POPULAR Computing WEEKLY

35p 12-18 May 1983 Vol 2 No 19

## This Week

**Spectrum software**
Graham Taylor takes a critical look at some of the recent arcade type games which have been released for the Spectrum. See page 14.

**BBC regression**
Calvin Woodings explains some of the finer points of linear regression and correlation on page 20.

**Draw command**
Ian Logan explains why the Spectrum's Draw command can give rise to patterns rather than curved lines. See page 17.

**Ace graphics**
Simon Cross runs through an animated graphics program for the 3K Jupiter Ace on page 19.

★STAR
Alien Lander on BBC. See page 10.
GAME★

## News Desk

# Virgin plans games release

VIRGIN Games is planning to release eight programs in time for the Earl's Court Computer Fair, June 16-19.

Four of the programs are for use with the Sinclair ZX Spectrum. Nick Alexander, head of Virgin Games, said the programs included an arcade style game, a graphic adventure and a golf simulation.

Three of the remaining four programs are for the BBC micro. They consist of an original arcade type game, a Mars lander simulation and a graphic adventure.

The final program is an arcade game for the Vic20.

All eight programs will be priced at £7.95 and will be launched officially on June 14. The games will be available initially through retail chains — Nick Alexander hopes to distribute the games through record shops later.

Virgin plans to release further software in September and will cover an expanded range of machines, including

Continued on page 5

# Memotech debut at computer fair

MEMOTECH is to launch a new, low-cost, micro at the London Computer Fair next month. It will feature a professional-style keyboard, with 16 user-definable functions, and the ability to Run CP/M software.

So far the Oxfordshire-based company has specialised in enhancing Sinclair machines. Demand for its ZX81 keyboard convinced Memotech that a quality keyboard was an "essential", according to Robert Branton who is developing software in-house for the new machine.

He added that the need to have software readily available has prompted Memotech to launch disc drive systems at the same time as the machine.

Both 5¼ and 8 inch versions will be available, allowing buyers to use CP/M software. As Branton said: "If somebody buys this system, software is guaranteed."

Details of pricing are not yet available, but the machine will

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*Head of Virgin Games, Nick Alexander*

## Classified Classified Classified Classified

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**YATZEE!!** The popular dice game for any Spectrum. Up to six players, £3.50 from: M. Dolphin, 8 The Handbridge, Highgate Park, Fulwood, Preston, Lancashire.

Continued on page 38

★★ADVENTURE COMPETITION—WIN A 64★★

# WINDOW ON ANOTHER WORLD

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Salamander Software

POPULAR Computing WEEKLY

12-18 May 1983 Vol 2 No 19

SUNSHINE

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**How to submit articles**
Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

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

## This Week

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## Editorial

Top 10 charts are becoming increasingly popular among software users. Just as pop fans follow the Top 10 record charts religiously each week, so micro enthusiasts are turning to the software charts.

However, as the number of charts proliferates, so does the concern over the way in which they are compiled. Software manufacturers are worried that the charts often bear little relationship to the actual number of games being sold.

What is needed is an independent chart which accurately reflects the state of the market. But, such a chart could not be compiled by any one magazine, software company or retail chain.

Ideally, the Computer Trade Association should approach a body such as the British Market Research Bureau and ask it to compile a Top 10 chart.

This chart could then be supplied to all software companies and magazines — it would provide a standard Top 10 for the industry.

It is in the interests of both the software manufacturer and the micro user to know which program really is the number one selling game in Britain.

At the moment you can do little better than take an educated guess.

## Next Thursday

**Shoot down all the aliens that fly in formation before they get you and then move to the star base where the mother ship is waiting! Star Swarm — a new game for the 16K Spectrum by Richard Sharod.**

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PCWk

## Micro debut

Continued from page 1

fall in the £125-£300 bracket — more than the Spectrum, less than the BBC A. Production is scheduled to start this month so that the micro will be available after the fair.

The quality of the keyboard and the CP/M compatibility point the micro towards the business market, but Memotech is equally keen to capture games users. With this in mind, the machine's Basic has been extended to include Logo commands, adding to the range of shapes that can be defined and giving easier movements. The games video section is "very powerful" according to Branton, with "a good clean picture and excellent facilities for animation".

The Basic has also been extended so that up to eight virtual screens can be defined, each with independent editing.

The machine has additional built-in features allowing users to learn more about programming. A front panel display lets users write assembly level programs and then see what is happening inside the computer

Branton explained that this gives users "complete control of the machine at a high level while everything is displayed".

The micro has a full qwerty keyboard, plus a numeric keypad and eight function keys. These work in shift, giving users 16 functions which can be programmed in a similar way to the BBC micros.

Branton said the keyboard has a professional feel, superior to the Dragon's, and it is costing Memotech "a fortune"! There is 32K of Ram, 16K of video Ram and 16K of Rom. Memory can be expanded up to 512K in 32K blocks. There are 16 colours and 256 by 192 high resolution graphics.

Other features of the micro are two joystick ports and a Centronics interface. An add-on board provides an RS232 interface.

## Virgin games

Continued from page 1

the Commodore 64 and possibly the Texas Instruments micros.

● Laurence Kaye has joined Virgin Games as sales manager — he was previously part of the Virgin record sales force.

# Casio's pocket - size built-in printer

*CASIO is now selling a pocket computer with a built-in printer at just under £100.*

*The new machine, the FX802P, costs £99.95 and is about the same size as a man's wallet. It has a standard cassette interface, but no facilities for linking separate printers or televisions. Basic is the programming language and the capacity is 1,568 keystrokes.*

*Twenty characters a line are displayed on the printer and 12 on the liquid crystal display, although this scrolls to a maximum of 60 characters. The keyboard is laid out in the conventional qwerty style, but has been improved over previous models in the same family: rows have been staggered and the space bar extended.*

## Salamander converts Dragon!

SALAMANDER Software has now converted its range of Dragon 32 software to run on the 32K Tandy Color Computer with Extended Basic.

The conversions have been carried out for sale in America where the Tandy Color Computer has a considerable following, but the titles are now also available in the UK.

The Tandy titles are priced the same as the Dragon versions. Enquiries to Salamander Software, 27 Ditchling Rise, Brighton.

# Now it's computer graphics and pop music!

POP music accompanied by computer graphics is the latest idea from Manchester singer-songwriter Chris Sievey, the man who brought you *I'm in love with the girl on the Manchester Virgin Megastore check-out desk.*

The "B" side of his new single *Camouflage* contains a program for the 16K ZX81. The idea is that you load this and then run it while playing the "A" side of the record — giving you lyrics and computer graphics on the tv screen in synchronisation with the music.

Chris admits that the graphics are "not exactly Tron". But then, as he says, "at a quid what do you expect?" And, anyway, there's more on the "B" side — a 16K arcade style game called *Flying Train* and a shortened 1K version for users without Ram expansion.

The single, called *Camouflage*, is released by Random Records and will be available from record shops from May 20 (order number RND*1).

Chris is now busy writing more songs and programs to run on the ZX81 and Spectrum, "with a possibility of Dragon, BBC, Oric, etc, recordings to follow".

## American launch

VIRGIN Books are to launch their range of computer books in America. The move follows an agreement with American publishers Dell.

To check the listings before printing, Virgin Books are looking for people experienced on all the popular micros, including BBC and Oric.

If you're prepared to spend a few hours typing in programs, either write to Norman Dinesen at 61-63 Portobello Road, London W11, or ring him on 01-221 7535.

## Hitch-hikers dispute is over

THE dispute over the Hitch-hikers Guide to the Galaxy adventure game has been settled.

Supersoft, the Middlesex-based software company, and Hitch-hikers author, Douglas Adams reached an agreement through their solicitors moments before the case came to court.

An injunction was sought by Douglas Adams on the grounds that Supersoft had no right to use the names and places from the book in the game.

In return for Supersoft dropping the game, Douglas Adams has agreed not to pursue any claims over royalties on those cassettes already issued.

The game was originally released by Supersoft in the belief that a letter from Pan had given them the necessary rights (*PCW*, 21-27 April). Pan have paid the legal costs of both sides.

## Sound module for Dragon

A THREE channel sound module has been developed for the Dragon.

The JCB Microsystems Sound Extension Module uses a sound chip, the AY-3-8910, to extend the on-board sound facilities of the Dragon.

The manufacturers claim the module is easier to use than similar modules for other machines. A 4K Eprom within the module sets up the registers, and a new basic command "MUSIC" is provided for use within programs.

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# LETTERS

## Misquoted!

We refer to an article written by David Kelly in your magazine, 24-30 March 1983, entitled *The House of the Rising Psion*.

In this article the magazine has stated that "Psion has recently concluded a licencing agreement with Spears to produce a home computer version of *Scrabble*". We must inform you that there has been either a misunderstanding or a misquote with regard to this statement.

J W Spear & Sons PLC has in fact concluded an exclusive licencing agreement with Little Genuis Ltd to produce home computer versions of the game *Scrabble*. Little Genius Ltd, in turn, has concluded an agreement with Psion Ltd, on an exclusive basis, to produce and market *Computer Scrabble* for the Sinclair ZX Spectrum personal computer.

*J G Baldachin*
*Little Genius*
*22 Inverness Street*
*London NW1 7HJ*

## A little mishap

I am writing to you, not to complain, but to inform you of a little mishap I had this evening.

Dawlish College is a boarding school for boys, and we have a Sinclair Spectrum. I find putting in long programs a challenge, but I have such little time that I have to do it in dribs and drabs.

I started to put in the very interesting *Defender* program (*PCW* 14-20 April) which took me three days. Now when I'd finished it, I was really pleased with myself. So I ran the program and had a game. It was very good and interesting, especially the fast-moving graphics which you do not get in many games.

So I had a go, lost all my ships, then put my name in the hall of fame. Then the computer printed up *"Would you like another go Y/N?"*. I said 'no', so I could *Save* it on the tape. To my surprise it then said *"This program will now self-destruct"*.

I thought it would just flash and flicker, different colours, which it did not — it *Newed* itself! I looked through the whole of the program, and could not see a *New*, so I expect it was in one of the *Poke*s which I know changes the working of the machine.

I thought I would write this letter, just in case something like this happens to another one of your readers.

*N Collins*
*Dawlish College*
*Mamhead Park*
*Kenton*
*Nr Exeter*
*S Devon*

**Our apologies to N Collins and to anyone else who suffered the same fate. We should have pointed out the effect of pressing *N* in the accompanying notes. However, this does highlight a very important point — always *Save* a game on tape immediately after you have entered it. That way, if anything does go wrong, you still have a back-up copy.**

## Going to the dogs?

In issue No 16 P G Clark objected to a CND ad because it is "political".

Quite right, too! If we right-thinking people can't open a magazine without being exposed to (political) views different from our own, this country is really going to the dogs.

Still, at least P G Clark had his views published free — the CND had to pay, so you see PG, *Popular Computing Weekly* is not without a sense of proportion.

On the other hand, if the editor shows further signs of commie sympathies, how about me and you and a few of the boys going round and sorting him out — eh! They'll be looking for the vote next . . .

*T Foxe*
*25 Primula Drive*
*Norwich*

## Nothing like the book

I have long been a Tolkien fan. Recently I have also become a Spectrum fan. Hoping to get the best of both worlds, I bought a copy of *The Hobbit* (an expensive item!!).

I was influenced by your reviews, among others, which suggested that the program bore a close resemblance to the book. However, it seems that this is not so. Neither Gandalf nor Thorin seem to display any of the characteristics which they possess in the book. As for sticking to the story, where are the dwarfs?

Also, how about the fascinating conversations you are *supposed* to be able to hold with the characters? Most of them seem to say no more than "hurry up" or "no"! I am beginning to wonder now whether I have wasted £15, and would have got better value from three normal-priced cassettes.

*Ruth Morris*
*219 Station Road*
*Sutton Coldfield*
*West Midlands B73 5LE*

**I am sorry to hear that you are disappointed with *The Hobbit*. I agree that it does have certain faults, but it is still the best adventure game for the Spectrum that I have seen. Judging from the reaction to our *Hobbit* competition, most other people rate it highly as well.**

## Minority machine

I have been reading your publication for some months now because I like its presentation of news and general format.

However, I have bought a Sharp MZ80A, mainly to complement my youngest son's education since his school uses Sharp MZ80Ks and the elder lad's school uses MZ80Bs (I also own a MZ80B for business purposes). I have seen no reference whatsoever in your pages to these excellent little micros and wonder whether this is a matter of editorial policy? If so, it is plainly not the magazine for my needs.

It is perhaps pertinent to add that my lad's school has had six Sharp MZ80Ks for some 18 months taking a very considerable pounding. The staff tell me that they've had no breakdowns to date: more than could be said for some other machines, I suggest.

*R H Hill*
*8 Parkland Road*
*Woodford Green*
*Essex IG8 9AP*

**There are now so many different micros on the market that it is impossible to cover all of them. However, we do try and devote some space to the minority machines, as well as the more popular Spectrums, Vics, *et al.***

## Political offence?

I am writing in response to the letter from P G Clark (Vol 2 No 16) who appears to be confusing classified advertisements with editorial. He also appears to be unable to differentiate between propaganda and advertisements to join particular groups, be they user groups, programmers for real ale or whatever.

Advertisements for "the best computer money can buy" and your editorial "16-year-old whizz-kid programmers" must also be propaganda by this reckoning.

Even though there is absolutely no mention of politics, P G Clark says that the offending advertisement is political (is living in peace left or right?). Or is it that only politicians (the 'experts') understand the subtler points of mass destruction and that a desire for peace is too simplistic a view to be left to mere programmers?

*P Tomlinson*
*88 Pickhurst Rise*
*West Wickham*
*Kent*

## A perfect square?

I like reading *Popular Computing Weekly*, especially Boris Allan when he writes about maths techniques. I am not games inclined, so my first priority is the puzzle which I try to solve with the aid of my trusty ZX Spectrum.

Could you please help me with a problem? Some puzzles resolve to checking to see if a number is a perfect square, but if I use the algorithm:

```
If Int Sqr (N) = Sqr (N) etc
```

it does not work on all perfect squares; eg, 25 fails. Can you supply me with a method that is trustworthy?

Incidentally, I get the same problem on my TRS80.

*H Hudson*
*4 Leyton Crescent*
*Idle*
*Bradford*
*West Yorks BD10 8RB*

**Unfortunately, I do not have any easy answers on tap. Perhaps some of our other readers will send in some suggestions.**

# Critical review?

"The sound commands on the Oric 1 are, for a computer of this price, very sophisticated. Three music channels, and one noise channel, mean that you can program some fairly complex sounds."

POPULAR COMPUTING WEEKLY

"Oric is everything you hoped it would be. Alive with colour, and zapping with built-in sound effects, the Oric looks like a match for any machine now selling for less than £200"

YOUR COMPUTER

"The 16k Oric – fighting the 16k Spectrum – is £25 cheaper. It feels a good deal more 'professional' than the home-appeal Sinclair. Oric's sound is extremely versatile, and well up to the standard of the £300 or £400 BBC microcomputer made by Acorn."

WHICH MICRO?

"Oric was over twice as fast as the Spectrum. Surprisingly perhaps the Oric, which initially seemed only faster when performing the simplest of calculations, has come back to beat the Spectrum by a small amount. As the problems get more complex the Oric comes into its own. One final point – in entering the benchmark tests – the Oric was certainly the easiest to handle."

WHICH MICRO?

"This slope coupled with the design of the keys makes the Oric an easy machine to touch-type on. All keys have auto-repeat and there are four keys dedicated specifically to cursor control. It is certainly easier to type on than any of Sinclair's offerings."

YOUR COMPUTER

"Oric will soon be selling a Modem so that Prestel will become available. Owners will be able to accept telesoftware – programs loaded straight down the phone line – eventually electronic mail could come into the home by the same route, and with the addition of a tape recorder the Oric with its Modem could become a telephone answerer and message taker."

YOUR COMPUTER

"One good feature of the Oric is an on-screen reminder in the top right hand corner to show that you've engaged all-capitals mode. So much better than the BB's variety of lights in the corner of the keyboard. The Oric is sound, simple to get along with and offers great expansion potential."

WHICH MICRO?

"When compared to the stogginess of the Spectrum's keyboard this is certainly an improvement. I can't see any Orics failing through bad assembly. If only the £2400 IBM were so easy to use."

WHICH MICRO?

"Instead of the Spectrum's 28 look-up single-character error reports, the Oric has 18 self-explanatory messages. If you actually want to do computing, rather than just exploring the world of off-the-shelf games programme entertainment the Oric will be a better buy."

WHICH MICRO?

"A good speaker and built-in noises get the Oric's sound off to a good start. Typing Zap, Ping, Shoot or Explode produces convincing arcade game noises which can easily be incorporated into any program."

