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Computer Magazine of the Year

POPULAR Computing WEEKLY

35p

12-18 April 1984 Vol 3 No 15

BRITAIN'S BEST-SELLING MICRO WEEKLY

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SEE PAGE 59

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★STAR
Pac Man on Commodore 64
See page 10
GAME★

News Desk

Cut-price Dragons — end of line?

BRITISH Home Stores has caused Dragon some embarrassment by deciding to discontinue sales of the Dragon 32 micro.

Remaining stocks of the computer have been sold off in some of the company's stores for as little as £87.50.

A spokeswoman for one BHS branch, confirming the substantial price drop, explained that the Dragon line was to be discontinued in favour of a machine from a rival manufacturer.

The price change seems to have thrown both Dragon and other retailers into some confusion. Boots, one of the larger Dragon stockists, denied that the company has any plans to lower its own £149 price. A spokesman for Boots also reaffirmed its commitment both to the Dragon brand and to the 32K model.

Following enquiries by GEC, British Home Stores claimed that the price drop was only in force for a few days to clear small remaining stocks.

In touch with Commodore

COMMODORE announced a substantial range of new peripherals for its Vic 20 and 64 computers — as well as two new business micro systems — at the Hanover Computer Fair, in West Germany last week.

The company also displayed its new 116 and 264 machines although their future now looks uncertain.

Commodore UK's marketing manager John Baxter has announced that the 116 — a 16K micro with 'toy' keyboard — has been shelved indefinitely: "We don't think there is a market for it in Europe."

He also took a step backwards as far as the 264 machine is concerned. Although this successor to the existing 64 model was originally planned for launch in June, he now says: "We have not decided on a date for its introduction."

Among the new peripherals for the 64 shown in Hanover are a touch screen, the much-

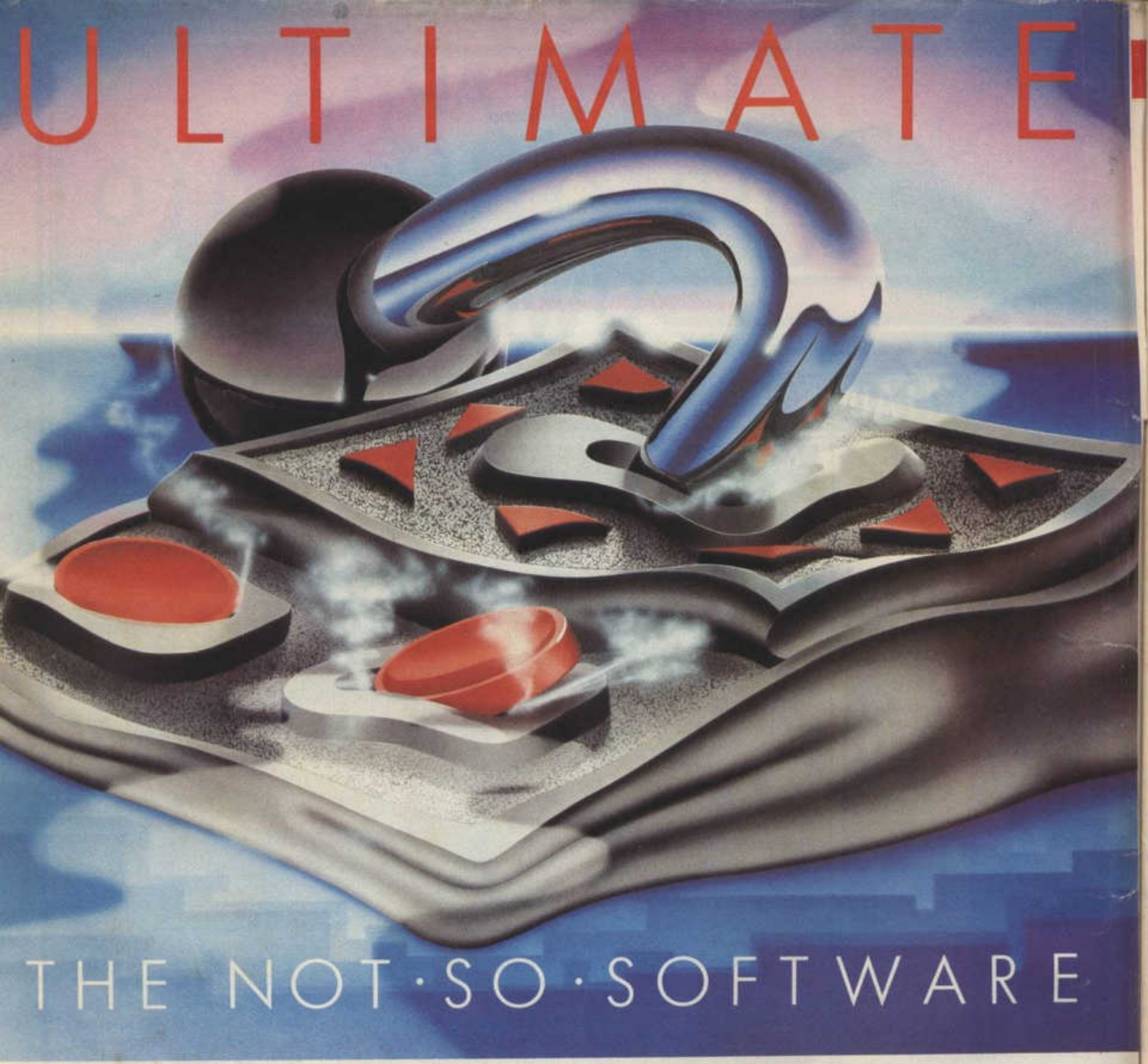
continued on page 5

This Week

● **Reviews** *Andy Pennell looks at Micro Prolog on page 17.* ● **Preview** *Feature on The Games Network by Mike Hoff. See page 19.* ● **Spectrum** *Mark Lawrence shows how to turn the Spectrum into a musical instrument on page 26.* ● **Dragon** *Jason Orbaum and Geoffrey Campbell continue their discussion on Assembly language programming. See page 34.* ● **New Releases** Confrontation *from Lothlorien and* The Sorcerer's Apprentice *from Phoenix Software are among the programs reviewed this week, beginning page 66.*

● **Street Life** *Christina Erskine talks to Five Ways Software, on page 13.*

ULTIMATE



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POPULAR Computing WEEKLY

12-18 April 1984 Vol 3 No 15

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

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.

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Editorial

Dungeons and Dragons, a mainstay of role-playing gamers for more than 10 years, is under attack.

A number of clergy in the UK, worried at the possible effects of the game on young children, have written to schools and parents, suggesting they ban *Dungeons and Dragons*.

It is easy to be cynical and accuse the clergy of being killjoys, who just want to prevent children from having fun. However, the church is obviously sincere in its belief that *Dungeons and Dragons* can be harmful. Nevertheless, the church is wrong.

To the best of my knowledge, there is not one case where a child has been disturbed through playing the game.

Dungeons and Dragons is essentially a game of the imagination. It allows people to explore worlds which range from the Tolkienesque to the far-flung future. The main difference between D&D and more conventional games is that there is no physical board. The action takes place in people's minds.

However, for all its complexity, *D&D* is still just a game. Its participants have no more interest in engaging in the occult than *Risk* and *Diplomacy* players have in taking part in a war.

It makes as much sense to ban *D&D*, because it contains references to demons, as to ban C S Lewis's *Screwtape Letters*, where the principal characters are demons.

Next Thursday

Tank Battle for the Spectrum, by Julian Chaudhury, is next week's Star Game.

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NEWS FLASH

TITANIC

15th April 1912

TITANIC SINKS. (THE "UNSINKABLE" STRIKES ICEBERG)

Our American correspondent via wireless telegraphy reports: Late last night the S.S. TITANIC, pride of White Star line, was in collision with an iceberg approximately 300 miles off the coast of Newfoundland, it is feared that many lives have been lost. Further reports to follow.

NEWS FLASH

TITANIC

22nd March 1984

N.A.S.A. SOURCES REVEAL POSSIBLE LOCATION OF "TITANIC"

At a Press Conference today a N.A.S.A. spokesman confirmed that recent photographs taken by their Intel-Sat G Marine Resources Satellite show a number of large sub-marine objects, one of which is thought to be the wreck of the TITANIC which sank 72 years ago next month.

NEWS FLASH

TITANIC

29th March 1984

GOLD FEVER — THE RACE IS ON

Following the disclosure last week that N.A.S.A. photographs could pinpoint the location of the "Titanic" – the Gold Rush is now on.

Many groups are seeking sponsorship to recover the considerable quantity of gold which sank with the "Titanic".

Now is your chance to go for the Gold . . .

. . . The adventure begins.

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Commodore

continued from page 1

rumoured mouse cursor control device called The Cat, and a light pen.

Four new printers for the Vic 20, Commodore 64 and 264 were announced — a low-cost dot-matrix, a high-end dot-matrix, a colour dot-matrix and a low-cost daisy-wheel.

All of these products are expected to become available in the second half of this year.

The first of the new business systems is a 16-bit Z8000-based machine with 256K Ram, 80-column graphics and built-in dual floppy disc drives. The machine runs the Unix operating system.

The second is the previously announced tie-up to market the Hyperion IBM-compatible 8088-based computer under the Commodore brand name. The machine, with 256K Ram is expected to under-cut the IBM PC in price and sell for around £1,500.

No indication of availability was given for either of the business machines.

Robot association gets under way

THIRTY delegates from seven different countries assembled in Paris last month to establish the International Personal Robotics Association.

They included Nolan Bushnell, founder of Atari, and Skip Steveley, president of Androbot. Britain was well-represented with six delegates.

The organisation has deliberately been set up while the industry is still in its infancy. "The delegates are concerned that the robotics industry should achieve a certain amount of standardisation, both in the sense of establishing a commercial standard in robot manufacture and also in the realm of safety," explained an IPRA spokesman.

"As robots are machines inter-acting with people, the safety aspect is obviously important.

"Secondly, it wants to promote the idea of robots as something 'real', rather than a sci-fi gimmick."

The driving force behind the Association is Sidney Nata, head of the French company NATA Industries, who are concerned with both domestic and industrial robotics.

It is hoped that IPRA will be a fully independent body, funded by its members. Membership is intended in time to include not only robotics companies, but also colleges, universities and interested individuals.

● The world's first personal robotics conference will be held in Alberquerque, New Mexico, this week.

Skip Stevely

Spectrum cartridges

PARKER Brothers, the US toy company, will be the first independent company to produce cartridge software for the Sinclair Spectrum.

The first programs will be released in August — a mixture of established titles on other machines such as *Q-bert*, *Popeye* and *Return of the Jedi* and two new home computer titles — *Gyruss* and *Star Wars* (both converted from the original arcade games).

Until now, only Sinclair has taken advantage of the facility offered by the ZX Interface II of running plug-in Rom software.

In October last year Sinclair announced, along with the Interface II, a range of 10 cartridge titles — all of which had been previously available on cassette.

A Parker spokesman commented: "We are taking a long term view on the Interface II and we feel it will eventually be successful."

Parker Brothers are known to be particularly concerned by software piracy and this has been one of the factors leading it to launch a range of programs on Rom rather than cassette.

Prices for the cartridges are expected to match Sinclair's own — at around £10. However, Parker's cartridges will use a 16K Rom, unlike Sinclair's which use an 8K Rom.

TV licence case dismissed

MICROCOMPUTER user Peter Battle has established a precedent in the computer world.

Having been charged with having no tv licence, his case was dismissed by Ilkeston magistrates after he explained that he only used the television as a display monitor for his micro.

A Home Office spokesperson explained that if the set is used to receive any tv signal then a licence is needed, but it was up to the courts to decide in individual cases.

Desmond helps teachers

THE Open University has developed an educational computer which, following successful classroom tests, may be adopted by the Microcomputers in Education Programme (MEP) for use in secondary schools.

The micro is one of a number of projects developed for the second phase of the Government's Micros in Education Scheme and was originally designed as a learning aid for teachers.

Desmond (Digital Electronic System Made of Nifty Devices) is now being manufactured by Deltic Automation and costs around £75. It has a 6809 processor, 0.112K Ram, 3.8K Rom and is programmable only in assembly-language. The machine is supplied with two programming packs dealing with digital logic and computer architecture.

Although intended as an advanced programming techniques trainer — teaching machine-code — Desmond can also teach control applications. It can be used, for example, to monitor temperature or control light switches.

Church attacks D & D

MICRO owners who play the *Dungeons and Dragons* style of role-playing games are in danger of becoming Satanists. That is the view of a number of American church groups, and now, in Britain, some education authorities have dropped *Dungeons and Dragons* from evening classes.

A Buckinghamshire vicar, Rev John Hollidge, has sent a letter to parents and schools in the area, deploring the use of Satanist symbols in the game. "Satan is real and wants your child's mind," the letter reads.

However, the managing director of TSR (UK), which has been selling the game for 10 years in Britain, says there has been no reported incident of anyone being psychologically disturbed by the game.

No emulator yet

VIDEO VAULT'S remarkable *New Emulator* program which is claimed to allow Spectrum software to be run on the Commodore 64 (see *Popular Computing Weekly*, March 29) has still failed to materialise.

Riad Kasser, Video Vault's managing director, has now admitted that a working version of the program — which is priced at £13.95 — will not be ready for another two weeks.

Some industry experts remain sceptical that a Commodore 64 emulator can be made to work successfully with the majority of Spectrum programs.

Still no QL but Sinclair stirs

● PCW's QL order: Week 12. Although, three months on, our QL is still not with us, there are vague signs of stirring at Sinclair.

The company now has a small number of fully-working machines which, within a week or so, should become available for magazines to evaluate.

Interest from our order is up to approximately £5.80.

PRICE BREAKTHROUGH

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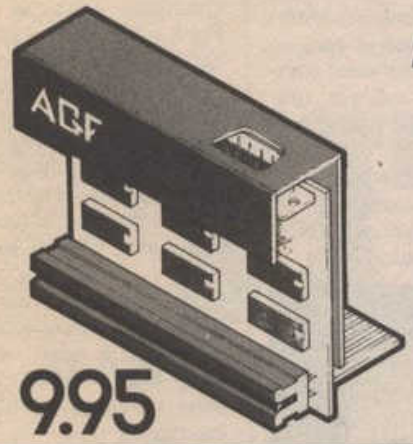

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AGF Joystick Interface II for Spectrum or ZX81

Now the AGF Interface II is even better value. Since we pioneered the cursor-key interface in October 1982 there are now over 100 games or utility programs with either the AGF option or cursor key controlled – that makes it unbeatable at this new low price.

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All AGF Joystick interfaces will work with any industry standard joysticks using 9-pin 'D' plugs – including QuickShot II and the new Trackball controllers.

Don't settle for less . . . . . choose AGF.

Joysticks

The choice is yours. The standard QuickShot is excellent value incorporating suction cups for sure-footed precision and a comfortably contoured handle with a convenient top firing button, plus conventional button in the base.

Four feet of cord terminates in the industry standard 9-pin 'D' plug for compatibility with our interfaces or direct connection to a selection of home micros.

The new QuickShot II has improved styling with a trigger type firing control as well as the top firing action and a broader base for greater suction stability. The rapid fire switch, which allows a continuous stream of shells where normally a button press is required for each one, is located in the base for easy access in use.

Cord length and termination is as the standard QuickShot controller.

8.95

QuickShot

QuickShot II

11.95

12.5% discount off our Programmable Interface – valid 1 year on orders over £18

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so HURRY . . . post free both ways

Please allow up to 28 days from receipt of your order although we normally despatch from stock within 7 days. All AGF products are guaranteed for 12 months and are supplied on a 14 day money back undertaking. AGF Hardware, Bognor Regis, West Sussex. Telephone: (0243) 823337.

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Letters

Ban the swap shops

In your March 1 issue you announced the formation of the Society of Software Authors and I have no doubt that pirating will be high on the agenda at the inaugural meeting on May 5. As both author and pro-tem Treasurer of the Society, may I comment?

1) The decision by your magazine banning copier adverts is a bit feeble. Too many have already been sold — the pirates obviously have them — and if they need more, well, copying is, after all, their chosen trade.

2. Tapes snarl up in the best of recorders, often ruining the Side 2 back-up as well. Many suppliers do not even provide this back-up, use cheap tape giving poor loading or fall-out, and are deaf to replacement requests. Making one's own back-up is therefore essential.

3) For some, any protection device is a challenge. It does not necessarily mean that they will pirate the 'broken' tape. Writers and artists study books and paintings to learn technique. Programmers will always try to learn how others achieve certain effects.

4) We will never stop kids swapping copies with friends. In my computerless youth I swapped comics, with never a thought that I was doing the publisher out of a sale. I find many youngsters, liking a copy, go out and buy the original — the copy providing a sale which might not otherwise have been made.

On the other hand, if we could persuade all Clubs and Schools, where the potential for swapping becomes much wider than immediate friends, to ban copying on their premises, we would be some way towards reducing the loss. Perhaps publishers could offer, under suitable written guarantee, free software samples to Clubs or Schools enforcing such bans. The demonstration of these at meetings could be good advertising, since it is so difficult to see before you buy at shops.

5) Organised piracy is far more serious. Commercial pirates, offering copies complete with colour inserts, indistinguishable from the original, become a matter for the law and the unfortunate software house so favoured. In the last few months I have answered a number of personal magazine adverts, offering originals for sale or swap. Far too often, the conversation has gone something like this:

Me: You're advertising some cassettes for sale (or swap)

Them: Which micro do you have?

Me: Your advert said Spectrum.

Them: Oh, for the Spectrum we've got... (a very long list) and we've got *XYZ* coming in next week.

Me: (knowing that *XYZ* is not due to be released until next month) Are these all originals?

Them: Well, some are.

Me: My swaps are original.

Them: That's OK. We'll give you 3 copies for every original.

Me: (in time-honoured manner, I make an excuse and hang up)

Clearly these are organised copying networks. If you disbelieve me, try ringing a few numbers from your own back pages, pretending to be a buyer. Don't you notice the same names and numbers coming up issue after issue?

I conclude you could take a far more practical stand against piracy by refusing all swap and sell adverts for software only. It may penalise the genuine advertiser but they could always join a club or try exhibition Bring and Buy stalls.

Dorene Cox
7 Meadway Court
Whalebone Lane South
Dagenham, Essex

The question of organised, commercial, software piracy is becoming increasingly important. We will obviously do everything we can to help stop piracy.

However, banning all software swap and sale advertisements would not solve the problem and it would punish the innocent as well as the guilty.

If anyone has any evidence of organised copying networks using our pages, please let us know.

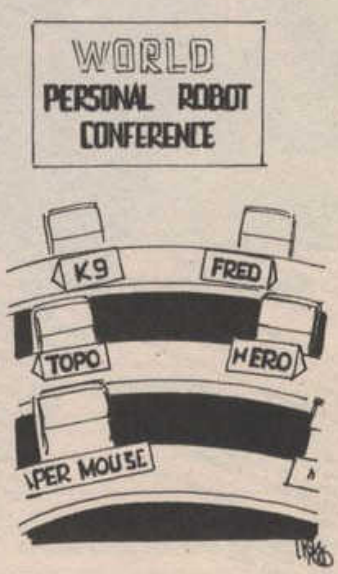
Complete control

The debate about the morality/legality of tape copying continues. The points made against tapes designed specifically for copying other people's work are justified and reasonable.

There are other important issues, however, the most important being the rights that we have over our own computers. Like many others I purchase commercial software, not just for games appeal, but because of their quality of programming. I realise why software writers include routines to prevent illegal copying. But many interested computer owners find the inability to examine, study, modify, or simply learn from software they have purchased, very frustrating.

It is in the nature of computer owners to enquire into, and customise programs, and in doing so they expand their own knowledge of their machine, and add to their own enjoyment.

I recently purchased a program called *(S)top secret(s)*, which amongst other features, incorporates a routine which puts me back in full control of my Spectrum. It allows me to *Stop* Basic or machine code programs, without them crashing. I've tried it on all my commercial software, and it works. I can now learn from my purchases, without getting a black screen, or a system nervous breakdown. I can now utilise all my computer's functions.



I sympathise with software houses regarding illegal copying, but I would question the right of any person to dictate that certain of the keys on my computer must remain inactive, or even 'lethal', when I use tapes I have purchased. Professional 'pirates' are not interested in programs like *'(S)top secret(s)'*. They use data copying machines, manufactured by well known 'world-wide' companies. I will not be using the program to make 'illegal' copies, just because the *'Save'* option is now open to me. It is apparent that it was not designed for such a use.

I don't defend any software designed merely to *'Copy'* programs, but I would defend very useful utility programs like *(S)top secret(s)*, which restores my rights over my computer, and allows me to learn, not just play.

C C Mole
1 Stour close
Burntwood
Staffordshire

Back numbers

Recent editions of your magazine have included a series of articles of a program by Paul Sellin, *The Pit*. As I have only the final part of this program to hand, would you please inform me if it is possible to obtain either past numbers of the magazine, including parts 1 and 2 of this program, or a copy of the program itself.

M F Wood
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Cleveland TS15 9NR

Back numbers can be obtained by writing to *PCW*, Back Numbers Dept, 12-13 Little Newport St, London, and enclosing 50p per back number. Please remember to write the issue date of the magazine clearly.

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Jogger Guide your joggers across a 4-lane motorway and crocodile infested river to reach their safe haven through the gap in the fence. Each time a jogger is safely home the next one will have to encounter more lorries and cars on the motorway but fewer crocodiles and logs in the river. Full on-screen instructions. M/code, sound effects and full action colour graphics.
Oric Author – Adrian Sheppard
Spectrum Author – Mike Howard
Oric 48K – **£6.95** Spectrum 16/48K – **£4.95.**

Dinky Kong Attempt to rescue your lovely girlfriend, who is held captive by the angry gorilla. As you climb the connecting ladders and move along the gangways, the gorilla will be throwing barrels and fireballs at you! The only way to reach her is to leap over these obstacles and progress to the top. M/code action with sound effects, full colour action graphics, skill levels etc.
Author – Adrian Sheppard
Oric 48K – **£6.95**

Quincy A superb dice game for 2 to 6 players. 3 throws per go to try and score points by obtaining certain combinations. I.e. 3 of a kind, a run, pairs etc. 13 go's to complete a game. The highest score is the winner! It's a game that is easy to learn but can be won by skilful and thoughtful play. Full colour graphics, on-screen instructions, bonus scores, etc.
Author – Tony Churcher.
Spectrum 48K – **£4.95.**

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SEVERN SOFTWARE
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Lone Raider As Captain of the space-ship 'Lone Raider' your mission is to save earth from the alien Zugs, who are aiming to destroy all forms of intelligent life in the Universe. The 'Lone Raider' possesses formidable weaponry such as phaser cannons and neutron bombs. Armed with these you will need to battle through the planetry defences to seek the mother ship. She is heavily guarded and your chances of surviving long enough to even glimpse her are slim ... Superb graphics, volume control, hi-score, 4 screen scenarios, missiles, fuel dumps, mines, sharks, octupi, mother ship etc. Can be played with keyboard or joystick using the Fase Ltd interface.
Author – Adrian Sheppard
Oric-1 48K – **£7.50**

NEW

Encounter A complex and intriguing classic-style text adventure. A girl has been kidnapped by thugs – your job is to locate and rescue her! Everything you need can be found in the game but sometimes you may have to manufacture items. Chemistry knowledge will help! Most commands are verb followed by noun although abbreviations can be used. If the alarm sounds you too are caught. It's worthwhile making a map noting what you find and where as the time limit is only 500 moves.
Oric-1 48K – **£7.50**
Spectrum 48K – **£5.95**
CBM 64 – **£7.50**

NEW

Moria A challenging adventure game set in the mines of Moria. You'll have to try and survive encounters with the monsters of middle-earth while trying to locate Durins Ring. The Wizard and the Trader may help or hinder you on your journey to find and open the hidden doors to freedom – a game that will really test your character and staying power.
Oric Author – Adrian Sheppard
Spectrum Author – Mike Howard
Oric 48K – **£6.95** Spectrum 16/48K – **£4.95.**

All Oric titles available from Laskys.
Dinky Kong for Oric also available from W H Smith.
Mail order service available on all titles.

Oric titles recommended by ORIC PRODUCTS INT. LTD.

All Spectrum Software is available on Micronet 800.

TRADE ENQUIRIES WELCOME

ORIC UTILITIES

Oricade A combined assembler, Disassembler and editor for the Oric.
*Handles full 6502 Mnemonics.
*Features Save and Reload M/C.
*Assembles and disassembles at any address.
*An essential tool for any serious programmer.
Author – Adrian Sheppard
Oric 48K – **£8.50.**

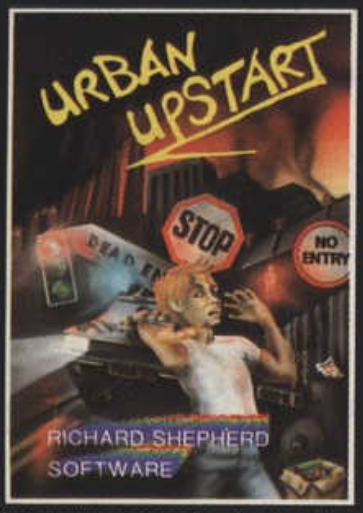
Oric Extended Basic A must for the programmer! Extended Basic offers the user 13 additional commands to the present Oric-1 48K commands and yet only takes up 2K of RAM.
Features * Commands include Verify, Write, Recall, Find, Scroll, Draw box, Rotate and others. * Takes up only 2K of RAM, so plenty of memory left for user to program. * Demonstration programs – all detailed in the cassette inlay. * Full instructions.
Author – Adrian Sheppard
Oric-1 48K **£7.50**

NEW

Address File Manager This is a new departure for software for the ORIC-1 micro. It will allow you to keep ALL your important records of NAMES & ADDRESSES. Up to 255 can be kept in each file and files can be SAVED & LOADED using an ordinary cassette recorder. This means an unlimited amount of information can be permanently stored in a convenient format.
Features: *Menu-driven. *Prompted keyboard entry of data with check. *Delete option for old data. *Search by surname (handles multiple occurrences). *Saves and loads NAMED files to cassette. *Up to 255 records can be kept in each file. *Prints on Screen or Printer. *Up to 255 records The program gives all information to the user in real-time and can be used by anyone who can operate the Oric-1.
Author – Mike Howard
Oric-1 48K – **£4.95**

NEW

"ADVENTURES INTO IMAGINATION"



Your quest is to escape from Scarthorpe! a run down 20th Century Suburb where even the dogs carry flick knives. Where there's only one road in, and that's a one-way street. Not many people come to Scarthorpe, and even fewer leave the streets are deserted now is your chance to escape from over 90 graphic locations.

£6.50 Cassette £9.50 Disk

STOP PRESS

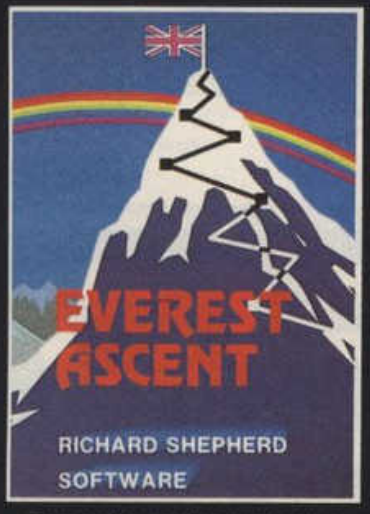
COMMODORE 64

NOW ON Disk and Cassette

All these adventure games are also available in Cassette format for 48K Spectrum.

A spine chilling maze adventure enter via the dungeons navigate your way through 500 3-D rooms survive the swooping vampire bats reach the terrifying top and rid the world of the evil Count Kreepie! Can you survive the top of the Tower?

£6.50 Cassette £9.50 Disk



Conquer the world's highest peak in defiance of all the obstacles, man and nature can throw at you. Survive avalanches, cross bottomless crevasses, cope with wayward Sherpas — but don't run out of supplies!

