
Lines 100-104 and 500	Contains the routine which selects the random numbers to decide what will go where.
Lines 103-170	Contains a routine to make a missile fly and also to allow you to fire a shot at it.
Lines 200-250	Contains a routine which destroys a portion of the HQ should a missile hit it.
Lines 300-350	Contains a routine to make a missile fly and also to check if it has exploded on its path.
Lines 500-575	Contains a routine to make two missiles fly at once and also to allow you to shoot at it.
Lines 700-830	Contains a routine to make two missiles fly at once and also to check if they hit anything on their path.
Line 900	Contains a routine which prints when a missile hits the commander of the moonbase.

## Variables

	symbol	Defines the column at which the missile will be printed at the end
Here follows a list of the most variables used throughout the program		
	<b>C</b>	Determines the colour of the missile
	<b>ATT</b>	Attribute of missile's last position
	<b>ATR</b>	Attribute of missile's next position
<b>d</b> Data used for the user-defined graphics	<b>e</b>	
<b>f</b> Score 0 to 254	<b>e</b>	
<b>h</b> Hours at which the HQ is put under attack	<b>e0</b>	Determines whether the black missile is still moving on has been destroyed. Has to be changed to 0 if already off screen.
<b>i</b>	<b>e2</b>	Score to +0 but for the yellow missile.
<b>score</b>		
<b>z</b>		

Lines 90-25, 1000

Contains the routine to set the user-defined graphics.



## SPECTRUM GAME

```

10 FOR A=0 TO 99
20 READ S PUNK USR "R"to,d
30 NEXT S
30 BORDER S PAPER S CLR
40 PRINT AT 0,7,INK 1,"
1. MISSILE ATTACK"AT 0,7,IN
1.
50 PRINT "Defend your base--
"Send your fire against a missi
le attack"
60 PRINT "Use your fire
"to destroy the missiles"
70 PRINT "Shoot down t
he black missiles with your F-2
"missile P to Shoot and gain one
point
80 PRINT "Use your G-R
"to shoot at the white ones!
"Use A to shoot A hit adds 1
to your score"
90 PRINT "Sometimes we
"will face 2 missiles at once, by
"attacking both you'll gain 5 point
1.
99 PRINT "Press any ke
y to continue"
99 IF INKEY="" THEN GO TO 50
99 CLR
99 PRINT "If a missile h
its your HQ a part of the protec
tion shield will disintegrate"
99 PRINT "If you are h
it the game is over"
99 PRINT "Choose still
-level now press 1,2 or 3"
70 LET I=INKEY
70 IF I=1 AND (A<10) AND
(A<10) THEN GO TO 70
70 LET I=LEVEL
74 PRINT "Level "I,"You'll
need a 10+score" points to ea
ch the money give up
75 PRINT "You have 0.1
"one shot for one missile"
75 PRINT "Press 0 to s
top the game"
80 IF INKEY="0" THEN GO TO 0
101 BORDER 1 PAPER 0 LET I=0
CLR
102 LET S=1 LET A=1-1 PRINT
AT 0,0,LEVEL-1, DRAW INK 0, 0,7
10 PRINT AT 0,0,0,0,0,0,0,0,0,0
10 PRINT AT 0,1,0,0,0,0,0,0,0,0
10 PRINT AT 0,2,0,0,0,0,0,0,0,0
10 PRINT AT 0,3,0,0,0,0,0,0,0,0
10 PRINT AT 0,4,0,0,0,0,0,0,0,0
10 PRINT AT 0,5,0,0,0,0,0,0,0,0
10 PRINT AT 0,6,0,0,0,0,0,0,0,0
104 IF A=0 TO 10,0,1-47 THEN DRAW
100 0,100,100 DRAW INK 0,-100,-
100
105 IF INT (RAND*510) THEN GO TO
105
106 LET S=1 LET W=INT (RAND*5)
107 LET Y=0+INT (RAND*5) LET
W=INT (RAND*5,00)
107 PRINT AT W,Y,INK 1,"E"
108 IF S=1 AND INKEY="P" THEN
109 100,100 DEEP 0,0,1,00 DRAW
110 0,100,-100 LET S=0
110 IF S=0 AND INKEY="S" THEN
109 100,100 DEEP 0,0,1,00 DRAW
110 0,-100,-100 LET S=0
110 LET X=INT (Y,X)
110 IF I=0 AND S=10 THEN GO TO
110
111 IF I=0 AND S=47 THEN GO TO
110
112 PRINT AT W,Y," LET X=X+1
"IF X=0 THEN GO TO 300
113 GO TO 107
114 BORDER 0 PAPER 0 CLR PRINT A
T 10,10,FLASH 1,"YOU ARE DEAD"
PRINT AT 20,20,"SCORE = 3 FOR
"30 TO 40 STEP 10 DEEP 0,0,0,
"0 STEP
1000 DATA 0,0,0,0,10,100,200,300,400
200,300,400,500,600,700,800,900
0,1,0,7,14,20,26,32,38,44,50,56
0,0,0,0,0,100,200,300,400,500,600,700
0,0,0

