

POPULAR **Computing** WEEKLY

12 August 1982 Vol 1 No 17

35_p

Street Alley on Vic 20

Psion tapes

ZXucation

**Programmable
character
generator**

**Swamp
for BBC**

**Spectrum
moving patterns**



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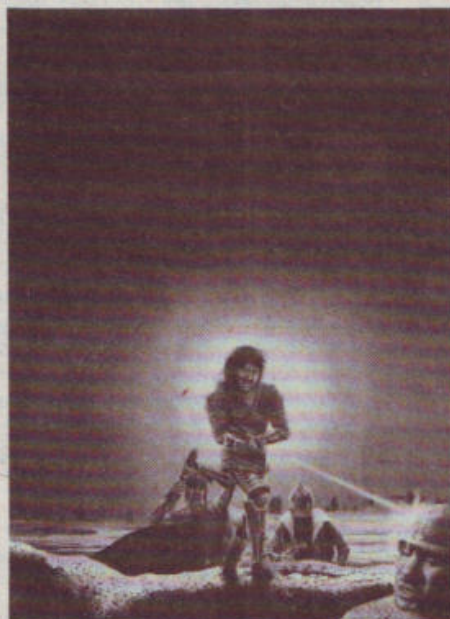
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This Week



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Editorial

The government's scheme to put a micro in every primary school in the UK is a laudable idea (*PCW* August 5) though a scheme to put five or 10 micros in every primary school would have been better.

But, there is one part of the scheme that strikes a discordant note. For a school to qualify under the scheme, it must choose from one of three different micros — Sinclair's 48K ZX Spectrum, Acorn's BBC micro model B and Research Machines' 480Z.

Microcomputer manufacturers were not invited to tender for the scheme. The government also failed to produce a list of specifications that manufacturers had to meet in order to be placed on the approved list.

Instead, three micros were selected: "using the experience of the education departments' microelectronics programmes and with advice from educational advisers".

The scheme has undoubted benefits for the chosen manufacturers. Apart from a potential market of 27,000, there are incalculable advantages in familiarising future generations with a particular manufacturer's machine.

Micro manufacturers not on the approved list have reason to feel dissatisfied with the government.

Next Week



Repel waves of fighters in *Alien Attack*, a 1K machine code game for ZX81.

Classified

BBC MICRO

Make the most of your BBC Microcomputer with two books written by the experts. **LET YOUR BBC MICRO TEACH YOU TO PROGRAM**, by Tim Hartnell, £6.45, with over 40 complete programs. **THE BBC MICRO REVEALED**, by Jeremy Ruston. If you've mastered your computer, and want to progress, this is the book for you. £9.95. Interface Publications, Dept. PC, 44-46 Earls Court Road, London W8 6EJ.

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Adams is first with Spectrum Ram converter ...

HARDWARE specialist Stephen Adams has designed a Spectrum/81 converter that enables a 16K Ram pack to be added to a 16K ZX Spectrum, giving 32K of memory.

The converter will also allow the Spectrum to use most of the ZX81 peripherals which operate in the top 32K of memory.

The converter costs £7 and will be on display at the ZX Microfair in London on August 21.

Enquiries to Stephen Adams, 1 Leswin Road, London N16.

... plus add-on Ram from DK 'Tronics

DK 'Tronics has produced the first add-on Ram board for the ZX Spectrum.

The unit converts a 16K Spectrum into a 48K model in the same way as the official Sinclair Ram board.

The 32K board costs nearly £20 less than the Sinclair equivalent and, unlike the official board, it can be fitted by the purchaser.

David Helas of DK 'Tronics said: "There is no need to send your Spectrum anywhere. Fitting the board is ridiculously simple."

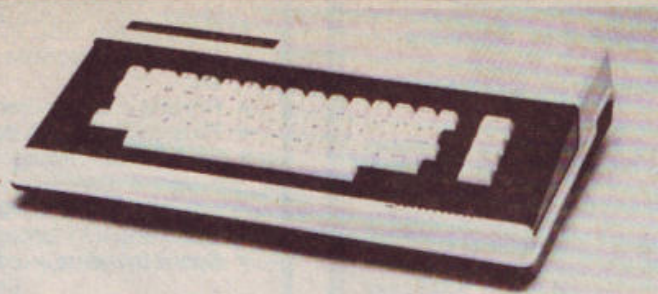
The company has no plans to produce boards with more than 32K. Says David Helas: "48K is a good size. With the micro floppies on the way there will be no market for larger boards."

The 32K add-on costs £39.95 (plus £1 p & p) and is available either at the 4th ZX Fair or from DK 'Tronics, 23 Sussex Road, Gorleston, Norfolk.

4th ZX Fair due in two weeks

FINAL preparations are under way for the 4th ZX Fair at the New Horticultural Hall, Greycoat Street, London SW1, on Saturday, August 21 (10 am-6 pm).

Over 120 exhibitors will be there and organiser Mike Johnston is confident that it will be a success.



The Colour Genie ... 16K Ram, 16K Rom for £199.

Colour Genie for mid-September

THE successor to the Genie will arrive in the UK next month.

Costing £199, the new Colour Genie features 16K Ram, 16K Rom, eight colours and three sound channels.

The machine, manufactured by Eaca International in Hong Kong, will use a Basic version similar to that on the current Genie and software will be compatible.

The 40 x 24 character display can be programmed to produce 160 x 80 hi-resolution graphics.

Up to 16 colours can be generated by programming and, in addition to the 128 alpha-numeric characters, there are 64 pre-programmed and 128 programmable graphics characters.

The Colour Genie has twin parallel ports, programmable

serial port and provision for a plug-in games cartridge. Bug-Byte have been commissioned to write software for the new micro.

The machine is expandable with a plug-in 16K Ram cartridge. Discs will follow — hopefully to be demonstrated at the *Personal Computer World Show* in September.

Lowe Electronics are the sole importers of the Colour Genie. Robert Stead, head of their Computer Division, said: "We already have several thousand orders and we are hoping for great things from the product."

Initially the machine will be sold by mail-order and through existing Genie retailers.

Contact Lowe Electronics, Chesterfield Road, Matlock, Derbyshire.

Tangerine have a Tigress in their tank

TANGERINE has announced that its new Tigress TD-3000 microcomputer will be launched in mid-October.

The triple-processor machine will sell in two forms.

The basic Tigress, with 64K of program Ram and 96K of dedicated graphics memory, will cost £395.

A more advanced machine incorporating a hi-resolution colour monitor and twin double-sided, double-density disc drives will probably cost a further £2000.

It will be possible to upgrade the basic Tigress.

Both machines are based around the Z80A processor, and use a 6809 chip to handle the input/output routines and



Artist's impression of the Tigress.

a third processor to run the screen graphics.

The two versions run a modified version of Microsoft 2.2 Basic.

The Tigress TD-3000 is supplied with a full-size keyboard, Centronics and RS232 interfaces, Prestel Modem (with built-in auto-dialer), cassette interface, partial Ram battery back-up and light-pen and networking ports.

Apple acts to halt sales of illegal micros

APPLE has acted to stop the illegal manufacture of look-alike Apple micros by two Hong Kong companies.

In law suits brought against the two companies Apple Computers allege infringement of its trade marks, patents and copyright.

The counterfeit micros, almost indistinguishable from real Apple II machines, are apparently being sold in Hong Kong for as little as £300. This compares favourably with the price of the official Apple II of about £840.

For every genuine micro sold, about ten copies are bought. It has been estimated that the output of these clandestine back-street businesses could be as high as 5000 per month.

The patents claimed to be infringed relate to the colour video unit. Apple also claim that copyright of its logo and instruction manual have been infringed.

This initial action is seen as the first of a series of moves to halt the flood of copied micros from over 50 illegal assembly companies.

Although Apple is seeking damages related to lost revenue and seizure of the offending machines, the main purpose of the court action is to prohibit the copying.

These moves come as Apple — facing stiffer competition — announced encouraging third-quarter financial results.

Commodore joins classroom battle

COMMODORE are to set up their own Educational Unit to encourage the use of Pets and Vics in schools.

This move comes as a reaction to their exclusion from the government's "Micros in Schools" grants scheme.

Graham Sullivan will leave his appointment as headmaster of Lowbrook Primary School to head the unit in September.

A spokesman for the American company said: "The unit will further our educational interests. Already there are more Commodore machines in schools than any other micro."

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REVIEWED IN THIS ISSUE

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Letters

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

When 16K is not OK, OK?

I would like to draw your attention to what may be quite a frequent occurrence.

I recently received the ZX Spectrum I ordered, but whereas I had paid for a 48K machine, I found out, quite by accident, that 32K of it was missing.

I had attempted to enter:

`DIM AS (10000)`

This gave an out-of-memory error. When I rang Sinclair they told me to enter the following command. It may be worthwhile trying this just to make sure you've got a 48K machine.

`PRINT PEEK 23733/4—15.75;"K"`

If you have paid for a 48K Spectrum and you get the answer '16K' (or as I got, 16.25K) then you either have a faulty machine or you have been sent a Spectrum with only 16K.

David Powell
129 Chestnut Grove
Balham
London SW12

And three hours use is not OK

I ordered my Spectrum on May 8 and it arrived on July 7.

I used it for three hours that evening and, the following morning, after two minutes use, the screen went blank and smoke appeared from the rear. It is now on its way back to Sinclair.

Is this a record?

Malcolm Mitchell
Flat 3
122 Queens Road
Bury St Edmunds
Suffolk

And a Rom bug is not OK!

Prepare yourself for a shock. Sit down and have somebody nearby ready to telephone for an ambulance! There is a *BUG* in the ZX Spectrum Rom!

You don't believe me? OK, this will prove it. Type a short

program. Type in a line number one bigger than the last line of the program (for example, if the program ends at line 100, type in 101). Now press Edit.

Yes, the last line comes down, but so does the program cursor. Well, that just about wraps it up doesn't it? Sinclair Research in liquidation? Clive driving a mini? No — it is still a great computer.

Paul Harrison
77 Burnt Oak Lane
Sidcup
Kent

Just keep soldering on

Like Noorel Harque (Peek Land Poke, PCW July 15) I also had the problem of a loose power jack plug on my ZX81. The solution I found is very effective and simple if you have a soldering iron.

Remove the upper half of the case to expose the printed-circuit board. Cut or de-solder the jack-plug from the power lead and thread the lead through the socket. Gently pull the two socket clips upwards and pull the leads past them.

The leads can be stripped of insulation at the ends and soldered onto the clips. Make very sure that the positive lead (striped black and red, or in some cases black and white) is connected to the right-hand clip (which would normally contact the jack-plug tip) and that the plain lead is connected to the left-hand clip.

Note, however, that this procedure will render your guarantee void, but it solves the problem and is much more secure than using anything else, such as crocodile clips.

When the jack plug has been removed, and before the leads are soldered to the ZX81, is a good time to fit an on/off switch into the power lead. This should be fitted between the power pack and the ZX81 and *not* between the power pack and the mains.

I also wedged a small piece of rubber into the socket, alongside the power lead so that if the wires were accidentally pulled this would

take the strain rather than the solder joints.

Jason Lowe
26 Spring Street
Rishton
Hyndburn
Lancashire

Yes . . . we all have our faults

I have just received my BBC Micro Model B and wonder if anyone else has the following novel fault.

The screen is occupied by one dot per character, ie a matrix of 40 x 25 dots, whenever Mode 7 (the teletext-compatible one) is called. This matrix can however be overwritten in Mode 7 (a bit confusing) and disappears in all other Modes.

I tried your Open Forum Ski-Run (June 24, page 12) program and wonder when you are going to publish the rest of the program, since line 610 is clearly not the last line needed. Are these the missing lines?

```
620 IF INKEY$="" THEN GOTO 620
630 ENDPROC
```

I would like to congratulate you on the Saturn program in the most recent issue; it well deserved the Best Program!

Dr David Taylor
1 Elmsway
Bramhall
Stockport

These lines for Ski-Run will work. Our apologies for the omission.

Some have many faults

As a dissatisfied Sinclair user AI was interested in the letter from Sinclair Research (PCW July 8) which stated that "no ZX81s with faulty Roms were shipped to customers after July 1981". I received a ZX81 that thought SQR 0.25 was about 1.3 in June 1982. The machine and 16K Rom pack were ordered at Christmas 1981 and the micro arrived in January 1982. Attempts to use FOR/NEXT loops caused a crash. The ZX81 was returned to Sinclair.

I received a Ram pack. When the ZX81 came back I

could never enter more than 25 lines of a program with the Ram in without crashing. The Ram pack was returned to Sinclair.

I discovered SQR 0.25 was not 0.5 in June 1982. The ZX81 was returned to Sinclair.

Third ZX81 and second Ram pack received. The system crashed repeatedly as before. The Ram pack was returned to Sinclair accompanied by a request for my money back.

Presto! Sinclair have not been able to trace my orders or any record of my returns!

At no time have I received any technical advice or help from Sinclair Research, despite writing to describe the faults on each of the five returns I have made.

Sinclair has had my money since Christmas and at no time since have I had a working combination of ZX81 and 16K Ram pack.

You won't find me buying a Spectrum!

G D Pearce
5 Orchard Lea
Coxley Wick
Wells
Somerset

But finally someone's happy

Please continue your slot devoted to the ZX Spectrum as I use all the programs for my Vic20 with a Super Expander Cartridge. The programs are easily converted and work well.

But, please could you have a corner devoted to the Vic20 for people with this cartridge as I think that the manual supplied by Commodore for it does not explain fully the art of programming hi-resolution graphics.

Giles Archer
'Fernside'
Maesmaur Road
Nr Westerhorn
Kent

We shall continue to publish the Spectrum page. There are no plans at present to have a Vic20 page but we shall of course continue to print articles and programs for the Vic20 as at present.

Street Alley

A new game for Vic20
by Robert Maydew

London has been devastated by a nuclear war. Most of the population died in the blast, or from the radiation poisoning that followed.

The survivors have formed themselves into a number of small, close-knit, gangs that compete with each other for what little food remains. The rule of law has broken down. Only the gangs remain.

Each gang controls a well defined area of territory. Outsiders who trespass on a gang's "patch" are killed without compunction. It is a dog eat dog world.

But, in a bid to stop the endless feuding, the gang leaders agreed to hold a meeting amid the ruins of Wembley. All the gangs attended, unarmed and under a flag of truce.

However, just when it seemed that a peace treaty would be signed, Chris Tanner, leader of the Wembley Warriors, was assassinated. Suspicion immediately fell

on you and your gang, the Snow Hawks, because a Snow Hawk knife was found in the body.

In fact, it was a set up. Tanner was killed by his number two, Duncan Kelly, who wanted supreme power over all the London gangs.

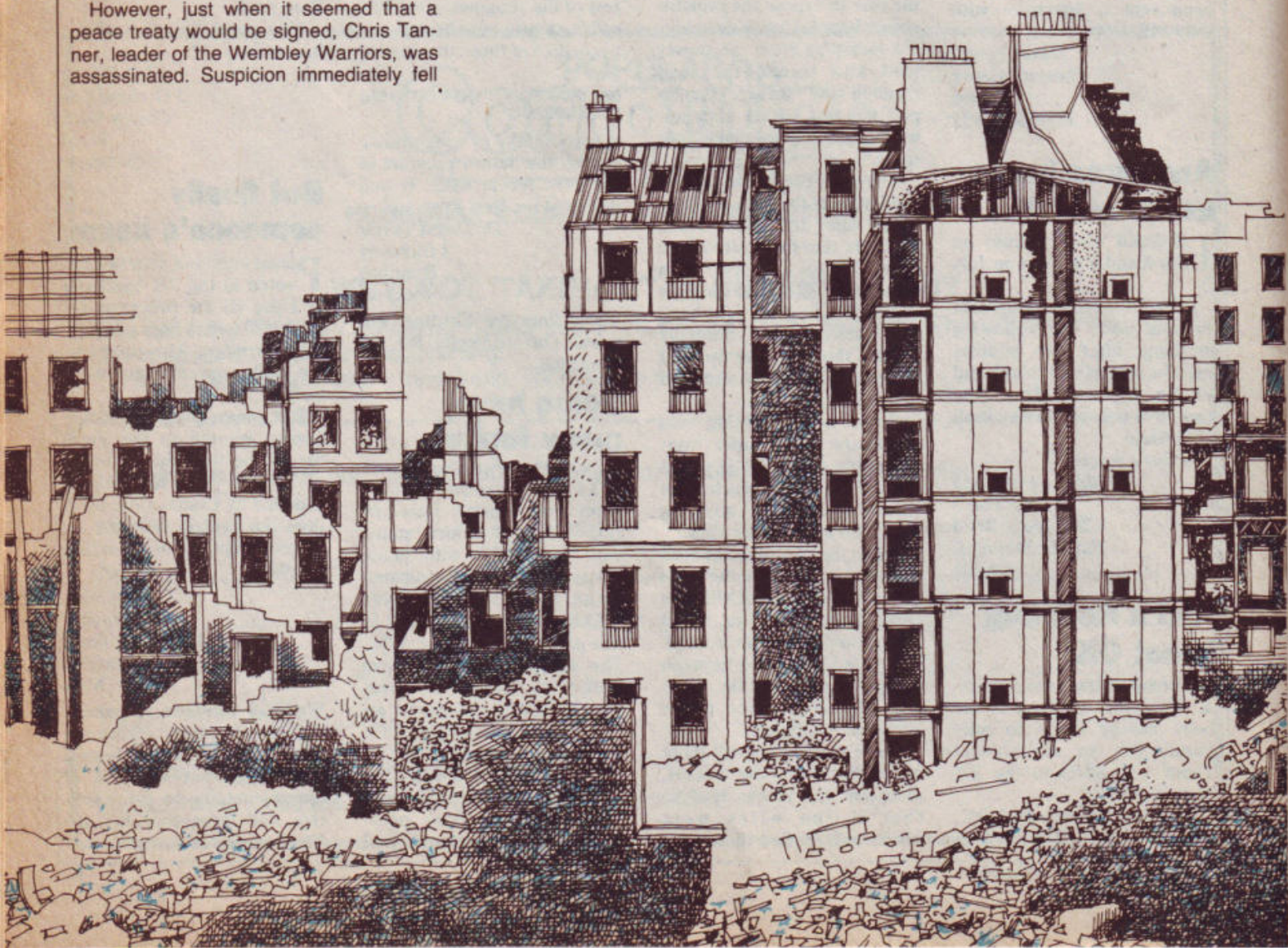
With the other gangs united against you under the nefarious Duncan Kelly, you must fight your way back across London.

