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October 1984

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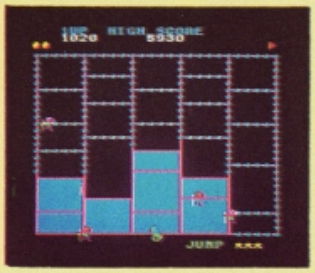
"It is an extremely good version of the arcade game ... thoroughly recommended." ... BEEBUG MAGAZINE



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The only full-feature version available for the BBC micro. On the first screen, you take the part of a monkey being chased by African tribesmen. If you manage to survive by painting-in all the squares, the bonus screen features the monkey trying to reach his bunch of bananas. After that, you take control of a paint-roller and each square painted-in adds to your score. But beware ... the teddy-bears are now in hot pursuit. Superb animation and sound-effects.
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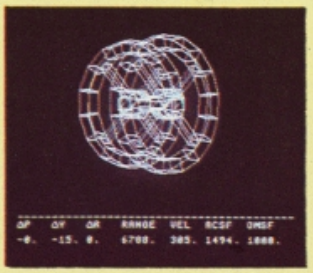

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"... this game is as good as any on the market." ... HOME COMPUTING WEEKLY.

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CENTIPEDE (32K) £7.95

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Acorn programs

Now a monthly publication

THIS ISSUE of Acorn Programs has some major changes. The magazine is now monthly, so you will not have to wait so long for your next copy, which will appear in November and our constantly expanding editorial section has grown even further to reflect every aspect of the BBC and Electron software scene.

This month Clive Williamson has assessed the present batch of low-cost business programs — page 16 — Eric Deeson surveys the educational market on page 21, we interview Charles Moir, author of a best-selling word processor on page 26, and Chris Naylor considers the new BBC/Acorn contract on page 19. You will still find our usual software reviews and programming advice, but do not miss our exciting competition — page 29 — or the special offer program on page 46.

Your program listings have not been forgotten and we are launching a new beginners' section for those who are new to computing. We hope you will continue to send us your excellent contributions. Each disc or cassette should be accompanied by your name and address and a brief description of the program. All entries must also be accompanied by the coupon on page 42.

As usual, our listings have been made for working copies of the programs, and all will run on the BBC B, including those written for the Electron.

The Editor

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Telephone, all departments: 01-359 3525. If you would like to contribute to *Acorn Programs*, please send programs on disc or cassette to *Acorn Programs*, ECC Publications, 2 Newington Green Road, London N1 4AQ. We cannot undertake to return them unless a stamped addressed envelope is enclosed. We pay a basic rate of £15 for the copyright of each program published.

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DEALER ENQUIRIES WELCOME

Acorn wins new BBC contract

THE CONTRACT with Acorn Computers for the BBC computer has been extended for another four years. The agreement runs from September 1, 1984.

The deal was signed despite a number of approaches from other manufacturers, including Sinclair Research, which was disappointed at not winning the original contract.

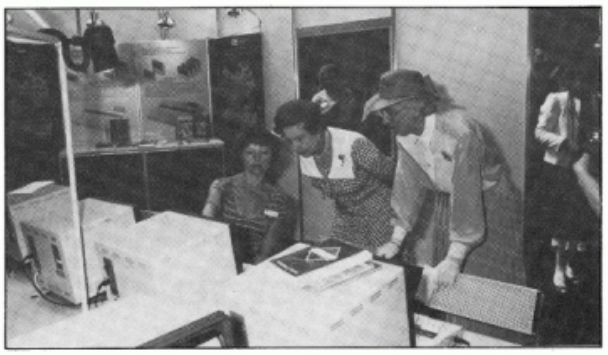
The decision was taken on the basis that it would ensure continuity, although it is reported that there will be enhancements and improvements to the Model B.

Bill Cotton, managing director and chairman of BBC Enterprises, said: "Following the enormous success we have had with Acorn in the last three years with the BBC microcomputer I am delighted that we have a further agreement."

Chris Curry, managing director of Acorn, said he thought the BBC micro was the centre of an expanding system which would be capable of meeting the needs of a wide range of users. He pinpointed three areas for possible expansion — hardware, software and overseas sales.

The BBC Computer Literacy Project, which is based on the BBC B, is in its third year. The Corporation plans to have more new series, as well as producing books and software and repeating old series. More than 350,000 BBC microcomputers have now been sold.

"Much of the success of the BBC microcomputer is due to the combination of the BBC's pioneering excellence in programme production and broadcasting technology and Acorn skills in computer design. In the next four years we intend to work out natural extensions to this relationship which will take it into new areas of technology" Curry said.



THE QUEEN inspects an Acorn computer at the Women's Institute Life and Leisure exhibition at Olympia, London. Acorn was the only computer exhibitor at the show and set up 29 BBC micros and Electrons to show visitors the capabilities of the machines.

Almost all the stand demonstrators were women, as part of the Acorn campaign to raise women's awareness of computers and technology. The event was reported to be a great success, with more than 100 visitors regularly at the Acorn stand.

O level students are put to the test

ACORNSOFT has released a series of O level and CSE revision programs for the BBC and the Electron. Based on current O level syllabuses, the courses are designed to help students study for their examinations at home.

The four programs — two maths, one English language and one biology — have up to 150 pages of tutorial, with a 10-question revision test at the end of each section. A mock examination completes each program.

The maths and English programs were compiled by a group of teachers at University College School in London, and the biology program was compiled by the educational publishing house Hodder and Stoughton. The programs are available on cassette and cost £12.65 each.

In a less serious vein, Acornsoft has also released five new arcade and adventure games for the BBC and converted six of its most popular existing titles for the Electron. The new Electron conversions comprise three favourite arcade games — **Hopper, Freefall** and **Arcadians** — as well as **Sphinx Adventure,** and two home interest programs, **Desk Diary** and **Picture Maker.** Each cassette retails at £9.20.

Electron expansion

NEW ADD-ONS are appearing for the Electron with increasing frequency.

First Byte has launched a printer interface to complement the company's earlier joystick interface. Available from W H Smith and other dealers, the printer interface costs £34.95 including VAT.

Broadway Electronics has produced a sideways ROM card which plugs into the Electron expansion port. The device enables users to plug in up to four chips which were compatible only with the BBC previously. Word processing, accounts, spreadsheet and other programs turn the Electron into a low-cost business machine. The Mushroom sideways ROM card costs £29.95.

Teachers' favourite

A RECENT survey has revealed that almost three-quarters of schools and colleges in Britain use a BBC B. That is far ahead of the next most important machine, the Research Machines 480-Z with machines in 19 percent of schools and colleges and the Sinclair Spectrum with 14 percent.

The survey also predicted that the BBC B will account for almost two-thirds of purchases of new educational computers this year.

Chris Curry, managing director of Acorn Computer group, said: "Its results clearly demonstrate that the BBC micro is the most important computer in education and one which is proving to be as valuable a tool in universities and colleges as it is in primary and secondary schools."

In higher education the figures showed that 84 percent of institutions chose the BBC while the figures for primary and secondary were 73 percent and 78 percent.

The results showed also that there is strong support for the machine among teachers. Of those who own a computer at home, 46 percent chose the BBC.

The survey was carried out by *Educational Computing* in February this year.

Adaptor seeks gold

ACORN HAS launched a new viewdata interface which links the BBC micro to Prestel and Telecom Gold, British Telecoms electronic mail service.

Costing £113.85, the Prestel adaptor connects directly with the telephone network, turning the computer into a two-way terminal. Users can access the database of consumer and business information published by Prestel, as well as its teleshopping facilities, and the Micronet 800 telesoftware and Viewfax information services.

They can also send and receive electronic mail via Telecom Gold. The adaptor includes an autodial facility and can handle telephone numbers stored by the computer on disc or tape.

The adaptor is available by mail order only from Vector Marketing, London Road, Denington Estate, Wellingborough, Northamptonshire NN8 2RL.

Imperial/Triumph Adler is claiming to be the first European typewriter and systems manufacturer to be supplying Telecom Gold with its equipment. The company is offering its Bitsy word processor with an optional modem which links to the telephone socket.

The system allows companies to send letters, memos, reports and messages to any other system, which uses a similar mailbox.

The cost of Bitsy-Telecom Gold systems starts at £3,500 for single disc drive, 128K memory, screen, keyboard, dot matrix printer and software.

Network speeds the results

A NETWORKED BBC microcomputer system was a novel feature of the British Grand Prix race meeting at Brands Hatch.

The computers and software, supplied by Acorn, were designed to improve the distribution of information about the race, drivers, teams, and the organisation of the event. A BBC micro in the pit area issued news, via an Econet system, to strategically-placed monitors for the benefit of the press, officials and VIPs. It was the first time such a system had been used at a Formula One event.

BBC television commentator Murray Walker said the system proved invaluable. "I was getting up-to-the-minute information faster than ever before. Also during the race we had a television monitor failure and I was able to use the information on the Acorn system to fill in the background."

Cedric to reveal the beauty of gas

THE BRITISH GAS energy study is attracting great interest from schools and organisations throughout the country. By the beginning of July, 2,000 entries had been received and that was a long time before the closing date.

The study, entitled Energy Study U.K., is a competition for secondary schools which is intended to help students improve their understanding of energy use and saving. Teams will calculate and analyse energy use in their own and neighbours' homes, compare the effects of various energy-saving methods and produce a program for energy-saving in the community.

To a large extent the competition is based on a specially-written British Gas program called Cedric, which runs on the BBC B as well as other popular home micros.

Many teachers are said to have been so impressed with Cedric that they are to use it to teach children the capabilities of computers.

The closing date for the competition is December 28, after which there will be regional awards ceremonies next February and the national finals will take place in May. Regional winners will receive £200 for the school and team members will receive £10 each. The national winners receive £1,000 for the school and £20 each.

BBC B TOP TEN

	Title	Company
1	Aviator	Acornsoft
2	Fortress	Pace Software
3	Micro Olympics	Database Publications
4	Overdrive	Superior Software
5	Ghouls	Micropower
6	Jet Power Jack	Micropower
7	Lords of Time	Level 9
8	Stock Car	Micropower
9	JCB Digger	Acornsoft
10	Spitfire Command	Superior Software

Soviet campaign

SOVIET schoolchildren could soon be using BBC micros and Electrons in the classroom.

Following the announcement by the Soviet authorities to equip eight million pupils with computers in the 1985 five-year plan, the Acorn distribution company 3SL is mounting a series of promotional visits to the Soviet Union. It is also spending £50,000 in an attempt to secure a contract for the BBC micro and technical training and assistance.

Until recently, the West has maintained an embargo on computer exports to the Soviet bloc because of U.S. fears that computers could be used for military purposes. Now the embargo has been lifted for small micros.

The lifting of the embargo has created a large new export market which several companies, including Sinclair Research and Apple, as well as Acorn, are viewing with keen interest.

A spokesman for 3SL commented: "Chances are good for the BBC but you have to remember that the Soviet market is not the same as ours. Everything tends to be slow and complicated, so it could be a long time before any serious deal is finally concluded."

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EDUCATIONAL 1 *BBC/ELECTRON* *Tape £8.00 Disc £10.00*
Hours of fun and learning for children aged five to nine years. Animated graphics will encourage children to enjoy counting, maths, spelling, and telling the time. The tape includes six programs: MATH1, MATH2, CUBECOUNT, SHAPES, SPELL and CLOCK.
. . . 'An excellent mixture of games' . . . Personal Software – Autumn 1983.

EDUCATIONAL 2 *BBC/ELECTRON* *Tape £8.00 Disc £10.00*
Although similar to Educational 1 this tape is more advanced and aimed at seven to 12 year olds. The tape includes MATH1, MATH2, AREA, MEMORY, CUBECOUNT and SPELL.

FUN WITH NUMBERS *BBC/ELECTRON* *Tape £8.00 Disc £10.00*
These programs will teach and test basic counting, addition and subtraction to four to seven year olds. The tape includes COUNTING, ADDING and an arcade type game to exercise addition and subtraction. With sound and visual effects.

FUN WITH WORDS *BBC/ELECTRON* *Tape £8.00 Disc £10.00*
Start your fun with alphabet puzzle, continue your play with VOWELS, learn the difference between THERE and THEIR, have games with SUFFIXES and reward yourself with a game of HANGMAN.
. . . 'Very good indeed' . . . A&B Computing – Jan/Feb 1984.

JIGSAW AND SLIDING PUZZLES *BBC/ELECTRON* *Tape £7.95 Disc £9.95*
There are two jigsaw and four sliding puzzles on a 3 x 3 and 4 x 4 grid. Each program starts off at an easy level to ensure initial success but gradually becomes harder. It helps children to develop spatial imagination and in solving problems. The tape includes: OBLONG, JIGSAW, HOUSE, NUMBERS, CLOWN and LETTERS!

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. . . 'This package is good value' . . . Acorn User – Nov 1983.

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User groups

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Name of group _____

Organiser(s), name and address _____

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Meetings, time and place _____

Forthcoming events _____

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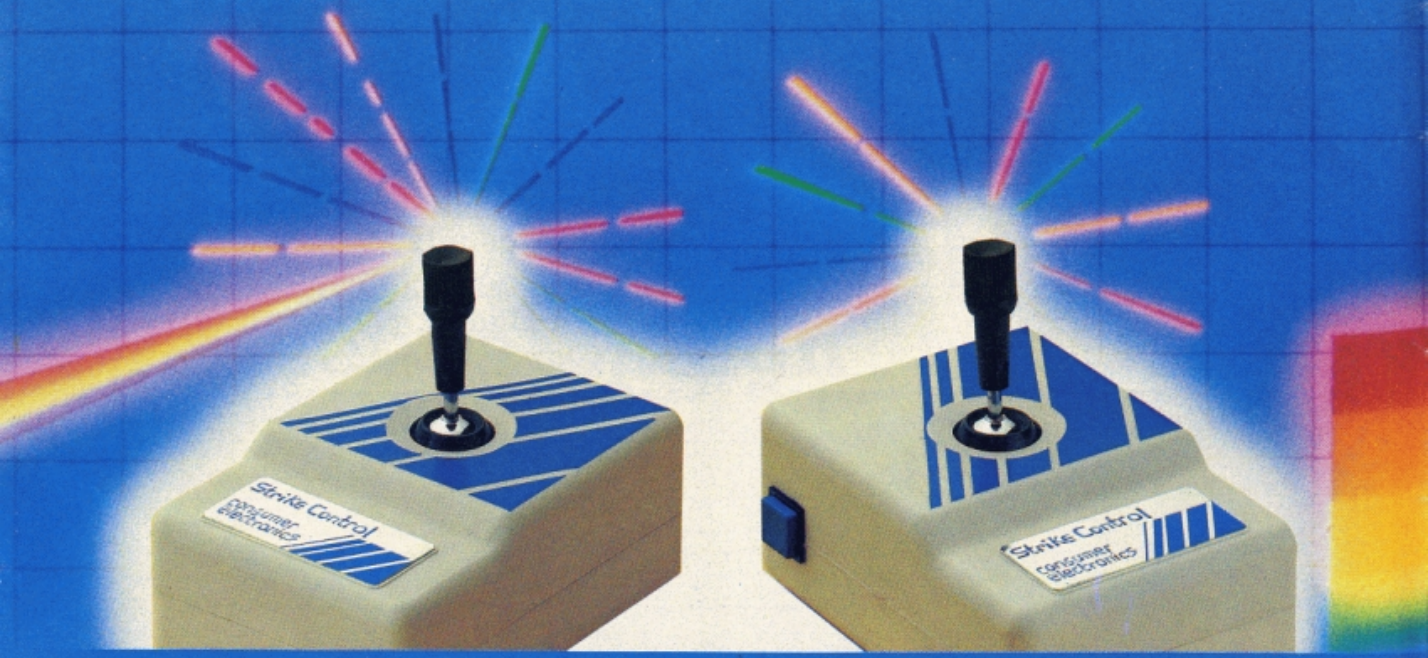

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Telephone: 061-682 2339

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Uneasy blend of arcade and adventure games

MAKE SURE you have plenty of free time before you embark on an adventure called **Gisburne's Castle,** the first game for the BBC B and Electron from Software Communications.

A cross between an arcade game and a graphics adventure, Gisburne's Castle features the intrepid Robin Hood, sallying forth on a mission to rescue Maid Marion, who is held captive in his heavily-defended castle by the treacherous Guy of Gisburne.

Controlling Robin with either keys or a joystick, you start in the heart of Sherwood Forest and attempt to find your way to the castle via forest, glade, moat, log cabin and various other locations. At each one you will be assailed by large birds and what are presumably meant to be the Sheriff of Nottingham's men, armed with some strange weapon which appears to be firing bricks at our hero.

Whatever the missile, it detracts from Robin's strength at every hit. If his energy runs out the game is over but Robin can defend himself by firing at the enemy with his bow and arrow, scoring points as he does so. Having cleared a screen of all pests, he can proceed to the next location or stop to examine and possibly pick up a variety of useful objects such as food to restore his depleted energy, quivers full of arrows, keys, a rope and even an anachronistic stick of dynamite.

Dealing with the enemy, determining the route to the castle, and deciding which objects — only three are allowed at a time — will prove the most valuable requires a considerable amount of ingenuity, and there are some important lessons to be learned by trial and error. For instance, it is a good idea to finish shooting before you begin sleuthing. Ambitious and carefully-produced, Gisburne's Castle is an absorbing game, marred only by its somewhat uneasy blend between arcade and adventure themes.

In the shooting sequences the action is slowed by the time it takes for each of Robin's victims to disintegrate before dissolving completely, and even after you have the hang of ambushing the enemy and eliminating them speedily, you may find that a succession of repetitively similar screens at the start will discourage you from persevering until some interesting object or new location appears.

Gisburne's Castle is produced by Software Communications, 8 The Avenue, Eastbourne, and costs £7.95.

Graphics redeem banality of zapping

AMONG a range of new games for the BBC B from Superior Software is **Star Striker,** a straightforward zapping game which is redeemed from banality only by its attractive graphics.

In spite of the war-like theme, Star Striker manages to look very attractive, with the aliens fluttering like brilliantly-coloured butterflies, splitting into two when hit, or bursting with a little shower of stars. Fairly easy at the start, the action becomes more demanding as the game progresses, providing players of all skill levels with a reasonable amount of entertainment.

Star Striker is available from Superior Software, Regent Street, Skinner Lane, Leeds LS7 1AX and costs £7.95.

Much more than child's play

A GAME featuring the Mr Men may seem to be intended for young children but **Hi Bouncer** for the BBC B needs the nimble fingers of the mature keyboard expert.

Excellent picture-book graphics and a cheerful tune lend a great deal of charm to the game, which consists of a series of screens providing Mr Bounce with various challenges. On screen one he has to secure Mr Tail's scarf by landing on it feet first, having previously avoided bumping into any of the other characters.

On screen two, where Mr Lazy is building a house, Mr Bounce has to somersault on to a seesaw; screen three has him jumping to catch fruit on a tree, and on screen four he must leap to the clouds to prevent a snowman melting; it is best not to ask how this works.

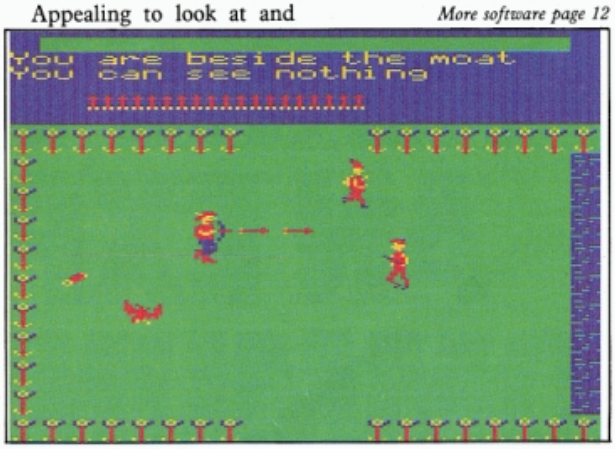
You can play the game with a joystick or with keys to move Mr Bounce left, right and into the air. There is a 'slow' button to control the size of Mr Bounce's jumps and without it the action is difficult to master, with Mr Bounce careering into the scenery every time he hits an obstacle.

Your three lives on any particular screen may soon be lost, in which case you will have to start again.

Appealing to look at and full of amusing details, Hi Bouncer fails to be truly addictive and certainly seems too difficult for younger people who would most appreciate the portrayal of the familiar characters.

Hi Bouncer is produced by H & H Software for Mirrorsoft, Holborn Circus, London EC1P 1DQ and costs £6.95 for the cassette, £9.95 for the disc.

More software page 12



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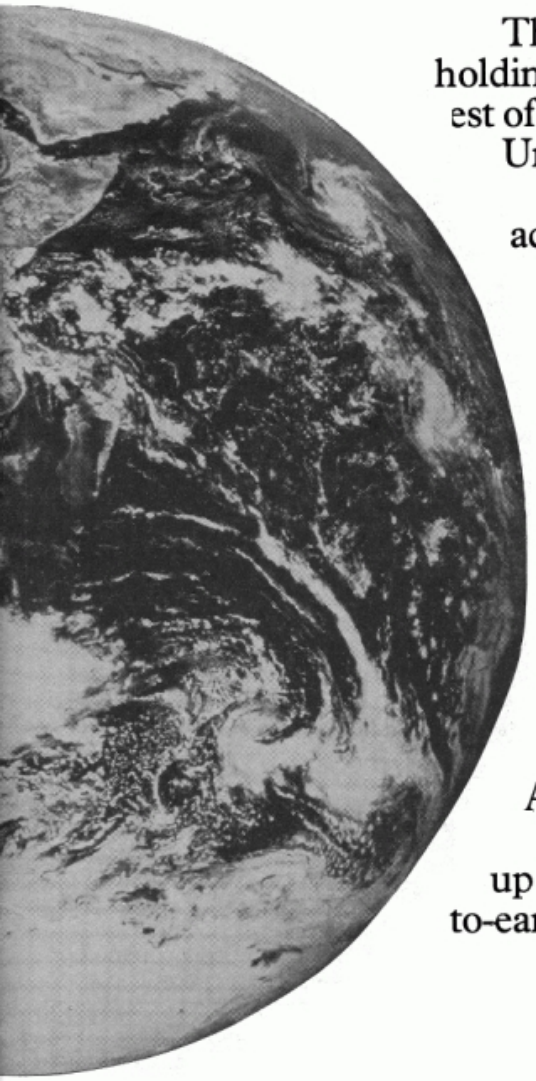

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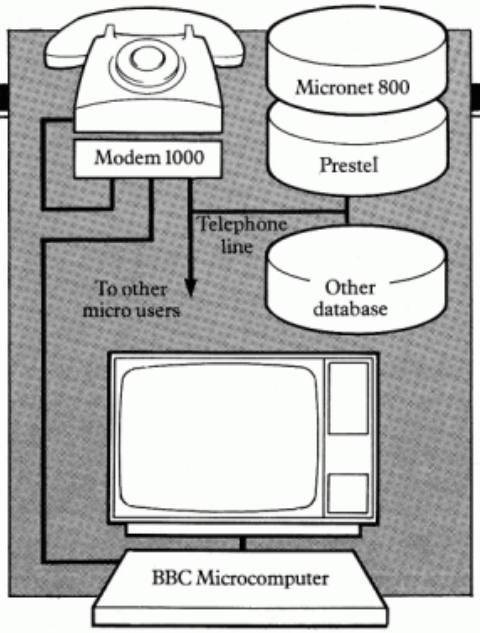

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Olympics fails to win gold

SPORT and athletics are becoming an increasingly popular theme for computer games and it is scarcely surprising that the Olympics should provide the focus for at least one recent release.

Database Publications billed its **Micro Olympics,** available for the BBC B and the Electron, as the first software program to carry paid advertising, an ingenious way of combining both profit and extra realism in a topical and carefully-produced game.

Excellent graphics and true-to-life action are the great asset of the program. Players can choose to compete against the greatest athletes of the day in a range of events such as running from 100 to 1,500 metres, long jumping, throwing the discus or the javelin.

World records are the target to beat and the simulation of the athletes' movements is accurate and lively. Waving crowds, action replays and tongue-in-cheek news flashes, like the one reporting that the discus thrower has collapsed from spinning round too fast, as well as those famous advertisements, all add to the fun.

Where the program suffers, however, is on playability. The fact that each category of events, whether running, jumping — including pole vaulting and high jump — or throwing, has to be loaded separately is a cumbersome arrangement.

The method of competing is also a little wearisome. In the running events, for example, the player chooses two keys to represent the left and right feet and then punches them alternately to achieve some semblance of a running motion — scarcely a test of skill and agility. The same method applies to the throwing events, where the player chooses an angle and then runs like mad as before.

Micro Olympics will, however, make an impression on the strength of its visual appeal and topicality, if not addictiveness. The game is produced by Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY and costs £5.95 for cassette, £7.95 for disc.

Bouncing game is exciting

RECOGNISABLE instantly to anyone who has ever played Jumping Jack on a Spectrum, **Bouncing Bill** for the BBC B involves negotiating a series of sliding horizontal walls to reach a basket of plums at the top.

The plums are apparently there only to give rise to a ghastly joke — your mission is to rescue these damsens in distress says the instruction screen — and the walls are unusual in that they have moving gaps.

The idea of Bouncing Bill is extremely simple and the graphics are rudimentary, yet the game manages to seize the attention. You must judge your leaps accurately so as not to hit your head on the next level or crash through a gap beneath you — both of which will knock you out for a few vital moments — and even when you think you are doing well, you may suddenly find yourself right back at the bottom again.

Bouncing Bill is available from Oak Software, 71 Woodlands Road, Hertford, Herts. It costs £4.

Board theme lacks appeal

TWO new releases for the BBC B from Virgin Games can claim to be a little out of the ordinary, although neither is entirely successful in what it sets out to do. **Brainstorm** is billed as a game of skill and logic for two players. For some reason the authors have chosen to give what is basically a board game transferred to the screen a thoroughly unprepossessing theme; one player must try to defend his brain against a laser attack by the other player, while attempting in turn to destroy the opponent's brain.

At the start the players choose between three board layouts, each with a set pattern of electro-prisms with an unknown deflection factor. The players must move their electro-prisms about the screen and attempt to fire their lasers in such a way as to wipe out the enemy brain. A number of rules govern where prisms may or may not be placed and players can vary the level of difficulty by choosing the length of time laser beams remain visible.

If you have the patience to work out the slightly obscure instructions, and if you enjoy taxing your mind, Brainstorm can provide a few absorbing moments but apart from the random deflection factor — and eyestrain from prolonged scrutiny of the screen — it is difficult to see what the game offers which could not be supplied equally well by an old-fashioned games board.

Sea Adventure has the player adrift in the South Seas trying to return home to England via pirate ships, desert islands, sea creatures and other maritime encounters. Colourful graphics illustrate the various incidents and do much to enliven the adventure but the action is a little restricted, with a choice of directions being the option offered most frequently.

The authors boast that the use of the function keys to issue commands such as North, South, Pick up object, Use object and so on make the player's task simpler. In fact, in the case of the direction commands, pressing N or S, as is the convention in so many adventure games, is simpler than checking the insert to see which function key represents which direction.

Having proceeded in one direction, you may reach a dead end and have to retrace your steps and that can become wearisome after a time, although the scenery as represented by the graphics may encourage you to persevere.

Brainstorm and Sea Adventure are produced by Virgin Games, 61-63 Portobello Road, London W11 3DD and cost £7.95 each.

Caesar has successfully invaded the BBC B

ALREADY FAMILIAR to Commodore 64 and Spectrum owners, **Caesar the Cat** has now made an appearance on the BBC B, with very little difference to its previous incarnations. The most distinctive feature is the appealing cartoon-style graphics.