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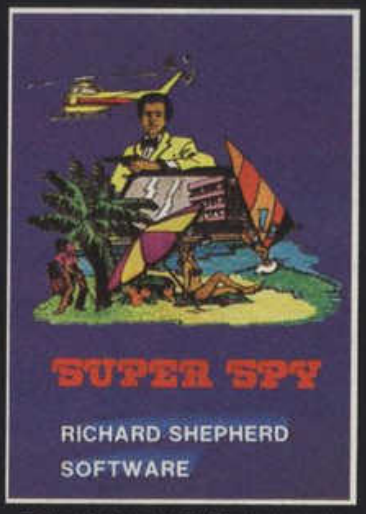
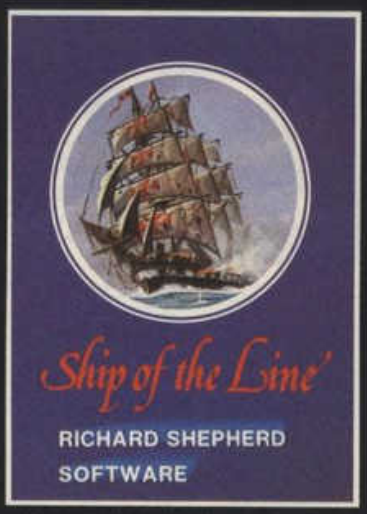


Follow the trail of Dr. Death through complex puzzles, coded messages and 3-D mazes until you find his lair! But beware — even with your death-defying gadgets you may not live to tell the tale!

£6.50 Cassette £9.50 Disk



Command a sailing ship, juggle your supplies, crew and firepower. Fearlessly battle your way up the admiralty ladder, bribe Sea Lords as necessary until you make First Sea Lord!

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Pac Man

A new game for Commodore 64 by F Buys

This game hardly needs any introduction. Move your Gobbler around the maze to eat the power dots, but watch out for the ghosts. Chase the ghosts when you eat one of the corner dots.

I have put quite a few Rem statements in the program, so there are no notes. The game includes a proper title page, high score table and a sound for the new high score. Because there are quite a lot of things happening at once, there was a danger of the program being slow — so I have deliberately kept the Basic as tight as possible by using a short main loop (lines 390-1240).

```
100 REM ************
110 REM * PAC-MAN *
120 REM *   BY    *
130 REM * F.BUYS  *
140 REM *  1984   *
150 REM ************
160 DIMM$(400)
170 DIMP(3),Q(3),A(3),I(3),J(3),K(3)
180 READP(0),P(1),P(2),P(3),Q(0),Q(1),Q(2),Q(3)
190 DATA1,-40,-1,40,-1,-40,1,40
200 :
210 FORT=1TO25:A$=A$+CHR$(17):NEXT:A$=CHR$(19)+A$:FORT=1TO10:SC(T)=0
220 SC$(T)=CHR$(154)+"**"+CHR$(158)+CHR$(18)+"COMMODORE"+CHR$(146)
    +CHR$(154)+"** ":NEXT
230 :
240 REM *** START GAME ***
250 :
260 PRINT"■"CHR$(8):SC=0
270 GOSUB1300
280 PRINT"■_____"
290 PRINT"■■          BY FABIAN BUYS ■■"
300 S1$="▙      DO YOU WANT INSTRUCTIONS ?"
310 PRINTS1$
320 Y=PEEK(1024):POKE1063,Y:Y1=PEEK(56896):POKE56135,Y1:FORZ=0TO65:NEXTZ
330 PRINT"┐"CHR$(20)
340 GETE$:IFE$="N"THEN420
350 IFE$="Y"THENPOKE53281,0:GOTO2230
360 Q1=Q1+1:IFQ1=118THENQ1=0:GOTO1890
370 GOTO320
380 :
390 REM *** MAINLOOP ***
400 :
410 PRINTCHR$(142)
420 JX=64:LX=46:RT=93:RS=32:RU=42:RV=86:RW=81:JL=64:HA=0
430 GOSUB1440
440 :
450 K=32:I=1964:POKEI,RW:A=0:C=1
460 A(3)=3:K(3)=32:C(3)=5:I(3)=1534
470 M=2:A(2)=2:A(0)=0:A(1)=1:I(0)=1963:I(1)=1509:I(2)=1164
480 K(0)=32:K(1)=32:K(2)=32:C(0)=1:C(1)=3:C(2)=2:MA=360
490 POKE1963,RV:IFND=1THENPOKE1509,RV:M=4:MA=720
500 IFND=2THENPOKE1164,RV:M=5:MA=1080
510 IFND=3THENPOKE1534,RV:M=6:MA=1440
520 TP=VAL(TI$)
530 AZ$="■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■ START
540 PRINTAZ$:PRINTTAB(12)"■ IN  "3-VAL(TI$)+TP;" SEKOND "
550 IFVAL(TI$)-TP<20OTO540
560 PRINTAZ$:PRINTTAB(12)"■ IN   1  SEKOND  ":FORUN=1TO1000:NEXT
570 PRINT"■■■■■■■■■■■■■■■■■■■■■■■■■■▙ SCORE ■":PRINTTAB(12)"■
580 PRINTTAB(19)"┌┐■■■■■■■■▙HIGH="MID$(STR$(HI),2)"┐"
590 UN=1:PE=56321:OX=12
600 X=UN:IFPEEK(PE)=239THENX=M
610 FORW=UNTOX
620 J=I+P(A)
630 L=PEEK(J):IFL<>JLANDL<>RTTHEN660
640 A=A+UN:IFA=4THENA=0
650 GOTO620
660 IFK<>LXTHEN750
670 SC=SC+UN:IFPT<>MATHENPRINTTAB(OX)"┌■"SC"┐■":K=RS:GOTO1050
680 N=N+1PRINTTAB(12)"┐"SC"┐"
690 PRINTTAB(19)" ■■┐ WELL DONE■ "
700 INF=4THEN63999
710 :
720 :
730 :
740 GOTO420
750 IFK=RSTHEN1050
760 IFK=RVTHEN1250
770 P=PEEK(PE)
780 IFP=253THEND=2:GOTO830
790 IFP=254THEND=8:GOTO830
800 IFP=251THEND=4:GOTO830
810 IFP=247THEND=6:GOTO830
820 GOTO1050
830 ON0/2GOTO840,900,950,1000
840 IFA=1ORA=3THEN1050
850 IFC=1ANDA=0THEN1050
860 IFC=5ANDA=2THEN1050
870 IFA=0THENJ=I+81:C=C-1:L=PEEK(J):GOTO1050
880 REM *** GET JOYSTICK ***
890 J=I+79:C=C+1:L=PEEK(J):GOTO1050
900 IFA=0ORA=2THEN1050
910 IFC=1ANDA=3THEN1050
920 IFC=5ANDA=1THEN1050
930 IFA=1THENJ=I-42:L=PEEK(J):C=C+1:GOTO1050
940 J=I+38:L=PEEK(J):C=C-1:GOTO1050
950 IFA=0ORA=2THEN1050
960 IFC=1ANDA=1THEN1050
970 IFC=5ANDA=3THEN1050
980 IFA=1THENJ=I-38:L=PEEK(J):C=C-1:GOTO1050
990 J=I+42:L=PEEK(J):C=C+1:GOTO1050
1000 IFA=1ORA=3THEN1050
1010 IFC=1ANDA=2THEN1050
1020 IFC=5ANDA=0THEN1050
1030 IFA=0THENJ=I-79:L=PEEK(J):C=C+1:GOTO1050
1040 J=I-81:L=PEEK(J):C=C-1:GOTO1050
1050 IFHA=1THENRW=81:GOTO1100
1060 IFA=0THENRW=81:GOTO1100
1070 IFA=1THENRW=81:GOTO1100
1080 IFA=2THENRW=81:GOTO1100
1090 RW=81
1100 POKEI,K:POKEJ,RW:K=L:I=J:HA=ABS(HA-1):NEXTW
1110 FORB=ZE TO N
1120 J(B)=I(B)+Q(A(B))
1130 L(B)=PEEK(J(B)):IFL(B)<>JLANDL(B)<>RTTHEN1160
1140 A(B)=A(B)+UN:IFA(B)=4THENA(B)=0
1150 GOTO1120
1160 IFK(B)=RSORK(B)=RSORK(B)=LXTHEN1230
1170 IFK(B)=NWTHEN1250
1180 NW=RW
1190 V=SGN(C-C(B))+2
1200 ON(V)GOTO1210,1230,1220
1210 C(B)=C(B)-1:ONA(B)+1GOSUB2150,2160,2170,2180:L(B)
    =PEEK(J(B)):GOTO1230
1220 C(B)=C(B)+1:ONA(B)+1GOSUB2190,2200,2210,2220:L(B)
    =PEEK(J(B)):GOTO1230
1230 POKEI(B),K(B):POKEJ(B),RV:I(B)=J(B):K(B)=L(B):NEXTB
1240 GOTO600
1250 :
1260 REM *** HIGH SCORE ***
1270 IFSC>HITHENHI=SC:GOSUB1810:GOSUB1750:GOSUB1720:GOSUB1310
1280 IFPEEK(PE)<>239THEN1280
1290 SC=0:N=0:RESTORE:GOTO420
1300 REM ** SCREEN MAKE UP **
1310 POKE53281,6:POKE53280,6:PRINTCHR$(147):FORT=1TO2:PRINTCHR$(13):NEXT
1320 PRINT"  ┌─┐ ┌─┐ ┌─┐ ┌─┐ ┌─┐ ┌─┐ ┌─┐  │ │"
1330 PRINT"  │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │"
1340 PRINT"  │ │ │ │ │ │ │ │ │ │ │ │ │ │ │ │"
1350 PRINT"  └─┘ └─┘ │ │ │ │ │ │ └─┘ │ │ └─┘"
1360 PRINT"  │   │ │ │ │ │ │ │ │ │ │ │ │ │"
1370 PRINT"  │   │ │ │ │ │ │ │ │ │ │ │ │ │"
1380 PRINT"  │   │ └─┘ │ │ │ │ │ │ │ │ │ │"
1390 RETURN
1400 POKE53281,0:FORI=1TO4:PRINT"■ ";:NEXTI:PRINT"■!";
1410 :
1420 REM *** SET UP SCREEN ***
1430 :
1440 POKE53281,0:PRINT"■",
1450 PRINT"■┌──────────────────────────────────────┐"
1460 PRINT"■│■.....■■  ■■.....■│"
1470 PRINT"■│■.┌──┐.┌──┐.┌──┐.┌──┐.■│"
1480 PRINT"■│■.│■■│.■■  ■■.■■│.■■  ■■.■│"
1490 PRINT"■│■.└──┘.└──┘.└──┘.└──┘.■│"
1500 PRINT"■│■.....■■  ■■.....■■  ■■.....■│"
1510 PRINT"■│■.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.■│"
1520 PRINT"■│■.│■■│.■■  ■■.■■  ■■.■■  ■■.■│"
1530 PRINT"■│■.└──┘.└──┘.└──┘.└──┘.└──┘.■│"
1540 PRINT"■│■.....■■  ■■.....■■  ■■.....■■  ■■.■│"
1550 PRINT"■│■.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.■│"
1560 PRINT"■│■■ * * * *■■│  ■■ PAC-MAN■■  ■■ * * * *■■│"
1570 PRINT"■│  │  └──┘  └──┘  │  │"
1580 PRINT"■│■■ * * * *■■│  ■■ * * * *■■│"
1590 PRINT"■│■.└──┘.└──┘.└──┘.└──┘.└──┘.└──┘.└──┘.■│"
1600 PRINT"■│■.....■■  ■■.....■■  ■■.....■■  ■■.■│"
1610 PRINT"■│■.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.■│"
1620 PRINT"■│■.│■■│.■■  ■■.■■  ■■.■■  ■■.■■  ■■.■│"
1630 PRINT"■│■.└──┘.└──┘.└──┘.└──┘.└──┘.└──┘.■│"
1640 PRINT"■│■.....■■  ■■.....■■  ■■.....■■  ■■.■│"
1650 PRINT"■│■.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.┌──┐.■│"
1660 PRINT"■│■.│■■│.■■  ■■.■■  ■■.■■  ■■.■■  ■■.■│"
1670 PRINT"■│■.└──┘.└──┘.└──┘.└──┘.└──┘.└──┘.■│";
1680 PRINT"■│■.....■■  ■■.....■■  ■■.....■■  ■■.■│";
1690 PRINT"■└──────────────────────────────────────┘■";
1700 POKE2023,75:POKE56295,14:RETURN
1710 REM *** INPUT HIGH SCORE ***
1720 PRINT"■":GOTO1920
1730 PRINT"■■■■■■■■■■■■■■"
1740 RETURN
1750 REM *** HIGH SCORE SOUND ***
1760 POKE54296,15
1770 POKE54276,0:POKE54272,0:POKE54273,0:POKE54277,0:POKE54278,240
1780 POKE54276,33
1790 FORZ=2TO17:POKE53280,Z:FORZ1=1TO15:POKE54273,Z*Z1:NEXTZ1,Z
1800 POKE54276,0:RETURN
1810 PRINT"■"
1820 POKE53281,6
1830 FORT=1TO11
1840 PRINT"■ HIGH SCORE                    HIGH SCORE■"
1850 NEXT
1860 PRINT"■ HIGH SCORE                    HIGH SCORE■"
1870 RETURN
1880 :
1890 REM *** SCORE TABEL ***
1900 :
1910 PRINT"■"
1920 Z=0:FORT=1TO10:IFSC>SC(T)THENZ=T:T=11
1930 NEXT:IFZ=0THEN2030
1940 PRINTLEFT$(A$,7)SPC(9)CHR$(154)"ENTER TEXT FOR SCORE TABLE"
1950 PRINTLEFT$(A$,13)SPC(11)"NAME      .........";
1960 FORT=1TO13:PRINTCHR$(157);:NEXT:PRINTCHR$(31);:INPUT"▙";N$
1970 IFLEN(N$)>11THENN$=LEFT$(N$,11)
1980 FORT=1TO11:Z$=MID$(N$,T,1):IFZ$=CHR$(46)THENN$=LEFT$(N$,T-1)
1990 NEXT
2000 IFZ=0THEN2030
2010 FORT=9TOZSTEP-1:SC(T+1)=SC(T):SC$(T+1)=SC$(T):NEXT
2020 :
2030 :
2040 SC(Z)=SC:SC$(Z)=CHR$(29)+CHR$(29)+CHR$(18)+CHR$(32)+N$+CHR$(32)
2050 REM *** SCORE TABEL ***
2060 PRINTCHR$(147)TAB(12)CHR$(154)"**"CHR$(30)"SCORE TABEL"CHR$(154)
    "**"CHR$(17)
2070 FORT=1TO10
2080 PRINTCHR$(30)CHR$(17)" PACER  ";T;TAB(12)CHR$(5);SC(T)TAB
    (22)CHR$(158);SC$(T):NEXT
2090 PRINTLEFT$(A$,25)SPC(8);
2100 GETR$
2110 IFD1=150THEND1=0:GOTO260
2120 IFR$=""THEND1=D1+1:GOTO2100
2130 SC=0
2140 GOTO260
2150 J(B)=I(B)+79:RETURN
2160 J(B)=I(B)-42:RETURN
2170 J(B)=I(B)-79:RETURN
2180 J(B)=I(B)+42:RETURN
2190 J(B)=I(B)-81:RETURN
2200 J(B)=I(B)-38:RETURN
2210 J(B)=I(B)+81:RETURN
2220 J(B)=I(B)+38:RETURN
2230 PRINTCHR$(147):PRINTCHR$(8):PRINTCHR$(14):PRINTCHR$(9)
2240 MN$="THE OBJECT OF THE GAME IS TO EAT":GOSUB2310
2250 MN$="AS MANY AS POSSIBLE POINTS.":GOSUB2310
2260 MN$=" YOU CAN GO FASTER WHEN YOU PRESS ":GOSUB2310
2270 MN$="FIRE BUTTON■. YOU CAN CHANGE OF":GOSUB2310
2280 MN$="DIRECTION WHEN YOU ARE ON A '*'.":GOSUB2310
2290 GETR$:IFR$=""THEN2290
2300 GOTO390
2310 FORK=1TOLEN(MN$)
2320 PRINTMID$(MN$,K,1);:FORY=1TO50:NEXTY:NEXTK:PRINT:RETURN

READY.
```

NOW AT LAST!

Cuthbert ON THE Commodore 64

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***Christina Erskine** goes back to school in order to learn about educational software*

Those who decry educational software as not being worth the tape it's written on, should perhaps take into account a company who has successfully been writing for schools since 1979, and only recently broadened into the retail market.

Five Ways Software of Birmingham began with a minicomputer in the maths department of King Edwards Five Ways school, and an enthusiastic maths teacher, Tony Clements.

"When minicomputers began to be taken over by micros, we started fund-raising in order to upgrade ours," explained Tony. "We were about a quarter of the way there when the Government announced the MEP programme. They granted us the rest of the money, which meant we were able to take on two full-time programmers."

The school's governors then bought two Portakabins to house the micros in the playground. As the MEP were keen that projects such as Five Ways should become self-supporting, the work expanded to the extent that in January 1983, Five Ways Software — and Tony Clements, now an ex-maths teacher — moved out of the playground and into office premises in Northfield with 18 full-time staff.

Having moved, Five Ways were gradually decreasing the amount of work directly produced for the MEP, and, in reverse order to many companies, beginning to produce software for the primary sector.

"We began working closely with the Dudley Education Authority to produce programs for primary schools on the Research Machines 480Z micro," said Tony. "We used head teachers and educational consultants to provide the design and expertise.

"From our experience, I'd say that programs for a younger age group present far more of a challenge than for secondary schools. Partly because there's much more competition, but mainly because it's difficult to use the full power of the computer for a six-year-old child's program."

By September 1983, Five Ways had outgrown its Northfield premises, and moved again, to its present building, which houses 40 full-time staff.

Tony Clements began looking at the possibilities of software for the retail market. Through Heinemann, the publishers, a number of primary programs for schools were converted for home use. The latest of these is the *Learning Box* series.

The series consists of eight programs designed for children between the ages of three and eight, each one based around a well-known story or nursery rhyme.

But Five Ways has taken care that the packaging and additional details are also suitable for that age group.

"Each program contains a story book and also a parents' guide, explaining how to get the most out of it. We also use an overlay for the keyboard, so that instead of having to press a particular key, the child will only have to press any key in say, the pink or blue area of the overlay.

"We also tested the box the programs came in fairly rigorously. It's made of tough plastic and, after an extensive period of extremely rough treatment, showed no signs of breaking."

So far, all the retail programs are for the Spectrum only, but Five Ways plan to convert to other computers.

"I'm also looking forward to the arrival of the QL, and we'll certainly be moving up to it when it appears. Its extra power will give us a new challenge in writing software."

Five Ways are currently going through a period of consolidation rather than growth. Its work is fairly equally divided between programs originated and produced entirely by Five Ways and work contracted to them.

Having expanded and diversified fairly rapidly over the last 15 months, Tony Clements is now analysing the progress made and looking at ways to improve efficiency and quality before seeking fresh growth areas.

"We are definitely planning to expand geographically. At the moment, we're selling predominantly to the British market, but we want to sell to the US and the Continent — we're looking into the idea of doing programs in European languages.

"I think too that Britain is soon going to be 'caught up' in terms of the quality of its computer products. At the moment we're streets ahead in terms of the quality of our software, but very weak, I believe in terms of marketing vigour."

Current projects underway at Five Ways include an arcade style game aimed to teach the value of nutrition, a lathe control program for 'O' Level/CSE standard and, for the same age group, a program which allows the user to design the front page of a newspaper.

The arcade game shows a *Pacman* type character, who must eat certain foods in his path in order to stay alive, and is designed for the 8-12 year old age group. Now in the trial stage, it is planned to be available retail in May.

The newspaper page and the lathe control programs are both MEP subsidised and will be for use in schools.

The newspaper program works with a simulated word processor. Having typed in a story, you can move the space for it around on the front page display, and select from four different type sizes. The program will tell whether you need to edit the story to fit and how much by.

Every Five Ways program is worked on simultaneously by two to four people, one of whom will assume responsibility as project leader for the particular work. The majority of the programmers at Five Ways are post-'A' Level students, taking their 'year off' before going to college or university, although there are a small number of permanent programmers.

"This is a quite deliberate policy," said Tony. "Many of them have no previous programming experience, nor are they planning a career in it.

"But it does mean that we have a steady flow of fresh talent and imagination running through the firm, and hopefully the ideas don't get stale.

"Generally speaking, they don't come back here after finishing their academic education, although we do have one permanent programmer who started while taking her 'year off'."

Tony Clements — ex-maths teacher, now head of Five Ways Software

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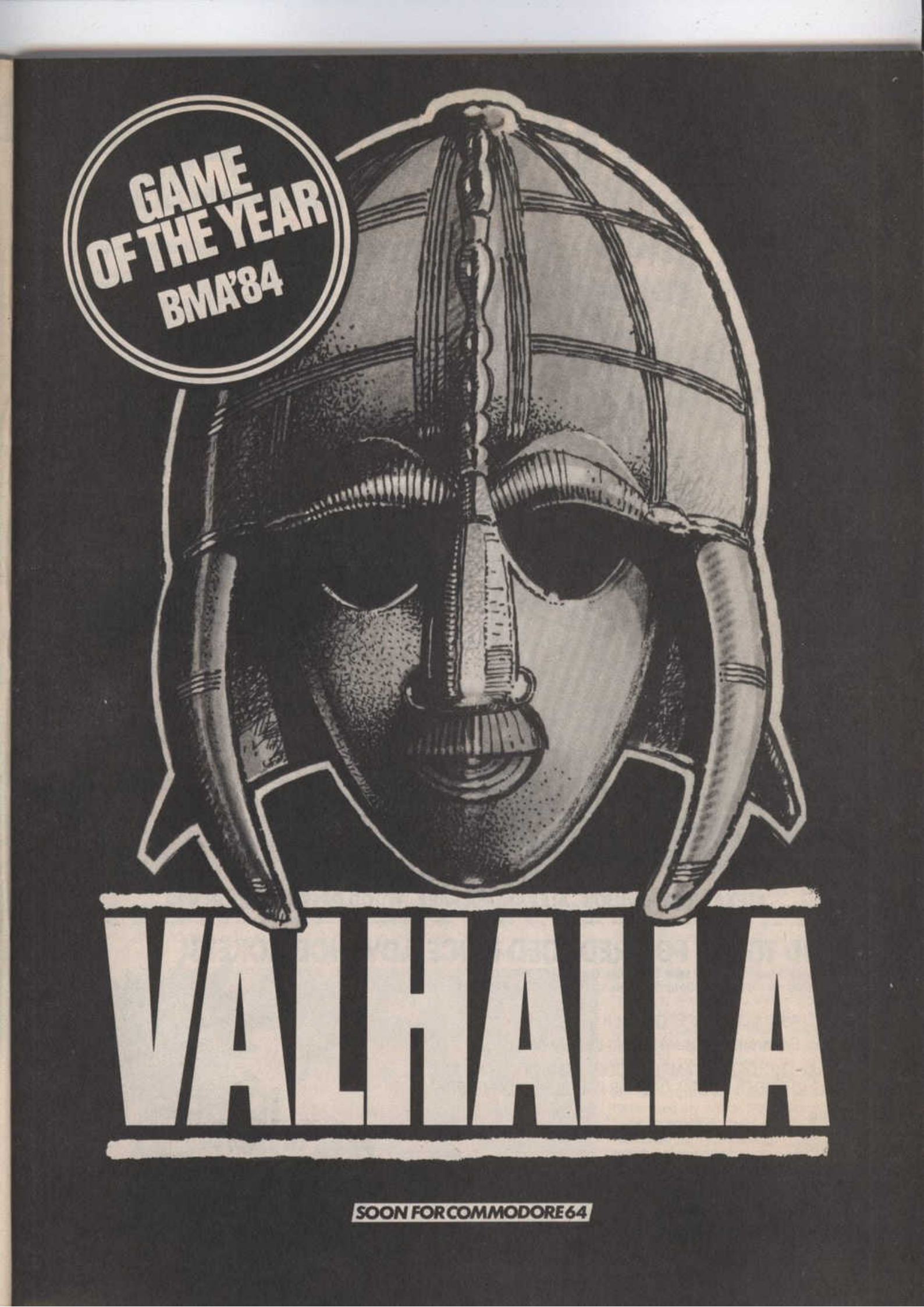
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11th ZX MICROFAIR

Foreword to the prolog

***Andy Pennell** explains the Artificial Intelligence of Micro-prolog*

Micro-prolog is based on one of the new languages for the next generation of intelligent computers, and is now available for the 48K Spectrum. It is supplied on cassette in a presentation box, together with a slim introductory manual, and a substantial 300 page mini-book, entitled *Micro-prolog Primer*.

The introductory book explains how to *Load* the program, and how to *Load* the supplement to it, called Simple. The Simple addition is necessary to introduce the Prolog concepts in an easy-to-use way, which it does very successfully. The booklet introduces line entering, editing and simple concepts. This is done well, as Prolog is very different from any other language.

Prolog works by using a database of information and definitions, forming a complete dictionary. For example, if you wanted to investigate a family tree, you could start by typing in *add(john father-of simon)* and *add(mary mother-of simon)* which add to the database the information regarding Simon's parents. Micro-prolog does not know anything apart from what you tell it, so to inform it about children, you could enter *add(x child-of y if (y father-of x) or (y mother-of x))*.

In this command, *x* and *y* are used as variables, and are used to explain the definition of 'child-of'. Having entered this, to see if Simon is a child of Mary, type *is(simon child-of mary)* and Prolog will reply 'yes'. If Simon was not a child-of mary, Prolog will reply with 'no'. As well as the *is* enquiry, the *which* command can be used to interrogate the information, in, for example, *which(x:x father-of simon)* which, in English, means 'find x such that it is the father of Simon', ie Simon's dad, and Prolog will respond with *john No (more) answers* in reply.

Using just *add, is* and *which*, a complex database of information can be entered and examined. As Prolog is supposed to be Artificially Intelligent, you may wonder what family trees have to do with it. Well, one Intelligent application would be to enter into the database a robot's environment, such as 'chair behind table', 'table under window', then the robot could use Prolog to find its way around the defined room.

As well as textual data, numeric applications can also be handled by Prolog, up to a large limit of 10^127. The Prolog Primer lists one of the fastest implementations I have seen for factorial calculation, using recursion.

The cassette also contains several Prolog programs to be loaded, but the function of most remains a mystery — the introductory booklet refers to the Reference Manual, which is not available at the time of writing. When trying to load them, I discovered a bug in Micro-Prolog — if, as I did, you mistype the filename in *Load*, and *Break* into it after realising your mistake, you cannot load anything else. When you try, it says 'Evaluation error 6 — *Close* last used file first'. I tried typing all manner of *Close* commands, but to no avail. The only solution I could find was to switch off the machine, and re-load the whole thing.

Keith Clark, who co-wrote Micro-prolog Primer with F G McCabe and J R Ennals

The *Micro-Prolog Primer* is a very compact introduction to Prolog, and gradually leads the reader into all the features of the language, but infuriatingly has no index — for a book of over 300 pages, this proved rather a nuisance. I would have liked to have used my printer from Prolog, which I think is possible, but I couldn't find any reference to the method in any of the literature supplied.

Although the Micro-Prolog package may seem expensive to some at £24.95, it does include a book, and is at least four times cheaper than the same program on various CP/M machines. It is a good introduction with AI languages.

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Window box

***Michael Hoff** takes a sneak preview of WH Smith's Games Network*

If the figures for computer sales and arcade game takings are anything to go by, *Waldo* 'the Wizard of Games' will have his work cut out when he makes his British television debut.