YOUR COMPUTER

"The modem is certainly unusual in a machine of this price. Together with the other peripherals, when finally available, it should make for an attractive package for a small business... surely a match for machines costing much more"

POPULAR COMPUTING WEEKLY

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**Adventure 1:** Based on the original game by Crowther, this game was the start of the Adventure craze. Reviewed Sinclair User.Iss.2. Features save game routine as the game can literally take months to complete. 16K ZX81 and 48K Spectrum. — ZX81 8.95 — 9.95

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# Alien Lander

**A new game for the BBC by Oke Uwechue**

The object of the game for the BBC micro, is to land your craft on the landing pad on an alien planet, but the game is not as easy at it seems. Firstly, your ship accelerates downwards due to gravity and you have to keep on *Thrusting* to buoy it up (however, the craft also accelerates upwards due to *Thrusting*). Secondly, every so often, a missile thunders past the screen, cruising at a level close to your landing pad, and it must be avoided. Thirdly, if your craft touches any part of the planet terrain, you will immediately lose a life.

Movement sideways is by using the arrow keys (← and →) and you can *Thrust* by pressing the *Q* button. Your score, hi-score, and general status are continuously displayed on the screen. The game contains a full set of instructions.

I have made use of some special features of the BBC machine.

i) The envelope command at line 390. The sound statement accompanying this is at line 1380.

ii) I used a different kind of *Inkey* statement (lines 690-710) because it allows a rapid keyboard scan.

iii) I have also used the key command: **FXIS, 1* in order to flush the keyboard buffer of surplus characters which appear at the end of the game. (This always happens when using the special *Inkey* command, as I have.)

iv) Nearly all the variables I used were % variables, ie 'integer variables' — this helps speed up the Basic a little.

### Program listing

| Lines | |
|---|---|
| 30-100 | Introduction display |
| 120-360 | Instructions |
| 390-410 | Initialising |
| 420-440 | Character definition |
| 450-650 | Constructing the scenario |
| 690-840 | Main loop |
| 900-980 | Thrusting procedure |
| 1010-1070 | Ending the game when your ship has gone too high |
| 1100-1160 | Procedure to forfeit a life |
| 1130 | Checks if you have any lives left |
| 1190-1250 | End of game when you have used up all your lives |
| 1290-1330 | Scoring procedure, also checks if velocity is less than 7 m/sec |
| 1460-1520 | Procedure to blow up the craft when it is hit by a missile |
| 1530 | Checks to see if you have any lives left |
| 1580 | Checks if missile has hit your craft |
| 1600-1660 | Ends the game when you run out of fuel |

```
10 REM*****1983(c)***D.UWECHUE*******
20 REM
30 MODE2:C.1:C.129:CLS
40 FORM%=1TO90:A%=RND(1300)-100
50 B%=RND(120):H%=RND(80)+15
60 MOVEA%,230:MOVEA%+B%,230
70 PLOT85,A%+30,230+H%:NEXT:C.3
80 C.128:PRINTTAB(3,9),"   ALIEN   "
90 PRINTTAB(7,10),"  LANDER   "
100 FORC=1TO2000:NEXT
110 CLG:MODE0
120 PRINT:PRINT
130 PRINT"              YOUR TASK IS QUITE A
SIMPLE ONE:"
140 PRINT"STEER YOUR CRAFT TO land (NOT crash!)
ONTO THE GLOWING LANDING PAD"
150 P."ON THE PLANET SURFACE WITH A DESCENT
VELOCITY OF LESS THAN 7m/sec."
160 P."USE THE CORRESPONDING 'ARROW' KEYS TO
MANOEUVRE YOUR CRAFT(along x-axis"
170 P."only).BE SURE TO TAKE HEED OF THE
FOLLOWING:-"
180 P."  1) YOUR CRAFT WILL ACCELERATE DOWN
WARDS DUE TO THE PLANET'S"
190 P."     GRAVITATIONAL PULL."
200 P."  2) TO COUNTERACT THIS,YOU MUST USE THE
thrust BUTTON('Q') IN ORDER"
210 P."     TO PROPEL YOUR CARFT UPWARDS.BUT BE
CAREFUL:YOUR CRAFT ALSO"
220 P."     ACCELERATES UNDER thrustING AND YOU
MAY FIND YOURSELF PROPELLED"
230 P."     OUT INTO ORBIT!"
240 P.:P."YOU ONLY USE UP 2 FUEL POINTS FOR ANY
MOVEMENT ALONG X-AXIS"
250 P."BUT YOU BURN UP 5 FUEL POINTS AT A TIME
FOR thrustING."
260 P."     BEWARE THE PLANET'S DEFENCES:
'surface missiles' THAT PERIODICALLY"
270 P."SKIM THE SURFACE OF THE PLANET IN SEARCH
OF ANY ALIEN LANDING"
280 P."CRAFT.IF YOU SHOULD COLLIDE WITH ONE OF
THESE,YOUR CRAFT WILL BE"
290 P."IMMEDIATELY DESTROYED AND YOU WILL
CONSEQUENTLY LOSE ONE OF YOUR"
300 P."THREE LIVES.YOU WILL ALSO LOSE A LIFE IF
YOUR CRAFT CRASHES INTO"
310 P."THE MOUNTAINOUS TERRAIN."
320 P."HOWEVER,YOU WILL BE WARNED OF THE
MISSILE'S APPROACH BY THE "
330 P."PECULIAR BURST OF ULTRASOUND IT EMITS.
THIS SOUND WILL BE PICKED"
340 P."UP BY YOUR SCANNERS AND TRANSMUTED INTO
AN AUDIBLE FREQUENCY."
350 P."   YOUR SHIP WILL BE REFUELLED AFTER
EVERY 4 SUCCESSFUL LANDINGS."
360 P."          YOU SCORE 10 POINTS PER
LANDING."
370 P.:P."   (press any key to begin)..."
380 D$=GET$
390 HI%=0:ENVELOPE 1,1,100,0,-3,15,1,50,126,-1,
0,-5,126,126:W%=0
400 MODE1:X%=500:Y%=970:G%=0:VDU5
410 LIFE%=15:FUEL%=900:SC%=0:T=0:K%=0
420 VDU23,250,130,130,68,40,16,0,0,0
430 VDU23,230,0,0,3,7,13,62,71,224
440 VDU23,235,0,16,16,240,176,124,226,7
450 A$=CHR$230+CHR$235:GCOL0,1:E%=2
460 FORM%=1TO80:A%=RND(1300)-100
470 B%=RND(120):H%=RND(50)+15
480 MOVEA%,230:MOVEA%+B%,230
490 PLOT85,A%+30,230+H%:NEXT
500 MOVE0,230:MOVE1300,230
510 PLOT85,0,180:PLOT85,1300,180
520 GCOL0,2:FORV=1TO20:S1=RND(1300)
530 S2=RND(685)+290:PLOT69,S1,S2:NEXTV
540 P=RND(300)+400:GCOL0,0:MOVE P,220
550 MOVE P+75,220:PLOT85,P,295
560 PLOT85,P+75,295:GCOL0,1
570 PRINTTAB(13,27),"S T A T U S"
580 GCOL0,3:Z%=0
590 PRINTTAB(14,29),"SCORE:"+STR$(SC%)
600 PRINTTAB(25,29),"VELOCITY:"
610 P.TAB(1,29),"FUEL :"+STR$(FUEL%)
620 GCOL0,1
630 P.TAB(5,30),"LIVES:"
640 GCOL0,3:P.TAB(11,30)+A$+A$
650 GCOL0,1:P.TAB(18,30),"HI-score:",STR$(HI%)
660 REM::::::::::::::::::::::::::
670 REM:::main    loop::::
680 REM::::::::::::::::::::::::::
690 IF INKEY(-17)=-1 GOTO900
700 IF INKEY(-122)=-1 THENX%=X%+15:FUEL%=FUEL%
-2:GOTO720
710 IF INKEY(-26)=-1 THENX%=X%-15:FUEL%=FUEL%-2
720 T=T+1
730 Y%=Y%-T:MOVEX%,Y%
740 GCOL0,0:PRINT A$
750 VDU4:P.TAB(34,29)+STR$(T*1.1)
760 IF POINT(X%,Y%-30)=1 THEN1110
770 IF POINT(X%+60,Y%-30)=1 THEN1110
```

Continued on page 13

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Continued from page 11

```
780 IF Y%(240 GOTO1110
790 IF Y%-29(232 AND Y%-29)228 THEN1290
800 IF Y%)990 THEN1010
810 IF K%=1 THEN1390
820 IF K%=0 AND RND(30)=1 THEN1380
830 VDU5:MOVEX%,Y%:GCOL0,0:PRINTA$
840 GOTO690
850 REM:::::::::::::::::::::::::
860 REM::::::e n d    l o o p::::
870 REM
880 REM::::PROC thrust:::::::::
890 REM:::::::::::::::::::::::::
900 GCOL0,3
910 MOVE X%+18,Y%-30:VDU250
920 MOVE P,230:DRAW P+75,230
930 FUEL%=FUEL%-5:VDU4
940 IF FUEL%(2 THEN1600
950 P.TAB(7,29)+STR$(FUEL%):VDU5
960 T=T-3:SOUND1,-10,5,1:GCOL0,0
970 MOVE X%+18,Y%-30:VDU250
980 Y%=Y%-T:GOTO730
990 REM::::END thrust:::::::::
1000 REM:::::::::::::::::::::::::
1010 SOUND2,-10,100,6:SOUND3,-10,60,6
1020 *FX15,1
1030 VDU4:P.TAB(10,7),"* E N D *"
1040 P.:P."You have been propelled out into
orbit."
1050 PRINT:INPUT"ANOTHER GAME",Q$
1060 IF Q$="Y" OR Q$="YES" GOTO1350
1070 MODE7:PRINT:PRINT:END
1080 REM:::::::::::::::::::::::::
1090 REM::::MINUS LIFE:::::::::
1100 REM:::::::::::::::::::::::::
1110 SOUND0,-15,5,5
1120 LIFE%=LIFE%-2
1130 IF LIFE%(11 THEN1190
1140 VDU4:P.TAB(LIFE%,30)," "
1150 VDU5:GCOL0,0:MOVEX%,Y%:PRINTA$
1160 X%=RND(300)+400:Y%=950:GOTO690
1170 REM:::::::::::::::::::::::::
1180 REM
1190 SOUND2,-10,100,6:SOUND3,-10,60,6
1200 *FX15,1
1210 VDU4:P.TAB(10,7),"* E N D *"
1220 PRINTTAB(3,8),"You have used up all your
lives."
1230 PRINT:INPUT"ANOTHER GAME",Q$
1240 IF Q$="Y" OR Q$="YES" THEN1350
1250 MODE7:PRINT:PRINT:END
1260 REM:::::::::::::::::::::::::
1270 REM::::::PROC score:::::::
1280 REM:::::::::::::::::::::::::
1290 IF T)7 THEN690 ELSESC%=SC%+10:VDU4:P.TAB
(20,29)+STR$(SC%):G%=G%+1:IF G%=4 THEN FUEL%=
800:G%=0:T=0
1300 SOUND2,-12,190,2
1310 VDU5:GCOL0,0:MOVE X%,Y%:PRINTA$
1320 X%=RND(200)+400:Y%=950
1330 GOTO690
1340 REM:::::::::::::::::::::::::
1350 IF HI%(SC% THEN HI%=SC%
1360 GOTO400
1370 REM:::::::::::::::::::::::::
1380 K%=1:Z%=1400:SOUND&11,1,90,4
1390 GCOL0,2
1400 MOVE Z%,295:DRAW Z%+10,295
1410 IF Z%(X%+30 THEN1580
1420 GCOL0,0:DRAW Z%+37,295
1430 Z%=Z%-30:IF Z%(200 THEN 1570
1440 GOTO830
1450 REM:::::::::::::::::::::::::
1460 K%=0:GCOL0,0:SOUND0,-15,4,7
1470 MOVE X%+15,Y%-15:DRAWX%+40,Y%+25:MOVE X%
+15,Y%-15:DRAW X%+45,Y%+18:MOVE X%+15,Y%-15:
DRAW X%+50,Y%+10:MOVE X%+15,Y%-15
1480 DRAW X%+45,Y%-15:MOVE X%+15,Y%-15:DRAW X%
+36,Y%-45
1490 GCOL0,0:MOVE X%-10,Y%-15
1500 MOVEX%+60,Y%+60:PLOT85,X%+50,Y%-67
1510 VDU5:MOVE X%,Y%:PRINTA$
1520 LIFE%=LIFE%-2
1530 IF LIFE%(11 VDU5:GOTO1190
1540 VDU4:P.TAB(LIFE%,30)," ":VDU5
1550 X%=RND(400)+300:Y%=970:GOTO690
1560 GOTO830
1570 K%=0:DRAW Z%,295:GOTO830
1580 IF Z%)X%-3 AND Y%)295 AND Y%(325 THEN 1460
1590 GOTO1420
1600 PRINTTAB(10,7),"~~EMPTY FUEL TANKS~~"
1610 PRINTTAB(7,29)+STR$(0)
1620 *FX15,1
1630 P.TAB(2,9),"You are out of fuel:your craft
has crashed."
1640 PRINT:INPUT"ANOTHER GAME",Q$
1650 IF Q$="Y" OR Q$="YES" THEN1350
1660 MODE7:PRINT:PRINT:END
```

# Absolute power . . .

***Graham Taylor** battles with his conscience in a bid to become The Great Dictator – and loses!*

Despite the fact that Z80 programmers are a dime a dozen these days (well, about 20 percent royalties a dozen actually) software houses often still rely on versions of arcade favourites to win sales.

Those wishing to buy a copy of the most popular arcade game (ie, *Space Invaders*) have a choice of about five different versions with only minor differences between them. The reason for this is not hard to find — it is far more difficult to think up original games ideas than it is to find programmers who can turn existing ideas into code. The upshot of all this is that companies are now turning to the second division arcade leaders like *Frogger* and *Centipede*.

In the past months there have been at least three versions of *Centipede* issued. Your choice will depend very much on what you value most — speed, graphics or authenticity.

The first game, from DK 'Tronics, loaded a pleasing title page complete with centipede, but was lacking in some of the more exotic garden creatures featured in the original. Although disappointing in this respect, I nevertheless enjoyed the game. Fast keyboard response and sound affects made it in the "Oh no, it's three o'clock in the morning and I have to get up tomorrow" class.

In contrast, CDS Systems' *Catterpillar* features a poisonous snail that wanders across the screen from time to time and a very realistic spider that gleefully bounces towards you. Unfortunately, the game is painfully slow, particularly the missiles (insecticide?) which drift leisurely up the screen.

Silversoft's *Cyber Rats* should be included with the above, since the packs of rats behave very much like the centipede, depositing what look like tufts of grass instead of mushrooms. Like DK 'Tronics, I don't think the graphics are all they could be, indeed the rats look more like frogs to me.

However, the game is very fast and you can't escape from the rats simply by staying out of their way, as you can with *Centipede*. Rather, the rats which reach the bottom of the screen remain there, necessitating some deft finger work in order to survive to the next wave.

New Generation was highly regarded for its ZX81 programs. Now, it has two programs available for the Spectrum.

## More fun watching the computer play itself!

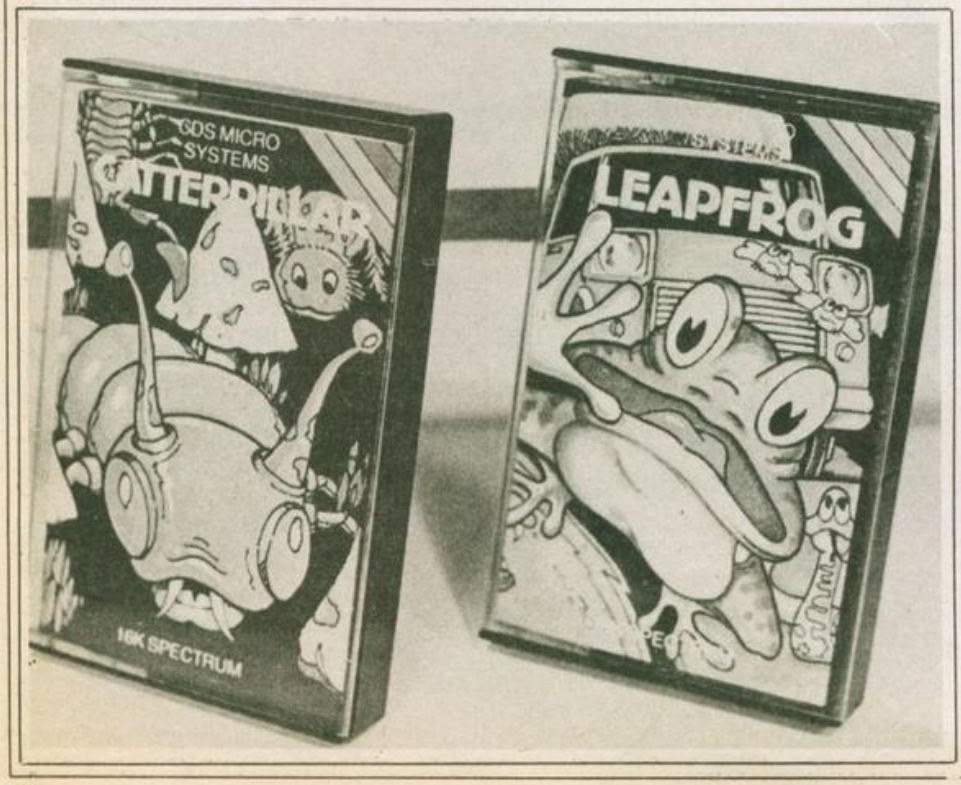
The first, issued almost as soon as the machine was available is *Escape*. In a sort of *Theseus and the Minotaur* scenario, you are trapped in a maze pursued by various kinds of prehistoric monster. Most of these are somewhat slower than you, but at the hardest level a vicious pterodactyl swoops over the maze after you.