The title screen has our moggy hero drawing the credits with its tail and, on the next screen, he can be seen padding along the shelves of the larder while a horde of mice nibble away at the various items of food to be found there.

The player's aim is to guide Caesar on his patrol, pouncing on the mice and taking them out through a door whenever it manages to catch one. Points are scored for each mouse despatched in that way but meanwhile they are also lost in proportion to the amount of food the mice put away.

After clearing one screen occupied by black mice, worth 300 points each, the player goes to a more difficult level where the mice are blue and worth 500 points. The child-like graphics might lead you to think that it is an easy game but it requires a fair degree of skill and feline patience.

The mice have a habit of disappearing as soon as Caesar is on the same shelf, and when he leaps from one shelf to another in an attempt to catch them, he must be careful not to knock over any items of crockery — disturbing the red crockery, in particular, puts an end to the game. Attractive to look at and entertaining to play, it is a thoughtfully-produced game with the only disadvantage being the time it takes to start again after losing a round.

Caesar the Cat is produced by Mirrosoft, Holborn Circus, London EC1P 1DQ and costs £6.95.

Supreme puzzle

IF YOUR TASTE runs to infuriating puzzles which test the brain cells rather than furious arcade action which challenges the reflexes, **Gatecrasher** for the BBC B and Electron could be the game to keep you awake late into the night.

The aim is to drop 20 barrels through a maze into nine boxes at the bottom. As a barrel descends through the maze, it passes through a series of gates, altering the direction of each as it does so. If a barrel drops into a box which has already been filled, both barrels are lost.

By studying the maze carefully and by scrolling it up or down to see if a more convenient course is presented, you must try to fill each of the boxes. If you are desperate, as you may well find on occasion, you can press E for earthquake.

There are seven levels to the game, including two where you not only fill the boxes but do so in a numbered sequence.

You need 15,000 points to reach level seven and if you manage to complete that you will be given a chance to crack a secret code. To make sure you give the game your full attention, Quicksilva is offering a prize of £200 to whoever breaks the code and has the highest score; entries must be received before December 3.

Gatecrasher is available from Quicksilva, Palmerston Park House, 13 Palmerston Road, Southampton SO1 1LL and costs £6.95.

Classic still on top

CLASSIC ADVENTURE for the BBC B and the Electron is aptly named. First written in Fortran in the 1970s, the game is the archetypal adventure program, condensed from its original 200K to the BBC 32K.

A text-only adventure, the game features all the elements which have since become the familiar staple ingredients of many other adventure programs. Starting from a wellhouse somewhere in the forest, the player must set off to find the fabulous treasure hidden in the Colossal Caves. Useful objects such as a lamp, an axe and food, and less obviously useful ones like an Eastern flute or a black rod with a rusty star on the end of it — are strewn about as you wend your way through valley, stream or large domed hall.

```
I cant go that way

N

You are standing at the end of a road
before a small brick building. Around
you is a forest. A small stream flows
out of the building and down a gully.

E

You are inside a building, a well house
for a large spring.

Here can be seen:-

A bottle of water.

TAKE WATER

Your bottle is already full.
```

Despite its venerable age, **Classic Adventure** shows no signs of tiring and should still please purists who like their adventures unadulterated by graphics. The storyline is eventful enough to make you want to keep playing and the style of the descriptions is agreably poetic. Be warned, however, that as you follow winding paths and streams, keeping track of the changes of direction you have made will not necessarily produce an accurate map.

Classic Adventure is available from Melbourne House, Church Yard, Tring, Herts HP23 5LU and costs £6.95.

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Fast action with lively graphics

IF YOU LIKE fast action accompanied by colourful graphics and a lively tune, **Mr Wiz** for the BBC B should fit the bill.

Your aim is to guide a wizard round a garden to eat as many cherries as he can while avoiding the attentions of a swarm of gremlins which are in hot pursuit.

Mr Wiz can fend off the gremlins by throwing his crystal ball at them, if he can turn to face them in time; or he can lead them under one of the apples scattered about the garden in the hope that they will fall on them and squash them.

There are 10 points to be earned for every bunch of cherries the wizard eats and a bonus 1,000 for eating the magic mushroom in the middle of the maze.

Nimble reflexes are required to keep out of the way of the gremlins and the fact that the crystal ball takes a short time to recharge after it has been thrown only adds to the player's difficulties. Although you start with three lives, you may find that until you have become accustomed to the ways of the gremlins the game is over very quickly.

Examined closely, Mr Wiz is just another variation on the familiar Pac-man theme but it is a well-produced and challenging game which is likely to hook even the jaded keyboard expert.

Mr Wiz is produced by Superior Software, Regent Street, Skinner Lane, Leeds LS7 1AX and costs £7.95.

Pinball wizard's delight

KANSAS City Systems has hardly gone to town with the packaging of its **Pinball Arcade** but behind a forbiddingly plain insert lies a well-designed and thoughtfully produced program.

The game allows you to play a straightforward computer version of the classic pinball machine game, or if you are disenchanted with that, to build a pinball board of any design you wish. The choices are almost unending — you can take the computer board and play with that or you can start from scratch and put in the bouncers, slots, numbers and other elements displayed at the side of the screen. You simply move them round with the cursor keys, pressing the space bar to pick up or fix in place.

As well as designing the layout of the board, you can alter the scoring of each element, or to speed the bounce or change the angle of the table, and when you have finished you can save any table you have designed to tape.

The simulation of the pinball game is excellent, with the ball bouncing off the obstacles at a realistic angle and the flippers doing their job very much like the real three-dimensional variety. Only the option of shaking the whole machine to alter the course of the ball is missing but purists would not allow that anyway.

Although there seems to be no reason to play with a computer version rather than a real pinball machine, except perhaps for the rarity of the genuine article nowadays, Pinball Arcade manages to be a thoroughly entertaining program, thus more than justifying its existence.

It is available from Kansas City Systems, Unit 3, Sutton Springs Wood, Chesterfield and costs £10.35.

Drumming up endless possibilities

QUICKSILVA has aimed **Drum-Kit,** a programmable rhythm synthesiser for the BBC B, at the serious musician, but if you are strictly amateur or even almost tone deaf, you should find the program fun, educational and easy to use.

The program puts the user in control of four instruments — a base drum, a snare drum, a whistling electro and sticks, which produce a blip. Each is represented by a row of 16 buttons or keys which the player can turn on or off. If an instrument key at any particular beat is on white it will play; if it is on red it will remain silent.

The method for entering the beat is simple; you use the cursor keys to move an arrow to the required key and press return. Keys are numbered and there is a 'clear' button to cancel a whole row.

The possibilities of the program are almost endless; besides combining the different instruments you can also put accents on certain beats, alter the volume of any or all of the instruments, change the tempo, and vary the number of bars or beats to the bar. There is even a facility for playing along by pressing the 'Tap' key.

Lack of volume is the main limitation to the program for anyone intending to use it in earnest and professional musicians are likely to prefer one of the more sophisticated synthesisers available on the market.

Nevertheless, this is a thoughtfully designed and reasonably priced program offering ample instruction and entertainment. An excellent, clearly explained manual is not the least of its assets.

Drum-Kit is available from Quicksilva, Palmerston Park House, 12 Palmerston Road, Southampton SO1 1LL. It costs £9.95.

Getting down to business

Clive Williamson examines BBC software for the home and office

MANY PEOPLE who buy the BBC micro do so with the intention of making it help them in a business in some way. Others, having bought one, realise that beyond programming and games playing, it can help with ordinary tasks in the home, like writing letters or keeping information.

Either way, the BBC Model B is well-suited to prolonged use of packages like word processors, databases and spreadsheets by virtue of its full-sized keyboard, multiplicity of screen modes and its variety of display outputs to domestic TVs or monitors.

A printer is essential for business use and one or more disc drives could be added to the system, although they are by no means vital, as many of the business programs available for the BBC micro will work with cassettes as well.

A small set-up could be used to word-process letters, cope with accounts and invoicing or predict the cashflow in a business, and can also help a club secretary to do mailshots to members.

Software which extends the use of a BBC micro into the small business or self-employed environment falls roughly into five categories — word processors, spreadsheets, accounting, databases and, finally, software to perform such operations as invoicing, stock control and order processing. The tendency now is for several of those programs to be linked, making the whole system more versatile.

Software is supplied for the BBC micro in three forms — on cassette, on disc or as a plug-in ROM chip. The latter has the advantage that a long program can be installed permanently in the micro, taking up none of the machine memory until it is called-up. It then works as a language in its own right, replacing Basic. A simple '*' command is all that is needed to make one of these chips run instantly, with no delay while the program is loaded. While they are more efficient, programs in ROM tend to be expensive items; discs are often much cheaper and cassettes cheaper still.

> 'The tendency now is for several of those programs to be linked'

The single most useful piece of software which can transform a micro from a programmable toy into a professional tool is a word processor. Several are available for the BBC machine and most are ROM-based. **Wordwise** from Computer Concepts was the first and is still the most popular at £46. It was written with the inexperienced user in mind and works from a simple selection of menu options. The Acornsoft **View** is more complex to use and more expensive at £59.80 but is capable of rather more advanced operations.

A feature found on professional word processing systems is the ability to link with external data such as names and addresses to produce standard letters from a single text file but until now neither of the aforementioned programs has been able to do that. Fortunately, things are changing and the new **Database** program from Acornsoft can create special files of data to give View owners a simple standard letters facility. Prices are £11.90 for the cassette version and £15.35 for the disc. Other manufacturers are also working on software for this useful function.

A database is a means of storing large amounts of information so that it can be retrieved quickly, having been edited, sorted or searched for specific data. Maintaining a large database usually takes up a good deal of time, so this form of information storage is really useful in business terms only if the data can be made available to a number of people, or if the searching and sorting for specific references make the system cost-effective. Those factors sometimes make a database unsuitable for the home environment, as it can be quicker to write the information on file cards and refer to it by hand.

The simplest database is something like a mailing list, which holds a number of names and addresses and can print them out on a series of sticky labels. Data can be added or deleted from the file of information and usually can be sorted into some kind of order — e.g., numerically or alphabetically — or selected in some way — e.g., everyone in the file who lives in Surrey. An example of a database of this type is **Mailist** by Gemini Marketing which sells for £19.95 on cassette or £23.95 on disc and is extremely useful for clubs or companies needing to do simple mailshots. A similar program is included in the Acornsoft **Desk Diary,** which is a combination of planning diary and address book on one cassette for £9.95.

A more complex form of database permits the users to set up or configure the format of their own data storage. Data such as catalogues, recipes, personnel or medical records, or product information can be held in files created to the user's requirements. Databases of this type are best run with one or more disc drives, which can allow much larger files to be created than with cassettes.

The Clare **Betabase** is for disc use only, is a very versatile program, and is good value at £25, while the already-mentioned Acornsoft Database costs £15.35 for the disc version and can be used in conjunction with View.

Even more advanced databases are available now in ROM form. The powerful Gemini **Datagem** program is two ROMs mounted on their own printed circuit board and at more than £100 it is also beyond most people's pockets. It is aimed squarely at business and educational users of the BBC micro, hence the high price tag.

More reasonably priced is the **Starbase** ROM marketed by GCC of Cambridge for £69. It has some very pleasant features, including the ability to manipulate information in the database to generate customised printed reports and, like Betabase, it has a large storage capacity which is limited only by the type of disc drive in use. Starbase can have only one Mode 7 screenful per record, while the individual records in Datagem can be much bigger.

The database structure is also at the heart of many packages which can be used to handle the day-to-day running of a small business and there are two suites of this type of software available for the BBC micro. One is by Acornsoft — its **Mirle** modular business software

range — which is disc-based and enables the user to buy one module at a time.

The full list is invoicing, order processing, accounts receivable, accounts payable, stock control, purchasing and mailing system. Each £24.95 program can be linked to others in the range, so that information from one updates files in the others automatically. A second range is available from Gemini — its integrated accounting programs for the 32K BBC micro. These modules are £99.95 each and the titles are stock control, invoicing and sales ledger, purchase ledger, nominal ledger and payroll.

If you are considering spending a large amount on software of this kind, it is advisable to study its specifications well and, if possible, see it running first to make sure that it really does the things you want it to do.

A spreadsheet is a program for performing masses of inter-related calculations, making it ideal for tasks such as cashflow analysis or financial modelling, scientific tables and accounting. Once a sheet has been defined, its contents can be saved, usually on to tape or disc, or printed-out to provide a permanent record of the results.

The spreadsheet is a large two-dimensional matrix or grid of cells held in the computer memory, every cell on the sheet having its own grid reference. Each vertical column is identified by one or more letters of the alphabet, while each horizontal row is given a number. Each cell may contain text, a numerical value or a formula which enables calculations to be carried-out using the contents of other cells.

The formulae are not visible in the cells but the results they produce are. There is always some way of moving the cursor from cell to cell, so that each location can be inspected or edited and it is at that stage that the formulae become visible.

The overall size of a spreadsheet is dependent on the amount of memory available in the computer but is typically 100 cells wide by 200 down. The screen acts as a window which can be moved to see different areas of the grid. The factor limiting the amount of data which can be held by the spreadsheet is the memory remaining after the sheet has been defined by the software and for that reason those sheets available as plug-in ROMs are capable of supporting a larger matrix and can therefore perform much more complex calculations.

'Vu-Calc responds very quickly as it is written in machine code'

Two inexpensive spreadsheets are available for the BBC micro which are suitable for disc or cassette use — **Vu-Calc** by Psion and **Spreadsheet Analysis,** another Gemini product. Both are fairly easy to master and the latter can be used with a second program — **Graph Plot** — to generate pie-charts and bar-graph displays from the calculated results.

My favourite here is the Gemini offering, which has a pleasant, colourful Mode 7 presentation and gives most of the essential spreadsheet facilities. It is slow, though, being a Basic program, whereas the more workmanlike Vu-Calc responds very quickly to commands as it is written in machine code.

More ambitious spreadsheet programs are the BBC Soft **Ultracalc** and **Viewsheet** by Acornsoft, both plug-in ROMs, which are modelled on professional packages and have a big range of features. At around £80, Ultracalc is the more expensive of the two, having marginally better mathematical functions and facilities for setting-up complex sheets and easily-remembered mnemonics for its commands, but it works only in Mode 7.

Viewsheet, on the other hand, makes full use of the BBC micro function keys and can operate in any of the BBC screen modes, including the 80-column modes 0 and 3. Selling for £59.80, Viewsheet has the added advantages that it can be set up to display different areas of a large sheet on screen at the same time and it can also generate an output which can be used directly by word processors such as View and Wordwise when writing reports.

Many of the programs essential to running a small business are now included free with the Z-80 second processor for the BBC model B which is complete with word processor, spreadsheet with graphics output, database and an accounting program. Also in the bundle of software is a program for customising your own databases, as well as two versions of Basic, plus CIS-Cobol, a business-orientated language.

All the programs run under CP/M, the operating system used by many of the major commercial packages available for big-league business micros, and the Z-80 processor has been developed by Acorn as a way of running those existing packages on the BBC.

The whole processor/software bundle costs £299, which sounds expensive but is incredible value considering the value of the free software. The only snag is that you must have disc drives.

Whether you buy a word processor chip, a simple database or an expensive set of linked programs to help in a small business, the BBC micro can assist with an enormous range of tasks in the home or a small-scale business environment.

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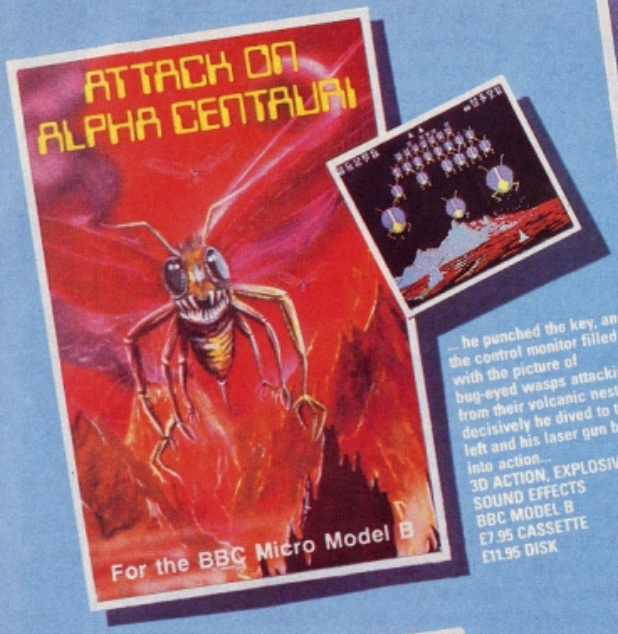

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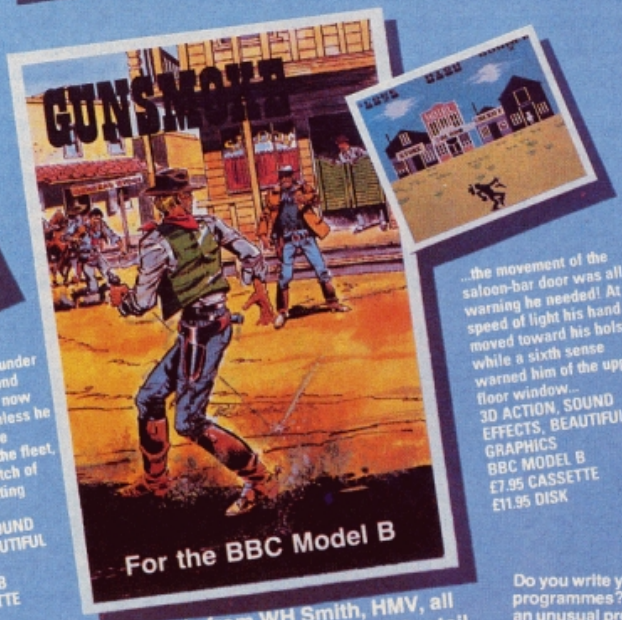

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Real pleasure in BBC deal

In the first of a new series, Chris Naylor considers the new Acorn contract

SAY what you will, from a journalist's point of view it made good copy. It had drama, intrigue — and millions of pounds were at stake. The existence of certain computer companies might have depended on the outcome. That is why representatives of magazines and newspapers waited with bated breath for one of the hottest contracts in the microworld, the lucrative, make or break contract with the BBC.

In late 1981 the BBC signed a contract with Acorn Computers, under the terms of which Acorn was allowed to refer to its machine as the BBC computer. In return for the privilege, Acorn paid the BBC a fee on each such machine sold. At the same time the BBC developed and screened *The Computer Programme,* the first programme in its computer literacy series, and the big star of the show was the new BBC machine.

At the time, Acorn was reasonably successful financially but it was by no means in the big league of computer firms. Neither was it at all certain that the BBC contract would place it in the big league. Initial estimates in 1981 suggested that the demand for the BBC micro might be some 12,000 machines a year — according to the BBC — or, more optimistically, 17,000 a year, according to Acorn.

The cheapest Model A cost £299 and who, in 1981, could reckon on many people wanting to part with almost £300 for what was, after all, only a computer? For that kind of money it was possible to buy a dishwasher and, say what you like, at least everyone knows what a dishwasher does.

Now, in 1984, more than 350,000 machines have been sold. Production is running at 25,000 machines per month, twice the estimated initial annual production — and Acorn has been floated on the Unlisted Securities Market with a value on it of £150 million, putting it firmly in the big league in the U.K. computer world alongside such giants as ICL, Britain's biggest mainframe computer company.

Despite its 20-year existence, the value of ICL, prior to its recent merger with Standard Telephone and Cables, was probably little more than twice that of Acorn, which demonstrates clearly that the growth of Acorn has been phenomenal in anybody's terms.

Tom Hohenberg, Acorn marketing manager, admits that the BBC contract helped Acorn enormously: "There is no way," he says, "that we could have sold so many machines without the BBC name," which is a fair and generous comment.

Less generous have been the comments from firms which have not benefitted from the BBC connection. At various times several micro makers announced their intention to be in the running when the BBC contract was due for renewal, including Dragon, Camputers and, of course, Sinclair Research.

At last the waiting is over. The contract was placed. The BBC was "pleased to announce that a contract has been signed extending the agreement with Acorn Computers for the manufacture and distribution of the BBC microcomputer for a further four-year period from September 1, 1984."

SIGNING THE AGREEMENT: From left to right. Hermann Hauser, Chris Curry, Bryon Parkin, managing director BBC Enterprises, and Bill Cotton, chairman.

The one fact which appears to be generally overlooked, though, is that when the BBC used the word "pleased" in making its announcement it was not just being polite — it must have been grinning from ear to ear with pleasure. For there was never any real doubt that the contract would go again to Acorn and the real reason for that is, as much as anything, the pleasure the deal gives, not to Acorn, but to the BBC.

Commonly, other firms tend to look at the BBC contract "as a licence to print money," says Hohenberg. "They talk as if the BBC bought the machines but they do not." Acorn gets the benefit of the BBC name and the enormous publicity derived from every screening of *The Computer Programme.* The BBC receives its fee from Acorn without having to do anything. Neither party will indicate the terms of the deal but nobody is denying that the BBC must have collected some £6 million from its licence fee on Acorn machines.

To put that in perspective, one of the BBC's money-spinners is *Radio Times,* a magazine which falls into the best-seller class. In the year to April 1983 profit from *Radio Times* was £5.6 million on a turnover of £45.2 million.

That means that the contract with Acorn is worth more to the BBC than *Radio Times* and, to receive the Acorn money, the BBC does not have to go to the trouble of publishing a magazine. All it has to do is to receive the cheques.

Look at it another way. The licensing of the BBC name and similar commercial enterprises is handled by BBC Enterprises Ltd. So it is BBC Enterprises Ltd which receives the cheques. In the year to April, 1983 the turnover of BBC Enterprises Ltd was £26.1 million, with no profit recorded. Take away the Acorn contribution and it becomes apparent that, were it not for the contract with Acorn, BBC Enterprises Ltd could have run into the red.

'The contract with Acorn is worth more to the BBC than the *Radio Times*'

Has the BBC contract been a licence to print money? Probably it has, but not only for Acorn — it has been manna for the BBC, too. With a deal like that, who in their right mind could have thought that the BBC would want to go elsewhere?

It was with real pleasure, not the simulated kind, that the BBC announced the renewal of the contract and who can blame it?

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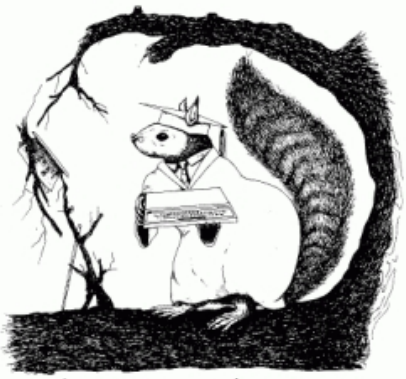


Schools software could do better says Eric Deeson

BAD MARKS for maths programs said a headline in the *Acorn Programs* June issue. The report concerned the fact that the Mathematical Association, one of Britain's professional organisations for teachers, had found some fairly serious errors in BBC software supplied free to schools by the Government. That headline was echoed in a number of periodicals, there being undercurrents of glee in almost all the reports.

My first reaction was glee, too. The glee did not, however, indicate a feeling of superiority that I could have done better. Rather it was a kind of I told you so reaction, one of relief almost that not even Government-sponsored, high-cost learning software can hit the mark.

I have been involved in educational software development and in writing about learning with micros for a number of years. The former activity has led me to two major conclusions. The first is that, defining an educational program on the basis of the kind of product which is now swamping the market, we need something like one million learning software packages before we can reckon to have covered the needs of home and school learners between the ages of five and 16 — in Britain those ages mark the limits of compulsory formal schooling.

That mind-boggling total is neither a misprint nor the result of miscounting on my part. I must point out that I have gone through the calculation in print and in public a number of times and never had it queried. In essence, the argument is that a learning program is one which covers a single topic or skill in such a way that the user can spend perhaps an hour or two with it, without getting bored, and end with new understanding and consolidated knowledge. Such a program, properly supported as required by print materials, is as valid for use at home as at school.

The formal school career of a typical British youngster comprises some 10,000 hours in the classroom. If, on average, he picks up one topic or skill each hour, we would need 10,000 programs to provide for those learning objectives.

We can double the figure at once by recalling the fact that no single child at secondary level covers all the syllabuses offered in any school. Most schools allow a choice of four or five options subjects from 20 or more.

A factor of about 10 now enters the calculation to cover at least in part the need to allow for the differing abilities and backgrounds of children and the different approaches teachers may want. A concept such as adding vectors, for instance, would need different approaches for less able and high-flying children, and for physics and mathematics syllabuses.

It would need different approaches for someone meeting the subject for the first time and for someone else looking at it in the light of last-minute revision requirements. It would need different approaches depending on whether the learner knew little geometry or had a clear concept of vectors as mathematical entities. The home learner might require something other than would a youngster at school with a teacher to hand, and so on.

That brings us to 200,000 learning programs. It is simple to step from there to the million mark by recalling the number of different hardware systems in use. The Acorns, Commodores and Sinclairs are at the moment the main machines involved in home and school learning but the giants of the past — the Apples and TRS-80s — will no doubt be replaced by new undreamed-of systems before the end of the decade.

I shall labour the point of those million programs. Clearly the work will never be completed, if indeed we ever set ourselves that task of meeting all formal learning objectives to age 16 by way of micro software. Certainly many people are looking forward rather to intelligent systems which know how to teach and can draw on the proper subset of human knowledge for a given learner at a given moment.

Certainly, too, others are looking to multi-purpose software systems into which teachers can breathe some undefined essence of fact and fancy the night before 3C pupils sit down with their micros and turn to Program 1047d. Yet others look to the logical endpoint of the information revolution and prepare to welcome the day when our masters throw factual examinations out of the window.

Who knows which of those will arrive to save us the task of preparing a million learning programs? Certain it is, though, that literally hundreds of software houses are desperately publishing so-called educational programs as if their lives depended on it, as indeed they may do, whether they were conceived in teachers' midnight-oil garrets or in the plush boardrooms of long-established book publishers.

The second claim is that there is no such thing as a perfect learning program. The glee which welcomed that Mathematical Association report on the costly Government-backed software was simply a sigh of relief that company X, faced with a poor review, could now state that not even flagship programs were perfect.

Yet can there be such a thing as a perfect learning program? Can anyone conceive a package of software which can by used with ease by any suitable learner, without problems for the supervising parent or teacher, and which deals with the topic in question without error, without chance of boredom, without being too fast or too slow?

I do not think the answer to those questions can be in the affirmative, but in saying that I at once throw down the gauntlet to those hundreds of software houses. Can they send us one of their programs and claim that it is perfect in meeting its stated aims and objectives

continued on page 22

> 'Most teachers know little about the wide field of computers in society'

continued from page 21

with learners in a stated category, and in being a model of communication as defined by current learning psychology thinking?

I remind myself of a secondary school chemistry textbook which after 40 years and dozens of editions contained an unreported error until a few years ago; and of a sixth-form physics textbook, also with sales past the million mark, with six mistakes in the latest edition.

I think of learning software for the BBC micro with screen after screen of undiluted text — all in capital letters and without full stops; and other programs which do not utilise colour and sound in any really communicative way, plus others again which respond "No, that is wrong," after every single incorrect response.

While micro technology is far from the state at which a system could conceivably model the approaches and behaviour patterns of a real teacher — compassion and patience, flexibility and humour, real-life links and references to related concepts in other topics — one must wonder at the view of education held by so many writers of learning programs.

