

ACORN-USER

BBC MICRO · ELECTRON · ATOM

JANUARY 1985 £1

39 LEAF

Wordprocessors:
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Second processors:
more haste, less speed

Electronic magazines
on the Econet

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on your micro

Reviews:
books,
games, lightpen
software and
an airbrush
program



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Electron
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your computer
or play a friend
with Quadline

GAMES

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for BBC micro
and
Electron

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Address: _____

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NEW USERS

- Hints and Tips** 41
Moving objects around the screen, drawing shapes, shuffling cards and accessing wordwise text from Basic are all covered by Martin Phillips this month. Several of the listings are printed in bar code format in the yellow page section
- Letters** 49
Software for education, CP/M, frustrations with Basic II, weather dumps from our issue on satellite communications, views from Scotland and Australia, robot kits, BBType and more on bulletin boards

- Dear Kitty** 53
Monitors versus TVs and problems with typing in listings without making mistakes are the two issues tackled by our Kitty this month for readers who are struggling with the bamboozling aspects of computers

FEATURES

- Computers on the high seas** 20
BBC micros are taking part in the four-year Operation Raleigh adventure. A converted trawler, renamed Sir Walter Raleigh, will be the nerve-centre of the project and it is equipped with BBC micros and satellite communications. Report by Keith Parish

- Joe's Jottings** 77
Set up your own teletext database or magazine complete with linked frames and animation on Joe Telford's Eco-fax software. It comes complete with menu, editing and display facilities, function key strips and instructions

- Second processor power** 135
Paul Beverley looks at the theory and practice of using these expensive add-ons. There are several ways of taking advantage of the extra processing power and some are better than others

YELLOW PAGES

All the major listings in this issue can be found in the yellow page section, starting on page 105. For details of bar code versions available in a separate booklet produced with the MEP, see page 127

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- Order the monthly listings cassette** 96



BUSINESS

- Wordprocessor choice** 143
Wordprocessing is the first task most small businesses tackle. Our reviewer Jacquetta Megarry gives her impressions of six popular systems – *Beebpen*, *Edword*, *The Kansas Wordprocessor*, *Scribe*, *View* and *Wordwise*. They range in price from £22 to £60 and come on disc, cassette and ROM. The choice is yours

EDUCATION

- Activity board revisited** 164
A superb idea for teaching children at home and in schools. Robert Southall develops the idea

- Teletext emulator on Econet** 77

Joe Telford devotes his Jottings to producing a superb piece of software for use on the Econet or a disc system. If you want to set up a teletext database or magazine on the lines of Ceefax, this is your chance!



- Education news** 161
Teachers are 'blundering in the dark'. Find out who said this and why. Reporting by Nick Evans

REGULARS

- News** 7
Series C computers – Curry spills the beans; *The Times* reveals its network for schools; Atari comes the heavy with arcade game 'copies'; the true story of the Palace Prestel break-in

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GAMES SPECIALS

JANUARY



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Quadline	64
Just get four of your own counters in a row and you've won the game. Sounds simple? Maybe, but first you've got to beat a friend – or your own micro. David Acton is the author	
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Put the blocks back in the correct place to re-assemble the picture. And Roland Waddilove shows how to add your own graphics	
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Painting your graphics	86
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REVIEWS

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Software and games	177
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Books	191
Three offerings on business, women in computing and lots of uses for dead cats computers	

NEXT MONTH

Turtle graphics
A great way to produce graphics for youngsters – and learn about functions and procedures
Micro paintbox
Draw shapes or pictures and colour them in on your BBC micro or Electron
Random access filing
How to organise your data on disc
Reviews
Modems – spreadsheets – colour printers – games



Acorn User
January 1985
Issue number 30

Cover illustration by
Peter Wilson

Acorn User welcomes submissions from readers. Articles should be typed, double-spaced text with diagrams and screen dumps on separate sheets, or on disc in *Wordwise* (saved as a *SPOOL file using option 8) or *View* format. Leave large margins to allow space for editing. Please enclose all programs on disc or cassette, with listings if possible. Also follow the style used in presenting listings in the yellow pages section. Photos should be 35mm, or larger, transparencies, or 5in by 7in black and white prints.

Ensure your name is on everything, and keep a copy. Enclose a suitable stamped, addressed envelope if the submission is to be returned. Attach a short letter with the article giving its title with a day time phone number if possible. Address your article to the Technical editor. Articles are acknowledged on receipt, but not submissions for the regular columns, letters pages and competitions. Please limit telephone enquiries to the Technical editor to Wednesday and Thursday afternoons.

AMX ART

AMX MOUSE

The AMX MOUSE is an advanced opto-mechanical device which brings to the B.B.C. micro facilities hitherto only available on more expensive machines. It enables you to use advanced features such as ICONS, WINDOWS, and POINTERS in your own programs.

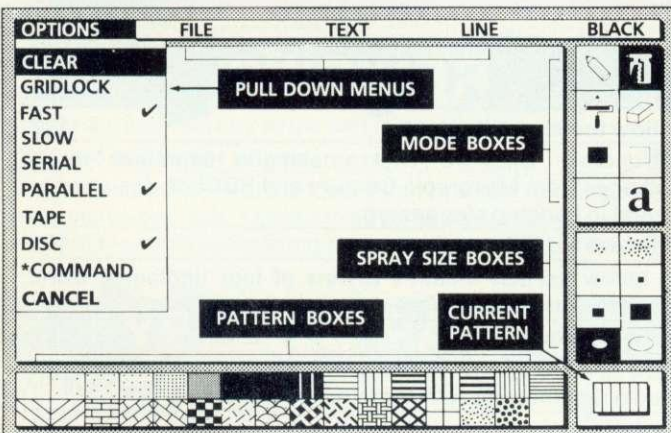
The AMX MOUSE can be used with ordinary programs to replace the cursor keys and with the AMX software it turns the B.B.C. micro into a far more user-friendly device, enabling beginners to quickly learn to use the computer for a wide range of purposes, including COMPUTER AIDED DESIGN, Word Processing, and a host of business uses – to say nothing of its inclusion in games software.

A further range of software will be released in 1985. Starting with "DESK TOP MANAGER".

THE AMX MOUSE PACKAGE

The AMX MOUSE – an advanced three buttoned mouse which simply plugs into the B.B.C. user port drawing its power from the computer.

AMX ART GRAPHICS PROGRAM



The AMX ROM – contains fast machine code routines for creating on screen windows, icons, and pointers and enables to MOUSE buttons to be programmed for use with commercial software such as Wordwise and VIEW.

Please send No _____ **AMX MOUSE** package/s (including **AMX ART** and EPROM) at **£89.95** inc. VAT and P&P. I enclose a cheque/PO for £ _____ or debit my credit card.

Card No. _____ Visa Access

Name _____

Address _____

Signature _____ Date _____

(Please tick choice of media for **AMX ART**) Cassette 3" Disc 5 1/4" Disc

To: Advanced Memory Systems Ltd., Woodside Technology Centre, Green Lane, Appleton, Warrington, WA4 5NG, England.

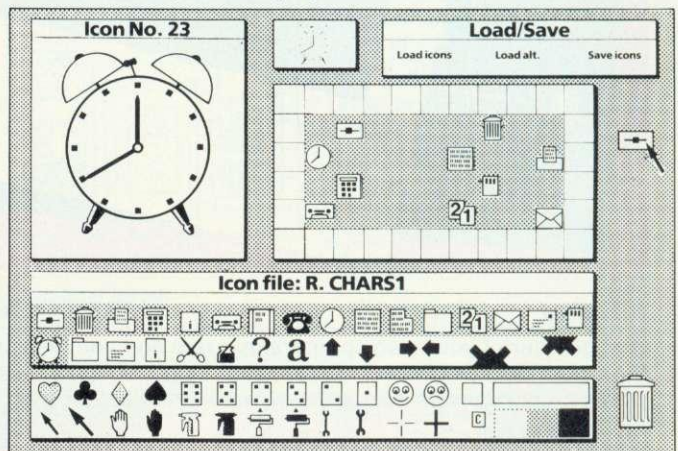
If not available from one of our main dealers, fill in the coupon and we will send you an AMX MOUSE with AMX ART with our full no quibble money back guarantee. OR phone 0925 602690/62907 for instant Access or Visa orders.

A MANUAL describes how to operate the MOUSE and the ROM routines which are available in both basic and machine code programs.

AMX ART – a superb computer aided drawing program on both tape cassette and a 5 1/4" floppy disc with its own manual. It is suitable for a wide range of uses including preparation of illustrations, architectural and engineering detail drawings, teachers' worksheets, and just creating your own pictures. It soon becomes addictive.

AMX ART includes full use of on screen menu boxes, icons, and pull down menus so that beginners find it very easy to learn and gain confidence in the use of the B.B.C. Micro.

An ICON DESIGNER program which enables you to create and store icons for use in your own programs.



TECHNICAL REQUIREMENTS

The AMX MOUSE can be used with any B.B.C. Model B computer fitted with the Operation System 1.2 and is compatible with the second processor and disc or tape filing systems.

The AMX MOUSE is adjustable for sensitivity via software control and three buttons can be programmed to simulate 24 different key codes.

The AMX MOUSE may be disabled by a simple software command and will then not interfere with normal operation of the computer.

The AMX ART programme enables users to print out screen displays using any Epsom compatible dot-matrix printer. Owners of non-standard printers may use their own screen dump routines.



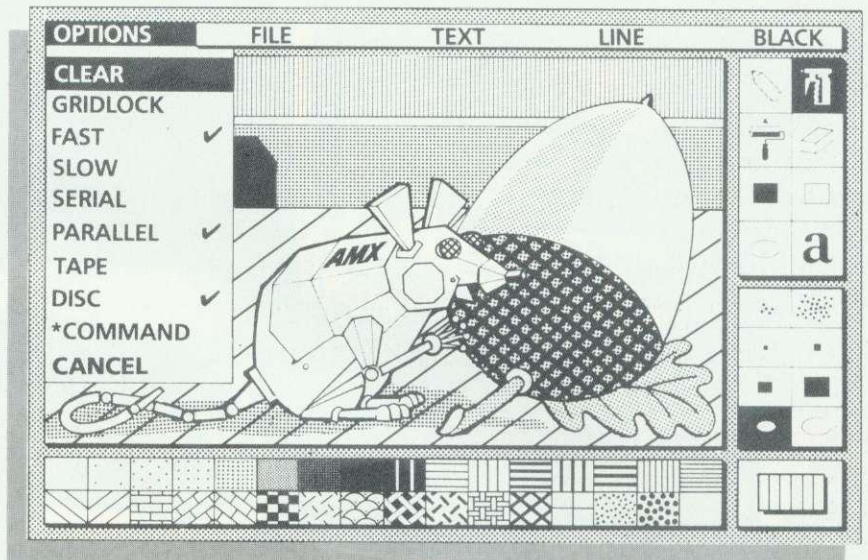
*Wordwise' is a wordprocessing program by Computer Concepts.

*View' is a word processing program by Acornsoft Ltd.

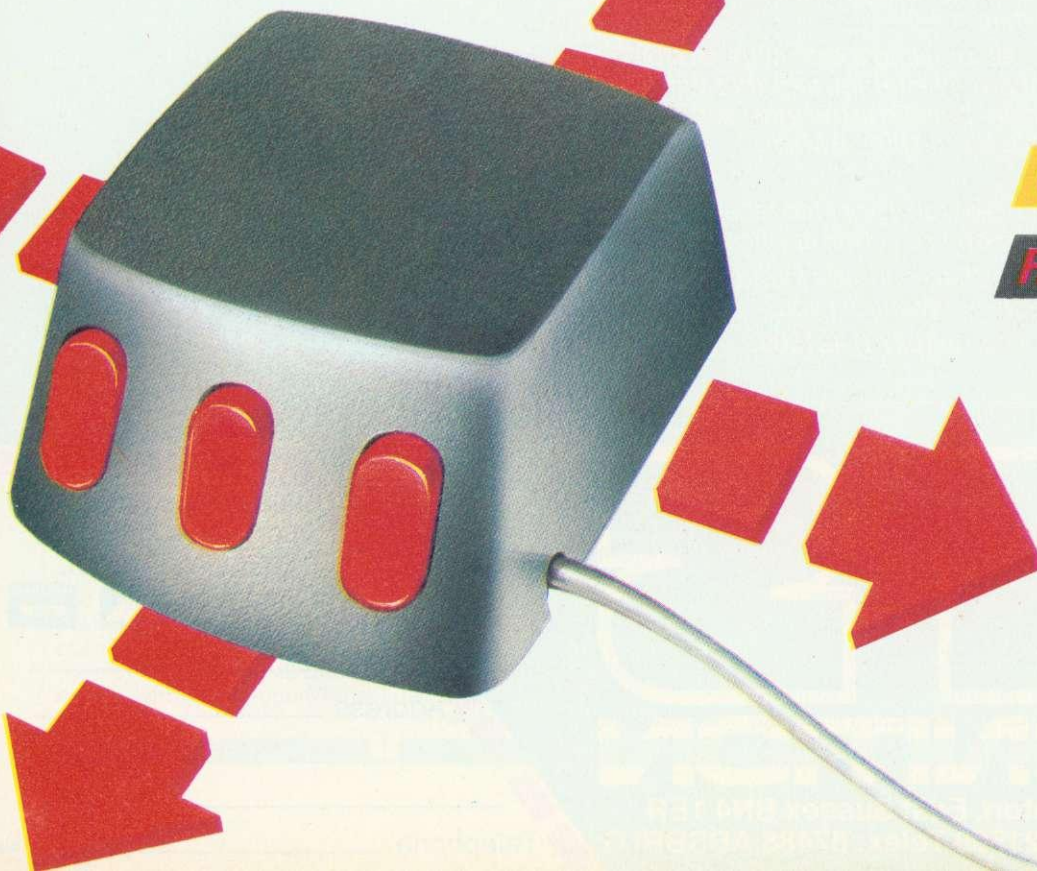
AMX MOUSE

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**FOR THE
BBC MICRO
MODEL B**



with AMX ART GRAPHICS PROGRAM



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The **CTS Graphics Tablet** is a highly sophisticated device enabling graphic drawings and designs to be input directly into the computer by the most natural method known to man.

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Please send me further information about The CTS Graphics Tablet.
£495 + VAT



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Curry reveals 'C' series

ACORN is to launch a 'C' computer next year, but it will not be a successor to the BBC model B. The C stands for Communicator, and it will come with built-in telephone handset, demonstrating a further expansion into business computing for Acorn.

Managing director Chris Curry spilled the beans to the *Financial Times*, but the rest of the company refuses to discuss the project – especially those most closely connected to it.

However, Acorn director Christopher Ward said it would be based on a 16-bit pin-compatible version of the 6502 microprocessor chip used in both the BBC micro and Electron.

This chip is most likely to be the 65C816, which has a 24-bit address bus so it can use up to 16Mb of memory, although the C will probably come with 128k of user RAM. It can operate as

a 6502 emulator, or as a 16-bit chip.

From what we can glean the C will come with built-in telephone handset, and decisions have yet to be made on View, Viewsheet and communications software, 3.5in disc drives and a flat-screen display, as on portable computers.

The specification sounds similar to ICL's recently announced One Per Desk, but Chris Curry apparently sees it as an OPD plus, plus, plus, undercutting the ICL machine in price but with better facilities.

The machine will not carry the BBC name. In fact, it may be produced for other companies to put their own labels on, as Acorn did with the Merlin M2105, an Electron-based communications terminal, for British Telecom.

By using the 16-bit chip and



ICL's OPD – £1,500 business machine based on Sinclair's QL

BBC Basic, the C series would have a large measure of compatibility with the BBC and Electron (which also uses the 3.5in drives).

The price has been quoted by Curry and Ward as between £500 and £800, but there appear to be several versions, one of which comes with a teletext adapter enabling it to

receive Ceefax and Oracle. A launch date in the spring has been mentioned by Ward, but elsewhere in the company the feeling is 'Summer at the earliest'.

The group working on the project has been split off from



Chris Curry – spilled the beans

Electron tops in survey on reliability

THE Electron comes out tops in a survey of computer reliability in which 100 High Street shops took part.

The survey of Acorns, Sinclairs and Commodores, was made over six months. It found that only four per cent of Electrons were returned, and five per cent of BBC micros. The figure for Spectrums was 24 per cent.

Acorn computers still have only a six-month warranty, as against a year for the Sinclair Spectrums.

Check your chess

CHESS fanatics can analyse their play with software from Compuchess – and the company provides data files on games.

The Chess Analysis System costs £9.95 (£11.95 for the disc) and eight data files are so far available on openings at £2.95 each.

Compuchess is at 48 Beatty Ave, Newcastle-upon-Tyne NE2 3QP.

Times Network awaits the call from schools

by Geoff Nairn

News International, owner of the *Times*, has finally unveiled its computer networking system for schools, after the news was exclusively announced in the August issue of *Acorn User*. The Times Network for Schools (TTNS) offers both electronic mail and database facilities and will initially be running on Telecom Gold, British Telecom's public computer networking service.

The Network is at present aimed at secondary schools that own BBC micros (or RML machines) and for £152 each participating school gets a BT-approved, direct-connect modem and the necessary software to use Telecom Gold, bulletin boards and Prestel, as well as TTNS. There is an additional charge each term of £69 for the hire of each electronic 'mailbox', giving unlimited access.

These charges represent a

considerable saving on standard Telecom Gold levies and have been obtained by business sponsorship – Memorex and the National Computer Club are among some of the first organisations to contribute information pages.

One slightly worrying aspect is the predominance of Army Careers information under the careers section of the database.

At the moment, the information stored on TTNS is a bit sparse, but Times Network Systems, which runs TTNS, hopes that both schools, local education authorities (LEAs) and industry will contribute pages of information.

Nine LEAs have been trialling TTNS at selected schools including one in Cleveland, where *AU* author Joe Telford teaches. The network was unveiled to the public at the Garth Hill School, Bracknell.

the rest of Acorn and is apparently not even based in the company's main research building.

The two main sources of the new chip are both in America. Acorn itself is unlikely to have production quantities of the chip yet, and it may still have some bugs to sort out before going into full-scale production. One source estimated that Acorn couldn't have more than 10 chips as there were only about 20 in Britain.

Acorn User is pipped at the post

AFTER three nail-biting weeks, *Acorn User* finally came second in the best launch category of the National Magazine Publishing Awards.

It was a close thing, we reckon, but *Just 17* pipped us to the post.

Education in the arcade from ASK

ASK has broken away from Acornsoft to launch its latest title, *Number Painter*.

The program is aimed at children aged 5-14 using a micro at home. It follows ASK's arcade-style approach, with the screen resembling Acornsoft's *Monsters*, to test mental arithmetic.

Versions are available for the Electron (at £8.95), and for the BBC (£9.95, disc version costs £11.50).

Acorn prices

ACORN's Plus 3 disc drive pack for the Electron will cost £229. It plugs into the back of the micro and features a 3.5in drive.

The company's Winchester drive will cost £2299 and gives 30Mb storage capacity.

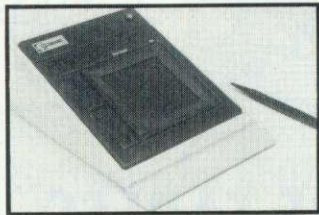
Modem approved

MODEM maker Pace has gained approval to connect its Nightingale modem to the BT phone network.

The modem offers Prestel and bulletin board access for £119 (plus VAT).

Graphics touchpad

CUMANA's Touch Pad gives easy graphics access to the BBC micro. The device costs £69.95 and comes complete



with RS423 cable, instructions and demonstration software.

The company sees it as a substitute for a mouse, keyboard or as a graphic input device.

PITMANS has released a range of educational business training packages on the BBC micro.

Sixgam is a business game where six groups compete in a world market for up to ten 'years'. The 40-track disc comes with manuals and guides for £28.75.

Data Processing accompanies a Pitman book of the



Slow, slow software

IF GAMES on the Electron and BBC are too fast for your fingers, here's a little device which could help - the Slomo.

It fits into the micro's user port (there's an extension for the Electron) and slows the whole game down to give you time to think!

Slomo can also freeze frames, to give you time to analyse the sound and graphics - or take pictures. It costs £14.95.

The distributor claims it works with 95 per cent of BBC/Electron software and is plugging its applications with children and the disabled. Cambridge Computing Research, 61 Ditton Walk, Cambridge CB5 8QD.

Prestel offers 'special deal' to school users

SCHOOLS interested in computer communications now have a difficult choice, for as well as the Times Network, Prestel has revamped its educational pages and is now offering a 'package deal'.

For £49 per quarter, subscribers have access to Prestel Education, Prestel Micro-computing (including Micronet and Viewfax) and the general pages on Prestel. The subscription also entitles them to ten hours of free use per quarter, with a £40 'credit' towards the cost of chargeable frames. Free training and support is also included.

Prestel Education is the umbrella name for all the educational pages on Prestel and they can now all be accessed from page 888.

Major new features include: School-Link, an electronic version of *Educational Computing* magazine; ED.IT, a 'who-does-what-where' collection of pages put on by the Council for Educational Technology; and ECCTIS, a careers database drawing on the Open University mainframe computer. All

Prestel Education pages are free to subscribers, apart from telesoftware.

Schools without the necessary hardware can buy a special package consisting of modem and communications software for the Beeb. As well as giving access to Prestel, the software also allows an off-line private viewdata system to be set up. The price has still to be fixed, but Prestel is hoping to keep it under £100.

Few schools will be able to afford both Prestel Education and the Times Network, so a choice has to be made. Prestel Education, being a viewdata service, offers colour and graphics, and can draw on the huge range of existing pages on Prestel. The newcomer TTNS has an 80-column, pure text screen format, but has more substantial telesoftware and interactive services. It remains to be seen if the database side of TTNS really takes off.

Prestel Education's Chris Knowles said cryptically: 'All schools need to do is compare the two services.'

Business training software packs from Pitmans

same name. It covers cash books, sorting, electronic mail and a hotel simulation. The disc costs £22.94.

A typing tutor on cassette

(£9.95) or disc (£14.95) runs on the BBC covering the alphabet, numbers and other keys.

The *Payslip* package simulates calculating wages for students on business studies courses. It costs £45.43.

Other new titles include *Introduction to Microeconomics* and chemistry software.

Pitman is at 128 Long Acre, London WC2E 9AN.

End of Prestel censorship

BRITISH Telecom has, as predicted in *AU* last month, dropped its ban on politics and religion on Prestel's open pages.

It's a decision with immense implications for the future of videotex and computer communications by modem.

BT chairman Sir George Jefferson had followed a 'better safe than sorry' policy since 1983 when he turned down the Social Democrat's request to use Prestel for its election campaign. The Labour Party brought the issue to a head.

The Opposition's technology spokesman, Dr Jeremy Bray - one of a growing number of MPs using BBC micros - challenged Sir George's decision.

Dr Bray complained: 'The fact that an effectual ban had been imposed and allowed to continue for an indefinite period created a presumption in favour of censorship which is disturbing in a free society.'

The result was a frenzy of activity in Whitehall. The Home Office confirmed that viewdata and cable data providers should be in the same position as conventional publishers, and so it was up to the industry to work out its own self-regulatory arrangements.

A BT spokesman said: 'British Telecom had interim guidelines and now they have been lifted. That's all.'



REWRITE THE HIGH SCORE TABLES

So, you've got a BBC. You've also got enemies. With the Gunshot, you'll have all the opposition covering in corners. 8-directional action and an all-in-one moulded stem allows accurate annihilation and strength to survive those all-night sessions.

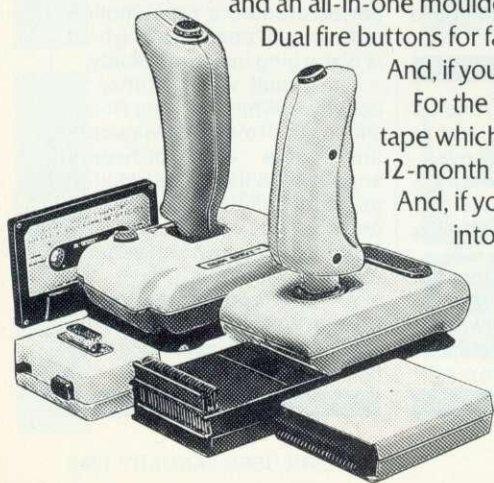
Dual fire buttons for fading fingers (and a rapid fire version when they're really coming thick and fast).

And, if you break it (and we know you'll try) our 12-month guarantee will prove invaluable. Only £8.95.

For the Gunshot, Vulcan's colour-coordinated, totally hardware BBC interface comes with a free tape which converts all keyboard software for joystick use. Exceptional value at £12.95, 12-month guarantee.

And, if you're a bit short of the readies, the Harrier is a tailor-made joystick which plugs directly into the BBC analogue port. Colour-coordinated and with a 12-month guarantee, only £10.95.

See the range of Vulcan joysticks and interfaces at your local stockist ... we'll see you on the high score tables.



VULCAN
ELECTRONICS LTD
Joystick Genius

200 Brent Street, Hendon,
 London NW4 1BH. 01-203 6366

Beebs used to encourage saving

BROADWAY Electronics has installed a £5000 BBC micro system for the Leeds Permanent Building Society in Luton to encourage young savers.

Two model B computers run three special games for youngsters to play. The winners receive a £1 voucher printed out by the micro to open an account.

Broadway is one of four Acorn dealers taking part in a pilot scheme in East Anglia, which the Leeds hopes to extend. For customers with a Leeds cheque, Broadway will reduce the price of a BBC model B by £10, and the Electron by £5, including free software.

Science software

THE physical sciences, particularly Chemistry, at secondary or tertiary level are catered for in programs by Herdman Educational.

Programs cost £5-£10 each, with disc versions £1 more. Write for a catalogue to Herdman at 43 St Johns Drive, Clarendon, Retford DN22 9NN.

Hi-tech hands-on

READERS interested in high technology are being catered for by Gwent College in Newport and Ebbw Vale College. People can come in at times to suit themselves to gain 'hands-on' experience on subjects including computing, robotics, pneumatics, and computer-aided design.

It costs £1 per hour initially and time can be booked for evenings and weekends.

Software for 6502

SYSTEM has adapted its ADE, ASM and SPY2 software utilities to run on Acorn's 6502 second processor. These new versions have also been enhanced, and, when using the second processor, the time to assemble programs is halved, and the new editor works in 80 column mode.

Handy hints cards

HANDY summary cards for programming the BBC micro and Electron cost £1.99 each from Boots and computer stores. They're made by Phoenix and cover Basic, the operating system and offer hints and tips.

Penman robot plotter out

PENMAN is a revolutionary new plotter. It is a type of robot which moves freely across the paper, removing the need for a frame for the pen, or a paper-moving mechanism.

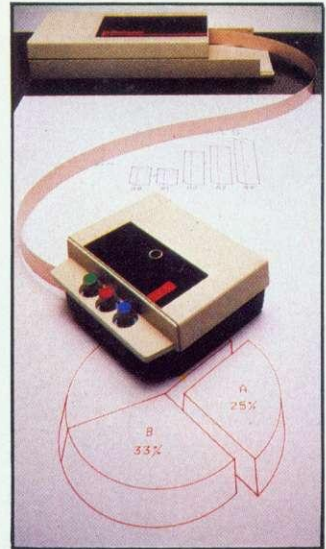
The complete unit costs £249 and consists of the five-inch square robot with three colour pens, and a control box that connects to the Beeb via the RS423 port.

The precision design allows it to draw near-perfect circles without any 'zigzag' effect, and straight multi-coloured lines in any direction. A built-in character set means designs can be labelled with letters as

small as 1mm. The Penman may be used with many commercial packages for hard copy of drawings and graphs.

It may be used as a desk top turtle, mouse or even a robot with collision detection. Software is under development for the educational market. Available already is the Penman Utility pack, MICAD, a 2-D and 3-D CAD suit.

Penman was featured on BBC TV's science magazine *Tomorrow's World* and *Computers in Control*. Details from: Penman Products, 8 Hazelwood Close, Dominion Way, Worthing, Sussex, BN14 8NP.



Hacking into the Palace

by Geoff Nairn

LAST month, a 19-year-old pulled off what must be the biggest coup so far among the hacker fraternity - leaving bogus messages on Prestel which appeared to come from the Duke of Edinburgh.

He broke into private pages and changed financial information - to the embarrassment of British Telecom, which operates Prestel.

Alias

The youth, who comes from West London and uses the alias Roger Le Hacker, managed to obtain system operator status on an 'ex-directory' Prestel mainframe. This allowed him to copy down over 300 identity codes and passwords belonging to legitimate users which he then passed on to three accomplices.

One of the ID codes belonged to HRH Prince Philip and Roger used it to leave the message: 'I do so enjoy puzzles and games. Ta ta! Pip pip! Signed HR Hacker.'

Roger also got Information Provider (IP) codes, which let him add a bogus page to the *Financial Times* section on Prestel, bearing the incredible news: 'FT NEWSFLASH!!! £1 EQUALS \$50.'

British Telecom claims there was a 'short lapse in the normally tight security' and promptly advised all Prestel users to change their passwords.

But despite this assurance, it is clear that the electronic

break-ins had been going on for two weeks before the *Daily Mail* broke the news on November 2.

Even more worrying is Roger's accusation that British Telecom only found out a week before and then denied it had happened. The two 'stunts' were performed in front of a *Daily Mail* reporter to show that Roger had indeed hacked the system.

The *Mail* also claimed Roger had broken into the private 'telebroking' pages of stockbrokers Hoare Govett which would have allowed him to order stocks and shares. Doug McGregor, of Hoare Govett, tried to dispel such fears: 'With our ID, he would have been able to read mess-

ages stored in our Prestel Mailbox, but we're confident that the telebroking wasn't breached; to do that you need an extra code and we vet all orders to see if they're genuine.'

The *Financial Times* has 100 frames on Prestel and is obviously worried that Roger's deeds could be repeated. Said Martin Brooks, Director, Information Services, *Financial Times* Business Information: 'He must have got hold of the *Financial Times* IP code - that's the only way the pages can be altered.'

'We are seeking urgent reassurances from Prestel that it won't happen again.'

Vulnerability

The above incidents highlight the vulnerability of Prestel's private pages and interactive services and could undermine Prestel's claims to be a serious business service, especially when Roger explained how he'd done it: 'Someone from BT left a manual lying around and I copied down the phone number for the back-up Prestel computer.'

'When I dialled the number, I couldn't believe my luck - the system manager's ID code was displayed on the first page! After that it was easy.'

'They've changed the passwords but it's only a matter of time before we get back into the system.'

Why does he do it? - 'It beats stamp collecting!'

BT investigates

SINCE the incident, British Telecom has held an investigation to find out what went wrong. Said a spokesman: 'It's true, the ID codes were displayed on a public page for about two days before we found out. It wasn't the front page though, so the hacker must have found it just by chance.'

'It was simply a case of someone flicking the wrong switch and was not done maliciously - the story about a disgruntled employee deliberately putting the codes up is just not true.'

TAKE A TEST FROM THE RANGE

So now you have got your home computer, you're ready to talk to Cumana – the best name in memory. Already a market leader throughout Europe for their range of disc drives, Cumana now have other products on offer, all to the same exacting standards that have made their disc drives the number one choice in the home and in education.

The Touch Pad

The Touch Pad is a low-cost graphic plotting aid for the BBC micro. This compact display cursor moving device simplifies programming with the touch of the stylus.

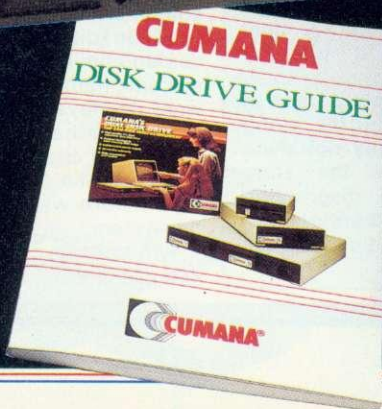
The product comes complete with an instruction booklet, basic software, stylus and connecting cable. Its uses are in graphics, computer aided design, education and games.

£69.95
including VAT.

Disc Drives

Cumana have spent years on research, development and marketing a range of drives second to none. Their drives are compatible with BBC, Spectrum, Dragon, Oric, Tandy Models I, II, III and 4 and Video Genie. They are fully guaranteed for 12 months and approved for electrical

safety by the D.M.E.E. and are extensively used in GLC and ILEA establishments. Cumana were the first independent disc drive supplier and are now Europe's market leader. Their products have been proven in the schools, universities and homes throughout Europe. Let us drive you in the right direction, send now for further details of the Cumana range, or see them at our distributors and at selected branches of W.H. Smith, Lasky's, Greens, Currys, and Spectrum UK.



DRIVE CUMANA

The Acorn Electron Computer

A microcomputer with a proven track record. Using BBC Basic, the Electron was developed out of the Micro that has been chosen for over 80% of schools participating in the Government's current Micros In Schools project. It connects into almost any TV set and cassette player and is supplied with a comprehensive User Guide which runs through, in a simple to follow manner, the basic principles of programming. A wide range of software is available, including games, educational packages and home accounts.

Cumana price
£199.00

Disk interface now available
for the Acorn Electron, details from Cumana.

Diskettes

Only when Cumana found a double density diskette up to their stringent quality control requirements, and at a price that made sense to the end user, were Cumana ready to put their name to it.

The result was a top quality diskette, complete with a plastic protective case for the ten-pack (they are also sold in two-packs!) together with index stickers.

Cumana diskettes are available now in both 5¼ inch and 3½ inch as single or double-sided, 40 or 80 track, from your local computer dealer. Don't trust it to chance, go for the best name on record.

Cumana BBC Microcomputer compatible disk drives:
retail price list.

Cumana disk drives supplied with formatting diskette, drive connecting cable and comprehensive user manual. Independent power supply, mains lead and moulded plug included.

CS100 40 Track single sided (100K)	£159.95
CS200D 40 Track double sided (200K)	£203.95
CS200 80 Track single sided (200K)	£192.95
CS400 80 Track double sided (400K)	£219.95
CD200 2 x 40 Track single sided (200K)	£284.95
CD400/S 2 x 80 Track single sided (400K)	£359.95
CD800/S 2 x 80 Track double sided (800K)	£414.95

Cumana disk drives with independent power supply, mains lead and plug. Excluding other accessories.

CS100E 40 Track single sided (100K)	£149.95
CS200ED 40 Track double sided (200K)	£192.95
CS200E 80 Track single sided (200K)	£180.95
CS400E 80 Track double sided (400K)	£208.95

Cumana disk drives supplied with formatting diskette and comprehensive user manual. Power supply taken from BBC Microcomputer, with lead supplied.

CSX100D 40 Track single sided (100K)	£119.95
CSX200D 40 Track double sided (200K)	£165.95
CSX200 80 Track single sided (200K)	£159.95
CSX400 80 Track Double sided (400K)	£189.95

3½ INCH DRIVES

CSX351 40 Track single sided (100K)	£139.95
CSX354 80 Track double sided (400K)	£199.95
CDX352 2 x 40 Track single sided (200K)	£256.95
CDX358 2 x 80 Double sided (800K)	£383.95

**All Prices Inclusive of VAT.
All 80 Track 5¼" Drives are
Switchable to 40 Track Mode**

DISTRIBUTORS/RETAIL

Available from the following retail outlets:
W.H. Smith, John Lewis Partnership,
Greens Leisure, Laskys, Spectrum UK.

Area distributors:

Addons Ltd. (Southampton) 0703 34775/6,
Audio & Computer Centre (Jersey)
0534-74000, Eltec (Bradford)
0274-722512, South Wales
Peripherals 0633-841760, HCCS
Associates (Gateshead)
0632-821924, Hugh Symons
(Bournemouth) 0202-26535,
J. S. Simnett Computers (South
London) 01-541 1495, Kingdom
Design (Belfast) 0232-643720,
Lightning (Harrow) 01-969 5255,
Microage Distribution (North London)
01-205 7688, Microworld (Edinburgh)
031-228 1111, National Micro Centre
(Stockport) 061-429 8080, Silicone
Express (Leicestershire) 0533 374917,
Thompson Cook (Birmingham)
021-328 3895.

+ National Dealer Network.



Cumana Limited, Pines Trading Estate,
Broad Street, Guildford, Surrey. GU3 3BH
Telephone: 0483 503121

For under £200 you can become your brother's keeper

In just a few days you could be using this amazing, new printer from Brother. It's small and neat but packed with more than its fair share of features.



With Tractor Feed

TRAVELS AT A STEADY FIFTY

In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

The M-1009 has bi-directional and logic seeking printing for normal characters and uni-directional printing for super script, sub script and graphics.

PRINTS ON ANY PAPER

Being an impact printer, the M-1009 will print on virtually any paper, including letter headings, invoices and standard office stationery.

It will even print two copies together with your original.

A GREAT CHARACTER REFERENCE

No less than 96 ASCII plus international type and graphic characters are standard.

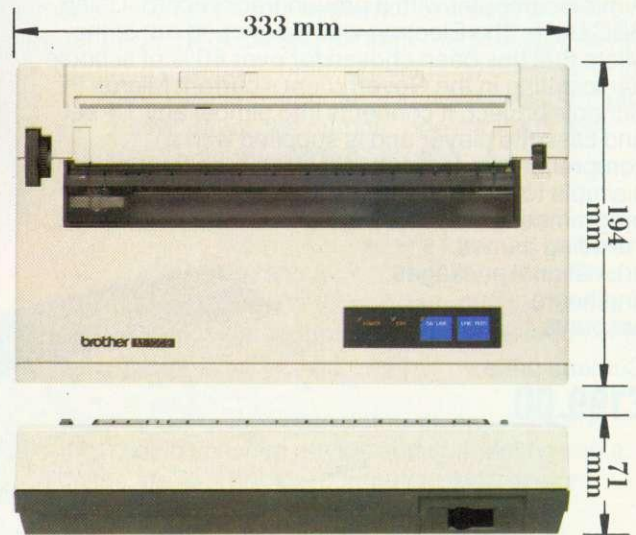
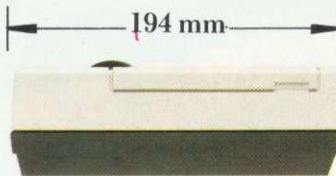
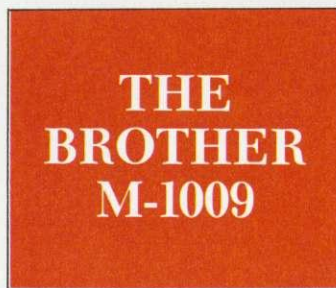
BIG BROTHER RELIABILITY

Built to the same exacting standards as Brother's elite office printers, the Brother M-1009 already has faultless credentials for reliability.

It's 9x9 dot matrix head, for example, has an astonishing 20 million character service life.

SUITABLE FOR ANY MACHINE

With IBM Centronic and the Epson dual serial/centronic interfaces fitted as standard the M-1009 is suitable for any home or business computer.



FULLY GUARANTEED 7 DAY DELIVERY

You can order in confidence, your Brother printer will arrive by courier within 7 days of your order complete with manual and full guarantee.

Order your Brother M-1009 now! Access/Visa holders ring 01-482 1711 or fill in the coupon below, or write to:

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UNICOM HOUSE,
182 ROYAL COLLEGE STREET,
LONDON NW1 9NN.**

(Personal callers welcome Monday-Friday 9-6, Sundays 10-1).

£199.95

NO MORE TO PAY!



TO: RELATIVE MARKETING, UNICOM HOUSE, 182 ROYAL COLLEGE STREET, LONDON NW1 9NN.

Please send me by courier _____ (qnty) Brother M-1009 printer(s) _____ (qnty) Tractor Feed unit(s) at £17.25 (inc VAT). _____ (qnty.) Printer Cables at £9.95 (inc VAT). State make and model _____

I enclose a cheque for £ _____ or debit my Access/Visa card no _____

Name _____ Signature _____

Address _____

Postcode _____ Telephone _____ AUI

Disc holds analysis of 25 shares

EUROPE's first share guide on disc for private and professional investors with a BBC micro is available from Investment Research in Cambridge.

Investors will be able to analyse the data on their own computer to judge investments.

The monthly disc analyses around 25 shares and markets, and comes with notes on

the technical position of price and market levels, and forecasts of future levels. Companies covered include Plessey, GKN, Rowntree Macintosh, RTZ, Shell and BP.

The disc uses the 200-day moving average of share prices, and can be updated to keep track of prices and indices.

The Special Report disc

costs £75 a month from Investment Research on (0223) 356251.

●BCSSP is a dynamic simulation package for engineering and scientific applications on the BBC micro.

Prices vary according to user, but a demonstration costs £15 from Micropacs, 50 Gosport St, Lymington SO4 9BE.

Atari forces software houses to drop games

ATARI is spoiling for a fight over software piracy, only this time it's other software houses that are the target.

The American micro giant owns the rights to several 'classic' arcade games and has taken exception to software with similar titles or themes.

One such company, Superior Software, has decided to stop selling the BBC micro game *Winged Warlords* after Atari claimed it was a copy of the *Joust* game.

Said Richard Hanson, of Superior: 'It's not the same game at all - ours has winged warlords instead of the ostriches used in *Joust*.

'Nevertheless, we took it off

the market - we can't afford to argue the case in court. Anyway, the game wasn't selling particularly well, so we didn't lose much.'

Another Beeb game has come under the spotlight: MRM Software's *Castle of Gems* was alleged to be very similar to Atari's *Crystal Castles*. Again, the smaller firm backed down and gave an undertaking not to sell any more copies.

Atari holds exclusive licences to produce home micro versions of *Donkey Kong*, *Pac-Man* and *Pole Position*, all of which can be obtained, in various guises, for the Beeb and Electron.

For example, Micropower's

Killer Gorilla, for the Beeb, bears more than a passing resemblance to *Donkey Kong*. Chris Payne, of Micropower, made no apologies: 'With a successful arcade game such as *Donkey Kong*, people are inevitably going to write software based on the same theme.'

'Atari hasn't produced a version for the BBC micro so we can't be accused of taking sales from them.'

Losing money

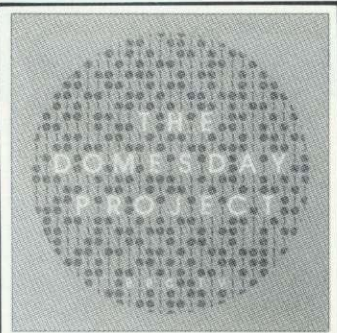
Jon Dean, of Atari, was quick to defend his company's actions: 'We have the rights to many successful games and are losing a lot of money over copyright infringement.'

'We don't want to seem heavy-handed about this, but we're quite prepared to take companies to court. Several such actions are pending at this moment.'

Acornsoft, whose range contains several near-copies of arcade games, seemed remarkably unperturbed about possible litigation. 'We'll wait and see what happens,' said a spokesman.

Although two years ago it was a different story, when fear of court action led the company to rename its *Defender* as *Planetoid*, and change the character shapes in *Snapper*.

But if the big software companies are not unduly worried, others have more to lose. Superior's Richard Hanson warned: 'The small software houses could be put out of business.'



Schools set to write history

A MILLION schoolchildren could be running around Britain in the summer collecting facts for the BBC's Domesday Project.

About 30,000 schools up and down the country have been asked whether they want to help produce the modern computerised version of the original Domesday Book of 1086 (see last issue).

Children will collect information about a 12 kilometre-square area surrounding their school and eventually this will build into a nationwide database, stored on video disc and accessible using a BBC micro.

Although the actual video disc won't be available until 1986, the BBC has written to the schools and replies were expected by December 20. Schools interested in participating - between 10,000 and 12,000 are necessary for the project to be viable - will then receive a detailed briefing pack in March.

The summer term can then be used for gathering all the necessary information and the briefing pack explains how the data-collecting process can be integrated into the school curriculum.

Each school gets a questionnaire in the form of a set of discs for the particular 4km by 3km area assigned to them. This asks about the local geography and amenities. In addition, children are asked to contribute 16 pages of text, in their own words, and five 35mm slide photographs of the area.

All local education authorities have been consulted about the project and it has been on trial in 17 schools.

Said Mike Tibbets, the assistant editor: 'In the trial schoolchildren have been running around with clipboards collecting data.'

'The enthusiasm and interest shown by both children and teachers is very encouraging and we're confident the project will be very successful.'



Eltime stores TV pictures

IMAGE 3 is a video frame store which enables a BBC micro to capture video or TV pictures, hold them in memory and manipulate them.

The £2000 device has a resolution of 512 by 512 pixels, and the software provided

enables the user to alter the grey shade of any pixel. Also, if a lower resolution is used, up to four pictures can be displayed and compared.

Details: Eltime Ltd, Unit D29, Maldon Industrial Estate, Fullbridge, Maldon CM9 7LP.



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IF NUMBERS are the bane of your life, the Softlife keypad could make things easier.

At £59 (plus VAT), the keypad comes with software in EPROM and in normal use takes up no extra memory. When programmed without using the EPROM, it takes up 256 bytes of RAM.

No extra power is needed as the device plugs into the user port. It is designed to work with software complying with Acorn-approved calls.

Contact Softlife at 7 Rose Crescent, Cambridge CB2 3LL.

Software boost for cable TV

CABLE TV channels are soon to get their own telesoftware pages which subscribers can download into a BBC micro fitted with an adapter.

Just as the BBC broadcasts telesoftware programs on its Ceefax teletext service, so three Thorn-EMI cable channels will carry telesoftware squeezed between the frames of each TV picture.

Teletext is already broadcast on the cable channels: Thorn-EMI's *Music Box*, for example, carries a hundred pages of the latest music news and forthcoming group tours, and there are plans to extend teletext to the film channel, Premier, and the Children's Channel.

However, the pages of telesoftware represent an exciting new addition to cable TV which is expected to be in 100,000 homes by Christmas, according to Thorn-EMI.

Unlike Ceefax, which can carry only a few telesoftware

programs, the cable channels will have a greater capacity.

Said Richard Wolfe, of Thorn-EMI Cable: 'We don't have to carry all the pages of news and general information that broadcast services, such as Ceefax, are obliged to do.'

'We can devote more or less of the teletext pages on any cable service to telesoftware, depending on consumer demand. One channel will probably concentrate more on telesoftware than the others.'

The company hopes to produce adapters for the Beeb and other popular machines, and it's considering transmit-

ting the telesoftware pages in coded form so they can only be downloaded if paid for. This is made possible by the 1984 Cable and Broadcasting Bill (September issue) which, for the first time, permits subscription-only teletext services. Thorn-EMI's plans for telesoftware were first announced in October's *Acorn User*, but since then there appears to have been a change of plan, for the most innovative feature—a full-field teletext channel offering a large selection of pages and faster access times—has been postponed until 1986.

Double density disc revision

OPUS has launched a new version of its double density disc operating system which has been modified to run the latest disc games from Acornsoft, including *Elite*.

The system, which is selectable for 80 and 40 track software, is being offered with an Opus 5.25 in drive for £299.95.

The OS on its own costs £129.95.



EDWORD

Educational word processor for the BBC microcomputer

BBC INTERFACING COURSE

Introduction to the use of microcomputers as controllers of external equipment.

DIGITAL ELECTRONICS TASTER COURSE

Introduction to microelectronic digital circuitry.

KEYMASTER

Keyboard emulator for the BBC microcomputer.

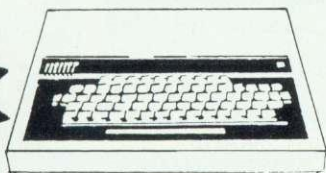
These and other educational/computing products are available from:

CLWYD TECHNICS LTD

(Dept AU1), Antelope Industrial Estate, Rhydymwyn, Mold, Clwyd
Telephone: Hendre (035283) 751

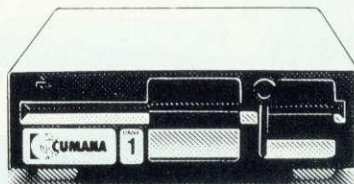
Micro Resources Limited

Southfield House, 11 Liverpool Gardens, Worthing, Sussex BN11 1RY
 Telephone: Worthing (0903) 213174

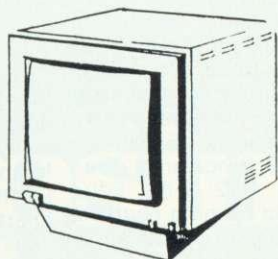


BBC MODEL B £330.00 + VAT = £379.50
 BBC MODEL B with ACORN DFS £399.14 + VAT = £459.00
 ACORN Z80 2ND. PROCESSOR £346.96 + VAT = £399.00

CUMANA CSX 100K 40 TRACK £100.00 + VAT = £115.00
 CUMANA CSX 200K 40/80 TRACK £135.00 + VAT = £155.25
 CUMANA CD 800K 40/80 with PSU £348.00 + VAT = £400.20
 ACORN DISC UPGRADE KIT £95.00 + VAT = £109.25

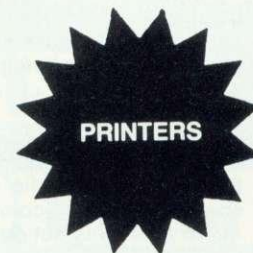
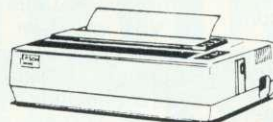


*******SPECIAL OFFER*******
 CUMANA CSX 100K DISC DRIVE AND ACORN DFS KIT £189.00 + VAT = £217.35
 (Includes Manual and fitting instructions)



MICROVITEC STANDARD 14" COLOUR £164.74 + VAT = £189.00
 MICROVITEC MEDIUM 14" COLOUR £265.20 + VAT = £305.00
 PHILLIPS MONOCHROME 12" TP200 £65.00 + VAT = £74.75

EPSON RX80 F/T £239.00 + VAT = £274.85
 ADMATE ADM-80 F/T £173.06 + VAT = £199.00



MR. FLOPPY LIFE TIME WARRANTY DISCS
 SS DD PER 10 £12.61 + VAT = £14.50
 DS DD PER 10 £17.40 + VAT = £20.00

ACORN VIEW £52.00 + VAT = £59.80
 ACORN VIEWSHEET £52.00 + VAT = £59.80
 STARBASE £60.00 + VAT = £69.00
 MASS MACRO ASSEMBLER £35.00 + VAT = £40.25
 WORKSTATION VT52 £40.00 + VAT = £46.00

Add £3.00 for carriage on disc drives and £1.00 for discs and software £8.00 for computers, monitors, printers.
 Send cheque to the above address or phone to use your visa card or fill in attached coupon.
 Quantity and education discounts given, phone for a quotation.



I WISH TO PAY BY VISA
 PLEASE CHARGE TO MY ACCOUNT.
 MY CARD NUMBER IS

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SIGNATURE _____
 NAME _____
 (BLOCK CAPITALS)
 ADDRESS _____



Fred Harris, who appears next month on both BBC TV ('Micro Live') and Channel 4 ('Me and My Micro').

18

TV micro show to go weekly

BBC TV's *Micro Live* show will be broadcast weekly from Autumn 1985 – at the moment it's only monthly.

Producer Terry Marsh said: 'We've been getting a tremendous amount of feedback from the public, especially on the bulletin boards and Micronet. By going weekly we can offer a better, more immediate service.'

January's *Micro Live* has a strong educational flavour. Presenter Fred Harris asks whether educational software offers good value for money and tries to find an easy-to-learn wordprocessing pack.

For teachers interested in using their school micros over the summer holidays, the programme offers help and advice on setting up a computer camp.

There is also a live link-up to the USA using cellular radio – the new mobile radio system controlled by computers. *Micro Live* goes out on BBC 2 at 6pm, Friday, January 11, repeated the next day at about 2.30pm on BBC 2.

● Schools have queried whether they can treat *Micro Live* as an educational broadcast for video taping. The BBC has assured us the answer is Yes. The programme is put out as part of the Literacy Project.

Watchdog rejects Acorn complaint

THE Advertising Standards Authority has rejected a complaint, from two members of the public, that BBC micros fitted with a disc interface did not also come with the 'Starter for free' package of free cassette player and software.

The ASA decided the offer obviously only applied to the tape-based system.

On television

□ Fred Harris pops up again on Yorkshire TV's *Me & My Micro* series which is to be repeated on Channel 4, starting Monday, January 7 at 5.30pm.

□ *Computers in Control*, BBC 2, Fridays 12.30pm. Repeat of the Introduction to robotics and control applications of microcomputers.

□ *The Computer Programme*, BBC 2, Fridays 12.05pm. The series that started it all off way back in 1982.

□ *Making the Most of the Micro*, BBC 1, Sundays 12.35pm. This one will run and run.

On radio

□ *Chip Shop*, BBC Radio 4, Saturdays 4.15pm (repeated on VHF at 11pm Tuesdays). Shorter version on Radio 1, Saturdays, 7.33am with software broadcasts.

□ *Take A Byte*, BBC Radio Lancashire, Sunday, December 16 at 11.05am (repeated at 6.35pm on following Tuesday). Monthly programme.

On the phone

□ READERS in Bradford who dial 722622 will tune into British Telecom's Home Computer Line – taped information on hardware, software, peripherals and what's new in the computer world.

No connection

WE HAVE been asked to make clear that there is no connection whatever between Comsoft of 7 Roman Drive, Leeds, tel (0532) 665621 and Comsoft Software Library of Wigan. The mention we made of Comsoft (November, page 15) referred to Comsoft in Leeds.

To contact

□ Acorn Customer Services (0223) 210111

□ Radio 4 *Chip Shop's* Chip-line

London 01-790 3400

Liverpool 051-236 8474

Birmingham 021-355 6144

Bristol (0272) 279494

□ BBC TV's *Micro Live* bulletin board is on 01-579 2288 (type INFO BBC on Telecom Gold electronic mail system).

□ BBC Computer Literacy Project, Broadcasting Support Services, PO Box 7, London W3 6XJ. Please send self-addressed envelope.

□ MEP (Microelectronics Education Programme), Cheviot House, Coach Lane Campus, Newcastle-upon-Tyne, NE7 7XA. Hardware and software support for schools. Please send sae.

□ MAPE (Micros and Primary Education), c/o Barry Holmes, St Helen's Primary School, Bluntisham, Cambs. User group for primary teachers. Please send sae.

□ MUSE (Micro Users in Schools and Education), Freeport, Bromsgrove, Worcs B62 7BR. User group for teachers and parents. Please send sae.

□ NEC (National Extension College), 18 Brooklands Ave, Cambridge CB2 2HN. Educational and training courses on the BBC micro. Please send sae.

□ CET (Council for Education Technology), 3 Devonshire Street, London W1N 2BA. Government body which oversees MEP. Please send sae.

□ Software Ltd configures CP/M programs for the BBC micro. Write for a catalogue to No 2 Alice Owen Technology Centre, 251 Goswell Rd, London EC1N 7JQ. Tel: 01-833 1173

For help

□ To contact *Acorn User* authors, write c/o the editorial address given on page 2 of this issue.

□ Seikosha AP/GP100 printer

help sheets are available from *Acorn User* for 50p, plus sae.

□ Monitor choice: Photocopies of the review of four monitors, plus a set of nine test programs from the June issue cost 72p (inc post). A copy of the issue costs £1.25 (see page 93).

□ Bulletin boards: Information on 26 free-access boards was given in the October issue. 54p for photocopy (see page 93).

□ For *Acorn User* cassettes, discs, back issues, binders, contact PHS Mailings on (02934) 72208 (see page 96).

On course

□ On January 8, the NEC is holding a workshop on interactive video, for teachers and trainers. It will be in Cambridge and costs £86.25. Tel: (0223) 316644.

Blunder box

□ December, page 121, program 1 of Paul Beverley's article 'When speed is of the essence': Line 20 should read:

20 *KEYORUN!M

□ December, pages 109-112, the listing for Mike Fryer's database was printed on a daisywheel and there is no difference between a 1 (one) and l (letter). All should be ones, apart from line 960. Also in lines 510, 1200, 1240, 2370 the "l" symbol should be 1, found above the "l" next to the grey cursor keys. Finally, the letter O and 0 are printed the same, but should cause no confusion.

□ Going back to June's issue and Malcolm Banthorpe's 'soft pottery' article, the program labelled listing 1 is in fact listing 2 and vice versa. Also, several ^ symbols have been missed out. Look out for two-thirds down column one on page 68 where the expression should read:

SQR (500^2 - (500 - V% * 100) ^ 2)

Also, one-third down column one on page 69 should read:

SQR (500^2 - (500 - 25 * V%) ^ 2)

Bruce's Brainteaser

The question last month was why did entering the line 10G:10: G:10: etc until the keyboard buffer was full, produce alien sounds when the return key was pressed? The answer is that the keyboard buffer, which takes 256 characters, located between &700 to &7FF, overflows into the sound processing workspace starting at &800. The problem occurs when the Basic interpreter tries to tokenise the line. The abbreviation G: converts into the GOTO token and the line number is also tokenised, but each number requires four bytes of storage when tokenised – thus the overflow! Any more brainteasers?



Choosing a printer is a lot easier than choosing a computer.

THERE are dozens of quality printers from which to choose. With quality price tags of around £250.

The Brother M-1009, however, breaks all the rules.

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In the speed stakes, the M-1009 is certainly no slouch, being fully capable of up to 50 characters per second.

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printers, the Brother M-1009 already has faultless credentials for reliability.

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Many home computers tend to be a little on the large side.

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Operation Raleigh



Acorn systems play a central role in an ambitious four-year international project. Keith Parish logs the details

20

THE BEEB'S GREAT ADVENTURE

BBC MICRO systems aboard the *Sir Walter Raleigh*, which set sail for North Carolina last month on the first leg of its four-year circumnavigation, will fulfil vital roles in Operation Raleigh. This 1900-ton vessel is the flagship of the most ambitious multinational expedition ever undertaken and it will serve as tactical HQ, floating laboratory, warehouse and satellite communications centre of the enterprise.

As the research vessel travels westwards, mainly at tropical latitudes, more than 40 expeditions will strike out under a directing staff of well-known scientists, explorers, service personnel and youth leaders from many countries. Four thousand research assistants ('Venturers') aged between 17 and 24 will help them, performing arduous tasks of setting up forward HQs and research camps, gathering data and making observations in projects covering a variety of disciplines: biological, physical, medical, geological, geographical, ecological and archaeological. And BBC micro systems donated by Acorn will be relied upon to help in the field, on the ship and back in the UK.

As the main system in use collating, analysing and transmitting data gathered in 150 projects undertaken across the world over the four-year period – in locations as diverse as the rain forests of Costa Rica, the cold heights of the Andes, the searing heat of the Oman desert, and chilly Falklands and freezing Antarctica – the Beeb will be severely tested. And so will the Venturers, who are each being recruited to

serve three-month stints in the field.

Operation Raleigh (OR) follows in the wake of the highly successful Operation Drake (1978–80), in which more than 400 young men and women worked together on 'projects of high adventure' involving scientific research and community tasks on worldwide expeditions.

It was Operation Drake's patron, the

tingents from the developing nations to be visited.

Prince Charles is again patron, and director of operations is the intrepid explorer Col. John Blashford-Snell.

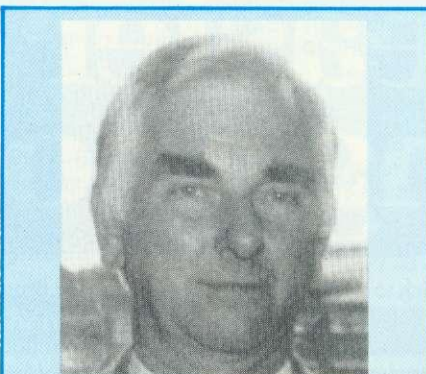
The *Raleigh*, built as a trawler and subsequently converted into a seismic survey ship, was fitted out as a research vessel in Hull. She will link base camps within each phase area, supply forward HQs, ferry the Venturers and act as a mother ship to the smaller craft associated with each three-month phase. She will also provide facilities for marine research and diving. On board are 'wet' and 'dry' laboratories, workshops and storage space for specimens and equipment.

Eleven BBC micros form part of a floating Acorn computing laboratory. Four will operate on board and seven will be ready to be taken into the field under battery or generator power at forward HQs.

The systems will use twin 400k disc drives and Z80 or 6502 second processors, and IEEE488 interfaces will permit use of sensory and monitoring equipment used in oceanographic studies. Sea water, for example, will be monitored on board *Raleigh* to obtain readings of fluorescence and bioluminescence of marine algae.