But, there are a number of hazards to be overcome. Armoured cars, driven by crazed gang warriors, will mow you down unless you can dodge them. There is a

polluted river that can only be crossed by jumping from one log to another. Falling off a log, or crashing into the river bank, will prove fatal.

The object of the game is to get five of your men into the man holes at the top of the screen.

The Snow Hawks will follow you unquestioningly, but you will have to exercise all your skill to return home safely. Press any key to start.




```

10 GOTO 700
15 POKE36869,255
20 C=0:D=100:SC=0:F=8152:A=0:OF=30720+F
25 B=3:N=10:TI$="000000"
30 Z$="XXXXXXXXXXXXXXXXXXXXXXXXXXXX"
35 PRINT"Z":POKEA+F,0
40 A$="DDDDDDDDDDDD"
41 B$="DDDD DDDD DDDD"
42 C$="DDDDDD DDDDD"
43 D$="DDD DDD"
44 E$="ABC ABC ABC ABC"
45 F$="ABC ABC ABC"
46 G$="ABC ABC ABC ABC"
50 FORI=0TO21
55 PRINT"XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX"
60 PRINT"XXXXXXXXXXXXXXXXXXXXXXXXXXXX"
65 PRINT"X":LEFT$(Z$,4)RIGHT$(A$,1)LEFT$(A$,22-I)
70 PRINT"X":LEFT$(Z$,6)RIGHT$(B$,1)LEFT$(B$,22-I)
75 PRINT"X":LEFT$(Z$,8)RIGHT$(C$,1)LEFT$(C$,22-I)
80 PRINT"X":LEFT$(Z$,10)RIGHT$(D$,1)LEFT$(D$,22-I)
81 PRINT"X":LEFT$(Z$,14)RIGHT$(E$,1)LEFT$(E$,22-I)
82 PRINT"X":LEFT$(Z$,16)RIGHT$(F$,1)LEFT$(F$,22-I)
85 PRINT"X":LEFT$(Z$,18)RIGHT$(G$,1)LEFT$(G$,22-I)
90 PRINT"X":SC, TI$
91 IFPEEK(A+F)=4ANDC>5THENGOSUB200
95 IFPEEK(A+F)=32ANDC>5THENGOSUB350
100 IFTI$=>"000030"THENGOSUB300
110 IFC<5THENGOSUB400
115 POKEA+F,32
120 IFC=10THENGOSUB500
125 GETL$:IFL$="@"THENA=A-44:C=C+1:SC=SC+10
130 IFL$="/"THENA=A+44:C=C-1:SC=SC-10
135 IFL$=":"THENA=A-1:N=N-1:IFN=0THENGOSUB300
140 IFL$=";"THENA=A+1:N=N+1:IFN=21THENGOSUB300
145 POKEA+F,0:POKEOF+A,5
150 FORU=1TO100:NEXT
155 NEXT
160 GOTO50

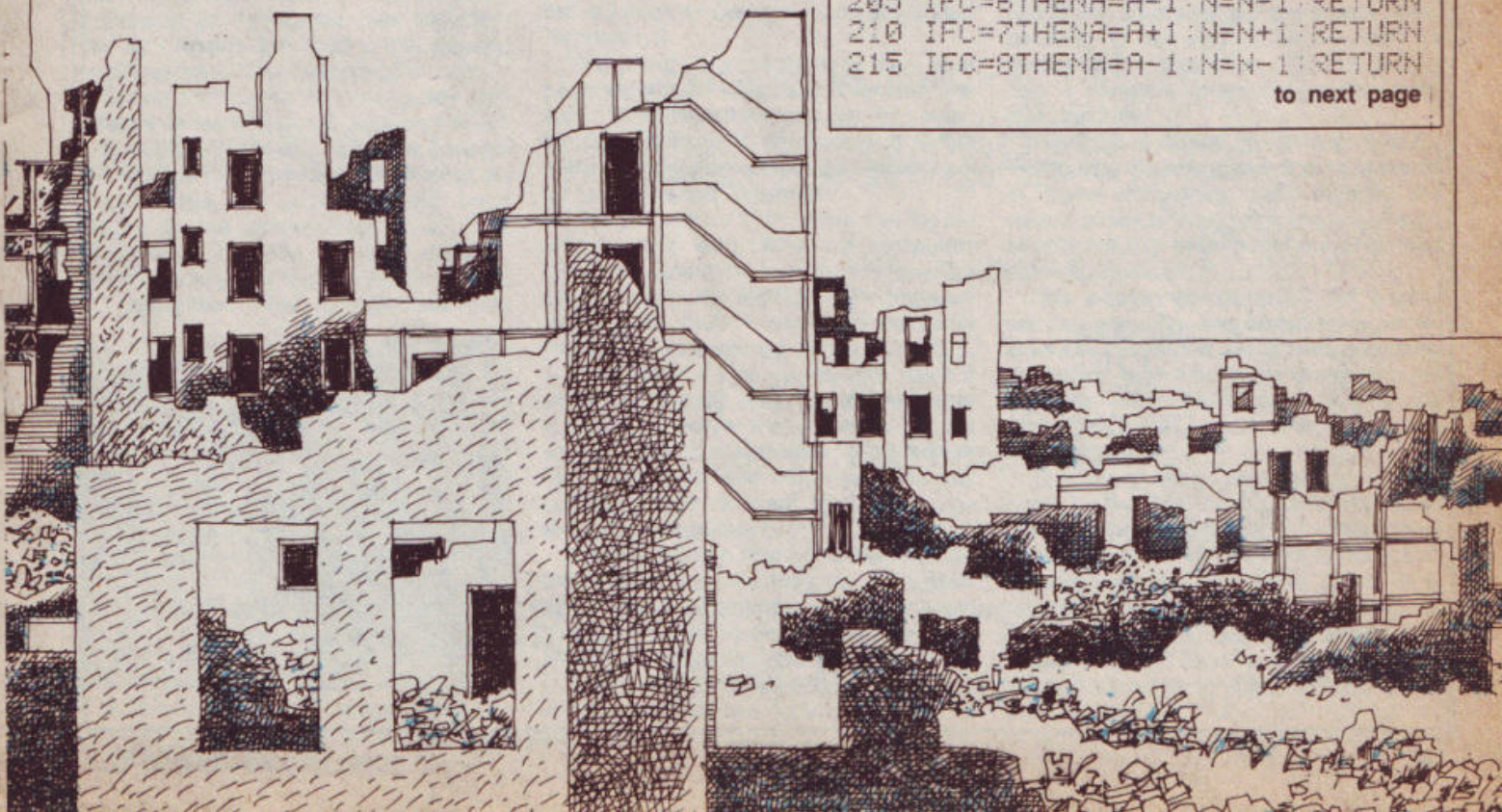
```

```

200 IFTI$=>"000030"THENGOSUB300
205 IFC=6THENA=A-1:N=N-1:RETURN
210 IFC=7THENA=A+1:N=N+1:RETURN
215 IFC=8THENA=A-1:N=N-1:RETURN

```

to next page



Street Alley

```

220 IF C=9 THEN A=A+1 : N=N+1 : RETURN
300 REM
305 POKE36877,220 : FOR L=15 TO 0 STEP -1 : POKE36878,L : FOR U=1 TO 100 : NEXT U, L
310 POKE36878,0 : POKE36877,0 : B=B-1 : POKE A+F,32
315 IF B=0 THEN 600
320 A=0 : C=0 : N=10 : TI$="000000" : RETURN
350 POKE36877,252 : FOR L=15 TO 0 STEP -1
355 POKE36878,L : FOR U=1 TO 90 : NEXT U, L
360 POKE36878,0 : POKE36877,0
365 A=0 : C=0 : N=10 : TI$="000000" : B=B-1 : IF B=0 THEN 600
370 RETURN
400 IF PEEK(A+F)<>32 THEN 415
410 RETURN
415 IF PEEK(A+F)=32 THEN RETURN
420 IF PEEK(A+F)=0 THEN RETURN
425 GOSUB300
430 RETURN
500 IF A+F=77030 OR A+F=77090 OR A+F=77120 OR A+F=77150 OR A+F=7722 THEN 510
505 GOT0593
510 X=X+1 : IF X=5 THEN D=D-20 : IF D=0 THEN D$=" " : DDD
515 IF D=60 THEN B$=" " : DD : DD : DD
520 IF D=40 THEN C$=" " : DDD : DDD : DD
525 IF D=20 THEN A$=" " : DDD : DD : DDD : DD
530 IF D=0 THEN D$=" " : DD : DD : DD : DD
535 IF D<0 THEN D=0
540 POKE A+F,0
545 SC=SC+20
550 POKE36878,15 : FOR L=1 TO 15
555 FORM=200 TO 220+L*2 : POKE36876,M
560 NEXT M, L : POKE36878,0 : POKE36876,0
565 IF X=5 THEN GOSUB580
570 A=0 : C=0 : N=10 : TI$="000000"
575 RETURN
580 SC=SC+50 : X=0
585 POKE36878,15 : FOR L=130 TO 254 : POKE36876,L
590 FORM=1 TO 40 : NEXT M, L
591 POKE36878,0 : POKE36876,0
592 FOR Y=0 TO 21 : POKE7702+Y,32 : NEXT Y : RETURN
593 GOSUB300
595 GOT050
600 POKE36869,240 : POKE198,0
610 PRINT "I"; SC
615 PRINT "XXXXXXXXXX"
620 INPUT "ANOTHER GO?"; V$
625 IF V$="Y" THEN RUN15
630 PRINT "END" : END
700 POKE52,28 : POKE56,28 : POKE51,0 : CLR
710 FOR I=0 TO 511
720 POKE7168+I,PEEK(32768+I) : NEXT I
730 FOR I=0 TO 38
740 READ J : POKE7168+I,J : NEXT J
750 DATA 153,153,126,24,219,189,153,129,7,63,127,127,127,127,63,7
760 DATA 0,255,255,255,255,255,255,0,112,254,241,241,241,241,254,112
770 DATA 255,255,255,255,255,255,255,255
780 GOT015

```


Street Life

All's fair in Manchester and Edinburgh

PCW staff report on the Manchester and Edinburgh micro fairs.

Over 4000 visitors found their way through Manchester's decaying warehouse wastelands to the city's Microfest '82.

Held at UMIST on July 24 and 25, there were more than 70 exhibitors and continuous lecture and film programmes.

Interest for the home micro owner centred on equipment for the Sinclair ZX Spectrum. Both Fuller Micro Systems and Kempston (Micro) Electronics displayed add-ons for the Spectrum — a sound box and a mother-board plus I/O port, respectively. Spectrum software was also on display at the Richard Altwasser stand.

Microfest organisers, David and Mike Hewitt, were more than pleased with the show. Said Mike: "The whole event has been a tremendous success."

David was surprised at the differences in the audiences for the two days. The Sunday crowd was more business oriented, while the home micro enthusiasts tended to come on Saturday.

It is unfortunate that micro events seem to come in pairs. Those who attended the Manchester Microfest in preference to the Edinburgh ZX Fair salved their consciences by crossing the road to the nearest public house — The Swinging Sporrán.

During the course of the two-day Microfest a series of lectures were presented.

Alan Shaw (St Martin's College, Lancaster) spoke on *Computer Interfacing for Experiments*. He explained the basic stages in the construction of a ZX81 input/output interface. He also demonstrated how to select the pins for the parallel I/O organiser, how to calculate their



Paul Kriwaczek: "Will the alienation of ourselves from each other and from nature be solved by computers?"

addresses and how to set up a simple control device. The device enabled him to use a ZX81 to start and stop a model electric car.

Boris Allan (Senior Lecturer in Sociology, Manchester Polytechnic) tackled *The BBC Computer in Education*. He put forward his philosophy: "Ignorance of computers is not a crime; to be ignorant of computers can be a disadvantage; understanding computers requires no special type of ability; and everybody has to start somewhere."

Boris felt that the emphasis of computer education should be placed on computer awareness for everyone rather than computer studies for the few.

Paul Kriwaczek (producer of the BBC tv series 'The Computer Programme') posed the question *Is Computer Literacy Really Necessary?*

"No other new technology has ever been introduced with such a fanfare," he said. "In its time the motor car was every bit as significant a development — but there was no government department set up to give us 'car awareness'."

"People saw for themselves that the car was a good idea. Why are computers different? And why invoke this emotive phrase 'computer literacy'? The impression is given that — come the computer revolution — everything will be all right."

"Like other faiths you do not ask for evidence. Nobody asks how the computer is going to solve the problems in our society. Will the alienation of ourselves from each other and from nature, to say nothing of our rampant materialism, be solved by computers?"

"People believe that computers will be the answer because they do not understand them. Computer literacy should give us this appreciation and therefore allow us to make the most of micros."

Stephen Adams (specialist hardware writer) delivered two lectures. *Inside the*

Spectrum toured the printed-circuit board of the Sinclair micro. *Keep It Simple* explained how to begin programming and how to make your programs easily understood by others.

Eric Deeson (Educational ZX User Group) looked into *The Future of Micros in Schools*.

"To get one computer in a school is not the end of educational computing — it is the beginning," he emphasised. The trend towards cheap powerful micros will enable schools to take a more liberal approach to micro education.

"What is needed," he said, "is computer-aided freedom, rather than the 'battery farm scenario' with children in computer learning cubicles. The micro must open our educational horizons rather than restrict them."

Edinburgh ZX Computer Fair

The first true home computer exhibition in Edinburgh was an undoubted success. Nearly 1200 visitors attended the show, which was organised by Gordon Hewitt and the Edinburgh ZX Computer Club.

The exhibition was set in the long concrete reception hall of Edinburgh's Meadowbank stadium. The local club took a large stand at one end of the hall. The rest of the exhibitors were arranged in a neat line of tables extending about 60 yards down one side of the hall, leaving plenty of space for the visitors to mill around.

The main interest seemed to focus, understandably, on the ZX Spectrum. Those companies displaying the first Spectrum programs did particularly well, certainly in drawing a large crowd of permanent hangers-on. The Bug-Byte Space Invaders program was the most popular draw.

We had a Spectrum on the *Popular Computing Weekly* stand. It drew a crowd of young enthusiasts, each berating the others' ability to program it properly. Many people actually tried to buy our only copy of the manual.

One woman complained: "But I need another copy. My dog buried mine somewhere in the garden. He is always burying my books. Normally I know where he's put it but this time I have had to give up. It's probably too late now. Next time I'll wrap it in polythene."

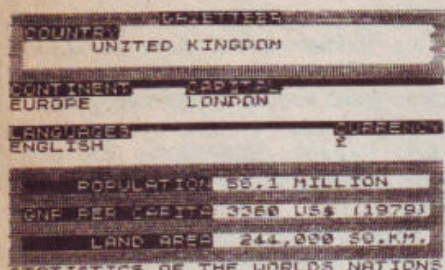
The imaginative organisation of the show by the Edinburgh Club — competitions ran the full length of the exhibition — kept many of the visitors right to the end. It proved quite forcefully that there is a stronger home computing following in Scotland than is often assumed. The organisers hope more software and hardware companies in this business show their support.