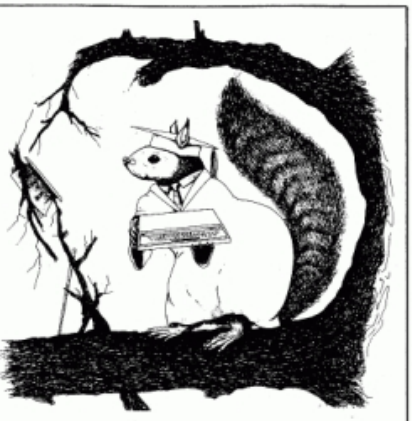
Even though most primary schools have at least one micro and secondary schools have on average four or five, computers do not affect by one jot the classroom work of the vast majority of teachers and pupils. If that is news to you, ask a sample child or two. If it amazes you, stop and think about the logistics of sharing hardware at the rate of one micro/display/backing store per 250 children — nine classes — in the light of the teacher's busy day, the staircases which fill most schools and the rarity of classroom power points.

If your child spends two hours on a learning program or two on your home BBC, he or she will probably learn more with the new technology than in a year at school.

So in what ways are micros, in theory, used in our schools? One can break down educational computing into several distinct categories. Computer awareness is often called information technology in school prospectuses and timetables. Its aim is to maximise children's familiarity with computers in the world as a whole — their use, their uses, their abuses. Many schools include at least a few hours of such work in various kinds of general course followed by all pupils. Not only is a computer not needed in that kind of work — a school micro on the teacher's desk can interfere with the kind of learning for life which is to take place.

The reasons are that most teachers know little about the wide field of computers in society and that so far there is almost no relevant software to aid the demonstration of principles. Another message to software houses: let us have some good computer awareness simulations — booking systems, police-style databases, banking software. Almost all we have so far is the Tecmedia **Edfax,** a DIY teletext simulator.

In computer studies, the computer is the apparatus used in formal examination-based computer science teaching. In the last few years the number of candidates for examinations like CSE and GCE — the main British public examinations at around age 16 — have grown enormously and have flung the subject well and truly into the top 10.



It is almost possible to teach courses like that without a micro in the classroom; some schools still do so, with success. Yet computer power of some kind is essential and it fulfils two needs. The first is computer awareness as I defined it — and where the teacher's needs are as desperate as I said; the second is for the pupils to learn the elements of programming where the need is for good sample software.

That "good sample software" has to show originality of purpose, a thoughtful use of coding techniques at different levels, and structure from the purists' entirely valid point of view.

Again, such software does not exist, though it is the area which uses most computer time in all secondary schools and that is the area in which the use of the home micro can do most good.

Computer-assisted learning is the field I had in mind when talking about one million programs. The computer joins chalkboard, textbook and projector as one of the many resources available to maximise the effectiveness of teaching in almost all subject areas at all levels. Many teachers do not use textbooks — they do not like them and/or they cannot afford them; many more do not use projectors — they fear electrical equipment and/or they cannot afford the software; and the vast majority do not use computers for the same kinds of reason.

If we want micros to be able to help every subject-based classroom need, that is where we want those million programs, and that is where all those software publishers are concentrating their dreams of riches.

Of the 200,000 programs we need for the BBC, we have now perhaps a thousand or even two. The spread is poor, however, there being dozens of packages helping with the rote learning of multiplication tables and dozens more offering to drill the hapless youngster in simple French vocabulary.

They are the programs which are

Ampalsoft, 31 Woodbridge Road, Darby Green, Blackwater, Camberley, Surrey — a new entrant to the field with some interesting potential, so far too early to assess.

AVC Software, PO Box 415, Harborne, Birmingham B17 9TT — a number of Electron and BBC programs, mainly drills for the 8-13 age range but also a popular simple version of turtle Logo.

Beebugsoft, PO Box 109, High Wycombe, Bucks — **Paintbox, Masterfile** and other valuable relevant utilities.

Bourne Educational Software, Bourne House, The Hundred, Romsey, Hampshire SO5 8BY — a prolific publisher with some good products.

Chalksoft, 37 Willowslea Road, Worcester WR3 7QP — a good and growing range, though rather uneven in quality.

Clwyd Technics, 4B Antelope Estate, Rhydymwyn, near Mold, Clwyd CH7 5JH — **Edword,** a text-processing package designed for school use.

Computer Concepts, 16 Wayside, Chipperfield, Herts WD4 9JJ — **Wordwise** and other fine utilities.

Golem, 77 Qualitas, Bracknell, Berkshire RG12 4QG — another new company with some interesting-sounding products.

Griffin Software, Ealing Road, Alperton, Middlesex HA0 1HJ — a good list of educational programs, mainly at secondary level.

Heinemann Computers, 22 Bedford Square, London WC1B 3HH — several invaluable packages, particularly in secondary mathematics.

Kosmos Software, 1 Pilgrim's Close, Harlington, Dunstable, Beds LU5 6LX — a newcomer to the scene with rather heavy foreign language drills.

Longman Software, Burnt Mill, Harlow, Essex CM20 2JE — a major publisher, long in the field but only now beginning to hit the mark.

MUSE, PO Box 43, Hull HU1 2HD — the world's biggest range of educational software, with much for the BBC — all levels, many subjects.

Shiva Software, 64 Welsh Row, Nantwich, Cheshire CW5 5ES — a highly-appreciated range of learning programs, mainly for younger children.

Tecmedia, 5 Granby Street, Loughborough, Leics LE11 3DU — **EdFax,** a superb model teletext system, good for school newspapers and such.

4MAT Educational Software, Linden Lea, Rock Park, Barnstaple, Devon — some novel educational games.

appearing, however, and the ones we shall be reviewing. They are the programs parents have to select for their unfortunate offspring, because they are the only ones which reach the software shelves. I hope we shall be able to say something different in two years.

In administration I see the computer as helping run a school in just the same way as it helps run the day-to-day and year-to-year work of any other complex business. That field can clearly be of no interest to parents but we shall be reviewing products as they appear from school management point of view.

Here the concern of published software is school accounts, calendar organisation, time-tabling options system development and such. It is a field where much is still to be done but where, as yet, the interest of schools is not particularly high because they have insufficent hardware.

Having said that educational administration software is not of interest to home users, I must observe one category where one could argue that that is not the case. I am thinking of text-processing software as used outside the school office and staffroom and outside the commerce, business and office practice departments. Some teachers claim that every child should learn to use a computer as a text processor, to improve the preparation of stories, compositions and essays in all contexts.

Computer Concepts' **Wordwise** is the front-runner, being as pleasant to use for a child's history essay as for any other task. In fact, it is not so good in office practice departments.

You may have seen **Edword,** published by Clwyd Technics specially for the schools market in which it has a number of clear advantages. I would still reckon that home users should stay with Wordwise, even if most of the home-work is homework.

Data capture and process control is an area where educational software is almost restricted to school rather than home use. The concern is interfacing the BBC with specialist equipment in the science laboratory, the craft/design/technology workshop, the audio-visual studio and the gymnasium. While interfacing and robotics are, of course, areas of great interest to the home hobbyist, their educational benefits are not often direct other than to help the young explorer gain experience and expertise in certain skills.

In schools, on the other hand, we can think of linking a micro to meters, oscilloscopes, recording devices, lathes, greenhouse environmental control systems, projectors and fencing hit-registers. Such applications are all specific to group work in specialist subject departments.

There are more uses. Some may fit approximately into one or other of my five main categories. Others are important but difficult to classify. We may think of the crucial work of school computing clubs which can keep teachers and caretakers on their toes from 7.30 a.m. to 8 p.m. Or of pure gaming — not the same as educational gaming — in those clubs, in awareness classes and for raising cash on Open Days and during parent/teacher association gatherings; and of the embryonic businesses which use school equipment, electricity and expertise to break into the ever-expanding software and add-on market.

In this context of preparing to review educational software, those areas are likely not to figure largely. I offer a list, with little comment, of the major publishers in the field. The products of most can be brought from retail outlets but mail order is safe with them all. Note that many also have products for other micros than the Electron and BBC, so you will need to state clearly what you want when you order.

● *Eric Deeson heads the computing department in a Birmingham sixth-form college, is editor of the magazine* Computers in Schools *and wrote* The BBC Micro in Education, *published by Shiva.*

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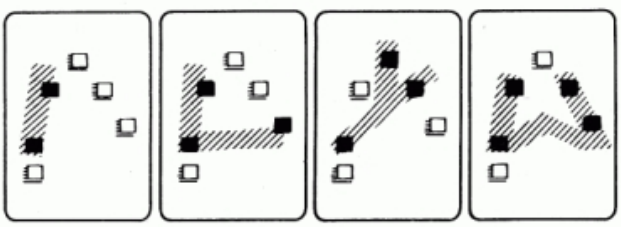

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– PETER RODWELL (as Editor of 'Personal Computer World') "took me half an hour to learn the alphabet . . . far easier than learning to type. It's an addictive device, and I'm starting to wonder how I ever managed without one."

– PETER WHEELER (in the 'Times Educational Supplement') "a new user can start to touch type after one hour's usage."

– FRANK DALE (BBC Producer – writing in 'Electronic Times') "no other machine is so easy to use, so easy to learn, so generally useful . . ."

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TECHNICAL DATA:
Loading length: &605. Running length: &300.
No zero-page locations, all ADC channels.
Interrupt service vector IRQ2V, correctly chained.

TESTED COMPATIBILITY

BBC Model "B"	Acorn
OS 1.2	
BASIC I or BASIC II (unless using INKEY with negative argument)	Acorn
DFS 0.90	Acorn
View A1.4	Acornsoft
Wordwise 1.17	Computer Concepts
Edword	Clwyd Technics

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THE BEST IDEA SINCE THE HUMAN HAND

Wise words of a top programmer

Nicole Segre talks to Charles Moir, author of a best-selling ROM

ONE of the best-selling pieces of software for the BBC micro is not, as you might expect, an arcade game or even an educational program but a word processing chip called **Wordwise.** Since it appeared in November 1982, the £46 ROM has sold roughly 35,000 copies, a feat many far more modestly-priced programs would envy. It has also founded the fortunes of Computer Concepts, a flourishing little company known as the specialist in ROM-based software for the BBC micro.

The man behind both the business and the program is Charles Moir, a retiring 24-year-old without any formal training in programming. Because of the pressures of running his business, Wordwise has so far remained his only major attempt at software authorship.

Moir left public school at Oundle with one A level in physics, having dropped out of both his mathematics and chemistry courses. To add to his meagre qualifications, Moir had a keen interest in electronics and only the vaguest idea of what he wanted to do in life. To pass the time, he worked for a period in his father's acoustical engineering firm.

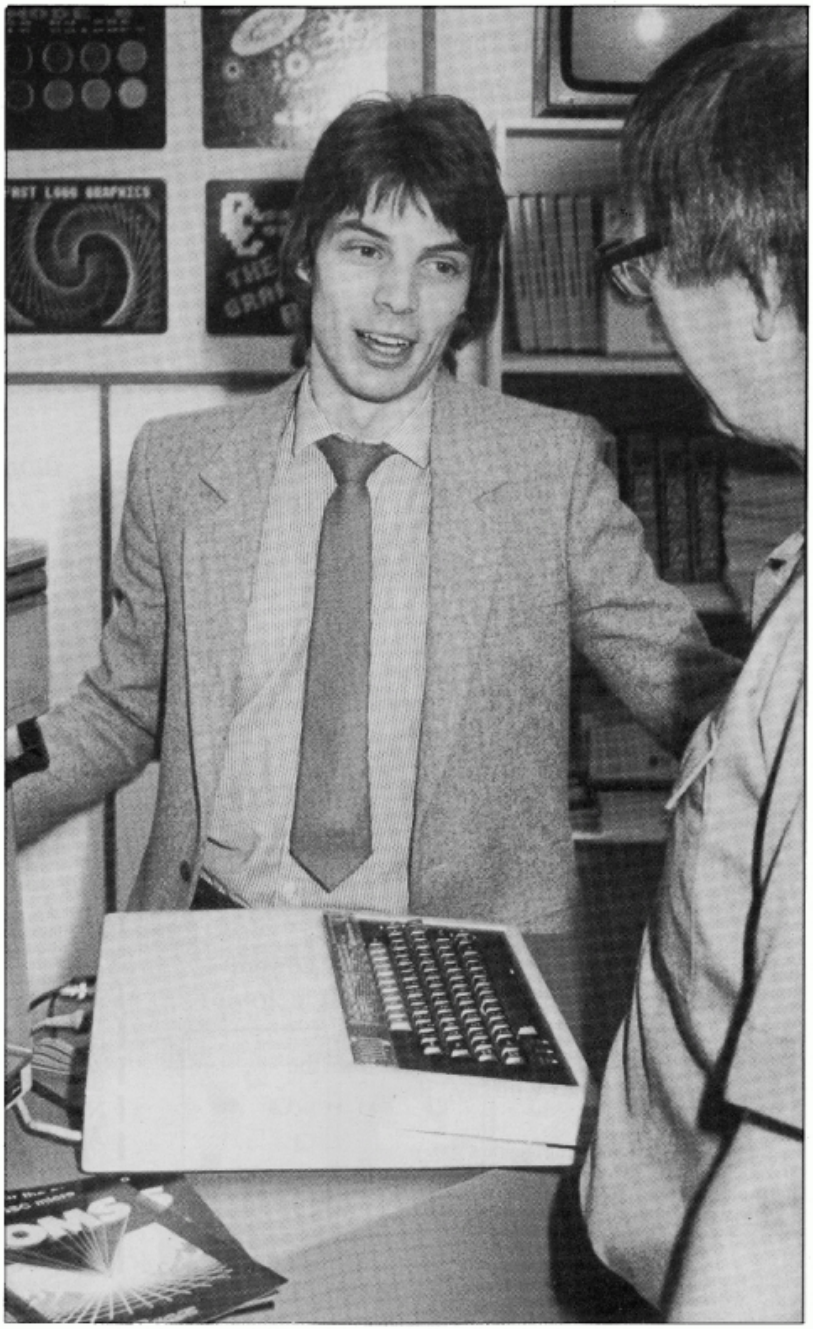
Moir's future began to take shape in 1979 when he bought a Nascom 1 in kit form for £125. "It had to be programmed in machine code, so I learned the hard way," Moir says. Soon afterwards, he graduated to an Atom and began to think about Wordwise.

"A word processor seemed the obvious choice," he explains. "Also, I knew people who worked at Acorn and had a fair idea of what the BBC micro would be like before anyone had seen it. That gave us a great advantage."

It took Moir nearly nine months to write the program, although he says it could easily have been done in three. "I'm very lazy," he says, "and much as I like programming, it can be incredibly tedious at times."

From the start, Moir decided to make his word processor ROM-based, rather than produce it on a disc or cassette, for two reasons. "One was to make the most of the exceptional capacity of the BBC to take extra ROM chips, 16 with an expansion board, and four without," he says. "The other was that a ROM would not use any of the limited memory store of the machine." The program was based mainly on the word processor then available for the TXED research machine, considered a standard in educational circles.

"There was nothing particularly complicated about writing the program," Moir says, "apart from making



sure at the start that it would not go over-size. Where I did spend a good deal of effort, however, was in making the program user-friendly. I wanted anyone to be able to use it, even if they had never seen a computer in their lives."

There is no doubt that the user-friendliness and simplicity of Wordwise has been the major factor in its success. Unlike the TXED word processor, which Moir describes as having "horrible combinations of all kinds of keys", Wordwise is menu-driven to perform simple operations such as save, load, insert, and search and replace, and the manual is praised frequently as a model of clarity.

"Of all the word processors, including WordStar, the most popular CPM-based business processor, or View from Acornsoft, ours is the one which appeals most to the non-professional," Moir says. Confirmation of this can be seen in the fact that Wordwise is still selling at a steady rate of about 7,000-8,000 copies each week.

The success of Wordwise enabled Moir to look forwards into new products. Among them are one or two games, notably **Android Attack,** but early this year Moir sold all the company's games to GTM Computers. "Games are becoming very competitive," Moir says. "You have to sell too many of them to make the effort worthwhile, especially if prices are to fall, as I am sure they are. I would prefer not to be involved in that side of the market."

Since the first timid advertisements appeared for Wordwise, Computer Concepts has released nine ROM-based programs, putting the company way ahead in its field. "There are only about four or five other ROMs for the BBC on the market," Moir says, "and none is as good as ours."

The range of products includes **Gremlin,** a utility to help debugging machine code programs; **Disc Doctor,** which adds a variety of new facilities to disc drive operations; and a graphics extension ROM putting complex designs within the reach of even inexperienced programmers.

"Acorn has always promised that it would be producing a graphics ROM but so far it has not done so," Moir says. "That is one of the great things about Acorn; it takes it ages to produce anything, even though it employs something like 260 people, so we can always be ahead."

Moir thinks the real future now lies with communications ROMs. He has already produced **Communicator** and **Termi R,** connecting the BBC micro

to other computers, inclusing mainframes, and turning it into a terminal. Although the ROMs can link into electronic mail systems, they do not connect to Prestel or other viewdata systems, but Moir regards that as the next step.

"There is no mass market yet," he says, "but if British Telecom manages to get its prices right, communications may well be the consumer boom of the future."

He thinks that Telecom Gold, rather than Prestel, will be the real winner. "Prestel is satisfactory for information but Telecom Gold, which is aimed purely at businessmen, is an inexpensive way of providing an electronic mail system to a world-wide network. A ROM enabling people to link into the system could have huge potential."

Moir runs Computer Concepts from his home, until recently a large, lawn-ringed house at Chipperfield, and now an even bigger house at Hemel Hempstead. The firm comprises Moir and six helpers, as well as several outside programmers. Most of them are local schoolboys whom Moir has instructed in what he wants, or people who have submitted their work out of the blue. Two of them, he says, are "absolute naturals", who are managing to earn considerable amounts of money from programming while still working for their A levels.

Besides programming talent, Moir feels that several other factors are important in contributing to the success of the company. One is that it has established itself as a supplier of ROM software long before anyone else. As a result, it has acquired the greatest experience in obtaining, duplicating and packaging chips, and has also developed a distinctive house style.

Most of all, Moir says, Computer Concepts prides itself on its manuals, which aim to make every product accessible to the most uninitiated customer.

"We should have a full-time manual writer," Moir says, "but so far we have just made the programmer explain his program and then all of us, including various friends and my Mum, have read his notes and made comments until we think we have the right combination. The difficulty is in getting the manual to seem neither too simple, which would seem patronising, nor too complicated."

The only fly in the ointment at present is the rising price of the chips on which the company's existence depends. Moir attributes the present chip shortage to the huge numbers of personal computers being built by IBM, which he thinks is using more than a fair share of the world's supply of chips. He is paying three times what each chip cost only a few months ago and if prices rise further, he would have to increase the prices of his ROMs, a prospect he does not relish.

In other respects, he says, the future is rosy, even though he cannot look more than two years ahead. "This business moves so fast; who knows where we will be in five years time?" he asks. One thing, however, seems likely and that is that although all the software he has produced so far has been for the BBC, he will probably soon start looking at other machines.

"The BBC is an excellent computer," he says, "but in its present form, its days are numbered. It will soon seem dated compared to some of the newer products on the market."

Moir is particularly attracted to the QL, even though he thinks its launch was a little hasty. Also, he says the amount of software accompanying the machine makes it scarcely worth producing more. "There may, however, be scope for a ROM-based language," he thinks.

In the meantime, he is busy working on a full BBC Basic compiler and a Logo interpreter, another product promised by Acorn which so far has not materialised.

Moir works at all kinds of strange times, as well as during normal office hours, and as a result finds little time for programming of his own.

"When you have just finished a program," he says, "you think you never want to look at another but eventually the urge returns. Nowadays, I have the chance to write only the odd routine or part of a program, but I would really love to be able to do another major one of my own."

If he does and if it proves as successful as Wordwise, Charles Moir and Computer Concepts together can scarcely go wrong.

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CAN YOU CRACK THE CODE?

```
 10  MODE 6
 20  VDU28,0,5,39,0
 30  y=O
 40  INPUT "ENTER CODE BREAKER
     NUMBER", num
 50  FOR x = 1 TO 14
 60  READ data

 80  PRINTTAB (x.y+1); MID$(converts$,1,x)
 90  NEXT
100  DATA 16575, 17085, 20145, 20910,
     19890
110  DATA 8160, 20400, 20910, 20145, 18105
120  DATA 20910, 16575, 19635, 21165
```

WHETHER you own an Electron or a BBC, there is a super prize to be won in our special competition to celebrate the launch of *Acorn Programs* as a monthly publication.

The first correct entry from an Electron owner wins the recently released PLUS-1 expansion unit. Worth £59.90 in the shops, the PLUS-1 adds a centronics-compatible printer interface, a joystick port, and two slots for the new cartridge software from Acornsoft.

If you own a BBC B, you could win a DFS disc interface from Acorn, allowing you to connect a wide range of disc drives to your computer. Acorn Computers will even arrange to have the interface fitted for you, bringing the value of the prize to about £90.

All you have to do is to find the secret message in the program listed here.

Unfortunately the gremlins have struck again and line 70 is missing. As luck would have it, the program will not work without the line. What we would like you to do is to write line 70 and tell us the encrypted message. You must answer three questions. They are:

What is the missing line 70?

What are the four possible positive numbers which will break the code?

What is the encrypted message?

Once you think you have the answers, send them on a postcard to: Acorn Programs Competition, ECC Publications, 2 Newington Green Road, London N1 4AQ.

BORIS spi

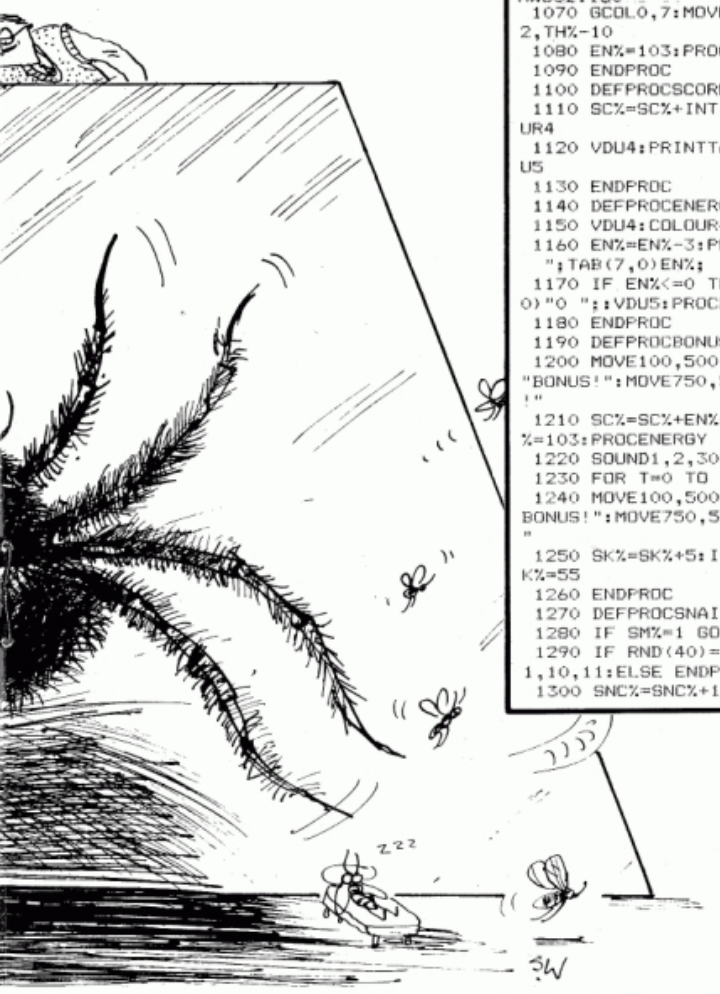
```
   10 REM ££££££££££££££££
   20 REM £      BORIS      £
   30 REM £    By S.Rear    £
   40 REM ££££££££££££££££
   50 REM ******ENVELOPES******
   60 ENVELOPE1,1,-10,-37,-89,24
,13,46,43,106,64,64,135,0
   70 ENVELOPE2,1,0,2,4,10,20,20
,100,10,0,10,120,120
   80 ENVELOPE3,2,-10,-40,8,4,3,
7,126,-1,10,-5,126,0
   90 ENVELOPE4,130,120,-56,20,-
11,100,-23,42,0,0,-1,126,0
  100 REM ******DEFINE*CHARACTER
S******
  110 VDU23,224,1,7,15,61,79,151
,162,162
  120 VDU23,225,64,224,240,188,2
50,233,69,69
  130 VDU23,226,112,248,248,248,
248,112,0,0
  140 VDU23,227,5,2,2,2,2,2,124,
0
  150 VDU23,228,0,0,78,241,225,1
27,72,36
  160 VDU23,229,0,0,0,128,192,12
8,0,0
  170 VDU23,230,1,2,68,249,243,1
27,72,144
  180 VDU23,231,0,128,0,128,192,
128,0,0
  190 VDU23,232,0,0,0,1,3,1,0,0
  200 VDU23,233,0,0,114,143,135,
254,18,36
  210 VDU23,234,0,1,0,1,3,1,0,0
  220 VDU23,235,128,64,34,159,20
7,254,18,9
  230 VDU23,236,0,4,69,85,215,24
7,255,255
  240 REM ******CONTROL*PROGRAM*
*****
  250 ON ERROR IF ERR=17 RUN ELS
E MODE7:REPORT:PRINT" at line ";
ERL:GOTO 350
  260 MODE1:VDU23;8202;0;0;0;:PR
OCINST
  270 MODE2:VDU23;8202;0;0;0;:*F
X4,1
  280 PROCINIT:PROCSCREEN
  290 REPEAT
  300 SOUND4,-5,105,1
  310 PROCSPIDER:PROCSPIDER:PROC
FLY:PROCSNAIL
  320 EC%=EC%+1:IF EC%>=INT(200/
SK%)-3 THEN EC%=0:PROCENERGY
  330 UNTIL RE%<>0
  340 IF RE%=1 THEN VDU4:GOTO 28
0:ELSE MODE7
  350 *FX4,0
  360 END
  370 REM ******DEFINE*PROCEDURE
S******
  380 DEFPROCINIT
  390 EN%=100:SC%=0:PS%=800:TH%=
810
  400 D%=0:FX%=0:FY%=0:SK%=15:SF
%=0
  410 FL%=0:EC%=1:SO%=110:ERS%=1
88
  420 FC%=0:SN%=0:SNC%=0:SM%=0:R
E%=0
  430 ENDPROC
  440 DEFPROCINIT2
  450 PS%=800:TH%=810:D%=0:FX%=0
:FY%=0
  460 SF%=0:FL%=0:EC%=1:SO%=110:
SN%=0
  470 SNC%=0:SM%=0
  480 ENDPROC
  490 DEFPROCSCREEN
  500 COLOUR134:CLS:COLOUR4
  510 PRINTTAB(0,0)"ENERGY=";EN%
  520 PRINTTAB(11,0)"1UP=";SC%
  530 PRINTTAB(0,2)STRING$(20,"-
")
  540 COLOUR2:PRINTTAB(0,29)STRI
NG$(20,CHR$236)
  550 VDU5:GCOL0,0:MOVE570,800:V
DU224,225
  560 MOVE380,980:GCOL0,0:VDU224
,225,9,224,225,9,224,225
  570 GCOL0,7:MOVE632,940:DRAW63
2,800
  580 ENDPROC
  590 DEFPROCSPIDER
  600 IF INKEY(-66) AND TH%<920
THEN GOTO 610 ELSE GOTO 620
  610 GCOL0,6:PROCSPID:PS%=PS%+2
0:TH%=TH%+20:GOTO640
  620 IF INKEY(-98) AND TH%>150
THEN GOTO 630 ELSE FOR W=0 TO 30
:NEXT:GOTO 640
  630 GCOL0,6:PROCSPID:PS%=PS%-2
0:TH%=TH%-20
  640 GCOL0,0:PROCSPID:GCOL0,7:P
ROCTHREAD
  650 IF PS%<FY%+20 AND PS%>FY%-
20 THEN GOTO 660 ELSE 670
  660 IF FX%>470 AND FX%<680 THE
N PROCCAUGHTFLY
  670 IF TH%<170 AND SN%>520 AND
 SN%<660 THEN PROCCAUGHTSNAIL
  680 ENDPROC
  690 DEFPROCSPID
  700 MOVE570,PS%:VDU224,225
  710 ENDPROC
  720 DEFPROCTHREAD
  730 MOVE632,PS%:DRAW632,TH%+10
  740 ENDPROC
  750 DEFPROCFLY
  760 IF SM%=0 THEN FOR W=0 TO 1
5:NEXTW
  770 IF D%>0 THEN 800 ELSE ON R
ND(2) GOTO 780,790
  780 FX%=0:FY%=RND(510)+400-(SK
%*2):D%=1:FL%=232:SF%=232:GOTO80
0
  790 FX%=1120:FY%=RND(510)+400-
(SK%*2):D%=2:FL%=228:SF%=228
  800 GCOL0,6:MOVEFX%,FY%:VDUFL%
,FL%+1
  810 IF D%=1 THEN FX%=FX%+2*SK%
 ELSE FX%=FX%-2*SK%
  820 FL%=FL%+2:IF FL%>SF%+2 THE
N FL%=SF%
  830 IF D%=1 AND FX%>1120 OR D%
=2 AND FX%<0 THEN D%=0:GOTO860
  840 MOVEFX%,FY%:GCOL0,1:VDUFL%
,FL%+1
  850 IF FX%>480 AND FX%<680 AND
 PS%<FY% THEN PROCDEAD
  860 ENDPROC
  870 DEFPROCCAUGHTFLY
  880 SOUND0,-10,4,2:GCOL0,6:MOV
EFX%,FY%:VDUFL%,FL%+1
  890 D%=0:FX%=0:EN%=EN%+5:PROCE
NERGY:PROCSCORE:FC%=FC%+1
  900 IF FC%=10 THEN FC%=0:PROCB
ONUS
  910 ENDPROC
  920 DEFPROCDEAD
  930 MOVESN%,120:GCOL0,6:VDU226
```

BORIS THE SPIDER needs flies and snails to keep alive and it is your job to see that he gets them. Lower him on his thread to catch the flies, worth more points the lower they are, and the snails, worth 500 points each. You get bonus points after catch-

S THE der

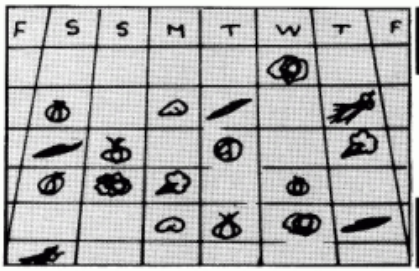
ing 10 flies, but be careful — if a fly hits the spider's thread, or if Boris runs out of energy due to lack of nourishment, he crashes to the ground.

