Computer Magazine of the Year C+VG

POPULAR Computing WEEKLY

35p

19-25 April 1984 Vol 3 No 16

Hobbit competition — p.47

BRITAIN'S BEST-SELLING MICRO WEEKLY

CLASSIFIEDS START HERE

VALHALLA

THE Ω RUN

LYNX SOFTWARE
SEE PAGE 38

SABOTEUR
ANOTHER HIGH VOLTAGE GAME BY CABLE

AQUARIUS
SEE PAGE 53

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★STAR GAME★
Tank Battle on Spectrum
See page 10

News Desk

Amstrad machine is announced

ALAN Sugar, Amstrad's chairman, has now formally announced the Amstrad home computer.

Called the CPC 464, the machine will be offered in four versions. System 1 consists of the CPC 464 console with green screen monitor, priced at £229. System 2 replaces the green screen monitor with a colour monitor for £329. Systems 3 and 4 are the same as 1 and 2, respectively, except a single 3in Hitachi disc drive is also included running CP/M. These latter options are priced at £429 and £529.

The two disc versions result from a licencing deal with Digital Research for the CP/M 2.2 disc operating system.

Amstrad plans to deliver the first batch of 1,000 machines to stores in June and by Christmas expects to have produced over 200,000 machines, all of which have already been underwritten by the major chain stores.

The CPC 464 is to be sold initially by Boots, Dixons, Comet (recently bought by Woolworths) and Rumbelows.

The CPC 464 — reviewed in this issue — has a Z80 processor, with 64K Ram and 32K Rom. The machine also features a built-in cassette unit.

According to Alan Sugar, the machines demonstrated at the launch were production run units with finished Roms, which means that Amstrad may well avoid embarrassing delivery delays.

Software for the CPC 464 also looks healthy. By June

continued on page 5 ▸

Alan Sugar, Amstrad's chairman

Tatung launches micro

TAIWANESE electronics giant, Tatung, this week launches its first home computer — developed and manufactured in the UK.

The machine is Z80A based with a professional quality keyboard, 64K Ram and has a single 3inch Hitachi disc drive built in.

The machine runs a version of Basic similar to Microsoft Basic and its disc operating system is similar to Digital Research's CP/M. According to a company spokesman the machine will be able to run programs written for CP/M.

Screen display is both 40 and 80 columns and it has a graphics mode of 256 x 192 pixels.

The machine has both RS232 and Centronics printer interfaces.

Tatung —

▸

This Week

● **Reviews** *Andy Pennell looks at the CPC 464 micro from Amstrad on page 16.* ● **Programming** *Ian Goldsack presents a bubble sort program for the BBC. See page 20.* ● **Dragon** *Jason Orbaum and Geoffrey Campbell explain some of the intricacies of different addressing modes on page 27.* ● **New Releases** *This week's reviews include* Millionaire *from Incentive and* Pigs in Space *from Ace. Page 56.*

Empires is a game of the type which has not been seen before. It is a fully player interactive strategy game for up to six players and an umpire. The basic set contains three players. Expansion set one contains three more. Each player controls a unique race struggling to take over the galaxy. Mining companies, space fleets and sound strategy all contribute to the success of your race; but beware the other players will be trying to tear your empire apart. The skill required to organise your empire as it grows is enormous. To assist you galactic maps and data cards are provided. Soon further expansion sets will be available to give you an advantage over the other players. Move information is transferred via cassette to the umpire who analyses it with his program and returns the new data to the players. Messages can be sent to other players in the same way.

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19-25 April 1984 Vol 3 No 16

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Published by Sunshine Publications Ltd.

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

Registered at the Post Office as a newspaper

ISSN 0265-0509

Typeset by The Artwork Group, 55-63 Goswell Road, London EC1, in association with Ink on Paper Ltd.
Printed by East Midland Litho Printers Ltd, Oundle Road, Woodston, Peterborough PE2 9QR.

Distributed by S M Distribution London SW9. 01-274 8611. Telex: 261643

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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

The launch of the Amstrad CPC 464 and the imminent arrival of the MSX machines could change the face of the UK micro market.

The Amstrad machine is based upon an elder statesman among microprocessors — the Z80 chip. However, it comes complete with its own monitor, built-in cassette recorder, 64K Ram and 32K Rom, all for just £229. In addition, software support is promised in the form of 50 programs when the CPC 464 hits the shops in June.

With large chain stores such as Comet, Boots and Rumbelows already agreeing to take the Amstrad in quantity, it looks set to make quite an impact on the market — though th is does depend on the machine being readily available, in quantity, on time.

This will undoubtedly affect those companies which are already losing their share of the home market, notably Camputers and Dragon. It could also conceivably hit Sinclair's still invisible QL, particularly as an Amstrad disc drive should also make its debut soon.

With the marketing muscles of the MSX companies added to the fray, Commodore, Sinclair and Acorn will suddenly find themselves faced with their first real outside competition.

Christmas 1984 is likely to be an even bigger micro buying spree than Christmas 1983. It is also starting to look as if there will be a much wider choice of machines.

Next Thursday

Next week's star game is Ye Olde Castle for BBC B by Simon Pitners, in which you must rescue the princess from the castle.

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ADVENTURE REVIEWS

"Adventures which have a fast response time, are spectacular in the amount of detail and number of locations, and are available to cassette owners . . Simply smashing!"
– Soft, Sept 83

"**Colossal Adventure** is included in Practical Computing's top ten games choice for 1983: "Poetic, moving and tough as hell."
– PC, Dec 83

"**Colossal Adventure** . . For once here's a program that lives up to its name . . a masterful feat. Thoroughly recommended"
– Computer Choice, Dec 83

"**Colossal Adventure** is one of the best in its class. I would recommend it to any adventurer."
– Acorn User, Feb 84

"**Adventure Quest** . . This has always been one of the best adventures for me as it seems to contain the lot. In all it took me about eight months to solve."
– PCW, 18th Jan 84

"To sum up, **Adventure Quest** is a wonderful program, fast, exciting and challenging. If you like adventures then this one is for you" *– NILUG issue 1.3*

"Colossal Adventure is simply superb . . For those who want to move onto another adventure of similar high quality, **Dungeon Adventure** is recommended. With more than 200 locations, 700 messages and 100 objects it will tease and delight!"
– Educational Computing, Nov 83

ADVENTURE REVIEWS

"Colossal Adventure . . undoubtedly the best Adventure game around. Level 9 Computing have worked wonders to cram all this into 32K . . Finally **Dungeon Adventure**, last but by no means least. This is the best of the lot – a truly massive adventure – you'll have to play it yourselves to belive it."
– CBM 64 Users Club Newsletter

"The puzzles are logical and the program is enthralling. **Snowball** is well worth the money which, for a computer program, is a high recommendation."
– Micro Adventurer, Dec 83

"**Snowball** . . As in all Level 9's adventures, the real pleasure comes not from scoring points but in exploring the world in which the game is set and learning about its denziens . . this program goes to prove that the mental pictures conjured up by a good textual adventure can be far more vivid than the graphics available on home computers."
– Which Micro?, Feb 84

"**Lords of Time.** This program, writen by newcomer Sue Gazzard, joins my favourite series and is an extremely good addition to Level 9's consistently good catalogue . . As we have come to expect from Level 9, the program is executed with wonderful style – none of those boring "You can't do that" messages! Highly recommended."
– PCW, 1st Feb 84

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Please describe your computer

Library access for micro owners

SPECTRUM, Commodore 64 and Oric owners are soon to have access to the library of software — now extending to over 5,000 titles — available under the CP/M operating system.

ITL Kathmill, maker of the Byte Drive 500 disc unit for the Oric, has concluded a deal with CP/M's owners, Digital Research, to implement the operating system on its disc configuration.

The company will shortly announce its CP/M disc system for the 48K Spectrum. For around £150 the company will offer a disc interface unit which plugs into the expansion connector on the Spectrum. The unit will provide 16K Ram (bringing the Spectrum's memory up to the 64K level required by CP/M), an RS232 port, a Centronics printer interface, a disc connector, a continuation of the Spectrum's own expansion bus and a floppy disc containing the CP/M 2.2 disc operating system software.

Up to four disc drives can then be plugged into the interface — even of a variety of types: 3inch, 3½inch and 5¼.

ITL will also be selling its own 3inch drives, compatible with the system at £192. These are double-sided double-density drives with a formatted capacity of 220K per side.

The interface unit for the Spectrum is expected to be ready in May. The disc drives are available now.

Both the Oric and Commodore 64 versions of the system are not expected to be ready until September. Neither machine is Z80-based, so the interface units will include a Z80 chip as a second processor together with 64K Ram. In the case of the Oric 1 and Atmos version, the unit will also feature a built-in modem.

For the Spectrum, the company will also offer a non-CP/M version of the disc system without the CP/M operating system disc and without the extra 16K Ram. This is expected to sell for around £100.

Amstrad

◂ continued from page 1

some 50 cassette titles will be finished. About 22 titles are running now.

These will include educational titles from Bourne Software, a wordprocessor from Juniper, Pascal from Hisoft and a promising selection of games conversions. These include: *Codename Mat* and *Haunted Hedges* from Micromega, two titles from Indescomp *Roland in the Cave* and *Roland on the Ropes* (better known in this country as Quicksilva's *Boogaboo* and *Fred*), *Mr Wimpey*, *Hunchback* and *Pengwyn* from Ocean, *Microbot* from Softek and several titles from Romik.

An assembler/disassembler is in the pipeline and Softek is working on a Basic Compiler.

The CPC 464 is to be launched simultaneously in the UK, Franch and Germany. At present there are no plans to sell the Korean manufactured micro in the US.

Tatung micro

◂ continued from page 1

Taiwan's largest company — took over Decca's consumer electronics division three years ago and the new micro will be manufactured at its plant in Bridgnorth, Shropshire.

The machine is expected to be priced at the upper end of the home micro price range.

ASA takes notice

THREE months after Sinclair first began taking orders for non-appearing QL computers, the Advertising Standards Authority has begun to take notice.

Following complaints from customers still waiting for their machines the ASA, according to its spokesman, is now "persuing an investigation against Sinclair".

Although the ASA has no legal weight it can bring to bear on the problem, it can advise publishers to refuse to carry advertisements placed by Sinclair.

● *PCW*'s QL order. Week 13. Hopes raised last week now appear premature. If we are lucky one of us will spend six hours with one of the beasts some time this week — supervised by a Sinclair employee. This is volume production?

Valhalla converts to CBM 64

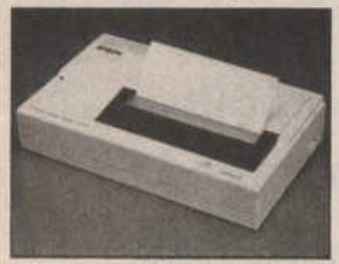
THE award winning adventure game *Valhalla* is being converted to run on the Commodore 64. The game itself will be identical to the Spectrum version, but Legend are concentrating on improving the graphics for the 64.

Priced at £14.95, it should be available from the beginning of May.

Epson launches new printers

EPSON has launched four new printers.

The P40 thermal printer is



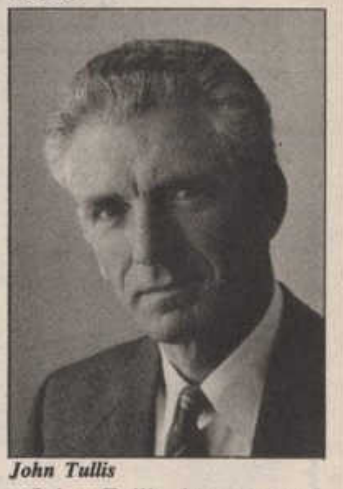
priced at £110. A compact dot-matrix machine, it prints at 45 characters per second with 40 characters a line. Varying the character mode will produce either 80 or 20 characters to a line.

Rather more expensive is the Epson P80 thermal transfer printer. It uses sheet paper, printing at 45 characters a second in true 80 column mode. The P80 is battery operated, although rechargeable batteries can be used. It costs £184.

The other two units announced are the HI-80 colour plotter and the Jx-80 colour printer.

Oric completes its shake-up

ORIC has now completed an internal reorganisation, begun after its takeover last November by Edenspring Investments.



John Tullis

John Tullis has stepped down as chairman, with his place being taken by the present Edenspring chairman, David Duguid. John Tullis leaves to devote time to his other business interests, although he will still act as a consultant to Oric.

Barry Muncaster remains as managing director, a post he now holds jointly with Edenspring's managing director, Peter Jones. Barry also becomes a joint managing director of Edenspring.

Rental plans for Falconhurst

VIDEO hire specialist Falconhurst plans to begin renting out computer games for the Spectrum and Commodore 64.

The company has 150 video outlets throughout the country — mainly inside independent grocery stores. The titles will be hired out by a related company, Falconsoft, for as little as 50p per night or £2 for a week.

Falconsoft spokesman John Le Mesurier said: "The reaction from software houses has generally been hostile, but there is nothing they can do about it.

"Computer games are just not worth the £6 or so they are charging for them."

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ANIMAL, VEG & MINERAL	Arn Wheaton	J/S	£17.25
BEAT THE CLOCK	Arn Wheaton	J	£17.25
BEEBSYNTH	Clares	J/S	£7.95
BUBBLES	Softwarehouse	J	£5.95
CHEMISTRY	Micropower	S	£6.95
CODE	Softwarehouse	J/S	£5.95
CONSTELATION	Micropower	J/S	£6.95
DREAMWORLD ADVENTURE	Molimerx	J	£9.99
FAIRYTALE ADVENTURE	Molimerx	J	£9.99
FAIRSHARE	Griffin	J	£9.95
FIRST STEPS/MR MEN	Mirrorsoft	I	£8.95
FLAGS	Softwarehouse	J	£5.95
FRENCH MISTRESS A	Kosmos	S	£9.95
FRENCH MISTRESS B	Kosmos	S	£9.95
FUN TO LEARN	Shards	J	£6.95
GERMAN MASTER A	Kosmos	S	£9.95
GERMAN MASTER B	Kosmos	S	£9.95
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WONDERLAND ADVENTURE	Molimerx	J	£9.99
WORDSPELL	Griffin	J/S	£9.95
WORLD GEOGRAPHY	Micropower	J/S	£6.95

COMMODORE 64

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BESIEGED	Sulis	S	£9.95
BUMBLE GAMES	Learning Co	J	£29.50 d
CEASAR THE CAT	Mirrorsoft	J	£8.95
CHEMISTRY	CBM	S	£9.99
COLOURING SERIES I	Koala	J	£22.95 d
DAS SCLOSS	Chalksoft	S	£9.95
DECIMALS	Chalksoft	J/S	£9.95
DEMOLITION DIVISION	DLM	J/S	£25.95 d
DRAGON MIX	DLM	J/S	£25.95 d
DUNGEON OF ALGEBRA DRAGON	Time	J/S	£18.95 *
EARLY LEARNING	Counterpoint		
FRACTION FACTORY		J	£22.95 *
MATCH MAKER		I/J	£22.95 *
PIECE OF CAKE		I/J	£22.95 *
YOUNG CHILDREN		I/J	£22.95 *
EIFFEL TOWER	Chalksoft	J/S	£9.95
ENGLISH LANGUAGE	CBM	S	£9.99
FACE MAKER	Spinnaker	J	£25.95 d
FIRST STEPS WITH MR MEN	Mirrorsoft	I	£8.95
GET IT RIGHT	Sulis	S	£9.95
GRAMMAR TREE 1	Sulis	S	£10.95
GRAMMAR TREE 2	Sulis	S	£10.95
GRAMMAR TREE 3	Sulis	S	£10.95
HEY DIDDLE DIDDLE	Spinnaker	I/J	£22.50 d
HISTORY	CBM	S	£9.99
JUGGLES RAINBOW	Learning Co	I/J	£22.50 d
KIDS ON KEYS	Spinnaker	J	£22.50 d
KOALAGRAMS SPELLING	Koala	J	£29.50 d
MARATHON	English Software	J	£9.95
MASTER TYPE	Lightning S'ware	J/S	£29.95 d
MATHS 1	CBM	S	£9.99
MATHS 2	CBM	S	£9.99
MICRO ADDITION	Hayden	I/J	£14.95 *
MICRO DIVISION	Hayden	I/J	£14.95 *
MICRO MULTIPLY	Hayden	I/J	£14.95 *
MICRO SUBTRACT	Hayden	I/J	£14.95 *
PATRICK MOORE: ASTRONOMY	CBM	S	£9.99
PHYSICS	CBM	S	£9.99
QUICK THINKING	Mirrorsoft	I/J	£6.95
QUIZMASTER	CBM	S	£9.99
QUIZZER	Bubble Bus	J/S	£6.95
RHYMES & RIDDLES	Spinnaker	J	£22.50 d
SNOOPER TROOPS 1	Spinnaker	J/S	£29.50 d
SNOOPER TROOPS 2	Spinnaker	J/S	£22.50 d
SPIRATES/SNOWMEN	CBM	I/J	£4.99
STORY MACHINE (Cartridge)	Spinnaker	J	£29.95
TOWERING INFERNO	Sulis	J/S	£9.95
WORD ATTACK	Davidson	J	£34.95 d
WORD POWER	Sulis	J	£9.95
WORD SEARCH	T & F Software	J/S	£14.50
XANAGRAMS	Postern	J/S	£6.95

d = Disk * = Disk or Cassette

DRAGON

Name	Producer	Age	Price
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COMPUTER STUDIES	Ampalsoft	S	£14.95
EARLY READING	Ampalsoft	I	£14.95
FAMILY PROGRAMS	Shards	J	£6.95
FUN TO LEARN	Shards	J	£6.95
GEOGRAPHY	Cable	J/S	£8.75
INFANT PACK	Shards	I	£3.95
JUNGLE MATHS	Scisoft	J	£7.50
LIVE & LEARN	Shards	J	£6.95
MATHS LEVEL 1	Ampalsoft	I	£14.95
MATHS LEVEL 2	Ampalsoft	J	£14.95
MATHS O LEVEL 1	Ampalsoft	S	£14.95
MATHS 0 LEVEL 2	Ampalsoft	S	£14.95
MONSTER MATHS	Shards	J	£6.95
MYSTERY OF JAVA STAR	Shards	J	£7.95
SEARCH WORD	Temptation	S	£5.95
SUPER SPY (Mod History)	Ampalsoft	S	£14.95
TELETUTOR	Microdeal	J/S	£24.95
WIZARD BOX	Scisoft	J	£7.50

SPECTRUM

Name	Producer	Age	Price
ALL ABOARD	Arn Wheaton	J	£17.25
ALPHAGRAPH	Arn Wheaton	J/S	£17.25
ANIMATED ARITHMETIC	LCL	J	£6.50
ANIMAL, VEGETABLE & MINERAL	Arn Wheaton	J/S	£17.25
ASSIGNMENT E BERLIN			
FRENCH	Eclipse	S	£7.95
GERMAN	Eclipse	S	£7.95
SPANISH	Eclipse	S	£7.95
BALLONING	Heineman	J	£9.95
BEAT THE CLOCK	Arn Wheaton	J	£17.25
CARGO	McMillan	J	£9.95
CAR JOURNEY	Heineman	J	£9.95
CEASAR THE CAT	Mirrorsoft	J	£8.95
CHEMISTRY	Think Tank	S	£6.50
COUNT WITH OLIVER	Mirrorsoft	I	£7.95
FIRST STEPS/MR MEN	Mirrorsoft	I	£8.95
FRENCH IS FUN	CDS	S	£5.95
FRENCH MISTRESS A	Kosmos	S	£9.95
FRENCH MISTRESS B	Kosmos	S	£9.95
GERMAN MASTER A	Kosmos	S	£9.95
GERMAN MASTER B	Kosmos	S	£9.95
GLIDER	McMillan	J	£9.95
GRAMMAR TREE 1NOUNS	Sulis	J/S	£10.95
GRAMMAR TREE 2VERBS	Sulis	J/S	£10.95
HOT DOT SPOTTER	Longman	J	£7.95
JERICHO ROAD	Shards	J	£5.75
JUNGLE JUMBLE	Clever Cloggs	J	£6.50
LEARNING BOX	Arrow	J	£9.95
LEARNING SERIES 1	Calpac	J	£9.50
LEARNING SERIES 2	Calpac	J/S	£9.50
LEARNING SERIES 3	Calpac	J/S	£9.50
LOOK SHARP	Mirrorsoft	I/J	£7.95
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Name	Producer	Age	Price
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FRENCH	Tansoft	S	£12.95
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VIC 20

Name	Producer	Age	Price
ALPHABET ZOO	Hesware	J	£25.95 r
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EARLY GAMES	Counterpoint	I/J	£22.95
GEN KNOWLEDGE 7-11	CBM	J	£9.95
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MICROMATHS	LCL	J/S	£24.50
QUIZ MASTER & QUIZ SET UP	Bubble Bus	J/S	£6.95

r = Rom Cartridge

ZX 81

Name	Producer	Age	Price
ASTROMATHS	Scisoft	J	£6.95
CHEMISTRY	Calpac	S	£7.50
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MATHS	A Parsons	J/S	£4.95
PATTERNS	Calpac	I	£5.95
WIZARD BOX	Scisoft	J	£6.95

Age is given only as a guide. I – Infants, J – Juniors, S – Seniors.