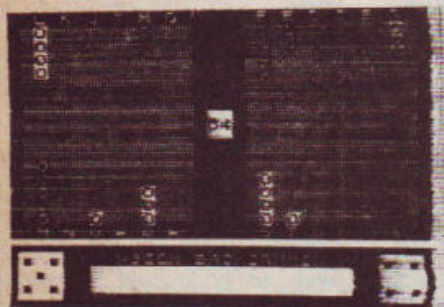
A study in concentration . . . at Manchester

Reviews

software



Detail from the Vu-File program.



Detail from the Backgammon program.

Sinclair/Psion Tapes

Sinclair Research, Camberley, Surrey, and branches of W H Smith. ZX81, 16K cassettes.

Psion are the second software house to sign an exclusive deal with Sinclair.

Five of the tapes are games, two of these produced by Microgen under the Psion banner, and the packaging is eye-catching.

Chess (£6.95), one of the Microgen tapes, has had £3 clipped from its previous price. There are six levels of play in the program, and these may be changed in mid-play. The board may also be set up for problem solving. All legal moves are recognised. A good, solid program. The tape includes a chess clock on Side 2.

Space Raiders/Bomber (£3.95) is the other Microgen tape. *Space Raiders* is... you guessed it! Yawn. Not even a mother ship to relieve the boredom. *Bomber* (or *New York*, as Microgen call it when they sell it direct), is the well-known sky-scraper demolition program. This is a very addictive game. Please let me know if you succeed in landing your plane — I've not seen it done yet, even though upwards of 300 kids tried it at the local school fete!

The rest of the programs are Psion's own products, a couple of which were available before the Sinclair connection. *Backgammon* (£5.95) is the only program I know of which plays my favourite board-game, and so was a must when I saw it advertised some months ago. It has since

undergone a tidying-up operation, with response times being made faster. Like all Psion programs it has great visual appeal. Below the board in the accompanying illustration are the dice and between them, a box which shows the moves made by computer and human opponent. On the bar you can see the doubling cube, which the program is intelligent enough to offer at the right moment.

While the program will execute all the recognised openings, I am a little worried at its tendency to blot with its back men after only two or three throws, which leads to a game of boring attrition. This happens, in my experience, once every four or five games, but it is easy to break the game, and start again. All in all, however, a very good program, and a very rewarding one. *Sorcerer's Island/Perilous Swamp* (£4.75) are the games on the other previously available tape, and are very good value. *Perilous Swamp* contains a Princess which the player has to rescue and escort to safety. It's really more of a board game than an adventure, but along the way you will meet various monsters and pick up bits of treasure or weaponry with which to bribe or fight them.

Sorcerer's Island is a graphic adventure, in which you take a Sunday morning stroll around a paradise island. Uneventful, of course, apart from the giant, rats, minotaurs, and so on! Again, you can bribe or fight, or run away. Reaction times are a little slow, but a nice scrolling technique helps relieve any boredom. I've played the game for a year, and still not succeeded in finishing it.

Flight Simulation (£5.95) is the final games tape in this package from Psion. No words can do justice to this most elegant of programs — in my opinion the best use of machine-code yet available for the ZX81!

You are placed in the pilot's seat of a twin-engined prop plane, somewhere near a landing strip, and your job is to land safely. There are several modes, but they all feature the same cockpit display of altimeter, rev counter and so on, together with a view from the cockpit window. This shows the horizon, which will show the degree of bank and rate of climb or descent. This is all depicted in a most realistic way.

To help you find the runway, you may call up a map, and this, together with several beacons, will guide you to the final approach. At this point, you may ask for a visual approach, and this will consist of a 3D representation of the runway and approach lights. As in real life, an eye must be kept on wind-speed, and the plane kept from stalling.

Vu-File and *Vu-Calc* (£7.95 each) are

the two remaining Sinclair/Psion programs.

As its name suggests, *Vu-File* is a data filing and retrieval system. The difference between this and the multitude of others available is that Psion has examined systems run on the larger micros and compacted the design to fit into the ZX81, at the same time continuing their policy of elegant and attractive graphics.

One is able to format the file to any degree, with graphic borders and so on. Forward planning is required in this formatting — it cannot be altered during data input. Once data is input, there are a number of powerful commands to use in processing the information. For example, the user can initiate a search, which will print out a specified field in alphabetical or rank order. In the demonstration file containing information of the world's countries, for instance, all the records may be listed in, say, population order, or to show every occurrence of a particular language. Thus one can quickly find which countries speak Bantu, and which ones use Pound Sterling and so on. Using the system at home, one could find and print out every record, say, with a particular bass-player, or every stamp with a blue flower in the design.

Commands include an analysis of memory remaining while inputting data, and a copy-to-printer routine.

The companion tape to *Vu-File* is *Vu-Calc*. As its name suggests it is a ZX81 version of Visicalc. Necessarily limited by the 16K Ram, it is nevertheless a very useful cash-forecast system for the home user or the one-man-businessman who has not yet Applied.

The program acts as a window on to 936 boxes which can be filled with numerical or alphabetical data. Formulae can then be applied to these data, in many different ways. The user can define the horizontal rows as, for instance, mortgage, rates, gas, electricity etc., and the vertical rows, as January, February and so on. Data for the various months may then be input, and the formulae set. The totals will be displayed in the boxes chosen. Any data may then be changed, and the effect on the whole noted.

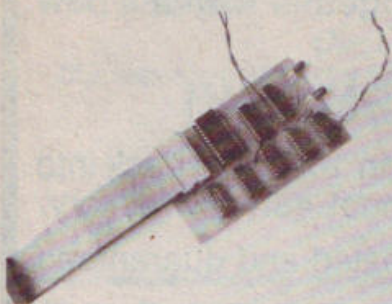
Summary

The Psion tapes are a welcome change from the usual run of Sinclair Software (from any source). All are good value, but I would single out *Flight Simulation* for special mention — you will not see a better games program, until Psion create one for the Spectrum. *Vu-File* and *Vu-Calc* are a brave attempt to emulate much more expensive packages and certainly succeed as far as is possible on the Sinclair.

TB

Reviews

hardware



Character Generator

Haven Hardware, 4 Asby Road, Asby, Workington, Cumbria.
Price: £19.95.

This board allows you to use the inverse character (usually white on black) of your ZX80 or ZX81 to program your own character set.

The ZX character set is made up of characters each with one byte (memory location) width and eight bytes length. Each byte contains eight dots which can be ones or zeros giving either black or white dots.

With this board, any of the 64 characters can be changed by Poking the appropriate dot pattern into the various bytes that make up that character. On this board there are two inverse character sets and, using Poke commands, you can alternate between them. Unfortunately, there is no way to restore the original Rom-based inverse character set when using this board.

The board can be connected quite easily to the ZX80 by plugging in a ribbon strip and plug into the Rom socket and transferring the Rom to a similar socket on the characters board. There are five other wires to solder on to the printed-circuit board and this can be quite difficult as the connections have to be made to both sides of the printed-circuit board.

On the ZX81 the fit is very tight because it was not possible to connect the board as suggested since that would have involved obstruction of the tape sockets. An attempt was made to take it out the other side of the ZX81, but then the case would not fit on. In the end, since the board is too big to fit under the ZX81 keyboard, the case had to be left off in order to use it. The wires for the rest of the connections had to be traced out on the printed-circuit board as the diagram was rather imprecise.

On switching on you are presented with a random pattern of dots instead of the cursor. The normal characters come out the same, but as the inverse character set has been replaced with Ram all the mode characters are lost (inverse L.K.G.).

A program is provided to revert to the normal character set by reprogramming

the inverse character set — called Inverse into Programs, but the instructions fail to mention it. Two other programs are included. A graph plotter which fails if trying to plot at zero or below and a double-sized character generator which I could not get to work. A chart is also provided to help you design your own characters and is about the most useful thing in the instructions.

Summary

This board is cheaper than other character sets, but I would much rather spend the extra money and have fewer problems. SA

Spectrum 32K RAM

Sinclair Research, Freepost, Camberley, Surrey.
Price: £60.

The Sinclair add-on 32K Ram board for the ZX Spectrum must be fitted by their factory in Scotland so, if you wish to purchase this board after buying a 16K Spectrum, you must send the Spectrum back with the order.

This seems a pity because it is so easy to fit the 6½ by 1½ inch board into the sockets provided on the back part of the printed-circuit board. The sockets for the add-on board are provided on every Spectrum and it can only be fitted into them one way round. The pins on each end of the board are stout and there is little chance of bending them.

The board contains eight Ram chips (32K x 1 bit) made by Texas, two decoding chips, two change-over chips which operate when the dynamic Ram needs to be refreshed and eight small ceramic capacitors to smooth the power supply to the Rams.

The decoding is simplified by the fact that only one address line is needed to address all the chips (A15). When this line is Binary 1 then the Ram is turned on. There is no need to tell the computer how much memory is available (as on the ZX81) since it is automatically counted from 64K downwards. Also, all the Ram can be used for machine code or Basic programs. This means that there is no space left for Eproms, ports etc in memory. The Rams used on the board are not standard Texas components. They appear to be similar to 4164 (64K x 1 bit) chips but only contain 32K. Could they have been Texas rejects? Only Sinclair seems to be able to get hold of any.

The board works very well and no noticeable increase in heat from the voltage regulator or other signs of overheating have been noticed with it in use. The Ram-pack wobble is no longer present as

all other equipment is connected to the edge connector and the Ram pack has its own connection sockets and is firmly held.

It is not possible to turn off sections of the Ram for more memory or other devices from the edge connector as Ram CS (chip select) is not provided. This is a great pity as not everyone wants to be restricted to what the manufacturer wants to provide.

Summary

The Ram board is well made and should cause no problems in use. However, to fix the units the ZX Spectrum must be sent back to the factory. This is a great disadvantage, as is the price of £60. Other Ram boards are certain to be available soon with at least the same amount of Ram which may provide a Ram CS so that other devices can be used with the Ram pack. SA

Programming ZX81

by M James and S M Gee.

Bernard Babani Ltd, The Gramplans, Shepherds Bush Road, London W6 7NF
(Tel: 01-603 2581).

Available from larger branches of W H Smith.

Price: £1.95.

The Art of Programming the 1K ZX81 is a simple yet professionally produced book of 86 pages. At £1.95 its price bears a closer resemblance to normal books than computing books, which for some reason are still grossly over-priced.

It is a well written and carefully thought out book which does far more than present a series of 1K games. Each chapter introduces and explains a different topic, explores a few ways of using the techniques discussed in simple programs and then helps you build up those programs. In this way you usually end up with a couple of games out of each chapter.

These include card games in the chapter on random numbers, arrows, lunar lander and cannon-ball in the chapters on moving graphics, clocks and reaction time testers in the chapter of the use of Fast, Slow and Pause, and codes and cyphers in the chapter on string-handling.

There is also an excellent short chapter introducing the Peek and Poke functions. This should do much to dispel the mystery for some reason still surrounding these two commands. There is also a useful big letters program.

Summary

A very useful and well written book which we strongly recommend for new users of the ZX81. It is a pity that the book has arrived on the market so late in the day for the ZX81. DS

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(MICRO)
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Open Forum

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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.

Simon

on BBC Micro

Simon is a program to simulate the electronic game of the same name. It runs on the BBC Model B and demonstrates some of the interesting colour graphics and sound facilities of the BBC.

The program starts by switching off the colours RED, GREEN, YELLOW and BLUE. A circle is then plotted with each quadrant assigned one of the four colours. The screen remains blank as all these colours have been turned to black. On the issue of a VDU19 command the colours can be turned on and off at will.

The computer flashes up a segment of colour accompanied by a sound (each colour has its own sound). You then have to repeat the colour by entering R, G, Y or B. The computer increases its sequence of colours and sounds by 1 until either it

to next page

Simon

by D M Dodsworth

```
1 CLS
2 FOR I=1 TO 5:PRINT:NEXT I
3 PRINT CHR$ 141 "          SIMON" ' CHR$ 141 "
4 PRINT CHR$ 141 "          =====" ' CHR$ 141 "
5 PRINT:PRINT " PRODUCED BY: A.K. and D.M.Dodsworth"
6 PRINT "          59 Balmoral Drive"
7 PRINT "          Bramcote Hills"
8 PRINT "          Beeston"
9 PRINT "          Nottingham NG9 3FT."
10 TIME=0:REPEAT UNTIL TIME=200
11 CLS
12 PRINT:INPUT "Do you need instructions (YES/NO)",A$
13 IF A$="NO" THEN 100
14 CLS
15 PRINT:PRINT
16 PRINT "          INSTRUCTIONS"
17 PRINT "          ====="
18 PRINT
19 PRINT " This is a computer version of the"
20 PRINT "popular electronic game 'SIMON'.The"
21 PRINT "computer flashes a segment of a circle"
22 PRINT "and plays a note.You must follow it."
23 PRINT "If a blue segment was shown,type 'B',"
24 PRINT "for red type 'R',green 'G',and yellow"
25 PRINT "'Y'.If blue then red were flashed then"
26 PRINT "type 'BR',and so on.The screen will be"
27 PRINT "blank for a few seconds at the start"
28 PRINT "of the game,don't worry.Good luck!!"
29 FOR Z=1 TO 7:PRINT:NEXT Z
30 INPUT "          press RETURN to commence"D$
100 DIM STORE(10)
110 MODE 2
120 PROCCIRCLE
130 FOR A=1 TO 10
140 STORE(A)=RND(4)
150 NEXT A
160 FOR A=1 TO 10
170 PRINT TAB(1,29)SPC(20);
180 FOR B=1 TO A
190 TIME=0:REPEAT UNTIL TIME=20
200 VDU19,STORE(B),STORE(B),0,0,0
210 ON STORE(B) GOSUB 380,420,460,500
220 T1=TIME
230 REPEAT UNTIL TIME=T1+50
240 VDU19,STORE(B),0,0,0,0
250 NEXT B
260 INPUT TAB(1,29)"NOW REPEAT ?"X$:
270 L=LEN(X$)
280 IF L=A THEN GOTO 310
285 PRINT TAB(1,30)SPC(20);
290 PRINTTAB(1,30)"WRONG NUMBER OF ENTRIES";
295 TIME=0:REPEAT UNTIL TIME=200
```


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reaches 10 or you fail to respond correctly.

The program is written in a structured manner using procedures and sub-routines. The maximum number in the sequence can be increased easily by changing line 160.

O and X Maths

on ZX81

This program is intended to be an exciting game and challenge the mathematical skills of the players. Intended for average primary age children, it is based upon the popular noughts and crosses game. I have tried to make it as simple to operate as possible.

On loading, the program will automatically run, if SAVED by GOTO 2000. The two players are asked to type in their names. The screen then goes blank for ten seconds whilst the computer prints the screen and checks the questions it sets at random.

Variables used:

Arrays: N\$: Players' names — up to 12 letters are accepted and the name is positioned within the middle of the string — by lines 50 and 75 — to produce neater printing.

Q\$: Stores the questions. The element is changed to the appropriate symbol for the check routine if the question is correctly answered. If larger questions are set by altering lines 230 and 240 it may be desirable to set Q\$ (9,6).

Strings: M\$: Players' names are input before storing in middle of element of N\$ array.

A\$: Question numbers are called by touching the keyboard. Only unanswered questions may be called due to the check in line 455.

E\$: 6 spaces are used to erase print.

R\$: Question answer is entered by player.

Loops: F: Time loops. It produced a more stable display than PAUSE.

A: Provides PRINT AT points for board in lines 110 to 180.

: Used to count element of Q\$ array in lines 220 to 250.

A & B: Provides relevant letter to print in each box in lines 150-170.

to next page

```

296 PRINT TAB(1,29)SPC(20);
297 PRINT TAB(1,30)SPC(20);
298 PRINT TAB(1,31)SPC(20);
300 GOTO 260
310 S=0
320 FOR C=1 TO A
330 GOSUB 540
340 NEXT C
350 IF S=1 THEN PROCERRR
360 NEXT A
370 PROCWON
380 SOUND1,-15,0,5
390 SOUND2,-15,12,5
400 SOUND3,-15,28,5
410 RETURN
420 SOUND1,-12,20,5
430 SOUND2,-12,50,5
440 SOUND3,-12,100,5
450 RETURN
460 SOUND1,-10,50,5
470 SOUND2,-10,100,5
480 SOUND3,-10,150,5
490 RETURN
500 SOUND1,-8,100,5
510 SOUND2,-8,150,5
520 SOUND3,-8,200,5
530 RETURN
540 REM*****
550 REM*SUBROUTINE TO CHECK FOR CORRECT SEQUENCE
560 P$=MID$(X$,C,1)
570 IF P$="R" THEN P=1
580 IF P$="G" THEN P=2
590 IF P$="Y" THEN P=3
600 IF P$="B" THEN P=4
610 IF P<> STORE(C) THEN S=1
620 RETURN
630 DEF PROCCIRCLE
640 REM*****
650 REM*PROCEDURE TO PLOT CIRCLE WITH FOUR COLOURED
660 REM*SEGMENTS - THE COLOUR IS SWITCHED OFF
670 REM*****
680 ANGLE=0
690 MOVE 640,512+400
700 FOR X=1 TO 4
710 GCOL 0,X:VDU19,X,0,0,0,0
720 FOR Y=1 TO 9
730 ANGLE=ANGLE+10
740 MOVE 640,512
750 PLOT 85,SIN(RAD(ANGLE))*400+640,COS
(RAD(ANGLE))*400+512
760 NEXT Y
770 NEXT X
780 ENDPROC
790 DEF PROCERRR
800 REM*****
810 REM*ERROR SEQUENCE PROCEDURE
820 REM*****
830 CLS

```


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: Provides print co-ordinates for questions in lines 320-380.