```

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# MACHINE SPECIFICATIONS

## ZX80

### Dimensions

Width 134mm (5 1/4")  
Depth 218mm (8 5/8")  
Height 38mm (1 1/2")  
Weight 300g (10.5oz)

### Microprocessor/Memory

Z80A 3.28 MHz clock  
ROM: 4K bytes containing BASIC  
RAM: 1K bytes internal, externally expandable to 128K bytes

### Display

Requires an ordinary domestic black and white colour TV. The lead supplied connects between the ZX80 and your TV's aerial socket. The display organisation is 24 lines of 32 characters per line showing black characters on a white screen. The ZX80 does not connect to a printer.

### Programming

Programs can be entered on the keyboard or loaded from cassette. The ZX80 has automatic "wrap round" so lines of program can be any length but not more statements lines.

### Syntax check

The syntax of the entered line is checked character by character. A syntax error number marks the first place the syntax breaks down if there is an error. Once any errors have been added over the syntax error cursor disappears. Only syntax error free lines of code are accepted by the ZX80.

### Graphics

Total of 32 graphics symbols giving 48 x 64 pixel resolution consisting of 10 symbols plus space and various includes symbols for drawing bar charts. Under control of your BASIC program any character can be printed in reverse field.

### Editing

The line edit allows you to edit any line of program or input including statement numbers. The edit and cursor control keys are EDIT, RUBOUT, HOME.

### Arithmetic

Arithmetic operators +, -, \*, /, % separate. Ratiocational operators <, >, =, <=, >=, <>, <=, >=, <>, <=, >=, <>. Logical operators AND OR NOT yielding boolean result. Ratiocational operators also apply to strings. ZX80 BASIC uses 16 bit two's complement arithmetic (i.e. 32767).

### Variables

Numeric variable names may be any length, must begin with a letter and consist of alphanumeric. Every character in the name is significant thus an infinity of unique names is available.

String variables may be assigned to or from, characterised but not concatenated. String variable names are A\$ - Z\$. Strings do not require a dimension statement and can be any length.

Arrays have a maximum dimension of 255 (254 elements) each. Array names consist of a single letter A-Z.

Control variable names in FOR...NEXT loop consist of a single letter A-Z.

### Expression evaluator

The full expression evaluator is called whenever a constant or variable is encountered during program execution. This allows you to use expressions in place of constants especially useful in GOTO, GOSUB, FOR...NEXT etc.

### Immediate mode

The ZX80 will function in the "calculator mode" by simply typing a constant or statement if it is not preceded with a line number.

### Cassette interface

Works with most domestic cassette recorders. The transfer rate is 240 baud using a unique tape-recording format. Other systems are not compatible with the ZX80's. The ZX80 also saves the variables as well as the program on cassette. Therefore you can save the data for updating next time the program is executed. The ZX80 does not support cassette drive files. The lead supplied with the ZX80 is fitted with 3.5mm jack plug.

### Expansion bus

At the rear has 8 data, 16 address, 12 control lines from the processor and 0v, G, 5V, 0 and internal memory control lines. These signals enable you to interface the ZX80 to your own electronics, PIO, I/O, SIO, H you want I/O ports etc.

