40 Rock ©

POPULAR Computing WEEKLY

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25-31 October 1984

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Vol 3 No 43

128K Machine planned by CBM

COMMODORE is working on a new up-market home micro, intended as a direct competitor for the Sinclair QL.

The machine, called the C128, is based on the 8-bit 6502 processor with 128K Ram and a built-in disc drive.

Unlike the 68008 used in the QL which can address 128K of continuous memory, the 6502 can only address a maximum of 64K at on time. With the C128 Commodore gets around this problem by arrannging the 128K in two 64K banks either of which can be switched in as required.

When the C128 is first turned on the machine behaves as an ordinary Commodore 64 and is fully compatible with existing C64 software. Hitting a function key swaps to the other 64K Ram giving access to Basic 3.5, the same version of Basic as that offered on the new Plus/4 machine, and an 80-column display.

The C128 is likely to be previewed at the January Consumer Electronics Show in Las Vegas.

Also included is Econet software and the word-processor

Acorn's ABC prices

ACORN'S new ABC range of microcomputers, previewed at this year's Personal Computer World Show, will kick-off at £700, rising to £4,000 for the top-of-the-range machine.

For £700 you get the Personal Assistant, technically similar to a BBC machine with a built-in 12 inch black-and-white monitor and single 640K disc drive. Also included is Econet software and the word-processor

continued on page 5 ▸

Frankie steps in

FRANKIE Goes to Hollywood, the top selling pop group with records like *Relax* and *Two Tribes*, are to have a computer program written for them by Ocean Software.

According to Ocean's software development manager the Frankie program is currently at an adanced stage of development: "It will take the form of an arcade-style game featuring members of the band as characters within it," he said.

A spokesman for Frankie Goes to Hollywood's record company ZTT refused, however, to confirm the existence of the Frankie computer game: "We have nothing to say to your magazine, whatsoever," he said.

Ocean has in the past been involved in a number of joint ventures linking well-known figures to computer games, most notably Daley Thompson for *Daley Thompson's Decathlon*.

continued on page 5▸

SPECTRUM+REVIEWED

INSIDE 13 FREE ZX FAIR TICKETS ⟩ AMSTRAD DRAW ⟩

AT LAST THE ARCADE ADVENTURE FROM MICROMEGA

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JASPER!

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View

The top home computer manufacturers seem to have lost confidence in their ability to continue to innovate, whilst at the same time staying on top of the heap.

Last week Sinclair announced its Spectrum+ to use the wealth of Spectrum software and hopefully get at those people thinking of buying an Electron, Commodore 64 or Atmos. Clever as a marketing ploy but nothing more.

And there is Commodore's C128 which takes bits and bobs from the Commodore 64 and the Plus/4, adds in a disc drive, to get an interesting bundling job.

But it is almost as though both companies are treading water. Sinclair has been at a loss to understand why the QL's microdrives have not been welcomed with open arms and it is taking a long time for UK software houses to come to grips with the 68008. Commodore on the other hand doesn't seem confident that the Plus/4 will 'knock 'em dead'. Commodore UK's manager Howard Stanworth even warned journalists at the Plus/4 launch against prejudging the machine by adverse press reaction in the US.

So both companies are being cautious. Making the most of their respective software strengths and working out what to do next.

With MSX around the corner, launching a 16-bit home micro may be a necessary — but very risky — gamble for Sinclair.

For Commodore, which has yet to offer a 16-bit machine, the dilemma is all the greater.

The problem is that there is no such thing as a good time to launch a machine which is incompatible with your existing base of software.

If he can continue to sort the company out, watch out for something daring next year from Jack Tramiel's new-style Atari.

POPULAR Computing WEEKLY

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ABC

56,052 copies sold every week (Jan-June 1984 ABC).

How to submit articles Articles which are submitted for publication should not be more than 2000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted. **Accuracy** *Popular Computing Weekly* cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

Computer Trade Association Magazine of the Year

How to teach your Micro a thing or two

Thousands of home computer owners have yet to discover their microcomputer's potential to help with many of the problems and decisions that come up every day in the home or office.

Perhaps you have always promised yourself that you would teach yourself programming, but have been put off by manuals which seem to assume a lifetime spent studying computer science and mathematics. Maybe you have looked at other computer books, but have yet to find one which is free of unnecessary jargon or where the program examples bear some relevance to real life and not space invaders.

Relax, your search is over.

The 'Learn BASIC' tutorials from Logic 3 are the latest development of a teaching method pioneered by Professor Andrew Colin and perfected by testing on 3 generations of students at Strathclyde University. The 'Strathclyde Method' has been translated into 8 languages and used by over 300,000 microcomputer users.

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01

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Dragon games row

A ROW has broken out between Dragon software house Impsoft and Touche Ross, solicitors acting as receiver for the failed micro manufacturer Dragon Data.

Touche Ross is refusing to pay the company any royalties on Impsoft's *Fruity* title originally marketed by Dragon Data and now being sold by Touchmaster.

Touchmaster — the new company formed by former Dragon chiefs Brian Moore and Richard Wadman after the Dragon collapse — purchased quantities of Dragon Data software from receivers Touche Ross which it is now selling off at a hefty discount.

"Yet we will see no royalty payment from our title because Touche Ross is claiming that the software sold to Touchmaster was 'distressed stock'. Our *Fruity* title which retailed under Dragon Data for £7.95 is now being sold off for £3.95," explained Impsoft's Norman Silver.

"We have instructed our solicitors to clarify our position and we intend to pursue the matter vigorously."

Christmas micro show scrapped

THE YOUR Computer Christmas Computer Fair has been cancelled.

The fair was to have been held at Olympia on November 30-31.

"We felt that the day of the computer show as an end-user's buying extravaganza are over," explained a spokesman for the magazine sponsoring the show, *Your Computer*.

"No doubt it would have been attended by large numbers of people but it probably wouldn't have made money for the software houses attending," he added.

Thirty-eight companies had booked to attend the show when the decision to cancel was made but, of the major microcomputer manufacturers — Sinclair, Commodore, Acorn, Oric, the MSX companies and Amstrad — only the latter had agreed to exhibit.

ABC prices

continued from page 1

and spreadsheet packages *View* and *Viewsheet*. The Personal Assistant is fully expandable to the top of the ABC range.

The £700 tag will make the Personal Assistant attractive to anyone considering assembling a similar system around a BBC machine.

The flagship of the new range — the ABC310 — will sell for £4,000 with a colour monitor and additional 80286 IBM-compatible second processor, 10M hard disc and a selection of bundled software.

Software movies now from the US

THE IDEA of linking a computer program to an audio tape, first seen in this country with Automata's *Deus Ex Machina*,

is being developed by a number of companies.

Unlike the Automata program, most of the other packages are designed for the educational market where the audio tape contains a spoken commentary on the computer pictures and invites children to answer questions.

American software house Maximus has produced Software Movies aimed at the four to eight age range. The packages, for the Commodore 64 consist of program disc and audio tape. After the program is loaded the tape is played and linked to the computer by pressing the space bar.

Speech on the audio track is matched to the lip movement of a cat called Max.

A Kenilworth-based company, Softlee Systems, is using a similar system on its range of Spectrum educational software. Its three programs, *A Day at the Seaside, A Picnic in the Park*, and *Jo Visits the Farm*, all teach simple spelling by associating simple spoken words with pictures. Computer and hi-fi or headphones are linked via a simple lead. This system uses the spare channel on the stereo cassette tape to carry the spoken words but requires the child to stop and start the tape between questions. The price for the tapes is £9.75 each with the lead costing £1.95. More details from Softlee Systems, Freepost, Kenilworth, Warwickshire.

The Maximus Software Movies are not yet available in this country, but the company can be contacted at 6723 Whittier Avenue, McLean, Virginia 22121, USA.

Big-name tape deal

A NEW company, Computer Records has released two impressive software compilation tapes

Each of the two tapes - one for the 48K Spectrum and one for the Commodore 64 - contains twelve titles and will retail for £12.99

The two compilation tapes are as follows.

Spectrum: *Hunchback, Mr Wimpy* and *Transversion* from Ocean; *Space Intruders, Meteor Storm* and *Time Gate* from Quicksilva; *Kong, Missile Defence*, and *Moonbuggy* from Anirog; *Pool* and *Spectres* from Bug-Byte; and *Dennis Through the Drinking Glass* from Applications.

Commodore 64: *Hunchback* and *Mr Wimpy* from Ocean; *Galaxy, Kong, Hexpert, Skramble, Moon Buggy, Cosmic Commando* and *Star Base Defence* from Anirog; *Ring of Power* and *Purple Turtles* from Quicksilva and *Dennis Through the Drinking Glass*.

Computer Records is an associate company of Telstar Records.

More budget games titles

SOFTWARE Projects — home of Miner Willy — has launched a range of budget-priced software titles under the label Software Super Savers.

Eight titles have so far been announced — all priced at £2.99 — for the Spectrum 48K,

the commodore 64 and the 8K-expanded Vic20. They are: *Flip Flap, Moonlighter, Shuttle Shock, Ziggurat* and *Fred's Fan Factory* on the Spectrum; *California Gold Rush* and *Faces of Haarne* on the Commodore 64 and *Revenge of the Quadra* on the Vic20.

Pirates get organised

GAMES software houses in the UK now believe that European commercial software pirates are becoming organised.

An International Cracking Agency is now apparently operating, based in Holland, the purpose of which is to circulate recognised software pirates with a 'cracking' disc of software and know-how designed to get round most commercial program protection techniques currently being used.

International organised piracy is now a widespread and serious problem: "It's getting so bad that you can't release a new title slowly through Europe — two weeks after the program is launched in the UK, pirated copies are available in a number of other countries and you haven't got any market left," commented CRL's Clement Chambers.

"If we could find out who is behind this International Cracking Agency they'd be in the Thames with a set of concrete wellies," he added.

PCS folds

PCS — at one time the largest UK software distributor — folded last week.

The collapse, emphasising the depth of the summer slump in the industry, will not make life easier for many of the troubled software houses. PCS still owes over £60.000 mainly to software companies who will now have little hope of recovering the money.

ATTENTION! ATTENTION! ALL COMMODORE USERS

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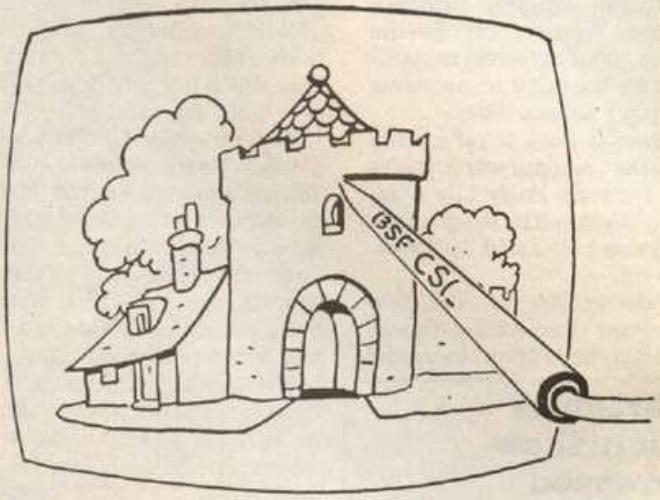
- Design your own colourful sprites and characters
- Play the games in the package! or use the light pen in your own games/education/programs

GRAPHKIT is available on disk and tape. Tape version is £1595 and disk version (recommended) is £19.95.



All you 1540/1541 disk users **DMON**! Is here at last. Dmon is the disk monitor you have been waiting for it will allow you to:

- read/write blocks from/to the disk
- display and edit blocks on the screen
- display and send disk messages/commands
- transfer your programs from tape to disk or disk to disk or even disk to tape! • and more!

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Do your Run/Stop and Restore keys often fail? Do you want to come out of those crashes?! Or get into those unbreakable programs?! Then what are you waiting for, get yourself a **BREAKER!!** Reset switch and let your computer know who is the boss!! Breaker can be connected to your machine in seconds, no soldering. Included with the Breaker is a copy of basic recovery software on tape. Now available for any CBM 64 or Vic 20.

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PCWK

Amstrad interest

It is good to see in your pages a little more interest in the Amstrad CPC464 — the only machine capable of preventing a love-hate affair between me and a QL.

P J Long's reporting of the *Mod* function (Letters, October 4 issue) enables a much simplified prime-finding routine:

```
10 CLS
20 FOR n=3 TO 1000 STEP 2
30 FOR m=3 TO SQR (n) STEP 2
40 z = n MOD m
50 IF z=0 THEN GO TO 80
60 NEXT m
70 PRINT n
80 NEXT n
```

The *For–To* limits in Line 10 can of course be altered to give other ranges, but it should start with an odd number. The program tests for primes at the rate of about 14 odd-numbers per second. It is easily modified to test the various prime-finding formulae which have been proposed from time to time.

And now, back to my dongle-less CP464.

R J Peter
8 Fitzherbert Street
Warsop
nr Mansfield
Notts

Editing system

I was interested to read in one of your September issues of a way of using the QL *Quill* word processor to write and edit SuperBasic programs using a utility program written by Richard Snowdon.

There is in fact another way of doing this which requires no special utility program, and which uses the *Quill Print* option to print to a file.

Several things have to be set up before this system works effectively.

The first thing that must be done is for the printer characteristics to be altered by running *mdv1_install_bas* and setting the following parameters:

End of line code :<LF>
End of page code :<LF>
Preamble code :1, ,R,E,M

This provides the correct line terminator for SuperBasic, and puts a preamble on the front of the file which actually gets lost when the SuperBasic program is loaded. If the preamble is not included, you lose the first line of your program.

The second thing is that when editing of an imported SuperBasic test is started, the *Design* option of *Quill* should be entered and the following parameters set:

Bottom margin	0
Gaps between lines	0
Page size	0
Start page	1
Upper margin	0

This ensures that no paging characters are sent to the printer file, and that page delimiters do not appear on screen while editing.

When this is complete, and the text is left-justified (the default condition), a loadable SuperBasic program is generated by *Printing current, whole,* not to printer but to *xxxx_bas* where *xxxx_bas* is the file to be created on mdv2_. If the file already exists, *Quill* will ask if you wish to overwrite it.

The SuperBasic program *mdv2_xxxx_bas* can then be loaded and run in the usual way.

I use this system of editing on my PM version QL.

The system is fairly slow, given that *Quill* takes a long time to load itself, and a long time to *Save* and *Print* text, and even longer to import a SuperBasic program. The best procedure seems to be to always edit using *Quill* and *Save* the text at the end of each editing session, periodically printing to produce a file that can be loaded and run, and to not edit the file using the ordinary SuperBasic facilities so as to avoid the need to import the file back into *Quill*.

Chris Davis
Bristol BS8

Spectrum network

After reading B Cornill's program on the QL page called *Quantum mechanics* in the August 23 issue I wondered why you could not modify this program to utilise the net on the Spectrum and QL, instead of cutting up the RS232 printer cables (even if it was a free gift from Sinclair).

By changing lines 10, 20 and 25 in the Spectrum program to:

10 *Format* "n ; 10
20 *Open* #6; "n ; 5
25 *Let A$ = Inkeys #6*
type in as a direct command to the QL:—
Net 5
Open #6, Net 0-10
List #6

I called the Spectrum network station 10, and the QL network station 5 — the above modifications worked with my JM Rom and produced QL listings on the ZX printer — does anyone know if the Rom type makes any difference to whether the net works?

D C Pitts
7 Station Road
South Cerney
Glos.

Unofficial bug

Perhaps you will be interested in a genuine bug on the Amstrad — not produced by using unusual variable values, or the like — and which I think ought to be publicised because Amsoft have not officially acknowledged it.

I was trying to think of a name for those who take an interest in bugs, and after a moment's thought decided it was safest to say nothing — "buggies" being a bit lame.

The function Dec$ does not work in Amstrad Basic although it is listed in their concise basic specification.

If you feel like trying it, type it in a program and you will see that the interpreter recognises the word and converts it to upper case, but execution will fail with a "Syntax error" report. Extremely unhelpful and time wasting, if you have spent two hours trying to work out what you had done wrong.

It seems this is the reason that the function is not listed in the User Instructions Manual.

You can simulate the function to a certain extent with: *Right$(Str$(*<numeric expression>),<sub-string length>). But this will not give you the handy formatting features of *Dec$*, eg, automatically getting a '*' in leading empty digit positions.

Finally, in the hope of keeping the software lads on their toes, it would be nice to have software delivered by promised dates. Amsoft's (Tasman written) *Amsword* wordprocessor was on 28 day delivery in July. Amsoft have been as helpful as they can be, and said Tasman were going to have it ready to go out by the end of September.

An unoptimistic call to them last week received the reply that it was still not out of Tasman's hands. Perhaps the Spectrum Plus issue will inspire them . . .

John Mawhood
4 Landford Road
London SW15

Random challenge

I would be interested to hear if anyone has found the same 'bug' which has crashed my game of Psion *Scrabble* for the Spectrum. When using the Quit procedure and requesting to continue the game with the same players all I got was 'B integer out of range, 10. 11'.

I would also be interested to know from which dictionary the vocabulary the game knows was taken. Some of the words appearing are certainly not in any dictionary I can find!

Does the computer challenge at random? The word Qua — a valid word — is used by the computer quite often. But, on the four occasions I have used it the computer has challenged it twice.

L T Rees
10 Granville Court
De Beauvoir Estate
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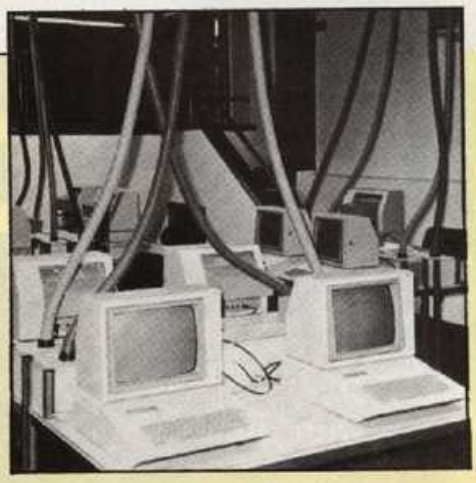
AGF products for the ZX Spectrum are compatible with the new Spectrum Plus computer.

A drop in the ocean

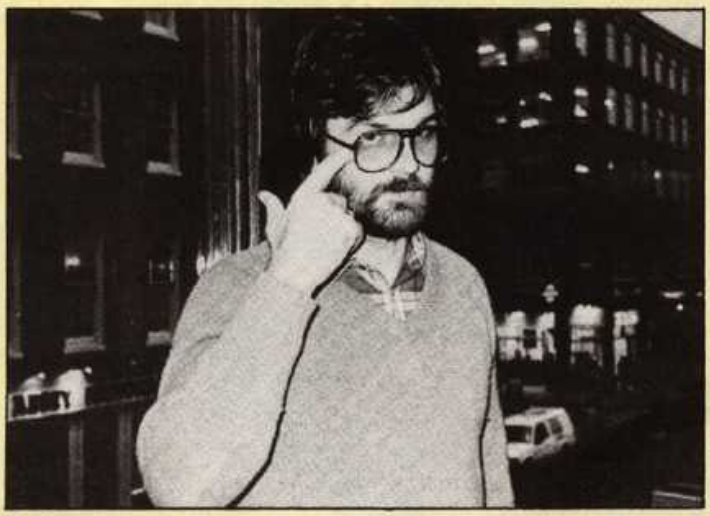
***Graham Taylor** visits the Micro Training Programme which aims to prepare teenagers for jobs in computing*



This Christmas thousands of parents will be bludgeoned, harassed, goaded and emotionally blackmailed into paying anything between £100 and £400 on a micro computer. The gist of most devious arguments from astute teenagers will be the claim that somehow a micro computer is going to help at school, with homework and, most tellingly of all, towards getting a job.

Getting a job is difficult. Despite everything ever uttered by everyone about an inevitable momentum towards a technological age, there are still few opportunities for school leavers in computing. Employers, — those prepared to train school leavers can pick and choose from a large number of worthy candidates.

Giving teenagers an edge in the fight for jobs and helping them discover where their computing strengths lie is the Micro Training Programme — a year long course for 16 and 17 year olds run by the Central London Youth Project. The intention is primarily that the training provided be practical, that students who complete the course should end it with a real chance, not only of getting a job, but of going on to colleges for further training.



I visited the project which is based in Covent Garden and talked to the manager, Steve Jolly about its aims and intentions.

"Although we don't demand any specific qualifications, when we started in June we were clear about one thing — students had to show some sort of motivation towards new technology and we had to be convinced they would last the course."

The centre is equipped with IBMs and Apples rather than BBCs or Spectrums. Why the expensive gear? "When we started there was a deliberate policy decision that we would buy business machines rather than small micros. There are a number of reasons; we wanted a networkable system, running Pascal, which could run the kind of software most used in businesses, such as *Wordstar* and *dBase II*."

The year's course is divided into various sections, designed to cover the most important areas of computing. There are five week blocks covering software, hardware, business applications, a residential course and an important work experience section using computers in a real company.

I wondered what sort of people had joined the course — were there more men than women? Did they have any existing technical skills — did they already own micros and if so was that an advantage? "Well, the ratio is 70/30 in favour of men and that reflects the original applications. I wish it were 50/50, but short of positive discrimination, which has a lot of problems associated with it, there's little we can do.

"In terms of skills, whilst some had O levels or CSEs, there doesn't seem to be any special link between those kinds of skills and doing well here — girls tend to get used to the computer keyboard quicker since they've often had some sort of typewriter training already.

"I think a couple of our students have micros, but, whilst it's obviously not a bad thing, there is a general problem — people learn Basic in a very unstructured way and think they know quite a lot, but here they really have to start again. Apart from the fact that we teach Pascal as our main computer language, it's more a matter of approach.

So are home micros really relevant at all? "Well, for our purposes no, but then we aren't here to play games — I usually tell people here not to buy them. Apart from anything else, they don't have much money [Standard weekly pay under the Government's Youth Training Scheme under which this falls is £26.25] and they are free to use the equipment here."

The course is not confined to strict computing matters alone; towards its end there is the task of sorting out work placement which will utilise a student's talents and teaching basic skills like letter writing and interview techniques.

This is Dawn Charles' job. "I think a lot of kids come here with unrealistic expectations about what's possible — you have to help them see that they're not going to jump straight into well-paid jobs in computing.

"What I think we can do at the end of it is produce someone who would make a very well equipped trainee or be suitable for more advanced courses. But of course it's a two sided thing; so far as is possible we try to guide the students towards what they feel they want to do.

"The work experience section of the course starts in February and all in all I suppose we've been pretty lucky. People like Esso, IBM, the GLC, as well as local firms have all offered jobs at the end of it."

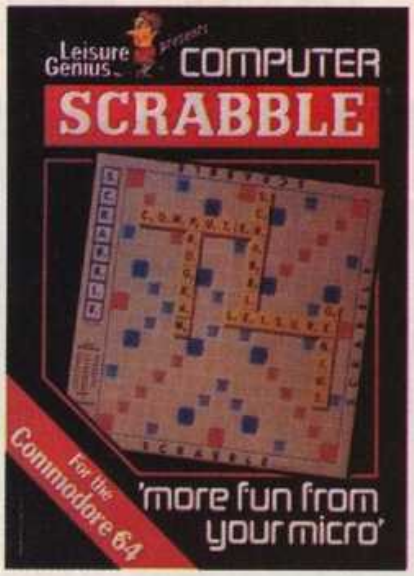
The centre has charity status and is funded by a mixture of donations and various government grants. There are plans to develop it further, by introducing evening courses for 16 and 17 year olds who would receive instruction in basic computing topics and gain hands-on experience with the machines.

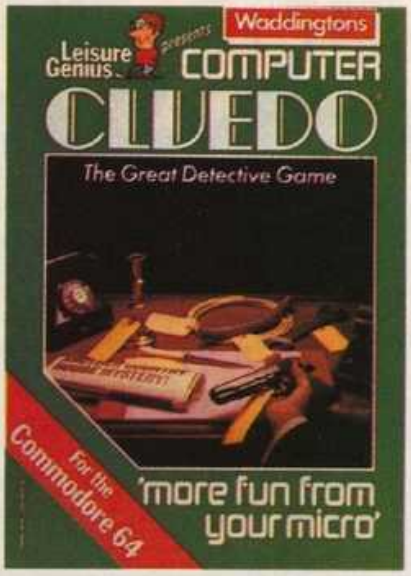
There are three further developments planned for the centre; a word processing bureau, a computer consultancy and possibly, but less certainly, a micro-shop. Some of the profits from these operations would go towards the micro-training program, but the hope is that successful entrepreneurs will come in to run the operations, investing their own capital and taking a share of the profits. The entrepreneur would gain certain advantages like access to a lot of useful computer information and a rate-reduced site in Covent Garden. Solvent and proven wiz kids should apply direct.

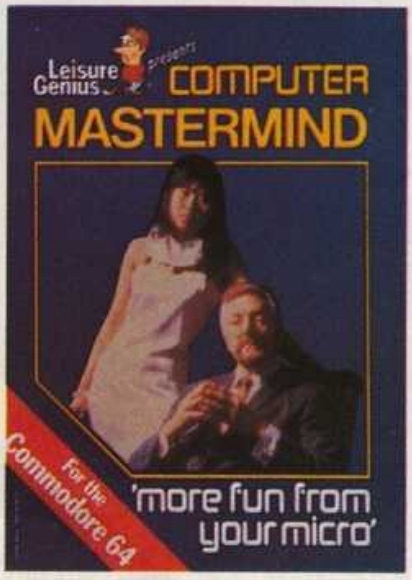
Said Dawn, "Next year we're hoping to take a slightly higher number of students and get more equipment, but I should stress that we're full up for the time being and, anyway, have to give priority to local young people in the Covent Garden area. What we do need is support from manaufacturers, we have some but we always need more."

Manufacturers and other people interested in supporting the Micro Training Programme should contact them at 99-103 Long Acre, Covent Garden, London WC2E 9NR, tel: 01 240 8377. There are no vacancies on the scheme for students at present.

Ingenious...