The only aim is to escape and to do this you need to find an axe which is hidden somewhere within the maze. But, if you do find the axe you will run at half speed, making a quick death all the more likely.

The highest recommendation I can give this game is that I bought it last November and have never stopped playing it. Indeed, I have only ever escaped from the monsters once at level five.

The follow up — *Tunnel* — is less easily recommended. This game features the best animated graphics I have seen on the Spectrum (and that includes *Horace*) with highly detailed frogs and rats that run and jump towards you. If you just want to impress your Atari-owning friends, this is the one to do it. However, as a game it does not work.

To pass from one stage to the next, you must kill vast numbers of each animal, armed only with a strangely pathetic laser. This takes ages and soon gets tedious — you will have more fun watching the computer play itself in the demo version. Obviously, a vast amount of work has gone into this program and it seems a pity it has been rather thrown away at the last minute.




Talking of frogs, CDS Systems has issued a version of *Frogger* which features all the tunes of the original. It is a good game, simply because it is a fast machine code version of an excellent original concept. However, the graphics, particularly for the river and frogs, are not as good as they might have been. And the tune at the beginning gets irritating after you have heard it a few times. In short, enjoyable but not particularly inspiring.

*Derby Day* by Computer Rentals was something of a dark horse (sorry). The idea of a horse racing game written in Basic was not inspiring, but when I actually ran it, I was pleasantly surprised. There are a number of options, including the chance to name your own horses and odds. Bets are placed with honest Clive — a bookmaker of doubtful integrity.

The animation of the actual race is astonishing for a Basic program and might inspire you to greater things in your own programming.

*Breakout* is a popular computer program that is so often included in books amd magazines (and indeed on the Horizons demonstration tape), that it takes courage to try and sell one commercially. *Superball*, from Axis, attempts just that — is it worth buying? I think if you are a *Breakout* fan the answer is yes. Good sound, various options and machine code speed make it highly addictive and infuriating. There is a significant enough difference between this and what you might get for free elsewhere to justify paying for it.

## Your only allies are the Secret Police!

*Dictator* from DK 'Tronics is one of the most original games I have seen. It is a form of those "run the country" games where you have to balance various interests that conflict — but at such an ingenious and witty level it hardly betrays its origins.

You are the Dictator of "somewhere vaguely equatorial" and have two basic objectives — first to survive revolutions and assassination attempts, secondly to steal as much money as possible from your own treasury for your Swiss bank account.

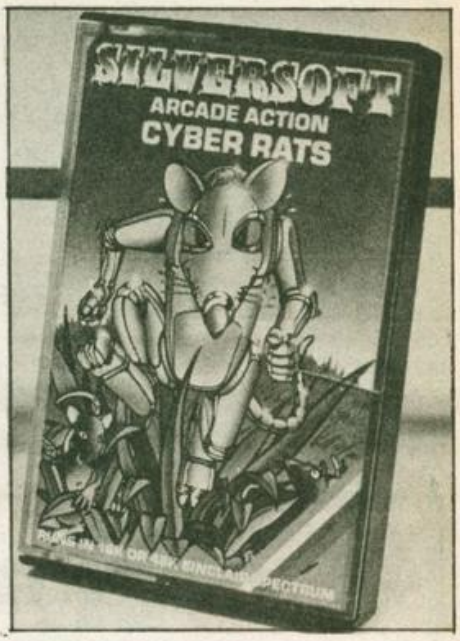
Your only real allies are the Secret Police, who can give you police reports on the state of the various factions within the country. You can appease these factions by policy decisions — the problem is that these will either cost money or upset some other faction.

Failing to maintain this balance will result in plots against you and eventually a revolution which you may or may not survive. It is almost worth deliberately upsetting some group so that this situation occurs. The screen flashes red and battle begins with your weedy Spectrum sound device suddenly making impressive machine gun and bomb noises. Suddenly the screen goes black — have you survived or not?

It was instructive to discover how quickly you lose what liberal conscience you may have begun with in the pursuit of money and power. For example, I quickly lowered the minimum wage of the peasants to please the landowners.

An excellent game not exhausted by even dozens of plays.

Finally, an adventure game — or rather two adventure games. Micro-Gen's *Mines of Saturn* and *Return to Earth* are basic text adventures with all the usual features. For those new to adventuring, two games for the price of one is good value. And being able to break into the Basic, usually a disadvantage, is helpful in gaining experience of how to solve the problems — useful for novices.




A mixed bag of software then, none of it actually bad value for money, but the quality both of programming and original thought differing widely. Being positive though, I would rate two of the games here, *Escape* and *Dictator*, as being amongst the best Spectrum games I have played. ■

| Firm | Program | Cost | Value (1-10) |
|---|---|---|---|
| DK 'Tronics<br>23 Sussex Road<br>Gorleston<br>Great Yarmouth<br>Norfolk | *Dictator*<br>*Centipede* | £5.95<br>£4.95 | 9<br>7 |
| CDS Micro Systems<br>10 Westfield Close<br>Tickhill, Doncaster | *Leapfrog*<br>*Catterpillar* | £4.95<br>£4.95 | 7<br>6 |
| New Generation<br>16 Brendon Close<br>Oldland Common<br>Bristol BS15 6QE | *Escape*<br>*Tunnel* | £4.95<br>£5.95 | 9<br>6 |
| Silversoft<br>London House<br>271-273 King Street<br>London W6 | *Cyber Rats* | £5.95 | 7 |
| Axis (UK)<br>71 Brookfield Avenue<br>Loughborough, Leics<br>LE11 7LN | *Superball* | £5.95 | 6 |
| Computer Rentals<br>140 Whitechapel Road<br>London E1 | *Derby Day* | £5.95 | 8 |
| Micro-Gen<br>24 Agar Crescent<br>Bracknell<br>Berkshire | *Mines of Saturn*<br>*Return to Earth* | £5.95 | |

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# The mystery solved

*Ian Logan explains some of the mysteries contained in the* Draw *command*

There have been several requests in *Popular Computing Weekly* for an explanation to the phenomenon of the very attractive patterns produced by using the *Draw* command with high 'angles of turn' (for the best introduction to this see Nick Wilson's article, January 20-26 1983).

Patterns are produced as follows, eg:

```
PLOT 50,50: DRAW 50,50,9999
```

which produces the pattern labelled Figure 1. So, just what is going wrong to give a pattern rather than a 'curved line'?

Well, the answer lies in the programmer failing to take the 'angle of turn' *Mod 2*Pi* — that is, using the 'remainder' after dividing by *2*Pi*. And, indeed a curve is produced by:

```
PLOT 50,50: DRAW 50,50,9999-2*PI*INT (9999/(2*5PI))
```

For the best patterns the number of arcs is 252 (the limiting value in the Rom program), as the pattern is built up by drawing a series of arcs. In the example — *Draw 50,50,9999* — the first arc is much too long and the succeeding 251 arcs continue with the 'hunt' for the destination with an equal lack of success.

In order to show just how these patterns are produced, I have written the *Draw an arc program*. This is a Basic program that closely follows the algorithm used in the *Draw* routine of the Spectrum Rom. By having it in Basic, the user is able to see a pattern developing slowly and can use the *Break* key to modify the program easily. Indeed, by adding the line:

```
65 LET G=G-2*PI*INT (G/(2*PI))
```

the patterns are abolished as predicted.

The variable labels *M0–M4* refer to the 'calculator's memory area and the variable label *Sc* to the machine stack. Figures 2-4 show a range of patterns produced by this program. ■

```
   10 REM A DRAW AN ARC PROGRAM
   20 PLOT 75,35: REM just a suit'
able starting position
   30 INPUT "X value ";X: PRINT "
X = ";X;
   40 INPUT "Y value ";Y: PRINT T
AB 10;"Y = ";Y;
   50 INPUT "Angle ";G: PRINT TAB
 20;"Angle = ";G
   60 REM How many arcs?
   70 LET z=ABS ((ABS x+ABS y)/SI
N (g/2))
   80 LET Arcs=4*INT (INT (ABS (g
*SQR Z)+0.5)/8)+4
   90 IF arcs>252 THEN LET arcs=2
52
  100 PRINT '"ARCS = ";ARCS
  110 LET w=SIN (g/(2*arcs))/SIN
(g/2)
  120 LET M0=PEEK 23678
  130 LET sc=PEEK 23677
  140 LET F=.5*(g-g/arcs)
  150 LET M1=y*w*SIN f+x*w*COS f
  160 LET M2=y*w*COS f-x*w*SIN f
  170 LET M3=COS (g/arcs)
  180 LET M4=SIN (g/arcs)
  200 REM 'DRAW THE ARCS'
  210 LET M0=M0+M2
  220 LET Sc=Sc+M1
  230 LET X=sc-PEEK 23677
  240 LET Y=M0-PEEK 23678
  250 GO SUB 510
  260 LET Arcs=Arcs-1: IF Arcs=0
THEN STOP
  270 LET MM1=M1
  280 LET M1=M1*M3-M2*M4
  290 LET M2=MM1*M4+M2*M3
  300 GO TO 210
  500 REM 'DRAW A LINE' from last
position to X,Y
  510 LET Plotx=PEEK 23677: LET P
LOTy=PEEK 23678
  520 LET dx=SGN X: LET dy=SGN Y
  530 LET X=ABS X: LET Y=ABS Y
  540 IF X>=Y THEN GO TO 580
  550 LET L=X: LET B=Y
  560 LET ddx=0: LET ddy=dy
  570 GO TO 610
  580 IF X+Y=0 THEN STOP
  590 LET L=Y: LET B=X
  600 LET ddx=dx: LET ddy=0
  610 LET H=B
  620 LET i=INT (B/2)
  630 FOR N=B TO 1 STEP -1
  640 LET i=i+L
  650 IF i<H THEN GO TO 690
  660 LET i=i-H
  670 LET ix=dx: LET iy=dy
  680 GO TO 700
  690 LET ix=ddx: LET iy=ddy
  700 LET PLOTy=PLOTy+iy
  710 IF PLOTy<0 OR PLOTy>175 THE
N STOP
  720 LET PLOTx=PLOTx+ix
  730 IF PLOTx<0 OR PLOTx>255 THE
N STOP
  740 PLOT PLOTx,PLOTy
  750 NEXT N
  760 RETURN
```

```
PLOT 50,50: DRAW 50,50,9999
```

Fig 1

```
X = 80     Y = 80     Angle = 9999
ARCS = 252
```

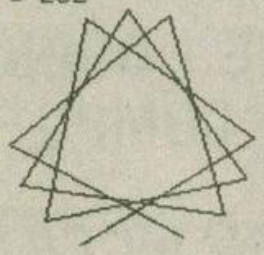
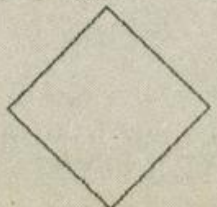


Fig 2

```
X = 50     Y = 50     Angle = 720
ARCS = 252
```

Fig 3

```
X = .045   Y = 0      Angle = 395.
84165
ARCS = 252
```



```
Angle is 126*PI+1/1024
Credit to Mr.P.Ainsworth
```

Fig 4

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# Graphic exercises . . .

***Simon Cross** presents an animated graphics program for the 3K Jupiter Ace*

This is a program for the 3K Jupiter Ace. It demonstrates how smooth animated graphics can be produced by redefining characters whilst the program is running. The program prints a squad of 112 men on the screen who then go through a series of arm exercises. Unfortunately, the limitations of the 3K memory do not permit leg movements or the use of sound.

Type in the word definitions in the usual way and *Save* the program on tape. The program is Run by typing *Drill* and then pressing *Enter*. You can put the men through your own routine by typing *Invis drill* and pressing *Enter* followed by *Break*. Letters *a* to *j* can then be entered to produce single movements of the men (unfortunately, *Error 3* still remains printed at the bottom of the screen).

**Program notes**

Each man consists of four user-defined characters as follows:

| *ASCII CODE* | *CHARACTER* |
|---|---|
| 1 | left top half |
| 2 | left bottom half |
| 3 | right top half |
| 4 | right bottom half |

The squad of men is printed on the screen by the *Do-loop* before *Begin* in the word *Drill*. Their movements are produced by redefining the characters of which they are composed. This gives a smooth and simultaneous movement of all the men which could not be achieved by printing different characters "on top" of the original characters. The words *a* to *j* merely put the numbers necessary to redefine the character on to the stack and these numbers are then read into the character set memory by a *Do-Loop*. ■

```
: Z
 DO
  I C!
 LOOP
;

: A
 006 002 002 002
 002 003 011 011
 011 015 001 001
 003 003 007 003
 11288 11272 Z
;

: B
 096 064 064 064
 064 192 208 208
 208 240 128 128
 192 192 224 192
 11304 11288 Z
;

: C
 006 002 002 002
 002 003 003 003
 003 127 001 001
 003 003 007 003
 11288 11272 Z
;

: D
 096 064 064 064
 064 192 192 192
 192 254 128 128
 192 192 224 192
 11304 11288 Z
;

: E
 027 039 065 001
 003 003 007 003
 11280 11272 Z
;

: F
 216 228 130 128
 192 192 224 192
 11296 11288 Z
;

: G
 003 007 009 017
 035 067 007 003
 11280 11272 Z
;

: H
 192 224 144 136
 196 194 224 192
 11296 11288 Z
;

: I
 003 007 009 017
 019 011 007 003
 11280 11272 Z
;

: J
 192 224 144 136
 200 208 224 192
 11296 11288 Z
;

: *
 1500 0
 DO
 LOOP
;

: DRILL
 CLS 7 0
 DO
  16 0
  DO
   ." (Graphics A,C)"
  LOOP
  16 0
  DO
   ." (Graphics B,D)"
  LOOP
  CR
 LOOP
 BEGIN
  A B * C *
  D * E * F
  * G * H *
  I * J * H
  * G * F *
  E * D * C
  * B * A *
  0
 UNTIL
;
```

# Drawing the line . . .

***Calvin Woodings** explains the ins and outs of linear regression and correlation*

One of the most common forms of experiment involves measuring the response of a variable ($Y$) to changes, either deliberate or random, in a second variable ($X$). When the experiment is complete, the results are plotted on graph paper to see how the relationship between $X$ and $Y$ looks. Sometimes a straight line can be drawn through the plotted points, and this line can be used to deduce values of $Y$ from new and unmeasured values of $X$ and vice-versa.

Such lines are represented by the equation $Y=mX+c$ where '$m$' is a parameter expressing the slope of the line, and '$c$' is the value of $Y$ where the line crosses the $Y$ axis. All is simple and straightforward, so long as the plotted points form a reasonably straight run through which the line can be drawn without too much uncertainty. Unfortunately, in real-life situations there are all too many occasions where the plotted points appear more like frogspawn than a straight line and, as a consequence, there are real problems in deciding where to draw the line.

This program helps you to deal with all eventualities. Whether the data is good or bad it plots the points, and uses the least squares method to draw the best lines relating $X$ and $Y$. Two lines arise because, in cases where the correlation between $X$ and $Y$ is less than perfect, the best estimate of $Y$ from $X$ requires a different line from that giving the best estimate of $X$ from $Y$. These two lines are called the regression lines, and a full explanation of their derivation will be found in statistics textbooks.

Having drawn the two regression lines, the computer then prints out the two equations for these lines and the correlation coefficient for the data as a whole. You can estimate intermediate values of the variables, either from the lines by inspection, or from the equations by substitution. If you feel that the latter approach is more suited to your needs, you could easily add an additional procedure to request values of $X$ or $Y$ and print out the corresponding estimate of $Y$ or $X$ using the appropriate equation.

The illustration shows how the program presents its results. Actual points are given by the '+' signs. The best line for estimating $Y$ from $X$ is the bold line — the dotted line (or the fainter line if you don't have a monitor!) being the best line for estimating $X$ from $Y$. They intersect at a point which gives the mean values of the data.

The equations of the two regression lines contain the computed values for slope and intercept. These, along with the correlation coefficient, are printed out in whichever top corner is free of plotted points.

Looking further at the example graph, you can see that the scatter of results is quite large and that without the use of the least squares technique within the program the best lines would be difficult to draw. The negative correlation coefficient indicates that $Y$ (ie, the exam mark) decreases as $X$ (ie, hours viewed) increases. The value of 0.738 suggests a reasonable correlation, a value of 1.00 would have been perfect correlation, and a value of zero would have indicated no relationship.

If you wanted to know the most likely mark for a child who watched 300 hours tv in the final term, the answer would be $-0.102*300+88.2$ or 57.6 percent. The same deduction could have been made visually (and approximately) by reading off the $Y$ axis value corresponding to where the vertical from 300 on the $X$ axis cuts the bold ("*Y on X*" regression) line.

The other equation corresponds to the dotted regression line ("*X on Y*") and would be used if you knew the exam marks and wanted to deduce the hours of tv viewed.