Boris the Spider was written for the BBC B by Simon Rear of Immingham, South Humberside.

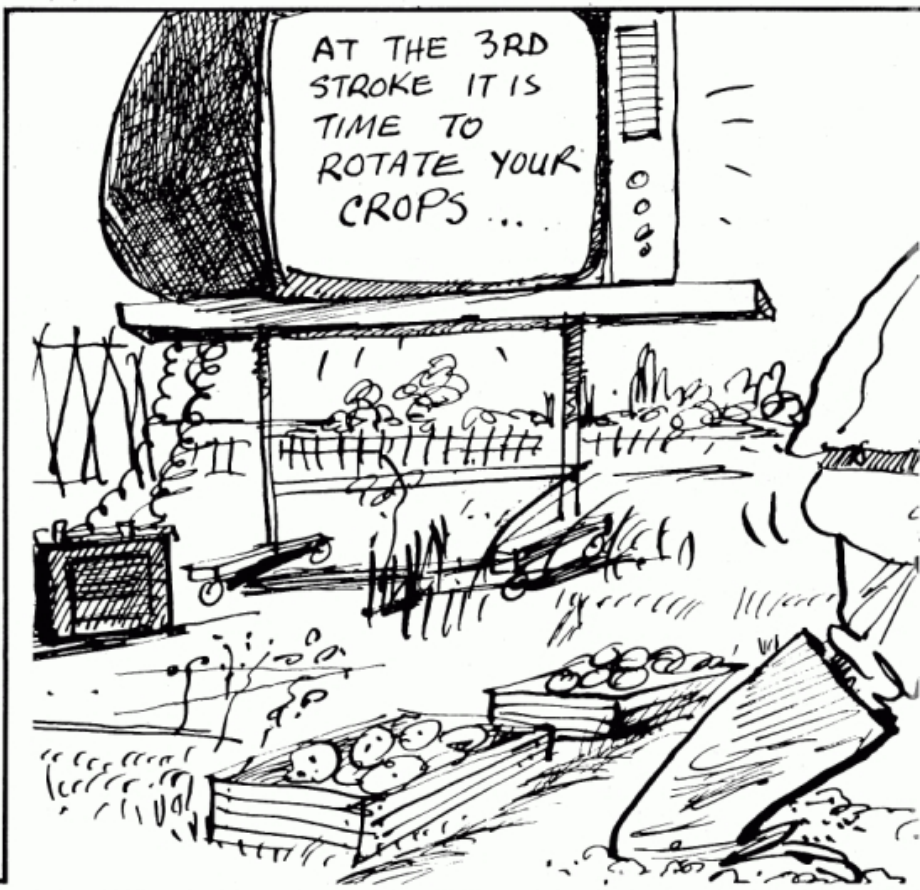


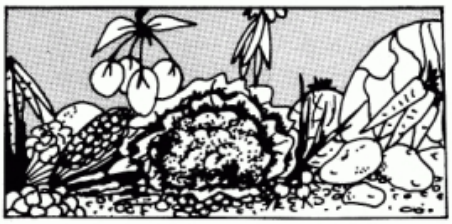
```
,8,227
  940 MOVE632,FY%:GCOL0,6:DRAW63
2,TH%-20:MOVEFX%,FY%:VDUFL%,FL%+
1
  950 FOR DE%=PS% TO 120 STEP-10
  960 SO%=SO%+1
  970 SOUND&0011,-15,SO%,2:SOUND
&0012,-15,SO%,2
  980 MOVE570,DE%:GCOL0,6:VDU224
,225
  990 MOVE570,DE%-10:GCOL0,RND(5
):VDU224,225
 1000 NEXT DE%:MOVE570,DE%:GCOL0
,6:VDU224,225:VDU4:COLOUR5
 1010 PRINTTAB(5,29);"S P L A T
!"
 1020 ERS%=ERS%+192:VDU5:GCOL0,6
:MOVE ERS%,980:VDU224,225
 1030 SOUND0,-10,6,40:FORW=0TO35
00:NEXT
 1040 IF ERS%=764 PROCNEWGAME:EN
DPROC:ELSE PROCINIT2
 1050 VDU4:COLOUR2:PRINTTAB(0,29
)STRING$(20,CHR$236)
 1060 VDU5:GCOL0,0:MOVE570,800:V
DU224,225:GCOL0,6:MOVE632,940:DR
AW632.150
 1070 GCOL0,7:MOVE632,940:DRAW63
2,TH%-10
 1080 EN%=103:PROCENERGY
 1090 ENDPROC
 1100 DEFPROCSCORE
 1110 SC%=SC%+INT(4000/FY%):COLO
UR4
 1120 VDU4:PRINTTAB(15,0);SC%:VD
U5
 1130 ENDPROC
 1140 DEFPROCENERGY
 1150 VDU4:COLOUR4
 1160 EN%=EN%-3:PRINTTAB(7,0);"
  ";TAB(7,0)EN%;
 1170 IF EN%<=0 THEN PRINTTAB(7,
0)"0 ";:VDU5:PROCDEAD:ELSE VDU5
 1180 ENDPROC
 1190 DEFPROCBONUS
 1200 MOVE100,500:GCOL0,11:PRINT
"BONUS!":MOVE750,500:PRINT"BONUS
!"
 1210 SC%=SC%+EN%*2:PROCSCORE:EN
%=103:PROCENERGY
 1220 SOUND1,2,30,100
 1230 FOR T=0 TO 7000:NEXT T
 1240 MOVE100,500:GCOL0,6:PRINT"
BONUS!":MOVE750,500:PRINT"BONUS!
"
 1250 SK%=SK%+5:IF SK%>55 THEN S
K%=55
 1260 ENDPROC
 1270 DEFPROCSNAIL
 1280 IF SM%=1 GOTO 1300
 1290 IF RND(40)=5 SM%=1:SOUND2,
1,10,11:ELSE ENDPROC
 1300 SNC%=SNC%+1:IF SNC%=11 THE
N SNC%=0
 1310 GCOL0,6:MOVESN%,120:VDU226
,8,227
 1320 SN%=SN%+20:IF SN%>1200 THE
N SN%=0:SM%=0:ENDPROC
 1330 GCOL0,1:MOVESN%,120:VDU226
,8:GCOL0,4:VDU227
 1340 ENDPROC
 1350 DEFPROCCAUGHTSNAIL
 1360 GCOL0,6:MOVESN%,120:VDU226
,8,227
 1370 GCOL0,7:MOVE500,150:PRINT"
5 0 0"
 1380 SOUND1,3,80,10:FOR W=0 TO
1000:NEXT W
 1390 GCOL0,6:MOVE500,150:PRINT"
5 0 0"
 1400 SC%=SC%+500:PROCSCORE:EN%=
103:EC%=0:PROCENERGY:SM%=0:SN%=0
 1410 ENDPROC
 1420 DEFPROCNEWGAME
 1430 *FX15,0
 1440 SOUND1,4,100,130:VDU4
 1450 COLOUR9:PRINTTAB(5,12)">GA
ME OVER<"
 1460 COLOUR5:PRINTTAB(4,14)"You
 scored-";SC%
 1470 FOR W=0 TO 10000:NEXT W
 1480 COLOUR4:PRINTTAB(0,16)"Ano
ther game? (y/n)"
 1490 RE$=INKEY$(0)
 1500 IF RE$="Y" OR RE$="y" THEN
 RE%=1:GOTO 1530
 1510 IF RE$="N" OR RE$="n" THEN
 RE%=2:GOTO 1530
 1520 GOTO 1490
 1530 ENDPROC
 1540 DEFPROCINST
 1550 VDU19,3,2,0,0,0:COLOUR3
 1560 PRINTTAB(16,1)"B O R I S"
 1570 COLOUR1:PRINTTAB(16,2)"By
S.Rear"
 1580 COLOUR2:PRINTTAB(1,4)"You
must keep Boris the spider alive
 by feeding ";
 1590 PRINT"him on the flies and
 snails";TAB(1,6)"which pass by.
"
 1600 COLOUR3:PRINTTAB(1,8)"Bori
s will loose one of his three li
ves if a fly ";
 1610 PRINT"hits his thread or h
e runs out of energy due to lack
 of flies."
 1620 COLOUR1:PRINTTAB(1,12)"Aft
er eating ten flies you score bo
nus  points ";
 1630 PRINT"depending on how muc
h energy you have left.You then
go onto the ";
 1640 PRINT"next     stage where
 the flies are faster and    Bor
is's";
 1650 PRINT" energy decreases mo
re rapidly."
 1660 COLOUR2:PRINTTAB(2,18)"To
move Boris:-";TAB(17,19)"up the
thread - 'A'";
 1670 PRINTTAB(15,20)"down the t
hread - 'Z'"
 1680 COLOUR3:PRINTTAB(2,22)"Sco
re - 500 pts. per snail";
 1690 PRINTTAB(10,23)"more point
s the lower the fly"
 1700 PROCTUNE
 1710 FOR WAIT=0 TO 2000:NEXT
 1720 COLOUR3:PRINTTAB(8,26)"HIT
 THE SPACE BAR TO BEGIN"
 1730 REPEAT UNTIL INKEY$(0)=" "
 1740 CLS:VDU20
 1750 ENDPROC
 1760 DEFPROCTUNE
 1770 FOR S=0 TO 18:READ N,D
 1780 SOUND 3,-10,N+10,D:SOUND 2
,-10,N+10,D:NEXT
 1790 DATA 81,4,81,4,89,4,81,4,1
01,4,101,4,93,4,93,4,89,4,81,4,8
9,8,93,8,89,8
 1800 DATA 81,8,73,4,69,4,73,4,8
1,4,81,4
 1810 ENDPROC
```

VEGETABLE PLAN




```
   10 REM ** VEGETABLE PLANNER *
*
   20 REM ** A UTILITY PROGRAM F
OR THE ACORN ELECTRON **
   30 REM ** <C> Steve W. Lucas
  June 1984 **
   40 REM ** NEXT TWO LINES DISA
BLE ESCAPE AND BREAK AND SHOULD
NOT BE TYPED IN UNTIL YOU ARE SU
RE THAT YOU HAVE FULLY DEBUGGED
IT **
   50 *FX229,1
   60 *KEY10 OLD|M RUN|M
   70 MODE6:VDU19,0,4,0,0,0,23,1
,0;0;0;0;
   80 PRINT'TAB(10);"Vegetable P
lanner"
   90 PRINT''TAB(10);"a utility
program"
  100 PRINT''''TAB(6);"<C> Steve
W. Lucas   1984"
  110 TIME=0:REPEATUNTILTIME>200
:MODE1:GCOL0,1:MOVE50,100:DRAW40
0,100:PLOT85,350,400
  120 MOVE50,100:PLOT85,50,400:G
COL0,2:MOVE350,400:MOVE650,400:P
LOT85,650,100:MOVE350,100:PLOT85
,350,400
  130VDU19,3,5,0,0,0
  140 GCOL0,3:MOVE650,100:MOVE65
0,400:PLOT85,950,100:PLOT85,950,
400
  150 GCOL0,2:DRAW1250,400:DRAW1
250,100:DRAW950,100
  160 COLOUR1:PRINTTAB(2,17);"PL
OT A","PLOT B","PLOT C","PLOT D"
  170 COLOUR 3:PRINTTAB(14,0)"CR
OP ROTATION":COLOUR2:PRINT"Most
 vegetables must not be grown on
 thesame land for two consecutiv
e years and need to be rotated."
  180 COLOUR3:PRINT'"PLOT A :- p
eas, beans etc"
  190 PRINT"PLOT B :- root veget
ables"
  200 PRINT"PLOT C :- Brassicas"
  210 PRINT"PLOT D :- plants whi
ch should be left inthe same bed
."
  220 COLOUR2:PRINTTAB(0,31);"Pr
ess   <Space Bar>   to continue"
;
  230 REPEAT UNTIL GET=32:MODE6:
VDU19,0,4,0,0,0,23,1,0;0;0;0;
  240 REPEAT:PROCtitle
  250 PRINT''''"Do you want :-"''
"A.  To look up a particular veg
etable"
  260 PRINT"B.  To list the vege
tables to be sown in    a given
month."
  270 PRINT"C.  To list the plan
ts suitable for a       given pl
ot"''"D.  To list the vegetables
 ready for       harvesting in a
 given month."
  280 REPEAT:A$=GET$:UNTIL A$="A
"ORA$="B"ORA$="C"ORA$="D"
  290 IFA$="A"THENPROCvegetable
  300 IFA$="C"THENPROCplot
  310 IFA$="B"THENPROCmonth
  320 IFA$="D"THENPROCharvest
  330 UNTIL FALSE
  340DATA ASPARAGUS,C,4,D,45
  350DATA RUNNER BEANS,S,456,A,7
89
  360DATA DWARF BEANS,S,3456,A,6
789
  370DATA FRENCH BEANS,S,3456,A,
6789
  380DATA BROAD BEANS,S,3412,A,5
678
  390 DATA ARTICHOKES,O,4,D,789
  400DATA BEETROOT,S,34567,B,89A
  410 DATA BRUSSELS SPROUTS,S,23
4,C,89ABC12
  420 DATA CABBAGE (SUMMER),S,23
,C,6789A
  430 DATA CABBAGE (AUTUMN),S,45
,C,BC12
  440 DATA CABBAGE (SPRING),S,8,
C,456
  450 DATA CARROTS,S,23456,B,678
9A
  460 DATA CAULIFLOWER,S,12345,C
,12345678
  470 DATA BROCCOLI,S,123,C,1234
5
  480 DATA CELERY,S,34,A,9ABC123
  490 DATA CHICORY,S,45,A,BC12
  500 DATA CUCUMBER,S,234,A,89A
  510 DATA ENDIVE,S,56789,A,9ABC
  520 DATA KALE,S,45,C,BC1234
  530 DATA LEEK,S,123,A,89ABC123
  540 DATA LETTUCE,S,3456,A,3456
789AB
  550 DATA MARROW,S,456,A,789
  560 DATA ONIONS,SA,1234,B,9A
  570 DATA SHALLOTS,A,4,B,9A
  580 DATA SPRING ONIONS,S,23456
78,B,6789ABC
  590 DATA PARSNIPS,S,23,B,ABC
  600 DATA PEAS,S,3456,A,56789A
  610 DATA POTATOES,T,34,B,6789A
  620 DATA RADISH,S,3456789,A,45
6789A
  630 DATA SPINACH,S,23456789,A,
6789AB
  640 DATA SWEET CORN,S,45,A,89
  650 DATA TOMATOES,S,34,A,89AB
  660 DATA SWEDES,S,4567,B,ABC12
  670 DATA X,X,X,X,X
  680 DEFPROCtitle
  690 PRINTTAB(10)"VEGETABLE PLA
NNER":ENDPROC
  700 DEFPROCvegetable
  710 PROCtitle
  720 INPUT''"ENTER THE NAME OF
THE VEGETABLE ",veg$
  730 CLS:B%=0:A%=1:RESTORE:REPE
AT
```



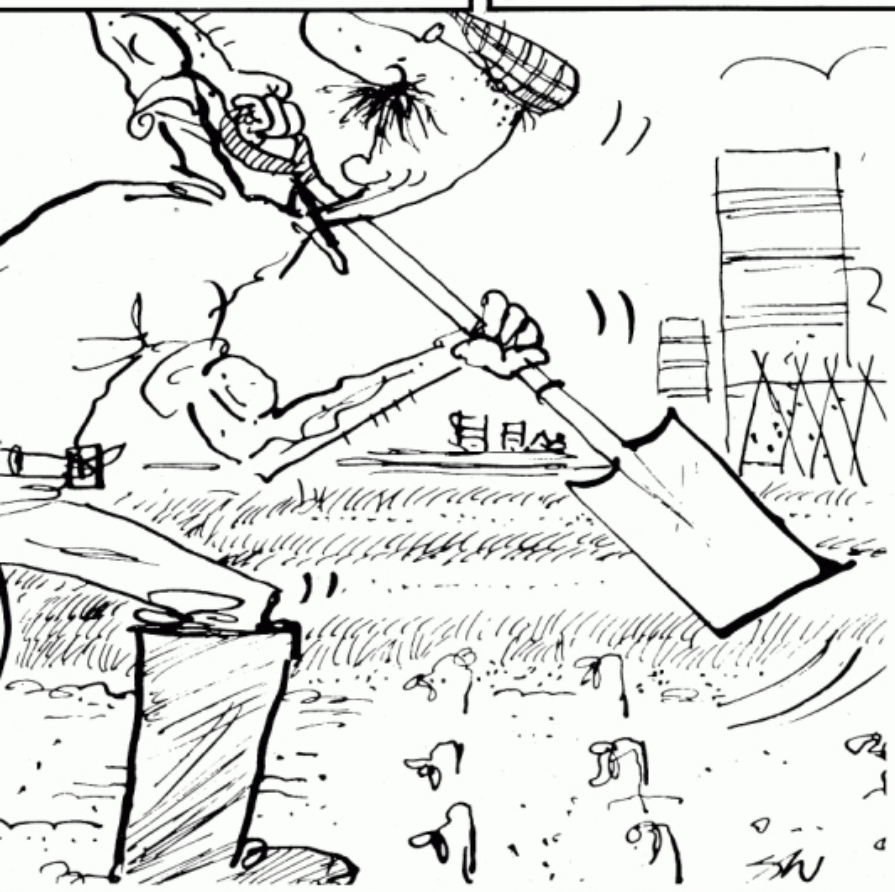


NNER

GARDENERS should find **Vegetable Planner** by Steve Lucas of Cheadle Hulme, Cheshire a useful guide to vegetable growing. On the first screen, a chart shows you which plants should be grouped in a plot and rotated every year. You can then choose to look for any particular vegetable and find out when to plant it, where, and in what type of soil; or you can enter a month and discover which vegetables are to be sown or harvested at that time.

The program lists more than 30 types of vegetable and you can, of course, alter the data to suit your needs. Vegetable Planner will run on both the Electron and BBC B.

```
  740 B%=B%+1:READ B$,C$,D$,E$,F
$
  750 UNTIL LEFT$(veg$,5)=LEFT$(
B$,5) OR B%=34
  760 IF LEFT$(veg$,5)=LEFT$(B$,
5) THEN PROClist ELSE PRINT"Sorr
y that vegetable is not availabl
e":ENDPROC
  770 ENDPROC
  780 DEFPROClist
  790 CLS:PROCtitle
  800 PRINT''B$''
  810 PRINT"Plant in plot ";E$
  820 IFE$="A"THENPRINT"needs ri
ch freshly manured/fertilised
soil."ELSEIFE$="B"THENPRINT"Shou
ld be planted in soil manured fo
r a previous crop."
  830 IFE$="C"THENPRINT"Best pla
nted in soil manured for a
previous crop. Likes a dressing
of lime."
  840 IFE$="D"THENPRINT"Should n
ot be rotated, but left in its
own bed."
  850 PRINT''"grown from :- ";:I
FC$="S"THENPRINT"Seed"ELSEIFC$="
C"THENPRINT"Crowns"ELSEIFC$="O"T
HENPRINT"Offsets"ELSEIFC$="SA"TH
ENPRINT"Seed or Sets"
  860 IFC$="T"THENPRINT"tubers"E
LSEIFC$="A"THENPRINT"sets"
  870 PRINT"Sow / plant in"
  880 FORX=1TOLEN(D$):X$=MID$(D$
,X,1)
  890 IFX$="1"THENPRINT"Jan "ELS
EIFX$="2"THENPRINT"Feb "ELSEIFX$
="3"THENPRINT"Mar "ELSEIFX$="4"T
HENPRINT"Apr "ELSEIFX$="5"THENPR
INT"May "ELSEIFX$="6"THENPRINT"J
un "ELSEIFX$="7"THENPRINT"Jul "E
LSEIFX$="8"THENPRINT"Aug "ELSEIF
X$="9"THENPRINT"Sep "
  900 IFX$="A"THENPRINT"Oct "ELS
EIFX$="B"THENPRINT"Nov " ELSEIFX
$="C"THENPRINT"Dec "
  910 NEXT
  920 PRINT''"Press <SPACE BAR>
to continue";*FX15,0
  930 REPEAT UNTIL GET=32
  940 CLS:ENDPROC
  950 DEFPROCmonth
  960 D%=0
  970 CLS:PROCtitle
  980 INPUT''"Enter the month as
 a number",month
  990 IFmonth<1ORmonth>12THENPRI
NT"don't be silly":GOTO980
 1000 IFmonth<10THENmonth$=STR$(
month)
 1010 IFmonth=10THENmonth$="A"EL
SEIFmonth=11THENmonth$="B"ELSEIF
month=12THENmonth$="C"
 1020 RESTORE
 1030 CLS:VDU14:PRINT"Press <SHI
FT> when screen is full ."
 1040 REPEAT
 1050 READ B$,C$,D$,E$,F$
 1060 FOR X=1TOLEN(D$):IFMID$(D$
,X,1)=month$ THEN D%=1:PROCprint
 1070 NEXT
 1080 UNTILB$="X"
 1090 IF D%=0 THEN PRINT"There a
re no seeds to sow this month."
 1100 PROCspacebar
 1110 VDU15
 1120 ENDPROC
 1130 DEFPROCprint
 1140 PRINT"sow :- ";B$
 1150 ENDPROC
 1160 DEFPROCspacebar
 1170 *FX15,0
 1180 PRINT''"Press   <Space Bar
> when ready."
 1190 REPEAT UNTIL GET=32: CLS:E
NDPROC
 1200 DEFPROCplot
 1210 CLS:PROCtitle
 1220 PRINT''"Which plot do you
 want to examine ?"''"A.   peas
beans etc"
 1230 PRINT"B.   root vegetables
"
 1240 PRINT"C.   brassicas"''"D.
  others"
 1250 REPEAT:G$=GET$:UNTILG$="A"
ORG$="B"ORG$="C"ORG$="D"
 1260 RESTORE:CLS:PROCtitle
 1270 PRINT''"Plot ";G$
 1280 REPEAT:READ B$,C$,D$,E$,F$
 1290 IF E$=G$ THEN PRINT B$
 1300 UNTIL B$="X"
 1310 PROCspacebar
 1320 ENDPROC
 1330 DEFPROCharvest
 1340 CLS:PROCtitle
 1350 INPUT''"Enter the month as
 a number",month
 1360 IFmonth<1ORmonth>12THENPRI
NT"don't be silly":GOTO1350
 1370 IFmonth<10THENmonth$=STR$(
month)
 1380 IFmonth=10THENmonth$="A"EL
SEIFmonth=11THENmonth$="B"ELSEIF
month=12THENmonth$="C"
 1390 RESTORE:CLS:VDU14:PRINT"Wh
en the screen is full press <SHI
FT>"
 1400REPEAT:READ B$,C$,D$,E$,F$
 1410 FOR X=1TOLEN(F$):IFMID$(F$
,X,1)=month$ THEN D%=1:PROChar
 1420 NEXT
 1430UNTILB$="X"
 1440 PROCspacebar
 1450 VDU15
 1460 ENDPROC
 1470 DEFPROChar
 1480 PRINT"Harvest :-";B$
 1490 ENDPROC
```



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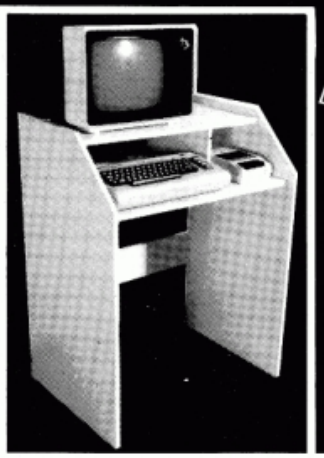

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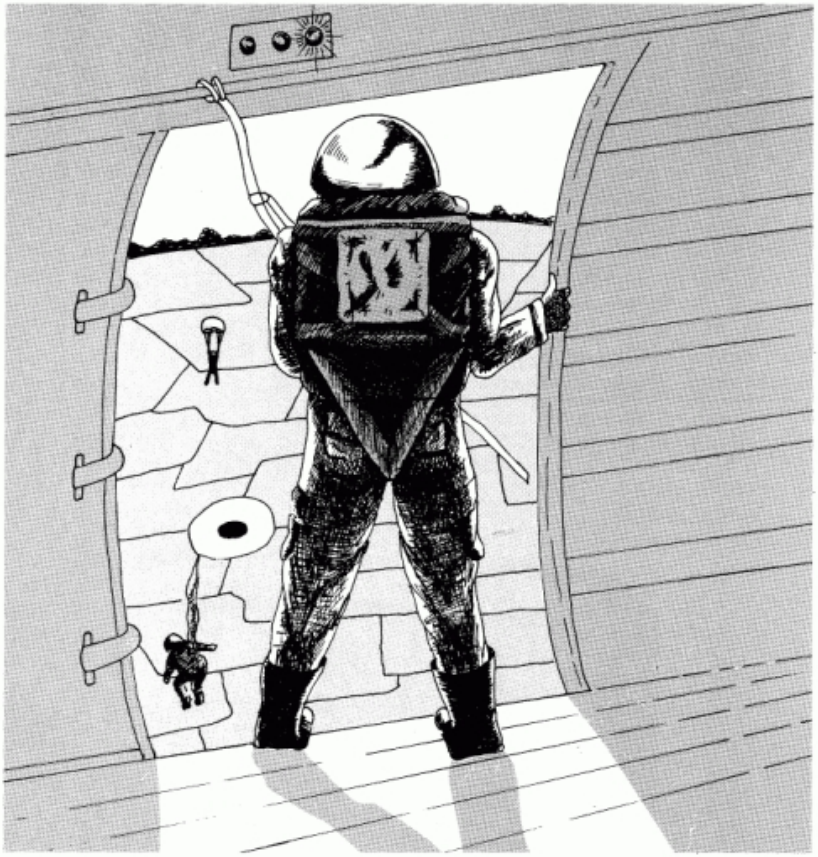
SKY DIVER



UNABLE to find employment elsewhere, you have decided to join the army, where you have the good fortune to join an elite parachute regiment. Having finished your training, the moment has arrived for you to jump from an aircraft.