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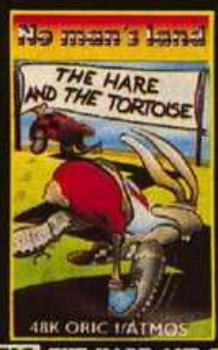

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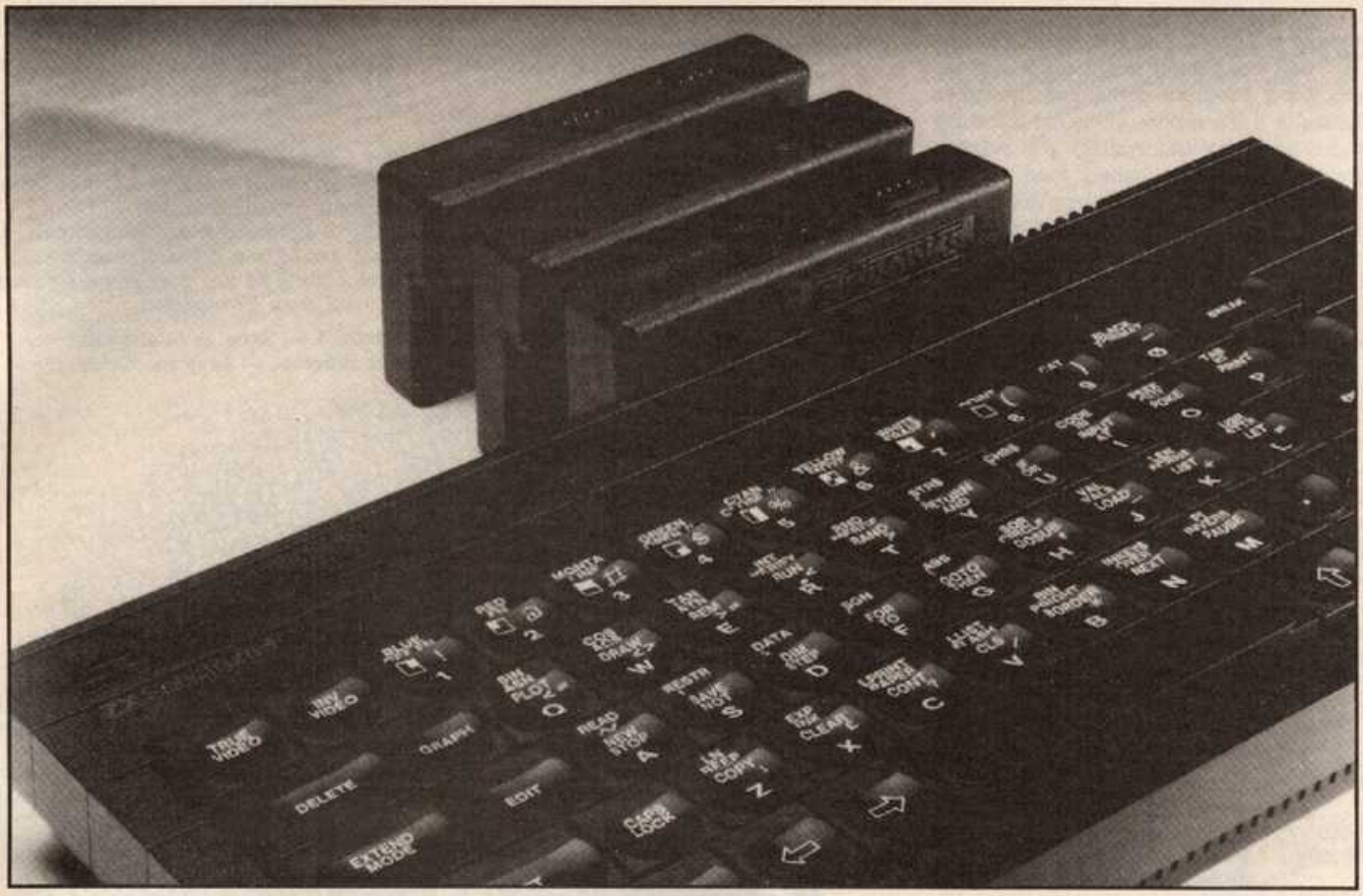

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The Spectrum (+) Connection

Cattapilla

Wander around the garden eating as you go....but watch out for Sammy Snake in Cattapilla for the BBC or Electron by Colin James

The program is in two parts, the first part containing instructions, the second program containing the game *Cattapilla*. It is a version of the old favourite, where as 'Catty Caterpillar', you wander around the garden, eating food, getting longer as you eat, ensuring you don't cross your body and avoid hitting any of the walls.

This is relatively straightforward, until the third and subsequent screens, when you have to avoid Sammy Snake, who will also be wandering around the garden.

Also on view during the game is on-screen scoring, the high score and the name of the person with the high score. A score over 500 can be considered very good.

Type in the first program, and save it on tape with *Save "Cattapilla"*. Then type in the main program, and save it on tape after *"Cattapilla"* with *Save "Catty"*. Then load and run the first program with *Chain "Cattapilla"*. The main program should automatically load and run after you have read the instructions.

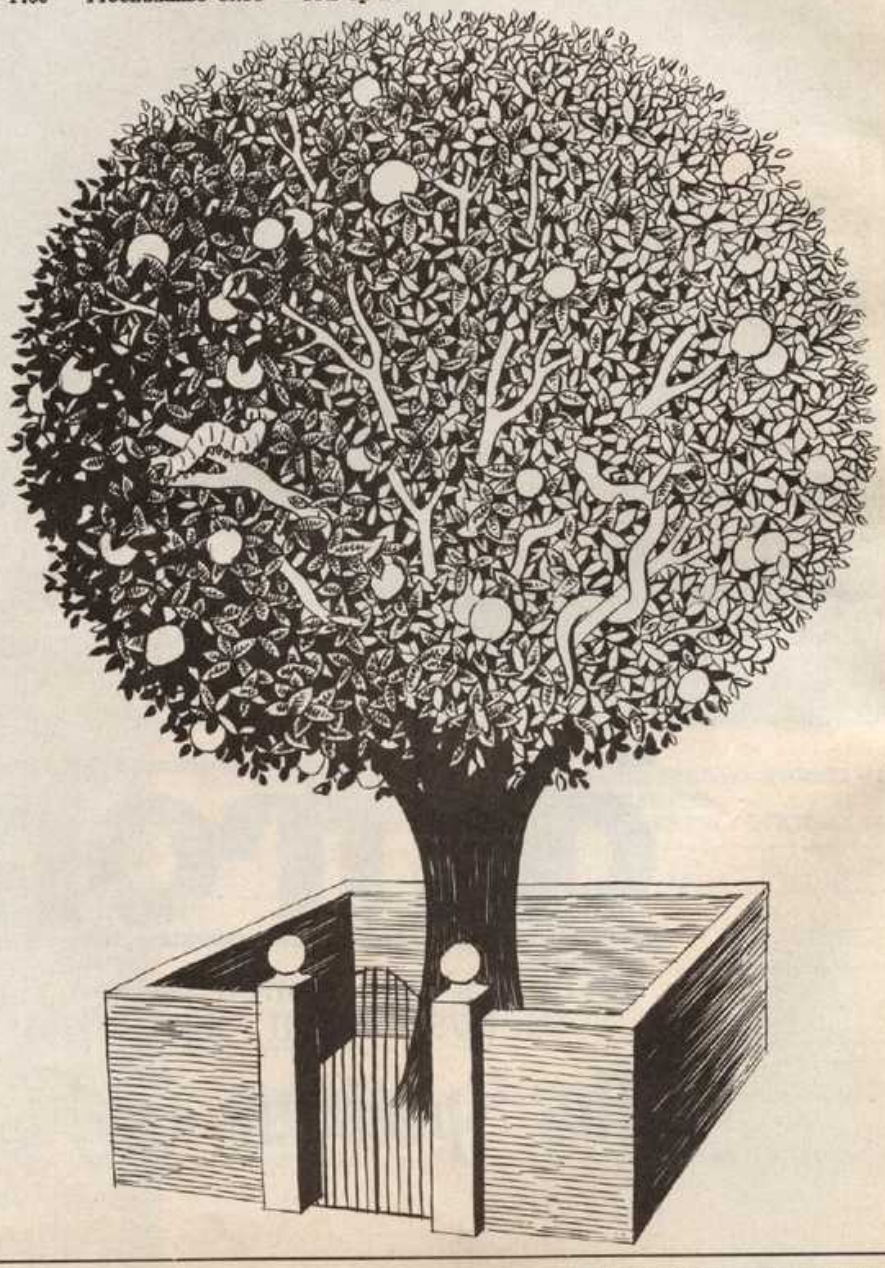
Program Notes

10-20	Program will automatically run if *Break* or *Escape* keys pressed.
30	Sets initial colours
40	Switch off flashing cursor
50	Moves cursor to top right of screen
60-260	Instructions
300-330	Puts a value into variable (D%) depending on which micro is used
340-430	Displays the movement keys, & *Chain's* the main program
30-190	Main program loop
200-290	*Procwall* — draws the wall and garden, puts up score, high score and high scorer
300-430	*Procscreenone* — draws the additional obstacle walls, which appear after the first screen
450-480	*Procscreentwo* — draws Sammy Snake at the start of screen three and all subsequent screens
490-510	*Procblocker* — moves Sammy Snake
520-620	*Procmove* — general movement routine
630-690	*Procinitialise-all* — sets the initial variables and conditions at the start of every screen
700-750	*Prochead* — draws Catty's head, if there is no obstacle in its path
760-810	*Proctail* — moves Catty's tail
820-900	*Procfood* — draws the food on the screen.
910-960	*Prochit* — if the caterpillar moves on to an obstacle, this routine decides which obstacle has been hit.
970-1020	*Prochitwall* — called when Catty hits a wall, to end the game.
1030-1080	*Proceatself* — as *Prochitwall*, but called when Catty tries to cross his own path
1090-1200	*Procscore* — prints up score at end of a game, if it is a new high score, allows you to enter your name
1210-1230	*Procpause* — gives a pause of about three seconds
1240-1350	*Procuser-graphics* — sets up the user defined graphics, and line 1330 switches off the cursor
1360-1370	*Prochitsnake* — as *Prochitwall*, but called when Catty tries to cross Sammy's path
1380-1460	*Procinitialise-once* — sets up initial variables.
1470-1510	*Procnewscreen* — called at the end of each screen.
1520-1530	Function which returns the colour of a specific point on the screen

The data statements from Line 1540 onwards should be copied carefully as they contain movements of Sammy Snake.

Lines 10 and 20 from the first program, and Lines 20 and 30 from the main program may be omitted initially so that the *Escape* and *Break* keys both work as expected.

Program 1 — Save as "Cattapilla"
Main Program — Save as "Catty"



```
10ON ERROR RUN
20*KEY10"OLD|MRUN|M"
30MODE2:COLOUR131:COLOUR13:CLS
40VDU23,1,0;0;0;0
50VDU30
60PRINTTAB(2,3)"** CATTAPILLA **"
70COLOUR1
80PRINTTAB(2,7);"Catty Cattapilla"" moves continuously"
90PRINT" around the garden"
100PRINT" looking for food"
110PRINT"  However he must"
120PRINT" be careful to avoid";
130PRINT" his own body and"
140PRINT" the walls."
150PRINTTAB(2);"Later on you will"
160PRINT" also have to avoid"
170PRINT" Sammy Snake.He is"
180PRINT" very curteous and"
190PRINT" will wait for you"
200PRINT" to pass if he gets"
210PRINT" stopped by you or"
220PRINT" the food,but he"
230PRINT" gets upset,and it"
240PRINT" is the end of the"
250PRINT" game if you cross"
260PRINT" his path."'
270COLOUR11
280PRINTTAB(2,30);"(Press any key)"'TAB(2)"( to continue )";:A$=GET$:
VDU28,0,31,19,5:CLS
290COLOUR1
300PRINT TAB(5,10)"--PRESS--"
310PRINT TAB(2,15)"""";:COLOUR11:PRINT"B";:COLOUR1:PRINT"" FOR B.B.C."
320PRINT TAB(2,18)"""";:COLOUR12:PRINT"E";:COLOUR1:PRINT"" FOR Electron"
330key$=GET$:IF key$<>"B" AND key$<>"E"THEN 330 ELSE D%=ASC(key$):CLS
340PRINT:PRINTTAB(5);"CONTROLS:-"
350PRINT:PRINT:PRINTTAB(2);"'A' . . . UP"
360PRINT:PRINTTAB(2);"'Z' . . . DOWN"
370PRINT:PRINTTAB(2);"'<' . . . LEFT"
380PRINT:PRINTTAB(2);"'>' . . . RIGHT"

410VDU28,0,31,19,21:CLS
420VDU30:COLOUR4:PRINT"   START THE TAPE"
430VDU28,0,31,19,22:CHAIN"CATTY"
```

```
10REM***CATTAPILLA***by C.V.James****
20ON ERROR RUN
30*KEY10"OLD|MRUN|M"
40MODE1
50PROCinitialise_once
60screen%=0:sc%=1:total%=0:score%=0:gain%=35
70PROCinitialise_all
80PROCwall
90PROCfood
100COLOUR2
110REPEAT
120IFscreen%>1THENPROCblocker
130PROChead:*FX21,5
140IF NT%=0 THEN PROCtail ELSESOUND1,-15,100,5
150UNTIL CRASH%=10Rscreen%=sc%
160IF CRASH%<>1 THEN 70
170PROCscore
180PRINT TAB(8,27);"(any key to play again)"
:t=GET:GOTO60
190END
200DEFPROCwall
210COLOUR2:COLOUR128:CLS:PRINTTAB(4,0);"SCORE = ";
total%;TAB(17);"HI-SCORE = ";HS%
220hilength=LEN"** Hi-score by "+LENN$+LEN" **":PRINT
TAB((40-hilength)/2,31)"** Hi-score by ";N$;" **";
230COLOUR0:COLOUR129
240PRINTTAB(0,1);STRING$(20,CHR$224+CHR$225);CHR$227;
STRING$(19,CHR$224+CHR$225);:VDU227,226,227
250FOR N=3TO27STEP2:VDU31,38,N,227,226,227,226,31,38,
N+1,2 , ,27,226,227:NEXT
260VDU127:PRINTSTRING$(19,CHR$224+CHR$225);CHR$226;
STRING$(20,CHR$224+CHR$225);
270VDU28,2,28,37,3:COLOUR131:VDU12,26
280IF screen%>0 THENPROCscreenone
290ENDPROC
300DEFPROCscreenone
310sc%=sc%+1
320COLOUR0:COLOUR129
330PRINTTAB(11,7);CHR$227;CHR$229;TAB(29,7);CHR$229;
CHR$227
340PRINTTAB(11,8);CHR$226;CHR$227;TAB(29,8);CHR$227;
CHR$226
350PRINTTAB(11,9);CHR$227;CHR$226;TAB(29,9);CHR$226;
CHR$227
360PRINTTAB(11,10);CHR$226;CHR$227;TAB(29,10);CHR$227
;CHR$226
370PRINTTAB(11,11);:VDU227,226,224,225,224,225,224,225
;PRINTTAB(23,11);:VDU224,225,224,225,224,225,226,227
380PRINTTAB(11,12);:VDU226,224,225,224,225,224,225,
229:PRINTTAB(23,12);:VDU229,224,225,224,225,224,225,226
390PRINTTAB(11,21);CHR$229;STRING$(9,CHR$224+CHR$225)
;CHR$229
400PRINTTAB(11,22);STRING$(10,CHR$224+CHR$225)
410COLOUR2:COLOUR131
420IF screen%>1THENPROCscreentwo
430ENDPROC
440
450DEFPROCscreentwo
460lensna%=7*screen%:IF lensna%>77THENlensna%=77
470wait%=wait%-4:G%=6:H%=7:I%=6:J%=8:PLACE%=0:TALE%=
TRUE:FORinitial%=1TO lensna%:VDU31,G%,H%,2
30:PLACE%=(PLACE%+1)MOD249:PROCmove(G%,H%,A%(PLACE%),1)
:NEXT
480ENDPROC
490DEFPROCblocker
500IF FNpoint(10,G%,H%)<>3THENENDPROC ELSEVDU31,G%,H%,
230:PLACE%=(PLACE%+1)MOD250:PROCmove(G%,
H%,A%(PLACE%),1)
510TALE%=(TALE%+1)MOD250:PROCmove(I%,J%,A%(TALE%),2):
VDU31,I%,J%,32:ENDPROC
520DEFPROCmove(X%,Y%,Z%,B%)
530ONZ%GOTO 540,550,560,570
540X%=X%+1:GOTO580
550Y%=Y%-1:GOTO580
560X%=X%-1:GOTO580
570Y%=Y%+1
580ON B% GOTO 590,600,610,620
590G%=X%:H%=Y%:ENDPROC
600I%=X%:J%=Y%:ENDPROC
610tX%=X%:tY%=Y%:ENDPROC
620AX%=X%:AY%=Y%:ENDPROC
630DEFPROCinitialise_all
640tX%=14:tY%=16:AX%=11:AY%=16:V%=14:W%=16:NT%=0:FOOD
%=0:head%=2:tail%=0:IF gain%<226 THEN gain%=gain%+15
650IF D%=66 THEN wait%=10 ELSE wait%=4
660M%=1:CRASH%=0:score%=score%+gain%
670FORt%=0 TO 2:cat%(t%)=1:NEXT
680*FX21,0
690ENDPROC
700DEFPROChead
710head%=(head%+1)MOD255:CM%=INKEY(wait%):CM%=(1ANDCM%
=46)+(2ANDCM%=65)+(3ANDCM%=44)+(4ANDCM%=90):IFCM%>0
THENM%=CM%:*FX21,0
720tX%=tX%+(M%=3)-(M%=1):tY%=tY%+(M%=2)-(M%=4):cat%
(head%)=M%:IF FNpoint(10,tX%,tY%)<>3 THEN PROChit
730VDU31,tX%,tY%,241,31,V%,W%,240:V%=tX%:W%=tY%

740IF NT%>0 THEN NT%=NT%-1:total%=total%+1:COLOUR128:
PRINT TAB(12,0);total%:COLOUR131:IF total %=score% THEN
PROCnewscreen
750ENDPROC
760DEFPROCtail
770REM  *** ERASES TAIL ***
780COLOUR131:VDU31,AX%,AY%,32
790PROCmove(AX%,AY%,cat%(tail%),4)
800tail%=(tail%+1)MOD255
810ENDPROC
820DEFPROCfood
830NT%=NT%+FOOD%:SOUND1,-15,100,5
840XF%=RND(36)+2:YF%=RND(26)+2
850IF FNpoint(10,XF%,YF%)<>3THEN840
860IFXF%=tX%ANDYF%=tY%THEN840
870COLOUR0:COLOUR131
880FOOD%=RND(9):VDU31,XF%,YF%,228
890COLOUR2
900ENDPROC
910DEFPROChit
920point=FNpoint(10,tX%,tY%):IFpoint=0THEN PROCfood:
ENDPROC
930SOUND1,-15,40,10:SOUND1,-15,27,9
940IFpoint=1THEN PROChitwall:ENDPROC
950IFpoint=2 AND FNpoint(6,tX%,tY%)=2THEN PROCeatself
```

Continued over the page

```
ELSE PROChitsnake
960ENDPROC
970DEFPROChitwall
980CRASH%=1:screen%=0
990COLOUR0
1000PRINT TAB(7,16);"YOU CRASHED INTO THE WALL."
1010PROCpause
1020ENDPROC
1030DEFPROCeatself
1040CRASH%=1:screen%=0
1050COLOUR0
1060PRINT TAB(4,16);"YOU TRIED TO CROSS YOUR OWN PATH."
1070PROCpause
1080ENDPROC
1090DEFPROCscore
1100FOR N=1TO 250:NEXT:CLS:*FX21,0
1110COLOUR0
1120PRINT TAB(1,12);"YOU MANAGED TO GROW TO A LENGTH
OF "total%
1130FOR N=1 TO 100:NEXT
1140IFtotal%>HS%THEN HS%=total%ELSE1170
1150PRINT TAB(6,14);"A NEW HIGH SCORE,WELL DONE."
1160PRINTTAB(6,16)"ENTER YOUR NAME: ";:INPUTN$:IF LEN
N$>15 THEN CLS:PRINTTAB(7,22);"(name too
long, try again)":GOTO1160 ELSE CLS
 1170PRINT TAB(12,15);"HIGH SCORE = "HS%
 11801ength=LEN"** Scored by "+LENN$+LEN" **"
1190PRINTTAB((40-length)DIV2,18);"** Scored by
";N$;" **"

1200ENDPROC
1210DEFPROCpause
1220TIME=0:REPEAT:UNTILTIME=277
1230ENDPROC
1240 DEFPROCuser_graphics
1250VDU 23,224,255,128,128,128,128,128,128,255
1260VDU23,225,255,1,1,1,1,1,1,255
1270VDU23,226,129,129,129,129,129,129,129,255
1280VDU23,227,255,129,129,129,129,129,129,129
1290VDU23,240,60,126,255,255,255,255,126,66
1300VDU23,241,60,126,90,90,126,126,60,0
1310VDU23,228,74,181,165,169,145,82,84,56
1320VDU23,230,24,102,90,189,189,90,102,24:REM*SNAKE*
1330VDU23;8202;0;0;0;
1340VDU23,229,255,129,129,129,129,129,129,255
1350ENDPROC
1360DEFPROChitsnake
1370CRASH%=1:screen%=0:COLOUR0:PRINTTAB(0,16);" OH
DEAR! -YOU TRIED TO EAT SAMMY SNAKE ":PROCpause:ENDPROC
1380DEFPROCinitialise_once
1390PRINTTAB(15,12);"GET READY!":PROCpause
1400DIMcat%(255):DIMA%(250):FOR f%=0TO 249:READ A%(f%)
:NEXT
1410HS%=100:VDU19,3,2,0,0,0
1420N$="Mickey Mouse"
1430*TV255
1440*KEY1"MODE6|MVDU17,0,17,129,23,1,1;0;0;0;0|MCLS|MV
DU14|MLIST|M'
1450PROCuser_graphics
1460ENDPROC
1470DEFPROCnewscreen
1480screen%=screen%+1
1490CLS:PRINTTAB(5,12);"Well done, you have scored ";
total%:TAB(5,15);"*it will be harder this time!*"
1500PROCpause
1510ENDPROC
1520DEF FNpoint(R%,S%,T%)
1530=POINT(32*S%+15,(31-T%)*32+R%)
1540DATA2,2,2,1,1,1,1,2,1,1
1550DATA1,1,4,1,1,1,4,4,3,4
1560DATA1,1,1,1,1,1,4,4,4,4
1570DATA4,4,1,1,1,2,1,1,4,4
1580DATA4,4,1,1,1,1,1,1,1,1
1590DATA1,1,4,4,4,3,3,4,4,3
1600DATA3,3,4,4,4,4,3,3,3,3
1610DATA3,3,2,2,3,3,3,3,2,3
1620DATA3,4,4,4,4,4,3,3,2,2
1630DATA2,2,2,3,3,3,4,4,3,3
1640DATA3,3,3,3,3,3,3,4,3,3
1650DATA2,2,2,3,3,2,2,1,1,1
1660DATA1,2,1,2,1,1,2,1,1,1
1670DATA1,1,2,1,1,1,1,2,2,2
1680DATA2,1,1,1,2,2,2,3,2,2
1690DATA2,2,2,1,2,1,2,1,4,1
1700DATA4,4,1,1,2,1,1,1,1,1
1710DATA2,2,1,1,1,4,4,4,1,1
1720DATA4,4,4,3,3,3,3,4,4,4
1730DATA4,4,4,3,3,3,3,3,3,4
1740DATA3,4,3,3,3,3,3,4,4,3
1750DATA3,3,4,3,2,2,2,2,2,2
1760DATA2,3,3,3,3,4,4,4,3,2
1770DATA3,3,3,2,3,3,3,3,3,3
1780DATA2,2,2,1,1,2,2,1,1,2
```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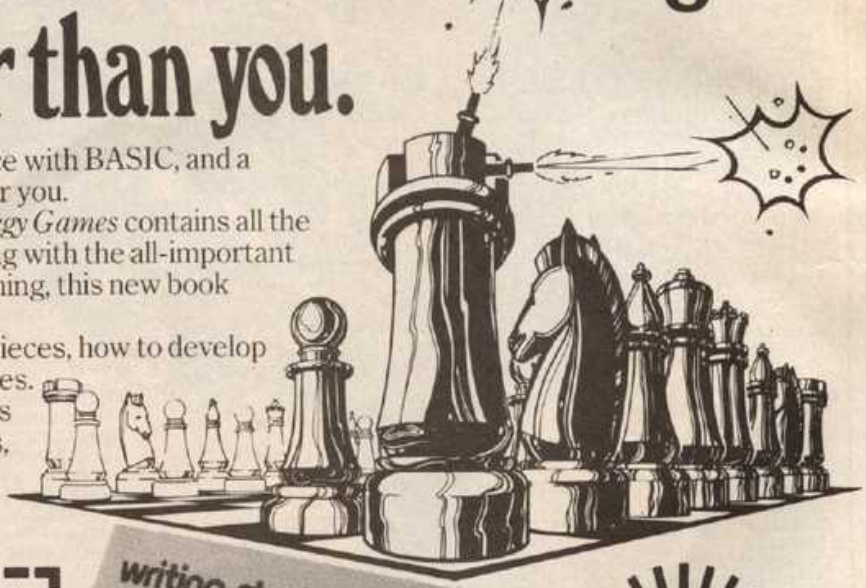

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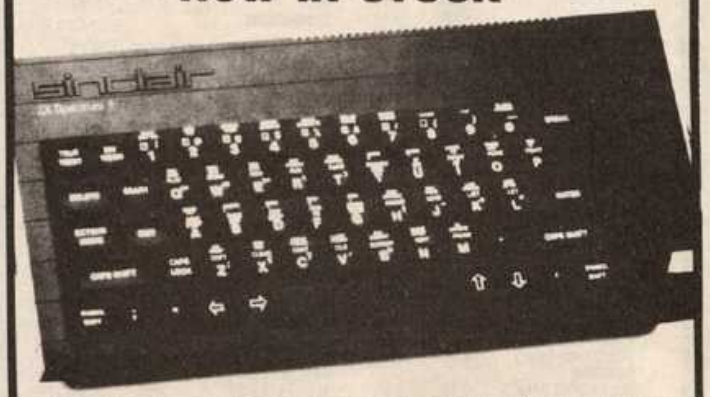

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The major novelty of Sinclair's new computer is that it is available in high street shops now.