The program only works for data which obeys the straight law ($Y=mX+c$). It will draw a line through points which are obviously better fitted by a curve, and under these circumstances the equations printed are meaningless. All is not lost, however. The data input routine will accept expressions, so you could re-enter the data using a function (logarithm, for instance) of $X$ to see if this improves linearity.

Before describing the program, and before irate students or teachers reach for their Letters-to-the-Editor pen, I should explain that the data used in the example graph is entirely fictitious, however plausible it may seem to some parents!

**Program notes**

The need to enter and edit pairs of data points means that some of the utility procedures are different from those used in the previous two programs (see *PCW*, issues 16 and 17). However, functions *'input'* and *'yes-no'*, along with procedures *'double-height'* and *'continue'*, are the same as before, despite a slightly space-saving change in appearance. These could be entered from tape if you have already typed one of the earlier programs.

The main routine at lines 50 to 160 is simply a series of questions, the responses to which determine the procedures to be called.

*Procanalysis* is used every time data has been entered or altered, and it works out the correlation coefficient ($r$) and the regression equations constants ($m$ and $c$ for "*Y on X*"; $m1$ and $c1$ for "*X on Y*") Along the way, it works out the means and standard deviations of the data to substitute in the equations given in lines 1070 to 1090. It also establishes the highest and lowest values of the data for scaling purposes (lines 940-1000).

*Procplot* draws the border (line 1140), the axes (line 1160), the points (lines 1170-1190), the bold regression line (lines 1200-1210) and the dotted regression line (lines 1220-1230), all using the false origin created by *Vdu29* at line 1150. It then calls *Proclabel* which labels the axes (lines 1270 to 1360), prints the equations (lines 1370-1400) and labels the graph (line 1410). The operation of the other procedures is fairly clear thanks to the BBC's ability to use long variable names in a well-structured layout.

Numerous extensions to the program are possible and, for my own use (no space restraints), I print out a second results page with the means, standard deviations, high and low values and the interpolation requests. I also call a machine code screen dump before finishing so that an attractive hard copy of the graph can be obtained quickly. ■

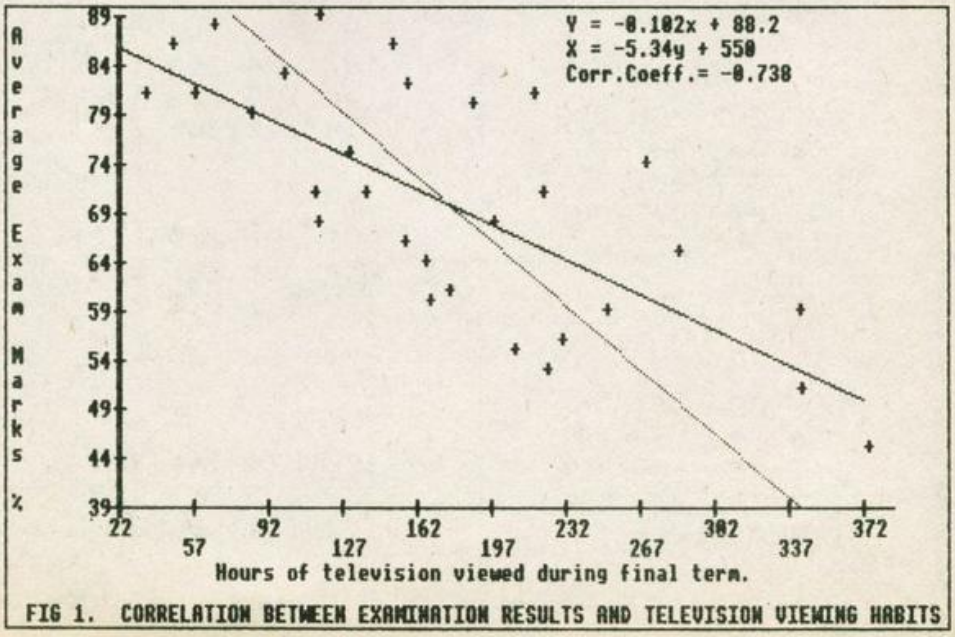


FIG 1. CORRELATION BETWEEN EXAMINATION RESULTS AND TELEVISION VIEWING HABITS

```
10   REM STATISTICS/LINEAR REGRESSION AND
     CORRELATION
20   REM (C) C.R.WOODINGS/APRIL 1983
30   REM FOR BBC MICRO MODEL B
50 DIMxdata(99),ydata(99):K=0:title$=""
60 MODE7:PROCtitle
70 REPEAT
80 MODE7:IF FNyes_no(5,10,"Start with fresh
   data") OR K=0 MODE1:PROCdataload
90 MODE7:IF FNyes_no(10,10,"See and edit")
   MODE1: PROCreview
100 PROCanalysis
110 MODE7:IF FNyes_no(7,10,"New graph titles")
   OR title$="" PROCgraph
120 CLS:IF FNyes_no(5,10,"Select the graph
   origin") PROCorigin
130 MODE0:PROCplot:REPEATUNTILGET
140 UNTIL NOT FNyes_no(12,VPOS+1,"Another run")
150 MODE7:PROCdouble_height(8,"BYE",132)
160 END
180 DEFPROCtitle
190   PROCdouble_height(8,"STATISTICS",132)
200   PROCdouble_height(12,"Linear Regression
      and Correlation",131)
210   PROCcontinue:ENDPROC
230 DEFPROCdouble_height(row,words$,colour)
240   column=INT((40-LEN(words$))/2)-2
250   FOR I=row TO row+1:PRINTTAB(column,I);
      CHR$141;CHR$colour;words$
260   NEXT:ENDPROC
280 DEFFNyes_no(x,y,A$)
290   LOCAL ans:PRINT:PRINTTAB(x,y);A$;"
      (Y/N) ? ";
300   REPEAT:ans=(GET AND &DF):UNTIL ans=&59
      OR ans=&4E:PRINTCHR$ans
310   =(CHR$ans="Y")
330 DEFPROCcontinue
340   PRINTTAB(7,23)"Press any key to continue
      ";:REPEATUNTILGET:ENDPROC
360 DEFPROCdataload
370   CLS:COLOUR 2:PRINTTAB(14,2)"DATA LOADING:
380   PRINTTAB(2,4)"Expressions are accepted:
      End with 00"
390   COLOUR 3:VDU28,0,31,39,6:K=1
400   PRINTTAB(11)"Max. no of pairs ";
410   array=VALFNinput(2,39,58):PRINT'
420   REPEAT
430   PRINTTAB(2);K;TAB(5,VPOS)"X=";
440   data$=FNinput(10,39,58):xdata(K)=
      EVAL data$
450   IF LEFT$(data$,2)="00" THEN 480
460   PRINTTAB(25,VPOS);"Y=";:data$=FNinput
      (10,39,58):ydata(K)=EVAL data$
470   K=K+1:PRINT
480   UNTIL LEFT$(data$,2)="00" OR K>array:
      K=K-1:ENDPROC
500 DEFFNinput(len,loASC,hiASC)
510   LOCAL K%,Z%:K%=0:In$="":PRINT"?";
      :REPEAT:Z%=GET
520   IF Z%=127 AND K%>0 THEN K%=K%-1:In$=LEFT
      $(In$,K%):VDUZ%
530   IF Z%>loASC AND K%<len AND Z%<hiASC THEN
      K%=K%+1:In$=In$+CHR$Z%:VDUZ%
540   UNTIL Z%=13 AND K%>0
550   =In$
570 DEFPROCreview
580   VDU26:CLS:COLOUR 2:PRINTTAB(14,2)
      "DATA EDITING:"
590   COLOUR 3:VDU28,0,31,39,6:L=0:M=0
600   REPEAT:CLS:FOR N=1 TO 10
610   IF N+L=K+1 THEN 640
620   PRINTTAB(2);N+L;TAB(5,VPOS)"X=";xdata
      (N+L);TAB(25,VPOS)"Y=";ydata(N+L)
630   NEXT
640   PRINTTAB(10,15)SPC150
650   IF FNyes_no(8,15,"Change an entry")
      PROCchange:GOTO640
660   L=L+10:UNTIL N+L-11=K
670   IF M>K THEN K=M
680   PRINTTAB(10,15)SPC150
690   IF FNyes_no(8,15," Another look   ")
      PROCreview
695   ENDPROC
710 DEFPROCchange
720   PRINTTAB(12,17)"Which pair ";:M=VAL
      FNinput(3,47,58)
730   PRINTTAB(2,18)"New X=";:xdata(M)=EVAL
      FNinput(10,39,58)
740   PRINTTAB(20,18)"New Y=";:ydata(M)=EVAL
      FNinput(10,39,58):ENDPROC
760 DEFPROCgraph
770   PROCdisplay(0,10,132,"Enter the graph
      title.(Up to 79 chars.)")
780   title$=FNinput(79,31,127)
790   PROCdisplay(2,10,132,"Enter X-axis label
      (Up to 60 chars.)")
800   xlabel$=FNinput(60,31,127)
810   PROCdisplay(2,10,132,"Enter Y-axis label
      .(Up to 20 chars.)")
820   ylabel$=FNinput(20,31,127):ENDPROC
840 DEFPROCdisplay(x,y,colour,A$)
850   CLS:PRINTTAB(x,y)CHR$colour;A$:
      PRINT:ENDPROC
870 DEFPROCorigin
880   PROCdisplay(2,10,130,"Enter X-axis
      origin.(X-axis units)")
890   xmin=VALFNinput(10,39,58)
900   PROCdisplay(2,10,130,"Enter Y-axis
      origin.(Y-axis units)")
910   ymin=VALFNinput(10,39,58):ENDPROC
930 DEFPROCanalysis
940   xsum=0:ysum=0:xmax=-1E37:ymax=-1E37
950   xmin=1E37:ymin=1E37:x2sum=0:x2sum=0:
      y2sum=0
960   FOR N=1 TO K
970   IF xdata(N)>xmax THEN xmax=xdata(N)
980   IF ydata(N)>ymax THEN ymax=ydata(N)
990   IF xdata(N)<xmin THEN xmin=xdata(N)
1000  IF ydata(N)<ymin THEN ymin=ydata(N)
1010  xsum=xsum+xdata(N):ysum=ysum+ydata(N)
1020  xysum=xysum+xdata(N)*ydata(N)
1030  x2sum=x2sum+xdata(N)^2:y2sum=y2sum+y
      data(N)^2
1040  NEXT
1050  xmean=xsum/K:ymean=ysum/K
1060  stdevx=SQR(x2sum/K-xmean^2):stdevy=
      SQR(y2sum/K-ymean^2)
1070  r=(xysum/K-xmean*ymean)/(stdevx*stdevy)
1080  m=r*(stdevy/stdevx):c=ymean-m*xmean
1090  m1=r*(stdevx/stdevy):c1=xmean-m1*ymean:
      ENDPROC
1110 DEFPROCplot
1120  VDU26,19,1,0;0;19,0,7;0;:CLS:@%=&307
1130  Yscale=800/(ymax-ymin):Xscale=1000/
      (xmax-xmin)
1140  MOVE4,4:DRAW4,1019:DRAW1275,1019:
      DRAW1275,4:DRAW4,4
1150  VDU29,160;200;5
1160  MOVE-4,-16:DRAW-4,800:MOVE0,800:DRAW0,
      -16:MOVE-20,0:DRAW1040,0
1170  FOR N=1 TO K
1180  MOVE (xdata(N)-xmin)*Xscale,(ydata(N)
      -ymin)*Yscale+16:PRINT"+"
1190  NEXT
1200  MOVE0,((xmin*m+c)-ymin)*Yscale
1210  DRAW(xmax-xmin)*Xscale,((xmax*m+c)-ymin)
      *Yscale
1220  MOVE((ymin*m1+c1)-xmin)*Xscale,0
1230  PLOT21,((ymax*m1+c1)-xmin)*Xscale,
      (ymax-ymin)*Yscale
1240  PROClabel:VDU4,31,0,5:@%=10:ENDPROC
1260 DEFPROClabel
1270  X%=0:pos=16:FOR N=0 TO 10:X%=N*100:Y%=
      N*80+28
1280  MOVEX%-8,12:PRINT"!"
1290  MOVEX%-16,-36+pos:PRINT;xmin+N*
      (xmax-xmin)/10:pos=-pos
1300  MOVE-8,Y%:PRINT"_":MOVE-124,Y%-14:
      PRINTymin+N*(ymax-ymin)/10
1310  NEXT
1320  D=LEN(xlabel$):E=INT(61-D)/2:MOVE
      E*16,-90:PRINTxlabel$
1330  D=LEN(ylabel$):E=INT(21-D)/2
1340  FOR N=1 TO D
1350  MOVE-148,(840-E*40)-N*40:PRINTMID$
      (ylabel$,N,1)
1360  NEXT
1370  q=SGN(r):REM DECIDES ON PRINTOUT
      POSTION
1380  MOVE350-(q*250),800:PRINT"Y = ";m;"x
      + ";c
1390  MOVE350-(q*250),760:PRINT"X = ";m1;"y
      + ";c1
1400  MOVE350-(q*250),720:PRINT"Corr.Coeff.
      = ";r
1410  VDU26:D=LEN(title$):E=INT(81-D)/2:MOVE
      E*16,40:PRINTtitle$:ENDPROC
```

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## the DRAGON 32 Word Processor

**TELEWRITER**

Telewriter is the powerful word processor designed specifically for the DRAGON 32 Computer. It can handle almost any serious writing job and is extremely easy to use. It has all the advanced features you need to create, edit, store, format and print any kind of text. With Telewriter you can quickly produce perfect, finished copy for letters, reports, term papers, articles, technical documentation, stories, novels, screenplays, newsletters. It is also a flexible and efficient way to take notes or organize ideas and plans.

**51 × 24 DISPLAY**

The DRAGON 32 is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required.** By using software alone, Telewriter creates a new character set that has **real lower case letters,** and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the DRAGON 32's standard display.

**FULL SCREEN EDITOR**

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, and beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

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The RAINBOW, Jan. 1982

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**Requires absolutely no hardware modifications**
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key, tells you how much space you have left in memory, and warns you when the buffer is full.

**FORMAT FEATURES**

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins, line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in text.

Telewriter will automatically number A4 pages (if you want) and centre lines. It can chain print any number of text files from cassette without user intervention. You can tell it to start a new page anywhere in the text or pause at the bottom of the page.

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with any printer (Tandy, Seikosha, MX-80, Okidata, NEC 8023, C. Itoh 8510, Centronics, GE Terminet, Smith Corona TP-1, etc.). There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

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To move the cursor, press the appropriate arrow key, which causes the cursor to flash. With this key held down, press a number from 1-9 to select the cursor speed. Now the cursor will move in the chosen direction at this speed as long as the arrow key is depressed.

Line 10 sets up the arrays for the cursor and picture, while lines 20-50 draw the cursor. Line 60 *Get*s the cursor into array *C* and lines 70-120 draw the random picture.

Line 510 *Get*s the picture in array *D*, where the cursor is to be, and line 520 *Put*s the cursor on to this part of the picture. The speed of the cursor is set by line 540 while line 550 detects which arrow key is pressed.

Lines 570-630 check that the cursor will not move off the screen and set the direction variables *A* or *B*. Line 640 *Put*s the picture back where the cursor is and line 650 moves the cursor.

**Variables**

C(6,6)=cursor
I=loop variable
A=x cursor increment
D(6,6)=picture
S= speed of cursor
Y=y cursor co-ordinate
B=y cursor increment ■

PROGRAM LISTING

```
2   REM************************
3   REM*** HIGH RES CURSOR ***
4   REM*** A.N.EDWARDS '83 ***
5   REM************************
10  DIM C(6,6),D(6,6)
20  PMODE 4,1:PCLS
30  LINE(0,0)-(6,6),PSET
40  LINE(0,6)-(6,0),PSET
50  RESET(3,3)
60  GET(0,0)-(6,6),C,G
70  PCLS:SCREEN 1,0
80  FOR L=1 TO 5
90  LINE(RND(255),RND(191))-(RND(255),RND(191)),PSET
100 LINE(RND(255),RND(191))-(RND(255),RND(191)),PSET,B
110 CIRCLE(RND(255),RND(191)),RND(50)
120 NEXT L
500 X=125:Y=93
510 GET(X;Y)-(X+6,Y+6),D,G
520 PUT(X,Y)-(X+6,Y+6),C,OR
530 FOR L=0 TO 3
540 Q$=INKEY$:IF Q$<>"" THEN S=VAL(Q$)
550 IF PEEK(L+341)=223 THEN ON L+1 GOTO 570,590,610,630
560 NEXT L:GOTO 530
570 IF Y>S-1 THEN B=-S
580 GOTO 640
590 IF Y<185-S THEN B=S
600 GOTO 640
610 IF X>S-1 THEN A=-S
620 GOTO 640
630 IF X<249-S THEN A=S
640 PUT(X,Y)-(X+6,Y+6),D,PSET
650 X=X+A:Y=Y+B:A=0:B=0
660 GOTO 510
```

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**_Open Forum_ is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published.**

## Digits

### on ZX81

It is a mathematical fact, though not widely known, that if a multi-digit number has its digits scrambled — and then the resultant number subtracted from the original, the remainder is always divisible by 9.