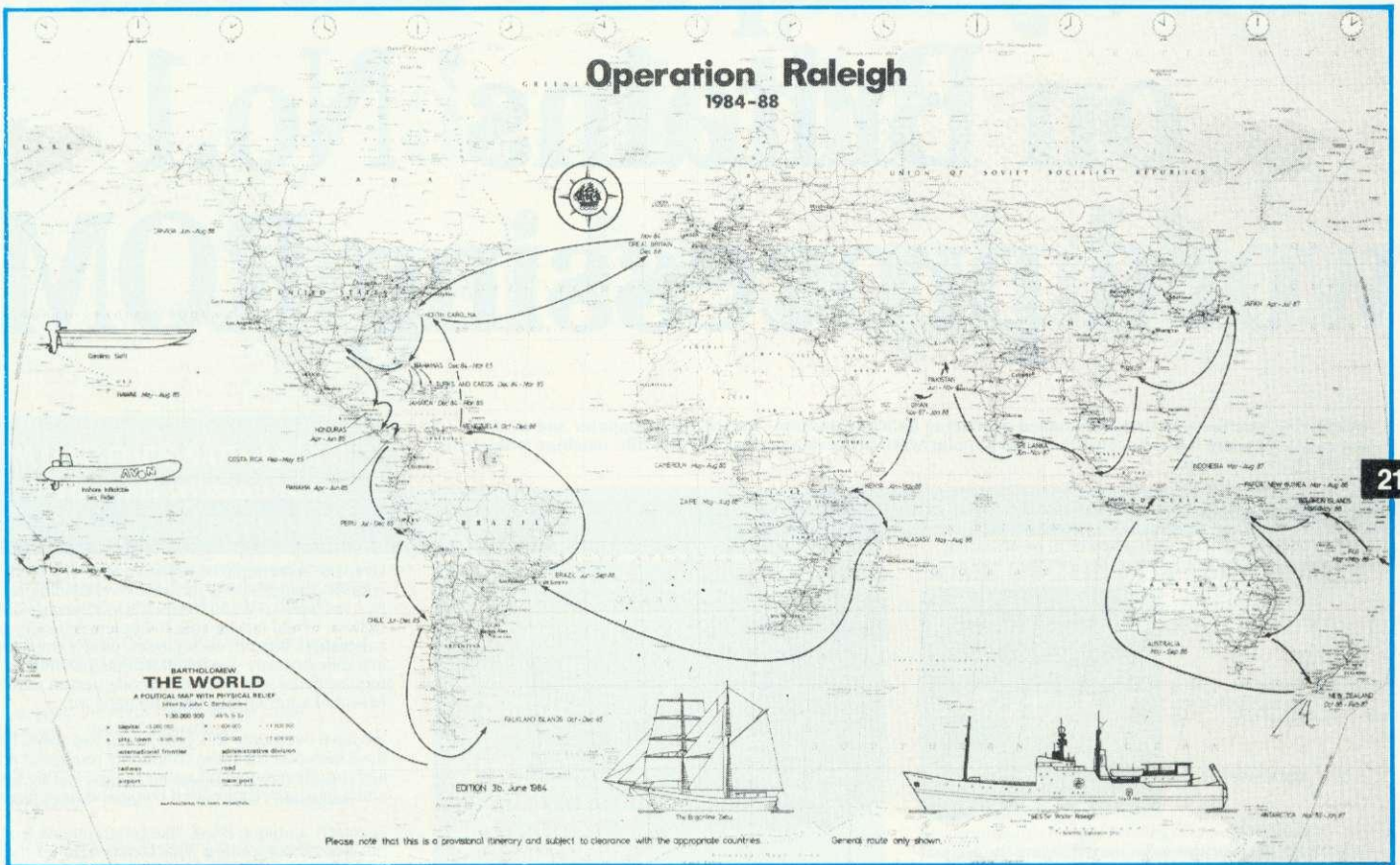
Spark-jet printers and monitors have been supplied by Acorn, and a Centronics Horizon NLQ wide-carriage dot-matrix printer will also be used. Verbatim is exclusive supplier of discs.

David Hopkins, an educational county co-ordinator, is OR's computer co-ordinator. He works at Globe Engineering, Hull, which undertook special-



Computer Co-ordinator of Operation Raleigh David Hopkins: 'The weather map application is an aspect we want to develop.'

Prince of Wales, who suggested that it should be repeated but on a much larger scale. The earlier project celebrated the 400th anniversary of Drake's circumnavigation. OR celebrates another quatercentenary – the founding of English-speaking North America by Raleigh's colonists in 1584. It is appropriate, therefore, that as many Venturers from the US (about 1500) will take part as from the UK. About 20 nations are involved, with strong con-



From the UK the 'Raleigh' sails west on its four-year circumnavigation, calling at points in the Caribbean and Central and South America, and around the Horn to the Falklands. The South Pacific phase doesn't begin until 1986. Phase I projects (to March '85) include Diving the Blue Holes (conservation studies), Reef Watch, Sea grass mapping, an irrigation project and sail training - all in the Bahamas. Pictured lower right is the 1900-ton 'Sir Walter Raleigh', formerly the seismic survey vessel 'Swanella'. She was converted in Hull for the Scientific Exploration Society, the charity that is organising Operation Raleigh. Aboard are teams of scientists working in 'wet' and 'dry' laboratories, a worldwide communications centre, an Acorn computing lab and an exhibitions deck.

ist roles in converting the flagship. He says: 'Two of the systems on board will be used for general administration tasks and two in scientific research. Basic will be in use and each system is fitted with View.

'With the Z80s we'll be running Graphplan, Fileplan and the Nucleus packages, and we've also been looking at Acornsoft's database.'

The 6502s come complete with Bitstiks, which will be indispensable for such tasks as map drawing and graphic presentation.

The seven systems operating in the field will be used for cataloguing artefacts, specimens and organisms, logging and processing data, statistical work and report preparation.

A Marisat terminal on board permits satellite links between shore camps and the ship and from the ship to the UK. Data will be received at Goonhilly and transmitted via the standard telephone lines to scientists at Leeds University, at the Queen's Dock HQ in Hull and at the central HQ at St Katharine's Dock, London.

The OR organisers regard the communications aspect of sending data quickly and in volume back to the UK as a research project in itself and Hopkins welcomes advice and suggestions from AU readers on these specialist

areas. The 'Downloading the Weather' article in the August issue sparked off some ideas, and Hopkins says: 'The weather map application is something we want to develop.'

Teams at Leeds, Hull and London will be using Beebs to co-ordinate planning and help organise research groups in the field. They will also be busy on applications development in areas such as map-drawing, surveying (terrestrial and marine), astronomy, navigations, ship-handling and collision regulations.

Hopkins hopes that, using the WS2000 modems supplied by Miracle Technology of Ipswich, OR will set up a Prestel link. 'We have ambitions to use Micronet,' he says, 'which is cheaper than a closed user network, although I'd be interested to hear from any micro-literate county co-ordinator who wanted to set up a closed-user group.'

Investigating underwater caverns in the Bahamas, mapping sea grasses in the Caribbean, surveying wrecks in the Falklands, looking for a lost Mayan city in the jungles of Honduras, archaeological digs on the coast of Oman, erecting aerial walkways in the rainforest canopy, pheasant-watching in Tibet - such is the variety of fields in which the Beeb's powers will be called upon. What precautions will be made to pro-

tect delicate equipment?

'We've been experimenting with cabinets to achieve climatic proofing - there's a hazard from mould in biotic conditions,' says Hopkins. 'And we'll be reporting back to Acorn.'

John Caswell, Acorn's promotions manager, describes OR as 'the ideal vehicle for us to show the user potential of the system. It's being used in the field on any number of tasks.'

He adds: 'We're also supplying Electrons - they're smaller and more compact for taking out to the camps and they'll be welcome for off-duty entertainment purposes.'

Acorn will be sending peripherals such as the new Plus-3. 'In fact, we'll be responding to OR on an ad hoc basis,' says Caswell. 'When they come up with a requirement we'll try to structure a package to meet it.'

'Nobody knows the full potential of the system, so we'll all be doing a great deal of learning.'

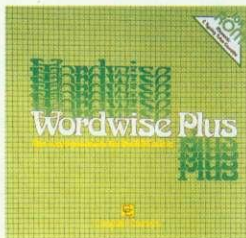
With Beebs and Electrons being wielded to such effect in faraway places over the next four years, Acorn must be expecting to break new ground in more ways than one.

WATCH future issues for exclusive reports on how the Beebs are being used in exotic locations.

Any improvement on Britains' No.1 word processing ROM...

WORDWISE was the very first ROM based product to be made available for the BBC computer and over the last couple of years it has become the most popular word processing system for the BBC machine with almost 50,000 chips now sold.

It has consistently received excellent reviews for its ease of use and speed. It takes only minutes for the user to become familiar with a powerful professional word processing system.



WORDWISE PLUS is now available extending the original program in many unique directions. Not only is the program now twice the size but the package includes two completely new manuals — an introductory manual that gently introduces the newcomer to word processing with WORDWISE, and a reference manual listing all the commands.

THE WORDWISE PLUS PACKAGE CONTAINS

- 1 16K ROM
- 2 SPIRAL BOUND REFERENCE MANUAL (180 Pages)
- 3 INTRODUCTORY MANUAL (56 Pages)
- 4 KEYSTRIP
- 5 TYPING TUTOR PROGRAM (On cassette)
- 6 EXAMPLE TEXT (On cassette)
- 7 EXAMPLE PROGRAMS enabling mail merging, index generation etc.



WORDWISE PLUS is completely compatible with all order versions and is able to use existing WORDWISE files without modification.

WORDWISE PLUS FEATURES

Over the last couple of years we have received countless suggestions for ways of extending or adding new facilities to WORDWISE. It soon became obvious that we would not be able to implement every single suggestion. Indeed, each person uses a word processor in a different way — each individual has differing requirements — a feature that one person may think essential another may have no need for.

We have overcome this problem in two ways. Firstly we have included the most commonly requested additions and improvements. A number of new editing features and a few more embedded commands have been added.

Secondly a unique BASIC-like programming language has been incorporated. This facility enables the capabilities of this word processor to be extended in an infinite number of ways.

The language itself has been designed, like WORDWISE, to be simple to use and understand. Many of the commands look and act like BASIC commands and so will be familiar to many users. However the language can control and use all the functions of the word processor and can control any aspect of WORDWISE PLUS.

There are over 75 commands and functions in the language alone, including numeric and string variables and random access file handling. Up to 10 separate programs may be held in memory at once and of course all the normal WORDWISE editing facilities are available to enter and alter the programs.

At the simplest level this language could be used to add new editing features. However more complex and powerful programs can of course be written. Four useful examples are supplied with the WORDWISE PLUS package.

- 1) A mail merging program.
- 2) An index generating program.
- 3) Two column text printout.
- 4) Continuous processing.



16K Wordwise plus is now available ...must be a plus!

WHAT THEY SAID ABOUT THE OLD WORDWISE

'WORDWISE offers an extremely user friendly program... it would make an excellent choice for someone rather apprehensive about word processing.'... **E&CM**

'WORDWISE is straightforward, friendly and excellent value.'... **Practical Computing**

'... it is ideal for the home hobbyist and small businessman.'... **A&B Computing**

'WORDWISE has won a devoted fan club because of its flexibility and ease of use.'... **Practical computing**

'... WORDWISE is an excellent wordprocessor... WORDWISE is thoroughly recommended.'... **VIEWFAX 258**

Words-260 Characters free-20004
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Pittsburgh,
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Buckinghamshire.

Peter Svelgbin,
1941 Temple Road,
Sugarland,
Manchester.

Thomas Savini,
13 Friday Road,
Crimsonville,
Essex.

SOME OF THE NEW EMBEDDED COMMANDS AND EDITING FEATURES:

Saving and loading of text is now up to ten times faster on disc, and now the computer gives the user a warning if a document is going to be overwritten on the disc or in memory.

New embedded command FI will fully indent text against the right margin.

New commands for underlining and bold printing. The bold and underline effects are shown on screen — and it is a simple matter to configure these features for any printer. Unlike other word processors there is no need to buy separate printer driver programs.

There is now a working filename — i.e. WORDWISE remembers the name of the current document you are working on — there is no need to type the filename every time you load or save your text.

New command for deleting markers automatically.

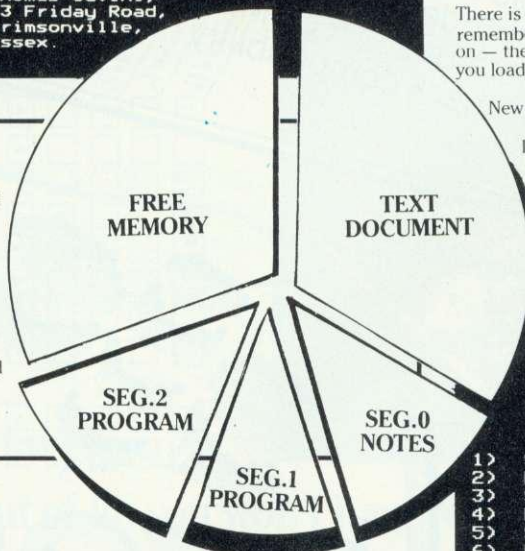
It is now possible to print or preview a file directly from disc without having to load it first.

WHAT WILL THEY SAY ABOUT WORDWISE PLUS?

SEGMENTS

When using WORDWISE PLUS, the BBC's memory is divided between your text and up to 10 'segments'. Each segment may contain either a program of just normal text. It is therefore possible to store and edit up to 11 separate documents in memory, or 1 document and 10 programs, or any mixture.

Often when writing letters or articles it is useful to keep a notepad, with outlines of what you intend include. In WORDWISE PLUS one of the segments could be reserved for an electronic notepad. It would be a simple matter to switch between your 'notepad' and your main document with just a single key press.



SEGMENT MENU*

(C) Computer Concepts 1984

- 1) Save segment
- 2) Load segment
- 3) Save marked text
- 4) Load text to cursor
- 5) Select segment (O)
- 6) Print segment
- 7) Preview segment
- 8) Delete segment
- 9) Main menu

Existing users of WORDWISE can upgrade to WORDWISE PLUS for £17 + VAT (£19.55). We are only able to offer this service through ourselves at the address below — Please return the old WORDWISE package complete with chip (suitably protected for postage) and the manual with your cheque or P.O. or quote your Access or Barclay number. We will send you the complete new package.

WORDWISE PLUS for £17.00 + VAT

£49.00 + VAT (£56.35)



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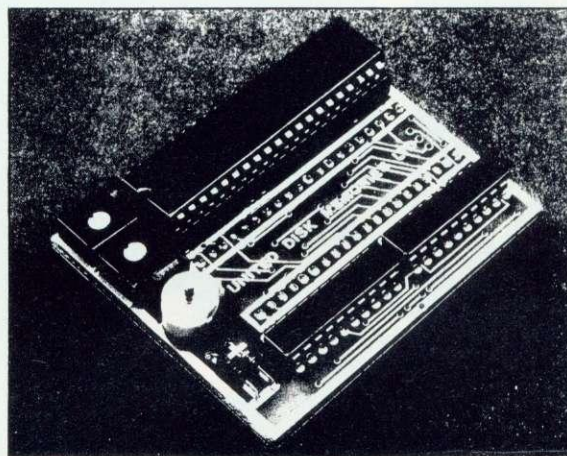
2=1

No, we're not trying to turn the mathematical establishment on its head. What we mean is that the new version 2.0 of our DDFS is the most powerful on the market. And that makes our 2 number 1!

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 Automatic 40/80 Switching
 Copying between Densities
 without user intervention
 Small 2"x2" board

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CLARE's new REPLICA II	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Database's MINI-OFFICE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
GEMINI SOFTWARE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
WORDWISE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
All current Acornsoftware*	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Double Density Storage Capacity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Automatic 40/80 Switching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Copying between Densities without user intervention	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Small 2"x2" board	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



If you don't score 10 out of 10, you won't have N^o1 COMPATIBILITY


* DECEMBER 1984

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Your Christmas Day Program Guide

Acornsoft announce tidings of great joy for both BBC Micro and Electron owners: eight brand new programs for Christmas.

Each one makes an ideal stocking filler.

They're all available at your local Acornsoft stockist. For the address or to order by credit card simply ring 0933 79300.

Or you can send off for our catalogue by writing to Acornsoft, c/o Vector Marketing, London Road, Wellingborough, Northants NN8 2RL.

Alternatively, however, you could always take a chance and drop a line to Father Christmas.

ACORNSOFT
Software for the BBC Micro and Electron.

9.00 Firebug

A fast moving arcade-type game in which you are a fireman, trying to rescue some oil drums and take them to the safety of a water tank. Your opponent is the firebug who runs around lighting fires which move slowly towards the drums and fire extinguishers, destroying them if contact is made.

10.00 Maze

A gripping graphics game where you enter a top secret installation with the aim of stealing secrets from a rival company. The security system, however, has many levels each consisting of a maze of corridors patrolled by armed robot guards. Complete with full colour 3-D graphics, sound effects and a high score table.

12.00 Elite

A superb 3-dimensional graphics game that's light years ahead of any other. You are a space trader who roams the universe, making your living from buying and selling cargo in your Cobra space craft. On your travels, you will encounter aggressors who are eager to put an end to your dealings. Be warned, only the fittest will survive.

1.00 Crazy Tracer

A crazy adventure in which you guide a paint roller round the edge of a maze of rectangles, while avoiding the monsters which are trying to stop you by crushing the roller. Beware – as the game progresses, so the number of monsters chasing you will increase.

3.00 Go

'Go' is a board game for two players which originated in China 3000 years ago and is now more popular than Chess in the Far East. It requires strategic insight, intuition and a strong, calculating mind. If you wish, you can also challenge the computer at differing degrees of difficulty. A velly good game indeed.

4.00 Watch Your Weight

At last, a weight-loss program designed especially for you. With it, your computer becomes an expert wholly conversant with and sympathetic to your needs, and will help you choose an appropriate and individual weight-loss plan. The program also includes a calorie counter and a series of apposite menu suggestions to help stimulate your imagination when you just can't think what to eat.

5.00 The Complete Cocktail Maker

With everything from a Black Russian to a Betsy Ross, this program contains data sufficient to concoct a staggering 320 different cocktails.

6.00 Paul Daniels' Magic Show

Stun and amaze your friends with your astounding feats of magic. This program contains ten tricks to be performed by or with your BBC Micro/Electron. Hurry though – it's bound to disappear fast.

PRINTERS

DOT MATRIX

All printers have centronic parallel interface unless otherwise stated. All printers have hi-res dot addressable graphic mode. Please send SAE for full details.

EPSON

FX80 160CPS 10" wide friction & pin feed	£347 + VAT £399
FX100 160 CPS 15" wide friction & tractor feed	£499 + VAT £574
RX80 F/T 100 CPS 10" wide friction & tractor feed	£239 + VAT £275
RX80 100 CPS 10" wide tractor feed	£199 + VAT £229
RX100 F/T 100 CPS friction & tractor feed	£385 + VAT £443
8143 RS 23 Interface for FX and RX printers	£39 + VAT £45
8148 RS 232 Interface with 2K buffer x on x off	£60 + VAT £69
Ribbon Cartridge for RX80 FX80 & MX80	£5 + VAT £6
Ribbon Cartridge for FX100 & MX100	£7 + VAT £8

STAR

Gemini 10X120 CPS 10" wide friction & tractor feed	£200 + VAT £229
Gemini 15X120 CPS 15" wide friction & tractor feed	£295 + VAT £339
Gemini Ribbon	£3 + VAT £3

SEIKOSHA

BP 420 designed for the business world, 420CPS in draft mode, 110CPS in NLQ mode.	£1095 + VAT £1259
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SMITH

CORONA

Fastext 80: 80 col, 80CPS. Friction feed standard	£149 + VAT £171
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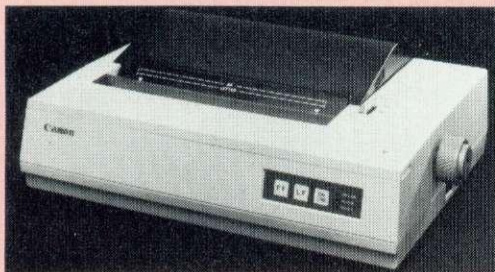
TAXAN KAGA

160CPS 10" wide 27CPS NLQ 24 x 16 matrix	£269 + VAT £310
160CPS 15" wide 27CPS NLQ 24 x 16 matrix	£349 + VAT £401

CANON

PW1080A
160CPS NLQ mode, 27CPS, 10" wide friction & tractor feed
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PW1156A
160CPS NLQ mode, 15" wide friction & tractor feed
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Seikosha GP700A 7 colour 50CPS printer	£299 + VAT £344
Canon PJ1080A 7 colour 40CPS ink jet printer	£391 + VAT £449

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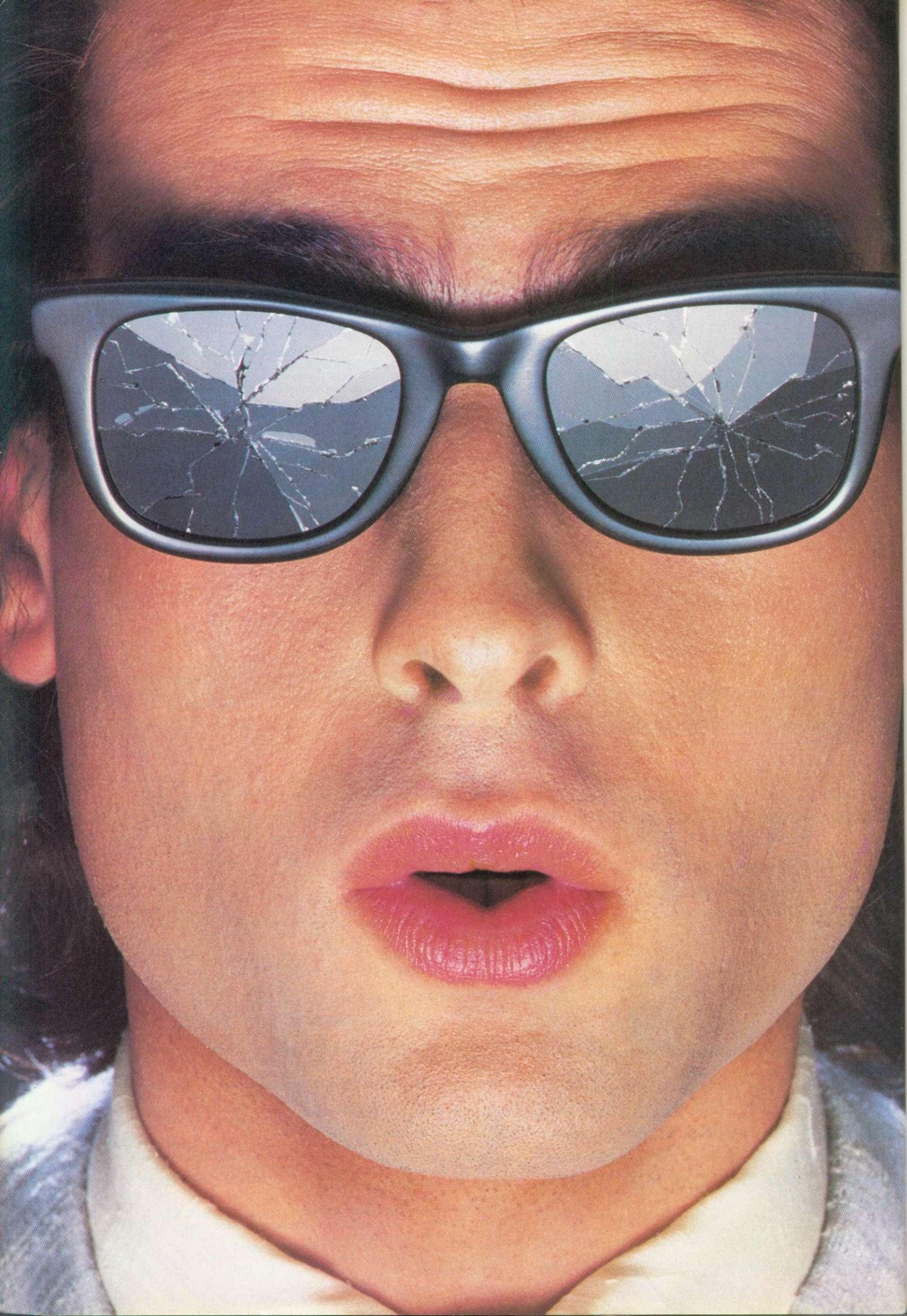
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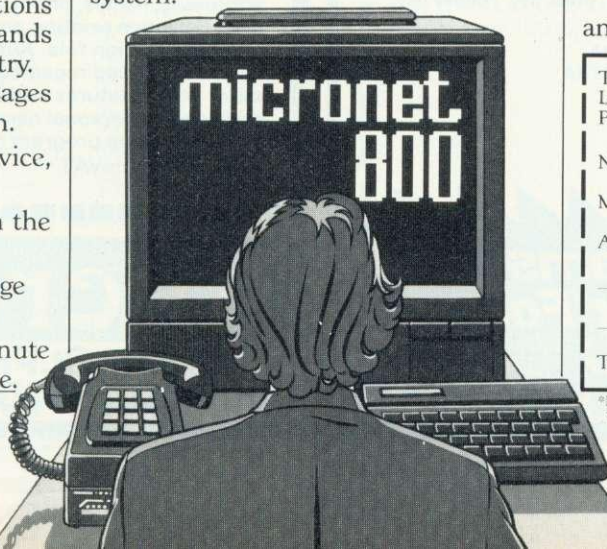
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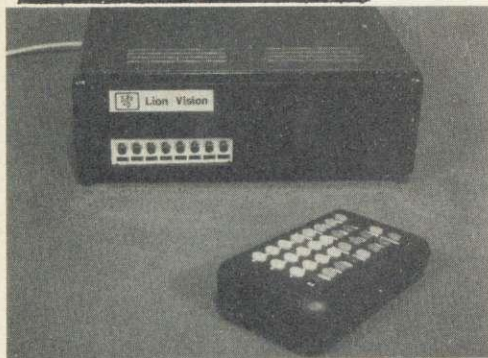
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UVIPROM plugs into the user port on the BBC microcomputer using a 20 way ribbon cable and socket, taking its power directly from the computer. It has a switchmode power supply for Vpp (21 volts nominal) voltage generation. Current consumption is 60 mA read, 200 mA program. Two switches with LED indicators are provided, one for powering down UVIPROM to insert an EPROM, and one for Vpp on/off.

The 1.0 UVIPROM software is available on Sideways ROM (EPROM) only from us, and the following commands are available: ★TEST (blank check), ★READ (afsp) (read EPROM to disc), ★BLOW (afsp) (blow EPROM with named file), ★VIEW (look at contents of EPROM after read), ★COMP (afsp) (Compare contents of EPROM to source). When using ★BLOW, ★VIEW and ★COMP the screen displays the data in hex and ASCII format, in full colour. EPROM data storage starts at &2000. If you have STL SWR then you can of course put UVIPROM 1.0 onto disc and erase the EPROM for further use. The software is also available from STL on volume 8.

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UVIPAC EPROM ERASER

The UVIPAC was designed especially for the home microcomputer enthusiast, but is equally useful in the development lab when quick erasure of just a couple of EPROMS is required.

A special type of discharge tube is used to help achieve the very compact dimensions of the unit, which is housed in a 90 x 80 x 40 mm plastic case. The 230 or 110 volt (+ or -5%) mains powered unit enables up to 3 EPROMs of any size, or 1 CPU with on-board EPROM to be erased in around 15 minutes usually.

The EPROMs are simply loaded into the conductive foam pad supplied and inserted into the unit. After the door has been closed the unit is switched on, an optical fibre indicator showing positively that the unit is in operation. When the required period has elapsed the unit is switched off and the EPROMs removed. The UVIPAC can also be supplied with a built in fixed 15 minute timer, the UVIPAC (T), or with timer and audible time out sounder, the UVIPAC (TS). Spare tubes and conductive foam pads are available if required.



Prices:
UVIPAC £20.95 **UVIPAC (T) £26.45** **UVIPAC (TS) £28.45**

EPROMS

2764-25 NEC..... **£6.90**
 27128-25 HITACHI..... **£16.10**
 27128-25 NEC..... **£12.50***

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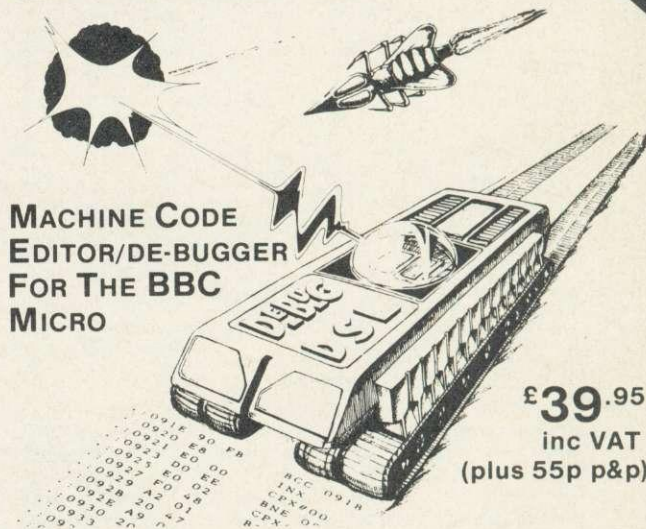
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**MACHINE CODE
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 FOR THE BBC
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£39.95
 inc VAT
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DEBUG is the most sophisticated machine code monitor yet produced for the BBC Microcomputer. This ROM based Language/Utility is fully compatible with Acorn Tubes (requires 1.2 OS).

To order, please send cheque/P.O. for £40.50 enclosing your full name and address, or telephone and quote your ACCESS/VISA number.

Micro choice

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A COMPLETE PROFESSIONAL WORD PROCESSING SYSTEM

Plus for the Kids as an Xmas Bonus

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BBC Model B Special Offer.....	£320 (a)
BBC Model B + Starter Pack.....	£348 (a)
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BBC Model B + Econet.....	£389 (a)
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BBC Dust Cover.....	£4 (d)
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ACORN BITSTICK

The renowned CAD package, providing unprecedented graphics facilities for the draftsman, engineer and graphics student — a 'word-processor' for graphics. Allows accurate drawing of lines, circles, curves etc — colours can be easily chosen from a palette. It is a FX80 dump routine easily loaded on software £325 (a)

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Complete Word Processing System for only £1175 + VAT
 Comprising: BBC Model B + DFS
 2 x 400K 40/80T Dual Teac Disc Drive
 (ideal for future upgrade for Z80)
 Sanyo/Kaga Hi Res. Green Monitor
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 Juki Printer Driver
 All necessary Cables, Manuals etc.
 and as an Xmas bonus for the kids!!
 we are including a Light-Pen with
 Software! or Acornsoft's Elite
 The choice is yours.



A BBC Family System

ACORN Z80 2nd Processor

This processor converts your BBC into a complete business micro with all the computing power a professional would need. The system is CP/M based and is supplied with a very extensive software package. The package includes three office productivity programs, (memoplan, fileplan and graphplan), Systems generator program, three programming languages plus the ACCOUNTANT business program. Software is accompanied by extensive manuals that not only get you started but also answers your whys and hows.
 All for only **£399 (a)** (incl VAT)

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

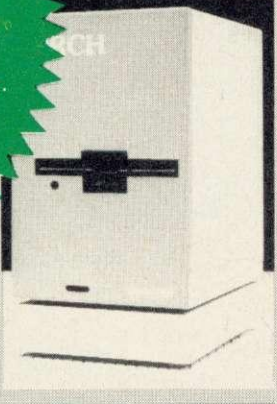
This processor is designed for the serious computer user who wants to get even more out of his computer. This processor provides increased memory — allowing up to 44K for Basic programs and up to 60K for assembly language programs, regardless of screen mode in use. (ideal for VIEW). An increase in speed means that programs run up to 50% faster. The second processor/BBC combination offer computing power comparable to systems costing twice as much. **£175 (a)**

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. (will run Lotus 123!). With 256K RAM and single/dual drives, it simply connects through the 1Mhz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the superb Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.
 G800/2: £945(a) Full Spec. & prices on application.

TORCH UNICOMM

For the Torch Z80 card user, comes a superb communications package. A BT approved modem using 1200/75 and 1200/1200 baud is supplied complete with BBC RS232 cable. Three superb software packages in CP/M included, clearly demonstrate TORCH's experience on the communications scene: UNIVIEW for PRESTEL type use, allowing saving of frames, downloading of files etc. UNITERM is a sophisticated terminal emulator. UNIMAIL is an amazing package specifically for TORCH users. Among other facilities, it allows messages and files to be accessed from distant machines — access to files can be controlled by hierarchial passwords. Hardware + software: **£159(a)**



Z80 Card ZEP100 with PERFECT Software Packages	
+ Z80 Basic.....	£299 (a)
Z80 Disc Pack ZDP240 with software as above.....	£699 (a)
20Mb Hard Disc + 1 x 400K Floppy Drive.....	£1,950 (a)
UNICOMM Communications Package + modem.....	£159 (a)
Unicorn 68000, Unix OS/Z80B/256K, 20MB Hard Disc, 400K Floppy.....	£2995 (a)

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- * Epson Compatible Control codes
- * 80 or 156 Column
- * NEAR LETTER QUALITY Print using 23 x 18 matrix
- * Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- * Dot Addressable graphics in various modes
- * 3K buffer which can also hold user defined characters
- * Extra socket for eeprom with custom made font
- * Friction & Tractor feed with built in paper roll holder

KP810 (80 coloumn) £249 (a)

KP910 (156 column) £359 (a)

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T £215 (a) RX80FT £225 (a)

RX100 £345 (a) FX80 £315 (a) FX100 £435 (a)

DAISY WHEEL

BROTHER HR15: * 14 cps * 3K Buffer * Two colour printing * Porportion spacing * Underline * Bold & Shadow printing * super/Sub script + many other features.

BROTHER HR15 £340 (a)

JUKI 6100: * 15 cps * 2K Buffer * Switchable 10/12/15 cpi * Proportional printing * Linear Motor for max reliability.

JUKI 6100 £340 (a)

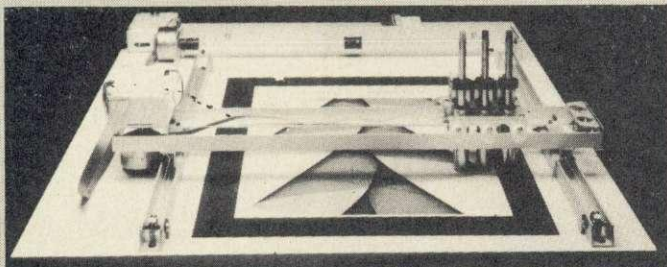
ACORN VIEW PRINTER DRIVER GENERATOR

This printer driver generator will end your search for the printer driver that suits your printer. You can fully exploit all the features of your printer by generating a driver to suit your particular printer. All you need to do is to answer a series of simple questions relating to your printer and you will have your driver. You can generate as many types of printer drivers as you require. Screen driver supplied with the printer driver enables highlighted text to be displayed on the screen showing the effects of underlining, bold, superscripts, subscripts, italics etc. MPRINT program enables more than one file to be printed at a time including the current text. Comprehensive manual supplied with the disc. **£10(d)**

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scribe can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete all accessories.

Workstation Complete £490(a)



Basic Plotter £270(a) Opto Sensor £72(c)

Drill/Router Attachment £79(c)

Power Supply: PS12V £42(c) PS24V £78(c)

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON

Paper Roll Holder **£17(d)** FX80 Tractor Attachment **£37(c)**.
Interfaces: 8143 RS232 **£28(c)**; 8148 RS232 + 2K **£57(c)**;
8132 Apple II **£60(c)**; 8165 IEEE + Cable **£65(c)**.
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 **£5.00(d)**; RX/FX/MX 100 **£10(d)**;
FX80 Dustcover **£4.50(d)**

KAGA TAXAN: RS 232 Interface + 2K buffer **£85(c)**; Ribbon KP810/910 **£6(d)**

JUKI: RS232 Interface **£65(c)**; Spare Daisy Wheel **£14(d)**; Ribbon **£2.50(d)**;
Sheet Feeder **£199(a)**; Tractor Feed Attach **£99(a)**

BROTHER HR15: Sheet Feeder **£199(a)**; Ribbons Carbon or Nylon **£4.50(a)**

BBC Printer Lead: Parallel (42") **£7(d)**; Serial **£7(d)**
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):

2000 sheets 9.5" x 11" **£13(b)** 2000 sheets 14.5" x 11" **£18.50(b)**
Labels: 2-3/4" x 1-7/16" in quantities of 1000
Single Row: **£5.25/1000 (d)**; Triple Row: **£5.00/1000 (d)**

PRINTER SHARER/BUFFER

A unique printer sharer/buffer that provides a simple way to improve the utilisation of the installed equipment by reducing the waiting time for printing documents. All but the smallest documents tie up the computer while being printed and the computer remains out of use until the printing is complete. This is more so in a network which does not have a dedicated computer for printer operation. This buffer/sharer would free the computers almost immediately for other uses and in many cases make the use of dedicated printer server machines unnecessary.

* Standard Centronics interface with 3 inputs.

* Each input port scanned every 5 secs to check for data. Switching between ports completely automatic.

* Data input rate 4800 bytes/sec

* LED Bargraph indicates percentage memory used.

* COPY key allows current document to be reprinted.

* Internal check to prove the data integrity.

* PAUSE switch allows printing to be stopped temporarily to allow paper change, adjust form feed etc. or allows temporary storage for large number of small files which can all be printed together.

* RESET allows all buffer memory to be cleared without having to hard break on the computer.

* 64K buffer capacity. * Mains powered * Compact 7cm x 17cm x 24cm



TSB 64 Buffer/Sharer £245(a)
Cable Set £30

PRINTER & COMPUTER SHARERS

Three Computers to one printer (parallel) **£65(b)**

Six Computers to one printer (parallel) **£129(b)**

Cable Set for three way sharer (ea. 1m long) **£25(c)**

Cable Set for six way sharer (ea. 1m long) **£45(c)**

Above sharers can be powered from the BBC

External mains adaptor for Printer Sharer **£7(d)**

Computer Sharer to connect 2 printers to one Computer (parallel) **£19.50(c)**

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. **£110(b)**.

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MONITORS

All monitors supplied with BBC lead

MICROVITEC 14" RGB

1431 Standard Resolution **£165(a)**

1451 Medium Resolution **£255(a)**

1441 Hi Resolution **£399(a)**

MICROVITEC 14" RGB with PAL & Audio

These monitors can receive TV programs thru a Video Recorder

1431AP Standard Resolution **£210(a)**

1451AP Medium Resolution **£310(a)**

All 14" monitors now available in plastic or metal cases, please specify your requirement.

MICROVITEC 20" RGB with PAL & Audio

2030 CS Std Res **£380(a)** 240CS Hi Res **£685(a)**

MICROVITEC 20" RGB

2031 Std Res **£260(a)** 2040CS Hi Res **£570(a)**

KAGA TAXAN 12" RGB

VISION II Hi Res **£245(a)**

VISION III Super Hi Res **£345(a)**

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen **£90(a)**

KAGA KX1201G Hi Res 12" Etched Green Screen **£99(a)**

KAGA KX1202A Hi Res 12" Etched Amber Screen **£105(a)**

ZENITH 123 Hi Res 12" Green Screen **£68(a)**

ZENITH 122 Hi Res 12" Amber Screen **£68(a)**

Swivel Base for Kaga Monochrome fitted with Digital Clock **£21(c)**

Monitor Plinth for the BBC **£13.50(b)**

Double Tier Plinth for BBC and flat pack dual drive **£19.50(b)**

BBC Leads Kaga RGB **£5(d)** Microvitec **£3.50(d)** Monochrome **£3.50(d)**

RB2 TRACKER BALL

Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker

ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the

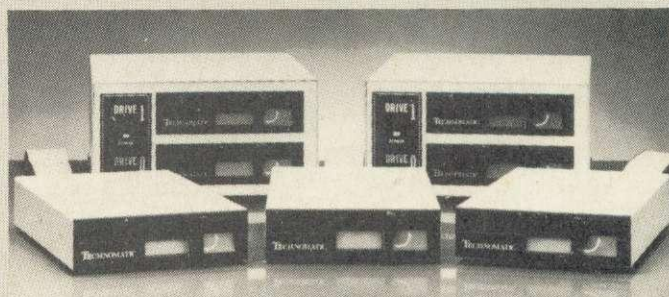
limiting stops or the zero point drift of joystick controls. Three switch buttons enable easy software manipulation

to incorporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional control of robots, drillheads etc. RB2 which plugs into the user port is supplied with utility programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. **£52(b)**

SANYO DR101 DATA RECORDER

A high quality data recorder with switch selectable data/normal modes as well as cue/review and tape counter providing a reliable cassette storage system. DR101 with data lead **£30(c)** Extra Data Lead **£3(d)**

DISC DRIVES



TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. Single drives are offered with or without integral power supply whilst the dual drives are supplied with generously rated switch mode power supply. Attractively designed steel casings are painted in hard wearing BBC matching paint. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives

1 x 100K 40T SS : TS55A **£100(b)**; CS55A with psu **£125(b)**

1 x 200K 40/80TSS : TS55E **£140(b)**; CS55E with psu **£150(b)**

1 x 400K 40/80TDS : TS55F **£155(a)**; CS55F with psu **£169(b)**

Dual Drives

2 x 100K 40T SS: TD55A with psu **£250(a)**

2 x 200K 40/80T SS: TD55E TEAC with psu **£325(a)**

2 x 400K 40/80T DS: TD55F TEAC with psu **£380(a)**

2 x 400K 40/80T DS: TD55M Misubishi with psu **£360(a)**.

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard.

Write for full details.

TDM 4 Quad Unit (upto 4 computers) **£135(a)**

TDM 2 Dual Unit (2 computers) **£75(b)**

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor Data Recording Products

Industry standard high quality discs with guaranteed error free performance for life. £1 Wine Voucher with purchases of every 20 discs — offer ends 31st December.

Discs in packs of 10:

40T SSDD **£15(c)**

80 T SSDD **£22(c)**

40 T DSDD **£18(c)**

80 T DSDD **£24(c)**



£1 Wine Voucher with purchase of every 20 discs — offer ends 31st December

DISC ACCESSORIES

Single Disc Cable **£6(d)** Dual Disc Cable **£8.50(d)**

10 Disc Library Case **£1.80(d)** 30 Disc Case **£6.00(c)**

Lockable Storage Boxes 30/40 Discs **£14(c)** 100 Discs **£19(c)**

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.

Floppiclene with 20 disposable cleaning discs. **£14.50(b)**.

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NEW

COMMUNICATIONS

We offer the customer a choice of BT approved modems and suitable communication software, enabling the user to choose an ideal cost-effective system, perfectly suited to his individual needs. We stock modems for every requirement, whether it is for the business, or private user, whether you require access to a public database, bulletin boards or a mainframe, whether for local or international use.

MODEMS

TORCH UNICOMM See our section on Torch for further details.

ACORN PRESTEL The dedicated Prestel adaptor complete with integral, BT approved, auto-dial modem and software in ROM **£120(b)**

BUZZ BOX A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as intercomputer communications. It conforms to CCITT V21 300/300 Baud Standard. Battery/mains powered **£55(c)** BBC Lead **£6** External PSU **£9(c)**

WS2000 A world standard, BT approved, direct connect modem switchable between 75,300/300,600, 1200/75, 75/1200 baud. It is compatible with Bell 103/113/108, 202 and CCITT V21 & 23 standards and allows you to communicate with virtually any computer system in the world. This is the new generation modem that was chosen by the BBC, to demonstrate a totally reliable USA-UK data link live on TV — it performed faultlessly in front of an



audience of millions. This modem will cover Prestel, Micronet, Telecom Gold, Distel, Microweb, One-to-One, Bulletin Boards both in the UK and abroad, etc. etc. as well as user-to-user communication. It also has a rather useful facility of 'Reverse-Prestel' mode i.e. 75/1200 so that you can communicate with other users who only have a standard 1200/75 type modem. What possibly gives this modem its biggest advantage is its option of computer controlled switching between all modes of operation. In addition, separate auto-answer and auto-dial cards are available, giving this modem possibly the greatest potential of all. Mains powered. **£129(c)**. Data Cable **£7**; Auto Dial Card **£30(d)**; Auto Dial Cable **£4**; Auto Answer Card **£30(d)**; Ski Software Control Kit **£14(d)**. DS1 menu driven software to hold directory of telephone nos and configuration data. Only one key entry to call any number. Operates with auto dial, SK1 and Commstar. **£10(d)** (please specify 40 or 80T).

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. **TELEMOD 2 62(b)** BBC Lead **£7.00**

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. **£29(d)**

TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). **£28(d)**

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). **£59(d)**.

TECHNOMATIC

All prices exclude VAT

EPROMER II

This enhanced eprom programmer will handle the full range of popular single rail eproms. Its sophisticated menu driven software makes the programming of eproms simple and efficient. Features included in this programmer are normally found in industrial grade programmers costing many times more.

- * Interfaces with the BBC tyru 1Mhz bus. Fully buffered and complies with the Acorn protocols. Integral mains power supply ensures no power drain from the computer.
 - * EPROMER II will handle 2516, 2532, 2564, 2716, 2732, 2764, 27128 and 27256 single rail eproms.
 - * All eproms up to 16K programmed in single pass.
 - * Fully software driven with easy to follow user friendly instructions displayed on the screen. Total control from the keyboard — no knobs to fiddle with.
 - * Eprom type selectable from the keyboard.
 - * Selectable programming voltage 25/21/12.5V.
 - * Defaults to normal programming — high speed algorithmic programming selectable.
 - * Can READ, BLANK CHECK, PROGRAM and VERIFY at any address/addresses.
 - * Constant display of eprom type, option and address range selected.
 - * Full screen editor with HEX or ASCII input.
 - * Full TAPE/DISC filing facility.
 - * Several basic BBC BASIC programs can be entered on a single eprom and called up with individual name.
 - * Comprehensive manual.
- EPROMER II with software Cassette **£99(b)**
Disc based Software **£3** extra

UV ERASERS

UV1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins

UV1 as above but without the timer.

For Industrial Users, we offer UV140 & UV141 erasers with handling capacity of 14 eproms. UV141 has a built in timer. Both offer full built in safety features UV140 **£61**; UV141

SMARTMOUTH

The Original 'Infinite Speech' Synthesiser — Still the Best!

A ready-built totally self-contained speech synthesiser unit, attractively packaged with built in speaker, Aux. output socket etc. Optimum sound quality is achieved due to a tailored frequency response audio stage. It allows the creation of any English word with both ease and simplicity, while, at the same time, being very economical in memory usage. You can easily add speech to most existing programs. Due to its remarkable infinite vocabulary, its uses spread throughout the whole spectrum of computer applications — these include educational, industrial, scientific, recreational etc. — simply plugs into the User Port. No ROMs are needed. Smartmouth is supplied with demo and development programs on cassette (easily transferred to disc) and full instructions.

'TIME-WARP' REAL-TIME CLOCK CALENDER

A low-cost compact unit that opens up the total range of Real-Time applications, and adds a new dimension to the personal computer. Though built to exacting professional standards, it is at a price previously unattainable, and brings it within reach of all BBC Computer owners. With its full integral battery backup, possibilities include an Electronic Diary, continuous display of 'on-screen' time and date information, automatic document dating, precise timing and control in scientific applications, recreational use in games etc. — its uses are endless and are simply limited by ones imagination. Simply plugs into the User Port — no ROMs needed. Extensive applications software supplied on cassette (easily transferred to disc) and full instruction manual. Please phone for details.



ATPL SIDeways ROM EXPANSION BOARD

This is a well constructed expansion board, that does not require soldering in its installation. All buses are buffered. It allows full sideways Rom expansion to a total of 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K byte CMOS RAM chips, giving a total of 16K sideways RAM. This is ideal for sideways rom development, and will also allow downloading of software from cassette or disc. The battery backup option will allow retention of data in the RAM, when power to the computer is removed. Several link-selectable options include the choice of type of Eprom, and a 'write-protect' for the RAM option. **£39(d)** Back-up Kit **£18**.

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ACORN IEEE INTERFACE

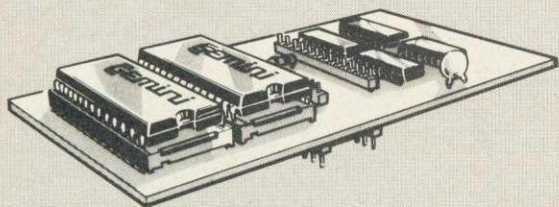
This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. **£282(a)**

ACORN TELETEXT INTERFACE

This interface allows the retrieval and storage of data transmitted by both BBC and IBA. There are currently many educational and other programs being transmitted, and this unit will allow their retrieval absolutely free. In 'Terminal' mode, the system receives and decodes pages from both Ceefax and Oracle. (These pages can be stored). In 'Telesoftware' mode, the system can load, run and execute programs that are transmitted. This unit gives you a professional teletext terminal at a cost effective price. **£195(b)**

DATABASE MANAGEMENT SYSTEM

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The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.

Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. **£112(c)**

FIRMWARE/SOFTWARE

VIEW Word Processor Rom on special offer at £48(c).

This is the new version V2.1. Advantages include being able to print straight from memory, as well as editing in any mode. Complete with comprehensive manuals to Acorns usual high standard.

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. **£52(c)**

VIEW INDEX Disc based program which will create an index from any marked view text file and sorts alphabetically noting each page number or section where the reference occurs. Marking of the words or phrases can be done while writing the file or when editing it. An ideal utility for any one concerned with writing extensive reports, books etc. **£13(d)**

WORDWISE One of the most popular word processors for general use **£34(d)**. Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d)**. If bought with Wordwise: No p&p and only **£14**.

SPELLCHECK II (Rom based) A new machine code program that works with both VIEW and WORDWISE and operates up to 5 times faster than SPELLCHECK I. A dictionary disc is supplied with a vocabulary of 6000 words and the data compressing technique used in storing the words will ensure that this can be extended to well over 17000 words on a 100K disc. The rom is fully compatible with the 6502 2nd processor. **£26(d)**

ULTRACALC This new version of the successful spreadsheet program has several enhancements to increase its power and flexibility including: * Operation in any mode * Greater printer flexibility incl. control codes £ sign definition * runs as HICALC with 6502 second processor allowing 44K of space in any mode * Spooling as ASCII text files. These features are in addition to the existing powerful features such as handling of labels as well as numbers as values, allowing search by a meaningful name rather than just a number. Facilities and commands include: variable column width, sum, replicate, insert, delete, justify and most mathematical functions. You can create and manipulate pricelists, balance sheets, payroll, c/flow order entry, small databases and scientific calculations. **£69(c)**

VIEWSHEET Acorns spreadsheet provides 255 rows and 255 columns and will operate in any mode. It distinguishes between values, labels and formulae. Windows can be created which can then be arranged to provide any type of format required for printing. Function keys provide for easy entry of commands which include insert, delete, replicate, justify etc. Most mathematical functions supported. Printer commands can be given using the VIEW printer driver. Files can be converted to VIEW files and data transferred between different worksheets. **£52(d)**

QUICKCALC An economically priced disc based spreadsheet program for personal accounts etc. It offers load, save, print, goto, replicate, histogram and many other functions. **£12.50(d)** (please specify 40 or 80T)

BCPL A full implementation of the BCPL compiler language consisting of the language rom, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. **£52(b)**

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL rom to be converted so that they can be run on any BBC micro whether it has a BCPL rom or not. Stand alone programs for other 6502 based systems can also be developed. **£43(d)**

BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. **£17.30(b)**

ACORN LISP Rom **£43(d)**

ISO-PASCAL: Write for details and availability **£60(c)**

ACORN LOGO Write for details and availability **£60(c)**

COMAL Write for details and availability **£43(c)**

6502 DEVELOPMENT PACKAGE Write for details and availability **£43(c)**

G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM **£43(d)**

DISC DOCTOR This general purpose ROM adds 20 commands to the DFS system. It includes a formatter, sector editor, tape-disc & disc-tape routines, a powerful disassembler, commands for listing function key definitions for editing etc. This ROM will obviate the need to go for non-standard DFS systems (with their inherent disadvantages) as it overcomes many of the Acorn DFS's shortcomings. **£28(d)**

DISCMaster Beebug's utility rom for disc users adds 11 powerful utilities. Commands include Disc editor/string search, recover, movedown, Link, overlay, format 40/80. Other facilities include colourful disc menu to automatically RUN/*RUN programs, copy non protected cassettes to disc, convert 40 track discs to 80 track and enable dual catalogues. **£16(d)**

EXMON II Updated ROM version of the original EXMON with new facilities including dual screen operation and full screen memory editor adding 60 more commands on the BBC. Dual screen operation allows running or single stepping of a game or any other program and watching it on the screen or flipping to the monitor screen to examine the registers, edit code or alter memory etc by simple switching. **£24(d)**

SLEUTH A single step debugging tool for Basic programs with features which include single stepping, Dual screen operation, Breakpoints to pause a program at any preset line or state of a variable, Accelerator to adjust the speed of the program from full speed to freeze frame, full feature control screen and sophisticated trace line facility. **£24(d)**

GRAPHICS ROM This Rom includes over 28 new graphics related commands which can be used in BASIC programs. Features include: sprites, LOGO Turtle graphics, fill routines, shading, large characters, rotation, scaling and 3D plotting all using '*' commands. **28(d)**

BASIC COMPILER Write for details and availability.

PRINTMASTER This ROM features the most versatile screen dump for EPSON MX/RX/FX80 and Kaga 810 printers. It supports three types of dumps. The first allows any graphics on the screen to be dumped. Colours appear as shades of grey. Any part of the screen can be printed at any position on the paper in any one of four orientations. The screen dump may be magnified by any factor x2, x3, x4 etc. A special feature allows true MODE 7 screen dumps with TELETXT text & graphics. The second dump allows any text to be dumped whilst the third dump will print the contents of a file on disc whilst the computer is doing other things. This is not all. All printer functions can be called up using the *command. *DEFINE allows the printer to define his own characters and store them. *GPRINT allows printing of enlarged text in any position, orientation, size & shade. *WINDOW allows windows to be defined in any size and position on the screen. **In short this one ROM does it all.** **£28(d)**

DUMPMASTER A sophisticated piece of software that produces fast, machine code, tailor made screen dumps for printers listed. It uses up to 8 shades and will copy accurately your screen in any graphics mode including the teletext mode. Once created, the routine can be called as required or appended to any Basic program. Snapshot facility allows screen dumps from a game or other program using single key as long as work areas do not clash. Printers are EPSON MX/FX, STAR 910, Seikosha GP80, 100, 250, 700, NEC PC8023, FACIT 4510 (linear), ANADEX DP9500A and 9501A and INTEGREG Colourjet 132A **£10(d)**

MUROM Sound Extension Rom: Helps you create your own tunes and sound sequences either with MUROM's editor and a musical score or using the keyboard to simulate a piano. Edit your creations with the full screen music editor and then switch to envelope editor to tailor the tonal quality and select instrument type. Incorporate the music into other programs or playback with or without MUROM. Instant sound effects can be called from Basic eg *ZAP, *SIREN, *EXPLODE etc. **£24.50(d)**

HELP Rom based comprehensive on screen HELP facility to aid and speed up programming. **£21(d)**

MICROTEXT This authoring system was developed by the National Physical Laboratories. It is a programming system designed to simplify the production of a wide range of man-computer dialogues. Using Microtext's simple commands, the user can draw up any number of 'frames', each containing text and/or graphics. A series of frames build up into a complete module. Each program can consist of more than one module. Using Microtext, an expert in any field can construct their own complete courses of computer-based instructional material. Applications include interviewing systems, teaching packages, training courses and interactive demonstrations and simulations. Available on Cassette and Disc; **Disc £53(b); Cass £43(b)**. Please specify the type of format required (Torch or Acorn).

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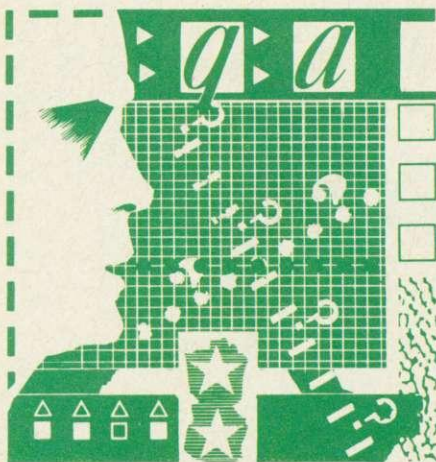
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Martin Phillips helps you to move characters around the screen, use Wordwise from Basic and shuffle a pack of cards sharply

IT IS often useful to be able to test the screen to see if it is possible to move, or if one has hit something. Also problems are frequently experienced when using the keyboard to move characters around the screen – one reader wanted a method of steering a character along the roads of a street plan without it being able to walk through buildings. The techniques are the same for the BBC and the Electron and the listings will work on both.



*FX4,1 call disables cursor keys

The cursor keys can be tested using the INKEY statement if the *FX4,1 call is made first. This call disables the cursor editing and makes the actual cursor arrow keys generate normal ASCII codes as follows:

Left	136
Right	137
Down	138
Up	139

Listing 1 shows how the cursor keys can be used to move a rectangle about the screen. PROCinitialise first switches off the cursor at line 90, then joins the text and graphics cursors. Character 128 is defined as a solid block at line 110. (It could be programmed to be any shape, a small man

for instance.) The background colour is changed to green at line 120 and the foreground to black at line 130. Line 150 programs the Break key to return to mode 7 and list the program.

Having executed the *FX4,1 call, the cursor keys do not function as normal, and also having joined the text and

```

10 REM listing 1
20 MODE 1
30 PROCinitialise
40 REPEAT
50 PROCmove
60 UNTIL 0
70 :
80 DEFPROCinitialise
90 VDU23;8202;0;0;0;
100 VDU5
110 VDU23,128,255,255,255,
    255,255,255,255,255
120 VDU19,0,2,0,0,0
130 VDU19,3,0,0,0,0
140 *FX4,1
150 *KEY10 OLD:M !N LIST:M
160 X%=640:Y%=512
170 ENDPROC
180 :
190 DEFPROCmove
200 I=INKEY(0)
210 IF I=136 THEN X%=X%-32
220 IF I=137 THEN X%=X%+32
230 IF I=138 THEN Y%=Y%-32
240 IF I=139 THEN Y%=Y%+32
250 MOVE X%,Y%
260 PRINT CHR$(128)
270 ENDPROC
    
```

Listing 1. Demonstration of how the cursor keys can be used to move a rectangle about the screen

graphics cursors, the screen will not scroll. Therefore listings are difficult to correct unless everything is restored to normal – the best way is to program the Break key to 'OLD' the program, put page mode on and list the program. X% and Y% give the position of the top left-hand corner of the block, and are initially set to the middle of the screen.

Lines 40 to 60 form an infinite loop calling up the procedure PROCmove,

```

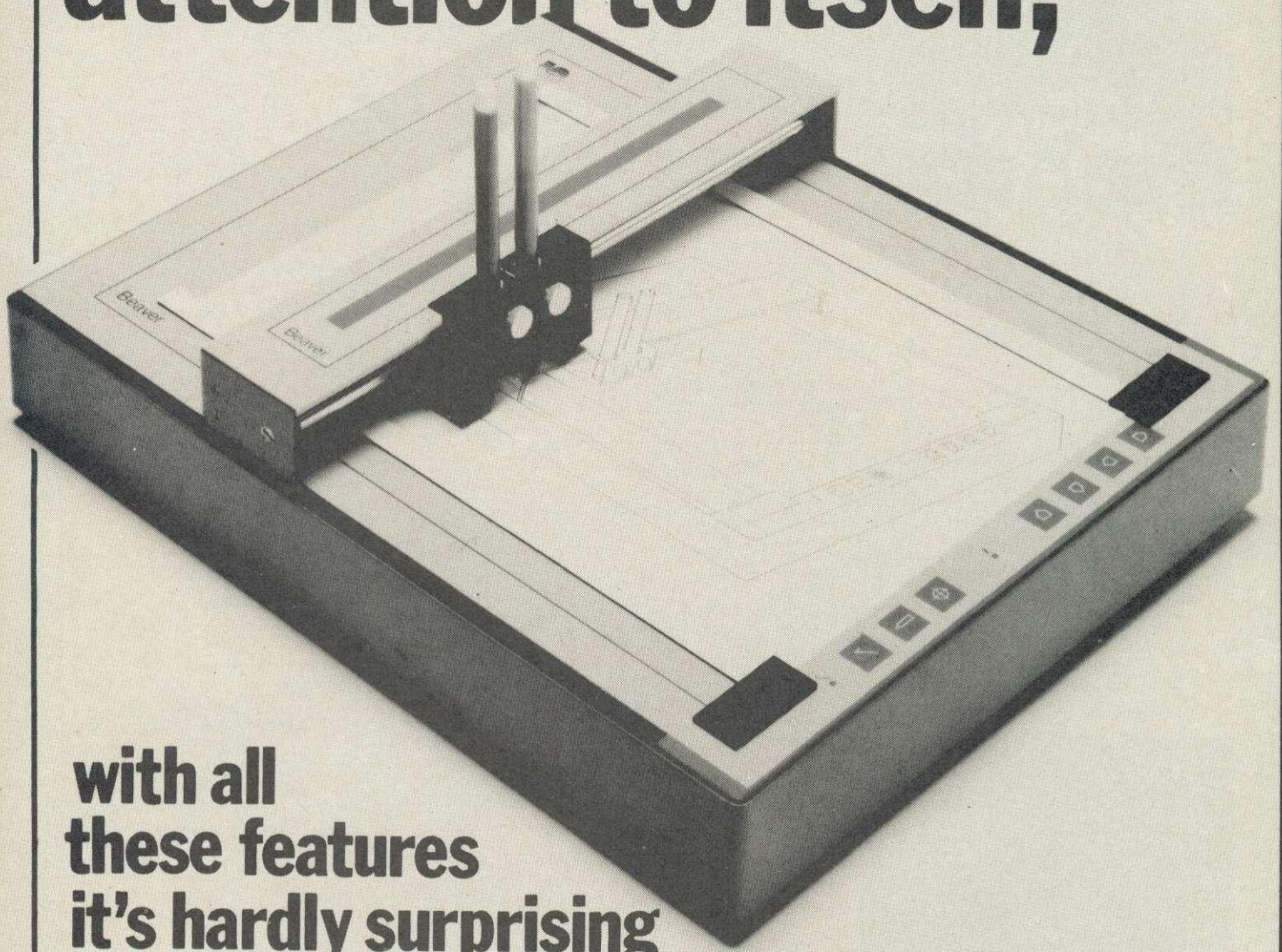
10 REM listing 2
20 MODE 1
30 PROCinitialise
40 REPEAT
50 PROCmove
60 UNTIL 0
70 :
80 DEFPROCinitialise
90 VDU23;8202;0;0;0;
100 VDU5
110 VDU23,128,255,255,255,
    255,255,255,255,255
120 VDU19,0,2,0,0,0
130 VDU19,3,0,0,0,0
140 *FX4,1
150 *KEY10 OLD:M !N LIST:M
160 X%=640:Y%=508
170 ENDPROC
180 :
190 DEFPROCmove
200 I=INKEY(1)
210 IF I=-1 THEN ENDPROC
220 IF I=136 THEN X%=X%-32
230 IF I=137 THEN X%=X%+32
240 IF I=138 THEN Y%=Y%-32
250 IF I=139 THEN Y%=Y%+32
260 IF POINT(X%,Y%)<>0
    THEN PROCbump:ENDPROC
270 MOVE X%,Y%
280 PRINT CHR$(128)
290 ENDPROC
300 :
310 DEFPROCbump
320 VDU7
330 ENDPROC
    
```

Listing 2. Includes a test to see if the block has reached the edge of the screen or crossed its own track

which tests if any key has been pressed, and moves the block appropriately. If a cursor key has been pressed then the appropriate X% or Y% value is changed. The values are changed by 32 each time because using mode 1 (or mode 4) requires 32 screen units to move the block to an adjacent position on the screen. The block is the size of one character, and there are 40 characters per line in mode 1. The normal horizontal screen resolution is 1280, and that divided by

IF YOU have a technical hitch or a programming problem let Martin Phillips give his diagnosis. We'll pay £5 if you raise a really interesting point. Please give full details of the system you're using and include a listing where appropriate, making your question as specific as possible. WRITE TO: Hints & Tips, Acorn User, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

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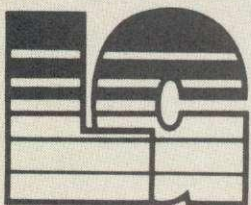
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```

10 REM listing 3
20 MODE 1
30 PROCinitialise
40 PROCdrawbox
50 REPEAT
60 PROCmove
70 UNTIL 0
80 :
90 DEFPROCdrawbox
100 MOVE 380,252:DRAW 380,448
110 DRAW 508,448:DRAW 508,572
120 DRAW 380,572:DRAW 380,768
130 DRAW 576,768:DRAW 576,640
140 DRAW 700,640:DRAW 700,768
150 DRAW 896,768:DRAW 896,572
160 DRAW 768,572:DRAW 768,448
170 DRAW 896,448:DRAW 896,252
180 DRAW 700,252:DRAW 700,380
190 DRAW 576,380:DRAW 576,252
200 DRAW 380,252
210 GCOL3,1
220 PROCprint
230 ENDPROC
240 :
250 DEFPROCinitialise
260 VDU23;8202;0;0;0;
270 VDU5
280 VDU23,128,255,255,255,
    255,255,255,255,255
290 VDU19,0,2,0,0,0
300 VDU19,3,0,0,0,0
310 *FX4,1
320 *FX11,0
330 *KEY10 OLD:IM IN LIST:IM
340 X%=640:Y%=508
350 ENDPROC
360 :
370 DEFPROCmove
380 I=INKEY(3)
390 PROCprint
400 IF I=136 AND POINT
    (X%-4,Y%)=0 THEN X%=X%-32
410 IF I=137 AND POINT
    (X%+32,Y%)=0 THEN X%=X%+32
420 IF I=138 AND POINT
    (X%,Y%-32)=0 THEN Y%=Y%-32
430 IF I=139 AND POINT
    (X%,Y%+4)=0 THEN Y%=Y%+32
440 PROCprint
450 FOR N=1 TO 100:NEXT N
460 ENDPROC
470 :
480 DEFPROCprint
490 MOVE X%,Y%
500 PRINT CHR$(128)
510 ENDPROC
    
```

Listing 3. This draws a black shape and provides an impenetrable boundary

40 equals 32. In all the graphics modes there are 32 lines of characters possible on the screen, and the vertical screen resolution is 1024, which divided by 32 equals 32.

Line 250 moves the graphics cursor to the point given by X% and Y%. Line 260 then prints character 128, the previously defined block, at the position of the graphics cursor. When listing 1 is run, a black line can be steered round (and off) the screen. A track is left by the block on the screen.

Listing 2 is similar except that a test is included to see if the block has reached the edge of the screen or

crossed its own track. This is done with the POINT statement, which returns the value -1 if the co-ordinates refer to a point off the screen, otherwise it returns the number of the logical colour at that point. If it's required that the block does not cross itself then it must stay on the background colour, which has the logical colour 0. If the block moves off the background colour, control moves to the procedure PROCbump, which simply sounds a bleep. It could be improved or altered to keep a score or print a message on the screen.

Listing 3 draws a black shape on the screen, and provides a boundary the block cannot pass, and also 'unprints' the block before moving and reprinting it. This is done by using the GCOL3 statement, which inverts the colour

already there, so printing the block for a second time on the same spot cancels out the block again. The colour of the actual block can be changed at this line. GCOL3,1 will give a red block, GCOL3,2 a yellow block, etc. Notice that a test to see if the block is within bounds is made before the X% or Y% co-ordinates are changed. Line 220 prints the block on the screen. It is then 'unprinted' at line 390 before any change in X% or Y% is made, and then reprinted at the new position. Line 450 is a line to introduce a short wait to slow down the flashing effect of the block.

Listing 4 is similar to listing 3 except that the whole of the shape is coloured-in to show that the technique can be used to keep the block within a certain colour on the screen.