But then if that were not the case the whole exercise would have been pointless.

The market for home computers has become notoriously seasonal, with the majority of sales occuring in the weeks before Christmas. The task of the Spectrum+ seems to be to steal sales from the Commodore 64, Acorn Electron, Oric and, perhaps, the Amstrad.

I will be very surprised if it does not succeed. For £179.99 you get a computer that has a reasonable keyboard and whose slightly outdated specification is more than compensated by its huge software base. Six programs, including the excellent word processor package *Tasword Two* and *Scrabble*, are included in the price and, contrary to some press speculation, the Spectrum+ can use all the peripherals designed for the original model.

There are only a few differences between the Spectrum and the Plus, and only one that really matters. The technolgy used to produce the QL keyboard has been employed to give a "real keyboard" to the Spectrum; 57 keys and a space bar adorn the top of a new, larger casing which measures 12·5 by 6 by 1·5 inches. I still find the Spectrum+ a small machine, but it certainly is more substantial than its predecessor.

To give credibility to my judgement of the keyboard I am writing this review on the machine itself, using *Tasword Two*. I have entered some fairly long programs on the QL's keyboard, and the Spectrum+ has the same 'soft-but-noisy' action. You get used to it, but a few moments spent using something with a 'proper' switch mechanism soon puts the membrane arrangement into perspective.

It is not just the tactile qualities of the new Spectrum keyboard that have been improved: the extra keys mean that less gymnastics are required to program and write. The old keying sequences will still work, although they are no longer marked. The cursor keys are placed either side of the space bar: there are also pairs of shift keys either side, with caps shift boasting double-sized keytops. The other additions are *Extend*, *Edit*, *Break*, *True Video* and *Inverse video*, *Graphics*, *Caps lock*, and the punctuation marks except colon, delete and break.

These last two are oddly positioned — the break key is where most micros have their delete keys, top right, while Sinclair place the delete key almost where you would find escape or break on other machines, top left.

Interestingly, I tried the new keyboard and case, fitted onto my old Spectrum and there were no problems. Anyone who has attempted to attach a conventional keyboard to their Spectrum may wonder how the double-action keys are wired up without any additional hardware. Normally, using diodes to connect two keys together to be operated by a third will fall foul of the keyboard scanning routine: for reliable operation the shift key must make contact first. On the new keyboard this is achieved mechanically by the membrane under the keys.

Two more improvements are visible on the Spectrum+. A reset button lies under the left-hand edge, a welcome addition but perhaps a little dangerously placed.

Also, the whole computer can be tilted with the aid of two retractable feet under the back of the machine. They position the machine at a comfortable angle, and snap in and out very positively — opening up the case revealed that the springs are actually made of plastic.

Not much else of interest is found inside as the circuit-board is standard Spectrum issue (4B actually).

Obviously, therefore, there will be no problems in running Spectrum software — the one pendantic point that I can think of is that some older software may instruct you to use the cursor keys, but actually mean the unshifted keys 5 to 8.

There is a thick metal plate behind the keys, giving a bit more mass to the whole affair, and the extra space and slots mean that the speaker sounds louder; so much louder that it may be irritating to some.

The six programs supplied with the Spectrum+ are *Tasword Two*, *Scrabble*, *Chess*, *Vu-3D*, *Make-a-Chip* and *Chequered Flag*. This is almost the same selection as is currently being bundled with the old Spectrum as a 'six-pack' special offer, except that *Tasword* and *Vu-3D*, replacing *Horace Goes Skiing* and *Survival*, gives the

Continued on page 23

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Spectrum+ programs a more serious slant.

Overall impressions are of a stylish and fairly solid computer, still not as substantial as the CBM 64, but in the same class. Unfortunately this image is spoilt if you turn the machine upside down and a number of the key-tops fall off! That could be a little annoying.

The manual that many Spectrum owners have come to know and love has — with the Spectrum+ — been replaced by an altogether more glamorous book. Using colour photographs and illustrations, it deals with the fundamentals in great detail. There are a number of simple routines to show off the graphics and sound and then a reference section for the Basic commands, while the few remaining pages gloss over machine-code and computing in general. This leaves the back cover on which to advertise some Basic programming books from the publishers of the manual.

Information not included in the new manual includes details of system variables, memory formats and the op codes attached to the character set table.

Overall the new manual reminded me of those glossy instructional books about DIY and car servicing: very good up to a point, but a little patronising.

The new welcome tape — a replacement for the Psion *Horizons* tape — falls into much the same category: very hot on the graphics but somewhat shallow. Side A contains a keyboard trainer with very good screen displays. If you break into the program a remark warns you that it is not an example of structured programming, "it is just meant to work". I broke in to find the bug that, when I had scored 100% on the graphic keys section, told me I needed more practice! The B-side contains only one program, but that contains two enjoyable games and an excellent user-defined character generator, the results of which can be fed into one of the games, *Maze Chase*.

So — the Spectrum+ is more a good example of marketing and repackaging, than a wildly innovative product.

For my money, I would have liked to see either Interface 1 or 2 built in to the new computer, but then it would never have been ready for Christmas.

The current price difference between the Spectrum and the Spectrum+ of £50 only makes sense if you believe that the software currently being bundled with the Spectrum (the six-pack) is a special offer and that the six programs with the Plus is a permanent part of the package.

Nevertheless, the Spectrum+ should bolster Sinclair sales considerably this Christmas and, after eclipsing the old Spectrum model, will probably take its place.

Jeff Naylor

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Popular Computing Weekly is giving away 250 free tickets for the 14th ZX Microfair — to be held at Alexandra Palace on 17-18 November — to the first 250 people who submit programs for the ZX Spectrum or QL for possible publication in the magazine **before November 12.**

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Touching

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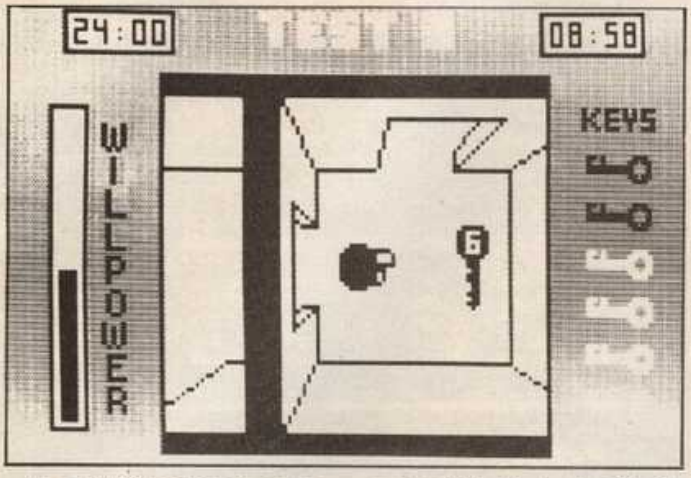
This is a maze game for one, in which the player steers 'Eddie' through the labyrinth. In order to escape, he has to pick up four keys in sequence and then find the exit door before his dwindling willpower is used up.



To assist him there is a map of the maze if he can find it and some items of fruit to revitalise his willpower. To make life difficult, there are snakes in other rooms of the maze which may or may not be lethal and a genetically mutated rug with nasty habits.

Control is by the arrow keys or by any other keys which the player nominates. The display is very good, being a bird's eye view down into the maze with 3-D perspective. Outside walls have windows which helps orientation except that some mazes have interior walled gardens. The sound of Eddie's running feet as his willpower drains away is quite touching.

This is a game of patience and endurance. The supplier's guide time for the first game is eight minutes and for the fifth is 40 minutes. They either regard the game as insoluble or have great faith in their sales, for the package includes a competition with a prize of a Cumana disc drive for which the entry qualification is to know what Eddie does after completing Test 5. So far, that prize is nowhere near my grasp.

Derrick Trueman

Gruesome

Program *Red Sky over Accrington* **Price** £6.95 **Micro** BBC B **Supplier** Vampyre Software, P.O Box MT15, Leeds, LS17 8DW.

Red Sky at night means it went off all right! The game *Red Sky Over Accrington* begins on 1st July 1985, and over four days the newspaper reports gradually worsen until nuclear war starts.

Red Sky is a kingdom style game where you have to outguess the computer on the correct proportions of supplies, food, drugs, and access to shelter to get hold of. The scenario is gruesome but the horrible fascination lies in trying to imagine how values would change in such a situation. What price gold? What price an anti-radiation drug?

You have a choice of actions such as 'move', 'visit casino' and 'buy shelter' but there is only a limited number of these activities before your time runs out. There are simple graphics and a choice of city, mountain, river-bed or grassland landscape, with varying hazards on them including fire, flood, earthquake, infection and mutants.

If you can overcome your horror at the situation, it is a competent strategy game, but its sale is probably limited to those who will enjoy its sensationalism

Jan Watterson

Outsider

Program *Racing League* **Micro** Spectrum **Price** £2.90 **Supplier** Racing League Software, 22 Lindale Garth, Kirkhamgate, Wakefield, W Yorks.

'Ullo, John — want to buy a race horse? Or three of them? *Racing League* lets you join H Copper, M Thatcher, HM Queen and others in the Sport of Kings.

There have been several racing games for the Spectrum, none of which is a Derby winner, but even in such an uninspired field this maiden should be despatched directly to the knacker's yard!

They're off — *Racing League* with a '0 OK, 0 : 1' message. Only a donkey won't *Run* without prodding! To be fair, the screens that follow have reasonably clear instructions and error trapping.

But if endless Entering, tables and weighted randomisations were all that the turf had to offer. Brough Scott would be out of a job. Player choices are minimal and, if you should win, the first you will know of it is the result — there are no graphics.

The letter accompanying the review copy speaks of this as the basis for exciting enhancements to come. They should be part of the program now.

Cheap as it is, *Racing League* is worse value than backing a rank outsider. At least that could give you a moment's excitement for your money.

John Minson

Evil force

Program *Heroes of Karn* **Micro** Commodore 64 **Price** £7.00 (cassette) £9.00 (disc) **Supplier** Interceptor, Lindon House, The Green, Tadley, Hants.

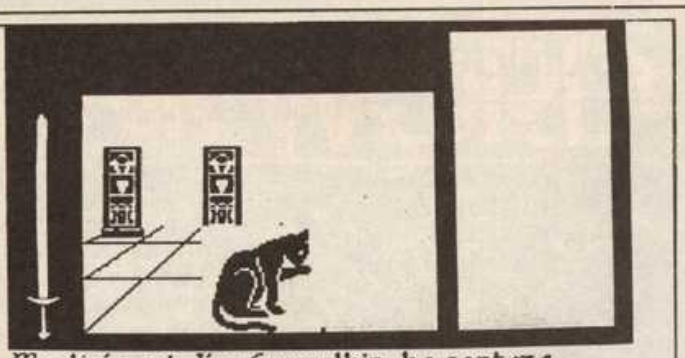
Heroes of Karn is described as a graphical adventure with music.

In fact, it is a pretty standard text-based adventure game with hi-res pictures accompanying each scene, with occasional snatches of music at some of the locations. The setting of the adventure is in some indeterminate historical fantasy world in which the Empire of Karn has been overrun by the Powers of the Night, including dragons, vampires, and other obligatory nasties. Only four of the Heroes of Karn have survived, and they have all been taken captive by the evil forces. Your quest is to free them, and recover the treasures of the Empire.

The game is structured in the usual adventure style, with a reasonable number of locations and hazards. The program seems to understand quite a large vocabulary of commands and objects, and even allows you to give instructions to other characters, who will carry them out if they are willing. The graphics provide illustrations of the locations, but they do not enter into the game directly. Although they are quite well done, they are painfully, achingly slow to draw. Fortunately, they only appear on your first visit to each location.

It is a quite challenging adventure, with enough locations and other characters to keep you occupied for some time. It is perhaps best to think of it as a text adventure and regard the graphics as a nice extra feature. But thev're *so* slow.

Richard Corfield



Adventure

Program *King Arthur's Quest* **Micro** Spectrum **Price** £7.95 **Supplier** Hill MacGibbons, 92 Fleet St., London EC4.

Here is a very playable, complex and addictive adventure, both challenging the mind and requiring quick reactions at times. There are eight areas to explore during the game, and each has its own perils and opportunities.

The graphics are generally good, and the comments helpful. With the cassette comes an instruction booklet and a wall poster containing relevant history and a code chart. All play is by single key press, except for spells which you type in full. Without giving too much away, I can say that it is worth your while to explore each area fully before moving on, and to write down everything you are told, no matter how useless or odd.

The game is identical each time you play, so making a map is a very worthwhile activity. It was crash free during testing: though the move commands sometimes seemed a little odd — or perhaps my mapmaking was at fault! There is a "Save" option, enabling you to start from half way through if you are killed off during a game, and I should mention also the facility to back up the game to Microdrive.

I really enjoyed *King Arthur's Quest*, and I'd recommend it as good value for money for games users who want a new challenge, and more serious users who like a bit of light entertainment from time to time. This program works the mind as well as the fingers, and should be a success in the run-up to Christmas.

Simon Springett

Scrabble

Program *Scrabble* **Price** £12.95 **Micro** BBC B **Supplier** Leisure Genius Retail

I can't help wondering how many PhD theses have been turned into successful computer games. This is one. Peter Turcan created it while researching word structures. The game caused a sensation when released on Sinclair machines a year or so back. Now, despite memory restrictions, it is here on the BBC B.

The game itself is standard *Scrabble* — a board game using letters set out in turn by each player and forming intersecting words rather in the manner of crossword puzzles. Various scores apply to each letter and to special positions on the board.

The micro version replaces board and loose tiles with a screen display. The colour of board and tiles can be modified to find the selection which best suits your screen. Up to four players can take part and any of them may be the micro itself.

The cleverest part is the word checking. The micro can check 8,000 words from its own store. If it fails to recognise a word it asks you to verify it. The game plays well and quickly with all the facilities you can enjoy with a board version.

It is quite fun but one has to ask why — unless you are a compulsive *Scrabble* player isolated on a remote island — you would want to play with your Beeb rather than a fellow human?

Dave Watterson

Jet-BBC

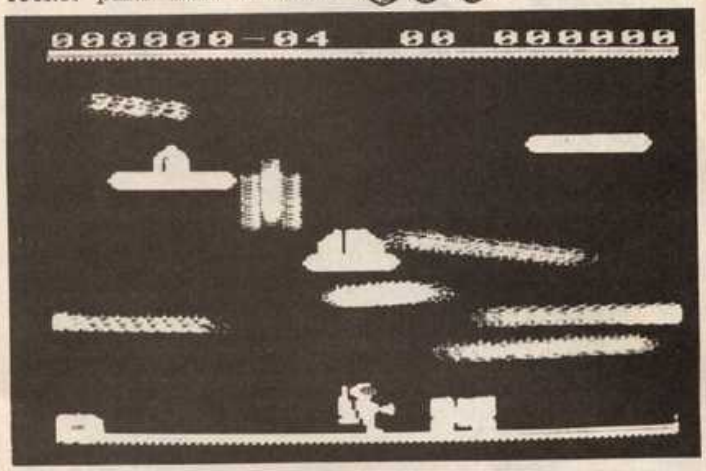
Program *Jet Pac* **Price** £6.95 **Micro** BBC B **Supplier** Ultimate, Ashby Computers & Graphics, The Green, Ashby-de-la-Zouch, Leicestershire

Can you construct a rocket while defending youself from flying aliens with continuous laser fire? That's the challenge in Ultimate's *Jet Pac*.

You move around with a booster rocket strapped on your back and collect the rocket parts from different platforms suspended in the air. Once the rocket is complete, you have to fill it up with six packs of fuel and then you can fly to the next planet. The fuel has to be dropped over the top of the rocket, which turns blue as it fills up. Each planet is harder than the previous one. The sound effects are strident and lively, the movement swift and smooth.

It is confusing at first, but once you get the hang of it you move faster and are able to progress.

Dave Watterson



Space Maths

Program ***Space Professor*** **Micro** Spectrum **Price** £5.95 **Supplier** Front Runner, K-Soft Distribution, 620 Western Avenue, London W3.

Space Invaders get education! Mathematical monstrosites (ie, wrong answers) fall from space towards a sum, with only a laser base and your mental arithmetic to zap them.

Computers are often accused of distracting children from their studies, so a program combining education and alien-blasting *should* please parents and off-spring alike. But will maths become fun when the reward is saving the world rather than a gold star?

In its favour *Space Professor* offers a wide range of difficulty (252/84? Quick!). Its menu, using icons, is extremely clear.

But chrome is mere flash when the game below is dull. Work out the solution, shoot the wrong answers and let the right one land.

There is also not enough time to read the problems before the aliens appear, making *Space Professor* too difficult for the youngsters who may benefit from it.

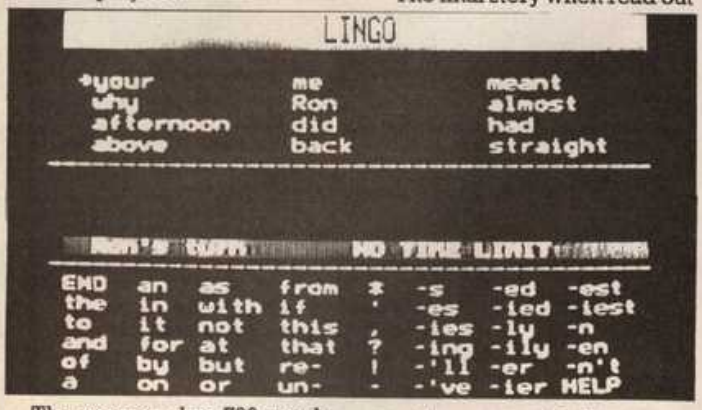
Sadly the ultimate incentive is not to practise maths but to *Load* a game with more variety.

John Minson

Hilarious

Program *Lingo* **Price** £9.95 **Micro** BBC B **Supplier** Complete Microcomputer Services Ltd., 32-38 Osnaburgh Street, London NW1 3ND.

This program, based on an idea by Alan Wakeman, is intended to teach sentence construction. It is built into a fun game which can be played on your own or with up to four players.



The program has 700 words and it chooses 12 at random which you then have to construct into a sentence with the help of a pool of common words and terminations: the cement that binds words into sentences like 'the', '-ly' and 'with'.

The game is easy to use, well explained and with simple controls. Your score takes into account how many of the 12 words you use (with a bonus if you involve them all) and how many of the pool words you use. The micro has to take your word for it that the sentence is correctly constructed so its value as an unsupervised educational aid is very limited. You may set a time-limit if you choose.

The final story when read out may be grammatically correct but its absurdity is usually hilarious. That's what makes *Lingo* fun to play.

Jan Watterson

Slow

Program *Supabasic* **Micro** Commodore 64 **Price** £9.99 (cassette or disc) **Supplier** Interceptor, Lindon House, The Green, Tadley, Hants.

Commodore's decision to equip the 64 with a rather primitive version of Basic has led to the appearance of a large number of Basic extension programs.

One of the latest is *Supabasic* from Interceptor. This gives you a further 72 Basic keywords covering the usual range of additional commands for graphics, sound, sprites and programming aids.

Unfortunately, no structured Basic keywords are included.

Although the new commands do include a number of handy additions there are a number of notable omissions. For example, there are various commands for manipulating a hi-res display including some nice features like a *Window* command to display a text window at the bottom of the hi-res screen. However, only standard hi-res mode can be used, not multi-colour, and a number of other popular commands like *Circle* and *Fill* are missing.

Similarly, programming aids like *Old* and *Renumber* are provided, but no *Auto* and *Delete* which are at least as useful. On the other hand, the facilities provided for the handling of sprites and user-defined characters are quite complete and easy to use.

The biggest drawback of *Supabasic* is its execution speed, or rather lack of it. Although many commands execute at roughly normal speed, both numeric and string expressions are evaluated at a snail's pace — two to three times more slowly than the standard Basic.

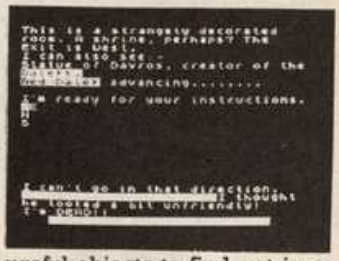
John Minson

Time Lord

Program *The Key to Time* **Micro** Spectrum **Price** £5.95 **Supplier** Lumpsoft, 17 Hardrow Road. Leeds

This is an adventure game based on the travels of a certain Time Lord, well known for travelling about in a police box. It is a text only adventure, but none the worse for that.

The Doctor has been placed under your command, and your task is to help him to find the five parts of the Key, thus, as usual, saving the universe. The game recognises a wide vocabulary fairly well — with the exception of the phrase "go to" which usually got the reply "I can't tie a rope to that!" There are numerous more or less



useful objects to find, retrieve and use.

This game is a good one. It promises all sorts of adventures for the budding Time Traveller, and many hours of enjoyment. There is no "Save" option — the length of the game makes this a sad omission — and no microdrive option either. These are minor problems in a well designed game, and it should do well.

Simon Springett

Bearface

Program *Castle of Gems* **Price** £6.70 **Micro** BBC B **Supplier** MRM Software, 17 Cross Coates Road, Grimsby.

Bertie Bear has to eat all the gems on each screen before his rivals do. The opposing characters include spring-like Gem Gobblers, Gremlins, deadly Moving Trees, Ghosts and Witches. If he puts on the hat he becomes invisible and invinvible he can kill witches and walk through his competitors.

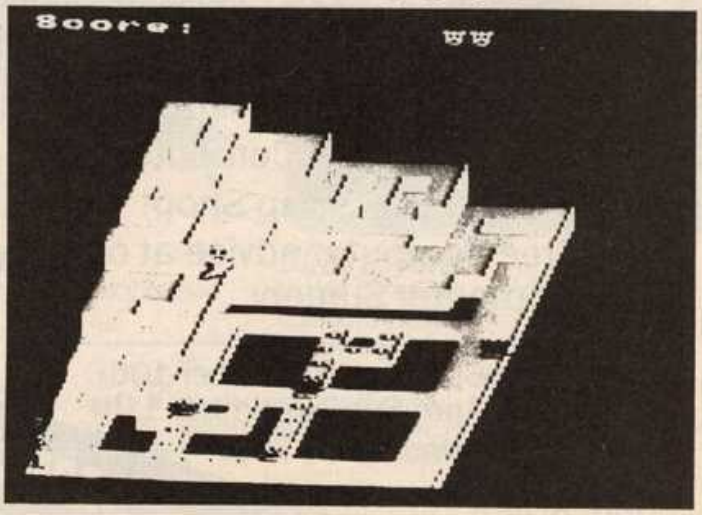
The castle setting is like something from Escher — endless staircases with occasional lifts so that moving around can be confusing at first. When all gems have gone from one screen Bertie can progress on to the next.

There are nine on each side of the tape — each harder than the last. some are faster, some have more enemies, some have more complicated stairs and paths for Bertie to follow. Honeypots appear on some screens and give bonus points.

The controls are left, right, up and down, which you can operate from keyboard or joysticks.

It is great fun to play being fast, furious and colourful. It has good sound effects and music, is easy to pick up and compulsive to play. If you can't get to an arcade to play *Crystal Castles*, it's a good second.