Can you touch down on the red landing pad below? Each time you do so, you score 10 points, but if you miss you will be killed. Fortunately, you have three lives and there is a 100-point bonus for clearing the first level. You will also gain an extra life if you reach 10,000 points.

Manoeuvre your parachute with Z and X to move left and right and press the space bar to jump from the aircraft.

Sky Diver was written for the BBC B by Stephen Murray of Leek Wootton, Warwickshire.

```
   10 REM ******************
   20 REM ***THE PARAS*****
   30 REM ** WRITTEN BY ***
   40 REM *STEPHEN MURRAY**
   50 REM **** AGED 13 ****
   60 REM ******1984*******
   70 REM ******************
   80 MODE7:VDU23;8202;0;0;0;
   90 PROCINST
  100 MODE1
  110 SCORE=0:HIGH=1000:MAN=3:LE
VEL=1
  120 VDU23;8202;0;0;0;
  130 VDU19,128,132;0;
  140 VDU19,135,130;0;:COLOUR135
:PRINTTAB(0,30)"
":COLOUR1:COLOUR132
  150 VDU23,240,60,126,255,66,90
,60,24,36
  160 VDU23,241,0,0,0,0,0,0,255,25
5,255
  170 VDU23,243,243,128,90,57,21
8,37,20,185
  180 GCOL0,2:MOVE0,950:DRAW1279
,950
  190 COLOUR2:PRINTTAB(0,0)"SCOR
E       HIGH       LEVEL       MEN"
  200 PRINTTAB(1,1);SCORE"     ":
PRINTTAB(11,1);HIGH:PRINTTAB(23,
1);LEVEL:PRINTTAB(33,1);MAN
  210 PROCMOVEMAN
  220 DEFPROCMOVEMAN
  230 COLOUR1
  240 Z=RND(39):PRINTTAB(Z,27)CH
R$241
  250 X=15:Y=3
  260 REPEAT
  270 IF INKEY(-98) AND X>0 THEN
X=X-1
  280 IF INKEY(-67) AND X<39 THE
N X=X+1
  290 PRINTTAB(X,Y)CHR$240:FORT=
1TO100:NEXT:PRINTTAB(X,Y)" "
  300 Y=Y+1:SCORE=SCORE+10:COLOU
R2:PRINTTAB(1,1);SCORE:IF SCORE=
10000 THEN MAN=MAN+1:PRINTTAB(33
,1);MAN
  310 COLOUR1
  320 UNTILY>26
  330 IF X=Z THEN PROCGOOD
  340 IF X<>Z THEN PROCBAD
  350 ENDPROC
  360 DEFPROCGOOD
  370 FORI%=100TO250 STEP5:SOUND
1,0,I%,1:SOUND0,-15,7,1:NEXT:SCO
RE=SCORE+100:COLOUR2:LEVEL=LEVEL
+1:PRINTTAB(1,1);SCORE:PRINTTAB(
23,1);LEVEL:PRINTTAB(15,6)"LEVEL
 ";LEVEL:COLOUR1:FORE=1TO1000:NE
XT:PRINTTAB(15,6)"          ":PR
INTTAB(Z,27)" "
  380 IF SCORE=10000 THEN MAN=MA
N+1:COLOUR2:PRINTTAB(33,1);MAN:C
OLOUR1
  390 PROCMOVEMAN
  400 ENDPROC
  410 DEFPROCBAD
  420 SOUND0,-15,4,10:PRINTTAB(X
,Y)CHR$243:COLOUR2:PRINTTAB(15,6
)"DEAD!!":FORE=1TO1000:NEXT:COLO
UR1:PRINTTAB(15,6)"          ":MAN=M
AN-1:COLOUR2:PRINTTAB(33,1);MAN:
COLOUR1:PRINTTAB(Z,27)" "
  430 PRINTTAB(X,Y)" "
  440 IF MAN=0 THEN COLOUR2:PRIN
TTAB(15,6)"PRESS SPACE":REPEATUN
TILGET=32:PRINTTAB(15,6)"
      "
  450 IF MAN=0 THEN IF SCORE>HIG
H HIGH=SCORE:PRINTTAB(11,1);HIGH
  460 IF MAN=0 THEN SCORE=0:LEVE
L=1:MAN=3:PRINTTAB(33,1);MAN:PRI
NTTAB(1,1);SCORE"     ":PRINTTAB(
11,1);HIGH:PRINTTAB(23,1);LEVEL"
      "
  470 IF MAN=0 PROCMOVEMAN
  480 PROCMOVEMAN
  490 ENDPROC
  500 DEFPROCINST
  510 VDU10:FOR A=0TO1:PRINTCHR$
129;CHR$141"              THE PARA
S":NEXT
  520 VDU10:PRINTCHR$131"
      By S.Murray"
  530 VDU10:PRINTCHR$130"Unable
to find employment elsewhere you
"CHR$130"are forced to join the
army and end up"'CHR$130"in the
PARAS division.After passing all
"CHR$130"your training the big m
oment comes when"
  540 VDU11:PRINTCHR$130"you mus
t parachute to earth.You can "'C
HR$130"land only on the red land
ing pad and if"CHR$130"you miss
it a life is lost.You have 3"'CH
R$130"lives and must guide yours
elf to the"
  550 PRINTCHR$130"pad using the
 ""Z"" & ""X"" keys for"'CHR$130
"left and right respectivley.Poi
nts are"'CHR$130"scored as you f
all with a bonus of 100"'CHR$130
"for clearing a level.An extra l
ife is "
  560 PRINTCHR$130"obtained for
scoring 10,000 points."''CHR$131
"GOOD LUCK !!"
  570 VDU10,10:PRINTCHR$136;CHR$
133"PRESS <SPACE> TO PLAY...":RE
PEATUNTILGET=32:ENDPROC
```

One-Arm

YOU HAVE to earn the money to play the fruit machine in this educational gambling game written by Roland Waddilove of Widnes, Cheshire.

Feed 10 pence into the slot machine and see if it produces three fruit of the same kind. If it does, you win a 50 pence jackpot but if you lose and run out of money, you must answer a few simple mathematics questions to obtain some more. You can choose how many questions you want to answer, in several categories — adding, subtracting, division and multiplication. If your times tables are a little rusty, you can even consult whatever table you like.

One-armed Bandit was written for the Electron and will also run on the BBC B.

```
   10ON ERROR GOTO 180
   20REM  **  One Armed Bandit
**
   30REM  **  By R.A.Waddilove
**
   40MODE 6
   50PROCinstructions
   60PROCset_up
   70REPEAT CLS
   80PRINT''" What would you lik
e to do ?"
   90PRINT''" Press  Q  to answe
r some questions,"''" Press  T
to look at your tables,"  ''" Pr
ess  B  to play the one armed ba
ndit."
  100VDU7
  110REPEAT key$=GET$
  120UNTIL key$="Q" OR key$="T"
OR                 key$="B"
  130VDU7
  140IF key$="Q" THEN PROCquesti
on
  150IF key$="T" THEN PROCtables
  160IF key$="B" THEN MODE 2 : P
ROCbandit : MODE 6 : VDU19,0,4;0
;
  170UNTIL FALSE
  180MODE 6
  190END
  200
  210DEF PROCset_up
  220DIM reel(3)
  230PROCfruit_graphics
  240PROCenvelopes
  250PROCinput_age
  260money=0
  270VDU19,0,4;0;
  280ENDPROC
  290DEF PROCenvelopes
  300ENVELOPE1,1,4,2,1,20,10,5,1
26,0,0,-126,126,126
  310ENVELOPE2,1,-1,0,0,100,50,5
0,126,0,0,-126,126,126
  320ENVELOPE3,1,4,0,-4,20,1,1,1
26,0,0,-126,126,126
  330ENDPROC
  340DEF PROCinstructions
  350CLS:VDU19,0,1;0;0;19,1,3;0;
0;
  360PRINT'TAB(12)"ONE ARMED BAN
DIT"
  370PRINT'"    This is a simple
 slot machine which"'" takes 10p
's . If you get three fruit"'" t
he same then you win the jackpot
-50p."
  380PRINT'"    If you get two f
ruit the same then"'" you get an
 free go ."''"    To play the sl
ot machine you need"'" money . Y
ou can earn this by answering"
  390PRINT " a few simple maths
questions ."''"    You can choos
e how many you answer"'" and the
 type of question ."
  400PRINT''" ( Don't forget to
press return when )"'" (   you h
ave typed in your answer . )"
  410PRINT''TAB(6)"press the spa
ce bar to start"
```

nedBandit

```
  420REPEAT UNTIL GET$=" "
  430ENDPROC
  440DEF PROCinput_age
  450REPEAT CLS
  460VDU7
  470PRINT''" How old are you .
. . ?"''" Please type in your a
ge."
  480INPUT'',age%
  490IF age%<5 OR age%>100 THEN
PRINT''" 5 to 100 year olds only
 !":PROCpause(300)
  500UNTIL age%>4 AND age%<101
  510ENDPROC
  520DEF PROCbandit
  530IF money<10 THEN
              PRINT''''" Not
enough money"
'"     Answer some"
       ''"      questions"
        :PROCpause(500) : ENDPR
OC
  540VDU23,1,0;0;0;0;
  550PROCdraw_machine
  560REPEAT
  570PROCwait_keypress
  580PROCspin_reels
  590PROCsee_if_won
  600UNTIL money<10
  610PROCwait_keypress
  620PROCno_money
  630PROCwait_keypress
  640VDU23,1,1;0;0;0;
  650ENDPROC
  660DEF PROCtables
  670VDU19,0,1;0;
  680REPEAT CLS
  690INPUT''TAB(10)"Which table
would"              'TAB(10)"you
like to see ",              tabl
e
  700SOUND1,1,1,5
  710CLS
  720PRINT'table;" Times Table"'
  730FOR times=1 TO 12
  740PRINT times;" x ";table;" =
 ";
  750PRINT;times*table
  760NEXT
  770PRINT''TAB(8)"Would you lik
e to"              'TAB(8)"  see
 another ?"                'TAB(
8)"     (Y or N)"
  780REPEAT key$=GET$
  790UNTIL key$="Y" OR key$="N"
  800UNTIL key$="N"
  810VDU7 : CLS : VDU19,0,4;0;
  820ENDPROC
  830DEF PROCquestion
  840PROCchoose_type
  850question=0
  860REPEAT CLS
  870question=question+1
  880PRINT''" Question : ";quest
ion
  890IF type$=" / " THEN
              right_answer=RND
(age%) :              number2=
RND(age%) :
number1=number2*right_answer
  900IF type$=" - " THEN
              number1=RND(age%
)+age%+age% :          number2=
RND(age%)+age% :
right_answer=number1-number2
  910IF type$=" + " THEN
              number1=RND(age%
)+age%+age%:           number2=
RND(age%)+age% :
right_answer=number1+number2
  920IF type$=" * " THEN
              number1=RND(age%
)+2    :               number2=
RND(age%)+2  :
right_answer=number1*number2
  930PRINT''number1;type$;number
2;
  940INPUT " = ",your_answer
  950IF your_answer=right_answer
           THEN PROCright
                ELSE PROCw
rong
  960PRINT''" Another question ?
 (Y OR N)"
  970REPEAT key$=GET$
  980UNTIL key$="Y" OR key$="N"
  990UNTIL key$="N"
 1000ENDPROC
 1010DEF PROCright
 1020money=money+5
 1030IF type$=" * " OR type$=" /
 " THEN          money=money+5
 1040PRINT''" Correct."''
 1050PRINT" You now have ";money
;" pence."
 1060VDU7
 1070ENDPROC
 1080DEF PROCwrong
 1090SOUND1,-15,0,5
 1100PRINT''your_answer;" is wro
ng..."
 1110PRINT''" The answer is ";ri
ght_answer;"."
 1120ENDPROC
 1130DEF PROCchoose_type
 1140CLS
 1150PRINT''" What type of quest
ion would you like ?"
 1160PRINT''
        " 1. Addition (+)
 : worth 5p"''  " 2. Subtraction
 (-)     : worth 5p"''  " 3. Mul
tiplication (*)  : worth 10p"''
" 4. Division (/)         : worth
 10p"''
 1170PRINT" Press key 1,2,3 or 4
."
 1180REPEAT key$=GET$
 1190UNTIL key$>"0" AND key$<"5"
 1200IF key$="1" THEN type$=" +
"
 1210IF key$="2" THEN type$=" -
"
 1220IF key$="3" THEN type$=" *
"
 1230IF key$="4" THEN type$=" /
"
 1240VDU7 : CLS
 1250ENDPROC
 1260DEF PROCfruit_graphics
 1270green$=CHR$18+CHR$0+CHR$2
 1280yellow$=CHR$18+CHR$0+CHR$3
 1290red$=CHR$18+CHR$0+CHR$1
 1300backup$=CHR$8+CHR$8+CHR$11
 1310backdown$=CHR$8+CHR$8+CHR$1
0
 1320REM  **  blank  **
 1330VDU23,255,255,255,255,255,2
```

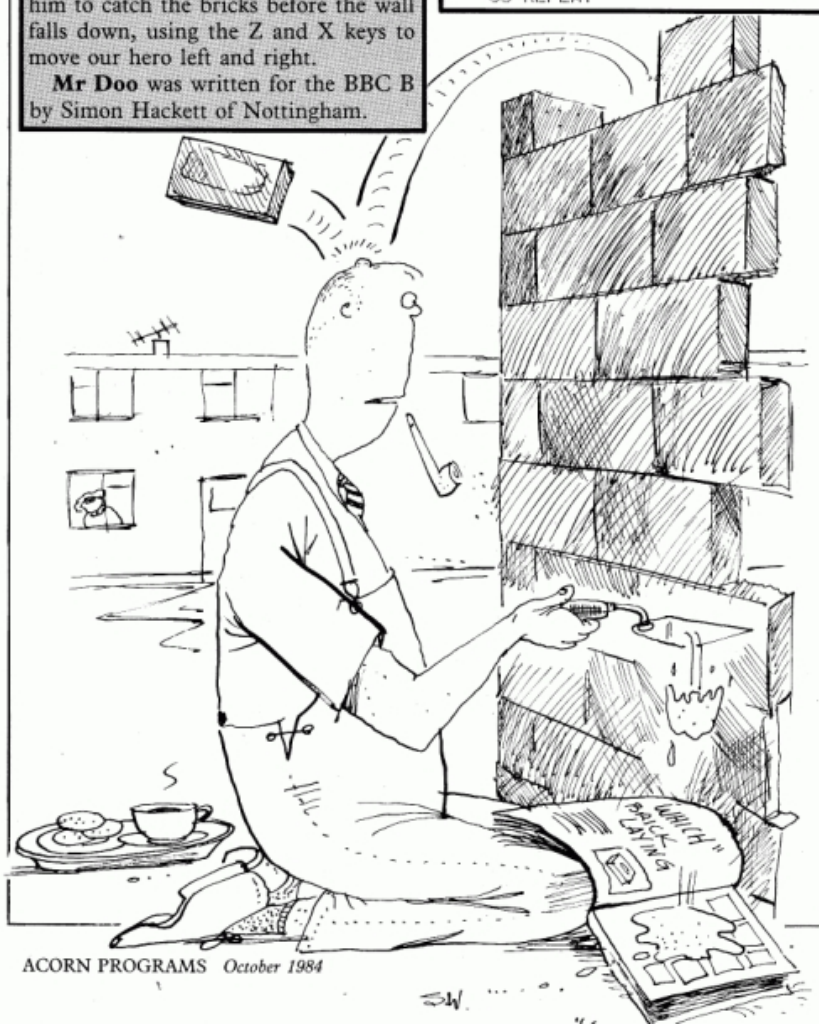
```
55,255,255,255
 1340blank$=CHR$18+CHR$0+CHR$7+C
HR$255+CHR$255+backdown$+CHR$255
+CHR$255+backup$
 1350REM  **  cherries  **
 1360VDU23,251,0,0,0,28,63,126,1
24,1
 1370VDU23,252,0,128,128,184,252
,190,158,64
 1380VDU23,253,30,63,111,95,94,1
10,60,0
 1390VDU23,254,56,124,118,122,12
2,62,28,0
 1400cherry$=blank$+green$+CHR$2
51+CHR$252+backdown$+red$+CHR$25
3+CHR$254+backup$
 1410REM  **  melon  **
 1420VDU23,239,0,31,1,0,0,0,0,0
 1430VDU23,240,0,0,192,96,48,24,
24,24
 1440VDU23,241,0,0,0,0,0,0,31,0
 1450VDU23,242,24,24,24,48,96,19
2,128,0
 1460VDU23,243,0,0,30,16,16,16,1
6,16
 1470VDU23,244,0,0,0,128,64,32,3
2,32
 1480VDU23,245,16,16,16,16,16,31
,0,0
 1490VDU23,246,32,32,32,64,128,0
,0,0
 1500VDU23,247,0,0,0,14,15,13,15
,15
 1510VDU23,248,0,0,0,0,128,64,19
2,64
 1520VDU23,249,15,15,13,11,15,0,
0,0
 1530VDU23,250,192,64,192,128,0,
0,0,0
 1540melon$=blank$+green$+CHR$23
9+CHR$240+backdown$+CHR$241+CHR$
242+backup$+yellow$+CHR$243+CHR$
244+backdown$+CHR$245+CHR$246+ba
ckup$+red$+CHR$247+CHR$248+backd
own$+CHR$249+CHR$250+backup$
 1550REM  **  pear  **
 1560VDU23,224,0,0,0,0,0,0,1,31
 1570VDU23,225,0,2,4,56,120,232,
208,160
 1580VDU23,226,63,118,110,108,12
4,113,31,0
 1590VDU23,227,192,224,224,224,2
24,192,0,0
 1600VDU23,228,0,0,0,0,0,0,16,32,6
4
 1610VDU23,229,0,9,17,17,2,4,0,0
 1620VDU23,230,0,0,0,0,0,0,32,0
 1630pear$=blank$+green$+CHR$224
+CHR$225+backdown$+CHR$226+CHR$2
27+CHR$8+CHR$8+red$+CHR$230+yell
ow$+CHR$8+CHR$229+CHR$11+CHR$228
+CHR$8+CHR$8
 1640REM  **  apple  **
 1650VDU23,231,0,0,0,0,14,31,53,
43
 1660VDU23,232,0,0,128,128,176,2
48,252,206
 1670VDU23,233,107,107,107,107,5
3,63,14,0
 1680VDU23,234,230,230,230,206,2
52,248,112,0
 1690apple$=blank$+green$+CHR$23
1+CHR$232+backdown$+CHR$233+CHR$
234+backup$
 1700REM  **  orange  **
 1710VDU23,235,0,3,7,15,27,55,55
,111
 1720VDU23,236,0,128,176,248,252
,236,238,166
 1730VDU23,237,107,107,107,63,63
,31,15,0
 1740VDU23,238,182,166,164,204,2
16,240,224,0
 1750orange$=blank$+red$+CHR$235
+CHR$236+backdown$+CHR$237+CHR$2
38+backup$
 1760ENDPROC
 1770DEF PROCwait_keypress
 1780SOUND1,-15,0,5
 1790COLOUR10:COLOUR128
 1800PRINT TAB(1,1)"   press  sp
ace   "
 1810REPEAT UNTIL GET$=" "
 1820PRINT TAB(4,1)"
"
 1830COLOUR132
 1840ENDPROC
 1850DEF PROCspin_reels
 1860COLOUR3 : money=money-10
 1870PRINT TAB(13,28);money;"p "
 1880VDU5
 1890FOR n=1 TO 3
 1900SOUND1,-15,100,1
 1910reel(n)=RND(5)
 1920MOVE n*192+192,736
 1930IF reel(n)=1 THEN PRINTpear
$;apple$;orange$;melon$;cherry$
 1940IF reel(n)=2 THEN PRINTappl
e$;orange$;melon$;cherry$;pear$
 1950IF reel(n)=3 THEN PRINToran
ge$;melon$;cherry$;pear$;apple$
 1960IF reel(n)=4 THEN PRINTmelo
n$;cherry$;pear$;apple$;orange$
 1970IF reel(n)=5 THEN PRINTcher
ry$;pear$;apple$;orange$;melon$
 1980NEXT
 1990VDU4
 2000ENDPROC
 2010DEF PROCsee_if_won
 2020IF reel(1)=reel(2) AND reel
(2)=reel(3) THEN PROCwon_jackpot
 : ENDPROC
 2030IF reel(1)=reel(2) OR reel(
2)=reel(3) OR reel(1)=reel(3) TH
EN PROCfree_go
 2040ENDPROC
 2050DEF PROCwon_jackpot
 2060SOUND1,1,5,100 : SOUND1,2,1
00,40
 2070money=money+50
 2080COLOUR11:PRINT TAB(6,4)"JAC
KPOT !"
 2090COLOUR3:PRINT TAB(13,28);mo
ney;"p"
 2100PROCpause(500)
 2110PRINT TAB(6,4)"           "
 2120ENDPROC
 2130DEF PROCfree_go
 2140SOUND1,3,20,60
 2150COLOUR9:PRINT TAB(6,4)"FREE
 GO"
 2160money=money+10
 2170PROCpause(300)
 2180PRINT TAB(6,4)"           "
 2190ENDPROC
 2200DEF PROCdraw_machine
 2210GCOL0,4
 2220MOVE 128,64:MOVE 128,800
 2230PLOT85,1152,64 : PLOT85,115
2,800
 2240MOVE1024,928
 2250PLOT85,128,800 : PLOT85,256
,928
 2260GCOL0,2
 2270MOVE128,64:DRAW1152,64:DRAW
1152,800:DRAW1024,928:DRAW256,92
8:DRAW128,800:DRAW128,64:MOVE128
,800:DRAW1152,800
 2280MOVE328,768:DRAW944,768:DRA
W944,632:DRAW328,632:DRAW328,766
 2290MOVE548,768:DRAW548,632:MOV
E740,768:DRAW740,632
 2300VDU5:MOVE384,736:PRINTcherr
y$:MOVE576,736:PRINTapple$:MOVE7
68,736:PRINTmelon$:VDU4
 2310COLOUR132:PRINT TAB(18,25)"
"
 2320FOR n=10 TO 26
 2330PRINT TAB(19,n)" "
 2340NEXT
 2350COLOUR5:COLOUR128
 2360PRINT TAB(19,9)"O";TAB(5,20
)"          ";TAB(6,21)"
"
 2370COLOUR132:COLOUR6
 2380PRINT TAB(5,14)"free go if"
 2390PRINT TAB(5,16)"2 the same"
 2400COLOUR6
 2410PRINT TAB(3,25)"costs 10p a
go"
 2420COLOUR3:PRINT TAB(4,28)"you
have ";money;"p"
 2430ENDPROC
 2440DEF PROCno_money
 2450COLOUR128:COLOUR9
 2460PRINT TAB(1,1)"Not  enough
money"
 2470VDU7
 2480PROCpause(300)
 2490COLOUR132:COLOUR3
 2500PRINT TAB(5,4)"answer more"
 2510PRINT TAB(6,5)"questions"
 2520PROCpause(300)
 2530ENDPROC
 2540DEF PROCpause(time)
 2550TIME=0
 2560REPEAT UNTIL TIME>time
 2570ENDPROC
```

MR DOO

```
    0 REM %%%%%%%%%%%%%%%%
    1 REM %%              %%
    2 REM %%    MR.DOO    %%
    3 REM %%              %%
    4 REM %%      By      %%
    5 REM %%              %%
    6 REM %%  S.Hackett   %%
    7 REM %%              %%
    8 REM %%%%%%%%%%%%%%%%
    9 *FX 220,0
   10 MODE 7:VDU 23;8202;0;0;0;
   11 PRINTTAB(5,2);CHR$(148)"j+
kj`5  j`dj``5j``5"
   12 PRINTTAB(5,3);CHR$(150)"j4
jj`d !jtzjtp5jtp5"
   13 PRINTTAB(3,5);CHR$(134)"HE
LP MR.DOO TO CATCH THE"
   14 PRINTTAB(1,7);CHR$(134)"FA
LLING BRICK`S WHICH HAVE BEEN"
   15 PRINTTAB(1,9);CHR$(134)"TH
ROWN BY THE EVIL MONSTER...."
   16 PRINTTAB(7,11);CHR$(129);C
HR$(141)"***";CHR$(131);"KEYS";C
HR$(129);"***"
   17 PRINTTAB(7,12);CHR$(129);C
HR$(141)"***";CHR$(131);"KEYS";C
HR$(129);"***"
   18 PRINTTAB(9,14);CHR$(130)"Z
 = LEFT"
   19 PRINTTAB(9,16);CHR$(131)"X
 = RIGHT"
   20 H=0
   21 PRINTTAB(4,22);CHR$(132);C
HR$(136)"Press `SPACE BAR` To Pl
ay...."
   22 A$=GET$:IF A$=" "THEN 23 E
LSE 22
   23 CLS:S=0:L=3:C=0:*FX 21,5
   24 PRINTTAB(0,1);CHR$(141);CH
R$(134)"SCORE = ";S
   25 PRINTTAB(0,2);CHR$(141);CH
R$(134)"SCORE = ";S
   26 PRINTTAB(25,1);CHR$(141);C
HR$(134)"HIGH = ";H
   27 PRINTTAB(25,2);CHR$(141);C
HR$(134)"HIGH = ";H
   28 IF C=1 THEN 67
   29 PRINTTAB(31,5);CHR$(151)"f
5"
   30 PRINTTAB(31,6);CHR$(147)"1
5"
   31 PRINTTAB(31,7);CHR$(146)"z
)00"
   32 A=39:B=8
   33 REPEAT
   34 A=A-1
   35 PRINTTAB(A,B);CHR$(146)"!"
   36 UNTIL A=30
   37 A=39:B=9
   38 REPEAT
   39 A=A-1
   40 PRINTTAB(A,B);CHR$(146)"/"
   41 UNTIL A=32
   42 A=37:B=9
   43 REPEAT
   44 B=B+1
   45 PRINTTAB(A,B);CHR$(146)"j5
"
   46 UNTIL B=22
   47 A=38:B=22
   48 REPEAT
   49 PRINTTAB(A,B);CHR$(146)"/"
   50 A=A-1:UNTIL A<0
   51 A=0:B=9
   52 REPEAT
   53 PRINTTAB(A,B);CHR$(146)"j5
"
   54 B=B+1:UNTIL B=22
   55 A=4:B=9
   56 REPEAT
   57 PRINTTAB(A,B);CHR$(146)"/"
   58 A=A-1:UNTIL A<0
   59 A=6:B=8
   60 REPEAT
   61 PRINTTAB(A,B);CHR$(146)"!"
   62 A=A-1:UNTIL A<0
   63 PRINTTAB(0,6);CHR$(145)"zu
 zu"
   64 PRINTTAB(0,7);CHR$(147)":e
:e"
   65 DEFPROCmain
   66 X=17:Y=20
   67 A=RND(27):IF A<8 THEN 67
   68 FOR B=4 TO 20
   69 FOR T=1 TO 80:NEXT T
   70 PRINTTAB(A,B);CHR$(148)"//
"
   71 PRINTTAB(A,B-1);"   "
   72 A$=INKEY$(0)
   73 IF A$="Z"AND X>5 THEN X=X-
1:SOUND 1,-10,30,1
   74 IF A$="X"AND X<32 THEN X=X
+1:SOUND 1,-10,30,1
   75 *FX 11,1
   76 *FX 15,1
   77 PRINTTAB(X,Y);CHR$(145)"zu
 "
   78 PRINTTAB(X,Y+1);CHR$(147)"
:e  "
   79 NEXT B
   80 IF X=A AND Y=20THEN PROCsc
ore
   81 IF X+1=A AND Y=20THEN PROC
score
   82 IF X-1=A AND Y=20THEN PROC
score
   83 PROClives
   84 DEFPROCscore
   85 SOUND 1,-15,50,2
   86 S=S+1:IF S>H THEN H=S
   87 C=1:GOTO 24
   88 GOTO 67
   89 DEFPROClives
   90 PRINTTAB(A,B-1);"   "
   91 PRINTTAB(X,Y);"   "
   92 PRINTTAB(X,Y+1);"   "
   93 SOUND 3,-15,150,2
   94 L=L-1:IF L=0 THEN FOR T=1
TO 2000:NEXT T:GOTO 102
   95 IF L=1 THEN 99
   96 PRINTTAB(4,6);"   "
   97 PRINTTAB(4,7);"   "
   98 PROCmain
   99 PRINTTAB(0,6);"   "
  100 PRINTTAB(0,7);"   "
  101 PROCmain
  102 SOUND 1,-15,40,7:SOUND 1,-
15,30,5:SOUND 1,-15,20,7:SOUND 1
,-15,30,5:SOUND 1,-15,40,10
  103 CLS
  104 PRINTTAB(0,9);CHR$(141);CH
R$(136);CHR$(132)"Press `SPACE B
AR` To Play Again"
  105 PRINTTAB(0,10);CHR$(141);C
HR$(136);CHR$(132)"Press `SPACE
BAR` To Play Again....":GOTO 22
```

MR DOO has just built a brick wall but someone is throwing the bricks back at him. Help him to catch the bricks before the wall falls down, using the Z and X keys to move our hero left and right.

