POPULAR Computing WEEKLY

15 July 1982 Vol 1 No 13

35p

Creator on ZX81

1K ZX Chess

Vic Breakout

Data transfer

Vic characters

Spectrum Graphics



Win a ZX Spectrum & ZX Printer - details inside

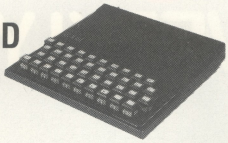
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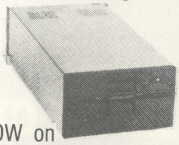
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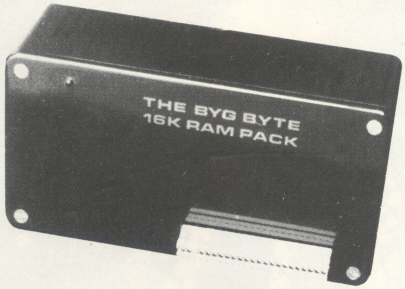


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Editor
Brendon Gore

Reporter
David Kelly [01-930 3271]

Sub-editor
Peter Harvey

Editorial Secretary
Fiona McCormick

Advertisement Manager
David Lake [01-839 2846]

Advertisement Executive
Alastair Macintosh [01-930 3840]

Managing Editor
Duncan Scot

Publishing Director
Nick Hampshire

Popular Computing Weekly,
Hobhouse Court, 19 Whitcomb Street,
London WC2
Telephone: **01-839 6835**

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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long.

All submissions should be typed and a double space should be left between each line.

Programs should, whenever possible, be computer printed.

At present we cannot guarantee to return every submitted article, so please keep a copy.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week



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Editorial

When Clive Sinclair first launched his ZX Spectrum in April, it was widely acclaimed as a breakthrough in low cost engineering.

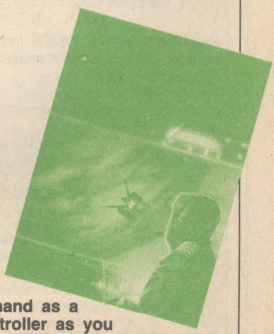
However, the ZX Microdrive, announced at the same time as the Spectrum, excited as much if not more interest among the microcomputing fraternity. The Microdrive, said Sinclair, could hold up to 100K bytes on a single interchangeable microfloppy, with a transfer rate of 16K bytes a second.

The Microdrive is due to be released later this year, probably in October, and will cost about £50. As with the ZX Printer, it should be possible to connect the Microdrive to other microcomputers apart from the Spectrum.

But, little has been heard of the Microdrive since it was first announced. Indeed, there has been some speculation that the Microdrive is not a disc system at all, but some form of tape storage method.

Either way, I suspect that when the Microdrive appears, it will prove to have some surprises in store.

Next Week



Try your hand as a NASA controller as you attempt a soft landing on Jupiter in a new game called Voyager

Classified

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BBC ASTEROID BELT GAME — with **Free Pair of Paddles** thrown in! £11.50. Electronics Applied, 4 Dromore Road, Carrickfergus, Co Antrim BT38 7PJ.

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National ZX Users Club, PC, 44-46 Earls Court Road, London W8 6EJ.

THREE MACHINE CODE GAMES for the ZX81-16K. Byte-man — eat your way around the maze before the ghouls catch you — or eat a "power-pill" and chase them! Also Space Fighter and Bridge Bomber. All for only £2.95. "Mindseye", 12 North Grove Drive, Leeds LS8 2NJ.

BBC COMPUTER, Model B. Complete with 30-hour Basic, some tapes, books and magazines, £400. Telephone Thistleton 735.

ZX81 16K Ram, printer, PSU, books, manuals, leads, separately or together. £110 ono. 027-970 284.

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ZX81 16K mortgage program, gross and nett monthly repayments. Reducing principal. Estimate effect of inflation on real costs, £4. Contact Dr. Pickup, 47 Ellesmere, Burnmoor-Houghton-le-Spring, Tyne and Wear, DH4 6EA.

ZX81 for sale with power supply and manual, £50. Tel: Rainford 3141.

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ZX81 "BASIC EXTRA": INPUT (flashing cursor, prints on screen), READ, RESTORE, DATA, AUTO-SCROLL routine (prevents errors), £4. M. Whitfield, 66 Bramblebury Road, London SE18 (sae for details).

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ZX81 16K LIBRARY INDEX. Accepts 600 entries with shelf No: + machine/code sort by Author/Title. Prints our 11 categories; Fiction, Non-fiction, etc. Can be modified for other listings. Cassette, £5. Durst, Coltscombe, Swerford, Oxon.

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BBC MICRO GAMES. Cassette A (Models A and B): Space Invaders (machine code), Dodgems Breakout — £5 (inc.). Cassette B (Model B only) Pacman (machine code) 3D Maze — £5 (inc.). Both cassettes for £9 (inc.). From B. Cridland, 8 Bowness Avenue, Fleetwood, Lancs FY7 8PA.

CASIO FX-60ZP programmable-calculator. Alpha-numeric display. Manual, program library, batteries and wallet included. Worth £75. Nearly new. £50. 01-328 1122.

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VIC-20 PLUS 16K RAM and C2N cassette unit with "Spiders from Mars" ROM, "Encounter" (16K) tape, further software and books. All new, £270. Bexhill 221415.

ATOM MICRON — HEARING IS BELIEVING — ZX81 GENIE

TELESOUND 82 combines with most home computers allowing full spectrum sound effects to be heard through an unmodified television set. Incredible but true, the Telesound 82 unit fits SINCLAIR's ZX81 to get realistic sound effects even with animated graphic games. Connections are made easy by leads fitted with alligator clips. The Telesound 82 ready built, complete with program for the above computers, costs only £9.95 incl.

COMPUSOUND
32 Langley Close, Redditch, Worcs B98 0ET

ZX 81, 16K memory, plus handbook. £80. Telephone Kings Langley 67405 after 5 pm.

ZX81 16K, full travel keyboard, £25 of software including Defender and Asteroids. £95. Telephone Melksham 702884 after 6 pm.

ZX81 16K, tapes, books. Ramsbottom (070682) 3747. £65.

MOONBASE BETA
A new ZX81 adventure from Aquarius Software; stranded on a deserted moonbase your task is simply to escape alive. But before doing so you must explore the base, performing many difficult tasks. An extremely challenging game taking up the full 16K. **Only £4.95** from
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HANGMAN for ZX81 (16K), cassette, large vocabulary, £2.95. C. G. Newbould, 11 Juniper Rise, Killamarsh, Sheffield.

ZX81 16K "Torpedo": sink the ships moving across the horizon, "Dunkirk" (machine code), fast action, ferry the troops, beware the bomber. Both on cassette, £4.00. G. Allan, 21 Perth Street, Edinburgh EH3 5DW.

ZX81 plus 16K RAM, manual, leads plus packing, cassettes, altogether £90. Telephone 061-790 04931.

P-E-P, the Program Enhancement Package for the ZX81 (16K). 7 fantastic new features for your basic programs. Only £4.95 from R. & R. SOFTWARE, 34 Bourton Road, Gloucester.

ZX81 16K, boxed, M/C software, books, £69. Tel: 01-870 0278.

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Texas and Atari in micro price war

THE expected micro price war has begun.

Both Texas Instruments and Atari have significantly reduced the price of their home computers.

Texas Instruments have cut the price of their 16-bit TI 99/4A machine from £315 to £199.

Irfan Salim, TI's Marketing Manager, identifies three reasons for this dramatic price drop. A quickly developing UK market and resulting sales has allowed TI to drop their price. It has also meant that retailers can manage with a diminished profit margin. Lastly, the increasingly competitive market in Britain has been a major determining factor.

Atari, meanwhile, have cut the cost of the Atari 400 from £299.95 to £199.99. This price does not include the Basic programmer kit, now at £49.99, or the entertainment kit, now at £69.99.



The competing micros.

IBM used FBI to knock out competition

HITACHI and Mitsubishi have both denied that they acted illegally in acquiring information about IBM's latest computer (see *PCW* July 1).

It has been suggested that IBM may have involved the FBI to knock out the rival companies. IBM gave an undercover FBI agent confidential technical documents which were then used to trap the 18 accused Hitachi and Mitsubishi employees.

The case has now assumed an even greater importance. On June 30 the US Federal Grand Jury added the Hitachi company itself to the list of those accused.

Hitachi has reacted strongly to the move, denying that either it or its employees have engaged in illegal activities.

Hitachi may claim, in its defence, that its employees were entrapped by the FBI and IBM. If this were proven to be the case, its employees could not be convicted.

Out for the count in China

TWENTY-NINE specially imported IBM computers will be used to sort data from China's national census which began on June 30.

More than 5m enumerators will be employed in this, the largest data collection exercise in history.

The IBM machines will take over four years to process the data on China's estimated 996.22m population.

Binatone prepare £50 Woolworth's computer

BINATONE intend to produce their new 16K colour micro, which will retail at £49.95, in time for Christmas.

Gulu Lalvani, chairman of Binatone points out that, although the company may not be noted for its technical innovations, it has considerable experience of consumer electronics and retail pricing and marketing.

Now convinced that the micro market is here to stay, Binatone are confident that they can produce the product.

The machine will be manufactured and quality-checked in the Far East. In the UK it will be sold at a manufacturer's mark-up considerably less than that of the Sinclair ZX81.

Binatone will rely on high-volume sales to ensure that the venture will be successful.

Next year, Binatone plan to manufacture more than 300,000 of the micros. They will be sold, with a 12-month guarantee, through the company's usual outlets, including Woolworth and Rumbelow.



Spectrum ... still few available.

Long wait still for Spectrum

FOLLOWING the discovery of a design fault (*PCW* June 17) Sinclair is still only sending out a limited number of hand-modified Spectrums.

Full production capacity cannot be restored until new printed-circuit boards are manufactured. These are due in mid-August.

It seems likely that buyers will have to wait until at least the end of August before the hoped-for 28-day delivery is achieved.

A credit to us all

AMERICAN Express in the US received over 25,000 orders for the ZX81 home computer in the first three weeks of June.

This follows the decision to sell the Sinclair machine to American Express credit cardholders through a direct mail offer.

By noon the day after the mailing 2000 orders had already been received and American Express is predicting that final sales will top 50,000.

Computer control

AB Electronic Products Group, manufacturers of the BBC Acorn, are to join with British Leyland to produce a micro-based control system for Jaguar Cars.

Hard talk over alleged software pirating

TWO Vic20 software suppliers have clashed following the alleged piracy of games tapes.

Audiogenic is considering taking legal proceedings against Arfon Microelectronics, following an alleged copyright infringement of the games *Amok* and *Alien Blitz*.

Martin Maynard, Audiogenic's Managing Director, saw the offending software items displayed on the Arfon stand at the Commodore show in London last month. Audiogenic has exclusive distribution rights for these games.

While Arfon insist that the games were not being offered for sale, Maynard has issued an open letter to all Commodore dealers warning of the possible breach of copyright.

Audiogenic have instructed Arfon to stop manufacture and sales of *Amok* and *Alien Blitz*, to account for any money received from such sales, and to place trade advertisements giving notification that Arfon has no rights to the products.

"We are trying to protect our market and our authors," Martin Maynard told *PCW*. "We need a printed retraction to reassure them. Legal proceedings will take place only if Arfon does not comply."

Magazine plays the name-game

THE micro users newest magazine has been forced to change its name, apparently because of possible confusion between it and other publications.

July has seen lavish promotion for the new magazine from Argus Specialist Publications.

Unfortunately, the publication has appeared with several titles. On the cover it is *Personal Computing Today* but inside it is variously *Personal Computing* and *Personal Computing Monthly*.

Editor Ron Harris explained that the magazine had originally been called *Personal Computing*. "But the name has been changed to avoid confusion with an existing publication," he said.



Keyboard with Electronics for ZX81

A full-size, full-travel 43-key keyboard that's simple to add to your ZX81 and requires no soldering in the ZX81.

Complete with the electronics to make "Shift Lock", "Function", and "Graphics 2" single key selections making entry far easier.

Powered from ZX81's own standard power supply – with special adaptor supplied.

Two-colour print for key caps.

Amazing low price for complete build-it-yourself kit, only **£19.95** incl. VAT and carriage. Order As LW72P

Full details in the June 1982 issue of "Electronics – The Maplin Magazine" on sale at all good newsagents price 60p. In case of difficulty send 60p to address below, or £2.40 for annual subscription (4 issues).

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P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel (0702) 552911

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60 Lectures on small micro applications
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	Additional 2K memory chips for above (HM6116P-3)	£4.50	
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22 exciting MACHINE CODE routines that give you control over your screen as never before!

(ZX81 - 16K RAM ONLY)

Draw/Undraw draws or deletes your multi-character shape which is defined in a REM statement.
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Fill fills any number of lines you specify, starting at any line you specify, by your chosen character.
Reverse converts all characters to their inverse video, control as in FILL.
Print Position Controls UP, DOWN, LEFT, RIGHT. Alter your next PRINT position in the direction indicated.
Editprint moves next PRINT position to first edit line.
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Onscreen/Offscreen turns your screen on or off.
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An ESSENTIAL addition to your 16K RAM ZX81

TOOLKIT
(written by Paul Holmes)

Provides the following additional facilities:-

Line renumber - you state starting number and increment value. GOTO's and GOSUB's included in line renumber.
Search and List - searches for and lists every line containing specified character.
Search and replace - changes every occurance of a character as you require.
Free space - tells you how many free bytes you have left.

Search and Replace will search the screen for every occurrence of the character you specify and replace it with your new character.
Square draws a square or rectangle from your specified co-ordinates.

All these routines are in machine code for SUPER-FAST response! GRAPHICS TOOLKIT uses only 2K of your RAM and that includes space to load the programmers TOOLKIT described above.

ALL FOR ONLY £5.95 ($11.90)

This includes a cassette with 2 copies of the program, 2 copies of a demonstration program plus a comprehensive instruction booklet with examples.
All prices are fully inclusive.