T&H Alabaster



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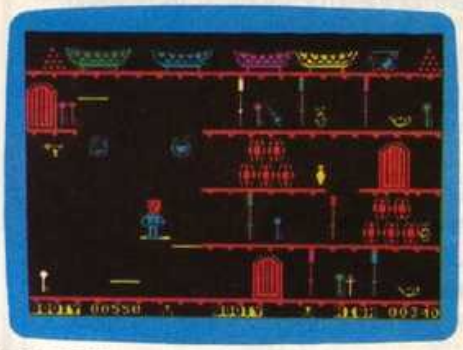

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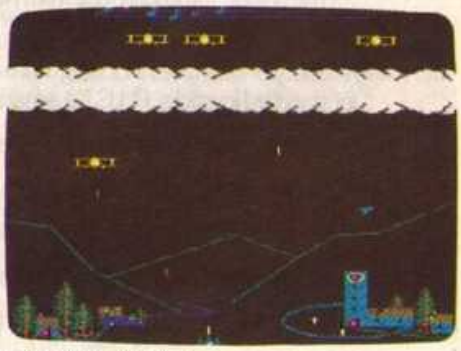

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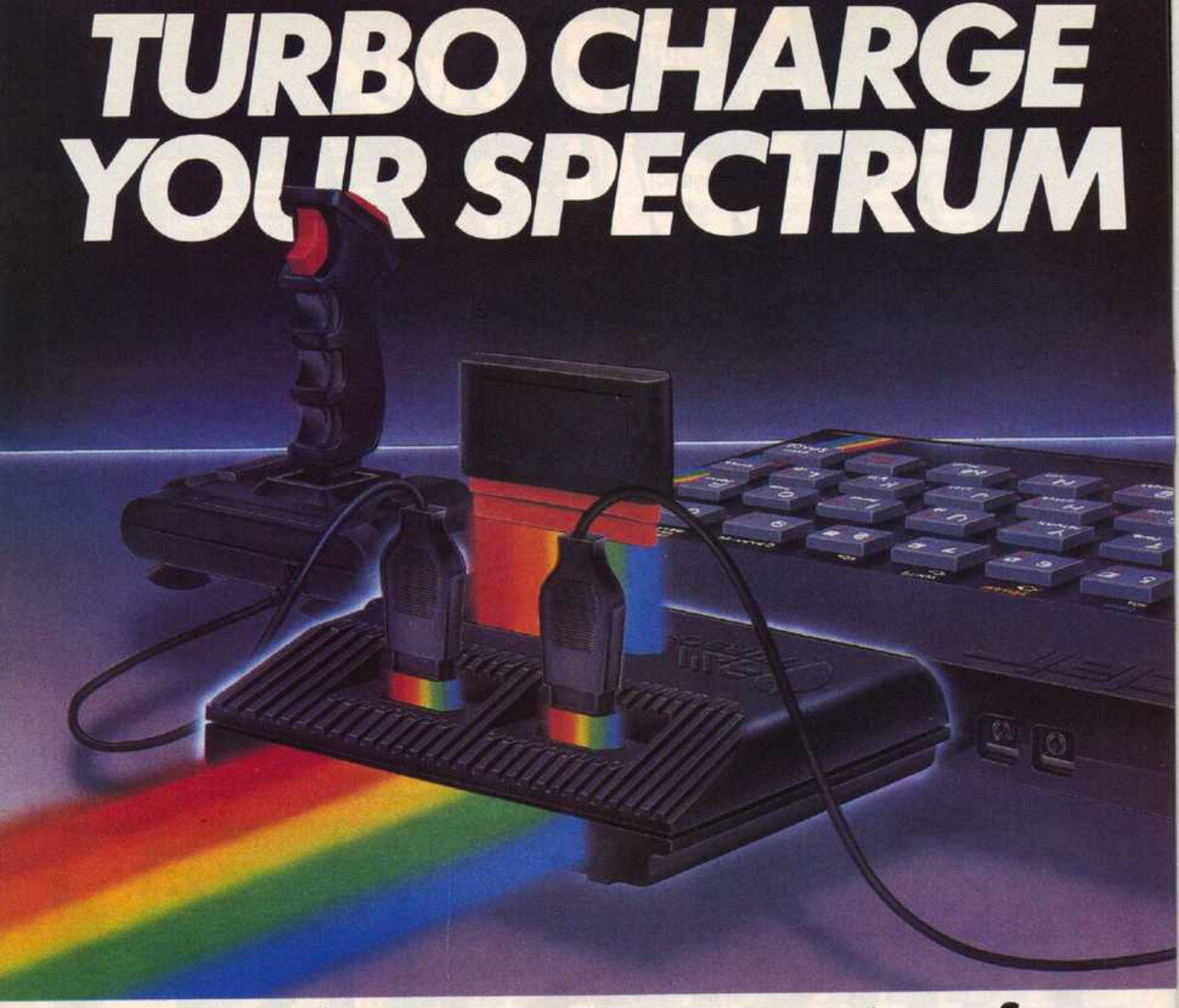

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Bigger and bigger

Make your screen just a bit bigger using this m/c program by ***Stuart Nicholls****, for the 48K Spectrum*

Spectrum owners, would you like to be able to enter the following types of line into your BASIC program:

```
10 REM SET UP SCREEN (24 lines)
20 border 4:PAPER 2: INK 7:PRINT CHR$ 12;
30 PRINT AT 23,0;"THIS LINE STARTS ON THE
   ACTUAL BOTTOM LINE OF THE SCREEN...
   WOT NO ERROR REPORT?"
40 REM SCROLL THE SCREEN .. TWICE
50 PRINT CHR$ 11; CHR$ 11;
```

What's this? Printing on the *Edit* lines without the usual *Print #0*; at 0,0; "message", clearing all 24 lines and a scroll call *Print Chr$*11; with no sign of a machine code routine *Usr* call. Well, the answer is yes it is possible and what is more it is not interrupt driven, does not require the microdrive 'shadow Rom' and works on a standard 48K Spectrum. (I assume it will work with microdrives attached but have not been able to prove this).

Although the answer is of course a machine code routine, we do not need to call it in anyway, as the Spectrum can be made to do this for us using a simple Basic command.

The Spectrum Rom machine code routine to *Print* a character makes use of an all-purpose subroutine accessed in machine code using the well known *Rst 16d* instruction. This subroutine normally occupies Rom area *09F4h* to *0EA3h* and handles printout to the *Upper* screen, *Lower* screen and the *Printer* so is slow in comparison to a dedicated *Upper* screen *Print* routine.

The word 'normally' in the above statement gives a clue to the answer. The Rom *Print* subroutine is accesed by the Rom using data in Ram! That is, whenever printing to the *Upper* screen is required *Stream 2* is selected and the address of the *Print Output* routine to be used is taken from the *Channel 'S'* data in Ram. The base address of the channel data is pointed to by the system variable *Chans 23631/2* and is normally situated after the system variables occupying the 21 bytes before the Basic program area (the fitting of a microdrive will alter this).

The *Channel 'S'* information normally occupies addresses 23739-23743 and is in the form:

23739/40 Address of *Output* routine *09F4*
23741/42 Address of *Input* routine *15C4*
23743 53h *Chr Code "S"*

So you can see that we are able to alter the output routine address to point to a user written routine, and that is exactly what has been done.

I have produced a revised *Print* routine with games programers in mind, although it has its uses for more serious applications, and gives other functions.

Because Keywords and the Spectrum graphics characters are seldom used in actual programs, and I wanted the new routine as short as possible to speed things up, these are ignored. For a similar reason *Inverse* has been left out. Characters 32 to 127 and *Udg's* are printed, as are colour, *AT*, *TAB*, and *N/L* controls. (You are still able to use your own character generator in Ram if you wish in the normal way).

Printing is allowed on all 24 lines. For example *Print Ink 0*; *Paper* 5; *Over* 1; *At* 23,0; "A" is quite acceptable and will print on the bottom line.

If the line or column number exceeds the screen size then the routine will amend it to stay on the screen, providing it does not exceed 255. For example, *Print At* 24,32; "A" is the same as *Print At* 0,0; "A". This can give the effect of a wrap around screen.

If printing runs off the bottom of the screen then the screen will automatically scroll and does not give the usual 'scroll?' prompt.

Because the Basic *Cls* will only clear 22 lines (0-21) I have included a *Clear* 24 lines code (also *Cls* will re-instate the Spectrum Rom routine). *Print Chr$ 12*; will clear the screen using the permanent colours and set the print position to 0,0; A semicolon must be used to supress the newline code that would be printed if we used *Print Chr$ 12*.

Print Chr$ 11; will produce an *Upscroll* but leave the print position unchanged. Note again that the semicolon has been used. *Print Chr$ 11* will produce an *Upscroll* with a *Newline*.

Print Tab column; is also permitted, and has the advantage over the Spectrum routine of not removing printing between the current print position and the *Tab* position.

The interrupts are disabled whilst printing and scrolling.

Using your favourite *Hexloader* enter the code from the *Hexdump*. The checksum byte at the end of each line is the sum of the previous 8 bytes. The start address is 64500 and the routine is 465 bytes long.

Once entered then *Save* the code using *Save* "name" *Code* 64500,465. To switch routines you should enter a line into your Basic program before any *Print* commands as follows.

Without microdrive fitted use **10** 0,251. With microdrives fitted (but note that the routine has not been proved this way) use:

```
10 Let Chans=Peek 23631+256*Peek 23632
20 Poke Chans+5,244:Poke Chans+6,251
```

This *Pokes* a new value into the output routine for channel 'S'. This new routine will now remain in operation until a *Cls* command is used or the Spectrum produces an automatic listing. This in no way affects the use of the printer and error reports or *Input* commands will overprint on the *Edit* lines using *Bordercolours*.

Using all this information, you will see that it becomes very easy to move characters over all the screen and so improve your games programs. I have included my Assembly listing (using the *Picturesque* assembler) should you wish to try out your ideas.

```
                0001 ;          "*********************"
                0002 ;          "*                   *"
                0003 ;          "* NEW PRINT ROUTINE *"
                0004 ;          "*        by         *"
                0005 ;          "*  Stuart Nicholls  *"
                0006 ;          "*                   *"
                0007 ;          "*********************"
                0008 ;
                0009 ;          "SCREEN FORMAT"
                0010 ;          "TOP LH=Line 24/Col.33"
                0011 ;          "BOT RH=Line  1/Col. 2"
                0012 ;          "B register holds Line"
                0013 ;          "C register holds Col."
                0014 ;          "HL holds SCREEN ADDR."
                0015 ;
                0016 ;
FBF4            0019        ORG  64500
5C0E            0020 TVDTA  EQU  23566
5C51            0030 CURCH  EQU  23633
2211            0040 TEMPS  EQU  2211H
5C88            0050 SPOSN  EQU  23688
5C84            0060 DFCC   EQU  23684
5C3B            0070 FLAGS  EQU  23611
5C36            0075 CHARS  EQU  23606
5C91            0080 PFLAG  EQU  23697
5C7B            0085 UDG    EQU  23675
5C8F            0090 ATTRT  EQU  23695
5C8D            0094 ATTRP  EQU  23693
                0095 ;
                0096 ;          "ENTER with the CHR"
                0097 ;          "CODE in the A reg."
                0098 ;
FBF4 CDB7FC     0100 PRINT CALL FPOSN
FBF7 FE20       0110       CP   32
FBF9 D2AAFC     0120       JP   NC,PNTIT
FBFC FE06       0130       CP   6
FBFE D8         0140       RET  C
FBFF FE18       0150       CP   24
FC01 D0         0160       RET  NC
FC02 2109FC     0170       LD   HL,C6-6
FC05 5F         0180       LD   E,A
FC06 1600       0190       LD   D,0
FC08 19         0200       ADD  HL,DE
FC09 5E         0210       LD   E,(HL)
```

```
FC0A 19          0220          ADD  HL,DE
FC0B E5          0230          PUSH HL
FC0C C3B7FC      0240          JP   FPOSN
                 0245 ;
FC0F 42          0250 C6       DEFB 66
FC10 41          0260 C7       DEFB 65
FC11 40          0270 C8       DEFB 64
FC12 3F          0280 C9       DEFB 63
FC13 3E          0290 C10      DEFB 62
FC14 38          0300 C11      DEFB 56
FC15 0C          0310 C12      DEFB 12
FC16 2D          0320 C13      DEFB 45
FC17 3A          0330 C14      DEFB 58
FC18 39          0340 C15      DEFB 57
FC19 46          0350 C16      DEFB 70
FC1A 45          0360 C17      DEFB 69
FC1B 44          0370 C18      DEFB 68
FC1C 43          0380 C19      DEFB 67
FC1D 42          0390 C20      DEFB 66
FC1E 41          0400 C21      DEFB 65
FC1F 3B          0410 C22      DEFB 59
FC20 3A          0415 C23      DEFB 58
                 0416 ;
FC21 F3          0420 CLS      DI
FC22 210040      0421          LD   HL,16384
FC25 110140      0422          LD   DE,16385
FC28 01FF17      0423          LD   BC,6143
FC2B 3600        0424          LD   (HL),0
FC2D EDB0        0425          LDIR
FC2F 23          0426          INC  HL
FC30 13          0427          INC  DE
FC31 01FF02      0428          LD   BC,767
FC34 3A8D5C      0429          LD   A,(ATTRP)
FC37 77          0430          LD   (HL),A
FC38 EDB0        0431          LDIR
FC3A 012118      0432          LD   BC,1821H
FC3D 210040      0433          LD   HL,16384
FC40 C354FD      0434          JP   SETCL
                 0435 ;
FC43 0E21        0437 NEWLN    LD   C,33
FC45 CD76FD      0450          CALL SCRLL
FC48 05          0460          DEC  B
FC49 C354FD      0470          JP   SETCL
                 0472 ;
FC4C F3          0475 UPSCR    DI
FC4D CD7DFD      0476          CALL SCR
FC50 FB          0477          EI
FC51 C9          0478 NOPNT    RET
                 0480 ;
FC52 116CFC      0490 TV2      LD   DE,CONT
FC55 320F5C      0500          LD   (TVDTA+1),A
FC58 180B        0510          JR   CHNGE
                 0515 ;
FC5A 1152FC      0520 TABAT    LD   DE,TV2
FC5D 1803        0530          JR   TV1
                 0535 ;
FC5F 116CFC      0540 INKOV    LD   DE,CONT
                 0545 ;
FC62 320E5C      0550 TV1      LD   (TVDTA),A
                 0555 ;
FC65 2A515C      0560 CHNGE    LD   HL,(CURCH)
FC68 73          0570          LD   (HL),E
FC69 23          0580          INC  HL
FC6A 72          0590          LD   (HL),D
FC6B C9          0600          RET
                 0605 ;
FC6C 11F4FB      0610 CONT     LD   DE,PRINT
FC6F CD65FC      0620          CALL CHNGE
FC72 2A0E5C      0630          LD   HL,(TVDTA)
FC75 57          0640          LD   D,A
FC76 7D          0650          LD   A,L
FC77 FE16        0660          CP   22
                 0665 ;                "EXIT via ROM routine"
                 0666 ;                "for colour codes"
FC79 DA1122      0670          JP   C,TEMPS
FC7C 201B        0680          JR   NZ,TAB
                 0685 ;
FC7E 7A          0690 AT       LD   A,D
FC7F E61F        0700          AND  31
FC81 4F          0710          LD   C,A
FC82 3E1F        0720          LD   A,31
FC84 91          0730          SUB  C
FC85 C602        0740          ADD  2
FC87 4F          0750          LD   C,A
FC88 7C          0760          LD   A,H
FC89 D618        0770 AT1      SUB  24
FC8B 30FC        0780          JR   NC,AT1
FC8D 2802        0790          JR   Z,AT2
FC8F C618        0800          ADD  24
FC91 47          0810 AT2      LD   B,A
FC92 3E18        0820          LD   A,24
FC94 90          0830          SUB  B
FC95 47          0840          LD   B,A
FC96 C354FD      0850          JP   SETCL
                 0855 ;
FC99 7C          0860 TAB      LD   A,H
FC9A CDB7FC      0870          CALL FPOSN
FC9D 81          0880          ADD  C
FC9E 3D          0890          DEC  A
FC9F E61F        0900          AND  31
FCA1 C8          0910          RET  Z
FCA2 57          0920          LD   D,A
                 0925 ;
FCA3 CD40FD      0950 SPACE    CALL PSPC
FCA6 15          0960          DEC  D
FCA7 20FA        0970          JR   NZ,SPACE
FCA9 C9          0980          RET
                 0982 ;
FCAA F3          0985 PNTIT    DI
FCAB CDBFFC      0990          CALL PTALL
                 0995 ;
FCAE ED43885C    1000 STORE    LD   (SPOSN),BC
FCB2 22845C      1010          LD   (DFCC),HL
FCB5 FB          1015          EI
FCB6 C9          1020          RET
                 1025 ;
FCB7 ED4B885C    1030 FPOSN    LD   BC,(SPOSN)
FCBB 2A845C      1040          LD   HL,(DFCC)
FCBE C9          1050          RET
                 1055 ;
FCBF FE80        1060 PTALL    CP   128
FCC1 380F        1070          JR   C,CHAR
FCC3 FE90        1080          CP   144
FCC5 D8          1090          RET  C
FCC6 D6A5        1120 CKUDG    SUB  165
FCC8 D0          1130          RET  NC
FCC9 C615        1140          ADD  21
FCCB C5          1150          PUSH BC
FCCC ED4B7B5C    1160          LD   BC,(UDG)
FCD0 1805        1170          JR   CHAR1
                 1180 ;
FCD2 C5          1190 CHAR     PUSH BC
FCD3 ED4B365C    1200          LD   BC,(CHARS)
                 1205 ;
FCD7 EB          1210 CHAR1    EX   DE,HL
FCD8 2600        1270 CHAR2    LD   H,0
FCDA 6F          1280          LD   L,A
FCDB 29          1290          ADD  HL,HL
FCDC 29          1300          ADD  HL,HL
FCDD 29          1310          ADD  HL,HL
FCDE 09          1320          ADD  HL,BC
FCDF C1          1330          POP  BC
FCE0 EB          1340          EX   DE,HL
FCE1 79          1350 ALL      LD   A,C
FCE2 3D          1360          DEC  A
FCE3 3E21        1370          LD   A,33
FCE5 2002        1380          JR   N2,ALL1
FCE7 05          1390          DEC  B
FCE8 4F          1400          LD   C,A
FCE9 B9          1410 ALL1     CP   C
FCEA D5          1420          PUSH DE
FCEB CC76FD      1430          CALL Z,SCRLL
FCEE D1          1440          POP  DE
FCEF C5          1450          PUSH BC
FCF0 E5          1460          PUSH HL
                 1465 ;                "Consider OVER"
                 1466 ;                "but NOT INVERSE"
FCF1 3A915C      1470          LD   A,(PFLAG)
FCF4 06FF        1480          LD   B,255
FCF6 1F          1490          RRA
FCF7 3801        1500          JR   C,ALL2
FCF9 04          1510          INC  B
FCFA 0E08        1520 ALL2     LD   C,8
FCFC A7          1530          AND  A
FCFD EB          1540          EX   DE,HL
FCFE 1A          1550 ALL3     LD   A,(DE)
FCFF A0          1560          AND  B
FD00 AE          1570          XOR  (HL)
FD01 12          1580          LD   (DE),A
FD02 14          1590          INC  D
FD03 23          1600          INC  HL
FD04 0D          1605          DEC  C
FD05 20F7        1610          JR   NZ,ALL3
FD07 EB          1620          EX   DE,HL
FD08 25          1630          DEC  H
FD09 CD11FD      1640          CALL ATTR
FD0C E1          1650          POP  HL
FD0D C1          1660          POP  BC
FD0E 0D          1670          DEC  C
FD0F 23          1680          INC  HL
FD10 C9          1690          RET
                 1695 ;
FD11 7C          1700 ATTR     LD   A,H
FD12 0F          1710          RRCA
FD13 0F          1720          RRCA
FD14 0F          1730          RRCA
FD15 E603        1740          AND  3
FD17 F658        1750          OR   88
FD19 67          1760          LD   H,A
FD1A ED5B8F5C    1770          LD   DE,(ATTRT)
FD1E 7E          1780          LD   A,(HL)
FD1F AB          1790          XOR  E
FD20 A2          1800          AND  D
FD21 AB          1810          XOR  E
FD22 FDCB5776    1820          BIT  6,(IY+87)
FD26 2808        1830          JR   Z,ATTR1
FD28 E6C7        1840          AND  199
FD2A CB57        1850          BIT  2,A
FD2C 2002        1860          JR   NZ,ATTR1
FD2E EE38        1870          XOR  56
FD30 FDCB5766    1880 ATTR1    BIT  4,(IY+87)
FD34 2808        1890          JR   Z,ATTR2
FD36 E658        1900          AND  88
FD38 CB6F        1910          BIT  5,A
FD3A 2002        1920          JR   NZ,ATTR2
FD3C EE07        1930          XOR  7
FD3E 77          1940 ATTR2    LD   (HL),A
FD3F C9          1950          RET
                 1955 ;
FD40 D5          1960 PSPC     PUSH DE
FD41 D9          1970          EXX
FD42 3A915C      1971          LD   A,(PFLAG)
FD45 F5          1972          PUSH AF
FD46 3E20        1973          LD   A,32
FD48 FD365701    1974          LD   (IY+87),1
FD4C D7          1980          RST  16
FD4D F1          1981          POP  AF
FD4E 32915C      1982          LD   (PFLAG),A
FD51 D9          1990          EXX
FD52 D1          2000          POP  DE
FD53 C9          2010          RET
                 2015 ;                "Find SCREEN POS."
                 2016 ;                "from Line,Col."
FD54 78          2020 SETCL    LD   A,B
FD55 C5          2025          PUSH BC
FD56 47          2030          LD   B,A
FD57 CD65FD      2040          CALL ADDR
FD5A C1          2050          POP  BC
FD5B 3E21        2060          LD   A,33
FD5D 91          2070          SUB  C
FD5E 5F          2080          LD   E,A
FD5F 1600        2090          LD   D,0
FD61 19          2100          ADD  HL,DE
FD62 C3AEFC      2110          JP   STORE
                 2115 ;
FD65 3E18        2120 ADDR     LD   A,24
FD67 90          2130          SUB  B
FD68 57          2140          LD   D,A
FD69 0F          2150          RRCA
FD6A 0F          2160          RRCA
FD6B 0F          2170          RRCA
FD6C E6E0        2180          AND  224
FD6E 6F          2190          LD   L,A
FD6F 7A          2200          LD   A,D
FD70 E618        2210          AND  24
FD72 F640        2220          OR   64
FD74 67          2230          LD   H,A
FD75 C9          2240          RET
                 2245 ;
FD76 1154FD      2250 SCRLL    LD   DE,SETCL
FD79 D5          2255          PUSH DE
FD7A 78          2260          LD   A,B
FD7B A7          2275          AND  A
FD7C C0          2280          RET  NZ
```

```
                2285 ;
FD7D 212040     2290 SCR    LD   HL,4020H
FD80 060B       2300        LD   B,8
FD82 E5         2310 SCR1   PUSH HL
FD83 0E03       2320        LD   C,3
FD85 C5         2330        PUSH BC
FD86 EB         2340 SCR2   EX   DE,HL
FD87 21E0FF     2350        LD   HL,0FFE0H
FD8A 19         2360        ADD  HL,DE
FD8B EB         2370        EX   DE,HL
FD8C 012000     2380 SCR3   LD   BC,32
FD8F EDB0       2390        LDIR
FD91 7D         2400        LD   A,L
FD92 A7         2410        AND  A
FD93 20F1       2420        JR   NZ,SCR2
FD95 212007     2430        LD   HL,0720H
FD98 19         2440        ADD  HL,DE
FD99 C1         2450        POP  BC
FD9A 0D         2460        DEC  C
FD9B C5         2470        PUSH BC
FD9C 20EE       2480        JR   NZ,SCR3
FD9E AF         2490        XOR  A
FD9F 0620       2500        LD   B,32
FDA1 12         2510 CLN1   LD   (DE),A
FDA2 13         2520        INC  DE
FDA3 10FC       2530        DJNZ CLN1
FDA5 C1         2540        POP  BC
FDA6 E1         2550        POP  HL
FDA7 24         2560        INC  H
FDA8 10D8       2570        DJNZ SCR1
FDAA 212058     2580 SCRAT  LD   HL,5820H
FDAD 110058     2590        LD   DE,5800H
FDB0 01E002     2600        LD   BC,736
FDB3 EDB0       2610        LDIR
FDB5 3A8D5C     2620        LD   A,(ATTRP)
FDB8 0620       2630        LD   B,32
FDBA 12         2640 CLN2   LD   (DE),A
FDBB 13         2650        INC  DE
FDBC 10FC       2660        DJNZ CLN2
                2665 ;
FDBE 210040     2670 RESET  LD   HL,4000H
FDC1 012101     2680        LD   BC,0121H
FDC4 C9         2690        RET
                2820        END
```

```
HEXDUMP for 48K ZX Spectrum

FBF4 CD B7 FC FE 20 D2 AA FC = 16
FBFC FE 06 D8 FE 18 D0 21 09 = EC
FC04 FC 5F 16 00 19 5E 19 E5 = E6
FC0C C3 B7 FC 42 41 40 3F 3E = B6
FC14 38 0C 2D 3A 39 46 45 44 = B3
FC1C 43 42 41 3B 3A F3 21 00 = 4F
FC24 40 11 01 40 01 FF 17 36 = DF
FC2C 00 ED B0 23 13 01 FF 02 = D5
FC34 3A 8D 5C 77 ED B0 01 21 = 59
FC3C 18 21 00 40 C3 54 FD 0E = 9B
FC44 21 CD 76 FD 05 C3 54 FD = 7A
FC4C F3 CD 7D FD FB C9 11 6C = 7B
FC54 FC 32 0F 5C 18 0B 11 5C = 1F
FC5C FC 18 03 11 6C FC 32 0E = D0
FC64 5C 2A 51 5C 73 23 72 C9 = 04
FC6C 11 F4 FB CD 65 FC 2A 0E = 66
FC74 5C 57 7D FE 16 DA 11 22 = 51
FC7C 20 1B 7A E6 1F 4F 3E 1F = 66
FC84 91 C6 02 4F 7C D6 18 30 = 42
FC8C FC 28 02 C6 18 47 3E 18 = A1
FC94 90 47 C3 54 FD 7C CD B7 = EB
FC9C FC 81 3D E6 1F C8 57 CD = AB
FCA4 40 FD 15 20 FA C9 F3 CD = F5
FCAC BF FC ED 43 88 5C 22 84 = 75
FCB4 5C FB C9 ED 4B 88 5C 2A = 66
FC3C 84 5C C9 FE 80 38 0F FE = 6C
FCC4 90 D8 D6 A5 D0 C6 15 C5 = 53
FCCC ED 4B 7B 5C 18 05 C5 ED = DE
FCD4 4B 36 5C EB 26 00 6F 29 = 86
FCDC 29 29 09 C1 EB 79 3D 3E = FB
FCE4 21 20 02 05 4F B9 D5 CC = F1
FCEC 76 FD D1 C5 E5 3A 91 5C = 15
FCF4 06 FF 1F 38 01 04 0E 08 = 77
FCFC A7 EB 1A A0 AE 12 14 23 = 43
FD04 0D 20 F7 EB 25 CD 11 FD = 0F
FD0C E1 C1 0D 23 C9 7C 0F 0F = 35
FD14 0F E6 03 F6 58 67 ED 5B = F5
FD1C 8F 5C 7E AB A2 AB FD CB = 29
FD24 57 76 28 08 E6 C7 CB 57 = CC
FD2C 20 02 EE 38 FD CB 57 66 = CD
FD34 28 08 E6 58 CB 6F 20 02 = CA
FD3C EE 07 77 C9 D5 D9 3A 91 = AE
FD44 5C F5 3E 20 FD 36 57 01 = 3A
FD4C D7 F1 32 91 5C D9 D1 C9 = 5A
FD54 78 C5 47 CD 65 FD C1 3E = B2
FD5C 21 91 5F 16 00 19 C3 AE = B1
FD64 FC 3E 18 90 57 0F 0F 0F = 66
FD6C E6 E0 6F 7A E6 18 F6 40 = E3
FD74 67 C9 11 54 FD D5 78 A7 = B6
FD7C C0 21 20 40 06 08 E5 0E = 42
FD84 03 C5 EB 21 E0 FF 19 EB = B7
FD8C 01 20 00 ED B0 7D A7 20 = 02
FD94 F1 21 20 07 19 C1 0D C5 = E5
FD9C 20 EE AF 06 20 12 13 10 = 18
FDA4 FC C1 E1 24 10 DB 21 20 = EB
FDAC 58 11 00 58 01 E0 02 ED = 91
FDB4 B0 3A 8D 5C 06 20 12 13 = 1E
FDBC 10 FC 21 00 40 01 21 01 = 90
FDC4 C9 = C9 END
```


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Design Design

IN THE DARK

The plot thickens

*Explore your artistic talents with Scribble written for the Amstrad by **Brian** and **David Lewis***

This program allows you to draw on the screen, either with a joystick, or by using the cursor controls. It shows you, amongst other things, the difference between mode 0 (20 column screen), mode 1 (40 columns) and mode 2 (80 columns) plus the maximum number of colours for each mode.

