

POPULAR Computing WEEKLY

15 July 1982 Vol 1 No 13

35_p

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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Articles which are submitted for publication
should not be more than 1000 words long.

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Accuracy

Popular Computing Weekly cannot accept any
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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



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

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

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ZX81 BLEEP. Provides audible feedback. Improves your keyboard cheaply, fits inside. Simple plug-in, no soldering connections. Aids faster more accurate programming. £8.95 includes instructions, P&P+VAT. Fulcrum Products, Dept. W, Hillside, Steep Lane, Finton, W. Sussex.

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 (see for details).

1K ZX81 CHESS

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Electronics and Computing July '82

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

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

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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.

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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



The competing micros.

£49.99, or the entertainment kit, now at £69.99.

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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(written by Paul Holmes)

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Search and Replace will search the screen for every occurrence of the character you specify and replace it with your new character.

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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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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 radians. 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: VDU23,225,3,4,60,40,104,50,126,205
20: VDU23,226,240,90,156,90,60,150,24,40
30: VDU23,227,24,24,36,66,100,100,66,36,24
40: VDU23,228,20,42,80,170,127,170,80,220
50: HIDE0
60: GCOL 0,130
70: GCOL 0,0
80: VDU 5
90: CL0
100: A=RD(41)-1
110: B=RD(41)+1
120: C=RD(9)+1
130: D=0
140: REPEAT
150: D=D+1
160: PROC G(A,B,C)
170: MOVE 10,976: INPUT "ANGLE",A
180: MOVE 10,936: INPUT "SPEED",E
190: CL0
190: A=RD(41)
200: X=B
210: REPEAT
220: X=X+44450+1
230: Y=32+44450+1
240: FLD 49,X1,Y+32
250: F=X+16
260: UNTIL X=1280 OR Y=32 OR PRINT(X1+9,Y+32)=0
270: PRINT CHR(226)
280: FOR F=1 TO 500: NEXT F
290: CL0
300: UNTIL D=10 OR ABS(X1-B444)=40
310: IF D=10 THEN PRINT TAB(4,10); "USELESS",ELDE PRINT
    TAB(5,10); "GOOD SHOT", "- YOU GOT IT IN "SUN"
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 PROC G(A,B,C)
370: LOCAL D
380: PRINT TAB(A,30); CHR(225)
390: PRINT TAB(B,30); CHR(226)
400: FOR D=1 TO C: PRINT TAB(D,30-0.1);
    STRING$(C,CHR(228)); NEXT D
410: ENDPROC
420: MSET
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=1 TO 1+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
Berwickshire 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-Deane
Rotherham
South Yorkshire

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.

However, a few, a very few, seem to have defied death's relentless march. Tales of Methuselah, the Fountain of Youth and the Elixir of Life, indicate that immortality is possible.

As a genetic engineer, you are attempting to discover the secret of immortality. Working with living cells, you are trying to create a cell structure that is both stable and constantly rejuvenated. Unfortunately, there are millions of possible cell combinations and no guarantee that any of them will lead to immortality.

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---REM GAME OF LIFE---GEN:000-

--POP:000

100 REM 183A0DDE5C5D5E53EFF32 02

101 REM 3540CD29023EFF322740 40

102 REM 21254046234ECB099FF0 20

103 REM 26C678C605CB0833FA0C 70

104 REM CB0938FB26006F7ECB77 50

105 REM 2602D603E1D1C1D0DE1C9 70

106 REM 218240E0E5B0C40130E180 20

107 REM 00ED080E0B03E0911E00019 10

108 REM 06207723310FC0E1400377 60

109 REM 23061E36002310F087722 40

110 REM 0D20F1B300620772310FC 00

111 REM 115A01ED082011C1CCD080 00

112 REM 66C0002600CD0000A7FE51 20

113 REM 2010257FE08200EC03316 20

114 REM 59757FE081577F1C09FE22 80

115 REM 2300E1101000197FE08000 10

116 REM 05A7ED0018D0FE03300000 70

117 REM 112100ED0527FE08000000 00

118 REM 101887FE02420009237FE0 00

119 REM 0620080281802FE1C20004 10

120 REM CB8E180A7FE1D20004CBFE 50

121 REM 18A2FE000C3FE372009821 90

122 REM A840ED05B0C4013012000 80

123 REM ED000D2A0C40111E000D 70

124 REM 192A0C400118033E80ED 50

125 REM B128CB7E232323CD0800 00

126 REM 18F1DD3402DD7E02FE00 00

127 REM C00D35021CDD3401DD7E 00

128 REM 01FE2600D36011CDD34 00

129 REM 00C9C00268FE00C8DD36 70

130 REM 001CDD36011CDD36021C 00

131 REM DD2A0C40111400DD19CD 00

132 REM 0669DD2A0C40116400DD 14

133 REM 19215802DD233E7FDDA6 04

134 REM 0020F70600DD7EDECDD8 80

135 REM 69DD7EDFCD8B69DD7E00 90

136 REM CD8B69DD7EFFCD8B69DD 80

137 REM 7E01CD8B69DD7E20CD8B 10

138 REM 69DD7E21CD8B69DD7E22 20

139 REM CD8B691805CB7FC804C9 80

140 REM 78FE032006DDC800F618 50

141 REM 0AFE022006DDC8007E20 70

142 REM F02B7CB820A4DD2A0C40 60

143 REM 111E00DD192A0C401164 10

144 REM 00190158023E0F23A620 00

145 REM FACB26CB7EC406690B78 80

146 REM B120EECC324690000000 00

147 REM IF PEEK 26624+24 THEN GOTO

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Spectrum Computer Group is a division of Spectrum (UK) Ltd - Britain's largest photographic retailing group.