Mr Doo was written for the BBC B by Simon Hackett of Nottingham.

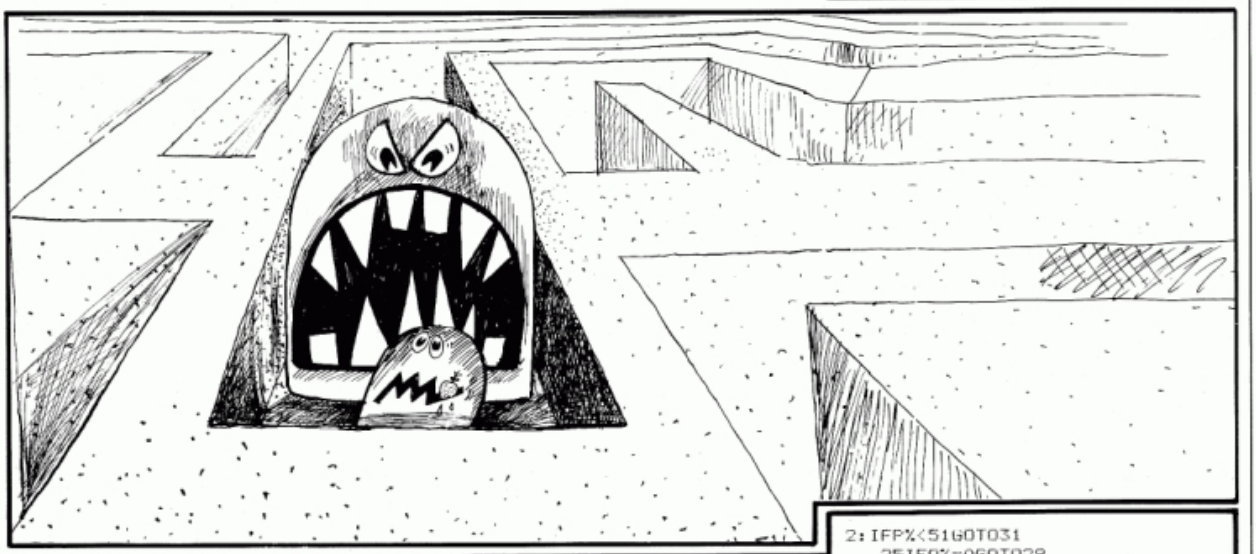


MUNCH MAN

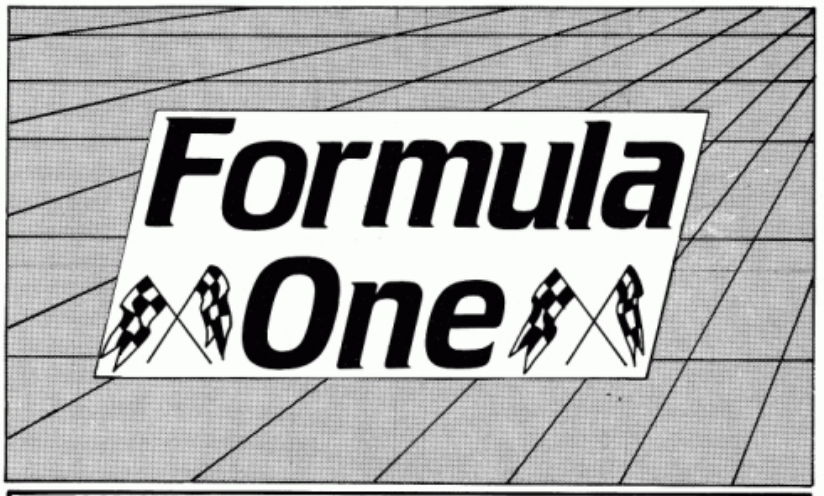
ELECTRON owners familiar with the classic arcade game of Pac-man will enjoy this version by Shaun Jones of Widnes, Cheshire. The player steers the red muncher round the maze using A to move up, Z to move down, and N and M to move left and right.

Each of the dots in the maze is worth 10 points and picking up the fruit in the corners is worth 50 points a time. Beware of the monsters which are trying to make a meal of the munchman.

Use A and Z to move up and down, N and M to move left and right. **Munchman** will also run on the BBC B.

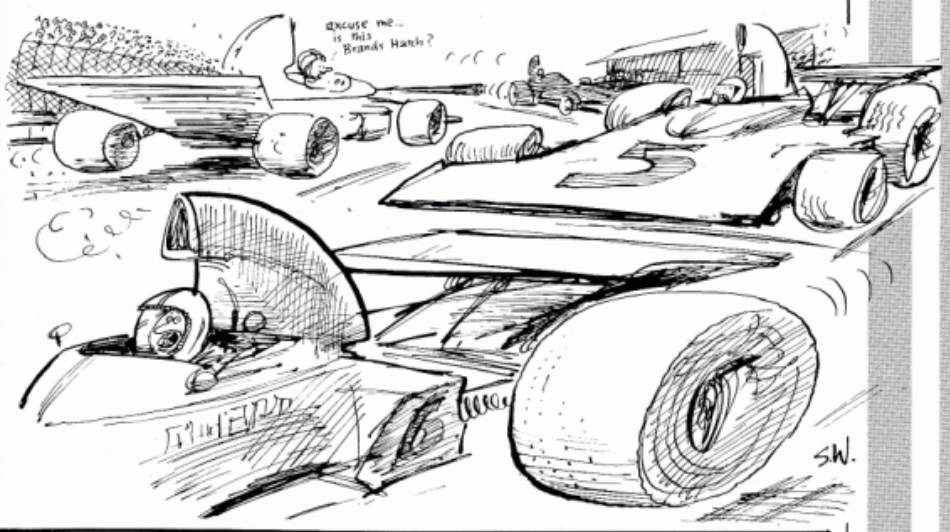


```
    1MODE6:PRINTTAB(13,7)"*SCOR
ES*"''TAB(9)"Dot"TAB(22)"0"T
AB(9)"Star      50"TAB(9)"M
uncher   100"''"   AmovesUP
      ZmovesDOWN"''"   Nmo
vesLEFT    MmovesRIGHT"TAB(
10,20)"Press any key.":T%=0
    2DIMX(1),Y(1),Z(1),F(1):GOSU
B41:REPEATPRINTTAB(9,3)"MUNC
HYMAN":B%=?&EE9:FORA%=&EE9T
O&EF7STEP2:?A%=?(A%+2):NEXT:?&EF
9=B%:UNTILINKEY(9)<>-1
    3*FX11,0
    4S%=0:L%=3
    5MODE5:R%=RND(6):FORC%=0TO3:
VDU19,C%,R%;0;:NEXT:GOSUB41:VDU2
3,224,-1;-1;-1;-1;23,227,60,126,
90,-1,231,126,102,60,17,3,23,226
;0;24,24;0;23,225,36,102,126,219
,-1,195,102,60:PRINT':GOSUB43:FO
RA%=1TO26:PRINT"'";:COLOUR1
    6FORB%=1TO18:PRINT"b";:NEXT:
COLOUR3:PRINT"'";:NEXT:GOSUB43:P
RINTTAB(1,3)"*"TAB(18,3)"*"TAB(1
,28)"*"TAB(18,28)"*";:RESTORE:FO
RA%=1TO41:READX%,Y%:GOSUB39:Y%=3
1-Y%:GOSUB39:NEXT
    7DATA5,6,3,10,4,8,4,5,3,5,3,
4,4,6,4,9,1,5,1,9,2,7,8,8,6,4,7,
4,8,4,9,4,2,12,2,13,2,14,2,15,6,
8,6,9,6,10,6,11,6,12,4,12,4,13,4
,14,5,14,7,6,8,6,9,6,8,10,9,10,7
,15,8,15,9,15,7,14,8,14,9,14,9,1
3
    8FORA%=0TO3:VDU19,A%,A%;0;:N
EXT:U%=303:Y(1)=13:Y(0)=18:X%=13
:Y%=15:COLOUR2:FORA%=0TO1:Z(A%)=
226:X(A%)=7:F(A%)=2:PRINTTAB(X(A
%),Y(A%))"a";:NEXT:COLOUR1:PRINT
TAB(X%,Y%)"c":IFL%>1PRINTTAB(9,1
7)"c":IFL%>2PRINTTAB(10,17)"c"
    9A%=INKEY(999/(S%+99)):D%=(A
%=78)-(A%=77):E%=(A%=65)-(A%=90)
:IFA%=-1GOTO18
    10V%=X%+D%:W%=Y%+E%:GOSUB42:I
FP%=255ORP%=208GOTO18
    11IFP%=1S%=S%+1:U%=U%-1:SOUND
1,-15,190,2
    12IFP%=51S%=S%+5:COLOUR3:FORA
%=0TO1:F(A%)=3:PRINTTAB(X(A%),Y(
A%))"a":NEXT:U%=U%-1:SOUND1,-15,
90,2
    13IFP%<>221GOTO16
    14S%=S%+10:A%=-(V%=X(1)ANDW%=
Y(1)):IFZ(A%)<>32U%=U%-1
    15X(A%)=7:Y(A%)=13:F(A%)=2:Z(
A%)=32:GOSUB38:IF?(HIMEM+4275)=1
Z(A%)=226
    16COLOUR3:A$="0":B%=S%:FORA%=
1TO3:A$=CHR$(B%MOD10+48)+A$:B%=B
%DIV10:NEXT:PRINTTAB(8,15)A$;
    17COLOUR1:PRINTTAB(X%,Y%)" ";
TAB(V%,W%)"c";:X%=V%:Y%=W%
    18IFU%=0S%=S%+50:GOTO5
    19FORA%=0TO1:IFRND(9)>2+S%DIV
100GOTO30
    20IFRND(99)>98F(A%)=2
    21D%=X%-X(A%):E%=Y%-Y(A%):IFF
(A%)=3D%=-D%:E%=-E%
    22O%=(ABS(D%)<ABS(E%)):D%=SGN
(D%):E%=SGN(E%):IFO%=-1GOTO24
    23V%=X(A%)+D%:W%=Y(A%):GOSUB4
2:IFP%<51GOTO31
    24V%=X(A%):W%=Y(A%)+E%:GOSUB4
2:IFP%<51GOTO31
    25IFO%=0GOTO28
    26V%=X(A%)+D%:W%=Y(A%):GOSUB4
2:IFP%<51GOTO31
    27V%=X(A%)-D%:W%=Y(A%):GOSUB4
2:IFP%<51GOTO31
    28V%=X(A%):W%=Y(A%)-E%:GOSUB4
2:IFP%<51GOTO31
    29V%=X(A%)-D%:W%=Y(A%):GOSUB4
2:IFP%<51GOTO31
    30NEXT:GOTO9
    31IFP%=15ANDF(A%)=3GOTO30
    32COLOURF(A%):PRINTTAB(V%,W%)
"a":COLOUR1:PRINTTAB(X(A%),Y(A%
))CHR$(Z(A%));:X(A%)=V%:Y(A%)=W%
:Z(A%)=32-(P%=1)*194:IFP%<>15GOT
030
    33A%=1:NEXT:GOSUB38:FORA%=1TO
9000:NEXT:L%=L%-1:IFL%<>0GOTO5
    34MODE7:PRINTTAB(12,2)"You ha
ve been"TAB(14,4)"MUNCHED"TAB(1
2,6)"three times!"TAB(8,9)"You
scored"S%*10:IFS%>T%PRINTTAB(10,
12)"The high score!":T%=S%:GOTO
36
    35PRINTTAB(8,12)"High score"
T%*10
    36*FX15,0
    37GOSUB41:PRINTTAB(10,18)A
nother game?";:A%=GET:IFA%=89GOT
O4ELSEIFA%<>78GOTO36ELSECLS:END
    38SOUND0,-15,4,2:RETURN
    39GOSUB40:X%=19-X%
    40PRINTTAB(X%,Y%)"'";:RETURN
    41VDU23;8202;0;0;0;:RETURN
    42P%=?(HIMEM+16*V%+320*W%+3):
RETURN
    43FORA%=1TO20:PRINT"'";:NEXT:
RETURN
```



FOOLISHLY, you are driving your **Formula One** car the wrong way round the race track. Can you avoid the oncoming cars? Use Q and P to steer your car left and right, gaining 100 points for each car you pass. You have an automatic accelerator and your speed will increase gradually as you reach 500, 1,000 and 10,000 points. The track becomes narrower the further you proceed. If you survive all the dangers in level one, you go to stage two, where each car is worth 250 points. At the winning post you will be welcomed by a chequered flag.

Formula One was written for the BBC B by Stephen Galea of Hornchurch, Essex.




```
   10 REM ONE-WAY DRIVER
   20 REM by Federico Porri
   30 REM 2/1/1984
   40 ENVELOPE 1,0,50,-50,50,1,1
,1,126,0,0,-126,126,126
   50 R%=1279
   60 ON ERROR GOTO 70
   70 MODE4
   80 PRINT'"              ONE-WAY
DRIVER"
   90 PRINT''''"  You are a mad F
.1 driver that is going  in the
wrong direction around the
 circuit.Your aim is try not to
hit the  cars or the guard-rail.
";
  100 PRINT ;"As you go on     t
he road becomes narrower and mor
e       cars run against you."
  110 PRINT ''''"  You move left
with the 'Z' key            and ri
ght with the 'X' key."
  120 PRINT ''"  Press the ESCAP
E key when you want       to rest
art."
  130 PRINT ''"       GOOD LUCK!"
  140 PRINT ''''"  Press the SPAC
E BAR to start"
  150 *FX21,0
  160 IF GET$=" "THEN 170 ELSE 1
60
  170 VDU23,1,0;0;0;0;
  180 VDU23,242,60,90,60,60,60,2
19,219,60
  190 VDU23,243,219,255,219,24,2
4,90,90,24
  200 VDU23,245,204,204,51,51,20
4,204,51,51
  210 VDU23,250,60,60,60,60,60,6
0,60,60
  220 VDU23,254,0,0,128,192,224,
240,120,60
  230 VDU23,253,30,15,7,3,1,0,0,
0
  240 VDU23,251,0,0,1,3,7,15,30,
60
  250 VDU23,252,120,240,224,192,
128,0,0,0
  260 VDU23,224,4,10,69,218,56,1
76,76,40
  270 VDU23,225,32,80,162,91,28,
13,50,20
  280 VDU23,226,101,42,20,40,60,
219,219,60
  290 VDU23,227,154,81,42,20,60,
219,219,60
  300 VDU23,228,0,16,118,169,210
,164,88,40
  310 VDU23,229,0,8,59,84,104,82
,44,20
  320 CLS:CLEAR
  330 VDU19,1,7,0,0,0
  340 FOR P=31TO14 STEP-1:PRINTT
AB(0,P)CHR$(250)TAB(38,P)CHR$(25
0):NEXT
  350 FOR Q=13TO1 STEP-1:PRINTTA
B(13-Q,0)CHR$(251)CHR$(252)TAB(2
4+Q,0)CHR$(253)CHR$(254):NEXTQ
  360 PRINT TAB(13,0)CHR$(250);:
FORK=1TO11:VDU245:NEXTK:PRINT ;C
HR$(250)TAB(0,0)CHR$(11);
  370 X%=13:A%=13:S%=0
  380 FORG%=12TO5STEP-1
  390 H%=38-G%:A%=A%-S%:S%=0
  400 PRINT TAB(X%,25);" "
  410 IFG%<>12THENPRINT TAB(A%,0
)CHR$(250)TAB(A%+G%,0)CHR$(253)C
HR$(254)CHR$(11)
  420 FORK=1TO200
  430 IFRND(G%)=5THENPRINTTAB(A%
+RND(G%-1),0)CHR$(243)
  440 IF S%=-1THENPRINTTAB(A%,0)
CHR$(253)CHR$(254)TAB(A%+G%,0)CH
R$(253)CHR$(254)CHR$(11):GOTO470
  450 IF S%=1THENPRINTTAB(A%-1,0
)CHR$(251)CHR$(252)TAB(A%+G%-1,0
)CHR$(251)CHR$(252)CHR$(11):GOTO
470
  460 PRINTTAB(A%,0)CHR$(250)TAB
(A%+G%,0)CHR$(250)CHR$(11)
  470 IFINKEY-67THENSOUND0,1,150
,1:PROCR:GOTO500
  480 IFINKEY-98THENSOUND0,1,150
,1:PROCL:GOTO500
  490 PRINTTAB(X%,25)CHR$(242)TA
B(X%,26)" ";
  500 IFPOINT(32*X%+16,228)=1THE
NPROCEND
  510 S%=RND(3)-2:A%=A%+S%
  520 IFA%>H%THENA%=A%-1:S%=0:GO
TO540
  530 IFA%<0THENA%=A%+1:S%=0
  540 SOUND1,0,0,0:SOUND1,-15,10
,1
  550 NEXTK
  560 NEXTG%
  570 DEF PROCR:X%=X%+1:IFPOINT(
32*X%+16,196)THENPRINTTAB(X%-1,2
6)" ";:PROCEND ELSEPRINTTAB(X%,2
5)CHR$(224)TAB(X%-1,26)" ";:ENDP
ROC
  580 DEF PROCL:X%=X%-1:IFPOINT(
32*X%+16,196)THENPRINTTAB(X%+1,2
6)" ";:PROCEND ELSEPRINTTAB(X%,2
5)CHR$(225)TAB(X%+1,26)" ";:ENDP
ROC
  590 DEF PROCEND
  600 *FX10,4
  610 *FX9,2
  620 VDU19,1,14,0,0,0
  630 FOR KT=1 TO 11:PRINT TAB(X
%,25)CHR$(226)TAB(X%,24)CHR$(228
):SOUND0,-15,100,3:PRINT TAB(X%,
25)CHR$(227)TAB(X%,24)CHR$(229):
SOUND0,-15,100,3:NEXTKT
  640 PRINT TAB(0,31);"Distance
traveled ";(12-G%)*200+K;" km"
  650 VDU7
  660 IF (12-G%)*200+K>R% THEN R
%=(12-G%)*200+K:PRINT "New recor
d":SOUND1,-15,150,10
  670 IF  (12-G%)*200+K<100 THEN
PRINT"Please,don't drive on stre
ets...."'"          You are a road
 danger !!!!!!"
  680 PRINT "Record ";R%;" km"
  690 PRINT "Press 'Y' to restar
t"
  700 *FX21,0
  710 IF GET$="Y" THEN CLS:GOTO3
20 ELSE GOTO 710
```

ERRORS & MISHAPS

IN THE August/September issue, the first section of the **Ghost Hunter** listing, containing the program graphics instructions, was inadvertently omitted.

We apologise for the inconvenience which many may have experienced as a result. We are investigating the cause of the difficulty and will provide the solution when it is resolved.

Two other errors in our last issue have come to our attention, both concerning lines missing in listings.

Gothic Horror, line 690 should read as follows:

690IFA$="/"ANDX%>2Y%=Y%-1:PRIN

Whist (page 55), the missing line is:

1150IF win=1 THEN PROCy play:PR

Programs must be your own work

FOLLOWING recent problems involving readers sending programs which were not their own work, we aim to ensure that does not happen again by deciding that only programs which are accompanied by a Program Voucher will be considered for publication.

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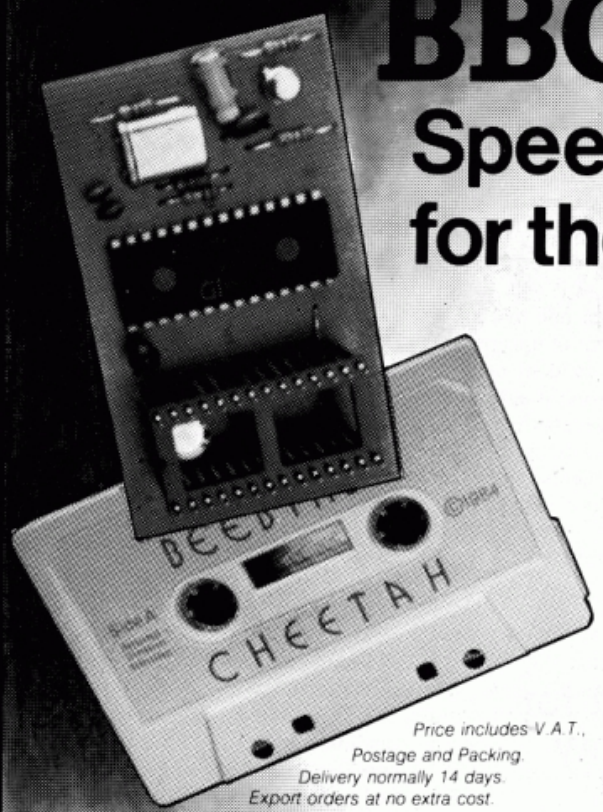

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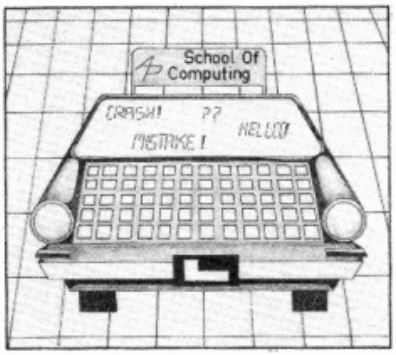


Mathematical certainties

Jeremy Richards' programming series goes on from numeric variables to loops

IN THE FIRST instalment of this series I left you with the problem of writing a program to test a person's knowledge of any multiplication table. Given the commands I covered the last time, you should have been able to write such a program. There is no single correct way of writing it but you should have been able to construct a program which works in a similar manner to the one I offer here:

Program 1.

```
10  counter=1
20  INPUT "Enter multiplication table", table
30  PRINT "What is"; counter; "times"; table
40  INPUT reply
50  IF reply=counter*table GOTO 80
60  PRINT "That is wrong . . . Try again"
70  GOTO 30
80  PRINT "That is correct . . . Let's try
    another"
90  counter=counter+1
100 IF counter > 12 GOTO 120
110 GOTO 30
120 PRINT "You have completed the"; table;
    "times table."
130 END
```

The program is by no means perfect and I will show you how it can be improved but first see if you can understand the way it works. There are three numeric variables at the heart of the program. The numeric variable counter is used to keep track of the number to be multiplied and it is incremented by one every time the program reaches line 90.

The program allows the user to type-in any number, which is the multiplication table to be tested. That number is held in the variable table. Note that I use meaningful variable names. You could, of course, call your variables what you like but it helps to clarify the program and makes it easier to follow.

Line 40 waits for the user to answer and the number entered is held in the variable reply. Line 50 then checks to see whether the answer is correct. It does so by seeing whether the number held in variable reply is equal to the sum of counter * table — remember that '*' is the sign for multiplication. If it is correct, the program goes to line 80 — GOTO 80.

If the user has typed an incorrect answer an appropriate message is printed and the question is printed again by sending the user back to line 30. By increasing the value of counter when the answer is correct, the same line for asking the questions can be used but with a different number.

You might think that is all we can do with this particular program but that is not so. Would it not be pleasant for an element of uncertainty to enter the program? At the moment the program is extremely predictable, as it will ask the questions in order from one to 12 but we can enter the element of uncertainty by letting it choose a random number every time a new question is asked.

To do that we use another Basic keyword, RND. It is a random number generator facility and builds into a program randomobility. For instance, instead of writing:

counter=counter+1

we could write:

counter=RND (12)

This would cause a random whole number between one and 12 inclusive to be assigned to the variable counter. By changing the number in the brackets, the range for a random number to be chosen is altered. Therefore:

anynumber=RND (145)

will choose a number between 1 to 145.

By incorporating the RND function into programs we can allow the computer to choose a number randomly. Besides using it in our multiplication program there are other ways we can utilise the command. Games of skill and luck are always fun and program two is a short game to test your powers of observation and memory. A set of numbers will appear briefly on the screen and you have to recall the numbers.

Program 2.

```
10  goes=0
20  counter=0
30  CLS
40  x=RND (99999)
50  PRINT x
60  wait=INKEY (50)
70  CLS
80  INPUT "What was the number", qnum
90  IF qnum=x THEN PRINT "Well done"
    ELSE PRINT "Wrong"
100 IF qnum=x THEN counter=counter +1
110 goes=goes+1: IF goes > 10 GOTO 140
120 REPEAT:PRINT "Press the spacebar to
    continue": UNTIL GET=32
130 GOTO 30
140 PRINT "You have scored"; counter; "out
    of 10"
```

Do not worry if you did not follow all the program, as I have put in a few new commands. They are INKEY, REPEAT — UNTIL, ELSE, GET and CLS. Line 40 is where the program chooses the random number and line 50 prints that number to the screen. To make sure that the number does not remain on the screen I have used the CLS command at line 70.

CLS is the command to clear the screen and in this program ensures that the number does not remain printed on the screen.