Modes can be toggled from the Enter key, with the mode number printed to the screen. The fire button (or copy key) prints out each colour (in that colour), whilst the screen can be cleared with the space bar.

Each mode change or screen refresh starts the cursor at 0,0 (ie, at the bottom left-hand side of the screen).

The flashing cursor lets you know where you are on the screen, which is particularly helpful when drawing in background colour.

Program Notes

Line 100	— initialisation
Line 110-140	— adjusts x and y co-ordinates
Line 150	— flashes cursor
Line 160-190	— changes pen colour
Line 200	— plots x and y
Line 210-220	— if space bar or enter, Gosub 300
Line 310-360	— adjusts mode, and associated parameters
Line 370	— restores x and y to 0,0
Line 380	— clears keyboard buffer
Line 400	— sets up variables
Line 410-470	— prints title page and instructions
Line 480-490	— configures for cursor or joystick control

Variables

cursor	= value for on-screen cursor (either 0 or 1)
maxcolour	= Maximum no. of pens in that mode
s$	= value of key pressed
s	= ASCII value of s$
m	= screen mode
jump	= x co-ordinate for scaling screen to fit mode
colour	= pen chosen
off	= used with Inkey to detect key release
fire	= keycode for fire button
copy	= keycode for copy key
space	= ASCII value of space bar
enter	= ASCII value of enter key

Lines 110 to 230 comprise the main loop of the program. 299 to 390 clear screen and change mode. Lines 399 to 500 are the initialisation subroutine.

```
99      REM  Amstrad scribble              18/7/84              B. & D. Lewis
100 GOSUB 400:GOSUB 310:GOTO 180
110 IF INKEY(up)=Pressed THEN y=y+2:GOTO 130
120 IF INKEY(down)=Pressed THEN y=y-2
130 IF INKEY(left)=Pressed THEN x=x-jump:GOTO 150
140 IF INKEY(right)=Pressed THEN x=x+jump
150 cursor=1-cursor:PLOT x,y,cursor
160 IF INKEY(changecolour)=off THEN 200
170 colour=colour+1:IF colour>maxcolour THEN colour=0
180 PEN colour:LOCATE 30,1:PRINT"Colour=";COLOUR
190 IF INKEY(changecolour)=Pressed THEN 190
200 PLOT x,y,colour
210 s$=INKEY$:IF s$="" THEN 110
220 s=ASC(s$):IF (s=space OR s=enter) THEN GOSUB 300:GOTO 180
230 GOTO 110
240     END
299     REM  SCREEN CLEAR & MODE CHANGE SUBROUTINE
300 IF s$=" " THEN CLS:GOTO 360
310 m=m+1:IF m=3 THEN m=0
320 MODE m
330 IF m=0 THEN maxcolour=15:jump=4
340 IF m=1 THEN maxcolour=3:jump=2
350 IF m=2 THEN maxcolour=1:jump=1
360 PEN 1:PRINT"Mode";m
370 x=0:y=0:colour=1
380 WHILE s$<>"":s$=INKEY$:WEND
390     RETURN
399     REM  INITIALISATION SUBROUTINE
400 colour=1:off=-1:Pressed=0:fire=76:copy=9:space=32:enter=13
410 MODE 0
420 PEN 1:LOCATE 7,1:PRINT"Amstrad":PRINT" Scribble Program"
430 PEN 2:LOCATE 1,6:PRINT"Press":PRINT:PRINT"Or"
440 PEN 15:LOCATE 7,6:PRINT"FIRE BUTTON":LOCATE 4,8:PRINT"COPY KEY"
450 PEN 4:LOCATE 1,11:PRINT"Use cursor keys OR joystick to draw lines. Back9
round isalways PEN 0  i.e.  NO COLOUR MESSAGE"
460 PEN 9:PRINT:PRINT"SPACE BAR - CLEARS                SCREEN":PRINT:PRINT"ENTER
KEY - CHANGES              MODE"
470 PEN 3:LOCATE 4,24:PRINT"By D & B Lewis"
480 IF (INKEY(fire)=off AND INKEY(copy)=off) THEN 480
490 IF INKEY(fire)=Pressed THEN changecolour=76:up=72:down=73:left=74:right=75
    ELSE changecolour=9:up=0:down=2:left=8:right=1
500     RETURN
```

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Starry, starry night

A program of immense magnitude for the Electron
by ***John Beckett***

Observation of the night sky will reveal that the stars are of unequal brightness. This brightness, or magnitude, of a star depends on its distance away and its luminosity. The system of magnitudes is related to a precise logarithmic scale. Each magnitude differs from the next one by a factor of 2.512; therefore a first magnitude star is 2.512 times brighter than a second magnitude star.

The brightest star in the sky, Sirius is magnitude −1.4. Care must always be taken to note the difference between a star's apparent magnitude as we see it at its true distance from Earth, and its absolute magnitude as the star would appear at a distance of 10 parsecs from us. (A parsec being a unit of stellar distance corresponding to 3.26 light-years).

For instance, suppose you observe Sirius, you will find that its apparent magnitude is −1.4. By calculation, we find that its absolute magnitude is 1.4. Therefore, if Sirius was say 40 times its distance from Earth, it would not be the brightest star as its apparent magnitude would have changed, although its absolute magnitude will stay the same. This makes the calculation of the absolute magnitude very important in astronomy.

The program consists of three main procedures.

ProcIntro is a simple text introduction of the concept of absolute magnitude.

ProcDataEntry asks for the distance of the star from the Earth (either in light-years or parsecs), the name of the star, and its apparent magnitude, assigning each its own variable.

Finally, *ProcCalculate* works out, then prints the absolute magnitude, using the equation in Line 370.

So, the program will work out the absolute magnitude of any star, as long as the distance (in light-years or parsecs) and the apparent magnitude from Earth is known.

```
10REM Absolute Magnitude/Electron
20REM John T W Beckett 1984
30ON ERROR REPORT:PRINT" at line ";ERL:END
40MODE6:VDU19,0,4;0;
50PROC_INTRO
60PROC_DATA_ENTRY
70PROC_CALCULATE
80INPUT'"Do you wish to run this program again"YN$
90IF LEFT$(YN$,1)<>"N" AND LEFT$(YN$,1)<>"Y"VDU7:GOTO80
100IF LEFT$(YN$,1)="Y" THEN 40
110IF LEFT$(YN$,1)="N" THEN END
120DEFPROC_DATA_ENTRY:CLS
130INPUT'"Enter stars name "SN$
140IF LEN(SN$)>40 VDU7:GOTO130
150INPUT'"Enter stars distance "SD
160IF SD<1 VDU7:GOTO150
170PRINT'"Enter unit of distance"'"L=LIGHT-YEAR     P=PARSEC"
180INPUT U$
190IF LEFT$(U$,1)<>"L" AND LEFT$(U$,1)<>"P" THEN VDU7:GOTO180
200IF LEFT$(U$,1)="L" SD=SD*0.3068
210INPUT'"Enter apparent magnitude "AP
220IF AP>1000 VDU7:GOTO210
230ENDPROC
240DEFPROC_INTRO
250PRINT'"   CALCULATION OF ABSOLUTE MAGNITUDE"
260PRINT''"The absolute magnitude of a star is the"
270PRINT'"magnitude which a star would have if"
280PRINT'"put at a distance of 32.6 light-years"
290PRINT'"or 10 parsecs from us.  It is a measure"
300PRINT'"of the real brightness of a star."
310PROC_SPACE:ENDPROC
320DEFPROC_SPACE
330PRINTTAB(4,23)"Press 'SPACE BAR' to continue";
340REPEATUNTILGET=32:ENDPROC
350DEFPROC_CALCULATE
360@%=&2040A
370AM=AP+5-5*LOG(SD)
380CLS:PRINT'"THE ABSOLUTE MAGNITUDE OF "SN$
390PRINT'"IS "AM:ENDPROC
```

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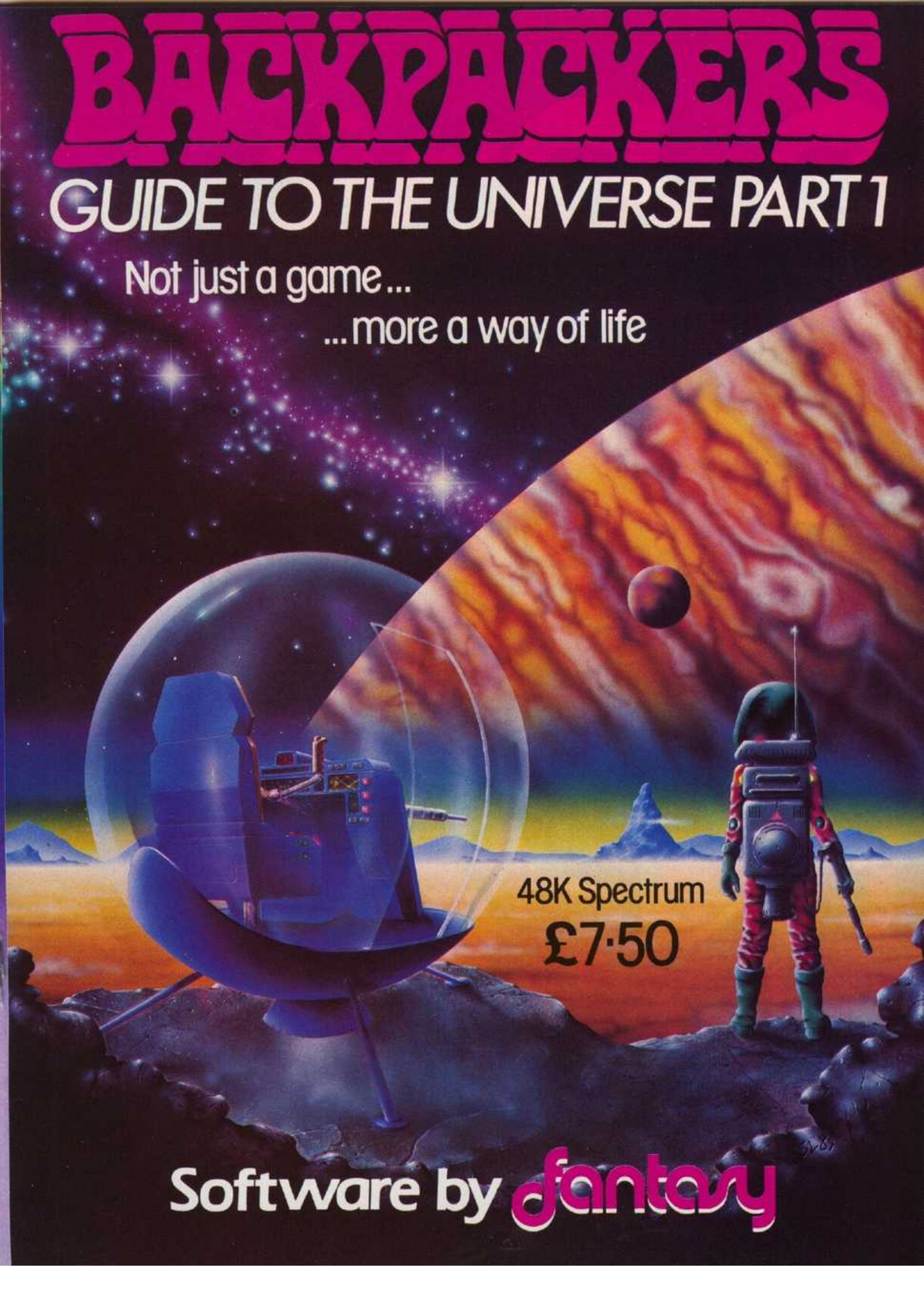

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The inner depths

***Keith Poole** concludes his QL Disassembler, the program that reaches parts other programs miss*

The QL Disassembler is a program which will show you the inner depths of your QL's memory. The first part of the listing was printed last week, the remainder follows below.

Program Notes

The main loop in the program consists of a *select* statement, which calls the procedure associated with each instruction group.

The procedures *Group O* to *Group e* decode each group of instructions as defined last week. *Group m* handles move instructions. *User* deals with the two user definable instructions (*Group a* and *f*) by printing udef. It assumes that these instructions take up a minimum 2 byte op-code.

The two functions *Addr$* and *Raddr$* decode the addressing mode of the instruct on using two arguments *reg* and *mde*. Some instructions only use a subset of these addressing modes, so *raddr$* checks for these before calling *addr$*.

Dec takes a hexadecimal string argument and returns the decimal equivalent. To use this function, remember to initialise a variable *digit$* with the value *0123456789ABCDEF*. The function can handle upper or lower case letters.

Hex$ performs the opposite to *Dec*. It takes a numeric argument and returns a hexadecimal string.

Slice takes a bit slice from a number supplied, (eg, slice (240,2,3) returns a three bit number starting at bit two.

Group 4 contains the miscellaneous instructions, and so is the most complex of the procedures. To simplify it, two subgroups *Sub8* and *Sub14* were given their own procedures.

```
2790 IF slice(rest,6,2)=3 THEN
2800    IF bot MOD 2=1 THEN
2810       op$="muls"
2820    ELSE
2830       op$="mulu"
2840    END IF
2850    op$=op$&"  "&addr$(slice(rest,3,3),slice(rest,
0,3))&",d"&(bot DIV 2)
2860 ELSE
2870  IF rest DIV 8=0 AND bot MOD 2=1 THEN
2880     op$="abcd  d"&(rest MOD 8)&",d"&(bot DIV 2)
2890  ELSE
2900   xx=4*(bot MOD 2)+slice(rest,3,5)
2910   SELect ON xx
2920 ON xx=40:op$="exg  d"&(rest MOD 8)&",d"&(bot DIV 2)
2930 ON xx=41:op$="exg  a"&(rest MOD 8)&",a"&(bot DIV 2)
2940 ON xx=49:op$="exg  d"&(rest MOD 8)&",a"&(bot DIV 2)
2950 ON xx=REMAINDER :op$="and"&type$(slice(rest,6,2))
2960    IF bot MOD 2=1 THEN
2970          op$=op$&"  d"&(bot DIV 2)&","&addr$(slice
(rest,3,3),slice(rest,0,3))
2980    ELSE
2990       op$=op$&"  "&addr$(slice(rest,3,3),slice(rest
,0,3))&",d"&(bot DIV 2)
3000   END IF
3010   END SELect
3020 END IF
3030 END IF
3040 END DEFine
3050 DEFine PROCedure groupd
3060 IF (bot MOD 2=1) AND (slice(rest,3,3)=0) THEN
3070    op$="addx"&type$(rest DIV 64)&"  d"&(rest MOD
8)&",d"&(bot DIV 2)
3080 ELSE
3090    IF (rest DIV 64)=3 THEN
3100       IF (bot MOD 2)=0 THEN
3110          op$="adda.w"
3120       ELSE
3130          op$="adda.l":lgt=1
3140       END IF
3150       op$=op$&"  "&addr$(slice(rest,3,3),slice
(rest,0,3))&",a"&(bot DIV 2)
3160     ELSE
3170     IF type$(rest DIV 64)=".l" THEN lgt=1
3180       IF (bot MOD 2)=0 THEN
3190          op$=addr$(slice(rest,3,3),slice(rest,0,3)
)&",d"&(bot DIV 2)
3200       ELSE
3210          op$="d"&(bot DIV 2)&","&addr$(slice(rest,
3,3),slice(rest,0,3))
3220       END IF
3230       op$="add"&type$(rest DIV 64)&"  "&op$
3240     END IF
3250 END IF
3260 END DEFine
3270 DEFine PROCedure groupe
3280 IF slice(rest,6,2)=3 THEN
3290    op$=addr$(slice(rest,3,3),slice(rest,0,3))
3300    SELect ON bot
3310       ON bot=0:op$="asr  "&op$
3320       ON bot=1:op$="asl  "&op$
3330       ON bot=2:op$="lsr  "&op$
3340       ON bot=3:op$="lsl  "&op$
3350       ON bot=4:op$="roxr  "&op$
3360       ON bot=5:op$="roxl  "&op$
3370       ON bot=6:op$="ror  "&op$
3380       ON bot=7:op$="rol  "&op$
3390    END SELect
3400 ELSE
3410  IF slice(rest,5,1)=1 THEN
3420     op$=type$(slice(rest,6,2))&"  d"&(bot DIV 2)&'
,d"&(rest MOD 8)
3430  ELSE
3440    p=(bot DIV 2):IF p=0 THEN p=8
3450     op$=type$(slice(rest,6,2))&"  £"&p&",d"&(rest
MOD 8)
3460 END IF
3470    xx=slice(rest,3,2)+4*(bot MOD 2)
3480   SELect ON xx
3490   ON xx=0:op$="asr"&op$
3500   ON xx=1:op$="lsr"&op$
3510   ON xx=2:op$="roxr"&op$
3520   ON xx=3:op$="rol"&op$
3530   ON xx=4:op$="asl"&op$
3540   ON xx=5:op$="lsl"&op$
3550   ON xx=6:op$="roxl"&op$
3560   ON xx=7:op$="rol"&op$
3570 END SELect
3580 END IF
3590 END DEFine
3600 DEFine FuNction slice(dta,bit,LEN)
3610 RETurn (dta DIV 2^bit) MOD 2^LEN
3620 END DEFine
3630 DEFine FuNction raddr$(mde,reg)
3640 IF mde=7 AND (reg=0 OR reg=1) THEN
3650   RETurn "error"
3660 ELSE
3670    RETurn addr$(mde,reg)
3680 END IF
3690 END DEFine
3700 DEFine FuNction addr$(mde,reg)
3710 LOCal temp
3720 SELect ON mde
3730 ON mde=1:RETurn "a"&reg
3740 ON mde=0:RETurn "d"&reg
3750 ON mde=2:RETurn "(a"&reg&")"
3760 ON mde=3:RETurn "(a"&reg&")+"
3770 ON mde=4:RETurn "-(a"&reg&")"
3780 ON mde=5
3790    temp=PEEK_W(s+op):op=op+2
3800    RETurn hex$(temp)&"(a"&reg&")"
3810 ON mde=6
3820    RETurn aiwx$(reg)
3830 ON mde=7
3850    IF reg=0 THEN op=op+2:p=PEEK_W(s+op-2):RETurn
hex$(p)
3860    IF reg=1THEN op=op+4:p=PEEK_L(s+op-4):RETurn
```

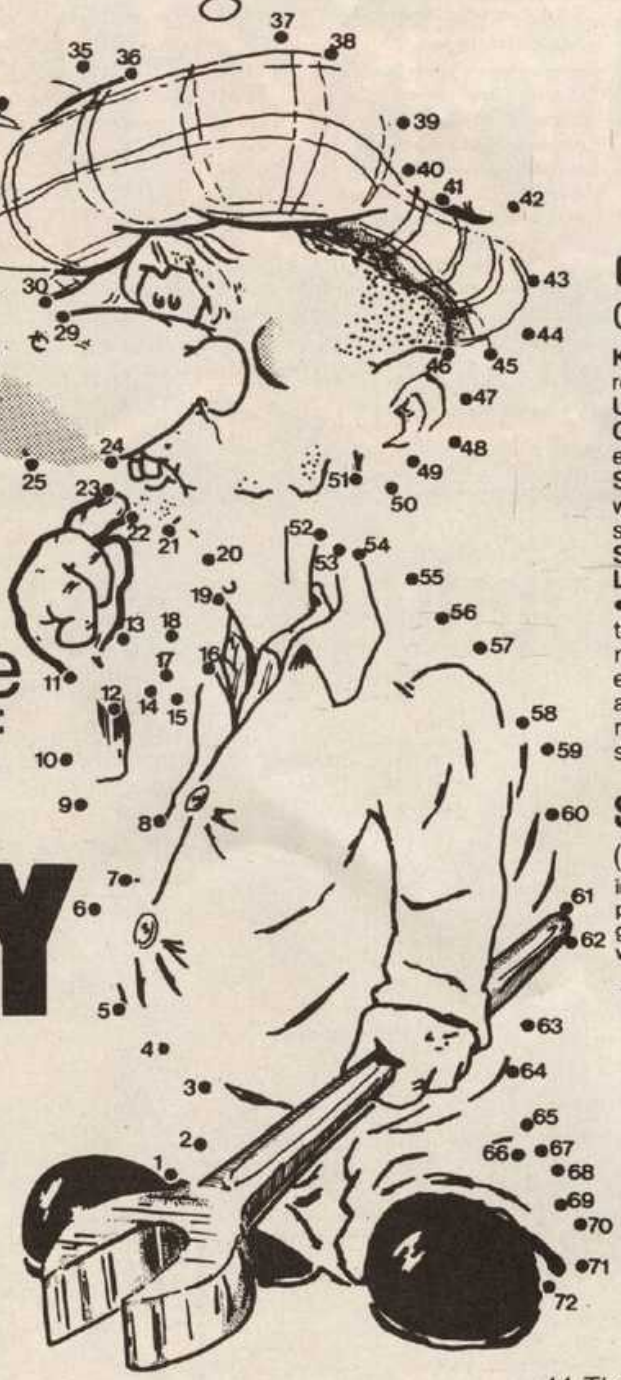
Continued over the page

```
hex$(p)
3870     IF reg=2 THEN op=op+2:p=256*PEEK(s+op-2)+PEEK
(s+op-1):RETurn hex$(p)&"(p
c)"&"!"&hex$(PEEK_W(s+op-2)+s+op)
3880     IF reg=3 THEN RETurn aiwx$(8)
3890     IF reg=4 THEN RETurn "£"&hex$(peeker)
3910 ON mde=REMAINDER :agh=1:RETurn "error"
3920 END SELect
3930 RETurn "error":agh=1
3940 END DEFine
3950 DEFine FuNction aiwx$(reg)
3960 LOCal n1,n2,reg$
3970 n1=PEEK(s+op):n2=PEEK(s+op+1):op=op+2
3980 IF n1>127 THEN
3990    reg$="a"
4000 ELSE
4010    reg$="d"
4020 END IF
4030 reg$=reg$&slice(n1,4,3)
4040 IF slice(n1,4,1)=1 THEN
4050    reg$=reg$&".l"
4060 ELSE
4070    reg$=reg$&".w"
4080 END IF
4090 IF reg=8 THEN
4100    RETurn hex$(n2)&"("&reg$&",pc)"
4110 ELSE
4120    RETurn hex$(n2)&"(a"&reg&","&reg$&")"
4130 END IF
4140 END DEFine
4150 DEFine FuNction peeker
4160 IF lgt=1 THEN
4170 op=op+4:RETurn PEEK_L(s+op-4)
4180 ELSE
4190 op=op+2:RETurn 256*PEEK(s+op-2)+PEEK(s+op-1)
4200 END IF
4210 END DEFine
4220 DEFine FuNction type$(n)
4230 SELect ON n
4240 ON n=0:RETurn ".b"
4250 ON n=1:RETurn ".w"
4260 ON n=2:RETurn ".l":lgt=1
4270 ON n=REMAINDER :RETurn "error":agh=1
4280 END DEFine
4290 DEFine PROCedure setup
4300 FOR i=0 TO 15:READ cc$(i)
4310 DATA "ra","sr","hi","ls","cc","cs","ne","eq","vc",
"vs","pl","mi","ge","lt", "gt","le"
4320 END DEFine
4330 DEFine PROCedure sub8
4340 IF (rest DIV 128)=1 THEN
4350   IF slice(rest,3,3)=0 THEN
4360      IF slice(rest,6,1)=0 THEN
4370         op$="ext.w  "
4380      ELSE
4390         op$="ext.l  "
4400      END IF
4410      op$=op$&"  d"&(rest MOD 8)
4420  ELSE
4430    IF (bot MOD 2)=1 THEN
4440       op$="movem.l  ":lng=1
4450    ELSE
4460       op$="movem.w  "
4470   END IF
4480  a=PEEK(s+op):d=PEEK(s+op+1):op=op+2
4490   op$=op$&addr$(slice(rest,3,3),slice(rest,0,3))
4500   IF slice(rest,3,3)=4 THEN
4510      xx=a:a=d:d=xx
4520      ot$=""
4530      FOR i=0 TO 7
4540      IF a/2<>a DIV 2 THEN ot$=ot$&"_a"&(7-i)
4550      IF d/2<>d DIV 2 THEN op$=op$&"_d"&(7-i)
4560      d=d DIV 2:a=a DIV 2
4570      END FOR i
4580      op$=op$&ot$
4590   ELSE
4600      ot$=""
4610      FOR i=0 TO 7
4620      IF a/2<>a DIV 2 THEN ot$=ot$&"_a"&i
4630      IF d/2<>d DIV 2 THEN op$=op$&"_d"&i
4640      d=d DIV 2:a=a DIV 2
4650      END FOR i
4660      op$=op$&ot$
4670   END IF
4680  END IF
4690 ELSE
4700   IF (rest DIV 64)=1 THEN
4710      op$="nbcd  "&addr$(slice(rest,3,3),slice
(rest,0,3))
4720   ELSE
4730      IF slice(rest,3,3)=0 THEN
4740         op$="swap  d"&slice(rest,0,3)
4750      ELSE
4760         op$="pea  "&addr$(slice(rest,3,3),slice
(rest,0,3))
4770      END IF
4780   END IF
4790 END IF
4800 END DEFine
4810 DEFine PROCedure sub14
4820 xx=slice(rest,6,2)
4830 SELect ON xx
4840 ON xx=3:op$="jmp  "&addr$(slice(rest,3,3),slice
(rest,0,3))
4850 ON xx=2:op$="jsr  "&addr$(slice(rest,3,3),
slice(rest,0,3))
4860 ON xx=1
4870    IF slice(rest,5,1)=0 THEN
4880       IF slice(rest,3,1)=0 THEN
4890        IF slice(rest,4,4)=4 THEN
4900           op$="trap  £"&(rest MOD 16)
4910        ELSE
4920           op$="link  a"&slice(rest,0,3)&",£"&PEEK
_W(s+op):op=op+2
4930        END IF
4940      ELSE
4950         op$="unlk  a"&slice(rest,0,3)
4960       END IF
4970    ELSE
4980    yy=slice(rest,0,4)
4990    SELect ON yy
5000    ON yy=0
5010          op$="reset"
5020   ON yy=1:op$="nop"
5030   ON yy=2:p=PEEK_W(s+op):op$="stop  "&hex$(p):
op=op+2
5040   ON yy=3:op$="rte"
5050   ON yy=5:op$="rts"
5060   ON yy=6:op$="trapv"
5070   ON yy=7:op$="rtr"
5080 END SELect
5090    END IF
5100 END SELect
5110 END DEFine
5120 DEFine PROCedure movemf
5130 IF slice(rest,6,1)=1 THEN
5140    op$="movem.l  ":lgt=1
5150 ELSE
5160    op$="movem.w  "
5170 END IF
5180 a=PEEK(s+op):d=PEEK(s+op+1):op=op+2
5190 op$=op$&addr$(slice(rest,3,3),slice(rest,0,3))&","
5200 ot$=""
5210 FOR i=0 TO 7
5220  IF a/2<>a DIV 2 THEN ot$=ot$&"\a"&i
5230  IF a/2<>a DIV 2 THEN op$=op$&"\d"&i
5240  a=a DIV 2:d=d DIV 2
5250 END FOR i
5260 END DEFine
5270 DEFine PROCedure dly
5280 CLS £0:PAPER £0,3:PRINT £0,"press any key to cont
inue":PAPER £0,0
5290 op$=INKEY$(-1)
5300 CLS £0
5310 END DEFine

5320 DEFine PROCedure ascii
5330 INK 0
5340 IF col>10 THEN PRINT FILL$(" ",col-10);:col=10
5350 FOR i=0 TO op-1
5360 IF PEEK(s+i)<32 THEN
5370    PRINT ".";
5380 ELSE
5390    PRINT CHR$(PEEK(s+i));
5400 END IF
5410 col=col-1
5420 END FOR i
5430 INK 7
5440 END DEFine
9999 POKE_W dec("3eff2"),dec("23c0")
```

Watch out for Wally in a dream of a Program, Pyjamarama.