ATARI



Developed by the Company famous for its TV and arcade games the Atari Computers have superb colour graphics and facilities for the manipulation of visuals on the screen.

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COMMODORE



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'SPECIAL EDITION' 48K RAM BOARD	£429.95	£494.44
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SHARP

The MZ80A is the newcomer to the Sharp range with the serious user very much in mind in the design. A complete stand-alone 48K system incorporating a profiled typewriter keyboard with numeric pad and a 9" green display screen. The 'BASIC' contains a number of very useful additions over the previous models.

A full line up of peripherals further add to the versatility of this machine. INCLUDES £75 OF FREE SOFTWARE.

SHARP MZ80A
£477.38
£548.99 INC.VAT

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The new PC 1500 takes technology close to personal computer ability. Its compact body has 16K bytes of ROM and 3.5K bytes of RAM. With an extended alpha basic numeric. You can then go further with the 4K or 8K RAM upgrades. There's also, for the first time in hand held computers, a four colour graphic printer or a combined printer and cassette interface.

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£75 OF FREE SOFTWARE WITH THE MZ80A



PC1211 Cassette and printer interface

- PC 1500 Computer
- PC 1500 Printer/cassette interface
- PC 1500 4K RAM upgrade

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- * Basic compiler
- * Pascal
- * Double precision basic

	EXC VAT	INC VAT
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STOP PRESS! At the time of going to press we still have a few of the very popular Sharp MZ80K computer. It has 48K RAM (approx 34.5 user when operating BASIC), a BASIC tape manual as well as an application tape and demo tape. It's an incredible package at the price. Phone now for availability.

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£369.57
£425.00 INC.VAT



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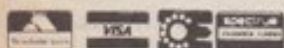
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spectrum

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 handwritten 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.

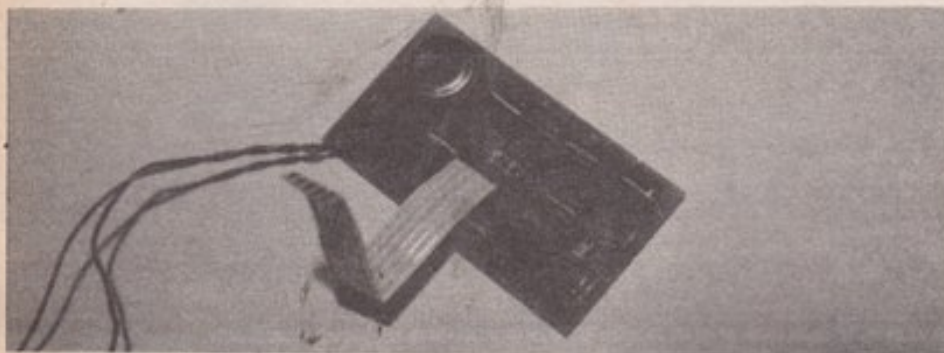
Summary

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 Streepe 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 fine type 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 re-

quired. 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 our 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



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

a PET running demonstration programs nearby.

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 is 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

```
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=36378:V3=V-1:V2=V-2:V1=V-3
100 Q=PEEK(44):=18:PP=7680+Q*3584:QQ=38400+Q*512
110 FOR I=1 TO 10
120 A(0,I)=0:A(11,I)=0:A(1,0)=0:A(1,10)=0
130 FOR J=1 TO 9
140 A(1,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*(1-1))=0:A(9,I+7*(1-1))=0
200 NEXT I
210 POKE 36873,26
220 PRINT "I"
230 REM DISPLAY AND START
240 FOR I=1 TO 10
250 FOR J=1 TO 9
260 POKE QQ+2*A(1,J)*(22*I+J),2
270 POKE PP+2*A(1,J)*(22*I+J),102
280 NEXT J
290 NEXT I
300 M=5:N=5
310 M=INT(RND(1)*10+1)
320 N=INT(RND(1)*9+1)
330 IF A(M,N)=0 THEN A(M,N)=1
340 PRINT "SPY UP *FIRE R=RIGHTD=DOWN L=LEFTM="
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((M-M0)^2+(N-N0)^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 W1=QQ+2*(22*M+N)
550 POKE W1,10
560 POKE W1,1
570 FOR L=230 TO 128:STEP -1
580 POKE W1,L
590 POKE W1,L
600 FOR K=1 TO 10
610 NEXT K
620 POKE W1,1
630 NEXT L
640 POKE W1,0
650 POKE V2,230
```

PROGRAM OF THE WEEK
Spy Hunt
by Czes Kosniowski

Continues next page

Open Forum

from previous page

you'll need to use hexadecimal 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.