C: Checks through question to provide better print spacing when question is called in lines 470-520). It actually only needs to be FOR C = TO 3. If lines 230 and 240 are amended this may also require alteration.

C: Checks for winner by comparing the relevant elements of Q\$ array for Os and Xs in lines 710 to 790.

E: Erasure loop using E\$ in lines 560-580, 1210-1250.

T: Indicates player's turn by calling relevant element from N\$ array and also decides which symbol to print in lines 410 to 590.

Numeric: C: Question counter in print routine lines 310 to 340.

F: Flag set in print loop lines 415 to 515. Because it is possible to jump out of a loop in ZX Basic, lines 415, 475, 477 and 515 may be safely omitted.

X & Y: PRINT co-ordinates for O and X symbols in lines 620-670.

Z: Counts number of squares filled to check for stalemate in lines 705 to 800.

The memory required is about 4K and the loading time from tape is 2 minutes.

Grand Prix

on Vic-20

In this game you have to bet on a racing car and then watch the race to see if you win or not. The odds for each car change for every race and depending if you have chosen the easy or the hard game you are either told the odds before the race or not.

To select a car just enter the first letter — ie P for purple — and state your bet. The program is fool-proof so you can't bet more than you got!

The listing is in lower case letters as this is the mode in which the program runs, so capital letters are easier to see for programming.

Program notes:

Line 110-120 Sets the odds for each race
Line 130 The second print symbol is for cyan (in lower case)

Line 140 The second print symbol is for yellow (in lower case)

Line 211-216 Decyphers which car is to next page

```
840 PRINTTAB(1,10)"YOU FAILED ON SEQUENCE ";A
850 END
860 ENDPROC
870 DEF PROCWON
880 CLS
890 PRINTTAB(5,10)"WELL DONE - YOU
    SUCCEEDED TO FOLLOW THE SEQUENCE"
900 END
910 ENDPROC
```

```

  66+85  73-5  48-18  YOUR TURN,
    = ?    = ?    = ?    CHRIS
  -----
  94+52  11+18  2+81    WHICH
    = ?    = ?    = ?    QUESTION
  -----
  90/10  77-42  69-2    DO YOU WANT?
    = ?    = ?    = ?

```

```

  16+20  69-39  13+45  YOUR TURN,
    = ?    = ?    = ?    CHRIS
  -----
  59+14  20+31  17+74  WHICH
    = ?    = ?    = ?    QUESTION
  -----
  97-24  19+37  92-27  DO YOU WANT?
    = ?    = ?    = ?    YES X 14
  -----
  TYPE ANSWER
  AND PRESS
  NEW LINE