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Letters

Public-key ciphers

Regarding your correspondent who does not believe in the efficacy of public-key ciphers. he can, of course believe whatever he wants to, but the fact remains that they work and are relied upon by a great number of people.

Yes, we all know how good one-time-pad is, but there is still the problem of secure communication of the pads in the first place.

If he wants to generate true random numbers I would suggest that he thinks in terms of using the vast number of natural noises in the environment, in such a way that they interact with each other. I have a system which uses a combination of a microphone attached to the bottom of a bird cage, another attached to the aquarium, one placed where it picks up wind noise, and a temperature sensor in a very draughty situation.

As far as encryption of data over BT circuits is concerned, I can assure you all that it is not only allowed, but encouraged by BT (for further information see the PSS technical guide). Also, when using a modem to communicate with another one via the PSTN, there is no requirement to use any particular baud rate, as long as you don't try to exceed the maximum, which allows techniques such as baud rate hopping. I have implemented such a scheme for a number of organisations, and their computer systems have never yet been 'broken into'.

As far as the German Enigma machine is concerned, it should not be dismissed too lightly. An emulation of that machine (with improvements) is sold by one of the major software houses for the TRS-80. They also offer an encrypted message, which if you like to send in the solution, they will pay you £250. The prize has not yet been claimed, although I know for a fact that the message has been decrypted by a few people, but they are not in a position to publicise the fact.

Finally, I must say that if your correspondent seriously thinks that there is a lot of misinformation on the subject, then it shows just how little he knows about it.

P G Strangman
Dept. of Computing and Maths
The Polytechnic
Wulfruna St
Wolverhampton WV1 1LY

Printing pokes

After buying a Seikosha GP50A printer I discovered that the *LList* command did print the program lines, but the printer did not linefeed after each line, thus printing the entire program on the same line.

To correct this, *Poke 330,2* to enable the linefeed after each line. Type *Poke 330,1* to disable linefeed.

Other *Pokes* that may be of use when printing are *Poke 329,255* to put upper case 'on' and *Poke 329,0* for lower case. case.

Neil Ritchie
35 Underwood Ave
Worsbrough
Barnsley
S Yorks

Thank you for the *Pokes*. If any other readers have any interesting *Pokes* or routines, please send them in.

Overloaded cables

This is just to let you know that my wife has threatened to leave me, the bank manager has written to me advising that I should go back to work and the electricity board have replaced all the street's cables due to an overload originating from my home.

'Why' I hear you ask. *'Jet Set Willy'* I reply. It must be one of the most addictive and frustrating games ever (*Manic Miner* bites the dust).

To date, I have stumbled across 55 screens and found 73 items (not collected them all yet though). Can there be any more I ask myself?

Enough of the praise — lets get down to the nitty-gritty. One side of my tape doesn't load, which isn't too bad as I have still got the other side. But, after about 30 minutes playing, sometimes the program corrupts itself and I find that if I enter the kitchen, under Megatree or the East Wall base, *Willy* automatically gets killed off for no apparent reason. Should I change my tape or not?

Simon Lilley
21 Roberts Street
Rushden
Northants

From the sound of it, the side of the tape that loads is perfectly OK. It may be that the Spectrum is overheating, which could cause the program to corrupt itself.

I would advise trying the program on a friend's machine. If the same problem occurs, then the tape is probably faulty and should be exchanged. If the problem does not occur, then the fault probably lies with the machine.

Ace on Spectrum

I own a 48K Spectrum and Abersoft's Forth. Can you tell me if there is a possibility of running Jupiter Ace listings on my Spectrum with my Forth program loaded?

Also, are Eproms available for the Spectrum? If so, how much do they cost and are they available from retailers?

Please could you settle a slight argument between myself and my friends. Which do you think is the best joystick, The Quickshot (original), the Kempston competition Pro 5000, or the Pointmaster Pro?

Paul Bryant
33 St Marys Rd
Gillingham
Kent ME7 1JJ

A Jupiter Ace listing might Run on your Spectrum, if you avoided all graphics and *Pokes*.

Eproms are available for the Spectrum. Eprom Services, 3 Wedgewood Drive, Leeds LS8 1EF, offers an 8K Eprom board complete with a programmed toolkit Eprom for £20.95.

As for the joysticks, it's very much a matter of taste, but I'll admit to being slightly inclined towards the Kempston.

". . . Complaining to the Advertising Standards Authority about Sinclair helps to pass the time while I'm waiting for my QL."

Software exchange

I am writing in response to a letter in your April 12 issue headlined "Ban the swap shops". The writer seems to make a dangerous assumption about software exchange clubs such as UK Software Exchange Club. The inference is that programs members will receive in return will be pirated copies.

As far as my own club is concerned, nothing could be further from the truth. If the author of that letter would care to name names concerning who is offering pirated copies, then action could quickly be taken against the offending clubs.

I suspect that the writer was meaning to say that it was private individuals who were responsible for these sort of offers, but the point was not clearly made and I feel that I should have the opportunity to set the record straight.

My club deals solely in originals which must be complete in every respect including all documentation. If anyone wants to be sure that they will not receive pirated programs in return for their exchange software, then they should avoid the adverts which look too good to be true and stick with an established club such as UKSEC.

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Tank Battle

A new game for 48K Spectrum by Julian Chowdhury

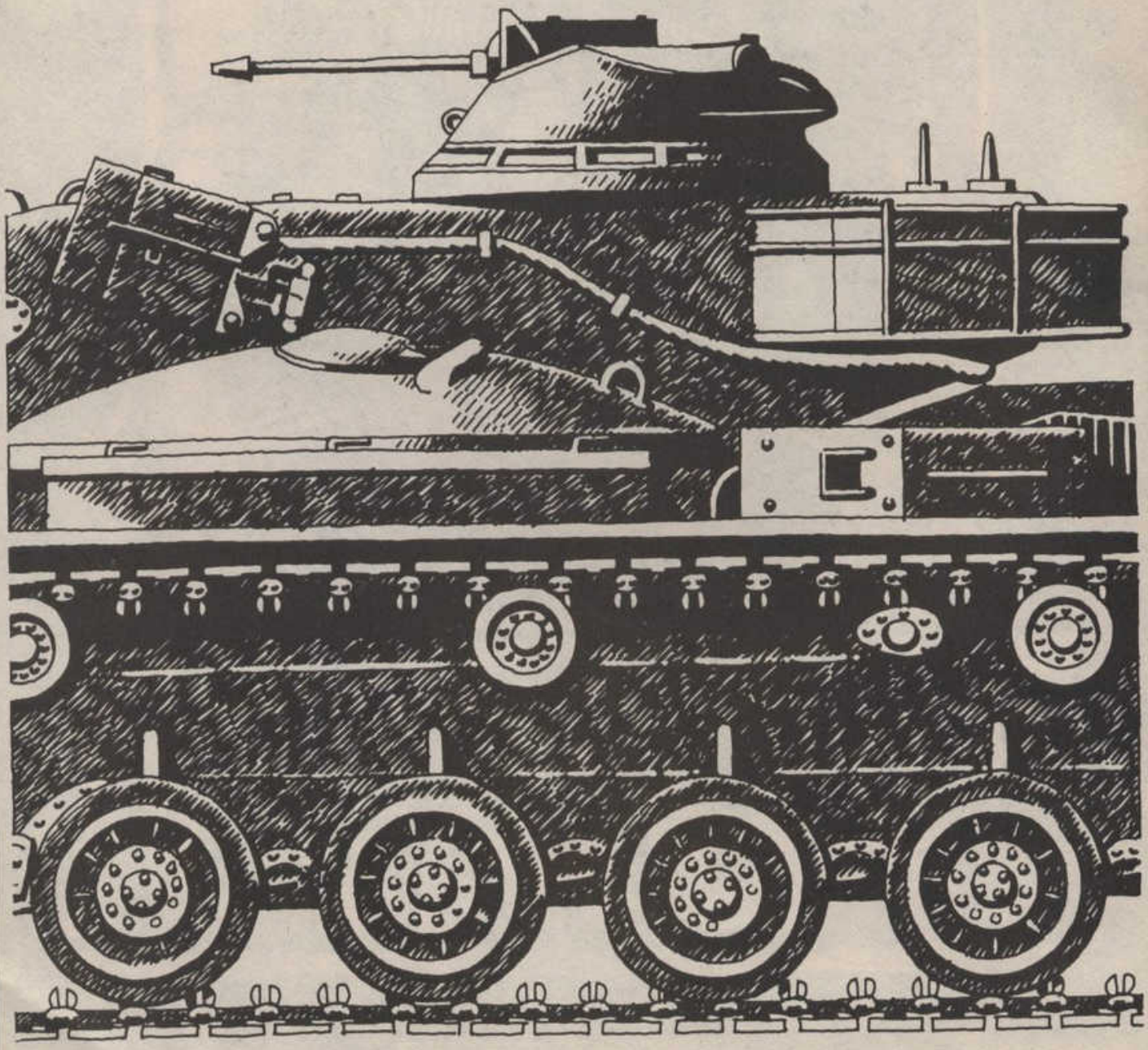
This arcade style game is called *Tank Battle*. The object of the game is to blast the tanks coming up the screen. But be careful! The tanks can fire back at you, diagonally left and right, and straight up. The direction is purely at random. You have only three lives and must, obviously, avoid the tank fire.

Blasting enough tanks will move you to the next level where your fuel will be restored and a bonus will be given. The highest points will be given for hitting the tanks on their turrets when they are far away.

The program could be speeded up slightly by taking out the Rem statements or removing the sound.

Graphics

Line 1110 Graphics GH & Line 1120 Graphics IJT
Line 1140 Graphics AB & Line 1150 Graphics CD
Line 1160 Graphics EF
Line 7030 Graphics KL & Line 6020 Graphics OP
Line 6030 Graphics MN & Line 7510 Graphics Q



```
    5 REM [illegible]
ACK
   10 LET high=0
   20 PAPER 6: BORDER 4: INK 0: C
LS
   30 GO SUB 9000
   50 LET z=7
   60 LET wa=1
  100 GO SUB 1000: REM Set variab
les
  110 GO SUB 2000: REM Set screen
1000 REM [illegible]
1010 LET sc=0
1015 LET c=1
1020 LET x=1: LET y=15
1030 LET fuel=100
1035 LET lives=3
1040 DIM a(4)
1050 LET p=0
1060 LET z1=z
1100 DIM a$(2,2)
1110 LET a$(1)="▛▜"
1120 LET a$(2)="▙▟"
1130 DIM b$(3,2)
1140 LET b$(1)="▗▖"
1150 LET b$(2)="▐▌"
1160 LET b$(3)="▝▘"
1170 LET c$="▞▚"
1180 DIM d$(2,3)
1190 LET d$(1)="/"
1200 LET d$(2)="\"
1500 RETURN
2000 REM [illegible]
2001 PRINT ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
2005 LET line=INT (RND*27)+2
2008 IF fuel<=0 THEN GO TO 8500
2010 PRINT AT 0,0;"SCORE=";FLAS
H 1;sc; FLASH 0;"  LIVES=";lives
2020 PRINT AT 0,20;"FUEL=";FLAS
H 1;fuel
2030 IF z<0 THEN GO TO 8900
2360 BEEP .1,0
2540 POKE 23692,-1: PRINT AT 0,0
;"SCORE=";FLASH 1;sc;AT 0,11;"F
LASH 0;"LIVES=";lives;AT 0,20;"F
UEL=";FLASH 1;fuel
2550 LET a=USR 3260
2600 FOR n=1 TO 3: PRINT AT x,y;
 INK 3;a$(1);AT x+1,y; INK 3;a$(
2);AT x,y;"  ";AT x+1,y;"  ": PR
INT AT 0,0;"SCORE=";FLASH 1;sc;
AT 0,11;FLASH 0;"LIVES=";lives;
AT 0,20;"FUEL=";FLASH 1;fuel: P
RINT AT 21,line; INK 1;b$(n): PR
INT : NEXT n
2650 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2): PRINT AT 0
,0;"SCORE=";FLASH 1;sc;AT 0,11;
FLASH 0;"LIVES=";lives;AT 0,20;
"FUEL=";FLASH 1;fuel
2700 GO SUB 3000
2900 GO TO 2002
3000 REM [illegible]
3010 LET count=1
3015 LET rnd=INT (RND*25)+3
3017 LET rnd1=INT (RND*25)+3
3019 LET rnd2=INT (RND*25)+3
3020 LET count=count+1
3030 LET angle=INT (RND*3)+1
3035 LET a(c)=line
3050 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2)
3075 PRINT AT x,y;"  ";AT x+1,y;
"  "
3100 LET y=y+(INKEY$="8" AND y<2
9)-(INKEY$="5" AND y>2): IF INKE
Y$="8" OR INKEY$="5" THEN LET fu
el=fuel-1
3150 IF SCREEN$ (x+2,y)<>"  " THE
N GO SUB 8000
3175 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2)
3180 IF INKEY$="0" THEN GO SUB 7
000
3200 IF count>8 THEN RETURN
3490 GO TO 4000
3500 RETURN
4000 REM [illegible]
4100 LET c=c+1: IF c>4 THEN LET
c=1
4110 IF p<4 THEN LET p=p+1
4150 FOR n=1 TO p
4160 IF rnd=a(n) OR rnd1=a(n) OR
 rnd2=a(n) THEN GO TO 6000
4170 NEXT n
4200 NEXT n
4300 GO TO 3015
6000 REM [illegible]
6005 GO TO 6050
6010 IF angle=2 THEN GO TO 6100
6020 IF angle=1 THEN PRINT AT n,
line; INK 1;"\": GO TO 6100
6030 IF angle=3 THEN PRINT AT n,
line; INK 1;"/": GO TO 6100
6050 REM [illegible]
6060 FOR n=2 TO 10
6065 IF ATTR (n,line)=49 AND ATT
R (n,line+1)=49 THEN GO TO 6010
6070 NEXT n
6080 GO TO 2005
6100 REM [illegible]
6105 PRINT AT x,y; INK 3;a$(1);A
T x+1,y; INK 3;a$(2)
6108 LET x2=n: LET y2=line
6110 LET x1=n-1: LET y1=line
6150 FOR n=x1 TO x STEP -1
6200 PRINT AT x1,y1; INK 2; OVER
 1;" o": BEEP .003,x1
6205 IF ATTR (x1-1,y1)=51 OR ATT
R (x1-1,y1-1)=51 OR ATTR (x1,y1)
=51 THEN GO TO 8500
6210 PRINT AT x1,y1; OVER 1;" o"
6215 IF angle=1 THEN GO TO 6240
6218 IF angle=3 THEN GO TO 6245
6220 LET x1=x1-1: GO TO 6250
6240 LET y1=y1-1: LET x1=x1-1: I
F y1<2 THEN LET y1=28
6242 GO TO 6250
6245 LET y1=y1+1: LET x1=x1-1: I
F y1>28 THEN LET y1=2
6250 NEXT n
6275 PRINT AT x2,y2; INK 1;"▗▖"
6300 RETURN
7000 REM [illegible]
7005 LET fuel=fuel-5: PRINT AT 0
,25; FLASH 1;fuel; FLASH 0;"  "
7010 LET r=x+2: LET t=y
7030 PRINT AT r,t; INK 2;" o ";AT
r,t;"  "
7032 BEEP .003,r
7035 IF SCREEN$ (r+1,t)<>"  " THE
N GO TO 7500
7040 IF SCREEN$ (r+1,t+1)<>"  " T
HEN GO TO 7500
7050 IF r<21 THEN LET r=r+1: GO
TO 7000
7060 RETURN
7000 PRINT AT r,t;" o "
7200 GO TO 7030
7500 REM [illegible]
7505 GO TO 7600
7510 PRINT AT r+1,t;"▗▖";AT r+2,
t;"▝▘";AT r+3,t;"▗▖": BEEP .05,2
0: PRINT AT r+1,t;"  ";AT r+2,t;
"  ";AT r+3,t;"  ": GO TO 2005
7600 IF ATTR (r+1,t)=49 AND ATTR
 (r+1,t+1)=49 THEN LET sc=sc+r:
LET z=z-1: GO TO 7510
7610 IF ATTR (r+1,t)=49 AND SCRE
EN$ (r+1,t+1)="  " THEN LET t=t-1
: LET sc=sc+INT (RND*5)+1: LET z
=z-.5: GO TO 7510
7620 IF SCREEN$ (r+1,t)="  " AND
ATTR (r+1,t+1)=49 THEN LET t=t+1
: LET sc=sc+INT (RND*5)+1: LET z
=z-.5: GO TO 7510
8500 REM [illegible]
8510 PRINT AT x1,y1;"  "
8520 PRINT AT x,y;"▗▖";AT x+1,y;
"▝▘"
8530 FOR n=0 TO 32: BEEP .01,n:
NEXT n
8540 PRINT AT x,y;a$(1);AT x+1,y
;a$(2)
8550 LET lives=lives-1
8560 IF lives<1 THEN GO TO 8600
8570 GO TO 2005
8600 CLS : FOR n=0 TO 7: BORDER
n: NEXT n: BORDER 4
8610 IF sc>high THEN LET high=sc
: PRINT AT 10,0;"WELL DONE!!! YO
U HAVE A THE HIGH SCORE."
8620 PRINT AT 0,0;"HIGH SCORE=";
high: BEEP 1,0
8650 PRINT AT 15,0;"DO YOU WANT
TO PLAY AGAIN? (y/n)"
8670 IF INKEY$="n" THEN GO TO 88
99
8680 IF INKEY$="y" THEN CLS : GO
 TO 50
8690 GO TO 8670
8899 STOP
8900 REM [illegible]
8910 LET z1=z1+.5: LET z=z1
8920 CLS
8930 PRINT AT 2,0;"YOU HAVE KILL
ED UAVE ";wa;"!": PRINT TAB 12;
 FLASH 1;"BONUS!!!!": FLASH 0: L
ET sc=INT (sc*1.5)
8940 LET fuel=100
8945 LET wa=wa+1
[illegible]
9000 REM [illegible]
9010 FOR n=144 TO 160
9020 FOR i=0 TO 7
9030 READ a: POKE USR (CHR$ n)+i
,a
9040 NEXT i
9050 NEXT n
9100 DATA 3,3,3,1,1,1,1,33,192,1
92,192,128,128,128,128,132,115,1
16,117,117,116,115,112,119,205,6
2,174,174,46,206,14,236,113,114,
116,119,113,120,119,32,142,78,62
,238,142,30,238,4
9110 DATA 7,52,62,122,60,55,1,1,
224,44,124,94,60,236,128,128,7,2
5,1,1,1,3,3,224,152,128,128,12
8,192,192,192
9120 DATA 0,1,2,4,4,2,1,0,0,128,
64,32,32,64,128,0
9130 DATA 0,0,0,0,0,0,0,33,2,7,1
4,24,48,96,192,196
9140 DATA 64,224,112,24,12,6,3,0
5,0,0,0,0,0,0,0,132
9150 DATA 85,170,85,170,85,170,8
5,170
9500 REM [illegible]
9510 PRINT AT 0,10;"TANK BATTLE"
: PRINT AT 0,10; OVER 1;"_____
_____": OVER 0
9520 PRINT '"  The object of t
he game is to  destroy as many
tanks as you  can."
9530 PRINT '"  You can score mo
st points by  hitting the centr
e of a tank."
9540 PRINT '"  You also have 10
0 units of  fuel. This is los
t by: ": PRINT "  Moving left or
 right- 1 unit  Firing- 5 unit
s."
9560 PRINT '"  BEWARE:The tanks
 fire back  in three directi
ons!!"
9570 PRINT '''[illegible]
[illegible]"
9575 PAUSE 0
9580 FLASH 0
9590 CLS
9600 PRINT AT 0,12; FLASH 1;"CON
TROLS"
9610 PRINT '''"  Press 5 to move
to the left."
9615 PRINT '''"  Press 8 to move
to the right."
9620 PRINT '''"  0 to fir
e."
9630 PRINT '''''[illegible]
[illegible]"
9640 PRINT '''"  [illegible]
[illegible]"
9645 PAUSE 0
9650 CLS
9660 RETURN
```

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20:20 vision

***Christina Erskine** talks to Clement Chambers of CRL*

The legend of the computer whizz-kid earning a million before the age of 18 is almost personified in Clement Chambers. Not quite, because Clement has now turned 20, and he's not a millionaire — yet.

Clement has been managing director of Computer Rentals Ltd for close on two years now. He can hardly be said to have worked his way up from the bottom.

"After leaving school, I wasn't entirely sure what I was going to do because I was far too thick for university," he said wrily. "I didn't particularly want to work for anyone else, so it seemed a good idea to set up my own company."

His first idea for a business explains the company's somewhat inappropriate name.

"I started out with plans to rent out hardware, but negotiations with the manufacturers fell through, so I was left with a company, but no product. I decided to have a go at the other end of the market and sell software instead."