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 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.

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.

turn to next page

```
660 FOR L=15 TO 0 STEP -1
670 POKE V3,L
680 POKE W4,L+1
690 NEXT L
700 POKE V2,0
710 POKE W4,4
720 REM ANOTHER 00
730 PRINT "ANOTHER 00? Y OR N"
740 POKE196,0
750 GET Q:IF Q="" THEN 750
760 IF Q="N" THEN 230
770 PRINT "IT"
```

```
1 REM RISK
2 PRINT "PROGRAM BY F R W 1982"
10 (C) RISK
12 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 40
80 PLOT X,Y
90 NEXT Y
100 NEXT X
110 UNPLOT 8,36
120 PRINT AT 3,3;"ESTATE"
130 PRINT AT 1,10;"TOWN"
140 PRINT AT 10,6;"A CAR IS USE"
150 PRINT AT 10,6;"ING AT ESTATE ROAD TO JOIN THE"
160 PRINT AT 10,6;"MAIN ROAD TO TOWN. VISIBILITY"
170 PRINT AT 10,6;"IS RESTRICTED DUE TO A SLIGHT RE"
180 PRINT AT 10,6;"NO AND OVERHANGING VEGETA"
190 PRINT AT 10,6;"TION."
200 PRINT "ANOTHER CAR LEAVING"
210 PRINT "TOWN SEES FIRST CAR STARTING"
220 PRINT "AND BRAKES."
230 PRINT
240 PRINT "THIS MODEL REPRESENT"
250 PRINT "THE RESULT FOR GIVEN SPEED OF"
260 PRINT "TOWN CAR AND DISTANCE OF SIGHTING"
270 PRINT
280 PAUSE 250
290 POKE 16437,255
300 CLS
310 PRINT "SPEED OF TOWN CAR"
320 INPUT U
330 PRINT U;" MPH"
340 PRINT
350 REM CONVERT TO FT/SEC
360 LET U=U*1.467
370 PRINT
380 PRINT "DISTANCE TO JUNCTION"
390 INPUT D
400 PRINT D;" FEET"
410 IF D<=U THEN PRINT "NO TIME"
420 PRINT "TO BRAKE"
430 IF D>U THEN GOTO 415
440 LET D=D-U
450 LET H=U*2/40.02
460 PRINT
470 IF (U*2)<=(40.02*D) THEN F
480 PRINT "TOWN CAR STOPPED (D-INT"
490 PRINT "M+.5) FEET FROM HAZARD"
500 IF (U*2)<=(40.02*D) THEN G
510 GOTO 415
520 LET C=50R ((U*2)-(40.02*D)
401 PRINT
402 PRINT
403 PRINT
410 PRINT "VELOCITY OF TOWN CAR"
420 PRINT "COLLISION AT JUNCTIO"
430 PRINT "IN ((D/1.467)/1+.5)*1;" MP
440 PRINT
441 PRINT
442 PRINT
443 PRINT
444 PRINT "ANY MORE? Y OR N"
445 INPUT Z
446 IF Z="" THEN GOTO 200
447 IF Z="Y" THEN STOP
```

Highway Code
by Frank Williams

```
0 PRINT AT 11,0;"
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
```

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```
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
BY I.CARSON
210 PRINT "=====
220 PRINT AT 4,0:"THIS PROGRAM
WILL DISPLAY THE
230 PRINT AT 5,0:"RESULTS OF TE
REACTION TESTS.
240 PRINT AT 9,0:"WHEN THE "S"
KEY IS PRESSED A
250 PRINT "RANDOM NUMBER WILL A
PEAR 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 TESTS 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