Waldo is the symbol of The Games Network, the most recent, and perhaps most adventurous of the three cable television games channels. For 24 hours a day, seven days a week, the bearded wonder will present a selection of 20 games on subscribers' television screens, at a cost that is approximately half that of one games cartridge and but a fraction of what arcade game players can spend in a month.

The Games Network is to be launched soon by high street giant WH Smith, whose successful entry into the home computer market, principally with Sinclair products, led to the establishment of a Cable Services division. Its managing director, Francis Baron, is confident of the new venture's success, and predicts that most if not all 11 of the recently franchised multi-channel cable schemes will take the service.

'We're not really too worried about the competition,' he says, 'even though we are not offering TGN to the existing cable operators as their systems are too outdated.'

The channel takes its name from a Los Angeles firm from whom WH Smith have a licence to distribute a 64K Ram microcomputer called The Window, which will be supplied to subscribers upon payment of a monthly connection fee (probably around £10). It is this unit, complete with 6502 microprocessor, which forms the basis for Baron's optimism.

Unlike the Sirius and Sinclair Spectrum micros used with the Gamestar and Micronet channels, The Window was designed with cable television games playing specifically in mind. It provides 280×192 high-resolution colour graphics, complex sound effects delivered on a full video channel, and comes complete with QWERTY keyboard, left and right hand 'Fire' buttons and manoeuvring keys. Joystick and paddle ports are included, as well as a special freeze frame key and a 'talk back' facility for eventual use on two-way cable systems.

The games are downloaded from dual computer systems with hard disc storage installed at cable operators' head ends, but as technical manager David Gayler points out, the present loading time provides ample room for expansion. "We're talking about some 10 seconds to load a game, and that gives us an enormous amount of slack," he says. "Most of that 10 seconds is empty at the moment, and as we're only filling two or three seconds with actual data, the capacity to take larger and larger games delivered in 64K chunks is quite considerable."

Although the final format has yet to be determined, the new channel will offer broad-based games programming ranging from the arcade, space battle, variety to the more sedate board games and educational exercises. TGN claims it will get the best of the new games, as it pays royalties based on the total number of Games Network subscribers, and because exposure on TGN will increase sales of a game to arcades and home computer and video games machine owners.

The 11 new cable franchises

Name of operator	Area proposed
Merseyside Cablevision	South Liverpool
Rediffusion Consumer Electronics Ltd	Guildford
Swindon Cable Services Ltd	Swindon
Ulster Cablevision	Belfast
Westminster Cable Company	City of Westminster
Aberdeen Cable Services Ltd	Aberdeen
CableTel Communications Ltd	London Borough of Ealing
Clyde Cablevision Ltd	North Glasgow
Coventry Cable Ltd	Coventry
Croydon Cable TV Ltd	London Borough of Croydon
Windsor Television Ltd	Windsor, Slough and Maidenhead

Details of competitions and tips on how to play the games are likely to be provided in a glossy monthly game guide. A feature of both the guide and the channel will be the considerable emphasis placed on educational games, one area where David Gayler expects there to be considerable turnover. 'No one wants to learn four plus four equals eight month after month from the same old fire-breathing dragon,' he says.

The one possible drawback for the Games Network is that having a wizard in your living room is not, as yet, quite like having your own micro. Unlike, for example, the Spectrum used with British Telecom's Gamestar service, you can't hack around inside The Window, nor can you take it over to the neighbours for a casual evening of fun. Each micro is identified by an individual subscriber number and an address code unique to his or her branch of any given cable system. Software pirates will find that data sent down the cable is not only scrambled but protected along its communication path by devices that prevent any unauthorised access.

The Window may lose out a little from being programmable only via a cable line, but its considerable capacity in relation to the micros on offer from the other games channels will prove to be of considerable adventage with the advent of interactive cable services. WH Smith intends to be a major force in this field, and firmly believes that interactive services interfaced with micros like The Window may well prove to be the saviours of the cable operators.

The new Smith's division hopes for a mid-1985 launch date for a range of home shopping, banking, financial and information facilities provided via The Games Network micro, and intends to later add a package of programming services which will use the advanced features of computer-driven two way systems to mix film, sound and text while bringing together entertainment, advertising, information and ordering facilities.

Channels like The Games Network provide not only the all important entertainment layer of the cable revolution, but also the computer hardware necessary to gain access to interactive cable services. People may well take these channels for all the right reasons, but will they be the real reasons too?

'People buy home computers with all sorts of pious intentions about word processing and education,' says David Gayler. 'But the evidence suggests that an astounding proportion simply end up playing games on them.'

The 64K window micro will be supplied to Games Network subscribers

BEYOND

CHALLENGING SOFTWARE

Less than human, far more than mere computer
The *Psytron* controls the massive Betula 5 Installation. When the attack comes, it will cope with defensive demands which would leave a human brain unhinged, computer circuits scrambled.
Damage in any sector of the base must be assessed and its effect on the fabric of the installation calculated immediately.
Human lives will be expended as necessary but if the Psytron ever goes down.

The Sinclair Spectrum has always attracted the best programmers. It's always had the most innovative software: Psion Scrabble, The Hobbit, Jet Pac and now . . .

PSYTRON

Ten screens of stunning graphics, animation which makes other programmers gasp, a 20 page booklet of hints, tips and help with the discovery of each of six levels of play.

"How long can you survive the Final Conflict? A true Psytron would last an hour and a Sinclair Q.L. goes to the first person to match that feat."

Plotting a graph

Sarah Cotton *presents two utility programs for the unexpanded Vic20*

The first program, Cos Graph, plots the cosine graph from 0° to 360°. However, it could easily be modified to produce any other graph.

Notes:

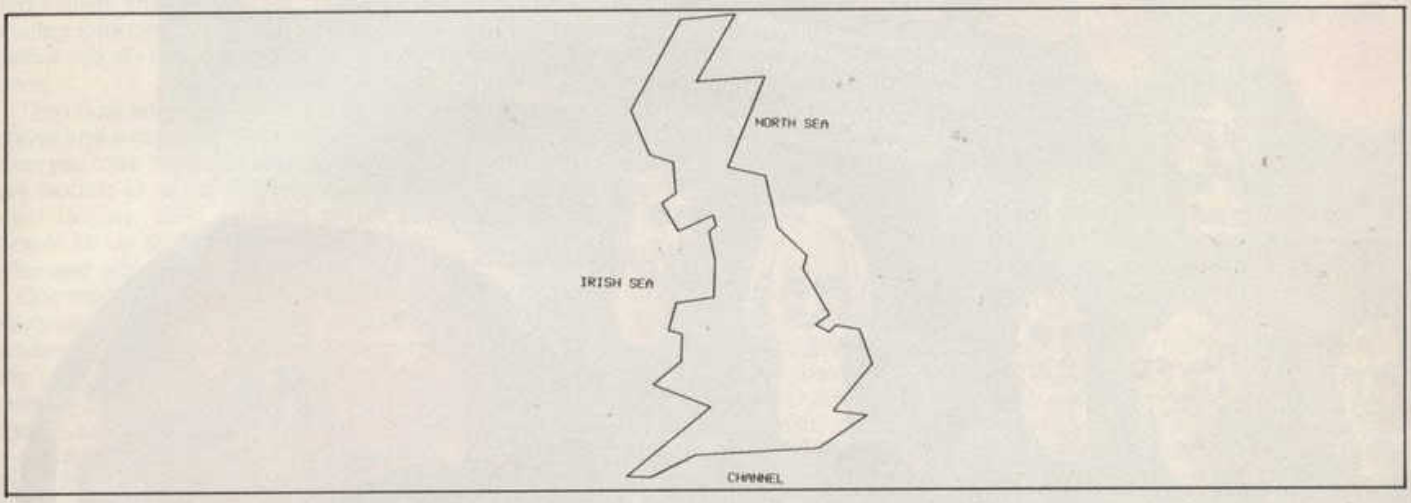
10-50	calculates y values, plots them on paper and prints them on screen
55-56	writes name of graph
57	sets printer colour to black
60	closes files and ends program
99	open files
100-158	draws axis

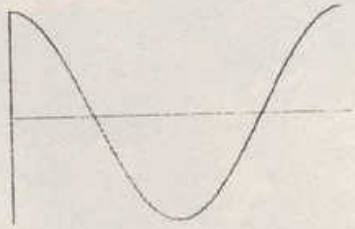
The second program, Map Plotter, draws an outline of mainland Britain and names three important stretches of water. The map is plotted on a co-ordinate system, using the numbers held in the Data statements.

Notes:

1	introduction
10	opens files
11	sets printer colour to black
20-35	sets origin
40-70	reads and plots points
90-130	numbers for plotting outline
135	sets porinters colour to blue
140-200	move to appropriate positions and label the stretches of water
210	close files

Both programes are designed to be used with the 1520 printer/plotter.

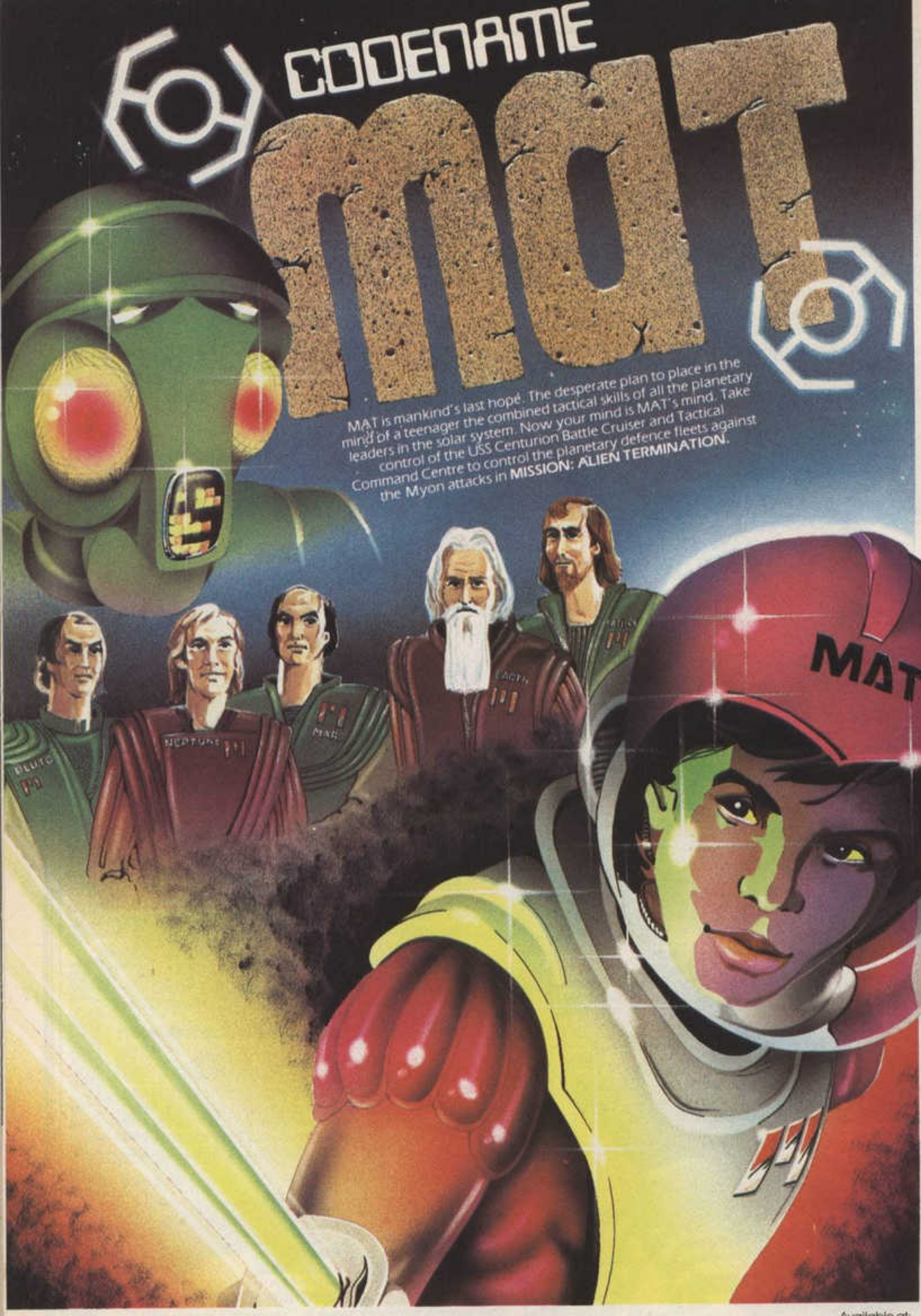




COS GRAPH

```
READY.


0 REM COS GRAPH BY SARAH COTTON
1 GOSUB99
10 FORX=0TO2*πSTEPπ/96
20 Y=COS(X)
30 PRINTY
40 PRINT#1,"J";X*50,Y*100
50 NEXT
55 PRINT#1,"R";200,-150:PRINT#2,"3"
56 PRINT#3,"COS GRAPH"
57 PRINT#2,"0"
60 CLOSE1:CLOSE2:CLOSE3:END
99 OPEN1,6,1:OPEN3,6:OPEN2,6,2
100 PRINT#2,"0"
101 PRINT#1,"M";20,-100
110 PRINT#1,"I"
130 PRINT#1,"J";0,100
140 PRINT#1,"R";0,0
150 PRINT#1,"J";320,0
155 PRINT#1,"H"
156 PRINT#1,"J";0,-100
157 PRINT#1,"H"
158 RETURN

READY.
```

```
READY.


1 PRINT"s":PRINT"QQQQQQQQQQQ11111MAP PLO
TTER"
10 OPEN1,6,1:OPEN2,6,2:OPEN3,6
11 PRINT#2,"0"
20 PRINT#1,"M";0,-700
30 PRINT#1,"I"
35 PRINT#1,"R";100,0
40 FORC=1TO38
50 READX,Y
60 PRINT#1,"J";X,Y
70 NEXT
90 DATA135,0,200,35,380,50,450,100,400,1
05
100 DATA455,175,435,225,400,230,390,220,
370,230,390,245,350,310,355,330,310,370
110 DATA290,445,235,456,285,590,185,580,
240,680,160,670,90,535,120,470,155,460
120 DATA160,415,140,400,165,360,215,385,
220,370,210,360,220,320,220,265,165,255
130 DATA155,215,175,210,175,170,135,135,
220,105,100,0
135 PRINT#2,"1"
140 PRINT#1,"R";275,515
150 PRINT#3,"NORTH SEA"
160 PRINT#1,"H"
170 PRINT#1,"R";250,-500
180 PRINT#3,"CHANNEL"
190 PRINT#1,"R";25,300
200 PRINT#3,"IRISH SEA"
210 CLOSE1:CLOSE2:CLOSE3

READY.
```



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Spectrum

Relatively speaking

***Pete Gerrard** explains how to compile a relative file in the second of his series on the Commodore disc drive*

Last week we took a brief look at sequential files and how to write them, but to get the most out of your Commodore disc drive you'll need, at some point, to start learning about relative files. Over the next couple of weeks that's precisely what we'll be talking about.

Relative files allow direct access to the information stored in them, rather than wading through a whole lot of other data before you get to the particular bit that you want.

The usual analogy here is with a record player and a cassette deck. On a cassette deck you have to wind through all the rest of the records to get to whichever track you want to play. With a record player you simply lift up the arm and place it down wherever you want it to go.

Commodore's disc drives have one great advantage over a lot of others in that they are intelligent, and require no memory from the computer itself; they have their own memory, and their own chips inside to handle a lot of tasks.

It is a lot easier to write a sequential file than it is to write a relative one. However, all the commands that allow you to write relative files are built into the computer, and provided you know what they are and how they work, it becomes a comparatively easy task to write a direct access system.

The terms relative files, random files and direct access files are all interchangeable, as they all mean precisely the same thing.

Once you know what's going on, you'll then be able to build up your own powerful programs, as well as possibly understanding the one given away with the free disc when you buy a Commodore disc drive!

In order to write a relative file, some understanding of how data is stored on a disc is called for.

The information is stored in a series of tracks, and each track is divided up into a series of little boxes called sectors. There are a total of 35 tracks on a 1541 disc drive, and the number of sectors depends on the location of the track. Tracks near the middle of a disc only have 17 sectors in them, while those at the outside have up to 21 sectors.

The total number of sectors on the disc is 690, and the disc itself tells you how many are left vacant on the disc. A look at any disc directory will reveal how many sectors, or blocks, there are free. Since the disc drive itself steals a few sectors for its own use, like linking programs together on disc, reminding itself where they all are, what they're called, how long they are and so on, we get left with 664 for our own use.

Each sector can hold up to 255 characters, and information is talked of as being in track 5, sector 7, or whatever.

Building up a file

A collection of items of data or information is called a file. For example, suppose you want to store the surname, first name and telephone number of all your friends in a file, held in alphabetical order. The information held for each person in the file is called a record, and the bits of information in each record are called items. So, in the example, we have three items of data per record.

This could all be held as a sequential file, but if you've got a lot of friends, it would take a long time to find the telephone number of someone whose name begins with W. If you then wanted another bit of information, you'd have to go through the whole file again. A tedious procedure.

Direct access allows us to specify which sector in which track and starting at which character a particular item of information is to go. Provided you keep track of where it's all stored, it can be directly accessed at some later date, without having to go through all the other records.

Since you can read and write to specific places on the disc, it means that you can also amend any items of information without having to update the whole file, which is certainly not the case with sequential files.

However, if you write your data into sectors which are used by other programs on the disc, those programs will become corrupted. Thus it makes sense to have one program disc and one data disc for direct access, and not to mix the two.

When using direct access, a fixed length for each item of information in the record is normally specified. Thus, the surname item could be 20 characters long, the Christian name 10, and the telephone number 20. Whatever length a name actually is, it will still occupy that much space.

It makes it easier to keep track of where all the data is, but it unfortunately takes up more room on the disc. A small price to pay for having a direct access file.

The Components of the System

Since the total number of characters used in this example is 50, it would be possible to maintain five records per sector. However, we'll keep things simple at this stage and stick to one record per block.

The seven stages in writing a direct access file are:

1) Open up a route from the 64 to a buffer in the disc unit.
2) Copy the record data into that buffer, starting at the first character position.
3) Find the next available block on the disc.
4) Tell the Disc Operating system that you want that block.
5) Put all the data from the buffer into it.
6) Make an entry in an index array relating the block to the record key, which is the index word you use to look up the record details. In this case, the surnames of the various people.
7) At some later stage, save the index array as a sequential file.

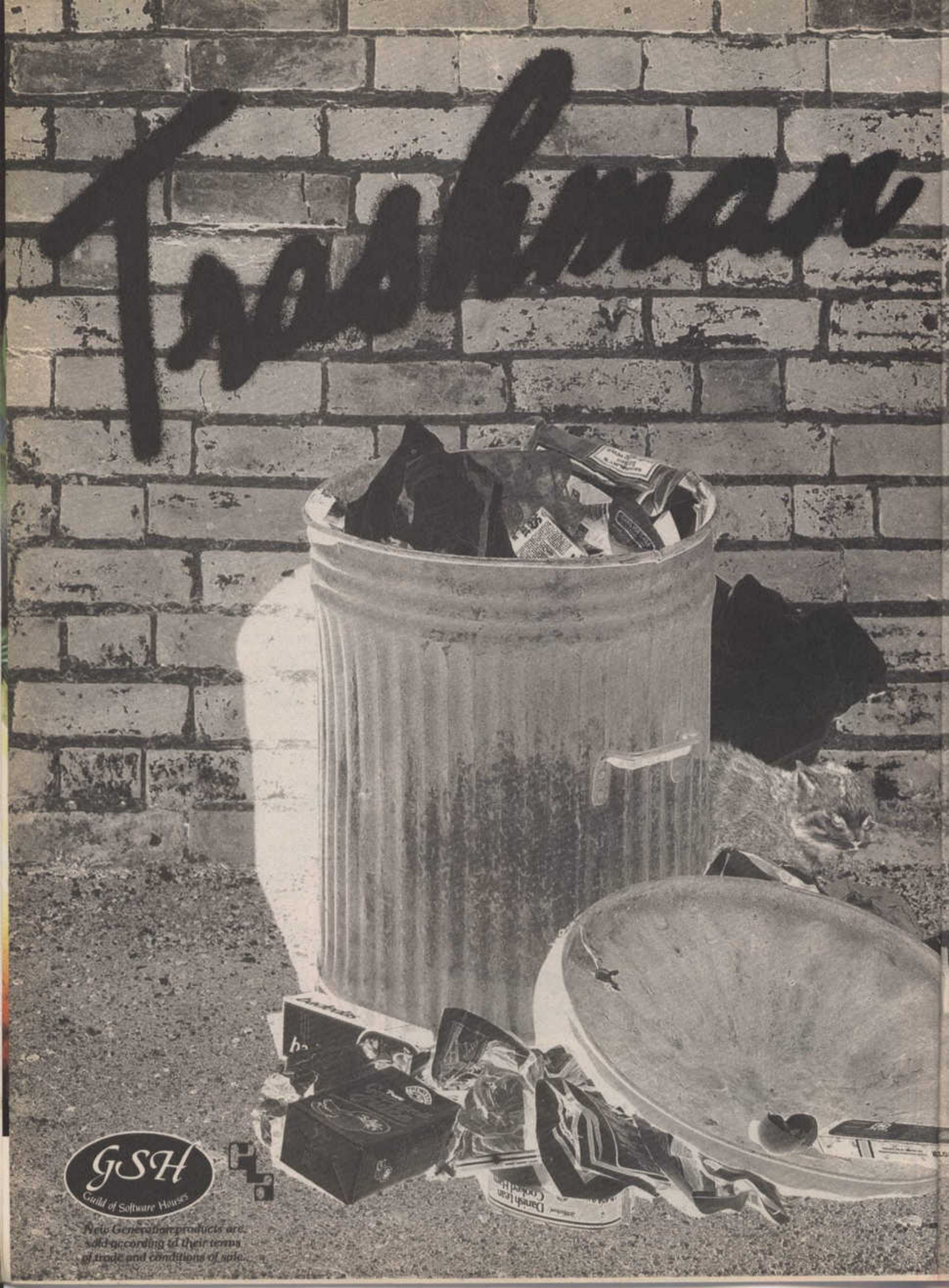
Once you've saved the index, that's it, and you can get on with something else. To read a record back is a five-stage process:

1) Read the index array back into a Basic array.
2) Open up a route from the disc buffer to the 64.
3) Search the index for the keyword of a required record and note the track and sector numbers associated with it.
4) Read the whole of that sector specified from the disc into the buffer.
5) Transfer the contents of the buffer into a Basic variable.

Finally, amending a direct access record is a four-stage process:

1) Read the whole block into the disc buffer as in 1) to 4) above.
2) Point at the part of the buffer to be overwritten.
3) Copy the new information from Basic into the buffer, overwriting the specified portion of the information in the buffer.
4) Write the contents of the buffer back to the block it came from.

Next week, we'll go into a lot more detail about the steps involved in each of these processes.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Play it again Sam

Mark Lawrence *explains how to emulate an organ*

This program allows the ZX Spectrum to be used as an organ, playing the twelve semi-tones from C to B. It does this by using the bottom two rows of the keyboard as if they were the keys of an organ.

The bottom row from Z to M produce the notes C,D,E,F,G,A,B respectively and the second row from S to J, excluding F, produce the sharp notes from C to A. If this sounds a little confusing, look at page 135, chapter 19 of the Spectrum manual and it should become a little clearer. The F key does not produce a note because there is no E sharp.

The program draws a keyboard, similar to the one on page 135 of the manual but only containing twelve keys, and as each key is pressed the key on the drawing changes colour, as in the start of *Manic Miner*, to give the impression of movement.

Once you have created your masterpiece you have the following options — pressing P will play back the tune that you have created, pressing R will reset the playback pointer, enabling you to start again, and pressing Q will return you to Basic. Enter *Goto 20* to return.

Facilities are also provided for saving and loading of a tune. To save start the tape first then press 1. Loading is done by pressing 0 and starting the tape.

The program itself occupies 1000 bytes of machine code but a short Basic program is needed to load and run the code from tape. This is the program titled Organ Basic. Type this program in and *Save "organ" LINE 1* and verify. Then type in the hex loader and run it, inputting 25000 when asked for the start address. Now enter the hex code in the listing and *Save "organ code" Code 25000, 1000*. Verify the code and then clear the machine by entering *Randomize USR 0*.