### Power supply

The ZX80 requires approximately 400mA from 7-11V DC. It has its own internal regulator.

### TV standard

The ZX80 is designed to work with UHF TV's (channel 28) and is the version approved for use in the United Kingdom. The ZX80 USA is designed to work with a VHF TV (American channel 2 - European channel 3) and is the version required for the American TV system, also for countries without UHF.

## ZX81

### Dimensions

Width 147mm (5 7/8")  
Depth 115mm (4 1/2")  
Height 40mm (1 5/8")  
Weight 350gms (12.5oz)

### Microprocessor/Memory

Z80A 3.28 MHz clock  
ROM: Containing 8K BASIC interpreter  
RAM: 1K bytes internal, externally expandable to 128K bytes

### Keyboard

40 key touch-sensitive membrane like function mode and single press key word system, this gives the equivalent of 91 keys and also graphics mode allows an additional 32 graphical and 24 numeric video characters to be entered directly.

### Display

Requires an ordinary domestic black and white or colour TV. The aerial lead supplied connects the ZX81 to the TV aerial socket. The display is organised as 24 lines of 32 characters with black characters on a white background.

### Two mode modes

The ZX81 can operate in two software selectable modes: FAST and NORMAL. FAST is ideal for really high-speed computing in NORMAL mode however the ZX81 allows comprehensive viewing flicker free expanded displays.

### Printer

The 8K ROM will permit connections (LPRINT, LIST and COPY) to drive the Sinclair ZX Printer.

### Programming

Programs can be entered via the keyboard or loaded from cassette. Programs and data can be saved onto cassette so that they

## SPECIFICATIONS

are not lost when the ZX81 is turned off by its check.

The syntax of a line of program is checked on entry. A syntax error cursor marks the first place the syntax breaks down if there is an error. The syntax error cursor disappears when errors have been corrected. Only lines free from syntax errors will be retained into the program.

### Graphics

Apart from the 20 graphics characters (space and its inverse), the display may also be divided into 84 x 44 pixels, each of which may be "blacked" in or "retained" out under program control.

### Editing

A line editor allows you to edit any line of program or input, including program line numbers. Lines may be deleted, or moved or deleted in place.

### Arithmetic

Arithmetic operators +, -, \*, exponentiation. Potential operators =, <, >, <=, >=, <>, like compare, and and arithmetic variables to hold 6 (float) or 1 (fixed) Logical operations AND OR NOT valid boolean result.

### Floating point numbers

Numbers are stored in 5 bytes in floating-point binary, here giving a range of  $\pm 3 \times 10^{-11}$  to  $\pm 7 \times 10^{11}$  accurate to 6% decimal digits.

### Scientific functions

Standard logarithms: SIN, COS, TAN and their inverses SIN<sup>-1</sup> or

### Variables

Alphabetical string any letter followed by alphanumerics

### FOR NEXT loops

As to Z1  
A-Z (locks may be used to any depth).

### Numerical arrays

As to Z1  
A-Z  
As to Z1

### Array

Arrays may be multi-dimensional with subscripts starting at 1.

### Expression evaluator

The full expression evaluator is called whenever an expression constant or variable is encountered during program execution. Its powerful features allows use of assignments in place of constants and is especially useful in GOTO, GOSUB etc.

### Command mode

The ZX81 will execute statements immediately, enabling it to perform like a calculator.

### Graphic interface

Works using domestic video recorders. The transfer into a 250 line set uses a unique recording format not compatible with other systems. The ZX81 will save the data as well as the program to avoid the need to re-enter the data when the program is next loaded.

ZX81 will search through a tape for the required program. The cassette levels supplied have 2 5 min. give away.

### Expansion port

At the rear, this has the full data address and control lines from the ZX81 CPU, as well as DY +5V, +9V and the memory select lines. These signals enable you to interface the ZX81 to the Sinclair 10K RAM pack and ZX printer.

### Power supply

The ZX81 requires approximately 420mA at 7-9V DC. It has its own internal 5V regulator. The fully assembled ZX81 comes complete with a power supply. The ZX81 kit does not require a power supply.