410 GOTO 400
FOR K=1 TO 10
2020 PRINT AT 18,18:" "
2040 FOR O=0 TO INT (50*RND)
2060 NEXT O
2080 LET A=INT (RND*10)
2100 PRINT AT 18,18:A
2120 FOR T=0 TO 100000
2140 IF CODE INKEY$=A+26 THEN GO
TO 1180
2160 NEXT T
2180 LET N(K)=T
2200 NEXT K
2220 CLS
2240 PRINT AT 1,1:"REACTION TEST
2260 PRINT AT 2,1:"=====
2280 PRINT AT 4,1:"RESULTS :-"
2300 PRINT AT 5,1:"-----"
2320 PRINT AT 7,0:"FASTEST :-"
2340 PRINT AT 9,0:"SLOWEST :-"
2360 PRINT AT 12,0:"AVERAGE :-"
2380 PRINT AT 21,22:"..TESTS..."
2400 PRINT AT 8,19:"T"
2420 PRINT AT 8,19:"I"
2440 PRINT AT 7,19:"H"
2460 PRINT AT 8,19:"E"
2480 PRINT AT 14,19:"S"
2500 PRINT AT 15,19:"C"
2520 PRINT AT 16,19:"E"
2540 PRINT AT 17,19:"S"
2560 FOR O=2 TO 20
2580 PRINT AT 0,21:"-"
2600 NEXT O
2620 LET A=0
2640 FOR K=1 TO 10
2660 LET N(K)=(INT ((N(K)/.02)+
.01)/1000
2680 IF N(K)<0 THEN LET D=N(K)
2700 IF N(K)>5 THEN LET S=N(K)
2720 LET A=A+N(K)
2740 NEXT K
2760 LET A=(INT ((A*100)+.5))/10
2780
2800 PRINT AT 7,11:0
2820 PRINT AT 9,11:5
2840 PRINT AT 12,11:A
2860 LET B=(INT ((0*.9)*10))/10
2880 LET C=(INT ((5*1.1)*10))/10
2900 PRINT AT 20,17:B
2920 PRINT AT 2,17:C
2940 PRINT AT 11,17:(B+C)/2
2960 LET D=(C-B)/38
2980 FOR O=1 TO 10
3000 LET E=(N(O)-B)/D
3020 FOR Z=2 TO E+1

```

```

3100 PLOT 43+(2*O),Z
3200 NEXT Z
3210 NEXT O
3220 IF A<F THEN GOSUB 5000
3230 IF A<F THEN LET F=A
3240 PRINT AT 16,0:"FASTEST AVER
AGE"
3250 PRINT AT 18,5:F
3260 PRINT AT 20,1:"BY: ":A$
3270 IF INKEY$("<") THEN GOTO 10
3280 GOTO 3270
3290 LET R=0
3300 LET B$=" YOU HAVE THE
3310 LET C$="FASTEST AVERAGE"
3320 LET D$="ENTER YOUR NAME"
3330 LET E$="
3340 PRINT AT 16,0:E$
3350 PRINT AT 20,0:E$
3360 FOR O=0 TO 20
3370 NEXT O
3380 LET R=R+1
3390 PRINT AT 16,0:C$
3400 PRINT AT 16,0:B$
3410 PRINT AT 20,0:D$
3420 FOR O=0 TO 20
3430 NEXT O
3440 IF A<3 THEN GOTO 5050
3450 INPUT A$
3460 IF LEN A$>10 THEN GOTO 5260
3470 FOR O=16 TO 20 STEP 2
3480 PRINT AT 0,0:E$
3490 NEXT O
3500 RETURN
3510 STOP
3520 SAVE "REACTION"
3530 RUN

```

REACTION TEST BY I.CARSON

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 :-



REACTION TEST

=====

RESULTS :-

FASTEST :- 0.7

SLOWEST :- 0.9

AVERAGE :- 0.81

FASTEST AVERAGE

0.76

BY: IAN CARSON

0.9

T
I
M
E

0.75

S
E
C
O
N
D
S

0.6

..TESTS...

Open Forum

Vlc

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 question appears 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.

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.