AUTOMANIA



Join the dots and complete the picture of a right....

WALLY

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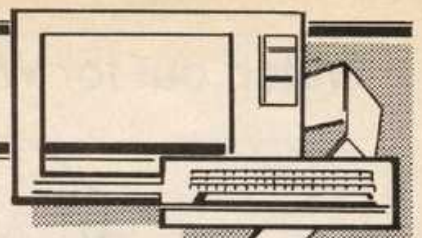

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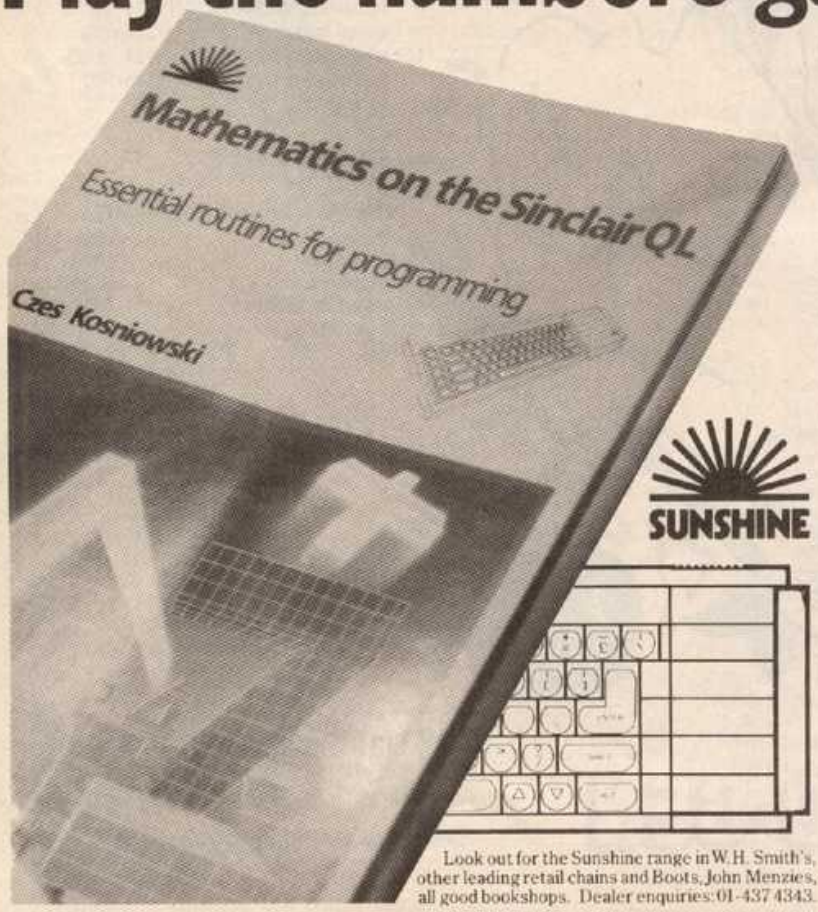

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Beneath the surface

Journey to the Land of Giants and repel borders on the CBM 64, programmed by ***Steve Phillips***

The Land of Giants is under attack from alien mini-subs. Your only defence is to hurl rocks at them, as they advance beneath the surface. Can you destroy them before your defensive wall is broken?

The program features full instructions and self-explanatory Rem statements.

Program Notes

C – Ship position
X – Rock X co-ordinate
Y – Rock Y co-ordinate
SC – Score
BN – Bonus
CL – Ship colour
G – Gap between each new position of ship

```
10 GOSUB 3100:REM**TITLE PAGE***
20 REM***SET UP GAME***
30 X=54276:A=54277:K=54295:H=54273:L=54272:
V=53248:CL=1:G=1
60 GOSUB2200:GOSUB2500:GOSUB600:GOSUB740:
GOSUB200:GOSUB300
90 REM***MAIN LOOP***
100 GOSUB700:GOSUB500:GOSUB900:GOTO100
200 REM***SET UP SPRITE 1 (ROCK)***
220 POKE2041,13
230 FOR T=0 TO 62:READS
250 POKE832+T,S:NEXT
270 POKEV+28,2:POKEV+38,1:POKEV+37,12:POKE
V+40,15:RETURN
300 REM***SET UP SPRITE 0 (SUB)***
310 POKE2040,14
320 FOR T=0 TO 62:READS
340 POKE896+T,S:NEXT
360 POKEV+21,3:POKEV+30,0:POKEV+39,CL:POKE
V+1,R:RETURN
400 REM***SURFACE SUB***
410 R=R-INT(G/2+1)
420 IF R<208 THEN R=208
430 POKE V+1,R:RETURN
450 REM***SUBMERGE SUB***
460 FOR R=208 TO 250 STEP0.1
470 POKE V+1,R
480 NEXT:POKE V,0:RETURN
500 REM***SELECT SHOT***
520 IF PEEK(197)=4 THENM=81:O=202:X=117:E
=36:D=6:RETURN
530 IF PEEK(197)=5 THENM=82:O=232:X=86:E
=27:D=5:RETURN
540 IF PEEK(197)=6 THENM=83:O=255:X=63:E
=20:D=4:RETURN
550 GOSUB1000:FOR T=1TO(INT(55/G)+18*G):
NEXT:GOTO520
600 REM***PRINT SCENE***
605 PRINT"■■";"■■■■■■■■■■■■■■■■■■■■"
610 PRINTTAB(30);"■  ■"
620 PRINTTAB(7);"◆◆◆■   ■";TAB(30);"
■"
630 PRINTTAB(5);"■          ■";TAB(30);"■■"
640 PRINT"■■ - - - - - - - - - - - - - - -
-■■          ";
650 PRINT"■■- - - - - - - - - - - - - - -
- ■■          ";
670 PRINT"■ -  -  -  -  -  -  -  -  -  -  -
■■          ■■";
680 POKE53280,5:POKE53281,6:POKE2023,160:
POKE56295,13:RETURN
700 REM***POSITION NEW ROCK***
710 O=160:X=157:Y=175:UU=0:POKEV+30,0
720 GOSUB1100:GOSUB800:RETURN
740 REM***PRINT GIANT***
750 PRINT"■■■■■■■■■■■■■■■■■■■■"
755 PRINT TAB(36);"|●\"
760 PRINT TAB(36);"■■ ■■■"
765 PRINT TAB(36);"■■ X"
770 PRINT TAB(36);"| \"
780 RETURN
800 REM***POKE SPRITE POS'N***
820 POKEV+2,O+X-OF*256:POKEV+3,Y
840 IF(PEEK(V+30)AND3)=3THENGOSUB2000:
GOSUB1800:GOSUB2300:GOSUB2500:UU=1
850 OF=0:RETURN
900 REM***MOVE ROCK***
920 GOSUB1000:IF UU=1 THEN RETURN
930 X=X-D:Y=INT(9*(X/E)+2)+M
940 GOSUB1100
950 IF Y>255 THEN RETURN
960 GOSUB800
970 IFUU=1 THEN RETURN
980 GOTO920
1000 REM***MOVE SUB***
1010 C=C+G
1020 IF C>170 THEN GOSUB400
1050 IF C>200 THEN GOSUB2600
1060 IF C<0 THEN RETURN
1070 POKEV,C:RETURN
1100 REM***CHECK IF MSB REQUIRED***
1110 IF(X+O)<256 THEN POKEV+16,0
1120 IF(X+O)>255 THEN POKEV+16,(PEEK
(V+16))OR2:OF=1
1130 RETURN
1200 REM***FIRE SUBS GUN***
1210 J=0:I=0
1220 IF PEEK(1848+J)=160 THEN POKE1848+J,
32:FOR T=1 TO 50:NEXT:I=1
1240 IF PEEK(1808+J)=160 THEN POKE1808+J,
32:POKE1848+J,160:I=1
1255 IF I=1 THEN RETURN
1280 POKE1848+J,100:POKE56120+J,8
1290 IF J=0 THEN GOSUB2400
1300 POKE1848+J,32
1310 IFO+X<317 THEN GOSUB930
1320 J=J+1:GOTO1220
1400 REM***KILL GIANT***
1410 PRINT"■■■■■■■■■■■■■■■■■■■■"
1420 PRINT TAB(36);"\●/"
1430 PRINT TAB(36);"■ ■■ "
1440 PRINT TAB(36);" X "
1450 PRINT TAB(36);"/ \"
1460 FOR T=0 TO 14
1470 POKE53281,T:NEXT
1480 POKE53281,6:POKEW,0:POKEA,0
1490 DUR=200:WF=129:NTE=5:B=3:GOSUB1600
1500 POKEV+21,0:POKEW,0:POKEA,0:RETURN
1600 REM***SOUND(VOICE 1)***
1610 FOR U=15 TO B STEP-1
1620 IF C<200 THEN POKEV+39,U
1630 POKEK,U:POKEW,WF
```

```
1640 POKEA,63 POKEH,NTE POKEL,85
1650 FOR Z=1 TO DUR:NEXT
1660 IFO+X<317 AND C>200 THEN GOSUB930
1670 NEXT RETURN
1800 REM***BLOW UP SUB***
1810 POKEV+3,255 UU=1
1820 DUR=75 NTE=2 WF=129 B=0 GOSUB1600
1830 POKEW,0:POKEA,0
1840 GOSUB1900 RETURN
1900 REM***FLASH SUB COLOUR***
1910 FOR Z=1 TO 15
1920 FORT=1 TO 10 NEXT
1930 POKEV+39,Z NEXT
1950 POKE V,0 RETURN
2000 REM***SCORING***
2010 SC=SC+200
2020 PRINT"":SPC(7);SC+BN SC=SC+BN
2030 BN=BN+50
2040 GOSUB2100:RETURN
2100 REM***BONUS***
2110 PRINT"";SPC(32);"
2120 PRINT"";SPC(32);BN
2130 RETURN
2200 REM***SCORE/BONUS DISPLAY***
2210 PRINT"
                   ";
2220 PRINT"SCORE= 0";SPC(17);"BONUS= 0"
2230 PRINT"
                   ";
2240 RETURN
2300 REM***CHANGE SUB COLOUR***
2310 CT=CT+1 HH=5+INT(CT/10)
2320 F=INT(HH*RND(1))
2330 IF F=0 THEN CL=1 G=1
2340 IF F=1 THEN CL=3 G=1.5
2350 IF F=2 THEN CL=9 G=2
2360 IF F=3 THEN CL=7 G=3
2370 IF F=>4ANDF<7 THEN CL=0 G=4
2380 IF F>=7 THEN CL=2 G=5
2390 POKE V+39,CL RETURN
2400 REM***LAZER SOUND***
2410 DUR=5 WF=33 B=15 NTE=100
2420 GOSUB1600:RETURN
2500 REM***DELAY BETWEEN SUBS***
2520 R=225 POKEV+1,R
2530 P=INT(RND(1)*7)
2540 IF P>3 THEN C=7 RETURN
2550 C=-INT(P*10*G) RETURN
2600 REM***EXPLOSION***
2620 UU=1:GOSUB1200:BN=0:GOSUB2100
2630 IF J>11 THEN GOSUB1400:GOSUB3000
2640 DUR=120:NTE=10:WF=129:B=0:GOSUB1600
2650 POKE W,0 POKE A,0 J=0
2670 IFO+X<317ANDY<255 THEN GOSUB930:
GOTO2670
2680 GOSUB460 GOSUB2300 GOSUB2500 RETURN
3000 REM***GAME OVER***
3010 PRINT""
3020 PRINT TAB(12);"GAME OVER"
3030 PRINT TAB(6);"YOU SCORED";SC,
"POINTS"
3040 PRINT TAB(6);"PRESS ANY KEY
TO RESTART"
3050 POKE198,0 WAIT198,1 C=0 RUN30
3100 REM***TITLE PAGE***
3110 PRINT"":POKE53281,13 POKE53280,5
3120 PRINT TAB(10)
3130 PRINT"MINI-SUB CONQUEST"
3140 PRINT TAB(10);"*****************"
3150 PRINT"THE LAND OF THE GIANTS IS
UNDER ATTACK"
3160 PRINT"FROM ALIEN MINI-SUBS.AS GIANT
LEADER,"
3170 PRINT"YOUR ONLY DEFENCE IS TO HURL
HUGE ROCKS"

3180 PRINT"AT THE SUBS AS THEY ADVANCE
JUST BENEATH";
3190 PRINT"THE SURFACE."
3200 PRINT"YOU SCORE 200 PTS FOR EACH SUB
PLUS A"
3210 PRINT"BONUS WHICH INCREASES BY 50 PTS
FOR EACHHIT."
3220 PRINT"FOR LONG THROW,PRESS KEY F1"
3230 PRINT"FOR MEDIUM THROW,PRESS KEY
F3"
3240 PRINT"FOR SHORT THROW,PRESS KEY
F5"
3250 PRINT"IF A SUB GETS THROUGH,IT WILL
SURFACE"
3260 PRINT"AND DESTROY PART OF YOUR
DEFENSIVE WALL.";
3270 PRINT"THE BONUS IS THEN RESET
3350 PRINT TAB(4);"PRESS ANY KEY
3360 POKE198,0 WAIT198,1 RETURN
4000 REM***DATA FOR SPRITE 1(ROCK)***
4010 DATA 0,0,0,0,0,0,0,0,0,0,0,0
4020 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0
4030 DATA 0,13,0,0,62,64,0,63,64,0,255
4040 DATA 144,0,255,144,0,255,144,0
4050 DATA 255,144,0,255,80,0,254,80,0
4060 DATA 57,64,0,37,64,0,5,0,0
4100 REM***DATA FOR SPRITE 0(SUB)***
4110 DATA 0,0,0,0,0,0,0,0,0,0,0,0
4120 DATA 0,12,0,0,8,0,0,8,0,0,8,0
4130 DATA 0,8,0,0,28,0,0,28,0,0,20,0
4140 DATA 0,28,0,0,28,0,33,255,128
4150 DATA 127,255,192,127,182,224
4160 DATA 127,255,192,33,255,128,0,0,0
4170 DATA 0,0,0

5000
5010 :

5020 REM************************
5030 REM************************
5040 REM***                  ***
5050 REM*** MINI-SUB CONQUEST ***
5060 REM***                  ***
5070 REM*** BY STEVE PHILLIPS ***
5080 REM***                  ***
5090 REM***   COMMODORE 64    ***
5100 REM***                  ***
5110 REM***  2ND APRIL 1984   ***
5120 REM***                  ***
5130 REM************************
5140 REM************************
```

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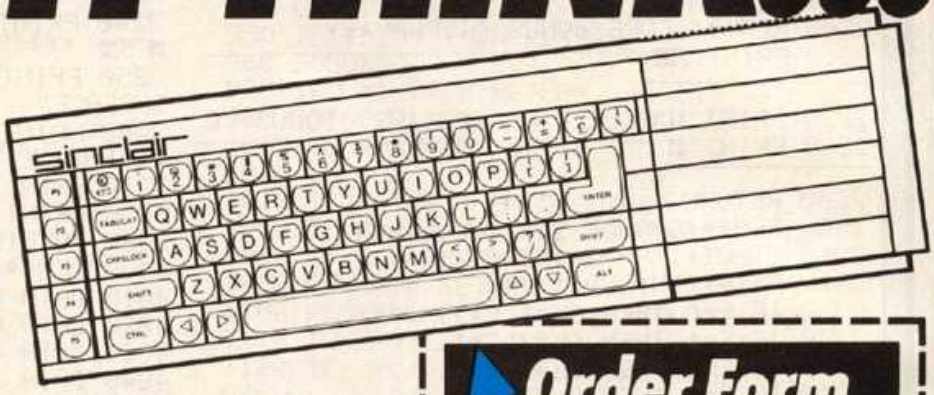

The three latest books on Sunshine's superb QL QLassics series are now available at your local bookshop or computer dealer. Let's take a look at the first one, Developing Applications on the Sinclair QL. It's full of practical ideas for making the most out of Quill, Easel, Abacus and Archive, for both your home and business. Ideal for both beginner and expert, Mike Grace's book gives you the knowledge you need.

Up till now, machine code programming on the powerful 68008 microprocessor of the QL was a daunting prospect. Andrew Pennell's QL QLassic, Assembly Language Programming, explains the internal structure, the register set and the many addressing modes – and includes the use of traps and exception handlers. Here are over 160 pages of vital data and advice for QL programmers, and all for just £7.95.

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Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed.

Windows

on QL

This program is designed to illustrate the *Window* facility on the QL. Four new windows will be opened, one in each corner of the screen, covering the whole of the display area. In each window a different type of graphical pattern is drawn; these patterns are described below.

In the top left hand corner, filled circles are drawn at random positions in random colours. In the top right hand corner filled squares are drawn at random positions in random colours. In the bottom left hand corner filled ellipses are drawn and in the bottom right hand window filled triangles are drawn at random positions in random colours. A border is also set up around each window.

The program will *Run* indefinitely, and should be stopped by pressing *Ctrl* and *Space* together.

```
100 REMark WINDOWS BY ANDREW FILBY
110 OPEN#5,scr_256x128a0x0
120 PAPER#5,0:CLS#5
130 INK#5,7
140 BORDER#5,15,1
150 SCALE#5,100,0,0
160 OPEN#6,scr_256x128a256x128
170 INK#6,0
180 PAPER#6,2:CLS#6
190 BORDER#6,15,3
200 SCALE#6,100,0,0
210 OPEN#7,scr_256x128a256x0
220 INK#7,0
230 PAPER#7,7:CLS#7
240 BORDER#7,15,6
250 SCALE#7,100,0,0
260 OPEN#8,scr_256x128a0x128
270 INK#8,0
```

Arcade Avenue

Room to move

Continuing on the subject of *Jet Set Willy* hacking from last week — here is Ben Caunce's table showing the memory locations of the various rooms.

Address (Hex)	Room Title
C000	Off Licence
C100	The Bridge
C200	Under Megatree
C300	Foot of Megatree
C400	The Drive
C500	Security Guard
C600	Entrance to Hades
C700	Cuckoo's Nest
C800	Inside Megatree
C900	Branch Over Drive
CA00	Front Door
CB00	Hall
CC00	Tree Top
CD00	Out On A Limb
CE00	Rescue Esmeralda
CFoo	Seen This Before
D000	Quirkafleeg
D100	Battlements
D200	Pn Roof
D300	Forgotten Abbey
D400	Ballroom East
D500	Ballroom West
D600	Main Stairway
D700	Kitchen
D800	West of Kitchen
D900	Cold Store
DA00	East Wall Base
DB00	Chapel
DCoo	First Landing
DD00	Nightmare Room
DE00	Banyan Tree
DF00	Swimming Pool
E000	Half Way Up East Wall
E100	Bathroom
E200	Top Landing
E300	Master Bedroom
E400	Bit Of Tree
E500	Orangery
E600	Priest's Hole
E700	Generator Room
E800	Dr. Jones
E900	The Attic
EA00	Under The Roof
EB00	The Conservatory
EC00	On Top Of House
ED00	Under The Drive
EE00	Tree Root
EF00	NOT USED
F000	Nomen Luni
F100	Wine Cellar
F200	Watchtower
F300	Tool Shed
F400	Back Stairs
F500	Back Door
F600	West Wing
F700	West Bedroom
F800	West Wing Roof
F900	Above West Bedroom
FA00	The Beach
FB00	The Yacht
FC00	The Bow

What I find particularly interesting is the room at EF00 which is not used. Using the information given in this article it seems not impossible that you could add your own room to the game. If anyone is clever enough to do this or even uses one of the 'JSW Designer' programs I mentioned a few weeks ago, then I'll see about arrancopy then I'll see about arranging a small prize for the best 'new room'. Anyway let's go on with Ben's letter which has still more useful tips. "I have also found a hidden object on the First Landing which is impossible to reach without modifying the room layout. To alter the room and retrieve it as you walk towards the cross *Poke* 53642,0; *Poke* 56350,0; *Poke* 56357,170.

The following *Pokes* are also useful (some are necessary). *Poke* 42183,11 and *Poke* 59901,82 will remove the Attic problems (and Graeme Carrot also points out that *Poke* 59900,255 will do the same).

Poke 56876,4 improves the Banyan Tree layout. *Poke* 60231,0 improves the 'conservatory' layout. *Poke* 50552,170 and 50553,170 blocks off the 'Entrance to Hades' (who wants to go there?). *Poke* 50512,168; 50520,168 and 50528,170 puts a ledge in the 'security Guards' so that you can get under the Drive without going through the Forgotten Abbey. *Poke* 54814,0 removes the annoying 'star' on the Main Stairway. *Poke* 57411,160; 57362,26; 57464,170 makes life a little safer in Priest's Hole. The following *Pokes* make it possible to travel from The Bow to Off Licence and vice versa — *Poke* 64610,21; 64632,85; 64633,85; 64634,85; 64635,4; 49386,60; 49263,0; 49271,0."

So thank you very much, Ben for that fascinating letter.

Tony Kendle

The Arcade Corner is a new section for anyone who enjoys playing arcade games. If you have any comments, from playing tips on difficult games or programs you'd particularly like to praise (or blame!) then write to: Tony Kendle, Arcade Avenue, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

Open Forum

```
280 PAPER#8,4:CLS#8
290 BORDER#8,15,5
300 SCALE#8,100,0,0
310 INK 7:CURSOR 40,103:FLASH 1:CSIZE 3,1:PRINT"WINDOWS  BY ANDREW FILBY":F
LASH 0
320 REPeat loop
330 window_1
340 window_2
350 window_3
360 window_4
370 END REPeat loop
380 DEFine PROCedure window_1
390 INK#5,RND(0 TO 7):FILL#5,1:CIRCLE#5,RND(0 TO 149),RND(0 TO 150),RND(0 T
O 50):FILL#5,0
400 END DEFine
410 DEFine PROCedure window_2
420 FILL#6,1:INK#6,RND(0 TO 7):q=RND(0 TO 100):l=RND(0 TO 149):LINE#6,l,q T
O RND(0 TO 148),RND(0 TO 100) TO RND(0 TO 148),RND(0 TO 100) TO l,q:FILL#6,
0
430 END DEFine
440 DEFine PROCedure window_3
450 q=RND(0 TO 100):w=RND(0 TO 149):e=RND(0 TO 70)
460 INK#7,RND(0 TO 7):FILL#7,1:LINE#7,l,q TO l,q+e TO l+e,q+e TO l+e,q TO l
,q:FILL#7,0
470 END DEFine
480 DEFine PROCedure window_4
490 FILL#8,1:INK#8,RND(0 TO 7):CIRCLE#8,RND(0 TO 149),RND(0 TO 100),RND(0 T
O 50),RND,RND(0 TO (2*PI)):FILL#8,0
500 END DEFine
```

Windows
by A Filby

Baud Walk

Special interest

If you spend a lot of time trying to contact people on the telephone, you will have noticed that the chances are that only one in three calls actually get you through to the person you want to chat to.

And its even more annoying and expensive when you are making a long distance call.

Well, now the UK's cheapest electronic mail service — which was previously only available in London — has been extended nationwide.

That means that for the price of a local telephone call and a small subscription of £20 per year you can get on to electronic mail, send messages, greetings, arrange blind dates and talk to other baud walkers.

The system actually sits on the Prestel network and at only £20 a year its almost worth joining just to access the Picotel pages. There are at least another 10,000 micro users hooked up too, courtesy of the Micronet 800 service.

The electronic mail system on Prestel comes complete with a directory of other users and a number of special interest groups.

Every subscriber is given an individual 10-digit address number which you complete on pre-formatted pages — most message pages take up to 120 words a time.

Viewdata software marketed by a number of companies with their modems also allows you to prepare your messages before going on-line, thus cutting out even more telephone costs.