Not that Clement was at all worried by his false start. He was attracted by the fact that the computer market was new and undeveloped, and he hoped he wouldn't need a vast amount of capital. Supreme youthful confidence convinced a bank that lending him £30,000 would reap dividends, and a half page advertisement in a computer magazine gave CRL its first six programs.

"The response to that ad was even better than I'd expected. I'm still getting the occasional reply to it now.

"After that, things grew extremely quickly. I'd paid off the bank in two months, and I had to take on more staff fairly fast. CRL began with me and a part-time secretary in 500 square feet above a Whitechapel tailors.

"Then Tim Vernon arrived to deal with sales, the secretary went full-time, and Ashley, an old schoolfriend, who'd been helping with the administration on an informal basis, joined the payroll."

CRL's next venture was the production of a Z80 based, infra-red driven robot. It was made by a team of schoolboys from Ilford County High School, and Clement took them all to Madrid for the Robotics World Championships where it won a prize in the Novices section.

"We're currently developing the robot for the commercial market, but its launch has been considerably delayed by the shortage of chips. But we've got two people working on it at the moment and when it does come out, it'll be under £100."

In October 1983, CRL moved to self-contained premises in Stratford, and Clement began raising its profile.

"I stopped driving my Mini Metro, and bought a BMW. It was bad enough when people looked down their noses at me because of my age, but I stood no chance at all with a Mini. Then I spotted an advertisement in *The Times* for the number plate CRL 1. It set me back £3,000, but I get taken a lot more seriously now."

CRL has now published over 40 titles, and exports widely to countries as diverse as Iceland and New Zealand. It also has two particularly big projects on hand at the moment.

One is the adventure game *War of the Worlds*, based on Jeff Wayne's music — rather than HG Wells' book — and with a target launch date of June 1.

"The venture started almost by accident," said Clement. "One of our programmers wanted to call his latest program *War of the Worlds*, and I pointed out that the title already existed. But the name and idea stuck in my mind. It occurred to me that it would make a very good game itself.

"Having found out that Jeff Wayne held the rights to the name, we came to an agreement, and set about turning it into a program for the Spectrum.

"The music will play continuously throughout and the screen shows the story of the change of earth into a Martian environment, and the player is the narrator, a journalist.

"Although it's fundamentally an adventure game, it's an attempt to blur the distinctions between adventures, strategy and arcade games. It will include the best elements from games such as *The Hobbit* and *Valhalla*, such as the interaction between characters and

add some new ones as well.

"Actually, all we've got so far is half an hour's worth of landscape, but I'm confident it'll be finished on time."

The second project is to produce a game based on *The Magic Roundabout*. Clement is in the process of tying up a deal to give CRL the rights to the title. Fans of Zebedee and Florence *et al* will doubtless be glad to hear that there will be no shoot-outs or intergalactic warfare involved.

"We're thinking along the lines of a non-violent arcade game for a number of machines," Clement explained, "but it's hardly got off the ground yet, so I don't know quite how it will turn out."

Not that CRL will run down their normal games output. With five programmers among the 11 full-time staff, a new game is expected to begin production about once a fortnight, including conversions of existing games for different machines.

Clement however would like to see CRL grow bigger and bigger.

"While CRL are not going in for expansion just at the moment, we'll certainly be ready to compete when the stakes go up. And I can see a lot of software houses — the smaller ones — going broke within the next nine months, while the large companies get bigger.

"In the long term, I think the computer industry will stay healthy, and I can see software gaining the same status as records and tapes have now. It won't be long before the home computer is as familiar as, say, the television or telephone, in people's homes."

Clement Chambers should certainly be around to see if his predictions come true — after all, he's got at least another 40 years of work ahead of him.

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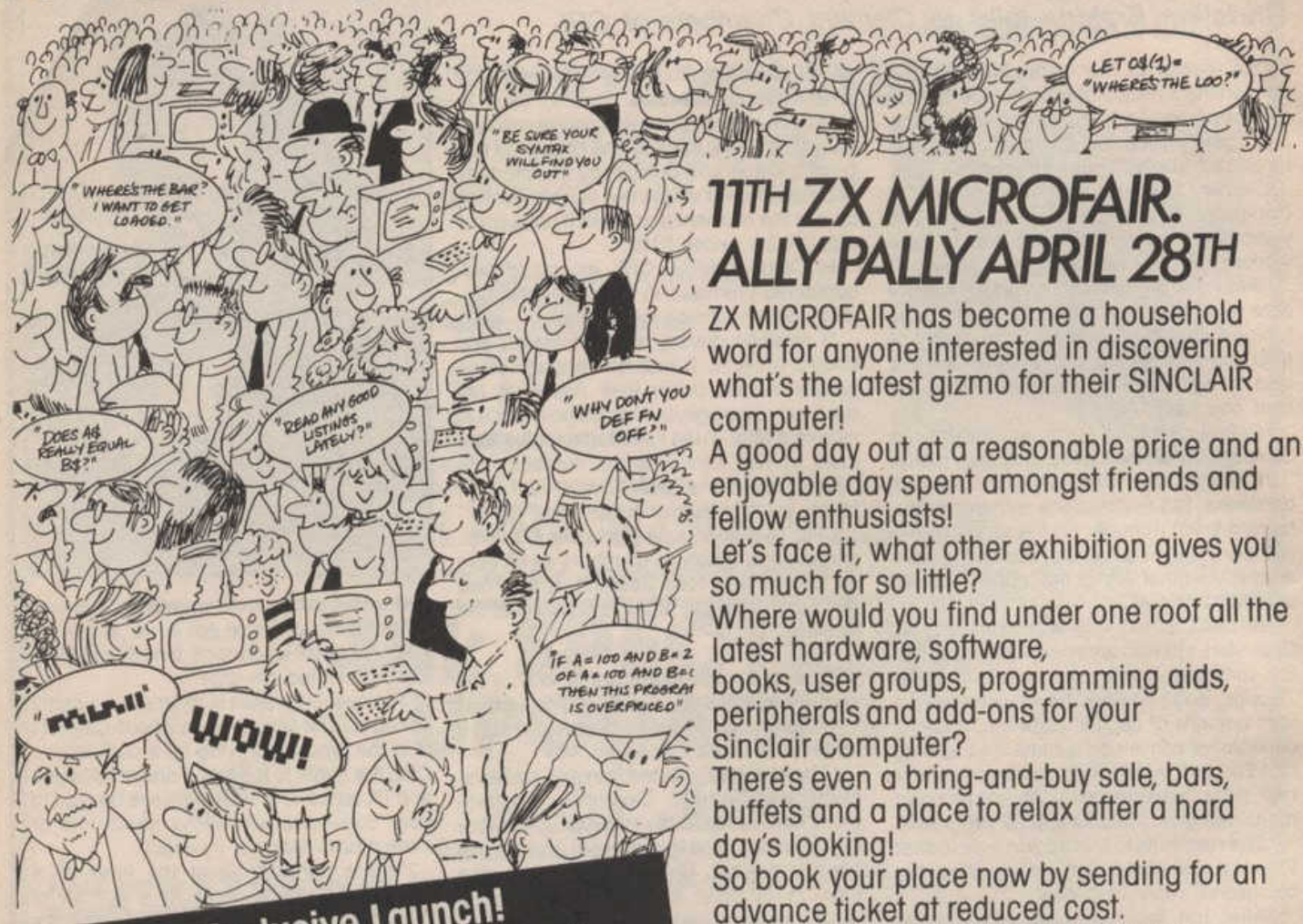

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Value for money

***Andy Pennell** looks at the new Amstrad micro which could challenge the dominance of Sinclair, Commodore and Acorn*

As revealed exclusively in PCW January 5-11, Amstrad have launched a computer that looks as if it could beat Sinclair, among others, at its own game. Amstrad has for some years been producing cheap hi-fi equipment and, more recently televisions and videos. Its new range of micros extends their philosophy.

Amstrad was the first to package hi-fi separates together in one box, and its micros use a similar idea that packages a monitor and a cassette deck along with the main unit, starting at the ridiculous price of £229. There are two models at the moment, both consisting of the CPO 464 main console with inbuilt cassette unit, one supplied with a green screen monitor, for £229, and the other supplied with a colour RGB monitor, for only £329. The machine itself comes with 64K of Ram and 32K of Rom, with high-res colour graphics and sound. At the heart of the machine is a Z80A processor, as used in many other machines including the Spectrum, which has the advantage over other processors in that it can run CP/M.

Of the 64K Ram, 16K is dedicated to the screen display, leaving around 42K available to the user, just a bit more than in the Spectrum. The screen has three modes — in mode 0, there are 16 colours selectable from a pallette of 27, with a resolution of 160x200, which is not bad. In mode 1, four colours can be displayed at one time, again from a pallette of 27, with a resolution of 320x200, which is good. Finally, mode 2 is the highest resolution, with two colours available at a resolution of 640x200, which is excellent.

The number of characters per line in these modes are 20, 40 and 80, respectively. This latter figure is most important for business applications, and in particular CP/M.

The sound on the Amstrad is very good, using the ubiquitous AY-3-8912, giving three channels. The channels are mixed to give a mono output on the internal loudspeaker, via a volume control, and there is also a mini-jack socket that gives 'sterio' sound output. The stereo is obtained by mixing the channels together differently, to obtain pseudo left and right sound.

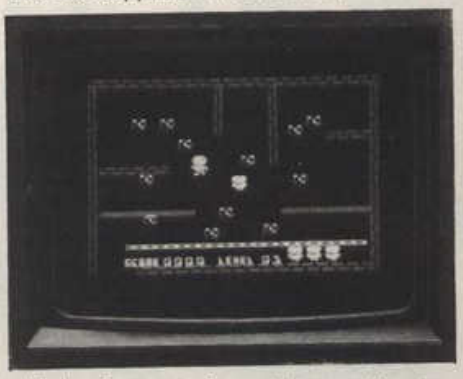
So much for the insides of the machine, what of the outside? The keyboard consists of 74 keys in all, in three groups. The main group is the QWERTY section, along with a nice long space bar, and massive Enter key. The keys themselves are very nice to type on, and are as good as on any home micro with a proper keyboard. There is also a numeric pad to the right of the main cluster, and a small cluster above it consisting of the cursor keys and a Copy key, for editing. Personally, I would have preferred the cursor keys to be part of the main group, as they really are too far away.

To the right of all the keys is the inbuilt cassette unit, or 'datacorder' as Amstrad like to call it, which consists of a bog-standard cassette recorder, with most of the audio electronics removed. Although all connections are internal, so there are no external leads to worry about, the computer does not actually control the recorder. The operator still has to press the relevant keys when required. Thoughtfully, a tape counter is included, along with a Pause button — would someone please tell me what use Pause is on a computer tape recorder?

Directly above the keys is a little coloured drawing, which serves no useful purpose, other than to fill up what would otherwise be an empty space on the facia. Amstrad's hi-fis all have little graphs on their facias, presumably for a similar reason.

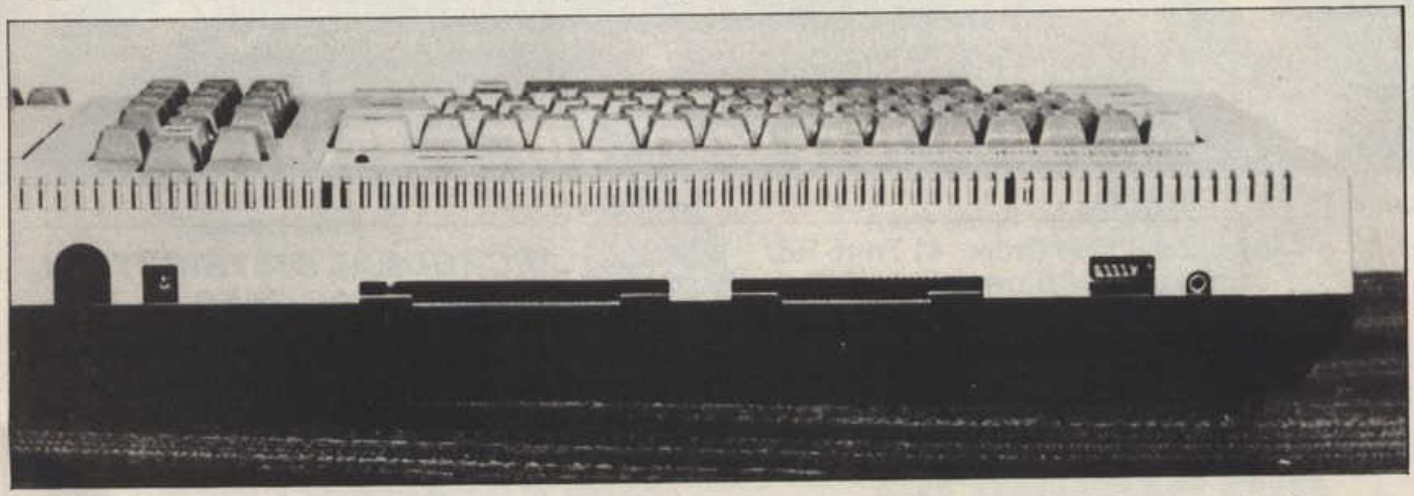
The monitors supplied with either system are a necessary part of it, as they contain the power supply for the main console. The colour monitor is based on an Amstrad tv with most of the electronics removed, requiring RGB input. The picture obtained is very nice indeed, certainly better than is possible on a domestic tv, but not quite as good as the better class of monitors available separately. However, the monitors that do give a better picture are more expensive than the Amstrad monitor and the computer together, so many people may feel that for £329 they can get a good RGB monitor, together with a 'free' computer, and a good one at that!

Eighty columns can be displayed clearly in colour, though for extensive work I would prefer a good quality b/w monitor, such as the one supplied with the cheaper model,



which gives a nice picture, with true grey-scale. For those that buy the cheaper system, for about £30 a modulator is available so that it can be hooked up to the domestic colour tv, with the unavoidable loss in picture quality.

The Basic occupies 16K of the Rom, and was written by a company called Locomotive Software. This name is particularly apt, as it is one of the fastest Basics I have seen, and is based very much on Microsoft. Thankfully, Amstrad has more thought for the user than companies such as Commodore, and have extended the Basic to cover all the hardware aspects of the machine, as well as being able to call the operating system.



Rear view of the CPC64. From left to right: monitor, power input, disc interface connection, printer port, joystick port, stereo sound output

Apparently, the Amstrad used the BBC micro as its model, but unfortunately the Basic does not have many of the structured features of the Beeb. However, it does have a function similar to the Beeb's **FX* command, for accessing the operating system, as well as a command for using any of the sideways Roms, up to 240 of which may be fitted. The Basic gives the user windows, to a fashion, for printing text and graphics, but they are not up to concurrent CP/M or QL standards. There are lots of easy to use graphics commands, for both absolute and relative plotting, and colour is controlled by sensible Ink, Paper and Pen commands.

As with the Spectrum and others, streams are used for input/output, and on the standard machine these are eight streams for the screen windows, one for the printer (via the parallel port), and one for the cassette unit. If a peripheral such as a serial port or disc drive is added, other streams can be defined for them.

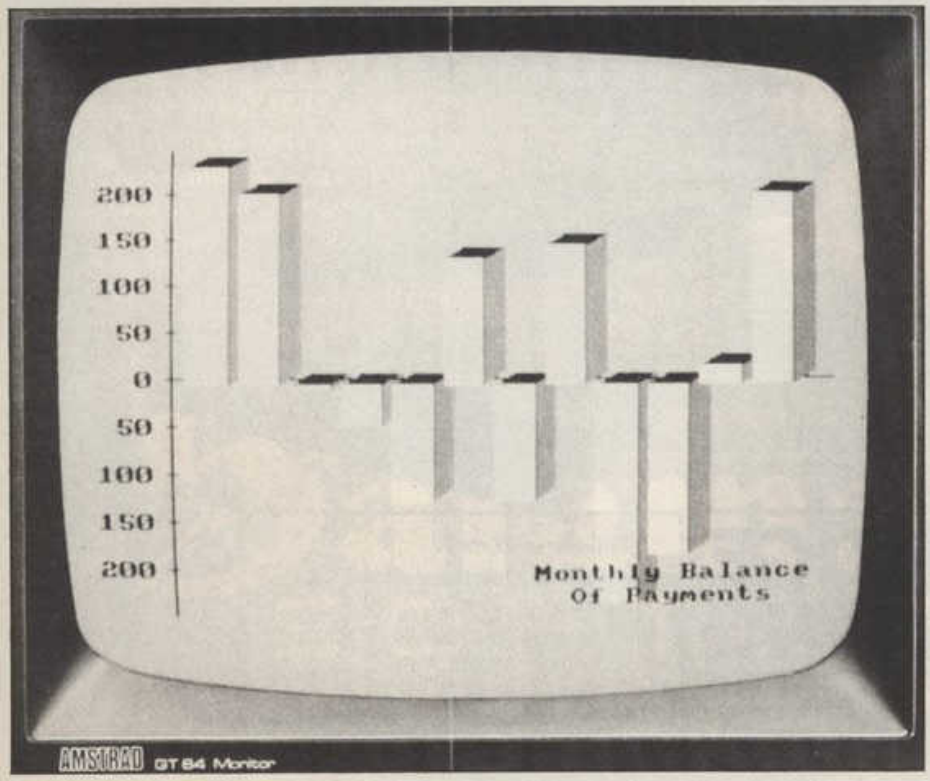
The Amstrad's Basic also has an almost original feature — that of controlling interrupts. It has the After and Every commands, that wait a defined time, then do the equivalent of a Gosub. The difference between them is that Every occurs regularly, but After triggers the routine once only. The only other Basic to come near this is Basic-G, available as an extra for the CGL/Sord M5, which extends the idea further to include interrupts triggered by key presses and joystick movements.

When entering Basic programs, the editor used is a cross between the much maligned Microsoft line editor, and the BBC method of using Copy to read characters from other parts of the screen, and Locomotive have used the best features of both.

Detail of numeric keypad, cursor controls and built-in cassette unit

If all goes to plan, and there seems little that could stop it, the Amstrad machines should be in the shops by June, in four selected retailers only — namely Rumbelows, Comet and Boots. Although not available quite as soon, CP/M will be available, and was demonstrated at the launch. The design is finished, but production has not been started, and the first drive and interface will be about £190, with a second drive available at £150. Instead of the more usual 5¼" drives, Amstrad have opted for the Hitachi 3" format, though in theory at least other drives could be used. The CPC 464 with b/w monitor and single drive will be a ridiculous £429, with a colour version for £529, making the Amstrad the cheapest CP/M machine to my knowledge.

Also shown at the launch was just some of the software that Amsoft, the software side of Amstrad, will be releasing. Much of it originally came out on the Spectrum, such as *Harrier Attack, Boogaboo the Flea,* and Hisoft's Pascal. The machine itself and its firmware has been finished for a couple of months now, so there should be none of the QL-type delays while bugs are ironed out of it. The forthought of Amsoft supplying machines to certain software houses in advance must be applauded, a feat few other companies in the market have matched.



How does it compare with the competition? Well, I think Amstrad are the first people to offer better value for money than Sinclair — for around the price of a QL, you will be able to get a CPC 464, disc drive and b/w monitor in a shop, without the delay of ordering by mail order, and with CP/M you have (theoretically at least) access to practically any piece of business software, instead of waiting for everyone to create from scratch programs to run under QDOS, and duplicate them on Microdrive.

I think the Amstrad will give a lot of sleepless nights to Sinclair, Acorn and Commodore, and nightmares to Memotech and Enterprise/Elan. I think it could turn out to be what the QL could, and should, have been — a terrific home micro, with an awful lot of potential as a business machine. It's just a shame that a machine conceived and designed in Britain has, because of import duty, to be manufactured in Korea. Those, myself included, who said that QL was going to be the micro of the year could prove to be rather short-sighted.

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This classic arcade game, originally developed by Jeff 'Awesome' Minter of Llamasoft, features 1 and 2 player options, spitting Llamas, Cyborg Arachnid Mutants, Disgusting Weeviloids, 99 levels of play. Joystick recommended. Supports Spectrum ZX Interface 2 and Kempston joysticks.

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Bubbling over

***Ian Goldsack** presents a bubble sort program for the BBC*

This small routine gives a visual display to help a pupil understand and remember the process involved in a bubble sort. It can run at six different speeds, and therefore can be used for a variety of purposes.

On its fastest speed, it can be used simply to sort up to 20 strings of letters, numbers, or both into order. As the sorting is based on the ASCII code of each character, numbers come before letters. For the same reason, lower case letters come after upper case.

In any of the slower modes, the program can be used as a demonstration for students. It is also useful to a beginner of any age who has a text book explaining the bubble sort, but is not sure how to interpret the pages of incomprehensible text with no examples.

As well as displaying the number of words to be sorted, this program also displays the number of passes which have been made by the bubble down the screen. In a very basic version of the bubble sort, this would always finish up being the same as the number of words sorted. However, with the bubble sort it is possible to introduce several time saving features. One of these is the decrementation of the variable *X* during the main sorting routine.

Another very common technique used during this type of sort is the use of the FLAG. If during one pass of the bubble through the array, no change is made, obviously all the elements of the array are in order and therefore there is little point in continuing with the time consuming sort.