This program which just fits into 1K demonstrates this fact and at the same time illustrates some uses of the functions *"Inkey$"*, *"Str$"*, *"Val"*, *"Abs"*, *"Int"* plus ZX81 string slicing and concatenation.

**Program notes**

*"Input"* in Line 10 is the keyword. The Time Delay at Lines 12-13 is to give you time to get your finger off the *"Newline"* key before the *"Inkey$"* function returns an error code C/20. Think about it! Replacing this with "12 *Pause* 5" gives a screen flicker to emphasise the prompt.

Line 40 generates a random number with the number of digits specified in Line 20. Line 50 ensures that it does contain the full number of digits.

Line 70 converts the number to a string which is then sliced and scrambled in the loop 90-120 while the subroutine at 300 converts the string variable back into a numeric and performs the arithmetic. The use of *Abs* in Line 300 ensures that if the scrambled number comes out larger than the original we don't get a negative result. The counter C and line 200 just allow the ZX81 to tell you "I told you so!"

This program only just fits into 1K and tends to run out of memory if numbers with over 6 digits are specified. If this annoys you delete Lines 11, 200, 330. Numbers with more than 7 digits make the screen display untidy, but you can't do much about this in 1K. If you want to try numbers with more than 9 digits delete Line 15 and change Line 20 to *"Input* N".

```
 10 PRINT " INPUT NO. OF
    DIGITS";
 11 LET C=0
 12 FOR T=1 TO 10
 13 NEXT T
 15 IF INKEY$="" THEN GOTO 12
 20 LET N=VAL INKEY$
 30 PRINT " - ";N;;;
 40 LET A=INT (RND*10**N)+1
 50 IF A<10**(N-1) THEN GOTO
    40
 60 PRINT A;
 70 LET A$=STR$ A
 80 LET L=LEN A$
 90 FOR I=1 TO L-1
100 LET A$=A$(2 TO )+A$( TO 1)
110 GOSUB 300
120 NEXT I
200 IF C=L-1 THEN PRINT AT
    20,5;"INTEGER DIVISION"
210 FOR T=1 TO 200
211 NEXT T
220 CLS
230 GOTO 10
300 LET X=ABS (A-VAL A$)
310 PRINT TAB L;"-";A$;"=";
    X;"/9=";X/9
320 PRINT
330 IF X/9=INT X/9 THEN
    LET C=C+1
350 RETURN
```

**Digits**
*by John Priest*

## Mirror Graphics

### on Spectrum

A graphics utility program allowing user-defined graphics on the 16K or 48K Spectrum to be easily manipulated. It is possible to mirror, invert or rotate characters at the touch of a button.

First, find the copy of the Horizons tape that came with your Spectrum, and blow the dust off it. Wind it on to near the end of side B and type *Load*"character" *(Enter)*. Once the program has loaded break into it and type in the lines as on the computer printout. It should now be possible simply to enter "m", "i" or "r" when prompted to change any of the user-defined graphics. To save the program simply type *"Goto* 9000" and the rest is done for you.

The user-defined graphics character is inversed simply by *Peek*ing the eighth decimal number which makes up each character, and *Poke*ing 255-that number. The mirrored character is produced by calculating the binary value of the *Peek*ed number and working out the decimal equivalent if the number were reversed; ie, 10011111 becomes 11111001. Rotation of the character is done by calculating the binary values as above which are then stored in a string. Every eighth character is sliced from the string, the decimal value calculated which is *Poke*d into the user-defined graphics area.

Due to lack of memory in the 16K Spectrum, it may be necessary to delete the *Rem* statements and some of the instructions.

```
1460>PRINT "M to mirror characte
r"
1470 PRINT "I to inverse charact
er"
1480 PRINT "R to rotate characte
r"
1560>IF k$="r" THEN GO SUB 9800
1570 IF k$="m" THEN GO SUB 9700
1580 IF k$="i" THEN GO SUB 9600
9600>REM Inverse character
9610 LET d$="inversed": GO SUB 9
900
9620 FOR r=USR c$ TO USR c$+7
9630 POKE r,255-PEEK r: NEXT r
9640 GO SUB 9950: RETURN
9700 REM Mirror character
9710 LET d$="mirrored": GO SUB 9
900
9720 FOR u=USR c$ TO USR c$+7: L
ET total=0: LET o=128: LET h=1
9730 LET g=PEEK u
9740 FOR v=0 TO 7
9750 IF g/o>=1 THEN LET total=to
tal+h: LET g=g-o
9760 LET o=o/2: LET h=h*2
9770 NEXT v: POKE u,total: NEXT
u
9780 GO SUB 9950: RETURN
9800 REM Rotated character
9810 LET d$="rotated": GO SUB 99
00
9820 LET h$=""
9830 FOR u=USR c$ TO USR c$+7: L
ET o=128
9840 LET g=PEEK u
9850 FOR v=0 TO 7
9860 IF g/o>=1 THEN LET h$=h$+"1
": LET g=g-o: LET o=o/2: NEXT v:
 NEXT u
9870 LET h$=h$+"0": LET o=o/2: N
EXT v: NEXT u
9872 FOR u=0 TO 7
9873 POKE USR c$+u,VAL h$(1+u)+2
*VAL h$(9+u)+4*VAL h$(17+u)+8*VA
L h$(25+u)+16*VAL h$(33+u)+32*VA
L h$(41+u)+64*VAL h$(49+u)+128*V
AL h$(57+u)
9874 NEXT u
9899 GO TO 9950
9900 INPUT "Which letter to be "
;(d$);"?"; LINE c$
9910 IF c$<"a" OR c$>"u" OR LEN
c$>1 THEN GO TO 9900
9920 RETURN
9950 PRINT AT 1,0;: GO SUB 6070:
 RETURN
```

**Mirror Graphics**
*by N Osborn*

## Snake Island

### on BBC Micro

The program is called Snake Island and runs in 32K without any additional hardware. Therefore, it will work on any Model B or Model A with 32K. Before describing how the program works, I will give a short description of the game.

You, the player, take control of a man trapped on a small island. Do not worry, you are not alone. You are accompanied by a horde of hungry, man-eating snakes. Also scattered about the island are a number of deadly pits. The idea of the game is for you to try to live as long as possible. The best way to do this is to avoid being eaten by the snakes and avoid falling down a pit.

The only way for you to kill a snake is to lure it into a pit, using yourself as bait! Most pits are only big enough to hold one snake, so do not go skulking behind a single pit hoping to live. The snakes have a very keen sense of smell, and will always try to move towards you, but they are not very intelligent. Most of them are easily lured into a pit, but you will get an occasional intelligent one which realises there is a large hole in between itself and you.

To make the game more interesting, there are also a number of snake eggs scattered around the island. These will spasmodically change into a snake during the game, catching you by surprise. The only way to avoid the reappearance of these extra snakes is to trample the eggs while you can. 10 points per level are gained for each snake eliminated and 25 points per level for every egg "scrambled".

After clearing the screen of snakes, another is put up with even more of them. You start off with three men, but you quickly lose them. The control keys used are as follows:

W for up
X for down
A for left
D for right

It is possible to get diagonal movement by pressing a combination of the Basic Keys at the same time. To help you I will give you one hint. Try to get the eggs as quickly as possible, otherwise they have the annoying habit of changing just as you are about to run over them.

**Line(s)**

| | |
|---|---|
| 30-70 | Reset high score table |
| 90-150 | Display high scores |
| 160 | Clear keyboard buffer |
| 170-240 | Ask whether instructions are needed |
| 250-550 | Print instructions in double height |
| 560 | Set number of men left to 3 |
| 570 | 16 colour mode 20 x 32 text |
| 580 | Make cursor invisible |
| 590 | Define snake |
| 600 | Define man |
| 610 | Define pit |
| 620 | Define egg |
| 630 | What character is under cursor, routine (NB change £ to #) |
| 640 | Number of pits |
| 650 | Number of snakes |
| 690 | Set up screen |
| 700-750 | Your move |
| 760-790 | Have you hit anything? |
| 800-830 | Are the eggs ready to change yet? |
| 840-1010 | Move snakes |
| 1030-1520 | Set up screen |
| 1530-1560 | Read Character at x, y position |
| 1570-1640 | A snake has died |
| 1650-1760 | You have died |
| 1770-1810 | Print your score |
| 1820-1860 | Is your score good enough to be put in the high score table? |
| 1870-1900 | Play again |
| 1910-1970 | Error in program |
| 1980-2010 | Print in double height |
| 2020-2200 | Put your name in high score table |
| 2210-2300 | You have run over an egg |
| 2310-2420 | An egg has changed into a snake |

PROGRAM OF THE WEEK

```
  0 REM
  1 REM SNAKE ISLAND
  2 REM
  3 REM by J.R.Wilson
  4 REM
 10 DIM X(10),Y(10),O% 10,M(10),N(10),T(10)
 20 X=1:Y=10
 30 H%=2560
 40 N%=2600
 50 FOR I=0 TO 4
 60 IF VAL($(H%+I*7))=0 THEN $(H%+I*7)="
    000000":$(N%+I*20)="****************
 70 NEXT
 80 ON ERROR GOTO 1910
 90 MODE7
100 PRINT ''''
110 PROCL("Todays top five:")
120 FOR I =0 TO 4
130PRINT
140 PROCL("    "+$(H%+I*7)+"    "+$(N%+I*20))
150 NEXT
160 *FX15,1
170 A=INKEY(300)
180 CLS
190 PRINT TAB(0,10)
200 PROCL("Do you want instructions?")
210 A$=GET$
220 IF A$="Y" THEN 250
230 IF A$="N" THEN 560
240 GOTO 210
250 CLS
260 PRINT '
270 PROCL(CHR$136+CHR$132+CHR$157+CHR$134+"
    S N A K E   I S L A N D")
280 PRINT
290 PROCL("   You are trapped on an island ")
300 PROCL("surrounded by snakes and pits. You")
310 PROCL("must try to stay alive as long as")
320 PROCL("possible by killing the snakes.
          The ")
330 PROCL("only way you can do this is to
          lure")
340 PROCL("them into the pits.")
350 PROCL("Unfortunately,only one snake will
          fit")
360 PROCL("in a pit.")
370 PRINT
380 PROCL("Press the"+CHR$136+"SPACE BAR"+
        CHR$137+"to continue.")
390 REPEAT UNTIL GET$=" "
400 CLS
410 PRINT
420 PROCL("   To move your man,you use the")
430 PROCL("following control keys:")
440 PRINT
450 PROCL("       W for up")
460 PROCL("       X for down")
470 PROCL("       A for left")
480 PROCL("       D for right.")
490 PRINT
500 PROCL("Bonus points can be gained br
          crushing")
510 PROCL("the eggs. Don't take too long as
          they")
520 PROCL("change into snakes.")
530 PRINT
540 PROCL("Press the"+CHR$136+"SPACE BAR"+
        CHR$137+"to start.")
550 REPEAT UNTIL GET$=" "
560 BLOKE=3
570 MODE 2
580 VDU 23;8202;0;0;0;
590 VDU 23,224,0,0,128,72,84,85,34,0
600 VDU 23,225,24,24,60,90,24,60,36,36
610 VDU 23,226,255,129,129,129,129,129,
      129,255
620 VDU 23,227,0,0,0,24,24,0,0,0
630 P%=0%:[OPT 0:LDA£135:JSR&FFF4:STX&70:RTS:]
640 TRAPS=20
650 SNAKES=10
660 SC=0
670 L%=0
680 W%=0
690 PROCscreen
700 PRINT TAB(X,Y);" ";
710 PRINT TAB(2,2);"SCORE = ";SC
720 IF INKEY(-66) AND X>1 THEN X=X-1
730 IF INKEY(-51) AND X<18 THEN X=X+1
740 IF INKEY(-34) AND Y>5 THEN Y=Y-1
750 IF INKEY(-67) AND Y<30 THEN Y=Y+1
760 IF FNP(X,Y)=224 OR ?&70=226 THEN PROCend
770 COLOUR 7
780 IF ?&70=227 THEN PROCsquashegg
790 PRINT TAB(X,Y);CHR$225;
800 E%=E%+1:IF E%>EGGS THEN E%=0
810 IF T(E%)=0 THEN PROCchange
820 T(E%)=T(E%)-1
830 IF T(E%)=-1 THEN SOUND 3,17,200,2
840 COLOUR 6
```

```
 850 L%=L%+1
 860 IF L%>SNAKES THEN L%=0
 870 IF Y(L%)=-1 THEN 850
 880 IF RND(5)=1 THEN 700
 890 PRINT TAB(X(L%),Y(L%));" ";
 900 A=0:B=0
 910 IF X(L%)>X THEN A=-1
 920 IF X(L%)<X THEN A=1
 930 IF Y(L%)>Y THEN B=-1
 940 IF Y(L%)<Y THEN B=1
 950 IF FNP(X(L%)+A,Y(L%)+B)=226 AND RND(5)=1
     THEN A=0:B=0
 960 IF ?&70=224 OR ?&70=227 THEN A=0:B=0
 970 X(L%)=X(L%)+A
 980 Y(L%)=Y(L%)+B
 990 IF ?&70=225 THEN PROCend
1000 IF ?&70=226 THEN PROCsnuffit:GOTO 700
1010 PRINT TAB(X(L%),Y(L%));CHR$224;
1020 GOTO 700
1030 DEF PROCscreen
1040 X1=X:Y1=Y
1050 TRAPS=TRAPS-1
1060 EGGS=RND(8)+2
1070 IF TRAPS<SNAKES+EGGS THEN
     TRAPS=SNAKES+EGGS
1080 W%=W%+1
1090 LEFT=SNAKES+1
1100 COLOUR 130
1110 CLS
1120 COLOUR 132
1130 VDU 28,1,30,18,5
1140 CLS
1150 VDU 26
1160 COLOUR 1
1170 FOR I=0 TO TRAPS
1180 X=RND(18)
1190 Y=RND(24)+5
1200 IF FNP(X,Y)<>32 THEN 1180
1210 IF X=X1 AND Y=Y1 THEN 1180
1220 PRINT TAB(X,Y);CHR$226;
1230 NEXT
1240 COLOUR 6
1250 FOR I=0 TO SNAKES
1260 X=RND(18)
1270 Y=RND(24)+5
1280 IF FNP(X,Y)<>32 THEN 1260
1290 IF X=X1 AND Y=Y1 THEN 1260
1300 PRINT TAB(X,Y);CHR$224;
1310 X(I)=X
1320 Y(I)=Y
1330 NEXT
1340 FOR I=0 TO EGGS
1350 X=RND(18)
1360 Y=RND(24)+5
1370 T(I)=RND(5)+5
1380 IF FNP(X,Y)<>32 THEN 1350
1390 IF X=X1 AND Y=Y1 THEN 1350
1400 M(I)=X:N(I)=Y
1410 PRINT TAB(X,Y);CHR$227
1420 NEXT
1430 E%=0
1440 COLOUR 7
1450 X=X1
1460 Y=Y1
1470 IF FNP(X,Y)<>32 THEN 1450
1480 PRINT TAB(X,Y);CHR$225;
1490 PRINT TAB(1,2);"SPACE to start."
1500 REPEAT UNTIL GET$=" "
1510 PRINT TAB(1,2);"                "
1520 ENDPROC
1530 DEF FNP(A,B)
1540 PRINT TAB(A,B);
1550 CALL 0%
1560 =?&70
1570 DEF PROCsnuffit
1580 SOUND 0,17,6,3
1590 PRINT TAB(X(L%),Y(L%));" ";
1600 Y(L%)=-1
1610 LEFT=LEFT-1
1620 SC=SC+W%*10
1630 IF LEFT=0 THEN PROCscreen
1640 ENDPROC
1650 DEF PROCend
1660 PRINT TAB(X-1,Y-1);"\!/"
1670 PRINT TAB(X-1,Y);"-X-"
1680 PRINT TAB(X-1,Y+1);"/!\";
1690 *FX15,1
1700 SOUND 0,17,6,10
1710 SOUND 0,17,5,10
1720 FOR I=0 TO 3000:NEXT
1730 W%=W%-1
1740 TRAPS=TRAPS+1
1750 BLOKE=BLOKE-1
1760 IF BLOKE>0 THEN PROCscreen:ENDPROC
1770 VDU 22,7
1780 PRINT ''''
1790 PROCL("Your score = "+STR$SC)
1800 FOR I=0 TO 3000:NEXT
1810 CLS
1820 FL=-1
1830 FOR I=4 TO 0 STEP-1
1840 IF SC>VAL($(H%+I*7)) THEN FL=I
1850 NEXT
1860 IF FL>=0 THEN PROChighscore
1870 PRINT TAB(0,10)
1880 PROCL("Press the"+CHR$136+"SPACE BAR"+
     CHR$137+"to play again.")
1890 REPEAT UNTIL GET$=" "
1900 RUN
1910 IF ERR=17 THEN RUN
1920 IF ERR=25 THEN GOTO ERL
1930 MODE7
1940 REPORT
1950 PRINT " in line ";ERL
1960 *FX15,1
1970 END
1980 DEF PROCL(A$)
1990 PRINT CHR$141;A$
2000 PRINT CHR$141;A$
2010 ENDPROC
2020 DEF PROChighscore
2030 PRINT '''
2040 PROCL("This is one of the highest")
2050 PROCL("scores today. Please enter
     your name.")
2060 *FX15,1
2070 PROCL("Max length 18 letters.")
2080 PRINT '''
2090 INPUT A$
2100 IF LEN A$>18 THEN CLS:GOTO 2030
2110 FOR I=3 TO FL STEP -1
2120 $(H%+I*7+7)=$(H%+I*7)
2130 $(N%+I*20+20)=$(N%+I*20)
2140 NEXT
2150 $(N%+FL*20)=A$
2160 SC$=STR$SC
2170 IF LEN SC$<6 THEN SC$="0"+SC$:GOTO 2170
2180 $(H%+FL*7)=SC$
2190 CLS
2200 ENDPROC
2210 DEF PROCsquashegg
2220 FL=-1
2230 FOR I=0 TO EGGS
2240 IF X=M(I) AND Y=N(I) THEN FL=I
2250 NEXT
2260 IF FL=-1 THEN ENDPROC
2270 SOUND 0,17,5,2
2280 T(FL)=-1
2290 SC=SC+W%*25
2300 ENDPROC
2310 DEF PROCchange
2320 FL=-1
2330 FOR I=0 TO SNAKES
2340 IF Y(I)=-1 THEN FL=I
2350 NEXT
2360 IF FL=-1 THEN T(E%)=RND(5)+5:ENDPROC
2370 Y(FL)=N(E%)
2380 X(FL)=M(E%)
2390 SOUND 2,17,100,2
2400 LEFT=LEFT+1
2410 PRINT TAB(X(FL),Y(FL));CHR$224;
2420 ENDPROC
```

**Snake Island**
*by J Wilson*

# OPEN FORUM

## Polynomial

on Vic20

This program for the unexpanded Vic could be very useful to students. It analyses a polynomial function (quadratic equation) entered by the user. He is given the roots (if discriminant >0), the variations of the function, its derivative and the summit of the graph.