I use this mailbox facility frequently to get in touch with people on the move or when I'm at home tinkering with my micro at midnight and run into problems I have sometimes mailboxed somebody on the network I know who might have the answer. Invariably next day there is their reply sitting in my mailbox store — ready for me to use, save back to store or delete from the system.

The biggest advantage for baud walkers on electronic mail systems is the special interest groups. Nobody has yet devised a directory of category of index, that would be really useful. Imagine being able to mailbox everybody, for example, who was struggling with a particular adventure game — every one could help each other to solve the puzzles.

Imagine too, starting your own special interest group. You could post the message on any one of Prestel's notice board services, collect the replies and from then on run your own club, all via electronic mail.

The disadvantage of this cheap form of electronic mail is its limitations — but then you can't have everything Expect too, some report about junk electronic mail.

● Next week: the UK's cheapest 300/300 modem is launched.

Robin Wilkinson

Baud Walk is a new weekly column with news on networking, databases, reviews of modems and software and points of contact for information.

Any readers with experience of networking are asked to send their experiences or news of services to, Robin Wilkinson, Baud Walk *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

He can also be contacted on Prestel mailbox 019993727.

Matrice

on Vic 20

This unexpanded program should be easily adopted for any 'Basic speaking' machine. It consists of two programs which are joined together. Each one can be used separately.

(1) The first program is located between lines 90-940 (and includes the subroutine in 1500). It allows you to enter a matrice and it will calculate the determinant and the inverse matric.

(2) The second program is located between lines 970-1430. It will multiply 2 matrices given by the user.

Example

3x+5+z=1
z+2y+3z=0
12x+3y−z=1

Type '1' to get the first program. The computer will ask you the size of the matric which is here 3.Type in 3.Then introduce 3/5/1/1/2/3/2/3./–1 You'll get 1 as determinant of the system. Then you'll get the inverse matrix.

Press '1' to go on with equation of any offer key to stop. If you pressed '1', you are asked for the 3 numbers following the = sign which are 1,0 and −1. Enter them and you'll get the result.

```
1 rem **************
2 rem *  matrices   *
3 rem **************
4 rem *  copyright  *
5 rem * cyril aubry *
6 rem **************
7 rem * october '83 *
8 rem **************
9 Printchr$(14)
82 Print"▒":Print"        ▒Matrices":Print"▒
Menu":Print"          ▒▒▒▒▒▒"
83 Print"▒▒▒1.To calculate":Printtab(4)"
▒-Determinant":Printtab(4)"▒-Inverse matrix"
84 Printtab(4)"▒-Equations":Print"▒▒2.To
multiply a(p,n)                  & b(q,p)
86 geta$:ifa$<>"1"anda$<>"2"then86
87 ifa$="1"thenrun90
88 ifa$="2"thenrun970
90 rem calculates the determinant of a sized n matrix
100 Print"▒"
110 Print"▒▒Size of matrix a";
120 inputn
130 dima(n,n)
140 dimb(n,n)
150 dimc(n,n)
160 dimd(n,n)
170 forl=1ton
180 forc=1ton
190 Print"a(";l;",";c;")"
200 inputa(l,c)
210 b(l,c)=a(l,c)
220 nextc
230 nextl
240 rem results-inverse matrix
260 Print"▒"
270 forq=1ton-1
280 gosub1500
290 forz=1ton
300 b(z,z)=b(z,z)-s/q
310 nextz
320 forl=1ton
330 forc=1ton
340 forz=1ton
350 d(l,c)=d(l,c)+a(l,z)*b(z,c)
360 nextz
370 nextc
380 nextl
390 forl=1ton
400 forc=1ton
410 c(l,c)=b(l,c)
420 b(l,c)=d(l,c)
430 d(l,c)=0
440 nextc
450 nextl
460 nextq
470 gosub1500
480 c=1
490 forz=1ton-1
500 c=-c
510 nextz
```

The Music Box

Sound chip

We all know about the revolution brought about in the few years that followed Intel's introduction of the first microprocessor chip — the antique 4040, best known as the progenitor of a million games of video tennis. The 4040 is now seen with something approaching religious awe.

As far as computer music is concerned, similar veneration probably awaits another chip — General Instrument's AY-3-8910 which, along with its somewhat less elaborate stablemate, the AY-3-8912, was probably the first fully digital programmable sound generator to reach the market-place. The 8912 is built in to the Oric 1 and Oric Atmos, while the 8910 is the chip chosen by the MSX manufacturers for their standard sound output features.

These chips have been popular with home constructors for some time, as has the Texas Instrument's near-equivalent, the SN76489, which is the chip used in the BBC micro to produce sound.

Most current PSGs are fairly simple devices. The 76489, for example, isn't even properly addressable — it is, effectively, connected to an eight-bit data bus and the registers within it (the three tone generators and one noise generator) are addressed via this bus. If the chip had to have a large number of facilities, such an approach would be impossibly time consuming.

As a result, the features of these basic chips are extremely limited. Nonetheless, the principle of the PSG allows us, in theory, to produce an entire synthesiser on a single chip and to control it from software.

The most advanced PSG in common use is the Mostek 6581, available only on Commodore machines. Commodore Basic, being what is is, makes handling the 6581 an extremely tedious matter (there are 29 different registers in the chip which must be individually *Poked* or *Peeked* to make anything happen). But then there are an increasing number of hardware and software add-ons to enable you to get the most out of this remarkable chip.

Just one item of news in this connection. The designer of the 6581 was a certain Bob Yannes. Bob left MOS Technology (the Commodore-owned company which produces Mostek chips) some time ago. Recently, he and his brother Dave have surfaced at the helm of a company called Peripheral Visions Inc. (Great Valley Parkway, Malvern, Pennsylvania 19355, USA). PVI have just announced an Apple add-on called the DrumKey — apparently everything you ever wanted from a drum synth and selling at only $£39.95.

Percussion synthesis is certainly one of the current things for the serious computer musician and it will be interesting to see whether the DrumKey (which includes a new Yannes-designed custom chip) comes up to the same standard in this area that the 6581 has set in the PSG field. To hear the device at 3000-miles' distance, you can ring 0101-215-647-3930.

Gary Herman

The Music Box is a new weekly column with news, reviews and readers comments on all aspects of micros and music.

Any readers with experience of computer music making or companies with new product news are invited to write to: drop a line explaining what they're doing to: Gary Herman, The Music Box, 12-13 Little Newport Street, London WC2R 3LD.

Open Forum

```
520 z=s/n*c
550 Print" The determinant of A  is:";z
560 ifz=0thengoto940
570 Print"The inverse matrix is:"
580 forl=1ton
590 forc=1ton
610 c(l,c)=c(l,c)*n/s
620 Print" inv(";l;",";c;")=";int(100*c(l,c))/100
625 fortt=1to1000 next
630 nextc
640 nextl
700 Print"  in order to solve
equations ";:Print"type '1'  "
710 getaf ifa$=""then710
711 ifa$<>"1"thenend
730 Print"
740 Print"enter results y:"
750 dimy(n)
760 dimx(n)
770 forl=1ton
780 Print"y(";l;")";
790 inputy(l)
800 nextl
810 Print"
820 Print"  The solutions of
these equations are:"
830 forl=1ton
860 forc=1ton
870 x(l)=x(l)+c(l,c)*y(c)
880 nextc
890 Printtab(8)"x";l;"= ";int(1000*x(l))/1000
900 nextl
901 for tt=1to3000:next:goto82
940 Print"   What a funny
 matrix !!!! ":fortt=1to2000 next:goto82
970 rem multiply matrices
980 Print"
990 Print"matrix a";,"number de rows";
1000 inputx
1010 Print"number of columns";
1020 inputy
1040 forp=1tox
1050 forn=1toy
1060 Print"a(";p;",";n;")"
1070 inputa(p,n)
1080 nextn
1090 nextp
1100 Print"
1110 Print"matrix b";,"number of rows";
1120 inputv
1130 dimb(v,x)
1140 forp=1tov
1150 forn=1tox
1160 Print"b(";p;",";n;")";
1170 inputb(p,n)
1180 nextn
1190 nextp
1230 dimc(v,y)
1240 forp=1tov
1250 forn=1toy
1260 fork=1tox
1270 c(p,n)=c(p,n)+b(p,k)*a(k,n)
1280 nextk
1290 nextn
1300 nextp
1330 x=v:Print"
1350 forp=1tov
1360 forn=1toy
1370 Print"c(";p;",";n;")=";c(p,n)
1390 a(p,n)=c(p,n)
1400 nextn
1410 nextp
1430 end
1500 s=0
1510 forz=1ton
1520 s=s+b(z,z)
1530 nextz
1540 return
```

Matric
by Cyril Aubry

Microradio

GW6JJN

Answer back

A large number of readers have enquired about radio teletype (RTTY) programs for the Commodore 64 computer. More and more radio software is coming along for this machine and about the best RTTY program I have seen comes from Grosvenor Software of 22, Grosvenor Road, Seaford, East Sussex, BN25 2BS.

The program's title is *RTTY Transceive* for the Commodore 64 and is available either on casssette at £14 or disc at £16. Written entirely in machine code, the program is professionally presented and includes extensive instructions on how to use the facilities available, and there are plenty of those. In addition to the program, the user will need a suitable RTTY terminal unit/interface between the computer and the radio. Many of you will already have one, but if not a unit including all leads is available from PNP Communications in conjunction with Grosvenor. Ring 0323 893378 for more details.

The program operates in split-screen mode. This means that in-coming messages are received at the top part of the screen and you are able to compose a reply during receive, the reply being stored in a 1000 character buffer and displayed in the lower half of the screen. When you are ready to transmit you press a key and out goes your response. You can type ahead during transmission or you can send previously prepared pages of text which can be stored in any of ten memories of 480 characters.

The selection of baud rate is software controlled between 20 and 250 baud. This will cope with just about everything in RTTY. The really cunning thing about this program is that it will tell you the baud rate of an incoming signal. I found this very impressive, it is something I have never seen before in such a package and is typical of the attention to detail displayed throughout.

Other features include automatic answer-back for radio mailboxes, in-built call-sign of user, the ability to remember all received and transmitted messages for later review. The function keys on the 64 are used for control of the major aspects of the program such as receive, transmit etc and a real-time clock is constantly displayed on screen and is available to send. On the whole this is a well thought-out program which is both efficient and easy to use. The features of the Commodore 64 have been used to full effect indicating that it has been written specially for the 64 and not cobbled together from a bunch of routines intended for something else.

There is a great deal of radio software appearing recently but I can honestly say that very little of it compares in features or quality to Grosvenor's RTTY for the Commodore 64. Here we have the unique combination of the ultimate in radio software along with excellent value for money. Another winner from the author, M J Kerry G4BMK.

Ray Berry GW6JJN

This series of articles is designed for radio and microcomputer enthusiasts alike. If you have any queries that you want answered, hints and tips to share, or topics that you would like to see covered, write to: Ray Berry, Microradio, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

Tony Bridge's Adventure Corner

Rubic's cube

Although we still have a lot of new adventures to get through (they're coming in thick and fast now — but should we complain?), I'm going to put them on one side for a week, and give some badly-needed help.

Now that the Infocom adventures are at last available for a reasonable £11 or so (although, of course, only on disc drive — don't hold your breath for tape versions, it's probably not possible!) — many more adventurers are being introduced to the delights of the *Zork Triology, Planetfall* and *Deadline* among others. Mr D Feal of London N1 went out and bought the whole trilogy. *Zork I* brings the following problems with it: "How do I pass Hage's entrance? 11,29 and 41. "And how do I open the granting in the forest?" You'll need the 32,15,46,45.

As for *Zork III:* "What is the secret of the Puzzle Room? A difficult one to answer, Mr Feal! Suffice to say that the whole thing is rather like a giant Rubic's Cube, and the minimum number of moves — worked out with the aid of an algorithm constructed by Ken Matthews and friends — is 60 moves. The end result must be to move a ladder beneath a hole in the ceiling. "How do I get the Crown Jewels?" You only need a small item from the Jewels, but 34,5,27,42. How do I get across the lake without getting my lamp wet?" 6,38! "How do I get through the rubble? "34,28,14,19. "And finally, I keept coming across a Viking ship with an old sailor on it. How do I board the ship?" This is a lovely example of why the Infocom adventures are so much more interesting than most others: in *Zork I,* the player will find a book, in the temple. This says "Beware of saying Hello Sailor"! Working through the trilogy, one cannot resist the temptation, of course, to say just that at every opportunity! So, at this point, there's only one thing to do, isn't there?

As for your question about where to get hint sheets for Infocom games, my copies of the Infocom games (which I bought for a long time ago for, unfortunately, rather more than £11), go into great detail about the Infocom Hint Book and Nifty Map for each adventure — they're $7.95 each (plus tax and postage). Unless the Commodore versions are very different, you'll find the address in the documentation.

Mr R A C Garroway, from Swindon, has invested recently in a disc drive for his CMB64, and a copy of the complete trilogy. He has collected 16 of the 20 treasures, but is now stuck. You've done very well, especially in getting the pot of gold and the huge diamond, but it is the jewelled egg which is holding you up now. There is a treasure lying within which you cannot get out — you'll need to get someone else to do the job for you, so 12, 26, 44, 16, 20, 46, 3, 36, 26. Incidentally, have you looked in the buoy, in the river?

From a trilogy on the Commodore, to a trilogy on the Spectrum — the *Ket Trilogy* has won an awful lot of fans, all trying, no doubt, for that video recorder that is the prize awaiting the first person to finish the *Final Mission* (if you see me wandering around with a load of smelly old hay, give me a wave!). David Bryan writes to me from Middlesborough about the first two parts, *Mountain of Ket* and *Temple of Vran.* In the first, he asks: "How do I get past the skull?." This is the final puzzle, David, as you may know. Although you say that you have got many objects with you, only three are needed — 46,10,39,16,13. You'll find the first in the south plateau, the second in the little-used room and the third in the mountains. As for the rope in *Temple of Vran,* tell your Dad, David, that he needs to 34,7,2,16,21,48 — then *tie rope* and *down.* *Lords of Time* about which I have had many letters is still a great favourite, and I shall devote a whole page to this great program soon. But for now, let me address just a couple of problems. "I must congratulate Sue Gazzard on the most exciting adventure game that I have tackled," says Mrs M Roberts of Pickering. "How do I open the door to the invention room on zone 3?" 47,22. "Can I do anything with the Viking longship? 49. "Can I get past the scorpion, squids or seaweed in zone 4? And where is the treasure trove, mentioned on the parchment?" 49 and 35,8,34,24,16,50. "How do I get rid of The Black Knight and where is the sharp sword in zone 5?" 1,43,7,37 — 46,18,33,23,1,26.

Finally she says: "In Artic's *Golden Apple,* what do I do with the computer?" Just think of what the deranged parrot is saying, and act on it!

Finally, the clue I gave to complete *Temple of Vran* — two weeks ago — was actually the clue to complete *Mountains of Ket.* You must have the Magic Sword, the magic Armour, the Magic Ring and the magic Wand — drop everything else.

```
KET                    SCORE=1%
We are near a door in the
east wall. It is 8' tall and
made of thick oak. There is a
glass window above it.

>OPEN DOOR
        It is locked!
>EXAMINE WINDOW
  Yep! It's a glass window!
>BREAK WINDOW
 You cannot reach the glass.
>
```

Clue Words: **1** Give **2** Cliff **3** Thief **4** Get **5** Back **6** Drop **7** To **8** Stone **9** Time **10** Hat **11** Bell **12** Carry **13** Beard **14** Before **15** From **16** And **17** In **18** Snow **19** Earthquake **20** Let **21** Feed **22** Eureka! **23** Will **24** Up **25** Down **26** It **27** Into **28** Through **29** Book **30** Crossing **31** Machine **32** Key **33** Queen **34** Go **35** Push **36** Nick **37** Prince **38** Lamp **39** Cloak **40** Before **41** Candle **42** Past **43** Sword **44** Around **45** Maze **46** The **47** Say **48** Elephant **49** No! **50** Easy.

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This series of articles is designed for novice and experienced Adventurers alike. Each week Tony Bridge will be looking at different Adventures and advising you on some of the problems and pitfalls you can expect to encounter. So, if you have an Adventure you want reviewed, or if you are stuck in an Adventure and cannot progress any further write to: Tony Bridge, Adventure Corner, *Popular Computing Weekly,* 12-13 Little Newport Street, London WC2R 3LD.

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Peek & Poke

Morse translator

C Parkes of Southend writes:

Q A few weeks ago your magazine published an address relating to a morse-code translater.
grateful if you could either re-publish it or possibly send it to me.

A The program to which I think you refer was reviewed in the Microradio colum in Vol. 3 No 22 (31st May). It is available from: Pinehurst Data Studios, 69 Pinehurst Park, West Moors, Wimbourne, Dorset BH22 0BP. The price for the ZX81 version is £7.00. I do not have a price for the Spectrum version.

Columns of keys

Robert Somerville of Dumfries, writes:

Q I own an 18 month old Spectrum, which is now out of guarantee. I wish to purchase a new keyboard membrane for it, as a column of keys has stopped working. Could you give the name of a company that would supply these membranes by mail order?

A The Spectrum keyboard is certainly the weak link in this particular Sinclair chain. Perhaps you should consider buying one of the excellent replacement keyboards.

If you want to stick with the original, you will be hard pressed to actually buy one, as it has become Sinclair policy to discourage shops from selling Spectrum components direct to third parties. However, a number of companies can replace membranes, one of these being RA Electronics, who can be telephoned on 0502 66289.

Picture quality

Richard Bennett of Tarporley, Cheshire, writes:

Q I have noticed a couple of adverts recently for units which enable the Spectrum's sound to be fed to the TV speaker. As they are about the same price as amplifiers I was wondering whether they are as effective and whether they affect picture quality?

A By and large these units are not as effective, on their own, as an amplifier. They usually use the TV amplification system and merely feed the computer sound signals through that. As they utilise the normal TV sound system they will have no effect on picture quality.

Spectrum queries

David Cowler of Hemel Hempstead, Herts writes:

Q After having just finished reading PCW, I felt that for the first time ever in my two years computing, I must write to a computer magazine. I have a number of queries which compelled me to write to you about my Spectrum.

1. How do you disable Break?

2. How do you disable List?

3. How do you disable Save?

4. Is there any way of testing to see if the Break key is being pressed?

5. What is the best available book (or cassette) which thoroughly explains Spectrum machine code?

A Phew....
OK here we go.

1) *Break* is normally disabled by setting the *Err Sp* system variable to zero. This causes the machine to *New* if *Break* is pressed during the running of your program.

2. My favourite method of disabling *List* is to scramble the keyword tokens in the character set. That is, change the *Save* keyword to *Load*, change *Let* to *List*, etc. This produces such a mucked up listing as to make it unusable.

3. Basically, if someone has broken in to your program then disabling *Save* is not really going to achieve very much. By far the best method of achieving program protection is to disable the keyboard scanning routine, and do all reading of keys yourself.

4. The ROM routine at 1F54 tests for the *Break* (and also for *Shift* and *Break*). It is a very small routine and can be used from within one of your own programs.

5. *Z80 Language Programming* by Lance Leventhal is one of the most comprehensive works on the subject.

Which system?

K D Outteridge of Didcot, Oxfordshire writes:

Q My problem is probably not a common one, but I should be very grateful if you could help me. Having been using main-frame computers for scientific computing for 20 years of so, and having recently retired, I should like to buy a home computer to continue some of the projects (using Fortran translating to Basic) which were never finished at work.

The problem is that I have costed my requirements — word processing, disc drive (single or double), at least 64K Ram, preferably a 16-bit processor, cassette recording capability (compatible with T199/4A), good graphics and colour — for several different systems, including the BBC and the total always seems to amount to around £1300.

I have an aversion to the Commodore 64 which would be less at £800 or so. It eventually penetrated my skull that a small business computer might suit me, and the two models I came up with are: Sanyo mdel MBC 555 — £1148 with 128K and twin disc-drive and the Sanyo model 550 — £862 with 128K and single disc drive. What do you think?

A Well...you obviously know what you want — now all you have to do is find it.

Of the two Sanyo machines you mention — which seem quite sensible — my preference would be for the MBC 555. The double disc drive gives you the ability to copy disc to disc (for security) and also increases the amount of on-line data storage at your command for work processing.

It is extremely unlikely that you will be able to achieve TI 994/A cassette compatibility, no matter what system you buy . So, unless you could write a machine-code program to read and list the contents of a TI cassette, or borrow one, I am afraid you have had it.

One last thought, as you are converting Fortran programs, why convert them to Basic? If the Sanyo computers have a Pascal compiler available you might find that that conversion was less tiresome, and that the programs ran a lot faster than with Basic.

Modem plug-in

Wendy Best of Nottingham, writes:

Q I own a Vic20 and I would like to buy an inexpensive telecommunications modem to plug in the back. Could you tell me how much they cost and where I could get one from?

A The Maplin modem at about £40 is probably the cheapest way into the communications area. Maplin also provide an interface to allow this modem to be connected to the Vic20 (via RS232C). You can contact Maplin on 0702-552941.

The modem comes in two forms, either as a kit or ready built.

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Phil Rogers and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW*, 12-13 Little Newport Street, London WC2R 3LD

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C64 software including Cavelon, Gilligans Gold, Sheep in Space, Arabian Nights, Monty Mole, Caesar The Cat, etc, worth £87, want £50, may split. After 4pm ask of for Martyn.

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VIC 20 software — Skyhawk, Hopper, Wacky Waiters, £5, book, Vic Games, Space Games, Learn Computing, £10; Joystick Cosmic Cruncher, £10. Tel: 0272 696162 after 7pm.

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VIC 20, C2N deck, 16K RAM, £65 games, basic + assembler tutorials, dust covers, joystick, prog. ref. guide, £120 ono. Ask for Richard, Aldridge 54484 after 5pm.

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SPECTRUM 48K + printer. All manuals, leads etc. S/w, books + mags. v.g.c. £120. Tel: 0442 49559.

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SPECTRUM programs Tasword II £7, Psytron, Mugsy, Codename Mat £3. JSW, Android 2 Scuba Dive and others £2 each. Paul on 01-997 3262 (Ealing).

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GRANDSTAND VGS, two Joysticks, two cartridges, PSU — £25. Tel: 0272 696162 after 5pm.

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EPSON HX-20 complete with case, optional controller for TV link manuals mains adaptor U.D.G. software blank micro tape £320.00. 021 427 8865.

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SPECTRUM 48K wanted will swap my AK1A HX-3 stereo cassette deck new (unwanted gift). Cost £100 phone Freddy 0346 24994/24208.

FOR SALE OR swap. 2 books, Programming your ZX Spectrum and Games ZX Computers Play. £7.00 ono. Please ring 0282 68646 and ask for Philip.

WANTED S.P.I. and A.H. Wargames. Write to 8 Oriel Close, Sudbury, Suffolk CO10 0DF.

WANTED ANY ZX81 software or hardware. Will exchange for Spectrum Hunter Killer and Ship Of Line or will buy. Tel: 0279 445204.

SWAP TRIO (27 watts per channel) stereo amplifier + matching tuner for CBM 64 peripheral. Office tel: 01-934 3167. R.G. Forster.

WANTED ORIC 1 5.25in. Disc drive and D.O.S. or any help to achieve it. Phone Blackpool (0253) 49493 Kevan evenings.

WANTED TO BUY software for BBC Dragon or Spectrum. Phone 09285 60635 Sundays only.

SWAP MY QUICKSHOT 11 for Kempston 5000 or Suncom Tac 2. Write to Stephen at 35 Elstead Road, West Vale, Kirkby, Liverpool L32 4TE.

WANTED MZ80K exp. 60x MZ8010 for sale — cord coupler £75. Ring John — on 021-551-6427.

ADVENTURE HELPLINE

The Hobbit on Spectrum. Once through the wine cellar, how do you find lake town and 'bard'? where is the key for the mountainside door? John Osbourne, 28 Edwin Avenue, Woodbridge, Suffolk.

Voodoo Castle on BBC. How do you get the ju-ju bag? Jason Wright, 99 Carter Drive, Collier Row, Romford, Essex.

Adventureland on Vic20. I am stuck at the royal chamber. When you say Help it says 'Blow it up'. Blow what up??? Matthew Pooler, 18 Johnstone Close, Wrockwadine Wood, Telford, Shropshire.

Countdown to Doom on BBC. How do I get past the robot in the screen of light? John Beman, 5 Church Lane, Elvington, N Yorks.

Ship of Doom on Spectrum. I cannot get the key from the glass cover or release the body from the ice. Any clues please? Jay Pannett, 3 Forest View, Hailsham, Sussex.

Espionage Island and Golden Apple on Spectrum. I cannot get past the tank in the first and the crocodile in the second. Andrew Cameron, 51 Backwoods Lane, Lindfield, W Sussex.

Tombs of Xeiops on Commodore 64. How do I get pas the keeper of the tombs—I have been everywhere else and my score is only 57 out of 100? Is the pyramid of any use? S P Lotterill, 38 Barnet Road, Stockland Green, Erdington, Birmingham.

Circus on Atari. How do I get shot from the cannon without getting killed? Craig Hornby, 12 Penyghent Avenue, Burnhdare, York.

Inca Curse On Spectrum. How do I get past the sand dungeon? R Foster, 67 Bushfield Road, Wath-on-Dearne, Rotherham, S Yorks.

Hobbit on Spectrum. How do I get the goblin's ring and how do I get across the fast black river? Scott Fountain, 6 Abinger Road, Pokesdown, Bournemouth.

Zork I on Commodore 64. How do I get the coffin out of the temple? How do I move the platinum bar? How do I use the cage in the shaft? Brendan Bradley, 54 Ashwood Road, Clondalkin, Co Dublin, Ireland.

Hobbit on Commodore 64. I cannot take the treasure. Richard Howlett, 9 Avondale road, South Benfleet, Essex.

Hobbit on Spectrum. How do you get away from the Elf clearing into the elf kingdom? Nicholas Metcalfe, 34 Crossmead, Eltham, London SE9.

Pyramid of Doom on TI99/4A. I cannot get into the pyramid. Can you help? Paul Jeffrey, 31 Pinetrees, Weston Favell, Northampton.