The program has been written in a way which makes it reasonably easy to convert for any micro. All the VDU's in the program are used to change the colour of the text, etc, and should not present many problems to an experienced programmer. The *Tab* command on the BBC is slightly more advanced than that on most micros and is in the form: Tab (Horizontal co-ordinate, vertical co-ordinate).

On the BBC, the program uses *Mode 0* (the 80 character mode), and so may not be clear on some ordinary television sets.

```
  10  *KEY 0 RENUMBER:MMODE0:M.LIST:M
  20  *KEY 1 RUN :M
  30  REM ************************
  40  REM *                      *
  50  REM *  BUBBLE SORT PROGRAM  *
  60  REM *                      *
  70  REM *       by:            *
  80  REM *                      *
  90  REM *      Ian  Goldsack   *
 100  REM *                      *
 110  REM ************************
 120  MODE 0
 130  MOVE 0,1023
 140  DRAW 1279,1023
 150  DRAW 1279,900
 160  DRAW 0,900
 170  DRAW 0,1023
 180  MOVE 640,1023
 190  DRAW 640,900
 200  PRINT TAB(2,1);"Number of words to be sorted:"
 210  PRINT TAB(42,1);"Number of passes made:"
 220  VDU 23;8202;0;0;0;
 230  REM ****************
 240  REM *              *
 250  REM *  Input Data  *
 260  REM *              *
 270  REM ****************
 280  PRINT TAB(5,8);"SPEED (0-5) >";
 290  LET K$=GET$:IF K$=""THEN GOTO 290
 300  IF ASC(K$)>47 AND ASC(K$)<54 THEN GOTO 310 ELSE GOTO 290
 310  PRINT TAB(19,8);K$
 320  LET SPEED=VAL(K$)*100
 330  PRINT TAB(5,10);"Enter number of words to be sorted (MAX 20) >
                                                                "
 340  LET NUMBER$=""
 350  K$=GET$:IF K$=""THEN GOTO 350
 360  IF ASC(K$)=13 THEN GOTO 410
 370  IF ASC(K$)>47 AND ASC(K$)<58 THEN LET NUMBER$=NUMBER$+K$ ELSE G
OTO 350
 380  PRINT TAB(30,10);NUMBER$
 390  SOUND 1,-15,200,1
 400  GOTO 350
 410  IF VAL(NUMBER$)>20 THEN PRINT TAB(10,12);"NUMBER TOO LARGE ":S
OUND 2,-15,100,10:FORD=1TO1000:NEXT:PRINTTAB(10,12);"
 ":GOTO 330
 420  LET NUMBER=VAL(NUMBER$)
 430  PRINT TAB(35,2);NUMBER
 440  DIM WO$(100)
 450  FOR I=1 TO NUMBER
 460    PRINT TAB(5,10);"Enter word number ";I;" >
                                                  "
 470    INPUT TAB(25,10);WO$(I)
 480    IF LEN(WO$(I))>24 THEN GOTO 460
 490    PRINT TAB(30,10+I);WO$(I)
 500    NEXT I
 510  PRINT TAB(0,10);"
```

```
520  REM ***************
530  REM *             *
540  REM *  SORT DATA  *
550  REM *             *
560  REM ***************
570  LET X=NUMBER-1
580  FOR PASSES=1 TO NUMBER
590    LET FLAG=0
600    FOR I=1 TO X
610      IF WO$(I)>WO$(I+1)THEN GOSUB 720
620      NEXT I
630    LET X=X-1
640    PRINT TAB(70,2);PASSES
650    IF FLAG=0 THEN GOTO 930
660    NEXT PASSES
670  REM ********************
680  REM *                  *
690  REM * SORT SUB-ROUTINE *
700  REM *                  *
710  REM ********************
720  FOR Q=30 TO 55
730    FOR D=1 TO SPEED:NEXT
740    PRINT TAB(Q,10+I);" ";WO$(I)
750    NEXT Q
760  FOR W=0 TO LEN(WO$(I))
770    PRINT TAB(55+W,10+I);" "
780    NEXT W
790  PRINT TAB(55,11+I);WO$(I)
800  FOR W=0 TO LEN(WO$(I+1))
810    PRINT TAB(30+W,I+11);" "
820    NEXT W
830  PRINT TAB(30,I+10);WO$(I+1)
840  FOR Q=55 TO 30 STEP-1
850    FOR D=1 TO SPEED:NEXT
860    PRINT TAB(Q,I+11);WO$(I);" ";
870       NEXT Q
880  LET X$=WO$(I)
890  LET WO$(I)=WO$(I+1)
900  LET WO$(I+1)=X$
910  LET FLAG=1
920  RETURN
930  REM END ROUTINE
940  PRINT TAB(1,25);"PRESS SPACE"
950  K$=GET$:IF K$=" "THEN RUN ELSE GOTO 950
```

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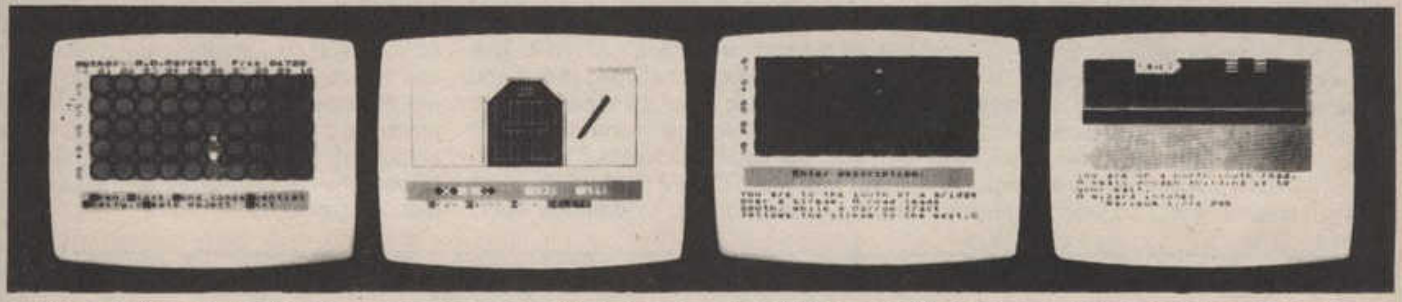

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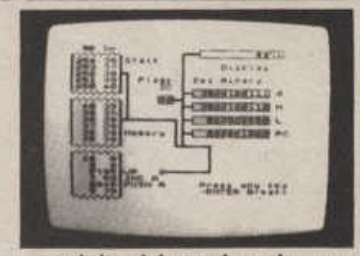

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Shake, rattle and roll

***Mark Lawence** presents a character generator which will rotate, invert, mirror and scroll*

While using the character generator on the *Horizon* tape, I thought it would be nice to have such facilities as rotate, invert, mirror and scrolling, which are available on commercial programs. This would greatly speed up character generation, as it is sometimes necessary to have the same character, such as a pacman, defined in four directions or to have a mirrored image of a character.

Instead of adding these facilities to the *Horizon* program, I decided to write a complete program. I also decided to write it in machine code as this would mean you would not have to wait while the character is rotated, scrolled, etc. This program fits my requirements and will hopefully be useful to others.

A good character generator is not only of use to games programmers — I used this program to develop the characters for a program I was writing which allows you to print 64 characters on a line.

The character generator is 1352 bytes of machine code, plus a short Basic program to load the code from tape and run it. This Basic program should be typed in first and saved by entering *Save 'char gen" Line 1*, then verified. Now type in the hex loader and load the code to address 31000 then *Save "gen code" Code 31000, 1352*. When you have verified this, by entering *Verify ""Code*, type *Randomize USR 0*, to clear the machine, and rewind the tape to the start. Type *Load""* and start the tape.

If all is well, the Basic program should load; auto-run, load the machine code and run it. This should produce a display of an 8 × 8 grid, the user definable character set and a menu. If it does not, type in the check program and check your code against the listing, *Poking* any incorrect values.

The menu should provide all the information needed to use the program, although the scrolling option may need a little explaining. The keys 1 to 4 act as scrolling keys in the same way as keys 5 to 8 act as cursor keys, so 1 scrolls left, 2 down, 3 up and 4 right. Pressing z changes mode from plot to unplot or vice versa. Plotting mode produces a flashing black/cyan cursor and unplot poroduces a flashing white/cyan cursor. The cap shift key is used to return to Basic. Type *Goto 20* to return.

```
                Character Generator
LIST
  10 CLEAR 30999:LOAD ""CODE 31000
  20 RANDOMIZE USR 31000

          CHAR GEN CODE

7918  3A 48 5C 32 B0 5C 3E 08
7920  32 6A 5C AF CD 97 22 CD
7928  6B 0D 11 01 58 21 00 58
7930  01 60 00 36 29 ED B0 01
7938  40 01 36 0D ED B0 01 60
7940  01 36 17 ED B0 21 26 40
7948  11 E6 7C 06 13 CD 8B 7B
7950  21 A0 48 11 F9 7C CD 8B
7958  7B 2E C0 11 1E 7E 06 32
7960  CD 8B 7B 21 00 50 11 0C
7968  7D 06 F2 CD 8B 7B CD AB
7970  7B CD D7 7B 21 63 58 1E
7978  BD 16 00 CD FE 7A 73 D5
7980  E5 CD 8E 02 7B E1 D1 FE
7988  1F 20 0E 7A 3C E6 01 57
7990  1E BD FE 01 20 02 1E C5
7998  AF FE 04 20 0C 7D E6 1F
79A0  D6 04 38 D7 CD CC 7A 2B
79A8  AF FE 13 20 0C 7D E6 1F
79B0  D6 0C 30 C7 CD CC 7A 23
79B8  AF FE 0B 20 13 E5 01 80
79C0  58 AF ED 42 E1 38 B4 CD
79C8  CC 7A AF 01 20 00 ED 42
79D0  FE 03 20 11 E5 01 80 59
79D8  AF ED 42 E1 30 9D CD CC
79E0  7A 01 20 00 09 FE 12 CC
79E8  10 7B FE 0F CA 1E 79 FE
79F0  0D CC 3B 7A FE 22 CC 30
79F8  7B FE 25 CC 6E 7B FE 1E
7A00  CA 7C 7A FE 19 CA 8E 7A
7A08  FE 24 CC 86 7C FE 1C CC
7A10  73 7C FE 14 CC 58 7C FE
7A18  0C CC 99 7C FE 10 CC AC
7A20  7C FE 00 CA 7B 79 FE 27
7A28  C2 7E 79 CD 6B 0D 3A B0
7A30  5C CB 2F CB 2F CB 2F CD
7A38  97 22 C9 D5 E5 21 00 5B
7A40  06 08 36 00 23 10 FB 11
7A48  84 58 06 08 21 00 5B C5
7A50  06 08 4E CB 09 1A FE 3D
7A58  20 02 CB C1 71 23 13 10
7A60  F1 21 18 00 19 EB C1 10
7A68  E3 21 00 5B 06 08 CB 0E
7A70  23 10 FB 11 00 5B CD A8
7A78  7A E1 D1 C9 CD FE 7A 2A
7A80  7B 5C 22 E2 7C DD 21 D5
7A88  7C CD 70 09 18 17 11 11
7A90  00 DD 21 D5 7C AF CD 56
7A98  05 11 A8 00 DD 2A 7B 5C
7AA0  3E FF CD 56 05 C3 1E 79
7AA8  D5 E5 06 08 21 84 58 C5
7AB0  06 08 1A 0E 0D CB 7F 28
7AB8  02 0E 3D 71 23 CB 07 10
7AC0  F2 01 18 00 09 13 C1 10
7AC8  E6 AF 18 2F D5 E5 7A 1E
7AD0  0D FE 01 20 25 AF 01 6D
7AD8  58 E5 ED 42 E1 38 19 7D
7AE0  E6 1F FE 03 28 12 FE 0C
7AE8  28 0E AF E5 01 6D 59 ED
7AF0  42 E1 30 04 1E 3D 18 02
7AF8  1E 0D 73 E1 D1 C9 D5 E5
7B00  11 01 00 21 2C 01 CD B5
7B08  03 06 0A 76 10 FD 18 EB
```

```
7B10 E5 06 08 21 84 58 C5 06
7B18 08 0E 0D 7E FE 3D 28 02
7B20 0E 3D 71 23 10 F3 01 18
7B28 00 09 C1 10 E9 E1 AF C9
7B30 D5 E5 CD 3B 7B EB CD A8
7B38 7A 18 D3 CD FE 7A 21 90
7B40 40 11 FE 7D 06 10 CD 8B
7B48 7B 21 08 5C 36 00 7E D6
7B50 41 38 FB FE 15 30 F7 26
7B58 00 6F 29 29 29 ED 5B 7B
7B60 5C 19 E5 21 90 40 11 0E
7B68 7E CD 8B 7B E1 C9 D5 E5
7B70 CD 3B 7B CD 24 7C CD AB
7B78 7B AF E1 D1 C9 D5 E5 C5
7B80 06 08 1A 77 13 24 10 FA
7B88 C1 18 EF C5 D5 E5 D5 E5
7B90 1A D6 20 6F AF 67 29 29
7B98 29 11 00 3D 19 EB E1 CD
7BA0 7D 7B D1 13 23 10 E7 E1
7BA8 D1 C1 C9 06 03 21 F0 40
7BB0 ED 5B 7B 5C C5 06 07 CD
7BB8 7D 7B 23 23 E5 21 08 00
7BC0 19 EB E1 10 F2 D5 11 32
7BC8 00 19 D1 C1 78 FE 03 20
7BD0 03 21 30 48 10 DE C9 06
7BD8 04 21 84 40 C5 11 50 7E
7BE0 06 08 CD 7D 7B 23 10 FA
7BE8 11 58 7E CD 7D 7B 11 18
7BF0 00 19 C1 10 E7 06 04 21
7BF8 04 48 C5 11 50 7E 06 08
7C00 CD 7D 7B 23 10 FA 11 58
7C08 7E CD 7D 7B 11 18 00 19
7C10 C1 10 E7 06 08 11 FF 3C
7C18 21 84 48 CD 7D 7B 23 10
7C20 FA 36 80 C9 C5 D5 E5 F5
7C28 11 84 58 06 08 C5 06 08
7C30 0E 00 1A FE 3D 20 02 CB
7C38 F9 CB 01 13 10 F4 71 23
7C40 E5 21 18 00 19 EB E1 C1
7C48 10 E3 F1 E1 D1 C1 C9 E5
7C50 21 00 5B CD 24 7C E1 C9
7C58 D5 E5 CD 4F 7C 21 00 5B
7C60 7E E5 D1 23 01 07 00 ED
7C68 B0 12 11 00 5B CD A8 7A
7C70 E1 D1 C9 D5 E5 CD 4F 7C
7C78 21 07 5B 7E E5 D1 2B 01
7C80 07 00 ED B8 18 E3 D5 E5
7C88 CD 4F 7C 21 00 5B E5 D1
7C90 06 08 CB 06 23 10 FB 18
7C98 D4 D5 E5 CD 4F 7C 21 00
7CA0 5B E5 D1 06 08 CB 0E 23
7CA8 10 FB 18 C1 D5 E5 11 84
7CB0 58 21 8B 58 06 08 C5 06

7CB8 04 1A 4E 77 79 12 13 2B
7CC0 10 F7 E5 EB 01 1C 00 09
7CC8 EB E1 01 24 00 09 C1 10
7CD0 E5 AF E1 D1 C9 03 67 72
7CD8 61 70 68 69 63 73 20 20
7CE0 A8 00 58 FF 00 80 43 68
7CE8 61 72 61 63 74 65 72 20
7CF0 47 65 6E 65 72 61 74 6F
7CF8 72 35 20 74 6F 20 38 20
7D00 6D 6F 76 65 20 63 75 72
7D08 73 6F 72 2E 5A 20 74 6F
7D10 20 43 68 61 6E 67 65 20
7D18 6D 6F 64 65 20 28 70 6C
7D20 6F 74 2F 75 6E 70 6C 6F
7D28 74 29 2E 20 51 20 74 6F
7D30 20 70 6C 61 63 65 20 69
7D38 6D 61 67 65 20 6F 6E 20
7D40 63 68 61 72 61 63 74 65
7D48 72 2E 20 20 53 20 74 6F
7D50 20 53 61 76 65 20 63 68
7D58 61 72 61 63 74 65 72 73
7D60 20 74 6F 20 74 61 70 65
7D68 2E 20 20 20 4C 20 74 6F
7D70 20 4C 6F 61 64 20 63 68
7D78 61 72 61 63 74 65 72 73
7D80 20 66 72 6F 6D 20 74 61
7D88 70 65 2E 20 52 20 74 6F
7D90 20 72 6F 74 61 74 65 20
7D98 63 6C 6F 63 6B 77 69 73
7DA0 65 20 39 30 20 64 65 67
7DA8 73 2E 20 20 43 20 74 6F
7DB0 20 43 6C 65 61 72 20 61
7DB8 6E 64 20 53 74 61 72 74
7DC0 20 61 67 61 69 6E 2E 20
7DC8 20 20 20 20 50 20 74 6F
7DD0 20 70 69 63 6B 20 75 70
7DD8 20 63 68 61 72 61 63 74
7DE0 65 72 2E 20 20 20 20 20
7DE8 20 20 20 20 49 20 74 6F
7DF0 20 49 6E 76 65 72 74 20
7DF8 69 6D 61 67 65 2E 57 68
7E00 69 63 68 20 43 68 61 72
7E08 61 63 74 65 72 3F 20 20
7E10 20 20 20 20 20 20 20 20
7E18 20 20 20 20 20 20 31 20
7E20 74 6F 20 34 20 74 6F 20
7E28 73 63 72 6F 6C 6C 20 28
7E30 6C 69 6B 65 20 35 20 74
7E38 6F 20 38 29 2E 20 4D 20
7E40 74 6F 20 6D 69 72 72 6F
7E48 72 20 69 6D 61 67 65 2E
7E50 FF 80 80 80 80 80 80 80
7E58 80 80 80 80 80 80 80 80
```

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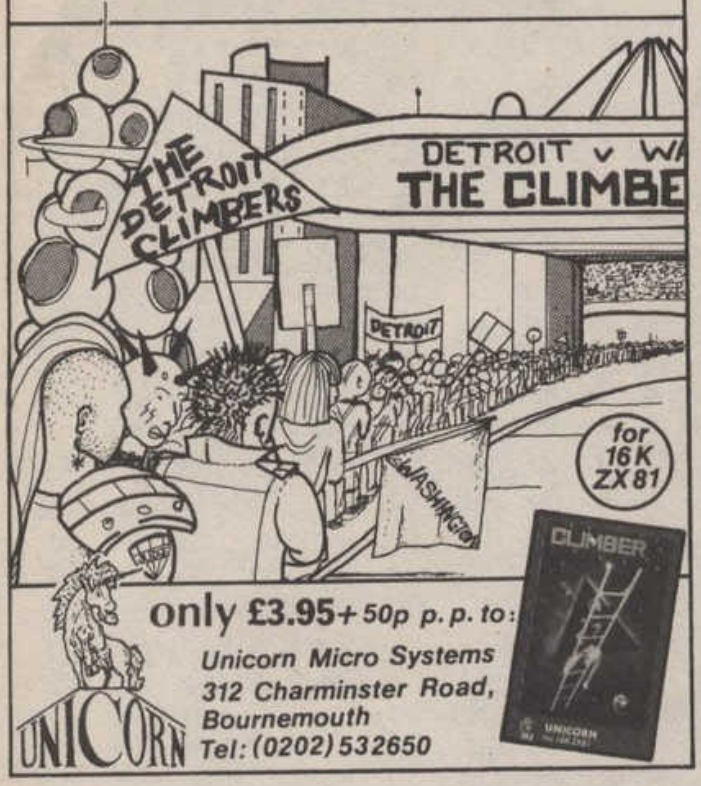

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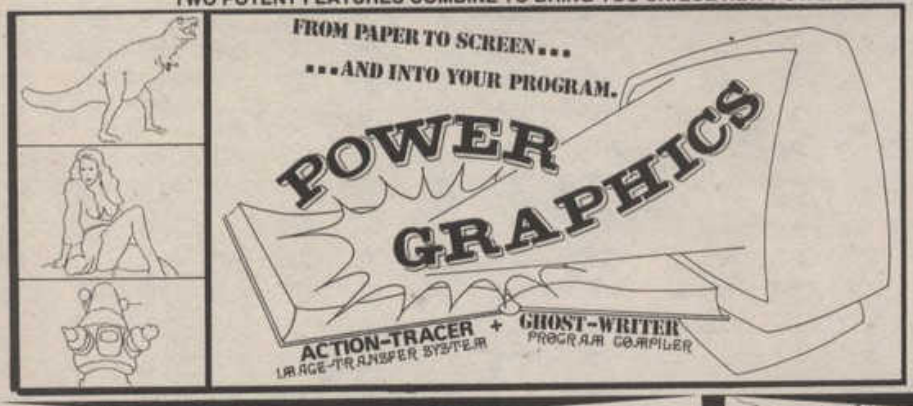

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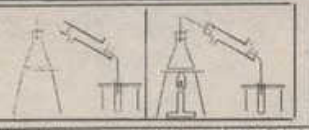

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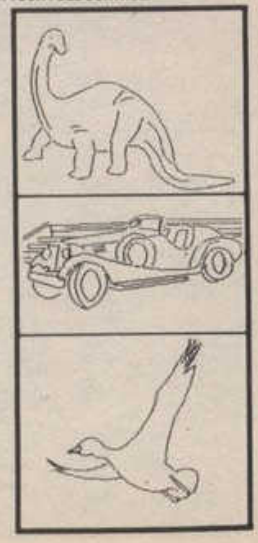

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Jason Orbaum and Geoffrey Campbell *explain some of the intricacies of different addressing modes*

Last week we showed how the Dragon represents numbers in binary, and the internal organisation of the processor. Obviously, this processing power is of no use unless the numbers obtained can be stored for later access and further processing.