Now, rewind the tape to the start, enter *Load""* and start the tape. The Basic program should then load, auto run, load the code and run it. If the code has been entered correctly you should see a drawing of an organ and a short menu. If you do not get this display, you have typed the code in incorrectly and will have to type in the check program to check your code against the listing, *Poking* any incorrect entries.

```
                Organ Basic
>LIST
   10 CLEAR 24999:LOAD ""CODE 25000
   20 RANDOMIZE USR 25000

>                ORGAN CODE
>
```

61A8	11	90	65	ED	53	3A	65	21
61B0	00	40	11	01	40	01	00	18
61B8	36	00	ED	B0	01	A0	00	36
61C0	17	ED	B0	01	60	02	36	0F
61C8	ED	B0	21	2A	40	11	72	64
61D0	06	0E	CD	1D	63	11	80	64
61D8	21	69	40	06	10	CD	1D	63
61E0	21	E0	48	11	90	64	06	17
61E8	CD	1D	63	11	A7	64	21	20
61F0	50	06	11	CD	1D	63	21	40
61F8	50	11	B8	64	06	33	CD	1D
6200	63	21	80	50	11	EB	64	06
6208	4F	CD	1D	63	3E	00	D3	FE
6210	3E	07	32	48	5C	21	12	64
6218	22	2D	63	3E	01	32	25	63
6220	21	E9	40	11	42	64	06	10
6228	CD	1D	63	21	09	48	CD	1D
6230	63	21	29	48	CD	1D	63	21
6238	49	48	11	52	64	CD	1D	63
6240	21	69	48	CD	1D	63	21	89
6248	48	CD	1D	63	11	62	64	21
6250	C9	40	CD	1D	63	21	A9	48
6258	CD	1D	63	CD	AE	63	3E	20
6260	32	25	63	21	00	3D	22	2D
6268	63	ED	5B	3A	65	DD	21	D6
6270	63	21	06	64	06	0C	CD	E4
6278	62	BE	20	05	CD	AD	62	18
6280	EC	23	DD	23	10	F3	FE	0A
6288	28	22	FE	19	20	05	CD	3F
6290	63	18	DA	FE	0D	20	09	11
6298	90	65	ED	53	3A	65	18	CD
62A0	FE	0F	CA	40	65	FE	14	CA
62A8	67	65	18	C1	C9	F5	3E	0C
62B0	90	12	13	2A	7B	5C	A7	ED
62B8	52	20	03	11	3C	65	D5	CD
62C0	7B	63	DD	6E	00	DD	66	0C
62C8	DD	5E	18	DD	56	24	DD	E5
62D0	C5	CD	B5	03	CD	AE	63	C1
62D8	DD	E1	D1	F1	4F	CD	E4	62
62E0	B9	28	CA	C9	C5	D5	E5	06
62E8	08	11	FE	FE	21	00	00	C5
62F0	D5	C1	ED	78	06	05	CB	47
62F8	28	0C	23	CB	0F	10	F7	C1
6300	CB	02	10	EB	18	E1	C1	7D
6308	E1	D1	C1	C9	F5	C5	D5	E5
6310	06	08	1A	77	13	24	10	FA
6318	E1	D1	C1	F1	C9	F5	C5	D5

```
6320 E5 D5 E5 1A D6 20 26 00
6328 6F 29 29 29 11 00 3D 19
6330 EB E1 CD 0C 63 D1 13 23
6338 10 E7 E1 D1 C1 F1 C9 21
6340 90 65 E5 A7 ED 52 20 01
6348 13 E1 06 00 4E DD 21 D6
6350 63 DD 09 CD 7B 63 E5 DD
6358 E5 D5 DD 6E 00 DD 66 0C
6360 DD 5E 18 DD 56 24 CD B5
6368 03 CD AE 63 D1 DD E1 E1
6370 23 E5 ED 52 28 03 E1 18
6378 D1 E1 C9 F5 C5 D5 E5 DD
6380 E5 11 E9 58 01 D5 63 A7
6388 DD E5 E1 ED 42 7D D6 06
6390 38 01 2C 3E 18 CB 45 20
6398 02 3E 3B 19 06 06 11 1F
63A0 00 77 23 77 19 10 FA DD
63A8 E1 E1 D1 C1 F1 C9 C5 D5
63B0 E5 21 C9 58 11 20 00 06
63B8 08 C5 E5 06 10 36 38 23
63C0 10 FB E1 19 C1 10 F2 E1
63C8 D1 C1 C9 D5 C1 ED 53 3A
63D0 65 C9 01 00 01 C9 6A 0C
63D8 B3 60 11 C6 80 3D FF C4
63E0 8C 57 06 06 05 05 05 04
63E8 04 04 03 03 03 03 1A 1C
63F0 1D 1F 21 23 25 27 29 2C
63F8 2E 31 00 00 00 00 00 00
6400 00 00 00 00 00 00 01 06
6408 02 07 03 04 09 27 22 26
6410 21 25 FE FE FE FE FE FE
6418 FE FE 7F 7F 7F 7F 7F 7F
6420 7F 7F 01 01 01 01 01 01
6428 01 01 80 80 80 80 80 80
6430 80 80 FF FF FF FF FF FF
6438 FF FF 00 00 00 00 00 00
6440 00 00 02 06 02 01 02 01
6448 03 04 02 01 02 01 02 01
6450 06 01 02 06 03 04 03 04
6458 03 04 03 04 03 04 03 04
6460 06 01 02 05 05 05 05 05
6468 05 05 05 05 05 05 05 05
6470 05 01 53 70 65 63 74 72
6478 75 6D 20 4F 72 67 61 6E
6480 42 79 20 4D 61 72 6B 20
6488 4C 61 77 72 65 6E 63 65
6490 55 73 65 20 74 68 65 20
6498 66 6F 6C 6C 6F 77 69 6E
64A0 67 20 6B 65 79 73 3B 51
64A8 20 72 65 74 75 72 6E 20
64B0 74 6F 20 62 61 73 69 63
64B8 5A 20 74 6F 20 4D 20 61
64C0 6E 64 20 53 20 74 6F 20
64C8 4A 20 28 6E 6F 74 20 66
64D0 29 20 6E 6F 74 65 73 20
64D8 50 20 74 6F 20 70 6C 61
64E0 79 20 62 61 63 6B 20 74
64E8 75 6E 65 52 20 74 6F 20
64F0 72 65 73 65 74 20 70 6C
64F8 61 79 62 61 63 6B 20 70
6500 6F 69 6E 74 65 72 2E 20
6508 20 20 20 31 20 74 6F 20
6510 53 61 76 65 20 74 75 6E
6518 65 20 74 6F 20 74 61 70
6520 65 2E 20 20 20 20 20 20
6528 20 20 20 30 20 74 6F 20
6530 6C 6F 61 64 20 74 75 6E
6538 65 2E A8 65 00 01 02 03
6540 DD 21 3A 65 EB 22 3A 65
6548 DD E5 E5 11 02 00 AF 37
6550 CD C2 04 E1 DD E1 DD E5
6558 D1 A7 ED 52 23 EB 3E FF
6560 37 CD C2 04 C3 AF 61 DD
6568 21 3A 65 11 02 00 AF 37
6570 DD E5 CD 56 05 DD E1 2A
6578 3A 65 DD E5 D1 A7 ED 52
6580 23 EB 3E FF 37 CD 56 05
6588 C3 AF 61 00 00 00 00 00
```

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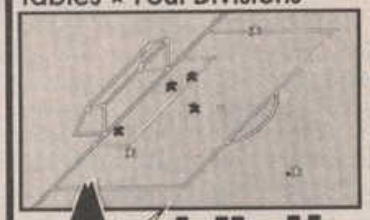

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Home Computing Weekly
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A maze of letters

***Ian and Damian Inger** present a complicated word puzzle*

The player, after reading the instructions, is presented with a maze at the top of the screen which is headed by six letters. The computer then selects a word at random from a data list, which is then displayed at the bottom of the screen as blocks, except for the first and last letters. The player is then asked whether or not he can see the letter he wishes to try at the top of the screen. If the answer to this prompt is "no", another set of six letters are dispayed. On answering "Y" to this prompt, an arrow is displayed in the bottom left corner of the maze.

The player types in a string of moves such as 'FFFFRRFFFBLRFF" to guide the arrow through the maze towards the guess letter. If this letter is in the word, all occurrences of it are displayed. If the path through the maze is blocked, "E" may be entered in the move string to explode the part of the barrier immediately in front of the arrow.

You can use this a maximum of 3 times. Should the arrow collide with the barrier in the maze, the arrow is lost and the move is terminated. 3 arrows are allowed per game.

The program particularly encourages thinking ahead and to program the machine in a fairly simple way to achieve the end result. When typing the program in, I would suggest that lines 270 and 280 are left out until all the typing errors have been removed. The word list can be expanded easily by increasing the value of the variable at line 520 and entering more data statements at line 570.

```
10REM
20REM   Word puzzle
30REM   (c) Feb 84
40REM   Ian & Damian Inger
50REM
60MODE7
70PRINTTAB(7,1)CHR$(141)+CHR$(130)+"INSTRUCTIONS"
80PRINTTAB(7,2)CHR$(141)+CHR$(130)+"INSTRUCTIONS"
90PRINT
100PRINTCHR$131+"The computer will think of a word"
110PRINTCHR$131+"and just like Hangman, you have to"
120PRINTCHR$131+"guess what it is."
130PRINT
140PRINTCHR$131+"To get your guess letters, you have to"
150PRINTCHR$131+"guide an arrow through a maze by typing";
    CHR$131;"F for forwards, B for backwards, R for"
160PRINTCHR$131+"right, or L for left."
170PRINT
180PRINTCHR$131+"Sometimes, you will find that your path";
    CHR$131;"through the maze is blocked."
190PRINTCHR$131+"If this happens, use E instead of F to"
200PRINTCHR$131+"move forwards. This will explode the"
210PRINTCHR$131+"square in front of the arrow."
220PRINT
230PRINTCHR$131+"You have three arrows and three E's."
240PRINTCHR$131+"Good luck!"
250PRINT:PRINT
260REPEAT:PRINTCHR$129+"Press SPACE BAR to start":UNTIL GET=32
270DIM D$(10)
280K.100LD:MRUN:M
290*FX229,1
300*FX11,0
310MODE2
320arrow=3
330E=3
340S%=65
3506$=""
360VDU23;8202;0;0;0;
370PROCword
380VDU23,241,0,126,126,126,126,126,126,126
390VDU23,242,126,126,126,126,126,126,126,0
400VDU23,243,255,255,255,255,255,255,255,255
410VDU23,244,0,24,60,126,24,24,24,24
420PROCgrid
430PROCbarrier
440REPEAT
450PROCletter
460PROCarrow
470PROCmovearrow
480PROCgetletter
490PROCcheck
500UNTIL FALSE
510DEFPROCword
520R=RND(10)
530FOR J=0 TO R
540READ word$
550NEXT
560RESTORE
570DATA CAT,DOG,MOUSE,RABBIT,HORSE,WOLF,FLY,FISH,BIRD,RHINO,LION
580W=LEN(word$)
590Q$(I)=LEFT$(word$,1)
600Q$(W)=RIGHT$(word$,1)
610COLOUR128:CLS
620COLOUR3
630PRINT:PRINT:PRINT
640PRINT"I'm thinking of a"
650PRINT
660PRINT"word!"
670PRINT
680PRINT"It has ";W;" letters."
690PRINT:PRINT:PRINT:PRINT
700COLOUR2
710PRINT"Press Y when you are"
720PRINT
730PRINT"ready to guess it."
740REPEAT
7506=GET
760UNTIL G=89 OR G=121
770ENDPROC
780DEFPROCgrid
790VDU24,0;320;1279;1023;
9006COL0,130:CLG
810VDU28,0,30,19,2
820COLOUR135:CLS
830COLOUR1
840FOR X=0 TO 1280 STEP 64
850MOVE X,320
860DRAW X,959
870NEXT
880FOR Y=320 TO 960 STEP 64
890MOVE 0,Y
900DRAW1279,Y
910NEXT
920ENDPROC
930DEFPROCbarrier
940VDU5
9506COL0,1
960A$=STRING$(5,CHR$(241))
9708$=STRING$(5,CHR$(242))
980FOR Y=384 TO 959 STEP 64
990I=(RND(16)*64)-64
1000MOVE X,Y
1010PRINTA$
1020MOVE X,Y-32
1030PRINTB$
1040NEXT
1050MOVE 0,Y:PRINTA$
1060MOVE 0,Y-32:PRINTB$
1070VDU4:ENDPROC
1080DEFPROCletter
1090REPEAT
1100PROCgetstring
1110VDU5
11206COL0,2
1130MOVE 320,1007:PRINTSTRING$(8,CHR$(243))
11406COL0,0
1150MOVE320,1007:PRINTD$
1160VDU4
```

continued on page 31 ▸

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◀ continued from page 29

```
1170CLS
1180COLOUR0
1190PRINTTAB(0,1)"CAN YOU SEE THE"
1200PRINT"LETTER YOU NEED?"
1210PRINT
1220COLOUR1
1230PRINT"PRESS 'Y' OR 'N'"
1240COLOUR4
1250FOR I=1 TO W
1260PRINTTAB(I,6)Q$(I)
1270IF Q$(I)="" THEN PRINTTAB(I,6)CHR$(242)
1280NEXT
1290COLOUR2
1300PRINTTAB(17,4)STRING$(E,"E")
1310PRINTTAB(17,6)STRING$(arrow,CHR$(244));
1320COLOUR4
1330COLOUR4
1340G=GET
1350UNTIL G=89 OR G=121
1360ENDPROC
1370DEFPROCgetstring
1380D$=""
1390FORB=0 TO 7
1400D$=D$+CHR$(SZ)
1410SZ=SZ+1
1420IF SZ)=91 THEN SZ=65
1430NEXT
1440ENDPROC
1450DEFPROCarrow
1460VDU4:CLS
1470XI=0:YI=368
1480VDU5
1490COLO.8
1500IF POINT(XI+8,368)=1 THEN XI=XI+64:GOTO 1500
1510MOVEXI,YI:PRINTCHR$(244)
1520VDU4
1530COLOUR0
1540ENDPROC
1550DEFPROCmovearrow
1560crash=0
1570COLOUR4
1580VDU4
1590FOR I=1 TO W
1600PRINTTAB(I,6)Q$(I)
1610IF Q$(I)="" THEN PRINTTAB(I,6)CHR$(242)
1620NEXT
1630COLOUR0
1640PRINTTAB(0,1)"ENTER YOUR MOVE"
1650COLOUR2
1660PRINTTAB(17,4)STRING$(E,"E");
1670PRINTTAB(17,6)STRING$(arrow,CHR$(244));
1680COLOUR0
1690INPUTTAB(0,3)M$
1700M=LEN(M$)
1710H=1
1720REPEAT
1730MI$=MID$(M$,H,1)
1740IF MI$="E" OR MI$="e" THEN E=E-1
1750IF ASC(MI$)>90 THEN MI$=CHR$(ASC(MI$)-32)
1760PROCmove
1770IF crash=1 THEN H=M
1780VDU4
1790COLOUR4
1800FORI= 1 TO W
1810PRINTTAB(I,6)Q$(I)
1820IF Q$(I)="" THEN PRINTTAB(I,6)CHR$(242)
1830NEXT
1840VDU5
1850H=H+1
1860UNTIL H)M
1870ENDPROC
1880DEFPROCmove
1890VDU5
19006COLO.2:MOVEXI,YI:PRINTCHR$(244)
19106COLO.8
1920IF MI$="F" THEN YI=YI+64:IF YI>1008 THEN YI=1008
1930IF MI$="B" THEN YI=YI-64:IF YI<368 THEN YI=368
1940IF MI$="L" THEN XI=XI-64:IF XI<0 THEN XI=0
1950IF MI$="R" THEN XI=XI+64:IF XI>1216 THEN XI=1216
1960IF MI$="E" THEN PROCexplode:YI=YI+64
1970MOVE XI,YI:PRINTCHR$(244)
1980SOUND0,-15,10,3
1990TIME=0:REPEAT:UNTIL TIME=30
2000IF POINT(XI+8,YI+8)=1 THEN VDU4:PROCcrash:crash=1
2010ENDPROC
2020DEFPROCgetletter
2030AN$=""
2040IF YI<1007 THEN ENDPROC
2050XP=XI-320
2060XPS=XP/64
2070AN$=MID$(D$,XPS+1,1)
2080VDU4
2090ENDPROC
2100DEFPROCcheck
2110IF AN$="" THEN ENDPROC
2120VDU4
21306$=""
2140FORV=1 TO W-1
2150I=INSTR(word$,AN$,V)
2160Q$(I)=AN$
2170NEXT
2180FOR I=1 TO W
21906$=G$+Q$(I)
2200NEXT
2210IF G$=word$ THEN PROCenc
2220VDU5
2230ENDPROC
2240DEFPROCcrash
2250arrow=arrow-1
2260VDU4
2270CLS
2280PRINTTAB(0,1)"YOU CRASHED!"
2290SOUND0,-15,100,20
2300VDU5
2310FOR D=0 TO 20
2320TIME=0:REPEAT:UNTILTIME=5
2330C=RND(16)
23406COLO.C
2350MOVEXI,YI
2360PRINTCHR$(244)
2370NEXT
2380VDU5
23906COLO.1
2400MOVEXI,YI
2410PRINTCHR$(244)
2420M$=""
24301F arrow=0 THEN PROCfailed
2440ENDPROC
24500EFPROCenc
2460VDU4
2470CLS
2480PRINTTAB(0,1)"YOU WIN!"
2490PRINTTAB(0,3)"IT WAS ";G$
2500PRINTTAB(0,5)"ANOTHER GO?"
25106=GET
2520IF G=89 THEN RUN ELSE CLS:CLG:END
2530ENDPROC
2540DEFPROCexplode
2550IF E<0 THEN PROCcrash:ENDPROC
2560SOUND0,-10,100,9
2570VDU5
2580MOVEXI,YI+80
25906COLO.2
2600PRINTCHR$(241)
2610MOVEXI,YI+48
2620PRINTCHR$(242)
2630ENDPROC
2640DEFPROCfailed
2650VDU4
2660CLS
2670COLOUR1
2680PRINT:PRINT"I won!"
2690PRINT
2700PRINT"It was ";word$;
2710COLOUR0
2720PRINTTAB(0,5)"ANOTHER GO?"
27306=GET
2740IF G=89 THEN RUN ELSE CLS:CLG:END
2750ENDPROC
```

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Spectrum graphics special – how to program great graphics into your micro.

Inside the 6809

Jason Orbaum and Geoffrey Campbell *look at the internal organisation of the 6809 in the second part of their series on assembly language*

Last week we left you with a couple of programs, which we will now explain.

Listing one displayed the whole character set, by *Poking* into the text screen area. A few eagle-eyed people probably noticed that this is different to the character set attained by entering *For N=0 To 255:Print Chr$(N):Next N.* This is due to the absence of control codes. The only difference that this gives is that for all the characters available from the keyboard, there is an inverse. Try getting an inverse space from characters 0-127 without using *Poke.*

Before going into listing two, it is necessary to have a reasonably good knowledge of the binary numbering system. This will help with assembly programming in future articles as well.

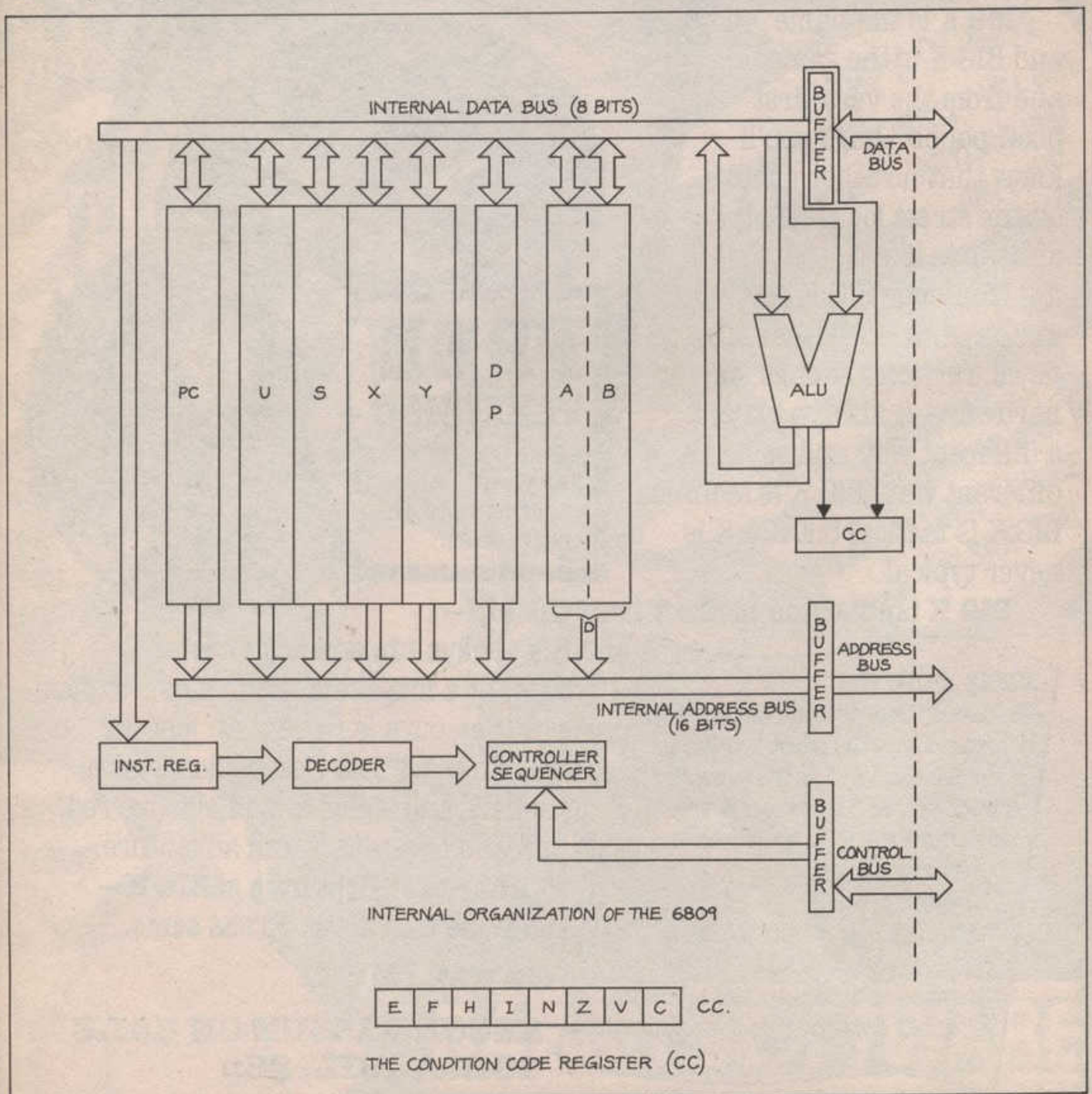
In the decimal numbering system, the number 12345 represents:

1*10000 + 2*1000 + 3*100 + 4*10 + 5*1

These represent the powers of 10, so that our number becomes:

(1*ten to the power 4) + (2*ten to the power 3) + (3*ten to the power 2) + (4*ten to the power 1) + (5*ten to the power 0)

Note that, in the last bracket of the expression, 10 to the power 0 is equal to 1. The binary number system works in the same way, but each digit is a power of two instead of ten. Just as the highest value a



INTERNAL ORGANIZATION OF THE 6809

THE CONDITION CODE REGISTER (CC)

single base ten (decimal) digit can hold is 9, so the highest value a single base 2 (binary) digit can hold is 1. Therefore, any binary number is going to be a string of ones and zeros.

An example of this is the number 1011000 /1B (the B denotes a binary number). This represents:

1*128 + 0*64 + 1*32 + 1*16 + 0*8 + 0*4 + 0*2 + 1*1
177

or, to put it in a more familiar form:

(1*two to the power 7) + (0*two to the power 6)
+ (1*two to the power 5) + (1*two to the power 4)
+ (0*two to the power 3) + (0*two to the power 2)
+ (0*two to the power 1) + (1*two to the power 0)

This is relevant to the hi-res Program given last week as, in Pmode 4, the picture is held as a set of binary numbers. Each bit (binary digit) represents one pixel (picture element), and so Poking different numbers into the hi-res screen locations produces different combinations of eight pixels, as there are eight pixels held in one memory byte (group of eight bits). If a particular bit is set to one, the pixel is set to white, and if it is set to zero, the pixel is set to black.

Thus it can be seen that listing two *Pokes* all possible combinations (in Pmode 4) of eight pixels to the hi-res screen. Now we will leave hi-res until a later article.

The processor at the heart of the Dragon is a very complex piece of electronics engineering, and an understanding of roughly how it works is a great aid to writing efficient assembly code.

Diagram one shows the internal organisation of the 6809E. Starting from the top left and working down to the bottom right, we have:

The *Internal Data Bus* — is a set of eight "wires" (silicon etchings), which carry data in sets of eight or 16 bits, ie, one or two bytes. In this case it carries one byte from a register to the ALU (Arithmetic Logic Unit), or vice versa.

A *Buffer* — this is a link to the outside world, and none of them need be considered here, as they are used for *Input/Output* operations.

The *Registers* — these hold numbers, in groups of eight or 16 bits. They are:

PC — The Program Counter. This holds the address of the next instruction to be executed.

U — The User Stack. A stack should be treated as a pile of numbers, and therefore the only number that can be taken from it is the last one put on the top. This is called a Filo (First In, Last Out) structure. This is a double — precision register, which means it can hold a 16-bit number.

S — The System Stack. This is similar to the User Stack, but it is occasionally used by the system, as the name suggests.

X — One of the Index Registers. This will be explained later, in the article on addressing modes.

Y — The other Index Register.

DP — The Direct Page register is an eight-bit register used to address pages of memory. A page is simply a block of 256 bytes. Thus, memory locations 0-255 are page 0. Since the addresses go up to 65535, there are 256 pages (0-255).

A — The A register is an eight-bit register, and is used in all the arithmetic functions. It can be combined with the B register to produce the 16-bit D register. The D register has B as the low byte (the eight bits with least value, on the right of the number).

The *ALU* — This performs all the arithmetic functions for the processor. It has inputs and outputs from and to all the registers, including the CC (Condition Code) register

The *CC* — This is, really, an eight-bit register, but it is used to display the status of the registers after the arithmetic functions.

The *Internal Address Bus* — This is a 16-bit bus, to transfer addresses from the registers out to Ram, for use in *Read/Write* operations.

The *Instruction Register* — along with the decoder and the controller sequencer, this controls the interpretation of the command.

Next week we will look at a few of the basic commands, and the addressing modes of the 6809.

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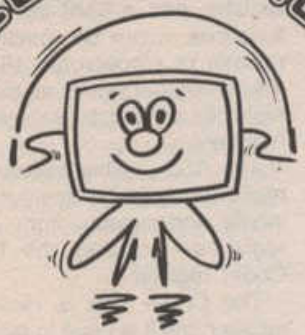

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Scroller

on Spectrum

This is a machine code utility routine. The routine is to be used in conjunction with readers' screen pictures or within a program they have written. It will scroll the screen up or down a pixel at a time up to 255 pixels each way. This program was written to run on the 48K spectrum but can run with the following changes on 16K.

```
LINE 10 CLEAR 31000 etc
        FOR A = 31000 TO 31227 etc
LINE 22 ...CODE 31000,228
LINE 8500 ...USR 31000 etc
LINE 8501 ...USR 31114 etc
```

The reason for this is the way that the memory is allocated to different areas on different machines. When run the program loads the machine code and you have the option to save it. You are then asked two questions which you can decide at the time. The machine code will then scroll the screen up and down the amount you desire from the questions. Your own pictures can be put between lines 50 and 8500. The pokes made are always in the printer buffer if you want to include the routine in your own programs. Save the program before running it as you could have mistyped some of the data which would cause the computer to crash. If this is so then check through the data statements.

```
   1 REM    Scroller/Roller
   designed and written by
   Chris Kenworthy January 1984
   4 BORDER 0: PAPER 0: INK 7: B
RIGHT 1: OVER 0: FLASH 0: CLS
   5 POKE 23658,8: REM SETS CAPS
 LOCK
  10 CLEAR 64000: RESTORE 9000:
FOR a=64000 TO 64227: READ b: PO
KE a,b: NEXT a
  20 PRINT "Do you want to save
the data?"
  21 LET z$=INKEY$: IF z$="" THE
N GO TO 21
  22 IF z$="Y" THEN SAVE "Roller
"CODE 64000,228
  30 INPUT "How many pixels up ?
";a: IF a<=0 OR a>=256 THEN GO
TO 30
  31 INPUT "How many pixels down
 ?";B: IF B<=0 OR B>=256 THEN GO
 TO 31
  40 REM   PUT YOUR SCREEN OR
DRAWING BETWEEN LINE 50 AND 8500
  41 REM HERE IS AN EXAMPLE
  50 INK 6: CLS : CIRCLE 100,100
,50
  51 CIRCLE 100,100,48
  52 CIRCLE 100,100,46
8500 POKE 23506,A: RANDOMIZE USR
 64000: REM POKE IS IN PRINTER
BUFFER
8501 POKE 23505,B: RANDOMIZE USR
 64114: REM POKE IS IN PRINTER
BUFFER
8502 IF INKEY$="" THEN GO TO 850
0
8503 INK 7: STOP
9000 DATA 58,210,91,71,197,221,3
3,204,91,33,0,91,221,54,0,0,221,
54,1,0,221,54,2,0,235,221,126,0,
203,39,203,39,203,39,221,134,2,1
98,64,103,221,126,1,203,39,203,3
9,203,39,203,39,203,39
9001 REM
9002 DATA 111,229,1,32,0,237,176
,225,221,52,2,221,126,2,254,8,32
,209,221,54,2,0,221,52,1,221,126
,1,254,8,32,195,221,54,1,0,221,5
2,0,221,126,0,254,3,32,181,33,0,
91,17,224,87,1,32,0,237,176
9003 REM
9004 DATA 193,16,147,201,58,209,
91,71,197,221,33,204,91,33,0,91,
221,54,0,2,221,54,1,7,221,54,2,7
,235,221,126,0,203,39,203,39,203
,39,221,134,2,198,64,103,221,126
,1,203,39,203,39,203,39,203,39,2
03,39,111,229,1,32,0,237,176,225
,221,53,2,221,126,2,254,255,32
9005 REM
9006 DATA 209,221,54,2,7,221,53,
1,221,126,1,254,255,32,195,221,5
4,1,7,221,53,0,221,126,0,254,255
,32,181,33,0,91,17,0,64,1,32,0,2
37,176,193,16,147,201
```

Scroller
by Chris Kenworthy

Quadratics

on Vic 20

Utilising the equation given in the program the user inputs values for A, B and C. In certain cases there may be no solutions. The program includes detailed instructions and aims to be user friendly.

Program Notes
10-121 Screen display and input three values.
130-160 Calculate answers if any.
170-190 Print answers and end display.
300-350 No solutions routine.
1000-1060 Input beep.
2000-2300 'Hit any key' beep.
5000-5460 Instructions.
5470-5700 Programming hints. The program is printed on the 1520 plotter printer which cannot handle some characters.