NEW **BATTLESHIPS & CRUISERS GAME**
(16K - ZX81)

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Hyper graphics mode - graphics never seen on a ZX81 before.
Fill - fills your screen instantly with your specified character.
Reverse - changes each character on your screen to its inverse video.
TAPE ROUTINE - provides a system WAIT condition until a signal is received in the cassette ear jack.

All these routines are written in machine code and together take up only 1K of your precious RAM -an incredible achievement!!

FOR 16K *ONLY £4.95 ($9.90)*

As reviewed in 'Your Computer' March 1982

16K RAM PACK

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Same quality as the 16K but giving massive memory to your ZX81, with external dimensions no larger than the 16K Ram Pack (above).

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Letters

write to Letters, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2

Please teach us how to use machine code!

YOUR editorial in the June 17 issue was very rousing, though I suspect from many ZX81 users, very much misguided.

I do not have a programming background, though I did purchase a ZX81 complete with 16K Ram, as I was keen and interested to learn. Already, from buying several tapes containing machine coded programs, I am aware of the vastly superior performance of machine code.

However, it is not because I lack courage that I am still stuck with Basic, it is because there are few intelligible books on machine code for the novice.

You were quick off the mark to criticise — how about an educational series in your magazine aimed at the novice, with a view to improving the general performance of all.

Never mind being willing to accept machine code programs, teach us how to program in machine code. And I do not mean just publishing a machine code loader, go further and teach us how to write a cohesive program and how to understand the language.

D R Wall
39 Standfield Drive
Boothstown M28 4NB

The best book that I have seen on the subject of machine code is Toni Baker's *Mastering Machine Code On Your ZX81*. It costs £7.50 and is published by Interface, 44-46 Earls Court Road, London W8 6EJ.

We do intend to run a series on machine code programming at some point, but the exact timescale is still uncertain.

Target Practice—making it work

PLEASE find enclosed a corrected copy of Target Practice published in *PCW* June 10.

After typing the original program into our BBC Micro, we discovered several mistakes. Is it not possible to check the program before it is printed in your magazine? These errors took some time to correct, there being no documentation with the program. We had to check several books before we discovered the correct formula for the Y co-ordinate.

Muzzle velocity is conventionally expressed in hundreds or even thousands of feet per second. The time delay was too long and has been reduced. BBC Basic has a RAD statement to convert degrees to radiens. The proc statement should be followed by the variable in lower case, with no space after proc.

It is also good practice to indicate the variable used with the NEXT statement. With these corrections, the program will run.

Educational Development Unit
Stevenage College
Monkswood Way
Stevenage
Hertfordshire

```
 10 VDU23,225,3,6,60,40,104,60,126,225
 20 VDU23,226,36,90,156,90,60,155,24,60
 30 VDU23,227,24,36,66,153,153,66,36,127
 40 VDU23,228,28,42,85,170,127,170,85,225
 50 MODE5
 60 GCOL 0,130
 70 GCOL0,0
 80 VDU 5
 90 CLG
100 A=RND(4)-1
110 B=RND(4)+15
120 C=RND(9)+1
130 D=0
140 REPEAT
150 D=D+1
160 PROCg(A,B,C)
170 MOVE10,976:INPUT"ANGLE",AL
180 MOVE10,936:INPUT"SPEED",E
185 CLG
186 PROCg(A,B,C)
190 AN=RAD(AL)
200 X=8
210 REPEAT
220 X1=X+64*(A+1)
230 Y=32+X*TAN(AN)-(X^2/((E/10)^2*COS(AN)^2))
240 PLOT 69,X1,Y*32
250 X=X+16
260 UNTIL X>=1280 OR Y<=32 OR POINT(X1+9,Y+32)=0
270 PRINT CHR$(226)
280 FOR F=1 TO 500:NEXT F
290 CLG
300 UNTIL D=10 OR ABS(X1-B*64)<40
310 IF D=10 THEN PRINT TAB(4,10);"USELESS",ELSE PRINT
    TAB(5,10);"GOOD SHOT",," YOU GOT IT IN ";D;"."
320 FOR F=1 TO 500:NEXT F
330 PRINT:INPUT"ANOTHER GO",H$
340 IF H$ = "Y" GOTO 90
350 GOTO 420
360 DEF PROCg(A,B,C)
370 LOCAL D
380 PRINTTAB(A,30);CHR$(225)
390 PRINTTAB(B,30);CHR$(226)
400 FOR D=1 TO C:PRINTTAB(5,30-D+1);
    STRING$(C,CHR$(228)):NEXT D
410 ENDPROC
420 MODE7
430 END
```

Games that leave a bad taste . . .

I AM writing to you on two somewhat diverse matters.

Firstly, I was pleased to note from your editorial of May 27 your concern with the bloodthirsty nature of many computer games. While those games which deal with space or fantasy warfare appear to offend no one, those which mimic real-life wars often leave a bad taste in one's mouth.

However, after being refreshed by the said editorial, I was surprised and saddened to see an advertisement on page 6 of your June 3 issue which invited Vic20 owners to bomb Buenos Aires. Not only is this using a subject — the Falklands conflict — which I think should be avoided by games designers, but furthermore the objective of flattening the Argentine capital is sickening.

I find this kind of game quite unacceptable. Must you really take advertisements from this company? I am sure that if you had a straight letters page you would be inundated with other letters expressing similar views to mine.

I would like to hear your defence of your decision to accept this advertisement. I hope that the advertisement does not appear in future issues of your otherwise excellent magazine.

The second point I allude to is much more trivial. I wondered if you have a back-copy service? I have all your issues to date except for April 29 and would very much like to complete my collection.

Ian Winfield
The Flat, The Grange
Little Melton
Norwich
Norfolk

We apologise unreservedly to our readers. The advertisement will not be repeated.

In answer to your second point, back issues are available for 50p a copy (to cover post and packing). Send a cheque or postal order to Back Issues, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2.

Stringalonga maximum errors

"STRINGALONGA maximum trickery" — I like it. However, I have identified three errors which will thoroughly confuse your readers.

In the first routine in the second column of my Sound and Vision article (June 24), line 30 should read:

```
30 LET A$=A$+CHR$ PEEK I
```

The second routine in that column should read:

```
50 FOR I=I TO I+694 STEP 33
```

Finally, the first routine in the third column should read:

```
40 LET I=PEEK 16396+256*PEEK 16397+694
```

Nick Godwin
4 Hurkur Crescent
Eyemouth
Berwicks TD14 5AP

Eliminating those flashing blobs

IN AN article by Andrew Esmond on plotting cubes on the ZX81 (June 17), he asks why blobs jump about on the 1K ZX81 while it is plotting.

The answer is connected with the fact that the 16K screen is only as big as it needs to be. If you print or plot anything to the right of something previously printed on that line, the Rom has to juggle about to extend that line. This restructuring of the display file causes the flashing blobs.

You can use empty print statements to fill the area before you start printing and thus prevent the fault from occurring. Unfortunately, you soon run out of memory.

A D Robins
107 Doncaster Road
Wath-on-Dearne
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COVER STORY

Creator

A great new game of skill for the 16K ZX81 by Simon Lane

The secret of immortality has eluded mankind down the ages. Kings and commoners alike have failed to escape the swathe of the grim reaper. Three score years and ten has remained the allotted span of a man's life.

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To help you in your task, a computer simulation of human cells has been constructed. You must create your own cell structures and watch them develop over the generations to see if you have succeeded in your quest.

Machine code

This is a machine code program for the 16K ZX81. It is based on the game of Life developed by Cambridge mathematician John Horton Conway.

The rules of the game are quite simple. Each cell on the screen has a maximum of eight possible neighbouring cells. Every cell that is adjacent to either two or three other cells will survive to the next generation. Any cell with less than two neighbours will die from isolation while any cell with four or more neighbours will die from overcrowding.

Each empty cell that is adjacent to three living cells will become a new living cell in the next generation.

Enter the program exactly as shown and Run it. The screen will go blank for a few seconds, while the machine code is loaded into memory. If you made a mistake in entering the program, the message "PARITY ERROR AT LINE N" will appear on the screen.

When the program is entered correctly a grey border will appear round the screen with a small cross in the centre. You must move the cross around the screen, using keys 5, 6, 7 and 8, to create your own cell structure.

Each time you move the cross, press 1 to create a living cell. If you make a mistake, press 0 to remove it.

When the initial cell structure is complete, type in R. Next, to see how the structure fares over succeeding generations, press any key apart from the Space key. When the structure ceases to evolve, press Space and the program will break.

Lines 100 to 146 contain the machine code in hexadecimal. Lines 150 to 510 Poke the machine code into memory and line 1000 puts the computer into Fast mode.

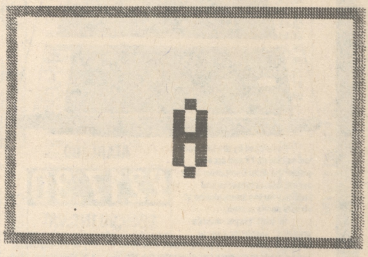
To check that the program is working properly, enter the structure shown in the example. It evolves quite spectacularly, but repeats itself after the 28th generation.



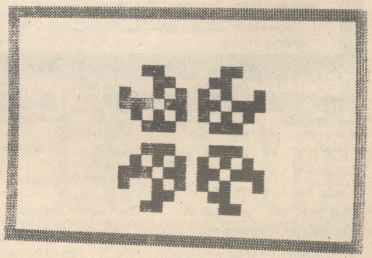


```
    1 REM GAME OF LIFE---NEW PATT
ERN------
    2 REM GAME OF LIFE---GEN:000-
--POP:000
  100  REM 183ADDE5C5D5E53EFF32  02
  101  REM 3540CD29023EFF322740  43
  102  REM 21254046234ECB099FF6  A6
  103  REM 26C678C605CB0838FA3C  70
  104  REM CB0938FB26005F7ECB77  5C
  105  REM 2802D603E1D1C1DDE123  FD
  106  REM 218240ED5B0C40130120  AB
  107  REM 00EDB0EB3E0811220019  1A
  108  REM 0620772310FC0E142377  86
  109  REM 230614E5600210FB7723  45
  110  REM 0D20F1230520772310FC  0D
  111  REM 115A01ED52011CCDD8D  3E
  112  REM 68CD0268CD8D68A7FE21  27
  113  REM 20102B7EFE0820EC2318  26
  114  REM E9F57EEE1577F1C9FE22  B0
  115  REM 200E112100197EFE0820  1D
  116  REM D5D7ED5218D0FE2320D0  F1
  117  REM 112100ED5B7EFE0822C2  D7
  118  REM 19188FFE242009237EFE  DA
  119  REM 0820B52B1882FE1C2004  10
  120  REM C8BE18AAFE1D2004C8FE  53
  121  REM 18A2FE0DC8FE3720D621  91
  122  REM A8402ED5B0C40130120D  B0
  123  REM EDB0DD2A0C40111E00DD  FC
  124  REM 192A0C400118033E80ED  56
  125  REM B128CB7E232823CD0669  CF
  126  REM 18F1DD3402DD7E02FE26  9D
  127  REM C0DD360221CDD3401DD7E  8E
  128  REM 01FE26C0DD360111CDD34  25
  129  REM 00C9CD0268FE00C8DD36  D9
  130  REM 001CDD36011CDD36021C  7D
  131  REM DD2A0C401114000DD19CD  3B
  132  REM 0669DD2A0C401164000DD  14
  133  REM 19215802DD233E7FDDA6  D4
  134  REM 0020F7050DDD7EDDB8AF  AE
  135  REM 69DD7EDFCD8B69DD7EE0  9F
  136  REM CD8B69DD7EFFCD8B69DD  B9
  137  REM 7E01CD8B69DD7E20CD8B  13
  138  REM 69DD7E21CD8B69DD7E22  23
  139  REM CD8B69180FCB7FC3040C  B5
  140  REM 78FE032006DDCB00F618  55
  141  REM 0AFE022006DDCB007E20  76
  142  REM F02B7CB520A4DD2A0C40  63
  143  REM 111E00DD192A0C401164  10
  144  REM 001901580023E3F23A620  DA
  145  REM FACB26CB7EC4268D0B78  EA
  146  REM B120EEC32469000000000  0F
  150  IF PEEK 26624=24 THEN GOTO
1000
  160  FAST
  170  LET P=26624
  180  LET Q=16590
  190  FOR I=100 TO 146
  200  LET C=0
  210  FOR J=1 TO 10
  220  LET D=(PEEK Q-28)*16+PEEK (
Q+1)-28
  230  POKE P,D
  240  LET C=C+D
  250  LET P=P+1
  260  LET Q=Q+2
  270  NEXT J
  280  LET D=(PEEK (Q+1)-28)*16+PE
EK (Q+2)-28
  290  LET C=C-INT (C/256)*256
  300  IF D<>C THEN GOTO 500
  310  LET Q=Q+9
  320  NEXT I
  330  GOTO 100
  500  PRINT "PARITY ERROR AT LINE
";I
  510  STOP
 1000  FAST
 1010  RAND USR 26624
```

```
GAME OF LIFE---NEW PATTERN------
```



```
GAME OF LIFE---GEN:028---POP:072
```



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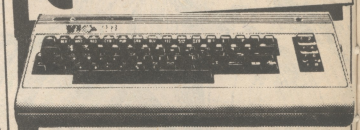
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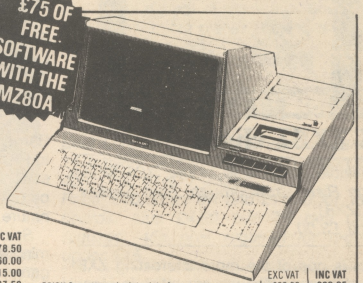
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spectrum COMPUTER GROUP

Reviews
software



1K ZX81 chess

Available from David Horne, 126 Southridge Rise, Crowborough, East Sussex. 1K ZX81.
Price £3.00.