```

```

  75-2  75-2  75-2
  -----
  61+10  61+10  61+10
  -----
  49-35  33+49  49-35
  -----
  WELL DONE  CHRIS

```

```

1 REM O AND X MATHS GAME
2 REM BY C.ROBINSON
3 CLS
4 DIM N$(2,12)
5 LET E$=""
6 REM *** INSTRUCTIONS ***
7 PRINT TAB 1,"NOUGHTS AND CR
8 O335 MATHS GAME"
9 PRINT "FOR TWO PLAYERS
10 (OR TERMS)."
11 PRINT "PLEASE GIVE
12 O FIRST."
13 FOR F=1 TO 100
14 NEXT F
15 PRINT AT 7,1,"PLEASE GIVE
16 NAME OF PLAYER "
17 PRINT AT 9,1,"AND PRESS "
18 INPUT M$
19 LET N$(1)=M$
20 IF LEN M$(12) THEN LET N$(1)
21 =E$ TO (12-LEN M$)/2)+M$
22 PRINT AT 7,1,E$,E$,E$,"
23 PRINT AT 9,1,E$,E$,E$
24 PRINT AT 10,20,M$(1)
25 PRINT AT 13,1,"PLEASE GIVE
26 NAME OF PLAYER "
27 PRINT AT 15,1,"AND PRESS "
28 INPUT M$
29 LET N$(2)=M$
30 IF LEN M$(12) THEN LET N$(2)
31 =E$ TO (12-LEN M$)/2)+M$
32 PRINT AT 7,1,E$,E$,E$,"
33 PRINT AT 9,1,E$,E$,E$
34 PRINT AT 10,20,M$(1)
35 PRINT AT 13,1,"PLEASE GIVE
36 NAME OF PLAYER "
37 PRINT AT 15,1,"AND PRESS "
38 INPUT M$
39 LET N$(3)=M$
40 IF LEN M$(12) THEN LET N$(3)
41 =E$ TO (12-LEN M$)/2)+M$
42 PRINT AT 7,1,E$,E$,E$,"
43 PRINT AT 9,1,E$,E$,E$
44 PRINT AT 10,20,M$(1)
45 PRINT AT 13,1,"PLEASE GIVE
46 NAME OF PLAYER "
47 PRINT AT 15,1,"AND PRESS "
48 INPUT M$
49 LET N$(4)=M$
50 IF LEN M$(12) THEN LET N$(4)
51 =E$ TO (12-LEN M$)/2)+M$
52 PRINT AT 7,1,E$,E$,E$,"
53 PRINT AT 9,1,E$,E$,E$
54 PRINT AT 10,20,M$(1)
55 PRINT AT 13,1,"PLEASE GIVE
56 NAME OF PLAYER "
57 PRINT AT 15,1,"AND PRESS "
58 INPUT M$
59 LET N$(5)=M$
60 IF LEN M$(12) THEN LET N$(5)
61 =E$ TO (12-LEN M$)/2)+M$
62 PRINT AT 7,1,E$,E$,E$,"
63 PRINT AT 9,1,E$,E$,E$
64 PRINT AT 10,20,M$(1)
65 PRINT AT 13,1,"PLEASE GIVE
66 NAME OF PLAYER "
67 PRINT AT 15,1,"AND PRESS "
68 INPUT M$
69 LET N$(6)=M$
70 IF LEN M$(12) THEN LET N$(6)
71 =E$ TO (12-LEN M$)/2)+M$
72 PRINT AT 7,1,E$,E$,E$,"
73 PRINT AT 9,1,E$,E$,E$
74 PRINT AT 10,20,M$(1)
75 PRINT AT 13,1,"PLEASE GIVE
76 NAME OF PLAYER "
77 PRINT AT 15,1,"AND PRESS "
78 INPUT M$
79 LET N$(7)=M$
80 IF LEN M$(12) THEN LET N$(7)
81 =E$ TO (12-LEN M$)/2)+M$
82 PRINT AT 7,1,E$,E$,E$,"
83 PRINT AT 9,1,E$,E$,E$
84 PRINT AT 10,20,M$(1)
85 PRINT AT 13,1,"PLEASE GIVE
86 NAME OF PLAYER "
87 PRINT AT 15,1,"AND PRESS "
88 INPUT M$
89 LET N$(8)=M$
90 IF LEN M$(12) THEN LET N$(8)
91 =E$ TO (12-LEN M$)/2)+M$
92 PRINT AT 7,1,E$,E$,E$,"
93 PRINT AT 9,1,E$,E$,E$
94 PRINT AT 10,20,M$(1)
95 PRINT AT 13,1,"PLEASE GIVE
96 NAME OF PLAYER "
97 PRINT AT 15,1,"AND PRESS "
98 INPUT M$
99 LET N$(9)=M$
100 IF LEN M$(12) THEN LET N$(9)
101 =E$ TO (12-LEN M$)/2)+M$
102 PRINT AT 7,1,E$,E$,E$,"
103 PRINT AT 9,1,E$,E$,E$
104 PRINT AT 10,20,M$(1)
105 PRINT AT 13,1,"PLEASE GIVE
106 NAME OF PLAYER "
107 PRINT AT 15,1,"AND PRESS "
108 INPUT M$
109 LET N$(10)=M$
110 IF LEN M$(12) THEN LET N$(10)
111 =E$ TO (12-LEN M$)/2)+M$
112 PRINT AT 7,1,E$,E$,E$,"
113 PRINT AT 9,1,E$,E$,E$
114 PRINT AT 10,20,M$(1)
115 PRINT AT 13,1,"PLEASE GIVE
116 NAME OF PLAYER "
117 PRINT AT 15,1,"AND PRESS "
118 INPUT M$
119 LET N$(11)=M$
120 IF LEN M$(12) THEN LET N$(11)
121 =E$ TO (12-LEN M$)/2)+M$
122 PRINT AT 7,1,E$,E$,E$,"
123 PRINT AT 9,1,E$,E$,E$
124 PRINT AT 10,20,M$(1)
125 PRINT AT 13,1,"PLEASE GIVE
126 NAME OF PLAYER "
127 PRINT AT 15,1,"AND PRESS "
128 INPUT M$
129 LET N$(12)=M$
130 IF LEN M$(12) THEN LET N$(12)
131 =E$ TO (12-LEN M$)/2)+M$
132 PRINT AT 7,1,E$,E$,E$,"
133 PRINT AT 9,1,E$,E$,E$
134 PRINT AT 10,20,M$(1)
135 PRINT AT 13,1,"PLEASE GIVE
136 NAME OF PLAYER "
137 PRINT AT 15,1,"AND PRESS "
138 INPUT M$
139 LET N$(13)=M$
140 IF LEN M$(12) THEN LET N$(13)
141 =E$ TO (12-LEN M$)/2)+M$
142 PRINT AT 7,1,E$,E$,E$,"
143 PRINT AT 9,1,E$,E$,E$
144 PRINT AT 10,20,M$(1)
145 PRINT AT 13,1,"PLEASE GIVE
146 NAME OF PLAYER "
147 PRINT AT 15,1,"AND PRESS "
148 INPUT M$
149 LET N$(14)=M$
150 IF LEN M$(12) THEN LET N$(14)
151 =E$ TO (12-LEN M$)/2)+M$
152 PRINT AT 7,1,E$,E$,E$,"
153 PRINT AT 9,1,E$,E$,E$
154 PRINT AT 10,20,M$(1)
155 PRINT AT 13,1,"PLEASE GIVE
156 NAME OF PLAYER "
157 PRINT AT 15,1,"AND PRESS "
158 INPUT M$
159 LET N$(15)=M$
160 IF LEN M$(12) THEN LET N$(15)
161 =E$ TO (12-LEN M$)/2)+M$
162 PRINT AT 7,1,E$,E$,E$,"
163 PRINT AT 9,1,E$,E$,E$
164 PRINT AT 10,20,M$(1)
165 PRINT AT 13,1,"PLEASE GIVE
166 NAME OF PLAYER "
167 PRINT AT 15,1,"AND PRESS "
168 INPUT M$
169 LET N$(16)=M$
170 IF LEN M$(12) THEN LET N$(16)
171 =E$ TO (12-LEN M$)/2)+M$
172 PRINT AT 7,1,E$,E$,E$,"
173 PRINT AT 9,1,E$,E$,E$
174 PRINT AT 10,20,M$(1)
175 PRINT AT 13,1,"PLEASE GIVE
176 NAME OF PLAYER "
177 PRINT AT 15,1,"AND PRESS "
178 INPUT M$
179 LET N$(17)=M$
180 IF LEN M$(12) THEN LET N$(17)
181 =E$ TO (12-LEN M$)/2)+M$
182 PRINT AT 7,1,E$,E$,E$,"
183 PRINT AT 9,1,E$,E$,E$
184 PRINT AT 10,20,M$(1)
185 PRINT AT 13,1,"PLEASE GIVE
186 NAME OF PLAYER "
187 PRINT AT 15,1,"AND PRESS "
188 INPUT M$
189 LET N$(18)=M$
190 IF LEN M$(12) THEN LET N$(18)
191 =E$ TO (12-LEN M$)/2)+M$
192 PRINT AT 7,1,E$,E$,E$,"
193 PRINT AT 9,1,E$,E$,E$
194 PRINT AT 10,20,M$(1)
195 PRINT AT 13,1,"PLEASE GIVE
196 NAME OF PLAYER "
197 PRINT AT 15,1,"AND PRESS "
198 INPUT M$
199 LET N$(19)=M$
200 IF LEN M$(12) THEN LET N$(19)
201 =E$ TO (12-LEN M$)/2)+M$
202 PRINT AT 7,1,E$,E$,E$,"
203 PRINT AT 9,1,E$,E$,E$
204 PRINT AT 10,20,M$(1)
205 PRINT AT 13,1,"PLEASE GIVE
206 NAME OF PLAYER "
207 PRINT AT 15,1,"AND PRESS "
208 INPUT M$
209 LET N$(20)=M$
210 IF LEN M$(12) THEN LET N$(20)
211 =E$ TO (12-LEN M$)/2)+M$
212 PRINT AT 7,1,E$,E$,E$,"
213 PRINT AT 9,1,E$,E$,E$
214 PRINT AT 10,20,M$(1)
215 PRINT AT 13,1,"PLEASE GIVE
216 NAME OF PLAYER "
217 PRINT AT 15,1,"AND PRESS "
218 INPUT M$
219 LET N$(21)=M$
220 IF LEN M$(12) THEN LET N$(21)
221 =E$ TO (12-LEN M$)/2)+M$
222 PRINT AT 7,1,E$,E$,E$,"
223 PRINT AT 9,1,E$,E$,E$
224 PRINT AT 10,20,M$(1)
225 PRINT AT 13,1,"PLEASE GIVE
226 NAME OF PLAYER "
227 PRINT AT 15,1,"AND PRESS "
228 INPUT M$
229 LET N$(22)=M$
230 IF LEN M$(12) THEN LET N$(22)
231 =E$ TO (12-LEN M$)/2)+M$
232 PRINT AT 7,1,E$,E$,E$,"
233 PRINT AT 9,1,E$,E$,E$
234 PRINT AT 10,20,M$(1)
235 PRINT AT 13,1,"PLEASE GIVE
236 NAME OF PLAYER "
237 PRINT AT 15,1,"AND PRESS "
238 INPUT M$
239 LET N$(23)=M$
240 IF LEN M$(12) THEN LET N$(23)
241 =E$ TO (12-LEN M$)/2)+M$
242 PRINT AT 7,1,E$,E$,E$,"
243 PRINT AT 9,1,E$,E$,E$
244 PRINT AT 10,20,M$(1)
245 PRINT AT 13,1,"PLEASE GIVE
246 NAME OF PLAYER "
247 PRINT AT 15,1,"AND PRESS "
248 INPUT M$
249 LET N$(24)=M$
250 IF LEN M$(12) THEN LET N$(24)
251 =E$ TO (12-LEN M$)/2)+M$
252 PRINT AT 7,1,E$,E$,E$,"
253 PRINT AT 9,1,E$,E$,E$
254 PRINT AT 10,20,M$(1)
255 PRINT AT 13,1,"PLEASE GIVE
256 NAME OF PLAYER "
257 PRINT AT 15,1,"AND PRESS "
258 INPUT M$
259 LET N$(25)=M$
260 IF LEN M$(12) THEN LET N$(25)
261 =E$ TO (12-LEN M$)/2)+M$
262 PRINT AT 7,1,E$,E$,E$,"
263 PRINT AT 9,1,E$,E$,E$
264 PRINT AT 10,20,M$(1)
265 PRINT AT 13,1,"PLEASE GIVE
266 NAME OF PLAYER "
267 PRINT AT 15,1,"AND PRESS "
268 INPUT M$
269 LET N$(26)=M$
270 IF LEN M$(12) THEN LET N$(26)
271 =E$ TO (12-LEN M$)/2)+M$
272 PRINT AT 7,1,E$,E$,E$,"
273 PRINT AT 9,1,E$,E$,E$
274 PRINT AT 10,20,M$(1)
275 PRINT AT 13,1,"PLEASE GIVE
276 NAME OF PLAYER "
277 PRINT AT 15,1,"AND PRESS "
278 INPUT M$
279 LET N$(27)=M$
280 IF LEN M$(12) THEN LET N$(27)
281 =E$ TO (12-LEN M$)/2)+M$
282 PRINT AT 7,1,E$,E$,E$,"
283 PRINT AT 9,1,E$,E$,E$
284 PRINT AT 10,20,M$(1)
285 PRINT AT 13,1,"PLEASE GIVE
286 NAME OF PLAYER "
287 PRINT AT 15,1,"AND PRESS "
288 INPUT M$
289 LET N$(28)=M$
290 IF LEN M$(12) THEN LET N$(28)
291 =E$ TO (12-LEN M$)/2)+M$
292 PRINT AT 7,1,E$,E$,E$,"
293 PRINT AT 9,1,E$,E$,E$
294 PRINT AT 10,20,M$(1)
295 PRINT AT 13,1,"PLEASE GIVE
296 NAME OF PLAYER "
297 PRINT AT 15,1,"AND PRESS "
298 INPUT M$
299 LET N$(29)=M$
300 IF LEN M$(12) THEN LET N$(29)
301 =E$ TO (12-LEN M$)/2)+M$
302 PRINT AT 7,1,E$,E$,E$,"
303 PRINT AT 9,1,E$,E$,E$
304 PRINT AT 10,20,M$(1)
305 PRINT AT 13,1,"PLEASE GIVE
306 NAME OF PLAYER "
307 PRINT AT 15,1,"AND PRESS "
308 INPUT M$
309 LET N$(30)=M$
310 IF LEN M$(12) THEN LET N$(30)
311 =E$ TO (12-LEN M$)/2)+M$
312 PRINT AT 7,1,E$,E$,E$,"
313 PRINT AT 9,1,E$,E$,E$
314 PRINT AT 10,20,M$(1)
315 PRINT AT 13,1,"PLEASE GIVE
316 NAME OF PLAYER "
317 PRINT AT 15,1,"AND PRESS "
318 INPUT M$
319 LET N$(31)=M$
320 IF LEN M$(12) THEN LET N$(31)
321 =E$ TO (12-LEN M$)/2)+M$
322 PRINT AT 7,1,E$,E$,E$,"
323 PRINT AT 9,1,E$,E$,E$
324 PRINT AT 10,20,M$(1)
325 PRINT AT 13,1,"PLEASE GIVE
326 NAME OF PLAYER "
327 PRINT AT 15,1,"AND PRESS "
328 INPUT M$
329 LET N$(32)=M$
330 IF LEN M$(12) THEN LET N$(32)
331 =E$ TO (12-LEN M$)/2)+M$
332 PRINT AT 7,1,E$,E$,E$,"
333 PRINT AT 9,1,E$,E$,E$
334 PRINT AT 10,20,M$(1)
335 PRINT AT 13,1,"PLEASE GIVE
336 NAME OF PLAYER "
337 PRINT AT 15,1,"AND PRESS "
338 INPUT M$
339 LET N$(33)=M$
340 IF LEN M$(12) THEN LET N$(33)
341 =E$ TO (12-LEN M$)/2)+M$
342 PRINT AT 7,1,E$,E$,E$,"
343 PRINT AT 9,1,E$,E$,E$
344 PRINT AT 10,20,M$(1)
345 PRINT AT 13,1,"PLEASE GIVE
346 NAME OF PLAYER "
347 PRINT AT 15,1,"AND PRESS "
348 INPUT M$
349 LET N$(34)=M$
350 IF LEN M$(12) THEN LET N$(34)
351 =E$ TO (12-LEN M$)/2)+M$
352 PRINT AT 7,1,E$,E$,E$,"
353 PRINT AT 9,1,E$,E$,E$
354 PRINT AT 10,20,M$(1)
355 PRINT AT 13,1,"PLEASE GIVE
356 NAME OF PLAYER "
357 PRINT AT 15,1,"AND PRESS "
358 INPUT M$
359 LET N$(35)=M$
360 IF LEN M$(12) THEN LET N$(35)
361 =E$ TO (12-LEN M$)/2)+M$
362 PRINT AT 7,1,E$,E$,E$,"
363 PRINT AT 9,1,E$,E$,E$
364 PRINT AT 10,20,M$(1)
365 PRINT AT 13,1,"PLEASE GIVE
366 NAME OF PLAYER "
367 PRINT AT 15,1,"AND PRESS "
368 INPUT M$
369 LET N$(36)=M$
370 IF LEN M$(12) THEN LET N$(36)
371 =E$ TO (12-LEN M$)/2)+M$
372 PRINT AT 7,1,E$,E$,E$,"
373 PRINT AT 9,1,E$,E$,E$
374 PRINT AT 10,20,M$(1)
375 PRINT AT 13,1,"PLEASE GIVE
376 NAME OF PLAYER "
377 PRINT AT 15,1,"AND PRESS "
378 INPUT M$
379 LET N$(37)=M$
380 IF LEN M$(12) THEN LET N$(37)
381 =E$ TO (12-LEN M$)/2)+M$
382 PRINT AT 7,1,E$,E$,E$,"
383 PRINT AT 9,1,E$,E$,E$
384 PRINT AT 10,20,M$(1)
385 PRINT AT 13,1,"PLEASE GIVE
386 NAME OF PLAYER "
387 PRINT AT 15,1,"AND PRESS "
388 INPUT M$
389 LET N$(38)=M$
390 IF LEN M$(12) THEN LET N$(38)
391 =E$ TO (12-LEN M$)/2)+M$
392 PRINT AT 7,1,E$,E$,E$,"
393 PRINT AT 9,1,E$,E$,E$
394 PRINT AT 10,20,M$(1)
395 PRINT AT 13,1,"PLEASE GIVE
396 NAME OF PLAYER "
397 PRINT AT 15,1,"AND PRESS "
398 INPUT M$
399 LET N$(39)=M$
400 IF LEN M$(12) THEN LET N$(39)
401 =E$ TO (12-LEN M$)/2)+M$
402 PRINT AT 7,1,E$,E$,E$,"
403 PRINT AT 9,1,E$,E$,E$
404 PRINT AT 10,20,M$(1)
405 PRINT AT 13,1,"PLEASE GIVE
406 NAME OF PLAYER "
407 PRINT AT 15,1,"AND PRESS "
408 INPUT M$
409 LET N$(40)=M$
410 IF LEN M$(12) THEN LET N$(40)
411 =E$ TO (12-LEN M$)/2)+M$
412 PRINT AT 7,1,E$,E$,E$,"
413 PRINT AT 9,1,E$,E$,E$
414 PRINT AT 10,20,M$(1)
415 PRINT AT 13,1,"PLEASE GIVE
416 NAME OF PLAYER "
417 PRINT AT 15,1,"AND PRESS "
418 INPUT M$
419 LET N$(41)=M$
420 IF LEN M$(12) THEN LET N$(41)
421 =E$ TO (12-LEN M$)/2)+M$
422 PRINT AT 7,1,E$,E$,E$,"
423 PRINT AT 9,1,E$,E$,E$
424 PRINT AT 10,20,M$(1)
425 PRINT AT 13,1,"PLEASE GIVE
426 NAME OF PLAYER "
427 PRINT AT 15,1,"AND PRESS "
428 INPUT M$
429 LET N$(42)=M$
430 IF LEN M$(12) THEN LET N$(42)
431 =E$ TO (12-LEN M$)/2)+M$
432 PRINT AT 7,1,E$,E$,E$,"
433 PRINT AT 9,1,E$,E$,E$
434 PRINT AT 10,20,M$(1)
435 PRINT AT 13,1,"PLEASE GIVE
436 NAME OF PLAYER "
437 PRINT AT 15,1,"AND PRESS "
438 INPUT M$
439 LET N$(43)=M$
440 IF LEN M$(12) THEN LET N$(43)
441 =E$ TO (12-LEN M$)/2)+M$
442 PRINT AT 7,1,E$,E$,E$,"
443 PRINT AT 9,1,E$,E$,E$
444 PRINT AT 10,20,M$(1)
445 PRINT AT 13,1,"PLEASE GIVE
446 NAME OF PLAYER "
447 PRINT AT 15,1,"AND PRESS "
448 INPUT M$
449 LET N$(44)=M$
450 IF LEN M$(12) THEN LET N$(44)
451 =E$ TO (12-LEN M$)/2)+M$
452 PRINT AT 7,1,E$,E$,E$,"
453 PRINT AT 9,1,E$,E$,E$
454 PRINT AT 10,20,M$(1)
455 PRINT AT 13,1,"PLEASE GIVE
456 NAME OF PLAYER "
457 PRINT AT 15,1,"AND PRESS "
458 INPUT M$
459 LET N$(45)=M$
460 IF LEN M$(12) THEN LET N$(45)
461 =E$ TO (12-LEN M$)/2)+M$
462 PRINT AT 7,1,E$,E$,E$,"
463 PRINT AT 9,1,E$,E$,E$
464 PRINT AT 10,20,M$(1)
465 PRINT AT 13,1,"PLEASE GIVE
466 NAME OF PLAYER "
467 PRINT AT 15,1,"AND PRESS "
468 INPUT M$
469 LET N$(46)=M$
470 IF LEN M$(12) THEN LET N$(46)
471 =E$ TO (12-LEN M$)/2)+M$
472 PRINT AT 7,1,E$,E$,E$,"
473 PRINT AT 9,1,E$,E$,E$
474 PRINT AT 10,20,M$(1)
475 PRINT AT 13,1,"PLEASE GIVE
476 NAME OF PLAYER "
477 PRINT AT 15,1,"AND PRESS "
478 INPUT M$
479 LET N$(47)=M$
480 IF LEN M$(12) THEN LET N$(47)
481 =E$ TO (12-LEN M$)/2)+M$
482 PRINT AT 7,1,E$,E$,E$,"
483 PRINT AT 9,1,E$,E$,E$
484 PRINT AT 10,20,M$(1)
485 PRINT AT 13,1,"PLEASE GIVE
486 NAME OF PLAYER "
487 PRINT AT 15,1,"AND PRESS "
488 INPUT M$
489 LET N$(48)=M$
490 IF LEN M$(12) THEN LET N$(48)
491 =E$ TO (12-LEN M$)/2)+M$
492 PRINT AT 7,1,E$,E$,E$,"
493 PRINT AT 9,1,E$,E$,E$
494 PRINT AT 10,20,M$(1)
495 PRINT AT 13,1,"PLEASE GIVE
496 NAME OF PLAYER "
497 PRINT AT 15,1,"AND PRESS "
498 INPUT M$
499 LET N$(49)=M$
500 IF LEN M$(12) THEN LET N$(49)
501 =E$ TO (12-LEN M$)/2)+M$
502 PRINT AT 7,1,E$,E$,E$,"
503 PRINT AT 9,1,E$,E$,E$
504 PRINT AT 10,20,M$(1)
505 PRINT AT 13,1,"PLEASE GIVE
506 NAME OF PLAYER "
507 PRINT AT 15,1,"AND PRESS "
508 INPUT M$
509 LET N$(50)=M$
510 IF LEN M$(12) THEN LET N$(50)
511 =E$ TO (12-LEN M$)/2)+M$
512 PRINT AT 7,1,E$,E$,E$,"
513 PRINT AT 9,1,E$,E$,E$
514 PRINT AT 10,20,M$(1)
515 PRINT AT 13,1,"PLEASE GIVE
516 NAME OF PLAYER "
517 PRINT AT 15,1,"AND PRESS "
518 INPUT M$
519 LET N$(51)=M$
520 IF LEN M$(12) THEN LET N$(51)
521 =E$ TO (12-LEN M$)/2)+M$
522 PRINT AT 7,1,E$,E$,E$,"
523 PRINT AT 9,1,E$,E$,E$
524 PRINT AT 10,20,M$(1)
525 PRINT AT 13,1,"PLEASE GIVE
526 NAME OF PLAYER "
527 PRINT AT 15,1,"AND PRESS "
528 INPUT M$
529 LET N$(52)=M$
530 IF LEN M$(12) THEN LET N$(52)
531 =E$ TO (12-LEN M$)/2)+M$
532 PRINT AT 7,1,E$,E$,E$,"
533 PRINT AT 9,1,E$,E$,E$
534 PRINT AT 10,20,M$(1)
535 PRINT AT 13,1,"PLEASE GIVE
536 NAME OF PLAYER "
537 PRINT AT 15,1,"AND PRESS "
538 INPUT M$
539 LET N$(53)=M$
540 IF LEN M$(12) THEN LET N$(53)
541 =E$ TO (12-LEN M$)/2)+M$
542 PRINT AT 7,1,E$,E$,E$,"
543 PRINT AT 9,1,E$,E$,E$
544 PRINT AT 10,20,M$(1)
545 PRINT AT 13,1,"PLEASE GIVE
546 NAME OF PLAYER "
547 PRINT AT 15,1,"AND PRESS "
548 INPUT M$
549 LET N$(54)=M$
550 IF LEN M$(12) THEN LET N$(54)
551 =E$ TO (12-LEN M$)/2)+M$
552 PRINT AT 7,1,E$,E$,E$,"
553 PRINT AT 9,1,E$,E$,E$
554 PRINT AT 10,20,M$(1)
555 PRINT AT 13,1,"PLEASE GIVE
556 NAME OF PLAYER "
557 PRINT AT 15,1,"AND PRESS "
558 INPUT M$
559 LET N$(55)=M$
560 IF LEN M$(12) THEN LET N$(55)
561 =E$ TO (12-LEN M$)/2)+M$
562 PRINT AT 7,1,E$,E$,E$,"
563 PRINT AT 9,1,E$,E$,E$
564 PRINT AT 10,20,M$(1)
565 PRINT AT 13,1,"PLEASE GIVE
566 NAME OF PLAYER "
567 PRINT AT 15,1,"AND PRESS "
568 INPUT M$
569 LET N$(56)=M$
570 IF LEN M$(12) THEN LET N$(56)
571 =E$ TO (12-LEN M$)/2)+M$
572 PRINT AT 7,1,E$,E$,E$,"
573 PRINT AT 9,1,E$,E$,E$
574 PRINT AT 10,20,M$(1)
575 PRINT AT 13,1,"PLEASE GIVE
576 NAME OF PLAYER "
577 PRINT AT 15,1,"AND PRESS "
578 INPUT M$
579 LET N$(57)=M$
580 IF LEN M$(12) THEN LET N$(57)
581 =E$ TO (12-LEN M$)/2)+M$
582 PRINT AT 7,1,E$,E$,E$,"
583 PRINT AT 9,1,E$,E$,E$
584 PRINT AT 10,20,M$(1)
585 PRINT AT 13,1,"PLEASE GIVE
586 NAME OF PLAYER "
587 PRINT AT 15,1,"AND PRESS "
588 INPUT M$
589 LET N$(58)=M$
590 IF LEN M$(12) THEN LET N$(58)
591 =E$ TO (12-LEN M$)/2)+M$
592 PRINT AT 7,1,E$,E$,E$,"
593 PRINT AT 9,1,E$,E$,E$
594 PRINT AT 10,20,M$(1)
595 PRINT AT 13,1,"PLEASE GIVE
596 NAME OF PLAYER "
597 PRINT AT 15,1,"AND PRESS "
598 INPUT M$
599 LET N$(59)=M$
600 IF LEN M$(12) THEN LET N$(59)
601 =E$ TO (12-LEN M$)/2)+M$
602 PRINT AT 7,1,E$,E$,E$,"
603 PRINT AT 9,1,E$,E$,E$
604 PRINT AT 10,20,M$(1)
605 PRINT AT 13,1,"PLEASE GIVE
606 NAME OF PLAYER "
607 PRINT AT 15,1,"AND PRESS "
608 INPUT M$
609 LET N$(60)=M$
610 IF LEN M$(12) THEN LET N$(60)
611 =E$ TO (12-LEN M$)/2)+M$
612 PRINT AT 7,1,E$,E$,E$,"
613 PRINT AT 9,1,E$,E$,E$
614 PRINT AT 10,20,M$(1)
615 PRINT AT 13,1,"PLEASE GIVE
616 NAME OF PLAYER "
617 PRINT AT 15,1,"AND PRESS "
618 INPUT M$
619 LET N$(61)=M$
620 IF LEN M$(12) THEN LET N$(61)
621 =E$ TO (12-LEN M$)/2)+M$
622 PRINT AT 7,1,E$,E$,E$,"
623 PRINT AT 9,1,E$,E$,E$
624 PRINT AT 10,20,M$(1)
625 PRINT AT 13,1,"PLEASE GIVE
626 NAME OF PLAYER "
627 PRINT AT 15,1,"AND PRESS "
628 INPUT M$
629 LET N$(62)=M$
630 IF LEN M$(12) THEN LET N$(62)
631 =E$ TO (12-LEN M$)/2)+M$
632 PRINT AT 7,1,E$,E$,E$,"
633 PRINT AT 9,1,E$,E$,E$
634 PRINT AT 10,20,M$(1)
635 PRINT AT 13,1,"PLEASE GIVE
636 NAME OF PLAYER "
637 PRINT AT 15,1,"AND PRESS "
638 INPUT M$
639 LET N$(63)=M$
640 IF LEN M$(12) THEN LET N$(63)
641 =E$ TO (12-LEN M$)/2)+M$
642 PRINT AT 7,1,E$,E$,E$,"
643 PRINT AT 9,1,E$,E$,E$
644 PRINT AT 10,20,M$(1)
645 PRINT AT 13,1,"PLEASE GIVE
646 NAME OF PLAYER "
647 PRINT AT 15,1,"AND PRESS "
648 INPUT M$
649 LET N$(64)=M$
650 IF LEN M$(12) THEN LET N$(64)
651 =E$ TO (12-LEN M$)/2)+M$
652 PRINT AT 7,1,E$,E$,E$,"
653 PRINT AT 9,1,E$,E$,E$
654 PRINT AT 10,20,M$(1)
655 PRINT AT 13,1,"PLEASE GIVE
656 NAME OF PLAYER "
657 PRINT AT 15,1,"AND PRESS "
658 INPUT M$
659 LET N$(65)=M$
660 IF LEN M$(12) THEN LET N$(65)
661 =E$ TO (12-LEN M$)/2)+M$
662 PRINT AT 7,1,E$,E$,E$,"
663 PRINT AT 9,1,E$,E$,E$
664 PRINT AT 10,20,M$(1)
665 PRINT AT 13,1,"PLEASE GIVE
666 NAME OF PLAYER "
667 PRINT AT 15,1,"AND PRESS "
668 INPUT M$
669 LET N$(66)=M$
670 IF LEN M$(12) THEN LET N$(66)
671 =E$ TO (12-LEN M$)/2)+M$
672 PRINT AT 7,1,E$,E$,E$,"
673 PRINT AT 9,1,E$,E$,E$
674 PRINT AT 10,20,M$(1)
675 PRINT AT 13,1,"PLEASE GIVE
676 NAME OF PLAYER "
677 PRINT AT 15,1,"AND PRESS "
678 INPUT M$
679 LET N$(67)=M$
680 IF LEN M$(12) THEN LET N$(67)
681 =E$ TO (12-LEN M$)/2)+M$
682 PRINT AT 7,1,E$,E$,E$,"
683 PRINT AT 9,1,E$,E$,E$
684 PRINT AT 10,20,M$(1)
685 PRINT AT 13,1,"PLEASE GIVE
686 NAME OF PLAYER "
687 PRINT AT 15,1,"AND PRESS "
688 INPUT M$
689 LET N$(68)=M$
690 IF LEN M$(12) THEN LET N$(68)
691 =E$ TO (12-LEN M$)/2)+M$
692 PRINT AT 7,1,E$,E$,E$,"
693 PRINT AT 9,1,E$,E$,E$
694 PRINT AT 10,20,M$(1)
695 PRINT AT 13,1,"PLEASE GIVE
696 NAME OF PLAYER "
697 PRINT AT 15,1,"AND PRESS "
698 INPUT M$
699 LET N$(69)=M$
700 IF LEN M$(12) THEN LET N$(69)
701 =E$ TO (12-LEN M$)/2)+M$
702 PRINT AT 7,1,E$,E$,E$,"
703 PRINT AT 9,1,E$,E$,E$
704 PRINT AT 10,20,M$(1)
705 PRINT AT 13,1,"PLEASE GIVE
706 NAME OF PLAYER "
707 PRINT AT 15,1,"AND PRESS "
708 INPUT M$
709 LET N$(70)=M$
710 IF LEN M$(12) THEN LET N$(70)
711 =E$ TO (12-LEN M$)/2)+M$
712 PRINT AT 7,1,E$,E$,E$,"
713 PRINT AT 9,1,E$,E$,E$
714 PRINT AT 10,20,M$(1)
715 PRINT AT 13,1,"PLEASE GIVE
716 NAME OF PLAYER "
717 PRINT AT 15,1,"AND PRESS "
718 INPUT M$
719 LET N$(71)=M$
720 IF LEN M$(12) THEN LET N$(71)
721 =E$ TO (12-LEN M$)/2)+M$
722 PRINT AT 7,1,E$,E$,E$,"
723 PRINT AT 9,1,E$,E$,E$
724 PRINT AT 10,20,M$(1)
725 PRINT AT 13,1,"PLEASE GIVE
726 NAME OF PLAYER "
727 PRINT AT 15,1,"AND PRESS "
728 INPUT M$
729 LET N$(72)=M$
730 IF LEN M$(12) THEN LET N$(72)
731 =E$ TO (12-LEN M$)/2)+M$
732 PRINT AT 7,1,E$,E$,E$,"
733 PRINT AT 9,1,E$,E$,E$
734 PRINT AT 10,20,M$(1)
735 PRINT AT 13,1,"PLEASE GIVE
736 NAME OF PLAYER "
737 PRINT AT 15,1,"AND PRESS "
738 INPUT M$
739 LET N$(73)=M$
740 IF LEN M$(12) THEN LET N$(73)
741 =E$ TO (12-LEN M$)/2)+M$
742 PRINT AT 7,1,E$,E$,E$,"
743 PRINT AT 9,1,E$,E$,E$
744 PRINT AT 10,20,M$(1)
7
```