Variables:
A
B — Input values
C
x — Solution to top part of equation.
P,Q — Completed solutions.
T,MM,DD — General variables for loops.

```
0 REM "QUADRATICS" BY SARAH COTTON
1 GOSUB5000
2 POKE36878,15
10 PRINT"s**********************";
20 PRINT"QQSOLUTIONS TO "
30 PRINT"QAX↑2+BX+C WHERE:"
99 PRINT"QQA=";
100 INPUTA:IFA=0THEN10
101 GOSUB1000
109 PRINT"B=";
110 INPUTB
111 GOSUB1000
119 PRINT"C=";
120 INPUTC
121 GOSUB1000
130 X=B*B-4*A*C
140 IFX<0THEN300
150 Q=(-B-(X↑0.5))/(2*A)
160 P=(-B+(X↑0.5))/(2*A)
170 PRINT"ARE X=";P
180 PRINT"OR  X=";Q
181 PRINT"Q**********************"
182 PRINT"SQQQQQQQQQQQQQQQQQQE     HIT AN
Y KEY";
```

```
183 GOSUB2000
184 PRINT"SQQQQQQQQQQQQQQQQQQ      HIT AN
Y KEY";
185 GOSUB2000
186 GETA$
187 FORT=1TO250:NEXT
188 IFA$=""THEN182
189 PRINT"←"
190 GOTO10
300 PRINT"sQQ        SORRY!"
310 PRINT"QQQJ CAN'T WORK THAT ONE"
320 PRINT"Q          OUT."
330 PRINT"QQQQ       TRY AGAIN"
340 FORT=1TO2500:NEXTT
350 GOTO10
1000 REM
1010 POKE36876,200:POKE36878,15
1020 FORMM=1TO200:NEXTMM
1030 POKE36878,0
1040 FORMM=1TO200:NEXTMM
1050 POKE36878,0
1060 RETURN
2000 POKE36878,15:POKE36876,245
2100 FORT=1TO350:NEXT
2200 POKE36876,0:POKE36878,0
2300 RETURN
5000 PRINT"sQQQQQQQQQQQ  QUADRATIC EQUAT
IONS"
5010 FORT=1TO2000:NEXTT
5011 PRINT"E"
5020 PRINT"stHIS PROGRAM IS "
5030 PRINT"QDESIGNED TO WORK OUT"
5040 PRINT"QQUADRATIC EQUATIONS"
5050 PRINT"QUSING THE FORMULA:"
5060 PRINT"QX=-B+ /##########"
5070 PRINT "     -: B↑2-4*A*C"
5080 PRINT "  99999999999999 "
5090 PRINT "Q        2*A
5091 PRINTCHR$(14)
5100 FORDD=38400TO38686
5110 POKEDD,0
5120 NEXTDD
5130 PRINT"Q£      HIT ANY KEY"
5140 GETA$:IFA$=""THEN5140
5150 PRINTCHR$(142)
5160 PRINT"sTO SOLVE THE EQUATION"
5170 PRINT"QYOU ARE REQUIRED TO"
5180 PRINT"QTO INPUT VALUES FOR"
5190 PRINT"QA,B AND C."
5200 PRINT"QEXAMPLE"
5300 PRINT"???????"
5400 PRINT"Q↑6X↑2£-2X←3_=0"
5410 PRINT"Q↑A=6"
5420 PRINT"Q£B=-2"
5430 PRINT"Q←C=-3"
5440 PRINT"Qp        HIT ANY KEY"
5450 GETA$:IFA$=""THEN5450
5460 RETURN
5470 REM PROGRAMMING INSTRUCTIONS (NO NE
ED TO TYPE THESE IN)
5480 REM "s"=CLR
5490 REM "S"=HOME
5500 REM "Q"=CRSR DOWN
5510 REM "E"=WHITE
5520 REM "£"=RED
5530 REM "←"=BLUE
5540 REM "↑"=GREEN
5550 REM "_"=PURPLE
5560 REM "p"=BLACK
5670 REM SMALL LETTERS INDICATE THAT THE
Y SHOULD BE SHIFTED
5680 REM LINE5060 "#"=COMMODORE KEY AND
T
5685 REM LINE5070 ":"=SHIFT KEY AND 0
5690 REM LINE5080 "9"=COMMODORE KEY AND
O
5700 REM LINE5300 "7"=COMMODORE KEY AND
Y

READY.
```

Quadratics
by Sarah Cotton

Colours

on Dragon

These programs provide a purple colour in pmode 3:screen1,0 by pokeing the value 187 onto the hi-res graphic screen. The colour is made up of alternate blue and red dots. The basic program (a) is very slow so I have included a machine code version (b) which is executed by the basic program (c). For those without assemblers, the row of hex numbers second from the left (reading 86BB 8E06 00 etc.) can be poked into the appropriate memory locations. The memory locations are listed in the first row. The numbers go in pairs so that &H86 is poked into memory location &H4E21 and &HBB is poked into memory location &H4E22 etc. You may have noticed that the lines are drawn in yellow. This is because the purple contains both red and blue and the paint wouldn't be able to flow anywhere if the border was either of these.

a

```
10 PMODE3,1:SCREEN1,0:PCLS
20 FOR X=&H600 TO &H1DFF
30 POKE X,187:NEXT
40 DRAW"C2"
50 CIRCLE(128,92),20
60 FOR U=40 TO 100 STEP 20
70 CIRCLE(128,92),U,2
80 NEXT
90 PAINT(100,92),2,2
100 PAINT(80,92),3,2
110 PAINT(60,92),1,2
120 PAINT(40,92),4,2
130 GOTO 130
```

continued on page 43 ▸

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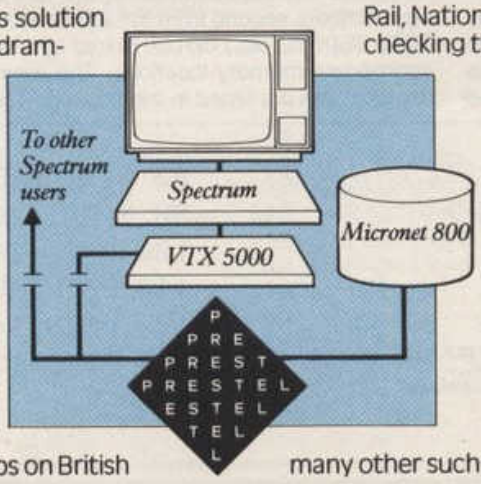

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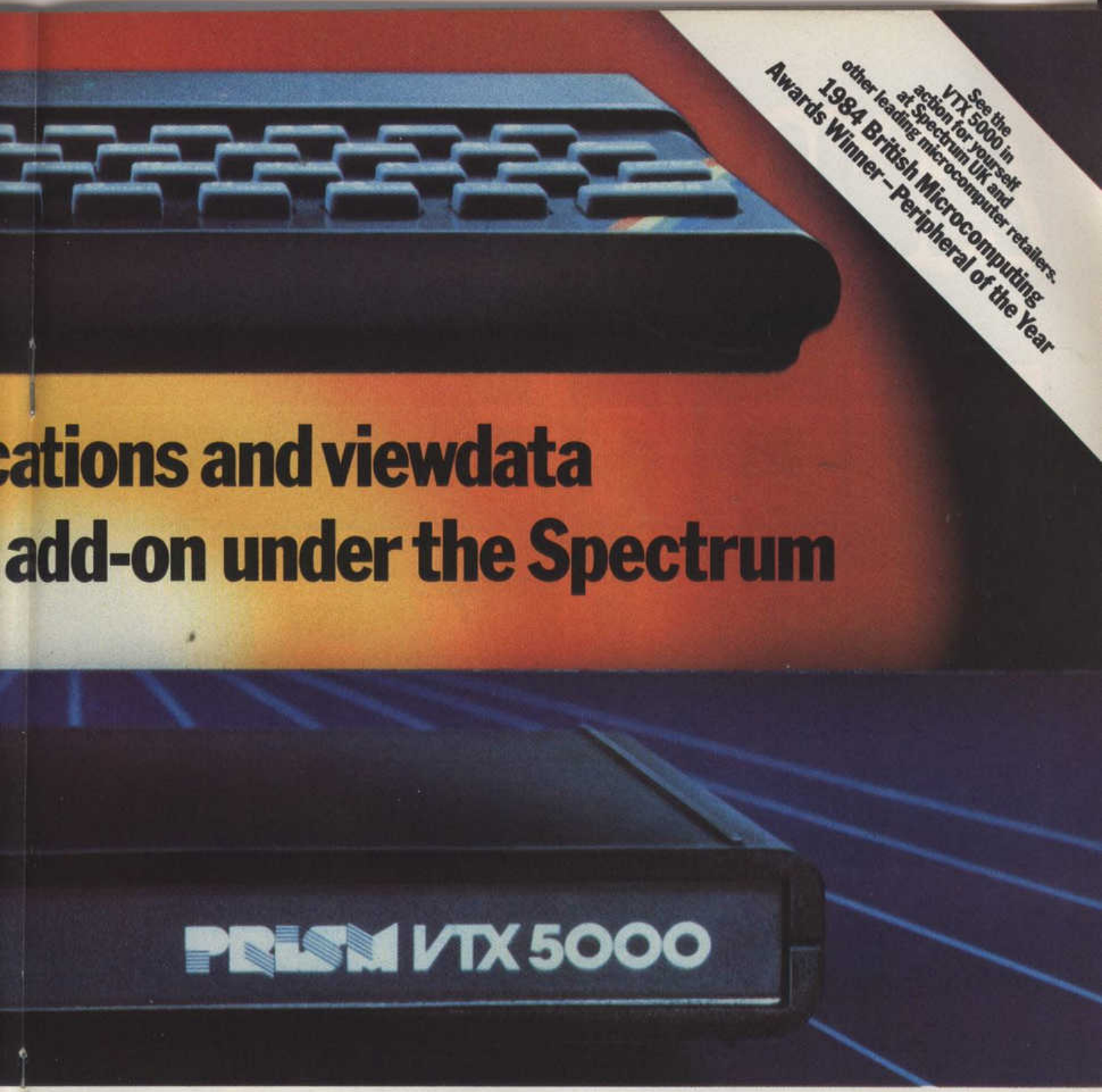

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Open Forum

◀ continued from page 39

b

```
4E21 86BB       LDA #187
4E23 8E0600     LDX #$600
4E26 A780      LOOP STA ,X+
4E28 8C1E00     CMPX #$1E00
4E2B 26F9       BNE LOOP
4E2D 39         RTS
4E2E
```

c

```
10 PMODE3,1:SCREEN1,0:PCLS
20 EXEC &H4E21
30 DRAW"C2"
40 CIRCLE(128,92),20
50 FOR U=40 TO 100 STEP 20
60 CIRCLE(128,92),U
70 NEXT
80 PAINT(100,92),2,2
90 PAINT(80,92),3,2
100 PAINT(60,92),1,2
110 PAINT(40,92),4,2
120 GOTO 120
```

Colours
by N Smith

Back to Basic

on Spectrum

This program will convert almost all *Machine code* programs back to *Basic* Type in listing then *save* and *run*. When border flashes load m/c — code must be less than 17K long or it will crash. Longer programs you must stop tape after about 30 seconds.

When screen goes black and *run* appears press *enter* to reveal the basic listing.

```
  2 RESTORE : CLS : DATA 130,16
0,164,146,152,64,140,158,158,152
  3 LET G=16394+32*5
  4 FOR T=0 TO 9: READ A
  5 LET G=G+1
  7 LET A=A/2-32
  8 LET DE=15615+A*8: LET X=0
 10 FOR y=0 TO 32 STEP 32
 11 LET hl=G+y
 12 FOR n=0 TO 7
 13 IF N/2=INT (N/2) THEN LET X
=X+1
 15 LET h=INT (hl/256)
 20 LET l=hl-256*h
 35 LET P=PEEK (DE+X)
 40 POKE hl,P
 42 LET h=h+1: LET hl=l+256*h
100 NEXT n: NEXT y: NEXT t
120 RANDOMIZE USR 5566
130 PAPER 0: RANDOMIZE USR 3435
: PAUSE 25: PAPER 7: RANDOMIZE U
SR 3435: RANDOMIZE USR 4742
```

Back to Basic
by E Duncan-Dunlop

Metronome

on BBC

This program should work on the BBC Micro A or B, any operating system. It simulates the sound produced by a metronome for any speed between 1 and 300 beats per minute.

Program notes
20 Re-run when *Escape* is pressed
40 Define large text window
50 click sound envelope
60-70 title in double height
80-190 Suggested numerical speeds for various tempos, and instructions
200 One line only text window
210 Ask for required tempo
220 Do not accept ridiculous tempos.
230 Remove flashing text cursor
240-250 Calculate pause between clicks — theoretically 60 should be found instead of 57, but the latter is an adjustment because of the time taken to run the program and for the click.
260-290 Continue sounds until *Escape* is pressed.

```
 10 REM METRONOME
 20 ON ERROR RUN
 30 MODE7
 40 VDU28,0,23,39,0
 50 ENVELOPE1,0,0,0,0,0,0,0,126,-2,0,0,126,110
 60 PRINTTAB(9,1);CHR$(141);"M E T R O N O M E "
 70 PRINTTAB(9,2);CHR$(141);"M E T R O N O M E "
 80 PRINTTAB(4,5);CHR$(130);"Grave=38";SPC(10);"Moderato= 87"
 90 PRINTTAB(4,6);CHR$(130);"Largo=45";SPC(8);"Allegretto=108"
100 PRINTTAB(4,7);CHR$(130);"Lento=51";SPC(11);"Animato=119"
110 PRINTTAB(3,8);CHR$(130);"Adagio=55";SPC(11);"Allegro=130"
120 PRINTTAB(0,9);CHR$(130);"Larghetto=59";SPC(5);"Allegro assai=143"
130 PRINTTAB(2,10);CHR$(130);"Andante=64";SPC(4);"Allegro vivace=152"
140 PRINTTAB(0,11);CHR$(130);"Andantino=68";SPC(12);"Vivace=159"
150 PRINTTAB(0,12);CHR$(130);"Sostenuto=74";SPC(12);"Presto=183"
160 PRINTTAB(3,13);CHR$(130);"Comodo=79";SPC(7);"Prestissimo=207"
170 PRINTTAB(1,14);CHR$(130);"Maestoso=83"
180 PRINTTAB(10,23);CHR$(129);"To stop hit 'ESCAPE'"
190 PRINTTAB(0,17)"Enter the required speed (as a number), then press 'RETURN'"
200 VDU 28,0,21,39,20
210 INPUTTAB(5)"BEAT= "Y
220 IF Y<1 OR Y>300 THEN CLS:GOTO 210
230 VDU 23;10,32,0;0;0;
240 Y=57/Y
250 A=Y*20
260 REPEAT
270   SOUND1,1,-15,1
280   SOUND1,0,0,A
290   UNTIL FALSE
300 END
```

Metronome
by J Wilson

Variable

on Spectrum

This short machine code routine will print out all the variables in a Basic program. Variables held in the Spectrum are of six different types as explained in Chapter 24 of the manual. The first byte of each variable coding defines which type it is and this byte is used in the following machine code routine which prints on the screen all of the variables defined in any *Basic* program. The six types of variables are as follows:

1: Single Letter
2: Multiple Letter
3: String
4: Number Array
5: Character Array
6: For/Next Loop

The routine starts by examining the bytes following the address held in the System Variables location 23627/8 *(Vars)* using the first byte of each variable coding to decide which type it is, then printing it on the screen using the *Rst* 16 instruction and the *Rom* routine at 6683 which prints the contents of register BC (if it is less than 10,000). When the routine finds a byte with a value of 128 this signals the end of the variables and the routine returns to Basic.

Single and multiple letter variables are printed out directly, strings are shown with the appropriate letter followed by a $ sign, arrays as *Dim* a (1,2,3 etc) and for/next loops as *"Fnl"* with the appropriate letter following.

The machine code routine which is 194 bytes long is given as a decimal dump in 5 byte blocks and may be loaded using any suitable Basic loader at any desired

continued on page 45 ▶

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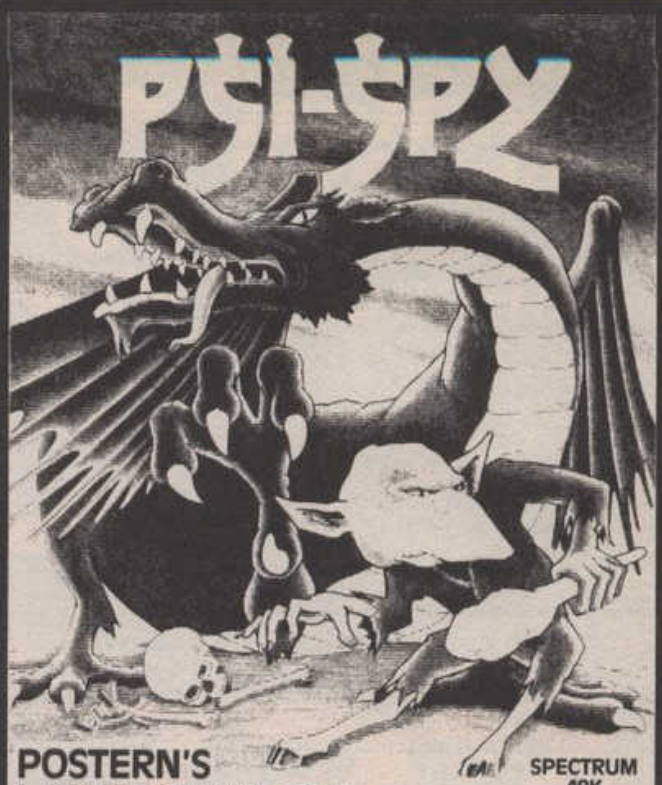

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address as all jumps within the routine are relative and the only absolute calls are to the ROM. In order to make the routine relocatable with no absolute jumps it is invoked at the start address + 81 e.g. in my original program location between 60000 and 60193 I used *Randomize USR* 60081.

For those with an assembler an assembly code listing is included.

```
60000 LD A,(HL)
60001 ADD A,32
60003 RST 16
60004 LD A,36
60006 RST 16
60007 INC HL
60008 LD C,(HL)
60009 INC HL
60010 LD B,(HL)
60011 INC BC
60012 INC HL
60013 DEC BC
60014 LD A,B
60015 OR C
60016 JR NZ,-4
60018 JR 71
60020 LD A,68
60022 RST 16
60023 LD A,73
60025 RST 16
60026 LD A,77
60028 RST 16
60029 LD A,32
60031 RST 16
60032 LD A,(HL)
60033 SUB 96
60035 RST 16
60036 LD A,36
60038 RST 16
60039 LD A,40
60041 RST 16
60042 INC HL
60043 LD C,(HL)
60044 INC HL
60045 LD B,(HL)
60046 INC BC
60047 PUSH HL
60048 PUSH BC
60049 INC HL
60050 LD B,(HL)
60051 PUSH BC
60052 INC HL
60053 LD C,(HL)
60054 INC HL
60055 LD B,(HL)
60056 CALL 5633
60059 LD A,44
60061 RST 16
60062 POP BC
60063 DJNZ -12
60065 LD A,8
60067 RST 16
60068 LD A,41
60070 RST 16
60071 POP BC
60072 POP HL
60073 INC HL
60074 DEC BC
60075 LD A,B
60076 OR C
60077 JR NZ,-4
60079 JR 10
60081 LD A,2
60083 CALL 5633
60086 LD HL,(23627)
60089 LD A,13
60091 RST 16
60092 LD A,(HL)
60093 CP 128
60095 RET Z
60096 AND 224
60098 CP 64
60100 JR Z,-100
60102 CP 96
60104 JR Z,18
60106 CP 128
60108 JR Z,23
60110 CP 160
60112 JR Z,37
60114 CP 192
60116 JR Z,-96
60118 CP 224
60120 JR Z,51
60122 LD A,(HL)
60123 RST 16
60124 LD B,6
60126 INC HL
60127 DJNZ -1
60129 JR -40
60131 LD A,68
60133 RST 16
60134 LD A,73
60136 RST 16
60137 LD A,77
60139 RST 16
60140 LD A,32
60142 RST 16
60143 LD A,(HL)
60144 SUB 32
60146 RST 16
60147 JR -108
60149 LD A,(HL)
60150 SUB 64
60152 RST 16
60153 INC HL
60154 LD A,(HL)
60155 SUB 128
60157 JR NC,6
60159 LD A,(HL)
60160 RST 16
60161 JR -8
60163 RST 16
60164 LD B,6
60166 INC HL
60167 DJNZ -1
60169 JR -80
60171 LD A,70
60173 RST 16
60174 LD A,78
60176 RST 16
60177 LD A,76
60179 RST 16
60180 LD A,32
60182 RST 16
60183 LD A,(HL)
60184 SUB 128
60186 RST 16
60187 LD B,19
60189 INC HL
60190 DJNZ -1
60192 JR -103
60194 NOP
60195 NOP
```

```
60000 126 198 32 215 62 60105 16 254 128 40 21
60005 36 215 35 78 35 60110 254 160 40 35 254
60010 70 3 35 11 120 60115 192 40 158 254 224
60015 177 32 250 24 69 60120 40 49 126 215 6
60020 62 68 215 62 73 60125 6 35 16 253 24
60025 215 62 77 215 62 60130 214 62 68 215 62
60030 32 215 126 214 96 60135 73 215 62 77 215
60035 215 62 36 215 62 60140 62 32 215 126 214
60040 40 215 35 78 35 60145 32 215 24 146 126
60045 70 3 229 197 35 60150 214 64 215 35 126
60050 70 197 35 78 35 60155 214 128 48 4 126
60055 70 205 27 26 62 60160 215 24 246 215 6
60060 44 215 193 16 242 60165 6 35 16 253 24
60065 62 8 215 62 41 60170 174 62 70 215 62
60070 215 193 225 35 11 60175 78 215 62 76 215
60075 120 177 32 250 24 60180 62 32 215 126 214
60080 8 62 2 205 1 60185 128 215 6 19 35
60085 22 42 75 92 62 60190 16 253 24 151 0
60090 13 215 126 254 126
60095 200 230 224 254 64
60100 40 154 254 96 40
```

Variables
by A Buchan

Dog Run

on Vic 20

This is an arcade game for the Vic 20 unexpanded, because of it's length there was no room for sound and the Vic's existing character set was used. There is though, a high score table for the best eight.

The game involves moving a Pi sign around a maze gathering points by landing on hearts, spades, clubs and diamonds. Electric fences appear to make the game harder. Each sheet is timed.

Controls:

A	Left
D	Right
F1	Up
F3	Down

Program notes

22	26	Title page and instructions.
50	90	Treasures
120		Clears Keyboard buffer
140	180	Scan for Dog Move
189	202	What treasure have you landed on?
205		Have you hit fence
207		Time
212		Score
500	540	Fences appear
750	752	Prints cross
754	790	Prints end of game
800	890	Top 8 scores with players initials
891	899	Another game?
900	970	Instructions
1000		Maze.

continued on page 47

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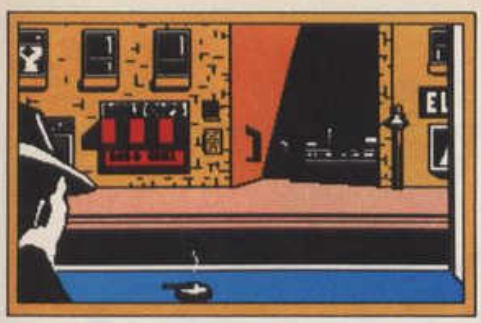
```
10 REM * DOG RUN *
19 REM * BY K.DENT FEB 84 *
20 CLR:PRINTCHR$(8):POKE650,255
21 FORIH=1TO8:HI$(IH)="???":NEXT
22 POKE36879,30
23 PRINT"■▓▓          DOG RUN                    BY K.DENT       ▓▓▓INSTRUCTIONS (Y/N) ?
"
24 GETA$:IFA$="Y"THEN900
25 IFA$="N"THEN29
26 GOTO24
29 GOTO1000
30 S=7977:SC=0:N=0:Z=1
40 POKES+30720,0:POKES,94
50 FORA=1TO20
55 IFA<5THENC=4:CH=65
57 IFA>5ANDA<10THENC=5:CH=83
58 IFA>10ANDA<15THENC=8:CH=88
59 IFA>15THENC=2:CH=90
60 B=7747+INT(RND(1)*417)+1
70 IFPEEK(B)<>32THEN60
90 POKEB+30720,C:POKEB,CH:NEXT
110 TI$="000000"
120 POKE198,0
130 M=S
140 GETA$
150 IFA$="A"ANDPEEK(S-1)<>160THENS=S-1
160 IFA$="D"ANDPEEK(S+1)<>160THENS=S+1
170 IFA$="▓"ANDPEEK(S-22)<>160THENS=S-22
180 IFA$="▓"ANDPEEK(S+22)<>160THENS=S+22
189 IFPEEK(S)=83THENSC=SC+5:N=N+1
190 IFPEEK(S)=65THENSC=SC+10:N=N+1
200 IFPEEK(S)=88THENSC=SC+15:N=N+1
202 IFPEEK(S)=90THENSC=SC+INT((RND(1)*5)+1)*10:N=N+1
205 IFPEEK(S)=102THEN750
207 IFTI$>="000100"THENA=1:GOTO754
210 POKEM,32:POKES+30720,0:POKES,94
212 PRINT"▓▓▓▓▓▓"MID$(TI$,3,2)":"RIGHT$(TI$,2)"▓▓▓"SC
215 IFN=20THEN500
220 GOTO130
500 REM * ELECTRIC FENCES *
510 N=0:Z=Z+1:PRINT"▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓"Z
511 FORA=1TO2
520 B=7747+INT(RND(1)*417)+1
530 IFPEEK(B)=94ORPEEK(B)=160ORPEEK(B)=102THEN520
535 POKEB+30720,6:POKEB,102
540 NEXT:GOTO50
750 REM * ENDING ROUTINE *
751 POKEM,32:POKES+30720,2:POKES,86
752 FORP=1TO4000:NEXT
754 POKE36879,238:IFA=1THEN760
755 PRINT"■YOU HAVE WALKED INTO  ▓ONE OF THE ELECTRIC"
756 PRINT"▓FENCES AND WAS KILLED.":GOTO790
760 PRINT"■YOU HAVE USED UP THE  ▓THE TIME GIVEN."
790 FORP=1TO4000:NEXT:POKE198,0
800 FORIH=1TO8:OS(IH)=HI(IH):OS$(IH)=HI$(IH):NEXT
805 FORIH=1TO8
810 IFSC>HI(IH)THENHI(IH)=SC:K=IH+1:IFK<10THEN815
813 NEXT:GOTO850
815 INPUT"▓▓▓YOU ARE IN THE HALL OF▓FAME.PLEASE INPUT YOUR▓INITIALS ";N$
816 HI$(IH)=LEFT$(N$,3)
820 FORIH=KTO8:HI(IH)=OS(IH-1):HI$(IH)=OS$(IH-1):NEXT
850 PRINT"■    HALL OF FAME"
860 PRINT"    ─────────────▓"
870 FORIH=1TO8:PRINTIH"▓L"HI(IH)
880 PRINT"▓▓▓▓▓▓▓▓▓▓▓▓"HI$(IH):PRINT
890 NEXT
891 PRINT"ANOTHER GAME (Y/N) ?"
892 GETA$
893 IFA$="Y"THEN22
894 IFA$="N"THENEND
899 GOTO892
900 REM * INSTRUCTIONS *
910 FORA=38TO156:POKE36865,A:NEXT
920 PRINT"▓▓▓▓MOVE YOUR 'DOG' AROUNDTHE MAZE TO COLLECT   TREASURE FOR POINTS."
930 PRINT"▓        ▓▓■  5 POINTS"
931 PRINT"         ▓▓■  10 POINTS"
933 PRINT"         ▓▓■  15 POINTS"
934 PRINT"         ▓▓■  MYSTERY"
935 PRINT"▓AFTER THE FIRST SHEET ELECTRIC FENCES (▓)   APPEAR.AVOID TOUCHING THE
M.";
940 PRINT"YOU HAVE 1 MINUTETO CLEAR EACH SHEET."
950 PRINT"▓▓▓ =LEFT        RIGHT= ▓F1▓=UP          DOWN=▓F3"
955 PRINT" ▓  PRESS F1 TO PLAY  "
```

continued on page 51 ▸



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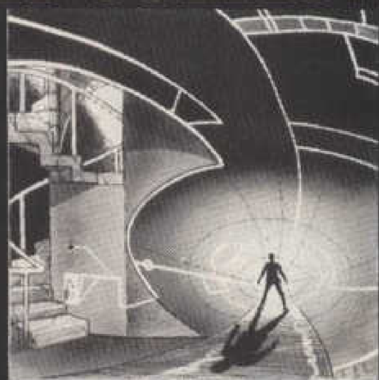

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Open Forum

◀ continued from page 47

```
960 FORA=156TO38STEP-1:POKE36865,A:NEXT
970 GETA$:IFA$<>"■"THEN970
1000 REM * MAZE *
1001 POKE36879,126
1005 PRINT"□■TIME        SC          ";
1006 PRINT"                          ";
1010 PRINT"        SHEET 1           ";
1020 PRINT" ■     ■           ■     ■ ";
1030 PRINT" ■ ■   ■             ■   ■ ■ ";
1040 PRINT" ■   ■ ■ ■   ■ ■  ■ ■   ■ ■ ■   ■ ";
1050 PRINT"   ■ ■ ■  ■ ■  ■  ■     ■ ■ ■   ";
1060 PRINT" ■   ■  ■   ■       ■ ■ ■   ■ ";
1070 PRINT" ■ ■ ■    ■ ■ ■    ■       ■ ■ ■ ";
1080 PRINT" ■ ■    ■ ■ ■   ■  ■ ■ ■ ■    ■ ■ ";
1090 PRINT" ■ ■    ■ ■   ■ ■  ■ ■ ■ ■    ■ ■ ";
1100 PRINT" ■ ■ ■    ■  ■     ■ ■    ■ ■ ■ ";
1110 PRINT" ■   ■     ■ ■  ■ ■    ■   ■ ";
1120 PRINT" ■ ■ ■    ■ ■     ■  ■    ■ ■ ■ ";
1130 PRINT" ■ ■    ■ ■ ■ ■  ■ ■   ■ ■    ■ ■ ";
1140 PRINT" ■ ■    ■ ■ ■ ■  ■   ■ ■ ■    ■ ■ ";
1150 PRINT" ■ ■ ■      ■    ■ ■ ■    ■ ■ ■ ";
1160 PRINT" ■   ■ ■ ■       ■   ■  ■   ■ ";
1170 PRINT"   ■ ■ ■     ■  ■  ■ ■  ■ ■ ■   ";
1180 PRINT" ■   ■ ■ ■   ■ ■  ■ ■   ■ ■ ■   ■ ";
1190 PRINT" ■ ■   ■             ■   ■ ■ ";
1200 PRINT" ■     ■           ■     ■ ";
1210 PRINT"                          ";:POKE38905,6:POKE8185,160
1220 GOTO30
```

Dog Run
by K Dent

Microradio

GW6JJN

Radio software index

Many of the letters received at Microradio have a common theme in that many of you are looking for Radio Software for your specific computer. This week I will devote part of Microradio to compiling an idex for Morse and RTTY programme suppliers so that, for the most popular micros, you will know where to look.