This is one of the more interesting ZX81 tapes to pass through our office in recent weeks. As a ZX81 chess program it is very different.

The main drawbacks of this chess program are that it will not allow you to castle, pawn promote or capture en passant.

The cassette comes in a library case with a fly-sheet made out of a ZX printer listing. The cassette itself has its hand-written name printed in red and the obscure legend 'In the beginning'.

The tape loads every time, without problems, in about 30 seconds. There are two versions of the game. In the first, the computer starts by moving its queen pawn forward one square. In the second version, the computer always moves its king pawn forward. The computer always plays white.

The chess board appears as a small grid in the top left hand quarter of the screen. The computer plays from the top and each square on the grid is identified by a letter and a number.

The computer looks ahead one move at a time. On the screen you see each of its pieces going through each of its possible moves. The computer gives each possible position a weighting and then makes its move.

The computer does not allow any illegal moves or cheating and so could prove useful as an introductory game for new players.

It is fascinating to see all the possible moves tried on the screen, rather than having to watch the more usual blank screen.

The greatest strength of this cassette lies in the skills which went into writing a chess game in 1K of machine code. Is there anyone reading this who could even contemplate doing the same?

Summary

Despite the limitations this is one cassette, at £3, which I would recommend. It might not teach you a great deal about chess, but it certainly lays down a challenge to other programmers. The author is now working on a 2K version. **DS**

Bargain Bytes

Richard Shepherd Software, 22 Green Leys, Maidenhead, Berkshire SL6 7EZ. ZX81 16K cassette.
Price £5.00.

Bargain Bytes Cassette Two is a follow up to Richard Shepherd's Bargain Bytes Cassette One. Cassette Two contains eight programs of a games and/or educational nature.

Seafaring Adventure, which takes three minutes to load, is a standard adventure game. Set in the Mediterranean of the 19th century, you find yourself as a Royal Navy Officer in charge of a ship. You start as a Lieutenant in charge of a frigate. You have a crew of 100, food and water for 29 days and 10 tons of ammunition.

Your objective is to sink as many enemy ships as you can while out on patrol. But, you must retain sufficient supplies and crew to return to port. This is where the program becomes difficult. You can only return to port when there are no enemy ships in sight. So, you may want to return to port after 10 days on patrol, but you may not be able to start your return for another five days.

There are a number of hazards to be faced when trying to reach port. Some of your food may go bad, your ammunition may become unusable and some of your crew may die of disease.

If you succeed in returning to port, and have sunk a reasonable number of enemy ships, you will be promoted and given command of a larger ship. To win the game, you must attain the rank of First Sea Lord.

Other games on the cassette include *Noughts And Crosses, Jackpot Fruit Machine, Ski Run* and *Stock Market*. The *Stock Market* game will appeal to all budding entrepreneurs. You start with £10,000 and the option of buying shares in a number of different companies. The shares change in value according to the state of the market and current events affecting trade.

However, *Stock Market* begins to pall after a while, unless you are fascinated by shares and the stock market. It also takes rather too long to set up new market conditions, which leaves you facing a blank screen until the ZX81 is ready for the next round of wheeling and dealing.

The best of the other programs on the cassette is undoubtedly *General Knowledge Quiz*. There are three levels of difficulty and a range of questions in each level. You are given three possible answers to each question and asked to decide which one is correct. The only real criticism I would make of this program is that it sometimes includes the same question twice in one round.

A novel feature of this cassette is a short test program at the beginning of side one. Before attempting to load any of the other programs, you can use the test program to check that the volume and tone levels of your tape recorder are set correctly. Simply load "test" and wait 25 seconds. If "Program OK" appears on the screen, you can load the other programs with confidence. If "Program OK" does not appear on the screen, adjust the volume and tone levels and try again.

Summary

A cassette of interesting, well documented programs, that is competitively priced at £5. **BG**

Breakout

Bug-Byte, Microcomputer Software, 98-100 The Albany, Old Hall Street, Liverpool. Vic20.
Price £7.00.

There must be a rule that says a rewritten version of a good old program is always better than a new program. Software writers have taken it to heart and followed it unswervingly.

A game like *Breakout* is fine when new. After a hoard of imitators have covered the same ground the game begins to look less exciting.

Another Vic in the Wall is *Breakout* for the Vic20. There is nothing wrong with the program — what it does it does very well — but it is hardly innovative.

There is a bat, three balls and a blue wall. When the ball hits the wall a brick is knocked out. When each of the balls has failed to hit the bat you are knocked out.

Movement of the bat is precise. It is small and its corners are curved, giving the ball the illusion of being sliced when hit using the outside portions of the bat. For some reason the speed of the ball varies, more or less at random, from one hit to the next.

When you have broken through the first blue wall there is a yellow wall following it down the screen.

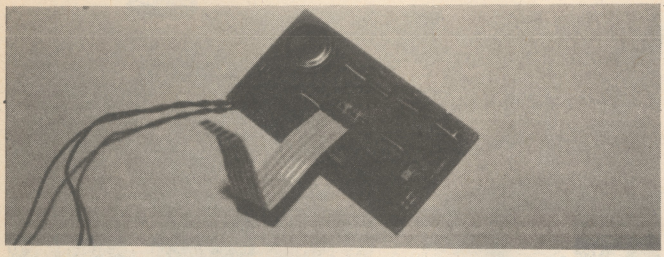
What happens when you break through the second wall is, unfortunately, still shrouded in mystery for this reviewer.

Summary

A difficult version of this standard game. It is, however, far too easy to produce new versions of old programs.

It is much more interesting to see what programmers can achieve when they do not have their bats to the wall. There is definitely a need for new ideas. **DK**

Reviews
hardware



The pcb that goes "bleep" . . . from Fulcrum Products.

ZX Bleep

Fulcrum Products, Hillside Streep Lane, Findon, Worthing, West Sussex. (Tel: 090-671 2750).
Price £8.95 inc VAT and postage.

A response from the keyboard of a ZX81 when a key has been pressed is the ambition of most ZX81 users who have not paid out for an additional keyboard.

This little printed circuit board will give a loud bleep everytime a key is pressed and requires no soldering to fit it on to the ZX81. It also fits underneath the keyboard of the ZX81, inside the case, so that no unsightly wires are showing and the edge connector is not blocked for the ram pack, printer etc.

The unit comes complete with a gold sticker for the top of the ZX81 saying "My ZX81 Bleeps (does yours?)".

The instructions contain diagrams on how to open the ZX81 (including the hidden screws) and how to fit the bleeper.

The keyboard five-way strip from the Sinclair keyboard must be carefully removed from the socket on the ZX81 printed-circuit board and then placed in the same type of socket on the bleeper. A five-way plastic and copper strip provided with the bleeper is then plugged into another socket on the bleeper and into the now empty socket on the ZX81. Care must be taken in fitting the Sinclair keyboard strip into its new socket as, once broken, the whole keyboard must be replaced.

Now comes the ingenious bit. The printed-circuit board requires power to work and this would normally require soldering to the printed-circuit board. However, Fulcrum have provided two little clips which fit into the holes on the printed-circuit board to make the connection. These clips could be very useful to constructors, so apply to Fulcrum if you want to get some.

Summary
The bleep will work when any key is pressed, not only when an input is required. It provides a good response from the keyboard everytime and is fairly easy to fit. **SA**

Computer Handbook

The Home Computer Handbook
By Frank Herbert and Max Bernard, Victor Gollancz, 297 pages, hardback.
Price £7.95.

Now being imported from the US, this bulky book looks very tempting at first glance, even at £8. But first impressions can be misleading. The original American title, *Without Me You're Nothing*, seems to sum up this over-long publication.

Instead of providing clear and concise information, much of the book is taken up with a lengthy diatribe against the perils of computers in society. The authors often get so worked-up about people's fear of micros that the work loses its direction.

The main thread of the book appears to be that computers have been kept in the hands of a minority for reasons too dark to disclose.

"You have been lied to about computers as part of a conspiracy . . . to keep them in the hands of an elite few" is just a sample of what to expect.

Fear not, however, help is at hand. The authors advise: "You have in your hands a book that can change your life." And they continue: "We are here to help rid the world of an elitist mystique that has acted as a barrier to your understanding." It is reassuring to know that someone is looking after out interests, isn't it?

The whole book is more of the same. It is a mish-mash of jargon and rhetoric, not a beginner's guide to home computing.

Although the chapter headings are fairly sensible — a buyer's guide, programming, organisation — the text of the chapters is wordy. There is not much of use to a computer novice. There is a glossary of terms but no index. A few TRS-80 listings are also included.

Summary
The title is somewhat misleading. Take no notice of the cover and look carefully at the contents within. You might find it of interest. But it's not of much use, however, to the new micro owner seeking a home computer handbook. **KJ**

Incremental RAM boards

East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London E6 4BT (Tel: 01-471 3308).
Price £10.50 for 8K and £11.50 for 16K boards, plus £4.93 per 2K ram chip required. 45p post required for orders under £15.

Incremental Ram boards offer an excellent way of buying just as much memory as you need for your ZX81.

The board comes socketed for four or eight 2K Ram chips (6116s) and both boards fit *inside* the ZX81. The method of fitting the boards requires absolutely no soldering as the connections are made to the ZX81 by plugging the Z80A board processor into a socket on the Ram board and plugging the board into the empty socket on the ZX81. The other connections required are by screws which secure the Ram board to the printed-circuit board of the ZX81 using the holes already present.

The instructions on fitting the Ram board cover almost every eventuality and are very easy to follow. The only problem comes when trying to find the holes the screws should go in as there is no diagram to help, only one of the Ram board itself.

Although it may seem an expensive way to buy Ram, all the memory is static and does not require refreshing like dynamic Ram packs.

The other advantage is that it can be altered to suit other Ram packs via a set of wire plugs and sockets on the board to be in any part of the 64K memory map of the ZX81. It can even be disconnected from the memory map without removing the board.

It is a simple system to set up and the Ram can be added to at any time with further 2K Ram chips. This makes it valuable for anyone who cannot afford to buy much Ram at one go, but wishes to build up memory little by little as funds become available.

The Ram can be moved to provide machine-code space anywhere from 8K to 48K (something other Rams cannot do) and could even be paged if required.

Summary
Well worth the money as it eliminates Ram wobble and refreshing problems. It is easy to fit and it can be moved to any position in the memory map. **SA**

Street Life

Chain reaction in the booming micro market

***David Kelly** looks at the way micros are being sold in the high street stores.*

Microcomputers are emerging at last from the dominance of the faceless distribution and mail-order companies. It is now possible to buy most microcomputers over the counter in high street stores.

Dixons have just spent £150,000 on promotion for the Vic20, which is being sold in 260 of its stores. Their advertisements give a telephone number to ring for the nearest stockist, but the girl on the other end of the line knew little about the Vic20: "Try our Oxford Street store — I imagine they would stock it — they stock everything else."

The Dixon's shop assistant who eventually offered to demonstrate the Vic20 was a bit out of his depth. He explained that it had sound, colour and an ample memory, but he had no software to show. He failed to Run a one-line program to print the word 'hello'.

It is not for a minute intended to suggest that this is a problem peculiar to Dixons. It affects all over-the-counter microcomputer sales. Selling a micro is not easy.

Terry Steel, spokesman for Boots, said succinctly: "Selling a micro is not like selling a new piece of garden furniture."

Boots also sells the Vic20. This is a comparatively new venture for the company. The idea was first considered six months ago when Boots undertook a reassessment of the audio department range.

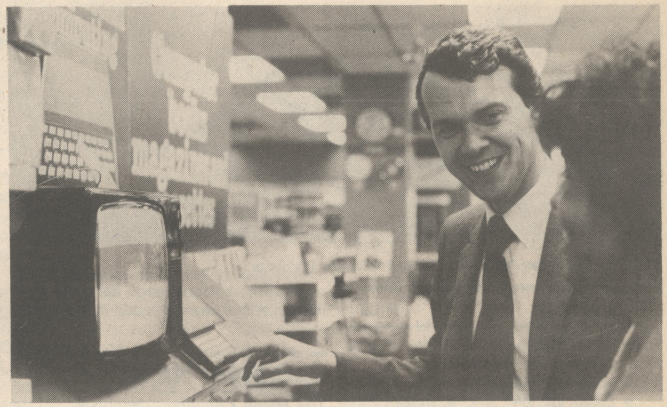
"We feel it is a fast expanding market and we are well placed to exploit it," explained Terry Steel. "We chose to specialise in one or two areas, rather than cover the whole field."

By only stocking the Vic20 and the TI 99/4A, Boots hope to do the machines justice.

The micros are only on sale in Boots' top 70 branches at the moment. At least one staff member in each branch has been specially trained by Boots to sell the micros.

W H Smiths were one of the first major chain stores to begin selling micros.

In September 1980 they conducted a regional survey of computer magazine sales. After analysing the results, W H Smiths began to place computer books and magazines together, sometimes with a PET running demonstration programs nearby.



W H Smith's John Roland . . . the man who is pioneering the computer boutique

Now, 20 months later, W H Smiths is well established in micro retailing, having arranged with Sinclair Research to sell the ZX81 machine. They began selling the ZX81 in September 1981. Initially, the ZX81 was sold through 120 stores, but now it is available in any store sited in a population centre of over 60,000.

John Roland, market development manager for W H Smiths, explained: "When you are starting out in a new product field it is important to start with something nice and simple. The ZX81 has some super features for beginners."

Commenting on the success of the line he said: "The ZX81's return per foot store area means that it more than earns its keep on the shelves."

W H Smiths obviously see a long-term future for selling computers in its stores. So far, more than 400 staff have been sent on a full-time residential micro training course.

W H Smiths have pioneered the idea of a 'computer boutique' selling a whole range of computer-related products. They offer magazines, books, the ZX81 and its add-ons and a wide selection of ZX81 software. Says John Roland: "Our philosophy has always been — if you are going to have a machine you must support it . . . totally."