```

1 PRINT "T"
2 POKE36879,58
3 GOSUB100
10 GOSUB300
12 GOSUB499
15 PRINT "XXXXXXXXXXXXXXXXXXXXX"
16 FORG=170100 NEXTS GOSUB300
17 PRINT "XXXXXXXXXXXXXXXXXXXXX"
18 PRINT "XXXXXXXXXXXXXXXXXXXXX"
19 FORG=170100 NEXTS GOSUB300
20 N=H+1:IF N=0:IF N=12 THEN GOTO 51
21 PRINT "XXXXXXXXXXXXXXXXXXXXX"
22 FORV=1702000 NEXTV
23 GOSUB300 GOTO52
24 FORG=1701000 NEXTS GOSUB300
25 PRINT "XXXXXXXXXXXXXXXXXXXXX"
26 PRINT "XXXXXXXXXXXXXXXXXXXXX"
27 FORG=1702000 NEXTS GOSUB300
28 PRINT "XXXXXXXXXXXXXXXXXXXXX"
29 PRINT "XXXXXXXXXXXXXXXXXXXXX"
30 PRINT "XXXXXXXXXXXXXXXXXXXXX"
31 FORG=1703000 NEXTS GOSUB300
32 H=INT(100*RND(1)+1):IF H=12 THEN GOTO 75
33 PRINT "XXXXXXXXXXXXXXXXXXXXX"
34 INPUT A
35 P=H*G
36 IF P THEN PRINT "XXXXXXXXXXXXXXXXXXXXX"
37 IF P THEN GOSUB300 GOSUB300 GOTO75
38 J=J+1:IF J=6 THEN GOTO 86
39 FORG=1701000 NEXTS GOSUB300 GOTO75
40 J=0:GOTO 90
41 FORG=1701500 NEXTS GOSUB300
42 PRINT "XXXXXXXXXXXXXXXXXXXXX"
43 PRINT "XXXXXXXXXXXXXXXXXXXXX"
44 PRINT "XXXXXXXXXXXXXXXXXXXXX"
45 PRINT "XXXXXXXXXXXXXXXXXXXXX"
46 FORG=1706000 NEXTS GOSUB300 GOSUB499
47 PRINT "XXXXXXXXXXXXXXXXXXXXX"
48 FORN=7680708155
49 POKE36879,160
50 NEXT X
51 PRINT "XXXXXXXXXXXXXXXXXXXXX"
52 PRINT "XXXXXXXXXXXXXXXXXXXXX"
53 PRINT "XXXXXXXXXXXXXXXXXXXXX"
54 PRINT "XXXXXXXXXXXXXXXXXXXXX"
55 PRINT "XXXXXXXXXXXXXXXXXXXXX"
56 PRINT "XXXXXXXXXXXXXXXXXXXXX"
57 PRINT "XXXXXXXXXXXXXXXXXXXXX"
58 PRINT "XXXXXXXXXXXXXXXXXXXXX"
59 PRINT "XXXXXXXXXXXXXXXXXXXXX"
60 PRINT "XXXXXXXXXXXXXXXXXXXXX"
61 PRINT "XXXXXXXXXXXXXXXXXXXXX"
62 PRINT "XXXXXXXXXXXXXXXXXXXXX"
63 PRINT "XXXXXXXXXXXXXXXXXXXXX"
64 PRINT "XXXXXXXXXXXXXXXXXXXXX"
65 FORG=1702000 NEXTS RETURN
66 PRINT "XXXXXXXXXXXXXXXXXXXXX"
67 PRINT "XXXXXXXXXXXXXXXXXXXXX"
68 PRINT "XXXXXXXXXXXXXXXXXXXXX"
69 PRINT "XXXXXXXXXXXXXXXXXXXXX"
70 POKE36879,15:POKE36879,215
71 FORH=170100 NEXTH
72 POKE36879,0:POKE36879,0
73 RETURN
74 POKE36879,15:FORT=17010
75 PRINT "XXXXXXXXXXXXXXXXXXXXX"
76 PRINT "XXXXXXXXXXXXXXXXXXXXX"
77 FORG=17050 NEXTS
78 PRINT "XXXXXXXXXXXXXXXXXXXXX"
79 PRINT "XXXXXXXXXXXXXXXXXXXXX"
80 FORG=17050 NEXTS
81 NEXTT
82 POKE36879,0:POKE36879,0
83 RETURN
84 POKE36879,15:POKE36879,130
85 POKE791,90:POKE8631,2
86 FORP=1701000 NEXTP
87 POKE36879,0:POKE36879,0
88 POKE791,160:POKE8631,4
89 PRINT "XXXXXXXXXXXXXXXXXXXXX"
90 RETURN

```

Vic
by David Pountner

Open Forum

```

5 DEM ***LAP COUNTER***
10 GOSUB 600
11 GOSUB 600
12 PRINT AT 11,23;" "
13 PRINT AT 21,0;"RACE IN PROGRESS"
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;A
T 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
430 CLS
430 PRINT "RACE TIME IS.....495"
440 T=T+1
495 LET T=T+60

```

```

500 FOR X=0 TO 19
510 PRINT " ";TAB 31;" "
520 NEXT X
530 PRINT "PRESS ANY KEY TO START"
540 PRINT AT 1,9;"LAP COUNTER "
550 PRINT AT 2,1;" "
555 PRINT AT 7,23;T;" SEC"
560 PRINT AT 4,2;"CAR NO.;"
LAP$=""
570 PRINT AT 5,1;" "
580 PRINT AT 7,3;"1....."
590 PRINT AT 9,3;"2....."
600 PRINT AT 11,3;"3....."
610 PRINT AT 13,3;"4....."
620 PRINT AT 15,3;"5....."
630 PRINT AT 17,3;"6....."
640 SLOW
650 RETURN
660 LET CD=10
605 IF INKEY$="" THEN GOTO 805
605 PRINT AT 21,0;"COUNTDOWN"
610 PRINT AT 11,23;CD;" "
620 LET CD=CD-1
630 IF CD>0 THEN GOTO 810
635 PRINT AT 11,23;"00"
640 LET L=RND*#RND
650 RETURN
1000 PRINT AT 21,0;"RACE OVER"
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"
1060 IF INKEY$<>"R" THEN GOTO 10
Lap Counter
by Gary Kennedy
1070 CLS
1080 RUN
2000 SAVE "LAP COUNTER"
2010 RUN

```

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

Open Forum

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 is 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=ATO A+506
40 IF PEEK(I)>127 THEN POKEI,
   PEEK(I)-128:GOTO60
50 POKEI,PEEK(I)+128
60 NEXTI