Some of you complain of not seeing any advertisements for radio software. The best thing to do is to watch the Classified section of this magazine. *Popular Computing Weekly* is the only magazine that has a regular radio-computing column so it seems to me to be the only logical place to look for ads. Here comes the Microradio Index:—

Oric 16/48K Owners: contact Vomek Software, 11 The Dell, Stevenage, SG1 1PH.
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BBC Model B: S.P. Electronics, 48 Linby Road, Hucknall, Nottinghamshire. also: G.O.C. Software, 47 Cranberry Lane, Alsager, Stoke-on-Trent.

This list should answer most of your queries and of course, ifyou are a producer or supplier of Radio-Computing software or hardware, then do not hesitate to contact Microradio. The column cannot mention products if I don't know about them.

Kevin Greaves of Queniborough, Leics wrote about problems he was experiencing interfacing his Dragon with a radio transceiver. Apparently sparks were leaping about. Having spoken to Kevin on the radio he has now solved the problem by getting a new power supply — the system now works perfectly. I mention this because interfacing a computer to the outside world can bring problems that can damage the computer thoroughly.

In Kevin's case, the problem was a power supply that he had bought in good faith, only to find it faulty. It is important that you remember that the voltage levels in a microcomputer are often much lower than in equipment that you may wish to connect it to. Voltages much in excess of TTL levels will make your micro's chips go pop.

Experimenting with computers has long been my favourite pastime, but since I am a long way from knowing everything, I have found it invaluable to be a member of a local club or radio-computer user group where a great deal of experience is often available. If you have a local club near you which deals with radio-computing, then let me know so that I can pass the information on.

Ray Berry GW6 JJN

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.

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Tony Bridge's Adventure Corner

Time zone traps

This is Letter Week for the Adventure Corner, in which the Grand Elf and I will look at some of your missives.

A couple of weeks ago, I mentioned *Lords of Time,* the new Adventure written by Sue Gazzard for Level 9. Atmosphere fairly oozes from the program, and the player really feels lost in another world — or nine other worlds, actually, as there are nine "time zones" to be explored, each with their own problems, and problems that cross over into other zones.

Judging from your letters, this new program from Level 9, along with *Snowball* from the same company, is already a very popular Adventure. You may remember that I was stuck at the garden shed — this in my first acquaintance with the Adventure. Several people wrote with hints for me; first, Nick Walkland from Sheffield.

"First, may I congratulate you on the best adventure corner in any computer magazine [of course you may, Nick!] — I always turn to it first to see which adventures you are looking at this week. Reading the latest issue, I found that in *Lords Of Time* from Level 9, you were stuck in the garden by the shed. I must not snigger, but I had the same trouble — eventually, I worked it out. To get through the shed door, you must be carrying two short planks (geddit?) and the rope. Using these, cross the river, and then:

ATNI/KESP/*LWA/NKI/
SV*E/DGRL/0APS/PSL

Then get back to the garden and:

EW*A/TV0E/**GL/E0TD/
*EKS/ETY0/SN

Once into the shed, you will find something to help you later, in gathering ingredients for the final formula.

Adventures I have completed:
Golden Baton
Hobbit (June 1983)
Mountains of Ket (Can't wait for the next two to win a delicious prize)
Black Crystal
Eye of the Star Warrior (which gave me sore fingers for two days typing!) [Hope you liked it, Nick! — TB] *Dragonsbane* (HA!)
Urban Upstart (which disgusted me as I finished it in just one hour!) [Many people think that this is the best of the Shepherd Adventures, Nick, and I think it's quite ingenious — TB]
Invincible Island

Please answer this question for me on *Arrow of Death* by Digital Fantasia or Channel 8 : How do you get into the giant building without tripping up and waking the giant who kills you? Please answer before the TV gets smashed by a mangled, overheated Spectrum!"

I'm afraid that you may have to restrain yourself a little longer, Nick — I don't know the answer to that question, but maybe another reader can write and let me know. For now, let's see if I can help you in *Lords of Time.* If you're still stuck at the plant:

=ED*R/00NP/**RB/000T/
TTSSL

and then

*TAH/TR*0/SWK*/EPLE/EBTB/
0LNE

Now a letter from Patrick Sharkey:

"I am a dedicated fan of Level 9 Adventures and have discovered how to get the keys in the shed in the first time zone (see previous letter). To get the first part of the formula, you will need what you find in the shed.

In exchange, I need some help. How in the world do you keep warm in the ice age? In another adventure — *Colossal Adventure,* also from Level 9 — how do you get the chain from the bear? Sandwiches don't help: Is there any way to get your treasure back from the pirate?

I also have a correction to make: You recently gave a *Colossal* player the answer to the problem of the snake — the answer is slightly different for the Level 9 version. In fact, you "drop" the bird, and the cage is not wicker, but "gilded" (geddit?).

Anyway, your column is wonderful, the best bit in the magazine! Yours, the tooth fairy (alias Patrick Sharkey)"

Thanks for the kind words, Patrick! To help with *Lords of Time,* try this:

RFTI/HN0D/FTTH/HEEM/IACM/
EMSO/HTEH/ENTO

and then

SPCO/AURR/E000/FTFP/
MEAT/MRMO/0LTT/H0

You'll probably know what to do now! As for the bear, there is no reason why he shouldn't enjoy your sandwiches — do you have the keys yet? As for the Pirate, he's a pesky varmint who will hide the Treasure away in a pretty inaccessible spot. But it can be found with a bit of perseverance!

Stephen Rhodes writes:

"I've been meaning to write for some time because, as a keen and often frustrated adventurer, yours is the first article I turn to in *PCW.*

I am stuck in the 3rd time zone in *Lord of Time.* I've managed to lure the T. Rex onto the Allosaurus and waved the mirror at the Brontosaurus, but once I've entered the cave, I can't get any further without the cavemen killing me. Any assistance would be greatly appreciated.

On the subject of adventures for beginners, I would recommend *Mountains of Ket* by Incentive Software. The puzzles are logical, relatively easy and the program has a scoring system so you can see how well (or otherwise) you're doing.

May I make a suggestion for your column (help yourself!) — a league table of reader's favourite adventures. This would be of benefit to future buyers and also to yourself in deciding which games to review.

My favourites are:

Adventure Quest	Level 9
Lord of Time	Level 9
Golden Apple	Artic
Velnor's Lair	Quicksilva
Mountains of Ket	Incentive".

To your problem in *Lords of Time:* you've got the right idea with the mirror, but try this:

EKCE/AEVP/EMMI/ERNR/
+0DR/0ANN/'DTR/POUP/
SBHE/PSAI/SDT

All the above clues follow The Corner's formula — starting at the second letter of the clue, read every other letter until you reach the final letter. Then return to the very first letter, and repeat the process.

Next week, I'll be looking at *Knight's Quest* again, with some hints and tips for the later parts of the Adventure — and I'll also be updating the HH0F.

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

VIC PROGRAMS

R.N. Futcher of Anstey Crescent, Tiverton, Devon writes:

Q I own a Vic-20 and also have a 16K Ram Pack. Could you please tell me if I can use it for programs that need only a 3K Ram pack, or is there a program that can be typed in to make 3K programs work with a 16K Ram pack?

A This is a typical letter from dozens I get on this subject. Indeed it has now replaced *Load/Save* problems on the ZX81 as the most common question. I have already looked at the quite ridiculous way the Vic's screen is mapped into the top half K of the first 8K memory block, thus effectively stopping the normal expansion of the Ram.

PCW did do an article on solving this problem but on looking back it was nearly two years ago in the days of the colour covers. Written by Malcolm Peltz it will be of benefit to many Vic owners to reproduce it again, so here it is.

```
10 IF PEEK (44)=36 OR PEEK (56)=32 THEN 200
20 A=PEEK (43)+256 * PEEK (44) : LO=A
30 IF PEEK (A)=0 AND PEEK (A+1)=0 THEN 50
40 A=PEEK (A)+256 * PEEK (A+1) : GOTO 30
50 HI=A+1 : IF HI+4096 PEEK (55)+256* PEEK (56) THEN PRINT "NOT ENOUGH ROOM TO MOVE THIS PROGRAM." : END
60 FOR A=HI+1 TO LO-1 STEP-1
70 POKE A+4608, PEEK (A) : NEXT : A=LO
80 IF PEEK (A+4608)=0 AND PEEK (A+4609) =0 THEN 120
90 POKE A+4609, PEEK (A+4609) + 18
100 X = PEEK (A+4608) " Y=PEEK (A+4609)
110 A = PEEK (A+4608) + 256 * (PEEK (A+4609)-18) : GOTO 80
120 X = X+2 : IF X 255 THEN X=X-255 : Y=Y+1
130 POKE 47, X : POKE 48, Y
140 POKE 49, X : POKE 50, Y
150 POKE 45, X : POKE 46, Y
160 POKE 43, 1 : POKE 44,36
170 RUN
200...Your Program...
```

If you have 8K or more expansion on your Vic this will re-locate shorter programs beyond the User Defined Graphics area. Enter it as a routine before your own program which can then start at line 200. Line 10 is a check, and lines 20-40 work out the last address of your program, and is quite a useful little routine in itself.

WHITHER ORIC?

A. Parker of Sandiway, Altrinham, Cheshire writes:

Q I wonder whether you could help me? I have an Oric 1, still under guarantee, and which is defective — a defect apparently present when I first got the machine. My problem is this: I cannot find an address to which I can return the computer. I have written to two addresses. Neither letter appears to have been answered. I believe there is a factory in Ascot but I have no details of this address. I would be grateful if you could help.

A You have my sympathy, it must be very frustrating to have a computer that's faulty, and have nowhere to return it to. In all fairness to Oric I do not think this is deliberate. The address you are probably looking for is this one: Oric Products International, L.T.D., Cowarth Park, London Road, Ascot, Berks.

PRINTER PROBLEMS

C Scott, 23 Grange Road, Shilbottle, Alnwick, Northumberland, writes:

Q I have recently upgraded from a Dragon 32 to a BBC B with disc drives and I am having problems with my printer, a Tandy CGP 115 four colour printer/plotter, which works well with the Dragon.

Having bought the standard parallel (25 to 36 connections) printer lead from my local dealer which did not work, I checked all the contacts and all were properly made and there were no faults in the cable. I then reconnected the printer end plug as described in the BBC user manual, but still no action.

By now my trial and error ways are making my ribbon cable shorter by the minute, so I would be grateful if you would give me a pin by pin connection for my set-up.

A You do not say whether the lead you bought was the standard IDC lead for the BBC or not. If it wasn't then this is the source of your problem. However, if it was then the connection procedure is as follows:

You need to fit a Tandy connector to the non-IDC end of your ribbon cable. The actual Tandy connector you need is described as 'DDK Amphenol 57/F 30360'. It is fitted by first removing the flexible metal strip, then attaching the 'red stripe' edge of the ribbon cable at pin 1 (ie as far left as it will go) and replacing the metal strip.

If this still fails to produce any results then I suggest that you contact Acorn (or the dealer who supplied you with the BBC) for advice, in that there could be a fault with the parallel interface within the BBC.

SPECTRUM TELETEXT ADAPTOR

S Guergueb, 76 Bagots Oak, Stafford ST17 9SB, writes:

Q Is there a teletext adaptor for the Spectrum computer? I was reading one of the early books for the Spectrum and the author mentioned something about it. Could you please confirm with some details.

Also, I came across a nice little electronic typewriter, a Brother Personal Printer/Typewriter in the £100 price range. Could that be interfaced to the Spectrum?

A I presume that you wish to connect your Spectrum to Prestel or Micronet, in which case the Prism VTX5000 modem is what you want. All teletext conversion is carried out by the modem (which runs its own Rom based softwrare).

I haven't come across the printer/typewriter you mention and can only say that:

a) if it has an RS232 capability and

b) you buy the Spectrum RS232 interface and

c) you can obtain the appropriate connecting cables Then you would be OK, somehow I doubt it though!

WHAT DO POKES DO?

Neville Vassallo, Gemini Ct, Flat 2, EB Vella Street, B'Kara, Malta (G.C), writes:

Q While typing a program I came across these Pokes. Can you please tell me what they do? I own a 48K Spectrum.

The Pokes are:

```
POKE 23561,0
POKE 23617,164
POKE 23609,50
```

A 23561 is the memory location referred to as Repdel (see chapter 25 of the Spectrum manual). By setting this location to zero, the program is producing an immediate repeat for any key pressed. In other words the *REP*eat *DE-La*y is reduced to nothing.

Setting 23617 to 164 changes the cursor presentation for input statements. It appears as a flashing black bar as you get if you flash a graphic 3.

23609 is used to control the length of the click you get when a key is pressed. Setting this location to 50 produces an audible note each time a key is pressed.

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

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ATARI VCS Joysticks, pair of paddles + Atari VCS. Tidy, 9 games inc. River Raid, pac man, tele soccer, video chess. £180. Tel: 01 647 1942.

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BBC MODEL B Games for sale or swap. Includes C&Bertron Mission, Hunchback and Attack on Alpha Centauri. All in excellent condition and in original packaging. Tel: Canterbury (0227) 58529.

BBC B 1.2 O/S. £335. Cumana Single disc drive, £140. Seikosha GP100A Printer £140. All only 2 months old. Phone 0703 559027.

BBC SOFTWARE for sale, including program power, Demon Decorator £4, C&Bertron Mission £5. Superior Hunchback £5. Software Invasion, Alpha Centauri £5. Microdeal Space Shuttle £5. Tel: Canterbury (0227) 58529.

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COMPUTER SWAP COMPUTER SWAP

Computer Swap entries are limited to 30 words. Either fill in the accompanying form and send to Computer Swap. *Popular Computing Weekly*, 12-13 Little Newport Street, London WC2R 3LD or telephone 01-437 4343.

All software offered through computer swap must be in original condition and for private sale only.

Warning: It is illegal to advertise pirated software.

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16K ZX81 small push action keyboard and repeat key, £35. ZX Printer and paper £25. Original s/w £2.50 each. All boxed with leads and manuals. The lot £90. Boy ZX81 16K and printer. £70. Tel: 01-639 8657.

16K ZX81 lots of books for starters and game cassettes incl. Flight Simulator, Sourcers Island and Space Raider. Also ZX81 Starter pack worth £30. Sell for £140 ono. Tel: Orpington 39601.

ZX PRINTER PAPER. £150 per roll. £7 per box. Tel: 01-340 3539.

ZX MICRODRIVE and interface I, 4 cartridges. Offers invited. 01-723 9947. Peter 4-7pm only (Cash only).

16K ZX81. real keyboard, case of player tape loading aid. £40 of s/w. Handbook and program, £85 ono. Tel: 01-936 2069.

ZX81 16K. 2 months old, 5 cassettes. £35. Tel: or 248 3517. Daytimes only.

SINCLAIR ZX81, ZX16K, Ram pack, AGF Joystick Interface £200. s/w and mags £300. Sell £60. Tel: Hornchurch 42642 quick sale needed. Tel: after 4.15pm.

16K ZX81 with keyboard and cassette recorder complete with over 15 games including 3D Defender, Kong Galaxians, etc and magazines. Immaculate condition. £75 ono. Also Octopuss game and watch £7. 86 Heath Way, Hatton, Derbys.

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SINCLAIR ZX81, leads, 10 games, boxed. £33. Tel: Poyton 872899.

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VIC 20 MICRO assembler £25. 16K Ram pack with cartridge slot £20. Vic printer word processer £10. or £40 the lot. 01-656 7122.

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VIC 20 + games & cassette recorder titles include. Donkey Kong, Arcadia, will sell for £120 or swap for 48k Spectrum + s/w. Tel. 01-572 6725.

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VIC 20 8K + 16K Vic kit intro to part I & II programer guide. s/w inc. Blitz, Bonzo's, frogger + 10 other. Box as new £160.00. Tel, Wareham 3909.

VIC 20 and cassette deck and Super Expander + 16K Ram + Programmers reference guide plus £160 of the latest software. All worth £360, all boxed and manuals plus joystick. Bargain at £150 ono. Tel: Mansfield 792911.

VIC 20. 16K Super Expander. Sargon, Chess, Pirates Cove, Myriad, Trader, plus odd cassettes. £150. Mike 0734 341958.

VIC 20 + C2N cassette, 8K, Super Expander, Buti plus, motherboard, light pen, joystick, much software and books. Worth £370. Sell for £250. Phone Boldon 363680 after 5pm.

VIC 20 plus many accessories to swap for BBC B also Vic 20 Games Designer to go with computer or sell separate for £10. My computer is under 9 months guarantee, is your BBC-B? Broadstone 691208 after 6pm.

VIC 20 CSE O-LEVEL programs inc. Physic, Mathmatics I and II, Biology, English language. All as new. £10.99. Sell for £5 each. Vic 1.2, 11a Commodore S/Expander, 3K Ram Centronics, new, £10. Tel: 01-942 1715.

VIC 20 STARTER PACK and Arcadia, Grid Runner and Introduction to Basic Part I, Atari video games system, Astroids, Missile Control, Outlaw and Combat for £230. Tel: 01-969 9392 after 6pm.

COMMODORE 64, C2N cassette, Quickshot joystick, brand new, games and books inc. Hobbit. £235. 01-890 8950.

VIC 20 AND STACK. 8K expansion and cassette deck, 2 games cartridges, s/w Vic rebuild joystick, £140 ono. or will sell separate. 01-422 6331.

CBM 64 Address book and mailing list program. Uses tape or disc. £5. 9 Barncroft, Wallingford, Oxon.

VIC 20 plus tape recorder 8K, 3K expansions, Vic-Kit 2, Super Lander cartridge, £100. Phone 0209 215074.

VIC 20 Disc cassette unit, one cartridge and Introduction to Basic Part I. £90. Tel: 01-672 6759.

VIC 20, C2N cassette unit, Commodore 16K Ram pack, £100 of s/w, books, magazines, leather cover, 1 year old, one cartridge. £135 ono. Call Mark, Epsom 27682.

VIC 20 3K Super Expander. Boxed. £10.50. Tel: Chelmsford 57663 after 4pm.

VIC 20 FOR SALE with cassette recorder and games. Sell for £45. Tel: 0604 402750. Ask for Mark.

VIC 20 and tape deck, joystick, cartridge cassettes, books, etc. £170 or swap for 48K Spectrum. Tel: Coppull 792879.

COMMODORE 64 cassette unit, 7 books, Extended Basic and games and joystick. £260 ono. Tel: 881-2525 (01).

VIC 20 CASSETTE DECK switchable 16K joystick, ZX printer and interface, Speech synthesiser, £200 of s/w, £250 ono. Tel: Theydon Bois 2458 after 5pm.

VIC 20 C2N cassette unit Introduction to Basic and tapes. £100 of s/w. Mags and books, leads. £120 ono. Tel: Leatherhead 378689.

CBM 64 CMB 1541 disc drive, juki bloo printer and prints green monitor, and s/w. £750 the lot. Tel: 01-204 1167 (Stanmore).

VIC 20 + 32K + books + joystick + £90 of software & compatible cassette unit + mags., worth over £300.00, sell for £140.00 ono. Better offer than VIC starter pack. Telephone Steve on Coventry 418809.

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COMMODORE 64 garanteed, 1 month old. Never used + leads manuals. Plus £30, worth of mags. Bargain at £160.00. Tel. 021-772 3939. Ask for Murtha Piggott.

COMMODORE 64 plus C2N cassette, 1520 Printer, 15 tapes, books and desk. 3 months old. Offers around £380. Buyer collects. Telephone after 2p.m. Any day. Tel: Pont 794506.

VIC 20 plus 16K rpm pack C2N cassette drive. 2 Joysticks 'O' level Geography plus £163 worth soft ware. Inc 6 cartridges and book. £220. Phone Bournemouth 23578.

COMMODORE 64 Quickshot Joystick cassette Interface, Falcon Patrol, 2 month old. Little used £180. Tel: (Milton Keynes) 0908-311687.

VIC 20 software for sale all originals Xeno II, Jetpac, Skramble, Cosmic Firebirds, Cyclons, Dungeons Wizard + princess, skyhawk £3. Each or the lot for £21!!. Tel. Formby 71812.

COMMODORE 64 plus C2N cassette unit, quickshot joystick, software including manic miner, skramble, revenge of the Mutant Camels. Only two months old £260 ono. Ring 01-204 2456 after 4pm.

VIC 20 tape, £40 s/w, cartriges m/c monitor + £30 worth of books. Swap for CBM 64. Ring any night 4.30 — 6.00. Call Pete on 0282 56458

VIC 20 with C2N cassette unit,m basic 1, 32K switchable, joystick, 3 cartridges, nine cassettes including Wacky waiters, Catcha Snatcha. Sell for £170 or swap 48K Spectrum with S/W. Tel: 529 3324.

VIC 20 super expander, 16K ram, motherboard & jobstick. Ten cartridges, over 20 cassettes, (all top machine code arcade originals) & books, magazines. All vgc & guaranteed, cost £300+. Want £130 or £150 inc B½W TV 01-444 9132.

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VIC-20 space raiders, for unexp. Only £3.00! and get blank C-15 tape with 2 games. Guaranteed or money back — C.H.S Ltd, 66 Park Avenue, Clough Hall, Kidsgrove, Stoke-on-Trent, Staffs, ST7-1B6.

16K VIC20 tape player, various manuals, £60 of software including scramble, Arcadia, Walcky waiters, Dungeons, worth £270, all offers. Considered or swap for CBM64. Tel. Coventry 415346 after 6.30 p.m.

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VIC 20 starter pack (Vic 20, cassette, introduction to basic course Part 1.) 16K Ram, super expander cartridge, joystic. Boxed, 6 months guarantee, little used. £130. 021 354 5648.

COMMODORE 64 + disk drive for sale. £400 ono. Phone 736-3898 and ask for Byron.

VIC 20 with recorder, 16K RAM pack, joystick, introduction to basic part one, and software worth 8210. Sell for £170. Phone Larkhall 882835 after 5 o'clock.

VIC-20 + 16k + cassette + quickshot joystick + bags of software, including big names, worth over £1000. Good condition, all together worth well over £1100. Offers. Tel: Rochdale 353719.

CBM 64 + C2N cassette joystick, lots of books inc. Programes Reference Guide, basic one, 15 games inc. Falcon patrol, Rom game, leads. £260. Tel: 486 5811 ex 6548 (evenings.)

SELLING my complete collection of VIC 20 + CBM 64 s/w. Phone for detils 77335 Derby.

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VIC 20 cassette player, 8k expansion. Basic I inc. cassette joystick, 3 cartridges + 10 cassettes games. Total value £350. £150 ono. Tel Chippenham (0249) 652716.

VIC 20 + cassette + 16K R/P, 2 catridges various games Bks + Mags £100. Tel: 01-205 2834 (Colindale).

ORIGINAL SOFTWARE for VIC-20 + books. All half price. Tel 01-303 9277. After 5pm.

CBM64 + CBM cassette player & several games, image etc. 1 month old. £230. 01-568 7325, (anytime).

VIC 20 C2N cassette, 3 joysticks; + Intro to basic part I & 3.8.16K + Programmer Aid + A Cartridge + 110 Cassette games + 8 books. Offer. Tel: 01-205 9649, after 4pm.

CBM64 + C2N cassette. 3 months old, + books, £200 ono (Tel: Woking) 20119.

CBM 64 games £3.00 inc. revenge of the Mutant Camels, Grid Trap, everest and snooker, Attack of the Mutant Camels. Many others. Tel: 01 948 3916. (eves.)

For sale

VIC 20 software for sale. Quackers, Wacky Waiters, Catcha Swatcha, Panic, only £3.00 each, all originals. Tel: Wormley (042879) 2226.

VIC20, cassette unit, 16K, Joystick over £120 software including cartridges 16K: Defenda Skramble Lazer Zone Matrix Set Pac also Asteroids Panic Frantic etc. Cost £400. Sell £200 no offers Wraysbury 2518.

COMMODORE 64 original software for sale or swap also BBC model B disc interface wanted D/D if possible Tel: 051 420 3462.

VIC20 and C2N cassette unit with 3 cartridges — Omega Race, Rat Race and Sargon Chess. Also 3 Cassettes — Panic, Cosmiads Asteroids, £100 ono Tel: Simon Langley Mill 712938 after 5pm.

BBC SOFTWARE originals, £5.00 each wanted collosal adventure, lords of time (level 9) Dragan Quest, Bug Byte (0438) 60537. (eves).

BBC MICRO model B O.S. 1.2 inc. s/w £350 ono. Tel: 0223 84456.