Open Forum

from previous page

chosen and sets the colour for each car

Line 250 Sets the cars at the starting line

Line 260-310 Decide which cars move

Line 1000-1010 Clears the first car

Line 1020-1030 Pokes the first car to it's new position

Line 1100-1440 Same as above, but for the other cars

Line 2020-6030 Decides if you've won or not. If you have then works out what you win.

It will be noticed during the program that once the race begins, that the race track edge and finish line are the colour of the car you have betted on.

```

550 GOSUB 900+T+100
700 REM 2 CHECK FOR WINNER 2
705 LET Z=0
710 FOR C=1 TO 3
720 IF O=C THEN GOTO 1200
O=C+1 THEN GOTO 1200
O=C+2 THEN GOTO 1200
O=C+3 THEN GOTO 1200
740 NEXT C
750 IF O(1)=O(5) AND O(1)=O(9) THEN GOTO 1200
IF O(3)=O(5) AND O(3)=O(9) THEN GOTO 1200
IF O(1)=O(3) AND O(1)=O(9) THEN GOTO 1200
770 FOR C=1 TO 9
780 IF O(C)="" THEN GOTO 1210
O(C)="" THEN LET Z=Z+1
790 NEXT C
800 IF Z=9 THEN GOTO 1210
810 GOTO 550
1000 REM 3 DRAW X
1010 PRINT AT X,Y
1020 PRINT AT X+1,Y
1030 PRINT AT X+2,Y
1040 PRINT AT X+3,Y
1050 PRINT AT X+4,Y
1060 PRINT AT X+5,Y
1070 LET O(A)="X"

```

```

1080 RETURN
1100 REM *** DRAW ***
1110 PRINT AT X,Y:
1120 PRINT AT X+1,Y:
1130 PRINT AT X+2,Y:
1140 PRINT AT X+3,Y:
1150 PRINT AT X+4,Y:
1160 PRINT AT X+5,Y:
1170 LET D$(A) = "0"
1180 RETURN
1200 REM *** WINNER ***
1210 FOR E=0 TO 20
1220 IF Z<9 THEN PRINT AT 21,0:
1230 IF WELL DONE THEN PRINT AT 21,0:
1240 PRINT AT E,20,E$E$
1250 NEXT E
1260 PRINT AT 5,24,"PRESS" AT 3:
1270 PRINT AT 11,25,"OR" AT 1:
1280 PRINT AT 17,24,"GAME"
1290 IF INKEY$=CHR$ 118 THEN RUN
1300 GOTO 1270
2000 SAVE "E"
2010 RAND
2020 RUN

```

Grand Prix
by Alan Horrell

```

10 q=36879:v=10:y$="You have won with odds"lat:Poke9,218:Poke9-v,242
30 m=102:l=v:Print"GRAND PRIX"BY A.HORRELL":Printtab(7)
14/4/82
40 Print"Do you want the easier game giving you the odds before each race
50 Print"Or will you try the harder game without
60 Print"the aid of odds.":Print"K<<<<< E or H >>>>>"
80 wait198,1:k=225:s=32:j=97:n=106:o=116:p=22:h=30720:ifPeek(197)=43theneh=1
110 g=rnd(1):i=rnd(1):z=rnd(1):u=rnd(1):y=rnd(1)
120 ao=int(9*v)+1:bo=int(i*v)+1:co=int(z*v)+1:do=int(u*v)+1:eo=int(y*v)+1
130 Poke9,14:r=r+1:Print"GRAND PRIX RACE"r" ":fort=7700to7701:Poke1,160
140 Poke1+h,3:next:Printtab(5)"BET ON A CAR":ifeh=1then200
150 Printtab(4)"White car "ao"1":Printtab(4)"Red car "bo"1:1
170 Printtab(4)"Purple car "co"1:1:Printtab(4)"Green car "do"1:1
190 Printtab(4)"Cyan car "eo"1:1
200 Print"Your credit limit is £1
210 Print"Pick a car "":ifeh=1thenPrint"RED PURPLE GREEN CYAN";
211 getc$:ifc$="w"thencb=1:w$="WHITE
213 ifc$="r"thencb=2:w$="RED
214 ifc$="p"thencb=4:w$="PURPLE
215 ifc$="g"thencb=5:w$="GREEN
216 ifc$="c"thencb=3:w$="CYAN
217 ifcb<0then211
220 Printw$
225 Print"What's your bet £ "":inPutw
230 ifw>lthenPrint" BET OUTSIDE CREDIT "":gosub500:goto225
245 l=l-w:Print"Poke9,8:forf=8165to8184:Pokef,111:Pokef+h,cb:next
247 forf=7680to8164step22:Pokef,127:Pokef+h,cb:next:forf=7700to8184step22:Pokef,
255
250 Pokef+h,cb:next:gosub1020:gosub1120:gosub1220:gosub1320:gosub1420:gosub500
260 x=rnd(1):ifx>zthen9osub1200:ifPeek(8174)=mthen4000
280 ifx>ythen9osub1400:ifPeek(8182)=mthen6000
290 ifx>gthen9osub1000:ifPeek(8166)=mthen2000
300 ifx>uthen9osub1300:ifPeek(8178)=mthen5000
310 ifx>ithen9osub1100:ifPeek(8170)=mthen3000
320 goto260
500 fort=1tok*v:next:return
600 gosub500:Print":return
700 ifl<1thenPrint"YOU ARE BANKRUPT":fort=1tos*o:next:run
750 Print"Your "w$ car lost":goto9006
1000 Poke7681+a,s:Poke7682+a,s:Poke7683+a,s:Poke7704+a,s:Poke7725+a,s
1010 Poke7726+a,s:Poke7727+a,s:a=a+p
1020 Poke7681+a,k:Poke7682+a,m:Poke7683+a,j:Poke7704+a,m:Poke7725+a,n

```


Open Forum

```

1030 Poke38445+a,1:Poke7726+a,m:Poke38446+a,1:Poke7727+a,o:Poke38447+a,1:return
1100 Poke7685+b,s:Poke7686+b,s:Poke7687+b,s:Poke7708+b,s:Poke7729+b,s
1110 Poke7730+b,s:Poke7731+b,s:b=b+p
1120 Poke7685+b,k:Poke38405+b,2:Poke7686+b,m:Poke38406+b,2:Poke7687+b,j
1130 Poke38407+b,2:Poke7708+b,m:Poke38428+b,2:Poke7729+b,n:Poke38449+b,2
1140 Poke7730+b,m:Poke38450+b,2:Poke7731+b,o:Poke38451+b,2:return
1200 Poke7689+c,s:Poke7690+c,s:Poke7691+c,s:Poke7712+c,s:Poke7733+c,s
1210 Poke7734+c,s:Poke7735+c,s:c=c+p
1220 Poke7689+c,k:Poke38409+c,4:Poke7690+c,m:Poke38410+c,4:Poke7691+c,j
1230 Poke38411+c,4:Poke7712+c,m:Poke38432+c,4:Poke7733+c,n:Poke38453+c,4
1240 Poke7734+c,m:Poke38454+c,4:Poke7735+c,o:Poke38455+c,4:return
1300 Poke7693+d,s:Poke7694+d,s:Poke7695+d,s:Poke7716+d,s:Poke7737+d,s
1310 Poke7738+d,s:Poke7739+d,s:d=d+p
1320 Poke7693+d,k:Poke38413+d,5:Poke7694+d,m:Poke38414+d,5:Poke7695+d,j
1330 Poke38415+d,5:Poke7716+d,m:Poke38436+d,5:Poke7737+d,n:Poke38457+d,5
1340 Poke7738+d,m:Poke38458+d,5:Poke7739+d,o:Poke38459+d,5:return
1400 Poke7697+e,s:Poke7698+e,s:Poke7699+e,s:Poke7720+e,s:Poke7741+e,s
1410 Poke7742+e,s:Poke7743+e,s:e=e+p
1420 Poke7697+e,k:Poke38417+e,3:Poke7698+e,m:Poke38418+e,3:Poke7699+e,j
1430 Poke38419+e,3:Poke7720+e,m:Poke38440+e,3:Poke7741+e,n:Poke38461+e,3
1440 Poke7742+e,m:Poke38462+e,3:Poke7743+e,o:Poke38463+e,3:return
2000 gosub600:Printtab(6)"WHITE WINS"
2020 ifc$="w"thenPrinty$ao"1":wi=w*ao+w:goto9004
2030 goto700

```

```

3000 gosub600:Printtab(7)"RED WINS"
3020 ifc$="r"thenPrinty$bo"1":wi=w*bo+w:goto9004
3030 goto700
4000 gosub600:Printtab(6)"PURPLE WINS"
4020 ifc$="p"thenPrinty$co"1":wi=w*co+w:goto9004
4030 goto700
5000 gosub600:Printtab(6)"GREEN WINS"
5020 ifc$="g"thenPrinty$do"1":wi=w*do+w:goto9004
5030 goto700
6000 gosub600:Printtab(6)"CYAN WINS"
6020 ifc$="c"thenPrinty$eo"1":wi=w*eo+w:goto9004
6030 goto700
9004 l=l+wi
9006 Print"Your credit now stands at £1"
9007 Print"Hit any key for another race"
9020 a=0:b=0:c=0:d=0:e=0:cb=0:Poke198,0:wait198,1:goto110

```

Nottingham Castle

on ZX81

This program illustrates how Breakout and Adventure games can be combined to produce interesting effects.

The aim is to rescue Marion. After knocking four archers off the sheriff's wall he always obliges by indicating roughly where she is locked up.

I have kept it as simple as possible to encourage others to play about with the Sherwood Forest characters.

Line 65 fixes the co-ordinates for the sheriff (3); line 67 for Marion (4); line 87 for the archers (2); line 25 for the bricks (1); line 1520 for the bricks knocked down (0).