Ordering a microcomputer through a mail-order company is often an unsatisfactory experience, since you have to buy the goods unseen. Buying through a shop, therefore, has to be an improvement. There, at least, one can touch the keyboard and prod the casing.

Putting the micro through its paces for a potential purchaser is much more difficult. It is not like a garden chair. You cannot just look at it and understand completely. For many first-time buyers, microcomputers are a mystery which needs to be explained.

It is important that the retail shops should offer an informed, integrated approach to micro selling. Those stores which succeed will, at present, be those who offer what a mail-order company does not.

They will be able to de-mystify the micro and provide a continuing source of help and advice coupled with a selection of back-up software and add-ons.

What's happening

Mid-Cheshire Computer Club throws down the gauntlet! Dave Clare reckons his club can beat any other in the Computer Challenge Match he plans for Friday August 13. Anyone ie eligible to join the competition who is willing to try to beat the home team. Dave also wants to hear from clubs in the northwest who could field a team as part of a possible North West League. Contact Dave Clare, 222 Townfields Road, Winsford, Cheshire (Tel: 06065 51374).

Bognor Computer Club (BUG) meets at 7.30 pm on the last Thursday of each month in the RAFA Club. Entry is 50p per session. Contact Neil Vass, Greys Cottage, 38 Aldwick Avenue, Bognor Regis (Tel: 0243 8654510).

Gwent Amateur Computer Club meets on most Thursday evenings at 7.30 pm in St Mary's Institute, Stow Hill, Newport. Contact Ian Hazell, 50 Ringwood Hill, Newport, Gwent.

Open Forum

Open Forum is for you to publish your programs and ideas.
It is important that your programs are bug free before you send them in. We cannot test all of them.
Contributions should be sent to: Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2H 7HF.*

How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.
The author of that program will qualify for DOUBLE the usual fee we pay for published programs.
(The usual fee is £10.)
Presentation hints
Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.
The program will be well documented, the documentation being typed with a double spacing between each line.
The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.
Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.
Please enclose a stamped, self-addressed envelope.

Spy Hunt

on Vic-20

In this game a spy is hidden behind one of 78 bushes — using logic and geometric insight, or just plain guesswork, you have to locate the spy.

You are at the bush that is flashing and you can either press asterisk or move to another bush by using U, D, R or L. When you press * a number appears telling you approximately how far away the spy is from you.

In fact the number shown is INT (distance between you and spy), so that the spy is between D and D+1 away from you where D is the number showing. Try and find the spy in as few guesses as you can. If you're clever or lucky you should be able to do it in about three guesses.

The display is arranged so that no two bushes are more than nine units apart — you could create a larger display but then

turn to next page

PROGRAM OF THE WEEK

Spy Hunt
by Czes Kosniowski

```
10 REM  ****************
20 REM  *   SPY  HUNT    *
30 REM  *       BY       *
40 REM  *CZES KOSNIOWSKI*
50 REM  ****************
60 REM
70 REM SETTING UP
80 DIM A(11,10)
90 V=36878:V3=V-1:V2=V-2:V1=V-3
100 Q=PEEK(44)*16:PP=7680+Q*3584:QQ=38400+Q*512
110 FOR I=1 TO 10
120 A(0,I)=0:A(11,I)=0:A(I,0)=0:A(I,10)=0
130 FOR J=1 TO 9
140 A(I,J)=1
150 NEXT J
160 NEXT I
170 A(0,0)=0:A(11,0)=0
180 FOR I = 1 TO 2
190 A(1,I)=0:A(1,7+I)=0:A(10,I)=0:A(10,7+I)=0:A(2,I+7*(I-1))=0:A(9,I+7*(I-1))=0
200 NEXT I
210 POKE36879,26
220 PRINT"□"
230 REM DISPLAY AND START
240 FOR I=1 TO 10
250 FOR J=1 TO 9
260 POKE QQ+2*A(I,J)*(22*I+J),2
270 POKE PP+2*A(I,J)*(22*I+J),102
280 NEXT J
290 NEXT I
300 M=5:N=5
310 MM=INT(RND(1)*10+1)
320 NN=INT(RND(1)*9+1)
330 IF A(MM,NN)<>1 THEN 310
340 PRINT"■U=UP   *=FIRE  R=RIGHTD=DOWN          L=LEFT■";
350 REM MOVE LOOP
360 POKE QQ+2*A(M,N)*(22*M+N),1
370 FOR I=1 TO 200:NEXT I
380 POKE QQ+2*A(M,N)*(22*M+N),2
390 FOR I=1 TO 200:NEXT I
400 GET B$
410 IF B$="D" AND A(M+1,N)=1 THEN M=M+1
420 IF B$="U" AND A(M-1,N)=1 THEN M=M-1
430 IF B$="R" AND A(M,N+1)=1 THEN N=N+1
440 IF B$="L" AND A(M,N-1)=1 THEN N=N-1
450 IF B$="*" THEN 470
460 GOTO 350
470 DI=INT(SQR((MM-M)↑2+(NN-N)↑2))
480 IF DI=0 THEN 520
490 POKE QQ+2*(22*M+N),5
500 POKE PP+2*(22*M+N),48+DI
510 GOTO 350
520 REM ENDING
530 POKE PP+2*(22*M+N),42
540 WW=QQ+2*(22*M+N)
550 POKE V,10
560 POKE WW,1
570 FOR L=230 TO 128 STEP -1
580 POKE V1,L
590 POKE WW,L
600 FOR K=1 TO 10
610 NEXT K
620 POKE WW,1
630 NEXT L
640 POKE V1,0
650 POKE V2,230
```

Continues next page

Open Forum

from previous page

you'll need to use hexadecimals for distances of 10 and over.

The program will run on any Vic20 with or without any memory expansion — line 100 takes care of the various changes that happen when 8K or more memory is added.

```
660 FOR L=15 TO 0 STEP -1
670 POKE V3,L
680 POKE WW,L+1
690 NEXT L
700 POKE V2,0
710 POKE WW,4
720 REM ANOTHER GO
730 PRINT"■ ANOTHER GO? Y OR N
740 POKE198,0
750 GET G$:IF G$="" THEN 750
760 IF G$<>"N" THEN 230
770 PRINT"[CLR]"
```

Highway Code

on ZX81

This program for a ZX81 models the relation between the speed of a car and the time needed to avoid a hazard in the road. Allowance is made for 'thinking time' preparatory to braking. The result is given as either 'no time to brake', velocity on impact or distance between stopping and the hazard.

The formulae employed are the normal equations for rectilinear velocity and acceleration. The deceleration factor is that quoted in the Highway Code for optimum weather conditions.

The early lines draw a diagram and give a description of the problem. The program takes does about 1.5K of memory, but could be run on an unexpanded ZX81 by starting at line 300. It should be useful to learner drivers and underlines the lessons in the Highway Code.

```
   1 REM RISK
   2 PRINT "PROGRAM BY F R W 198
0 (C) RISK"
  10 FOR Y=37 TO 40
  20 FOR X=0 TO 20
  30 PLOT X,Y
  40 NEXT X
  50 NEXT Y
  60 FOR X=7 TO 9
  70 FOR Y=30 TO 43
  80 PLOT X,Y
  90 NEXT Y
 100 NEXT X
 110 UNPLOT 8,36
 120 PRINT AT 3,3;"ESTATE"
 130 PRINT AT 1,16;"TOWN"
 150 PRINT AT 10,6;"A CAR IS WAI
TING AT ESTATE ROAD TO JOIN THE
MAIN ROAD TO  TOWN.  VISIBILITY
IS RESTRICTED DUE TO A SLIGHT BE
ND AND          OVERHANGING VEGETA
TION."
 155 PRINT
 160 PRINT "ANOTHER CAR LEAVING
TOWN SEES    FIRST CAR STARTING
AND BRAKES."
 165 PRINT
 170 PRINT "THIS MODEL REPRESENT
S THE RESULT FOR GIVEN SPEED OF
TOWN CAR AND DISTANCE OF SIGHTIN
G."
 180 PAUSE 250
 190 POKE 16437,255
 300 CLS
 305 PRINT "SPEED OF TOWN CAR",,
 310 INPUT U
 320 PRINT U;" MPH"
 322 PRINT
 329 REM CONVERT TO FT/SEC
 330 LET U=U*1.467
 335 PRINT
 340 PRINT "DISTANCE TO JUNCTION
 "
 350 INPUT D
 360 PRINT D;" FEET"
 370 IF D<=U THEN PRINT "NO TIME
 TO BRAKE"
 375 IF D<=U THEN GOTO 415
 380 LET D=D-U
 387 LET M=U**2/43.02
 389 PRINT
 390 IF (U**2)<=(43.02*D) THEN P
RINT "TOWN CAR STOPPED ";(D-INT
(M+.5));" FEET FROM    HAZARD"
 395 IF (U**2)<=(43.02*D) THEN G
OTO 415
 400 LET C=SQR ((U**2)-(43.02*D)
 )
 401 PRINT
 402 PRINT
 403 PRINT
 410 PRINT "VELOCITY OF TOWN CAR
 ON          COLLISION AT JUNCTIO
N ";,INT ((C/1.467)/1+.5)+1;" MP
H"
 415 PRINT
 416 PRINT
 418 PRINT
 420 PRINT "ANY MORE? Y OR N"
 430 INPUT Z$
 435 IF Z$="Y" THEN GOTO 200
 440 IF Z$<>"Y" THEN STOP
```

Highway Code
by Frank Williams

Reaction Test

on ZX81

I wrote the program to evaluate the effect of alcohol on reaction times, but due to excessive programming I have not had a chance to get around to the "alcohol test".

The program is aesthetically pleasing and evaluates the results of ten reaction tests. The results are given both numerically and on a histogram, using the entire screen. The axis of the graph are automatically scaled and cover the maximum to minimum results (+and−10%).

In order to appeal as a game, I have allowed the fastest entrant to enter his/her name.

Anyone wishing to make the timing more accurate may adjust the .02 in line 3010, although it is quite accurate up to 10 seconds. Lines 0, 1 and 2 also may be omitted.

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```
   0 PRINT AT 11,0;"   COPYRIGHT
I.CARSON   MAY 1982"
   1 FOR O=1 TO 50
   2 NEXT O
   3 CLS
   4 LET F=100000
  10 DIM N(10)
  15 CLS
  20 RAND
  30 LET Q=100000
  40 LET S=0
  50 LET R=0
```

Reaction Test
by Ian Carson

Open Forum

```
 200 PRINT AT 1,0;" REACTION TES
T BY I.CARSON  (C)"
 210 PRINT "  ==================
============"
 220 PRINT AT 4,0;"THIS PROGRAMM
E WILL DISPLAY THE"
 230 PRINT AT 6,0;"RESULTS OF TE
N REACTION TESTS."
 240 PRINT AT 9,0;"WHEN THE ""S"
" KEY IS PRESSED A"
 250 PRINT "RANDOM NUMBER WILL A
PPEAR IN THE"
 260 PRINT "BOX BELOW. YOU MUST
RE-ENTER THE"
 270 PRINT "NUMBER AS QUICKLY AS
POSSIBLE."
 280 PRINT "THIS WILL CONTINUE U
NTIL THE TENTESTS ARE COMPLETED.
"
 290 PRINT AT 16,16;"┌─┐"
 300 PRINT AT 17,16;"│ │"
 310 PRINT AT 18,16;"└─┘"
 320 PRINT AT 19,16;"   "
 330 PRINT AT 20,16;"   "
 340 PRINT AT 18,5;"NUMBER :-"
 400 IF INKEY$="S" THEN GOTO 100
0
 410 GOTO 400
1000 FOR K=1 TO 10
1020 PRINT AT 18,18;" "
1040 FOR O=0 TO INT (60*RND)
1060 NEXT O
1080 LET A=INT (RND*10)
1100 PRINT AT 18,18;A
1120 FOR T=0 TO 100000
1140 IF CODE INKEY$=A+28 THEN GO
TO 1180
1160 NEXT T
1180 LET N(K)=T
1200 NEXT K
2000 CLS
2100 PRINT AT 1,1;"REACTION TEST
"
2120 PRINT AT 2,1;"==============
"
2140 PRINT AT 4,1;"RESULTS :-"
2160 PRINT AT 5,1;"-------"
2180 PRINT AT 7,0;"FASTEST :-"
2200 PRINT AT 9,0;"SLOWEST :-"
2220 PRINT AT 12,0;"AVERAGE :-"
2280 PRINT AT 21,22;"..TESTS..."
2282 PRINT AT 5,19;"T"
2284 PRINT AT 6,19;"I"
2286 PRINT AT 7,19;"M"
2288 PRINT AT 8,19;"E"
2290 PRINT AT 14,19;"S"
2292 PRINT AT 15,19;"E"
2294 PRINT AT 16,19;"C"
2296 PRINT AT 17,19;"S"
2300 FOR O=2 TO 20
2320 PRINT AT 0,21;"-"
2340 NEXT O
2360 LET A=0
3000 FOR K=1 TO 10
3010 LET N(K)=(INT ((N(K)/.02)+.
5))/1000
3020 IF N(K)<0 THEN LET 0=N(K)
3030 IF N(K)>S THEN LET S=N(K)
3040 LET A=A+N(K)
3050 NEXT K
3060 LET A=(INT ((A*100)+.5))/10
00
3070 PRINT AT 7,11;0
3080 PRINT AT 9,11;S
3090 PRINT AT 12,11;A
3100 LET B=(INT ((0*.9)*10))/10
3110 LET C=(INT ((S*1.1)*10))/10
3120 PRINT AT 20,17;B
3130 PRINT AT 2,17;C
3140 PRINT AT 11,17;(B+C)/2
3150 LET D=(C-B)/38
3160 FOR 0=1 TO 10
3170 LET E=(N(0)-B)/D
3180 FOR Z=2 TO E+1
3190 PLOT 43+(2*0),Z
3200 NEXT Z
3210 NEXT 0
3220 IF A<F THEN GOSUB 5000
3230 IF A<F THEN LET F=A
3500 PRINT AT 18,0;"FASTEST AVER
AGE"
3510 PRINT AT 18,5;F
3530 PRINT AT 20,1;"BY:  ";A$
3570 IF INKEY$<>"" THEN GOTO 10
3590 GOTO 3570
4990 LET R=0
5000 LET B$="■ YOU HAVE THE ■"
5020 LET C$="FASTEST AVERAGE"
5040 LET D$="ENTER YOUR NAME"
5060 LET E$="                "
5080 PRINT AT 16,0;E$
5100 PRINT AT 20,0;E$
5120 FOR O=0 TO 20
5140 NEXT O
5150 LET R=R+1
5160 PRINT AT 18,0;C$
5180 PRINT AT 16,0;B$
5200 PRINT AT 20,0;D$
5220 FOR O=0 TO 20
5240 NEXT O
5260 IF R<3 THEN GOTO 5080
5280 INPUT A$
5300 IF LEN A$>10 THEN GOTO 5280
5320 FOR O=16 TO 20 STEP 2
5340 PRINT AT O,0;E$
5360 NEXT O
5400 RETURN
6000 STOP
6500 SAVE "REACTIO■"
6600 RUN
```

```
 REACTION TEST BY I.CARSON  (C)
 ================================

THIS PROGRAMME WILL DISPLAY THE
RESULTS OF TEN REACTION TESTS.