### TV standard

The ZX81 is designed to work with LHF TVs (internal 361 626 lines).

# ZX SPECTRUM

### Dimensions

Width 232 mm  
Depth 144 mm  
Height 80 mm

### CPU/Memory

60A microprocessor running at 3.5 MHz. 10K bytes RAM can be expanded to 64K bytes with external and operating system. 16K bytes 256K tape optional. 12K bytes RAM on internal expansion board or 48K bytes RAM.

### Keyboard

40-key keyboard with upper and lower case with capitals lock feature. All 64-70C words displayed by single key plus 186 alpha characters, 22 colour control codes and 21 user-definable graphics characters. All keys have auto repeat.

### Display

Memory mapped display of 288 pixels x 192 pixels plus one attribute byte per character screen. Defining one of eight foreground colours, one of eight background colours, raised or extra brightness and flashing or steady. Screen border colour also available to one of eight colours. RGB drive a PAL (LHF) colour TV set or black and white set which will give a colour grey on channel 35.

### Sound

Internal loudspeaker can be operated over more than 10 octaves (usually 130 semitones) via basic 80CP command. Jack socket at the rear of computer allows connection to external amplifier/speaker.

### Graphics

Pixel line style and end drawing commands in high-resolution graphics.

16 pre-defined graphics characters plus 21 user-definable

graphics characters. Also functions to yield character at a given position, attributes at a given position, brightness, brightness and whether a pixel (dot) is set. Text may be written onto screen or 24 lines of 32 characters. Text and graphics may be freely mixed.

### Colors

Foreground and background colours, brightness and flashing are set by BASIC BK, PAPER, BRIGHT and FLASH commands. ZX81 may also be set, which performs an exclusive — or operation to overwrite any printing or plotting that is already on the screen. WYVERSE will give reverse video printing. These bits commands may be intelligible to cover all further PRINT, PLOT, DRAW or CIRCLE commands, or locally within basic commands to cover only the results of the programmed. They may also be used locally to control the screen by an (PRINT) statement. Colour control codes, which may be 60C entered from the keyboard, may be inserted into text or code as one byte, and when displayed will override the globally set colours until another control code is encountered. Brightness and flashing codes may be inserted into programs or text similarly. Colour control codes in a program listing have no effect on the screen. Border colour is set by a BORDER command. The eight colours available are black, blue, red, magenta, green, cyan, yellow and white. All eight colours may be changed on the screen once, with same area flashing and others steady, and any area may be highlighted once bright.

### Screen

The screen is divided into two sections. The top section — normal for the first 23 lines — displays the program listing or the results of programs or command execution. The bottom section — normally the last 3 lines — shows the command or program line currently being entered, or the program line currently being edited. It also shows the report messages. Full editing facilities of cursor left, cursor right, insert and delete (with auto-repeat facility) are available over this line. The bottom section will respond to accept/curved key of up to 23 lines.



#### Mathematical Operations And Functions

Arithmetic operations of  $+$ ,  $-$ ,  $*$ ,  $/$ , and  $\wedge$  (to a power). Mathematical functions of sine, cosine, tangent and base-e (natural) value of logs and reciprocals, sign function, absolute value function, and integer function, square root function, random number generation, and pi. Operates in the standard five types of floating point format — giving a range of  $\pm 3 \times 10^{-38}$  to  $\pm 7 \times 10^{38}$  accurate to 9 1/2 decimal digits. Binary numbers may be entered directly with the full form  $bin <n>$ ,  $bin <n>$ ,  $bin <n>$ ,  $n$  and  $<n>$  may be used to compare strings or integers, values or variables to yield 0 (false) or 1 (true). Logical operators AND, OR and NOT yield boolean results but will accept 0 (false) and any number (true). User-definable functions are defined using GOSUB, and called as GOSUB. They may take up to 20 numeric, and 20 string arguments and may produce string or numeric results. There is a full 64K RAM mechanism, using the commands READ DATA and RESTORE. A real-time clock is obtainable.