**Lines**

| | |
|---|---|
| 1-100 | Presentation |
| 102 | Enter function |
| 104 | Reminds you of your choice |
| 110-287 | Results |
| 1000 | To enter F(x) |
| 2000 | Calculate roots |
| 10000 | Wait for key press |
| 20000 | Print top of the screen |

```
1 rem ***************
2 rem * Polynomial *
4 rem *     by      *
6 rem * cyril aubry*
7 rem ***************
8 rem *January 1983*
9 rem ***************
10 dimt(3,10),tb(4)
40 Print"■"
50 Printchr$(14)
100 n=2
102 gosub1000
103 t(3,4)=n:t(3,5)=p:t(1,6)=o
104 Print"■Here are the coeff.
    ofthe Polynomial."
105 fori=n+1tolsteP-1:Printt(1,i);:next
110 gosub10010
111 e=0
112 gosub20000
113 ifP=0thenPrint"■P(x)<>P(-x)<>-P(-x)"
115 ifP=2thenPrint"P(x)=P(-x)"
116 ifd<0thenPrint"■■No roots !!":
    Print"DELTA=";d:goto122
117 Print"■Its roots are:":Print"
    ■";r1:ifr1=r2thenPrint"■(double root)
    ":goto122
118 Print"and■";r2
122 gosub10010:gosub20000:Print"■Limits:";
124 ift(1,3)>0thench$="+":r$="+":goto126
125 ch$="-":r$="-":goto126
126 Print"■";r$;"inf->";ch$;"inf"
128 Print"■■■Derivative of P:"
129 forx=2tolsteP-1:Printt(2,x);:next
130 gosub10010
132 ifm=1thenPrint"■That derivative has
    a unique root"
200 gosub20000:Print"■    ■Properties of"
    :Print"    ■the graPh    :"
201 Print"■■The graPh admits only one
    summit."
202 x=-b/a:x=x/2:x=int(100*x)/100
203 Print"S("x","a*x↑2+b*x+c")"
280 gosub10010:gosub20000
287 end
1000 :
1001 gosub 20000
1002 Print"■Quadratic equation":Print"■"
1003 forde9=0ton
1004 Print"x";de9"term";:inPutt(1,de9+1)
1005 nextde9
1006 ift(1,3)=0thengoto1003
1007 gosub2000:gosub20000:t(3,6)=0
1011 t(1,6)=0
1012 ift(1,2)=0thenP=2
1014 forJ=nto1steP-1:t(2,J)=(n+1-J)*t
    (1,J):next
1015 ift(2,2)=0thenP=2
1016 t(2,6)=1:t(2,7)=-t(2,2)/t(2,1):t(3,4)
    =n:t(3,5)=P
1032 return
2000 b=t(1,2):a=t(1,3):c=t(1,1)
2001 d=b*b-4*a*c:ifd<0thenreturn
2003 r1=(-b-sqr(d))/(2*a):r2=(-b+sqr(d))
    /(2*a)
2004 return
10010 Print"■":forx=1to8:Print"■":next:
    PrintsPc(17)"--->"
10011 geta$:ifa$=""then10011
10012 return
20000 Print"■■ Study of a quadratic ";
    :Print"■       equation       ■"
20002 return
```

**Polynomial**
*by Cyril Aubry*

## Multiply

on Dragon

This is written for the Dragon 32 and is an interesting example of a conversational program.

You are given a choice of ten addition or multiplication questions. If you answer the sum correctly, you are rewarded with a suitable sound. If it is wrong, you are given a low note and the correct answer is displayed.

Your score out of ten is shown at the end of the game, and if you are fortunate enough to get ten out of ten, you are rewarded with an interesting graphic display.

```
1 '*******************
2 '****DRAGMATHS*****
3 '****COPYRIGHT*****
4 '**B & M SOFTWARE**
5 '*******************
10 CLS5
20 T=10
30 Q=0
40 GOSUB180
50 CLS5
60 PRINT@10,"'DRAGMATHS'";
70 A=RND(15)
80 B=RND(15)
90 T=T-1
100 PRINT@98,"WHAT IS:-";A;"TIMES:-";B;
110 INPUTC
120 SOUND150,1:FORN=1TO600:NEXT
130 IFC=(A*B)THENQ=Q+1
140 IFQ=10THEN480
150 IFT=0THEN420
160 IFC=(A*B)THENPRINT@331,"'CORRECT'";:FORN=
    10TO210STEP20:SOUNDN,1:NEXT:FORS=1TO2000:
    NEXT:GOTO50
170 IFC()(A*B)THENPRINT@332,"'WRONG'";:SOUND1,
    15:PRINT@423,"THE ANSWER IS";(A*B);:FORM=1
    TO2000:NEXT:GOTO50
180 PRINT@42,"'DRAGMATHS'";:PRINT@101,"(C)
    1983 B & M SOFTWARE";:PRINT@170,
    "INTRUCTIONS";:PRINT@224,"  THE AIM IS TO
     ANSWER THE 10     QUESTIONS AS THEY APPEAR
     ON     THE SCREEN.
190 PRINT@422,"HIT A KEY TO CONTINUE";
200 PLAY"T803CL2FL4FAFA04L1CL2O3CL2FL4FAFA04C"
210 IFINKEY$=""THEN210
220 SOUND150,1
230 CLS5
240 PRINT@10,"'DRAGMATHS'";:PRINT@132,"SELECT
    YOUR PREFERENCE";:PRINT@229,"M:-
    MULTIPLICATION";:PRINT@293,"A:- ADDITION";
250 I$=INKEY$:IFI$=""THEN250ELSEI=ASC(I$)
```

```
260 IFI=77THENSOUND150,1:RETURN
270 IFI=65THENSOUND150,1:GOTO280
280 CLS5
290 PRINT@10,"'DRAGMATHS'";
300 C=RND(40)
310 D=RND(40)
320 E=RND(40)
330 T=T-1
340 PRINT@98,"WHAT IS:-";C;"+";D;"+";E;
350 INPUTG
360 SOUND150,1:FORN=1TO600:NEXT
370 IFG=(C+D+E)THENQ=Q+1
380 IFQ=10THEN480
390 IFT=0THEN420
400 IFG=(C+D+E)THENPRINT@331,"'CORRECT'";:
    FORN=10TO210STEP20:SOUNDN,1:NEXT:FORS=
    1TO2000:NEXT:GOTO280
410 IFG()(C+D+E)THENPRINT@332,"'WRONG'";:
    SOUND1,15:PRINT@423,"THE ANSWER IS";(C+D+E);
    :FORM=1TO2000:NEXT:GOTO280
420 CLS5
430 PRINT@163,"YOUR SCORE IS";Q;"OUT OF 10";
440 PRINT@327,"ANOTHER GO (Y/N)?";
450 Z$=INKEY$:IFZ$=""THEN450ELSEZ=ASC(Z$)
460 IFZ=89THEN10
470 IFZ=78THEN670
480 FORK=1TO8
490 A=RND(8)
500 PRINT@167,"CONGRATULATIONS";:PRINT@226,
    "YOUR SCORE IS 10 OUT OF 10";
510 FORN=1TO250:NEXT
520 CLSA:SOUND200,1
530 NEXT
540 POKE&HFFD7,0
550 PMODE4,1:PCLS:SCREEN1,1
560 FORX=0TO255STEP2
570 LINE(128,98)-(0,X),PSET
580 LINE(128,98)-(X,0),PSET
590 LINE(128,98)-(255,X),PSET
600 LINE(128,98)-(X,255),PSET
610 SOUND200,1
620 NEXT
630 POKE&HFFD6,0
640 FORN=1TO1000
650 NEXTN
660 GOTO420
670 CLS5
680 PRINT@166,"THANKS FOR PLAYING";
    :PRINT@235,"GOODBYE";
690 GOTO690
```

**Multiply**
*by Brian and Martin Bond*

# Apples

## on Spectrum

The basic object of the game is to catch apples thrown over the orchard wall by Sid Spectrum. Every 15 apples caught will cause Sid to place a plank under you, thus giving you less time to catch the apples.

**Variable**

| | |
|---|---|
| A | Dummy |
| B | Dummy |
| Demo | Demonstration flag |
| CA | Apples caught |
| DR | Apples dropped |
| X,Y | Clive's co-ordinates |
| Y1 | Dummy |
| AX,AY | Apple's co-ordinates |

**Lines**

| | |
|---|---|
| 10 | Set up colours |
| 20 | Set up UDGs |
| 30-50 | Instructions |
| 60-220 | Set up and start |
| 230-340 | Main game loop |
| 350 | Apple caught |
| 360-390 | Plank |
| 400-410 | Apple dropped |
| 420-520 | Game end |
| 530-650 | Graphics |
| 660 | Save |

```
  10 PAPER 0: INK 7: POKE 23609,
30: POKE 23562,1: POKE 23658,8:
FLASH 0: BRIGHT 0: OVER 0: INVER
SE 0: CLS : BORDER 0: INPUT ""
  20 FOR A=0 TO 119: READ B: POK
E USR "A"+A,B: NEXT A
  30 CLS : PRINT PAPER 3;"
     SCRUMPING", PAPER 0''" Cupi
d Clive and Sid Spectrus"''"have
 a great lust for apples and"''"
are always raiding the local"''"
orchard."''" A new wall has been
 built"''"around the orchard rec
ently, but"''"a fast growing ivy
 has grown up"''"the wall.......
"
  40 PRINT '" Key 1 moves Clive
left"''" Key 0 moves Clive right
"
  50 PRINT #0;AT 1,0; PAPER 7; I
NK 2;"    PRESS ANY KEY TO CONTIN
UE",
  60 LET DEMO=0
  70 FOR A=1 TO 3000: IF INKEY$<
>"" THEN GO TO 90
  80 NEXT A: LET DEMO=1
  90 CLS : PRINT PAPER 5,,,,,,,,
"
": FOR A=0 TO 15: PRINT INK 2;
PAPER 7;"AAAAAAAAAAAAAAAAAAAAAAAA
AAAAAAAAAA": NEXT A: PRINT PAPER
4,,
 100 IF DEMO THEN PRINT AT 1,12;
 INK 0; PAPER 5; FLASH 1;" DEMO
"
 110 INK 4: FOR A=8 TO 135: PLOT
 0,A: DRAW RND*16+16,0: PLOT 255
,A: DRAW -RND*16-16,0: BEEP .001
,A*.5: NEXT A: INK 7
 120 PRINT AT 19,0; PAPER 4; INK
 0;"  "'"  "; INK 6; PAPER 2;AT
18,15;"  ";AT 19,15; INK 7;"  ";
AT 20,15;"  "
 130 PRINT #0;AT 0,0; PAPER 1;"H
EY SID, WHY DON'T YOU CLIMB    O
VER THE ORCHARD WALL?",: BEEP .6
,-10: BEEP .2,-6: BEEP .4,-7: BE
EP .4,-10: BEEP 1.6,-4
 140 PRINT #0;AT 0,0; PAPER 1;"O
K. YOU USE THE BASKET TO CATCH T
HE APPLES AS I THROW THEM OVER "
: BEEP .6,-3: BEEP .6,-5: BEEP .
6,-7: BEEP .6,-8: BEEP 1.2,-10
 150 INPUT "": FOR A=18 TO 5 STE
P -1: PRINT AT A,0; PAPER 4; INK
 0;"  "'"  ";: BEEP .05,30-A
: BEEP .05,-A: NEXT A
 160 PRINT AT 4,0; PAPER 5; INK
0;"  "' PAPER 4;"  "'"  ";: BEEP
.05,26: BEEP .05,-4: PRINT AT 3,
0; PAPER 5; INK 0;"  "'"  "' PAP
ER 4;"  ": BEEP .05,27: BEEP .05
,-3
 170 PRINT AT 3,0; PAPER 5;"  "'
 INK 0;"  ": BEEP .05,26: BEEP .
05,-4: PRINT AT 4,0; PAPER 5;"
"
 180 FOR A=5 TO 18: BEEP .05,30-
A: BEEP .05,-A: NEXT A
 190 IF DEMO THEN PRINT AT 3,5;
PAPER 5; INK 0;"PRESS ANY KEY TO
 PLAY"
 200 LET CA=0: LET DR=0: LET X=1
8: LET Y=15
 210 PRINT #0; PAPER 1;"G E T
R E A D Y   ! ! !",: FOR A=0 TO
300: NEXT A: INPUT ""
 220 LET AX=5: LET AY=INT (RND*2
2)+5: PRINT AT AX,AY; PAPER 7; I
NK 4;" "
 230 LET Y1=Y
 240 IF DEMO THEN LET Y=Y+(AY>Y)
-(AY<Y): GO TO 270
 250 IF INKEY$="1" AND Y>5 THEN
LET Y=Y-1
 260 IF INKEY$="0" AND Y<25 THEN
 LET Y=Y+1
 270 IF Y1<>Y THEN PRINT AT X,Y1
; PAPER 7; INK 2;"  ";AT X+1,Y1;
"  ";AT X+2,Y1;"  "
 280 PRINT AT X,Y; PAPER 2; INK
6;"  ";AT X+1,Y; INK 7;"  ";AT X
+2,Y;"  "
 290 IF Y1=Y THEN FOR A=0 TO 5:
NEXT A
 300 PRINT AT AX,AY; PAPER 7; IN
K 2;" ": LET AX=AX+1
 310 IF ATTR (AX,AY)=22 THEN GO
TO 350
```

continued on page 33

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```
 320 IF DEMO AND INKEY$<>"" THEN
 GO TO 30
 330 IF AX>X+2 THEN GO TO 400
 340 PRINT AT AX,AY; PAPER 7; IN
K 4;"■": BEEP .01,21-AX: GO TO 2
30
 350 LET CA=CA+1: PRINT #0;AT 0,
0; PAPER 1;"WE'VE CAUGHT ";CA;"
SO FAR","     GREAT AIN'T IT !!!"
,: BEEP .5,20: IF CA/15<>INT (CA
/15) THEN GO TO 220
 360 PRINT #0;AT 0,0; PAPER 1;"H
ANG ON A MINUTE, I'VE FOUND     A
 PLANK TO ""HELP"" YOU !!";
 370 PRINT AT X,Y; PAPER 7; INK
2;"■■";AT X+1,Y;"■■";AT X+2,Y;"■
■";AT X+1,5; PAPER 2; INK 7; INV
ERSE 1;"■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■";
AT X+2,10;"NADAAAAAANAD"
 380 FOR A=0 TO 60: BEEP .01,A:
NEXT A
 390 LET X=X-2: GO TO 220
 400 LET DR=DR+1: PRINT #0;AT 0,
0; PAPER 1;"THAT'S ";DR;" YOU'VE
 DROPPED","SO FAR...I'LL SOON GE
T ANGRY !!",: BEEP 1,-20
 410 IF DR<15 THEN GO TO 220
 420 PRINT #0;AT 0,0; PAPER 1;"I
'M NOT PLAYING ANY MORE !!!!",,,
 430 PRINT AT 1,12; PAPER 5;"
   ";AT 3,5,,
 440 FOR A=16 TO 5 STEP -1: BEEP
 .05,30-A: BEEP .05,-A: NEXT A
 450 PRINT AT 4,0; PAPER 5; INK
0;"■■": BEEP .05,26: BEEP .05,-4
:: PRINT AT 3,0; PAPER 5; INK 0;
"■■"''"■■": BEEP .05,27: BEEP .05
,-3
 460 PRINT AT 3,0; PAPER 5;"   "'
 INK 0;"■■"' PAPER 4; INK 0;"■■"
: BEEP .05,26: BEEP .05,-4: PRIN
T AT 4,0; PAPER 5;"  "' PAPER 4;
 INK 0;"■■"''"■■": BEEP .05,25: B
EEP .05,-5
 470 FOR A=5 TO 18: PRINT AT A,0
; PAPER 4; INK 0;"  "''"■■"''"■■":
 BEEP .05,29-A: BEEP .05,-A-1: N
EXT A
 480 IF DEMO THEN GO TO 30
 490 CLS : IF CA>PEEK USR "U" TH
EN POKE USR "U",CA
 500 PRINT "SCORE:              ";
CA''''"HI-SCORE:              ";PEEK
USR "U"
 510 PRINT #0;AT 1,0; PAPER 1; I
NK 7;" PRESS ANY KEY FOR ANOTHER
 GAME "
 520 GO TO 70
 530 DATA 127,127,127,0,247,247,
247,0
 540 DATA 0,127,127,127,63,63,55
,176,51,55,55,55,51,27,31,15
 550 DATA 3,3,3,7,14,28,56,56
 560 DATA 0,254,254,254,252,252,
236,13,204,236,236,236,204,216,2
48,240
 570 DATA 192,192,192,224,112,56
,28,28
 580 DATA 179,183,183,183,51,27,
31,239
 590 DATA 131,131,131,247,14,28,
56,187
 600 DATA 204,236,236,237,204,21
6,248,247
 610 DATA 192,192,192,239,112,56
,28,221
 620 DATA 6,6,118,255,223,223,12
6,60
 630 DATA 0,0,0,0,247,247,247,0
 640 DATA 112,112,112,0,7,7,7,0
 650 DATA 15,15,15,0,240,240,240
,0
 660 CLEAR : SAVE "SCRUMPING" LI
NE 1: VERIFY "": STOP
```

**Apples**
*by T Lewis*

## The Tube

on Lynx

This program uses an unusual procedure to draw circles to create its effect.

The circle procedure can be 'lifted' out quite easily and the x and y co-ordinates are all you will need to add.