ACORN FOR SALE — BBC 100K TEAL disc drive with disc doctors rom + over £500. Worth of s/w whole lot worth over £700. Sell for £25. (no offers). Tel: 05827 69152.

ACORN ELECTRON for sale, still boxed with intro-tape, books, cover etc. £175.00. Oxted (08833) 5074.

BBC 3 complete with manuals and Welcome Pack. Never opened £340. Tel: (04867) 4755.

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BBC MODEL B with disc Interface Acordn speech upgrade, Rom expansion board with wordwise and beep cale £380. Epsom FX80 Printer £300. Micro Bitec colour monitor £150.00. Tel: (0344) 886178.

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MAGAZINES FOR SALE most weekly + monthly, half price — stretching back years. Tel: 0259 60840 eves.

EPSON MX80FT type 3 graphic chip installed. Cable included for Atari micro. Will sell for £195. Ring David after 11pm from Monday to Friday. Tel: 01-948 6654.

WANTED! NON-WORKING Spectrum 16 or 48K (for parts) will pay reasonable price. Absolutely any condition! Send details and price to: Richard Hasty, Hegel Strasse 13D, 6520 Worms, West Germany.

SWAP COMMODORE 64 + C2N recorder + books and well known software for BBC B or Electron with extras. Tel: Uxbridge 55497 ask for Martyn after 7pm except Tuesdays.

WANTED VIC 20 tape recorder and manual £60 offered. 0462 811700 after 7pm. (K.J. Hasler).

SPECTRUM OWNER to swap cassettes flight SIM £500. Planet Death £400. Espinage Island £400. Trans Tower £4.50. 'O' level chemistry, physics each £700. Several more great bargains Tel: 034 226569 after 4pm.

WANTED ANY SOFTWARE for Spectrum 16/48Ko computer plus PCW magazines from 2/2/83 to 1/12/83 please write to Mr Ouajid Younes 17 Rue Paup Cangerin 93430 Villetaneuse France.

SWAP ZX81 software: Vu-calc, Psion Flight, Raiders, Bomber, CDS Pheonix Adventure: All 4 tapes for P.S.S. Mcoder or Mcoder II: Wolverhampton (0902) 725762 after 6pm. Ask for James

MICROTAN 65 Tanex 10K basic Xbug Tanbug V2 Tanram 40K, Memory Manuals and forth on tape with Home Brew case and power supplies with ASC11 keyboard £250. Tel: 058283 3411 after 6pm.

SWAP VIC20 pirates cove for the count or voodoo castle. Bodmin 6085.

SHARP MZ80K + basic extensions. Basic assembly + forth language. Also books, sharp users notes + mags. £280 ono. Tel: Birmingham 021 355 1908.

WANTED ADD on keyboard for Spectrum will swop for Condless Tel: very good range with paging etc. Tel: 0472 602445.

96K LYNX and joystick interface and joystick and R5232 printer interface and mags and much software. All for a bargain price of £290. Worth at least £400. Ring Stafford (0785) 661745 after 5pm.

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LOTS OF S/W for Sharp MZ-80K. A price range from £3-£4. 01-455 6641 after 4.15pm.

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ZX PRINTER as new £20 ono. Tel: 0259 60840 after 6pm.

SHARP MZ-80K with twin disc drives, 48K. Yours for £240 or swap for Commodore 64 and tape deck. Packages includes four dialects of Basic, Forth and lots of s/w. Phone Peter on Warrington (0925) 56861 after 6pm.

LYNX 48. Manual, books and leads. Boxed and under guarantee. Also serial pack, disassembler, Snowball, etc. £170. Lynx joystick interface, £10. parallel printer pack £35. Both boxed and unused. Tel: 0703 844051.

SHARP MZ 721, 3 months old, Basic, Pascal, Forth language and 40 programs. £235 ono. Tel: 0929 463632.

SHARP MZ-80K 48K plus Hi-res Xtal Basic. Basic extensions. Integer Basic Compiler, Sharp and Hisoft Pascal, Knights, Fortran £250 ono. Seikosha GP80, D Printer £100 ono. Tel: Medway 377755.

MICRO PROFFESSOR. Z80 based micro with Z80 assembler. Machine code Training Manual, £45. Tel: (0444) 456026 after 7pm or w/ends.

TRS 80 Level I 4K memory, monitor screen, tape, programs and mags. Tel for details: 01-808 8876.

SIEKOSHA GP250X Printer, 50 cps with manual, and lead for BBC B including 2000 sheets paper. £175 ono. Tel: 04865 2452.

ZAXXON CARTRIDGE for sale for use with the Colecovision system. Tel: Mbro 824885 between 5pm and 7pm.

SHARP MZ80A 48K monitor cassette deck built in or swap for Vic 20 starter pack plus games or sell for £200 ono. Mr N. Barber, 195 Norwich Row, Park Hill Flats, Sheffield S2 5RH.

WANTED C2N cassette unit + joystick Tel: 01 348 8271.

WANTED 48K Spectrum with or without s/w £70. Tel: (0900) 824202.

SWAP DRAGON GAMES, my titles inc: King, Cuthbert, Frogger, Writer Empire, Kiriegspield, Strategic Command and similar. Tel: (04626) 5521 after 4pmn.

I HAVE PRODUCED 10 'O' level physics educational programs for the 16K Spectrum and wish to sell them to a company. Please write to 6, The Fir Trees, Thorpe Willoughby Selby, N. Yorkshire YO8 9PR.

WANTED ORIC 1, 48K with/without software or books. Will pay £65 to £80. Must be in excellent condition. Tel: Porthcawl (065 671) 4304 after 4pm.

SPECTRUM DEVPAC 3 (original) wanted for swapping either Games Designer or any three of other originals including Ultimates: SAW for other titles 54 Park House, 314 Seven Sisters Road, London N4 2LS.

48K SPECTRUM lots of games AGF programable joystick interface and recorder. Swap for CBM64 or Atari 600XL or 800 must have recorder. Phone 01-232 2924 between 9-5pm. Ask for Billy (weekdays).

SPECTRUM SOFTWARE to swop over 150 titles. Please send your list to S.A. Robinson, 18 Sumpter Croft, Penwortham, Preston, Lancs. PR1 9UJ + Micro Drive order form for sale Phone (0727) 744439.

GAMES DESIGNER for spectrum to swap for H.V.R.G. or sell for £12 brand new unwanted gift. Mr Keith Burton 6, Westbourne Terrace, Barnslet, South Yorkshire Tel: (0226) 292118 after 7pm.

WANTED DRAGON RTTY or disc s/w to swap. Although I will swap anything I have well over 60 titles. Ring Fleetwood 70044 ask for Russell after 4pm.

DRAGON 32 software swap — ultimate adventure 4, Mansion Adventure 1 and escape all Microdeal for any 1 haven't got. Tel: 09642 2950 I will pay postage.

DRAGON OWNER seeks like for swap ideas, progams etc. Contact Ian, 3 Birchwood Ave, Grove Hill M'bro Cleveland TS4 2XB.

SWAP ORACLE'S Cave for Black Crystal, Manic Miner for Ghost Town, Molar Maul for Horace and The Spiders and 3D ant attack for Xadom. All originals please. Tel: Gordon 0382 502085.

WANTED ANY NON-WORKING ZX printer for cash. Phone (0908) 72048 or write to Mark Purcell, 8 Wordsworth Drive, Bletchley, Milton Keynes, MK3 5HR.

SWAP AUDIOLINE car AM FM stereo cassette player in very good condition for a computer monitor the smaller the better. Write to Ronnie 67 Church Rd, London NW4.

SPECTRUM IN GOOD working order prefer 48K will consider 16K. Ring Swindon (0793) 47281. Answer phone service.

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AQUARIUS WANTED. will swap for 16K ZX81, original programs including Monster Maze, and one month guarantee (negotiable) Tel: South Shields (0632) 553158 after five and ask for Ian Boyer collects.

ORIC 1 487K with joystick, games worth £80 (all genuine). Books, Oric mags, all for £165; MCP-40 colour printer plotter £120, or £275 the whole lot. Buyer collects. Tel: 01-460 9334 evenings.

ORIC-1 48K with external reset button, eleven months old plus joystick and interface, speech synthesizer three books, Forth £76 of softwarre. £155. Tel: Heywood (07066) 6233154 after six.

SHARP MZ80K, P3 printer, interface box, crystal basic, forth, pascal, assembler, fortran, chess and many other programs plus books. Offers Tel: Langport 250130.

LANGUAGE TRANSLATOR for spectrum (any), any European language, please state which. Only £2. Make cheque p.o. payable to Monksoft Highlands Blue Boys Park Minchinhampton, Stroud, Glos. GL6 9JT.

FED UP PAYING £5 for one game? Three excellent games. Force, Town, Snake for £2. Send cheque PO payable to: Monksoft Highlands, Blue Boys Park, Stoud, Glos GL69JT (Spectrum).

LYNX 48K in good condition, £130. ono Tel: 029-344330.

NEWBRAN AD £150 Sharp TC 1251 and printer micro cassette unit £130. Tel: 01 790 0066 (daytime).

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HUNCH BACK, B7 Ocean, Forth, Alchemist for sale each one goes to highest offer. By Monday evening, Ring David after 4pm on Reading (0734) 661401.

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3D DEFENDA ZX81: 100% M/C: Smooth Arcade Action: tape £2.85: S.A.E. lists: James Paton, 2 The Avenue, Fallings Park, Wolverhampton.

BBC PERSONAL BANKING attends to S.O. and D.D. automatically. Send £3.95 Whiteheads, Household, Freepost 11, Chester Road, Northwich, Cheshire.

MICRODRIVE EXCHANGE. Have you been wasting your time transferring tapes to microdrive & they didn't work? New newsletter club solves the problem in most cases. Issue I includes transferring VU-FILE and programs which normally overwrite microdrive map. Membership is £5/year. ZX-GUARANTEED, 29 Chadderton Drive, Unsworth, Bury, Lancs.

NEWBRAIN MODEL A plus compatible (Sanyo) tape recorder. Beginner's guide and tape. Two independent guides including m/c. Gobbler game. £150 + p&p. Evenings Tel: Bourne End 23734.

NASCOM 48K RAM, 64K Rom contains Basic, Pascal, Pilot, Zeap, Nas-Dis, Debug, Nas-Pen. 6000 daub microcassete drive. All documentation. £450 ono. Tel: Sellwood 0235-21900 ext 5357 (day).

DRAGON LIGHT-PEN. Never used. One week old. Trojan light pen allows Hi-res or text screen input. Hi-res draw also. £10. Tel: Batley (0924) 470377 after 5pm.

Wanted

COMMODORE 64 wanted. Tel: Woking 70318.

SWAP VIC PANIC, Crawler, Bewitched. All in good condition. £3 each or swap. Tel: Rob Harrowgate (0423) 866266 after 4pm.

HELP! I really need somebody, Help! My Vic 20 needs a super expander and compute's! First Book of Vic (quick). Tel: 0558 822509.

SWAP 8 Danger Ranger, Talking Android Attack, Skramble, Donkey King, Katterpilla Attack, Flipper, Adventure, for a Dragon Speech Synthesis Module, also Want a Rainbow Writer. Jimmy 9 Granville Road, Lancaster, Lancs, LA7 2PA.

SWAP SPECTRUM games and utilities. Phone 01-599 3515 any time and ask for Peter.

SPECTRUM SOFTWARE to swap or sell: Games Designer, Black Crystal, Blind Alley, Beyond Horizons, High Noon, D.N.P.G., Spectrum computing tape magazine 1 to 4. Details: Keith Burton, 6 Westbourne Terrace, Barnsley, Yorks.

BBC SOFTWARE will swap Franklyns Tomb, Gunsmoke, Lost City, Countdown to Doom, Escape from Moonbase Alpha. Send list to S. Rayner, 15 Welbeck Street, Abbey Hey, Manchester M18 8GW.

INTELLIVISION CARTRIDGES to swap Sea Battle and others. Also Spectrum software to swap. Ilong, Inca Curse and more. Phone Tim on Melton Mowbray 66917 after 5.30pm.

SWAP AQUARIUS SNAFU cartridge and book of programs and £10 for Aquarius Data Recorder or sell for £15, 7 Mill Stile Braunton, N. Devon. Tel: 816010 after 5pm.

16K ZX81 fuller keyboard and £35 of s/w. Swap for 16K or 48K Spectrum. Tel: 0274 834450 eves.

KEYBOARD SPECTRUM. Will swap for cordless phone. Very good range. Tel: 0472 602445.

COMMODORE 64 owner wishes to contact other 64 owners to swap games and ideas. Contact 10 Rothbury House, Kings Lynn Drive, Harold Hill, Rainford, Essex.

SWAP CBM 64 with Arrow cartridge and cassette and printer with interface and books, 3 months old. Swap for Mark I Osborne. Tel: 01-478 7868 after 6pm (John).

AQUARIUS WANTED. Swap for 16K ZX81, s/w inc. Monster Mazze, 3D Defender, Mazogs, manual, etc. and 1 month guarantee (negotiable). Tel: Sth Shields 0632) 553158.

TI 99/4A and s/w module. Inc Mutiplication, Division, addition and subtraction, early reading, beginners grammer and TI logo and any necessary additions to enable logo programming will pay up to £100 ono. Tel: 01-843 1080 after 6pm.

CENTRONICS HANDBOOK for 501 printer buyer borrow and RS 232 interface or Spectrum. Tel: (work) 0992 460355 ex 48, (home) 09892 460 665.

BUSINESS PROGRAMS for disc based TRS 80 Model III. Tel: 0346 32683.

WILL SWAP £40 of original software (Pimania, Espionage Island, Mazeman, Space Intruders, Meteor Storm and PSE games tape 2 for ZX Printer (good condition). Phone Aldershot 25783 evenings after 5.30pm.

SWAP SNOOKER TABLE, 6 x 3 plus 3 cues and balls for ZX Spectrum. Must be in good condition issue 2-3 16/48K Tel: Sos 0702 540452, buyer collects, ask for Paul.

ATARI 400 48K with tape recorder and Basic cartridge and s/w and joystick for a ZX Spectrum 48K with recorder and s/w. Tel: New Ash Green 874564 after 4pm.

ACORN ELECTRON, prefer London area. Tel: North Weald (037882) 2654.

URGENT! SWAP OR SALE. Atari VCS with six cartridges including E.T., Dodge Em, Street Race, Air-Sea-Bat, Combat, Grand Prix, £70 or swap for any computer (not ZX81). Call or write to Ian, 99 Pilch Lane, Huyton, Liverpool L24 0LD.

POOR BELGIAN ZX Spectrum owner wishes to swap or buy software at reasonable prices. Please write to: Leo Heirman, Kamiel Van Baelenstraat, 16B 2300 Turnhout (Belgium) (14) 424115.

SWAP SPECTRUM Software. Arcade games plus Adventure (Mr Whimpy, Hunchback, Valhalla, Hobbit), etc. For DK Tronics keyboard. Write W. H. Gray 87H Tower Drive, Midton, Gourock, Inverclyde. Phone(Gourock 39817 evening.

SPECTRUM SOFTWARE, Speak Easy, Galaxy Attack, Jetpac, Ground Attack, Night Flight, Games Designer, Great Britain Ltd. Excellent condition. For sale or swap. Tel: (0473) 822284 (evenings).

SPECTRUM. Swap Kempston joystick interface for Valhalla or Hobbit. Spectrum Briefcase for printer, both in excellent condition. Ady Barlow, 22 Maes Cynbryd, Llanddulas Clwyd LL22 8HF.

SPECTRUM GAMES wanted or to swap for Kong, Acid Attack, Manic Miner, Snooker, Chuckie Egg, Football Manager and Jetpac. Tel: Rayleigh 770560 evenings.

CEASER THE CAT adventures and other CBM 64 games to swap for any other adventures. Preferably level 9 adventures. Tel: 0889 270920 evenings.

WANTED 3.5 JUPITER ACE around £40. Will collect if in Leicester area. Phone Welford (085881) 346 after 5pm.

SPECTRUM SOFTWARE to swap, sell. Arcadia Diddums, Zzoom and 30 others. Microdrive free to first reply. Wanted Hobbit, pinmania, M/Miner, Valhalla. Your list for mine. Contact R. Lucas Sergeants, Romans Road, Winchester, Hants.

ZX PRINTER. Willpay up to £25. Tel: 01-594 0894.

SWAP OR SELL Spectrum s/w inc. Groucho, Cookie, Avenger, Harrier Attack, Dictator, Johnny Rob, Metorer Storm, Tyrant O'Fathers, Scisoft, Chemistry, Physics, Picturesque, assembler. Tel: Lamblugh 861275 (Cumbria) after 4.30pm.

MONEX RS232 Centronics Printer Interface for Spectrum. Willing to approx £20. Tel: 01-580 7262 room 422 (Andrew eves).

EPYX, TRONICS, any other other new Vic 20 s/w to swap. Tel: 025 671 3445 after 4.30pm.

SWAP HEWLETT PACKARD Hp41C programmable Calculator as new. For CBM 64, Spectrum 48, Oric with tape or disc if possible. Tel: day (0244) 811809. Chester area.

TRS-80 ADVENTURES for Model I level 2. Especially the system and Infocom adventures. Tel: Basildon (0268) 555655.

ATARI 800 Disc drive. Good condition. Tel: Leicester 872940 after 5pm.

LONELY DRAGON 32 wants Hi-Res cartridge. Will swap for 5 cassette games. Telephone Corby (05363) 66590 after 6pm.

CBM 64 GAMES. Swap or sell. All originals. Tel: 0272 837617.

SPECTRUM OWNER would like a penfriend to help in programming. Exchange ideas. Please write to Chris Rainer at 2 Mill Hill Road, Hinckley, Leicestershire LE10 0AX.

WANTED DRAGON 32 with leads and manual are only required. Will pay around £60. Tel: Coventry 596412.

WANTED 1K ZX81. In good condition, no software, books or peripherals please. £15 or near offer. Tel: (0264) 4628 after 5pm.

48K SPECTRUM under £100 if possible with software, can't collect out of Manchester area. Tel: (061) 794 2644 after 4pm.

SWAP YORK HOME BASE CB, power mic, aerial and S.W.R. meter (worth over £120) for a computer or equipment for BBC and Spectrum. Tel: Vicki on Potters Bar (77) 53596.

COMMODORE 64 software to swap. Phone 031 661-7477 after 5pm or weekends. Ask for Martin.

SPECTRUM S/WARE for swap. Hundreds of titles to choose from. Send your list for mine. Immediate reply. Eddie Earley, 65 Anner Road, Dublin 8, Ireland.

DRAGON SOFTWARE to swap: Leggit (Imagine) for Transylvanian Tower (Richard Shepherd), Crazy Painter for Cuthbert in the Jungle and Space Shuttle for Keys of the Wizard (all four Microdeal). Other offers welcome. Phone Hereford 0432-273439.

75 SPECTRUM MAGAZINES. Inc: PCW, Your Computer, Sinclair Programs etc: will swap or sell: Phone David. 01-854 8386 eves only.

SWAP ZX80 Sinclair, 16K Ram, for any computer except ZX81 or pocket computers. Tel: 01-455 6641 after 4.15pm.

16K SPECTRUM Jet Pack swap for any version 16K Spectrum Donkey Kong. Tel: 01-968 7556 (eves).

WANTED the following adventure games for ZX81. Planet of Death, Inca Curse, Ship of Doom. Any Adventure games for BBC Model B: Tel: 061 339 3227 after 6.30pm.

SPECTRUM 48K in good condition, preferably. N/W area. Tel: 061 491 1159 aFter 2pm.

CBM 64 + C2N cassette unit boxed as new + s/w. Bks + manual, swap BBC Model B and give £100 cash. Tel: 01-889 4159.

HARDWARE checking program required for Spectrum 16 + 1 or 48K. Top price paid. Send details to S. Dean, 40 Paddington Walk, Bentley, Walsall, W. Mids.

SPECTRUM GAMES to swap: Alchemist, Ant, Attack, Minet Out, M Coder, English Literature, Pac-MHN, Berserk, Scramble, Laser Snaker. Tel: (0272) 569599. Also Atari Compatible, Pistol Grip, Crack Shot, Joystick. £7 + P&P.

SWAP SPECTRUM originals. ABC Liftoff, Pathfinder, Hot Dot Spotter and Alphabet, for other educational. 01-800 6767. After 7pm.

EXTENSIVE RANGE of colour darkroom photographic equipment and supplies available to swap for Epson FX80 or colour TV monitor. Might sell. Tel: 01-959 1844 (eves).

WANTED, help with Adventure A for 16K Spectrum 1. Can get as far as the Ford Field and the Maze. Write or phone, 33 Parkin Close, Pukinfield, Cheshire. 061339 4325.

SWAP VIC 20 + C&N + 16K/8K/3K + 3K Super Expander. £150 Software + Joystick, books still boxed with cash for Z×48K Spectrum or sell for £140 ono.

SWAP Wacky Waiters, Arcadia, Bewitched, Gunfight, Gridrunner, Abductor, Panic, Skramble, Slapdab, all originals. 2 for 1 Expand. Or 1 for any others. For Vic 20 or 2 for an Expanded Adventure. Alice Seagrove, 34 Allendale St., Colne, Lancs B38 039.

SWAP VIC 20 Mission Impossible for any Adventure (Not Pirate Cove) Exeter (0392) 217322.

SWAP SPECTRUM Scrabble for The Quill. Also swap Atic Atac for Seiddab Attack. Have other Spectrum software to swap as well. Tel: Gordon, 0382 502085 (anytime).

WANTED URGENTLY. Vic-20. Rabbit's Paratrooper for Unex machine. Will pay below £4 (original). Also wanted, any ANIR0G-Kingsoft Games. Telephone Kidsgrove (07816) 3716, after 6.00pm.

WANTED ANIROG-Kingsoft software. For VIC-20 machine. Any memory, Unex or 16K Expanded. Must be original tapes. Telephone Kidsgrove (07816) 3716, after 6.00prn.

WANTED 2N tape unit and Joystick 01-348 8271 (eves).

WILL SWAP Binatone TV game and adaptor for three adventure games for VIC 20. Will swap Mole Attack cartridge for the Wizard and the Princess tape with other games for VIC20.

WANTED 70R TI99/4A Mini Memory, Personal Financial Aids and Othello Modules. Phone 01-472 3791.

WANTED 48K Spectrum with leads and manual. Will pay up to £75.00. Edinburgh area. Tel: (5) 881212.

SWAP Space Shuttle, Gridrunner, Stellar Wars, Motormania and Quizmaster for the CBM64 for other good quality original games. Especially interested in Level 9 and Channel 8 Adventures. Ring Sajid, 01-688 6444 after 6pm.

A.G.F. INTERFACE ONE plus Atari-type Joystick for Spectrum. As new. £15 ono. Tel: Llanelli 2132 (evenings or weekends).

SELL OR SWAP Sharp M1 700 with built in data recorder. Swap for printer or BBC Compatible disc drive or sell any reasonable offer. Tel: 0487 814043.

SWAP 40 Channel CB + Aquarius Computer + games booK and 16K or 48K. Tel: 01-720 84848.

BBC DISC owners to swap s/w. I have many titles inc: JCB latest Acorn Soft Superior programing etc. Tel: 05827 69152.

WANTED ZX80 computer, working order. Tel: 0298 6800. After 6pm.

ADVENTURE HELPLINE

Micro: *Vic 20*
Adventure: *Pirate Cove*
Problem: *At 68 years of age I enjoyed computing with my grandson. Then I was given "Pirate Cove" I can't get out of the flat.*
Name: *Bill Hanna*
Address: *1 Shandon Crescent, Edinburgh EH11 1QE*

Micro: *BBC B*
Adventure: *Snowball*
Problem: *1) What do I do at the revival machine. 2) How do I open the doors that are too smooth to grip 3) Where do I find the space suit?*
Name: *Craig Stevenson*
Address: *64 Springfield Park Road, Burnside, Glasgow, Scotland.*

Micro: *BBC B*
Adventure: *Sphinx Adventure*
Problem: *I have crossed the Glacier, I can pass the Dragon, Goblins and even (without the mouse) the elephant. What next? Where is the boat?*
Name: *John Reid*
Address: *25 Coombe Hill Crescent, Thame, Oxon OX9 2EQ.*

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by John Billingsley

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Although he spent eight years as a Cambridge don John Billingsley has a practical approach to engineering. His commercial designs range from auto-pilots and hospital computer systems to single-chip cooker timers and a rising damp meter.
He is a member of several IEE committees, leads a team researching into robotics and is well known as the organizer of the Euromouse Maze contest.

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by Keith and Steven Brain

Artificial Intelligence on the Commodore 64 shows you how to implement AI routines on your home micro and turn it into an intelligent machine which can hold a conversation with you, give you rational advice, learn from you (and teach you) and even write programs for you.

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For many years science fiction books and films have contained 'intelligent' computers which appear to be at least the equal of man. Although some of the features described in these remain illusions, extensive research into AI has brought many of the ideas much nearer reality.

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New Releases

METEORS

Gargoyle Games is another new Spectrum software house — a financial risk as certain as Monte Carlo. Nevertheless its first release is technically superb and pretty addictive.

Ad Astra is a shoot-'em-up game but with large colourful graphics and a degree of three-dimensionality raising the usual adrenalin level considerably.

Between each wave of aliens which hurtle from the far distance till within spitting distance to lob bombs at you, are some beautifully animated, tumbling meteors. The game caters for most joystick interfaces including Interface I.

My only (small) criticism is that the stars are static. Some movement would probably have been more exciting — but it's a great game anyway.

Program *Ad Astra*
Price *£5.95*
Micro *Spectrum*
Supplier *Gargoyle Games, 4 North Western Arcade Birmingham B2 5LH*

TACTICAL

Computer War — the program based on last year's hit movie *War Games* is now available on the Vic 20 with 8K expansion.

Most spin-offs are dreadful. This one isn't, being a nice balance between quick reactions and tactics as you try to save the world from global thermonuclear war.

Using a large scale map you must decide which missile poses the most immediate threat, track it down and knock it out. Time ticks away. Missiles can be deactivated at the last minute by matching two complex patterns using the joystick — succeed and one of your bases is saved.

However every success brings greater numbers of missiles and at some point destruction becomes inevitable. A morbid thought.

Program *Computer War*
Price *£5.95*
Micro *Vic 20 (+8K)*
Supplier *Thorn EMI Computer Software Film House 142 Wardour Street London W1V 3AU*

SOUPED-UP

Cranky is part of Dragon Data's souped-up new range of software. It is a machine code educational game — a rare enough thing in itself.

The program aims to help children learn number patterns and relationships. *Cranky* — the star of the game — is a pocket calculator whose circuits get damaged everytime it rains (a serious design fault I'd have thought).

Rather than send Cranky back under guarantee (perhaps being offered some rolls of printer paper for all the trouble he has caused) the children are invited to repair him.

Repairing Cranky involves the manipulation of numbers 3 and 5 to get a whole load of other numbers eg, 3 + 3 = 6 − 5 to get 1 and so on. When all the required numbers have been found Cranky will work again. It sounds like one of the better attemps so far to do something sensible using a computer to educate.

Program *Cranky*
Price *£10.95*
Micro *Dragon 32*
Supplier *Dragon Data Kenfig Industrial Estate Margam, Port Talbot West Glamorgan*

Pick of the week

DRESSED CRAB

Although continuing with its plans for double-sided cassettes containing two games, K-Tel has opted for a more conventional one game format with its latest Commodore 64 releases.

Odyssey is an arcade game worthy of Jeff Minter in terms of pure speed of action. Over several screens you have to blast away at an army of robo-crabs in a variety of differing scenarios. In the first, lines of what look like tiny Pac-men march across the screen up and down, left and right — a couple of hundred at least — you have to shoot them all.