```

10 REM listing 4
20 MODE 1
30 PROCinitialise
40 PROCdrawbox
50 REPEAT
60 PROCmove
70 UNTIL 0
80 :
90 DEFPROCdrawbox
100 FOR horiz=0 TO 320
    STEP 320
110 FOR vert=0 TO 320
    STEP 320
120 MOVE 384+horiz,256+vert
130 MOVE 384+horiz,444+vert
140 PLOT 85,572+horiz,
    444+vert
150 MOVE 572+horiz,256+vert
160 PLOT 85,384+horiz,
    256+vert
170 NEXT vert,horiz
180 MOVE 512,384:MOVE 512,636
190 PLOT 85,764,636:
    MOVE 764,384
200 PLOT 85,512,384
210 GCOL3,2
220 PROCprint
230 ENDPROC
240 :
250 DEFPROCinitialise
260 VDU23;8202;0;0;0;
270 VDU5
280 VDU23,128,255,255,255,
    255,255,255,255,255
290 *FX4,1
300 *FX11,0
310 *KEY10 OLD:IM IN LIST:IM
320 X%=640:Y%=508
330 ENDPROC
340 :
350 DEFPROCmove
360 I=INKEY(3)
370 PROCprint
380 IF I=136 AND POINT
    (X%-32,Y%)>0 THEN X%=X%-32
390 IF I=137 AND POINT
    (X%+32,Y%)>0 THEN X%=X%+32
400 IF I=138 AND POINT
    (X%,Y%-32)>0 THEN Y%=Y%-32
410 IF I=139 AND POINT
    (X%,Y%+32)>0 THEN Y%=Y%+32
420 PROCprint
430 FOR N=1 TO 100:NEXT N
440 ENDPROC
450 :
460 DEFPROCprint
470 MOVE X%,Y%
480 PRINTCHR$(128)
490 ENDPROC
    
```

Listing 4. Demonstration of how the technique can be used to keep the block within a certain colour on the screen

£5 Using Wordwise from Basic

IS there a way of using text prepared with *Wordwise* and stored on disc from within a Basic program? asks A Grima of Ilford. Such a facility would make the preparation of screen instructions much easier. There is a way to do it which involves using the *TYPE command.

This is an extra command that is only available if a DFS (Disc Filing System) is fitted, but will then work with either tape or disc. It's also a useful technique for including instructions in a program that would run out of memory if they were printed in the normal manner.

To prepare a set of instructions as a *Wordwise* text file that can be called up from within a Basic program:

- Prepare the instructions using *Wordwise*. If they are to be viewed as screen instructions (unless in modes 0 or 3), make the line length 39 or less.
- Save the file as a spooled file with the title INSTR (for the sake of this example).
- In the Basic program insert at the point where the instructions are needed the following lines:

```

VDU12,14
*TYPE INSTR
    
```

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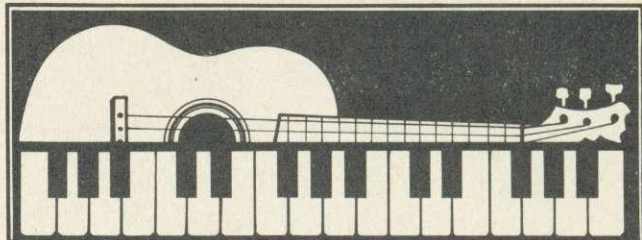
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The VDU12,14 is inserted to clear the screen and then put page mode on, so that a long set of instructions does not go beyond one screenful at a time. If this is extended to VDU12,14,2 then the printer will be switched on too, and a hard copy can be obtained. Notice that no speech marks are required round the filename INSTR. They can be put in, but are not essential.

For some programs, it would be useful also to input the filename for the text file. This cannot be included in the *TYPE command in the normal manner, but has to be done using the Command Line Interpreter, covered in detail in December's Hints and Tips. Listing 5

```
10 REM Listing 5
20 REM Basic 1 version
30 DIM B 20
40 INPUT "Enter title "T$
50 $B="TYPE "+T$
60 X%=B MOD 256
70 Y%=B DIV 256
80 CALL &FFF7
```

Listing 5. How a filename can be entered and called up for use with the *TYPE command

shows how a filename can be entered and called up for use with the *TYPE command. Basic II, which is fitted to newer BBC computers, has a statement OSCLI which will perform the task more easily. Listing 6 shows this statement being used.

```
10 REM Listing 6
20 REM Basic 2 version
30 INPUT "Enter title "T$
40 OSCLI "TYPE "+T$
```

Listing 6. Demonstration of the OSCLI statement

Connection

correction

AUGUST's Hints and Tips described a method for connecting two disc drives together. Unfortunately the first diagram and part of the text implied that a second cable was somehow linked together by a connector block to form a sort of 'Y' shaped cable, which caused several readers to enquire how to do this and which drive the resistor network should have been removed from. In fact the connector listed in the article is simply clamped over the existing cable about six inches from the first drive. It makes contact with the cable without breaking any of the connections, so the cable can then be looped inside the new disc drive to connect to the circuit board, and it is this drive which should have the resistor network removed.

Getting a yes/no answer

JOHN WEST has sent in a useful procedure to input a yes/no response to add to our library. Shown in listing 7, it will only accept a 'Y' or 'N' in upper or lower case, and the appropriate word is printed out. The variable 'q' stores the keypress and converts it to a number representing the position of the letter in the alphabet, eg 'Y' will

have the value 25. The MOD 32 at line 70 is used to convert a lower case letter to have the same value as an upper case letter. If the key pressed is not a 'Y' or an 'N' a bleep will sound and the function will call itself up again. The function could be changed to test for any two letters of the alphabet by changing the values at line 80.

```
10 REM listing 7
20 PRINT "Answer (Y/N) ";
30 IF FNquest THEN PRINT "Yes" ELSE PRINT "No"
40 END
50 :
60 DEFFNquest
70 q=(GET-64)MOD 32
80 IF q=25 OR q=14 THEN =q=25 ELSE VDU7:=FNquest
```

Listing 7. John West's procedure to input a yes/no response

Shuffle the pack

A ROUTINE using strings was published in September's Hints and Tips which could be used to shuffle a pack of cards. Peter Broadbent from Banbury has sent in a program (listing 8) which will do a card shuffle in 0.7 seconds. It works by defining a string of 52 characters and taking each one out of that string in a random fashion and putting it in another string. As the characters are taken out of the string it becomes shorter, thereby avoiding the delay as the program has to hunt or check for missing characters. The randomly sorted set of letters is stored in the string variable a\$. J A Thompson from St Leonards-on-Sea also sent in a similar listing.

```
10 REM listing 8
20 REM by Peter Broadhead
30 T%=TIME
40 PROCsort
50 PRINT (TIME-T%)/100; "
  Secs."
60 PRINT a$
70 END
80 :
90 DEFFPROCsort
100 LOCAL A$,r%,c%
110 A$="ABCDEFGHJKLMNP
  QRSTUVWXYZabcdefghijklmnop
  mnopqrstuvwxyz"
120 r%=53
130 a$=""
140 REPEAT
150 r%=r%-1
160 c%=RND(r%)
170 a$=a$+MID$(A$,c%,1)
180 A$=LEFT$(A$,c%-1)
  +MID$(A$,c%+1)
190 UNTIL r%=1
200 ENDPROC
```

Listing 8. Peter Broadbent's card shuffle routine

Quick fire

questions

THE variables A% to Z% are called the resident integer variables. Although they will only store whole numbers (integers), they can be used for passing values from one program to another as their values are not cleared when loading or chaining another program. Neither are they cleared when Break is pressed.

BERNARD BEESTON points out that the printer check given in September's Hints and Tips will send two spaces to the printer if it's switched on, and this can upset the formatting of the first line. As the characters sent to the printer don't matter, he suggests that the characters sent are 32 and 127. The 127 character deletes the 32, thereby leaving the printer at its original setting.

A SIMPLE way to get a program to wait until the space bar is pressed is to use the following loop:

```
REPEAT:UNTIL GET = 32
```

It will loop round each time a key is pressed, until the space bar (which has an ASCII value of 32) is detected.

LISTINGS often show up better when printed in mode 6 against a blue background. First type

```
MODE6
```

and press return, then type

```
VDU19,0,4,0,0
```

The program can now be listed.

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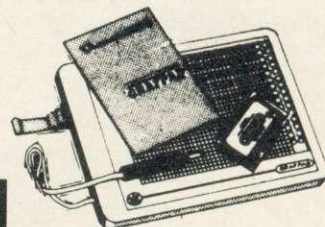
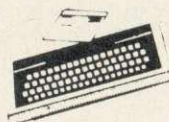
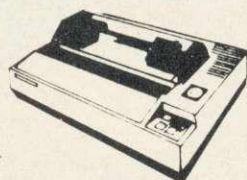
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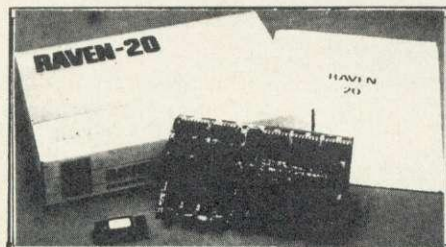
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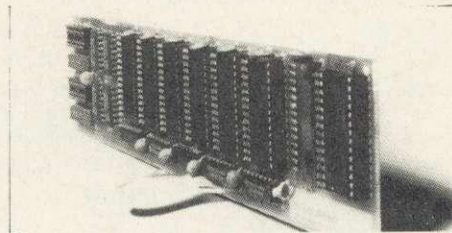
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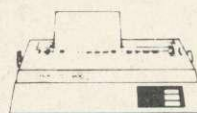
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Same as SAN 1 but with Dual 720K Drives

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SAN 5:

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Same as SAN 4 but with Dual 730K Drives

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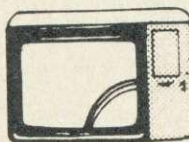
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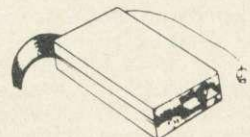
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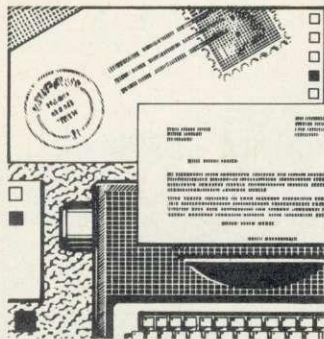


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Educational

software – in a

class of its own

Sir, The letter from Mr Hughes of Essex (November, page 61) neatly sums up the paradox that exists in the production and sales of educational software. He asks why software from the Government-backed Microelectronics Education Programme and others is not readily available. The answer is that it is, to the customers who can use it!

MEP's philosophy about software (the Council for Educational Technology is MEP's copyright holder) is that it should be an aid in the classroom, and not a replacement for the teacher. I can't speak for other groups such as MUSE and MAPE, but suspect their views would be similar to ours. There is therefore little point in selling through bookshops. Instead, we have worked with educational publishers and suppliers, who already have a sales network operating at school level.

Because we see software as an aid rather than a replacement, it has to be recognised that the market, in the UK, is limited to the number of schools. At the secondary level that means fewer than 6000 customers. And those customers are, rightly, extremely demanding in terms of the backup and support they expect – but it is costly and has to be paid for.

Also, we are talking about sophisticated program suites that are expensive to produce. When all development costs are calculated a package can cost in the order of £50,000 to £100,000. MEP pays that, and does not seek to recover it from UK educational sales. Therefore schools are paying only for manufacturing and support costs. However others, in this country and increasingly overseas, are buying MEP-developed packages and from these sales we do

seek to recover development investment.

Education authorities are very cost-conscious and the prices they pay, far from having high profit margins, are very competitive. If like is compared with like, ie business packages, rather than games, it's easy to see what a bargain real educational software is.

Mr Hughes has investigated what claims to be educational software and found it to be poor. That which is easily available to schools, from MEP through the publishers and from others like MAPE and MUSE, is collectively recognised as among the best in the world.

If Mr Hughes would like to see a catalogue of MEP-developed products, which includes devices like the Buggy sold by Economatics and the barcode reader sold by Addison-Wesley which *Acorn User* is promoting, as well as software, I would be pleased to send him one. This offer is also open to the first 10 non-teacher readers who write to me.

Teachers in England, Wales and Northern Ireland should have access to the catalogue already because one was sent to every school. If teachers haven't seen it they should contact their LEA mail service, who distributed it for us, their adviser, or failing all else write to me (on school notepaper).

Additionally, the major suppliers of hardware to schools (Acorn, Research Machines and Sinclair) also publish catalogues of educational software that is specific to their machines. These catalogues are available direct from them.

Michael Page
Corporate marketing manager,
MEP

Thanks

a million

Sir, Thank you very much for the fabulous prize given to me by your magazine from the May competition. I now have a complete BBC computing system beyond my wildest dreams and for which I shall remain grateful to you for many years.

I have recently decided to return to New Zealand at the end of this year, but have made arrangements to ensure that I will still be able to get *Acorn User*. I hope, if I succeed in solving the puzzles, you will

be able to accept entries from the other side of the world!

I have had great pleasure in attempting the competitions each month and have found that Simon Dally is able to set very challenging problems. (I have particularly appreciated his problems requiring thinking and programming abilities rather than literary or other non-computing skills.)

Once again, thank you for the prize and keep up the excellent standards your magazine has been setting.

John Faris
Leics

Long may your prize serve you well!

On the point you raise about accepting overseas entries, we deliberately set a deadline at least a month after the magazine appears (the third Thursday of the month before the cover date) to give time for postage from far and wide. We've had competition winners in Spain and Canada before now.

BBtype

observations

Sir, I was most interested to read the comments of your reviewer, Chris Drage, of our *BBtype* text processing package (November issue) and would like to make some observations.

1. The price to educational users is £18 inclusive, a reduction of £5 on the normal retail price.

2. Truly Epson-compatible printers, eg Canon and Kaga/Taxan will also work with *BBtype*.

3. *BBtype* will accept as input files from *View* and *Wordwise*, though this facility is limited owing to the differing methods used to store text (a specific advantage of *BBtype* is that it permits the use of the *TYPE command mentioned by your reviewer). However, to overcome the frustrations of users who wish to have the best of both worlds, we have produced more comprehensive conversion utility programs which are available from us at a nominal cost upon request.

4. *BBtype* already works on 6502 second processors. In addition, we now have an Econet version available which is far cheaper than ROM-based products. We are

grateful for the help given us in this development by Lady Margaret Middle School in Southall and Upper Latimer School in Hammersmith.

5. Your reviewer was (painfully!) accurate in that I was short of memory by the use of mode 3 (not every customer has 6502 second processors – yet!) and, regretfully, many very desirable word processing features had to be sacrificed to preserve the principle of 'what you see is what you get'. However, I am working on it!

6. The 'upside down' packaging is designed so that dealers can stand it up for display purposes – try it and see!

In conclusion, thank you for reviewing *BBtype* so thoroughly. We will certainly bear your comments in mind in our development programme, and look forward to hearing from customers, both new and old, at our new address: Furey Enterprise Products, 7 Manor Park, Froxfield, Marlborough, Wiltshire SN8 3LF.

Simon Furey
Furey Enterprise Products

Microtext

in CP/M

Sir, Following Ian Birnbaum's article on *Microtext* (October), readers with Z80 boards might be interested to know that a CP/M implementation of both the authoring and publishing systems is available.

This version of *Microtext* has been produced by Transdata Limited in collaboration with the National Physical Laboratory.

The authoring system will hold modules up to 32k long and offers additional features, notably increased user help, with details of all error messages, run-time and command mode commands, and the ability to include additional *Microtext* commands written in assembler.

The publishing system enables authors to publish *Microtext* course material with an inbuilt run-only system. The course material can be encrypted for security if required.

I would be happy to supply further details to anyone interested, from 11 South Street, Havant, Hants PO9 1BU.

Gary Allman
Transdata Ltd

The robot

connection

Sir, In the October issue under the readers' letters section you kindly gave information to your reader Paul Dormer in Cheshire about our new Fischertechnik robot kit. One small point I must make is that the kit itself, which is available from many computer shops, is priced at just £64.95 and that the price you mentioned of £92 includes a special interface and software manufactured by Micro Robotic Systems and sold by them in conjunction with our kit.

You will appreciate, of course, that not everybody wants to purchase a separate interface and some people will put together their own for their own purposes, hence the fact that we market the kit without an interface.

Martin Thomas
Marketing Manager,
Artur Fischer (UK) Ltd

Weather

dumps

Sir, Enclosed are some screen dumps of some weather pictures received using the interface mentioned in the *Acorn User* article about Mike Furminger's set-up. They are from Meteosat and were received here using a one-metre dish. The printouts were done on an Epson RX80 using the excellent *Printmaster* ROM.

Meteosat is the European Space Agency weather satellite in a geostationary position

22,000 miles above the equator directly over longitude 0, latitude 0. It sends back data which is received by an earth station in Germany. This station processes the data and retransmits it to the satellite for retransmitting to any station within range.

The one-metre dish used feeds the signal down to a radio receiver and thence to a BBC micro using Mike Furminger's interface.

Terry Weatherley
Lowestoft

Join

my board

Sir, I am writing to you after reading the communications section in the October issue, where you asked people who run their own boards to write in. Well here I am.

I have just started my board and it has only been running for about 6 or 7 weeks. It is run on a BBC model B. I wrote the software myself for a computer studies project at school. I am 15 years old and don't get many callers because I have only advertised on Microweb and Manchester BBS, so this is what I need to get a few more callers.

One comment on your list: the Manchester BBS run by Robert O'Donnell is wrong. The number is 061-427 1596 (not 061-427 3711 as printed). My phone number is (0295) 720812, and my times are 7 to 8 am, 6 to 7 pm and 10 to 11pm (school holidays only).

I know that the times are not much at the moment, but it's not my computer, it's my dad's!

I need another computer, disc drive, printer, modem and a new phone line put in before I can go 24 hours, which I hope I will be able to do when I get a bit of money.

Also if anyone else runs a BBS on their BBC, please could they contact me, as there is a club set up by myself called BSC which stands for Beeb Sysop Club. It's free and you are given a password so you can access the menu on my board.

My system is all in Basic and is about 17k long. Also it has a section for 'Letter Boxers' which again you have to have a password to get into, which you will only know if you are a Letter Boxer.

Alec Crawford
Banbury

Beebophilia

in Australia

Sir, The sad story from your correspondent Earl White (August) prompts me to tell you that there are better ways of acquiring Beebs and Atoms in Australia than buying them from the distributors.

In June 1983 when the Beeb model B with disc interface was selling here for just under \$1500, I mailed a cheque to Technomatic in the UK, and in less than three weeks my Beeb had arrived at the Redfern Mail Exchange. It cost me \$997, including air mail, sales tax and duty.

Also, Acorn and other British software is available from MCS Microcomputer Systems, PO Box 131, Cammeray, NSW 2062 (phone 923 1373). MCS also runs a hospi-

tal for sick Beebs.

Beebophiles in Sydney might be interested to know that a user group meets every second Wednesday evening. At present the venue is MCS, but when we grow bigger we'll probably have to find somewhere else to gather. There is also a Sydney group for teachers using Beebs in schools.

Jon Burkitt
NSW
Australia

Reliably

British

Sir, At a time when too many people (and some universities) are squandering the country's resources on imported manufactured products it is a pleasure to report that I have had perfectly reliable service from three excellent British made (and I don't mean British boxed) peripherals to the BBC micro.

These are the Walters WM2000 dot matrix printer (sturdy and fast), the medium resolution Microvitec colour monitor, and the new Tech OP Tracker 2, a dual, double-sided 5.25in disc drive, designed and manufactured by Data Track Technology.

Incidentally, if anyone is interested in screen dumps for the WM2000, send me a SAE for details of some machine code dumps.

Dr A R Cownie
7 Chatsworth Road
Broadoak Park
Worsley
Manchester
M28 4NU
page 53 ▶



Figure 1. Visible light picture of the Earth. It is just past noon and already it is dark in the south east of Africa.

Figure 2. The Mediterranean, Red Sea and the course of the River Nile. Crete and Cyprus show up well.

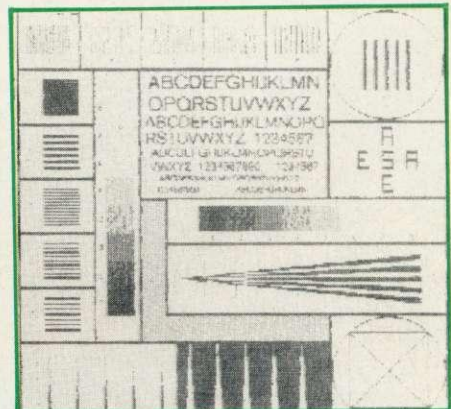


Figure 3. ESA test card showing the resolution obtainable from the Beeb: in all they show another side of a remarkable computer.

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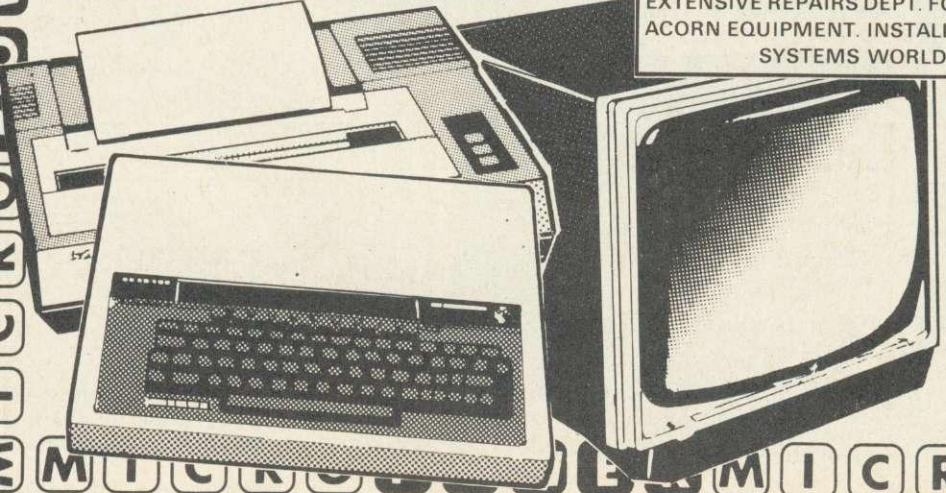
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M I C R O P O W E R M I C R O P O W E R M I C R O P O W E R

Basic II

frustration

Sir, I am writing to complain about the (machine-code) usage of Basic II statements in your listings. For instance, in the October 1984 issue a space remover program was printed containing EQU statements without any hints on how to convert them to Basic I. I suggest that 75 per cent of BBC owners have Basic I, and are frustrated in this way. I sincerely hope you will publish Basic II only features as little as possible, and always give hints on conversion between Basics.

Stephen Corcoran
London

Your point is a very valid one. At present we are compiling a list of notes about writing and presenting programs, and hope to publish it in the near future. One of the points made is that all programs must be written in Basic I so that they are compatible with Basic II machines.

We will also be publishing details on how to emulate Basic II commands in Basic I. An EQU simulation function was printed in the January issue of *Acorn User* in Jonathan Griffiths' article.

Simulators a

big letdown

Sir, The recent reviews of Acornsoft's *Aviator* led me to believe that the program was a real flight simulator, and on this fact, I bought it. What a mistake! *Aviator*, together with most other flight simulators for the Beeb, is a poor attempt at a simulation of how an aircraft actually reacts. The only good simulator available for the Beeb is *Jumbo*, by Molimerx. This reacts like a real aircraft. I suggest the reviewer of *Aviator* takes a few flying lessons.

Let us hope *Elite* will live up to its rave reviews.

Now to 2002 by Superior. I

ASK a silly question, pass a fair comment, stage an angry protest – we don't mind what you write to us about (or about us!). Keep 'em short, keep 'em sweet, but keep 'em coming! The address is: Letters, *Acorn User*, Redwood Publishing, 68 Long Acre, London WC2E 9JH.

have had some success in docking the Orion craft, but only on level 1. On the other levels (2–6), the wire frame drawing of the docking port becomes distorted and docking seems impossible. Have readers had similar problems?

Finally, thanks to Aardvark for two superb games (*Frak!* and *Zalaga*) and also to Acornsoft for *Planetoid* (yes, I'm still playing it) and also for *Hopper*, the best implementation of *Frogger* I have seen on the Beeb.

Great magazine, keep up the good work.

Phil Rimmer
Cambs

Missing out

in Scotland

Sir, I'm writing to you about the lack of computer shows here in Scotland. All you read about are exhibitions in the South of England, mainly London. We do have computers north of the border, you know! You often have letters from people in Scotland, so why not have a show?

I would like to complain about the time it takes for mail-order goods to be delivered. I sent away for software from an offer that was made by the WH Smith Computer Club and I'm still waiting for it five weeks later! Are they trying to beat Sinclair?

Simon Kindlen
Clackmannanshire

Ink solution

Sir, Many thanks for the free function key strip (October issue). However, might I suggest that rather than use a chinagraph pencil, which could rub off slightly on the underside of the clear plastic strip, a water soluble, fine-point marker pen be used. This has the advantage that cleaning is easy, and your precious Beeb doesn't get dirty.

Keep up the good work!

Martin Booth
Newcastle-upon-Tyne

Kitty helps with
screen decisions
and tips for
a tired typist

Q I'm thinking of buying a second colour TV as my family are beginning to complain about me stopping them watching *Dallas*. Is this the right choice, or should I buy a monitor?

Jane Orr
Sussex

A It all depends on what you want your computer system to do. If you spend a lot of time processing words – writing letters, drafting documents, etc – then it would certainly make sense to look at monitors. Even then you must decide between colour and monochrome.

If you use your system for playing games as well as wordprocessing (wp), you might feel that the trade-off between high resolution and colour is worth it – though bear in mind that a colour monitor can become very tiring on the eyes if you are using it for all but the minimum of wordprocessing. A good monochrome monitor, though, should allow you to work for hours in 80-column mode – but obviously most games look somewhat bleak.

A television will be fine if games are your main passion – even if you write a few letters, the TV shouldn't put too great a strain on your eyes if you stick to 40-column working.

Something relatively new on the market are the TV/monitors. How good they really are I'm not sure as I haven't used one. It might be worthwhile having a look at them at your local dealer's. Ask them to show you how 80-column text looks, as well as *3D Grand Prix* or *Elite*.

Q I find great difficulty typing in listings from magazines. Is there an easy way to check that I've done it right?

Julia Hill
Essex

A The first thing that helps is to use AUTO. Most listings have line numbers that are multiples of 10: Auto can relieve the tedium of remembering to type them in. If the odd line is, for instance, 345, just hit Escape after typing in line 340, type in line 345, then type AUTO 350,10 and you'll be back with your lines in 10s. Alternatively, just make a note of the 'odd' line numbers and enter these after you complete the main program entry.

The next thing that's useful is to place a ruler (*not* a transparent one) on the listing in the magazine and to move it down line by line, as you type each one in.

Lastly, almost all the listings in *Acorn User* are printed out to WIDTH 40. If you do the same, either to a printer or on-screen, you can check that the characters at the end of lines are the same – if they're not, look closely at those lines.

If you still have trouble, a bar code reader could solve your problems – see our offer on page 129.



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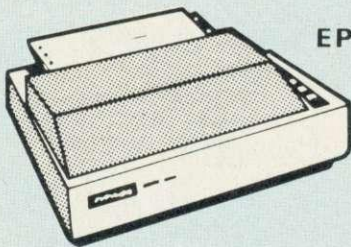
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 1,000 102 x 36mm **£6.25**

Carriage on Printer Paper or Labels £1.50

Carriage on 1,000 Labels £1.00

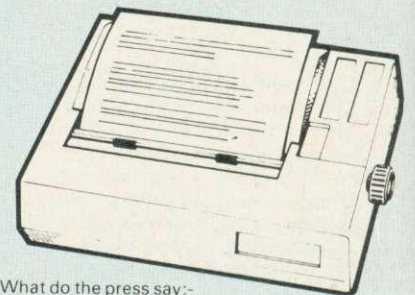
All prices exclude VAT

NEW 4 COLOUR PLOTTER PRINTER

How often have you wished you had a colour plotter for your computer, but have been put off by their high cost? Well, Watford Electronics can now supply you with a high quality, low cost plotter with Centronics interface. The SCP-800 printer/plotter facilitates plotting and printing in four colours on paper up to A4 size, using easily replaced pens. It can operate in a text mode, performing like an ordinary printer capable of speeds up to 12 CPS with a maximum of 160 characters per line on A4 paper. In graphics mode it offers full plotting facilities including drawing, moving, scaling of text, rotation and drawing of axes.

At an incredible low price of:
Only £179 (£5 carr.)

KAGA KP810



What do the press say:-
 "At £269 this is an unbeatable product for what it has to offer." - Educational Computing.
 "Offers excellent value for money." - Electronics & Computing.
 This new Japanese printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence, properadjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: **ONLY £242** (£7 carr.)

RS232 interface + 2K buffer to connect to other micros **£89**

KAGA KP910 PRINTER

Very similar to the KP810 but with 17" carriage for really wide print. Gives 156 columns of normal print or 256 columns in condensed mode. This printer is ideal for printing out spreadsheets and can also be used for correspondence in NLQ mode.

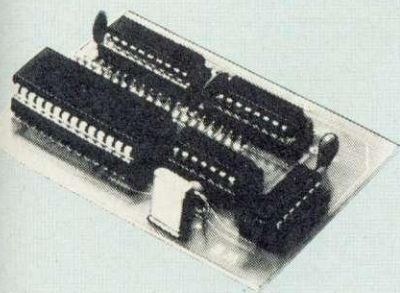
ONLY £339 (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long) **£7**
 Extra long (5 feet long) **£9**

DOUBLE DENSITY DISC INTERFACE



SIMPLE but SOPHISTICATED

We are proud to announce the launch of the Watford Electronics Double Density Board for the BBC micro. The DDFS supplied is a new version of the popular Watford Electronics DFS re-written to make full use of the capabilities of the new double density controller.

- Increases storage capacity of your Disc Drives by the maximum physically possible, 80% !!!
- Our system will use the whole of an 80 track drive. Inferior systems do not allow files longer than 3FFFF bytes, but with our system files can be as long as one disc side.
- Discs may be created in either single or double density format with the built in formatter and in single density mode are fully compatible with normal Acorn format discs.
- The density of the disc you put in is automatically sensed by the system and you are informed of the density in the catalogue display.
- The double density system is of course faster than single density.

The Watford Electronics DDFS implements an extremely comprehensive 8271 emulator so that commands passed through OSWORD & 7F are correctly interpreted. Other manufacturers thought that read and write sector alone were sufficient - we decided to implement every command of the 8271 that was physically possible. We have allowed the use of all the special registers including bad tracks, allowed access to deleted data etc., etc. The emulator itself takes up around 1K of compactly written machine code. We reckon it will run many of the protected discs now available. Gain all the advantages of the WE DFS together with much increased storage and compatibility with many existing protected discs. The price is the same as for the standard single density system that we continue to sell so you can choose between the two options without financial worries.

(please write-in for full technical specifications)

Complete Unit incl. DDFS ROM **£85**
DDFS Manual **£6.95** (no VAT)

We will exchange your existing Single Density Interface for our DDFS Unit for **£49** (Carriage £1.50)

3M - 5 1/4" DISKETTES

Top quality 3M - SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick, disc labels and write protect tabs.

DON'T SETTLE FOR LESS. BUY THE BEST.

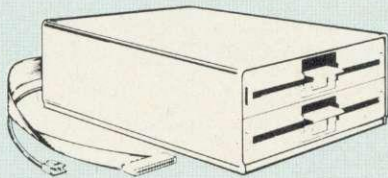
- 10 S/S/D/D 40 Track Discs **£14**
- 10 D/S/D/D 40 Track Discs **£18**
- 10 S/S/D/D 96 Track Discs **£22**
- 10 D/S/D/D 96 Track Discs **£24**

SPECIAL CHRISTMAS OFFER

We are offering a quality slimline pocket calculator. ABSOLUTELY FREE with every box of 10 Diskettes purchased during this month. Offer valid while present stocks last!

DISC DRIVE PRICES SLASHED!

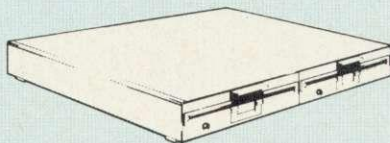
(NEW SLIM-LINE DRIVES)



(DRIVES Cased with Cables. No PSU. Connects directly to the BBC's power socket.

- **CLS 100** Single, TEC Single sided 40 track 100K, 5 1/4" Disc Drive **£97**
- **CLS200** Single EPSON Drive, Double sided 40 track, 200K, 5 1/4" **£119**
- **CLS400** Single, Mitsubishi/Epson Double sided 80 track 400K, 5 1/4" Disc Drive **£135**
- **CLS400S** Single, Mitsubishi/Epson Double sided 40/80 track Switchable, 400K, 5 1/4" Disc Drive **£145**
- **CLD200** TEC Single sided 40 track 200K, twin 5 1/4" Drives **£189**
- **CLD400** Epson, Double sided 40 track 400K, 5 1/4" TWIN Drives **£249**
- **CLD800** Mitsubishi/Epson Double sided 80 track 800K, 5 1/4" TWIN Drives **£269**
- **CLD800S** Mitsubishi/Epson Double sided 40/80 track switchable, 800K, Drives **£299**

(CUMANA) DRIVES CASED WITH PSU & CABLES



- **CS100** TEC Single sided 40 track 100K 5 1/4" Single Disc Drive **£119**
- **CS200** Epson Double sided 40 track 200K 5 1/4" Single Disc Drive **£149**
- **CS400** Mitsubishi/Epson Double sided 80 track 400K 5 1/4" Single Drive **£165**
- **CS400S** Mitsubishi/Epson Double sided 80 track 400K 5 1/4" Single Drive **£175**
- **CD200** TEC Single sided 40 track 200K 5 1/4" TWIN Disc Drives **£236**
- **CD400** EPSON Double sided 40 track 400K 5 1/4" TWIN Disc Drives **£280**
- **CD800** Mitsubishi Double sided 80 track 800K 5 1/4" TWIN Drives **£339**
- **CD800S** Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives **£360**
- SPARE DRIVE CABLES, SINGLE **£6**; DUAL **£8**
- DFS Manual (comprehensive) **£7.50** (No VAT)

P.S.

You do not require a formatting disc nor the expensive 40/80 track switchable drives if you use Watford's sophisticated Disc Filing System which has all these facilities in the ROM.

(Carriage on Disc Drives £7 securicor)

* SPECIAL OFFER *

EPROMs for sideways ROMs.

2764-250nS **£4.70**

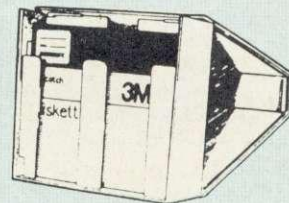
27128-250nS **£16.00**

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards.

6116LP (2K) **£3.75**

6264LP (8K) **£19.00**

NEW DESIGN PLASTIC LIBRARY CASES



for Disc Storage 5 1/4" (holds 10) **£1.80**

DUST COVERS

(For our Disc Drives)

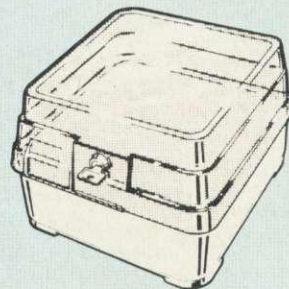
Single (without PSU)	£3.20
Twin (without PSU)	£3.85
Single (with PSU)	£3.25
Twin (with PSU)	£3.90
Twin (side by side with PSU)	£3.95

DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store up to 20 discs. Each disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISK STORAGE UNITS



Strong plastic cases that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 holds upto 40 discs **£13**

M85 holds upto 95 discs **£17**

FLOPPY HEAD CLEANER KIT

The heads in a floppy disc drive are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free one of these kits is a very sensible precaution against losing valuable data. A dirty head can destroy many disks before you realise the trouble. Very simple to use.

Only **£12**

Continued →



We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

MICROVITEC

- 1431 – Standard resolution as used on the BBC television computer programme **£165**
- 1451 – Medium resolution, suitable for word processing in mode 0 **£250**
- 1431AP RGB + PAL and AUDIO **£199**
- 1451AP RGB + PAL and AUDIO **£305**
- 1441 – High res, exceeds the capabilities of the BBC micro **£385**
- Dust Cover for Microvitecs **£5.50**

All Microvitec Monitors are 14" RGB in their distinctive right angle sturdy metal case or the new beige plastic case. They are supplied complete with connecting lead to the BBC and a 3pin mains plug.

KAGA

- KAGA Vision 2 High resolution, Colour **£245**
- KAGA Vision 3 Super High resolution, Colour **£310**

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

ZENITH

12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics. **ONLY £68**

LEADS

- BNC for Zenith or Philips** **£3**
- RGB lead for KAGA** **£5**

N.B. Carriage on Monitors **£7** (securicor)

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200k Teac drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer, Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc, 10 x 3M discs, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

CHRISTMAS OFFER: ONLY £1,119



**ACCESS
HOT LINE
(0923 50234)
24 Hours**

THE ULTIMATE DFS FOR BBC MICRO

Highly acclaimed at The ACORN and BBC MICRO USER Shows. What do the independent press say?

Good value for money – *Beebug Aug. '83*
A very worthwhile package – *The Micro User*

You'll be buying a very powerful package – *Personal Computer News*

Superior DFS: Excellent disc sector editor – *Computer Answers*

Without a doubt, the most sophisticated DFS Software yet written for BBC Micro Computer. This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

P.S. You can use Acorn & Watford DFS side by side in your Micro.

(Please write in for full technical specification.)

PRICES:

DFS (Disc Filing System) ROM only **£26**
Complete Disc Interface Kit including DFS ROM & fitting instructions **P.O.A.**
Acorn's DFS Kit **£99**
Acorn's new 1.2 DNFS ROM **£15**
Disc Filing System Manual. (Clearly written and comprehensive) **£7** (no VAT)

Complete Disc Interface Kit including DFS ROM & Fitting instructions P.O.A.

Disc Filing System Manual. Comprehensive and clearly written **£7.50** (no VAT)

P.S. We will exchange your existing ACORN DFS or PACE (AMCOM) DFS for Watford's highly sophisticated 16K DFS ROM for **£19**

Watford's DFS is exclusively available from Watford Electronics.

We do NOT retail this product through dealers. Every ROM carries a label with our LOGO and a serial number.

NEW LAUNCH

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronics' new book entitled 'MYSTERIES OF DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system. Why not ask for a copy for Christmas?

Price **£5.95** (Book – No VAT)

**STAR
LAUNCH**

ELECTRONIC DESK DIARY for the BBC Micro

Watford's Electronic Desk Diary and Clock, complete Diary, Alarm Clock and a Calendar. The attractively finished desk top unit comes complete with power supply, its own on-board RAM software in an 8K ROM.

Features include:

- A complete desk diary, planner, calendar and feature alarm clock for the BBC microcomputer.
- Software supplied on ROM for instant access.
- Over 100 events programmable into the minimum RAM.
- Events may be assigned many levels of priority.
- Diary may be opened at any date.
- Events may cause programmes to be executed at any predetermined time and date.
- Events may repeat yearly, monthly, weekly, daily.
- BBC will be powered up automatically to execute important events.
- 2K of CMOS RAM provided as standard for storing events.
- RAM expandable to 32K.
- No BBC's workspace RAM required.
- Printout of calendar for any month and year specified (between the years 1900 and 2100).
- Printout of current time and date on request.
- Easy access of time and date from BASIC and other programmes, (including M/C programmes).
- Internal power supply (no power taken from BBC).
- Interfaces to 1MHz bus.
- Battery backup optional.
- Diary compatible with all 'legal' BBC add-ons and ROMs.

Watford's Desk Diary Unit is a must for every serious user of BBC Micro

Introductory Price: Only £75
(Carriage £2.50)

Versatile BEEB SPEECH SYNTHESISER Unit



SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxiliary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs. Specialised Packages.

We know this all seems too good to be true but **DON'T BE LEFT SPEECHLESS!** Order your Versatile Speech Unit now!

SPECIAL OFFER £35

BEEB PRINTER ROM



This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

- ★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.
 - ★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.
 - ★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.
 - ★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.
 - ★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
- Operates with either parallel or serial interfaces.
- ★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

NEW
RELEASE

THE EPSON FX/KAGA PRINTER COMMANDS REVEALED

for the BBC Microcomputer
(The only Printer Book for the Epson FX-80 compatible printers).

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities - he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues; and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled **THE EPSON FX/KAGA PRINTER COMMANDS REVEALED**.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

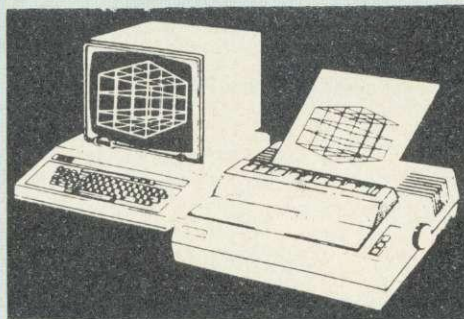
This book is superb value at only
£5.95 (Book - No VAT)

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only **£32**

TINY PASCAL for BBC Micro £54

DUMP OUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate - if anyone can supply flashing ink we would like to know!

The ROM also provides window setting facilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. Two commands are used to operate the dump routines:

- *GIMAGE - This provides a full graphics dump of any Mode (including Mode 8). There are various optional parameters but you need only specify the parameters you wish to change.
 - V <scale>, H <scale> - These 2 byte numbers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs the scale does not change with mode.
 - R <0-3> - Print dump rotated by 0.90, 180, 270 degrees.
 - I <indent> - Set gap from left edge of paper.
 - X <min>, <max>, Y <min>, <max> - The whole of the screen graphics window area is dumped except when these parameters are given.
 - P - Physical colour values are used for plotting, otherwise a negative scale is used (white darkest).
 - T Two tone dump for maximum resolution.
 - M <mask> - 8 bit colour mask.
 - E - Contrast expansion to make mode 7 text and separated graphics stand out from the background.
 - C - All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.
 - *TIMAGE <indent> - Does a fast, text only, dump of the contents of the text window in any mode.
 - *GWINDOW and *TWINDOW - These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. N.B. GIMAGE and GWINDOW work fully in mode 7.
- Designed for use with the following printers:
CP80, GP80, GP100, GP250, STAR, KAGA/TAXAN, NEC, SHINWA, GEMINI, EPSON MX/RX/FX, LPVII, DMP 100/120/200/400, CANON.

Price including comprehensive manual **£22**

SPECIAL PACKAGE OFFER

Our BEEB PRINTER ROM and DUMP OUT 3 ROM to give you a complete Printer Utility package.

Normal price: **£46**

SPECIAL OFFER PRICE £39

VIEW

VIEW WORDPROCESSOR

We are supplying the new VIEW version 2.1 allowing printing of memory contents etc. **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory. **£49**

VIEWSHEET (Acornsoft) £49

EPSON DUMP ROM

This screen dump ROM is specifically designed for use with the Epson RX/FX printers and the Kaga KP810. It is extremely simple to use as there is only one command to remember. It will accurately dump any screen mode using multiple tones as required. Mode 7 is fully supported giving teletext graphics, double height etc. For those who like to keep life simple this EPROM is only **£20**.

NEW
LAUNCH

EPSON FX/RX NEAR LETTER QUALITY PRINT ROM

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80FT, FX100.

Look at the features:

- Simply type *NLQ80 100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80), ENLARGED type, UNDERLINED type. These features can be used separately or in any combination.
- Full UK character set.

Standard 'pica size'
Proportional spacing
Enlarged
Underlined
Normal type

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

Only: **£20**

NEW

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Watford Electronics are now able to supply a new View Driver package to complement any View wordprocessor system using the Brother HR15 and Juki 6100 daisywheel printers.

The facilities offered by this driver are:

Auto Underlining; Bold; Shadow; Superscript; Subscript; Proportional spacing; Pad character facility. The program is supplied on a 40/80 track disc with full instructions for its use.

The program is supplied on a 40/80 track disc with full instructions for its use.

Only **£7**

FX80 PRINTER DRIVER

Watford's own Sophisticated VIEW Printer Driver for FX80

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£6**

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

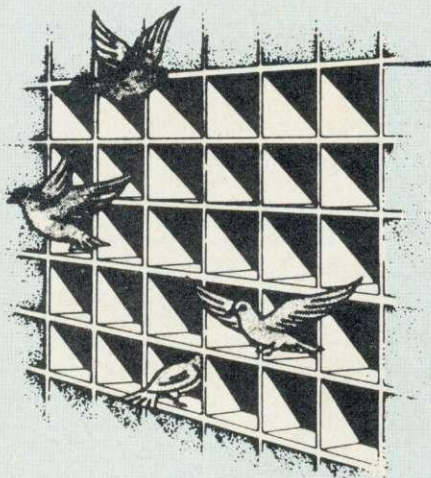
(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 and converted typewriters EX43/44 & 55.

Only: **£7**

Continued →

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely. Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features. String searching. Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**
(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer. File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density. The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are -, +, *, /, +---9999999999.9999 and compare facilities =, >, <, <=, >=, <, &..

Many keywords are supported by the language: assign, compare, display, end, goto, iff, ift, print, read, search, spool and update. Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer £99

PEN PAL - VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

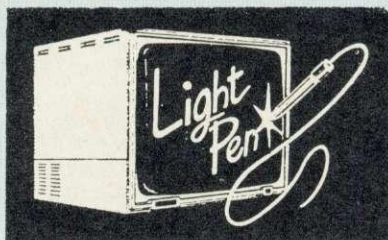
- Pixel, Line and Character definition
- Free hand drawing
- All Colours
- Fill, Refill and stripes
- User defined "Brush strokes" plus character definer
- Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
- Move design character to any screen position
- Save and Load screens, User defined characters and line drawings for video titles, own programmes etc.

This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.

Works with Watford, RH, Acorn User, DIY and many other Light Pens.

Prices
TAPE **£10**
DISC **£11**

LIGHT PEN



This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only £20

(For software on disc please add £2)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your cassette programs to disc. If you have difficulties transferring your cassette software to your disc system then this is the answer. It handles "locked" files and full length adventures (up to 8&E blocks) and programs that load below &E00. It is very simple to operate with instructions supplied. It saves you time and money.

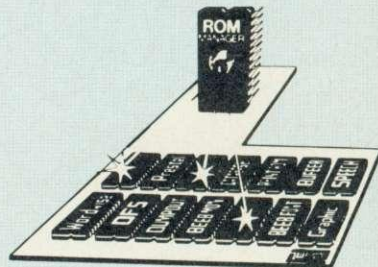
(Please specify 40 or 80 track discs) **Price £10**

ADE

Complete program development package in a 16K ROM. Full assembling and debugging facilities provided.

SPECIAL OFFER ONLY £43

ROM MANAGER



Provides comprehensive management of all your installed ROMs - BEEBUG Nov. '84.

This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.

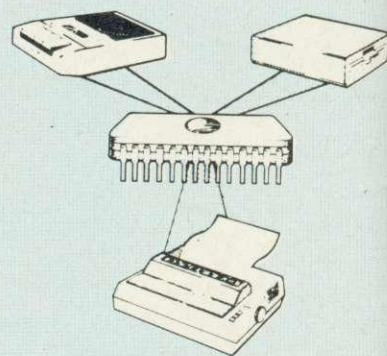
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.

The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price £22

BUFFER & BACKUP ROM

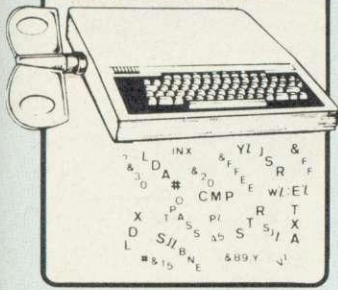


For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

- ★ 4K or 16K buffer for parallel printer.
- ★ Dumps selection of Disc files to Tape
- ★ Makes backup copies of tapes on to tape and disc.
- ★ Displays contents of paged ROMs on screen.
- ★ Menu display of ROM filing system contents on Shift-Break.
- ★ Comprehensive manual.

Only £22

BEEBMON



Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.

In use as a debugging tool, you run code under a total emulation system. Ever felt a desperate urge to set a break point in ROM? No problem - you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.

Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a virtual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£22



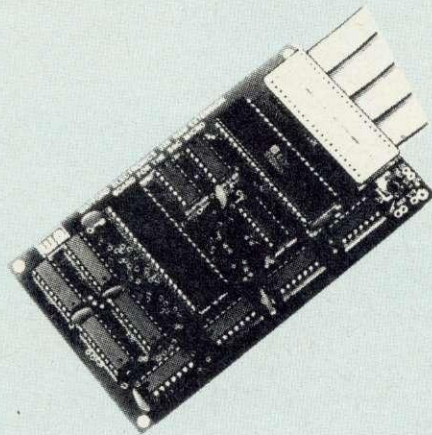
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use programmers tool.

A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL, ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.

Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY £18

32K RAM EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It simply plugs into your micro's 6502 processor socket. (No soldering required). This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive 32K !!!

There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0:1:2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE, etc.

- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER BUFFER for SERIAL or PARALLEL printers, sound channels, RS423, Keyboard or Speech Synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it, e.g. *FX15.21.138.145.ADVAL(no.) etc.

- This board is the ideal complement to any word processing system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on - TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +)

- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion board, double density DFS Units and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can be either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

SPECIAL OFFER
Only: £69 (carr. £1)

GRAPH PAD

With this popular British Micro's Graph pad you can add new dimension to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER £99

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display on screen in 13 different styles.

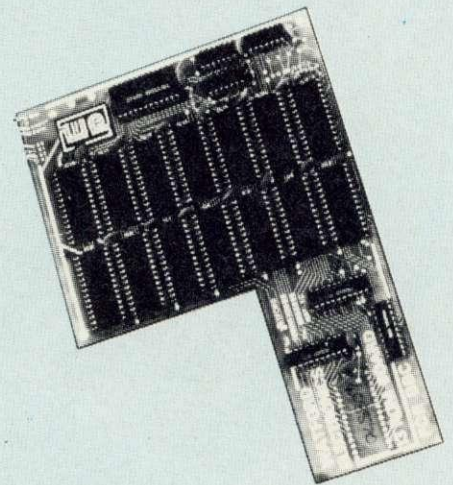
It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V - press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.

You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.

A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY £39

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered - On board battery back-up facility - will now accept EPROMs 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.

Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).

Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ).

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer. When fully populated, the ROM Board consumes less than half the recommended maximum current limit.

Supplied ready-built and tested complete with fitting instructions.

CHRISTMAS OFFER: £28 (carr. £1)

Continued

**WATFORD - Always
a step ahead**

COMPUTER CONCEPT'S ROMS

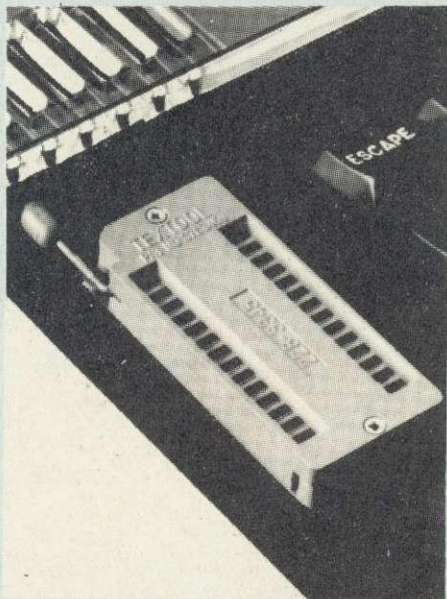
- CARETAKER Basic Utility **£28**
- Graphics ROM **£28**
- Disc Doctor ROM **£28**

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

**SIDEWAYS
ZIF SOCKET**



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort - no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the ROM Cartridge and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. **NO SOLDERING REQUIRED.** The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space. simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY £16 (£1 carr.)

**The UNICOM
Modem**



Are you thinking of purchasing a low cost high performance modem, but finding yourself confused by the features offered and the different prices? Well now the answer is here, in the form of The UNICOM Modem!

This fabulous modem offers the packed with all the features most Users will ever want (plus many more!) The software includes some of the most powerful, flexible and easy to use modem software ever written for a micro.

Just compare these facilities with other modems available on the market.

- Auto answer
- Auto Baud rate detection
- Auto dialing
- Auto redial
- 300/300 1200/75 75/1200 1200/1200 baud rates available
- Full and half duplex transmission
- Easy connection via the serial port of your Beeb
- Storage of upto 99 telephone numbers on disc for easy recall
- Bulletin board facilities
- Easy printer dump facilities
- Remote control facility
- Advanced error-free transmission protocol for sending data to other users

Price:
UNICOM MODEM **£49.95**
UNICOM ROM Software **£20.00**
UNICOM disc Software **£10.00**

(Carriage £2.50)

APPROVED for use
with telecommunication systems
run by British Telecommunications
in accordance with the conditions
in the instructions for use.

**MODEM 84
PRESTEL TERMINAL
For the BBC Microcomputer**



The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200-baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM.

- This totally machine code software:
- is fully compatible with not only the Modem 84 but also with the PRISM 1000 and most other modems that require a data link via an RS423/RS232 port making it a worthwhile purchase for those who already have Modems.
 - supports full Prestel colour alpha and graphic characters including double height, flashing, conceal/reveal.
 - called by simple *PRESTEL (*P.) command. Disc and tape configurations fully supported.
 - includes a comprehensive telesoftware downloader for BBC and other programs with continuous on screen status report (an essential facility).
 - has very powerful OFF LINE MAILBOX editor allowing colour flashing graphic mailboxes to be prepared without having to be on line to Prestel.
 - auto logon sequence can be burnt into ROM if desired.
 - a vital 'TAG' facility allows tagging and recall of interesting pages, avoids that common and annoying 'NOW WHERE WAS THAT PAGE' problem.
 - includes simple page and program loading and saving functions for both disc and tape, automatically assigning frame and program directories.
 - not one but TWO PRINTER DUMP ROUTINES are provided within the software allowing either full graphics dump (mode 7 to EPSON compatible printers) or ASCII characters only.
 - a user function built into the software allows interface with specialist routines, (yours as well as ours).

**WATFORD'S 1200 BAUD
FULLY AUTOMATIC USER
TO USER SOFTWARE**

- The addition of the WATFORD user to user ROM based software enables you to discover a whole new world of data communication.
- This software enables you to use the MODEM 84 very powerfully.
- Send and receive error checked programs and files (even WORDWISE files) to and from other users at 1200 baud.
 - 8k file transfer in under 2.5 minutes (approx four times faster than with 300 baud modems).
 - The transfer of data is totally AUTOMATIC which means that the modem is automatically switched between transmit and receive under software control.
 - A chat mode is provided which also has this automatic switching for receive and transmit. (This mode is essential just before and after data transfer when both hand sets are replaced to reduce noise).
 - A copy facility is provided which allows transmission of all screen output.
 - A continuous on screen modem status report is included.
 - The software is totally function key driven enabling easy transmission, reception, saving and loading of programs and files (Basic, Machine code or Data).
 - A help menu is available from within the software as an aid to use.
 - Full instructions are supplied.

PRICES

- MODEM 84
(with Lead & Manual) **£68**
- MODEM 84 complete with PRESTEL
SOFTWARE ROM, Lead and Manuals **£82**
- PRESTEL SOFTWARE ROM
+ Manual **£20**
- USER to USER SOFTWARE ROM **£15**
(Carriage on Modem **£2**)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max. Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£8.50**

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
36 Challenging Games for BBC	£5.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
Cassette version of above	£10.00
6502 Application Book	£11.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
6502 Software Design	£10.50
A young persons guide to BBC Basic	£4.50
A Beginners guide to LISP	£10.95
Advanced Machine Code Technique for BBC	£7.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC Basic	£7.95
Assembly Lang. Prog. on BBC	£7.40
BBC BASIC	£5.95
BBC Computer Magic	£5.50
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC Lisp	£7.50
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro ROM PAGING System Explained	£2.00
BBC Micro Revealed	£6.95
BBC Micro Assembly Lang. Prog.	£7.95
BBC Micro Disc Companion	£7.95
BBC Micro in Education	£6.50
Basic Programming on BBC Micro	£5.95
CP/M The software BUS	£8.95
CP/M Users Guide	£13.95
Creating Adventure Programs on BBC Micros	£6.95
Creative Graphics Cassette (Acornsoft). Has 36 graphics programs	£8.95
Creative graphics on BBC Micro	£7.50
Complete Programmer for BBC	£5.95
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
Discover FORTH	£13.95
DIY Robotics & Sensors with BBC	£6.95
Exploring FORTH	£6.95
Further Prog. for BBC Micro	£5.95
FORTH Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games on your BBC Micro	£2.95
Games BBC Computer Can Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Graphs and Charts (Cassette)	£7.50
Introducing the BBC Micro	£5.95
Introduction to FORTH	£9.30
Interfacing projects for the BBC Micro	£6.95
Introducing LOGO	£5.95
Let your BBC teach u to program	£6.45
LISP	£9.25
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	£5.95
Mastering CP/M	£13.65
Programming the 6502	£11.95
Programming the Z80	£14.25
PASCAL	£9.25
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Epson FX/KAGA PRINTER Commands REVEALED	£5.95
Using Floppy Discs with BBC Micro	£5.95
Using BBC Basic	£6.95
Using 6502 Ass. Language	£14.50
Wordstar & CP/M made easy	£6.95

SPECIAL XMAS OFFER

BEEBMON – The most sophisticated Machine Code monitor ROM for the BBC Micro.

Normally: £22 **NOW: £18**

FILE PLUS – A most versatile 16K ROM Based DATABASE for the BBC.

Normally: £42 **Now: £36**

PENGO

One of the 10 best arcade games developed for the BBC micro in 1984 'Acorn User, December 1984' is now available at a special Christmas price of:

Only: **£5**

For a superb value, last minute stocking filler (5:55pm on Christmas Eve!) why not purchase both 'THE CRAWLER' and 'PENGO' games at the extra special price of:

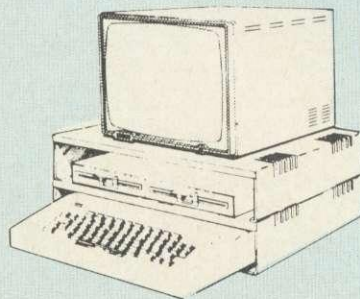
Only: **£8.75**

THE INVESTIGATOR

A utility program provided on disc to make security backup copies of all your valuable discs. Makes full use of all 8271 facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Price **£25**

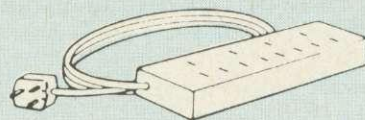
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH **£11** (carr. £1.50)
DOUBLE BBC PLINTH **£20** (carr. £2.00)
PRINTER PLINTH **£10** (carr. £1.50)

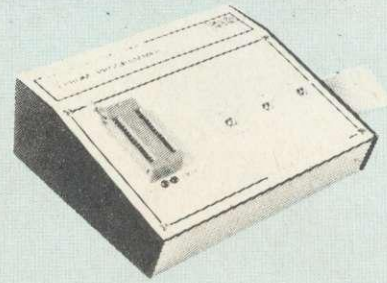
4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.50

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and integrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

CHRISTMAS OFFER £69

(£3 carr.)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE DELTA 14 JOYSTICK SYSTEM

The Voltmace system provides full facilities for connecting the Delta 14 handset. Delta 14 handset – On its own makes a high quality centre sprung analogue joystick with fire buttons. **£12.50**
Adaptor Module allows use of two joysticks and provides hardware to access all the keys on the keypad of the joystick. **£12.55**
Transfer program allows use of the keypad keys and joystick to simulate any key on the keyboard. This works by creating a machine code patch that stays in memory while another program is loaded in. Allows any game to be used with joysticks. Supplied on disc or tape.

Tape **£5.10** Disc **£7.95**

STANDARD JOYSTICKS

These are standard analogue type with a fire button on each joystick. Twin joysticks go to a single moulded plug. long leads provided.

Single Player version **£9.75**
Two Players version **£15.00**

Continued

ANTI GLARE MONITOR SAFETY SCREEN



HEADACHES? TIRED EYES? Don't take pills - Use a Watford Electronics anti-glare filter! Considerable research into the possible health problems associated with monitor screens has shown that eye strain, blurred vision, watering, itching eyes and headaches can result after prolonged use. The problems are caused by extraneous reflections which force the eye to continuously re-focus to try to ignore them. The answer is our contrast enhancement, anti-glare filter which is similar to those which have been previously available on business systems, but at the low cost that you would expect for your personal computer. You will soon find the reduction in eye strain well worth your investment.

Features:

- Simple fitting with sticky Velcro pads.
 - Easily removed for cleaning.
 - Tinting improves colour quality and contrast.
 - Works on monochrome or colour monitors.
 - Curved instead of usual flat screen reduces edge distortion.
 - Made in Britain by a long established glass maker.
- Available in 9", 12" and 14" versions - please specify when ordering.

Introductory offer price: **£14.95** (carr. £1)

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12** (£2

DATA RECORDER AND ACCESSORIES

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.

£20

DATA CABLE to connect recorder to BBC **£2.50**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20**.

ASSORTED CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug to 5 pin DIN Plug + 1 Jack Plug **£2.00**
to 3 pin DIN Plug + 1 Jack Plug **£2.50**
to 7 pin DIN Plug **£2.50**
to 3 Jack Plugs **£2.50**
6 pin DIN to 6 pin DIN Plug (RGB) **£2.50**

MONITOR LEADS

Microvitec RGB leads 6 pin DIN to 6 pin DIN for colour monitors. **£2.50**
KAGA/SANYO Colour Monitor Leads **£5.00**
Monochrome monitor leads **£3.00**
BNC to Phono **£3.00**

DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.

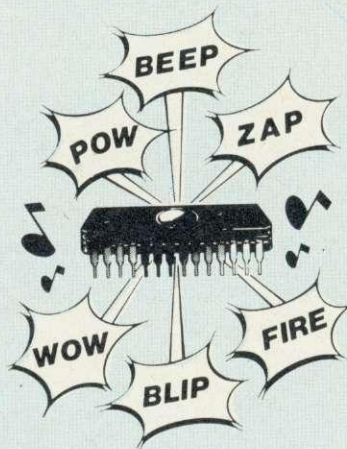
Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	-
Disc Drive Plug 4 way	75p	-

NEW RELEASE

SOUND EFFECT (ENVELOPE) ROM



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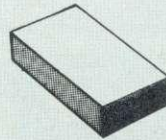
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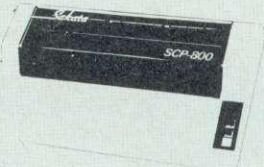
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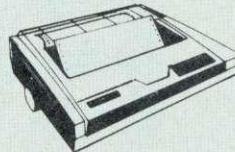
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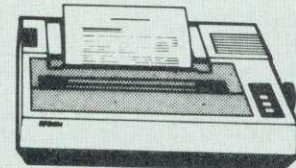
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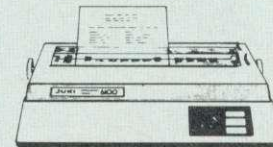
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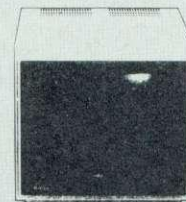
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It's deceptively simple but you'll get in a spin and see spots before your eyes with David Acton's Quadline.

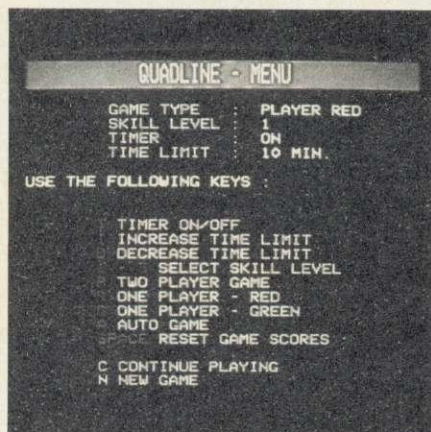
FOUR IN A ROW

For the BBC and Electron, it's a game of strategy in which you can pit your wits against friend or micro

QUADLINE is a deceptively simple game of strategy, written for the 32k BBC micro and Electron in Basic and assembly language. The fast machine-code routines enable the computer to play a good game against any human opposition without each move taking all night – a relief for some computer-chess addicts perhaps? The program consists of two parts, Quadline and Q2.

How to play

Two players take turns to drop counters of their own colour into one of the seven columns on the board. The winner is the first player to obtain a line of four of his own counters – vertically, horizon-



You return to the menu by pressing Escape tally or diagonally. To make a move use the left and right cursor keys to position your counter over the chosen column and press the cursor-down key. Your counter will fall into place.

Like many games, Quadline is controlled from a menu displayed at the start of every game, and you may return to it at any time by holding Escape down. Note that if the computer is 'thinking' it may take a few seconds to detect you are pressing Escape.

To start a new game, press N when the menu is displayed. To return to an unfinished game you press C. At the top of the menu you will see the skill level, game type and timer status. You may change any of these by using the keys specified on the menu, either in mid-game or before a new one.

There are four game types – 'auto', 'two-player' and two 'one-player' options. In the auto game the computer acts as both players. If a one-player game is selected, the player may choose red or green counters. The player with red counters always starts.

If the computer has been set to play, there are three skill levels to choose from, level three being the hardest. The computer considers many possible combinations of moves and the time taken to reach a decision is clearly proportional to the number of options reviewed. While it's 'thinking', two figures are displayed in the bottom right-hand corner of the screen. The first represents the level of 'thought'. A six displayed here indicates that the computer is looking to a depth of three moves by each player. The second figure is the number of combinations it has already considered (table 1).

Another feature of this program is the timer. When switched on, all human players are restricted to making their moves within the time shown on the menu. The time used up by a player is shown on the clock while a move is being made. A 'TIME-UP' message will be displayed if a player takes too long. The game may then be continued with the timer switched off if desired.

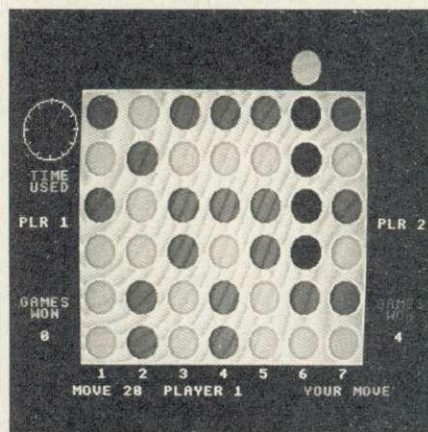
How the program works

Tables 2 and 3 contain the basic structure of parts one and two of Quadline respectively, but certain important routines need further explanation.

The main 'thinking' routine (labelled

'B' in the assembly language listing) uses a simple idea to calculate the best move. For example, to evaluate a move by player one the computer assigns a value to it equal to the length of line formed. From this value is subtracted the value of the best move player two can make in response. Now the value of the move by player two is calculated from the length of line formed and the best response by player one, and so the process continues until a given depth of moves has been reached. A summary of the functions of all the main machine-code routines is given in table 4.

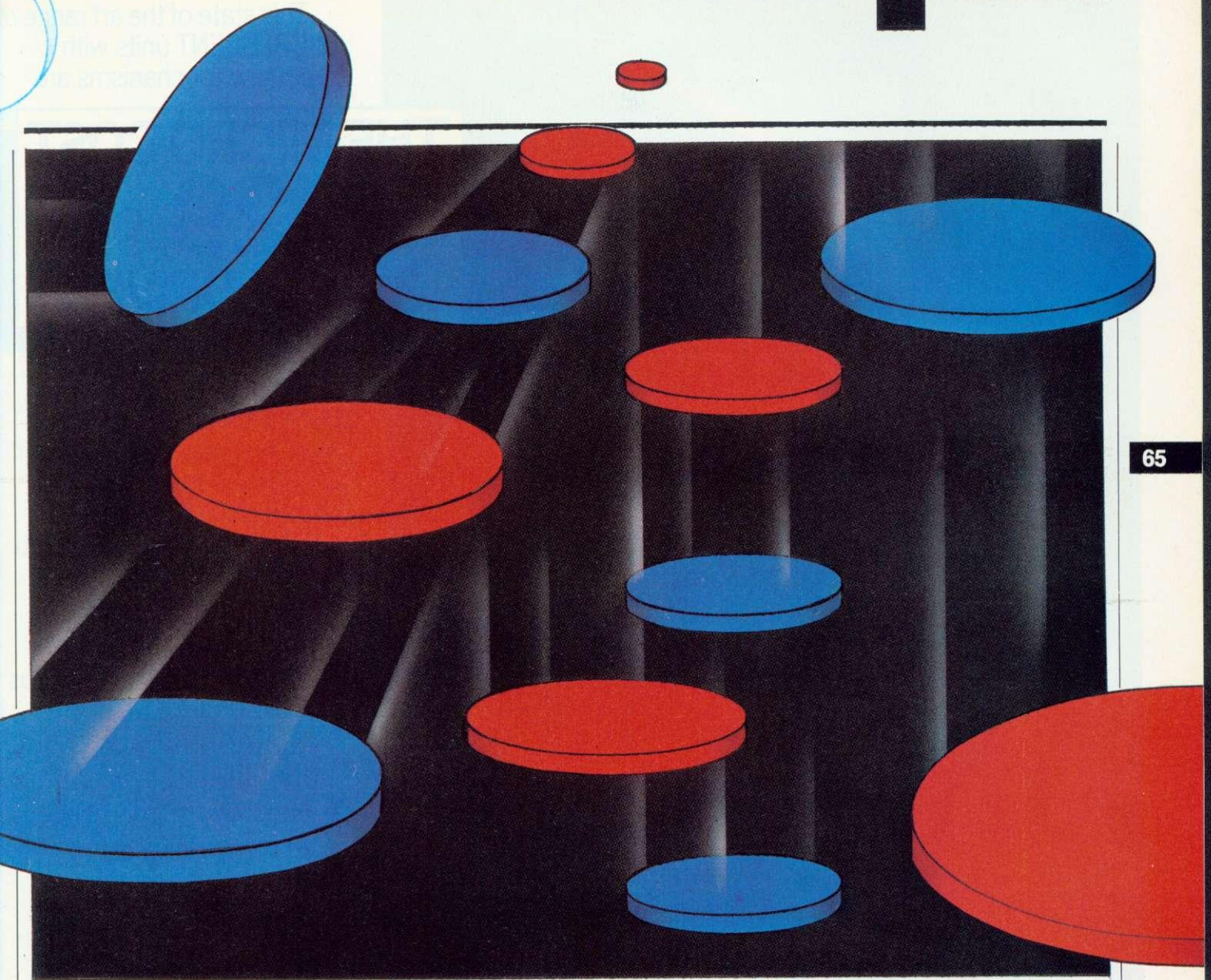
The graphics routines used in Quadline are very simple. The circular counter is formed from 16 characters



Nearing the end of a hard game

and stored as a string in the memory. The string contains cursor-down and cursor-left characters so it's printed as a four-by-four character block.

The clock is drawn using data stored at &B00 onwards, and two functions are used to read the data – FNx and FNy. The hands of the clock are drawn using PROCh1 and PROCh2. These procedures work for either the right or left clock, and the switch from one to the other is made by moving the graphics



origin with a VDU29 statement. PROC1 and PROC2 are called from within PROCtm, the procedure which updates the clock. Between moves, the time used by a player is simply stored away in the array named T%.

Another feature of the program is the scrolling message displayed at the end of the game. The machine-code routine responsible (labelled "MESS" in the assembly language listing) simply prints the message string, character-by-character, at text position (39,1). Between characters, a scroll routine is called twice shifting the text line by one byte to the left each time. (Each character is two bytes wide in mode 1.) To smooth the scrolling process a synchronisation routine ("SYNC") is called, reducing the scrolling speed to exactly one byte every 1/50 second. "SYNC" uses the elapsed-time clock.

Entering Quadline

Due to the limited memory on both the Beeb (model B) and Electron the Quadline listing is split into two separate programs, the first containing a large

amount of assembler. If you've never used assembler before then there's no need to worry as the notes that follow explain just how to go about it.

All users should note that because of the tight space restrictions it's most important that no extra spaces are included in the program, particularly between the line number and start of text. Note that if you are using AUTO this will show an extra space on the screen but it will not be entered in the program.

Electron users should now refer to yellow page 111 for conversion details which are minimal. Disc users should read the section relevant to them. Tape users read on.

Listing 1 can be broken down into two sections, Basic and assembly language. Mistakes are more likely to occur in the assembly language part of the listing so let's look at that. First set PAGE to &E00, if it's not already. To do this type:

```
PAGE = &E00 < return >
NEW < return >
```

Now enter the following lines *only*:

```
lines 370 to 3950 inclusive
lines 160, 170 and 180
```

and now add the following line:

```
181PROCass : END
```

Then change line 390 to read:

```
390FORZ% = 0TO3STEP3
```

Now Run the program. If any errors in syntax are present a suitable error message will be generated informing you of the line number containing it, which can be checked against the program listing and edited. This ensures that you have a syntactically correct assembler listing. Once it runs okay re-enter line 390 as per the listing, delete line 181 and add the remaining lines from the listing, but change line 240 for the time being to read:

```
240END
```

Assembler being what it is, problems could occur if you typed in TYA instead

Turn to yellow pages 109-111 for the Quadline listings and Electron conversation notes

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of TAY. These mnemonics use the same letters but work in opposite directions, so while they would not cause an assembly error, the machine-code would not operate as desired - a subtle bug! To ensure against such an error we can perform a checksum count. Looking at the listing you will see that line 220 has a REM showing where we need to enter the checksumming code. So add the following lines:

```
220T%=0:Z%=&2D40
221REPEAT
222T%=T%+?Z%:Z%=Z%+1
223UNTILZ%=P%
224IF T%<>80250 VDU26,12:
PRINT"ERROR":STOP
```

Now Run the program again. If an error message is not given, you have entered the program correctly, so go ahead and enter line 240 as per the listing; delete lines 220, 221, 222, 223 and 224; and save the whole lot to tape with SAVE "QUADLINE". If an error does occur you must recheck your listing.

Skill level	Depth of thought	Max no. of combinations	Max thinking time
1	4	2,800	0.45 sec
2	5	19,607	2.81 sec
3	6	136,172	19.29 sec
	or 7*	325,685	47.24 sec

**Depth of 7 used when one or more columns is full*

Table 1. Approximate 'thinking' times

All you need to do now is enter listing 2 as shown. So type

```
NEW <return>
```

and proceed as normal, saving the completed program to tape under the filename Q2, immediately after the QUADLINE file. The best way to test this listing is to run the whole thing. Simply rewind the tape, and type

```
NEW <return>
CH." " <return>
```

If any errors occur, recheck your listing as indicated and re-save the Q2 file over the one already present on the tape.

Quadline on disc

Quadline looks at first sight as though it's one of those programs that will just not work with the DFS. However, with some thought it can be implemented.

First, format yourself a blank disc. The most important rule now is to save *everything* you enter *before* you run it. If you don't, you're liable to lose your program. I would also suggest you read the tape users notes above to provide yourself with some background before you go on.

The first step is to re-set PAGE to

&1100, so enter

```
PAGE = &1100 <return>
NEW <return>
```

Listing 1 needs to be entered, but only lines 160, 170, 180, 210 and 370 to 3950 inclusive. Add lines 220 to 224 as before, plus this line:

```
225END
```

Now Run the program to ensure everything is correct. If any error messages

Line(s)	Description
40,50	Envelopes defined
70,80	Characters defined
90	Function keys disabled with OS 1.0
120	Data for clock put into memory
140,150	String data put into memory
190,200	Other data
240	"Q2" CHAINED
300-360	Character data
370+	Assembly language procedure

Table 2. Quadline part 1

are generated, correct as described above. We must now save the machine-code generated by the assembler. Enter

```
*SAVE MC 2D40 3000
```

Hit Break to reset PAGE to its normal value, and enter listing 2 as shown. Add to this the following line:

```
15$&DB2="QUADLINE ** © Copyright D.Acton 1984 ** Press any key to play again **"
```

This is in fact line 150 from listing 1.

This program must now be saved as a machine-code file. To do this find the values of PAGE and TOP by entering

```
PRINT ^PAGE <return>
PRINT ^TOP <return>
```

and then enter

```
*SAVE Q2 xxxx yyyy
```

where xxxx is the value of PAGE and yyyy the value of TOP.

The next step is to enter listing 3. Run this and save the code it generates:

```
*SAVE DLOAD A00 A60.
```

Now for the final step. Set PAGE to &3400:

```
PAGE = &3400 <return>
NEW <return>
```

and enter the following lines from listing 1: 10 to 140 inclusive, 190 to 360 inclusive.

Now add the following lines:

```
1*LOAD Q2 5000
2*LOAD MC 2D40
3*LOAD DLOAD A00
4*TAPE
5E%=&E00:N%=&5000
6FOR L%=0 TO 1000 STEP 4
7E%!L%=N%!L%:NEXT
180tb%=&DA3
240CALL&A00:END
```

Save this as "MINIQ1".

To load the whole jamboree, set PAGE=&3400 and CHAIN "MINIQ1". This will load all relevant files into memory, change filing systems, relocate programs and run Quadline!

Line(s)	Description
50-70	DIMs, variables
100-460	Main loop
110-290	Menu displayed, options selected
350-400	Game loop
410-460	Game over routine
470	PROCcomp: computer 'thinking' routine
530	FNb: returns the best move possible for a given player
580	PROCmove: human move routine
820	PROCbd: draws board, clocks etc.
920	PROCsq: displays a single square on board
930	PROCmv: executes a specified move
970	FN1: returns the length of line through a given position by calling the m/code routine '1'
980	PROCdn: drops a counter into the board
1120	FNyn: returns -1 if 'Y' pressed, 0 if 'N' pressed
1160	ON ERROR routine, called from line 10

Table 3. Quadline part 2

Label	Function/Operation
L	On entry, A contains a board position. On exit, &72 contains the length of the longest line through that position
B	On entry, A contains the player number (1 or 2) and X contains the depth of thought required. On exit, the memory table SC% contains the values of all possible moves by that player.
T1	Transfers main board to spare board.
T2	Performs reverse of T1
ESC	Detects Escape
SCRL	Scrolls second text line one byte to the left.

Table 4. Main machine-code routines

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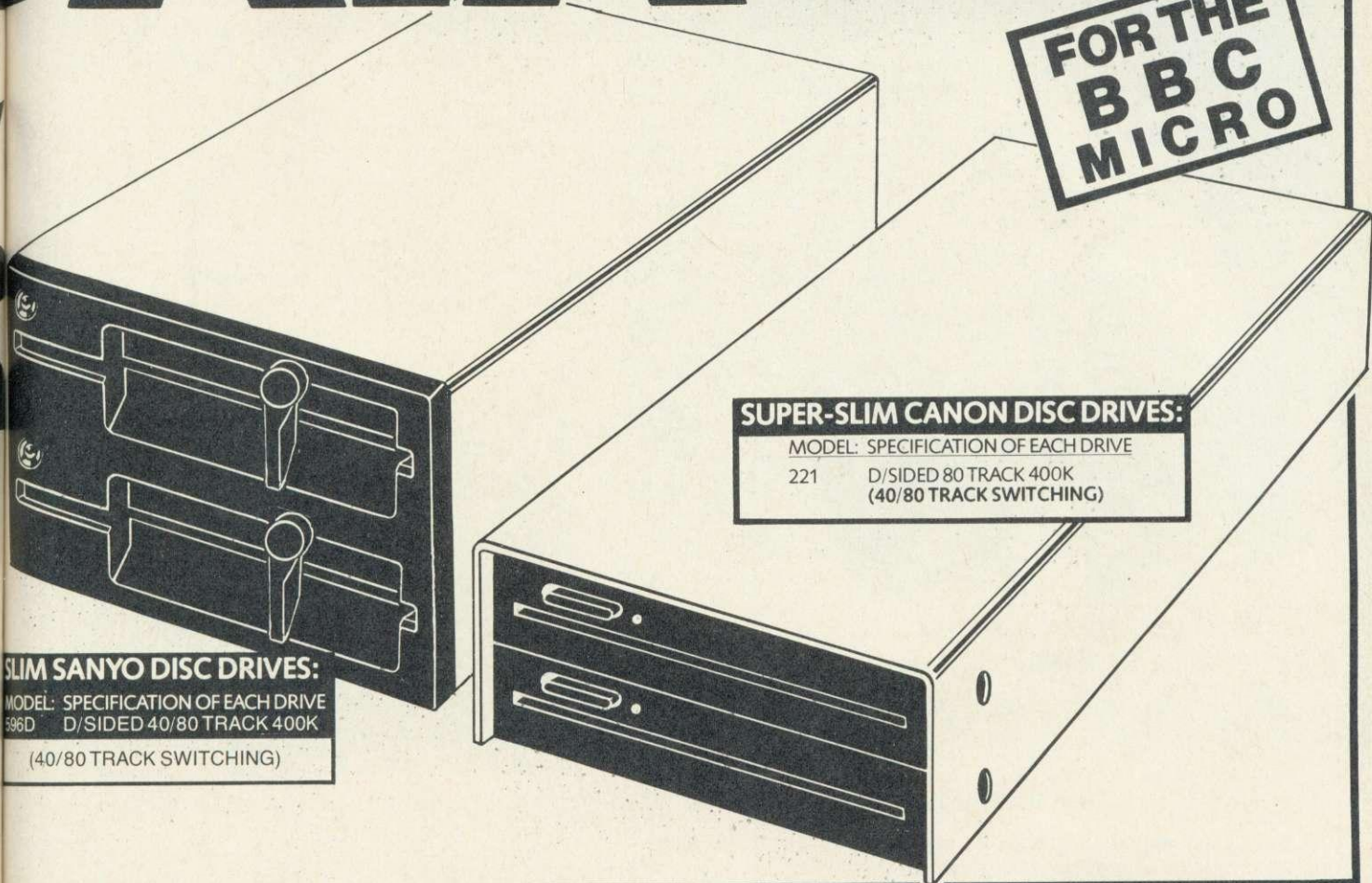
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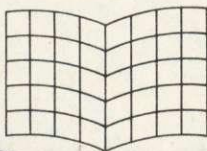
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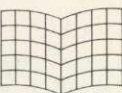
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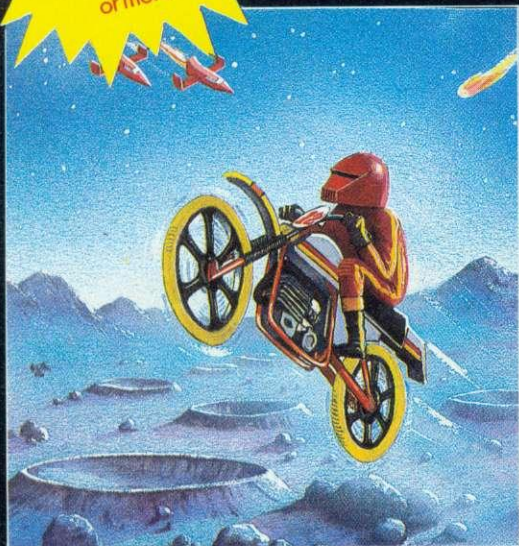
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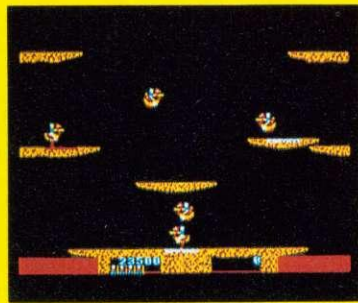
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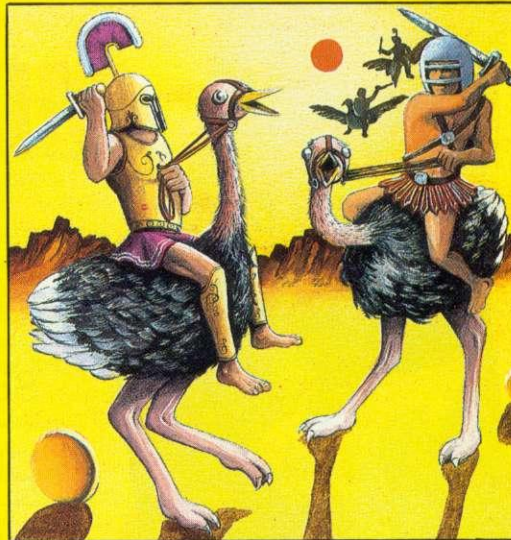
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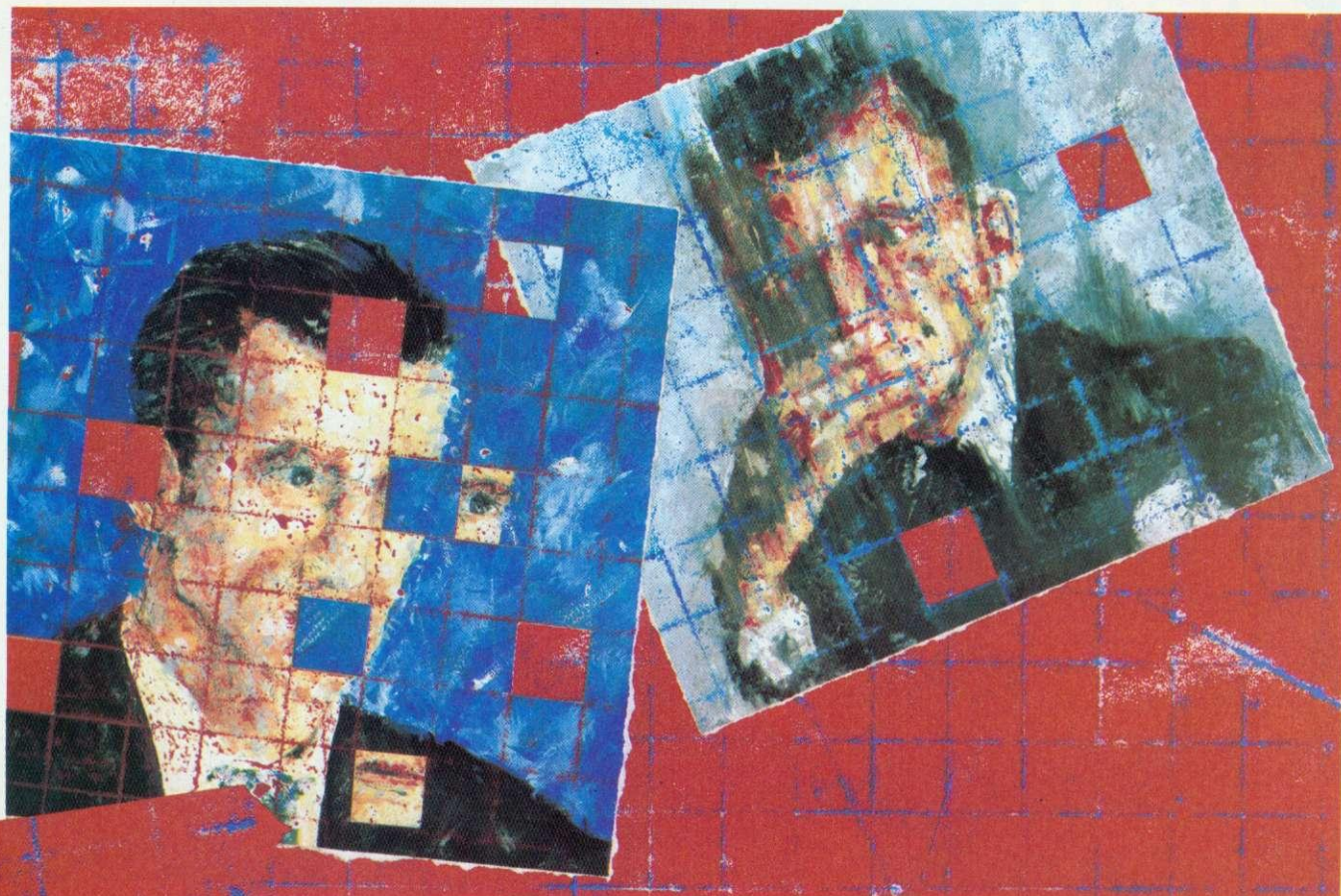


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JUST A CRAZY MIXED-UP GRID

Roland Waddilove
sets a sliding
puzzle for you
on his Electron

I can remember as a child (before the days of home computers) playing with a little plastic puzzle made up of letters or numbers which could be slid about a frame. The idea was to get the letters or numbers in order, a task which sometimes took hours and was very frustrating.

Everything is automated now, of

course, so we can play the same game on our micros. It's not unusual to find this type of puzzle on the BBC or Electron as it's fairly easy to write a program to move letters about a grid, but this program is different in that instead of using letters or numbers, a grid is drawn over a picture, and the parts of that are slid about.

A 3D perspective picture is drawn using mode 2 graphics and all eight colours (the flashing combinations aren't used). A grid is then drawn over the picture and the sections mixed up. You can decide on the level of difficulty, ie the degree to which the parts are jumbled (which is also partly random), and then watch it carried out.

Your task is simple. Restore the picture to its original form by sliding the sections back into place. Sounds easy, doesn't it? Try it on level 9!

The program was written on an Electron and will run on a BBC with OS 1.2 and Basic 2. Because of the Beeb's high processing speed Beeb owners will need to add the following line to slow the program down enough to allow you to use the game keys correctly:

```
185 FOR N=0 TO 250:NEXT
```

**Roland Waddilove's picture
slide listing is on yellow pages
106-108**



73

You can choose how difficult you make the task of moving blocks of the screen to complete the 3D perspective picture

PROGRAM NOTES

There are many interesting routines that could be incorporated quite easily into your own programs, such as the large letters procedure, sideways scroll of the title, and the procedure to scroll messages in from the side, plus the error handling routine.

The program is structured and does not contain any GOTOs or GOSUBs – line numbers are therefore irrelevant and the procedures could be entered in any order. Any picture can be used, so feel free to draw your own: it's all inside a graphics window so you can't go wrong.

PROCinitialise. Switch off the cursor and set colours 8 to 14 to white. The first 20 letters of the alphabet are placed at &A00, to record the order of the sections of the picture. &6980 is the address of the top left hand corner of the section with the flashing cross. Set up the graphics window.

PROCdraw_grid (colour). Draw the grid over the picture. The colour is the same as the cross.

PROCdraw_picture. Draw the picture. Replace this with your own if you desire. After drawing the sky the origin is moved to 800,600, where the sun is.

PROCbog (x%, y%, word\$, colour) word\$ is printed in characters 8 times normal size at x%,y%. This is worth studying as it can be used to print various sized characters. The dot pattern is read into zero page by calling OSWORD with A = 10. A character is designed and printed for each row.

PROCswap. The appropriate letters are swapped at &A00, then the two sections of picture are exchanged by calling the machine code routine.

PROCassemble. Assemble the two machine code routines. The first swaps two sections of the picture, the

second scrolls the title.

PROCslide. Find out which keys are being pressed.

PROCscroll (Y%, word\$, colour). Scroll word\$ left onto the screen at line Y%.

PROCmix_up. Input the level of difficulty and mix up the sections.

PROCchurrah. Make appropriate sounds. Work out score. Ask if you want to play again.

PROCinstructions. Print the large title and call the machine code to scroll the graphics window. Print the instructions.

PROCerror. The error handling routine. This can be used in any program. If Escape is pressed you have the choice of ending the program or starting again. If you haven't pressed Escape there must be an error so PROCstop is called.

PROCstop. Called if there is an error. The line with the error is printed by defining a function key to list it and placing the code for the key in the input buffer. If the error was 'No room' and PAGE is not &E00 (eg, if you have disc drives), the program is relocated.

Variables.

K%, Q%, J%, X%, Y% – Used mainly as loop counters.

done – A flag to show whether it has been done.


level – The difficulty level.

score – The score.

address – The address of the top left hand byte of the section of picture with the cross.

m%, n% – The co-ordinates of the section with the cross.

A string is placed at &A00. This is checked to see whether the puzzle has been completed.



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Welcome



MUSIC WHILE YOU PROGRAM

Amuse yourself with a
melody while you work,
by Jonathan Lidgard

you it's because it appeared on yellow page 1 of the August issue of *Acorn User*.

You can get some pretty weird effects by setting 'tune_start%' to equal the screen start address and then listing the program. If you're going to experiment like this it would be a good idea to alter the program slightly as it's not really suited to playing tunes on random data. Here's what I recommend you do:

DELETE lines 290-350 - Removes the pitch shifting
DELETE lines 220-250 - Removes sound channel 2
DELETE lines 430-450 - Removes channel 2 subroutine
DELETE lines 530-650 - Removes the data poking procedure

Change the following lines to:

```
190 LDY#&1
260 LDX#70:INX:STX#70
```

For those of you who want to adapt the routine even further, here's a detailed description of how it works.

The operating system of the BBC micro provides the user with a set of

HOW many of you Beeb users out there have thought how much more enjoyable your programs would be if they played a tune while they ran?

Well here's a routine that will allow your programs to do just that. And what's more, once you start the tune with a simple command it will continue to play until you use the command to turn it off or press Break. It can even be played while another program is loading!

As you can see from listing 1 (page 105) the program is in procedure format. To incorporate it into your own programs, add the procedure (omitting the REMs and changing the line numbers to suit) and then the following lines to the beginning of your program:

```
10 length%=32
20 DIM mcode% 122,t
tune_start% length%-1
30 PROCtune(mcode%,
tune_start%,length%)
40 PROCtune_data(tu
ne_start%,length%)
```

When you want to start the tune you must enable the vertical sync event with:

```
*FX14,4
```

To turn it off again use:

```
*FX13,4
```

Although this disables the vertical sync event there are still some notes left in the sound buffer, causing the tune to continue to play for a short while. To stop it instantaneously you must issue the command:

```
*FX15,0
```

which flushes all the buffers.

If you want to experiment with the routine add these lines to the start of the listing:

```
1 tune_start%=&C00
:length%=132:mcode%=&9
00
2 PROCtune(mcode%,
tune_start%,length%)
3 PROCtune_data(tu
ne_start%,length%)
4 *KEY0 *FX14,4IM
5 *KEY1 *FX13,4IM
*FX15,0IM
6 END
```

Run the program and when it ends press 'f0' to start the tune. You can now try listing the program - the tune should still continue to play - use 'f1' to stop it. You must enable the vertical sync.

If the tune sounds familiar to some of

built-in interrupts called events. The interrupt driven tune works by using one of these. The event used is the start of the vertical sync which occurs 50 times a second.

When the routine is entered the accumulator contains the event number - in this case 4. Line 140 tests for this, so it's only activated by the vertical sync pulse. In any interrupt driven routine it's imperative to save a copy of the registers, done here in line 150. However, the status register is saved earlier, in line 130, because line 140 would corrupt it.

Line 160 uses an OSBYTE routine to see how full the channel 1 sound buffer is. The amount of free space left is returned in the 'X' register. If there's no space left (X=0) a branch is made to 't5' where the registers are recovered and the routine is then ended.

If there's room left, the 'X' register is loaded with a pointer to the next data byte in the tune. If the pointer is used as an offset from T% (the start of the tune data), it points to the note pitch for channel 1. If it's used as an offset from (T% + 1) it points to the note pitch for channel 2. If it's used as an offset from (T% + 2) it points to the duration byte common to both channels. Both channels have the same duration so they do not get out of step with each other.

The notes are sent to their respective buffers by subroutines 'ch1' and 'ch2', which use the standard OSWORD call with the accumulator set to 7. The two sound tables used by OSWORD are stored in zero page from &80 to &8F and are set up by lines 490 and 500.

After the notes have been sent to the buffer, line 260 increments the pointer by 3. Line 270 checks if the pointer has gone past the end of the data - it's reset to zero in line 280 if it has.

In order to provide a variation in the basic tune, the pitch of each note is altered by a value which remains constant throughout the tune, but which is altered at the end before the tune is re-played. This is accomplished by lines 290-350. The pitch is repeatedly shifted down in the sequence (24 0 12).

The routine ends in line 390 after having recovered the registers in line 360.

ELECTRON USERS

This program will run on the Electron. Due to the Electron's limited sound capabilities the tune won't sound as good as on the Beeb, but it still demonstrates the techniques involved.

Jonathan Lidgard's music program is on yellow page 105.

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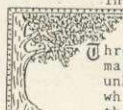
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Joe Telford gives you his recipe for an electronic magazine on the Econet Create and View pages of teletext graphics and characters

COOKING UP A TELETEXT EMULATOR

WHAT happens if you cross teletext with Econet? The answer is the Eco-fax teletext emulator – a software package which allows users to create, edit, delete and view pages made with teletext graphics and characters, in the BBC micro's mode 7 screen. So, free this month we have a package aimed specifically at using the level II file-server software in Acorn's Econet system. Its specification includes:

- Up to 400 pages or frames per disc.
- Still pages.
- Linked pages.
- Movie animation pages.
- Multiple users.
- Mixed edit/view on different stations.

No program conversion is required for a single disc system rather than Econet. In this case the maximum number of pages per disc is 31 (27 if the package and autoboot are included on the disc).

The package consists of three programs which must be located on either a blank DFS disc, or an initialised AFS (Econet) disc. These programs are Menufax, Eco-fax and Eco-ed. The first starts any session by helping a user to select the correct mode of operation, either viewing the teletext pages, or editing them. Eco-fax allows users to view teletext pages as still, linked, or movie frames. Finally, Eco-ed allows users to create, remove, load, save and amend any of the above frames.

Eco-fax can be considered under two guises. The first is as a display and information aid, in any situation where colourful notices or user-driven information systems are useful. Examples are doctors' surgeries, libraries, shops and businesses.

Second is in education, where Eco-fax will allow creative work to be based around an Econet. Initial attention might be focused on three areas.

In computing it could help demonstrate information handling, trees and other hierarchical structures, sequencing of frames and information, electronic transmission of information and authoring languages.

In art and design Eco-fax will allow students to consider how best information might be presented, design posters, compare colour schemes, handle text, design lettering, consider methods of gaining attention, eg flash, reveal, etc, not normally available, examine sequences of shapes, patterns, or pictures, and produce short animated movies.

Then, in English, students can use Eco-fax in a number of activities which have a language bias, and which can develop useful communication skills such as producing a school or department magazine.

Using Eco-fax

If the three programs are on a DFS disc then the system can be started by typing: CHAIN "Menufax". Alternatively a !BOOT file can be constructed.

If the package is to be used on Econet, I suggest a single directory and user called 'Fax' be created on a disc, and the three programs saved into that directory. The system can then be accessed by typing:

```
*I AM FAX
CHAIN "Menufax"
```

It is possible to preset the FAX directory to auto-CHAIN Menufax, by setting the OPTION to *OPT4,3 and then *BUILDing a !BOOT file in FAX which says:

```
0001 MODE7:CH."Menufax"
```

The three listings to create Eco-fax are on yellow pages 122-126

This will ensure Menufax is loaded after typing: *I AM FAX.

Creating pages is an enjoyable task which even very young children can join in. As with many command driven screen editors, the trick is to start with simple tasks. Short sessions with a target in mind and someone to help out will provide success (see *Eco-ed objectives* box).

Menufax

Program 1 shows the Menufax listing. Its aim in life is to provide a software interface between the user and the other two programs, Eco-fax and Eco-ed. Once the program has been chained, the screen clears to show a menu giving three choices: Eco-fax, Eco-ed or END. Only numbers in the range 1 to 3 are accepted, and once the return key is pressed the option will take effect.

Eco-fax

Program 2 shows the Eco-fax listing. This program allows the user to view any of the pages stored on the Econet

Eco-ed objectives

1. Try to type words just using the QWERTY keyboard.
2. See what the cursor keys do.
3. Examine (carefully) the use of return, to change modes of operation.
4. Try writing again up, down, left and right across the screen, using the master cursor.
5. Explore the function key overlay, trying out the ideas below as you go.
6. Produce red print.
7. Produce multicoloured print.
8. Produce a yellow background.
9. Produce blue printing on the yellow background.
10. Produce flashing text.
11. Produce large text.
12. Draw a square.
13. Draw a castle.
14. Copy text and graphics.

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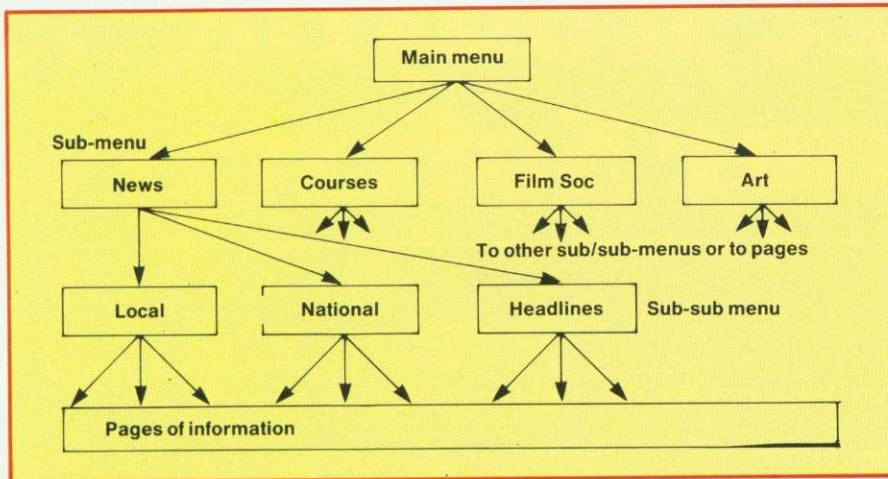


Figure 1. Tree structure of Eco-fax

or on disc. A number of special facilities are also included.

Once the program is chained, a title page is displayed asking for three items: the date, page link delay, and current time. Once these are entered, simply press the return key after each one to move on. The date must be entered as three separate inputs of year, month and date. These should each be entered as two-digit numbers, for example, 1984 can be entered as 84. Little validation is performed, which users can improve upon.

The link delay is a two-digit number representing a time delay up to 30 seconds between pages in a linked sequence. Older children, or mainly pictorial information will need a short time, while text and younger children may need longer. Start by setting the link delay to 10 (seconds) and then alter it to suit the material and the audience.

100 first, even if it has to be revised.

On all Eco-fax pages the top line contains the information:

```
PAGE XXX ECOFAX DD/MM/YY HH/MM/SS 'type'
```

Date and time are based on the original entry. The time displayed is when that page was called from Econet. The 'type' indicator is a single letter (S,L,M) which tells the user whether this is a single, linked or movie frame.

Single frames are pages which remain on screen until the user calls another. They are static, and consequently need to tell the user which page contains the local menu. Linked pages form part of a set. The linking from one to another is set by the creator. During the Eco-fax viewing session, any linked page accessed will, after 10 seconds, call another page. Linked page sets can be cyclic, ie loop round to provide a visual display. Linked pages can be held by simply holding the space bar. A linked page can be permanently frozen by pressing the return key.

Movies are linked pages which remain on the screen for only a fraction of a second. This means the Econet file server is going 'flat-out' loading screens. The movie option also works on disc systems, but the amount of disc read/write head movement is great. With Econet, the speed of animation depends on other users. As with linked pages, movies may be looped. Escape from a looping movie is by pressing the return key to freeze the frame, and selecting a new page.

Page selection is done by typing any frame number as three digits in the range 100 to 999, and pressing return. If the page requested is not on the system, a 'Page does not exist!' message appears briefly, and a beep is heard. Another page can then be requested. Remember, to select pages while links or movies are in progress, first press return.

If a page with hidden information appears, pressing the 'R' key will reveal the hidden information. Holding down the CTRL key and pressing '@'

will return the user to the main menu.

Page design

Rather than start designing pages, get an overview of the system. If using individual DFS discs, the practical problem of 31 (or less) files per disc will lead to creating individual discs around different topics. With level II Econet system, the amount of filespace is large, to the extent that many users can join in the collaborative use of the system.

It is important to give thought to the overall structure of the pages in Eco-fax. Initially, entry is at page 100 which therefore needs to indicate other main areas of the database. Paying due consideration to design and layout, the number of page references which can be made on frame 100 is small. It might therefore be best to indicate a few general headings. Each heading will have a page which is a sub-menu. This might (in a large system) lead to other sub-menus. The last layer of sub-menus leads to information pages.

Thanks to . . . Andy Peake, and the 'Escape Committee' from William Farr Secondary School, Lincolnshire

Inside Menufax

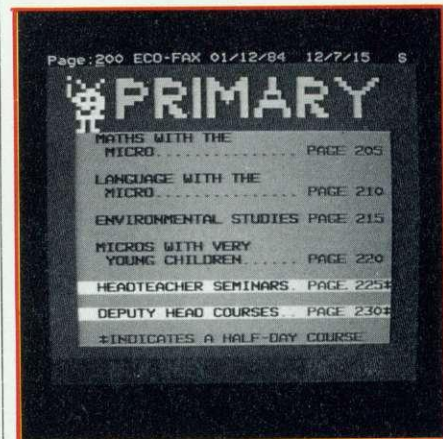
The main body of Menufax lies between lines 100 and 190. This part is self explanatory. The *FX200 calls disable and enable the escape key. Line 130 makes the only call outside the main program, to FNmenu. This function prints the title using PROC_xdblht, and displays the menu. Finally FNngpi is called to per-



The Eco-fax index page

The time should be entered as requested in two stages, first a two-digit 'hours' number and then a two-digit 'minutes' number.

After the introductory information, the first of the Eco-fax information pages will appear on the screen. This is always page 100, and consequently it will indicate where the other main areas of the Eco-fax system are found. Users should therefore construct page



The Sub-menu offers you further options

mit the controlled entry of a number 1, 2 or 3. Once the number is entered, line 330 of FNmenu returns the chosen option number to the main program.

The procedure PROC_xdblht simply produces double-height text on the screen, at the location indicated in its parameter list. FNngpi is a library routine which enables controlled entry of a predefined set of characters. Note that line 310 requests the input of one character, without any control on the keypress, within the range 1, 2, 3. page 82▶

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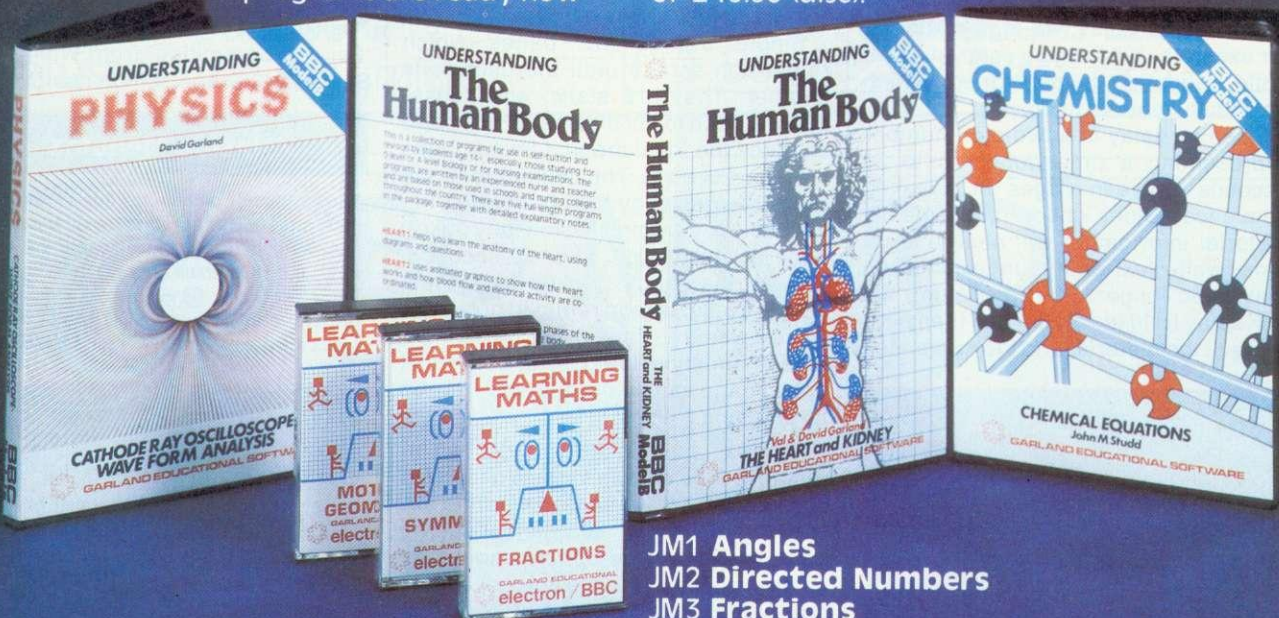
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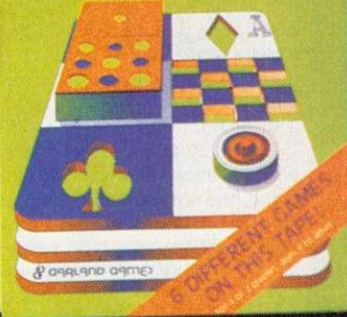
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Inside Eco-ed

Program 3 is the Eco-ed program. It has a short main body, between 100 and 340. It does, however, have a large number of utilities called from this part of the program.

In the main program line 100 calls a mode 7 screen, and sets HIMEM to a point just below the start of the screen. This is to accommodate the header information of page number, for links and movies, as well as the page type. Line 110 calls PROCsetup, which initialises the main variables and function keys and defines an error trap.

The main loop (lines 120 to 340) continues until the program is quit, as described in the documentation. Each time through the loop the screen cursor is positioned by line 120, and the character below it is read and printed on the bottom line of text by the pair of statements at line 130. The cursor position is restored in line 140. Line 150 waits for any character to be pressed. We use a GET here because we intend to work on one character at a time.

Lines 160 and 170 rely on the Computer Concepts Printmaster ROM. If it is not available, simply leave out these two lines.

Lines 180 and 190 set and indicate the setting of the two markers. Line 200 checks for ASCII code, 128, and calls PROCcopy to copy a block on the screen. Line 210 checks for the delete block command, and calls PROCdel. Line 220 resets the x and y cursor location to 0, 0, the Home position.

Lines 230 to 260 check the cursor key. If one is pressed in any mode other than command, the cursor is moved in that direction, via procedures 'left', 'right', 'down', 'up'. Line 270 checks for the <CR> key and toggles the mode between 0, 1, 2. The line then prints the current mode on the bottom line of the screen via PROCprintmode (mode).

Line 280 detects that graphics keys are being pressed in the graphics mode, and calls PROCgraphic to illuminate or darken the appropriate pixel/s. Line 290 simply tidies the program by short-circuiting any other keys pressed in graphics mode. Lines 300 and 310 behave in a similar way, with line 300 detecting a command, in command mode, and calling PROCcommand. Line 310 prevents spurious action being taken on characters other than the command character set, by restarting the main loop.

Line 320 prevents control characters under 32 from appearing. Line 330 prints the current character (in alphabetic mode) and handles both the delete key and the master cursor direction. The whole loop starts again, after meeting the terminator in line 340.

PROCmove tests the master cursor variable 'dir\$' and moves the cursor in the direction which it indicates.

PROClleft tests for hitting the left margin, and if so exits. Otherwise the cursor is moved one space left. **PROCright** tests for hitting the right margin, and if so exits. Otherwise the cursor is moved one space right.

PROCup tests for hitting the top of screen, and if so exits. Otherwise the cursor is moved one space up. **PROCdown** works as PROCup.

PROCgraphic looks at the routine from lines 560 to 680. This procedure allows both large blocks and small pixels to be displayed or erased. Each graphics key is allocated a

binary number, and this number is EORed with the contents of the screen location indicated by the cursor.

PROCstatus lines 690 to 730, prints the name of the character at which the cursor is flashing. Note this routine uses the array 'control\$()' which expands the effects codes so that CHR\$141 produces 'LARGE'.

PROCprintmode, lines 740 to 780, simply prints the name of the current mode, on the status line at the bottom of the screen.

PROCdirsay prints the single letter at the beginning of the status line, indicating the direction of the master cursor.

PROCcommand between lines 800 and 920, sets the master cursor variable and also decodes the four main commands: quit, save, load, remove. These are then called via subprocedures.

PROCsavpage checks that the page can be saved, asks for page type and page to link to. It also provides error messages if the page to be saved already exists.

PROCgetpage If the page entered exists, this procedure will load it. Otherwise an appropriate error message will appear.



Page 400 shows the graphics capabilities

PROCrempage checks if the page entered exists, and if so deletes it. The procedure has a 'safety latch' at line 1170, which asks the user to confirm the action.

PROCquit When this routine is called the user is asked to confirm the 'quit' at line 1220. If so the program chains Menufax, otherwise it returns to command mode.

PROCsetup initialises program variables: com\$ = string of valid command characters dir\$ = the direction of the master cursor mode = the mode in use (0, 1, 2) In addition, the function keys are set up and the cursor shape is set to be a large graphics square. The expanded names of the teletext control characters are read into the 'control\$()' array.

FNgpi is as used in Menufax and Eco-fax.

PROCdel deletes the current block marked by the two markers. It has to call PROCsort, to organise the x-y coordinates of the markers into the correct left/right, up/down sequence.

PROCcopy copies the current block to the new cursor position. Again PROCsort has to be called.

PROCsort sorts the markers so they always mark the bottom left and top right corners of the block.

PROCerr copes with system errors like 'Cat full' etc. It briefly replaces the status line with the error message, then restarts the main program loop.

The Eco-ed program

Program 3, Eco-ed, is longest and as such should be carefully copied into the BBC computer. Before using Eco-ed, readers will need a function key overlay strip as shown on yellow page 126.

Econet users should remember that Eco-ed allows access to the whole of the Eco-fax database. The database can be added to, or in the worst case deleted frame by frame, by a person with that intent in mind. *Always maintain a backup disc.*

Eco-ed program has three modes of operation. The command mode is used to save, load and remove pages; quit the program and set the master cursor direction. The graphic mode is self explanatory, while the alphabetic mode is used to display upper and lower case text numbers and control characters.

To enter command mode, press the return key until the display COMMAND (SLRQ`V<>) appears at the foot of the screen. Beeb is in command mode.

A page can be saved by pressing the 'S' key when a prompt will appear. This is answered by typing in the page number on which page is to be saved (in the range 100 to 999). If you enter a page number which already exists, a message appears to tell you so and the save command will abort. If you are successful in choosing a page number, the prompt.

Page Type: M (ovie): S (till): L (ink)?

appears. Enter your choice by pressing one of the capital letters shown (you should have already decided whether the page is part of a linked set or a still frame). Pressing 'S' will save the page, and the program will return to command mode. On pressing either 'M' or 'L' you will be asked 'Page no to link? ...'. Enter the number of the page to link to as a three-digit number in the range 100-999 and it will be saved.

To load an existing page from command mode press the capital 'L' key and a prompt will appear. Enter the three-digit page number and press return. A message will say if it does not exist: otherwise it will load.

Saved pages can be erased from command mode by pressing the capital 'R' key. Enter the three-digit page number in the prompt and press return. Non-existent pages are trapped, but if the page exists, the question 'Remove page no: 100 Confirm Y/N?' will appear. Enter 'Y' or 'N' appropriately. The program will then return to command mode.

To quit Eco-ed, press the 'Q' key, answer the confirmation, and Menufax is returned to.

From command mode, it is possible to set the direction of travel of the master cursor in alphabetic mode:

Key

- ↑ Text printed up.
- ↓ Text printed down.
- Text printed normally.
- ◀ Backward text.

The direction of the master cursor is shown in the bottom left corner of the screen. To demonstrate its use:

- 1 Press return until COMMAND (SLRQ`V<>) appears.
- 2 Press cursor up (↑) ('U' will appear).

page 85▶



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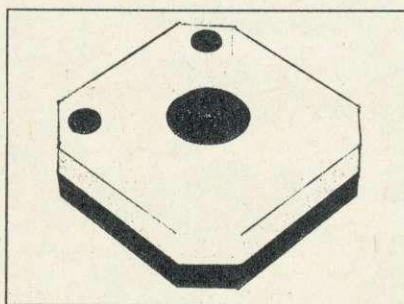
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3 Press return until Alphanumeric appears.

4 Type 'abc' and the screen will show it written down the screen.

The graphic mode is used only for creating or amending pages with pictures, draw in teletext graphics. Graphics pictures can be designed using blocks and/or individual pixels. Effects like the motorbike shown on page 81 can be created.

Provided the graphics control characters have been set up (see alphabetic mode), blocks of graphics can be created by pressing the space bar. A single press produces a single graphics block. Pressing the space bar for a second time erases the graphics block. Movement across the screen in graphics mode is only via the cursor keys. The master cursor is switched off.

A graphics block can be split into six individual pixels. These are arranged in a three-by-two rectangle. Provided the graphics control characters (see alphabetic mode) have been set up, designs can be created using the pixel graphics. The six pixels are controlled by the keys:

```
QW
AS
ZX
```

The positions of the six keys in the three-by-two rectangle correspond to the positions of the six individual pixels within the rectangle. An individual pixel is illuminated by pressing the key in the three-by-two rectangle which corresponds to that pixel. The pixel can then be darkened by pressing the same key again. For example, to illuminate the top-left pixel in the three-by-two rectangle, the 'Q' key would be pressed. To darken the pixel, 'Q' would be pressed again.

The third mode, alphabetic, places alphabetic and numeric characters on the screen. In addition, it is used to initiate many of the special effects by placing control characters on the screen. To enter alphabetic mode, press the return key until 'alphabetic' appears at the bottom left of the screen. Then, any of the QWERTY/1234... keys will print on the screen exactly as they are typed on the keyboard. The shift and caps lock keys work as normal. The CTRL key is disabled. The characters will be displayed across the screen in the direction set by the master cursor (see previous section). Note, however, that pressing return will *not* cause a new line, but change mode from alphabetic.

The control characters are shown on the overlay strip above the red function keys. Control characters are always invisible. The Eco-ed program will, however, display the character over which the cursor is flashing as a code on the bottom right of the screen, so the message 'ARED' means the cursor is above an alphabetic red character.

Each control character has the power to alter any other character placed on the same line. Most control characters cancel the effect of other control characters on the same line. The priority is that each control character from the right only affects text/graphics up to the next control character. There are only a couple of instances where this does not occur. These will be dealt with as we meet them.

The set of seven control characters marked 'Start alphabet characters' on the function key strip allow coloured alphabetic characters to be printed on the screen

(yellow page 126). For example, to print 'Hello cheeky' in red, follow these key sequences:

(SHIFT f1) Hello cheeky
where SHIFT f1 is the key combination to start alphabet character red.

As a second example, to RAINBO in multi-coloured lettering, follow the sequence:

R (SHIFT f1) A (SHIFT f2) I (SHIFT f3) N (SHIFT f4) B (SHIFT f5) O which gives the effect of (white) R (red) A (green) I (yellow) N (blue) B (magenta) O

The function keys marked 'Start graphics characters' are accessed by holding the CTRL key down and pressing function keys 1 to 7. The effect of a graphics colour character is to allow capital letters and numbers but not lower case letters to be printed. Whenever a lower case letter is printed, it will be represented by a set of graphics characters. Normally, these function keys are used to set up a complete graphics page and then the return key can be pressed to go into graphics mode. In graphics mode, pixel and block graphics are easier to use than remembering the graphics of the lower case letters.

To set up a complete page for graphics follow this sequence: press return until COMMAND appears; press cursor down to set the master cursor to point down; press return until alphabetic appears; press home (f1) to move to the top left of the screen; finally, hold down CTRL plus any function key from 1 to 7, depending on the colour required.

The cursor will rapidly move down the screen and, at the end, will beep. Using the cursor up key, it is possible to see the colour characters which have now been placed down the left hand side of the screen.

Function key 3 initiates large characters, while key 4 cancels the effect of the large characters. Because key 3 only works on one line, it effectively doubles the size of the character on that line. This means only half a large character can be seen on a line. To make a complete large character, it is important to duplicate the line, either below or above the original.

When using large characters, it is best to imagine that the screen is 40 characters wide by only 12 rows deep. It is possible to use the large character facility with graphics. Here again, two lines of graphics are required to produce the single large line. If small text is required after large, it is important to place a small control code after the large text.

The background can be set to be coloured by using f6, or to be black (as normal by f5). For example, to set a page to have blue writing on a yellow background, follow the sequence: Press return until command appears. Press cursor down so the master cursor points down. Press return until alphabetic appears. Press home (f0) to move to the top-left corner of the screen. Hold down alphabetic yellow (SHIFT f3) until the cursor moves to the bottom of the page. Press home. Press cursor right to move into the second column. Hold down new background (f6) until the cursor moves to the bottom of the page (as this happens, the screen will turn yellow). Press home. Press cursor right twice to move into the third column. Hold down alphabetic blue (shift f4) until the cursor moves to the bottom of the page. Press return until command appears. Reset the master cursor to point right. Press return until alphabetic appears. Move the cursor with the cursor

keys and any writing will now be in blue on a yellow background.

If at any point on a line black background (f5) is pressed, the background colour will change to black.

Graphics characters are initially set to be joined together. However, by pressing function key 9 (split) they can be separated into their component pixels. The picture of the motorcycle (after page 600) demonstrates the split capability. Remember only pixels on the same line and after the split control code will be affected. Characters may be rejoined by issuing the joined control code (CTRL f9).

It is possible to make text or graphics on a line flash on and off. This is done by pressing flash (SHIFT f8). All text or graphics following this code will flash. For example, to make 'Hello cheeky' flash on and off, in red, the key sequence is:

(SHIFT f1) (SHIFT f8) Hello cheeky

The steady control code cancels the flash code. For example, to make only the 'hello' of 'hello cheeky' flash, type:

(SHIFT f1) (SHIFT f8) Hello (SHIFT f9) cheeky

The hold graphics code is an advanced teletext facility. It allows a graphics character to be held over a control character where otherwise there would be a break-up of graphics/text: for example, in the transfer between two blocks of colours. This means the control code in the centre of the blocks would be covered by the character to its left.

The hide control code conceals any text or graphics on a line up to the next control code. It is used in conjunction with the reveal facility of Eco-fax. When R is pressed, all the hide codes are changed to reveal codes. When R is released they are changed back. For example, to hide the message Hello cheeky, simply type (CTRL f8) Hello cheeky. The message will not be visible during writing and so it is best to first write 'Hello cheeky' and then add the hide code.

The two marker keys, f1 and f2 can be used to invisibly mark a rectangle on the screen. Markers can only be repositioned; they cannot be cleared. To set a marker in alphabetic mode, move the cursor to one corner of the rectangle which is to be marked. Press 'Marker one' - a short 'beep' will be heard. Move the cursor to the diagonally opposite corner of the rectangle and press 'Marker two' - a double 'beep' will be heard. The rectangle is now marked. Note the rectangle includes the character positions marked.

Once a rectangle containing text or graphics has been marked, it may be copied to any point on the screen. To do this, move the cursor until it is at the top-left corner of the new rectangle and press SHIFT f0 (copy block). The block will copy into the new space. Remember that control characters may need to be copied across with graphics or coloured text. Note also that copying a rectangle into itself generally does not work. After the block is copied, the markers are still in place around the original block.

To delete a block, mark it, and just press CTRL-f0. Once deleted it cannot be recovered, and again the markers remain in place. The screen can only be cleared by re-starting Eco-ed, or by setting markers at beginning and end of page and pressing (delete block). This complexity removes the problem of accidentally clearing a page.

A HIGHER TONE OF PRINT

Peter Sandford helps you make a professional impression with your reports and maps with his colour-fill and dot pattern routines

PRESENTING a versatile machine code fill utility which can be used to fill complex shapes in a choice of 24 predefined dot patterns, this article follows up those by Jim McGregor and Alan Watt in the August and September 1983 issues of *Acorn User*. The former-introduced Basic algorithms for filling complex shapes with foreground colour, and the latter showed how colour fill routines could

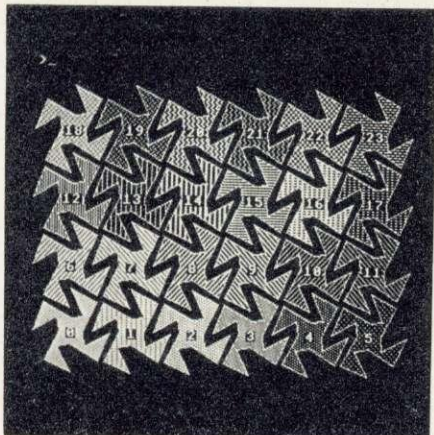


Figure 1. Dotfill's 24 tone patterns

be used to mix colours, creating the effect of 15 different tones at any time in mode 1.

With minor modifications, this routine can be used as a fast colour mixing fill utility. This allows mixing of foreground and background colours, and increases the number of colour tones available on screen at any one time in mode 1 to 28.

Both versions offer benefits of speed and reduced memory requirements

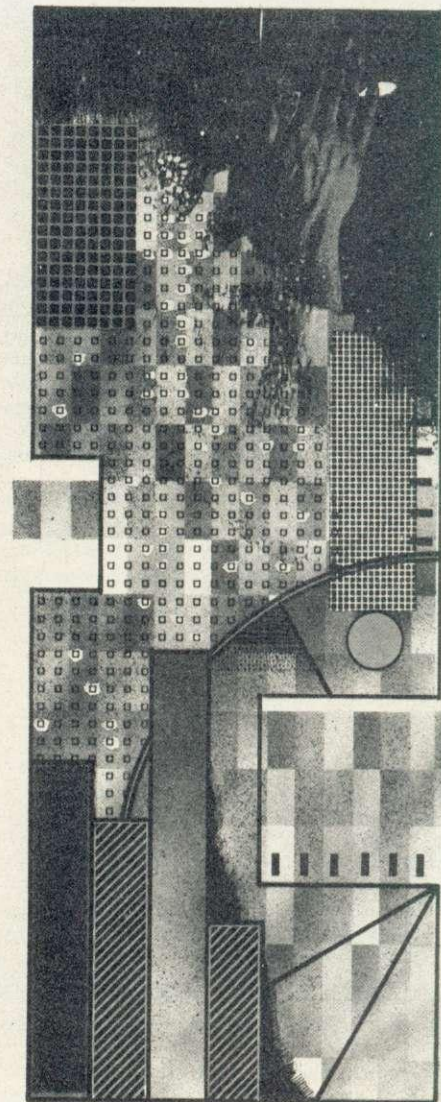
over existing Basic fill routines. The dot filling routine could be of value for a wide range of graphics applications, but is likely to be of most benefit in those requiring the high resolution and 80 column text capability offered by the mode 0 screen. Some examples of the results that can be achieved are shown on page 89.

Existing fill algorithms assume that the fill will be in solid foreground colour. This enables the algorithm to 'check back' on lines which have just been filled in order to explore the boundaries of the fill region. This technique isn't feasible where the fill routine is to leave individual pixels in their background colour, and a more complex algorithm has had to be devised.

Listing 1 on yellow page 112 is a Basic listing of a new fill algorithm which overcomes these limitations. It forms the basis of the main assembly language fill routines presented in this article, and it may be useful to compare this with program 1 of McGregor and Watt's August 1983 article.

The new routine provides a simple demonstration of filling using PLOT 21 to draw a dotted line instead of a line of unbroken foreground colour. Try substituting PLOT 21,x2,y for DRAW x2,y in line 1030 of the original program to see how this causes the old routine to 'hang up' when it checks back on the line most recently filled.

The major difference between the old and new algorithms is the complex checking of the limits of each line filled, in lines 300 to 320 of listing 1. The routine still uses a line queuing technique

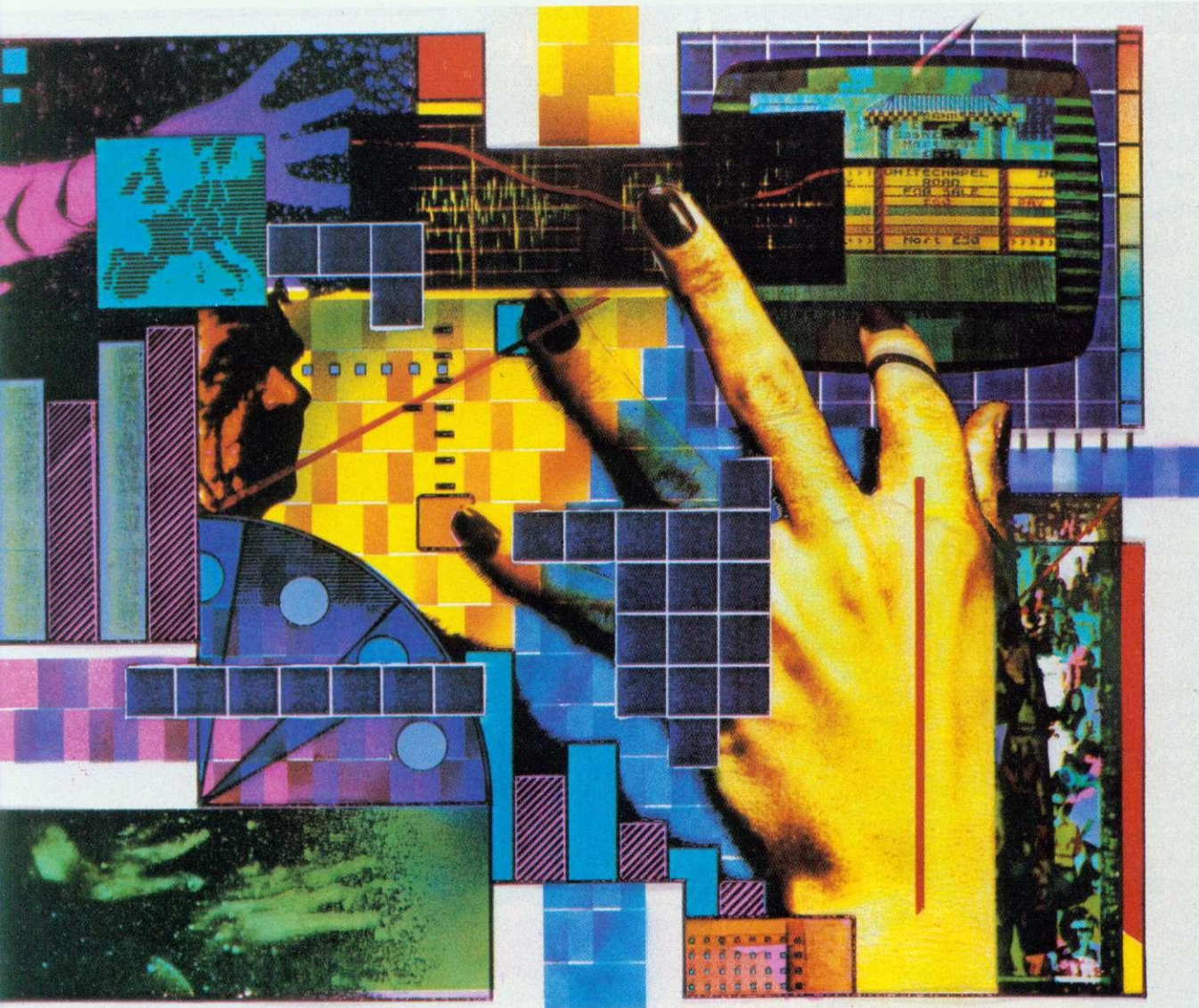


to cope with convoluted shapes, but you will notice that instead of filling on several fronts at once, it takes place only in one direction at a time. As the fill progresses in any one direction, the limits of each line are tested to see if filling should take place from any new points. If so, the new points are stored in the queue to await completion of the current direction of fill.

Listing 2 is the main assembly language coding for the new fill routine. The resultant machine code occupies just under three pages of memory (including an area of data storage for 24 predefined dot patterns). One additional page of memory is required for use as workspace for the queuing of new points and must be specified at the time of assembly (line 70).

Check listing 2 carefully after keying it in, and save it before running it. When run, the program will assemble the machine code and automatically save it under the filename DOTFILL.

As listed, the routine is configured for disc systems, assembling the code at &1200 and designating &1100-&11FF as workspace. This would enable



PAGE to be moved down to &1500 if memory is tight.

Tape users should alter the values of 'code' and 'workspace' in line 70 to &F00 and &E00 respectively, and set PAGE to &1200 before entering and running the assembly listing of program 2. PAGE should also be set to &1200 or higher before loading any program that is to use the routine.

Note that line 90 incorporates a 'checksum' test which adds together all the machine code bytes and halts the program if there has been an error in typing in the assembly listing. Tape users should insert the alternative checksum value of &1319D. This line should be deleted if you wish to assemble the code at any location other than &1200 or &F00, or alter the location of the routine's workspace.

After assembly, the routine can be called from Basic by the command:

```
CALL DOTFILL,x%,y%,t%
```

where x% and y% are set to the starting co-ordinates from which filling is to take place, and t% is a value between 0 and 23 specifying which predefined

tone pattern is to be used. The value 'DOTFILL' should have been set to the address at which the routine has been assembled. If the routine is called without these three integer parameters, it will exit with a 'CALL parameters' error message.

Listing 3 provides a demonstration of the operation of the DOTFILL routine, showing the 24 shading patterns which have been predefined. Tone 0 is a solid fill, and tones 1-5 provide a graduation in dot density down to one dot per eight pixels. The remaining tones provide a selection of diagonal, vertical and horizontal shading, plus six miscellaneous patterns and texture effects.

The 24 different tone patterns are specified in the DATA statements of lines 5030 onwards in listing 2. Each tone is defined on a 16 pixel (4 x 4) grid (figure 1). The pattern is coded into a two byte number and stored in sequence after the main routine by PROCassembletones.

The selection of tones contained in the listing is by no means exhaustive, and alternative patterns can easily be defined to suit your purpose and substi-

tuted in the DATA statements accordingly. If you wish to increase or decrease the number of tones stored with the routine then the value 'ntones' stored in the DATA statement at line 5010 should be amended.

DOTFILL will operate in any graphics mode, and the dot pattern is drawn in the current foreground graphics colour. It is important to note that, unless you are using a high resolution monitor, the distinction between all the tones may not be clear on the screen if listing 3 is run in mode 0. To study the effect in detail a call to an appropriate screen dump routine should be inserted at line 140.

The DOTFILL routine can be amended to provide a fast colour mixing fill routine with only a few modifications, shown in listing 4. Listing 2 should be loaded into the computer, lines 710-770, 3860-4510 and 4870-5350 deleted, and the new lines of listing 4 added. When run, the new program will now assemble and automatically save the modified routine under the filename 'COLFILL'.

This routine offers a choice of 28 dif-

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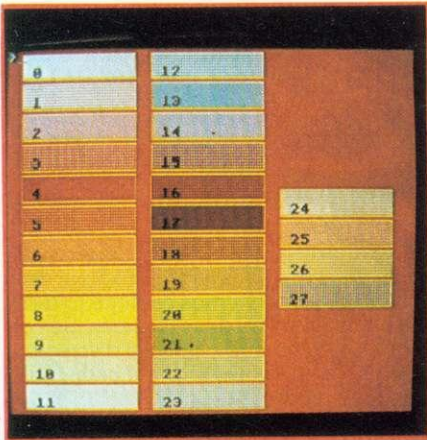
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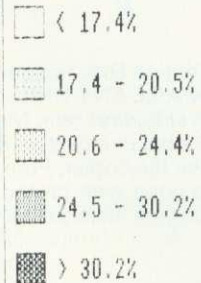
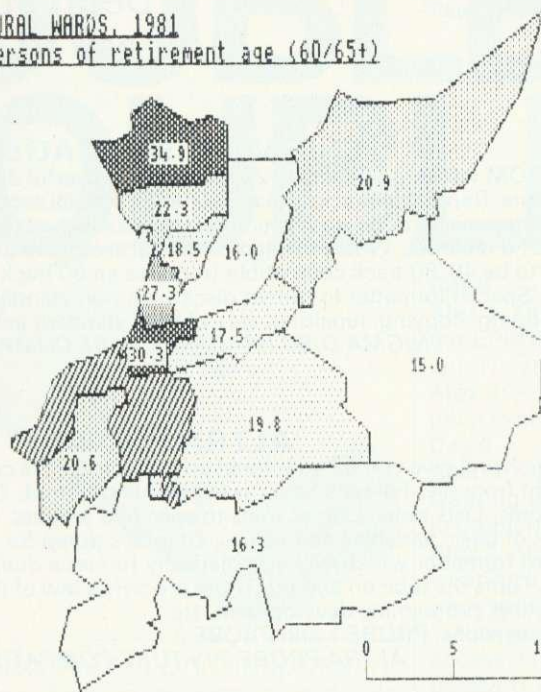


There are 28 coloured fill patterns available in mode 1

ferent coloured fill patterns. Each is based on a 2 x 2 pixel grid (or 'super pixel' - see *Acorn User*, September 1983). Each element of this block can be set to either colours 1, 2 or 3, or the background colour, colour 0.

The information for the different patterns is again stored in the DATA statements at the end of the listing. Each set of four colour values is encoded and stored after the main routine, this time only requiring one byte of storage space for each pattern. The new routine is called from Basic in the same way as for DOTFILL, requiring three integer parameters denoting X,Y co-ordinates and pattern value (this time in the range 0-27).

RURAL WARDS, 1981
Persons of retirement age (60/65+)



District Average
=23.5%

This pre-drawn map was shaded using the general purpose fill routine (listing 4).

Finally, listing 5 provides a simple but effective demonstration of the speed of operation of the new colour fill routine and of the range of colour tones now available.

See yellow pages 112-118 for Peter Sandford's suite of programs

PROGRAM NOTES

Listing 1: Basic listing of revised fill algorithm

Listing of PROCs, FNs, & variables.

PROCfillfrom - Control routine to fill from co-ordinates x,y.

PROCfillup - Fills as far as possible in a single direction, testing fill boundaries. nextx,y - Co-ordinates of start point. ystep - Controls direction of fill (ie up or down screen). tox - Right hand limit of last line drawn. newx - Used to test co-ordinates of next pixel of background colour around perimeter of fill area.

PROCfillalong - Fills single dotted line to left and right from point x,y. CPblock - Parameter block for OSWORD call. leftx - Left hand limit of line filled. rightx - Right hand limit of line filled. xstep - Width of single pixel in screen co-ordinates. 1x - X co-ordinate for first pixel to be filled.

FNback - Returns X co-ordinate of next pixel of background colour to right of point x,y.

PROCqueue - Stores co-ordinates for next call to PROCfillup. fx,y - X,Y co-ordinates of start point. tx - X co-ordinate used to test right-hand limit of first line to be filled. fromxq%() - Stores value of fx. yq%() - Stores value of y (sign denotes direction of ystep). toxq%() - Stores value of tx. first,last - Queue pointers.

PROCunqueue - Retrieves co-ordinates from queue.

PROCshape - Plots demonstration shape. x%,y% - Co-ordinates of central point. R1,R2 - Linear displacement of plotting points from centre. A1,A2,A3 - Angular displacement of plotting points.

Listing 2: Assembly language listing for DOTFILL routine

1 Conversion for tape systems.

Tape users should set PAGE=&1200 before entering and running the assembly listing. The following lines should be amended.

```
70 code = &F00:workspace = &E00
90 IF FNchecksum < > &1319D PRINT "Checksum error - check assembler listing":END
110 *SAVE DOTFILL F00+2FF
```

2 Zero page locations used by DOTFILL

```
&70,71 xlo/xhi Current X co-ordinate
&72,73 ylo/yhi Current Y co-ordinate
&74,75 newx Returns new X co-ordinate from OSWORD call
&76,77 newy Returns new Y co-ordinate
&78,79 tox Right hand limit of last line drawn
&7A bitmap Dot pattern for a given value of Y
&7B mask Used to test whether a bit corresponding to current X co-ordinate is set in bitmap
&7C xstep Width of single pixel for current screen mode
&7D xshift Loop counter used to calculate displacement for mask bit
&7E,7F pattern Stores 2 byte tone pattern
&80,81 first Pointer to next set of co-ordinates in queue
&82,83 last Pointer to next free location in queue
&84 flag Controls current direction of fill. If bit 7 clear, fill direction is up screen. If set, fill direction is downwards
&88,89 leftx Left hand limit of line filled
&8C,8D rightx Right hand limit of line filled
&8E,8F oldx Previous value of leftx
```

Listing 3: Demonstration of DOTFILL routine

1 Conversion for tape systems

Tape users should set PAGE=&1200 before loading and running the program. The LOAD

address at line 60 should be changed from &1200 to &F00.

2 Listing of PROCs, FNs, & variables

T% - Loop counter and tone value

PROCshape - Plots demonstration shape. x%,y% - X,Y co-ordinates for centre of plotting shape. R1,R2 - Linear displacement of plotting points from centre. A1,A2,A3 - Angular displacement of plotting points. charwidth - Width of single character in screen co-ordinates for current screen mode. TS - String value of fill tone.

Listing 4: Modifications to convert DOTFILL routine to colour fill

1 Load listing 2 and then enter the following commands to delete appropriate lines:

```
DELETE 710,770
DELETE 3860,4510
DELETE 4870,5350
```

2 Now enter listing 4

(NOTE: For tape systems the checksum value in line 90 should be changed from &1380E to &13790, and the SAVE address in line 110 changed to &F00).

Listing 5: Demonstration of COLFILL routines

1 Conversion for tape systems

Tape users should set PAGE=&1200 before loading and running the program. The LOAD address at line 60 should be changed from &1200 to &F00.

2 Listing of PROCs, FNs, & variables

T% - Loop counter and tone value

PROCblock - Plots rectangular block of colour. x%,y% - X,Y co-ordinates for position of block. tone% - Tone value for fill.



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Altra Probe is available in two versions. PROBE 1 and PROBE 2

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Basic Ed, is on 8K ROM which contains 21 additional commands. They are: \$ search, List matches, Number matches, Global replace, Selective replace, Bad programme relink, Copy lines from one part of a programme to another, Format a listing, Move, Super pack, Renumber, Table line references, Unpack, Variables X ref, List entire programme, Keyboard immediate mode, Printer on/off, Paged mode on/off, List match lines, Concatenate, Strips rems, spaces etc. Altra Basic Ed. is an essential helpful tool for the Basic / Assembler programmer. Altra Basic Ed. is available in two versions. Basic Ed. 1 and Basic Ed. 2.

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FIRST AID 1.1

First Aid 1.1 is an 8K ROM which contains 19 additional commands. They are: Machine code dissembler, Hex and ASCII dump, Sideways rom to ram copier, Function key predefined facilities, Variable table listing, Memory space free calculator, Checksum calculator, Rom lister, String search, Define function keys with strings, Rem and space stripper, Bad programme fixer, Clear all variables, Clear ram from &0400 to &8000, Machine code monitor, First Aid 1.1 as a language, Lists O.S. calls with there vectors, Lists the first 24 control codes. Altra First Aid 1.1 was designed to assist the Basic / Assembler programmer and the sideways rom user.

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DOUBLE TROUBLE

OUR OLD friend Mad Alex has been making trouble again in *Acorn User's* radioactive dungeon. He's been mucking around with his second processor and making some modifications unforeseen by Acorn. To start with, he's produced a clone of himself by feeding all his personal data into the machine. 'I thought that was what a second processor was for,' the pair of them purr.

To your mortal eyes Alex and his clone are indistinguishable. However, Auntie Kitty indicates there is a way of differentiating them. Because of an untraced bug, both Alex and his clone have to have silicone dongle chips interfaced to their earrings. One earring has a ROM chip, the other an EPROM – but you can't see who's wearing which. All you know is that whoever is wearing the ROM is telling the truth, while the EPROM wearer is lying.

Auntie Kitty's somewhat dubious treat is to invite you to breakfast four mornings in a row at the Hotel des Amis de la Quinless along with Mad Alex and his clone. This establishment, renowned for its fine mixture of a well-known bottled beer served over the proprietor's favoured Prawn Biryani, is the perfect place for you to grapple with logical problems.

Auntie Kitty explains that all you have to do is solve the problems below and determine each day which one is the real Alex and which is his clone. As usual, you have a number which, if you get it correct, may allow you access to the fabulous prizes on offer this month.

The prizes are located in Bruce's Burrow, a secret lair inside the dungeon whose fabled custodian spends most of the time scowling at royalty statements from publishing houses and inflicting foul language upon all who issue them. If you fail in your mission, you will be cast into the Stygian gloom known as R & D at a certain Cambridge computer company.

Each day you have to give your numerical password to the chief waiter, a surly brute with only one arm (following an unfortunate incident in Nairobi when he was foolish enough to attempt to deprive our favourite editor of his wallet); nevertheless he's good enough to zap you if you fail.

First you have to solve these three



Mad Alex is on the loose in the dungeon again – this time with his clone to set you thinking twice as hard

puzzles – a treat for all those entrants who moan that their own (invariably unique) answer is correct because we failed to stipulate that solving a problem in base 89 was disallowed.

Problem 1

Find a six-digit number which is square both in base 5 and base 10.

Problem 2

Find a two-digit number which is a prime in base 8, base 10 and base 12.

Problem 3

Find the largest number base in which a three-digit number in base 10 with no repeated digits can be expressed by reversing the digits.

The password on day one is the sum of the answers to these three problems. On each occasion, when you have determined which one is Mad Alex, you must do exactly as he says (even if he may be lying) and ignore all instructions from his clone. All calculations below are in base 10.

Day 1

Alex 1: Either I am Alex and this is the EPROM chip or I am the clone and this is the ROM. Add the solution to problem 1 to your password.

Alex 2: Add the answer to problem 2 to your password.

Day 2

Alex 1: Either I'm Alex or I'm wearing the EPROM. Add the answer to problem 3 to your password.

Alex 2: Subtract the solution to problem 2 from your password.

Day 3

Alex 1: The clone among us is wearing the EPROM. Add the solution to problem 1 to your password.

Alex 2: Add the square root of the solution to problem 1 to your password.

Day 4

Alex 1: Alex 2 is the clone and he's wearing the EPROM. Add the solution to problem 3 to your password.

Alex 2: Alex 1 is the real Alex – and he's wearing the ROM chip. Subtract the solution to problem 3 from your password.

Now you know the password to gain access to Bruce's Burrow put it on a postcard addressed to January Competition, *Acorn User*, 68 Long Acre, London WC2E 9JH, to arrive not later than February 1, 1985.

PRIZES

We've got three Quinkeys to be won – a new alternative keyboard for the BBC micro.

First prize, worth £250 – the Quinkey basic pack of a keyboard with prompt cards, an interface pack and user guide PLUS a Brother HR-5 thermal printer, an extra keyboard and two games – *Skram* and *Spooky Manor*.

Second prize – the Quinkey pack PLUS an extra keyboard and *Skram*.

Third prize – the Quinkey pack PLUS *Skram*.

SEPTEMBER

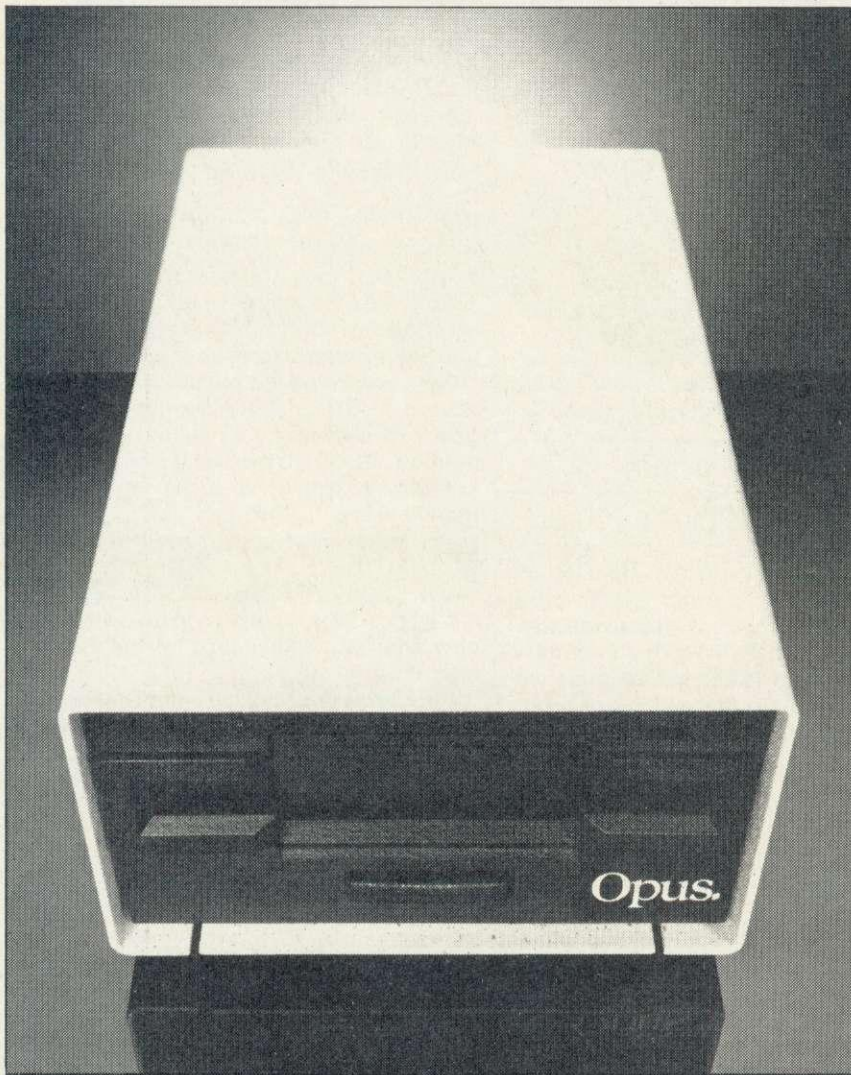
WINNERS

SEPTEMBER's competition produced an entry of several hundred – about 70% correct. The combination lock number for Kitty's Kitchen was 31966, derived as follows: the next four 'amicable numbers' are 1184–1210, 2620–2924, 5020–5564, 6232–6368. The gremlins were, respectively a,b,a and b.

Apologies for the (not intentional) misleading phrase in room 4 which some of you pointed out. You can't, given the terms, be certain of the identity of all three characters. You can, though, pinpoint the gremlin as b.

The three entrants who win 100k Cumana disc drives are: Alan Ryder of Manchester, Ian Barton of Cambridge and Brian Heaney of St Albans.

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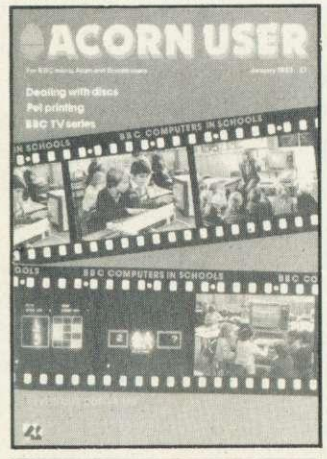
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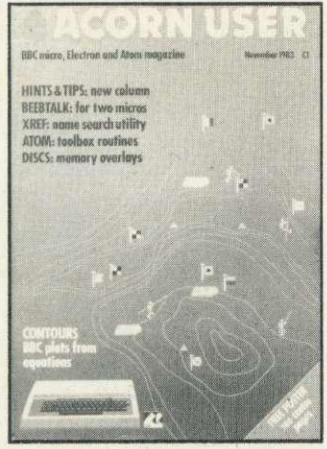
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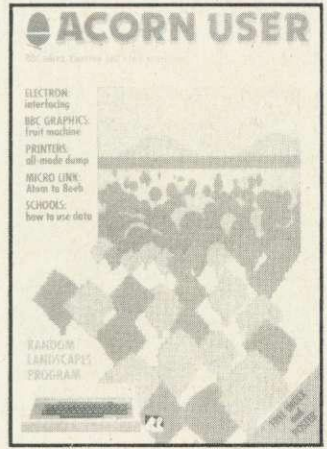
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16. November Techniques – impossible problems. Contour graphics. Connecting two Beebs together. XREF: sorts & lists variable, function and procedure names. Assembler utilities in Basic II. OS, VDU, *FX, OSBYTE calls – pull-out poster. Disc overlays. Adding extra Atom commands. Reviews of 7 educational packs, Atom ROM, books, games.

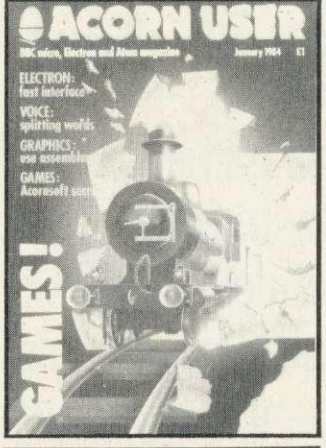


17. December Random graphics. Animated graphics in colour. Techniques – graphs. Hints & Tips. Universal printer dump. 6522 connected to the Electron. Saving machine code. Beeb Forum. Graphics pull-out poster. Index: July 82–July 83. Forum Extra: EQUUS. BBC helps the disabled. Schools – data processing. Transfer-



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18. January 1984: Games special issue Techniques – graphs part 2. Stacks and queues. Basic and languages. Hints & Tips. Voice chip revealed. How to write games. Electron interfacing. Beeb Forum. Life graphics routines. *Defencecom* game listing. *The Train Game* listing. Machine code graphics. Where to put machine code. Schools – handling data. Juki daisywheel printer examined. Atom Forum and adventure. Reviews of utilities, software, *Beeline* wordprocessor, educational packages, two chess programs.



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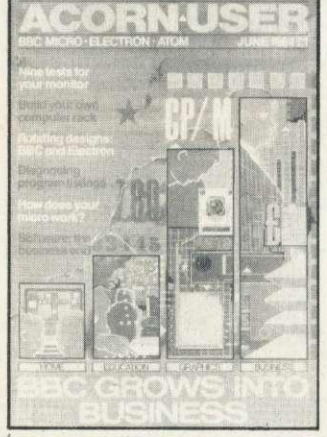
20. March Utility: timing routine. Fractals. Teletext and mode 7 dump. ROMs reviewed. Hints & Tips. Beeb Forum. Add sounds to your games. Learn Lisp 1. Cube graphics. Printer driver for View. Basic II from Basic I. Beeb's ADC chip. Atom Forum. Listing formatter for

the Atom. Atom 'bytes free' routine. Schools – test of *Factfile*. Keyboard skills. Amcom DFS v Acorn DFS. Reviews: *Beebpen* wordprocessor, Atom expansion system, software, books.

21. April Beeb graphics on TV. 6845 chip explored. Advanced filing systems. Lisp 2. Hints & Tips. Beeb Forum. Choose disc tracks to copy. Function key editing. Teletext dumps. CES scrutinised. Passing variables. Computer Concepts' graphics ROM. Schools – simulations. Calculating Easter dates. Better programming. Atom Forum. Atom ROM routines. Converting BBC to Atom Basic. Three printers compared. Reviews: software, Aries B20 RAM board, *Toolkit*, Monitors.

22. May Bitstik graphics system. Hints & Tips. 6502 second processor examined. Lisp 3. Beeb Forum. Disc utility to keep track of available space. Statistics. Pattern graphics. OSWORD explained. 4 colour graphics listings. Second-hand disc drives. Education – do girls get a fair deal? Atom Forum. BBC to Atom Basic 2. Reviews: British Micro's Grafpad, *Edword* wordprocessor, 4 sprite generators, Opus microdrive, *Beasty*, software.

23. June Acorn Z80 second processor. Forth. Graphics to brighten up your games. Soft Pottery graphics. Go faster and save memory space. Rapid search and load routine for tapes. How the Beeb and Electron work 1. Business: reviews and how to gently enter office computerisation. Education – adult literacy. Dumping Atom programs on the BBC. Atom Forum. Software copyright laws. Hints & Tips. Techniques – B-Trees. Beeb Forum. Reviews of monitors, printers, books, software, adventures, EPROM programmer.



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E·I·G·H·T of the G·R·E·A·T·E·S·T

During 1984 thousands of readers have played the Acorn User software games **Swordmaster** and **Trek**. Now, just in time for Christmas, we have expanded the range with six more tremendous games on cassette and disc. Every one is an absolute winner and, of course, great value. Give yourself a present this year, with the best wishes of Acorn User.

Produced, developed and tested by Micrograf

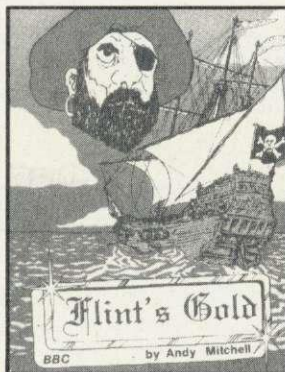
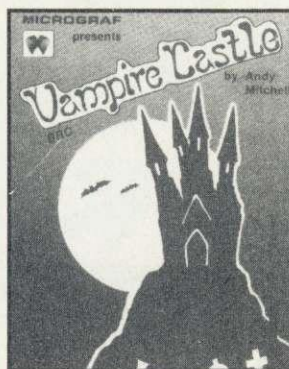
VAMPIRE CASTLE

Make sure you play this adventure with the lights on. It plunges you into spine-chilling reality, where you can almost smell the dank odours and feel the terror around every corner. Eyes peer at you through the gloom and all manner of creature awaits your slightest error. Try to find and destroy Dracula, but *remember there are fates worse than death.*

The game, written by Andy Mitchell, includes suitably eerie music and surprise graphics, and we accept no responsibility for heart attacks suffered as a result.

'A gem of an adventure' - PCN

£6.95 Cassette
£9.95 Disc (40/80)



FLINT'S GOLD

If you suffer from sea sickness, scurvy or beri-beri this game will either kill or cure. It's a swash-buckling adventure that may be the experience of a lifetime - if you can survive long enough. In your search for the legendary Flint's Gold you will sail the Spanish Main to a land of blood-thirsty pirates, and you may never return.

The sound of crashing surf, the cry of seagulls, and the accompanying sea shanty are so realistic that you can almost taste the salty air.

'It's a far better story than the Hobbit' - Micro User

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TREK

TREK was the first game to take advantage of voice synthesis on the BBC micro - and uses joystick or keyboard.

Trek puts you in charge of a Starship with the task of wiping out an alien fleet. It's an excellent adaptation of the classic game with 7 screen displays, 3 on-board computers and 2 weapon systems.

Versions have been written for BBC micro and Electron to use both machines to their full. The BBC tape uses voice synthesis (if the chips are fitted).

The game has been extensively developed from Tim Heaton's famous Trek III. It barely fits into 32K.

£7.95 Cassette
£10.95 Disc



SWORD MASTER

SWORD MASTER is one of the few two-player games around, and is designed for joystick or keyboard.

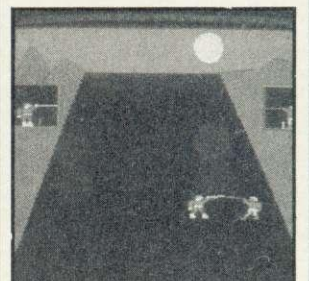
Sword Master by Ken Worrall is based on the fencing rules written in 1190 by Herman von Salza for the Deutscher Order of Teutonic Knights. It features full-colour machine code animation of a sword duel between two knights.

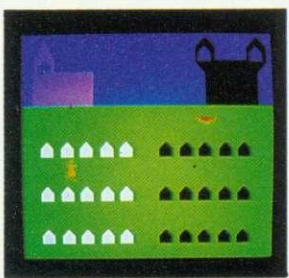
'... A quality game with high class graphics ... one of the most enjoyable games I have played' - Home Computing Weekly, June

'Swordmaster is an immensely entertaining game with excellent graphics and animation' - Personal Computer Games, June

'Swordmaster is a unique game ... one of the few two-player games that makes more than a token gesture towards truly interrelated action' - PCN, June

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COMPENDIUM

A tremendous-value compendium of the three most popular *Acorn User* games.

HEXANGLE demands the utmost concentration. You and the micro take turns in drawing lines between the six points of a hexangle, avoiding at all costs completing a triangle while at the same time forcing the computer to do so.

In **MEGA MONSTERS** you are confronted by waves of aliens. While avoiding these and many other obstacles you have to rescue the stranded mutants. It gets more difficult with each phase until finally you face the Monster himself.

VAMPIRE is a two-player action game in which good battles with evil. Each player has an equal number of souls in his care, represented by tombstones or crosses. During each period of day or night one player has the chance to recover or capture souls from the other. The winner is the one to recover all the souls.

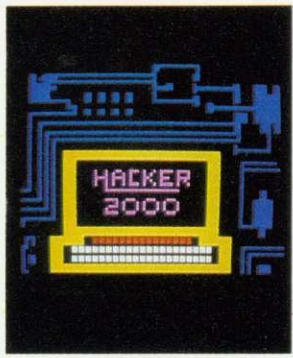
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HACKER 2000

In the year 2000 only two classes survive, Programmers and Prols. As a Prol, your only escape from a life of drudgery is to 'hack' your way into the massive Multivax complex in order to change your Brain Scan Report and obtain money to bribe the Thought Police.

You may gain vital information with the assistance of the Duty Android in a tour of the complex. If you manage this, you're on your own. From here on you start to appreciate the originality of the game in its representation of a real-time system. You'll need all your powers of logic and some lateral thinking to use the information you glean to 'hack' through the Multivax systems. Your goal can be reached in an unlimited variety of sequences.

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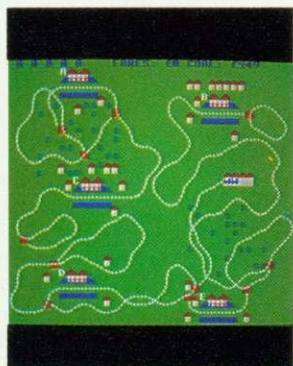


TRAINS

This classic game by Peter Balch requires quick wits and clear thinking. Your aim is to manoeuvre a number of trains around a complex network of track, as you pick up fare-paying passengers and deliver them to their destinations. All the time your valuable stocks of coal are dwindling. If you succeed, you have even more trains to control and more passengers to collect. And as if this were not enough to cope with, you are confronted by the Demon train over which you have no control.

The game has excellent graphics and will keep you on your toes. See how profitably you can run a railway.

£7.95 Cassette
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CORPUSCLE

In this superb machine code action game by Ken Worrall you assume control of the body's defences, journeying into the three-dimensional labyrinth of the human arterial system. Invading colonies of bacteria advance relentlessly and you must destroy as many as you can. If you fail to keep the bacteria count low they attack individual organs. You must then frantically follow the network of arteries to reach the site of infection. Too many critical areas and you die.

You don't need to know a great deal about the body to begin with - a map is provided. But we guarantee you'll know a lot more when you've finished. It's a unique adventure, truly educational and great fun.

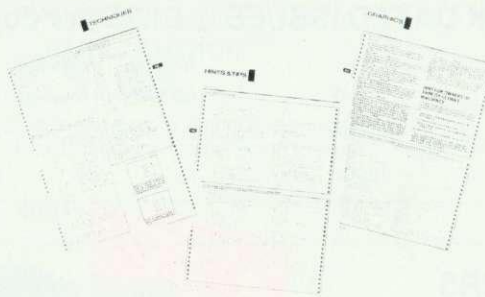
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Yes, at last, the tape you've been crying out for! Save the wear on your fingers by sending for one of our cassettes giving all the major listings in this issue. Each cassette costs £3.75 (inclusive) for the Electron and BBC micro. This includes a menu and disc transfer routine to help you find your way around - and use on your own programs. The tapes come with BBC programs on one side and Electron programs as the other, so it shouldn't be possible to mix the two.

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the time and bother of
typing in Acorn User listings

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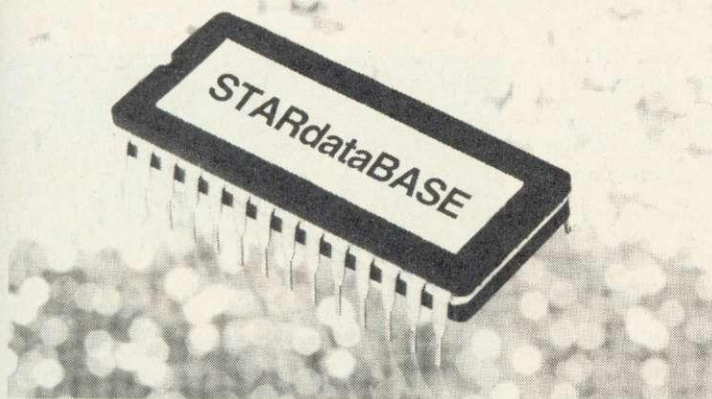
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STARdataBASE . . .

The database



for the BBC

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FEATURES:

- * Up to 4096 records in a file.
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HAVE YOU ALREADY GOT DISK DRIVE(S) FOR YOUR BBC COMPUTER?

SOLIDISK HAS SOMETHING TO OFFER.

— FOR THOSE OF YOU WHO DO HAVE ALREADY, A DUAL FDC DISK FILING SYSTEM (DFDC, using the old 8271 and adding the new WD1770 FDC), ADDS DOUBLE DENSITY AND KEEPS TOTAL COMPATIBILITY (See opposite page).

— FOR THOSE WHO HAVEN'T, A DUAL DENSITY DISK FILING SYSTEM (using the new WD 1770) WILL PROVE MUCH FASTER AND CHEAPER THAN THE 8271.

THE DISK DRIVE:

The disk drive (see pictures) comes from the new series VLSI ultra quiet, auto spin-up, 5.25" half height, solenoid head load, 40/80 track, single and double density MIT-SUBISHI M4853. It is fast, quiet and consumes far less power than any previous models. 2 new 64 pin surface mounted microcontrollers (from Motorola and Mitsubishi), largely reduce the area occupied by the drive electronics (see pictures), leaving so much more room for the diskette, with very low noise level and reduced friction of the media and the jacket.

SOLIDISK DUAL DENSITY DISK FILING SYSTEM.

Basic characteristics include very high operating speed, Acorn compatibility, automatic 40/80 track switching, auto-density, resident disk formatter and 100% compatibility with Solidisk Sideways RAM.

It is also the simplest ever Disk Upgrade for the BBC computer: with only 4 components: 1 ROM, 2 buffers and the FDC. (See picture 3).

Solidisk software engineers have built in to the 8192 bytes of the 1.40 ROM more facilities than any other DDFS manufacturer has managed before.

The result is a substantial cost reduction, which is passed on to you.

Solidisk engineers won't stop there.

But let's first answer some more immediate questions.

1 — SINGLE OR DOUBLE DENSITY?

You get 60% more storage in double density mode than in single density mode at no extra cost.

In single density — the usual Acorn disk format — you get 10 sectors or 2.5 k bytes of storage per track. That is what the Acorn DFS and many others can do.

In other words, you get 100k with a 40 track single sided disk drive (such as the TEAC 55A), 400k with a double sided 80 tracks disk drive (such as the one in this offer).

In double density, you get 16 sectors or 4k bytes per tracks, an increase of 60%. With the same TEAC 55A disk drive, you get 160k instead of 100k or with the disk drive in this offer, you get 640k bytes instead of 400k.

The majority of software tested also runs FASTER in double density mode than in single density mode, especially Wordwise, View, Masterfile and Scribe and 95% + of games are also compatible with double density.

2 — INSTALLATION:

As the STL DFS consists of only 4 ICs, to be plugged into existing sockets on the BBC computer board, installation is quite simple and should not take more than a few minutes even if you are a novice. Simply instal the 4 ICs into their sockets and connect the disk drive (see picture 4).

3 — BASIC DISK SYSTEM COMMANDS AND UTILITIES:

- *ACCESS <afsp> (optional L)
- *BACKUP (source drive) <dest. drive>
- *COMPACT (optional <drive>)
- *COPY <source drive> <dest. drive> <afsp>
- *DELETE <fsp>
- *DIR <dir>
- *DRIVE (optional <drive>)
- *ENABLE
- *F40 (optional <drive>)
- *F80 (optional <drive>)
- *INFO <afsp>
- *LIB (optional <dir>)
- *LOAD <fsp> (optional <load address>)
- *RENAME <old name> <new name>
- *SAVE <fsp> <start> <end> <exec>
- *TITLE <title>
- *VERIFY (optional <drive>)
- *WIPE <afsp>
- *BUILD <fsp>
- *DISC
- *DUMP <fsp>
- *LIST <fsp>
- *TYPE <fsp>
- *DDFS

THE SPECIAL PACKAGE DEAL:

A COMPLETE 640K DISK OUTFIT AT ONLY £209.95 INCLUSIVE:

- ONE 80 TRACK DOUBLE SIDED DISK DRIVE.
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Optional extra:

- DFDC instead of DDFS: £10.00.

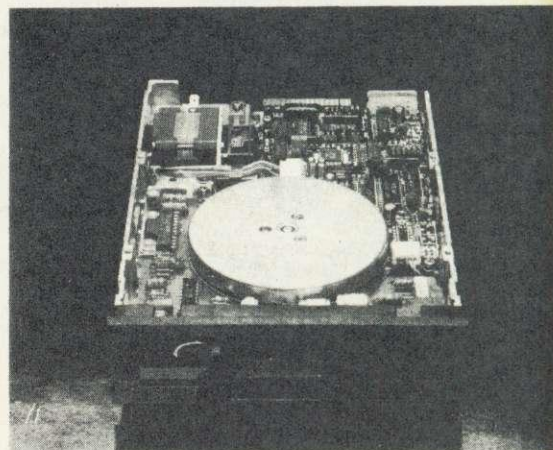
Other OS commands include LOAD, SAVE, BPUT, BGET, OSFILE, BLOCK GET, BLOCK PUT, OSARGS, OSFIND, PTR, OSWORD 7F, 7D, 7E etc.

Care is taken in the disk directory presentation, showing the disk size and other useful information. Whenever a diskette is being spun, its number of tracks and density are identified. This information helps the DFS to skip alternate tracks if a 40 track disk is in use in an 80 track drive and also switch the FDC to single or double density.

The net result is exceptional response and user-friendliness.

Outstanding speed too.

As shown in the benchmark test on the opposite page.



CUT THE COST OF RUNNING YOUR MACHINE

The Solidisk special package deal comes with the following free bundled software

- Solidisk Database — a fast, efficient and flexible disk based random access database. Ideal for prescription records, club membership etc.
- Solidisk wordprocessor.
- Solicalc electronic spreadsheet.
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- Sil Exxon — the most successful spelling checker with English, French and German dictionary. Self dictionary generating capability.
- Macro Basic — a BASIC program generator capable of using bits of old programs to create new programs. Simply ingenious!
- Benchmark for disk drive and disk utilities.

4 — OUTSTANDING PERFORMANCE:

The table below shows the benchmark timing for STL DDFS 1.4. The benchmark consists of disk operations such as save and load a 16k program, open and close files, BPUT, BGET strings and numbers, format and verify a disk etc., and is available upon request, otherwise listed in Solidisk DDFS User Manual.

The benchmark tests B1 to B9 are the same as used by many reviewers. The time is expressed in seconds and parts of 100th of a second. The disk drives are twin 40/80 track double sided MITSUBISHI M4853, the diskettes are Verbatim Datalife MD 557 series, 96 TPI, double density, double sided, pre-verified to ensure that the media is free of all error and mechanical defects and containing solely the benchmark program. The test is loaded into memory, the drive motors are allowed to stop completely 2 seconds between tests, 10 timing samples are taken and the mean time is calculated automatically.

For example:

100 DEFFN b1:REM Save a 16k program.

110 T% = TIME

120 *SAVE A 8000 + 4000

130 = TIME - T%

Full listings are included in the User Manual.

This FN is called 10 times with 3 sec. interval, the mean result is printed as 'B1'.

BENCHMARK DESCRIPTION	S/D TIME	D/D TIME	
B1 Save 16k	2.62	1.43	
B2 Load 16k	2.45	1.23	
B3 Openin and close 100 times	20.70	20.16	*See note 1
B4 Openout and print 1000 numbers (255)	5.84	4.66	
B5 Openin and input 1000 numbers (255)	4.72	4.14	
B6 Openout and print 100 80 bytes strings	6.18	4.91	
B7 Openin and input 100 80 bytes strings	4.90	4.31	
B8 BPUT 100 bytes (255)	3.01	2.06	
B9 BGET 1000 bytes (255)	1.88	1.52	

Note 1: Whenever a file is to be opened, STL DDFS automatically refreshes the disk directory, thus preventing erroneous disk change. Many other DFS's do not take the same care, although yielding a much shorter time, and this could accidentally stop the program.

With Wordwise:

Load 2000 words (17811 bytes) 16.80 sec. (41.40 sec. with AC.

With Scribe:

Count 2000 words (17811 bytes) 4.20 sec. (9.80 sec. with AC .90 DFS)

With Beebug's Masterfile:

Sort records 1 to 20 in PEOPLE sample database, the database is presorted on field 2 then the program is asked to sort on field 1, the time is then taken: 56.23 sec. (127.86 sec. with AC.90 DFS). These timings are improved even further in double density mode.

The figures speak for themselves.

STL DDFS dramatically increases the operating speed of your software, including wordprocessors like Wordwise, View, Scribe, databases like Masterfile, Starbase etc.

Solidisk engineers won't stop there.

ONE ROM TO RULE THEM ALL

Already a super mini floppy (2.4 MB) and controller for under £400, a 10MB integrated Winchester hard disk for under £600 AND AN EVEN MORE POWERFUL 16K ROM (2.0 UPGRADE) with outlined specifications below are planned for Christmas.

- Unlimited number of entries into the disk directory.
- File size and disk size can be as big as 16MB.
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- Built-in wordprocessor in place of the classical *BUILD.
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- Instant data encryption and decryption using 256 byte single key (expandable).
- Quadruple FDC drivers (8271, 8272, WD 1770, WD 2793).
- RAM Disk facilities for Solidisk Sideways RAM.

6 — SOLIDISK DFDC:

THE ONLY SYSTEM TO ADD DOUBLE DENSITY AND KEEP COMPATIBILITY.

If your BBC is already fitted with Acorn Single Density DFS, you can ADD double density to your system and KEEP the existing DFS with Solidisk DUAL FDC Filing System (DFDC).

Solidisk DFDC system overcomes the problems caused by around 5% of the games 'specially those produced by Acornsoft newest releases such as Elite). These programs (directly) controls the 8271 thus requiring its presence.

Solidisk DFDC ROM controls BOTH FDC at a flick of a switch, you can choose the new FDC for speed or the old 8271 for Acornsoft game disks.

OPERATIONS	S/D TIME	D/D TIME
FORMAT 40 TRACKS:	17.74	17.74
FORMAT 80 TRACKS:	33.22	33.22
VERIFY 40 TRACKS:	9.30	9.30
VERIFY 80 TRACKS:	17.84	17.84
BACKUP 01 80 TRACKS:	37.69	37.69
BACKUP 02 80 TRACKS:	39.46	39.46
COMPACT 100K-10 FILES	22.42	18.82

7 — PRICES (including P and P and VAT)

STL DDFS (disk chip upgrade for BBC B)	£39.95
STL DFDC for those who have Acorn DFS	£49.95
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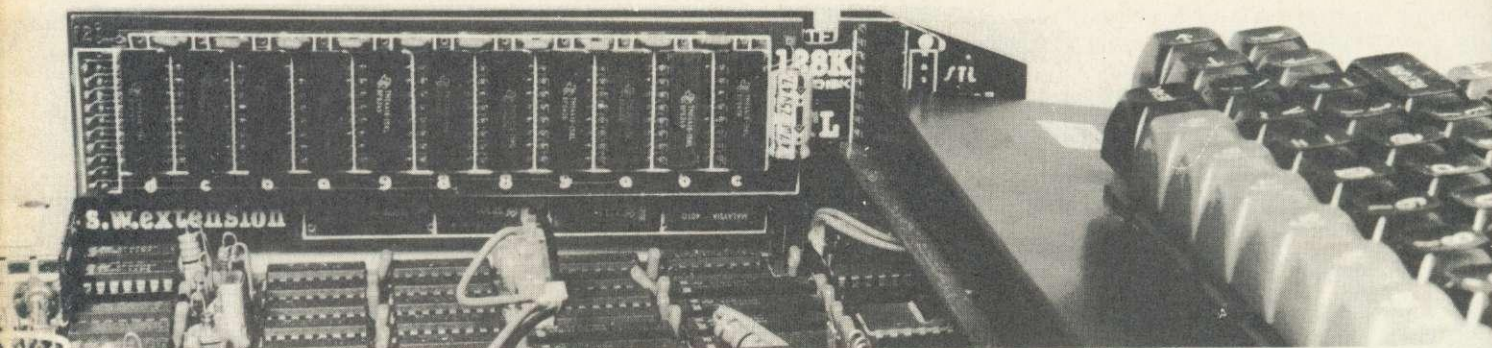
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SOLIDISK SIDEWAYS RAM: 25,000 UNITS SOLD



"Exciting" (ACORN USER JAN 84), "Power to your Beeb" (PCN 61, MAY 84), "Break the RAM Barrier" (A&B)

HAS YOUR BBC COMPUTER GOT ITS SIDEWAYS RAM BOARD YET?

Not surprisingly many BBC computers have got their sideways RAM boards. Solidisk Sideways RAM can be completely integrated into the BBC computer system: with 6502 and Z80 second processors, Torch disk pack, teletext, Econet and Solidisk 8— sideways ROM expansion board.

Adding Sideways RAM to the BBC computer is simple. And it will multiply the machine's power.

Here is how.

1 — HOW DOES IT WORK?

Occupying the same place as sideways ROMs (such as BASIC, DFS etc) it is treated like other sideways ROMs and therefore can replace them.

Sideways RAM can run any language, and filing system, wordprocessors, databases etc.

2 — WHAT SORT OF SOFTWARE DOES IT RUN?

Better than sideways ROM, sideways RAM can be written into. This property makes it not only possible to run the same programs as their ROM counterparts but sideways RAM can be used as Virtual Memory, RAM disc, printer buffer, Basic program store, 65-C-02 assembler, zero RAM, take DFS etc, etc . . .

3 — WHAT OTHER SERVICES DO YOU GET WITH ALL SIDEWAYS RAMS?

Solidisk sideways RAM comes with lots and lots of free software (see list on opposite page). As a sideways RAM user, you will be able to get updated disks*, free local expert advice and free bi-monthly newsletters to keep you informed. Solidisk spend more than 1,000 man hours every month to produce free software for all sideways RAM users. More and more free software will be available every month.

4 — WHO USES SIDEWAYS RAM?

Solidisk sideways RAM is widely used in schools for ECONET, by programmers to develop new software, in small business systems for wordprocessing and database and now at home, even for games. New applications are being found every day, such as moving screen memory to Sideways RAM (essential for increasing memory for VIEW and VIEWSHEET), Colour Imaging System, Teletext page logger and generator, computer typesetting etc.

Sideways RAM is such a versatile and flexible instrument that it will renew your interest continually.

5 — WHICH SIDEWAYS RAM DO YOU NEED?

Solidisk sideways RAM is available in multiples of 16k, each replacing a sideways ROM. Units are in 16k, 32k, 128k and 256k.

The first step is to evaluate your needs.

Then consult the chart opposite.

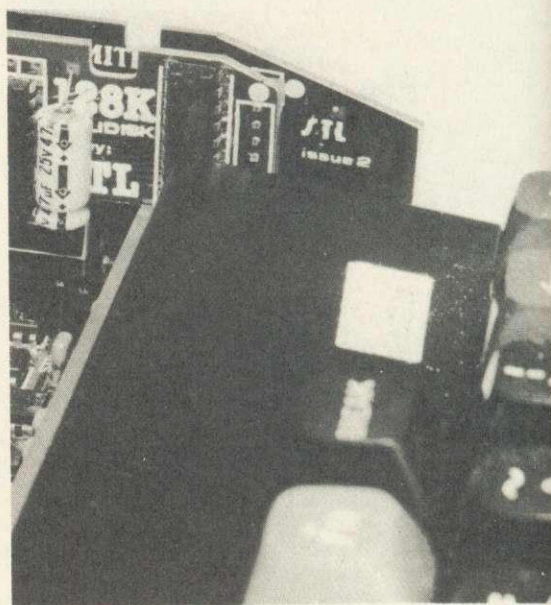
You can buy a small unit to start with, and exchange it later for a larger one. Extra costs involved with upgrading are minimal. The SWR16, 16k sideways RAM is adequate for most simple tasks (running common programs or for Econet slave stations), including fast disk copying with a single disk drive.

For wordprocessor: using VIEW or WORDWISE, a SWR32 will do. Large documents (20 page plus) will require something like SCRIBE and the 128k or 256k Solidisk.

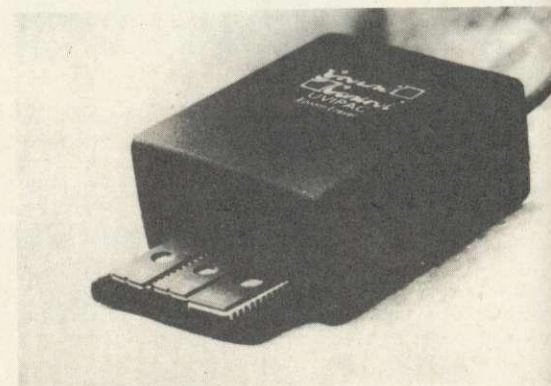
For database, unless very high speed is required, a SWR32 will suffice for most popular databases such as Beebase, Fileplus, Starbase, Datagem. Otherwise use the 128k or 256k Solidisk.

Remember — the more memory you instal inside the BBC computer, the more power you will get out of the machine.

All sideways RAM units come complete with 60+ page Sideways RAM User Manual, 1 utility diskette and 1 year warranty.



UVIPAC EPROM ERASER



TEAC DISC DRIVES FD55 Series



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6 - SENDING FOR FREE SOFTWARE:

Our free software is divided into volumes and is available in single density, either 40 or 80 track 5.25" diskettes. 40 track diskettes contain only 1 volume, 80 track diskettes contain 2 consecutive volumes, (1+2, 3+4, 5+6, etc.)

All sideways RAM is supplied with 1 diskette, containing either VOL. 1 (40 tracks) or VOL. 1+2 (80 tracks) as requested. Extra volumes are charged for media and postage cost.

The following volumes are available at the present time:

- **VOL. 1:** General Utilities: Menu, STLDISC, STLOEOO, STLRFS, Printer Buffer, STLRFS, Quickly, Fastbackup, Keyboard, Word64, help!
- **VOL. 2:** English Spelling Checker: Suilexon and English dictionary (15000 words).
- **VOL. 3:** BASIC program generator: Macro Basic. Never Bad Mode again: Virtual Memory.
- **VOL. 4:** Database: Solidisk Datafile.
- **VOL. 5:** Foreign Language Dictionary Generator: Silexigen, Silexicon source code for programmers.
- **VOL. 6:** French spelling checker (15,000 words).
- **VOL. 7:** German spelling checker (13,000 words).
- **VOL. 8:** Machine code tools: Solimon, the finest machine code monitor with Disassembler, debugger, single step etc. for both 6502 and 65-C-02 (for second processor 65 C 02 assembler (for second processor), UVIPROM control software, SPRITES and SPRITE generator (providing 60 sprites per 16k sideways RAM).
- **VOL. 9:** to be released in October: Solidisk Toolkit, Rubber band, and Z80 drive C (RAM disc facilities for Acorn Z80 second processor).
- **VOL. 10 to 19:** Source code for use with the Technical Manual.

7 - TECHNICAL MANUAL:

THE TECHNICAL MANUAL contains extensive program listings and notes by their authors. It also covers the MACRO language programming (part of Macro Basic), MOS conventions for sideways software. Solidisk conventions for sideways RAM software, STL DFS entry points, the 65C02 programming facilities and schematic diagram.

The Technical Manual package consists of the Technical Manual and 3- 80 track diskettes containing VOL. 10 to 15 and costs £10.00.

8- LOCAL EXPERT HELP:

A list of Solidisk experts is printed in the Sideways RAM User Manual. For the cost of a local call, they can certainly help you with installation of software advice. Potential experts are warmly invited to contact us.

UVIPROM EPROM PROGRAMMER AND UVIPAC EPROM ERASER

The UVIPROM EProm programmer, which plugs into the user port, allows the user to program 2764 and 27128 EPROMs, either from disc or master ROM. The unit is self-contained, complete with built-in Vpp generator and system software. Commands available are:-

- *TEST - blank test for new (or erased) EPROMs.
- *BLOW<aspf> - programs EPROMs from disc.
- *COMP<aspf> - compares programmed EPROMs with source on disc.
- *VIEW - displays hex and ASCII dump.
- *READ<aspf> - reads contents of EPROM to disc.

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Mains powered EPROM eraser, can erase up to 3 EPROMs of any size in only 15 minutes. Housed in a custom moulded plastic case, with optical fibre indicator.

SOLIDISK ANNOUNCE THE MOST EXCLUSIVE SUPPORT FOR THE 65-C-02!

Have you heard about the 65-C-02?

This is the CPU that Acorn has retained for their second processor. The 65C02 has an extended instruction set, with 43 brand new OPCODEs for you to play with. Things as PHY, PLY, STA (&A6), STZ, BRA, TRB etc can save 20% of memory and increase speed by 20-25%.

SOLIDISK GIVE YOU FREE* SPECIALLY DEVELOPED SOFTWARE FOR THE 65C02!

(*except media)

65C02 PATCH:

Using DEFFN such as DEFFN ("PLY"), extra instructions are added to the present BASIC assembler.

65C02 BASIC2 OVERLAY:

Providing you have a sideways RAM unit, this program will turn your BASIC2 instantly into 65C02 assembler. You do not have to type in "OPT FN("PLY")" but simply 'PLY' instead, making the conversion job a piece of cake.

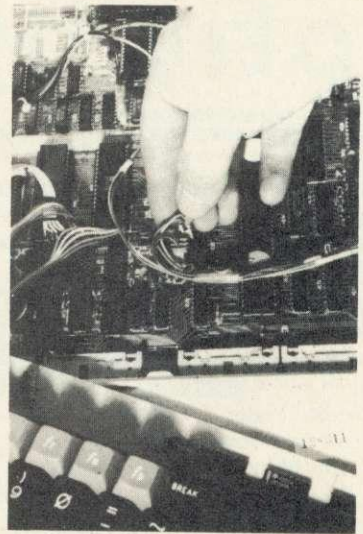
SOLIMON, THE ONLY 65C02 MACHINE CODE MONITOR:

This program can be softloaded into Sideways RAM or obtainable in ROM form. It has everything the popular EXMON has such as Disassembler, Find bytes/string, set ROM socket, spool, move, hard copy etc and also some 'impossible' features such as defining zero page location that will be used, single stepping sideways RAM, screen modes. More importantly, it works with the 65C02 and can even disassemble the second processor ROM!

IN VIEW OF THE LARGE DEMAND FOR THIS CHIP, SOLIDISK OFFERS IT AT ONLY £11.00+ £1.00 FOR POST AND PACKING

THE ABOVE SOFTWARE IS AVAILABLE FROM US AT ONLY £2.50 TO COVER THE MEDIA COST OF THE DISKETTE. NO EXTRA POSTAGE WILL BE CHARGED IF ORDERED AT THE SAME TIME AS THE 65C02 CPU.

(It is understood that enquiries about the 65C02 CPU should be sent directly to us rather than to RCS, the Rockwell distributor.)



Connect the control wires

Prices and terms subject to change without notice. Phone for details.

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SIDEWAYS RAM	
SWR16	£43.65
SWR32	£59.95
128K SOLIDISK	£150.95
256K SOLIDISK	£257.95

The following are upgrade prices for existing Sideways Ram Users:

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16 - SOLIDISK (return item)	£110.00
16 - SOLIDISK 256 (return item)	POA
32 - SOLIDISK	£95.00
32 - SOLIDISK 256 (return item)	POA
128 - 256 (return item)	£125.00

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MITSUBISHI TWIN (incl leads+manual)	£323.00
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You can order any item using the coupon. Prices are inclusive of VAT, post and packing. Access and Barclay card holders can place their order by phone.

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This self-marking program suits *anyone* learning music from 8 to adult, right up to levels required by the various examination boards. Teachers and their pupils will greatly value the freedom that the program gives to practise selectively and at your own pace.

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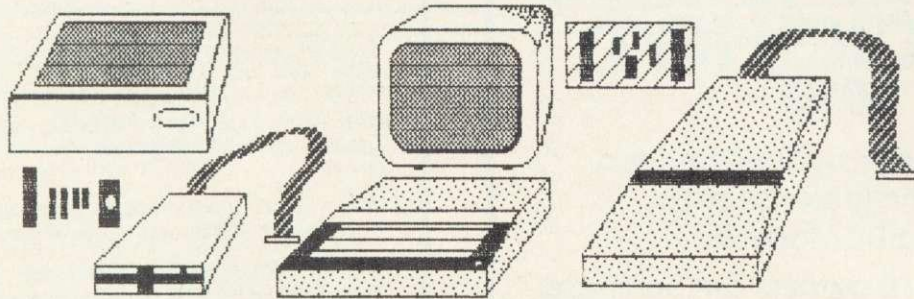
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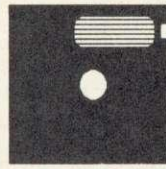
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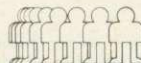
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See 'Music while you program', page 75

Jonathan Lidgard's listing for interrupt-driven tunes

This listing is a procedure which has to be called from a program. To run it type in the listing, save it and call it with the following lines of Basic:

```
10 length%=32
20 DIM mcode% 122,t
   tune_start% length%-1
30 PROCTune(mcode%,
   tune_start%,length%)
40 PROCTune_data(tu
   ne_start%,length%)
```

If you want to experiment with the routine add these lines to the start of the listing:

```
1 tune_start%=&C00
:length%=132:mcode%=&9
00
2 PROCTune(mcode%,
tune_start%,length%)
3 PROCTune_data(tu
ne_start%,length%)
4 *KEY0 *FX14,4!M
5 *KEY1 *FX13,4!M
*FX15,0!M
6 END
```



```
10 REM Interrupt Driven Tune!
20 REM For BBC and Electron
30 REM by J.Lidgard
```

```
40 REM (c) Acorn User
50 REM January 1984
60 :
70 :
80 DEFPROCtune(M%,T%,L%)
90 FORIX=0 TO 2 STEP 2
100 P%=M%
110 OPT I%
120 .tune
130 PHP
140 CMP##4:BNE evend
150 PHA:TXA:PHA:TYA:PHA
160 LDA##80:LDX##FA:JSR&FFF4
170 CPX##0:BEQ t5
180 LDX&70
190 LDA T%+2,X:PHA:TAY
200 LDA T%,X:SEC:SBC&71
210 JSR ch1
220 LDX&70
230 PLA:TAY
240 LDA T%+1,X:SEC:SBC&71
250 JSR ch2
260 LDX&70:INX:INX:INX:STX&70
270 CPX#LX:BCC t5
280 LDX##0:STX&70
290 LDX&71:BNE t3
300 LDA##C:STA&71:BNE t5
310 .t3
320 CPX##C:BNE t4
330 LDA##18:STA&71:BNE t5
340 .t4
350 LDA##0:STA&71
360 .t5
370 PLA:TAY:PLA:TAX:PLA
380 .evend
390 PLP:RTS
400 .ch1
410 STA&84:STY&86
420 LDA##7:LDX##80:LDY##0:JMP&FFF1
430 .ch2
440 STA&8C:STY&8E
450 LDA##7:LDX##88:LDY##0:JMP&FFF1
460 JNEXTI%
470 ?&220=tune MOD 256
480 ?&221=tune DIV 256
490 !&80=&FFF60001: !&88=&FFF60002
500 ?&85=0: ?&87=0: ?&8D=0: ?&8F=0
510 ?&70=0: ?&71=24
520 ENDPROC
530 DEFPROCtune_data(T%,L%)
540 FOR I%=0 TO L%-1
550 READ X%
560 I%?T%=X%
570 NEXT
580 ENDPROC
590 DATA 165,101,5,157,101,5,149,101,5
,177,97,5,177,89,5,177,81,5,165,101
600 DATA 5,157,101,5,149,101,5,177,97,
5,177,89,5,177,81,5,165,101,5,157
610 DATA 101,5,149,101,5,169,109,5,165
,109,5,169,101,5,177,97,5,169,97
620 DATA 5,165,101,5,157,81,5,157,89,5
,97,97,5,165,101,5,157,101,5,149
630 DATA 101,5,177,97,5,177,89,5,177,8
1,5,165,101,5,157,101,5,149,101,5
640 DATA 177,97,5,177,89,5,177,81,5,16
5,101,5,169,101,5,165,101,5,157,89
650 DATA 5,165,89,5,157,89,5,149,101,1
5,149,101,10
```

See 'Just a crazy mixed up grid', page 72

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Roland Waddilove's Picture Slide listing

```

10 REM Picture Slide
20 REM By R.A.Waddilove
30 REM For Electron ( and BBC )
40 REM (c) Acorn User OCT.84
50 :
60 ON ERROR PROCerror
70 MODE 1
80 PROCassemble
90 PROCinstructions
100 ON ERROR PROCerror
110 MODE 2
120 PROCinitialise
130 PROCdraw_picture
140 REPEAT
150 PROCdraw_grid(15)
160 PROCmix_up
170 REPEAT
180 PROCslide
190 UNTIL done
200 PROCchurrah
210 UNTIL K%=ASC"n"
220 MODE 6
230 PRINT""Bye bye...";
240 VDU 7:*FX4,0
250 *FX21,0
260 END
270 :
280 DEF PROCinitialise
290 VDU 23,1,0;0;0;0;
300 FOR Q%=8 TO 14
310 VDU 19,Q%,7;0;
320 NEXT
330 $A00="ABCDEFGHIJKLMNQPQRST"
340 m%=0;n%=3;address=&6980
350 VDU 5:MOVE 200,990
360 PRINT"PICTURE SLIDE":VDU 4
370 REM *** window ***
380 MOVE 0,959
390 DRAW 1274,959:DRAW 1274,63
400 DRAW 0,63:DRAW 0,959
410 VDU 24,8;64;1270;955;
420 GCOL 0,133:CLG
430 ENDPROC
440 :
450 DEF PROCdraw_grid(colour)
460 VDU 26:GCOL 3,15
470 FOR X%=256 TO 1024 STEP 256
480 MOVE X%,63:DRAW X%,959
490 NEXT
500 FOR Y%=287 TO 735 STEP 224
510 MOVE 0,Y%:DRAW 1280,Y%
520 NEXT
530 GCOL 0,colour
540 VDU 5:MOVE 100,163
550 VDU ASC"+",4
560 ENDPROC
570 :
580 DEF PROCdraw_picture
590 REM *** sky ***
600 GCOL 0,4
610 MOVE 8,955:MOVE 8,600
620 PLOT 85,1270,955:PLOT 85,1270,600
630 GCOL 0,6
640 FOR Y%=20 TO 375 STEP 4
650 FOR X%=8 TO 1272 STEP Y%DIV4
660 IF RND(Y%)<40 THEN PLOT 69,X%,Y%+5
670 NEXT
680 NEXT
690 REM *** sun's rays ***
700 GCOL 0,3
710 VDU 29,800;600;
720 FOR Q%=10 TO 160 STEP 30
730 MOVE 0,0
740 MOVE 400*COS(RADQ%),400*SIN(RADQ%)
750 PLOT 85,400*COS(RAD(Q%+9)),400*SIN
(RAD(Q%+9))
760 NEXT
770 REM *** sun ***
780 F%=1
790 FOR Q%=0 TO 90 STEP 2
800 F%=-F%:Y%=120*SIN(RADQ%)
810 FOR X%=-120*COS(RADQ%) TO 120*COS(
RADQ%) STEP 8
820 IF F%=1 THEN GCOL0,3 ELSE GCOL 0,7
830 F%=-F%:PLOT 69,X%,Y%
840 NEXT
850 NEXT
860 REM *** ground ***
870 GCOL 0,2
880 FOR X%=-800 TO 480 STEP 64
890 MOVE X%,0:MOVE X%*8,-600
900 PLOT 85,X%+32,0
910 PLOT 85,X%*8+256,-600
920 NEXT
930 REM *** shadows ***
940 GCOL 0,1
950 FOR X%=-610 TO 250 STEP 64
960 MOVE X%,-290:MOVE X%*4/3,-400
970 IF X%>0 OR X%<-300 THEN PLOT 85,X%
+30,-290:PLOT 85,X%*4/3+50,-400
980 NEXT
990 X%=-200:MOVE X%,-290
1000 MOVE X%*4/3,-400
1010 PLOT 85,X%+45,-290
1020 PLOT 85,X%*4/3+80,-400
1030 VDU 26
1040 REM *** ACORN USER ***
1050 PROCbig(188,554,"ACORN "+CHR#225+C
HR#226,3)
1060 PROCbig(196,558,"ACORN "+CHR#225+C
HR#226,3)
1070 PROCbig(808,558,"USER",3)
1080 PROCbig(816,554,"USER",3)
1090 PROCbig(180,550,"ACORN "+CHR#225+C
HR#226+" USER",1)
1100 PROCscroll(31," Press a key...",6
)
1110 *FX21,0
1120 K%=GET
1130 ENDPROC
1140 :
1150 DEF PROCbig(m%,n%,word#,colour)
1160 LOCAL Q%,J%,K%,X%,Y%
1170 GCOL 0,colour
1180 MOVE m%,n%:VDU 5
1190 FOR Q%=1 TO LEN word#
1200 ?&70=ASC MID$(word#,Q%,1)
1210 AX=10:X%=&70:Y%=0:CALL &FFF1
1220 FOR K%=1 TO 8
1230 VDU 23,224
1240 FOR J%=1 TO 8
1250 VDU K%?&70
1260 NEXT
1270 VDU 224,10,8
1280 NEXT
1290 VDU 11,11,11,11,11,11,11,11,9
1300 NEXT

```

Continued ►

◀ Continued

```

1310 VDU 4
1320 ENDPROC
1330 :
1340 DEF PROCswap
1350 Q%=?(&A00+m%+5*n%)
1360 ?(&A00+m%+5*n%)=?(&A00+X%+5*Y%)
1370 ?(&A00+X%+5*Y%)=Q%
1380 !picture1=address
1390 address=address+&80*((m%>X%)-(m%<X%))+&1180*((n%>Y%)-(n%<Y%))
1400 !picture2=address
1410 m%=X%:n%=Y%:CALL &900
1420 SOUND 1,-10,&8*RND(12),1
1430 IF #&A00="ABCDEFGHIJKLMNQPQRST" TH
EN done=TRUE
1440 ENDPROC
1450 :
1460 DEF PROCassemble
1470 picture1=&70
1480 picture2=&72
1490 P%=&900
1500 [ OPT 2
1510 LDX #7
1520 .loop1
1530 LDY #127
1540 .loop2
1550 LDA (picture1),Y
1560 PHA
1570 LDA (picture2),Y
1580 STA (picture1),Y
1590 PLA
1600 STA (picture2),Y
1610 DEY
1620 BFL loop2
1630 CLC
1640 LDA picture1
1650 ADC #&80
1660 STA picture1
1670 LDA picture1+1
1680 ADC #&2
1690 STA picture1+1
1700 CLC
1710 LDA picture2
1720 ADC #&80
1730 STA picture2
1740 LDA picture2+1
1750 ADC #&2
1760 STA picture2+1
1770 DEX
1780 BNE loop1
1790 RTS
1800 .movetitle
1810 LDA #18
1820 STA &70
1830 .loop1
1840 LDA #&58
1850 STA &73
1860 LDA #&63
1870 STA &74
1880 LDA #5
1890 STA &80
1900 .here
1910 LDA #19
1920 LDX #0
1930 LDY #0
1940 JSR &FFF4
1950 DEC &80
1960 BNE here
1970 LDX #9
1980 .loop2
1990 LDA #8
2000 STA &71
2010 LDA #0
2020 STA &72
2030 .loop3
2040 LDY #71
2050 LDA (&73),Y
2060 LDY &72
2070 STA (&73),Y
2080 INC &71
2090 INC &72
2100 BNE loop3
2110 CLC
2120 LDA &73
2130 ADC #&40
2140 STA &73
2150 LDA &74
2160 ADC #&1
2170 STA &74
2180 DEX
2190 BNE loop2
2200 DEC &70
2210 BNE loop1
2220 RTS
2230 ]
2240 ENDPROC
2250 :
2260 DEF PROCslide
2270 X%=m%-(INKEY(-104) AND m%<4)+(INKEY
Y(-103) AND m%>0)
2280 Y%=n%-(INKEY(-98) AND n%<3)+(INKEY
(-66) AND n%>0)
2290 IF (m%<>X% AND n%=Y%) OR (m%=X% AN
D n%<>Y%) THEN PROCswap
2300 ENDPROC
2310 :
2320 DEF PROCscroll(Y%,word#,colour)
2330 COLOUR colour:P%=0
2340 word#=STRING$(18,"")+word#+STRING
$(17," ")
2350 FOR Q%=1 TO 19
2360 TIME=0:P%=P%+4
2370 SOUND 1,-10,P%,1
2380 PRINT TAB(1,Y%);LEFT$(word#,18);
2390 word#=MID$(word#,2)
2400 REPEAT UNTIL TIME>10
2410 NEXT
2420 ENDPROC
2430 :
2440 DEF PROCmix_up
2450 PROCscroll(31,"Difficulty (1-9)?",
3)
2460 REPEAT level=GET-48
2470 UNTIL level>0 AND level<10
2480 PRINT TAB(18,31);CHR$(level+48);
2490 REPEAT
2500 FOR J%=1 TO level*10
2510 REPEAT R%=RND(3)-2
2520 IF RND>0 THEN X%=m%+R% ELSE Y%=n%+
R%
2530 IF X%<0 OR X%>4 X%=m%
2540 IF Y%<0 OR Y%>3 Y%=n%
2550 UNTIL X%<>m% OR Y%<>n%
2560 PROCswap:TIME=0
2570 REPEAT UNTIL TIME>90-level*10
2580 NEXT
2590 UNTIL #&A00<>"ABCDEFGHIJKLMNQPQRST"

```

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Continued ▶

◀ Continued

```

2600 done=FALSE
2610 PROCscroll(31," Keys: A Z < > ",2
)
2620 ENDPROC
2630 :
2640 DEF PROCchurrah
2650 score=2000*level-TIME
2660 IF score<0 score=0
2670 FOR Q%=1 TO 100
2680 SOUND 1,-15,100+8*RND(100),1
2690 NEXT
2700 COLOUR 129
2710 PROCscroll(31,"** WELL DONE ! **"
,3)
2720 COLOUR 128
2730 TIME=0:REPEAT UNTIL TIME>300
2740 COLOUR 134
2750 PROCscroll(31," Score: "+STR$(sc
ore),4)
2760 TIME=0:REPEAT UNTIL TIME>300
2770 COLOUR 132
2780 PROCdraw_grid(5)
2790 COLOUR 130
2800 PROCscroll(31,"Another Game (Y/N)"
,4)
2810 COLOUR 128
2820 *FX21,0
2830 REPEAT K%=GET OR 32
2840 UNTIL K%=110 OR K%=121
2850 ENDPROC
2860 :
2870 DEF PROCinstructions
2880 VDU 22,5,23,1,0;0;0;0;0;
2890 VDU 23,225,3,15,63,255,255,63,7,0,
23,226,192,240,252,255,255,252,224,0
2900 ENVELOPE 1,130,-1,0,0,96,0,0,126,0
,0,-126,126,126
2910 *FX16,0
2920 *FX4,1
2930 *KEY10 "OLD:MRUN:M"
2940 MOVE 75,340
2950 DRAW 75,800:DRAW 1150,800
2960 DRAW 1150,340:DRAW 75,340
2970 SOUND 1,-9,52,255
2980 PROCbig(216,708,"Picture Slide",1)
2990 SOUND 2,-11,68,255
3000 PROCbig(208,704,"Picture Slide",1)
3010 SOUND 3,-13,80,255
3020 PROCbig(200,700,"Picture Slide",2)
3030 SOUND &11,-15,100,255
3040 TIME=0:REPEAT UNTIL TIME>300
3050 SOUND &12,0,0,1
3060 SOUND &13,0,0,1
3070 SOUND &11,1,100,255
3080 CALL movetitle
3090 TIME=0:REPEAT UNTIL TIME>300
3100 SOUND &11,0,0,1
3110 GCOL 0,0
3120 FOR Q%=0 TO 290 STEP 2
3130 MOVE 0,300+Q%:DRAW 1280,300+Q%
3140 MOVE 0,850-Q%:DRAW 1280,850-Q%
3150 NEXT
3160 VDU 22,1,23,1,0;0;0;0;0;
3170 PRINT TAB(6);"P I C T U R E S L
I D E" TAB(5);STRING$(28,"-")
3180 COLOUR 2
3190 PRINT "" A picture is drawn on the
screen and"
3200 PRINT "" a grid placed over it."
3210 PRINT "" The sections of the pictu
re are then"
3220 PRINT "" jumbled up."
3230 PRINT "" Can you slide them back t
o their"
3240 PRINT "" original positions ?"
3250 PRINT "" The faster you do it, the
higher"
3260 PRINT "" your score."
3270 COLOUR 1
3280 PRINT ""Keys: "" "A=up Z=down
<=left >=right"
3290 COLOUR 3
3300 PRINT "" TAB(8);"Press space to sta
rt...";
3310 *FX21,0
3320 REPEAT UNTIL GET=32
3330 ENDPROC
3340 :
3350 DEF PROCerror
3360 CLS:VDU 22,6:*FX21,0
3370 IF ERR<>17 PROCstop
3380 PRINT ""Do you wish to end the pro
gram"
3390 PRINT ""or start again ?"
3400 PRINT ""Press E to end" TAB(7)"S
to start"
3410 REPEAT K%=GET OR 32
3420 UNTIL K%=115 OR K%=101
3430 IF K%=ASC"e" PROCstop
3440 ENDPROC
3450 :
3460 DEF PROCstop
3470 *FX4,0
3480 REPORT:PRINT " at line ";ERL
3490 OSCLI "KEY9 LIST"+STR$ERL+"IM"
3500 *FX138,0,137
3510 IF ERR<>25 OR PAGE=&E00 END
3520 *TAPE
3530 J%=PAGE-&E00
3540 FOR Q%=PAGE TO TOP STEP 4
3550 !(Q%-J%)=!Q%
3560 NEXT
3570 ?(TOP-J%)=255;PAGE=&E00
3580 SOUND 1,-15,0,20
3590 PRINT ""Program relocated..."
3600 PRINT ""BREAK will destroy program.
"
3610 PRINT ""Press function key 0 to run
-";
3620 *KEY0 "OLD:MRUN:M"
3630 END

```

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available containing all the major programs in this issue. It costs just £3.75, which includes postage and packing.

Turn to page 95 for details. The order form is at the bottom of page 96, immediately before the yellow pages section.

Listing 1. David Acton's Quadline program

```

10REM QUADLINE (1)
20REM (C)Acorn User
30:
40ENVELOPE1,1,18,-36,18,50,50,50,126,0
,0,-1,126,126
50ENVELOPE2,1,0,0,0,10,10,10,0,0,0,-1,
126,0
60MODE7:VDU23;B202;0;0;0;:SOUND1,1,100
,60
70FORC%=224T0236:VDU23,C%
80FORZ%=1T04:READK#:VDUEVAL("&"+K#);:N
EXT,
90IFINKEY-256 PROCfk
100FORX%=8T09:PRINTTAB(5,X%)CHR#141CHR#
132CHR#157CHR#135CHR#136"QUADLINE is load
ing "CHR#156:NEXT
110PRINTTAB(14,21)"PLEASE WAIT"
120FORX%=0T0354STEP6:?(%B00+X%/6)=128+1
20*SINRADX%:?(%B3C+X%/6)=128+120*COSRADX%
:NEXT
130B%=CHR#10+STRING$(4,CHR#8)
140%B78=CHR#224+CHR#225+CHR#226+CHR#22
7+B#+CHR#228+CHR#236+CHR#236+CHR#229+B#+C
HR#230+CHR#236+CHR#236+CHR#231+B#+CHR#232
+CHR#233+CHR#234+CHR#235
150%DB2="QUADLINE * * (C) Copyright D.
Acton 1984 * * Press any key to play agai
n * * "
160B%=&D08:B2%=&D48:BC%=&D80
170SC%=&D87:p%=&DBE:v%=&D95
180p2%=&D9C:tb%=&DA3:SN%=&DAA
190FORX%=0T06:X%?tb%=7*(7-X%):NEXT
200FORX%=0T0127:X%?&D00=0:NEXT
210PROCass
220REM Insert checksum if required
230VDU28,8,22,31,20,12
240CHAIN"Q2"
250DEFPROCfk
260*FX225
270*FX226
280*FX227
290ENDPROC
300DATA 0,0,0,100,0,0,3FOF,FFFF
310DATA 0,0,FCFO,FFFF,0,0,0,8000
320DATA 303,707,F0F,F0F,C0C0,E0E0,F0F0,
FOFO
330DATA F0F,F0F,707,303,F0F0,F0F0,E0E0,
C0C0
340DATA 1,0,0,0,FFFF,F3F,0,0
350DATA FFFF,FOFD,0,0,80,0,0,0
360DATA FFFF,FFFF,FFFF,FFFF
370DEFPROCass
380ch=&FFEE:fx=&FFF4
390FORZ%=0T02STEP2
400P%=&2D40
410OPTZX
420.L STXLX+1
430STYLY+1
440TAX
450LDAB%,X
460LDY#1
470STY&72
480\ Vertical line
490.L2 CMPB%+8,X
500BNE L3
510INY
520CMPB%+16,X
530BNE L3
540INY
550CMPB%+24,X
560BNE L3
570INY
580JMP LX
590.L3 CMPB%-8,X
600BNE L4
610INY
620CMPB%-16,X
630BNE L4
640INY
650CMPB%-24,X
660BNE L4
670INY
680JMP LX
690.L4 STY&72
700\ Horizontal line
710LDY#1
720CMPB%+1,X
730BNE L5
740INY
750CMPB%+2,X
760BNE L5
770INY
780CMPB%+3,X
790BNE L5
800INY
810JMP LX
820.L5 CMPB%-1,X
830BNE L6
840INY
850CMPB%-2,X
860BNE L6
870INY
880CMPB%-3,X
890BNE L6
900INY
910JMP LX
920.L6 CPY&72
930BCC L7
940STY&72
950\ Diagonal lines
960.L7 LDY#1
970CMPB%+7,X
980BNE L8
990INY
1000CMPB%+14,X
1010BNE L8
1020INY
1030CMPB%+21,X
1040BNE L8
1050INY
1060JMP LX
1070.L8 CMPB%-7,X
1080BNE L9
1090INY
1100CMPB%-14,X
1110BNE L9
1120INY
1130CMPB%-21,X
1140BNE L9
1150INY
1160JMP LX
1170.L9 CPY&72
1180BCC L10
1190STY&72
1200.L10 LDY#1
1210CMPB%+9,X
1220BNE L11
1230INY
1240CMPB%+18,X
1250BNE L11
1260INY
1270CMPB%+27,X
1280BNE L11
1290INY
1300JMP LX
1310.L11 CMPB%-9,X
1320BNE LX
1330INY
1340CMPB%-18,X
1350BNE LX
1360INY
1370CMPB%-27,X
1380BNE LX
1390INY
1400.LX LDX#0
1410TYA
1420.LY LDY#0
1430CMP&72
1440BCC L0
1450LDA&72
1460.L0 RTS
1470.B STA&BF
1480STX&BE
1490LDA#0
1500STA&7C
1510STA&7D
1520STA&7E
1530STAV%
1540.B2 LDA#6
1550STAp%,X
1560LDA#0
1570STASC%,X
1580TXA
1590AND#1
1600BNE B2A
1610LDA&BF
1620JMP B2B
1630.B2A LDA#3
1640SEC
1650SBC&BF
1660.B2B STASN%,X
1670DEX
1680BPL B2
1690LDX#0
1700.B3 LDYp%,X
1710LDABC%,Y
1720CMP#48
1730BCC B6
1740\ count=count+1
1750SED
1760LDA&7C
1770ADC#1
1780STA&7C
1790BCC B3A
1800LDA&7D
1810ADC#0
1820STA&7D
1830BCC B3A
1840LDA&7E
1850ADC#0
1860STA&7E
1870.B3A CLD
1880TYA
1890PHA
1900.B4 LDASN%,X
1910.B5 STX&BD
1920LDX&BC%,Y
1930STAB%,X
1940\ Evaluate move
1950TXA
1960JSR L
1970PHA
1980LDABC%,Y
1990CLC
2000ADC#8
2010STABC%,Y
2020LDX&8D
2030PLA
2040CPX&BE
2050BNE B5E
2060CMPv%,X
2070BCC B5A
2080STAv%,X
2090JMP B5A
2100.B5E STAp2%,X
2110INX
2120CMP#4
2130BCC B5F
2140LDA#0
2150STAp%,X
2160STAp%-1,X
2170JMP B6
2180.B5F LDA#0
2190STAv%,X
2200JMP B3
2210.B5A PLA
2220TAY
2230LDABC%,Y
2240SEC
2250SBC#8
2260STABC%,Y

```

```

2270TAY
2280LDA#0
2290STAB%,Y
2300.B6 DECp%,X
2310BPL B3
2320LDA#6
2330STAp%,X
2340DEX
2350BMI B0
2360LDAp2%,X
2370TAY
2380CLC
2390ADctb%,X
2400CPY#4
2410BCS B6W
2420SEC
2430SBCv%+1,X
2440.B6W CMPv%,X
2450BCC B6A
2460STAv%,X
2470.B6A CPX#0
2480BNE B5A
2490JSR CMB
2500PLA
2510TAY
2520PHA
2530LDAv%
2540STASC%,Y
2550LDA#0
2560STAv%
2570\ Escape pressed?
2580JSR ESC
2590BCC B5A
2600PLA
2610TAY
2620LDABC%,Y
2630SEC
2640SBC#8
2650STABC%,Y
2660TAY
2670LDA#0
2680STAB%,Y
2690.B0 RTS
2700.T1 LDX#47
2710.T1L LDAB%,X
2720STAB2%,X
2730DEX
2740BPL T1L
2750RTS
2760.T2 LDX#47
2770.T2L LDAB2%,X
2780STAB%,X
2790DEX
2800BPL T2L
2810RTS
2820.ESC PHA
2830TXA
2840PHA
2850TYA
2860PHA
2870LDX#143
2880LDY#143
2890LDA#129
2900JSR fx
2910CPX#255
2920BEQ E2
2930CLC
2940JMP E3
2950.E2 SEC
2960.E3 PLA
2970TAY
2980PLA
2990TAX
3000PLA
3010RTS
3020.SCR LDX#0
3030.SC2 LDA&328B,X
3040STA&3280,X
3050INX
3060BNE SC2
3070.SC3 LDA&338B,X
3080STA&3380,X
3090INX
3100BNE SC3
3110.SC4 LDA&348B,X
3120STA&3480,X
3130INX
3140CPX#120
3150BNE SC4
3160LDA#0
3170.SC5 STA&3480,X
3180INX
3190CPX#128
3200BNE SC5
3210RTS
3220.SYNC LDA#1
3230LDX##&B1
3240LDY#0
3250\ Read clock
3260JSR&FFF1
3270LDA&B1
3280SEC
3290SBC&B0
3300CMP#2
3310BCC SYNC
3320LDA&B1
3330STA&B0
3340RTS
3350.MESS LDA#0
3360STA&DB1
3370LDA#15
3380JSR fx
3390.MESS2 JSR SYNC
3400JSR SCR L
3410JSR SYNC
3420JSR SCR L
3430LDA#31
3440JSR ch
3450LDA#39
3460JSR ch
3470LDA#1
3480JSR ch
3490LDX&DB1
3500LDA&DB2,X
3510JSR ch
3520INX
3530CPX#76
3540BNE MESS3
3550LDX#0
3560.MESS3 STX&DB1
3570LDA#129
3580LDX#0
3590LDY#0
3600JSR fx
3610CPY##&1B
3620BEQ MESS0
3630CPY#0
3640BNE MESS2
3650.MESS0 RTS
3660.CMB TXA
3670PHA
3680LDA#31
3690JSR ch
3700LDA#34
3710JSR ch
3720LDA#30
3730JSR ch
3740LDX#2
3750.CMB2 LDA&7C,X
3760AND#240
3770LSRA
3780LSRA
3790LSRA
3800LSRA
3810CLC
3820ADC#48
3830JSR ch
3840LDA&7C,X
3850AND#15
3860CLC
3870ADC#48

```

```

3880JSR ch
3890DEX
3900BPL CMB2
3910PLA
3920TAX
3930RTS
3940: NEXT
3950ENDPROC

Listing 2. Quadline part 2
100NERROR GOTO1160
20REM QUADLINE - 2
30:
40HIMEM=&2D40
50DIMC%(1),G%(1),T%(1),S%(1),M%(1)
60B%=&D08:B2%=&D48:BC%=&D80:SC%=&D87
70SK%=1:TP%=1:TM%=1:LM%=10:c%=0
80PROCc1
90*FX4,1
100REPEAT
110MODE7:HIMEM=&2D40:VDU23;8202;0;0;0;
120PROCd(132,"QUADLINE - MENU")
130PRINT' SPC8CHR#131"GAME TYPE :"'SP
C8CHR#131"SKILL LEVEL : "
140PRINTSPC8CHR#131"TIMER"SPC7:"' SPC8
CHR#131"TIME LIMIT : "
150PRINTCHR#134"USE THE FOLLOWING KEYS
:"
160VDU28,7,24,34,11
170PRINTCHR#129"T"CHR#131"TIMER ON/OFF
"CHR#129"I"CHR#131"INCREASE TIME LIMIT"
180PRINTCHR#129"D"CHR#131"DECREASE TIM
E LIMIT"CHR#129"1 - 3"CHR#131"SELECT SK
ILL LEVEL"
190PRINTCHR#129"F"CHR#131"TWO PLAYER G
AME"CHR#129"R"CHR#131"ONE PLAYER - RED"
200PRINTCHR#129"G"CHR#131"ONE PLAYER -
GREEN"CHR#129"A"CHR#131"AUTO GAME"
210PRINTCHR#129"SPACE"CHR#131"RESET GA
ME SCORES"CHR#130"C"CHR#131"CONTINUE P
LAYING"CHR#130"N"CHR#131"NEW GAME";
220REPEATPROCdata: A%=INSTR(" 123ARGPTI
DCN",GET#)-1:IFAX=-1 SOUND&10,-10,2,5:UN
TILFALSE ELSE SOUND&11,-10,200,1
230IFAX=0 G%(0)=0:G%(1)=0:GOTO290
240IFAX<4 SK%=AX ELSEIFAX<8 TP%=AX-4
250IFAX=8 TM%=1-TM%
260IFAX=9 LM%=(LM%+1)MOD60
270IFAX=10 LM%=(LM%+59)MOD60
280IFLM%=0 LM%=60
290UNTILAX>10
300IFAX=12 PROCc1 ELSEIFAX<11 UNTILFAL
SE
310C%(0)=0:C%(1)=0
320IFTP%=1 C%(0)=1 ELSEIFTP%=2 C%(1)=1
ELSEIFTP%=3 C%(0)=1:C%(1)=1
330MODE1:VDU23;8202;0;0;0;19,2,6,0,0;
340HIMEM=&2D40:PROCbd
350REPEAT
360COLOUR128:COLOUR3
370PRINTTAB(5,30)"MOVE ";MNXTAB(9)"PLA
YER ";MV%+1TAB(18);:COLOURMV%+1
380IFC%(MV%)=0 PROCcomp ELSEPROCmove
390MV%=1-MV%:IFMV%=0 MN%=MN%+1:IFMN%=2
2 ED%=3
400UNTILEDX>0
410SOUND&11,1,0,60
420IFEDX<3 G%(EDX-1)=G%(EDX-1)+1
430COLOUR128:COLOUR3:PRINTTAB(0,30)SPC
40;TAB(0,30)"GAME OVER : RESULT - ";
440COLOUR2:IFEDX=3 PRINTSPC5"A DRAW"SP
C3 ELSEPRINT"PLAYER ";ED%:" HAS WON"
450PROCgw:VDU19,ED%,6,0;0:COLOUR2:CALL
&2F85
460PROCc1:UNTILFALSE
470DEFPROCcomp:PRINT"COMPUTER"SPC10;
480fc%=0:FORZ%=0TO6:IFBC%?Z%>47 fc%=1
490NEXT
500IFMN%<3 BM%=FNb(MV%+1,3):GOTO520
510IFSK%<3 BM%=FNb(MV%+1,SK%+2) ELSEBM
%=FNb(MV%+1,SK%+2+fc%)
520PROCdn(BM%):PROCmv(BM%,MV%):ENDPROC
Continued ▶

```



```

530DEFFN6 (A%,X%) COLOUR3:PRINTTAB (32,30
);X%+1:CALL&2E13
540BS%=?SC%:FORP%=1T06:IFP%?SC%>BS% BS
%=?SC%
550NEXT
560REPEATBM%=RND(7)-1:UNTILBM%?SC%=BS%
570IFBM%?BC%>47 OR((BM%=0 ORBM%=6 ORBM
%?BC%>6) ANDMN%<3) BM%?SC%=0:GOTO540 ELSE
=BM%
580DEFPROCmove:VDU29,96+1084*MV%;784,:
PRINTSPC5"YOUR MOVE"SPC10;
590TIME=T%(MV%):*FX15
600REPEATPROCTm(MV%):COLOURMV%+1:PRINT
TAB(6+4*c%,0) $&B78:U%=INKEY(0):IFTIME>LM
%*6000 ANDTM%=1 GOSUB660
610IFU%>135ANDU%<139 COLOUR0:PRINTTAB(
6+4*c%,0) $&B78
620IFU%=136 c%=(c%+6)MOD7 ELSEIFU%=137
c%=(c%+1)MOD7
630UNTILU%=138:IFBC%?c%>47 SOUND&10,-1
0,2,5:GOTO600
640PROCdn(c%)
650PROCmv(c%,MV%):T%(MV%)=TIME:ENDPROC
660PROCTm(0):COLOUR3:VDU28,0,3,39,0,12
,26:PRINTTAB(11,0)"TIME UP PLAYER ";MV%+
1TAB(7,2)"Do you want to continue?"
670SOUND1,1,0,40
680IFNOTFNyn PROCc1:TIME=0:*FX125
690TM%=0:VDU26,12:PROCbd:PRINTTAB(14,3
0)"OK play on":RETURN
700DEFPROCd(B%,A%)FORX%=0T01:PRINTCHR#
B%CHR#157CHR#135CHR#141SPC((32-LENA#)DIV
2)A#:NEXT:ENDPROC
710DEFPROCdata:PRINTCHR#26TAB(23,3)CHR
#134;
720IFTP%=0PRINT"AUTO"SPC8ELSEIFTP%=1PR
INT"PLAYER RED "ELSEIFTP%=2PRINT"PLAYER
GREEN"ELSEPRINT" TWO PLAYER "
730PRINTTAB(23,4)CHR#134;SK%TAB(23,6)C
HR#134;LM%:" MIN. "TAB(23,5)CHR#134;
740IFTM%=0PRINT"OFF"ELSEPRINT"ON "
750ENDPROC
760DEFPROCc1
770FORX%=0T044STEP4:X%!B%=0:X%!B2%=0:N
EXT
780FORX%=0T06:BC%?X%=X%:NEXT
790MV%=0:MN%=1:ED%=0
800FORZ%=0T01:T%(Z%)=0:S%(Z%)=59:M%(Z
%)=0:NEXT
810ENDPROC
820DEFPROCbd:FORZ%=1T03:VDU19,Z%,0,0,:
COLOUR131:NEXT:FORX%=0T047:PROCSq(X%):NE
XT
830VDU5:GCOL0,3:FORX%=0T06:MOVE240+128
*X%,112:VDU49+X%:NEXT:VDU4,20,19,2,2,0;0
840COLOUR129:FORX%=0T01:IFC%(X%)=0 ORT
M%=0 GOTO890
850VDU29,96+1084*Z%;784,:MOVE-9,83
860FORY%=0T059:DRAW.7*FNx(Y%),.7*FNy(Y
%):NEXT
870FORY%=0T055STEP5:MOVE.6*FNx(Y%),.6*
FNy(Y%):DRAW.7*FNx(Y%),.7*FNy(Y%):NEXT
880COLOURZ%+1:PRINTTAB(1+34*Z%,11)"TIM
E"TAB(1+34*Z%,12)"USED"
890COLOUR3:PRINTTAB(35*Z%,15)"PLR ";Z%
+1
900NEXT
910PROCgw:ENDPROC
920DEFPROCSq(A%)IFAZMOD8=7 ENDPROC ELS
E COLOURAZ%B%:PRINTTAB(6+AZMOD8*4,24-AZDI
VB*4) $&B78:ENDPROC
930DEFPROCmv(C%,P%)LOCALp%:COLOUR131
940p%=BC%?C%:B%?p%=MV%+1:B2%?p%=MV%+1:
CALL&2F0F:BC%?C%=BC%?C%+8
950PROCSq(p%):IFFN1(p%)>=4 ED%=MV%+1
960ENDPROC
970DEFFN1(A%)=USR(&2D40)AND&FF
980DEFPROCdn(c%)COLOUR131
990FORX%=1T06-(BC%?c%)DIV8
1000SOUND1,-10,196-16*X%,1:COLOURMV%+1
1010PRINTTAB(6+c%*4,X%*4) $&B78

```

```

1020T%=TIME:REPEATUNTILTIME>T%+4:COLOUR
0
1030PRINTTAB(6+c%*4,X%*4) $&B78
1040NEXT:ENDPROC
1050DEFFNx(x%)=x%?&B00-128
1060DEFFNy(y%)=y%?&B3C-128
1070DEFPROCTm(X%)sec%=(TIME MOD6000)DIV
100:min%=(TIME DIV6000:IFsec%=S%(X%) ORTM
%=0 ENDPROC
1080GCOL0,0:PROCh1(X%):S%(X%)=sec%:GCOL
0,1:PROCh2(X%):GCOL0,2:PROCh2(X%):SOUND0
,-8,5,1:IFmin%=M%(X%) ENDPROC
1090GCOL0,0:PROCh2(X%):M%(X%)=min%:GCOL
0,2:PROCh2(X%):SOUND1,2,100,1:ENDPROC
1100DEFPROCh1(X%)MOVE0,0:DRAW.55*FNx(S%(
X%)),.55*FNy(S%(X%)):ENDPROC
1110DEFPROCh2(X%)MOVE0,0:DRAW.4*FNx(M%(
X%)),.4*FNy(M%(X%)):ENDPROC
1120DEFFNyn:REPEAT:I%=INSTR("YnN",GET#
):UNTILI%>0:=I%DIV3-1
1130DEFPROCgw:FORZ%=0T01:COLOURZ%+1
1140PRINTTAB(Z%*35,22)"GAMES"TAB(1+Z%*3
5,23)"WON":COLOUR3:PRINTTAB(2+Z%*35,25);
G%(Z%)
1150NEXT:ENDPROC
1160CALL&2F1B:IFC%(MV%)=1 T%(MV%)=TIME
1170IFERR=17 ANDNOTINKEY(-1) GOTO100 EL
SEMODE7:*FX4

```

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Listing 3. For disc users only

```

10REM Quadline PAGE and GO!
20P%=&A00
30ILDA #&BA :LDX #0
40LDY #ASC("P"):JSR &FFF4
50LDY #ASC("A"):JSR &FFF4
60LDY #ASC("."):JSR &FFF4
70LDY #ASC("="):JSR &FFF4
80LDY #ASC("&"):JSR &FFF4
90LDY #ASC("E"):JSR &FFF4
100LDY #ASC("O"):JSR &FFF4
110LDY #ASC("O"):JSR &FFF4
120LDY #13:JSR &FFF4
130LDY #ASC("D"):JSR &FFF4
140LDY #ASC("."):JSR &FFF4
150LDY #13:JSR &FFF4
160LDY #ASC("R"):JSR &FFF4
170LDY #ASC("U"):JSR &FFF4
180LDY #ASC("N"):JSR &FFF4
190LDY #13:JSR &FFF4
200RTS J

```

ELECTRON USERS

Quadline will run on the Electron with just a few minor modifications.

Listing 1: This requires just two lines, line 60 and line 100 to be altered. The new lines are:

```

60MODE6:VDU23;8202;0;0;0;:SOUND1,1,100,60
100PRINTTAB(5,8)"QUADLINE is loading"

```

Listing 2: The new adjusted lines should read as follows:

```

100REPEAT
110MODE6:HIMEM=&2D40:VDU23;8202;0;0;0;
120PRINTSPC(10)"QUADLINE - MENU"
130PRINT'SPC8"GAME TYPE : "'SPC8"SKILL
L LEVEL : "
140PRINTSPC8"TIMER"SPC7:" "'SPC8"TIME L
IMIT : "'
150PRINT"USE THE FOLLOWING KEYS : "
160VDU28,7,24,34,11
170PRINT"TIMER ON/OFF""I INCREASE T
IME LIMIT"
180PRINT"D DECREASE TIME LIMIT""1 - 3
SELECT SKILL LEVEL"
190PRINT"P TWO PLAYER GAME""R ONE PLA
YER - RED"
200PRINT"G ONE PLAYER - GREEN""A AUTO
GAME"
210PRINT"SPACE RESET GAME SCORES""C
CONTINUE PLAYING""N NEW GAME";
710DEFPROCdata:PRINTCHR#26TAB(23,3);
730PRINTTAB(23,4);SK%TAB(23,6);LM%:" M
IN. "TAB(23,5);

```

See 'Raise the tone in print', page 86

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Listing 1. Basic listing of revised fill algorithm

```

10 REM REVISED FILL ALGORITHM
20 REM Peter Sandford
30 REM For BBC (not OS 0.1) and Elk
40 REM (C) Acorn User XXXX
50 :
60 DIM CPblock 8
70 DIM fromxq%(25),toxq%(25),yq%(25)
80 mode=5:MODEmode
90 xstep=2*2^(mode MOD3)
100 PROCshape(640,500)
110 END
120 :
130 DEF PROCfillfrom(x,y)
140 IF POINT(x,y)>0 THEN ENDPROC
150 first=1:last=0
160 PROCfillalong(x,y)
170 PROCqueue(leftx,rightx,y+4,4)
180 PROCqueue(leftx,rightx,y-4,-4)
190 REPEAT
200 PROCunqueue
210 PROCfillup(nextx,y,ystep,tox)
220 UNTIL first=last+1
230 ENDPROC
240 :
250 DEF PROCfillup(nextx,y,ystep,tox)
260 IF POINT(nextx,y)<0 ENDPROC
270 IF POINT(nextx,y)<>0 nextx=FNback(
nextx,y)
280 IF nextx>tox ENDPROC
290 PROCfillalong(nextx,y)
300 IF rightx>tox newx=FNback(tox+xste
p,y-ystep):IF newx<rightx PROCqueue(newx
,rightx,y-ystep,-ystep)
310 IF rightx<tox newx=FNback(rightx+x
step,y):IF newx<tox PROCqueue(newx,tox,y
,ystep)
320 IF leftx<nextx newx=FNback(leftx,y
-ystep):IF newx<nextx PROCqueue(newx,nex
tx,y-ystep,-ystep)
330 nextx=leftx:tox=rightx
340 y=y+ystep
350 GOTO260
360 ENDPROC
370 :
380 DEF PROCfillalong(x,y)
390 PLOT 76,x,y
400 X%=CPblock:Y%=CPblock DIV 256
410 A%=&0D:CALL &FFF1
420 leftx=!CPblock AND &FFFF
430 rightx=(CPblock+4) AND &FFFF
440 lx=leftx+xstep*((leftx DIV xstep)
MOD2)
450 IF lx<=rightx MOVE lx,y:PLOT 21,ri
ghtx,y
460 ENDPROC
470 :
480 DEF FNback(x,y)
490 PLOT 92,x,y
500 X%=CPblock:Y%=CPblock DIV 256
510 A%=&0D:CALL &FFF1
520 =(!(CPblock+4) AND &FFFF)+xstep
530 :
540 DEF PROCqueue(fx,tx,y,ystep)
550 last=(last+1)MOD 25
560 fromxq%(last)=fx
570 toxq%(last)=tx
580 yq%(last)=y*SGN(ystep)
590 ENDPROC
600 :
610 DEF PROCunqueue
620 nextx=fromxq%(first)
630 tox=toxq%(first)
640 y=ABS(yq%(first))
650 ystep=4*SGN(yq%(first))
660 first=(first+1)MOD 25
670 ENDPROC
680 :
690 DEF PROCshape(x%,y%)
700 R1=60:R2=240
710 FOR A1=0 TO 3*PI/2 STEP PI/2
720 A2=A1+PI/4:A3=A1+PI/2
730 MOVE x%+R1*COS(A1),y%+R1*SIN(A1)
740 DRAW x%+R2*COS(A2),y%+R2*SIN(A2)
750 DRAW x%+R2*COS(A3),y%+R2*SIN(A3)
760 DRAW x%+R2*COS(A2)/2,y%+R2*SIN(A2)
/2
770 DRAW x%+R1*COS(A3),y%+R1*SIN(A3)
780 NEXT
790 PROCfillfrom(x%,y%)
800 ENDPROC

```

Listing 2. Assembly language listing for DOTFILL routine

```

10 REM DOTFILL source code
20 REM Peter Sandford
30 REM For BBC (not OS 0.1) and Elk
40 REM (C) Acorn User XXXX
50 :
60 MODE 7
70 code=&1200:workspace=&1100
80 PROCassemble
90 IF FNchecksum<>&13215 PRINT"Checks
um error - check assembler listing":END
100 PROCassembletones
110 *SAVE DOTFILL 1200+2FF
120 END
130 :
140 DEF PROCassemble
150 osbyte=&FFF4:oswrch=&FFEE
160 xlo=&70:xhi=&71:ylo=&72:yhi=&73
170 newx=&74:newy=&76:tox=&78
180 bitmap=&7A:mask=&7B
190 xstep=&7C:xshift=&7D:pattern=&7E
200 first=&80:last=&82:flag=&84
210 leftx=&88:rightx=&8C:oldx=&8E
220 READ tones
230 FOR pass=0 TO 3 STEP 3
240 P%=code
250 [ OPT pass
260 .dotfill
270 LDA #6
280 STA &71
290 LDA #0
300 STA &70
310 LDY #9
320 .copyparam
330 LDA (&70),Y

```

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```

340 STA &80,Y
350 DEY
360 BPL copyparam
370 \ Check for 3 integer parameters
380 LDA &80
390 CMP #3
400 BNE badcall
410 LDA &83
420 CMP #4
430 BNE badcall
440 LDA &86
450 CMP #4
460 BNE badcall
470 LDA &89
480 CMP #4
490 BEQ paramok
500 .badcall
510 BRK:]
520 ?P%=45
530 $(P%+1)="CALL Parameters"
540 P%=P%+16
550 [ OPT pass
560 BRK
570 .paramok
580 LDY #1
590 .storeparam
600 LDA (&81),Y
610 STA xlo,Y
620 LDA (&84),Y
630 STA ylo,Y
640 DEY
650 BPL storeparam
660 INY
670 LDA (&87),Y
680 BMI badcall
690 CMP #ntones
700 BCS badcall
710 ASL A
720 TAY
730 LDA pstore,Y
740 STA pattern
750 INY
760 LDA pstore,Y
770 STA pattern+1
780 LDA #&87
790 JSR osbyte
800 TYA
810 CMP #3
820 BCC mode012
830 BEQ badmode
840 CMP #6
850 BCC mode45
860 .badmode
870 BRK:]
880 ?P%=46
890 $(P%+1)="Not graphics mode"
900 P%=P%+18
910 [ OPT pass
920 BRK
930 .mode45
940 SEC
950 SBC#3
960 .mode012
970 STA xshift
980 TAX
990 LDA #1

1000 .setxstep
1010 ASL A
1020 DEX
1030 BPL setxstep
1040 STA xstep
1050 \ Check start point is background
colour
1060 LDA #9
1070 JSR osword
1080 LDA &74
1090 BEQ ok2
1100 RTS
1110 .ok2
1120 \ Initialise up/down flag & queue
pointers
1130 LDA #0
1140 STA flag
1150 STA first
1160 STA last
1170 LDA #workspace DIV 256
1180 STA first+1
1190 STA last+1
1200 \ Fill first line
1210 JSR linefill
1220 JSR copylimits
1230 JSR incy
1240 \ Store point above first line
1250 JSR queue
1260 JSR decy
1270 JSR decy
1280 JSR invertflag
1290 \ Store point below first line
1300 JSR queue
1310 :
1320 .startloop
1330 \ Get point from queue & start to
fill in current direction
1340 JSR unqueue
1350 .nextline
1360 \ Test for ESCAPE key pressed
1370 BIT &FF
1380 BPL noesc
1390 LDA #&7E
1400 JSR osbyte
1410 RTS
1420 .noesc
1430 \ Exit if point off screen
1440 LDA #9
1450 JSR osword
1460 LDA &74
1470 BMI checkendoffill
1480 BEQ background
1490 JSR findback
1500 STA xlo
1510 LDA newx+1
1520 STA xhi
1530 \ Test for end of fill in current
direction
1540 LDA xlo
1550 CMP tox
1560 BNE noteq
1570 CLC
1580 .noteq
1590 LDA xhi
1600 SBC tox+1
1610 BCS checkendoffill

```

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```

1620 .background
1630 LDA xlo
1640 STA oldx
1650 LDA xhi
1660 STA oldx+1
1670 \ Fill current line
1680 JSR linefill
1690 JSR testnewlines
1700 JSR copylimits
1710 JSR incy
1720 JMP nextline
1730 :
1740 .checkendoffill
1750 LDA last
1760 CMP first
1770 BNE startloop
1780 RTS
1790 :
1800 \ Subroutine to test limits of line
just filled
1810 .testnewlines
1820 LDA rightx
1830 STA xlo
1840 CMP tox
1850 LDA rightx+1
1860 STA xhi
1870 SBC tox+1
1880 BCS test2
1890 JSR incx
1900 JSR findback
1910 CMP tox
1920 LDA newx+1
1930 SBC tox+1
1940 BCS test3
1950 JSR queue
1960 .test2
1970 CLC
1980 LDA tox
1990 ADC xstep
2000 STA xlo
2010 LDA tox+1
2020 STA xhi
2030 BCC t2noinc
2040 INC xhi
2050 .t2noinc
2060 JSR decy
2070 JSR findback
2080 CMP rightx
2090 LDA newx+1
2100 SBC rightx+1
2110 BCS test3
2120 JSR invertflag
2130 LDA rightx
2140 STA tox
2150 LDA rightx+1
2160 STA tox+1
2170 JSR queue
2180 JSR invertflag
2190 .test3
2200 LDA leftx
2210 CMP oldx
2220 LDA leftx+1
2230 SBC oldx+1
2240 BCS endtest
2250 LDY #3
2260 .t3loop
2270 LDA leftx,Y
2280 STA xlo,Y
2290 DEY
2300 BPL t3loop
2310 JSR decy
2320 JSR findback
2330 CMP oldx
2340 LDA newx+1
2350 SBC oldx+1
2360 BCS endtest
2370 LDA oldx
2380 STA tox
2390 LDA oldx+1
2400 STA tox+1
2410 JSR invertflag
2420 JSR queue
2430 JSR invertflag
2440 .endtest
2450 RTS
2460 :
2470 \ subroutine to copy plot limits
2480 .copylimits
2490 LDY #5
2500 .copyloop
2510 LDA leftx,Y
2520 STA xlo,Y
2530 STA newx,Y
2540 DEY
2550 BPL copyloop
2560 RTS
2570 :
2580 \ subroutine to invert up/down flag
2590 .invertflag
2600 LDA flag
2610 EOR #&80
2620 STA flag
2630 RTS
2640 :
2650 \ subroutine to store new point in
queue
2660 .queue
2670 LDA newy+1
2680 ORA flag
2690 STA newy+1
2700 LDY #5
2710 .q1
2720 LDA newx,Y
2730 STA (last),Y
2740 DEY
2750 BPL q1
2760 LDA last
2770 CLC
2780 ADC #6
2790 CMP #252
2800 BNE q2
2810 LDA #0
2820 .q2
2830 CMP first
2840 BEQ cantstore
2850 STA last
2860 .cantstore
2870 RTS
2880 :
2890 \ subroutine to retrieve point from
queue

```

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```

2900 .unqueue
2910 LDY #5
2920 .uq1
2930 LDA (first),Y
2940 STA newx,Y
2950 STA xlo,Y
2960 DEY
2970 BPL uq1
2980 LDA yhi
2990 TAX
3000 AND #&80
3010 STA flag
3020 TXA
3030 AND #&7F
3040 STA yhi
3050 LDA first
3060 CLC
3070 ADC #6
3080 CMP #252
3090 BNE uq2
3100 LDA #0
3110 .uq2
3120 STA first
3130 RTS
3140 :
3150 \ Subroutine to find next background point to right
3160 .findback
3170 LDA #92
3180 JSR plot
3190 LDA #&0D
3200 JSR osword
3210 LDA newx
3220 CLC
3230 ADC xstep
3240 STA newx
3250 BCC fb2
3260 INC newx+1
3270 .fb2
3280 RTS
3290 :
3300 \ Subroutine to increment Y in current direction
3310 .incy
3320 LDA ylo
3330 BIT flag
3340 BMI down
3350 .up
3360 CLC
3370 ADC #4
3380 STA ylo
3390 STA newy
3400 BCC nocarry1
3410 INC yhi
3420 INC newy+1
3430 .nocarry1
3440 RTS
3450 .down
3460 SEC
3470 SBC #4
3480 STA ylo
3490 STA newy
3500 BCS carryset
3510 DEC yhi
3520 DEC newy+1
3530 .carryset
3540 RTS
3550 :
3560 \ Subroutine to increment Y in reverse direction
3570 .decy
3580 LDA ylo
3590 BIT flag
3600 BMI up
3610 BPL down
3620 :
3630 \ Subroutine to increment X value
3640 .incx
3650 CLC
3660 LDA xlo
3670 ADC xstep
3680 STA xlo
3690 BCC incx2
3700 INC xhi
3710 .incx2
3720 RTS
3730 :
3740 \ Subroutine to fill single line with dot pattern
3750 .linefill
3760 LDA #76
3770 JSR plot
3780 LDA #&0D
3790 JSR osword
3800 LDY#5
3810 .storelimits
3820 LDA xlo,Y
3830 STA leftx,Y
3840 DEY
3850 BPL storelimits
3860 \ Initialise 'bitmap' - used to store pattern for this value of Y
3870 LDA ylo
3880 LSR A
3890 LSR A
3900 AND #3
3910 LSR A
3920 TAX
3930 LDA pattern,X
3940 BCC lohalf
3950 AND #&F0
3960 STA bitmap
3970 LSR A
3980 LSR A
3990 LSR A
4000 LSR A
4010 JMP duplicate
4020 .lohalf
4030 AND #&0F
4040 STA bitmap
4050 ASL A
4060 ASL A
4070 ASL A
4080 ASL A
4090 .duplicate
4100 ADC bitmap
4110 STA bitmap
4120 \ Initialise mask bit
4130 LDA xlo
4140 LDX xshift
4150 .shift
4160 LSR A