```

Anagram Brds

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 Pountner

[illegible]

```

570 NEXT FOR=FOR:IF FREEK=0:GOTO5100
580 NEXT FOR=FOR:GOTO5000:GOTO5100
590 PRINT "*****"
600 PRINT "*****"
610 PRINT "*****"
620 POKE6678,15
630 CC=175
640 FOR=FOR:GOTO5000:GOTO5100
650 POKE6678,1 POKE6679,CC
660 FOR=FOR:GOTO5100
670 NEXT
680 CC=CC-1
690 NEXT
700 POKE6678,0 POKE6679,0
710 GOTO510
720 END
730 NEXT:GOTO510:GOTO510:RETURN
1000 DATA:ROSE, FLOWER, DESK, CURTAIN, JILLOW
1010 DATA:FOR, KNOPE, PEARL, GUARD, DARD
1020 DATA:TABLE, PICTURE, PLANT, LOCK, FIRE
1030 DATA:CRISTIE, CRISTIE, LIGHT, BELT, LISON, DEGRUSE
1040 DATA:HERE, HERE, THEIR, HERE, FOLLO
1050 DATA:BOOKS, SCHOOL, TENOR, PEARL, WORK
1060 DATA:RED, CLOTH, PINK, FATHER
1070 DATA:WATER, SON, SUN, FATHER, SON, H
1080 DATA:CARPET, SWITCH, RAIL, UP, PAGE
1090 DATA:WALL, PAPER, RUG, FURNITURE, SILE, CYCLE
1100 DATA:MOTOR, BULL, SLIDE, BOOK, ATLAS
1110 DATA:WAGON, BRICK, YELLOW, RED, WHITE
1120 DATA:LEAF, LEAF, WAGON, BROWN, BLUE
1130 DATA:PIKE, INDIGO, PURPLE, BLUE, GREEN
1140 DATA:WIOLE, LEMON, LILAC, GREY, PLANT
1150 DATA:PEN, PENCIL, DRUM, TRUMPET, PIANO
1160 DATA:VIOLE, PINK, YELLOW, BOOK, SHIRT
1170 DATA:JUMPER, TROUSER, TIE, SLACKS
1180 DATA:TEETH, CYCLE, ROSE, BROWN, SHIRT
1190 DATA:ARM, FINGER, FOOT, FEET
1200 DATA:THIN, THING, LETTER, BOOK, PEARL
1210 DATA:WIRE, RY, ORANGE, TEE, PAPER
1220 DATA:RILL, CUP, CUP, CUP, CUP, CUP
1230 DATA:TABLE, AIR, PINK, BOOK, PINK
1240 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1250 DATA:WALL, NEEDLE, FINGER, FINGER, PINK
1260 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1270 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1280 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1290 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1300 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1310 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1320 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1330 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1340 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1350 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1360 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1370 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1380 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1390 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1400 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1410 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1420 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1430 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1440 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1450 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1460 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1470 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1480 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1490 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1500 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1510 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1520 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1530 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1540 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1550 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1560 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1570 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1580 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1590 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1600 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1610 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1620 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1630 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1640 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1650 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1660 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1670 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1680 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1690 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1700 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1710 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1720 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1730 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1740 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1750 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1760 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1770 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1780 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1790 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1800 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1810 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1820 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1830 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1840 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1850 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1860 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1870 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1880 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1890 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1900 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1910 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1920 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1930 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1940 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1950 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1960 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1970 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1980 DATA:WALL, WIRE, WIRE, WIRE, WIRE
1990 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2000 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2010 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2020 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2030 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2040 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2050 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2060 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2070 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2080 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2090 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2100 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2110 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2120 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2130 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2140 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2150 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2160 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2170 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2180 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2190 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2200 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2210 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2220 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2230 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2240 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2250 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2260 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2270 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2280 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2290 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2300 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2310 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2320 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2330 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2340 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2350 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2360 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2370 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2380 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2390 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2400 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2410 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2420 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2430 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2440 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2450 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2460 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2470 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2480 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2490 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2500 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2510 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2520 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2530 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2540 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2550 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2560 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2570 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2580 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2590 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2600 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2610 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2620 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2630 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2640 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2650 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2660 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2670 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2680 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2690 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2700 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2710 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2720 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2730 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2740 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2750 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2760 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2770 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2780 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2790 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2800 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2810 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2820 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2830 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2840 DATA:WALL, WIRE, WIRE, WIRE, WIRE
2850 DATA:
```


Open Forum

[illegible][illegible]

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

Programming

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 XS
1010 IF XS="TRANSFER" THEN GOSUB 9900
1020 IF XS="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=1 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 XS=""
```

```
30 FOR I=1 TO I+703
40 LET XS=XS+CHR$(PEEK I)
50 NEXT I
```

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

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 XS=STR$(X(I))
40 FOR R=R TO R+LEN XS-1
50 IF R=32768 THEN STOP
60 POKE R,CODE XS
70 LET XS=XS(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 XS=""
50 IF PEEK R=128 THEN GOTO 90
60 LET XS=XS+CHR$(PEEK R)
70 LET R=R+1
80 GOTO 50
90 LET X(I)=VAL XS
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

Spectrum

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 XXXXXXXX... (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
4 PRINT "Y": INPUT Y
100 INPUT R
300 GO TO 50
50 LET L=INT ((50R ((R+2)-(C+2
))) +.5)
70 RETURN
120 FOR C=R-1 TO 0 STEP -1
130 GO SUB 50
135 PLOT (X-1), (Y+C)
145 DRAW (2+1), 0
150 NEXT C
160 FOR C=1 TO R-1
165 GO SUB 50
170 PLOT (X-1), (Y-C)
180 DRAW (2+1), 0
200 NEXT C
```