From machine code, this is achieved using the *ST* command, and, to retrieve a stored number, *LD*. Both these commands must have a register and an address specified. Thus, if we wanted to store the contents of the *A* register in address 2000, then we would write:— *STA 2000*.

Conversely, to load the *A* register with the contents of address 2000, we would write:— *LDA 2000*.

Now, in some cases, we might want to load a register with a number, not the contents of an address. To load the *A* register with 100, we would write:— *LDA #100*.

This is using a different addressing mode. There are, altogether, five different addressing modes:

INHERENT — this mode does not use an address. Examples are some forms of *INC*, *DEC*, and *CLR*.

DIRECT — this mode uses the specified address to operate on, but can only take a short address, that is, a one-byte number. It is fairly limited, but is faster than *EXTENDED*.

EXTENDED — essentially the same as the *DIRECT* mode, this acts on a two-byte address, and can therefore act on any address in memory. It takes more memory to store a command in *EXTENDED* mode, but the command will be more powerful.

RELATIVE — this mode is used with the branch instructions, and will be covered more fully next week.

INDEXED — this mode uses the index registers to modify the address acted on, so that it is possible to use arrays from machine code. The command *LDA, X* will load the *A* register with the contents of the address pointed to by the *X* register. Thus, if the *X* register contains 2000, the *A* register will now contain the contents of address 2000. The same thing can be done with the *Y* register.

Also, a base address can be specified, so that *LDA 2000,X* will load the *A* register with the contents of address (2000+X).

INDIRECT — this mode takes the address to be operated on as the contents of the specified address. If address 2000 held 100, the *LDA (2000)* will load the *A* register with the contents of address 100. This can be used to specify two-byte numbers, as the specified address if taken as one part of a two-byte number, so with address 2000 specified, addresses 2000 and 2001 are used to contain the final address.

If we wanted to put zero into address 2000, we could write:

```
LDA #0
STA 2000
```

but this is clumsy and it would be simpler to have a command to set an address to zero. The command to do this does exist, and the example could be replaced by:

```
CLR 2000
```

This can also be used on registers, so that *CLR A* will set the *A* register to zero. Note, though, that this instruction only works on a one-byte number, so that, to set the two-byte address at 2000 and 2001 to zero, we would have to write:

```
CLR 2000
CLR 2001
```

Most of the arithmetic functions will be dealt with in a couple of weeks, but two useful ones that we will use in this article are *INC* and *DEC*. These mnemonics stand for increment and decrement, or add one and subtract one. They can have two forms:

```
INCA
DECB

INC 2000
DEC 2001
```

This example will add one to the contents of the *A* register, subtract one from the contents of the *B* register, add one to the contents of address 2000, and then subtract one from contents of address 2001. Note that the first two instructions are *INHERENT* addressing, while the last two are *EXTENDED* addressing.

Of a similar form are the *LEA* commands. There are two of these, *LEAX* AND *LEAY*. The *LEA* stands for 'Load Effective Address', and the commands are used to add to, or subtract from, the *X* and *Y* registers. The main use of this is to modify indexed addresses. If we wanted to add two to the *X* register, we would write:

```
LEAX 2,X
```

and similarly for the *Y* register:

```
LEAY 2,Y
```

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Remote control

John Myerscough presents a program to turn the BBC into a time switch

For those people like myself who cannot be bothered to stay up until twenty-five past twelve twice a week to record the Basicode programs being transmitted by the BBC on Radio 4, here is a short program to turn the BBC microcomputer into a time switch.

The program can also be used to remotely record any other type of audio program — from *Gardener's Question Time* to the *Archers* at any preselected time.

To record programs at predetermined times the BBC micro is connected to a radio-cassette player or similar device with a motor control. Only the motor control lead need be connected from the radio-cassette player to the micro. If the motor control is part of a 7-pin Din plug arrangement then you will need to experiment to ensure this does not affect the recording quality.

To make the micro behave like a time switch first load and run the *Programmable Timer Switch* program. Then turn on the radio and set the cassette to record. Once the program is run the tv can be turned off as it plays no further part in the proceedings.

The computer program itself is fairly straightforward. Once the program is run the time delay before the cassette recorder is activated can be varied using the F0 and F1 keys.

The listings is for a 1.2 OS BBC machine, but it will run on a 0.1 OS BBCf simply by changing the cursor-off command in Line 40.

```
 10 REM PROGRAMMABLE TIMER SWITCH
 20 REM COPYRIGHT 84 J MYERSCOUGH
 30 MODE7
 40 VDU23;8202;0;0;0
 50 CLS
 60 PROCSETTIME
 70 PROCSETALARM
 80 REPEAT
 90   REPEAT
100     PROCTIME
110     PROCDISPLAYTIME(131)
120     UNTIL HOURS=SHOURS AND MINUTES=SMINUTES AND SECONDS=SSECONDS
130   *MOTOR1
140   REPEATPROCTIME
150     PROCDISPLAYTIME(129)
160     UNTIL HOURS=FHOURS AND MINUTES=FMINUTES AND SECONDS=FSECONDS
170   *MOTOR
180   UNTILFALSE
190 DEFPROCSETTIME
200 VDU28,0,24,39,21
210 PRINT"ENTER TIME (24 HOUR CLOCK)"
220 INPUT"HOURS,MINUTES,SECONDS",HOURS,MINUTES,SECONDS
230 TIME=HOURS*360000+MINUTES*6000+SECONDS*100
240 CLS
250 VDU26
260 ENDPROC
270 DEFPROCSETALARM
280 VDU28,0,24,39,21
290 PRINT"ENTER TURN ON TIME (24 HOUR CLOCK)"
300 INPUT"HOURS,MINUTES,SECONDS",SHOURS,SMINUTES,SSECONDS
310 CLS
320 PRINT"ENTER TURN OFF TIME (24 HOUR CLOCK)"
330 INPUT"HOURS,MINUTES,SECONDS",FHOURS,FMINUTES,FSECONDS
340 CLS
350 VDU26
360 PRINTTAB(5,3)"CASSETTE ON AT ";SHOURS;":";SMINUTES;":";SSECONDS;"  "
370 PRINTTAB(5,5)"CASSETTE OFF AT ";FHOURS;":";FMINUTES;":";FSECONDS;"  "
380 ENDPROC
390 DEFPROCTIME
400 SECONDS=(TIME DIV 100)MOD 60
410 MINUTES=(TIME DIV 6000)MOD 60
420 HOURS=(TIME DIV 360000)MOD 24
430 ENDPROC
440 DEFPROCDISPLAYTIME(COL)
450 IFINKEY(-33) PROCSETTIME
460 IFINKEY(-114) PROCSETALARM
470 PRINTTAB(14,12)CHR$141;CHR$COL;HOURS;":";MINUTES;":";SECONDS;"  "
480 PRINTTAB(14,13)CHR$141;CHR$COL;HOURS;":";MINUTES;":";SECONDS;"  "
490 ENDPROC
```

More developments from:

Microholics Anonymous

For readers who did not see our previous ad in this journal we present below a list of the features of ULTIMON, the ultimate machine code monitor for the ZX Spectrum. Shortage of space prohibits us from providing a more complete description but if you have specific questions or you would like more information then please telephone our technical enquiries number (below) with your enquiry when we will be pleased to give you our personal attention.

Features of ULTIMON:
- Exerts total control over program under test (RAM and ROM)
- Up to twenty (non overwriting) break points (RAM or ROM)
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- Traced execution allows you to watch your source code 'execute' at your chosen speed
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- Disassemble RAM/ROM on request
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- Completely transparent to the program under test
- Comprehensive user manual packed with information and containing a full sample session for easy understanding

NEW!
Version 2 of ULTIMON is now available. If you thought ULTIMON could not be improved you were wrong! Version 2 is completely RELOCATABLE and will execute anywhere in RAM. In addition there is now a selectable facility to specify unmonitored execution of routines which have been fully de-bugged, thus speeding up execution of your program dramatically.

Existing users may upgrade for a nominal fee and at the same time receive our FREE Aspect/ULTIMON interface program. Telephone our technical enquiries number below if you require more details.

NEW!
Following the successful launch of ULTIMON, the ultimate machine code monitor we have now decided to make generally available the complete 48K Spectrum integrated assembly language development system which we ourselves use for software development.

While providing the ideal learning environment for newcomers to assembly language (definitely the most satisfying and rewarding of languages), the development system is also powerful enough to permit development of programs well in excess of 2,000 (yes, two thousand!) instructions in size (48K Spectrum).

The whole package comprises three components, BUG-BYTE's Aspect 4.2 Editor/Assembler (suitably improved), the incredible ULTIMON and our own custom-written automated interface program, all of which reside simultaneously in RAM and still leave space to develop programs of the size mentioned above. Of these components, new or upgrading ULTIMON users pay only for ULTIMON and/or Aspect, the interface program being FREE OF CHARGE.

This interface program includes a replacement keyboard input routine for Aspect (providing additional features), comes in both machine code and assembly language formats and is completely free of copyright restriction. Together these provide the following features:

Saving and loading of the source program (alone, not Aspect as well!)
Transfer of control to Aspect or ULTIMON
Storage (de-)allocation for ULTIMON video-swap
ZX print of the source program (each of the above requires only a single key depression!)
the ability to alter the Aspect symbol table/source buffer sizes
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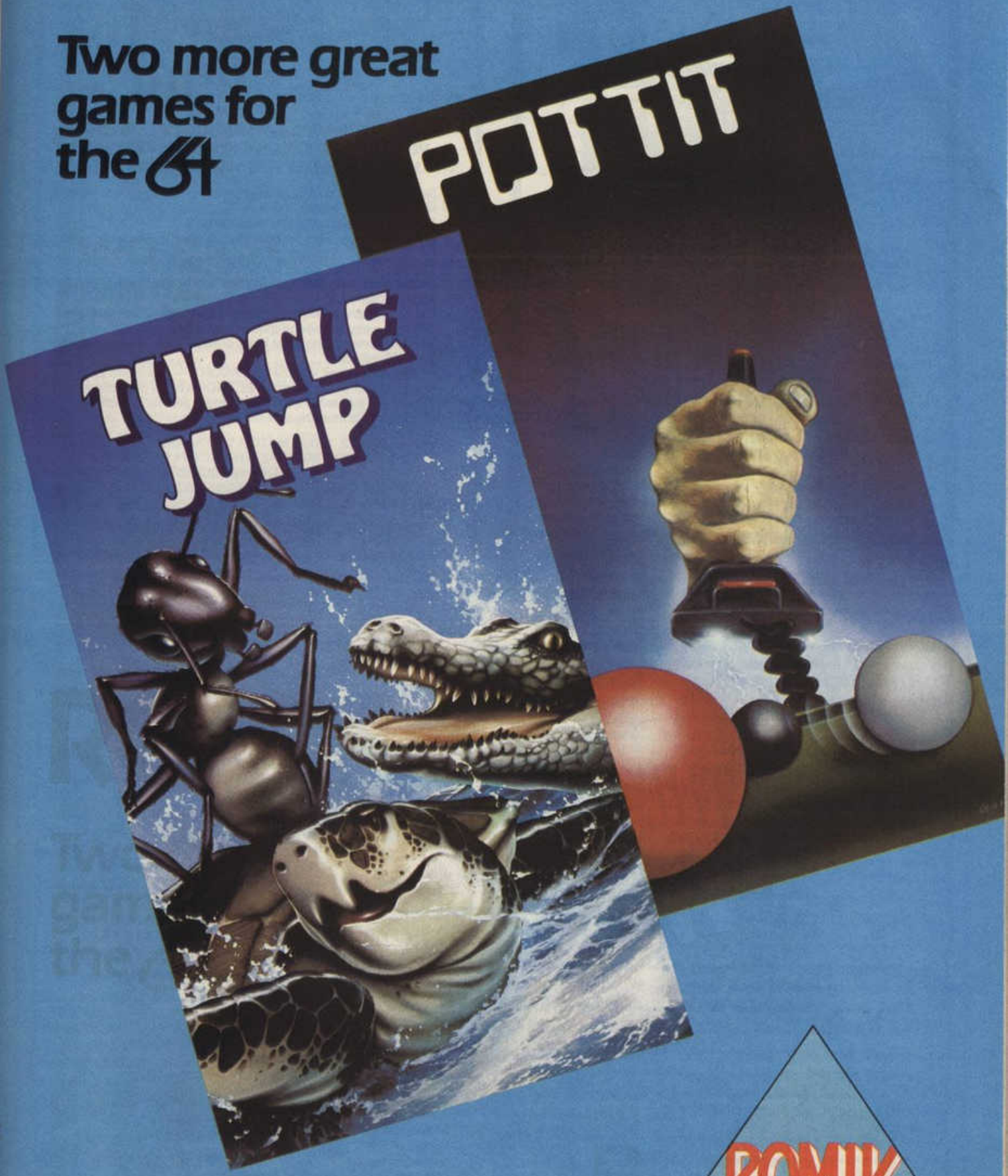

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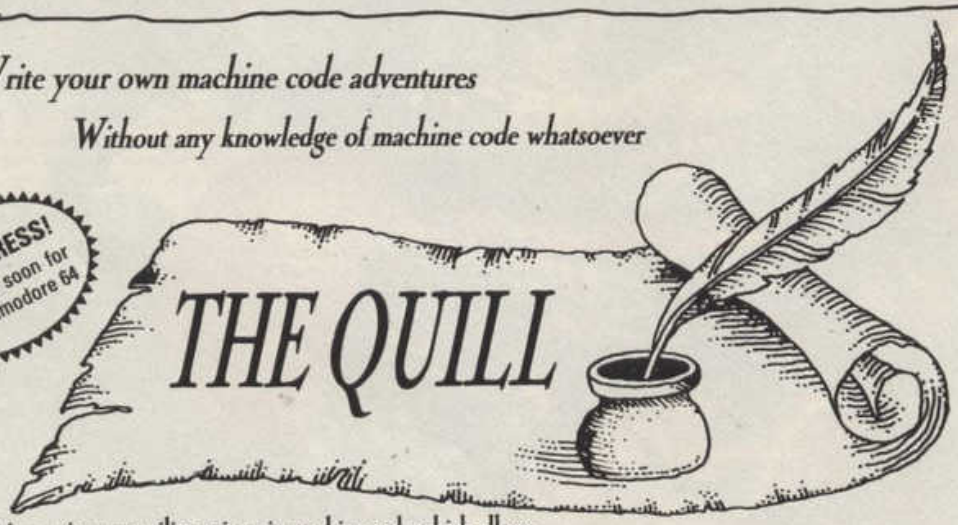

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The other side of the tracks

***Pete Gerrard** continues his series on the Commodore disc drives*

Last week we started exploring the basic (Basic?) principles involved when setting up a random access file on disc. Now, having outlined the procedures, we'll start creating such a file in earnest.

Writing a Record

First of all, we must open up a command route, using whatever disc drive device number is currently active: usually 8. We then have to specify a command channel, which can be any number from 2 to 14, since these are the routes used to transfer information to and from disc and 64, and channel 15 is the route for commands to the *Rom* in the disc and messages coming back from it. We also must specify a logical file number, which can be any number from 1 to 255, and which acts as a key to other details without you having to keep typing them in.

Normally people choose the same file number as channel number, so *Open* 15,8,15 would be the syntax we want, and records can now be got at using the *Print#* command.

The Data Route

Five routes, as well as the command route, can be open at the same time, and because of the time it takes to close a file (up to a few seconds, whilst the disc drive tidies everything up) it's as well to keep them all open whilst everything is going on, rather than opening and closing them all the time.

We also need to reserve a buffer to hold the information going to or coming from the disc drive, and the syntax here is *Open* file number, 8, channel, "#", where the # reserves the next available buffer, and associates it with that channel. Thus if we opened channel 2 we'd use:

Open 2,8,2,"#"

Copying the Data

This is done using the *Print#* command, and sending data down whatever channel we've opened into the correct buffer. Thus if our first record was:

GORE.....BRENDON...
01 437 4343.....

and the part to go to the buffer, as the keyword need not be part of the direct access record, was stored in the variable A$ thus:

A$="BRENDON . . .01 437 4343"

it could be transferred to the buffer by *Print#*1,A$. However, before we can do this we need to set the block pointer to a free block, and this is done using the Block Point command, or B-P. The syntax for this would be:

*Print#*15,"B-P";C;P

where C is the data channel number and P is the pointer position required. So our full command would be:

*Print#*15,"B-P";2;1
*Print#*2,A$

Finding a Free Block

A simple way of finding free blocks is to put the direct access files onto an otherwise empty diskette. Then, as long as you don't use track 18 sectors 0 to 2, which are reserved for the disc directory, you control completely the placing of information on the disc.

However, if there are going to be other things there, we must find out which blocks are free and reserve them for our own use. This is done using the Block Allocate command. When you use this command to tell the disc that a particular block is to be allocated, and read the error channel, one of two messages will occur.

Either you'll be told OK, and the block will be allocated, or you'll get error message number 65, *Bad Block*, followed by two numbers, which are the track and sector of the next free block down the disc.

So, if you always attempt to allocate track 1, sector 0, the first time you'll be okay, and ever after you'll be told *Bad Block*, and the location of the next free track and sector. Then, if we allocate that, it will be reserved for our use and the disc drive won't use it when storing programs or sequential files. So, the complete syntax would look like this:

*Print#*15,"B-A";0;1;0 which attempts to allocate drive 0, track 1, sector 0.
*Input#*15,EN,EM$,ET,ES which reads the error message from the error channel. If EN=65, EM$ will equal *Bad Block*, and we can then:

*Print#*15,"B-A";0;ET;ES which allocates drive 0, track ET and sector ES: the next free block.

To transfer the buffer to the disc, another disc command, Block Write, must be used, specifying the command channel, the drive number, the track and the sector, which we already know to be ET and ES. So, we must:

*Print#*15,"B-W";2;0;ET;ES assuming we're using command channel 2, of course.

Keeping Track of the Index

The index associates the keyword with the track and sector number of the information you put on the disc, and the ideal way to handle all this would be in an array, holding the surname, and the associated track and sector. Thus our entries might look like this:

GORE 1 2
LAKE 1 1
KELLY 1 0

The track and sector can then be read off using the *Val* and *Str$* commands to go from string data to numeric data and back again.

As the index grows, searching through it becomes a tedious process, so it would be a wise idea to keep it all in alphabetical order, and then use a binary search to get to the specified item quickly.

This involves guessing at the middle location in the array, and then (if there were 100 elements in it) guessing at 75 if your guess is too low, or 25 if it's too high: do you see why it should be alphabetical now? So that the computer can alphabetically compare the name it finds there with the name that it's after, and branch accordingly.

Thus, when we do track the name down we can get the track and sector numbers and read the data back again, using the U1 command, which requires the channel number, drive number, the track and the sector.

This command transfers the contents of a specified track and sector into the associated channel buffer, and a simple *Input#* down that channel will transfer the information into Basic. Like this (assuming channel 2):

*Print#*15,"U1";2;0;T;S which will transfer the information from track T sector S into the buffer associated with channel 2.

*Input#*2,A$ which will put the contents of the buffer into the variable A$.

A couple of things to watch for. Try to keep your records less than 80 characters long, as Basic *Input#* can normally only handle 80 character chunks at a time. Any more than that and the machine usually hangs up!

Don't put blank strings as part of the disc information, convert them into shifted spaces or something. Validating discs will cause all kinds of chaos, and if you have done that you'll have to re-create everything from your key index array. As you can see, relative records are not the easiest things in the world to write, but at least the last two weeks should have pointed you in the right direction!