You are probably wondering how we can instruct the machine to keep the number printed on-screen for a specified period. If you were to omit line 60 you would not see the number, so therefore line 60 contains the necessary instruction to cause a time delay between the number being printed and the screen being cleared.

The command is INKEY and in the context of this program causes the program to pause for a certain time. That period can be altered by changing the number in the brackets.

Line 120 uses the commands REPEAT, UNTIL and GET. The function GET tells the computer we are waiting for a certain key to be pressed,

> 'Would it not be pleasant for an element of uncertainty to enter the program?'

in this case the spacebar. How do we know it is the spacebar? Well, 32 is the number assigned to the spacebar key — you can look it up in the ASCII table at the back of the user guide — and therefore tells the program to recognise only the spacebar being pressed.

The REPEAT-UNTIL command sends the program into a loop, i.e., the command to wait for the spacebar to be pressed is REPEATed UNTIL the spacebar is pressed — GET=32. The colons in line 120 divide the different statements and allow more than one command a line. That is what is called a multi-statement line.

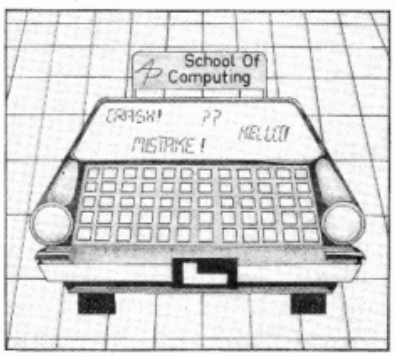
The variable 'goes' counts the number of questions asked and the value of 'goes' is equal to 10 — line 110 — the final score is given — line 140 — and the program finishes. In a similar way, counter keeps track of the score — line 100. To make the program more challenging you can change the possible number of digits presented by increasing the number in the RND statement — line 40 — or by decreasing the time delay in line 60.

Finally, line 90 shows a way of expanding the power of the decision statement IF. The command ELSE is very much as its name suggests. It tells the machine that IF an event has or has not occurred, THEN do this ELSE proceed to another course of action.

I mentioned the concept of loops and this is a very useful and powerful technique in programming. In my first article I showed how to ease the writing of your programs by using a counter in the program to increment numbers. For example, it is very tedious to type-in 45 PRINT statements just to print your name 45 times. To make it easier you could write the program as follows:

```
10 x=1
20 PRINT "Jeremy"
30 x=x+1
40 IF x<45 GOTO 20
50 END
```

There is a faster and more efficient way of writing this program. The answer is to place the 'PRINT "Jeremy" ' sequence within a loop and tell the machine that you want it repeated 45 times. This can be done using the FOR-NEXT command. Type-in program three:



Program 3.

```
10 FOR a=1 TO 45
20 PRINT "Jeremy"
30 NEXT a
```

As you can see, that is far simpler and quicker. When the program runs, variable 'a' is set to a value of one and then proceeds to line 20. When the name is printed, line 30 checks to see if there is a NEXT number which 'a' can be. As we have told the computer in line 10 that 'a' will equal all values between one TO 45, the program returns to line 10 and 'a' is incremented by 1 to equal 2. That continues in a loop until 'a' equals 45. The numbers in line 10 can be whatever you like but remember they must go from low to high. IF you wish to count down you must use the STEP command. To see this working type the following three short programs:

Program 4a.

```
10 FOR X=1 TO 100
20 PRINT X
30 NEXT
```

Program 4b.

```
10 FOR X=100 TO 1 STEP -1
20 PRINT X
30 NEXT
```

Program 4c.

```
10 FOR X=1 TO 100 STEP 10
20 PRINT X
30 NEXT
```

Program 4a carries out what we have learned so far but to count backwards we have to tag on STEP at the end of the command — program 4b — to tell the machine we are counting backwards in steps of one. Try writing the program leaving out STEP to see the effect. Finally, one can use STEP to tell the computer to count in steps of more than one, for instance in program 4c I have told the computer to count in steps of 10.

You may have noticed also that in line 30 I just say NEXT without tagging the variable name on the end. It is not necessary to place the name on the end as BBC Basic understands that the NEXT statement refers to the FOR loop in line 10. One golden rule to try to remember is not to jump out of a FOR-NEXT loop if you can avoid it.

Now for procedures. They are one of the better features of BBC Basic and make programs very neat and easy to follow. Creating a large Basic program is no more than stringing together a load of small Basic programs. The best way of achieving this is to use a procedure and program five is an example.

Program 5.

```
 10 PROCintro
 20 PROCquestion
 30 PROCreply
 40 END
 50 DEFPROCintro
 60 CLS
 70 PRINT "The following is a short test of
    your"
 80 PRINT "mental arithmetic. Press the
    SPACEBAR"
 90 PRINT "when ready."
100 REPEAT UNTIL GET=32
110 ENDPROC
120 DEFPROCquestion
130 x=RND (10): y=RND (10)
140 PRINT "What is" ;x; "times" ;y
150 INPUT reply
160 ENDPROC
170 DEFPROCreply
180 IF reply=x*y PRINT "Correct" ELSE
    PRINT "Wrong"
190 ENDPROC
```

'One golden rule to remember is not to jump out of a FOR-NEXT loop if you can avoid it'

Program five is another example of writing a mathematical program but this time it is split into three sections or procedures. Each section is a small program in itself and is given a name, i.e., PROCintro, PROCreply. To call this subroutine we use the command PROC followed by the name of the procedure.

The program is then sent to the line where the subroutine is and carries out the commands in that section. To identify the beginning and the end of the subroutine, DEPROC initialises the routine by DEFining the procedure name and ENDPROC tells the machine the procedure is finished. When the procedure has ended the program returns to the command after where the procedure was called, i.e., in program five after PROCintro is carried out it returns to line 20 to PROCquestion.

We can therefore say that the main program is just three lines long — lines 10 to 30 — and by splitting the program into subroutines and also giving the procedures meaningful names it is easier to follow. Try to use procedures in your larger programs and you will find that they help tremendously.

SIDNEY SQUIRREL

```
   10
   20  REM ********************
         * ACORN PROGRAMS   *
         * SIDNEY SQUIRREL *
         * PART 2           *
         ********************
   30
   40
   50  ONERROR IF ERR=17 RUN ELSE PRINT'
''':REPORT:PRINT" at line ";ERL:END
   60  MODE7:PROCinit
   70  REPEAT: PROCvar:MODE2
   80    PROCsetup:PROCplay
   90    MODE7:PROCendgame
  100    UNTIL FALSE
  110
  120
  130  DEFPROCinit
  140  HI%=0:A%=0:SP%=1:DIR%=1
  150 ENDPROC
  160
  170
  180  DEFPROCsetup
  190  VDU12,23;8202;0;0;0;4,19,1,0;0;19
,2,0;0;19,3,0;0;19,7,0;0;
  200  COLOUR1:COLOUR135
  210  PRINTTAB(0,0);"    ACORN PROGRAMS
  ";
  220  COLOUR7:COLOUR128
  230  PRINTTAB(0,2);"DAY   ";D%;TAB(9,2)
;"LIVES  ";M%;TAB(0,3);"NUTS ";AC%-A%;
  240  PRINTTAB(9,3);"HI      ";HI%;TAB(0
,4);"TIME ";T%;TAB(9,4);"DIST    ";S%;
  250  GCOL0,7:MOVE0,0:MOVE0,832:PLOT85,
1279,0:PLOT85,1279,832
  260  VDU20,5:X%=640:Y%=832:
  270  PROCsquirrel(X%,Y%)
  280  FOR C=1 TO LEAF%:PROCleaf(RND(18)
*64,832-(RND(24)*32)):NEXT
  290  IF RND(1)<.1 VDU19,7,0,0,0,0 ELSE
 VDU19,0,0,0,0,0
  300  ENDPROC
  310
  320
  330 DEFPROCplay
  340  REPEAT:A%=0:J=FALSE
  350    CX%=0:CY%=0:CU%=POINT(CX%,CY%)
  360    REPEAT:IF L=TRUE PROCsetup
  370      REPEAT:AX%=RND(18)*64:AY%=832
-(RND(24)*32):UNTIL POINT(AX%,AY%)<>6
  380      PROCacorn(AX%,AY%,SP%):TIME=0

  390      REPEAT:L=FALSE:B=FALSE:F=FALS
E
  400        SP%=SP%+1:IF SP%=5 SP%=1
  410        PROCacorn(AX%,AY%,SP%)
  420        IF D%>3 AND RND(1)<.5 PROCc
haser
  430        IFINKEY(-98) PROCleft
  440        IFINKEY(-67) PROCright
  450        IFINKEY(-73) PROCup
  460        IFINKEY(-105) PROCdown
  470        IF INKEY(-99) PROCjump
  480        IFINKEY(-56) PROCpause
  490        PROCupdate
  500        UNTIL (X%=AX% AND Y%=AY%) O
R L=TRUE OR B=TRUE OR F=TRUE
  510      IF B=TRUE VDU4,31,16,2:PRINT;
M%-1;:VDU5:PROCloseman(3," SLIPPED ON LE
AF ")
  520      IF F=TRUE VDU4,31,16,2:PRINT;
M%-1;:VDU5:PROCloseman(3," GOTCHA ")
  530        UNTIL M%<1 OR A%=AC%
  540    IF A%=AC% SOUND 1,2,150,10
  550    AC%=AC%+1:T%=T%-1:D%=D%+1:LEAF%
=LEAF%+2:S%=S%+(20*D%):L=TRUE
  560    UNTIL M%<1:ENDPROC
  570
  580
  590  DEFPROCleft
  600  DIR%=1
  610  IF POINT(X%-32,Y%)=6 ENDPROC
  620  IF POINT(X%-32,Y%-16)=1:B=TRUE
  630  SOUND 1,-15,180,1
  640  VDU25,4,X%;Y%;18,0,6,253
  650  X%=X%-64:IF X%<0 X%=1216
  660  PROCsquirrel(X%,Y%):S%=S%+1:ENDPR
OC
  670
  680
  690  DEFPROCright
  700  DIR%=2
  710  IF POINT(X%+96,Y%)=6 ENDPROC
  720  IF POINT(X%+96,Y%-16)=1:B=TRUE
  730  SOUND 1,-15,180,1
  740  VDU25,4,X%;Y%;18,0,6,255
  750  X%=X%+64:IF X%>1216 X%=0
  760  PROCsquirrel(X%,Y%):S%=S%+1:ENDPR
OC
  770
  780
  790  DEFPROCup
  800  IF POINT(X%+32,Y%+16)=6 ENDPROC
  810  IF POINT(X%+32,Y%+16)=1:B=TRUE
  820  SOUND 1,-15,180,1
  830  VDU25,4,X%;Y%;18,0,6,255
```

HELP SIDNEY Squirrel gather as many acorns as he can before the long winter sets in.

The acorns are scattered about a large, frozen lake, and as Sidney skids over it, the ice melts so that he cannot cross his own trail. To make matters worse, there are leaves on the lake on which Sidney might slip and kill himself, and he only has three lives.

Sidney has enough energy for one jump, but there is no telling where he might land.

Be careful how you guide Sidney. If he approaches the acorns too quickly, he may lose his chance of picking them up. Beware, too, of sudden nightfall, when Sidney cannot see where he is going or how much time he has left.

In the enhanced version of the game, you will also have to cope with the park-keeper who is attempting to catch Sidney and make squirrel stew out of him.

The keys you need are Z to go left, X to go right, * to go up, ? to go down, P to pause, R to re-start and space bar to jump.

MANY readers have already received a leaflet containing the vital graphics instructions for our exciting special offer program, Sidney Squirrel. Now we bring you the main part of the program to enable you to enjoy the game in full.

For those of you not lucky enough to have received the first instalment, the answer is simple. Fill in the coupon below to take out a subscription to *Acorn Programs*. You will receive not only the graphics instructions, but an enhancement to the program which will make Sidney Squirrel even more challenging and entertaining.

Those of you who already have both parts of the program will also receive the enhancement.

```
  840  Y%=Y%+32:IF Y%>832 Y%=32
  850  PROCsquirrel(X%,Y%):S%=S%+1:ENDPR
OC
  860
  870
  880  DEFPROCdown
  890  IF POINT(X%+32,Y%-48)=6 ENDPROC
  900  IF POINT(X%+32,Y%-48)=1:B=TRUE
  910  SOUND 1,-15,180,1
  920  VDU25,4,X%;Y%;18,0,6,255
  930  Y%=Y%-32:IF Y%<32 Y%=832
  940  PROCsquirrel(X%,Y%):S%=S%+1:ENDPR
OC
  950
  960
  970  DEFPROCvar
  980  VDU23;8202;0;0;0;:L=FALSE:M%=3
  990  S%=0:D%=1:T%=15:AC%=5:LEAF%=10
 1000  ENDPROC
 1010
 1020
 1030  DEFPROCjump
 1040  IF J=TRUE ENDPROC
 1050  VDU25,4,X%;Y%;18,0,6,255
 1060  REPEAT:X%=(RND(18)*64):Y%=832-(RN
D(24)*32):UNTIL POINT(X%,Y%)<>6
 1070  PROCsquirrel(X%,Y%):J=TRUE:ENDPRO
C
 1080
 1090
 1100  DEFPROCendgame
 1110  *FX15,1
 1120  FOR C=1 TO 2
 1130    PRINTTAB(5,C);CHR$141;CHR$129;"
  ACORN PROGRAMS   ":NEXT
 1140  PRINTTAB(3,4);CHR$133;"YOU HAVE B
EEN KILLED AFTER ";D%;" DAYS,"';CHR$133;
"HAVING SCORED ";S%;" POINTS"
 1150  IF S%>HI% THEN PRINT'TAB(2);CHR$1
31;"A NEW HISCORE!!! CONGRATULATIONS!!":
HI%=S%
 1160  PRINT''TAB(8);"PRESS SPACE TO PLA
Y"
 1170  REPEATUNTILGET=32:ENDPROC
 1180
 1190
 1200  DEFPROCpause
 1210  *FX15,1
 1220  W=TIME:REPEAT:K$=GET$:UNTIL K$="R
":TIME=W
 1230  ENDPROC
 1240
 1250
 1260  DEFPROCupdate
 1270  TL=INT(T%-(TIME/100))
 1280  VDU4,31,16,4:PRINT;S%;:VDU31,5,4:
PRINT;TL;" ";
 1290  IF TL=0:VDU31,16,2:PRINT;M%-1;:PR
OCloseman(4,"NO TIME LEFT")
 1300  IF X%=AX% AND Y%=AY% A%=A%+1:S%=S
%+10:SOUND 1,1,100,10:VDU31,5,3:PRINT;AC
%-A%;" ";
 1310  VDU5:ENDPROC
 1320
 1330
 1340  DEFPROCloseman(P,M$)
 1350  SOUND0,-15,20,10:L=TRUE:M%=M%-1
 1360  VDU4,31,P,20:PRINT;M$;
 1370  PROCdelay(5000):ENDPROC
 1380
 1390
 1400  DEFPROCdelay(P)
 1410  FOR Z=1 TO P:NEXT
 1420  ENDPROC
 1430
 1440
 1450  DEFPROCsquirrel(A%,B%)
 1460  VDU25,4,A%;B%;18,0,1,224
 1480  ENDPROC
 1490
 1500
 1510  DEFPROCacorn(A%,B%,C%)
 1520  VDU25,4,A%;B%;18,0,3,235,8,18,0,1
,228
 1560  ENDPROC
 1570
 1580
 1590  DEFPROCleaf(A%,B%)
 1600  VDU 25,4,A%;B%;18,0,1,253,8,18,0,
2,254
 1610  ENDPROC
 1620
 1630
 1640  DEFPROCchaser
 1720  ENDPROC
 1730
 1740
 1750  DEFPROCchpr(A%,B%)
 1770  ENDPROC
```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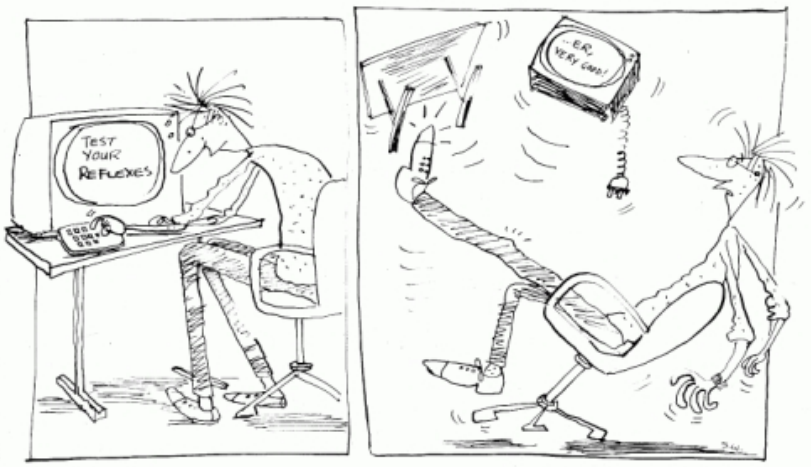
reaction timer

REACTION TIMER, a simple program for the BBC B by A Moulder of Rainham, Essex will help you sharpen those reflexes so necessary for playing the latest computer games or for making the brilliant catch which might put the West Indies out of a Test match for good.

After a variable time, a question mark appears at a random position on the monitor display. Hit the RETURN key as fast as you can and, after three attempts, your average time will be given in centiseconds, together with your rating.

See the breakdown of what each section of the program does to help you understand how it works.



The program is run in mode 7. Use is made of the CHR$ codes to produce coloured script.

Line 30 initialises a user-defined key for running the program.

Line 50 suppresses the cursor.

Line 110 produces a random delay.

Line 120 sets the internal timer to zero.

Lines 140-150 produce a random TAB display.

Line 190 is a cheat control.

Lines 280-340 print out reaction comments related to times.

Lines 350-360 simple sound generation.

```
   10 REM REACTION TIMER
   20 REM BY A.A.MOULDER  1984
   30 *KEY0 RUN|M
   40 CLS
   50 PRINT''''CHR$129"This will
test your reactions"
   60 PRINT''''CHR$130"Wait for ?
? to appear"
   70 PRINT''''CHR$132"When it do
es hit the return key"
   80 PRINT''''CHR$133"This will
occur three times"
   90 PRINT''''CHR$134"The averag
e will then be printed out"
  100 PRINT''''CHR$134"    Hit any
 key to proceed"
  110 pause = GET
  120 VDU12,23;8202;0;0;0;
  130 test =0
  140 r$ = "Reaction  "
  150 total=0
  160 DIM try(3)
  170 FOR repeat = 1 TO 3
  180  FOR delay = 1 TO (1500+RN
D(2000)):NEXT delay
  190  TIME = 0
  200  REM CORDINATES TAB(x,y)
  210  x=RND(36)
  220  y=RND(23)
  230  PRINTTAB(x,y)CHR$130"?";
  240   REM  SOUND1,-15,200,3
  250  INPUT try
  260  IF TIME < 5 THEN PRINT CH
R$129"CHEAT "''"Press f0 to cont
inue":END
  270  try(repeat)=TIME
  280  CLS
  290 NEXT repeat
  300 PRINT '''
  310 FOR repeat = 1 TO 3
  320  PRINT SPC(15)try(repeat)
  330  total = total + try(repea
t)
  340 NEXT repeat
  350 REM REACION COMMENTS
  360 PRINT''''CHR$134"THE AVERAG
E IS"INT(total/3)"  CENTI SECOND
S"
  370 IF total/3 <20 THEN PRINTC
HR$130r$"  Very fast"
  380 IF total/3 >=20  AND total
/3 <28 PRINTCHR$131r$"PRETTY GOO
D"
  390 IF total/3 >=28 AND total/
3 <37  PRINTCHR$130r$"  So So"
  400 IF total/3 >=37 AND total/
3 <  45 PRINTr$" Your are gettin
g old"
  410 IF total/3 >=45 THEN PRINT
CHR$130r$" You are either dead o
r Irish"
  420 SOUND1,-15,10,20
  430 SOUND1,-15,200,20
  440 PRINT''''CHR$129"Press f0 t
o continue"
```

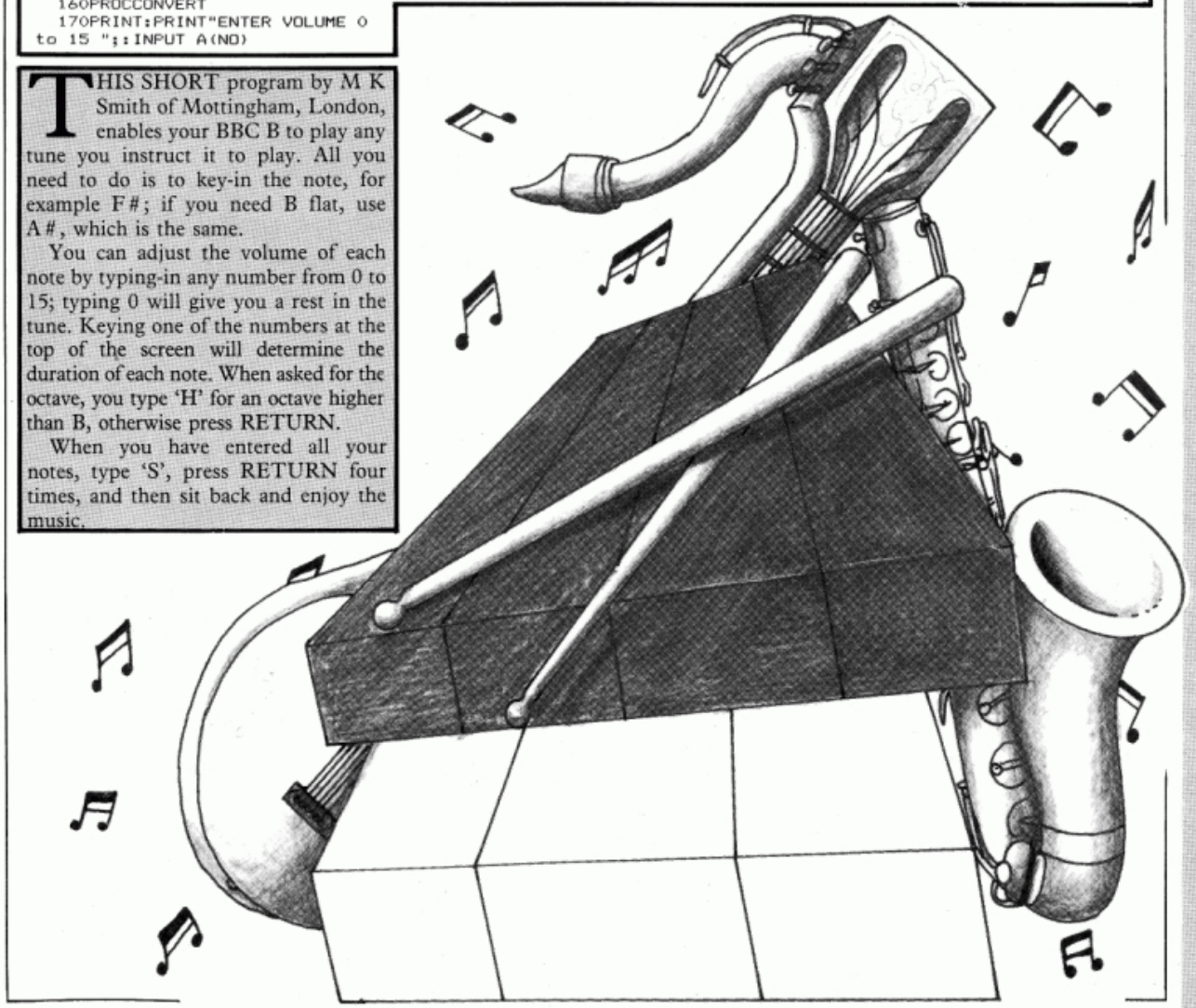
MUSIC MAKER

```
   10REM *** MUSIC MAKER ***
   20REM *** BY MIKE SMITH ***
   30REM *** JULY  1984 ***
   40CLEAR:CLS
   50MODE7
   60PROCINIT
   70MODE1
   80VDU28,0,10,39,0:VDU23;8202;
0;0;0;
   90PRINT:PRINT"QUAVER.........
........5"
  100PRINT"CROTCHET............
.10"
  110PRINT"MINIM...............
.20"
  120PRINT"SEMIBREVE...........
.40"
  130VDU28,0,24,39,10
  140REPEAT
  150PRINT:PRINT"ENTER NOTE ";:I
NPUT N$
  160PROCCONVERT
  170PRINT:PRINT"ENTER VOLUME 0
to 15 ";:INPUT A(NO)
  180PRINT:PRINT"ENTER DURATION
(as given above) ";:INPUT D(NO)
  190PRINT:PRINT"ENTER OCTAVE (H
 if above B )";:INPUT O$
  200NO=NO+1
  210UNTIL LEFT$(N$,1)="S"OR NO
>150
  220CLS
  230PRINT:PRINT:PRINT" Do you w
ant the tune played ";:INPUT AN$
:IF LEFT$(AN$,1)="Y" THEN PROCPL
AY ELSE RUN
  240END
  250DEFPROCCONVERT
  260IF N$="B" THEN N(NO)=145
  270IF N$="A£" THEN N(NO)=141
  280IF N$="A" THEN N(NO)=137
  290IF N$="G£" THEN N(NO)=133
  300IF N$="G" THEN N(NO)=129
  310IF N$="F£" THEN N(NO)=125
  320IF N$="F" THEN N(NO)=121
  330IF N$="E" THEN N(NO)=117
  340IF N$="D£" THEN N(NO)=113
  350IF N$="D" THEN N(NO)=109
  360IF N$="C£" THEN N(NO)=105
  370IF N$="C" THEN N(NO)=101
  380IF O$="H" THEN N(NO)=N(NO)+
48
  390ENDPROC
  400DEFPROCINIT
  410DIMA(150),D(150),N(150)
  420NO=0:O$=""
  430ENDPROC
  440DEFPROCPLAY:CLS
  450FOR TUNE = 0 TO NO
  460SOUND1,-A(TUNE),N(TUNE),D(T
UNE)
  470NEXT TUNE
  480PRINT:PRINT:PRINT"     AGAIN
 ";:A$=GET$:IF A$="Y" THEN RUN E
LSE IF A$="N" THEN ENDPROC
  490ENDPROC
```

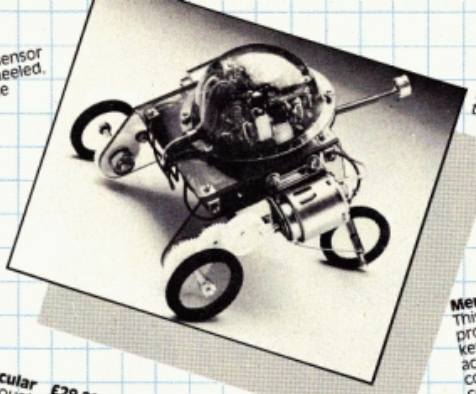
THIS SHORT program by M K Smith of Mottingham, London, enables your BBC B to play any tune you instruct it to play. All you need to do is to key-in the note, for example F#; if you need B flat, use A#, which is the same.

You can adjust the volume of each note by typing-in any number from 0 to 15; typing 0 will give you a rest in the tune. Keying one of the numbers at the top of the screen will determine the duration of each note. When asked for the octave, you type 'H' for an octave higher than B, otherwise press RETURN.

When you have entered all your notes, type 'S', press RETURN four times, and then sit back and enjoy the music.



Line Tracer II **£17.99**
Draw a line and the infra-red sensor picks it up and sends this 3 wheeled, twin motored robot along the course you plot.