Fig. 1

```
1 REM "circles - © M.Davison"
2 BORDER 0: INK 7: PAPER 1
300 FOR X=82 TO 172 STEP 10
400 CIRCLE X,87,80
500 NEXT X
600 FOR X=22 TO 232 STEP 10
700 CIRCLE X,87,20
800 NEXT X
900 INK 1
1000 FOR X=22 TO 232 STEP 10
1100 CIRCLE X,27,20
1200 NEXT X
1300 FOR X=22 TO 232 STEP 10
1400 CIRCLE X,147,20
1500 NEXT X
```

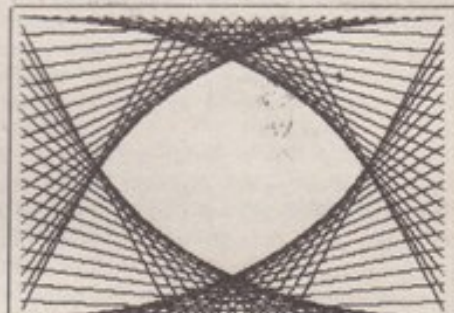
Fig. 2

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.

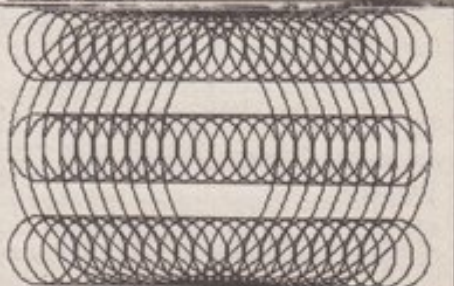
With a bit of practice, it should be quite easy to produce the Olympic Games symbol.

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
4 GO SUB 800
10 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,9: DRAW X,J
35 LET H=H-10
37 LET X=X+10
50 NEXT J
200 LET X=250
210 LET H=0
220 LET G=0
225 FOR J=10 TO 170 STEP 10
30 PLOT H,9: DRAW X,J
35 LET H=H+10
37 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
40 PLOT H,9: DRAW X,J
35 LET H=H+10
37 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,9: DRAW X,J
450 LET H=H-10
460 LET X=X+10
470 NEXT J
700 GO TO 799
800 FOR S=0 TO 21
810 PRINT AT S,31: PAPER 0: " "
820 NEXT S
830 RETURN
```

Fig. 3



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 8x8 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: AS and BS, 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)
3 POKE36879,8:PRINT"CH=81
4 PRINT"CHARACTER MAKER
5 PRINT"TYPE IN TWO NUMBERS TO SELECT THE SPACE TOBE FILLED IN
6 PRINT"NEG. 1 5 WOULD BE 1 SPACE ACROSS", "AND 5 DOWN.
7 PRINT"TYPE + AND THEN THE NUMBERS TO RUB OUT
8 PRINT"XXXXX=PRESS SPACE TO START
9 GETA$:IFA$<" THEN15
10 REM PRINT THE GRID
11 PRINT"12345678
12 FORI=1TO8
13 PRINT"00000000":NEXT
14 PRINT"TYPE IN 99 TO ENTER THE CHARACTER.
15 REM INPUT DATA
16 GETA$:IFA$=""THEN35
17 IFA$="+":THENCH=87:GOTO35
18 GETB$:IFB$=""THEN40
19 REM TEST IF THE INPUTS ARE NUMBERS
20 A=VAL(A$)
21 B=VAL(B$)
22 IFA=0ORB=0THEN35
23 REM WORK OUT WHERE INPUTS MEAN AND FILL IT IN
24 B=B-1:A=A-1
25 IFA=8ORB=8THEN200
26 O=B*22
27 O=7724+A+O
28 POKEO,CH
29 CH=81:GOTO35
30 REM WORK OUT THE DATA FOR THE CHAR
31 PRINT"DATA"
32 FORJ=7723TO7877STEP22
33 FORI=1TO8
34 IFPEEK(J+I)<>81THENPOKEJ+I,32:GOTO300
35 READA,B
36 IFA=ITHENT=T+B:RESTORE:GOTO300
37 GOTOT30
38 NEXTI
39 PRINTT:C=C+1:T(C)=T:T=0:NEXTJ
40 DATA8,1,7,2,6,4,3,8,4,16,3,32,2,64,1,128
41 PRINT"DO YOU WANT TO TEST IT(Y OR N)?"
42 GETA$:IFA$=""THEN510
43 IFA$="N"THEN640
44 IFA$="Y"THENPRINT"PLEASE WAIT":GOTO550
45 GOTOT510
46 REM MAKE CHAR
47 POKE52,28:POKE56,28
48 FORI=7168TO7679:POKEI,PEEK(I+25600):NEXT
49 POKE36869,255
50 FORC=7168TO7175:U=U+1:POKEC,T(U):NEXT
51 PRINT"THE CHARACTER FOR THE DATA:"
52 FORI=1TO8
53 PRINTT(I):NEXT
54 PRINT"THIS IS THIS: @ @ @ @"
55 PRINT"DO YOU WANT TO DO ANOTHER ONE(Y OR N)?"
56 GETA$:IFA$=""THEN650
57 IFA$="Y"THENPOKE36869,240:RUN
58 IFA$="N"THENPOKE36869,240:END
59 GOTOT650