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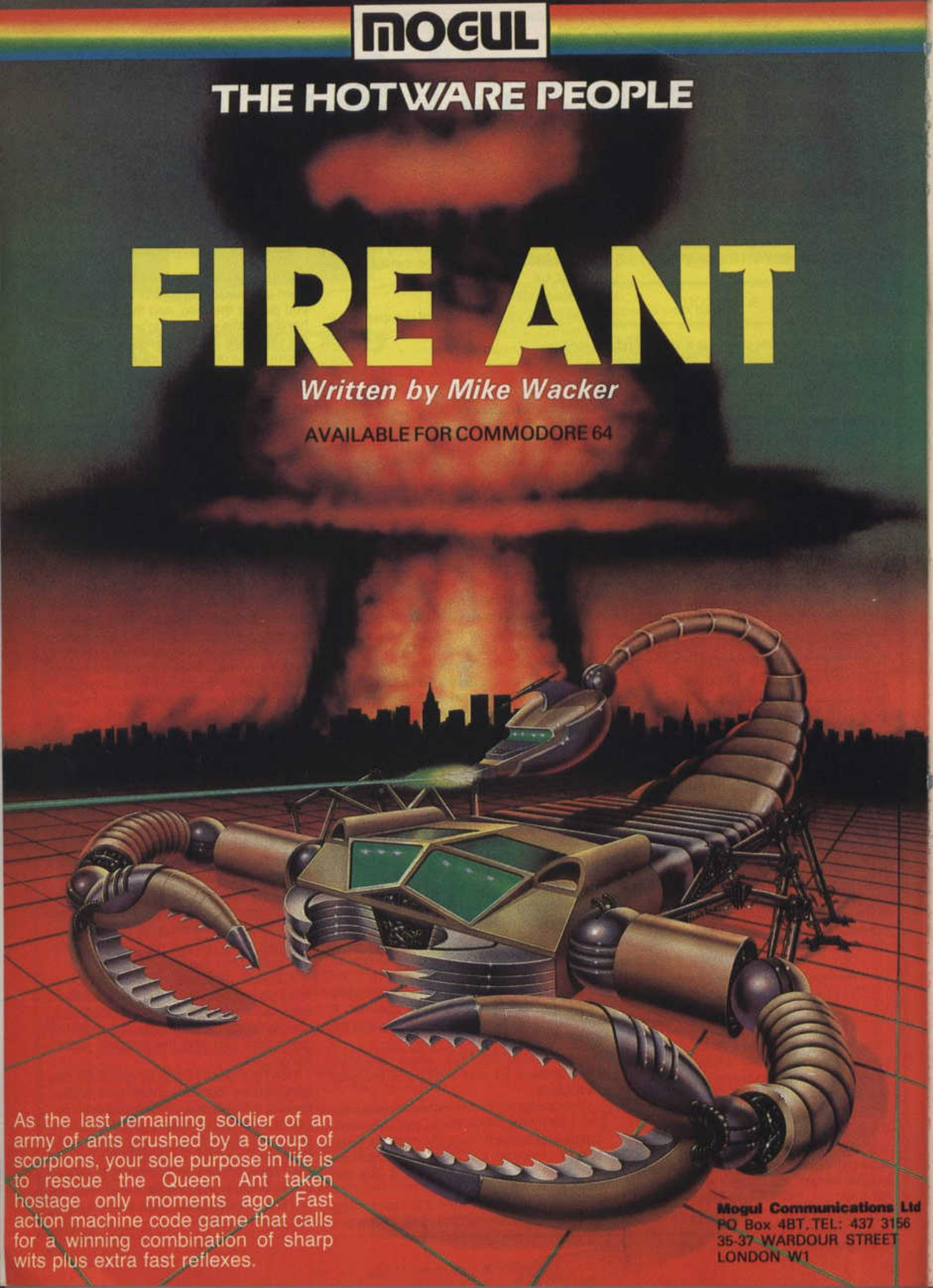

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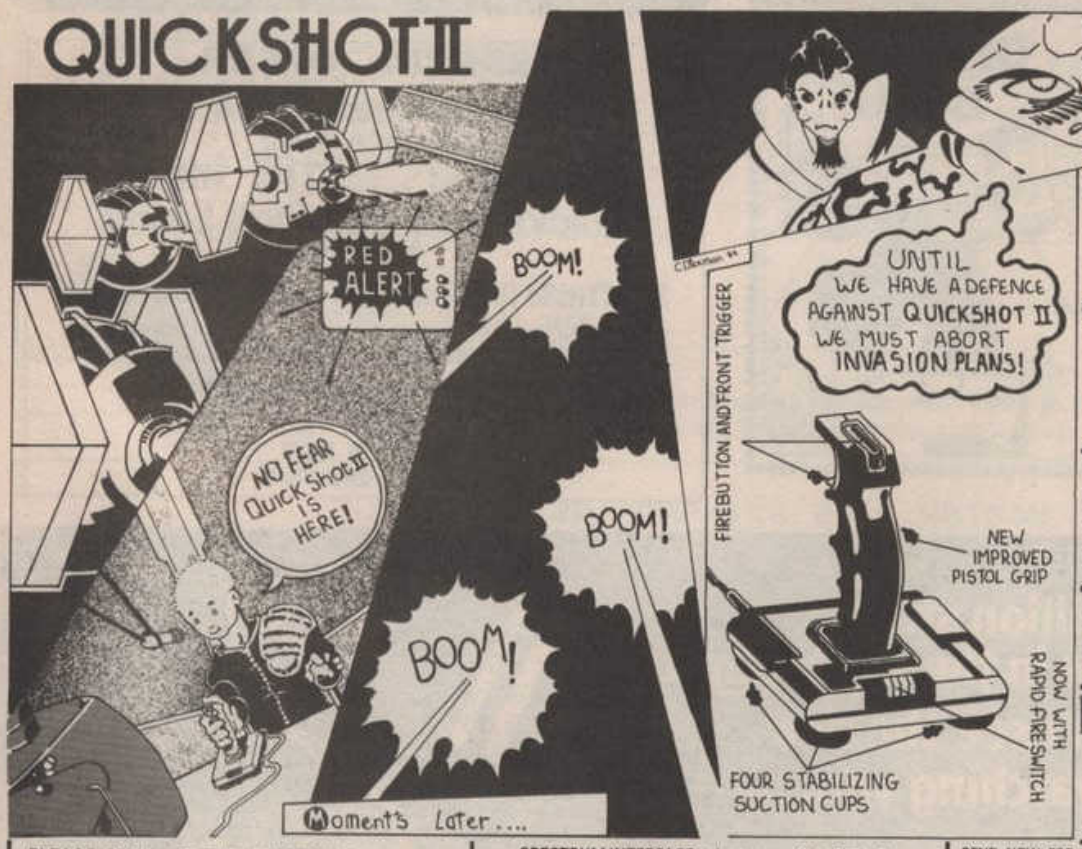

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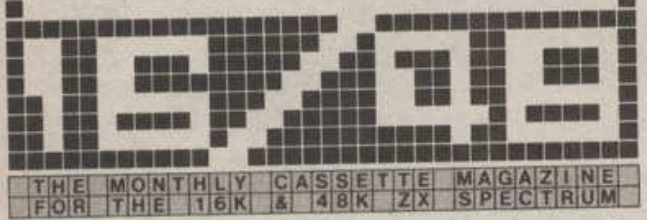

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Reactimer

on Spectrum

Have you ever wondered how fast your reaction time was, but couldn't find an easy way to calculate it?

My program will work out your reaction time quickly and easily, all you have to do is to press a key.

It works it out by using the Spectrum's internal clock. It takes two readings from the internal clock, one at the start and one when a key is pressed. Then the reaction time of the computer operator is found by taking away the 1st reading from the 2nd reading.

On average you will find it to be about 0.3 of a second. A good one is less than 0.2, my best is 0.22 of a second.

Program notes

10	Variables
11	Colours
100-120	Time to wait
140	Starting time
145	Stop cheating
170	Final time
200-250	Time printed
2000-2040	Quickest time
8000-8100	Title
8110	Funny effect

```
  10 LET s=9999: LET a$="JOHN KE
RR"
  11 INK 7: PAPER 0: BORDER 0: B
RIGHT 1: CLS : GO SUB 8000
  100 RANDOMIZE
  110 LET x=RND*200+350
  120 PRINT AT 0,0;"Quickest time
:";s;" seconds";AT 1,0;"Held by
";a$: FOR f=0 TO x: NEXT f
  140 LET time0=PEEK 23672+256*PE
EK 23673
  145 IF INKEY$<>"" THEN GO TO 14
5
  146 BORDER 6
  150 PRINT AT 10,10; FLASH 1;"PR
ESS ANY KEY"
  160 IF INKEY$="" THEN GO TO 160
  170 LET time1=PEEK 23672+256*PE
EK 23673
  180 LET time=time1-time0
  190 IF time<0 THEN LET time=tim
e+65536
  195 LET time=time/50
  200 BORDER 0: PRINT AT 10,2;"Yo
ur reaction time is:-";AT 11,6;t
ime;" seconds"
  210 IF time<s THEN GO SUB 2000
  240 PRINT AT 15,0;"If you have
a printer attached  then a certi
ficate will be made."
  250 LPRINT : LPRINT : LPRINT "
This to certify that the bearer
of this  printed certificate  h
as a reaction time of:-": LPRINT
"  ";time;" seconds": FOR x=
0 TO 4: LPRINT : NEXT x
  260 PRINT AT 21,0;"Press any ke
y to start again"
  265 BEEP 1.5,0
  270 PAUSE 0
  280 GO TO 11
2000 BEEP 1,4: BEEP .5,69: BEEP
.75,35
2010 PRINT AT 3,0;"Well done, yo
u have beaten the  previous quic
kest of ";s;" sec"; "held by ";a
$
2020 INPUT "Please type in your
name      ";a$
2030 LET s=time
2040 RETURN
8000 PRINT AT 0,6;"REACTION-TIME
R";AT 0,5; OVER 1;"
    ";AT 1,20;"© John Kerr"
8010 PRINT AT 3,3;"This program
will work out"
8020 PRINT AT 5,0;"how good your
 reactions are."
8030 PRINT AT 7,0;"The computer
will wait for a"
8040 PRINT AT 9,0;"random time b
efore it starts."
8050 PRINT AT 11,0;"A message wi
ll be printed on"
8060 PRINT AT 13,0;"the screen f
or you to press"
8070 PRINT AT 15,0;"a key , and
from this your"
8080 PRINT AT 17,0;"Reaction Tim
e will be worked"
8090 PRINT AT 19,0;"out."
8100 PRINT AT 21,3;"Press "SPACE
" to start"
8110 RANDOMIZE USR 1304
8120 CLS
8130 RETURN
9990 STOP
9997 SAVE "REACTIMER" LINE 1
9998 STOP
9999 VERIFY "REACTIMER"
```

Reactimer
by John Kerr

3D Graphics

on Vic 20

This short program creates a three dimensional sine wave using the super expander cartridge. It is surprisingly impressive for so few lines.

```
10  REM 3D GRAPHICS BY T.WATSON
20  GRAPHIC 2
30  COLOR 0,0,1,1
40  CHAR 0,4,"3D GRAPHICS"
50  REGION 2
60  FOR X=0 TO 330 STEP 15
70  Y=SIN ((X)/50)*80
80  CIRCLE 2,512,Y+550,X,X
90  NEXT X
100 REGION 1
110 CHAR 19,4,"PRESS ANY KEY"
120 GETA$:IFA$=""THEN120
130 GRAPHIC 0:COLOR 1,3,6,6
READY.
```

3D Graphics
by T Watson

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Open Forum

Fruit Machine

on ZX81

This programme is a simulation of an arcade fruit machine. When run, the screen shows how much money you have, and asks if you want another go. On entering a Y the screen shows the reels, the winning combinations and some other information. Each time you have another go: 20p or £.2 will be subtracted from your score. At random intervals, a hold will be awarded and the reels can be held by typing the reel Nos. When you have held the ones you want, type Q and the game will automatically continue. This program will fit into 4K of memory.

```
FRUIT MACHINE
    1 LET M=1
    2 LET A1=110
    3 LET B1=110
    4 LET C1=110
   10 LET I=9
   31 PRINT AT 7,I;"FRUIT MACHINE
"
   60 PAUSE 100
   61 CLS
   62 GOSUB 5000
   70 PRINT AT 0,1;"YOU HAVE £";M
;" LEFT"
   71 IF M<.2 THEN PRINT "YOU HAV
E GONE BUST"
   72 IF M<.2 THEN STOP
   80 PRINT AT 15,5;"DO YOU WANT
ANOTHER GO"
   81 PRINT AT 15,28;"?"
   90 INPUT G$
  100 IF G$="N" THEN GOTO 1000
  101 LET M=M-.2
  102 LET W=30
  111 PRINT AT 3,1;"WINNERS:-"
  115 PRINT "O - - =20"
  120 PRINT "O O - =40"
  130 PRINT "O O O =80"
  140 PRINT "V V - =20"
  150 PRINT "* * * =200"
  155 LET G=INT (RND*8)
  156 IF RND<.3 THEN GOSUB 500
  157 GOSUB 2000
  160 LET A$="*OOVVAA*OV*AOOV*OAA
/OO*"
  161 FOR I=1 TO G+20
  162 LET B=INT (RND*22)+1
  163 LET C=INT (RND*22)+1
  164 LET A=INT (RND*22)+1
  165 PRINT AT 10,9;"
  166 PRINT AT 11,7;"
  167 PRINT AT 12,9;"
  168 PRINT AT 15,28;" "
  169 GOSUB 2000
  170 PRINT AT 11,10;CHR$ (CODE A
$(A));AT 11,12;CHR$ (CODE A$(B))
;AT 11,14;CHR$ (CODE A$(C))
  180 NEXT I
  190 IF CODE (A$(A))=52 OR (CODE
 (A$(A))=59 AND CODE (A$(B))=59)
 THEN LET W=2
  200 IF CODE (A$(A))=52 AND CODE
 (A$(B))=52 THEN LET W=4
  205 IF CODE (A$(A))=23 AND CODE
 (A$(B))=23 AND CODE (A$(C))=23
THEN LET W=20
  210 IF CODE (A$(A))=52 AND CODE
 (A$(B))=52 AND CODE (A$(C))=52
THEN LET W=8
  211 IF W>20 THEN GOTO 270
  220 LET M=M+(W/10)
  250 PRINT AT 17,0;"  YOU HAVE W
ON £";W/10;" WHICH MEANS YOU HAV
E £";M;" LEFT
                "
  251 PAUSE 300
  252 PRINT AT 17,3;"
                "
  270 PRINT AT 0,1;"YOU HAVE £";M
;"  LEFT
                "
  280 PRINT AT 13,10;" ";AT 13,12
;" ";AT 13,14;"  "
  290 LET A1=110
  300 LET B1=110
  310 LET C1=110
  320 PRINT AT 16,0;"
                                "
  330 GOTO 80
  500 PRINT AT 17,4;"YOU HAVE A H
OLD JUST TYPE THE REEL NO. AND W
HEN NO MORE TYPE ""0""  ";
  510 LET D$=INKEY$
  520 IF D$="0" THEN LET B$="0"
  521 IF D$="0" THEN LET C$="0"
  522 IF D$="0" THEN GOTO 630
  530 IF D$="" THEN GOTO 510
  535 PRINT D$;" ";
  540 IF VAL (D$)>3 OR VAL (D$)<1
THEN GOTO 510
  550 LET B$=INKEY$
  560 IF B$="0" THEN LET C$="0"
  561 IF B$="0" THEN GOTO 630
  570 IF B$="" THEN GOTO 550
  575 PRINT B$;" ";
  580 IF VAL (B$)>3 OR VAL (B$)<1
THEN GOTO 550
  590 LET C$=INKEY$
  600 IF C$="0" THEN GOTO 630
  610 IF C$="" THEN GOTO 590
  615 PRINT C$
  620 IF VAL (C$)>3 OR VAL (C$)<1
THEN GOTO 590
  630 IF B$="0" THEN LET B$="0"
  631 IF D$="0" THEN LET D$="0"
  632 IF C$="0" THEN LET C$="0"
  635 IF D$="1" OR B$="1" OR C$="
1" THEN PRINT AT 13,10;"
  640 IF D$="2" OR B$="2" OR C$="
2" THEN PRINT AT 13,12;"
  650 IF D$="3" OR B$="3" OR C$="
3" THEN PRINT AT 13,14;"
  660 IF D$="1" OR B$="1" OR C$="
1" THEN LET A1=A
  670 IF D$="2" OR B$="2" OR C$="
2" THEN LET B1=B
  680 IF D$="3" OR B$="3" OR C$="
3" THEN LET C1=C
  690 RETURN
 1000 PRINT "OK,BYE FOR NOW"
 2000 IF A1<100 THEN LET A=A1
 2010 IF B1<100 THEN LET B=B1
 2020 IF C1<100 THEN LET C=C1
 2030 RETURN
 5000 PRINT AT 5,15;"RANDOM HOLDS
"
 5010 PRINT AT 6,15;"EVEN AFTER A
 WIN"
 5020 RETURN
```

Fruit Machine
by E Smith

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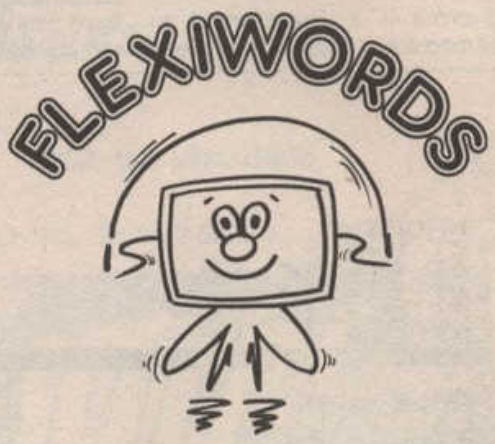

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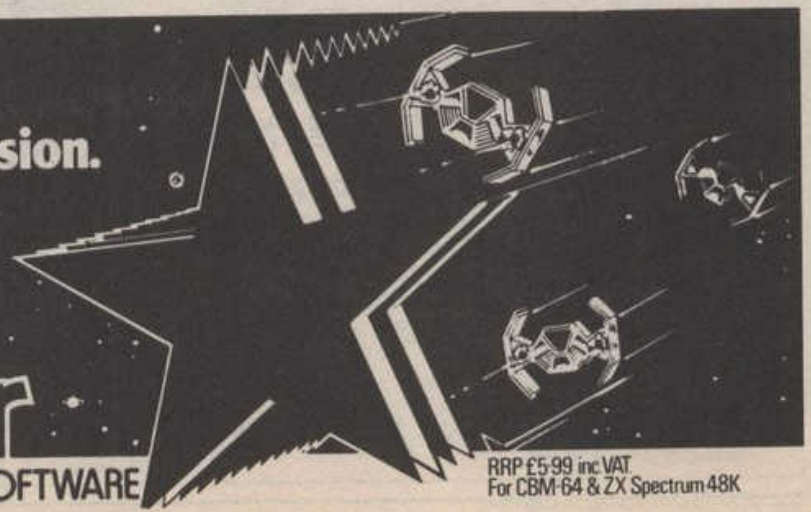

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For CBM 64 & ZX Spectrum 48K

Chemistry

on Oric

This program should work on any Oric. It is a Chemistry symbol tester. It asks what the symbol of an element is and you answer. I have used *Chr$* to turn off *Caps* and so the answer will have to be shifted on the first letter — you get four chances.

Variables

CN	Number of tries
C$	Name of Element
P$	Symbol of Element
J	Number of elements and symbols
RN	Random choice
AN$	Answer
R	Checks element is not the same as one before.