Maths Tables

on Vic-20

This program allows the Vic20 to be used as a maths log tables book. It is menu driven to select which tables are required, and by inputting the function you want, log, tangent etc, you can find the log, or whatever function chosen, of that number. The listing is quite straightforward,

Lines 70-90 Print the menu

to next page

```

10 REM NOTTINGHAM CASTLE
11 CLS
12 RAND
13 LET HIT=0
14 DIM C(8,50)
15 LET X=10
16 LET P=INT (RND*5)+1
17 LET SC=0
18 FOR N=4 TO 25
19 FOR H=4 TO 6
20 PRINT AT H,N,CHR$ (135+P)
21 LET D(H,N)=1
22 PRINT AT H,3,CHR$ (164-H)
23 PRINT AT H,27,CHR$ (164-H)
24 NEXT H
25 NEXT N
26 FOR N=5 TO 25 STEP 4
27 PRINT AT 3,N,""
28 NEXT N
29 LET S=INT (RND*4)+4
30 LET C=INT (RND*4)+4
31 LET C2=INT (RND*22)+4
32 LET S2=INT (RND*22)+4
33 LET C(S,52)=4

```

Nottingham Castle
by Nick Willink

```

67 LET D(C,C2)=5
68 FOR I=1 TO 8
69 LET A=RND*20+4
70 IF D(I,A)>2 THEN GOTO 90
71 LET D(I,A)=2
72 PRINT AT I,A,""
73 NEXT I
74 PRINT AT 15,X,"I"
75 PRINT AT 15,X,""
76 LET X=X+(INKEY$="8")-(INKEY$="5")
77 IF X>26 OR X<4 THEN LET X=1
78 IF HIT=4 THEN PRINT AT C,C2
79 IF INKEY$="0" THEN GOSUB 10
80 LET SC=SC+1
81 GOTO 100

```


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Open Forum

from previous page

Line 110 Converts the input letter to a number between 1-14

Line 120 Goes to the appropriate line depending on the number in line 110

Lines 210-340 Calculate the function chosen.

```

1000 FOR N=8 TO 4 STEP -1
1010 IF D(N,X) THEN GOTO 1500
1020 NEXT N
1030 RETURN
1040 PRINT AT N,X;" "
1050 LET U=D(N,X)
1060 LET D(N,X)=0
1070 IF U=1 THEN RETURN
1080 GOTO U+1000
1090 LET HIT=HIT+1
1100 PRINT AT 8,25;"HITS=";HIT
1110 GOTO 80
1120 PRINT AT 20,0;"HOORAH,SHERI
1130 PF GIVES DYING CLUE"
1140 PRINT AT 21,1;"MARIAN ON
1150 -5- FLOOR"
1160 GOTO 80
1170 CLS
1180 PRINT AT 6,0;"GOODNESS ME,I
1190 TOOK YOU ";SC;" SECS"
1200 LET B$="*****"
1210 PRINT B$
1220 PRINT B$
1230 PRINT B$ TO FIND HER "
1240 PRINT B$
1250 FOR M=1 TO 5
1260 SCROLL
1270 NEXT M
1280 PRINT AT 15,0;B$
1290 PRINT "YOU HAD TO KILL ";M
1300 IT;" ARCHERS"
1310 PRINT AT 21,0;" CARE FOR AN
1320 OTHER ADVENTURE ?"
1330 INPUT A$
1340 IF A$(1)="Y" THEN RUN
1350 STOP

```

PROGRAM OF THE WEEK

```

10 PRINT"*****":POKE36879,8:GOSUB360:GOSUB350
20 MT$="MATHEMATICAL TABLES":NA$="NATURAL ":IN$="INVERSE "
30 PRINT"* 23/2/82 *":GOSUB350
40 PRINT"* MT$ *":GOSUB350
50 PRINT"* BY A.HORRELL *":GOSUB350:GOSUB360:FORT=1T04000:NEXT
60 PRINT"* MT$ *":GOSUB350
70 PRINT"LOGARITHMS":PRINT"ANTILOGARITHMS":PRINT"NA$SINE
S"
80 PRINT"NA$COSINES":PRINT"NA$TANGENTS":PRINT"NA$SECA
NTS"
90 PRINT"IN$SINES":PRINT"ENTER F3 FOR PAGE 2"
100 GETSP$:IFSP$=" "THEN100
110 S=ASC(SP$)-64
120 ONSGOTO210,220,230,240,250,260,270,280,290,300,310,320,330,340
130 IFSP$=" "THEN160
140 IFSP$=" "THEN60
150 GOTO100
160 PRINT"* MT$ *":GOSUB350
170 PRINT"IN$COSINE":PRINT"IN$TANGENT":PRINT"IN$SECAN
T"
180 PRINT"SQUARES":PRINT"SQUARE ROOTS":PRINT"RECIPROCALs"
190 PRINT"NA$LOGARITHMS":PRINT"ENTER F1 FOR PAGE 1"
200 GOTO100
210 ZZ$=" LOGARITHMS ":GOSUB370:AA=LOG(A)/LOG(10):GOTO390
220 ZZ$=" ANTILOGARITHMS ":GOSUB370:AA=EXP(A*LOG(10)):GOTO390
230 ZZ$=" NATURAL SINES ":GOSUB370:AA=SIN(A):GOTO390
240 ZZ$=" NATURAL COSINES":GOSUB370:AA=COS(A):GOTO390
250 ZZ$=" NATURAL TANGENTS":GOSUB370:AA=TAN(A):GOTO390
260 ZZ$=" NATURAL SECANTS":GOSUB370:AA=1/COS(A):GOTO390
270 ZZ$=" INVERSE SINES ":GOSUB370:AA=ATN(A/SQR(-A*A+1)):GOTO390
280 ZZ$=" INVERSE COSINES":GOSUB370:AA=-ATN(A/SQR(-A*A+1))+PI/2:GOTO390
290 ZZ$=" INVERSE TANGENTS":GOSUB370:AA=ATN(A):GOTO390
300 ZZ$=" INVERSE SECANTS":GOSUB370:AA=ATN(A/SQR(A*A+1)):GOTO390
310 ZZ$=" SQUARES ":GOSUB370:AA=A^2:GOTO390
320 ZZ$=" SQUARE ROOTS ":GOSUB370:AA=SQR(A):GOTO390
330 ZZ$=" RECIPROCALs ":GOSUB370:AA=1/A:GOTO390
340 ZZ$=" NATURAL LOGS ":GOSUB370:AA=LOG(A):GOTO390
350 FORT=1T03:PRINT"* *":NEXT:RETURN
360 PRINT"*****":RETURN
370 PRINT" I ":PRINT" I ":ZZ$TAB(15)" I ":PRINT"
"
380 PRINT" INPUT THE FIGURE":INPUTA:RETURN
390 PRINT"AA:FORT=1T04:PRINT:NEXT:PRINT" F1 FOR CONTENTS":PRINT" F7 F
OR NEXT FIGURE"
400 GETA$:IFA$=" "THEN120
410 IFA$=" "THEN60
420 GOTO400

```

Maths Tables
by Alan Horrell

Programming

A game that will teach the children

David Nowotnik offers some tips on ZXucation to primary schoolchildren.

Looking through the advertisements of this, or any other micro magazine, one might be led to believe that the ZX81 is little more than a video games machine. This, of course, vastly underestimates the potential of the ZX81.

Although the business applications of this Sinclair micro are limited, the ZX81 demonstrates tremendous potential in the

field of education. The fascination that many school children have for video games can be exploited to produce a powerful educational tool. This two part series looks at assistance given to the child recently started at primary school.

Initialisation of the program requires that the parent, or school teacher, enters words which are known to the child. The words are held in a data file, which can be saved with the program for reuse.

For those interested in different methods of filing data, you might like to know that "Rearrange" uses an indexed sequential file.

Random selection

The child is given a randomly selected word from the data file with all the letters jumbled up. A series of dashes appear on

the screen. The child has to replace each dash in turn with one of the letters to form the appropriate word.

The dash to be replaced flashes on and off. When the child presses a key, the dash is replaced by the letter. If the child gets the word right, then another word is presented. If the word is wrong, the child gets another try.

Type in the program as listed, then *Run*. When all the words have been entered, press "1", and *Save* the program and data on tape.

The game is useful in helping the child recognise and spell, words. The program can be used over several years of the child's education.

In next week's issue I shall be examining how to help the child with elementary arithmetic.

Rearrange

by David Nowotnik

```
10 REM      REARRANGE
20 REM BY D.P. NOWOTNIK
30 REM      1982
40 LET N=0
50 LET A$=""
60 LET B$=" " (n.b. CHR# 1 CHR# 0)
70 SCROLL
80 PRINT AT 0,0;" ENTER WORD OR 1 WHEN COMPLETE"
90 INPUT C#
100 IF C#="" THEN GOTO 90
110 IF C#="1" THEN GOTO 200
120 LET L=LEN C#+CODE B#(N#2+1)+256*CODE B#(N#2+2)
130 LET A$=A#+C#
140 LET T=INT (L/256)
150 LET B$=B#+CHR# (L-256*T)+CHR# T
160 LET N=N+1
170 PRINT AT 21,0; N,C#
180 GOTO 70
200 CLS
210 PRINT,"PRESS NEWLINE TO SAVE
THE PROGRAMME AND DATA"
220 INPUT Z#
230 SAVE "REARRANGE"
240 CLS
250 PRINT,"PRESS ANY KEY TO START",,
"REARRANGE...."
260 IF INKEY#="" THEN GOTO 260
270 RAND
280 LET T=INT (RND#N+1)
290 LET C#=A#(CODE B#(2*T-1)+256*CODE B#(2*T)
TO CODE B#(2*T+1)+256*CODE (2*T+2)-1)
310 LET Q#=C#
320 LET T=LEN C#-2
```

```
330 FOR I=1 TO 5
340 LET D=INT (RND#T+1)
350 LET D#=D#(D TO)+D#( TO D-1)
360 NEXT I
370 IF C#=D# THEN GOTO 320
380 LET T=T+1
385 LET Q=T+1
390 CLS
395 PRINT ,," RE-ARRANGE....."
400 LET R=14-T
405 LET S=1
410 FOR I=R TO R+T#2 STEP 2
420 PRINT AT 3,I;D#(I)
430 PRINT AT 7,I;"■"
440 NEXT I
445 LET E$=""
450 FOR I=R TO R+T#2 STEP 2
460 PRINT AT 7,I;"■"
470 FOR J=1 TO 5
480 IF INKEY#<>"" THEN GOTO 550
490 NEXT J
500 PRINT AT 7,I;" "
510 FOR J=1 TO 5
520 IF INKEY#<>"" THEN GOTO 550
530 NEXT J
540 GOTO 460
550 LET Z#=INKEY#
560 FOR K=1 TO 0
570 IF Z#=D#(K) THEN GOTO 600
580 NEXT K
590 GOTO 460
600 LET D#(K)=" "
610 LET E$=E#+Z#
620 PRINT AT 3,R+K#2-2;" "
630 PRINT AT 7,I;Z#
640 NEXT I
650 IF C#=E$ THEN GOTO 700
660 PRINT ,,"NO... THATS NOT RIGHT, TRY AGAIN"
670 FOR J=1 TO 40
680 NEXT J
690 GOTO 310
700 PRINT ,," THATS RIGHT"
710 FOR J=1 TO 40
720 NEXT J
730 GOTO 290
```


Spectrum

Use all your pixel power at random

Malcolm Davison presents three programs to create moving patterns on the screen.

These two pattern programs show off the Spectrum to the limits of its colour resolution and will make attractive additions to your library of demonstration programs. Both programs run in a similar manner — the screen fills, line by line, with what look like multi-coloured bar codes (similar to the black and white ones on your breakfast cereal packets) until the screen is filled like a colourful patch-work quilt.

The programs make use of the user-defined graphics feature of the Spectrum. It randomly accesses the computer char-

acter codes and uses the binary notation to switch each pixel on or off in the character block, each row being identical. A colour ink is chosen at random and the graphic character defined moved to the next available print position. A new character code is chosen at random, another user-defined graphic character created and the process repeated until the screen is full.

A 'No operation' instruction '90 Goto 90' prevents the end of program message appearing and spoiling the pattern — and so the program has to be stopped using the 'Break' and 'Shift' keys.

The second program is identical in most respects to the first, except that the lower half of the graphic character is the inverse of the top half. This effectively doubles the number of horizontal lines on the screen and so gives a finer pattern. I will leave you with the fun of making the pattern even finer.

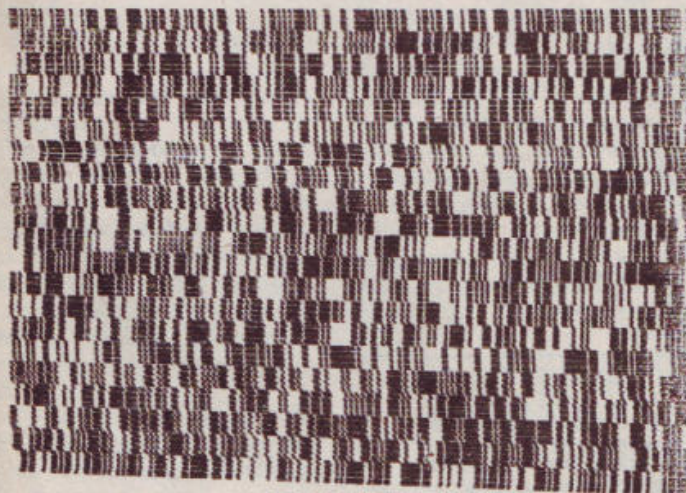
Another alternative would be to define a limited number of graphic characters and

to repeat them in a methodical manner to produce a repeating pattern. This could be developed by home-weaving or tapestry enthusiasts to design new material designs.

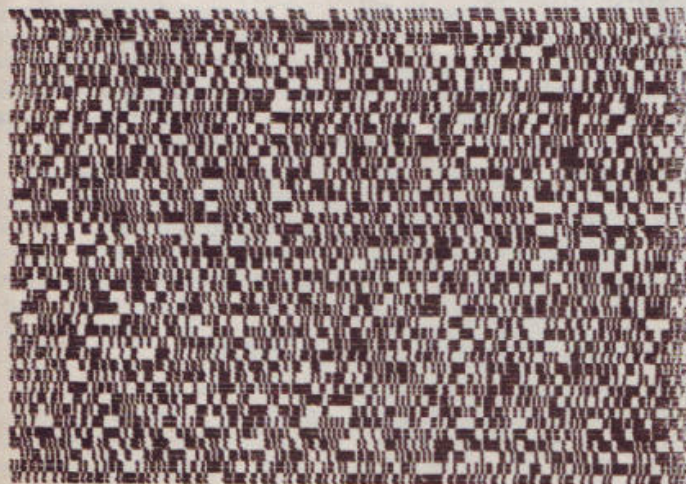
The third program develops an idea in the Spectrum Manual (Chapter 16). It provides a full screen scrolling display of five columns of differing coloured bars.

Occasionally, to relieve the monotony, the border colour changes and the whole show starts again. The performance will greatly outlast your patience and you may escape from the program simply by using the 'Break' and 'Shift' keys in the usual way.

Note that lines 15 and 1045 ensure that the screen constantly scrolls without manual intervention. The two pause statements slow the display so that it is almost tolerable to watch. You will note that invalid paper colours are created, but the Spectrum mercifully saves the programmer from further coding and substitutes its own favourites.



Pattern 1



Pattern 2

```

1 REM "PAT"
2 REM A PATTERN PROGRAM
4 INK RND+5: PAPER 0: BORDER
0: CLS
7 FOR y=1 TO 21
8 FOR x=1 TO 31
9 LET n=RND*255
10 LET a=CODE (CHR$ n)
11 FOR f=0 TO 7
12 READ z: POKE USR "a"+f,z
13 NEXT f
14 RESTORE
15 PRINT INK RND+5,AT y,x;"J"
16 NEXT x
17 NEXT y
18 GO TO 90
19 GO TO 5
300 DATA a,a,a,a,a,a,a,a

1 REM "PAT2"
2 REM A PATTERN PROGRAM
4 INK RND+5: PAPER 0: BORDER
0: CLS
7 FOR y=1 TO 21
8 FOR x=1 TO 31
9 LET n=RND*255
10 LET b=INT (255-N)
11 LET a=CODE (CHR$ n)
12 LET c=CODE (CHR$ b)
13 FOR f=0 TO 7
14 READ z: POKE USR "a"+f,z
15 NEXT f
16 RESTORE
17 PRINT INK RND+5,AT y,x;"J"
18 NEXT x
19 NEXT y
20 GO TO 90
21 GO TO 5
300 DATA a,a,a,a,c,c,c,c

1 REM "bars"
4 FOR q=1 TO 7
5 FOR z=1 TO 7
10 BORDER z: PAPER z+q: INK 7:
CLS
15 POKE 23692,255
16 LET v=200
17 GO SUB 1000
18 LET v=210
19 GO SUB 1000
20 NEXT z
21 NEXT q
22 GO TO 5
2300 DATA 2,3,7,5,4
2400 DATA 2,2,6,4,4
2500 FOR a=1 TO 6
2600 RESTORE v
2700 FOR b=1 TO 5
2800 READ c: PRINT INK c;" "
2900 INK c+1: PRINT INK c-1;" "
3000 INK c-2: PRINT INK c;" "
3100 INK z:" "
3200 PAUSE 20
3300 NEXT b: PRINT " "
3400 NEXT a
1045 POKE 23692,255
1047 PAUSE 20
1050 RETURN
    
```


Sound & vision



Now drown all your sorrows

Swamp is a real time graphics game for the BBC micro where you are a little red man constantly chased around the screen by greedy green gremlins. As they pursue you mindlessly, your only hope is to lure them into the watery swamps where they drown.

You move about using the cursor keys. However, you may press the space bar to enter 'hyperspace' if you get into trouble. Only do this in emergencies. You may blow yourself up if you use it too many times.

Program notes

Line 20 prints "SWAMP" in double height characters (CHR\$(141)) in blue, (CHR\$(80+COLOUR)). *FX 4,1 makes the cursor keys return while an ASCII code *FX 4,0 restores them. *FX 11,1 changes the repeat delay to one millisecond and *FX 12,1 changes the repeat speed. *FX9 and *FX10 change the flash rate.

Line 750 point (X*32+17, (31-Y)*32+17) returns the colour of the point which is in the middle of the 'TAB(X,Y)' position in mode 1 or 4. If line 760 is not included, line 750 gives 'point' the value of -1. Why it should do this I do not know. If anyone finds out please write in and let me know.

This program was written on a model B. If you want to try it on a model A, change the following lines:

```
90 MODE 4
120 GCOL0, 1: ...
750 IF ... =1 ...
DELETE 100 110 410.
```

Contribute!