Colditz Adventure on BBC. Having escaped from the castel I cannot find the map to show the way to freedom. David Quinn, 35 Longhill Avenue, Ayr, Ayrshire, Scotland.

Hobbit on Commodore 64. I am trapped in the goblins dungeon. I have found the key and I have the sword, the rope, the golden key, the map and the curious key. Chris Barnes, 19 Scafwell Way, Clifton, Nottingham.

Hobbit on Spectrum. How do I escape from the goblins dungeon?. How do I escape down the river from the elevenkings halls? James Haslam, 6 Sittingbourne Avenue, Bush Hill Park, Enfield, Mddx.

Valhalla on Spectrum. I cannot find Ofnir and I have had the program for three months now. Help! Paul Waggett, 9 Lexton Drive, Churchtown, Southport, Merseyside.

Curse of the Werewolf on Vic20. How do you get into the castle that is guarded by the zombie. Guy Cliffe-Jones, 25 Somerset Road, Edgebaston, Birmingham.

Hobbit on Commodore 64. Terrible to admit but I cannot get beyond 75% of the adventure. Help please. D A Sidey, 11 Romiey Close, Basingstoke, Hants.

Franklin's Tomb on Dragon. I am stuck with the cave system which I cannot get out of. Charles Beighton, 25 Penland Road, Haywards Heath, West Sussex.

Diary

Event	Dates	Venue	Admission	Organisers
Electron and BBC Micro User Show	Oct 25-27 10.00am-5.00pm Oct 28 10.00am-4.00pm	Alexandra Palace London N22	£3.00 adults £2.00 children	Database Publications 061-456 8383
Home Tech 84	Oct 26-29 10.00am-6.00pm	Bristol Exhibition Centre	£1.50 adults £1.00 children	Nationwide Exhibitions 0272 650465
Computers in Action	Oct 30 10.00 am-6.00pm Oct 31 10.00am-8.00pm Nov 1 10.00am-6.00pm	Anderson Centre Glasgow	Free	Trade Exhibitions 041-204 0280
Mycomp (Thames Valley Personal Computer Exhibition)	Nov 1-3 10.00am-6.00pm Nov 4 11.00am-5.00pm	Fulcrum Centre Slough	£2.00 adults £1.00 children	Swan House Special Events 09322 43866
Home Computer Show	Nov 7 2.00pm-9.00pm Nov 8-10 12.00pm-9.00pm Nov 11 12.00pm-6.00pm	Royal Dublin Society (Main Hall) Ballsbridge Dublin 4	£2.00 adults £1.00 children	SDL Exhibitions Dublin 904171
Buxton Home Computer Fair	Nov 10 10.00am-5.00pm	Paxton Suite Pavilion Gardens Buxton	£1.00 adults 50p children	Technical Promotions 0298 6174
Home Computer Exhibition	Nov 10 10.00am-6.00pm	David Davies Gallery Newtown Powys Wales	20p	Newtown and District Computer Club 0686 28715
Microelectronics Applications	Nov 10 10.00am-4.00pm	Barden High School Burnley Lancs		Barden High School 0282 36324
London Micro Market	Nov 10 10.00am-6.00pm Nov 11 10.00am-4.00pm	Wembley Exhibition Centre	£1.50 adults 75p children	ECC Publications 01-359 3525
6809 Colour Show for Dragon and Tandy Users	Nov 17-18 10.00am-6.00pm	Royal Horticultural Halls London SW1	£2.00 adults £1.00 children	Computer Marketplace 01-930 1612
Computer Auction	Nov 28 6.00pm	Bonnington Hotel Southampton Row London WC2	Free	Crocker Computer Auctions 01-387 5838

Top 10

Vic 20

1)	(2)	Duck Shoot	Mastertronic
2)	(1)	Computer War	Creativesparks
3)	(-)	Punchy	Mr Micro
4)	(3)	Flight 015	Craig Communications
5)	(4)	Max	Anirog
6)	(6)	Maze Gold	Visions
7)	(7)	Tank Commander	Creative Sparks
8)	(-)	Tower of Evil	Creative Sparks
9)	(8)	Jet Pac	Ultimate

(Figures compiled by Boots/Websters)

ZX81

1)	(-)	Crazy Kong	PSS
2)	(3)	Walk the Plank	Novus
3)	(4)	Black Crystall	PSS
4)	(2)	Krypton Ordeal	Novus
5)	(-)	Espionage Island	Sinclair
	(-)	ZXTK	Bug Byte
	(-)	Toolkit	Sinclair
	(-)	Chess II	Artic
	(-)	Vu-file	Sinclair

(5 titles tied for 5th position)
(Figures compiled by Boots/Websters)

Dragon 32

1)	(1)	Hunchback	Ocean
2)	(-)	Mystery of the Java Star	Shards
3)	(-)	Hungry Horace	Melbourne House
4)	(-)	Mr Dig	Microdeal
5)	(-)	Cuthbert in Space	Microdeal
6)	(3)	Kriegspiel	Beyond
7)	(2)	Chuckie Egg	A&F
8)	(4)	Dragon Chess	Oasis Software
9)	(5)	Ring of Darkness	Wintersoft
10)	(-)	Eightball	Microdeal

(Figures compiled by Boots/Websters)

Atari

1)	(-)	Solo Flight	Centresoft
2)	(5)	Captain Stickys Gold	English Soft
3)	(8)	Computer War	Atari
4)	(2)	Zaxxon	Centresoft
5)	(-)	Carnival Massacre	Atari
	(4)	Caverns of Khafka	Centresoft
7)	(-)	Gridrunner	
	(-)	Attack on Mutant Camels	Llamasoft
9)	(1)	Airstrike II	Llamasoft
	(3)	Loggit	Englishsoft
			Imagine

(Figures compiled by Boots/Websters)

Commodore 64

1)	(-)	Jet Set Willy	Software Projects
2)	(-)	Gumshoe 64	A&F Software
3)	(-)	Zimzalabim	Melbourne House
4)	(-)	Storm Warrior	K-Tel
5)	(1)	D Thomson's Decathalon	Ocean
6)	(-)	World Cup	Artic
7)	(-)	Scrabble	Leisure Genius
8)	(-)	Zaxxon	Centresoft
9)	(-)	Chiller	Mastertronic
10)	(2)	Beach Head	Centresoft

(Figures compiled by Boots/Websters)

Spectrum

1	(1)	Daley Thompson's Decathlon	(Ocean)
2	(3)	Toledo Low Level	(Vortex)
3	(–)	Beachhead	(US Gold)
4	(4)	Matchpoint	(Psion)
5	(–)	Kokotoni Wilf	(Elite)
6	(2)	Full Throttle	(Micromega)
7	(6)	Avalon	(Hewson)
8	(8)	American Football	(Argus Press)
9	(5)	Sherlock Holmes	(Melbourne house)
10	(7)	Lords of Midnight	(Beyond)

(Figures compiled by W.H. Smith)

BBC B

1	(1)	Elite	(Acornsoft)
2	(2)	Frak	(Aardvark)
3	(4)	Micro Olympics	(Database)
4	(3)	Fortress	(Pace)
5	(7)	Wallaby	(Superior)
6	(5)	Aviator	(Acornsoft)
7	(8)	Smash n' Grab	(Superior)
8	(–)	Mr Wiz	(Superior)
9	(6)	Stockcar	(Micropower)
10	(10)	Dune Rider	(Micropower)

(Figures compiled by W.H. Smith)

Books

1)	(1)	CBM 64 Programmers Reference Guide	Pitman
2)	(2)	Very Basic, Basic for the Spectrum	Century
3)	(3)	60 Programs for the Commodore 64	Pan
4)	(-)	Teach yourself Computer Programming on the CBM 64	Hodder
5)	(7)	60 Programs for the Spectrum	Pan
6)	(-)	Step by Step Programming on the Spectrum	D.Kindersley
7)	(-)	Practical Spectrum Machine Code	Virgin
	(5)	Sinclair User Book of Progams and Games	Penguin
9)	(6)	Discover your Spectrum	Century
10)	(-)	Step by Step Programming on the BBC: Book 1	D. Kindersley

(Figures compiled by Boots/ Websters)

Book Ends

SCREEN MAPS

On first impressions, the *Spectrum Advanced User Guide* is clearly set out and comprehensible, with decent type and a goodly weight. Luckily, reading confirms these impressions.

The first third of the book is a *Basic* reference section, listing every command alphabetically, each with its own page. Next comes a very good memory map and a screen map . . . things which are usually inadequate or unobtainable.

There is extensive information about machine code, which also includes a short introduction to this field.

Many *Rom* routines are listed, not only for the 'stand alone' Spectrum, but also for the microdrives, RS232 interface, network port and ZX printer, allowing all the peripherals to be successfully accessed via m/c. The book manages to include so much because it really is aimed at the advanced.

The only useful thing I can think of that has not been included is the Spectrum character set.

Overall, the book comes out with flying colours.

Book *The Spectrum Advanced User Guide*
Authors *Adrian Dickens, Mark Plumbley, Leycester Whewell*
Supplier *Adder Publishing, PO Box 148, Cambridge, CB1 2EQ.*

ABSTRACT

Purchasers of expensive business systems expect full support in choosing programs: this book provides similar advice for small-business people who use the *BBC B*.

It covers a range of applications, from accounts to word processors (even a bar code reader), and touches on hardware expansion, including the Torch Disk Pack.

Each topic is discussed in the abstract, indicating what questions to ask about any program type, before specific examples are candidly reviewed, with illustrations.

It is realistic about the expectations and limitations of the machine and should prove invaluable for the newcomer who has just purchased, or is considering, a BBC micro.

Book *Business Applications on the BBC Micro*
Price £7.95
Micro *BBC*
Supplier *Granada Publishing, 8 Grafton St., London W1X 3LA*

This Week

Program	*Type*	*Micro*	*Price*	*Supplier*
Rally Driver	Arc	Aquarius	£4.95	Micro Mart
Scramble	Arc	Aquarius	£4.95	Micro Mart
The Magic Sword	Ad	BBC	£8.95	Database
Datagem	Ut	BBC	£129.95	BBC
Erik the Viking	Ad	Commodore 64	£9.95	Mozaic
Sherlock	Ad	Commodore 64	£8.95	Melbourne House
The Nomad of Time	Ad	Commodore 64	£9.95	Mozaic
The Pettigrew Chronicles	Ad	Commodore 64	£9.95	Shards
BMX	Arc	Commodore 64	£7.99	Jetsoft
California Gold Rush	Arc	Commodore 64	£2.99	Spectrum
Cavelon II	Arc	Commodore 64	£7.99	Jetsoft
Henry's House	Arc	Commodore 64	£8.95	English
Quari	Arc	Commodore 64	£7.99	Jetsoft
Super Utility	Ut	Commodore 64	£10.95	Gala Soft
Spread Sheet Calculator	Ut	Commodore 64	£14.99	Kuma
Soldier of Fortune	Arc	Commodore 64	£7.95	English
Strike Force	Arc	Commodore 64	£6.99	Bubble Bus
Tazz	Arc	Commodore 64	£6.99	Bubble Bus
Witchswitch	Arc	Commodore 64	£7.95	English
CHR$	Ut	Commodore 64	£4.95	Miro Mart
Gala File	Ut	Commodore 64	£7.95	Gala Soft
Blockbuster Quiz	Ut	Dragon	£5.50	Computerwise
Darts	S	Dragon	£5.50	Computerwise
Linkword	Ut	Dragon	£5.50	Computerware
Galilee	Ad	Spectrum	£5.95	Shards
The Pettigrew Chronicles	Ad	Spectrum	£9.95	Shards
Flip Flap	Arc	Spectrum	£2.99	Software Projects
Freds Fan Factory	Arc	Spectrum	£2.99	Software Projects
Freex	Arc	Spectrum	£2.99	Software Projects
Loony Lander	Arc	Spectrum	£2.99	Software Projects
Moonlighter	Arc	Spectrum	£2.99	Software Projects
Shuttle Shock	Arc	Spectrum	£2.99	Software Projects
Travels with Trashman	Arc	Spectrum	£5.95	New Generation
Ziggurat	Arc	Spectrum	£2.99	Spectrum
Jack in Magicland	Ed	Spectrum	£6.95	Turtle Software
Sub Hunter	S	Spectrum	£6.95	Micro Mart
Friendly Face 2	Ut	Spectrum	£6.95	Monitor
Micro Draw	Ut	Spectrum	£4.95	Micro Mart

Key: Ad — adventure/**Arc** — arcade/**Ed** — education/
S — strategy-simulation/**Ut** — utility

This Week is a new section that covers all the new software coming on to the home micro market each week. All suppliers should send details of their new programs to: This Week, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

PICTURE SHOW

Projector 1 is a clever idea from McGraw Hill, designed for schools and businesses who want to display a series of graphics, graphs and other information.

The program contains not only graph drawing routines of various sorts, but also a choice of font styles. Having created a number of screens they can be presented in any order, with the delay between screens selected in advance or operated manually.

You can use the program very much like a slide projector, moving back and forth from picture to picture, returning to any particular one as often as you wish.

Program *Projector 1*
Price *£9.95*
Micro *Spectrum*
Supplier *McGraw Hill*
Shoppenhangers Road
Maidenhead
Berkshire SL6 2QL

WITTY

Mozaic should probably be credited with starting the idea of bookware, where linked books and software are packaged together, although, its first efforts were pretty disappointing. With *The Stainless Steel Rat saves the World*, things are looking up.

This time you get a pretty sophisticated machine code, graphically illustrated adventure in which you play James di Griz, the stainless steel rat. The

strength of the book (for me anyway) is in the sharpness and wit of the writing; thankfully, the adventure too does not take itself too seriously.

There is a vocabulary of 200 words and the graphics are pretty good, although language analysis is simple verb, noun. Since much of the plot involves travelling through time, the first problem is to find the time helix and work out how to manipulate its four properties of spin, flux, resonance and phase — needless to say, I didn't get anywhere at all.

The worst that could be said of the program is that it lacks anything really new — the best that it captures the flavour of the book well and should keep Tony Bridge in letters for a good few months.

Program *The Stainless Steel Rat Saves The World*
Price *£9.95*
Micro *Commodore*
Supplier *Mozaic*
187 Upper Street
London N1 1RQ

DRAUGHTS

Superior Software has been fairly successful at producing BBC games — the company has now introduced a range of Commodore 64 material including, strangely perhaps, given the number of similar packages, *Chess* and *Draughts*.

Chess is one of those things that computers can do so superbly well (theoretically) that they cannot fail to win. Still, any sensible program is going to make sure you can avoid this inevitable alternative.

Draughts allows you a variety of different options — next worse move, take back, play best move, etc, and will play at a variety of levels and speeds. One useful option for those who find the level of speed they have set is too slow is a 'play immediately' command which forces the computer to move.

If you want draughts for your Commodore 64 this one would seem to have all the features you could need.

Program *Draughts*
Price *£7.95*
Micro *Commodore*
Supplier *Superior Software*
Regent House
Skinner Lane
Leeds
LS7 1AX

Pick of the week

POT-POURRI

I always wonder about multi-player games on computers. For some social or ergonomic reaction, computers seem best suited for solo activities and I wonder whether multi-player games ever do well — has anyone ever seen one in any of the charts?

The above, of course, has nothing to do with any inherent failure on the part of the games. *The Prince* would seem to be excellent — in any event it won a prize.

The Prince is for four players and is a veritiable pot-pourri of Machiavellian machinations between player and player, and player and machine. The objective is to become master of the Lore — chief bureaucrat to the Prince and all round power wielder. This is accomplished by discovering and presenting the appropriate tokens of succession.

The four players represent a landowner, a cleric, and merchant and a tipstaff, and are respectively named Grasper, Ambrose, Porcus and Fernado (some evidence of political bias revelled here, I think Margaret). Each role has inherent advantages, eg, Porcus dispenses money.

The actual game consists of each player taking turns buying and selling, using spies, vio-

lence and bribery to discover the whereabouts of each token. The castle can be searched as in a conventional adventure, moving around and using words like Look, Examine and Take to see what's there.

It's devious and enormous fun — I hope that there are enough computer owners with three friends out there to do it justice. Oh yeah, it has nice graphics too.

Program *The Prince*
Price *£7.95*
Micro *Spectrum*
Supplier *Cases Computer Simulations*
14 Langton Way
London SE3 7TL

CHEAP

Now this is a very good idea — a range of Quilled adventures for a mere £1.75; not only that, but the various titles are coded so that you can get an idea of the degree of difficulty of each adventure before you start. Each adventure is divided into two sections; side one outlines the story and gives you some hints, side two is the game itself.

Faerie is described as of advanced level and is the only one of the first crop of six adventures to follow the traditional dungeons, dragons and elvish path. Nevertheless, it has much to recommend it. For one thing it manages to be both

surreal in plot but logical in terms of connundrum solving at the same time.

There is a sort of dreamish air about *Faerie*, with an aura of innocence about it too. Snowmen, caves, granite chess pieces and magic circles all feature in the game and it is excellent. Nor are these Eighth Day adventures one day wonders; the cheat sheet on *Faerie* extends to three pages and I'm not going to give you a single clue.

Program *Faerie*
Price *£1.75*
Micro *Spectrum*
Supplier *Eighth Day Software*
18 Flaxhill
Moreton
Wirral
Merseyside L46 7UH

CAVEMAN

Fire Quest is another one of those games which describes itself as more than an arcade game having adventure overtones. What it is is a multi-screen arcade game which has overtones of *Horace and the Spiders* and, more particularly, *Ugh!*

Ugh! was an excellent arcade game involving a cave-

man collecting eggs; *Fire Quest* continues the caveman's adventures in search of fire over seven different adventures. All involve dodging things, mostly spiders and fireballs, climbing things (ladders) and swinging across vast gulfs.

It's all about fast reactions so is definitely for arcade, rather than adventure, fans — still, at least it doesn't include aliens. If you get past the final screen, there's a prize; what greater motivation do you need?

Program *Fire Quest*
Price *£9.95*
Micro *Commodore 64*
Supplier *The Edge*
31 Maiden Lane
Covent Garden
London WC2

VIKING SAGA

The Saga of Erik the Viking is the latest of Mozaic's bookware packages — the original book by Terry Jones now has an adventure game based on it written for Mozaic by Level 9. Level 9 have produced a fairly compulsive graphic adventure with versions for the Spectrum, BBC and Commodore 64.

Obviously the various versions will have slightly different characteristics — the Commodore 64 edition took ages to draw its pictures, but that may not be true of the Spectrum version.

The graphics are pretty good, and more importantly perhaps, they have a sort of style — the Viking farm not only looks pretty but also looks vaguely like how you'd think such a farm would look.

As it is by Level 9 the adventure itself is pretty devious; although it sticks to basic verb noun entry, there is much to explore and within the first few screens. Enough connundrums are introduced to keep it all interesting. I was really chuffed that I managed to solve one of them which is to do with some footprints . . .

Program *The Saga of Erik the Viking*
Price *£9.95*
Micro *Commodore 64*
Supplier *Mozaic*
John Wiley & Sons
Baffins Lane, Chichester
Sussex PO19 1uD

SEQUEL

Pitfall has a sequal and it's called *Pitfall II*. Pitfall Harry, hero and adventurer, returns again to do battle and swim, jump, climb and run his way through the usual sprites.

The object of the game is to move Harry around various screens looking for his niece, the Raj diamond and a treacherous cat called Quickclaw; as a

bonus there are 28 bars of gold to collect.

There are a large number of different screens with ropes to swing on, pits to avoid, rivers to swim with nasty fish and platforms to run along. If you liked the first one, you're sure to like this.

Program *Pitfall II*
Price *£9.99*
Micro *Commodore 64*
Supplier *Activision*
CGL House
Goldings Hill
Loughton
Essex

CUTHBERT

Cuthert rears his bespectacled head yet again in *Cuthert enters the Tombs of Doom* — for the Commodore 64. This one falls into the category of 'complicated arcade game' as you try to find your way (well, Cuthert does) around over 200 rooms in which lurk nasty things, clues, chests to be opened and so on.

Cuthert is equipped only with the Ray of Ra which lets him zap at the more feeble ghosts but mostly its better to keep him out of their way (I know how they feel). You can guess that with a couple of hundred locations there's going to be a sense of deja vu about them, but even so there is a variety .

The packaging is particularly nice — you get a neat little manual that gives you a few hints on how to master the first few sections and even has a map of the first 40 rooms. There is, inevitably perhaps, a prize at the end. One of the best Microdeal games in a while and reasonably priced too.

Program *Cutherbert enters the Tombs of Doom*
Price *£6.95*
Micro *Commodore 64*
Supplier *Microdeal*
41 Truro Road, St Austell
Cornwall PL25 5JE

UNORIGINAL

Rocket Roger is the sort of game title that makes my heart sink — you just know that the game concept will be boring and unoriginal, the programming technically professional but lacking real inspiration and the damn thing will sell by the sackfull.

Anyway, *Rocket Roger* has to walk run, jump and (it says here) thrust his way around the many caverns of an unknown planet. The idea is to collect vital power crystals and fight off the usual baddies.

It is, of course, *Manic Miner* again except that there's far less wit and far less inspiration — if you want your 127th version of MM then this is the program for you.

Program *Rocket Roger*
Price *£7.95*
Micro *Commodore 64*
Supplier *Alligata*
1 Orange Street
Sheffield
S1 4DW

Compiled by Graham Taylor

New Releases is designed to let people know what software is coming on the market. If you have a new game or utility which you are about to release send a copy and accompanying details to: New Releases, *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD.

Chance confusion

Probably probability is one of the most confusing, and confused, topics around.

Take poor Prince Harry, nappies and all; so much depended upon him, because "If the Princess of Wales' second child is a girl, she'll complete a pattern of births which beats almost astronomical odds — about one in 65,000 to be precise" (*Parents* magazine, October 1984).

Of course what *Parents* forgot to tell you is that, if the second baby was a boy, then the odds on that pattern of births was also about one in 65536.

The odds on any pattern of 16 births is 2^{16}, be the child male or female. The actual probability that any child is male (or female), regardless of any previous pattern or history is approximately one in two.

Given the past history of royal birth presented in the article, the odds on the second child being a boy were 11 to eight — the second child was more likely to be a boy.

The second child was more likely to be a boy if the present birth was related to previous royal births (royal genes?). And, if not, boy or girl is equally likely.

Examples abound of similar confusions in probability, where the confusion is between what happens by chance, and the sense we make from a sequence. Any sequence of 16 births is as likely as any other, though it may be interesting that first-born were all boys, and the second born were all girls (until Harry).

Take a rather less regal example. In a magazine there are eight reviews, for example, and two of the reviews are by the same person, call him/her *X* (the other six reviews are by six other people). There are 28 different combinations of two reviews; to choose any combination 'at random' means that each combination is as likely as any other to be chosen.

Therefore, of course, one is just as likely to choose two reviews by the same person as any other combination of reviews. To assert that a choice is not random because the two reviews are by the same person is a confusion on a par with that from *Parents* magazine. 'Randomness' is a facet of the selection procedure, not of the result of the selection. Incidentally, the probability of choosing *X* as at least one of the two reviewers is 13 out of 28 (or almost one in two) — that is probably surprising.

If you had to bet on one of the two reviewers being *X*, good odds would be three to one (you argue that the odds of choosing an *X* review are two to six), but really the fair odds are 15 to 13. If you had to bet on one person appearing (at whatever odds) one would, of course, choose prolific reviewer *X*. You are more likely to be wrong than right — but you are *least* likely to be wrong. *X* is the 'maximum likelihood' estimate, in that if you have to guess, choose *X*, because it is the most likely single answer.

Generally speaking this is what expert systems in computers perform: an expert system is no more than a set of rules and probabilities, the outcome being the most probable solution, with possibly a series of less likely answers.

As we have seen, in the expert system to predict who has a review within the two chosen at random, the 'most likely' answer is often more likely to be wrong than right. However, of all the possible answers, it is least likely to be wrong.

Often, however, the decision from the expert system is also more likely to be right, rather than wrong. If a decision has to be made between a restricted range of causes of an illness, it is possible that the expert system can be very useful at predicting the appropriate cause. The success of such an expert system is difficult to assess, for an interesting reason.

If I have two points on a graph, I can always draw a straight (two dimensional) line through these two points. With these two points I can draw an infinity of flat (three dimensional) surfaces. If I have three points, I can draw one surface, but possibly no straight line, and the extra point is a check on the line. If I have a large number of observations on fewer people, I can always be totally correct in my predictions.

This is why to assess the utility of an expert system, which by its nature is continually being modified to take into account new forms of information, the testing of the system has to take place over a wide variety and number of independent test cases.

Boris Allan

Letter substitution

Puzzle No 130

Here are two alphanumerics in which digits have to be substituted for the letters.

(i) P * (P * C * W) = PCW
(ii) W * (P * C * W) = PCW

There are no prizes to readers of this magazine for identifying what those letters usually mean — but here we are after the digital value of these expressions. There is one answer to the first alphametic, but *three* possibilities for the second. What are they?

Solution to Puzzle No 125

Of the 7776 different throws possible with five dice, 1811 of them will win. Thus the player will have slightly less than one winning throw in every four.

The program takes each throw in sequence and keeps count of winning and losing throws.

```
10 LET T = 0: LET U = 0 20 FOR A = 1 TO 6 30 FOR B = 1
TO 6 40 FOR C = 1 TO 6 50 FOR D = 1 TO 6 60 FOR E = 1
TO 6 70 LET S = A + B + C + D + E 80 LET P = A * B * C
* D * E 90 LET Z = P/S 100 IF Z = INT(Z) THEN LET T = T
+ 1 110 IF Z <> INT(Z) THEN LET U = U + 1 120 NEXT
E,D,C,B,A 130 PRINT T 140 PRINT U 150 PRINT T + U
```

Winner of Puzzle No 125

The winner is Carol Huffman, Albany Ct, Brunswick Rd, Earlsdon, Coventry, (using a QL), who receives £10.

Rules

If the puzzle prize can be sensibly solved using a computer, then the winner will have included a listing of the program used to find the correct answer. The closing date for entries to Puzzle No 130 is November 9.

The Hackers

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