```
 1 PROC CIRCLE
 2 VDU 4, 21, 25
 3 PROC BRAIN
 4 FOR X = 0 TO 190 STEP 10
 5 INK X + 1
 6 FOR A = 0 TO 360
 7 PLOT 4, 30 + (M(A)+X), 30 + (N(A)+X)
 8 PLOT 4, 30 + (M(A)+(190-X)), 30 + (N(A)+X)
 9 NEXT A
10 NEXT X
11 PROC DUNNIT
12 G = GETN
13 END
14 DEFPROC CIRCLE
15 R = 25, r = 25
16 DIM M (360)
17 DIM N (360)
18 CLS
19 VDU 24
20 PRINT @ 40, 20; "I'M THINKING !"
21 PROC BRAIN
22 FOR A = 0 TO 360
23 B = A * PI/180
24 C = R * COS (B)
25 D = r * SIN (B)
26 M(A) = C
27 N(A) = D
28 NEXT A
29 ENDPROC
30 DEFPROC BRAIN
31 FOR F = 0 TO 100
32 BEEP RAND (300) + 1, 3, 63
33 NEXT F
34 ENDPROC
35 DEFPROC DUNNIT
36 FOR J = 0 TO 1
37 FOR S = 100 TO 0 STEP - 10
38 FOR U = 0 TO 100 STEP 10
39 BEEP U + S, 10, 63
40 NEXT U
41 NEXT S
42 NEXT J
43 ENDPROC
```

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*Hobhouse Court*
*19 Whitcomb Street*
*London WC2 7HF*

Each month we will publish the name of the winner and the new *Cruising* high score. Are you good enough to accept the *Cruising* challenge?

The highest score sent in so far this month is 9968 from Carl Doran of Skidby Mill, N Humberside. Entries for this month's competition close on May 31.

### Notes

1) Each entry must consist of a ZX printout and your name and address.
2) Closing date for this month's *Cruising* challenge entries is May 31.
3) The highest score each month will receive £10.
4) High scores cannot be transferred from one month to another.
5) The judges' decision is final.
6) No employees of Sunshine Publications Ltd, or their families, will be eligible to enter.

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Each month *Popular Computing Weekly* is giving away £10 to the player with the highest score on *Blind Alley*. To enter this month's competition simply send in a copy of your score and the code at the bottom of the score table, together with your name and address to:

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*Hobhouse Court*
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The highest score sent in so far is 32465 from Jonathan Farmer of 34 Cramond Park, Edinburgh. Entries for this month's competition close on May 31.

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# Tony Bridge's Adventure Corner

## A colossal temptation!

Some weeks ago I was talking about the midnight programmers, and their obsession with after-hours adventures. To illustrate what this original adventure must have felt like to play, I then started up a game on a DEC PDP/11, inviting readers to send me any ideas they might have on how to go about it.

Over 295 of you thought that I was actually stuck and in need of *Help*, while two of you got the idea and sent highly colourful solutions to the snake problem.

However, I was amazed to find that so many of you had either played the original or played one of several versions for home microcomputers. I have seen the ads claiming that this or that program is "based on the Crowther original" or "like the mainframe adventure", but I was happily surprised to learn from your letters how alike these programs actually are to the one I am currently playing.

Michael Austin, of Level 9, has very kindly sent me a tape of his *Colossal Adventure* which is one of those games mentioned in your letters. The adventure follows, in the opening phase anyway, the Crowther original — but it contains many more rooms in the closing stages. Quite frankly, I think it is a minor miracle of programming. The original is rather long at the beginning — it can take some time before the intrepid adventurer finally stumbles upon the entrance to the cave. Level 9's program allows the player to get straight into the action.

Level 9 also provided me with a crib sheet (sealed) in case I should need help in solving the adventure — it is currently sitting on my desk tempting me to open it, but I have resisted so far!

Michael tells me that Level 9 has several other programs that evolve from *Colossal Adventure*; the scenario in one, for example, involving the countryside glimpsed beyond the forest in *Colossal Adventure*. I shall bring you news of these as I receive them, but I can tell you that anybody who likes a good, traditional adventure will certainly find good value with Level 9's programs.

Back to your letters, Hugh Owen-Jones is stuck, like many others, in one of Artic's adventures. He is trying to get past the tank in *Espionage Island* — his friend knows, but won't let him in on the secret. Well, here's a clue. Just type in the code using the *Help* program that I gave last week — in this case, I've given the clue to you in three parts, it entails a very long wait for the program to sort out the whole thing in one go!

1. "shte*tw*cmlishoit,wgcireh"
2. "ie*ai.n*g.nrpsc.tihstit.ioit"
3. "scwhaser.towhi*ih*c.oli* tanithi*etscg.no,nh"

A Buchan, of Aberdeenshire, is also playing *Espionage Island* and is going round in circles. Try decoding this I hope it may put you on the right track.

"tinwerognaya*sm*tdyflor"

Finally, from the same source, A Buchan, comes our signing-off message: *Bribe a bunyip today!* ■

This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further, write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

# Adventure Competition

## Write an adventure game and win a Commodore 64!

***Popular Computing Weekly* is offering a star prize of a Commodore 64 for the best adventure game written for *any* home micro — PLUS — a special prize of a Vic20 for the best essay on an adventure theme — PLUS — for the next 10 runners-up, two Commodore adventure games.**

**Each week during May, *Popular Computing Weekly* will publish a coupon — simply cut out any three and send them in with your entry.**

The best adventure games are ideally a combination of action and logical riddles. For instance, to open a door, the player should not merely have to find the magic word, but have to solve a puzzle in order to progress to the next location. Good graphics obviously enhance a program — and we'll be looking for a game that makes imaginative use of graphics, although that does not mean that a text-only program will be eliminated.

Other things we will be looking for are the surprise twists that make a program worth coming back to again and again.

And remember, don't make your game too difficult in the early stages — adventuring novices should have a chance to get some way into the game before getting stuck!

For those of you submitting scenarios with your program, think of it as a guide line for a programmer. Draw a map showing location objects and other important details of your adventure, and compile a dictionary of key words that your program will accept.

If you do not want to write a full-blown adventure game, you can still enter the competition by writing an essay (up to 2,000 words) on an original adventure theme. A Vic20 will be awarded to the essay which describes the most original and interesting adventure game.

The competition will be judged by Tony Bridge and *Popular Computing Weekly* editor Brendon Gore.

**PRIZES**

1. Commodore 64
2. Vic20
3. Two Commodore adventure games of your choice for 10 runners-up

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All you have to do to enter this competition is collect the coupons from three issues of the magazine and send them, together with your entry (stating which machine your game is for) to:

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**RULES**

1. Each entry must consist of your adventure, or essay, together with three coupons, and your name and address.
2. Closing date for the Adventure Competition is 30 June 1983
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## PURPOSE BUILT

*Mr V J Baker of Shunters Way, Doncaster, writes:*

**Q I have a BBC computer and I have for some time been considering getting a desk or unit especially for it, so that I do not have to set it up each time I want to use it. I have been told that purpose-built furniture is available for the BBC machines, but have not seen any details. Can you help?**

A I do not know of any especially designed for the BBC, but I know of two companies that make a computer desk-type unit. They are: OFCO, 65 Tredegar Street, London E3 5AE, and Micro Aids, 2 Boston Close, Culcheth, Warrington WA3 1BR.

## EXTRA MEMORY

*Francis McGregor of Blaydon, Newcastle-on-Tyne, writes:*

**Q I have an Atari 400, and I am getting on with it very well. But I have seen a lot recently about the language Forth and the Jupiter Ace microcomputer and think that it is very interesting.**

**Do you think Forth is worth learning for the Atari computers, and will I need to get any extra memory for it? Also, is it available on cassette, as I only have a cassette drive with my computer? I know there are cassette versions for other computers.**

A I am afraid that you are not in luck. The only Forth I know of is by Maplin in Rayleigh, Essex. Unfortunately, it is a disc version and needs 24K. This means you would need £350 of extra equipment before you even buy the Forth itself — and the Forth disc costs £63. Just to learn Forth, it would be a lot cheaper to buy an Ace for less than £100. On the other hand, if you plan to develop your Atari system in any case, and were thinking of buying a disc drive, then it could be worth getting.

As for whether it is worth learning Forth, that depends on how you want to develop your computing. Certainly I would recommend it as a second language. It is generally faster and shorter, and indeed many arcade games are now in Forth. It is quite different from Basic and takes quite a bit of getting used to.

And there are other languages also becoming popular such as C or Logo. I understand that Atari will be doing a version of Logo for their machine, but I do not know when it will become available. In the end it is up to you — it is your money!

## A GROWING CONFLICT

*Mr I D Mackenzie from Handsworth Technical College, Soho Road, Birmingham, writes:*

**Q Good to see that *Popular Computing Weekly* is bang up to date; I refer to 'Meteor' for the Ace. Basic is not the only language that is widely available. Forth seems to be just what is needed for interfacing high-level languages to assembler code. At the college we are using two of them for control and data conversion applications.**

**But can you help me concerning the expansion port at the back. It just does not look like the plan in the manual. Is it just a case of the 'viewed from the front' problem, or is it more serious. I dare not take the top off, since I do not think that it would stay together afterwards.**

A Here we have some early exchanges in what I think will be a growing conflict, namely Forth versus Basic; I am glad that you recognise that Forth is better for some applications, though not necessarily all.

The plan at the bottom of page 152 is a 'looking down on' view. The two top and two bottom connections beyond the slot are not used. As for taking the top off, if you are not happy about doing this, then don't. The Ace is constructed in a similar way to the ZX80 — you can open it provided you do not interfere with the poppers underneath.

## THE RIGHT DIRECTION

*David Muir of Ailsa Road, Saltcoats, Ayrshire, writes:*

**Q Could you please tell me how I can Save and Load data to and from my BBC computer?**

**The problem is that I am trying to write a program that will test the user's knowledge of French — I want to input the French and the English equivalent in the program and, through a menu, Save or Load a different selection of words or phrases.**

**I have tried a number of ways to do this based on what I have found in books and magazines, but to no avail. Can you guide me in the right direction?**

A You will need to use the *Open In* and *Open Out* commands to create a file on the cassette or disc. But before you can do that, the information that you want to save needs to be put into a string. So a line is needed to the effect: *Print A$ # Channel* then *Input A$ # Channel.*

The string is then stored in space created by the command *Open Out* and the command *Open In* will return the string value to the display.

## UNABLE TO SAVE

*R M Jones of Broad Park Road, Bere Alston, Yelverton, Devon, writes:*

**Q What welcome news the progress of the Sinclair Microdrive! Time scale notwithstanding, I for one will consider its advent as a new dimension.**

**The reason for this is that so far I have been totally unable to Save even the simplest two-line program on cassette, despite trying three machines. (In each case after verbal assurances that they would operate with the Spectrum.) All I get is 'Tape Loading Error'.**

**It would appear that there is a large gap in the market for compatible recorders (most dealers say they cannot get their hands on them). The possibility of a fault with my Spectrum has finally occurred to me. Have you, or anyone else, any experience of this with either recorders or the micro.**

A When I read the first part of your letter I assumed that it was yet another ZX81 *Load/Save* problem. I must admit when the culprit turned out to be the Spectrum I was surprised. The Spectrum ironed out most of the *Load/Save* bugs of its brother, and I think this is the first question like this that I have had. Have you a shop near you that sells Spectrums and has demonstration machines *Run*ning? If so it might do to ask if you could try and *Load* or *Save* using their cassette player. It might well establish which is at fault, the micro or the cassette.

As for a compatible recorder, the Thorn model marketed by Data-assette is the nearest to a standard. It was adapted for the ZX81, and there are several people who will say that if it *Loads* a ZX81, it will *Load* anything. In this case I would suggest you try one of these.

## NO GUARANTEE

*R M Chart of St Mawes, Truro, Cornwall, writes:*

**Q In your 3 March issue you stated that it was possible to expand a 16K Spectrum to a 48K model, by using chips from an independent supplier. Would this 'User' conversion nullify the Sinclair guarantee?**

A Yes, is the simple answer. You void the guarantee simply by taking the top off, and if they sold you a 16K Spectrum, which is returned with chips in sockets which should be empty, then obviously they are within their rights to refuse to deal with it under the guarantee.

**Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.**

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**BBC MODEL B 32K,** 1 month old, still in original packing with guarantee, enclose manual, cassette recorder and leads, some software and magazines, £440. Tel: 061-740 3858.

**BBC MODEL A** with extra 16K, equals 32K including 12in black and white monitor and cassette recorder, £300. Tel: 352 4577.

**BBC MODEL B,** 3 months old + joystick + 5 cartridges, £370. Tel: 01-534 5717 after 7 pm.

**BBC MODEL A,** + 1.2 OS + 32K, printer, user, anilog bus upgrades + over £100 quality software. Will deliver within reason, £350. Tel: 01-337 6163.

## For sale

**DEMON ATTACK** for Atari VCS to exchange for Parker Star Wars cartridge. Tel: 04862 70318.

**CHESS PARTNER 2000** computer, in original packing, manual, 8 levels of play, LED display, touch sensitive keyboard + transformer, £55 ono. Tel: 0698 62119.

**SWAP** 14in. b/w portable telly for ZX81 with 16K. Tel: 01-641 1671, after 6 pm.

**TI 99,** 4 months old, cassette, interface cable, 2 game cartridges, all books/manuals, dust-proof cover + cassettes, £120. Tel: 061-338 2350, after 6 pm.

**KEMPSTON** joystick for Spectrum, excellent condition, will swap for any Spectrum keyboard or sell for £20. Tel: 0203 346848 anytime.

**VIC20,** original cassettes, including Night Circular, Lazer Zone, Grid Runner and many, many others. Between £3-£4 each. Tel: 574 4122.

**HEATH ET 3400** micro processor trainer + manuals, £75; E Prom programmer for Commodore Pet — 2716, 2532, 2732 — £50; Pet — speed compiler for CBM 4032/4040, only £100. Tel: Hereford 273047.

**HANIER CB X** Stardust Aerial, SWR meter and back track, swap for Dragon 32. Tel: St Helens 55128.

**ATARI 400** Eastern Front, 1941, + cash for cartridge or will swap for another cassette. Tel: 01-989 8138, evenings.

**VIC CARTRIDGES,** Road Race + Meteor Run, £10 each. Vic cassettes, trader £10, Sub-space Striker, Arrow of Death, Andes Attack, £7 each, Star Trek £4. Tel: 01-788 8272 after 6 pm.

**JELLY MONSTERS ADVENTURE CARTRIDGE** for Commodore Vic20, £16. Tel: Stafford 663166.

## Wanted

**DRAGON 32's** required, £125 awaits each sound machine: decision by return post. I pay any collection/delivery charges. Details to A. Ellis, 22 Turnaveau Road, St Austell, Cornwall PL25 5NX.

**WANTED: AFRON EXP BOARD** for Vic20 in exchange for stack 4-slot board + cash. Tel: Litchfield 53344 anytime.

**WANTED BBC MICRO COMPUTER** Model A or B, must be in good condition. Tel: Havant 473069.

**VIC20 GORF CARTRIDGE** wanted for cash. Tel: Johnstone (Renfrewshire) 21586.

**WANTED 48K SPECTRUM.** Exchange for ZX81 + Filesixty keyboard + 16K + software + cash. Tel: Crawley 0293 541 988.

# NEW RELEASES

## RESCUED!

*Lunar Rescue* is a version of Lunar Lander with a number of additional features. Not only must you guide your ship through an asteroid storm and land on one of three pads, you must also rescue a stranded android and re-dock with your mothership while fighting off waves of aliens.

Points are awarded according to various elements, including numbers of humanoids rescued, aliens shot down and size of landing pad.

The game is for the 16K ZX81 and is one of a number of new games recently issued by Mikro-Gen.

**Program** *Lunar Rescue*
**Price** *£4.95*
**Micro** *ZX81 (16K)*
**Supplier** *Mikro-Gen*
*24 Agar Crescent*
*Bracknell*
*Berkshire*

## A THREESOME

*Triplet* is a new games pack for the Dragon 32 from Wizard Software.

Three games are included, *Breaker* which is a version of mastermind, *Copycat* which is like the game Simon, and *Tile* in which you must arrange a series of letters alphabetically.

**Program** *Triplet*
**Price** *£5.50*
**Micro** *Dragon 32*
**Supplier** *Wizard Software*
*PO Box 23*
*Dunfermline*
*Fife KY11 5RW*

## LOOP THE LOOP

*Programmer, William Wray*

*Galaxians* is a popular arcade game that has not had the amount of coverage such arcade favourites usually receive on the Spectrum. One of the first micro *Galaxians* comes from Artic and is claimed to be a close copy of the original, even down to the birds looping the loop at the end of each screen.

The game also has a two player option — a feature often strangely lacking in games which would otherwise invite cut-throat competition.

The programmer, William Wray, has graduated from the ZX81 for which he produced two games, *Galaxy Warrior* and *ZX Galaxians*. He is currently experimenting with 3D animation and speech synthesis techniques for use in future games.

**Program** *Galaxians*
**Price** *£4.95*
**Micro** *Spectrum 16/48K*
**Supplier** *Artic Computing*
*396 James Reckitt Ave*
*Hull, N Humberside*
*HU8 0JA*

## SOUNDED OUT

Not a cassette this time but a book. *Lynx Computing* is the first I've seen catering for this machine.

The book is aimed at both computer novices and the more experienced user, and comes from an author well known in the computer books field, Ian Sinclair.

Particularly welcome, I suspect, will be extensive sections on using the Lynx's sound to the full.

**Book** *Lynx Computing*
**Price** *£6.95*
**Micro** *Lynx*
**Publisher** *Granada*
*PO Box 9*
*Frogmore*
*St Albans*
*Hertfordshire AL2 2NF*

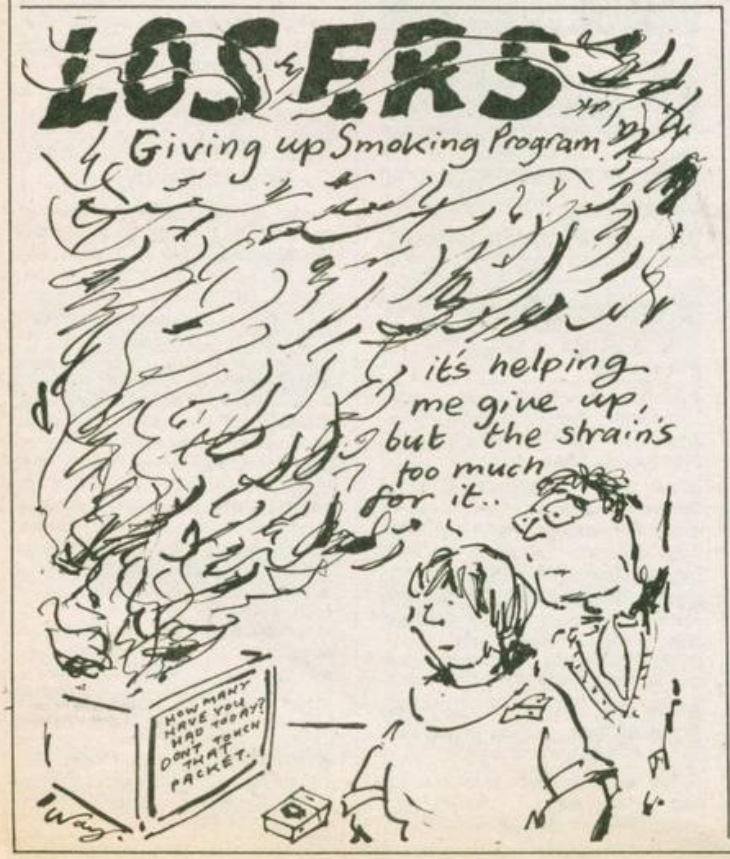
## START RIGHT!

A package which aims to gently teach you the mysteries of programming is one of the first offerings from Collins Educational, a branch of the publishers who have now entered the software market.

Called *Spectrum Starter Pack I*, the cassette comes complete with a booklet to illustrate in more detail how each program works.

Despite all those "Father educating son" advertisements, the educational market is still lagging behind the games market for Spectrum. It will be interesting to see the results of this venture.

**Program** *Spectrum Starter Pack I*
**Price** *£9.95*
**Micro** *Spectrum 16/48K*
**Supplier** *Retail outlets and from Collins Educational*
*PO Box*
*Glasgow G4 0NB*




## FILED AWAY!

Psion is a software company with an enviable reputation amongst Spectrum owners for supplying excellent software.

*Vu-File* is the first release from Psion for a non ZX micro — in this case the BBC. *Vu-File* is a package that enables you to use your BBC as a filing system with near instantaneous retrieval of information.

This program is apparently closely related to the Spectrum *Vu-File*, since it offers similar facilities and the same demonstration program *Gazetteer*.

**Program** *Vu-File*
**Price** *£14.95*
**Micro** *BBC A or B*
**Supplier** *Psion Software*
*2 Huntsworth Mews*
*Gloucester Place*
*London NW1 6DD*

## IMPOSSIBLE?

Music on ZX81 — Impossible? Not according to the blurb for a new program which claims to provide just that.

*ZX Music* requires 16K and will enable you to produce music through your ZX81 simply using software.

**Program** *ZX Music*
**Price** *£5.50*
**Micro** *ZX81 (16K)*
**Supplier** *Stephen Newton Software*
*5 Freegrove Road*
*Holloway*
*London N7 9JN*

New Releases is designed to let people know what software is coming on to the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, Popular Computing Weekly, 19 Whitcomb Street, London WC2 7HF.

## Ziggurat

# Turning turtle

Notwithstanding that Logo is procedural, interactive, and has a list-processing ability — there is one other feature which swamps all others in terms of the applicability of the language.

This is the use of Turtle Geometry in Logo.

A Turtle is a computer-controlled "cybernetic animal" that lives on the vdu display screen and responds to Logo commands that make it move (*Forward* or *Back*) and rotate (*Left* or *Right*).

When the Turtle moves, it leaves a trace of its path, and so can be used to make drawings on the display screen. For example, to draw a square with the Turtle using a Logo procedure repeat four times "go *Forward* 200 units, turn *Right* 90 degrees":