Program notes

100–120	Rem Statements
130	Clear Screen and turn off Caps
140–170	Reads Data (Elements and symbols)
180–210	Choose Element
220–240	Print Element
250	Correct Answer
260–300	Try again
310	Leaves line
320	Wrong then tells answer
321	Different Element
350–650	Data

```
100 REM
110 REM ** CHEMISTRY SYMBOLS **
115 REM **     PAUL DAVIS      **
120 REM
130 CLS:PRINT CHR$(20)
140 DIM C$(31),P$(31)
150 FOR J=1 TO 31
160 READ C$(J),P$(J)
170 NEXT J
180 CN=0:WAIT 100:CLS:PRINT:PRINT
190 RN=INT(RND(1)*31)+1
200 IF RN=R THEN 190
210 R=RN
220 PRINT
230 PRINT "What is the symbol of
    ";C$ (R):PRINT
240 INPUT AN$:PRINT
250 IF AN$=P$(R) THEN PRINT
    "CORRECT !":PING:GOTO 180
260 CN=CN+1
270 IF CN=4 THEN 310
280 PRINT "TRY AGAIN ":SHOOT
290 PRINT
300 GOTO 240
310 PRINT
320 EXPLODE:PRINT "The symbol of
    ";C$(R) ;" is ";P$(R);"."
321 WAIT 100:GOTO 180
330 PRINT
350 DATA BROMINE,Br
360 DATA CALCIUM,Ca
370 DATA CARBON,C
380 DATA CHLORINE,Cl
390 DATA CHROMIUM,Cr
400 DATA COBALT,Co
410 DATA COPPER,Cu
420 DATA FLUORINE,F
430 DATA GOLD,Au
440 DATA HELIUM,He
450 DATA HYDROGEN,H
460 DATA IODINE,I
470 DATA IRON,Fe
480 DATA LEAD,Pb
490 DATA MAGNESIUM,Mg
500 DATA MANGANESE,Mn
510 DATA MERCURY,Hg
520 DATA NEON,Ne
530 DATA NICKEL,Ni
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Chemistry
by Paul Davies

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Open Forum

Spiral

on BBC

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Also try changing line 130 *Draw* X,Y to 130 *Plot* 86,X,Y

```
10 REM SPIRA BY PHILIP VENABLES
20ON ERROR RUN
30MODE4
40VDU29,640;512;
50CLS:INPUTTAB(5,6)"TYPE IN THE
   STEP VALUE (THE LOWER  THE
   VALUE THE MORE SIDE UP
   TO CIRCLES)",ST
60CLS:INPUTTAB(5,6)"TYPE IN THE
   SPIRAL SIZE i.eTHE DISTANCE
   BETWEEN EACH LINE ",ST1
 70MOVE0,0
 80CLS
 90RD=1
100REPEATD=D+ST
110X=SIN(D)*RD
120Y=COS(D)*RD
130DRAWX,Y
140RD=RD+ST1
150UNTILFALSE
>*FXL.
```

Spiral
by Philip Venables

Microradio

GW6JJN

Science fiction?

This week brings news of a breakthrough in microchip technology that makes science fact seem even more like science fiction. Many radio amateurs will be familiar with certain transistors known as *GaAsFETs*. These transistors have been developed mainly because of radio's demands for components combining high gain with extremely low-noise characteristics. Radio enthusiasts like myself, who are interested in using the VHF and UHF sectors of the radio spectrum combined worldwide communication have looked to *GaAsFETs*, with their ability to amplify the tiniest most distant signals, to extend out horizons.

The secret of *GaAsFETs* is the semiconductor Gallium Arsenide. This material is superior to silicon in that it allows the passage of electrons at about six times the speed that they can travel in conventional microchips. What all this means in simple terms is that if we could replace silicon in our current computer chips with Gallium Arsenade (GaAs) then our microprocessors and memory etc would operate that much faster. The big problem has been the seemingly insurmountable difficulty growing GaAs crystals that are sufficiently pure in significant quantities.

Well, the news is that the Toshiba Corporation of Japan have overcome the problems. At a recent International Solid State Conference in San Francisco, Toshiba presented a paper describing their new, large scale integration gate array based on the semiconductor Gallium Arsenide. They have produced chips with over 1050 basic gates or 5000 transistors on a piece of GaAs 3.75mm × 3.75mm. The propogation time is the world's fastest at 210 picoseconds — a record. Suffice for me to say that a picosecond is a millionth of a millionth of a second. The mind boggles.

As if this wasn't enough, Toshiba calmly went on to announce their 'reactive ion etching' system. One of the gret problems with microchips of any sort is etching the tiny circuits involved. Toshiba's new system incorporates something called a Platinum Buried Gate process and has halved the size of the already incredibly tiny transistors that make up these chips. They have reduced them from two millionths of a metre to one millionth of a metre.

These two achievements together lead to a speed and integration never before achieved. Next time you look at a transistor, think of Toshiba who have now made them invisible to the naked eye.

Ray Barry 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.

Build a robot...

DIY Robotics and Sensors with the BBC computer

by John Billingsley

How do you interface a home-made joystick, a stepper motor or a fully fledged robot to your BBC computer? How do you write the software for stepper motor control and how can you use the software and a few pennyworth of components to get an analogue output? How can you build a cheap eye for robot vision?

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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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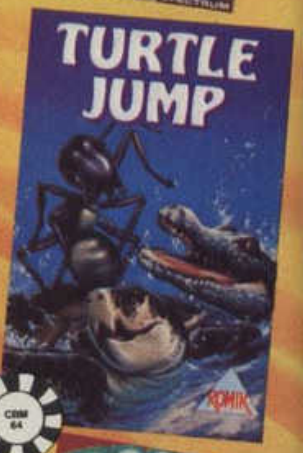

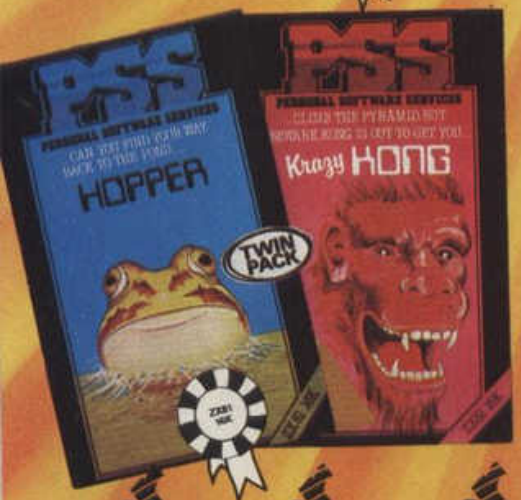

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Tony Bridge's Adventure Corner

A moral tale

I know that you are all itching to get on with adventures, but this week I want to take some time out to tell you of a very strange experience I've just had — and no, it wasn't walking past a pub!

To set the scene: A software shop in London's West End on a rainy Wednesday afternoon.

Dramatis Personae:

Tony Bridge, an occasional scribbler, specialising in popular computer software.

Mr Smooth, a shop assistant.

Bridge enters the premises. Two reasons for this — the first and foremost, to escape the pouring rain. The second, to check out new adventures and other light relief.

Mr Smooth: Yes, sir?

Bridge: Er — pardon?

Mr Smooth: May I help you sir?

Bridge: No, thanks, just looking.

Suddenly, his eyes light up! What's this, in the Apple section? Not an adventure, but the fabled Sublogic Flight Simulator II, rumoured to be the best available for computers of less than two million dollars. This is a snip at — gulp! — £41.50. Still, hang the expense, the program is perfection personified.

Bridge (holding up the package and looking toward the cash desk): Excuse me, do you have this for the Atari?

Receiving a negative answer, Bridge replaces the box from where he plucked it.

Mr Smooth: (snarling): Put that back where you found it!

He snatches it from the hands of the astonished Bridge, and places it in a completely different position on the shelf.

Bridge (aghast): But — but — I found it up here (attempts to put it back where he found it).

Mr Smooth: I said, put it back where you found it!

Bridge: But — er —

Mr Smooth: Leave it alone!

Collapse of Bridge, who exits into the rain of London's West End, leaving behind a shop assistant who can put another feather in his cap, labelled "Who do these customers think they are?"

This program was just about the most expensive non-business package in the shop and I was quite prepared to buy it. So why was I made to feel like a common thief?

What is it about us computer-users that invites such cavalier treatment? The shopkeepers and assistants are there to serve us, and they should look after the 14-year-old trying to decide which version of Galaxian to purchase with his hard-saved £5 as much as the businessman spending 15,000 tax-deductible pounds on an accounting package for his VAT.

While I'm on my soapbox, I've just noticed that, finally, an Atari program has reached the top three in the software charts. Atari games have never before reached such dizzy heights, even though any Atari game can wipe the floor with any of the opposition. Trouble is, of course, they're so darned expensive! It is, surely, no coincidence that the one I'm talking about, *Batty Builders*, from English Software, is priced at under £10. Take note, Atari — when are you going to price your software for the real world?

Back to the world of adventuring!

Thanks for your letter, Mrs M Roberts — to *PCW's* Editor, I know, but the sentiments you expressed are of great interest to this column and its readership.

Back in the second or third Corner I made some comments about an ill-advised adventure for the ZX81. This was *Love*, from Remsoft of Brighton. At the time although I didn't much care for the program, I did wonder if I was being rather po-faced in complaining about it. The game relied on the player, who took on the persona of a poor, defenceless female, having to strip or undress to progress at certain points in the adventure. But more and more women have written to me over the intervening months, in support of my criticism, and now we have, in this magazine, writers like Jane Stoneham drawing our attention to the attitude of most software producers towards women. As she says, every one should try playing *Ant Attack*, from Quicksilva. Yes, it is a good game in itself, but it allows the player to take the role of either the male or the female protagonist, the female being cast in the traditional submissive mould, seeking help from the dominant male character. Any male player taking the female's part would gain a certain idea of just how annoying and patronising this traditional role can be to a woman.

It is for this reason that I didn't much care for Remsoft's *Love*, nor more recent programs, like *Gwendoline*, from the States.

It's noticeable that, while a majority of the letters from males mention their Hi-Score in an arcade game, I have not had one "Score Sheet" from a woman. It seems to me that women grow out of zap-games very quickly — although my own daughters certainly enjoy a quick game of *Frogger* or *Pole Position* on the family Atari, they are quite happy to immerse themselves in *Snowball* or *Knight's Quest*, and this is borne out by the letters I receive. Women certainly appear to have a tenacity when it comes to adventures, and they only write to me for help when they are absolutely desperate.

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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Enter our competition by answering the questions below and win a copy of *A Guide to Playing The Hobbit*, by David Elkan published by Melbourne House. When you have answered the questions, fill in the coupon and send it together with next week's coupon to *PCW*, 12-13 Little Newport St., London WC2 3LD by 10 May 1984. The first 50 correct entreis will receive a copy of the book.

1. **What is Durin's Day?**
2. **What is Thorin's last name?**
3. **Where does Elrond live?**
4. **What is Gollum's birthday present?**
5. **What is the answer to this riddle: 'A box without hinges, key or lid, Yet golden treasure inside is hid'**
6. **Where does Gandalf's cousin, Radagast live?**
7. **Why did Bilbo name his sword Sting?**
8. **What is the name of Thorin's father?**
9. **What is the necklace of Girion, Lord of Dale, made from?**
10. **What was laid on Thorin's tomb?**

RULES

1) Each entry must consist of two coupons.
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Peek & Poke

BROKEN CARTRIDGE

Melvyn Sturee of Gorleston, Great Yarmouth, writes:

Q I have a TRS 80 colour computer which I think is great, but not many people over here seem to know the machine. Are you going to publish any material for it? Also can cartridges be broken if connected when the computer is switched on? I did this with an old *Dino Wars* cartridge and now it does not work.

A We would probably publish some material if we were sent it. The TRS 80 is like the Dragon in that it uses not only the 6809 but also passes control straight to the cartridge. Indeed I recently dealt with this problem on the Dragon. It is very likely that your action has caused damage to the cartridge, because when anything is switched on there are short, but potentially lethal, (to the ICs) power surges.

IS IT SAFE TO USE?

Eric Good of Cherwell Avenue, Woodstock, Oxford, writes:

Q I am thinking of buying a Dragon home computer (64) but I would like to know if it is safe to use it on an old black and white (625) line television. Another question about televisions comes from *Paul Hendry of Boundry Park Road, Manchester who writes:* Is sitting in front of a television that I use for my computer dangerous? A friend of mine at school said that a television when used with a computer gives out small amounts of radiation that can be bad if used for too long?

A Any 625 line television should work with your home computer, and no damage is done whether it is black or white, or colour. Indeed problems are more likely to arise with colour televisions as they need far more control and balancing in terms of display. There are plenty of Spectrum owners who can testify to this.

As for the second question, minute amounts of X-rays are emitted through the front of cathode ray tubes, which are, after all, beams of fast moving electrons. Evidence of this is still hazy and based mainly on older types of VDUs, which have now been improved. If you sat within a few inches of your television screen, for several hours a day for several years then you might start to do yourself harm. Whether the TV is used for computing or not is irrelevant.

PONDEROUS BASIC

N.G. Harvey of Robina Drive, Cheadle, Stoke-on Trent, Staffordshire, writes:

Q After several months of frustration with a 1K ZX81 I obtained a Commodore 64. I am delighted with this machine but a little disappointed with the ponderous *Basic*.

Is there any way that I can access the *Ram* of the 64 to the Z80 chip in my ZX81, ie, can I interface the two computers with a standard or made-up interface, or will I have to pay someone to delve into the innards of my ZX81. Also, if the above is possible, would I lose the superior sound, graphics, sprites, and so forth?

A There are a few unclear points in what you sy. Where you say *Ram* I think you mean *Rom*.

A point that needs to be made is the difference between the *Cpu* and the *Rom*. (In fact *Rom* itself is only a particular type of storage but is taken to mean the language and the operating system, which is how I shall use it here.)

A 6502 is a 6502, regardless of whether it is used in an Apple, Commodore, BBC or whatever. The same is true of the Z80. What is different from computer to computer is the *Rom* that uses the CPU. In the same way that three identical cars, in the hands of three different drivers will soon handle differently. In computer systems most of each computers uniqueness comes from the *Rom*. The *Rom* of the CBM 64 is in 6502 machine code, this would have to be translated into Z80 machine code if it was to be usable on the ZX81. Unfortunately you are trying to merge the excellent Sinclair Basic with the good bits of the CBM 64. Thus a straightforward translation is not sufficent. (Neither is it easy). A single instruction to the CPU which you might want translated to Z80 in one context, might need to remain the same in another. At the most fundamental level you are trying to merge two *Roms* used by two different Central Processing Units.

ASSEMBLY LANGUAGE

Oliver Cobb of Hadlow Down Road, Crobourough, Sussex writes:

Q For Christmas I received the Picturesque *Editor/Assembler*. Unfortunately I do not know any thing about assembly language. I have looked for a book on the subject, but I have not found one. Could you tell me if there is one and if so what, and what is the price?

A The *Editor/Assembler* is only a way of making machine code easier to use. There are two books that might help you if you want to start learning machine code. Melbourne House do a book called *Spectrum Machine Code For The Absolute Beginner* by William Tang. Or there is *Spectrum Machine Code Made Easy*, volumes one and two, by James Walsh, and Paul Holmes, published by Interface. Either would be a good way to start to learn machine code.

CRYPTIC MANUAL

J.E. Price of Woodlands Close, St Albans, Herts writes:

Q The Sinclair manual is fairly cryptic about the possibilities of adding Strings together, and almost nothing on about the use of *Screens* command, to examine what character is displayed at a given screen location. Nevertheless it seems logical that the following program should produce the results:

abc abc abc

Can you explain why it does not?