WHEN THE "S" KEY IS PRESSED A
RANDOM NUMBER WILL APPEAR IN THE
BOX BELOW. YOU MUST RE-ENTER THE
NUMBER AS QUICKLY AS POSSIBLE.
THIS WILL CONTINUE UNTIL THE TEN
TESTS ARE COMPLETED.

        NUMBER :-  ┌─┐
                   │5│
                   └─┘
```

```
 REACTION TEST
 =============

 RESULTS :-
 -------

FASTEST :- 0.7

SLOWEST :- 0.9

AVERAGE :- 0.81


FASTEST AVERAGE
     0.76

 BY: IAN CARSON
```



Open Forum

Vic

on Vic-20

This is a multiplication table with a difference. A face appears on the screen and shows the x 2 table, line by line, for a child to recite. The program proceeds through all the times tables up to x 12.

After each table questions appear for a child to answer. When the answer is correct Vic moves on to the next question. If the answer is wrong the same question stays on the screen until it is answered correctly.

Vic's nose glows red when a question is answered wrongly. The number of correct answers is shown at the end of the program.

This is an ideal teaching program for children to learn and remember those boring old tables. It is a program which holds a child's interest as I have proved with my own son.

Vic
by David Pounter

```
1 PRINT""
3 POKE36879,58
5 GOSUB100
10 GOSUB300
12 GOSUB499
15 PRINT"I'M VIC20"
40 FORG=1TO12:N=0
43 FORS=1TO1500:NEXTS:GOSUB300
44 PRINT"   SAY OUR"
45 PRINT"";G;" X TABLE"
48 FORS=1TO1500:NEXTS:GOSUB300
50 N=N+1:F=N*G:IFN=13THEN60
51 PRINT"";N;"X";G;"=";F
52 FORY=1TO2000:NEXTY
57 GOSUB300:GOTO50
60 FORS=1TO1500:NEXTS:GOSUB300
62 PRINT"TEST YOU ON
64 PRINT"";G;"X TABLE"
66 FORS=1TO2000:NEXTS:GOSUB300
68 PRINT"   PUSH"
70 PRINT"   RETURN"
72 PRINT"AFTER ANSWER"
74 FORS=1TO3000:NEXTS:GOSUB300
75 H=INT(100*RND(1)+1):IFH>12THEN75
76 PRINT"";H;"X";G
78 INPUTR
80 P=H*G
82 IFR=PTHENPRINT"CORRECT! ":L=L+1:GOSUB499
83 IFR<>PTHENGOSUB600:GOSUB230:GOTO76
84 J=J+1:IFJ=6THEN88
86 FORS=1TO1000:NEXTS:GOSUB300:GOTO75
88 J=0:NEXTG
90 FORS=1TO1500:NEXTS:GOSUB300
92 PRINT"YOU GOT"
94 PRINT"";L;" RIGHT"
97 PRINT"";M;" WRONG"
98 FORS=1TO6600:NEXTS:GOSUB300:GOSUB499
99 PRINT"BYE BYE! ":FORS=1TO2500:NEXTS:PRINT"":END
100 FORX=7680TO8185
110 POKEX,160
120 NEXT X
130 PRINT"          "
140 PRINT"           "
150 PRINT"            "
160 PRINT"             "
170 PRINT"            "
180 PRINT"            "
190 PRINT"                  "
200 PRINT"                 "
210 PRINT"                 "
220 PRINT"     V     "
230 PRINT"     I     "
240 PRINT"     C     "
250 PRINT"           "
260 FORZ=1TO2000:NEXTZ:RETURN
300 PRINT""
305 PRINT"                  "
310 PRINT"                  "
320 PRINT"                  "
330 PRINT"                  "
335 POKE36878,15:POKE36875,215
336 FORHH=1TO100:NEXTHH
337 POKE36878,0:POKE36875,0
340 RETURN
499 POKE36878,15:FORT=1TO10
500 PRINT"":POKE36876,INT(RND(1)*128)+126
501 PRINT"   X     X  "
502 FORS=1TO50:NEXT
503 PRINT""
504 PRINT"          "
505 FORS=1TO50:NEXTS
506 NEXTT
508 POKE36875,0:POKE36878,0
509 RETURN
600 POKE36878,15:POKE36874,130
602 POKE7911,90:POKE38631,2
610 FORP=1TO1000:NEXTP
615 POKE36874,0:POKE36878,0
630 POKE7911,160:POKE38631,4
700 PRINT"WRONG!!":M=M+1
710 RETURN
```

Lap Counter

on ZX81

One of my hobbies, other than computing is model car racing. One of my fellow racers suggested that a ZX81 could be used as a lap counter as it is inexpensive and portable.

It sounded easy enough, so I set to work and came up with the following program. The program does all that is needed but it has one slight problem. It is nowhere near fast enough.

In order for a lap to be added the corresponding key has to be held down until the basic program reaches the line concerned, which can take quite a while. Also the time taken for a loop (lines 20 to 150) varies depending on whether or not a key is being pressed, so it is impossible to include accurate race timing in the program.

From my limited knowledge of programming the answer seems to be to use machine code. I have tried to write an equivalent program in machine code, but failed dismally. If anyone can help I would be very grateful.

My present Lap Counter program works as follows:

Lines 20 to 150: Main loop incrementing score of car 1 to 6 (A to F).
Lines 105 and 107: Time check, time is input (in minutes) at start, these lines decrement T and check that time is not zero.
Lines 300 to 370: Set variables.
Lines 490 to 630: Establish picture.
Lines 800 to 850: Give a 10 second (approximately) countdown to start of race.
Lines 1000 to 1060: End of race, and reset.
Lines 2000 and 2010: "SAVE" from within program, so that program starts automatically on loading.

Open Forum

```
   5 REM ***[illegible] LAP COUNTER***
  10 GOSUB 300
  11 GOSUB 500
  12 PRINT AT 11,23;"  "
  13 PRINT AT 21,0;"RACE IN PR[illegible]"
  20 IF INKEY$="1" THEN LET A=A+1
  30 IF INKEY$="2" THEN LET B=B+1
  40 IF INKEY$="3" THEN LET C=C+1
  50 IF INKEY$="4" THEN LET D=D+1
  60 IF INKEY$="5" THEN LET E=E+1
  70 IF INKEY$="6" THEN LET F=F+1
 100 PRINT AT 7,14;A;AT 9,14;B;AT 11,14;C;AT 13,14;D;AT 15,14;E;AT 17,14;F
 105 LET T=T-1
 107 IF T=0 THEN GOTO 1000
 110 PRINT AT 7,23;T;" "
 150 GOTO 15
 300 LET A=0
 310 LET B=0
 320 LET C=0
 330 LET D=0
 340 LET E=0
 350 LET F=0
 360 PRINT "TIME RACE IS TO RUN?"
 370 INPUT T
 375 CLS
 380 PRINT T;" MINUTES O.K."
 390 LET K=20
 400 LET K=K-1
 410 IF K>=0 THEN GOTO 400
 420 FAST
 480 CLS
 490 PRINT "[illegible]";T;"[illegible]"
 495 LET T=T*60
 500 FOR X=0 TO 19
 510 PRINT "█";TAB 31;"█"
 520 NEXT X
 530 PRINT "[illegible]"
 540 PRINT AT 1,9;"LAP COUNTER "
 550 PRINT AT 2,1;"[illegible]"
 555 PRINT AT 7,23;T;" SEC"
 560 PRINT AT 4,2;"CAR NO.";"LAPS";"     TIME"
 570 PRINT AT 5,1;"[illegible]"
 580 PRINT AT 7,3;"1......."
 590 PRINT AT 9,3;"2......."
 600 PRINT AT 11,3;"3......."
 610 PRINT AT 13,3;"4......."
 620 PRINT AT 15,3;"5......."
 630 PRINT AT 17,3;"6......."
 640 SLOW
 650 RETURN
 800 LET CD=10
 805 IF INKEY$="" THEN GOTO 805
 806 PRINT AT 21,0;"COUNTDOWN[illegible]"
 810 PRINT AT 11,23;CD;" "
 820 LET CD=CD-1
 830 IF CD>0 THEN GOTO 810
 835 PRINT AT 11,23;"00"
 840 LET L=RND**RND
 850 RETURN
1000 PRINT AT 21,0;"RACE OVER[illegible]"
1010 PRINT AT 7,23;"00"
1020 LET L=250
1030 LET L=L-1
1040 IF L>=0 THEN GOTO 1030
1050 PRINT AT 21,0;"PRESS R TO[illegible]"
1060 IF INKEY$<>"R" THEN GOTO 1060
1070 CLS
1080 RUN
2000 SAVE "LAP COUNTE█"
2010 RUN
```

Lap Counter
by Gary Kennedy

User Characters

on Vic-20

There has been a great deal of information published regarding user defined characters for this computer, but as yet I haven't seen any mention of how this can be achieved with an expanded Vic.

The problem is that the new character generator can only be located in certain areas of the Ram memory, and any program of more than a few K in length would overwrite the new characters.

My program overcomes this by locating the character generator low in memory — starting at location 5120 and relocating the start of basic to 9216. This leaves, with the 16K expansion, just under 15K of user Ram. The unused portion of memory from 4608 and 5119 could be used for machine code routines.

The program transfers the first 64 characters from the Rom character generator to the new one, as these will most likely be needed, and leaves 3.5K from 5632 to 9215 free for user defined characters.

On running the program you will be left with an odd cursor character as the location of this now contains garbage. To

to next page

User Characters
by John Ireland

```
10 FOR I = 0 TO 511
20 POKE 5120 + I, PEEK (32768 + I)
30 NEXT
40 POKE 36869, PEEK (36869) OR 13
50 POKE 9216, 0 : POKE 9217, 0 :
   POKE 9218, 0
60 POKE 45, 3 : POKE 46, 36
70 POKE 47, 3 : POKE 48, 36
80 POKE 49, 3 : POKE 50, 36
90 POKE 43, 1 : POKE 44, 36
```

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from previous page

restore the usual character, type FOR I = 6400 to 6407: POKE I, 255: NEXT and ENTER.

Care should be taken when entering your own characters not to overwrite these locations. Should it be necessary to press STOP at any time, the computer will revert to reading the Rom characters. To restore your own characters simply POKE 36869, PEEK (36869) or 13.

Hangman

on Vic

This a normal hangman program. After starting the program the asterisks on the screen denote each letter in the word. The player types a letter into the computer. If it is correct the letter appears in the correct position in the word.

If it is wrong, part of the scaffold is built and the wrong letter appears below the asterisks.

The words are kept in data statements between lines 1000 and 5000. The number of words put in data statements must be counted and entered on line 60 (NW).

Reverses

on Vic

This program reverses any non-reversed characters on the screen and unreverses any already reversed characters. It fits easily into an unexpanded Vic20.

Line 10 sets the screen for an unexpanded Vic. The first position on the screen is 7680.

Line 20 tests for additional memory by Peeking into 4096. On an unexpanded Vic this always contains 0. If the Vic is expanded the screen starts at 4096 and the variable A is set to 4096.

Line 30 starts the loop.

Line 40 tests for a reversed character and unreverses it if it is. Then it goes to the next character.

Line 50 reverses any unreversed characters.

Line 60 completes the loop.