```
TO SQUARE
REPEAT 4 [FORWARD 200 RIGHT 90]
END
```

And then, by typing in *Square*, it will.

Though Turtle graphics was designed for use with Logo, it has appeared in other languages, notably Smalltalk, and UCSD Pascal. And there are now many systems calling themselves Logo which are no more than systems to run Turtle graphics. In their *Information Leaflet No 40*, the teams at the NorthWest Regional Centre for the Microelectronics in Education Programme (799 Wilmslow Road, Manchester) distinguish between full implementations of the language Logo, Logo sub-sets (usually Turtle graphics), Logo written in languages such as Pascal or Basic, and, finally, a miscellany of implementations that range in their ability to give the flavour of Turtle graphics.

Many start their study of Logo by using the Turtle — and a large proportion never get beyond that stage. This is reflected in the claim recently in one magazine that a Turtle graphics language is "a version of Logo".

In a Logo system one types *Clearscreen*, and it does, leaving a little triangular object in the middle of the screen — the Turtle — pointing upwards. You draw by telling the Turtle to move and leave a trace of its movements, and when you tell the Turtle to turn a certain number of degrees, the Turtle turns to point in that direction. In many systems the Turtle is never seen (eg, USCD Pascal), but most systems have a command named something like *Whereami* (the actual name in UCSD Pascal).

One reason why Turtle graphics are so popular with those in primary (and secondary?) education is that the movements of the Turtle on the screen can be matched by the movements of a robot on the floor (eg, the BBC Buggy).

With Logo there is no need to learn any of the structure of the language at the outset, though to progress will require study. Commands such as *Forward* can be simplified to *Fd*, and so the *Square* procedure can be written:

```
TO SQ
REPEAT 4 [FD 100 RT 90]
END
```

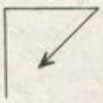
and there are no 'right' or 'wrong' procedures. If there is a mistake in a procedure, in that it does not do what the child intended, then part of the learning experience comes from fixing the bug.

Whereas many computer scientists insist that there should be no bugs in programs, Papert (in *Mindstorms*) says: "The question to ask about the program is not whether it is right or wrong, but if it is fixable."

Consider the child who defines a procedure:

```
TO TRI
FD 100 RT 90 FD 100 RT 45 FD 100
END
```

to draw an isosceles triangle (45°, 45°, 90°).



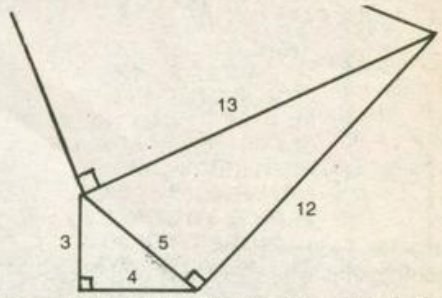
When the child types in Tri, the result is as shown: no triangle. The child then has to find out where the error is, and correct it. In searching out the error the child learns about geometry through use, and about the process of thinking. The child also learns from making mistakes, because the results of the mistakes are made concrete. ■

**Boris Allan**

## Puzzle

# At an angle

**Puzzle No 55**




For a right-angled triangle, the sum of the squares of the two smaller sides equals the square of the longest side.

The two smallest right-angle triangles with all three sides an exact number of units length are the 3,4,5 and 5,12,13 triangles.

The longest side of the first and the shortest side of the second are the same length — so they can be joined together.

This procedure can be continued — there is a right-angle triangle with integer sides with a smallest side of 13, which could be joined to the second triangle. In this way a chain of triangles can be built up.

The first two are given above — what are the lengths of the sides of the next three in the series?

**Solution to Puzzle No 50**

Two solutions, one in Basic, one in Forth. In the Basic program *P* is the number of porpoises, *D* is the number of dolphins and *S* is the number of sprats received by each porpoise. If this is a whole number then we have a possible solution.

```
10 FOR P = 1 TO 31
20 LET D = 31 - P
30 LET S = (576 - 4 * D)/(D + P)
40 IF S - INTS = 0 THEN PRINT "Number of
   porpoises =";P
50 NEXT P
```

And the Forth solution:

```
: F = ROT = ROT ROT = AND;
: FISH 31 0 D0 I 4 * 576 +
UNFLOAT 31. F/ OVER OVER INT
UNFLOAT F = IF
I . . "Porpoises"
THEN LOOP ;
```

**Winner of Puzzle No 50**

The winner is: David Bayliss, Elgin Road, Cheshunt, Herts, who receives £10.

## Top 10

**Dragon**

| | | | |
|---|---|---|---|
| 1 | (1) | Donkey King | (Microdeal) |
| 2 | (4) | Dragon Trek | (Salamander) |
| 3 | (2) | Champions | (Peaksoft) |
| 4 | (8) | Katerpilla Attack | (Microdeal) |
| 5 | (3) | Pimania | (Automata) |
| 6 | (6) | Phantom Slayer | (Microdeal) |
| 7 | (9) | Cosmic Zap | (Microdeal) |
| 8 | (5) | Planet Invasion | (Microdeal) |
| 9 | (—) | Missile Defender | (Tiger) |
| 10 | (—) | Chess | (Morrison) |

(Figures compiled by Dragon Dungeon, Ashbourne 0335 44626)

**Spectrum**

| | | | |
|---|---|---|---|
| 1 | (1) | Test Match | (Computer Rentals)* |
| 2 | (4) | Do Not Pass Go | (Workforce)* |
| 3 | (5) | Galaxians | (Artic) |
| 4 | (—) | Knights Quest | (Phipps Associates)* |
| 5 | (8) | Black Crystal | (Carnel)* |
| 6 | (10) | ETX | (Abbex) |
| 7 | (—) | Spawn of Evil | (DK'Tronics) |
| 8 | (2) | Assembler/Editor | (Picturesque) |
| 9 | (9) | Master File | (Cambell Systems) |
| 10 | (—) | Forth | (Abersoft)* |

*Requires 48K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

**Atari**

| | | | |
|---|---|---|---|
| 1 | (—) | Hellcat Ace | (Microprose Software)‡ |
| 2 | (8) | Miner 2049er | (Big Five)* |
| 3 | (—) | Floyd of the Jungle | (Microprose Software)‡ |
| 4 | (3) | Zaxxon | (Data Soft) |
| 5 | (—) | Astro Chase | (First Star)‡ |
| 6 | (1) | Quix | (Atari)* |
| 7 | (—) | Adventure Land | (Adventure International)† |
| 8 | (—) | Rear Guard | (Adventure International) |
| 9 | (—) | Voodoo Castle | (Adventure International) |
| 10 | (6) | Sea Dragon | (Adventure International) |

*Cartridge. †24K cassette. ‡32K.

(Figures compiled by Calisto Computers, Birmingham 021-632 6458)

**Vic20**

| | | | |
|---|---|---|---|
| 1 | (—) | Programmers Aid | (Commodore)* |
| 2 | (1) | Grid Runner | (Llamasoft) |
| 3 | (5) | Abductor | (Llamasoft) |
| 4 | (—) | Introduction to Basic Part 1 | (Commodore) |
| 5 | (—) | Introduction to Basic Part 2 | (Commodore) |
| 6 | (—) | Vic Forth | (Datatronic)* |
| 7 | (8) | Traxx | (Llamasoft)† |
| 8 | (—) | Space Phreeks | (Rabbit) |
| 9 | (—) | Number Chaser | (A S K)† |
| 10 | (—) | Vic Rel | (Datatronic)* |

*Cartridge. †16K.

(Figures compiled by Vic Centre, London 01-992 9904)

**BBC***

| | | | |
|---|---|---|---|
| 1 | (4) | Rocket Raid | (Acornsoft) |
| 2 | (8) | Arcadians | (Acornsoft) |
| 3 | (5) | Planetoid | (Acornsoft) |
| 4 | (—) | Word Wise | (Computer Concepts)† |
| 5 | (—) | View | (Acornsoft)† |
| 6 | (1) | Chess | (Program Power) |
| 7 | (—) | Frogger | (A + F) |
| 8 | (—) | Meteors | (Acornsoft) |
| 9 | (—) | Creative Graphics | (Acornsoft) |
| 10 | (—) | Graphs and Charts | (Acornsoft) |

*All Model B. †Rom.

(Figures compiled by Micro Management, Ipswich 0473 59181)

**ZX81***

| | | | |
|---|---|---|---|
| 1 | (4) | Froggy | (DJL) |
| 2 | (5) | 3D Monster Maze | (J K Greye) |
| 3 | (7) | ZXAS Assembler | (Bug Byte) |
| 4 | (—) | Do Not Pass Go | (Workforce) |
| 5 | (3) | Krazy Kong | (PSS) |
| 6 | (1) | Black Crystal | (Carnel) |
| 7 | (—) | Ravenous Reg | (Tony Barber) |
| 8 | (—) | M Coder | (PSS) |
| 9 | (—) | Personal Banking System | (Hilton) |
| 10 | (—) | The Bible | (Automata) |

*All 16K.

(Figures compiled by Buffer Micro Shop, London 01-769 2887)

**Books**

| | | | |
|---|---|---|---|
| 1 | (9) | Spectrum Machine Language for the Absolute Beginner, *Tang* | (Melbourne House) |
| 2 | (2) | Enter the Dragon, *Carter* | (Melbourne House) |
| 3 | (4) | Mastering the Vic20, *Jones* | (Sigma) |
| 4 | (3) | Assembly Language Programming for the BBC Micro, *Birnbaum* | (Melbourne House) |
| 5 | (—) | Starting Forth, *Brodie* | (Prentice-Hall) |
| 6 | (5) | The BBC Micro — An Expert Guide, *James* | (Granada) |
| 7 | (8) | Commodore 64 Programmers Reference Guide, *Commodore* | (Commodore) |
| 8 | (—) | The Oric 1, *Sinclair* | (Granada) |
| 9 | (6) | The Spectrum Hardware Manual, *Dickens* | (Melbourne House) |
| 10 | (7) | Programming the 6502, *Zaks* | (Sybex) |

(Figures compiled by Watford Technical Books, Watford 0923 23324)

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