#### String Operations And Functions

Strings may be concatenated with  $+$ . String variables or values may be compared with  $=$ ,  $<$ ,  $>$ ,  $<=$ ,  $>=$ ,  $<>$ , or  $=$  to give boolean results. String functions are VAL\$, VAL\$, STR\$, LEN, CHR\$, CHR\$, and CHR\$ (concatenating characters and/or strings), using the ASCII code. A string-finding mechanism exists, using the form of a FOR.

#### Variable Names

Names may be string starting with a letter (upper and lower case are not distinguished between), and spaces left ignored. String — A-Z to Zz. FOR-NEXT loops — A-Z. Numeric words — A-Z. String variables and arrays with the same name are allowed and distinguished between.

#### Arrays

Arrays may be multidimensional, with subscripts starting at 1. String arrays, technically character arrays, may have their last subscript omitted, yielding a string.

#### Expression Evaluator

A full expression evaluator is called during program execution whenever an expression contains variables/labels encountered. This allows the use of expressions as arguments to GOTO, GOSUB etc.

It also operates on commands allowing the ZX Spectrum to operate as a calculator.

#### Carriage Control

A line leader is recorded before the information to overcome the suspension resulting from fluctuations of some tape loaders, and a carriage return is used to remove noise on playback. All record information is stored with a leader containing information both as to the type, file, length and address information. Program, screen, blocks of memory, string and character arrays may all be saved separately. Programs, blocks of memory and arrays may be verified after saving.

Programs and arrays may be merged from tape to combine them with the existing contents of memory. Where large line numbers or variable names are used, the old one is overwritten. Programs may be saved with a line number, where execution will start immediately on loading.

The carriage interface uses an 1500 baud, through two 3 1/2 inch disk platters.

#### Expansion Port

This has the full data, address and control buses from the Z80A and is used to interface to the ZX Printer, the MSX32 add-on kit (also uses the ZX Microdrive), IN and OUT commands give the I/O port equivalents of PEEK and POKE.

#### Z80 Compatibility

Z80 (BASIC) is essentially a subset of ZX Spectrum 48K. The differences are as follows:

FAST and SLOW: The ZX Spectrum operates at the speed of the Z801 in FAST mode with the steady display of SLOW mode and does not include these commands.

SCROLL: The ZX Spectrum scrolls approximately using the operation "scroll" — entry time is almost 1/3 that.

PRINT: The ZX Spectrum can print a page using PLOT OVER, and thus achieve 24 lines.

Character set: The ZX Spectrum uses the ASCII character set (as opposed to the Z801 non-standard set).

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**Auto-Data** is a multi user management system which runs on the ZX Spectrum. It controls single transmitter personal and multi-line banking systems, supermarket inventory and stock control and may be applied to any bank, retail or industrial business. It provides an easy to use program which can be written for any ZXSX processor. **Auto-Data** is one of our year-on-year programs. It is also **Auto-Data** will be available from most good software stores. Auto-Data may also be purchased on rental basis for £5.00 per hour, including the SAC Computer Services (Sunderland), 99 Thorne Crescent, Sunderland, Sunderland D02 9AS. Details of our products will be available on request.

#### TAPE COVER

**LIMITED** is a multi-user program for the ZX Spectrum. It allows you to write programs in BASIC or PASCAL and compile them into a tape image. It also allows you to write programs in BASIC or PASCAL and compile them into a tape image. It also allows you to write programs in BASIC or PASCAL and compile them into a tape image. It also allows you to write programs in BASIC or PASCAL and compile them into a tape image.

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#### SPECTRUM REPORT WRITING HELP GUIDE

**REPORT WRITING HELP GUIDE** is a multi-user program for the ZX Spectrum. It allows you to write programs in BASIC or PASCAL and compile them into a tape image. It also allows you to write programs in BASIC or PASCAL and compile them into a tape image. It also allows you to write programs in BASIC or PASCAL and compile them into a tape image.

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#### ALLOTMENT (2001 HX)

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#### SPECTRUM POOLS PREDICTOR

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#### WALL SCREEN for ZX Spectrum

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#### ASP SPECTRUM

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#### PLAY THE GUITAR

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