```
5:**REVERSE PROGRAM BY R. W.
10 A=7680
20 IF PEEK(4096)<>0 THEN A=4096
30 FORI=ATOA+506
40 IF PEEK(I)>127 THEN POKEI,
   PEEK(I)-128:GOTO60
50 POKEI,PEEK(I)+128
60 NEXTI
```

Anagram Birds

on Vic

This program is designed to help children spell. The Anagram Bird lays eggs which explode into a jumble of letters. Twenty seconds are given to work out what the word is.

After each word has been guessed the screen clears to show the correct answer and shows how many guesses are correct and incorrect.

Words are stored between lines 1000 and 2000. Line 480 indicates the number of words and has to be altered accordingly.

Hangman
by David Pounter

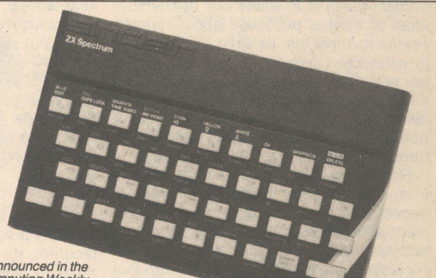
```
10 PRINT"HANGMAN"
11 POKE36879,170
30 N=RND(1)
40 GOSUB690
60 NW=150
70 RESTORE:GOSUB690:FORI=1TON*NW:READB$:NEXT
80 SC=8141:A=LEN(B$):WR=0
90 WP=7778:FORI=1TOA:POKEWP+I+22,42:NEXT
99 T=0
100 GETA$:IFA$=""THEN100
110 T=ASC(A$)
120 FORI=1TOA:IFASC(MID$(B$,I,1))=TTHEN550
125 NEXT
130 T=T-64:WR=WR+1:POKEWP+176+WR,T
132 POKE36878,15:POKE36874,130
134 FORL=1TO200:NEXTL
136 POKE36878,0:POKE36874,0
140 ONWRGOTO240,250,260,270,280,290,300,310,320,330
240 PRINT""
242 PRINT"          ":GOTO100
250 PRINT"":FORI=1TO17
252 PRINT" ":NEXT
254 GOTO100
260 PRINT"         "
262 PRINT"        "
264 GOTO100
270 PRINT""
272 GOTO100
280 PRINT""
282 PRINT""
284 PRINT""
286 PRINT""
288 GOTO100
290 PRINT""
292 PRINT""
294 PRINT""
296 PRINT""
299 GOTO100
300 PRINT""
302 PRINT""
304 PRINT""
306 GOTO100
310 PRINT""
312 PRINT""
314 PRINT""
316 GOTO100
320 PRINT""
322 PRINT"":PRINT"":PRINT""
324 PRINT"":GOTO100
330 PRINT""
332 PRINT"":PRINT"":PRINT""
334 PRINT""
340 PRINT"POOR OLD FELLOW"
350 GOSUB5000
355 FORN=1TO1000:NEXT
360 PRINT"YOU FAILED THAT TIME"
370 PRINT"THE ANSWER WAS"
380 PRINT"";B$
510 PRINT:INPUT"ANOTHER GAME";Q$
520 IFLEFT$(Q$,1)="Y"THEN10
530 END
545 T=T-64
550 POKE36878,15:POKE36876,220
552 FORL=1TO50:NEXTL
354 POKE36876,0:POKE36878,0
556 FORI=1TOA
560 IFASC(MID$(B$,I))=TTHENT=T-64:POKEWP+I,T:T=T+64:IFPEEK(WP+I)=32THEN100
570 NEXT:FORI=1TOA:IFPEEK(WP+I)=32THEN100
580 NEXT:FORI=1TO2000:NEXT
590 PRINT"WELL DONE!!"
600 PRINT"YOU FOUND IT WITH ONLY"
610 PRINTWR;" WRONG GUESSES"
620 POKE36878,15
622 CC=175
625 FORL=250TO200STEP-2
630 POKE36876,L:POKE36879,CC
635 FORM=1TO100
640 NEXTM
645 CC=CC-1
650 NEXTL
655 POKE36876,0:POKE36878,0
660 GOTO510
670 END
690 N=1/N+RND(1):N=N-INT(N):RETURN
1000 DATAVASE,FLOWER,DESK,CURTAIN,WINDOW
1010 DATACUP,FORK,KNIFE,PAN,CUPBOARD
1020 DATATABLE,PICTURE,PLANT,BOOK,FIRE
1030 DATARADIO,CASSETTE,LIGHT,TELEVISION,BECAUSE
1040 DATAWHEN,WERE,THEIR,THERE,FOSSIL
1050 DATASNOOKER,SCHOOL,TEACHER,FEATHER,WORK
1060 DATAPLAY,BED,QUILT,ROAD,FATHER
1070 DATAMOTHER,SON,SUN,DAUGHTER,COUSIN
1080 DATACAR,CARPET,SWITCH,APPLE,ORANGE
1090 DATAWALLPAPER,RUG,FURNITURE,BIKE,CYCLE
2000 DATAMOTOR,BULB,GLASS,DOOR,ATLAS
2010 DATAGAS,BRICK,YELLOW,RED,WHITE
2020 DATALEAF,LEAVES,MAROON,BROWN,BLUE
2030 DATAPINK,INDIGO,PURPLE,BLACK,GREEN
2040 DATAVIOLET,LEMON,LILAC,GREY,RUST
2050 DATAPEN,PENCIL,DRUM,TRUMPET,PIANO
2060 DATAVIOLIN,FIFE,WELLINGTON,SOCK,SHIRT
2070 DATAVEST,JUMPER,TROUSERS,TIE,BLOUSE
2080 DATATEETH,EYES,NOSE,MOUTH,EARS
2090 DATALEG,ARM,FINGERS,FOOT,FEET
3000 DATATHINK,THING,LETTER,BOOK,PETAL
3010 DATAWIRE,SKY,GRASS,TREE,PAPER
3020 DATAGIRL,BOY,CUSHION,SLIPPER,SHOE
3030 DATASANDLE,HAIR,TOES,BODY,PAINT
3040 DATAHOLIDAY,WEEK,DAY,YEAR,MONTH
3050 DATAWOOL,NEEDLE,MACHINE,SPHERE,EARTH
3060 DATACOLOUR,BAND,FILM,SHELF,MEAT
3070 DATAPOTATO,EGG,CABBAGE,CAULIFLOWER,BEAN
3080 DATABEEN,PEA,CARROT,TURNIP,FINISH
5000 READC$:IFC$="FINISH"THEN5010
5005 GOTO5000
5010 POKE36878,15
5020 READP
5030 IFP=-1THENPOKE36874,0:RETURN
5040 READD
5044 POKE36874,P
5046 FORN=1TOD:NEXT
5050 POKE36874,0:FORN=1TO20:NEXT
5055 GOTO5020
5060 DATA152,1000
5070 DATA152,1000
5080 DATA152,100
5090 DATA152,1000
5100 DATA163,750
5110 DATA159,500
5120 DATA159,1000
5130 DATA152,1000
5140 DATA152,1000
5150 DATA143,1000
5160 DATA152,2000,-1
```

Open Forum

Anagram Birds
by David Pounter

```
1 GOSUB2000
2 POKE36879,172
3 Y=0:CLR:F=0
4 DIMA(20),B(20),A$(20)
10 PRINT"THE ANAGRAM BIRD"
15 PRINT""
20 PRINT""
30 PRINT""
40 PRINT""
50 PRINT""
60 PRINT""
70 PRINT""
80 PRINT""
90 PRINT""
100 PRINT""
110 PRINT""
120 PRINT""
130 PRINT""
140 PRINT""
150 PRINT""
152 PRINT""
154 PRINT""
155 PRINT""
156 PRINT""
157 PRINT""
158 PRINT""
160 FORA=8164TO8185
165 POKEA+30720,5
170 POKEA,160:NEXT
180 POKE36878,15:FORL=1TO20
185 FORM=254TO240+INT(RND(1)*10)STEP-1
186 POKE7765,62
190 POKE36876,M:NEXTM:POKE36876,0
192 POKE7765,60
195 FORM=0TOINT(RND(1)*100)+120:NEXTM:NEXTL
300 E=7931
305 POKE36878,10
307 LL=231
310 FORD=1TO10
312 FORL=1TO2
313 LL=LL-1
314 POKE36876,LL
316 FORM=1TO20:NEXTM:NEXTL
320 E=E+22
325 POKEE+30720,6
330 POKEE,81
350 FORC=1TO500:NEXTC
360 POKEE,32
380 NEXTD:E=E-1
382 POKEE,66:POKEE+1,78:POKEE-1,77:POKEE-20,46:POKEE-21,46:POKEE-22,46
383 POKEE-23,46:POKEE-24,46
384 POKE36876,0:POKE36877,200
386 FORL=15TO0STEP-.05
388 POKE36878,L:NEXTL
389 FORP=10TO0STEP-1
390 POKE36877,0
395 NEXTP
400 POKEE,32:POKEE+1,32:POKEE-1,32:POKEE-20,32:POKEE-21,32:POKEE-22,32
405 POKEE-23,32:POKEE-24,32
480 M=64
495 DEFFNR(X)=INT(X*RND(TI)+1)
500 RESTORE:R=FNR(M)
510 FORI=1TOR:READW$:NEXT
520 REM ANAGRAM IT
530 L=LEN(W$):FORI=1TOL:A(I)=I:NEXT
540 FORI=LTO1STEP-1:R=FNR(I)
550 B(I)=A(R):A(R)=A(I):NEXT
560 IFB(1)=1THENB(1)=B(2):B(2)=1
565 PRINT""
570 PRINT""
575 FORI=1TOL
580 PRINTMID$(W$,B(I),1);:NEXT
590 PRINT""
600 Y=Y+1:TI$="000000"
610 J=1:G$=""
620 IFTI$>"000020"THEN700
630 GETC$(J):IFC$(J)=""THEN620
640 G$=G$+C$(J):PRINTC$(J);
650 IFJ=LTHENT$=TI$:FORZ=1TO1000:NEXTZ:F=F+VAL(T$):GOTO700
660 J=J+1
670 GOTO620
700 PRINT""
705 PRINT""
710 IFG$=W$THENPRINT"FOUND IT IN ";RIGHT$(T$,2);" SEC'S":RR=RR+1:GOTO760
715 IFG$<>W$ANDLEN(G$)=LEN(W$)THEN730
720 IFLEN(G$)<LEN(W$)THENPRINT"OUT OF TIME!"
725 PRINT"THE ANSWER IS ";W$;"":GOTO760
730 PRINT"WRONG IT'S ";W$;""
760 PRINT"";RR;" RIGHT OUT OF ";Y
770 IFY=10THEN:GOTO800
780 FORZ=1TO3000:NEXTZ
785 POKE198,0
790 GOTO10
800 PRINT"TOTAL TIME TAKEN"
810 PRINT"";F;" SECOND'S":END
1000 DATALOST,FOOD,FARM,SHUT
1010 DATAHOUSE,GRASS,DATE,DART
1020 DATAYOUNG,THERE,THEIR,WERE
1030 DATAWHERE,FOUND,POND,HORSE
1040 DATARADIO,BOOK,PAPER,NEWS
1050 DATACLASS,BURN,HANDS,FEET
1060 DATAHEAD,HAIR,BODY,GLASS
1070 DATASHOE,FIRE,NIGHT,WORK
1080 DATAPLAY,DOOR,VASE,LUNCH
1090 DATABREAD,BIRD,DRAW,ROOM
1100 DATAZEBRA,SOME,LIGHT,WRONG
1110 DATARIGHT,NAIL,PLAIN,QUEEN
1120 DATAKING,LAST,LEMON,BLACK
1130 DATABOX,XMAS,QUAY,ONLY
1140 DATABUSH,PHONE,BROWN,BLUE
1150 DATAWHITE,NAVY,ARMY,PINK
1160 DATAGREEN,APPLE,PEAR,PLUM
2000 PRINT"THE ANAGRAM BIRD"
2010 PRINT"WELCOMES YOU"
2020 PRINT"THIS WONDERFUL BIRD"
2030 PRINT"LAYS ANAGRAM EGGS."
2040 PRINT"ALL YOU HAVE TO DO"
2050 PRINT"IS TYPE IN THE WORD"
2060 PRINT"WITHIN 20 SECOND'S."
2070 PRINT"P/S YOU HAVE 10 WORDS."
2080 PRINT"HIT ANY KEY TO START"
2090 GETB$:IFB$=""THEN2090
2100 RETURN
```


Win the great new ZX Spectrum



All you have to do to enter this award scheme is send us a program in one of the following categories: (a) Games; (b) Educational/Scientific; (c) Business/Office; (d) Utility.

Programs for each category should be accompanied by a cassette, a copy of the listing and full documentation. Points will be awarded for use of machine code, innovation, structure and ease of use.

The overall winner will receive a ZX Spectrum and Printer. Individual category winners will be awarded £30 of software, and 24 runners-up will receive programming merit awards.

A competition coupon will be published in each issue of *Popular Computing Weekly* for the next two weeks. To enter the competition, you must send in your program together with any four differently numbered coupons to:

Popular Computing Weekly,
Programming Award Scheme,
Hobhouse Court,
19 Whitcomb Street,
London WC2.

Rules

1. *There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.*
2. *Closing date for entries is August 16, 1982.*
3. *The names of the winners will be announced in the September 16 issue of Popular Computing Weekly.*
4. *The Judges' decision is final.*
5. *No employees of Sunshine Publications Ltd, or their families, will be eligible to enter the competition.*

Popular Computing Weekly
Programming Award Scheme

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: *Popular Computing Weekly*, Programming Award Scheme, Hobhouse Court, 19 Whitcomb Street, London WC2.

NAME: ....

ADDRESS: ....

PROGRAM CATEGORY: ....

3

Basic rewards to be found in Ramtop

Nick Godwin explains how you can transfer data from one program to another.

When you first buy a 16K Ram pack for the ZX81 its potential seems enormous. Indeed, compared with the initial 1K machine, it is considerable. Nevertheless it has limits, which can show themselves surprisingly quickly if you stick to Basic.

One way of expanding the effective capacity of the ZX81's Ram is to learn machine code. For many people, however, this task is simply too daunting. Having grappled with Basic, the prospect of repeating the process with an unfamiliar and more complicated computer language may be off-putting.

Another method of expanding the effectiveness of the Ram is to physically expand it by means of the various jumbo expansion boards which can now be purchased. However, that is not always financially feasible.

Ram Garrier

There is a third way of breaking the Ram barrier, which is to make use of Ramtop. Most of what is published about Ramtop seems to imply that its main application is in connection with machine code. If you are one of the many ZX81 users who has decided to stick to Basic, you may have dismissed it as being of no use for your purposes. However, Ramtop can be extremely useful in Basic programming.

Ramtop can be used to transfer data from one program to another. First it is necessary to set Ramtop at some convenient address. Ramtop can be set at any address between 16509 and 32768. It represents the top of the area of Ram that can be used for Basic programming.

Whatever exists above Ramtop is unaffected by Save, Load, Clear and New. The only way it can be changed, apart from switching the power off, is by using Poke. The following program enables the address of Ramtop to be set as required:

```
10 SAVE "RAMTOP"
20 PRINT "RAMTOP=";PEEK 16388+256*PEEK
   16389
30 INPUT R
40 IF R=0 THEN NEW
50 LET X=INT (R/256)
60 LET R=R-256*X
70 POKE 16388,R
80 POKE 16389,X
90 GOTO 20
```

To save this program, first set your tape-recorder to record and switch it on, then Run. Do not Run the program before Saving it, as it erases itself after completing the operation.

To use the program, first Load "Ramtop". The present address of Ramtop (probably 32768) is displayed at the top of the screen. Enter the address required, and check the display. If the display is incorrect, enter the correct number. If the display is correct, enter zero. The program will promptly disappear. To check that Ramtop has been correctly set, use the following direct command:

```
PRINT PEEK 16388+256*PEEK 16389
```

The display should equal the number that you entered, not zero.

In order to transfer a screen image from one program to another, Ramtop should be set no higher than 32064. Load the program from which you want to transfer the data, and add the following subroutine to it:

```
9910 LET R=PEEK 16388+256*PEEK 16389
9920 LET Q=1+PEEK 16396+256*PEEK 16397
9930 FOR I=0 TO 703
9940 POKE R+I,PEEK (Q+I+INT (I/32))
9950 NEXT I
9959 RETURN
```

You must provide some means of access to that subroutine in your program. This should be situated so that it can be activated when the required display is on the screen. This could be done automatically, at some predetermined point in the program, by writing the line: GOSUB 9900. Alternatively, it could consist of some control facility at a convenient string input:

```
1000 INPUT X$
1010 IF X$="TRANSFER" THEN GOSUB 9900
1020 IF X$="TRANSFER" THEN GOTO 1000
```

If your program normally operates in Slow mode, you may prefer to modify the subroutine so that it operates in Fast. Add the following lines:

```
9900 FAST
9955 SLOW
```

Once you have operated the subroutine, Stop the program. If you want to Save the program, do it now. Next, Load the program to which you want to transfer the image or, if you want to write an entirely new program around the image, press New. In either case, the image will be preserved in its location above Ramtop.

The data can now be called down into a string, or printed directly onto the screen. If you want to call the data onto the screen, write the following lines:

```
10 LET I=PEEK 16388+256*PEEK 16389
20 FOR I=I TO I+703
30 PRINT CHR$ PEEK I;
40 NEXT I
```

Run the program or, if you have other data to preserve, GOTO 10.

To call the data into a string, enter the following lines:

```
10 LET I=PEEK 16388+256*PEEK 16389
20 LET X$=""
30 FOR I=I TO I+703
40 LET X$=X$+CHR$ PEEK I
50 NEXT I
```

Any string can be substituted in place of X$. Again, either Run the routine or use GOTO 10. The effectiveness of the routine can be tested by the command: PRINT X$.

To transfer a set of numbers from one program to another, you follow a similar procedure. For demonstration purposes, I have assumed that the data you wish to transfer is contained in a variable array X(n), where n is the number of elements in the array. The same principle applies for individual variable names, but it is important to ensure that they are dealt with in the same order on the outgoing and the incoming programs.

First, as before, set Ramtop at some convenient level. The exact level required will depend upon the total number of digits plus the total number of variables. However, so long as you leave plenty of room, you should have no trouble.

Load the program from which you wish to transfer the data, then execute the following lines:

```
10 LET R=PEEK 16388+256*PEEK 16389
20 FOR I=1 TO n
30 LET X$=STR$ X(I)
40 FOR R=R TO R+LEN X$-1
50 IF R=32768 THEN STOP
60 POKE R, CODE X$
70 LET X$=X$(2 TO )
80 NEXT R
90 POKE R,128
100 LET R=R+1
110 NEXT I
```

Line 50 is a check that you have set Ramtop low enough. If not, the routine will Stop with report code 9/50. In such a case, you should Save the program, reset Ramtop at a lower level, reload the program and GOTO 10.

When this routine has been successfully operated, Load the program to which you want to transfer the data. If you want to write a new program based upon this set of data, operate New. In either case, the data remains stored intact above Ramtop. Enter the following routine:

```
10 LET R=PEEK 16388+256*PEEK 16389
20 DIM X(n)
30 FOR I=1 TO n
40 LET X$=""
50 IF PEEK R=128 THEN GOTO 90
60 LET X$=X$+CHR$ PEEK R
70 LET R=R+1
80 GOTO 50
90 LET X(I)=VAL X$
100 LET R=R+1
110 NEXT I
```

Remember that n = the number of elements in your original array. Once you execute this routine, X(n) will contain the original data. This can be tested as follows:

```
10 FOR I=1 TO n
20 PRINT I,X(I)
30 NEXT I
40 STOP
```

to next page

If more than 22 elements of data are involved, it will be necessary to operate Cont for every 22 lines of display.

To transfer a machine code routine, you must again set Ramtop to some convenient level. This should be far enough below 32768 to accommodate one byte for each machine code element.

Load the program from which you want to transfer the machine code. I have assumed that the machine code is held in a Rem statement in line 1, but the program can be adapted by adjusting the initial value of I in line 9010. This initial value must be the address prior to the address at which the machine code starts. The line numbers of the following routine are optional:

```
9000 LET R=PEEK 16388+256*PEEK 16389
9010 LET I=16513
9020 LET I=I+1
9030 IF R=32768 THEN STOP
9040 POKE R,PEEK I
9050 IF PEEK I=118 THEN STOP
9060 LET R=R+1
9070 GOTO 9020
```

Run 9000. If executed correctly, the routine should Stop with report code 9/9050. If it Stops with report code 9/9030 then you have not allowed enough bytes above Ramtop. In that case, Save the program, reset Ramtop to a lower level and reload the program.

The next step is to Load the program to which you want to transfer the machine code routine. Alternatively, enter New. Assuming that you want to hold the machine code routine in a Rem statement in line 1, you must prepare space to hold it according to normal practice:

```
1 REM XXXXXXX . . . (as many Xs as there are
  elements in the machine code)
```

Note that the next routine enables you to estimate the number of Xs — inaccuracies will not cause havoc. Enter the following lines:

```
9000 LET I=16513
9010 LET R=PEEK 16388+256*PEEK 16389
9020 LET I=I+1
9030 IF PEEK R=118 THEN STOP
9040 IF PEEK I=118 THEN STOP
9050 POKE I,PEEK R
9060 LET R=R+1
9070 GOTO 9020
```

If executed properly, the program will Stop with report code 9/9030. If it Stops with report code 9/9040 then you have not allowed enough room in line 1. So call line 1 and Edit in more Xs, then GOTO 9000. Any surplus Xs remaining at the end of line 1 after execution of the routine can be Edited out.

The address of the first element of the machine code routine will be 16514, or 1 more than the value of I as set at line 9000.

NEXT WEEK: Simulating the upper and lower case functions.

Seeing curves where none really exist

***Malcolm Davison** explains how to draw a curve that is not really there.*

While the Spectrum's Circle instruction neatly draws an outline circle, drawing a solid circle of colour is not so straightforward. However, this program does the job.

Attractive designs may be created by introducing new co-ordinates, new circle radii and changing the Ink colours. To make this easier, you should add line 210 GOTO 4 and introduce an input for the Ink colour.

```
  1 REM "circle"
  2 BORDER 0: PAPER 4: INK 2: C
LS
  4 PRINT "x";: INPUT x
  5 PRINT "y";: INPUT y
 10 PRINT "R"
 20 INPUT r
 30 GO TO 80
 50 LET l=INT ((SQR ((r↑2)-(c↑2
)))+.5)
 70 RETURN
120 FOR c=r-1 TO 0 STEP -1
130 GO SUB 50
135 PLOT (x-l),(y+c)
145 DRAW (2*l),0
150 NEXT c
160 FOR c=1 TO r-1
165 GO SUB 50
170 PLOT (x-l),(y-c)
190 DRAW (2*l),0
200 NEXT c
```

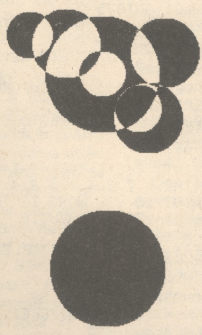


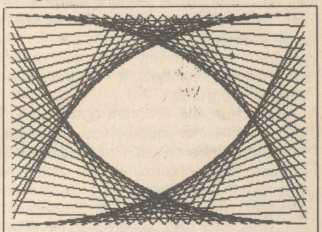
Fig. 1

Incidentally, it takes approximately 30 seconds to draw a 50 pixel circle, which shows how slow the Spectrum is.

The second program does make use of the Spectrum's Circle facility. It will print an array of circles with a black border and a white Ink on a blue background. If you add line 6 CLS the Spectrum will lock on to the correct colours when the program is first Run.

With a bit of practice, it should be quite easy to produce the Olympic Games symbol.

The final program is based on an old idea to brighten up school geometry lessons. This program deceives the eye into seeing curves where none actually exist. The lines are black on a cyan background with a black border, but these can be changed to suit your own taste. A CLS command on line 3 would be a useful, though not essential, addition.

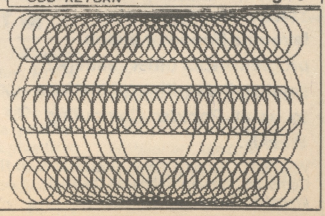


```
  1 REM "curves"
  2 REM  Program © M.Davison
  3 BORDER 0: INK 0: PAPER 5
 12 GO SUB 600
 13 PAUSE 100
 14 LET x=-250
 15 LET h=250
 16 LET g=0
 20 FOR j=10 TO 170 STEP 10
 30 PLOT h,g: DRAW x,j
 35 LET h=h-10
 37 LET x=x+10
 50 NEXT j
200 LET x=250
215 LET h=0
220 LET g=0
225 FOR j=10 TO 170 STEP 10
230 PLOT h,g: DRAW x,j
235 LET h=h+10
240 LET x=x-10
250 NEXT j
300 LET x=250
310 LET h=0
320 LET g=175
330 FOR j=-10 TO -170 STEP -10
340 PLOT h,g: DRAW x,j
350 LET h=h+10
360 LET x=x-10
370 NEXT j
400 LET h=250
410 LET g=175
420 LET x=-250
430 FOR j=-10 TO -170 STEP -10
440 PLOT h,g: DRAW x,j
450 LET h=h-10
460 LET x=x+10
470 NEXT j
799 GO TO 799
800 FOR m=0 TO 21
810 PRINT AT m,31; PAPER 0;" "
820 NEXT m
830 RETURN
```

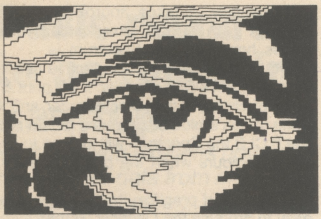
Fig. 3

```
  1 REM "circles - © M.Davison"
  5 BORDER 0: INK 7: PAPER 1
 10 FOR x=82 TO 172 STEP 10
 20 CIRCLE x,87,60
 30 NEXT x
 40 FOR x=22 TO 232 STEP 10
 50 CIRCLE x,87,20
 60 NEXT x
 70 INK 1
 80 FOR x=22 TO 232 STEP 10
 90 CIRCLE x,27,20
100 NEXT x
110 FOR x=22 TO 232 STEP 10
120 CIRCLE x,147,20
130 NEXT x
```

Fig. 2



Sound & vision



A chance to show your character

After sitting for hours, trying to make up new characters for my Vic20, I decided to write a program to help me define my own characters.

This program can be used to experiment with different characters and shapes. You can use your own imagination to create new spaceships for your space invader program. Alternatively, you can design new graphic symbols to illustrate more serious programs.

When Run, this program draws an 8×8 grid. To fill in the squares you must press the keys numbered 1-8. Pressing a key for the first time determines the horizontal co-ordinate while the second key pressed gives the vertical co-ordinate. Thus, pressing keys two and seven will fill in the square two spaces along and seven spaces down on the grid.

After completing the new character, press key nine twice and the computer will give you the data for that character. If required, the computer will then display the character on the screen.

Lines 9 to 34 of the program print the instructions and the grid. Lines 35 to 100 input the numbers and fill in the squares, while lines 200 to 400 calculate the data. Lines 530 to 630 make up the new character.

The program variables are as follows: A$ and B$, which are the get statements; a and b, which are the grid co-ordinates; T(1-8), which is the data for the character; CH, which determines which squares should be filled in or rubbed out.

Andrew Blackham

You can share your own favourite Sound or Vision programs with other readers by sending lists with explanations to us at *Popular Computing Weekly*.

WRITE TO: Sound & Vision, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Character Maker
by Andrew Blackham