```
10 CLS: PRINT "abc"
20 LET m$ =""
30 FOR x=0 TO 2 STEP 1
40 LET m$=M$= SCREEN$ (0,x)
50 NEXT x
60 PRINT m$
```

A You do not need to look any further than your program, as this contains the answer in line 40. *Screens* like *Strs* is a read only command. There is no place in the Spectrum's memory map, that is reserved and labelled *Screens*. It cannot be stored and cannot be operated on. Because of the way the *Rom* is written, any attempt to operate on it will result in the String holding the value twice.

Further, any new values will always overwrite any existing values. There are probably some interesting quirks somewhere within the *Screens* command, but this does not help you. What you need to do is assign a second variable the value of *Screens* and then carry out any new operations with this. So your line 40 will be something like:

40 *Let* n$= *Screens* (0,x): *Let* m$=m$ + n$

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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COMMODORE 64 software tape copier £3.50. Assembler Tutor £20. Dr Watson's Assembler Tutor £10. Tornado fast tape loader £8. CBM Educational Programs £6 each. Tel: 0222 865067 after 6pm.

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VU-3D ATAC, Zoom, Invincible Island, Painter, Jungle Fever, Astro Blaster, Psst. Ring for price 06076 720927 after 4pm.

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WALTERS PRINTER model WM 2000, Screen dump program — unused, £350.00 ono. Tel: 021 458 3637 [not legible].

TI99/4A S/W cartridge + cassette games, Muck Men, Black Jack + Poker Blasto, Treasure Island cassette + command module, Programming Aids 1. £50 Tel: Southampton Mr Richie (0703) 431958.

ORIC 1 48K + joystick £90. Oric Printer + word processor, £95.00. Texas T199 + much more. £40. Tel: 01-485 8593.

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Wanted

SWAP ZX81 tapes for copies of DK Tronics Graphic Rom Software for ZX81. Wanted Invaders, Defender, Asteroids. Phone 01-769 5297. After 6.30pm G. Woods, 201 Fallsbrook Road, Streatham, London SW16 6DF.

SWAP CBM Ad-land Cartridge for CBM Mission Impossible Cartridge (0935) 872 836 after 6pm.

WANTED PET 6540-Rom. 6550 Ram-Chips. For 2110/8. Also Addons Upgrade Boards or Complete Pet. Tel: 062-9823207 (eves).

TANDY TRS 80 Level II with monitor, Flopp tape with Printer, System desk + lots of s/w. Swap for CBM64 or sell for £450. Tel: Chipping Sodbury 325523.

DRAGON 32 s/w to swap. Titles Inc: Ugh, Zaxxon, Shuttle etc. Ring Cower. Halstow. Kent 842990.

WANTED Spectrum 48K. Tel: Chesham 0494 772544 (eves).

ORIGINAL CBM64 software to sell or swap; Annihilator, Depthcharge, Stellar Wars, Hungry Horace. £3.50 each. Tel: Stroud 5506.

WANTED EPSOX HX20. Have Sharp PC1500 plus RS232 plus 8KRam plus software board plus Printer/Cassette Interface for sale or exchange worth £680. Offer includes CNC programs.

CBM 64 Software. Swap or sell. Titles include Hobbit, Shamus, Hunchback, plus many more. Phone 0733 237101 and ask for Richard.

SWAP SORD M5 Basic I. Some tapes. Will swap for Spectrum 48K. Basic. 01-476 7235.

WANTED. Any decent computer with bits and pieces for colour darkroom contents (waiting for QL). Derek on Egham (0784) 37978.

ADVENTURE HELPLINE

Micro: *Spectrum 48K*
Adventure: *The Lost Gnomes*
Problem: *The hut is locked — who has a key?*
Name: *M. Peel*
Address: *23 Rutland Walk, Mkt Harborough, Leics.*

Micro: *ZX81 16K*
Adventure: *Buy Byte "Adventure"*
Problem: *I can't get past the big spider. I've rolled wheel but it just falls over . . . I have Staff and Ruby. Can you help?*
Name: *Danny Stankevitch, aged 12*
Address: *7 Abbotsford St, Seacombe, Merseyside.*

Micro: *Spectrum 48K RAM*
Adventure: *Espionage Island*
Problem: *How to enter the Dark Corner? And are you meant to do anything with the guard once you have killed him?*
Name: *Martin Reid*
Address: *237 Bredhurst Road, Wigmore, Gillingham, Kent, ME8 0RD.*

Micro: *Vic 20*
Adventure: *Voodoo Castle*
Problem: *How do I get through the crack in the wall and how do I open the safe?*
Name: *I. Wilson*
Address: *8 Claverdale Road, Upper Tulse Hill, London SW2 2DP.*

Micro: *Spectrum 48K RAM*
Adventure: *Atic Atac*
Problem: *Trying to find the rest of the gold key in the castle.*
Name: *Wayne Clay*
Address: *62 Barberry Avenue, Davis Estate, Chatham, Kent.*

Micro: *Vic 20*
Adventure: *The Count*
Problem: *What do you do when you get in the Crypt. Also how do you get through the vents.*
Name: *Kate Buckingham*
Address: *144 Elmwood Road, Barnton Northwich, Cheshire CW84NN*

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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'Tell me more about your mother...'

Artificial Intelligence on the Commodore 64
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.

The book explains AI from first principles and assumes no previous knowledge of the subject. All the important aspects of AI are covered and are fully illustrated with example programs.

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.

Look out for the Sunshine range in W.H. Smith's, Boots, John Menzies, other leading retail chains and all good bookshops. Dealer enquiries: 01-437 4343

Please send me ☐ Intelligence on the Commodore 64 at £6.95 each. I enclose cheque/postal order for £_____ made payable to: Sunshine Books, 12-13 Little Newport Street, London WC2R 3LD.
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Name_____
Address _____
_____
Signature _____

SUNSHINE

PEAKSOFT Tim Love's CRICKET

"I've just been reading your advert. It says Tim Love's Cricket is the most realistic cricket game yet produced for any home micro."
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"Well, you've got to say that, haven't you? I'm surprised you didn't say it swept the floor and made the tea as well. It says it's under total joystick control."
"Right again."
"Are you saying I can use a joystick to make the bowler deliver an off-break pitched two feet to the bowler's left, six feet from the crease..."
"With practice, certainly."
"...hang on, I haven't finished yet. And to fool the batsman, can I make it a quicker or slower ball than usual?"
"Finished?"
"Yes...no - can I also, using the joystick, control where the bowler releases the ball and the direction in which he bowls it?"
"Finished now?"
"Yes."
"The answer's still yes - and you'll see it happen in full-bodied, animated graphics."
"What about the fielders - can I position them myself?"
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"If it's a Denis Lillee special, he might be lucky and fluke a boundary. On the other hand, he might be caught in the slips."
"You do, of course, control the batsman with the joystick."
"Of course."
"Come on - there must be a limit."
"Ask away."
"All right - can I pick my own teams, decide how skilful each batsman and bowler is, can I practise bowling, be out LBW, run out or bowled, can I hit my wicket or be caught, are there byes, no-balls and wides, does a damp wicket help the spinners, if I need a break, can I save the game..."
"Hang on, let's catch up. Yes, yes, yes, yes, yes, yes, yes, yes, yes, yes, yes and yes."
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New Releases

LIBERAL?

More DK'Tronics software in dribs and drabs but *ZigZag* is one of its most impressive releases for ages.

The game is a very sophisticated version of all those 3D maze games where you grope your way through endless passages looking for things and running away from baddies.

ZigZag is true to this form but cleverly done with sprites and perspectives and all the

other techiques now mandatory on any self-respecting Spectrum game.

Aim of the game is to patrol various sectors hunting down the Scarabaqs — funny little creatures looking like they've stepped out of *Yellow Submarine*. Using the layout of the maze intelligently these must be cornered and interrotated — a blast of the old plasma soon loosens their furry little tongues. Once a Scarabaq cracks you get the digit of a code which, once completed, will allow you to reach the next level.

As a sop to liberal consciences you are given the option of whether to blast the little beast into a thousand particles or let him free to scurry away another day — worryingly, the temptation to blast is strong.

It's not all one sided, of course, there are some much nastier nasties that will sap your energy — needed for movement and blasting.

Program *ZigZag*
Price *£6.95*
Micro *Spectrum*
Supplier *DK'Tronics*
Shire Hall
Industrial Estate
Saffron Walden
Essex CB11 3AQ

FAMILY TREE

Genealogy is a subject that involves months of painstaking work, not only tring to prove your family are of royal blood, but also actually constructing the vast chart of all your discoveries.

In the latter area the computer can now help. *Genealogy* from Bel Tech is an elaborate database/cataloging system that enables you to input the details of your family tree and see them displayed in the classic form, ie, with branches and lines indicating the various links between all the different parts of your family.

Using a range of menu options you can 'interrogate' the database to explore particular areas of interest, like marriages in the female line, etc. You can print out the results to impress your friends.

Program *Genealogy*
Price *£12.50*
Micro *Spectrum/CBM 64 BBC*
Supplier *Bel Tech*
Stanmore Industrial Estate
Bridgenorth
Shropshire
WV15 5HP

LOADED

The Duckworth *Editor/Assembler* is a utility program designed to facilitate machine code programming on the Commodore 64.

In the past, these packages have been expensive — partly because they are usually derived from the very different, and more expensive market for the Pet — Commodore's business machine. However, there are now a couple of packages available for under £20 which have all the main features of the more expensive packages.

Briefly, the *Editor/Assembler* enables you to write your machine code in the slightly easier to understand language of assembly — mnemonics describing what's been loaded in which register, etc.

The booklet with the program is brief and not I think suitable for the beginner. Machine code programmers should find it useful though.

Program *Editor/Assembler*
Price *£18.50*
Micro *Commodore 64*
Supplier *Duckworth/*
Bug Software
The Old Piano Factory
43 Gloucester Crescent
london NW1 7DY

SELECTIVE

Penguin's new range of study software is designed to provide basic text revision of Shakespeare's plays. At the moment, programs are available for *Henry IV Part 1, Julius Caesar, Macbeth, Merchant of Venice, Romeo and Juliet,* and *Twelfth Night.*

What the programs do is enable you to search the text of the play for particular references to a given person or theme.

In a way, it works rather like a conventional database — you tell it to 'search' the text for, say, text references featuring Lady Macbeth and Blood and it produces all the examples it can find. More than that, it refers you to other interlocking themes and explains each reference.

For people taking 'O' levels these programs could be genuinely useful — something I've not been able to say about many other pieces of educational software I've seen.

Obviously, the program does not look through the text, it would be impossible to fit it into 48K; rather it has a selective and carefully prepared store of references and correspondences created by a particular person (or group of people). Thus you can't investigate say, Lady Macbeth and sexual repression, because it isn't one of the given topics. Treat it with some suspicion then.

Program *Macbeth*
Price *£5.95*
Micro *Spectrum 48K*
Supplier *Penguin Books*
Bath Road
Harmondsworth
Middlesex
UB7 0DA

Pick of the week

PROFIT-MAKING

Before *Millionaire* from Incentive software no-one had exploited the one obvious subject for a simulation/strategy game — running a software house.

Millionaire is about just that and, more to the point, does it with some style and professionalism. Like most simulations the idea is to make money by taking the right decisions for your business. Unlike many simulations, however, you really will have to consider carefully what to do, how much to spend, etc.

Aside from being very complex, the game has many other good points — an automatically rescaling graph is drawn to show you how sales are going, the character sets have been redesigned to add variety and interest.

As a point of interest (or rather lack of it) I went bankrupt after two years of profits — more than can be said for a good many real software houses.

Program *Millionaire*
Price *£5.50*
Micro *Spectrum 48K*
Supplier *Incentive Software*
54 London Street
Reading RG1 4SQ

BIZARRE

Pigs In Space used to be the dramatic cry that preceded one of the funnier sketches in the *Muppet Show* before it went cute. It is also the title of a fairly bizarre new game from Ace.

It seems these intergalactic space wolves are dropping threateningly out of their intergalactic wolf spaceship. Their objective, we can know in advance, is not friendly. You have to prevent the wolves from reaching the ground by shooting at them from a basket which is raised and lowered by some pigs.

The wolves can defend themselves from this attack, by throwing rocks at you and running towards your basket. The game is totally ludicrous and even addictive in a strange sort of way. No programming marvels here though.

Program	*Pigs in Space*
Price	*£6.90*
Micro	*Commodore 64*
Supplier	*Ace* *82/84 Peckham Rye* *London* *SE15 4HB*

SQUARED GRID

Timebomb is the latest arcade game from CDS Microsystems whose recent releases have been language programs.

The game is one that has been seen before in various guises including quite a good version printed in this magazine. It involves moving a boot across a grid of squares to get to a bomb before it explodes.

As a square is touched it can no longer be used so the game becomes consequently more and more difficult. Grid lines can be moved left or right in an attempt to form usable paths to each new bomb. It is definitely a game of skill and tactics rather than a test of reflexes, despite the urgency provided by a clock ticking away the seconds before you are blasted to Kingdom Come.

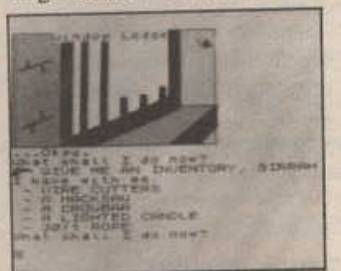
Not a difficult game to program but good fun nevertheless.

Program	*Timebomb*
Price	*£5.95*
Micro	*Spectrum*
Supplier	*CDS Micro Systems Systems* *10 Westhill Close* *Tickhill* *Doncaster* *DN11 9LA*

SPLIT SCREEN

Phipps Associates have released a new program — it's an adventure (cheers, whistles, sighs of relief etc) and it looks great.

Colditz is a graphic adventure in the reliable tradition of *Knight's Quest* and *Pharoah's Tomb* — it has pleasing split screen colour pictures and a large number of locations.



Phipps have thoughtfully provided me (knowing, probably, how hopeless I am with adventures) with a map annotated with what objects are required where as well as what actions must be performed.

This reveals the adventure to be very complicated but totally fair — more or less the ideal state. The plot involves escaping from Colditz and then blowing up a bridge — you will find it very, very difficult indeed.

Program	*Colditz Adventure*
Price	*£6.95*
Micro	*Spectrum 48K*
Supplier	*Phipps Associates* *172 Kingston Road* *Ewell* *Surrey KT19 0SD*

GHOULISH

More from Virgin, this time it's a text adventure for the Spectrum. *Atlas Assignment* has you in search of the American nuclear defence plans stolen by a man called Atlas — this cartographical reference is, as you will discover, not irrelevant to playing the game.

There is superficially nothing really new here — standard two word entry etc. In fact though, a quick play suggested the game was imaginative — many of the locations have shadowy figures lurking in them — an amiable drunk or a baddie? There is also a micro Jet that isn't to difficult to find but where do you tell it to go? Such mysterious questions abound and I got quite hooked. Well worth a play.

Program	*The Atlas Assignment*
Price	*£5.95*
Micro	*Spectrum 48K*
Supplier	*Virgin Games* *61/63 Portobello Road* *London W11 3DD*

LOW LEVEL

Most independent witnesses would agree that Digital Integration's *Flight Pilot* is the best flight simulation program for the Spectrum, beating even Psion's highly regarded offering into second place.

Night Gunner is the companies most recent release and despite the cassette cover and title is really a different sort of game entirely — for one thing you don't need any (well, not much) piloting skill at all.

The game involves fighting and bombing your way through 30 missions before being rewarded with the ultimate challenge of bombing the enemy base. Within each mission there are a number of elements requiring different sorts of skill — low level attacks where the danger of crashing is great, defending the plane against fighters, blitzing tanks, etc.

The graphics and more surprisingly, the sound effects, are superb (it's almost worth

crashing just to hear them) the 3D is very well done and Ultimate would be happy to put this one out. Who are Digital Integration anyway?

Program	*Night Gunner*
Price	*£6.95*
Micro	*Spectrum 48K*
Supplier	*Digital Integration* *Watchmoor Trade Centre* *Watchmoor Road* *Camberley* *Surrey*

DIET COUNTER

Although by and large, most computer addicts are not over weight (they seldom remember to eat) there are a growing number of programs for them should they decide to diet.

The latest is called *Calorie Controller* but really it's a simple filing system which comes with 100 foods and the number of calories they contain.

Program	*Calorie Controller*
Price	*£5.95*
Micro	*Spectrum*
Supplier	*S D Micro Systems* *PO Box 24* *Hitchin* *Herts*

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

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)

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 Atak (Supersoft)
10	(-)	The Hobbit (Melborne House)

BBCK

1	(-)	Mr Wimpy (Ocean)
2	(3)	Chuckie Egg (A&F)
3	(2)	Fortress (Pace)
4	(-)	Daredevil Dennis (Visions)
5	(8)	Battle Tanks (Superior)
6	(5)	Chemical Simulations (Acornsoft)
7	(-)	Penguin (Postern)
8	(-)	3D Space Ranger (Microbyte)
9	(6)	Cosmic Kid (Superior)
10	(-)	Saloon Sally (Psion)

★ All model B
(Figures compiled by Micro Management, Ipswich 0473 59181)

Atari

1	(1)	Rally Speedway (Adventure International)*
2	(2)	Warlock (Warlock)
3	(5)	Saga 5 The Count (Adventure International)†
4	(4)	Slinky (Cosmi)
5	(3)	Caverns of Kafka (Cosmi)
6	(-)	Zaxxon (Datasoft)
7	(6)	Prepple (Adventure International)
8	(-)	Astro Chase (Parker Brothers)*
9	(-)	Arrow of Death Part 2 (Channel 8)
10	(10)	Savage Pond (Starcade)

* Cartridge † 32K Disc
(Figures compiled by Calisto Computers, Birmingham 021 632 6458)

Spectrum*

1	(2)	Chequered Flag (Psion)
2	(—)	Ant Attack (Quicksilva)
3	(5)	Hunchback (Ocean)
4	(—)	Fred (Quicksilva)
5	(4)	Atic Atac (Ultimate)
6	(—)	Cyrus is Chess (Intelligent)+
7	(3)	Scuba Dive (Durrell)
8	(6)	Flight Simulation (Psion)
9	(7)	Lunar Jetman (Ultimate)
10	(9)	Snowman (Quicksilva)

* All 48K except where noted. + 16K.
(Figures compiled by W H Smith and Son, London)

Books

1	(5)	Interfacing Projects for the BBC Micro, *Smith* (Addison Wesley)
2	(9)	Mastering the Commodore 64, *Jones and Carpenter* (Horwood)
3	(3)	Advanced Graphics with the BBC Microcomputer, *Angell and Jones* (Macmillan)
4	(2)	Disc Systems for the BBC Micro, *Sinclair* (Granada)
5	(1)	BBC Micro Disc Companion, *Latham* (Prentice-Hall)
6	(–)	Introducing Logo, *Allan* (Granada)
7	(–)	The C Primer, *Hancock* (Byte)
8	(–)	Complete Forth, *Winfield* (Sigma)
9	(6)	68000 Assembly Language Programming, *Kane and Leventhal* (Osborne)
10	(6)	Spectrum Hardware Manual, *Dickens* (Melbourne House)

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

Book Ends

PERSPECTIVE

Designs from your Mind is another one of those horrendously expensive but excellent books from America. It is about using the graphics on Atari machines to the fullest extent, and concerns itself as much with design and perspective techniques and with actual programming.

In many ways the book reads like a good school textbook should, with clear examples, recapitulations of new information, and plenty of pictures and diagrams.

This approach, of taking the 'art' part of computer graphics as seriously as if the TV screen was a piece of paper, proves very illuminating.

Book *Designs from your Mind*
Price *£13.45*
Micro *Atari*
Supplier *Prentice/Hall International 66 Wood Lane End Hemel Hempstead Herts HP2 4RG*

RESTRICTED

Goldstar Software whose programs we have mentioned in Popular has, as another string to its bow, a book division called Dorling Kindersley.

The first products are a series of step by step books on programming for all the main micros.

The books are excellent, at least in terms of the way they use lots of colour and screen displays to clearly explain exactly what to do. As a series they could form the best "basic introduction" to programming I've seen. But there's the rub — each section is so clear because it restricts itself to a limited area — if you want to cover the whole area it'll cost you a lot.

Book *Step by Step*
Price *£5.95*
Micro *Spectrum*
Supplier *Dorling Kindersley (Dept MP) 9 Henrietta Street London WC2E 8PS*

SID CHIP

Sprites and Sound on the Commodore 64 is the latest of Pete Gerrard's torrent of books on the Commodore machines.

Aside from some good advice and tips what this book gives you is a number of very useful programs to access the sprites and sound very much more easily. I particularly liked the sections on synthesizers and the Sid chip.

Book *Sprites and Sound on the Commodore 64*
Price *£6.95*
Micro *Commodore 64*
Supplier *Duckworth The Old Piano Factory 43 Gloucester Crescent London NW1*

This Week

Program	Type	Micro	Price	Supplier
Games Pack 4	Arc	Aquarius	**£4.95**	Processor
Demolator	Arc	BBC	**£6.95**	Vision
Battle Planet	Arc	BBC B	**£6.95**	ISP
Monsters and Magic	Ad	BBC B	**£6.95**	ISP
Calc Result	Ut	Commodore 64	**£99.00**	Handic
Calc Result Easy	Ut	Commodore 64	£49.95	Handic
Flight Path 737	S	Commodore 64	£7.95	Anirog
Get Off Garden	Arc	Commodore 64	**7.00**	Interceptor
Gyropod	Arc	Commodore 64	£6.90	Taskset
Wheelin' Wallie	Arc	Commodore 643	**£7.00**	Interceptor
Sunken City	Ad	Dragon	**7.95**	Slik
Type and Print	Ut	Dragon	**£6.95**	D Hill
Maxima	Arc	Memotech	**£6.95**	PSS
Board/Dice	S	Newbrain	**7.50**	Eborsoft
Busy	Ut	Newbrain	**£172.50**	Eborsoft
Busyfiles	Ut	Newbrain	**90.00**	Eborsoft
Busyfiles 2	Ut	Newbrain	**£71.25**	Eborsoft
Catering	Ut	Newbrain	**£18.00**	Eborsoft
Dice	S	Newbrain	**£11.25**	Eborsoft
Gourmet	Ut	Newbrain	**£8.25**	Eborsoft
Housekeeper	Ut	Newbrain	**£62.25**	Eborsoft
Text	Ut	Newbrain	**£10.50**	Eborsoft
Character Generator	Ut	Spectrum	**£8.95**	ISP
Psi Spy	Ad	Spectrum	**£7.95**	Postern
3D Spell	Ed	Spectrum	**£5.95**	Camel
Chopper X1	Arc	Spectrum	**£5.05**	R&R
Galaxy Warlords	Arc	Spectrum	**£5.50**	R&R
Geography	Ed	Spectrum	**£5.95**	Thor
Guitar Tutor	Ed	Spectrum	£4.95	Harlequin
Screen Machine	Ut	Spectrum	**£8.95**	ISP
Spectel	Ut	Spectrum	**£9.95**	Jaytronics
Spectrum Sprites	Ut	Spectrum	**£7.95**	ISP
Spellbound	Arc	Spectrum	**£5.95**	Beyond
The Multi File	Ut	Spectrum	**£9.95**	ISP
The Tebbit	Ut	Spectrum	**£5.05**	Applications
Air Traffic Control	S	ZX81	**£4.95**	Hama

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.

Is it education

I used to think . . . actually, I never used to think about educational software, having loftier matters to consider, such as how long to opening time. Pressed for an opinion, I'd have expected the stuff to be worthy and dull, selected by that rigorous screening which during O-level Eng Lit kept my pure young mind from the pollution of living authors.

Then the *Sunday Express* dreamt up their feature on educational software. Being involved with this book *Micromania*, I landed on the panel of alleged experts. It was hell: trapped all day in the Café Royal with a litter of Spectrums and BBC Micros (some even working) and endless schoolkids reducing everything to rubble in the name of Software Evaluation. Peering over their shoulders, I gazed upon the awesome vistas of state-of-the-art educational software. Worthy and carefuly screened? Believe me, games like *Frogger* or *PacMan* are not only more exciting but — with their training in how to cross roads and dodge the fuzz — a lot more educational.

What should teaching programs do? Hold a kid's attention, I suppose, and painlessly teach something. Also the something should be worthwhile: too many of that day's programs chiefly taught you how to "play" the program itself, without relation to the real world. Thus *Amazing Ollie* ("Learning about numbers") and a set called *First Steps with the Mr Men* educate almost exclusively in how to move cursors round the screen. Computing for the sake of computing.

Again, familiar complaint, educational software isn't up to the pictures on the boxes. The thrilling space-war imagery of *Hot Dog Spotter* fades on sight of the actual display, dullish graphics featuring the occasional fall of a blob with dots on. You count the dots and hit the relevant key, thus being educated in number recognition (fair enough), finding the Spectrum's number keys, bashing them hard enough to have any effect, and slumping across the keyboard in catatonia after about three minutes.

The programs lack imagination. *Timeman* is aimed at the doubtless vast number of kids who can't read clocks but are fluent with numbers and know without being told that you hit *Return* after each number. *Children from Space* uses the exciting idea of space visitors who, unexcitingly, need their English corrected. If your "corrected" sentence is wrong you type the whole thing again — no cursors here!

Symmetry is a pattern-drawing program which might teach a little geometry. The initial display explains how to draw lines by hitting 1 to go north, 2 to go northeast, 3 to go east, etc. You're then advised to write all this down, since you won't be told again. The prosecution rests . . .

Words Words Words was my favourite: as a professional writer I like to see potential rivals discouraged in early life. The challenge is to spot what the graphics are supposed to be: so when something appeared which looked like a large vole or small megatherium, our nine-year-old playtester scored for answering "dog". Next, the castle scene: a recognisable portcullis! "Portcullis," she typed. Not on your nelly, said the program. No such word. Only "gate" would do.

Educational software seems uneasily aware of its tediousness. Biggest hit with the kids was *Facemaker*, which despite promotional guff about "teaching children how to draw" was blatantly not educational: just another exercise in computerised funny faces. *Time Traveller* tries to teach history in multiple choice quizzes ("The Bronze Age was famous for: structural linguistics, votes for women, punk rock, bronze?"): the kids skipped through these to play the dodge-the-nasties arcade games thrown in to make history interesting. Thus the lasting educational impression was that Ancient Brits spent their days being chased by wolves through forests; Tudor folk by dagger-wielding courtiers through palaces; Victorians by rats through sewers.

So *is* educational software educational? Not very. It's great virtue, novelty, wears off too quickly — kids are blasé about computers even if we addicts aren't. Looking at today's great splurge of trendy "educational" cassettes, I can't help remembering the trendy skateboard rinks so many councils were building a few years back — or the language laboratory at my old school, abandoned when the novelty faded and the O-level results dropped through the floor.

David Langford

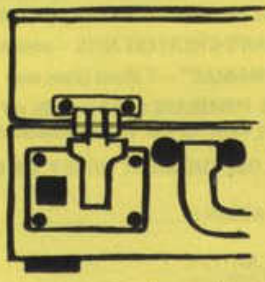
Reverse digits

Puzzle No 103

When Cyndy became a 'young executive' she decided that the one essential item to complete the image was a new briefcase.

You know the sort of thing — real leather case, hand stitching, gold plated fittings, gold leaf initials and a personally selectable combination lock.

It was the lock that caused the problem as she could never remember the combination. Not, that is until she hit upon the following idea. You see, there were two fastenings each with its own independently settable four-digit code. She has



now set the locks so that the combination of both have the same digits but one has its digits in reverse order.

In case you are wondering how this helps Cyndy, she just has to remember that one number is just twelve times the other.

There you go! It's just a simple step to work out what the two code numbers are if she should ever forget. Or is it?

Solution to Puzzle No 98

In the program all the possible amounts are checked against the known facts. Note that the original number of pounds must have been greater than the number of pennies.

```
10 FOR L = 2 TO 99
20 FOR P = 1 TO L
30 LET A = L * 100 + P
40 LET B = P * 100 + L
50 IF (A-B) -50 = A/2 THEN PRINT "ORIGINAL SUM = ";A
60 NEXT P
70 NEXT L
```

Running the program shows that Tom originally had £66.32 and he lost £32.66. A further loss of 50p left him with a balance of £33.16 — half of the original amount.

Winner of Puzzle No 98

The winner is: M Docherty, Grand Avenue, London N10, who receives £10.

The Hackers

.... but seriously,

AUTOMATA

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16K ZX81 £5 ☐ BBC 32K £10 ☐ Dragon 32 £10 ☐ Spectrum 48K £10 ☐

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