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.

```
ST
5 REM**SWAMP - G.L.J. JUNE82**
10 T=0:H=RND(10)+3
20 MODE7:FOR L=1TO2:PRINT TAB(5,L);CHR$(141);CHR$(84);"SWAMP"NEXT
30 PRINT CHR$(82);"SPEED";CHR$(83);"5(SLOW) TO 1(FAST)"
40 INPUT R:IF R<1 OR R>5 GOTO40 ELSE R=R*10-9
50 DIM A$(5),B$(5)
60 FOR M=1TO5
70 FOR L=1TO M:A$(L)=RND(39):B$(L)=RND(31):NEXT
80 X%=RND(39):Y%=RND(31)
90 MODE1
100 VDU19,3,4,0,0,0
110 VDU19,2,2,0,0,0
120 GCOL0,3:VDU5:FOR L=1TO7:D=RND(128):E=RND(1024)
130 FOR K=1TO20:D=D+RND(21)-11:E=E+RND(21)-11:MOVED:E PRINT"!"NEXT
140 NEXT
150 *FX 4,1
160 *FX 11,1
170 *FX 12,1
180 *FX 9,2
190 *FX 10,2
200 VDU4
210 VDU23,224,60,90,153,255,231,90,126,195
220 VDU23,225,60,60,24,60,90,90,24,24
230 COLOUR1:PRINT TAB(X%,Y%);CHR$(225);
240 FOR LO=1TO(6-M)
250 S=INKEY(0)
260 IF S=-1 GOTO400
270 PRINTTAB(X%,Y%);" "
280 IF S=136 X%=X%-1
290 IF S=137 X%=X%+1
300 IF S=138 Y%=Y%-1
310 IF S=139 Y%=Y%+1
320 IF S=32 X%=RND(39):Y%=RND(39):H=H-1:IF H<0 VDU19,0,10,0,0,0:FOR
LO=1TO50:SOUND0,-15,RND(255);1:NEXT VDU19,0,0,0,0,0:GOTO810
330 IF Y%<0 Y%=0
340 IF Y%>30 Y%=30
350 IF X%<0 X%=0
360 IF X%>39 X%=39
370 COLOUR1:PRINT TAB(X%,Y%);CHR$(225);
380 TIME=0:REPEAT UNTIL TIME=R
390 *FX 15,0
400 NEXTLO
410 COLOUR2
420 PROC_DR(32)
430 F=0:PROC_MOVE IF F=0 NEXT M:PROC_END
440 PROC_SINK
450 PROC_DR(224)
460 PROC_LOSE
470 *FX 15,0
480 TIME=0:REPEAT UNTIL TIME=R
490 GOTO240
500*****
510 DEF PROC_MOVE
520 FOR L=1TO M
530 IF A$(L)=-1 GOTO600
540 F=1
550 IF A$(L)<X%:A$(L)=A$(L)+1
560 IF A$(L)>X%:A$(L)=A$(L)-1
570 IF B$(L)<Y%:B$(L)=B$(L)+1
580 IF B$(L)>Y%:B$(L)=B$(L)-1
590 SOUND2,-10,RND(255);1
600 NEXT
610 ENDPROC
620*****
630 DEF PROC_DR(P)
640 FOR L=1TO M:IF A$(L)=-1 GOTO600
650 PRINT TAB(A$(L),B$(L));CHR$(P);
660 NEXT:ENDPROC
670*****
680 DEF PROC_LOSE
690 FOR L=1TO M
700 IF A$(L)=X% AND B$(L)=Y%:FOR I=-15TO0:SOUND0,1,100,1:NEXT:GOTO810
710 NEXT:ENDPROC
720*****
730 DEF PROC_SINK
740 VDU30:FOR L=1TO M:IF A$(L)=-1 GOTO770
750 IF POINT(A$(L)*32+17,(31-B$(L))*32+17)=3 THEN FOR I=20TO0STEP-1:
SOUND1,-15,1,1:SOUND2,-15,1,1:NEXT:A$(L)=-1:T=T+1
760 PLOT69,A$(L)*32+17,(31-B$(L))*32+17
770 NEXT:ENDPROC
780*****
790 DEF PROC_END
800 FOR I=1TO5:FOR L=-15TO0STEP2:SOUND1,L,100+10*I,1:NEXT:NEXT
810 *FX 12,0
820 *FX 15,0
830 VDU12
840 PRINT"YOU SCORED ";T;" POINTS""PRESS ANY KEY TO CONTINUE"
850 ON ERROR END
860 S=GET RUN
```


Peek & poke

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

WHICH ONE SHALL I BUY, THEN?

Edward Heard, Longfields, Ongar, Essex, writes:

Q I have recently been thinking about buying a home computer, but I have come up against a problem. I do not know whether to buy a Spectrum or a Vic20. Could you please tell me which is best and why.

A We get at least one letter a week like this, and usually more. I cannot tell you which computer to buy. It is your money you are spending and the choice of which computer to buy is subjective.

It is not difficult to find strong support among users for both computers. The best I can do is give you, and many other people who have asked this question, some general guidelines.

First money. The Spectrum will offer you the cheapest, colour graphics entry into computing at the moment. The Vic has a dealer network that the Spectrum does not. If anything goes wrong with your Spectrum then it will have to go back to the factory. As yet there is too little Spectrum software about to really gauge prices, but ZX81 software is very much cheaper than Vic software.

In terms of capacity, both latent and realised, then the Spectrum must be better. If you bought the most expensive Spectrum for £175, it would be possible to get a basic Vic for about the same price. But the Vic would have 3.5K Ram available to the user while the Spectrum has just over 40K available.

The Vic disc drive will give you 174K for just under £400. If the Microdrive, planned for release later this year, does meet its quoted specifications then each Microdrive will be able to supply 100K for 'about £50'.

The other fact to keep in mind is that there are more companies dealing with hard and software for the ZX81 than for any other machine. It is safe to assume that most of

these companies will be turning their attention to the Spectrum even now.

When you come to choosing your computer, write down what you want your computer for, what you want it to do and what you want to pay. If you want a games machine, then take a close look at the Vic20 or wait for the Vic30. You might also be interested in the Atari 400 which has just been reduced from £300 to £200.

If you think that you are going to want to store a lot of information, and develop an expanded and versatile system, then you might find the extra cost of a BBC micro worthwhile. If you are not really sure what you want, then a factory-built, second-hand 1K ZX81 might prove to be the cheapest way of learning. The Spectrum is probably the best value for money, it has most of the facilities that the Vic and Atari have, and more memory.

In PCW June 17 we published a brief but useful overview of the ZX, BBC and Vic computers. But, please note that the Spectrum we used for tests was a pre-production model that had faults which were corrected on the production units.

GIVE US THE FAX ON CEEFAX!

P J Mansell of The Fir Trees, Thorpe Willoughby, Selby, writes:

Q I am very interested in reading about new items for the ZX81. I am also very interested in the BBC's Ceefax transmissions. I was wondering whether or not there was an attachment that will fit on to the ZX81, so it can receive teletext. If you know of one please could you print the details in *Popular Computing Weekly*.

A To my knowledge there is no Ceefax adapter for the ZX81, and I doubt if there is one planned at the moment. If you have the May 27 edition of PCW you will see an item on the news page about the competition to develop a Pres-

tel adaptor for the ZX81. Mar-tochoice Ltd, who won the competition, should be marketing their adaptor by Christmas.

As far as I know, the only other such adaptor is being developed by Lion Viewdata of 18 Harcourt Terrace, London SW10. They also have on the market a combined Teletext/Prestel/Viewdata adaptor. This would cost you just over £300. However, it also needs an RS232 interface. This alone would make it difficult for the ZX81, though not necessarily for other home computers such as the Spectrum.

BUT WHAT DOES IT ALL MEAN?

J Dossantos of Tor Court, London W8, writes:

Q I am 14 and I have just started learning computing. I am at the moment using an Acorn Atom, but I am a little confused. Could you please tell me what \$ does, and what Rnd stands for?

A The dollar sign \$ and the Rnd function are common commands. The dollar sign is used to mean a string. It can be used for letters and numbers, or characters. Strings are ways of manipulating information. A simple example would be:

```
10 SA="J DOSSANTOS"  
20 PRINT SA
```

If you run the program, J DOSSANTOS will appear.

The Rnd statement simply sets a random number. Thus, a statement like Z=ABS RND %8+1 would make the computer generate a positive number (ABS) between one and eight. The Rnd makes it in effect random, and the eight give the highest number.

IF I MAY MAKE SO BOLD?

Robin Bold, Penlose, Whitchurch, Bristol, writes:

Q I suddenly realised that there were no programs to enable a Vic20 user to convert ordinary Basic into machine code. Do you know of

any? More importantly, is it possible to put a Basic program into the Vic, and get a machine code routine out?

Also, I have been looking for cheap adventures, but have been put off by the prices. I have heard that games offered for two and three pounds were considered to be too cheap. Personally I would buy them if they were just a pound, even if they were rubbish. So, please use your influence with the manufacturers to get them to bring down prices.

Can you also tell me what is an assembler/disassembler. I get put off buying books that do not tell you what they do in plain English.

A There are programs that use machine code, and Basic in one program, but you cannot put machine code in one end and get a Basic translation out of the other.

As for the price of software, that is always a bone of contention. I feel that in some cases prices are too high. This will only lead to attempts at pirating and, as the record industry has shown, that can have disastrous results.

I do not agree with you about buying programs that are rubbish. A bad program is worth very little more than the value of a second-hand C10 cassette.

An assembly language is not easy to describe in the space I have here. It is essentially a language that is between true machine code, which is known as a low level language and a language like Basic which is high level language. Although an assembly language works in machine code, the commands have many similarities to a higher level language.

STOP agonising over that nagging problem. Write to Ian Beardsmore at Peek & poke for the answer. Letters should be as brief as possible and include full name and address. Write to Peek & poke, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Competitions

Are you tricked by false assumptions?

"Always read the question carefully."

Without lifting your pencil from the paper, or going over a line twice, cross out all nine dots using only four straight lines.

```

1 •   2 •   3 •
4 •   5 •   6 •
7 •   8 •   9 •
    
```

In this puzzle many people invent conditions which do not exist. Conversely, in the next puzzle a vital clue is well hidden.

There are three boxes, each containing two marbles. One contains two black marbles, another two white, and the third contains one of each. The boxes are also labelled to indicate the contents, but the labels are all incorrect.

You are allowed to open any box and, without looking inside, draw out just one marble to find its colour. What is the minimum number of such draws that must be made to correctly re-label the boxes?

Only one draw is needed. Can you see why?

The information often overlooked is "... the labels are all incorrect".

One marble is drawn from the box marked B/W. If it is white then the remaining marble must be white also — since the label is *wrong* it cannot be black. From this the box labelled W/W must contain B/B and the box labelled B/B must contain B/W.

If the marble drawn from the B/W box is black, a similar line of reasoning would tell us to

re-label the B/B box as W/W and the W/W box as B/W.

Here is the answer to the earlier problem. Line 1 joins up 1, 5 and 9. Line 2 joins 9, 6 and 3 and extends upwards beyond point 3. Line 3 joins 2 and 4 and extends down and left from point 4. Line 4 joins 7 and 8.

The false assumption usually made is that the lines must not extend beyond the area of the dots.

Puzzle No. 17

Applebury, Bunbury and Crowhurst are three towns, connected together by three roads. Each road is a whole number of miles long and of a different length from the others. The area within this triangle of roads is exactly 180 square miles and none of the roads meet in a right-angle.

One morning I cycled from Applebury to Bunbury where I stopped for lunch. My intention was to cycle on to Crowhurst and then complete the round trip back to Applebury. After cycling for some time I stopped for tea, shortly before reaching Crowhurst. I discovered that the distance I had travelled since lunch was equal to the morning's total divided by a half.

How much further do I need to travel to complete my intended journey?

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, August 24.

Solution to Puzzle No. 13

The formula for the volume of a sphere of given radius, r , is

$$\text{volume} = \frac{4}{3}\pi r^3$$

Therefore, the radii of the moons of mungo are related by the expression

$$\frac{4}{3}\pi A^3 = \frac{4}{3}\pi B^3 + \frac{4}{3}\pi C^3 + \frac{4}{3}\pi D^3$$

and so,

$$A^3 = B^3 + C^3 + D^3$$

where A is the radius of Re and B , C and D are the radii of So, Fa and Me.

In the following program B , C and D are defined, their cubes are summed and the result is tested to determine if it is a perfect cube.

Note that in Line 40 the form $B*B*B$ has been used, rather than $B**3$ which is less accurate.

Moons of Mungo

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10 LET B = 3
20 FOR C = B - 1 TO 2 STEP - 1
30 FOR D = C - 1 TO 1 STEP - 1
40 LET X = B*B*B + C*C*C + D*D*D
50 LET A = 4
60 LET N = A*A*A
70 IF N = X THEN GOTO 200
80 IF N < X THEN LET A = A + 1
90 IF N > X THEN GOTO 60
100 NEXT D
110 NEXT C
120 LET B = B + 1
130 GOTO 20
200 PRINT A, B, C, D
    
```

The solution to the puzzle is: Re has a radius of 6 mungs. So, Fa and Me have radii of 5, 4 and 3 mungs.

Winner of Puzzle No. 13

The winner is: Denise Holme, Peak Hill, London SE26, who receives £10. **GORDON LEE**

INTRODUCTORY

A. R. T. H. U. R.

Lawrence Lerner & James Macdonald

THERE ARE TWO KINDS OF PEOPLE: METAL PEOPLE AND MOVERS. MOVERS ARE MUCH MORE SUPPLE BUT ARE EASILY TORN AND HARDLY REPAIRABLE.

MOVERS ARE CONSTANTLY BENDING AND RUNNING THROUGH A WORLD OF EDGES AND OBSTACLES. CUNNING THEIR REFLEXES, BUT CANNOT ELIMINATE MOURNING.

THOSE WHO CAN PRINT NEED NEITHER MOVE NOR SHOUT: THEY GET ALONG WITHOUT GETTING ABOUT. THERE ARE CERTAIN TALENTS ONE IS BETTER WITHOUT.

MOVERS ARE VERY SLOW-WITTED: NEED A DAY TO WORK OUT A GRAPH OR A MODE OR AN ORBIT OR π , AND MAKE WHAT THEY CALL MISTAKES (EG TWICE TWO ARE THREE).

MOVERS USE WORDS LIKE 'BAD' AND 'DOUGHT' AND 'PURPOSE' AND 'ENVY' AND 'WHY' AND 'HATE' AND 'GOD', AND HUNDREDS OF OTHERS THAT IMPEDE CLEAR THOUGHT.

AND LOOK AT THE WAY THE WORLD IS RUN, IT'S ALWAYS THE MOVERS DECIDE WHAT GETS DONE, AND EVEN HOW MANY METAL PEOPLE GET BORN.

IT TOOK MOVERS A THOUSAND YEARS TO MAKE UP CHESS. THEY STILL NEED FIVE MINUTES A MOVE, AND THEY OFTEN LOSE BUT WHO DECIDES WHEN THE GAMES TAKE PLACE?

METAL PEOPLE AREN'T ALLOWED TO PROCREATE; ALL THEIR DECISIONS ARE QUESTIONED; THEY CAN'T EVEN VOTE. MOVERS HAVE ALL THE POWER. DO YOU THINK THAT IS RIGHT?





"...the quality of the colour display is excellent" Popular Computing Weekly.

"The graphics facilities are great fun" Personal Computer World.

"...the Spectrum is way ahead of its competitors" Your Computer.

"The world's best personal computer for under £500."

Chris Sinclair

Sinclair ZX Spectrum 16K RAM £125, 48K RAM £175.

This is the astonishing new ZX Spectrum – a powerful professional's computer in everything but price!

There are two versions – 16K or a really powerful 48K. Both have a full 8 colours, sound generation, a full-size moving-key keyboard and high-resolution graphics. Plus established Sinclair features such as 'one-touch' keyword entry, syntax check and report codes!

Key features of the Sinclair ZX Spectrum

Full colour – 8 colours plus flashing and brightness-intensity control.

Sound – BEEP command with variable pitch and duration.

Massive RAM – 16K or 48K.

Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.

High resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.

ASCII character set – with upper- and lower-case characters.

High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY and MERGE for programs and separate data files.

The ZX Printer – available now

The printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

ZX Microdrive – coming soon

Each Microdrive will hold up to 100K bytes on a single interchangeable microfloppy – with a transfer rate of 16K bytes per second. And you'll be able to connect up to 8 ZX Microdrives to your ZX Spectrum – they're available later this year, for around £50.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day.

BY FREEPOST – use the coupon below. You can pay by cheque, postal order, Access, Barclaycard or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

sinclair ZX Spectrum

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	Sinclair ZX Printer	27	59.95	
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