```

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```

4170 DEX
4180 BPL shift
4190 AND #3
4200 TAX
4210 SEC
4220 LDA #0
4230 .rotate
4240 ROR A
4250 DEX
4260 BPL rotate
4270 STA mask
4280 .plotloop
4290 LDA bitmap
4300 AND mask
4310 BEQ noplot
4320 \ Plot current point if relevant b 2
it in 'bitmap' is set
4330 LDA #69
4340 JSR plot
4350 .noplot
4360 \ Shift mask bit 1 place to right
4370 LSR mask
4380 BCC xinc
4390 LDA #&80
4400 STA mask
4410 .xinc
4420 JSR incx
4430 .checkendofline
4440 CMP &74
4450 BNE ntequal
4460 CLC
4470 .ntequal
4480 LDA xhi
4490 SBC &75
4500 BCC plotloop
4510 RTS
4520 :
4530 \ Subroutine to PLOT A,X,Y using &
70-73 for X,Y values
4540 .plot
4550 PHA
4560 LDA #25
4570 JSR oswrch
4580 PLA
4590 JSR oswrch
4600 LDX #0
4610 .plot2
4620 LDA &70,X
4630 JSR &FFEE
4640 INX
4650 CPX #4
4660 BNE plot2
4670 RTS
4680 :
4690 \ Subroutine to perform OSWORD CAL
L with parameter block at &70
4700 .osword
4710 LDX #&70
4720 LDY #0
4730 JMP &FFF1
4740 :
4750 .pstore
4760 J
4770 NEXT pass
4780 ENDPROC
4790 :
4800 DEF FNchecksum
4810 C%=0
4820 FOR J%=code TO pstore-1
4830 C%=C%+?J%
4840 NEXT
4850 =C%
4860 :
4870 DEF PROCassembletones
4880 RESTORE 5010:READ ntones
4890 FOR P%=P% TO P%+(ntones-1)*2 STEP
4900 B$="":T%=0
4910 FOR J%=1TO4:READ V$:B$=V$+B$:NEXT
4920 FOR J%=15 TO 0 STEP-1
4930 V%=VAL (MID$(B$,J%+1,1))
4940 T%=T%+V%*(2^J%)
4950 NEXT
4960 !P%=T%
4970 NEXT
4980 ENDPROC
4990 :
5000 REM Total number of tones
5010 DATA 24
5020 :
5030 REM Tone 0 - solid fill
5040 DATA 1111,1111,1111,1111
5050 :
5060 REM 87.5%,75%,50%,25%,12.5% tones
5070 DATA 1011,1111,1011,1111
5080 DATA 1011,1110,1011,1110
5090 DATA 0101,1010,0101,1010
5100 DATA 0001,0100,0001,0100
5110 DATA 0001,0000,0100,0000
5120 :
5130 REM Diagonals
5140 DATA 0111,1011,1101,1110
5150 DATA 1110,1101,1011,0111
5160 DATA 1001,1100,0110,0011
5170 DATA 1001,0011,0110,1100
5180 DATA 1000,0100,0010,0001
5190 DATA 0001,0010,0100,1000
5200 :
5210 REM Stripes & bars
5220 DATA 1010,1010,1010,1010
5230 DATA 0010,0010,0010,0010
5240 DATA 0110,0110,0110,0110
5250 DATA 0000,1111,0000,1111
5260 DATA 0110,1111,0110,1111
5270 DATA 0000,0011,0000,0011
5280 :
5290 REM Patterns
5300 DATA 0111,1101,1110,1011
5310 DATA 0010,1000,0001,0100
5320 DATA 1100,0110,0011,0110
5330 DATA 0010,0001,0010,0100
5340 DATA 1001,0110,0110,1001
5350 DATA 0000,0111,0000,1101

```

Listing 3. Demonstration program for DOTFILL routine

```

10 REM DOTFILL demonstration
20 REM Peter Sandford
30 REM For BBC (not OS 0.1) and Elk
40 REM (C) Acorn User XXXX
50 :
60 dotfill=&1200:*LOAD DOTFILL 1200
70 mode=4:MODEmode
80 charwidth=16*2^(mode MOD3)
90 FOR T%=0 TO 23
100 x%=128+200*(T% MOD6)
110 y%=200+200*(T% DIV6)
120 PROCshape(x%,y%,T%)
130 NEXT
140 REM Insert CALL to screendump
150 END
160 :
170 DEF PROCshape(x%,y%,tone%)
180 R1=40:R2=128
190 FOR A1=0 TO 3*PI/2 STEP PI/2
200 A2=A1+PI/4:A3=A1+PI/2
210 MOVE x%+R1*COS(A1),y%+R1*SIN(A1)
220 DRAW x%+R2*COS(A2),y%+R2*SIN(A2)
230 DRAW x%+R2*COS(A3),y%+R2*SIN(A3)
240 DRAW x%+R2*COS(A2)/2,y%+R2*SIN(A2)
/2
250 DRAW x%+R1*COS(A3),y%+R1*SIN(A3)
260 NEXT
270 CALL dotfill,x%,y%,tone%
280 VDU5
290 T$=STR$(tone%)
300 MOVEx%+(LEN(T$)*charwidth/2),y%+8
310 PRINT STRING$(LEN(T$),CHR$(127));T$
$
320 VDU4
330 ENDPROC

```

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Listing 4. Modifications to convert DOTFILL routine to colour fill

```

10 REM COLFILL source code
90 IF FNchecksum<>&1380E PRINT"Checksum error - check assembler listing":END
110 *SAVE"COLFILL" 1200+2FF
710 TAY
720 LDA pstore,Y
730 STA pattern
3860 LDA #2
3870 STA &7A
3880 .plotloop
3890 \ Calculate colour value for this pixel
3900 LDA ylo
3910 AND #4
3920 LSR A
3930 TAY
3940 LDA xlo
3950 LDX xshift
3960 .shift
3970 LSR A
3980 DEX
3990 BPL shift
4000 LSR A
4010 TYA
4020 ADC #0
4030 TAY
4040 LDA pattern
4050 .getcolour
4060 DEY
4070 BMI colourgot
4080 LSR A
4090 LSR A
4100 JMP getcolour
4110 .colourgot
4120 AND #3
4130 BEQ noplot
4140 TAY
4150 \ Set graphics colour & plot dotted line
4160 LDA #18
4170 JSR oswrch
4180 LDA #0
4190 JSR oswrch
4200 TYA
4210 JSR oswrch
4220 LDA #20
4230 JSR plot
4240 JSR swapx
4250 LDA #21
4260 JSR plot
4270 JSR swapx
4280 .noplot
4290 JSRincx
4300 CMP &74
4310 LDA xhi
4320 SBC &75
4330 BCS linedone
4340 .nextplot
4350 DEC &7A
4360 BNE plotloop
4370 .linedone
4380 RTS
4390 .swapx
4400 \ Subroutine to swap x values &70/1 - &74/5
4410 LDX #1
4420 .swapx1
4430 LDA &70,X
4440 PHA
4450 LDA &74,X
4460 STA &70,X
4470 PLA
4480 STA &74,X
4490 DEX
4500 BPL swapx1
4510 RTS
4880 DEF PROCassembletones
4890 RESTORE 5010:READ ntones
4900 FOR P%=P% TO P%+ntones-1
4910 T%=0
4920 FOR J%=0TO3
4930 READ V%

```

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```

4940 T%=T%+V%*2^(2*J%)
4950 NEXT
4960 ?P%=T%
4970 NEXT
4980 ENDPROC
4990 :
5000 REM Total number of tones
5010 DATA 28
5020 :
5030 DATA 3,3,3,3, 3,3,1,3, 3,1,1,3, 3,
1,1,1,
5040 DATA 1,1,1,1, 1,1,2,1, 1,2,2,1, 1,
2,2,2
5050 DATA 2,2,2,2, 2,2,3,2, 2,3,3,2, 2,
3,3,3
5060 DATA 3,3,0,3, 3,0,0,3, 3,1,0,3, 1,
3,0,1
5070 DATA 1,1,0,1, 1,0,0,1, 1,2,0,1, 2,
1,0,2
5080 DATA 2,2,0,2, 2,0,0,2, 2,3,0,2, 3,
2,0,3
5090 DATA 3,2,1,3, 1,2,3,1, 2,1,3,2, 0,
2,1,3

```

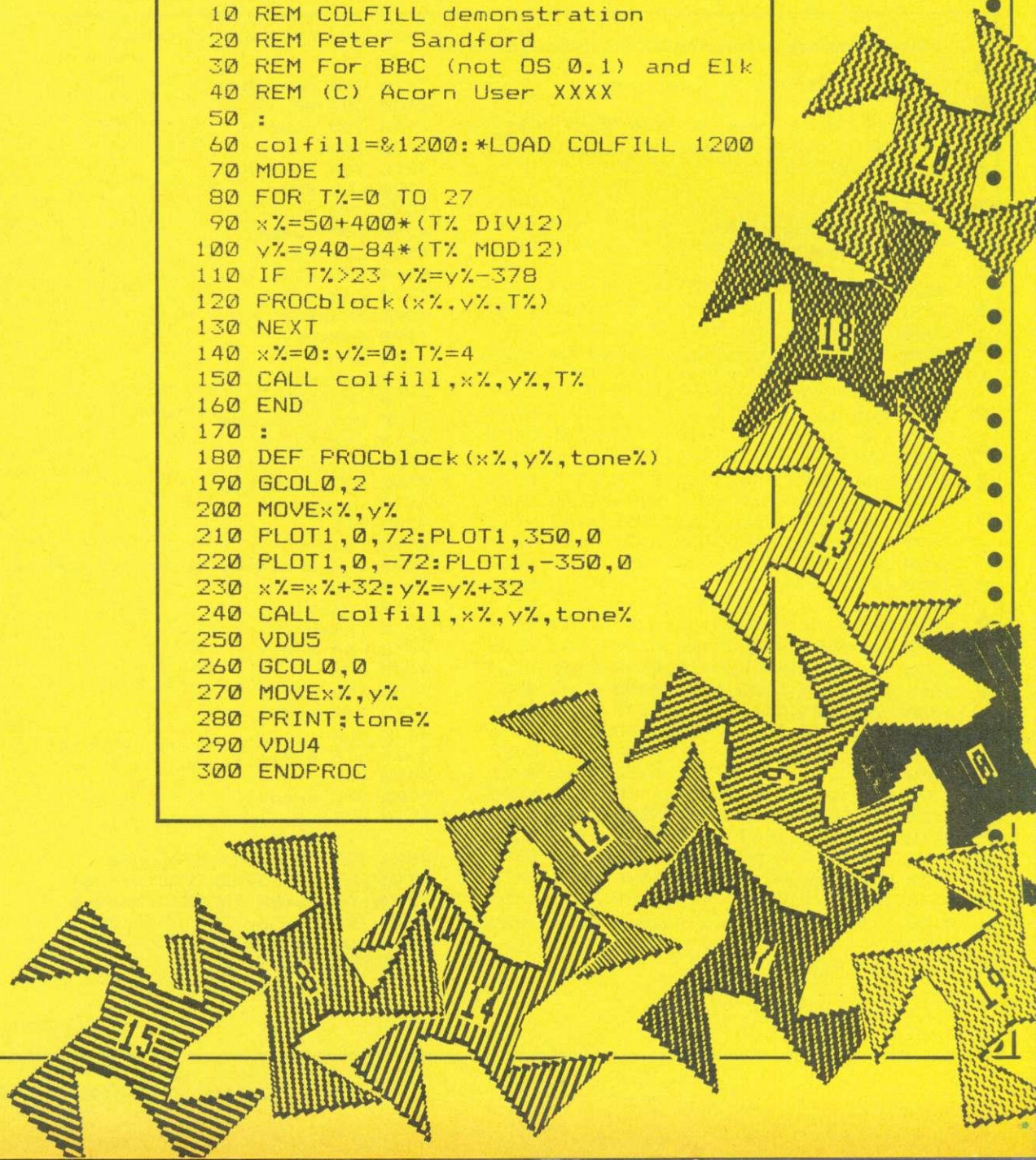
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Listing 5. Demonstration program for COLFILL routines

```

10 REM COLFILL demonstration
20 REM Peter Sandford
30 REM For BBC (not OS 0.1) and Elk
40 REM (C) Acorn User XXXX
50 :
60 colfill=&1200:*LOAD COLFILL 1200
70 MODE 1
80 FOR T%=0 TO 27
90 x%=50+400*(T% DIV12)
100 y%=940-84*(T% MOD12)
110 IF T%>23 y%=y%-378
120 PROCblock(x%.y%.T%)
130 NEXT
140 x%=0:y%=0:T%=4
150 CALL colfill,x%.y%.T%
160 END
170 :
180 DEF PROCblock(x%.y%.tone%)
190 GCOL0,2
200 MOVEx%.y%
210 PLOT1,0,72:PLOT1,350,0
220 PLOT1,0,-72:PLOT1,-350,0
230 x%=x%+32:y%=y%+32
240 CALL colfill,x%.y%.tone%
250 VDU5
260 GCOL0,0
270 MOVEx%.y%
280 PRINT;tone%
290 VDU4
300 ENDPROC

```




```

10 REM STORYBOARD
20 REM adapted by Robert Southall
30 REM from 'Activity Board'
40 REM by Susan Kingsbury
50 REM Acorn User August 1984
60 :
70 *FX200,1
80 *KEY10 OLD:M RUN:M
90 DIMB$(64):DIMD$(14)
100 DIMSTORY$(9):DIMA$(10)
110 MODE7
120 Flag=0
130 PROCinstruct
140 MODE7
150 PROCsetup
160 MODE 4
170 VDU19,0,Txt,0,0,0,19,1,Bkg,0,0,0
180 COLOUR 0:COLOUR 129:CLS
190 PROCgetname
200 PROCmenu
210 PROCwait
220 PROCprint
230 CLS:PROCdouble(NAME$,2,6)
240 PROCdouble("....",13,6)
250 Go$="Press 1 for another story"
260 Col$="Press 2 to change colour"
270 End$="Press 3 to end"
280 PROCdouble(Go$,2,18)
290 PROCdouble(Col$,2,22)
300 PROCdouble(End$,2,26)
310 No$=GET$
320 CLS
330 IF No$="1" THEN 200
340 IF No$="2" THEN 140 ELSE CLS
350 PROCdouble("BYE - BYE",3,15)
360 *FX200,0
370 END
380 :
390 REM P R O C E D U R E S
400 :
410 DEF PROCwait
420 LOCAL I
430 READ A$
440 IF Story=56 THEN end=64 ELSE end=8
450 FOR I=1 TO end
460 READ B$(I)
470 NEXT I
480 Count=0
490 CLS:PROCdouble(A$,10,12)
500 IF 765120=255 THEN 500
510 CLS
520 L=500
530 X$=INKEY$(0):IF X$="P" OR Count>=1
4 THEN ENDPROC
540 C=(765120)
550 G=255-C
560 IF L=G THEN 530
570 IF G>0 THEN PROCsentence
580 GOTO 530
590 ENDPROC
600 :
610 DEF PROCprint
620 CLS
630 Sp=0
640 FOR K=1 TO Count
650 PROCdouble(D$(K),0,K+Sp)
660 Sp=Sp+1
670 NEXT K
680 PROCprinter
690 PRINTTAB(1,29)"Press SPACE BAR"
700 z$=GET$:IF z$<>" " THEN 820
710 ENDPROC
720 :
730 DEF PROCprinter
740 PRINTTAB(0,29)"Do you want to print
your story? (Y/N)"
750 Pr$=GET$:IF Pr$="" THEN 740
760 IF Pr$<>"Y" THEN 920
770 *FX15,0
780 VDU2,1,32,1,32,1,13,3
790 IF ADVAL(-4)=63 THEN 800 ELSE 920
800 VDU2,21
810 PRINT:PRINT STRING$(40,"*")
820 PRINT"***** ";NAME$;"`s"TAB(29)" S
TORY *****"
830 PRINT STRING$(40,"*")
840 PRINT A$
850 PRINT
860 FOR K=1 TO Count
870 PRINT D$(K)
880 NEXT K
890 PRINT STRING$(40,"*")
900 VDU6
910 PRINT CHR$(3)
920 FOR X=0TO38:PROCpause(100):PRINTTAB
B(X,29)" ":NEXT
930 ENDPROC
940 :
950 DEF PROCdouble(String$,col,row)
960 LOCAL counter
970 A%=&A:X%=0:Y%=&A
980 m=&A00
990 FOR counter=1 TO LEN(String$)
1000 letter$=MID$(String$,counter,1)
1010 ?m=ASC(letter$)
1020 CALL (&FFF1)
1030 VDU23,240,m?1,m?1,m?2,m?2,m?3,m?3,
m?4,m?4
1040 VDU23,241,m?5,m?5,m?6,m?6,m?7,m?7,
m?8,m?8
1050 PRINTTAB(col+counter,row);CHR$(240
);
1060 PRINTTAB(col+counter,row+1);CHR$(2
41)
1070 NEXT counter
1080 ENDPROC
1090 :
1100 DEF PROCmenu
1110 LOCAL Co,J,Z,Y
1120 CLS
1130 Co=0:J=0
1140 Heading$=" choose a story :-"
1150 RESTORE 3100
1160 REPEAT
1170 Co=Co+1
1180 READ STORY$(Co)
1190 UNTIL STORY$(Co)="*"
1200 Z=4:Y=1
1210 PROCdouble(NAME$,0,Y)
1220 PROCdouble(Heading$,10,Y)
1230 FOR I=1TO Co-1
1240 PROCdouble(STORY$(I),0,Y+Z)
1250 Z=Z+3:NEXT
1260 INPUTTAB(0,30)"Press story number"
1270 *FX15,1
1280 In=GET
1290 IF In=49 THEN RESTORE 2390
1300 IF In=50 THEN RESTORE 2490
1310 IF In=51 THEN RESTORE 2590
1320 IF In=52 THEN RESTORE 2690
1330 IF In=53 THEN RESTORE 2790
1340 IF In=54 THEN RESTORE 2890
1350 IF In=55 THEN RESTORE 2990
1360 IF In=56 THEN RESTORE 2370
1370 IF In>=57 OR In<=48 THEN 1270
1380 Story=In
1390 ENDPROC
1400 :
1410 DEF PROCinstruct
1420 LOCAL X,Y
1430 CLS:X=5:Y=5
1440 PRINTTAB(10,3)" PROGRAM NOTES"

```

```

1450 PRINTTAB(0,6)" The STORY-BOARD must be connected to"
1460 PRINT" the user-port on the underside of the"
1470 PRINT" machine. When the magnetic figure is"
1480 PRINT" placed over one of the marked points"
1490 PRINT" a sentence will appear on the screen."
1500 PRINT" When all points have been visited, or"
1510 PRINT" when you wish to end story, press 'P'"
1520 PRINT" and the sentences will be printed on"
1530 PRINT" the screen or a printer."
1540 PRINT" Sentences can be easily changed by"
1550 PRINT" altering DATA lines and new overlays"
1560 PRINT" made to go with the story."
1570 PRINT" Press space to continue"
1580 Z$=GET$:IFZ$<>" "THEN1580
1590 ENDPROC
1600 :
1610 DEF PROCsetup
1620 LOCAL X,Y
1630 CLS:X=0:Y=3
1640 PRINTTAB(X,Y)" Choose colours for LETTERS and PAPER:-"
1650 PRINT:PRINT" 0 = Black"" 1 = Red"
1660 PRINT:PRINT" 2 = Green"" 3 = Yellow"
1670 PRINT:PRINT" 4 = Blue"" 5 = Magenta"
1680 PRINT:PRINT" 6 = Cyan"" 7 = White"
1690 PRINTTAB(25,7)" Press "TAB(22,10)" COLOUR NUMBER"
1700 PRINTTAB(26,13)"then"TAB(25,16)"RETURN"
1710 INPUTTAB(5,22)" LETTER colour? "
1720 IF Txt>7 OR Txt<0 THEN 1710
1730 INPUTTAB(5,24)" PAPER colour? "
1740 IF Bkg>7 OR Bkg<0 OR Bkg=Txt THEN 1730
1750 ENDPROC
1760 :
1770 DEFPROCsound
1780 ENVELOPE 6,1,70,16,2,2,0,0,126,0,0,-126,126,126
1790 SOUND 1,6,50,5
1800 ENDPROC
1810 :
1820 DEF PROCpause(P)
1830 LOCAL X
1840 FOR X=1 TO P:NEXT
1850 ENDPROC
1860 :
1870 DEF PROCsentence
1880 LOCAL J
1890 CLS:PROCsound:L=6
1900 IF Story=56 THEN jump=((RND(6)-1)*9)+1)ELSE jump=0
1910 IF G=1 THEN J=1
1920 IF G=2 THEN J=2
1930 IF G=4 THEN J=3
1940 IF G=8 THEN J=4
1950 IF G=16 THEN J=5
1960 IF G=32 THEN J=6
1970 IF G=64 THEN J=7
1980 IF G=128 THEN J=8
1990 Z=J+jump
2000 PROCdouble(B$(Z),0,12)
2010 Count=Count+1
2020 D$(Count)=B$(Z)
2030 IF Count>=8 THEN PROCdouble("Press 'P'",0,28)
2040 ENDPROC
2050 :
2060 DEFPROCgetname
2070 IF Flag<>0 THEN ENDPROC
2080 VDU23,1,0;0;0;0;0;
2090 CLS:LOCAL C,J,X,Y
2100 PROCdouble("Type your first name:",0,3)
2110 PROCdouble("and press <RETURN>",6,6)
2120 NAME$="":C=0
2130 C=C+1
2140 A$(C)=GET$
2150 IF INKEY(-74) OR C=10 THEN 2200
2160 PROCdouble(A$(C),C+21,3)
2170 Flag=1
2180 *FX15,1
2190 GOTO2130
2200 FOR X=1 TO 39:FOR Y=1 TO 7
2210 PRINTTAB(X,Y)" ":NEXT:NEXT
2220 FOR J=1 TO C-1:NAME$=NAME$+A$(J):NEXT J
2230 PROCdouble("Hello",0,3)
2240 PROCdouble(NAME$,6,3)
2250 PROCpause(1000)
2260 PROCdouble("Would you like to play:",0,8)
2270 PROCpause(1000)
2280 PROCdouble("*****
*****",2,14)
2290 PROCdouble("* S T O R Y - B O A R D *",2,17)
2300 PROCdouble("*****
*****",2,20)
2310 PROCpause(1000)
2320 PROCdouble("Press 'Y' or 'N'",0,25)
2330 Y$=GET$:IF Y$<>"Y" THEN 2330
2340 ENDPROC
2350 :
2360 :
2370 DATA SURPRISE STORY!
2380 :
2390 DATA NAME THE SHOPS
2400 DATA The newsagents
2410 DATA The post office
2420 DATA The chemists
2430 DATA The toy-shop
2440 DATA The grocers
2450 DATA The greengrocers
2460 DATA The bakers
2470 DATA The butchers
2480 :
2490 DATA THE SHOPKEEPERS
2500 DATA Mr Brown the newsagent
2510 DATA Mrs Jones the post-mistress
2520 DATA Mr Wright the chemist
2530 DATA Mr Young owns the toy-shop
2540 DATA Mr Green is the grocer
2550 DATA Mr Smith the greengrocer
2560 DATA Mr West is the baker
2570 DATA Mr Davies is the butcher
2580 :
2590 DATA WHAT DO THEY SELL?
2600 DATA Mr Brown sells newspapers and comics
2610 DATA Mrs Jones sells stamps
2620 DATA Mr Wright sells medicines
2630 DATA Mr Young sells toys
2640 DATA Mr Green sells food

```

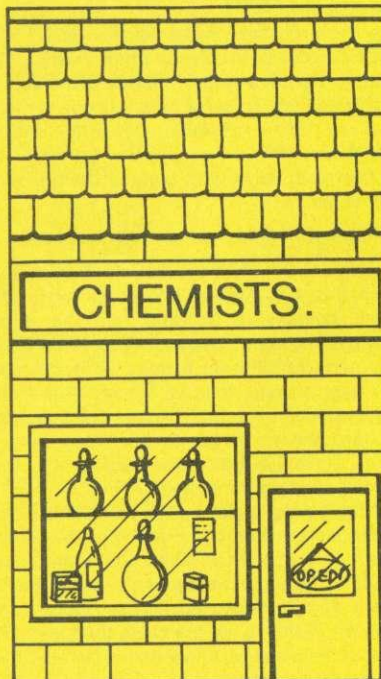
2650 DATA Mr Smith sells fruit and vegetable tables
 2660 DATA Mr West sells bread and cakes

 2670 DATA Mr Davies sells meat
 2680 :
 2690 DATA IN THE SHOP WINDOW
 2700 DATA There are lots of papers in the window
 2710 DATA The window is full of pens and pencils
 2720 DATA They can see lots of medicines
 2730 DATA Poppy likes the toys in the window
 2740 DATA Lizzie thinks the food looks very nice
 2750 DATA The fruit and vegetables look fresh
 2760 DATA The bread smells delicious
 2770 DATA The meat looks good enough to eat!
 2780 :
 2790 DATA BUYING THINGS
 2800 DATA Lizzie buys a comic and Poppy sweets
 2810 DATA Mummy wants some stamps for letters
 2820 DATA Lizzie collects some medicine for Daddy
 2830 DATA Poppy buys a football and Lizzie a doll
 2840 DATA Mummy wants some custard and ice-cream
 2850 DATA They buy 4 oranges and 6 apples
 2860 DATA Poppy buys some brown bread
 2870 DATA They buy some sausages for su-

pper
 2880 :
 2890 DATA HOW MUCH DOES IT COST?
 2900 DATA Lizzie spends 10p and Poppy spends 5p
 2910 DATA The stamps cost 34p
 2920 DATA Daddy's medicine costs 50p
 2930 DATA The football costs 40p and the doll 75p
 2940 DATA The custard and ice-cream cost 65p
 2950 DATA Oranges 12p each and apples 10p each
 2960 DATA Poppy spends 45p on the bread
 2970 DATA The sausages cost 80p
 2980 :
 2990 DATA WHAT DO YOU REMEMBER?
 3000 DATA What is the newsagent's name?
 3010 DATA What does Mr Jones sell?
 3020 DATA Who was the medicine for?
 3030 DATA What did Poppy buy here?
 3040 DATA What did they buy here?
 3050 DATA How much did they spend here?
 3060 DATA What did they buy from Mr West
 3070 DATA How much were Mr Davies' sausages?
 3080 :
 3090 :
 3100 DATA 1. NAME THE SHOPS, 2. THE SHOPKEEPERS
 3110 DATA 3. WHAT DO THEY SELL?, 4. IN THE SHOP WINDOW
 3120 DATA 5. BUYING THINGS, 6. HOW MUCH DO THEY COST?
 3130 DATA 7. WHAT DO YOU REMEMBER?, 8. A SURPRISE STORY!
 3140 DATA *,



The Acorn User January cassette contains all the data for the shops program, plus data for another story on a farms theme



Listing 1. The Menu-fax program

```

10 REM Menufax
20 REM Entry to Eco-fax or Eco-ed
30 REM For BBC with discs or Econet
40 REM by Joe Telford
50 REM (c) Acorn User Jan. 1984
60 :
100 MODE7
110 ON ERROR MODE7:PRINT':PROCend
120 *FX200,1
130 option = FNmenu
140 IF option= 1 CHAIN "ECO-FAX"
150 IF option= 2 CHAIN "ECO-ED"
160 REM *BYE is only for Econet
170 REM Remove if not using Econet
180 MODE7:*BYE
190 PRINT'"Bye."' :END
200 DEFPROCend
210 *FX200,0
220 REPORT:PRINT" at line ";ERL
230 END
235 :
240 DEF FNmenu :LOCAL option
250 PROC_xdblht (CHR$(131)+"ECO-FAX TEL
ETEXT EMULATOR",7,4)
260 PRINTTAB(9,7);(CHR$(130)+"(c) Joe
Telford 1984.")
270 PRINTTAB(10,10);(CHR$(134)+"ECO-FA
X.....1")
280 PRINTTAB(10,12);(CHR$(134)+"ECO-ED
.....2")
290 PRINTTAB(10,14);(CHR$(134)+"END...
.....3")
300 REPEAT:PRINTTAB(10,17);CHR$(133);"
Which? ";
310 option = VAL (FNgpi(1,0,"123"))
320 UNTIL option >0
330 =option
335 :
340 DEFPROC_xdblht(x$,x,y)
350 PRINTTAB(x-1,y);CHR$(141);x$
360 PRINTTAB(x-1,y+1);CHR$(141);x$
370 ENDPROC
375 :
380 DEFFNgpi(len,effect,valid$)
390 LOCALa$,b
400 a$=""
410 PRINTSTRING$(len,".");STRING$(len+
1,CHR$(8));" ";*FX21,0
420 b=GET:IF b=13 THEN =a$
430 IF b=127 AND a$="" THEN 420
440 IF b=127 a$=LEFT$(a$,LEN(a$)-1):PR
INTCHR$b;". ";CHR$(8);:GOTO420
450 IF effect=0 THEN480
460 IF effect=1 b=b AND 223 ELSE b=b 0
R32
470 IF effect=3 AND(RIGHT$(a$,1)="" 0
R a$=""") b=b AND 223
480 IF LEN(a$)=len OR INSTR(valid$,CHR
$b)=0 VDU7:GOTO420
490 PRINTCHR$b;:a$=a$+CHR$b:GOTO420

```

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INSIDE ECO-FAX

The main body of program 2 extends from line 100 to line 490. Line 100 and 110 allow the CTRL @ keys to generate an escape condition, which can be trapped by the on error statement of line 120. This returns the user to the Menufax program. Line 130 ensures the program operates in mode 7, and line 140 reserves 40 bytes for a machine code routine, within PROCmc. Lines 160 to 320 produce the introductory page which asks for the date, link delay and time. Note the simple validation procedures, which may easily be improved.

Line 330 sets the system variable TIME to the time entered previously. A 'Please wait' message is generated, then the loop which runs Eco-faxproper is entered. The first page number is set by line 350 to 100. The main loop is from 360 to 490, and here a number of things happen.

First, the page in question is searched for using the OPENIN command. It is important to realise that each page is a byte-dump of the screen to disc and is a file in itself. If a page does not exist, line 360 calls PROCnoway which tells us so. The program then calls PROCgetpage, to allow us to input a new page number. This in turn is checked for validity, and the loop continues.

If the requested page exists the program moves past line 360, first cancelling the OPENIN by closing the page at line 370 (crudely with CLOSE#0). Line 380 *LOADs the required page to start at location 7C22, just past HIMEM. Effectively, each page starts about five characters from the end of the top line of the screen. The actual screen display takes up the lower 24 lines, while the last few characters of the top line contain information on the type of page, and the next page in the linked set or movie. Once the page has

*LOADed, the type of page is read from location &7C26 into the variable type\$, and the string number at &7C22 is read into variable 'p' as a number. The technique for this relies on the number being in the form (eg):

```
310<SPC>L<CR>
```

The statement

```
p=VAL($&7C22)
```

of line 390 takes the whole six-byte string terminated by <CR> and VALs it by discarding the <SPC>L<CR> and converting the first three bytes to a number. The <CR> causes problems when viewing the teletext frame, because it exists at the end of a screen line. To solve this, it is overwritten with a <SPC> character (32) at the end of line 390.

The next stage is to display the heading line of text:

```
Page: XXX ECO-FAX 12/10/84 10/21/33 L
```

This is done by PROCstatus, which is called from line 400. Also at this point the linked page number is updated into the page number variable 'pageno'. The lines after 400 perform different actions depending on the type of page loaded. In line 410, if the page loaded is a still frame, the program waits for the next page number to be entered. Once done the main loop repeats and the loading process starts again.

If the frame is not a still, line 420 checks whether a freeze command (<CR>) has been entered. Once done the main loop repeats and the page loading process starts again (this provides an escape route from movies). If this is not the case, then line 430 checks for a movie, and if one is running the main loop repeats.

When the current page is not a movie, the program assumes it is part of a linked set of frames. Lines 440 to 470 allow the program to loop round until one of four things happens:

- The time set by the link delay variable (delay) runs out.
- The Space bar is pressed, in which a further delay time will be started.
- The 'R' key is pressed, in which case PROC-reveal will be called.
- The <CR> key is pressed, at which time the program waits for the next page number. Once this loop is left, the main loop is repeated with the new page number.

PROCgetpage runs from line 500 to 520. It repeatedly calls FNgpi until a number greater than 99 and less than 1000 is entered.

PROCnoway, lines 530 to 570, simply explains 'That page does not exist', beeps, and waits for a second before calling PROCstatus, which prints the heading information.

FNrhms at line 600 returns the current internal clock time as a string in the form hrs/ mins/secs. FNtset at line 610 sets the internal clock to the time represented in the three parameters h,m,s, (hrs, mins, secs).

PROCreveal sets up two bytes at the beginning of the machine code routine, which is then called. Whenever the R key is released (line 770) the two bytes are reversed, and the routine is again called.

PROCmc, line 800 onward, simply sets up the machine code necessary to do the reveal code. The reveal task is done by checking each byte of screen memory for a 'conceal' teletext code (152) and replacing it with an unused code of 142. Concealing the page is done by reversing the procedure. The machine code routine therefore has a general purpose 'global search and replace function', over the area of the mode 7 screen.

Listing 2. The program for Eco-fax

```

10 REM Eco-fax
20 REM The Teletext Viewer
30 REM For BBC with disc and Econet
40 REM by Joe Telford
50 REM (c) Acorn User Jan.1984
60 :
100 *FX200,0
110 *FX220,0
120 ON ERROR IF ERR=17 CHAIN"MENUFAX"
ELSE GOTO350
130 MODE7
140 DIM Mcode% 40
150 PROCmc
160 CLS
170 PRINTTAB(5,1);CHR#141;CHR#134;"ECO
-FAX START UP PAGE."
180 PRINTTAB(5,2);CHR#141;CHR#134;"ECO
-FAX START UP PAGE."
190 REPEAT:PRINTTAB(7,4);CHR#131"Year
";
200 year#=FNngpi(2,0,"0123456789"):UNTI
LVALyear#>0
210 REPEAT:PRINTTAB(7,6);CHR#131"Month
";
220 month#=FNngpi(2,0,"0123456789")+ "/"
:UNTILVALmonth#>0 AND VALmonth#<13
230 REPEAT:PRINTTAB(7,8);CHR#131"Date
";
240 date#=FNngpi(2,0,"0123456789")
250 UNTILVALdate#>0 AND VALdate#<32:da
te#=date#+ "/" +month#+year#
260 REPEAT:PRINTTAB(7,10);" Link delay
(secs) ";
270 delay=VALFNngpi(2,0,"0123456789"):U
NTIL delay>0 AND delay<30
280 REPEAT:PRINTTAB(7,12);CHR#130"Time
(Hrs) ";
290 hr#=FNngpi(2,0,"0123456789"):UNTIL
VALhr#<25
300 REPEAT:PRINTTAB(7,14);CHR#130;"Tim
e (Mins) ";
310 min#=FNngpi(2,0,"0123456789"):UNTIL
VALmin#<60
320 sec#="00"
330 TIME=FNTset(VAL(hr#),VAL(min#),VAL
(sec#))
340 PRINTTAB(4,20);CHR#129;"Please wai
t!"
350 pageno=100
360 REPEAT:ch=OPENIN(STR$(pageno)):IFc
h=0 PROCnoway:PROCgetpage:UNTIL FALSE
370 CLOSE#0
380 OSCLI("LOAD "+STR$(pageno)+ " 7C22
")
390 type#= CHR#?&7C26:p=VAL($?&7C22):?&
7C27=32
400 PROCstatus:pageno=p
410 IFtype#="S" PROCgetpage:UNTIL FALS
E
420 A=INKEY(0):IFA=13 PROCgetpage:UNTI
L FALSE
430 IFtype#="M" UNTILFALSE
440 REPEAT
450 time=TIME+delay*100:REPEAT A=INKEY
(0):IF A=ASC"r" OR A=ASC"R" PROCreveal
460 UNTIL A=32 OR A= 13 OR TIME>time
470 UNTIL A= 13 OR TIME>time
480 IF A=13 PROCgetpage
490 UNTIL FALSE
495 :
500 DEFPROCgetpage
510 REPEATPRINTTAB(6,0);:pageno=VALFNg
pi(3,0,"0123456789")
520 UNTILpageno>99:ENDPROC
530 DEFPROCnoway
540 PRINTTAB(9,0)CHR#131;"That Page do
es not exist! "
550 VDU7:time=TIME+100
560 REPEAT UNTIL TIME>time:PROCstatus:
ENDPROC
565 :
570 DEFPROCstatus
580 PRINTTAB(0,0);STRING$(38," ");TAB(
0,0);" Page:";pageno;" ECO-FAX "date#
"FNrhms(TIME);
590 ENDPROC
595 :
600 DEFFNrhms(tm)=STR$(tm MOD 8640000
) DIV 360000)+ "/" +STR$(tm MOD 360000) D
IV 6000)+ "/" +STR$(tm MOD 6000) DIV 100)
605 :
610 DEFFNtset(h,m,s)=h*360000+m*6000+s
*100
615 :
620 DEFFNngpi(len,effect,valid#)
630 LOCALa#,b
640 a#=""
650 *FX21,0
660 b=GET:IF b=13 THEN =a#
670 IFb=ASC"r" OR b=ASC"R" PROCreveal:
GOTO660
680 IF b=127 AND a#="" THEN 660
690 IF b=127 a#=LEFT$(a#,LEN(a#)-1):PR
INTCHR#b;". ";CHR$(8);:GOTO660
700 IF effect=0 THEN730
710 IF effect=1 b=b AND 223 ELSE b=b 0
R32
720 IF effect=3 AND(RIGHT$(a#,1)=" " 0
R a#="") b=b AND 223
730 IF LEN(a#)=len OR INSTR(valid#,CHR
#b)=0 VDU7:GOTO660
740 PRINTCHR#b;:a#=a#+CHR#b:GOTO660
745 :
750 DEFPROCreveal
760 ?data=152:?(data+1)=142:CALLstart
770 REPEAT Q#=INKEY$(50):UNTIL Q#=""
780 ?data=142:?(data+1)=152:CALLstart
790 ENDPROC
795 :
800 DEFPROCmc
810 page=%71
820 FOR pass= 0 TO 3 STEP 3
830 P%=Mcode%
840 [OPT 0
850 .data NOP:NOP
860 .start LDA #HIMEM DIV256:STA page
870 LDA #0:STA page-1
880 LDY #HIMEM MOD256
890 .loop LDA (page-1),Y
900 CMP data:BNE on:LDA data+1:STA (p
age-1),Y
910 .on INY:BNE loop:INC page:LDA page
:CMP #&80
920 BNE loop
930 RTS
940 ]
950 NEXT:ENDPROC

```

Listing 3. The Eco-Ed program

```

10 REM Eco-Ed
20 REM For BBC with discs and Econet
30 REM by Joe Telford
40 REM (c) Acorn User Jan.1984
50 :
100 MODE7:HIMEM=&7BFA
110 PROCsetup:ON ERROR PROCerr
120 REPEATPRINTTAB(xpos,ypos);
130 char=? (HIMEM+6+xpos+ypos*40):PROCstatus(char)
140 PRINTTAB(xpos,ypos);
150 A=GET
160 IF A=16 THEN*GDUMP
170 IF A=16 UNTILO
180 IF A=1 X(1)=xpos:Y(1)=ypos:SOUND1,-15,0,2:UNTILO
190 IF A=2 X(2)=xpos:Y(2)=ypos:SOUND1,-15,0,2:SOUND1,0,0,2:SOUND1,-15,0,2:UNTILO
200 IF A=128 PROCcopy:UNTILO
210 IF A=144 PROCdel:UNTILO
220 IF A=3 xpos=0:ypos=0:UNTILO
230 IF A=8 AND mode<2 PROCleft:UNTIL 0
240 IF A=9 AND mode<2 PROCright:UNTIL 0
250 IF A=10 AND mode<2 PROCdown:UNTIL 0
260 IF A=11 AND mode<2 PROCup:UNTIL 0
270 IF A=13 mode=(mode+1) MOD 3:PROCprintmode(mode)
280 IF mode=1 AND INSTR("QWASZX qwaszx",CHR#A)>0 PROCgraphic(CHR#A):UNTIL FALSE
290 IF mode=1 UNTIL FALSE
300 IF mode=2 AND INSTR(com$,CHR#A)>0 PROCcommand(CHR#A):UNTIL FALSE
310 IF mode=2 UNTIL FALSE
320 IF A<32 UNTIL FALSE
330 VDUA:IF A=127PROCleft ELSEPROCmove
340 UNTILO
345 :
350 DEFPROCmove:IF dir$="R" PROCright:ENDPROC
360 IF dir$="L" PROCleft:ENDPROC
370 IF dir$="U" PROCup:ENDPROC
380 IF dir$="D" PROCdown:ENDPROC
390 ENDPROC
395 :
400 DEFPROCleft:LOCALa
410 IF xpos=0:VDU7:ENDPROC
420 xpos=xpos-1
430 ENDPROC
435 :
440 DEFPROCright
450 IF xpos=39 VDU7:ENDPROC
460 xpos=xpos+1
470 ENDPROC
475 :
480 DEFPROCup
490 IF ypos=0 VDU7:ENDPROC
500 ypos=ypos-1
510 ENDPROC
515 :
520 DEFPROCdown
530 IF ypos=23 VDU7:ENDPROC
540 ypos=ypos+1
550 ENDPROC
555 :
560 DEFPROCgraphic(x$):LOCALchr,pixel,flag:flag=0
570 chr=char:IFchr=32 chr=160
580 IFx$="Q" OR x$="q" pixel=1
590 IFx$="W" OR x$="w" pixel=2
600 IFx$="A" OR x$="a" pixel=4
610 IFx$="S" OR x$="s" pixel=8
620 IFx$="Z" OR x$="z" pixel=16
630 IFx$="X" OR x$="x" pixel=64
640 IFx$=" " ANDchr=255 chr=160:PRINTAB(xpos,ypos)CHR#chr:ENDPROC
650 IFx$=" " ANDchr<>255 chr=255:PRINTTAB(xpos,ypos)CHR#chr:ENDPROC
660 chr=chr EOR pixel
670 PRINTTAB(xpos,ypos)CHR#chr;
680 ENDPROC
685 :
690 DEFPROCstatus(char):PRINTTAB(25,24);"Char:";STRING$(8," ");
700 IF char>127 AND char<160 PRINTTAB(30,24)control$(char-128):ENDPROC
710 IF char>32 AND char<127 PRINTTAB(30,24)CHR#char;
720 IF char>159 PRINTTAB(30,24)CHR#char;
730 ENDPROC
735 :
740 DEFPROCprintmode(x):PRINTTAB(2,24)"Mode:";
750 IFx=0 PRINTTAB(7,24)"ALPHABETIC";
760 IFx=1 PRINTTAB(7,24)"GRAPHIC";
770 IFx=2 PRINTTAB(7,24)"COMMAND(SLRQ^v[])";
780 ENDPROC
785 :
790 DEFPROCdirsay:PRINTTAB(0,24)dir$;:ENDPROC
795 :
800 DEFPROCcommand(x$):PRINTTAB(0,24);STRING$(39," ");
810 CLOSE#0
820 IF x$="Q" ORx$="q" PROCquit
830 IF x$="S" ORx$="s" PROCsavepage
840 IF x$="L" ORx$="l" PROCgetpage
850 IF x$="R" ORx$="r" PROCrempage
860 IF x$=CHR$(8) dir$="L"
870 IF x$=CHR$(9) dir$="R"
880 IF x$=CHR$(10) dir$="D"
890 IF x$=CHR$(11) dir$="U"
900 PRINTTAB(0,24);STRING$(39," ");
910 PROCdirsay:PROCprintmode(mode):PROCstatus(char)
920 ENDPROC
925 :
930 DEFPROCsavepage
940 REPEAT:PRINTTAB(0,24);"Save Page No: ";
950 pageno=VALFNghi(3,0,"0123456789"):UNTILpageno>99
960 ch=OPENIN(STR$(pageno))
970 IF ch<>0 PRINTTAB(0,24)"Sorry! Page No: ";pageno;" Exists!";:VDU7:TIME=0:REPEAT UNTIL TIME>200:ENDPROC
980 PRINTTAB(0,24);"Page type? M(ovie):S(till):L(ink) ";
990 type%=FNghi(1,0,"MLS")
1000 IFtype%<>"S"PRINTTAB(0,24);STRING$(39," ");:REPEAT:PRINTTAB(0,24);"Pageno to link? ";:pno%=FNghi(3,0,"0123456789"):UNTILVALpno%>99:ELSEpno%=STR$(pageno)
1010 pno%=pno%+" "+type%:$HIMEM=pno%+3C6")
1020 OSCLI("SAVE "+STR$(pageno)+" 7BFA")
1030 ENDPROC
1035 :
1040 DEFPROCgetpage
1050 REPEATPRINTTAB(0,24);"Get Page No: ";

```

```

1060 pageno=VALFN GPI (3,0,"0123456789"):
UNTIL pageno>99
1070 ch=OPENIN (STR$(pageno))
1080 IF ch=0 PRINTTAB(0,24)"Sorry! Page
No: ";pageno;" Not found!";:VDU7:TIME=0
:REPEAT UNTIL TIME>200:ENDPROC
1090 OSCLI("LOAD "+STR$(pageno)+" 7BFA"
)
1100 ENDPROC
1105 :
1110 DEFPROCrempage
1120 REPEATPRINTTAB(0,24);"Remove Page
No: ";
1130 pageno=VALFN GPI (3,0,"1234567890"):
UNTIL pageno>99
1140 ch=OPENIN (STR$(pageno))
1150 IF ch=0 PRINTTAB(0,24);"Sorry, Pag
e No: ";pageno;" Not found!";:VDU7:TIME=
0:REPEAT UNTIL TIME>200:ENDPROC
1160 CLOSE#0
1170 PRINTTAB(0,24);"Found Page No: ";p
ageno;" Remove Y/N?";
1180 REPEAT B$=GET$:UNTIL INSTR("YyNn",
B$)>0:IF B$="N" OR B$="n" ENDPROC
1190 OSCLI("DELETE "+STR$(pageno))
1200 ENDPROC
1205 :
1210 DEFPROCquit
1220 PRINTTAB(0,24);"Quit Program : Con
firm Y/N?";
1230 REPEAT B$=GET$:UNTIL INSTR("YyNn",
B$)>0:IF B$="N" OR B$="n" ENDPROC
1240 CLS:*FX4,0
1250 CHAIN"MENUFAX"
1260 END
1265 :
1270 DEFPROCsetup
1280 com$="SLQRslqr"+CHR$(8)+CHR$(9)+CH
R$(10)+CHR$(11)
1290 dir$="R"
1300 *FX4,2
1310 *FX5,4
1320 *KEY12 :H
1330 *KEY13 :I
1340 *KEY14 :J
1350 *KEY15 :K
1360 VDU23,0,10,64,0;0;0;0;
1370 mode=0
1380 PRINTTAB(0,24);"R MODE:ALPHABETIC"
;TAB(25,24);"Char: ";
1390 xpos=10:ypos=12
1400 DATANULL,ARED,AGREEN,AYELLOW,ABLUE
,AMAGENTA,ACYAN,AWHITE,FLASH,STEADY
1410 DATANULL,NULL,SMALL,LARGE,NULL,NUL
L,NULL,GRED,GGREEN,GYELLOW,GBLUE
1420 DATAMAGENTA,GCYAN,GWHITE,HIDE,GCO
NT,GSEPARATE,NULL,BLACKBCK
1430 DATANEWBACK,GHOLD,GRELEASE
1440 DIMcontrol$(31):FOR I%= 0 TO31:REA
Dcontrol$(I%):NEXT
1450 *KEY0 :C
1460 *KEY1 :A
1470 *KEY2 :B
1480 DIM X(2),Y(2)
1490 *KEY3 :!!M
1500 *KEY4 :!!L
1510 *KEY5 :!!\
1520 *KEY6 :!!J
1530 *KEY7 :!!^
1540 *KEY8 :!!_
1550 *KEY9 :!!Z
1560 X(1)=0:Y(1)=0:X(2)=0:Y(2)=0
1570 ENDPROC
1580 DEFFN GPI (len,effect,valid$)
1590 LOCALa$,b

```

```

1600 a$=""
1610 PRINTSTRING$(len,".");STRING$(len+
1,CHR$(8));" ";;*FX21,0
1620 b=GET:IF b=13 THEN =a$
1630 IF b=127 AND a$="" THEN 1620
1640 IF b=127 a$=LEFT$(a$,LEN(a$)-1):PR
INTCHR$b;". ";CHR$(8);:GOTO1620
1650 IF effect=0 THEN1680
1660 IF effect=1 b=b AND 223 ELSE b=b 0
R32
1670 IF effect=3 AND (RIGHT$(a$,1)="" 0
R a$="" ) b=b AND 223
1680 IF LEN(a$)=len OR INSTR(valid$,CHR
$b)=0 VDU7:GOTO1620
1690 PRINTCHR$b;". ";a$=a$+CHR$b:GOTO1620
1700 DEFPROCdel
1705 :
1710 PROCsort
1720 FOR yp=Y(1) TO Y(2)
1730 FOR xp=X(1) TO X(2)
1740 PRINTTAB(xp,yp);" ";
1750 NEXT,:ENDPROC
1755 :
1760 DEF PROCsort
1770 IF X(1)>X(2) THEN spare=X(2):X(2)=
X(1):X(1)=spare
1780 IF Y(1)>Y(2) THEN spare=Y(2):Y(2)=
Y(1):Y(1)=spare
1790 ENDPROC
1795 :
1800 DEFPROCcopy:PROCsort
1810 FOR yp=Y(1) TO Y(2)
1820 FOR xp=X(1) TO X(2)
1830 khr=? (HIMEM+6+xp+yp*40)
1840 px=xpos+xp-X(1):py=ypos+yp-Y(1)
1850 IF px>39:GOTO1880
1860 IF py>23:xp=X(2):GOTO1880
1870 PRINTTAB(px,py);CHR$(khr);
1880 NEXT,:ENDPROC
1885 :
1890 DEFPROCerr:LOCALtime:PRINTTAB(0,24
);STRING$(39," ");
1900 PRINTTAB(0,23);:REPORT:PRINTCHR$13
1" Please wait!";:VDU7
1910 time=TIME+200:REPEAT UNTIL TIME>ti
me
1920 PRINTTAB(0,24);STRING$(39," ");
1930 PROCdirsay:PROCprintmode(mode):END
PROC

```



Fred the tortoise comes out of his shell on Eco-fax page 700

The function keystrip for Eco-ed – you'll need one for each terminal in your network

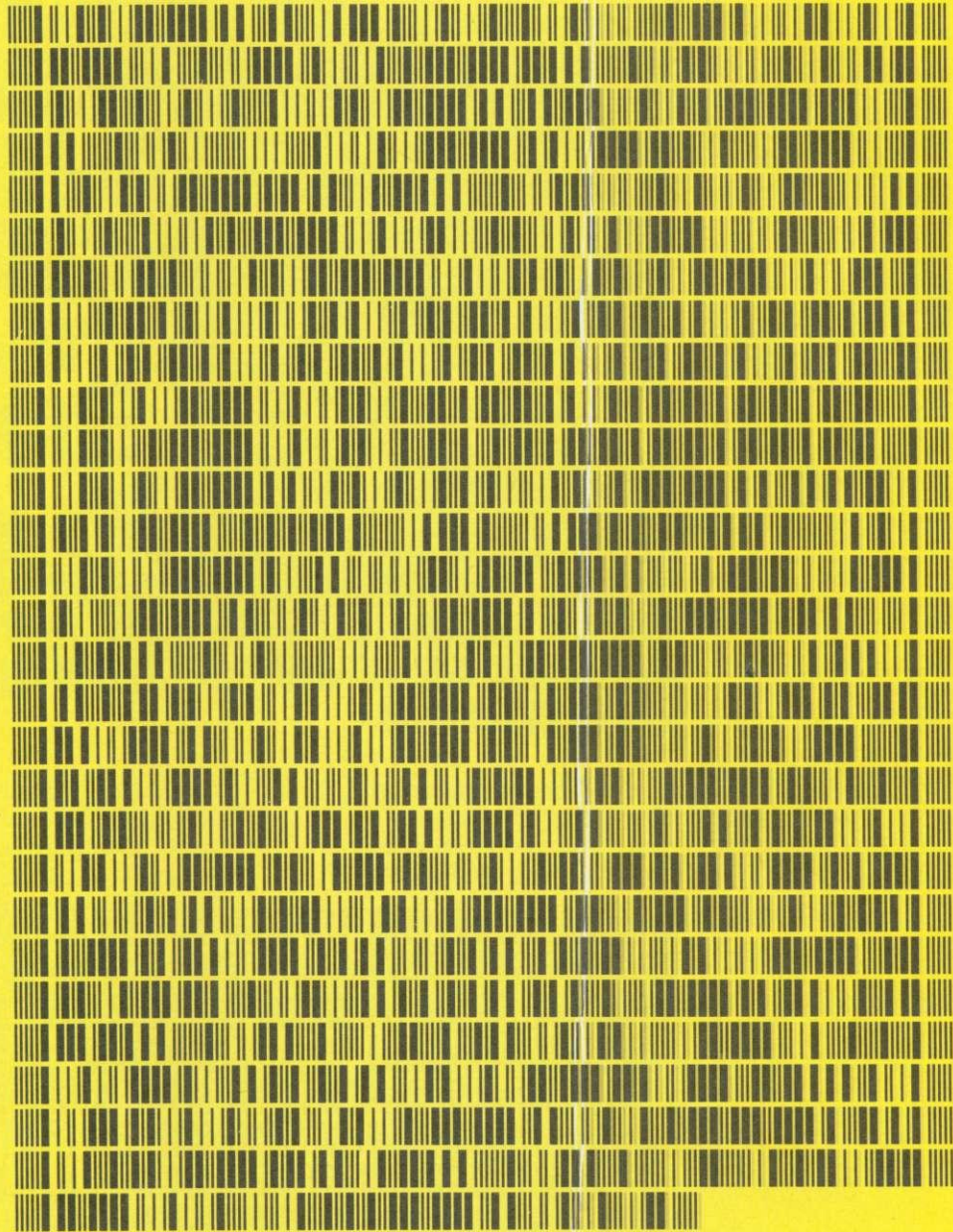
CTRL	Block delete	Red	Green	Yellow	Blue	Magenta	Cyan	White	Hide	Joined
	Block copy	Red	Green	Yellow	Blue	Magenta	Cyan	White	Flash	Steady
SHIFT	Home	Set markers		Size		Background		Hold	Release	Split
		1	2	Large	Small	Black	New			

CTRL	Block delete	Red	Green	Yellow	Blue	Magenta	Cyan	White	Hide	Joined
	Block copy	Red	Green	Yellow	Blue	Magenta	Cyan	White	Flash	Steady
SHIFT	Home	Set markers		Size		Background		Hold	Release	Split
		1	2	Large	Small	Black	New			

CTRL	Block delete	Red	Green	Yellow	Blue	Magenta	Cyan	White	Hide	Joined
	Block copy	Red	Green	Yellow	Blue	Magenta	Cyan	White	Flash	Steady
SHIFT	Home	Set markers		Size		Background		Hold	Release	Split
		1	2	Large	Small	Black	New			

CTRL	Block delete	Red	Green	Yellow	Blue	Magenta	Cyan	White	Hide	Joined
	Block copy	Red	Green	Yellow	Blue	Magenta	Cyan	White	Flash	Steady
SHIFT	Home	Set markers		Size		Background		Hold	Release	Split
		1	2	Large	Small	Black	New			

Program 2. Hints and Tips, page 41



127

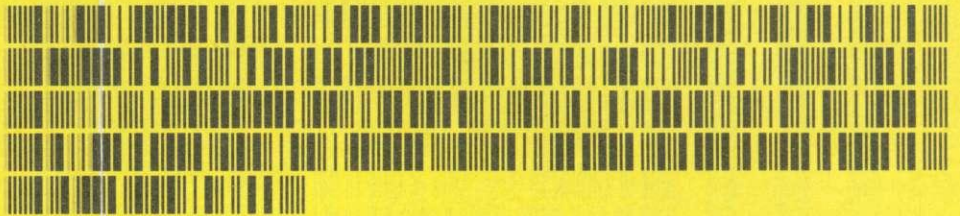
BAR CODE LISTINGS AVAILABLE

To receive a copy of the listings in this months yellow pages section in bar code format, send a £1 cheque or postal order plus an A4-sized stamped addressed envelope to: Bar Code Listings, Acorn User, 68 Long Acre, London WC2E 9JH.

Program 5. Hints and Tips, page 45



Program 6. Hints and Tips, page 45



Program 8. Hints and Tips, page 45



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129

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These bar code readers are being offered to schools first and versions will not be available to the public in the shops until later in the year – when they will certainly cost more. However, because of its active involvement in the scheme *Acorn User* is able to offer the Teaching Packs direct to readers at the introductory price of £49.95 plus £2.95 post and packing (plus VAT).

Acorn User will be printing some listings in bar code format in each issue and making booklets of bar codes available by mail order. Book publishers are already printing listings in bar code format, in fact Bruce Smith's latest book *The BBC Micro Machine Code Portfolio* has 13 pages of bar code listings.

So, to stay ahead of the latest development in computers and education, send off for a pack from *Acorn User* today. See page 127 for offer of magazine listings in bar code format.

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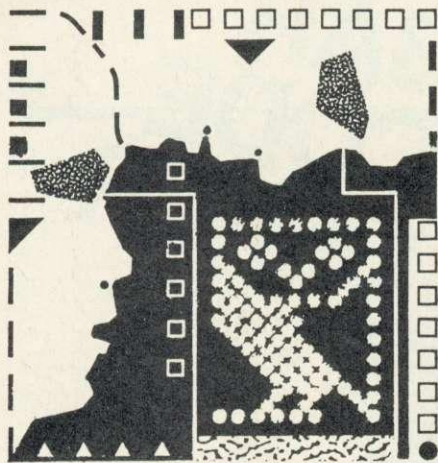
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Bruce Smith offers cash for the best use of an ingenious graphics compiler – plus: pixel chart Mk II and a version numbering utility

130

Convert graphics from

Basic to use in

assembler programs

£20

ENDING the year with a bang, Brian Wyld of East Kilbride wins top marks and £20 for an ingenious compiler that will convert a whole Basic graphics program into a sequence of OSWRCH-based VDU codes that can be called either from a machine code loop or a one-line Basic program: all done in mode 7, or mode 6 for the Electron.

I'll let Brian handle the details...

Listing 1 will help anyone who has a Basic program that draws a picture on the screen they want to reproduce in assembler. To produce graphics from assembler you have to convert a Basic program of PLOTs, DRAWs and other statements into bytes of data for VDU statements – not an appealing thought. This program does it for you. All it requires is that you add PROCassemble to your graphics program that will assemble the necessary code. Then add a line, 'CALL intercept' before any graphics commands (including mode changes) to start the routine and a 'CALL restore' at the end to restore the status quo.

The routine works by intercepting the

OSWRCH vector, through which all graphics commands, being VDU based, go through. The routine stores these VDU codes in a buffer located at 'block%'. It therefore stops anything from reaching the screen, including any mode change, so no graphics will appear. This means that all graphics should take place in mode 7 (mode 6 on the Electron), to gain the maximum space for the buffer. Thus long graphics programs can be built up without fear of running out of memory as the RAM normally used for the screen is left free!

After the program is run, the buffer can be saved. The start address is found by 'PRINT "block%" and the end address by 'PRINT "(!&82 AND &FFFF)'.

```

1 REM Graphics Compiler
2 REM For BBC and Electron
3 REM by Brian Wyld
4 REM (c) Acorn User 1984
5 :
10 REM This program will convert
20 REM any picture, text etc put
30 REM onto the screen by a BASIC
40 REM program into a block of memory
50 REM containing all the vdu codes
60 REM needed to produce the same
70 REM picture from machine code
80 :
90 PROCassemble
100 :
110 REM put a 'CALL intercept' before
120 REM any mode change, graphics etc
130 CALL intercept
140 MODE5
150 TIME=0
160 REPEAT
170 GCOL 0,RND(7)
180 PLOT 85,RND(1200),RND(1000)
190 UNTIL TIME>100
200 REM put a 'CALL restore' at the
210 REM end to restore normal screen
220 REM handling
230 CALL restore
240 END
250 :
260 DEF PROCassemble
270 DIM code% 100
280 REM code% is location of program
290 REM block% is location of VDU codes
300 block%=&3000
310 FOR pass%=0 TO 3 STEP 3
320 P%=code%
330 IOPT pass%
340 .intercept
350 \save OSWRCH vector
360 LDA &20E:STA &80
370 LDA &20F:STA &81
380 \replace with own vector
390 LDA#(new_wrch MOD 256):STA &20E
400 LDA#(new_wrch DIV 256):STA &20F
410 \set up block pointer
420 LDA#(block% MOD 256):STA &82
430 LDA#(block% DIV 256):STA &83
440 RTS
450 :
460 .new_wrch
470 \save A and Y regs
480 STA &84:STY &85
490 \store VDU code
500 LDY#0:STA (&82),Y
510 :
520 \increment pointer
530 INC &82
540 BNE return
550 INC &83
560 \if pointing into ROM then stop
570 LDA &83:CMP#&80:BEQ stop
580 :
590 .return
600 \restore A and Y
610 LDA &84:LDY &85
620 RTS
630 :
640 .stop
650 \restore A and Y
660 LDA &84:LDY &85
670 :
680 .restore
690 PHA
700 \restore vector
710 LDA &80:STA &20E
720 LDA &81:STA &20F
730 PLA
740 RTS
750 J
760 NEXT
770 ENDPROC
    
```

Listing 1. BBC and Electron graphics compiler

Beeb Forum is a platform for ideas, tips and applications relating to the BBC micro and the Electron, intended for experienced programmers to share their thoughts. For every reader's tip published we pay £5 – or more for something special. Contributions should be typed or printed, with substantial listings on cassette. WRITE TO Beeb Forum, Acorn User, Redwood Publishing, London WC2E 9JH.

This area of memory thus contains all the VDU codes needed to exactly reproduce the picture. The routine will also work with character definitions, as long as it is called before they are executed. . .

Brian's program contains a demonstration routine. Once run, the VDU codes can be saved with

```
*SAVE VDUCODE 3000 32D2
```

A simple Basic line to implement the graphics (try it after running Brian's program) is

```
FOR N% = &3000 TO &32D2:A% = ?N%:CALL &FFEE:NEXT
```

And it really is as simple as that!

Send any comments in to me, and there will be more cash for the best graphics program/display produced by this program. Enclose the entire listing on disc or cassette and address it to Beeb Forum (with sae for return please). The best in my opinion will get the cash and have the listing included on the monthly cassette!