```
1 REM A BLACKHAM'S
2 REM CHAR MAKER(1982)
9 POKE36879,8:PRINT"■■":CH=81
10 PRINT"■■  CHARACTER MAKER
11 PRINT"■TYPE IN TWO NUMBERS   TO SELECT THE SPACE TOBE FILLED IN
12 PRINT"■EG.  1 5 WOULD BE     1 SPACE ACROSS","AND 5 DOWN.
13 PRINT"■TYPE ← AND THEN THE   NUMBERS TO RUB OUT
14 PRINT"■■■■PRESS SPACE TO START
15 GETA$:IFA$<>" "THEN15
18 REM PRINT THE GRID
19 PRINT"■■12345678
20 FORI=1TO8
30 PRINT"00000000"I:NEXT
32 PRINT"■TYPE IN 99 TO ENTER   THE CHARACTER.
34 REM INPUT DATA
35 GETA$:IFA$=""THEN35
37 IFA$="←"THENCH=87:GOTO35
40 GETB$:IFB$=""THEN40
41 REM TEST IF THE INPUTS ARE NUMBERS
42 A=VAL(A$)
43 B=VAL(B$)
44 IFA=0ORB=0THEN35
45 REM WORK OUT WHERE INPUTS MEAN AND FILL IT IN
46 B=B-1:A=A-1
50 IFA=8ORB=8THEN200
60 Q=B*22
70 Q=7724+A+Q
80 POKEQ,CH
100 CH=81:GOTO35
199 REM WORK OUT THE   DATA FOR THE CHAR
200 PRINT"■DATA"
205 FORJ=7723TO7877STEP22
210 FORI=1TO8
220 IFPEEK(J+I)<>81THENPOKEJ+I,32:GOTO300
230 READA,B
240 IFA=ITHENT=T+B:RESTORE:GOTO300
250 GOTO230
300 NEXTI
310 PRINTT:C=C+1:T(C)=T:T=0:NEXTJ
400 DATA8,1,7,2,6,4,5,3,4,16,3,32,2,64,1,128
500 PRINT"DO YOU WANT TO TEST IT(Y OR N)?"
510 GETA$:IFA$=""THEN510
520 IFA$="N"THEN640
530 IFA$="Y"THENPRINT"■PLEASE WAIT":GOTO550
540 GOTO510
550 REM MAKE CHAR
560 POKE52,28:POKE56,28
570 FORI=7168TO7679:POKEI,PEEK(I+25600):NEXT
580 POKE36869,255
590 FORC=7168TO7175:U=U+1:POKEC,T(U):NEXT
600 PRINT"■THE CHARACTER FOR THE DATA:"
610 FORI=1TO8
620 PRINTT(I):NEXT
630 PRINT"■IS THIS: @ @ @ @"
640 PRINT"■DO YOU WANT TO DO     ANOTHER ONE(Y OR N)?
650 GETA$:IFA$=""THEN650
660 IFA$="Y"THENPOKE36869,240:RUN
670 IFA$="N"THENPOKE36869,240:END
680 GOTO650
```

Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

WHAT'S YOUR GAME COMMODORE, EH?

Graham Allen of Broomage Park, Larbert, Scotland writes:

Q Could you please tell me how the Vic30 compares to the Vic20? Does it have all the colours, the famous Pet graphics, the sound? Can Vic20 programs run on it? Is Vic20 pre-packaged software compatible with the Vic30?

A *Commodore have created some confusion by re-naming their new family of computers after the Vic. The Vic10, the Vic30 and the Commodore 64, are a family of computers that are related to the Vic20, but are more geared to the games end of the market.*

From what is known of the Vic30, it will have 16K on-board Ram, far better sound and graphics. It should be able to support all the Vic20 peripherals, including two joysticks, and up to four paddles. Ultimax cartridges should run on it, but probably not ordinary Vic20 cassettes. The Vic30 will most likely have a mini version of Pet Basic, with no dimensioning of arrays.

It looks to be an excellent games machine that will turn out to be an acceptable computer as well. With a price tag around the £250 mark, one cannot help wondering whether or not it is aimed to go into competition with the Atari 400.

NO JOY OUT IN THE STICKS

David Rapport of Cyncoed Road, Cardiff writes:

Q I have purchased a ZX Spectrum. I would like to know if the Micro-Gen joysticks for the ZX81 will work with it?

A *According to Micro-Gen the answer is no. At the moment there is, to my knowledge, no joystick available for the ZX Spectrum. But it is early days yet.*

Micro-Gen will be bringing out a joystick for the Spectrum in the next few months, but they are waiting until there are sufficient Spectrums on the market. It would seem that their caution is well founded, judging by the delays we have already seen in the Spectrum delivery dates.

It is most likely that the Spectrum joystick will be similar to the ZX81 joystick, in that it will effectively be in two parts – a controller board and the joystick proper.

IS IT WORTH IT, HE ASKS

J. J. Montgomery, of Hampstead, London writes:

Q I am a BBC micro model B user and I am looking for a printer. In your magazine recently I saw an advertisement by Microtanic Software, which claims that you can add a printer to your 6502 system, for less than £80, via their Printerface unit. In their list of computers they include the BBC micro.

Could you investigate their claims. How efficient is the Printerface and can the ZX printer cope with the BBC Hi-res graphics? If not, do you know of any other suitable printer for under £250?

A *Printers, like computers, are often a matter of personal choice. The ZX printer uses an aluminium coated paper that is four inches wide. The characters are sparked onto the metal film by two quickly revolving electrodes. It will at best only make an adequate job of the Hi-res graphics on your BBC micro.*

If you do have £250 to spend, then I would suggest that you take a look at the Seikosha GP-80. This is an 80-column dot matrix printer and just falls within your budget. The printer has been quite widely advertised in the computer press, but you might find it best if you write and ask for further details. The address is: Micro Peripherals, 61 New Market Square, Basingstoke, Hampshire RG21 1HW.

The GP-80 should make quite a good job of the Hi-res graphics. It is a paper printer that can be interfaced to other computers, but it costs more than twice as much as the ZX Printerface. When it comes down to it, I can only say that it is your money and your decision.

YOU MUST BOOK UP YOUR IDEAS

Miss V. Allen, of Stockton Lane, York writes:

Q I am interested in computer programming and would appreciate it if you could give me some examples of flow charts and programs.

A *This quite simple question could be answered more easily in a book. If, as I assume, you are new to microcomputing, I would suggest that you seriously consider getting a computer. Without a computer, books quickly become frustrating or meaningless.*

As for computer programs, we publish about six pages of them every week. Most books on computers, and probably all the magazines, have examples of computer programs.

If you are looking for a book that combines both programs and flow charts, you should realise that many books published for the home computer user do not deal with flow charts. This is because many hobbyists, who have not had any computer instruction at school, do not use them.

One book that does combine both flow charts and the development of programming skills is Computer Programming In Basic *by Peter Bishop. Published by Nelson, it is used in some schools as an 'O'-level textbook and would make a good general introduction.*

IT'S ENOUGH TO MAKE YOU JACK IT IN

Noorel Harque of Downside Road, Wolverhampton, writes:

Q I bought a ZX81 about three months ago. Ever since I have had a problem with the 3.5mm jack plug from the mains adapter. It does not fit exactly into the socket and it wobbles. It is pretty annoying when this happens in the middle of a program and it crashes. I do not want to send it back because it will take a long time. Could you please tell me what to do?

A *This is the sort of Catch 22 that many Sinclair owners find themselves in – dare I or daren't I send my computer back. In this case, experience has shown that even if you did, it might well come back with no appreciable differences.*

There are two things you can do. Firstly, take the case apart. This is quite easy, as long as you remember that three of the screws holding the case together are under the rubber feet.

Next, unscrew the PCB, which will give you access to the sockets. Using a small screwdriver, depress the clips on the power input socket. This should give you a better connection, but unfortunately it does not always work.

If you get really desperate, cut a hole in the case on the slope below the X8 of ZX81. Open up the socket clips and take the power from the jack plug to the clips using small crocodile clips.

Warning – *firstly, the case is surprisingly thick at this point. It will take time and care to cut through it. Secondly, there will be extra wires that might interfere with the LOAD/SAVE leads if you are not careful. Thirdly, keep a wedge of insulating tape between the two crocodile clips, or you might short out the power supply.*

It sounds complicated, but as long as you are careful it is quite straightforward. But, remember that it does make your guarantee void.

● *Stop agonising over that problem. Write to Ian Beardsmore, Peek & Poke, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

Competitions

Easy as falling off a log?

by Gordon Lee

When programming, you will probably have found the IF/THEN Basic command to be one of the most useful.

However, the command, in some circumstances, has to be used with care. Consider the following example (for the ZX81 but applicable to other machines). Key in as a direct command (** is the power symbol):

```
IF 3**3=27 THEN PRINT "HOORAY"
```

Did your computer print "Hooray"? If it did not let us try to see why not.

Key in:

```
PRINT 3**3.
```

This gives a display of 27, yet the computer has just rejected this in the IF/THEN statement. Now key in:

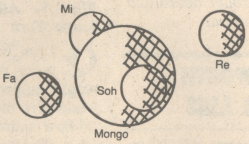
```
PRINT 3**3-27.
```

Instead of the expected result of zero, you should see displayed 1.4901161 E−8. This should now give us a clue as to what has been happening.

If you are unfamiliar with scientific notation you will probably be puzzled by this strange number with the letter 'E' tucked away among the digits. This is just a way of expressing very small, or very large, numbers, without having to use lots of zeros. In this notation the number is separated into two parts — the first part denotes the actual numerical value and the second part, called the exponent, indicates its magnitude. For example, $4E5 = 4 \times 10^5 = 40000$ or $4E-5 = 4 \times 10^{-5} = 0.00004$.

Let us now return to our original problem of evaluating 3 to the power of 3. Instead of the correct answer of 27, the computer has, in fact, evaluated the result as 27.00000014901161. Unfortunately, although the spurious decimal value is not displayed, it is still held in the computer's internal memory and will influence any IF/THEN decisions made upon it.

The reason for this is the computer's use of its own logarithmic function in evaluating powers. Since logarithms are numbers which cannot be expressed *exactly* as decimals, their use entails certain inaccuracies.



Puzzle No 13

At the far reaches of the universe, in the galactic nebula NM6143 is the distant star alpha-epsilon. Around this star orbits the inhabited planet of Mongo.

This planet possesses four perfectly spherical moons: Re, Mi, Fa, and Soh. It has recently been discovered that the volume of Re, the largest of the moons is exactly equal to the sum of the volumes of the three smaller moons — all of which are of different sizes. Latest research indicates that the radii of all four moons can be measure in an exact number of 'mungs' (Mongoese units of length).

What are the smallest radii possible for the four moons of Mongo (in mungs)?

Rules

The winner of the puzzle will be the reader who, in the opinion of *Popular Computing Weekly*, has submitted the best solution. Preference will be given to solutions which show how the entrant arrives at the correct answer.

Envelopes containing entries should be marked clearly with PUZZLE.

The closing date for the competition is Tuesday, July 27.

Solution to Puzzle No 9

By making a few trials it can been seen that the maximum value, X_{max}, required lies between 2 and 3. The easiest approach is to start at 2 and increment this value by a small amount using a loop. If X is found for each value of n then X_{max} will be found at the turning point when X stops increasing and begins to decrease. (This assumes that there is only one such "maximum").

Using such a routine, X_{max} is found to be equal to 2.7182 . . . This number is a mathematical constant called *e*. *e* is used as the base of the natural or Naperian logarithms.

There is, however, a less longwinded way to solve this problem. Using calculus, take the natural log of both sides and find the differential, dX/dn. At the maximum value, assuming $X/0$ and $n/0$, $dX/dn=0$. This solution is more elegant and does provide the exact answer, *e*.

Winner of Puzzle No 9

The winner is: A G Hall, Arncliffe Way, Cottingham, who receives £10.

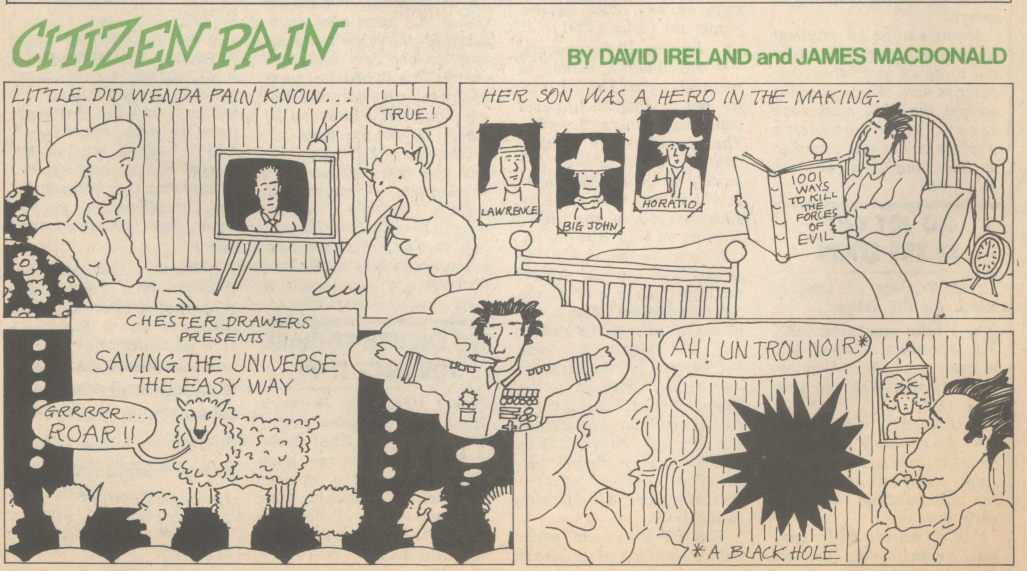
Solution to Crossword No 9

Across: 1 Commodore, 8 Boot, 9 Spectrum, 10 Rescue, 11 Master, 13 Trolls, 15 Brassey, 16 Sinclair, 18 Dodo, 19 Tangerine.

Down: 2 Optical, 3 Masie, 4 Dream, 5 Rat, 6 Forebrain, 7 Supersede, 12 Stand on, 14 Slang, 15 Borer, 17 CIA.

Winner of Crossword No 9

The winner is: G. Wood, Lawson House, London W12, who receives £10.



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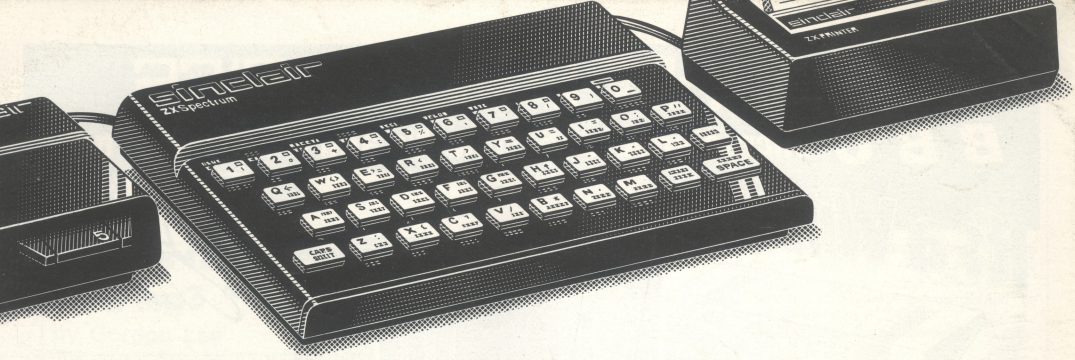
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