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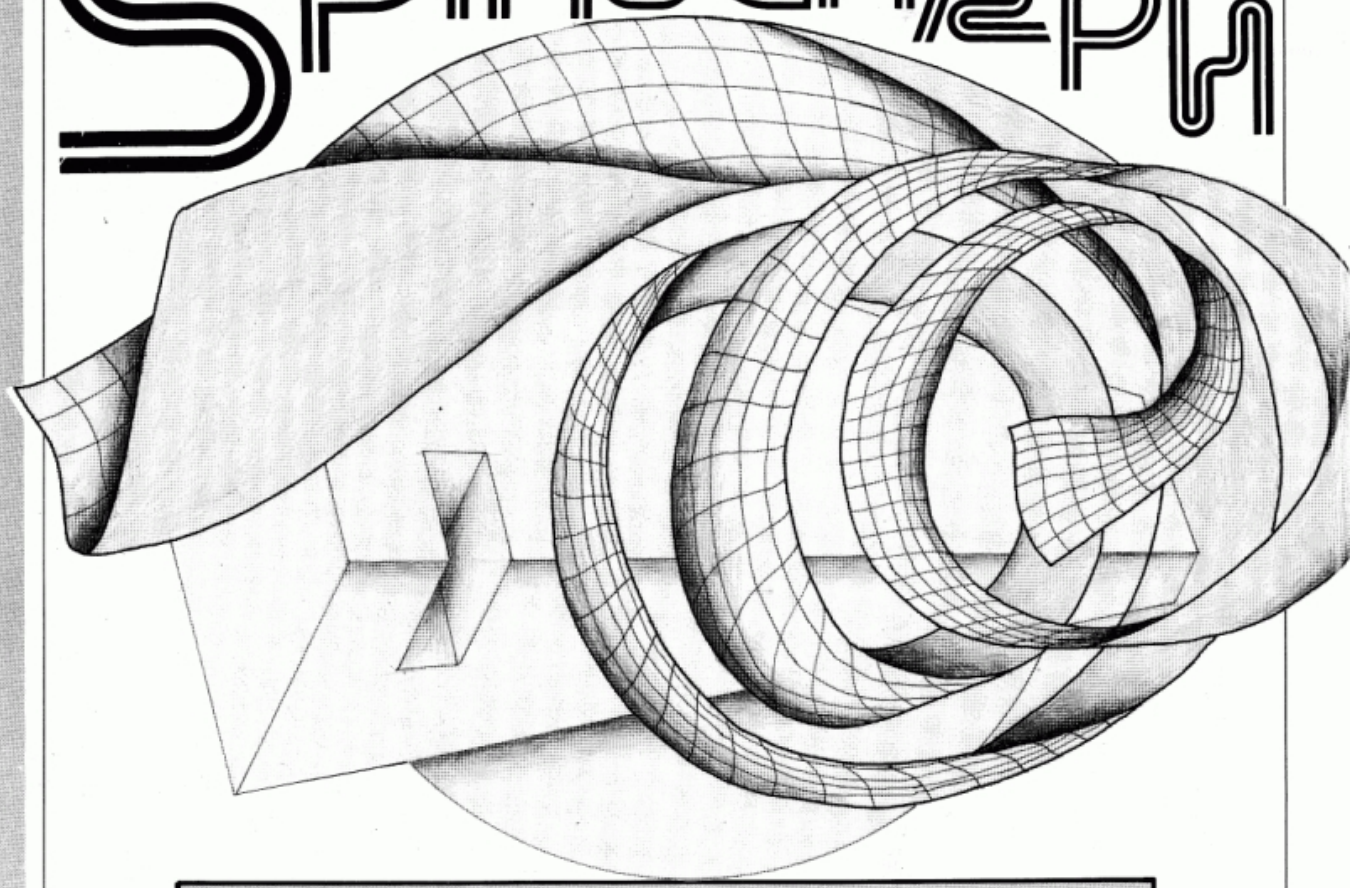
Telephone: 01-253 2277

SPIROGRAPH

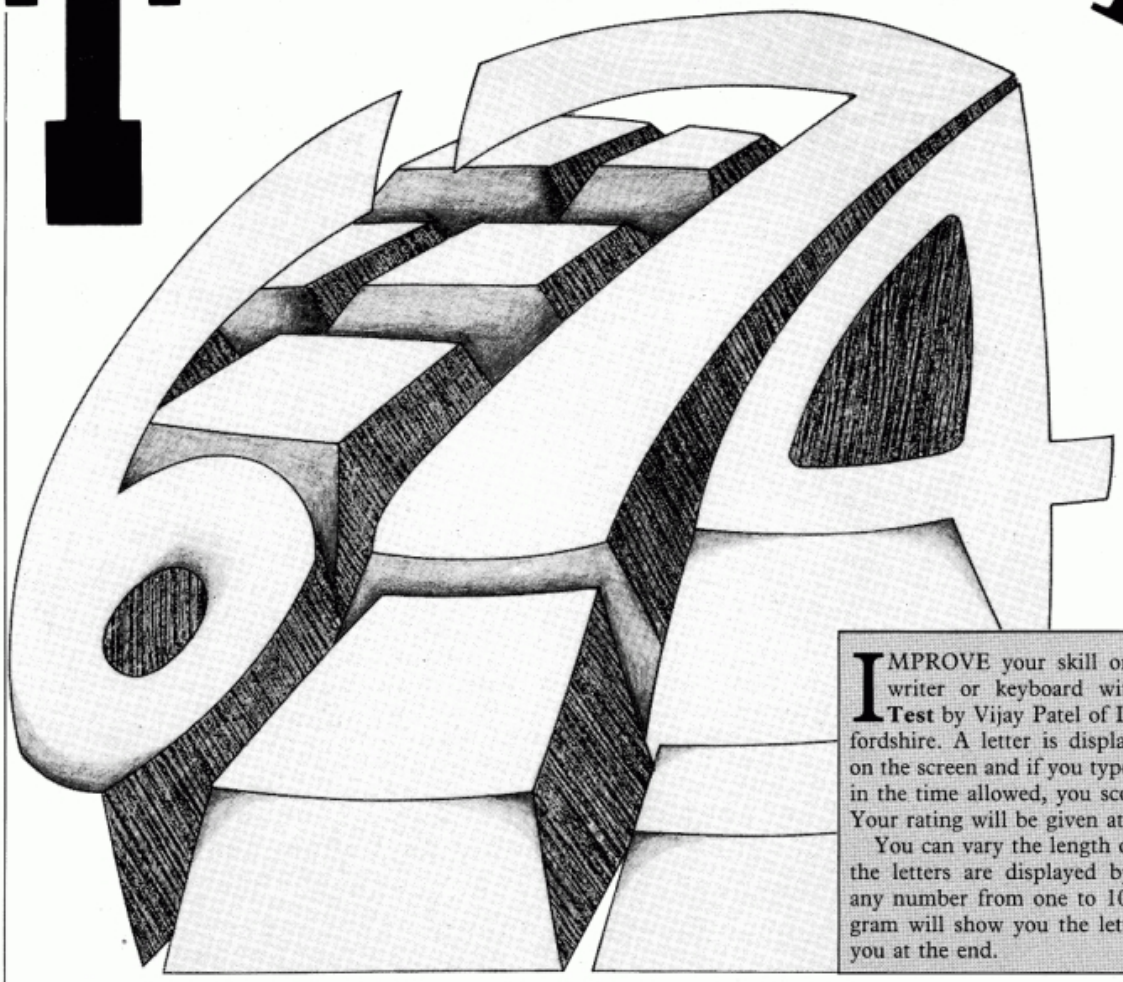


HAVE your computer draw a shape with any number of sides with **Spirograph** by I Doyle of Little Sutton, Cheshire. Besides telling the computer how many sides you want, you can move your shape up and down by using : and ? or left and right by using Z and X. The same keys also allow you to use the program as a sketcher if you type-in 1 when asked for the number of sides. Pressing . will make the shape smaller, ; makes it bigger and pressing the space bar will start the program again.

Try typing numbers with a decimal point for some interesting shapes.

```
    1MODE7
    2PRINTCHR$141"S P I R O
G R A P H"
    3PRINTCHR$141"S P I R O
G R A P H"
   13X%=600:Y%=500
   14R%=200
   20PRINTTAB(15,5)"HOW MANY SID
ES DO YOU WANT THE SHAPE(1=SKETC
HER)":INPUT NS
   21IF NS=0 THEN CLS:RUN
   25MODE2
   26GCOL0,RND(5)
   50DTH=2*PI/NS
   51MOVEX%+R%,Y%
   55TH=0
   63PROCmove
   80TH=TH+DTH
   91DRAWX%+R%*COS(TH),Y%+R%*SIN
(TH)
  101GOTO63
  110DEF PROCmove
  120H%=INKEY (0)
  130 IF H%=58Y%=Y%+4
  140 IF H%=47Y%=Y%-4
  150 IF H%=88X%=X%+4
  160 IF H%=90X%=X%-4
  170 IF H%=59R%=R%+4
  180 IF H%=46R%=R%-4:IF R%<0 R%
=0
  190 IF H%=32 RUN
  200 IF H%=-1 ENDPROC
  210GOTO120
  211GOTO26
```

TYPING TEST



IMPROVE your skill on the typewriter or keyboard with **Typing Test** by Vijay Patel of Luton, Bedfordshire. A letter is displayed briefly on the screen and if you type that letter in the time allowed, you score a point. Your rating will be given at the end.

You can vary the length of time that the letters are displayed by typing-in any number from one to 10. The program will show you the letters it gave you at the end.

```
   10 MODE 7
   20 LET F=0
   25 PRINTTAB(0,2);"INPUT SPEED
 1-10 (5=AVERAGE)":INPUT
 S:IF S<1 OR S>10 THEN GOTO 25
   30 PRINTTAB(0,4);"PRESS THE K
EY SHOWN TO SCORE A POINT"
   40 PRINTTAB(8,6);"HIT ANY KEY
 TO START"
   50 G=GET
   55 DIM R(20)
   60 FOR D=1 TO 1000:NEXT D
   70 FOR A=0 TO 19
   80 LET Z=RND(26)
   90 LET Z=Z+64
   95 LET R(A+1)=Z:IF R(A)=Z THE
N GOTO 80
  100 PRINTTAB(16,11);CHR$(141);
CHR$(Z)
  110 PRINTTAB(16);CHR$(141);CHR
$(Z)
  120 LET I$=INKEY$(S*32)
  130 IF I$=CHR$(Z) THEN LET F=F
+1
  140 NEXT A
  150 CLS
  160 PRINTTAB(8,9);"YOU SCORED
";F;" OUT OF ";A
  170 IF F>16 THEN PRINTTAB(12,1
1);"THAT IS EXCELLENT"
  180 IF F<10 THEN PRINTTAB(12,1
1);"THAT IS RUBBISH"
  190 IF F>9 AND F<17 THEN PRINT
TAB(10,11);"THAT IS QUITE GOOD"
  195 PRINTTAB(11,14);"THE LETTE
RS WERE ":PRINT:FOR A=1 TO 20:PR
INTCHR$(R(A));" ";:NEXT
  200 PRINTTAB(6,19);"DO YOU WAN
T ANOTHER GO Y/N"
  210 PRINTTAB(17,21):INPUT C$
  220 IF LEFT$(C$,1)="Y" THEN RU
N ELSE MODE 7
```

Peripherals which expand the frontiers of the BBC

Modems and processors loom large among queries to Jeremy Richards

FROM a mixed bag of queries, D Clayton of Lancashire, following my mention of the command OSCLI in the July issue, wrote to ask what OSCLI does and how to use it.

Last month I included a short menu program. One problem with it is that for every file loaded the appropriate command LOAD or CHAIN has to be used. It would be far simpler if one could type-in the name and the program would be loaded. It is not so easy as that. To see what I mean, try to set up a one-line program — just a REM statement is sufficient — and SAVE the program with the name "TEST", type-in Programs 1 and 2 and run them both.

Program 1.

```
10 name$="TEST"
20 LOAD name$
```

Program 2.

```
10 name$="TEST"
20 OSCLI "LOAD"+name$
```

Program one produces a syntax error message but program two loads the program successfully. What OSCLI does is to take a string expression and pass it to the operating system. It is rather similar to operating system commands and adds a powerful feature to Basic.

A natural extension of the foregoing program is to use it in a menu. The following program CATalogues the disc and then allows the user to type the name of the program to be used and implements OSCLI as the means of loading the file. As with last month's program, use !BOOT to call the menu program.

Program 3.

```
10 ON ERROR GO TO 30
20 *CAT
30 INPUT "Which file to load", file$
40 OSCLI "LOAD"+file$
```

Remember that OSCLI will work only if you have Basic 2 in your machine. If you have any more interesting uses of OSCLI, please send them in.

The next subject is second processors for the BBC. I have had several queries on the differences between the two processors, the Z-80 and the 6502, what they can and cannot do and their use. So I shall look at the two offerings from Acorn. The Z-80 and 6502 second processors were launched earlier in the year but there is still some confusion as to the differences between them.

The Z-80 second processor is aimed primarily at the business market and turns the BBC into a CP/M machine. The processor is a Z-80B running at 6MHz and has 64K RAM. By means of the tube interface the second processor allows the BBC to become an input/output processor whose job it is to handle the screen display and I/O jobs such as disc drive.

While that is happening the second processor processes programs. Effectively that splits the tasks of processing between two machines and speeds the time of execution. On the Z-80 the speed increase is approximately 30 percent on Basic programs, compared to 50 percent on the 6502.

The Z-80 is in a package with bundled CP/M software such as word processor, spreadsheet and databases. Aimed primarily at the business market, it provides business users with a relatively inexpensive CP/M system. Running under CP/M there is a full implementation of BBC Basic and utilities have been included to transfer from the DFS disc format to the CP/M format.

The 6502 is geared to a wider market though it will probably have most appeal initially to enthusiasts who demand more speed and memory in their programs. It doubles the memory to 64K, though if you are using Basic the increase is only to about 44K. The 6502, however, has already found a specific field in which it can be used, namely computer-aided design. The 6502 is practicable for simulation and graphics because of its speed.

> 'The 6502 is geared to a wider market though it will probably have most appeal to enthusiasts who demand more speed and memory'

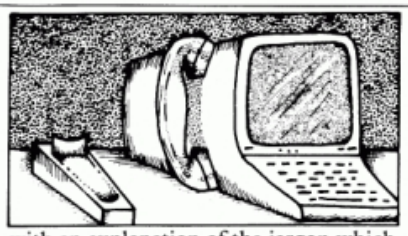
The Bitstik package from Acorn is an implementation of the Robocom software originally for the Apple and is a professional package which provides an inexpensive CAD system. It may be the first of many products which will utilise the power of the second processor and it maintains the BBC as an exciting product.

All, though, is not good news. It seems that some people are having difficulty in getting a 6502 second processor to work with the paged ROMs. With sideways ROMs appearing in vast quantities, many people now have software on EPROM. Unfortunately not all these products will work with the second processor because of the way the EPROMs have been written, using locations which are incompatible with the tube software.

Two specific problems have arisen. First, where the ROM will not work when the second processor is working and, second, and more serious, where the ROM appears to prevent a second processor working. The latter is unusual and the answer is to disable the ROM before using the tube.

In the case of ROMs not working across the tube there is little you can do other than contact the manufacturers of the firmware and hope they produce tube-compatible ROMs.

My mention of modems and acoustic couplers last month has sparked requests for more information about the field. So here is a lightning introduction to the world of micro communications,



with an explanation of the jargon which confuses many people.

Two terms you will hear used constantly are modem and acoustic coupler and they are often interchanged when meaning different items. Generally an acoustic coupler is where the handset of a telephone is placed so that the signals may be transmitted between two micros.

The difficulty with acoustic couplers is that they can suffer from line noise distortion. A better method is to use a hard-wired modem where the modem is connected directly to a telephone line. That can also dispense with the need to pick up handsets and dial, as dialling can be handled from the micro — the new Prestel adaptor from Acorn is one such modem.

What happens when you connect a computer to a modem? The digital signals from a micro are converted by the modem into a form which can be transmitted along a telephone line to a receiving computer at the other end. The difficulty is that there is no universal system in use and there are many protocols — protocol being the accepted term for the rules used between machines.

When looking for a modem, make sure it will work with the systems you want. Firmware is available from various companies which can permit you to change the transmit and receive rates — i.e., speeds of data transmission — as well as other protocols.

Computer Concepts and Pace produce ROMs like Termi, Communicator and Commstar which permit the user to establish contact with a growing range of systems, many freely-accessible to the public, with public bulletin boards for users to exchange news and views.

To help survive in the world of communications I have listed below the most commonly used jargon.

Acoustic coupler: A modem which transmits and receives data via the handset of a telephone. Also a portable package.

Auto-answer: A modem which can answer an incoming telephone call, rather like an answerphone for micros.

Auto-Dial: Enables the telephone number of the host computer to be dialled from a micro or modem. Not available with acoustic couplers.

Baud: Transmission rate of data.

CCITT: The international committee responsible for communications. Acronym for Comité Consultatif International Téléphonique et Télégraphiqe.

Full-duplex: A system which can send data both ways at the same time.

Half-duplex: A system which can send data both ways but only in one direction at a time.

There are also many protocols which systems may use, usually referred to by name like V21, V24. They refer to the bits-per-second rates, half- or full-duplex, and the kind of telephone systems being used.

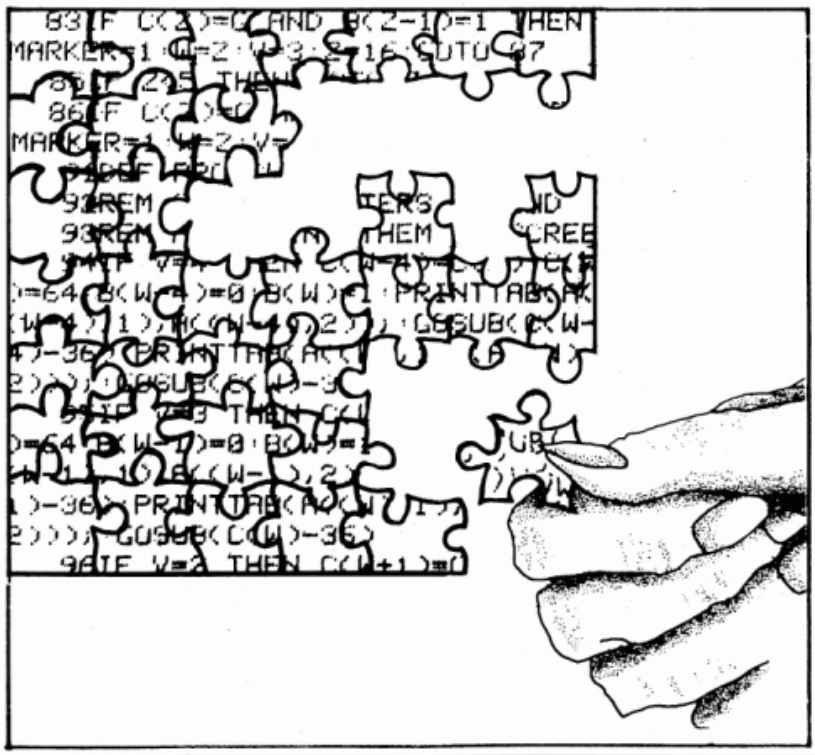
So what is there to use? The best-known viewdata system is Prestel. Besides providing news pages, business information and buying services, it allows users to send electronic mail and Telex messages and to download computer software, all down a telephone line.

There are other similar systems and for the enthusiast many a happy hour can be spent contacting people. Spending many a happy hour is where the problem arises, as telephone usage is not cheap. Fortunately many systems have free access either all the time or after 6pm and at weekends.

The one disturbing aspect of the communications market is the rise of the computer hacker. Most of us have probably heard or read of the War Games type of incident where young people have broken into military or banking computers. The communications industry, however, is growing and learning fast and hacking is not so easy as it was.

The BBC computer is ideal for telecommunications and there is support for the machine in that area and there are many Special Interest Groups for BBC users on the various systems. Where does that leave the Electron user? Well, certainly not in the cold. Because of the lack of mode 7, systems which use teletext graphics such as Prestel are not accessible but with the appearance of interfaces for the Electron, connections to modems will not be far away and I have just heard of a company launching a mode 7 interface for the Electron.

'The communications industry is growing and learning fast and hacking is not so easy as it was'



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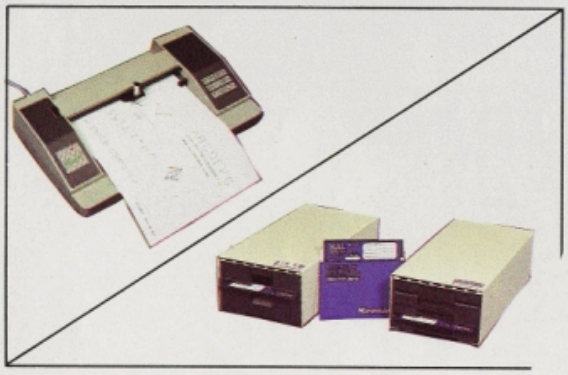

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SIDNEY SQUIRREL

Enhancement

These listings contain all the additions necessary to produce the enhanced version of Sidney Squirrel. We have included all of Part 1 for anyone who missed the original distribution.

If you already have a copy on tape or disc then all you have to do is LOAD PART1 into the computer and add lines 120 to 300 inclusive. This will overwrite some of the original VDU statements, provided you have retained the original line numbering. If not then it may be easier to start from scratch.

All the REM statements can be removed, as can the lines which only contain a line number, these were only used to separate the Procedures in the listing.

The same method should be used with Part 2. If you have the original listing SAVEd then the lines can be simply added and they will overwrite some of the old lines. If you have RENUMBERed the program then delete the contents of the following PROCedure DEFinitions and add the lines in with suitable line numbers.

PROCsquirrel	1460 & 1470
PROCacorn	1520 to 1550
PROCchaser	1650 to 1710
PROCchpr	1760

The enhanced version should be SAVEd as "PART2" so that line 70 in Part 1 can CHAIN it.

Part 1

```
   10
   20 REM ********************
                  * ACORN PROGRA
MS  *                    * SIDN
EY SQUIRREL *
  * PART 1          *
          ********************
   30
   40
   50 ONERROR IF ERR=17 RUN ELSE
 PRINT'':REPORT:PRINT" at line
";ERL:END
   60 MODE7:PROCinit:PROCins
   70  CHAIN"PART2":END
   80
   90
  100 DEFPROCinit
  110 VDU23,224,2,7,76,38,251,62
,28,56
  120 VDU23,225,0,0,0,64,0,0,0,0
  130 VDU23,226,64,224,50,100,22
3,124,56,12
  140 VDU23,227,0,0,0,2,0,0,0,0
  150 VDU23,228,32,32,128,192,96
,32,0,0
  160 VDU23,229,0,64,96,32,128,6
4,32,0
  170 VDU23,230,0,96,32,128,192,
96,32,0
  180 VDU23,231,32,0,192,96,32,0
,0,0
  190 VDU23,232,0,0,0,2,28,0,0,0
  200 VDU23,233,0,0,0,30,0,0,0,0
  210 VDU23,234,0,0,28,2,0,0,0,0
  220 VDU23,235,0,28,0,2,0,28,0,
0
  230 VDU23,236,0,0,30,29,30,0,0
,0
  240 VDU23,237,0,28,30,29,2,28,
0,0
  250 VDU23,238,0,28,30,1,30,28,
0,0
  260 VDU23,239,0,28,2,29,30,28,
0,0
  270 VDU23,240,60,126,66,126,90
,102,126,60
  280 VDU23,241,0,0,0,0,36,24,0,
0
  290 VDU23,242,0,0,40,0,0,0,0,0
  300 VDU23,243,0,0,20,0,0,0,0,0
  310 VDU23,253,0,0,0,36,254,36,
0,0
  320 VDU23,254,0,32,116,218,1,2
18,116,32
  330 VDU23,255,255,255,255,255,
255,255,255,255
  340 ENVELOPE 1,2,3,-6,3,1,1,1,
127,0,0,-127,126,126
  350 ENVELOPE 2,4,-8,4,-12,1,1,
1,127,0,0,-127,126,126
  360 ENDPROC
  370
```

PTO

```
  380
  390 DEFPROCins
  400 PROCtitle:PRINT'"  Sidney
the Squirrel is getting ready  f
or winter. He has to go out ever
y day  to collect his favourite
food,";CHR$131;"ACORNS";CHR$135;
"."
  410 PRINT"  He lives by a larg
e, frozen, lake fromwhich he can
 not escape and, as he hot- foot
s it across the lake, the ice me
lts behind him so he can not cro
ss his trail";
  420 PRINT"  To make life even
more difficult thereare many lea
ves scattered around on the ice
and if he steps on one of them h
e   will slip and possibly kill
himself. He only has three lives
."
  430 PRINT"  You must guide Sid
ney around the ice, collecting";
CHR$131;"ACORNS";CHR$135;"and st
opping him from slipping up. To
help you Sidney has      enough e
nergy for just one jump, but he
could land anywere."
  440 PROCcont:PROCtitle
  450 PRINT'"  Be VERY careful h
ow you guide Sidney, if he appro
aches the";CHR$131;"ACORNS";CHR$
135;"too quickly he may lose his
 chance of getting       another
."
  460 PRINT"  If that was not en
ough occationally  night will f
all and Sidney will not be  able
 to see how much time he has lef
t."
  470 PRINT"  Watch out for the
Park Keeper, he willhelp you get
 around by sweeping up the  leav
es but if he catches you...."
  480 PRINT'"Keys..."'"  Z   Le
ft        X   Right"'"  *   Up
        ?   Down"  '"  P   Pause
    R   Restart"'"  <SPACE>   J
ump"
  490 PROCcont:ENDPROC
  500
  510 DEFPROCtitle
  520 CLS:FOR C=1 TO 2
  530 PRINTTAB(2,C);CHR$141;CHR$
129;"         ACORN PROGRAMS"
  540 NEXT:ENDPROC
  550


  560 DEFPROCcont
  570 PRINT;CHR$133;CHR$136;"
  Press <SPACE BAR>"
  580 REPEAT UNTIL GET=32:ENDPRO
C
```

Part 2

```
 1460 IF DIR%=1 VDU 25,4,A%;B%;1
8,0,1,224,8,18,0,0,225
 1470 IF DIR%=2 VDU 25,4,A%;B%;1
8,0,1,226,8,18,0,0,227

 1520 IF C%=1 VDU25,4,A%;B%;18,0
,3,237,8,18,0,6,234,8,18,0,0,228
,8,18,0,1,229
 1530 IF C%=2 VDU25,4,A%;B%;18,0
,3,238,8,18,0,6,233,8,18,0,0,230
,8,18,0,1,231
 1540 IF C%=3 VDU25,4,A%;B%;18,0
,3,239,8,18,0,6,232,8,18,0,0,229
,8,18,0,1,228
 1550 IF C%=4 VDU25,4,A%;B%;18,0
,3,236,8,18,0,6,235,8,18,0,0,231
,8,18,0,1,230

 1650 CX1%=CX%+64*((CX%>X%)-(CX%
<X%)):CY1%=CY%+32*((CY%>Y%)-(CY%
<Y%))
 1660 CNU%=POINT(CX1%,CY1%)
 1670 IF CU%=6 VDU25,4,CX%;CY%;1
8,0,6,255
 1680 IF CU%=7 VDU25,4,CX%;CY%;1
8,0,7,255
 1690 PROCchpr(CX1%,CY1%)
 1700 CU%=CNU%:CX%=CX1%:CY%=CY1%
 1710 IF CX%=X% AND CY%=Y% F=TRU
E


 1760 VDU25,4,A%;B%;18,0,7,240,8
,18,0,1,241,8,18,0,8,242,8,18,0,
15,243
```