I floundered at the next screen where a sort of white rugby ball is being guarded by several crabs — you have to hit it five times. The problem is it keeps sending out a missile which sends your score back to zero and is almost impossible to avoid. I didn't get beyond two.

The last screens are a crab-orientated version of *Scramble* where you have to pilot your ship over mountains whilst avoiding all kinds of attack — arcade geniuses may make it to the end, where lies the alien base itself. Addictive, with superb sound effects. Cheap too at £6.95.

Program *Odyssey*
Price *£6.95*
Micro *Commodore 64*
Supplier *K-Tel K-Tel House 620 Western Ave London W3 0TD*

NEW WAVE

Advancing with the Electron is the first Second-wave book I've seen for the machine.

Let me explain. Publishers want to make money. When any new machine is released there will be countless numbers of people who (a) can't find any software for it and want to type in the sort of games found in *100 games for . . .* type books and (b) people who find the manual incomprehensible and need a book like *Ludicrously Easy Programming on the . . .*

After these people have got their programs and have made some sort of attempt at learning how to program then they want to go on to more sophisticated things like machine-code and advanced Basic — thus comes Wave Two.

Advancing with the Electron uses the development of a database program to illustrate things like elegant programming and debugging techniques. The database looks fairly substantial and the book seems above average in usefulness of content.

Book *Advancing with the Electron*
Price *£5.95*
Micro *Electron*
Supplier *Micro Press Castle House 27 London Road Tunbridge Wells Kent TN1 1BX*

SWEEPING

The latest Commodore program in Phoenix's range of twin Adventure/Arcade packages is *The Sorcerer's Apprentice*.

The arcade game follows the plot of the Walt Disney cartoon fairly closely, with you as a young magical apprentice left

alone with some recalcitrant brooms (perhaps what they need is a short, sharp stick?) intent on leaving water all over the place.

Using your magic wand you have to persuade the brooms to clear up the mess and visit the sorcerer's castle where you will be able to experiment with a whole series of spells, the function of which Phoenix is unkeen to divulge. You'll have to play it to find out.

Success in the arcade game gives clues and the running code for the adventure. This proved too tough for me to get very far, even knowing the start code. The only thing I can say for sure is that it's tough.

Program *The Sorcerer's Apprentice*
Price *£9.95*
Micro *Commodore 64*
Supplier *Phoenix Software*
Spangles House,
116 Marsh Road
Pinner
Middlesex

FACE PACK

I've had a couple of phone calls recently about the lack of educational software for the Commodore 64 — finally it seems to be trickling through.

Identikit may or may not be very educational but I think kids will enjoy it. As you might assume from the title, your task is to construct a face by choosing from a selection of different bits — eyes, ears, nose, mouth, etc. It is rather like Commodore's own *Facemaker*.

Most of the faces look like nothing on earth — one or two look like middle of the road pop stars. As a sort of bonus the features can be made to move, ears wiggling, mouths smiling and so on.

It's the sort of program that is ideal for the Commodore with its excellent graphics. But I'm really not at all sure about its educational value — perhaps if your children want to become Policemen?

Program *Identikit*
Price *£7.95*
Micro *Commodore 64*
Supplier *Stell Software*
36 Limefield Ave
Whalley
Lancs BB6 9RJ

WARFIELD

Lest its ventures into arcade game publishing confuse us, Lothlorien has released some more strategy games, *Johnny Reb* on the Dragon and *Confrontation* on the BBC B.

Confrontation is a game of tactics for two players using 20th century warfare including air combat and paratroops. Victory can be whatever you want it to be and, likewise, you can create your own battlefields. However, the game is supplied with a ready-made scenario set in Europe.

All instructions in the game take the form of single key presses with graphic symbols depicting the various kinds of terrain, including mountains, marshes, towns, cities, woods, and an airfield.

I suspect that part of the fun of wargaming is to develop your own rules. Nevertheless, fairly extensive ones are supplied with the cassette.

Program *Confrontation*
Price *£7.95*
Micro *BBC B*
Supplier *Lothlorien*
56a Park Lane
Poynton
Cheshire SK12 1AE

TUNEFUL

Spooky Mansion is a 100% machine-code arcade spectacular — at least, that is what the blurb says. In any event it sounds like fun of the (broadly) Manic Miner variety.

The appallingly named Hugho First must move through seven levels in a mansion collecting objects as he goes.

Guess what. There are obstacles in the form of various creepies and ghouls which have been sent by Count Dracula to bar your way.

Where the game definitely does score over similar games on the Spectrum is in the wide variety of tunes and effects it generates whilst you are playing.

Program *Spooky Mansion*
Price *£7.95*
Micro *Oric/Atmos*
Supplier *Mercury Microware*
1 Duxford Walk
Moston
Manchester 10
M10 9JN

KILLER APES

Jungle Jive is a new release from Virgin running on both the BBC and Electron. It probably won't appeal to campaigners for animal rights.

The keyboard controls a lone explorer strolling through the jungle when suddenly (surprise, surprise) the enterprising adventurer is beset by dozens of strange animals including pink elephants and green crocodiles.

The idea is to blast away at them with your rifle or run away, a mixture of both being necessary to do well at the game. It is pretty basic but some form of subtlety is introduced in the form of baboons.

These are as dangerous to your health as all the other animals but killing them will result in your own demise. Poetic justice I suppose.

Program *Jungle Jive*
Price *£7.95*
Micro *BBC/Electron*
Supplier *Virgin Games*
61/63 Portobello Road
London W11 3DD

STAR STRUCK

For Astronomers with a Spectrum, *Planetarium* must be an essential purchase. Using machine code it displays the sky at night with all the visible stars for any date, time and place between the years 1800 and 2100.

Along with the impressive main display, a side display shows the altitude and azimuth of any visible planets. Another command allows you to see selected constellations. All the screen displays can be printed out on the ZX printer.

Program *Planetarium*
Price *£7.45*
Micro *Spectrum 48K*
Supplier *Eclipse Software*
79 Ardrossan
Gardens
Worcester Park
Surrey

BLOOD'N'GUTS

Orc Attack is a game for the Spectrum from Thorn EMI continuing the development of its Spectrum range.

The basic game has been around for a long while and

continued on page 69 ▸

DRAGON | BBC | SHARP MZ700 SPECTRUM

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100% high-res. graphics possible. Demonstrates and tests the students use of vernier callipers, micrometers etc.

'O' LEVEL/CSE PHYSICS (PART 2 – VOLUME) – DRAGON, BBC – £6.50
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Designed to teach and test the students knowledge of weather map symbols. Each symbol is represented in high-res. graphics and the program covers the complete syllabus.

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◂ continued from page 67

probably gives ammunition to the Mary Whitehouses of this world. The object of the exercise is to defend your battlements from hordes of Orcs who are attempting to scale them with ladders. Other Orcs are firing arrows at your lone knight.

The violence of the game comes when an Orc is successfully dispatched either by being cut to ribbons or crushed by a rock. Each Orc explodes with blood and gore like something from a Sam Peckinpah movie — worst still is the boiling oil which dispatches the entire horde in a blaze of fire and mayhem.

Violence aside it's a good game and infuriatingly addictive — technically it's pretty clever too, the way the Orcs mill about being particularly impressive.

Program *Orc Attack*
Price *£6.95*
Micro *Spectrum 48K*
Supplier *Thorn EMI Computer Software Creative Sparks Thomson House 296 Farnborough Road Farnborough Hants*

FAIR FIGHT

Carnival Massacre is the latest Atari cartridge from Thorn EMI, and pretty gruesome stuff it is too. 'Where fun turns to fear' it says enthusiastically on the front of the box.

You are Super Sam defending the funfair from Butcher Bill and Ruthless Rick. These alliterating agents of the awful aim to alienate all by potting passing passengers by pelting them with projectiles (enough! Ed).

People taking rides on the carnival ferris-wheel and roller-coaster are being thrown off by the two baddies. You have to catch them whilst avoiding a bouncing spring. The graphics are good and the music is in a suitable carnival spirit.

Program *Carnival Massacre*
Price *£9.95*
Micro *Atari*
Supplier *Thorn EMI Computer Software Film House 142 Wardour Street London W1V 3AU*

DODGE ALL

DK Tronics seem to have been quiet for a long time now — its latest release follows a gap of several months.

Given that it has been released all on its tod, it's a strange one.

Trom is a game for the 16K Spectrum written almost entirely in Basic with a small amount of code for the graphics and movement. In this time of flicker-free sprites and 3D logic, the game looks graphically clumsy.

On the other hand it's pretty good fun to play — basically of the Dodge Everything variety. It's so difficult you find yourself playing it time after time. Strange.

Program *Trom*
Price *£5.95*
Micro *Spectrum*
Supplier *DK Tronics Unit 6 Shire Hill Industrial Estate Saffron Walden Essex CB11 3AQ*

TEST CASE

It was with some trepidation that I looked at Pulsonics new releases.

The company is selling its games at £2.95 each; 'a pocket money price'. I suspected the worst — cheap prices to get rid of dreadful tat no-one ought to touch with a barge pole.

I was wrong. All the games seem to be worth playing and many are written in machine code. Nothing staggering, of course, but certainly worth consideration.

Ashes is a cricket simulation involving both tactics and quick reactions. Graphically it isn't far beyond a ZX81 program but in terms of the thought required to play it's a very satisfying game indeed. Factors like the type of ground, bowler and weather are vital considerations.

Program *Ashes*
Price *£2.95*
Micro *Spectrum*
Supplier *Warwick Distribution 3 Standard Road Park Royal London NW10 6EX*

ALIEN FROGS

Hudson software, the Japanese software company whose programs have formed the bulk of Sinclair's most recent software release have come to a similar arrangement with Kuma computers who have recently entered the Spectrum software market.

Frog Shooter is one of the first releases. Hudson's trademark seems to be large, colourful graphics. *Frog Shooter*, far from being a Frogger derivative, is a bang-bang space fighter game.

Your wing fighter zooms down a channel in which are found various aliens (marvellous sprite animation). Shooting at them seems to produce an alien evolution from funny disc to odd tadpole to bizarre frog. The later the point of evolution you hit the higher the points. Naturally the baddies fire back. Unoriginal maybe, but graphically spectacular.

Program *Frog Shooter*
Price *£6.95*
Micro *Spectrum*
Supplier *Kuma Computers 12 Horseshoe Park Pangbourne RG8 7JW*

BUSINESS

When it was launched, the Commodore 64 was being promoted as a business machine. Although the excellence of some of the games has tended to obscure this fact, there is no reason why it should not be suitable for such purposes.

One of the prime languages for business uses is *Pascal* — one that is rarely implemented on home micros. However Oxford Computer Systems have now produced it on the 64.

The version is a full implementation of *Ansi Pascal* generating standard p-code — the compiler is also written in *Pascal*. Additions have been made to accommodate *Peek* and *Poke* and sprite editing.

The disc-based version incorporates a disc to disc compiler using the entire memory for Pascal programs. An extensive manual is also supplied.

Program *Pascal*
Price *£14.95/£49.95 (disc)*
Micro *Commodore 64*
Supplier *Oxford Computer Systems Hensington Road Woodstock Oxford*

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

Top 10

Commodore 64

1	(3)	Krazy Kong (Interceptor)
2	(6)	Boogaboo (The Flea) (Quicksilva)
3	(-)	Revenge of the mutent camels (Llamasoft)
4	(-)	Superblitz (Commodore)
5	(2)	Manic Miner (Software Projects)
6	(10)	Chinese Juggler (Ocean)
7	(-)	Depth Charge (Commodore)
8	(-)	Mr Wimpy (Ocean)
9	(-)	Tank Attack (Superior)
10	(-)	The Hobbit (Melbourne House)

Vic 20

1	(-)	Snooker (Visions)
2	(2)	Krazy Kong (Interceptor)
3	(3)	Wizard and the Princess (Melbourne House)
4	(1)	Flight 015 (Ferranti Davenport)
5	(6)	Jet Pac (Ultimate)
6	(9)	Grid Runner (Llamasoft)
7	(8)	Arcadia (Imagine)
8	(7)	Snowman and Maths Maze (Commodore)
9	(-)	Race (Commodore)
10	(-)	Super Vaders/Bomber Run (K-tel)

Dragon

1	(1)	Chuckie Egg (A&F)
2	(7)	Up Periscope! (Beyond)
3	(8)	Pedro (Imagine)
4	(6)	Hungry Horace (Melbourne House)
5	(-)	Devil Assault (Microdeal)
6	(-)	Ring of Darkness (Wintersoft)
7	(10)	Frogger (Microdeal)
8	(3)	Kriegspiel (Beyond)
9	(-)	Dragon Chess (Oasis)
10	(-)	Scramble (Microdeal)

ZX81★

1	(-)	Mothership (Softsynch)
2	(3)	Krazy Kong (PSS)
3	(-)	Fantasy Games (Psion)
4	(-)	Flight Simulation (Psion)
5	(-)	Space Raiders (Psion)
6	(2)	Asteroids (Quicksilva)
7	(1)	Scramble (Quicksilva)
8	(-)	1K Chess (Artic)
9	(4)	Football Manager (Addictive Games)
10	(-)	Defender (Quicksilva)

★All 16K
(Figures compiled by Boots/Websters)

Atari

1	(1)	Rally Speedway (Adventure International)*
2	(4)	Warlock (Calisto)‡
3	(3)	Caverns of Kafka (Cosmi)
4	(2)	Slinky (Cosmi)
5	(8)	Saga 5 The Count (Adventure International)
6	(-)	Preppie (Adventure International)
7	(-)	Meltdown (Cosmi)
8	(-)	Xenon Raid (English software)‡
9	(-)	Planet Fall (Infocom)†
10	(5)	Savage Pond (Starcade)

* Cartridge † 32K disc 32K cassette
(All figures compiled by Calisto Computers, Birmingham 021 632 6458)

BBC★

1	(-)	JCB Digger (Acornsoft)
2	(-)	Fortress (Pace)
3	(-)	Chuckie Egg (A&F)
4	(9)	Hopper (Acornsoft)
5	(-)	Chemical simulations (Acornsoft)
6	(-)	Cosmic Kidnap (Superior)
7	(-)	Super Invaders (Acornsoft)
8	(-)	Battle Tanks (Superior)
9	(-)	Chemical Analysis (Acornsoft)
10	(-)	Dodgy Dealer (OC consultants)

★ All Model B
(Figures compiled by Micro Management)

Spectrum

1	(5)	Jet Set Willy (Software Projects)
2	(4)	Chequered Flag (Psion)
3	(6)	Scuba Dive (Durrell)
4	(1)	Atic Atac (Ultimate)
5	(—)	Hunchback (Ocean)
6	(10)	Flight Simulation (Psion)
7	(2)	Lunar Jetman (Ultimate)
8	(7)	Pogo (Ocean)
9	(—)	Snowman (Quicksilva)
10	(—)	Speed Duel (DK Tronics)

(Figures compiled by WH Smith and Son, London)

Books

1	(2)	BBC Micro Disc Companion, *Latham* (Prentice-Hall)
2	(-)	Disc Systems for the BBC Micro, *Sinclair* (Granada)
3	(5)	Advanced Graphics with the BBC Microcomputer, *Angell and Jones* (Macmillan)
4	(3)	Advanced Programming Techniques on the Commodore 64, *Lawrence* (Sunshine)
5	(1)	Interfacing Projects for the BBC Micro, *Smith* (Addison Wesley)
6	(-)	68000 Assembly Language Programming, *Kane and Leventhal* (Osborne)
7	(7)	Computing for all the family on the BBC Micro, *Nobel* (Sigma)
8	(-)	Spectrum Hardware Manual, *Dickens* (Melbourne House)
9	(-)	Mastering the Commodore 64, *Jones and Carpenter* (Horwood)
10	(4)	Mastering Machine Code on your ZX Spectrum, *Baker* (Interface)

(Figures compiled by Watford Technical Books, Watford 0923 23324 Prestel 28844)
(Last week's position in brackets)

Book Ends

HOBBIT GUIDE

You can now read the book of the adventure game or more precisely the book about the adventure game with *A Guide to Playing the Hobbit.*

The book offers various levels of help from a general playing guide, to specific instructions on what to do at each location, and what objects can be found there. A more strong-minded person than myself might manage to read only the more general advice and so leave the challenges open — but I confess I cheated.

Although the book is short all the screens from the game are shown and both successful adventurers who have solved the program and those still trying to find their way out of the Goblin's Dungeon should get something from it.

Book	*The Guide to Playing The Hobbit*
Price	*£3.95*
Micro	*BBC/Spectrum/ Oric/Commodore*
Supplier	*Melbourne House Castle Yard House Castle Yard Richmond TW10 6TF*

BARGAIN

It is certainly true that a lot of people find all those books called 'Introduction to . . . Basic' an introduction only to feeling even more confused than when they started. There is always scope for making things simpler still.

Very Basic Basic does just that. The book is intended for the Electron but likely to be made available for other machines. It covers everything from connecting the TV, choosing the right tape recorder to *Strings* and other Basic programming commands. All Basic words are illustrated with an example. I really think this is a book anyone could understand, no matter how computer illiterate.

The book won't take you very far into programming but the small distance it does go is thoroughly and clearly covered. Not only that but it only costs £2.95. A bargain.

Book	*Very Basic Basic*
Price	*£2.95*
Micro	*Electron*
Supplier	*Century Publishing, 12-13 Greek Street, London W1V 5LE*

This Week

Program	*Type*	*Micro*	*Price*	*Supplier*
5 A Side Football	S	BBC B	**£7.95**	Salamander
Crazy Tracer	Arc	BBC B	**£9.95**	Acornsoft
Digger	Arc	BBC B	**£6.95**	Visions
Eagle	Arc	BBC B	**£7.95**	Salamander
Learn About Shapes	Ed	BBC B	**£9.95**	Goldstar
Learn About Words	Ed	BBC B	**£9.95**	Goldstar
Sketch Pad	Ut	BBC B	**£9.95**	Goldstar
The Greedy Dwarf	Ad	BBC B	**£9.95**	Goldstar
Krypton	Arc	Commodore 64	**£6.90**	Ace
Indian Attack	Arc	Commodore 64	**£5.95**	Anirog
3D Speed Duel	Arc	Commodore 64	**£6.95**	DK Tronics
Colossus Chess	S	Commodore 64	**£9.95**	CDS
Cybotron	Arc	Commodore 64	**£7.95**	Anirog
Dark Star	Arc	Commodore 64	**£6.90**	Ace
Jungle Drums	Arc	Commodore 64	**£7.95**	Anirog
Lewdo	S	Commodore 64	**£6.95**	Twilight
Magic Carpet	Arc	Commodore 64	**£6.90**	Ace
Mind Control	Arc	Commodore 64	**£6.90**	Ace
Moby Dick	Arc	Commodore 64	**£7.95**	PSS
Munroe Manor	Ad	Commodore 64	**£8.50**	Severn
Niterider	Arc	Commodore 64	**£6.90**	Ace
Pigs in Space	Arc	Commodore 64	**£6.90**	Ace
The Pyramid	Ad	Commodore 64	**£6.50**	Fantasy
Zodiac	Arc	Commodore 64	**£7.95**	Anirog
Moneybox	Ut	Dragon	**£9.99**	Harris
Chemistry Tutor	Ed	Dragon 32	**£5.95**	Multisoft
Extended Commands	Ut	Dragon 32	**£5.95**	Multisoft
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Red Meanies	Arc	Dragon 32	**£7.95**	Salamander
Touch N Go	Ed	Dragon 32	**£9.95**	Goldstar
100 Programs for the Electron	Ut	Electron	**£11.90**	Prentice-Hall
Battle Flight	S	Oric	**£4.95**	Stour
Grid Bomb	Arc	Oric	**£5.95**	Touchstone
Racing	S	Oric	**£9.95**	Salamander
The City of EhDollah	Ad	Spectrum	**£9.95**	Goldstar
Calorie Controller	Ut	Spectrum	**£5.95**	S D Micro Systems
Chinese Juggler	Arc	Spectrum	**£5.90**	Ocean
Colditz	Ad	Spectrum	**£6.95**	Phipps Associates
Draw 15	Ut	Spectrum	**£5.00**	Fowler
Dyslexia Beater	Ed	Spectrum	**£12.95**	Martin Dinitz
Engine Collectors	Ut	Spectrum	**£3.45**	Placet
Grid Patrol	Arc	Spectrum	**£5.95**	Lothlorien
Manic Designer	Ut	Spectrum	**£4.50**	P & M Software
Matrix	Arc	Spectrum	**£5.95**	Salamander
Megagalactic	Arc	Spectrum	**£5.95**	Salamander
Millionaire	S	Spectrum	**£5.50**	Incentive
Mummy Mummy	Arc	Spectrum	**£5.95**	Lothlorien
Night Gunner	Arc	Spectrum	**£6.95**	Digital Integration
Titanic	Ad	Spectrum	**£7.95**	R&R Software
ZigZag	Arc	Spectrum	**£6.95**	D K Tronics
Course Winner	Ut	Spectrum/BBC	**£12.90**	Selec
Kwazy Kwaks	Arc	Vic 20	**£5.05**	Mr Chip
Westminster	S	Vic 20	**£5.50**	Mr Chip
Climber	Arc	ZX81	**£3.95**	Unicorn

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.

Worthy of note

It's a fair assumption that readers of this magazine think microcomputers are, well, *important*. Your relationship with the wretched things may be a love-hate one — the balance tipping towards love when that vital tax-fiddling program works first time, to hate when after entering 1500 lines of Basic you accidentally hit the *Reset* button conveniently situated next to *Return*.

But, of course the machines are important! Everybody says so. Newspapers drivel on about them all the time. Microcomputers are the sole growth industry of the eighties. Even W H Smith, usually so reluctant to handle offbeat commodities like books, now have vast computer book and computer magazine shelves dwarfing every other section of their shops.

Once in a while, though, you get to see it all from a chilly outside perspective, and this world of computer magazines shrinks like Earth observed from 250,000 miles out in space. It happened to me the other day. I'll try to lead up to it gradually and minimize readers' heart attacks.

First, a party game: write down the names of all the computer magazines you can think of in 60 seconds. Let's see, there are some weeklies like *Popular Computing Weekly, Personal Computer News* and *Home Computing Weekly*. A lot more monthlies, *What Micro?* and *Which Micro?* (I always confuse those two), *Personal Computer World, Computer Answers, Computer & Video Games*, a million others I forget. Upmarket ones, shading into mainframe-only interest: *Computer Weekly, Software, Computer Talk, Datalink, Informatics*. A ridiculous number are dedicated to one manufacturer or one machine: *Commodore User, Sinclair User, ZX Computing, Acorn User, Dragon User, A & B, Your Spectrum, Sinclair Projects*, and I've already seen *two* magazine supplements called *QL User* (hope they settle out of court).

Now brace yourself and let me break it to you. None of these magazines officially exists, not one. Their editors and readers, as appropriate in this year, are un-persons inhabiting a shadowy half-world. This startling news comes on high authority: nothing less than the *Writers' and Artists' Yearbook 1984* (A & C Black, £4.50), 77th edition of "the indispensable handbook for writers." Among authors and journalists, the *Yearbook* is regarded as rather more authoritative than the Bible or even the *Oxford English Dictionary*.

According to the 1984 edition, though, the *only* British newspapers/magazines concerned with computers are *Computing, Computing Today, Practical Computing* and *Your Computer* (the four editors concerned can now stop grinding their teeth to powder over their omission so far, and instead can preen themselves smugly).

Now admittedly the *Yearbook* does explain that "Many journals do not appear in our lists because the market they offer for the freelance writer is either too small or too specialized, or both." But to get this in its proper perspective, you need to know that although they list only four markets for computer material, there are eight in the category of stamp collecting, and 27 under "Health, Medicine and Nursing." You know, all those health, medicine and nursing magazines that crowd the feeble minority of computer publications off the stands. Then there are 34 publications for the blind, mysteriously including *Piano Tuners' Quarterly*, and you begin to wonder if the *Yearbook* editors would recognize a too-small or too-specialist market if it bit them in the leg.

Possibly Kingsley Amis, John Fowles and Salman Rushdie would not be bombarding all the computer magazines with articles even if the *Yearbook* gave more than four magazines names and addresses. But doesn't it seem silly for such a thriving and, dare I say it, important interest to be treated like this? Computer-mag editors, worried about the standard of their submissions, could do worse than ask to be mentioned in the 1985 edition. If the *Yearbook* can mention *Ad Astra*, an SF magazine which ceased publication in 1981, why can't they mention *this* far more wonderful journal?

Meanwhile, when overwhelmed by the hugeness and bustle of the gaudy computer scene, the rest of us can take comfort from the thought of being a tiny, minority interest, dwarfed by the titans of numismatics, scale modelling and stamp collecting.

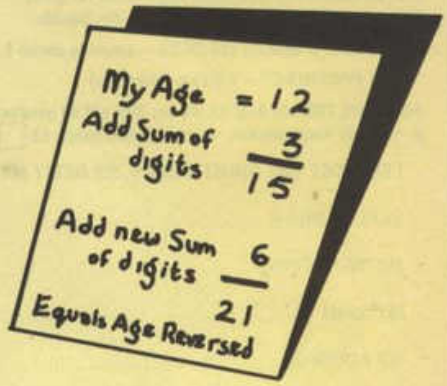
David Langford

How old is Grandpa?

Puzzle No 102

Two people meet. The one says, "I have a brother" and the other says, "Its a small world, so have I."

Young Chris became a victim of just such an amazing coincidence. "This is odd," he remarked to his grandfather one day, "If I take my age, in years, and add the sum of its digits, then take this total and add the sum of the digits in the total, I get my age again, with the figures reversed."



Chris' grandfather thought for a moment: "That's a coincidence — I can do exactly the same with my age!"

How old is Grandpa?

Solution to Puzzle No 97

The program works by summing consecutive odd numbers up to the sample address, *A*. A separate count, *C*, then continues until it exceeds *A*. If the count falls exactly on the value *A*, the program ends.

```
10 LET T = 0 20 FOR N = 1 TO 99 STEP 2 30 LET T = T
+ N 40 NEXT N 50 LET A = 101 60 LET C = A + 2 70
LET D = C + 2 80 IF C = T THEN GOTO 160 90 IF C >
T THEN GOTO 130 100 LET C = C + D 110 LET D = D
+ 2 120 GOTO 80 130 LET T = T + A 140 LET A = A +
2 150 GOTO 60 160 PRINT A,,D-2
```

Find your way home by running the program. My address is at number 239. The last house on my side is number 337.

Winner of Puzzle No 97

The winner is: Ms R Yaakub, Isambard Close, Cowley, Middlesex, who receives £10.

The Hackers

. . . . but seriously,

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MY SIGNATURE .....

MY NAME .....

MY ADDRESS .....

.....

..... POST CODE .....

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MESSAGE FROM EVANS: PRIOR TO THE LAUNCH OF THE LESS-THAN-SENSIBLE **PILAND BUGLE** (EXCLUSIVE TO CERTIFIED SOAMAWIDS), I'VE BEEN SIFTING THROUGH AUTOMATA'S FAN MAIL. AS THERE WERE ONLY SIX LETTERS (TWO FROM CROUCHER, ONE FROM THE TAXMAN) IT WAS NO FAT TASK - BUT IT SEEMS IF I SAY ***HI THERE*** TO JAMIE DURANT OF PORRIDGE - SORRY, NORWICH, HE'LL WIN 5 QUID FROM HIS BROTHER — AND IF I MENTION MIKE "DEMENTED HEADBANGER" WILSON OF NUMB BUMBERSIDE, HE'LL BUY MORE AUTOMATA PRODUCTS, AND THEN PENFOLD AND CROUCHER CAN KEEP PAYING ME! ANYWAY - ON TO THE KARTUNE - IN WHICH UNCLE GROUCHO IS GOING TO GIVE A SLIDE SHOW.

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NEW YORK TO CALIFORNIA BY JET.
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JUST. AND EVEN IF YOU DON'T WIN... IT'S A GREAT GAME.