```


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 micro-computing, 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

Noel 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.
```

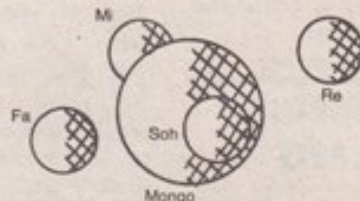
Instead of the expected result of zero, you should see displayed 1.4901161 E-8. This should now give us a clue as to what has been happening.

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 measured in an exact number of 'mung' (Mongoose 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 be 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.

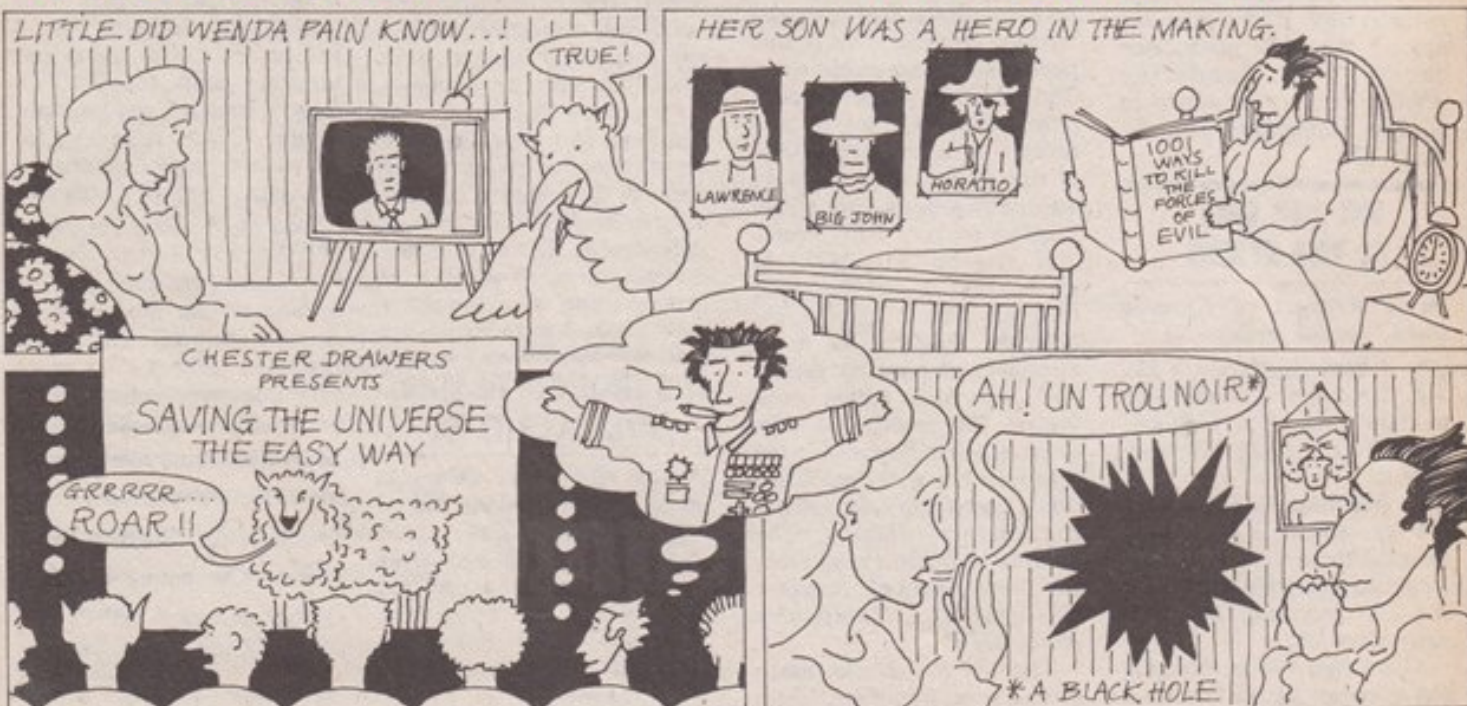
Down: 2 Optical, 3 Masie, 4 Dream, 5 Rat, 6 Forebrain, 7 Supersede, 12 Stand on, 14 Slang, 15 Borer, 17 CIA.

Winner of Crossword No 9

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

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