Pixel One ↓	Pixel Three →				Black (0)				Red (1)				Yellow (2)				White (3)			
	Pixel Four →				BLACK (0)	RED (1)	YELLOW (2)	WHITE (3)	BLACK (0)	RED (1)	YELLOW (2)	WHITE (3)	BLACK (0)	RED (1)	YELLOW (2)	WHITE (3)	BLACK (0)	RED (1)	YELLOW (2)	WHITE (3)
BLACK (0)	Black (0)	00	01	10	11	02	03	12	13	20	21	30	31	22	23	32	33			
	Red (1)	04	05	14	15	06	07	16	17	24	25	34	35	26	27	36	37			
	Yellow (2)	40	41	50	51	42	43	52	53	60	61	70	71	62	63	72	73			
	White (3)	44	45	54	55	46	47	56	57	64	65	74	75	66	67	76	77			
RED (1)	Black (0)	08	09	18	19	0A	0B	1A	1B	28	29	38	39	2A	2B	3A	3B			
	Red (1)	0C	0D	1C	1D	0E	0F	1E	1F	2C	2D	3C	3D	2E	2F	3E	3F			
	Yellow (2)	48	49	58	59	4A	4B	5A	5B	68	69	78	79	6A	6B	7A	7B			
	White (3)	4C	4D	5C	5D	4E	4F	5E	5F	6C	6D	7C	7D	6E	6F	7E	7F			
YELLOW (2)	Black (0)	80	81	90	91	82	83	92	93	A0	A1	B0	B1	A2	A3	B2	B3			
	Red (1)	84	85	94	95	86	87	96	97	A4	A5	B4	B5	A6	A7	B6	B7			
	Yellow (2)	C0	C1	D0	D1	C2	C3	D2	D3	E0	E1	F0	F1	E2	E3	F2	F3			
	White (3)	C4	C5	D4	D5	C6	C7	D6	D7	E4	E5	F4	F5	E6	E7	F6	F7			
WHITE (3)	Black (0)	88	89	98	99	8A	8B	9A	9B	A8	A9	B8	B9	AA	AB	BA	BB			
	Red (1)	8C	8D	9C	9D	8E	8F	9E	9F	AC	AD	BC	BD	AE	AF	BE	BF			
	Yellow (2)	C8	C9	D8	D9	CA	CB	DA	DB	E8	E9	F8	F9	EA	EB	FA	FB			
	White (3)	CC	CD	DC	DD	CE	CF	DE	DF	EC	ED	FC	FD	EE	EF	FE	FF			

(Logical colours in brackets). Numbers are in hexadecimal.

Figure 1. Modes 1 and 5 pixel chart for BBC and Electron

£5 Automatic update for file versions

Dr BORCHERDS from the University of Birmingham has come up with a useful one-line utility that enables disc users to keep track of current program versions. Dr Borchers explains . . .

On larger computers than the BBC micro the filing system will often append to a file name a version number which is automatically incremented each time a file is saved under a previously used name. By using a function key on the BBC computer it is possible to obtain a similar facility.

The function key definition is shown in listing 2. The first '?' changes the version number in the listing of the key definition, the final one updates the function key itself.

The key definition may be saved as a text file and EXECed into existing programs, then edited to make the name agree with that of the program.

There are several precautions that must be observed:

1. The key definition *must* be the *first* line of the program, which has the advantage that the name of the program is included in the first line of a listing.

2. The key definition should be typed as shown and should not contain any spaces. If there are spaces the 21 and 13 may need to be changed. The file name should be given in full, as directory plus a seven-character name, of which the final character is the version number.

3. Any of keys f0 to f9 may be used: if a key other than f9 is being used, the final digit of &B09 must be made equal to that key number.

4. The key must be initially activated (by running the program). Thereafter each time it is pressed, the version number is incremented. The version number is actually an ASCII code, and after the '9' takes on values ':', ';' etc, and will eventually increment through the alphabet. It is seldom necessary to keep more than a few versions of a program, so when the version number is getting large, it may be reset to a low value by editing the key definition, and updating the key itself, at the same time locking any versions of the program which need to be preserved.

5. Care must be taken in making multiple copies of a program on several discs. If the function key is used each time identical programs on different discs will have different names. Repeating the most recent 'SAVE' will result in the program being catalogued

under a version number one less than the one in its key definition.

6. The function key will remain active when there is a new program in the computer: the new program is liable to be saved under the name of the previous program unless the function key is altered.'

£5 Pixel chart for two modes

B GABEL of Lewes was obviously pleased with his cheque from November's Beeb Forum. To complement his colour pixel chart for mode 2 he has now provided one for modes 1 and 5 on BBC and Electron (figure 1). Using it is simple . . .

Figure 1 gives the pixel chart for modes 1 and 5. In these modes one byte represents four pixels, which I call one, two, three and four, from left to right. To find the number to poke the byte with, go down the 'pixel one' column until you reach the colour of the first pixel.

Then, in the part of the 'pixel two' column to the immediate right of the section you have just chosen, find the colour of the pixel. Keep your finger on this row. Now do the same for the 'pixel three' and 'pixel four' rows. You should end up with your other finger on a vertical column which is labelled with the colour of the pixel four. Move your fingers along the row and down the column until they meet. That square holds the number that you want. It's really easier than it sounds! For example, black, red, yellow, white = 35.

```
1*KEY9SA."Z.LSOLAB5":MQ=PA.+21:??=?Q
+1:Q?=&B00+?&B09:Q?713=?Q:IM
```

Listing 2. Automatic update of version number for disc files



Electronequip



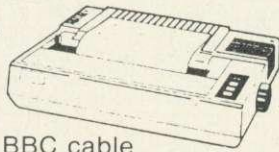
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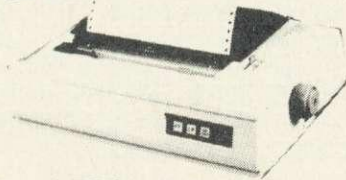
FX-80 £312.42 + VAT



Printer price includes paper and BBC cable
Screen dump rom available for £11.50

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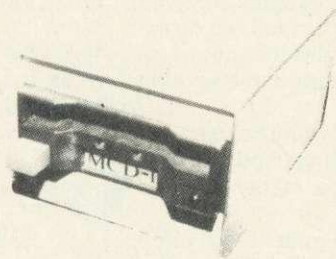
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The Micro disc drive offers a method of low cost quick access to programs. The drive is essentially a small version of a 5¼" disc drive and offers similar features to the larger drive. The data is stored on a 3" disc, this is enclosed in a protective hard plastic cassette which features a write protect switch. The micro drive requires the standard Acorn disc interface, but a new disc filing system rom. Acorn DFS may be exchanged for the micro DFS for £2.30. The new micro disc filing system can read and write to Acorn DFS discs. Thus if a 5¼ inch and a micro floppy were connected on the same cable files could be transferred between them.
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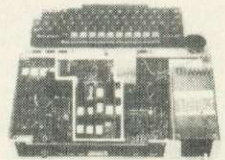
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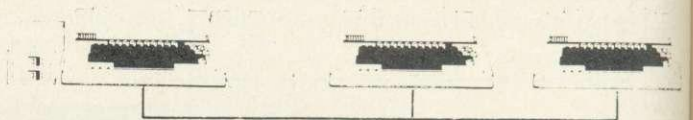
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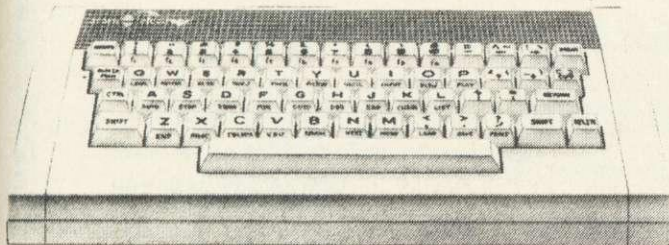
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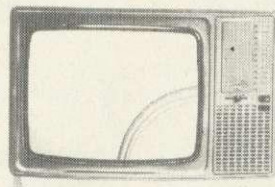
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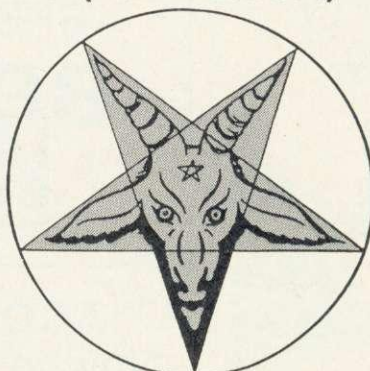
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In taking up the challenge you have to find The TALISMAN and locate a pentagram which then has to be prepared for the final rite. In the meantime dark forces will be opposing you making a difficult task almost impossible.

Do not allow yourself to be lulled into a sense of security for it will be short lived. Many have gone before only to swell the ranks of the damned.

This is the latest adventure from the stables of Microtest and has been written with the acclaimed features of other adventures in mind eg save facility, quick response, simple but extensive commands, a mixture of logical and friendly problems to solve.

Be warned this is an easy adventure to get into but devilishly difficult to end.

Cassette £7.95 inc. VAT Disc £9.45 inc. VAT + p&p 50p Disc 40 or 80 Track.

MICROTEST FONT ROM

This exciting new ROM from Microtest will enable you to get all sorts of new characters and fonts from your BBC Computer. Once you have produced your masterpiece on the screen, all you have to do is use the inbuilt screendump utility to produce a hard copy on to paper.

Typing *HELP FONTS gives you a list of available fonts and the blocks of characters which they replace.

Available fonts are:

- *Accents Accents and miscellaneous.
- *Block Small capitals.
- *Data Like the bottoms of cheques.
- *Greek It's all Greek to me too!
- *Joined Standard capitals with joined up lower case.
- *Maths A mix of until now unobtainable Mathematical symbols.
- *Miscellaneous A few oddities which often are very necessary.
- *Thick Thick text (for MODEs 0&3) to enhance 80 column mode.
- *Thin Thin text (for MODEs 2&5) which makes modes 2 & 5 much more readable or perhaps "READABLE".
- *Vertical For labelling graphs in a vertical plane.
- *Mode 8 10 column multi colour, memory miserly mode.
- *S Dump A Dump facility which will produce a screen dump of any mode from 0 to 8 (including a text only dump in mode 7) on an epson, star, CP80, MT80 or JP80 etc etc. . . .

The dump utility will produce negative or positive product, can magnify, and will also rotate the picture through 90 degrees as well as being able to position the picture anywhere laterally across the paper.

The ROM uses absolutely no user memory and can be used with word processors etc, as well as with normal word programs.

£17.50 inc. VAT + p&p 50p

New Issue Microtest Starstick & Joystick Package.

announcing the arrival of the new issue 2 + ROM.

Available now the NEW issue 2 + ROM Joystick comes in three forms:

- OPTION 1 The Starstick ROM and Quickshot I Joystick
Price £22.85 + £1.00 P&P.
- OPTION 2 The Starstick ROM and Quickshot II Joystick
Price £25.50 + £1.00 P&P
- OPTION 3 The Starstick ROM and Patch Lead (choose your own Atari/Spectrum style joystick)
Price £20.50 + £1.00 P&P
- OPTION 4 Send your old version STARSTICK ROM back to us for reprogramming to issue 2 +
Price £3.50 + £0.50 P&P

VI.4 STARSTICK was 4K the new version has been squashed into 8K.

The NEW ISSUE ROM is compatible with latest* ACORNSOFT programs as well as REPLICIA II.

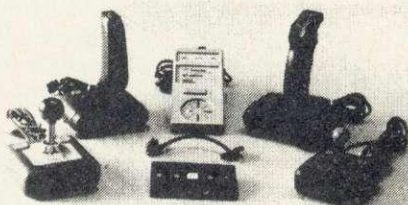
As with the VI41 issue of ROM you can at last connect good "self centring", "rapid action" joysticks to the BBC Computer via the user port. (Model A owners please note that you do not need the analogue interface fitted to your computer but you will need the user port and IC76).

Pressing any combination of the BREAK key does not affect the STARSTICK software and now by pressing TAB-BREAK REPLICIA II is auto booted and is compatible with the STARSTICK ROM V2.

The software patch provided in the ROM monitors O.S. calls and patches the Joystick to the Games programs, and so will work with most games programs even programs not meant to function with Joysticks (except those using illegal direct memory addressing).



- The new command summary and description is + -
- *STICK enables the ROM.
 - *NSTICK disables the ROM.
 - *SETSTICK program joystick.
 - *KSAVE save protocols set by *SETSTICK.
 - *KLOAD load protocols saved by *KSAVE.
 - *MAP remap current keyboard definitions, play games using your favourite keys, intelligent loading of software (ensuring ACORN compatibility).
 - *CLEVER relocate area of work memory used.
 - *PLONK proportional joystick emmulator 1.
 - *PROP2 proportional joystick emmulator 2
 - *ANA patches joysticks via the analogue port.



- *KILL to games. ROM manager, disables troublesome ROMs.
- *DOUBLE replace up to two joysticks.
- *TAB-BREAK Auto boots REPLICIA II.
- *PAUSE define key to freeze game.
- *NPAUSE dissable *PAUSE.
- *NAME predefined key protocols.
- *HELP KEYS display current key protocols.
- *REPEAT enables ROM based auto repeat.
- *NREPEAT dissables *REPEAT.

Should a contention state occur when two roms or more try to use the same *command prefixing any of the above with M will help solve the problem.

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Large picture shows BBC Computer System and a Quickshot II Joystick. Small inset just a few of the joysticks that will work with the patch lead. Screenshot by kind permission of SUPERIOR SOFTWARE
All MICROTEST ROMs are fully TUBE compatible. (TUBE is a reg. trademark of Acorn Computers).

DEALER ENQUIRIES and EXPORT ORDERS WELCOME





Do second processors speed things up? Paul Beverley looks at the theory and practice and outlines special programming techniques

SECOND PROCESSOR POWER

135

LAST month I looked at ways in which you could improve the speed of your Basic applications programs. If you have tried some of the ideas suggested and your application is still not running fast enough then, as I mentioned, one way ahead would be to use machine code routines for those parts of the programs which are most critical to the overall timing. However, that's not much use if machine code programming is still a closed book to you.

The other approach, which we are going to look at now, is to use a second processor. Surely this must speed things up, having two processors working side-by-side... but does it? In this article I shall study the principle behind using a second processor and then examine three of the second processors currently available to see whether they actually do run faster in Basic than the BBC on its own. Finally I shall try to see whether there are any special programming techniques needed when trying to get the best possible speed advantage out of running Basic on a second processor.

The second processor principle

The BBC micro has been very cleverly designed so that not only can it act as a very adequate stand-alone micro, but also is capable of acting as an I/O (input/output) processor to another, possibly more powerful, processor. The idea is that the 6502 in the Beeb handles all the input and output of data to disc, cassette, VDU, ADC etc, while the second processor runs the language interpreter which does all the calculations and makes all the decisions. The I/O processor is then just a rather intelligent slave to the second processor.

This is a very important concept and one which, as I prophesied in 1982, will keep the BBC micro in vogue much longer than most of its rivals. The reason is that as the technology (inevitably) develops and produces faster and more powerful processors with ever cheaper memory capacity and ever more sophisticated languages, you just attach them to your Beeb. You will always want a keyboard (voice recognition is still a long way off in terms of home use) and a VDU, and probably a disc drive, so instead of throwing these out, you just treat the new technologies as add-ons to the basic machine to bring it right up to date.

You will gather this is something I feel very strongly about, but I haven't finished yet! Why don't the other computer manufacturers produce a machine like this, with similar expandability? The reason is that it's not economical. Uncle Clive makes much more money than Uncle Chris and Uncle Hermann by the fact that he sells you a ZX80 and then you have to buy its replacement, the ZX81. Then you throw that away and buy a Spectrum. Then it's a QL, and what next? Still, I'll get down off my hobby-horse and back to the technical side of things.

Benchmark tests

The first and most obvious way of testing the speed of Basic when run on these second processors is to use the *PCW* benchmark tests. These were set out by John Coll (recognise the name?) in the first edition of *PCW* back in 1978 (when the 2708, a 1k EPROM, was being sold at £31.15!).

I think these benchmarks have often been misinterpreted by later *PCW* writers, but rather than go into detail here, which doesn't help us with the job

in hand, I have given two separate tables of results. Figure 1 gives the normal quotations of the benchmarks given in *PCW*, while figure 2 interprets them as I think they were originally intended. In some cases it is the difference between the times of the two tests that is the significant figure.

Also in these tables you will see percentage figures shown in brackets which are comparisons with the timings of the BBC micro on its own. As you will see, the Torch Z80 second processor is slower than the two Acorns but, in its defence, it was on the market a considerable time before Acorn's own.

Not surprisingly, the Acorn 6502 second processor is almost exactly half as fast again as the BBC processor on its own. This is because the language interpreter gets 'slurped' across the Tube at switch on and so it is the same interpreter running at a 3MHz clock rate instead of 2MHz. Even HiBasic, although slightly re-coded, has exactly the same benchmarks on the second processor as Basic II.

Although the version of Basic used on the Z80 second processor was written, as was the Basic on the Torch system, by R T Russell, there was a quite marked difference in speed between them. This is shown by the percentages in square brackets in figures 1 and 2, which indicate the increase in speed of the Acorn Z80 over the Torch Z80. This is partly due to improved coding, but mainly to the increased speed of the processor - 6MHz and no 'wait-states' as against 4MHz for the Torch Z80.

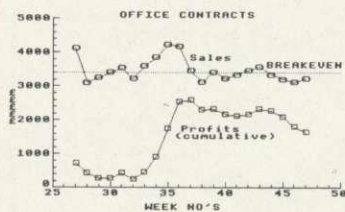
However there is one major speed difference which does not show up in these benchmarks. The only thing that they actually test is the speed of language interpretation of the second

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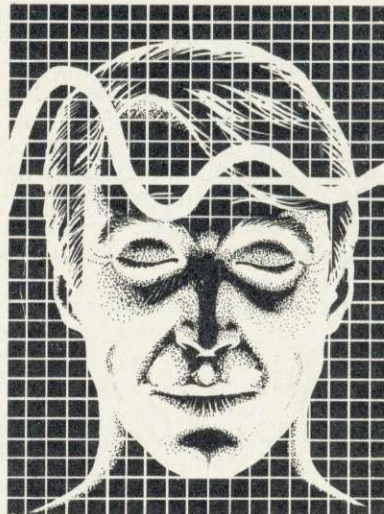
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processor, not the speed of input/output. If you time various I/O commands you will see things in a different light (figure 3).

The hardware of the Torch Z80 board is very much simpler than that of the Acorn board since it uses off-the-shelf I/O chips (6522 + 8255) instead of complex custom-designed ones, and the implementation of the Tube facilities, in software as well as hardware, is considerably more limited. The result is that, for example, none of the FX calls on the Torch takes less than 20 milliseconds (ie 40,000 clock cycles of the 6502A on the BBC!).

Programming for speed

Apart from the fact that second processors do the language interpretation faster than the first processor alone, there should also be some advantage in the fact that the two processors are running in parallel. That is, both processors are working at the same time and therefore should, in theory at least, be able to share the workload. This whole concept of parallel processing is one which, in the long run, is going to change the face of computing, and our whole approach to programming is going to have to change with it.

The programming we have all learned is, in contrast to the human brain's processing, strictly serial. The processor does each specific task in a strict order, which can of course be changed when it meets certain conditions, but it can never be doing two things at the same time. The use of interrupts may give the impression that the processor is doing more than one job at a time, but really all it's doing is temporarily stopping its main job while it deals with the interrupt and then going back and carrying on where it left off.

If you have two processors, you could have them doing two different jobs at once, but the problem then is to synchronise them. What could end up happening is that one processor does a job, sends some information to the other but then has to wait until it has finished dealing with that information before it can carry on. This would not be 'parallelism' but rather 'end-to-end' processing.

The second processor concept on the BBC micro system only becomes true parallelism when the second processor can give the I/O processor a job to be getting on with while it carries on processing. An example of this would be if you were drawing some form of geometric pattern which involved calculations which could be done at the same time as drawing the actual lines on the screen. This can be achieved because the instructions which the I/O

Benchmark	BBC solo	BBC + Acorn			
		BBC + Torch	6502	BBC + Acorn Z80	
1	0.63	0.79 (-20%)	0.43 (+47%)	0.50 (+26%)	[+58%]
2	2.76	3.08 (-10%)	1.85 (+49%)	2.00 (+38%)	[+54%]
3	7.80	11.43 (-32%)	5.24 (+49%)	7.04 (+11%)	[+62%]
4	8.27	12.31 (-33%)	5.55 (+49%)	7.49 (+10%)	[+64%]
5	8.76	13.11 (-33%)	5.87 (+49%)	7.98 (+10%)	[+64%]
6	13.47	18.47 (-27%)	9.03 (+49%)	10.81 (+25%)	[+71%]
7	20.79	26.42 (-21%)	13.92 (+49%)	16.01 (+30%)	[+65%]
8	4.98	3.37 (+48%)	3.36 (+48%)	2.06 (+141%)	[+61%]
7 + 8	25.77	29.79 (-13%)	17.28 (+49%)	18.07 (+43%)	[+65%]
Average of the percentage increases		(-28%)	(+49%)	(+36%)	[+62%]

Figure 1. PCW Bench Tests. Values in parentheses indicate the increase in speed over the BBC on its own, and those in square brackets are a comparison with the Torch Z80 second processor

Benchmark	BBC solo	BBC + Acorn			
		BBC + Torch	6502	BBC + Acorn Z80	
1	0.63	0.79 (-20%)	0.43 (+47%)	0.50 (+26%)	[+58%]
2	2.76	3.08 (-10%)	1.85 (+49%)	2.00 (+38%)	[+54%]
3-2	5.04	8.35 (-40%)	3.39 (+49%)	5.04 (+0%)	[+66%]
4-2	5.51	9.23 (-40%)	3.70 (+49%)	5.49 (+0%)	[+68%]
5-4	0.49	0.80 (-33%)	0.31 (+49%)	0.49 (+0%)	[+63%]
7-6	7.32	7.95 (-8%)	4.89 (+49%)	5.20 (+41%)	[+53%]
8	4.98	3.37 (+48%)	3.36 (+48%)	2.06 (+141%)	[+61%]
Total	26.73	33.57 (-20%)	17.93 (+49%)	20.78 (+29%)	[+61%]
Average of the percentage increases		(-28%)	(+49%)	(+35%)	[+60%]

Figure 2. PCW Bench Tests interpreted

Benchmark	BBC solo	BBC + Acorn		
		BBC + Torch	6502	BBC + Acorn Z80
S% = USR (&FFF4) (A% = 150)	1.16	1.91	0.91	1.44
*FX151,97,0	1.21	21.40	1.41	1.90
VDU23,32,0;0;0,0,1	3.21	5.65	1.60	2.93
*FX3,0	0.87	21.06	0.95	1.23

Figure 3. Some I/O Tests

Test	Torch	Acorn 6502	Acorn Z80	(BBC + BBC)
MOVE/DRAW	84%	89%	84%	(96%)
PRINT Z\$	nil	74%	80%	(95%)

Figure 4. Tests for maximum obtainable parallelism

processor uses are simply a series of codes - the familiar VDU commands. If you haven't seen this, try typing MODE 0 <return> and then VDU25,5,0,4,0,4 <return>.

To get such a line drawn, the second processor just sends these codes over to the I/O processor, prefixed by another code to tell it that what follows is a VDU command and not a disc command or whatever. If the I/O processor is still busy doing the last piece of drawing requested then it can store the command codes in a buffer until it's ready to deal with them. This is exactly the same idea as the buffers that are used with

the RS423 serial communication system.

The I/O processor continues to deal with these requests in strict order, unless of course its buffer becomes full, in which case the second processor has to stall until the I/O processor is ready to accept more codes, and this is where the parallelism begins to decrease.

The other thing which reduces the parallelism is that there are some tasks in which the second processor issues a command which demands a response. The most obvious example is accessing the disc or Econet systems. The

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only speed advantage to be gained from using a second processor then is that, since the memory of the I/O processor is not being used for program and variable storage, it's possible to provide much larger areas of buffer space. This means that large chunks of information can be pulled in at each access and read a section at a time directly from memory rather than having to re-access the file system.

Parallelism

In order to test how good the various processors are at achieving 'parallelism', a range of I/O tests was done to see how much time could be saved by doing the processing at the same time as the I/O. One of the programs used is given to show the sort of thing that was done, but I don't have space to give all the programs and results, so I'll summarise the conclusions.

As you can see from the program given, the test timing is done in four sections: the FOR...NEXT loop on its own; some trigonometrical calculations within the same loop; some moving and drawing done from the same loop; and the calculations mixed in with the moving and drawing in the one loop. The times for the calculations C% (after the loop time has been subtracted), the plotting P%, and the total T%, are then displayed along with a 'parallelism factor'. This shows how much you gain by interleaving the jobs, ie, how much less the total time T% is than the sum of the two times, C% and P%.

As you can imagine, if the two jobs take roughly the same length of time then the total can in some cases be very little more than the time of each job on its own, ie approaching 100 per cent parallelism. If the time for the two jobs is no less than the sum of their individual times then the parallelism is zero.

Drawing and printing characters were in fact the only two tasks where significant parallelism was obtained on any of the processors (figure 4). Disc access was very difficult to assess because of latency/access times being different under various conditions, but no evidence of any parallelism was discovered - generally it took longer to do the two jobs together than separately. The column in figure 4 marked as 'BBC + BBC' is the result obtained when using one BBC to do the language processing while sending the drawing or printing information down the RS423 serial port to the second one. This was running a simple Basic program inputting characters and sending them to the VDU drivers. As you will see, this exhibits even higher parallelism than with a 3MHz 6502 second processor, but I'm not really sure what this proves!

```

10 REPEAT
20   Z%=300
30   X%=800
40   TIME=0
50   FOR NZ=1TOZ%
STEP8
60   NEXT
70   LX=TIME
80   TIME=0
90   FOR NZ=1TOZ%
STEP8
100  K=SIN(NZ)
110  L=COS(NZ)
120  NEXT
130  C%=TIME-LX
140  MODE0
150  TIME=0
160  FOR NZ=1TOZ%
STEP8
170  MOVE 0,NZ
180  DRAW X%,NZ
190  NEXT
200  P%=TIME-LX
210  MODE0
220  TIME=0
230  FOR NZ=1TOZ%
STEP8
240  K=SIN(NZ)
250  L=COS(NZ)
260  MOVE 0,NZ
270  DRAW X%,NZ
280  NEXT
290  TX=TIME-LX
300  PRINT"
Calculation
Plotting Both
Parallelism %"
310  @%=&2020A
320  PRINT C%/100,
P%/100,
TX/100, (C%+P%-TX) /
(C%+P%) *200
330 UNTILO
    
```

Program 1. Test to examine the amount of parallelism on a second processor when doing calculations and graphical output

Conclusion

It seems that in terms of increased speed, second processors do not offer as much as one might have hoped. If it's working at a higher speed than the first, or is a more powerful processor than the 6502, the language processing will be faster, but it seems that the only way of getting any significant parallelism into the processing is to interleave the calculations and the graphical output wherever possible.

A Torch 'funny'

In doing these tests for parallelism it was discovered that with the Torch Z80 board, when running the program listed, the results of successive repetitions of the test were significantly different. For example, a sequence of results for percentage parallelism might give: 82, -4, 48, 84, 0, 82, -4, 46, 82, 0 etc, ie, the time taken is either not much more than the time of each individual task (80 per cent +), or roughly equal to the sum of the two times (zero per cent +), or half-way in between (40 per cent +), and the times are repeated in a definite sequence.

If you make slight changes to the program - adding spaces, REM statements etc, even outside the timing loops, the sequence of timings changes but still takes on the same three distinct values.

No-one I have spoken to at Torch Computers seems to have any real idea why it happens, neither do any of the independent experts I've asked! I've tried three different Torch boards and they all performed in exactly the same way. All I can do is offer a couple of clues.

Clues

First, the Torch people suggested it might have something to do with the fact that because the program is running in the second processor it has to keep checking across to see if the escape key has been pressed. Having to do this will certainly slow down the interpretation, but I'm dubious as to whether it would cause this strange sequence of timings. Disabling the escape key during the calculation by using *FX229,1 certainly changes the pattern of timings, but does not stop the variations occurring.

The second clue from my own experiments is that if you put one or more *FX19 (wait for vertical sync) commands just before the timing loop, it makes the timings stay at one particular value for a larger number of repetitions of the test before changing to a different value. Indeed, at one stage I added three successive *FX19s just before the timing loop and it stayed permanently at the fastest speed. I thought I'd found a way to achieve a consistently high speed, even though I didn't understand why it worked. I then added a REM statement to that effect and the timing changed to being consistently slow!

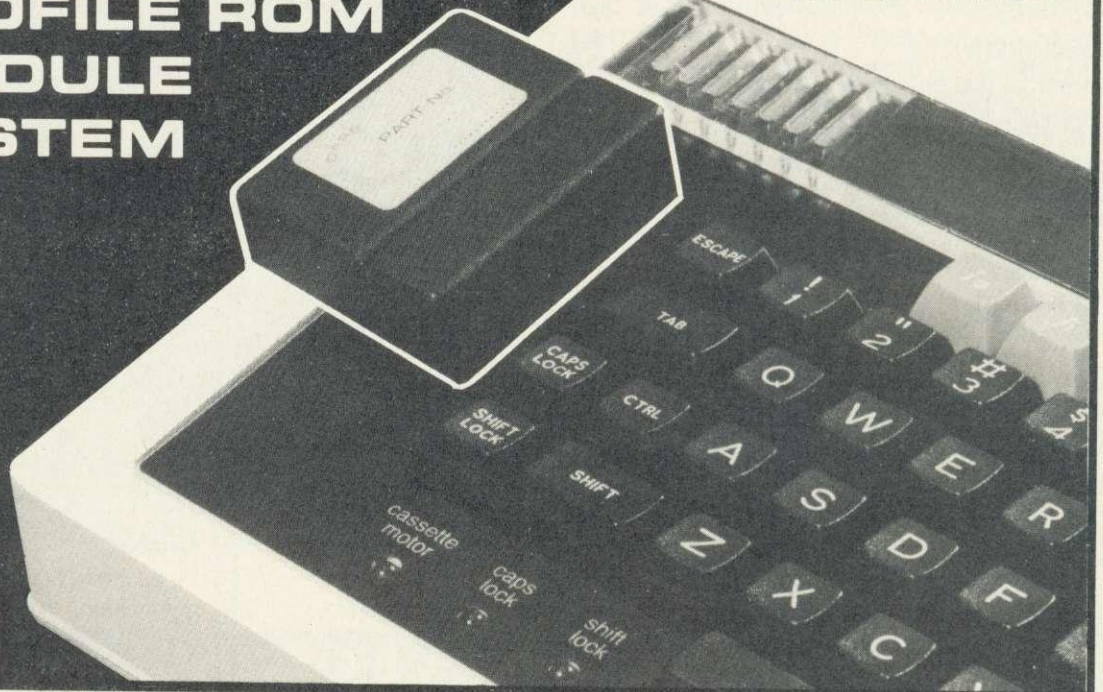
If there's anyone out there who can explain this strange effect, let us know. Even if you don't know what's causing it, but can find a way of making it stay at the fastest speed, we'd like to hear about that so we can pass the information on to everyone else.

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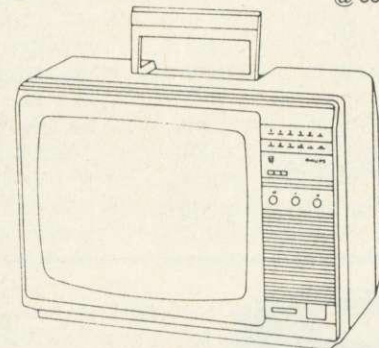
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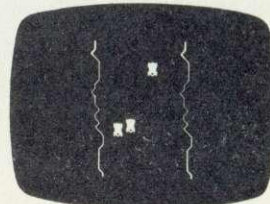
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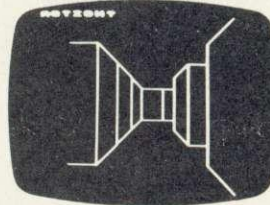
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WHICH WORDPROCESSOR MEETS YOUR DEMANDS?

143

Jacquetta Megarry, a writer and seasoned wordprocessor

user, gives a personal assessment of six to help you choose

TO SOME, a wordprocessor is a glorified electronic typewriter allowing flawless error-correction, justified (straight, not ragged) right margins and 'personalised' mailshots. To others, it is a medium for creative writing: a way of releasing the flow of ideas from the labour of getting words onto paper. The ability to move, copy or delete blocks of text provides a powerful electronic cut-and-paste capability for revising and editing. Whatever your needs, the six wordprocessors (wp) reviewed here provide an impressive range of facilities at low cost.

As a professional writer, my perspective is that of typist-as-author, though I have examined all six systems for copy typing features too. In two years my BBC has processed nearly a million words, about half for publication. It has been invaluable for rearranging jumbled thoughts, simplifying tangled wording, deleting redundant words. Above all, it helps me to get started: the knowledge that everything is provisional makes tackling a book much less daunting.

When composing text direct onto a typewriter, you have to choose the words and arrange them on paper at the same time. In wp, the stages are separate: you enter, edit, format and print in four distinct operations, allowing you to concentrate on one thing at a time. Wp adds a fifth vital stage: storing the words on disc removes the need for tedious retyping and rechecking. It also creates opportunities for getting extra mileage from the same text by rearranging, summarising and customising it.

The software reviewed here tackles these stages in strikingly different

ways. Three are fundamentally oriented toward the printed page, the others treat the document as a continuous stream of text that is only chopped up into page-lengths after it has been edited and line length and spacing specified. Whether a page-based or document-based system is better depends on your needs and style.

Wp and hardware

The appearance of the processed words will determine to whom you feel able to send them. If you haven't already bought a printer, wait until you know which wp software you want. Before committing yourself to either purchase, check carefully how much time and trouble it is to produce effects you use often: things like £ signs, underscoring (continuous underlining), proportional spacing (with and without justify and tabs), alternative typefaces and special characters. Never ask a dealer 'Can it do . . .?': he will almost certainly say 'Yes'. Instead ask 'Can you show me . . .' and watch how long it takes.

If you use mail-order (a questionable economy if buying a wp system blind), check whether its 'default printer' is suitable (this is a specific printer the software is designed to support in the absence of other instructions). You can save yourself hours of trouble by using the default printer – and feel confident of support from the wp supplier.

If you like wp and use it at all often, you will soon outgrow cassette loading and buy a disc drive. If possible, budget for it now and enjoy the advantages from the start.

Decisions about the screen and software are interwoven. If you want to stick to a television set, or simply like

editing the larger characters of a 40-column display, you won't want an 80-column display as in *Beebpen*. If you already have, or are happy to buy, a monochrome monitor, you may prefer 80-column-editing: the screen shows more words at a time and looks more like the printed page. Three packages (*Edword*, *Scribe* and *View*) allow a choice.

Memory usage

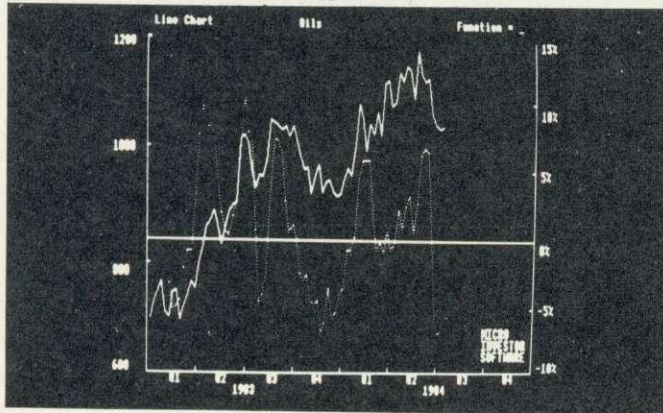
The limitation of the BBC is its memory. The ideal would be wp software that allowed editing of long documents in 80-column mode, preferably supplied on a disc easily customised to printer, stationery and layout. Unfortunately, compromises have to be made. *Wordwise* and *Kansas* permit long documents by editing only in 40-column mode, though *Wordwise* also allows 80-column preview of up to 1500 words. *View* is the most flexible, supporting any screen mode. In *Edword* the choice is more restricted, and in *Beebpen* non-existent. *Scribe* adopts a different approach by working on a page at a time and swapping text between RAM and disc. In effect the document can be as large as the disc permits.

Which approach suits you depends not only on the typical length of your documents, but also on how easy you find manipulating files and making 'seamless' joins at print-out stage.

How much?

Most people only ever want to learn one system, so the choice of software that you will spend hours learning to master and may use for years is important. Compared with the cost of a disc-based BBC with printer and monitor, none is expensive: they represent per-

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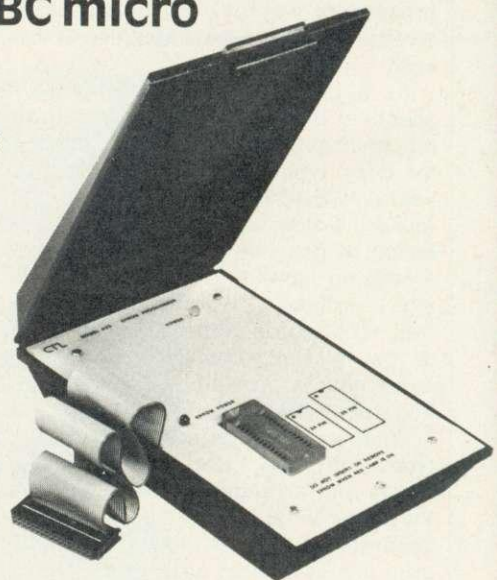
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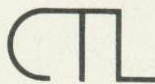
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Horses for courses

Your needs depend on what kind of documents you write, your style of working, how much and at what stage you revise, and whether you type your own words or someone else's. So you can judge my conclusions, let me describe my use of wp.

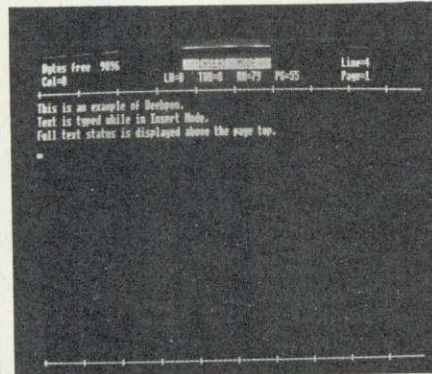
I type all my own material, edit heavily before a draft print-out and lightly after. I often feed in rough notes to develop and arrange later. I usually produce double-spaced text on an Epson MX82 dot-matrix, but sometimes reproduce a final version single-spaced on a slow daisywheel. For long documents I use the Epson (because it's tractor-fed and can be left unattended) and set both bold and double-strike for quality. I seldom need to produce elaborate tables or layouts as most things will be professionally typeset. I usually have to keep within length limits.

I find it quicker and less inhibiting to delay decisions about format until satisfied with content and length. In other words, my needs are better met by a document-based system (*Kansas*, *View* or *Wordwise*). If your needs are different, especially for tabulation work where exact knowledge of the cursor position is important, you will want to look more closely at *Beebpen*, *Edword* and *Scribe*.

Beebpen

Beebpen is quick to get into and what you see is close to what you get on paper. It also provides friendly safety

nets like asking for confirmation before deleting large chunks of text, and telling you that a filename is in use before allowing you to overwrite it. However, it has the least memorable set of commands outside a *Wordstar* manual. L is 'load' but S is not 'save': it is 'format with margins'. Worse still, case is significant: if you try to set up block operations by pressing b instead



Beebpen is a page-oriented system

of B, only the safety-net prevents you from killing all your text so far. Again, H homes the cursor but h elicits help, ie clears the screen and reminds you of available commands. Providing help is commendable, but more helpful codes would have been even better.

The program is command-driven and to get from one action to another you have to press CTRL-Z. Each command is then entered by a single letter, which sounds fine but usually demands the shift key. So to get from insert mode to overwrite, you have to play two different two-key chords, type in the correct version, and play another chord to get back to inserting.

Beebpen's manual says it doesn't

use the red function keys so experienced users could customise extensively. However, the manual offers little help: no index and hardly any guidance about how to control printer effects. For beginners, the function keys represent a golden opportunity - which *Beebpen* wastes.

In summary, *Beebpen* is a page-oriented system with full cursor information, suitable for 80-column tabular layouts and medium-length documents. It is the cheapest of the ROMs, and if you can live with its editing commands you may like it. I couldn't and didn't.

Edword

Edword is more of a curriculum development project than a wordprocessor. Its publicity material proclaims it 'the only word processor designed by teachers for pupils'. If you share the *Edword* philosophy, you may regard this as a strength. Certainly *Edword* provides excellent materials for teaching about wordprocessing. It is designed for classroom use, with good on-screen help facilities and a 240-page self-instruction guide to supplement the 108-page user guide.

It is menu-driven and easy to operate once you have copied the files you need onto a working disc and accepted its network orientation: the insistence on locking files automatically is disconcerting for solo users. The system is page-oriented and shows underlining, centring and justifying on-screen. However, it can't handle long documents and doesn't give any warning that you're about to run out of memory. Hitting the Break key (next to *Edword's* command key!) loses your document,

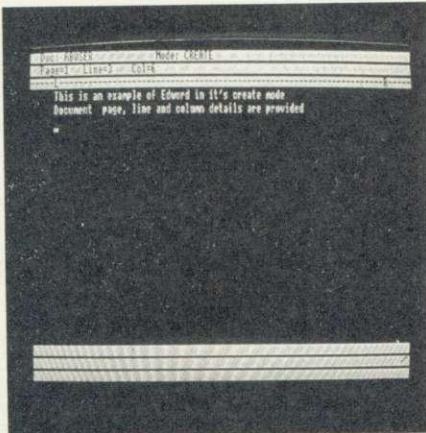
	Beebpen	Edword	Kansas	Scribe	View	Wordwise
Version reviewed	1.22	1.0		1.30	2.1	1.2
Price inc VAT	£37.49	£44.79	£22.50 (cassette/disc)	£59.95 (ROM)	£59.80 (ROM)	£46.00 (ROM)
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Electron version			£22.50		£49.80 (cartridge)	

Table 1. Facts and figures for six wps

and so does telling it to print before the printer is ready. Block-moving depends on a buffer that is limited to 80 words, so cut-and-paste is cumbersome. Cursor movement and editing are slow and printer control rudimentary: just two special effects (which can be varied using the print file generator). The justify has to be used carefully to avoid 'rivers of white' and is irreversible.

These limitations might not matter for teaching the principles of wordprocessing: indeed the slowness of some operations can be helpful. But if your interest is in wp as an educational *tool*, rather than as an end in itself, something more powerful is needed.

Edword+ (reviewed here in its September pre-release form) is a support disc that provides many facilities



Edword - designed for classroom use

missing from *Edword*. Unfortunately, it does so at a terrible price in complexity. Using *Edword+* demands mastery of another lengthy manual. I read the first 72 pages, 12 of which are occupied by a technical section with a forbidding warning that technical support may not be available!

You have to go through a lot of hoops to get started. First you have to create a working master copy, then make a user disc containing the printer file and a selection of command files. This means anticipating which facilities will be needed, and perhaps creating several discs with different permutations. Given a limit of 31 files per disc, if you want all 12 command files and the full eight command sequences, you will only have 10 filenames left for documents (one is reserved for the print file). Hence a disciplined approach to disc housekeeping is needed to ensure there is always space on a disc together with the right commands. Unless using the default printer, existing *Edword* print files must be converted into *Edword+* format. They can be customised further by using the hexadecimal control codes from the manual.

	Beebpen	Edword	Edword +	Kansas	Scribe	View	Wordwise
Cassette use	●	●		●		●	●
Disc use		●	●	●	●	●	●
Usable without cassette/disc?	●	●		●		●	●
Network use		●	●			●	
6502 second processor						●	
Editing 40-column		●	●	●	●	●	●
Editing 80-column	●	●	●	on new version out soon	●	●	preview only
Cursor information: page, line, column number, displayed?	●	●	●		●		
Access to OS* commands?	●		●		●	●	●
Edit Basic programs?			●		●	●	●
Handle text as ASCII file?			●		●	●	●
Maximum words per document (6.3 bytes per word)	1590	890 or 2250 depending on screen mode		3330 or 2880 (cassette or disc)	as many as disc can hold	890 to 3980 depending on screen mode	3900
Word count				total on command	total and by page	total and between markers	total on constant display, selective on request
Default printer	Epson MX80	Epson MX82		'most dot-matrix printers'	Epson FX80	none identified but effects tested with Epson MX82	using *MULTI machine code
Multiple copies unsupervised?	●			●	●	●	●
Running headers (H) and footers (F)	H		H,F		H,F	H,F	H,F
Selective print-out possible?	from cursor	using highlights			by page	by page	using markers
Automatic page numbers?	●		●	●	●	●	●
Built-in pause for sheet-fed paper?	●			●	●	●	●
Store printing instructions with document?		●	●		●	●	●

Table 2. Facilities of the software under review

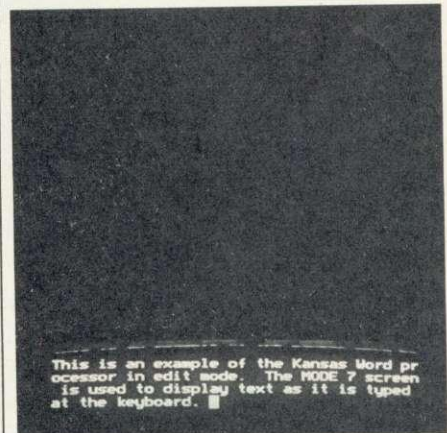
Although the *Edword* team has produced some excellent educational materials, I can't help feeling that the progressive layers of complication in *Edword+* make disproportionate demands on the user. *Edword* was limited but fairly user-friendly. To a school that has already made a commitment to *Edword*, *Edword+* will provide a valuable upgrade. To anyone starting from scratch, the approach seems cumbersome and expensive in relation to the facilities provided.

Kansas

The *Kansas Word Processor* is a cheap and cheerful document-oriented system aimed at people with dot-matrix printers and cassette recorders who don't want a ROM. Commands are entered from the function keys (you cut up your own keypad). Formatting is by embedded commands (TAB key followed by one letter). Although facilities seem limited, the 26 commands cater for most requirements.

First impressions of *Kansas* were unfavourable. The cassette refused to copy onto disc, despite adherence to the detailed instructions in its scruffy-looking but readable manual. Sub-

sequent experiment showed that (a) you must have motor control on your cassette recorder (or guess correctly where to stop the tape) and (b) Torch



Kansas is adequate for simple needs

Z80 disc-pack users must remove the CPN chip. However, *Kansas* helpfully provided a disc version and will supply customers in difficulties at cost.

The other problems I experienced were more apparent than real. The Insert command is unique and initially disconcerting: it wipes all text from the point of insertion off the screen - but

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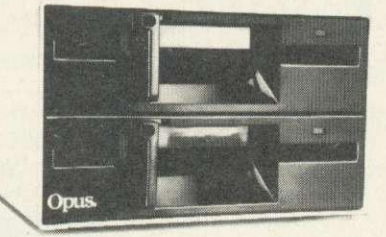
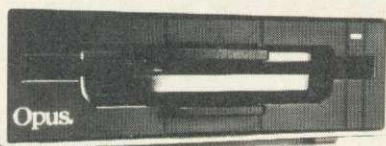
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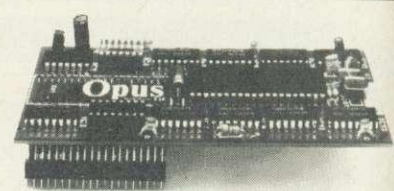
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only into a buffer, so it reappears when you press Insert again. The buffer is quite small (about 40 words) but you can insert words into an insertion. I had trouble creating new lines or paragraphs, until I realised that TAB commands don't take effect until you 'print' (to screen or paper). The effect is that the screen looks even less like the printed page than in, say, *Wordwise*. In fact, the structure of text is obscured until you print, which I found a handicap.

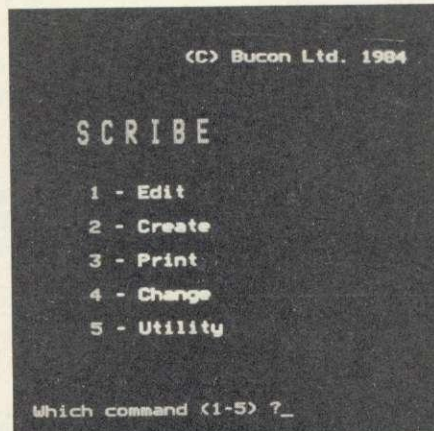
The print menu is fortunately self-evident (it is not documented) and offers options like multiple copies, double-spacing and a choice of normal versus emphasised printing modes with a simplicity that puts some of the more expensive systems to shame. However, its catechism of eight questions quickly became irritating for each print-out, especially as some of the answers are unlikely to change.

If the semi-permanence of a fitted ROM is a drawback, and your wp needs are simple or occasional, this cassette is worth considering. It won't take long to learn, and produces adequate results for jobs like multiple copies of dot-matrix memos. But if you expect your wp needs to grow, don't buy *Kansas* just because it's cheap. Other systems provide better editing and printer control. And ROM chips have two great advantages: they do not compete for precious user RAM, and they load instantaneously.

Scribe

Disc users will appreciate *Scribe's* ability to create documents of up to 255 pages and the way its utility programs effectively shield you from the disc filing system. *Scribe* automatically takes back-up copies, compacts the disc and assesses how much free space is available before letting you start. Its method of allocating disc space to create the empty document means you must estimate in advance how many pages a document needs – and wait several minutes while *Scribe* prepares the disc. Although you can extend the document length afterwards, in practice you overestimate. The result is that *Scribe* is greedy for disc-space: one regular user reckons to fit half as much *Scribe* text per disc as *Wordwise*. Care is needed when setting up the document for double or triple spacing (neither can be previewed): you must ensure page length is an exact multiple of the spacing interval.

Scribe is page-oriented and gives full cursor information, and 80-column display with text centred on-screen. Its on-screen underscore works only if you allow *Scribe* to send line feeds to your



Scribe can create 255 page documents

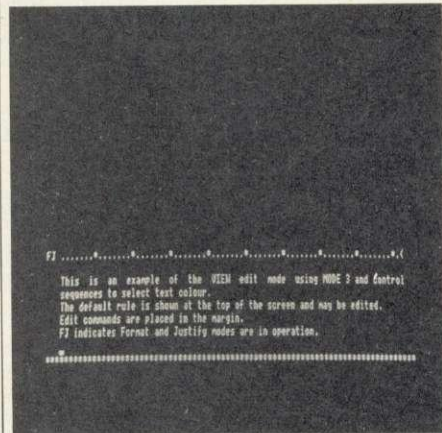
printer; on my Epson this meant either accepting everything double-spaced or resetting the printer's DIP switches. The alternative is to use printer control codes, which are needed for effects like bold and enlarged anyway. *Scribe's* menu approach to organising the printer is clear if slightly daunting. The 'Alter-create' option allows you to customise print-out instructions and save them. Since the printer control program is on disc, *Scribe* documents can be printed out on other BBCs without any wp ROMs – a useful feature.

Editing facilities are ponderous, with slow cursor movements and limited block movement (nine lines only). The inability to mark and save sections of a document limits its cut-and-paste power, though there is a simple merge facility. While editing, you *must* obey the 'Please wait' message while the program is shuffling text from page to page: entering anything seems to corrupt the buffer and text is lost. Deleting large sections can take several minutes while text is shuffled from page to page. However, for an author who gets things right, or nearly right, first time, these limitations might not matter, and the ability to jump directly to a given page is handy for editing book manuscripts.

Even if you buy wp for long reports or books, it will be used for odd letters and memos. By being methodical in your disc housekeeping, you could keep

dummy files containing standard empty *Scribe* documents and avoid the long start-up process. If your discs have an unholy mixture of Basic programs and other text files and there never seem to be enough blank discs anyway, *Scribe* may not suit you.

Merlin *Database* is a ROM plus disc package whose output can be used with *Scribe*. Its specification looks impressive, and if you need to incorporate database searches directly into reports, and have two spare ROM sockets, the combination price of £95 looks good value.



View – comprehensive and flexible

View

The first thing to say about the new *View* 2.1 is that it is a vast improvement over version 1.4, which had a scandalous number of bugs. It also had various hostile features like its inability to print straight from RAM. Indeed, had I bought the earlier *View* I would be hammering on Acornsoft's doors demanding a low-cost exchange option (see note below).

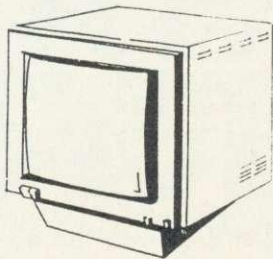
The package is still incomplete if you want printer effects such as bold and underlining (invoked by two highlight commands). With *View* 1.4 you had to buy a cassette containing printer drivers for specific printers and hope yours was catered for. This led to difficult situations like W H Smiths offering a £1200 package of hardware/software which included a printer that *View* was incapable of supporting even to the

	Beebpen	Edw	Ed+	Kansas	Scribe	View	Wordwise
Fidelity of screen to print-out	★★★	★★★	*	★	★★	★★★	★ or ★★★ (see text)
Accident protection	★★	★★		★★★	★★	★★	★★★
Quality of documentation	★★	★★		*	*	★★★	★★
Immediate results (first-timers)	★★	★★	*	★★	*	★★	★★★
Customised facilities (experienced users)	★★	*	★★	*	★★★	★★★	★★★
Cursor control	*	*	*	*	*	★★★	★★★
Cut-and-paste editing	★★	*	★★	★★	*	★★★	★★★
Ease of printer use	*	★★	*	★★★	★★★	*	*
Range of printer support	*	★★	★★★	*	★★	★★★	★★★

Table 3. How the six compare

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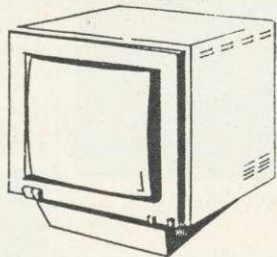
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	ex VAT inc VAT	
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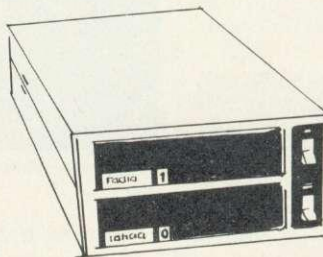
Examples of Screen Dumps, User-defined symbols and fonts including Near Letter Quality are available from the shop.

colour MONITORS



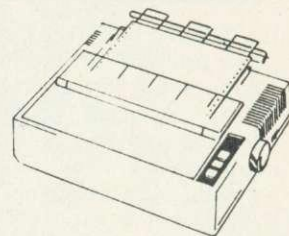
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Microvitec 1451	£239.14	£275
1451 (RGB/PAL/AUDIO)	£295.66	£340
Taxankaga Vision II		
BBC/APPLE/IBM	£225.22	£259
Microvitec 1441	£433.92	£499
Taxankaga Vision III		
BBC/APPLE/IBM	£321.75	£370

DISK DRIVES



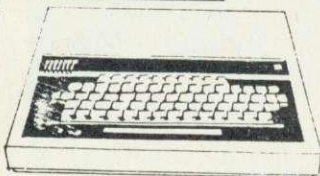
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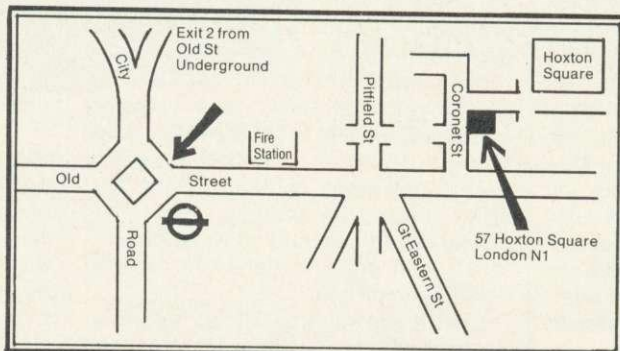


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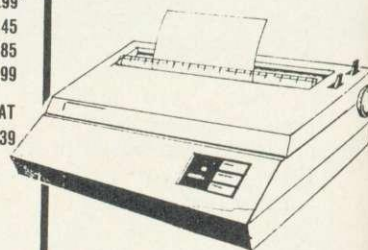
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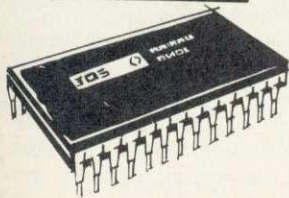
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extent of producing a £ sign! At least one customer (now happily *Scribing* away) won a refund after Acornsoft admitted the fiasco.

The new printer driver generator creates the necessary files from codes you type in—assuming they can be found in your printer manual. Although this is a lengthy process, by working from one of the answer-files provided you can get surprisingly rapid results. The ability to adapt existing text to a new printer just by typing in a printer file name is a major benefit compared with having to replace each control code as with *Wordwise*. The price is the initial labour of creating the printer driver—not a job for the impatient or for beginners, and this service may be offered to customers by dealers. In *View* 2.1, extended sequences of up to four highlight codes can be defined, overcoming its previous restriction to only two printer effects at once.

Unhappy history apart, *View* is now comprehensive and flexible. Its two well-written A5 manuals (70-page introduction and 51-page guide), are indexed, and Information Transfer Ltd are to be congratulated on fitting lucid explanations of a complex system into far less space than, say, *Edword's* manuals. What a pity the keystrip is so badly designed: 29 separate commands printed in spindly white capitals in random order.

Having found your way round the keystrip, editing is fast and flexible. There are six markers for block operations, two visible and four invisible. Layout commands are entered in the margin and can be stored. The macro facility allows true mail merge (eg of standard letters with address lists). You can preview centring, underlining and page-breaks using the Screen command, but not while editing.

Cursor movements seem slow until you master the combination of command keys and Shift-with-cursor-keys. Cursor speed and auto-repeats can be adjusted with *FX commands—a feature I first enjoyed, then wondered if I'd really use.

Overall, *View* 2.1 is comprehensive but not yet definitive. Why is there no numerical information on the rulers or cursors to assist formatting? Why doesn't it provide safety-nets against large deletions and overwriting an existing file? Why does LS2 produce triple-spacing instead of double? Why is the method of text recovery after hitting Break so deeply buried? Why doesn't the publicity make it clearer that the printer support program is indispensable?

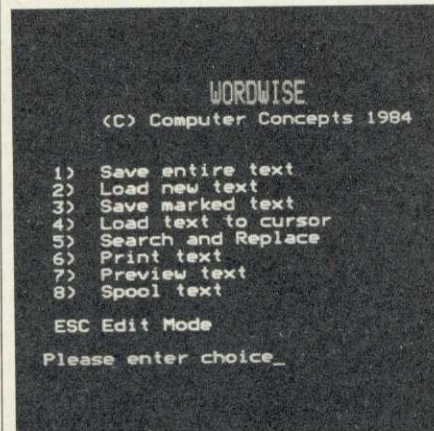
For specialist features like mail merge, running heads paginated for two-sided printing or microspacing

(allowing right-justify with proportional spacing), there is no other choice. If you want automatic indexing (for books or manuals), *ViewIndex* is powerful and flexible and—so far—unchallenged. The existence of an integrated spreadsheet (*ViewSheet*) may be the clinching factor. And if you have a second processor, the *HiView* option is unrivalled.

Wordwise

Wordwise was the first of these six to appear and has featured in these columns twice before. There is little need to describe its features: the tables show how it measures up to the competition. (The free touch-typing tutor is excellent, incidentally.)

Wordwise's three-level system of cursor control is still unrivalled and gives the option of moving a single character, line or screenful for really fast editing of long documents without

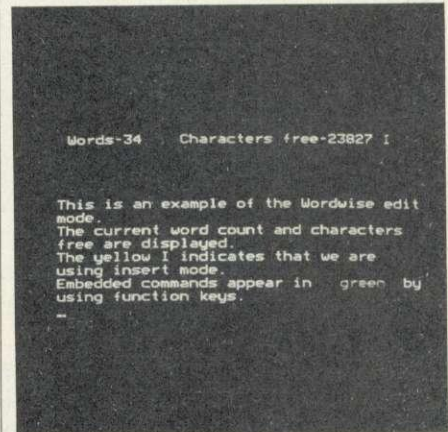


The wordwise menu

taking your eyes off the screen. Block operations are instant and limited in length only by the document. File merging and cut-and-paste are very easy. You can produce simple documents fast, without even switching on the disc drive. Yet if you are prepared to decide on standard commands for the function keys and save the codes, professional-looking results can be achieved using all your printer's capabilities. (I use a single !BOOT-file to define function keys for letterheads, standard page layouts and underline/double-strike codes on both my printers.)

Even *Wordwise* could be improved: the menu page is not ideal. If you don't notice your mistake before entering the filename, hitting 1 (load new text, thus clearing memory) in place of 2 (save entire text) could be fatal. It would be nice to be told what document you're working on (like *View* and *Edword*) and to have to confirm before re-saving to an existing filename (like *Scribe* and *Beebpen*). Although *Wordwise* can be thoroughly customised, I don't see why

the manual doesn't provide more powerful examples and explain how building a !BOOT file can avoid having to type *key gobbledegook to produce printer effects or standard layouts. A *Wordwise* help disc would be a good project—and a proper index for the manual should be an immediate one.



Wordwise can be thoroughly customised

Nevertheless, in the past two years *Wordwise* has helped me write several books and hundreds of articles (including this one). My admiration for a system that is so simple to learn yet has given so much room to grow is undiminished. I had expected this review to tempt me away to one of the more expensive recent systems; if I ever need an integrated spreadsheet or database, the attractions of *View* or *Scribe* might yet prevail. Given a free choice however, I have returned to *Wordwise*: it's not perfect, but it's a fast, flexible and forgiving all-rounder, still in its prime and superb value for money.

Reading

Business Applications on the BBC Micro by Susan Curran and Margaret Norman, Granada, £7.95. Chapter on wp is essentially a comparative review of eight BBC programs and is in many ways a complement to this article.

Wordwise reviews: *Acorn User*, February 1983, pp 56, 57.

View and *Wordwise* comparison, *Acorn User*, June 1983, pp 73, 75, 81.

View upgrades

As a result of pressure from customers and *Acorn User*, Acornsoft has decided to offer *View* upgrades as follows:

- *View* 1.4 chip trade for version 2.1, at £9.95 (inc post, VAT).

- *View* 1.4/2.1 trade for *HiView* disc, to run on the 6502 Second Processer, at £14.95 (inc post, VAT). The company stresses that this disc won't run on a BBC micro without the second processor, so is not to be done lightly.

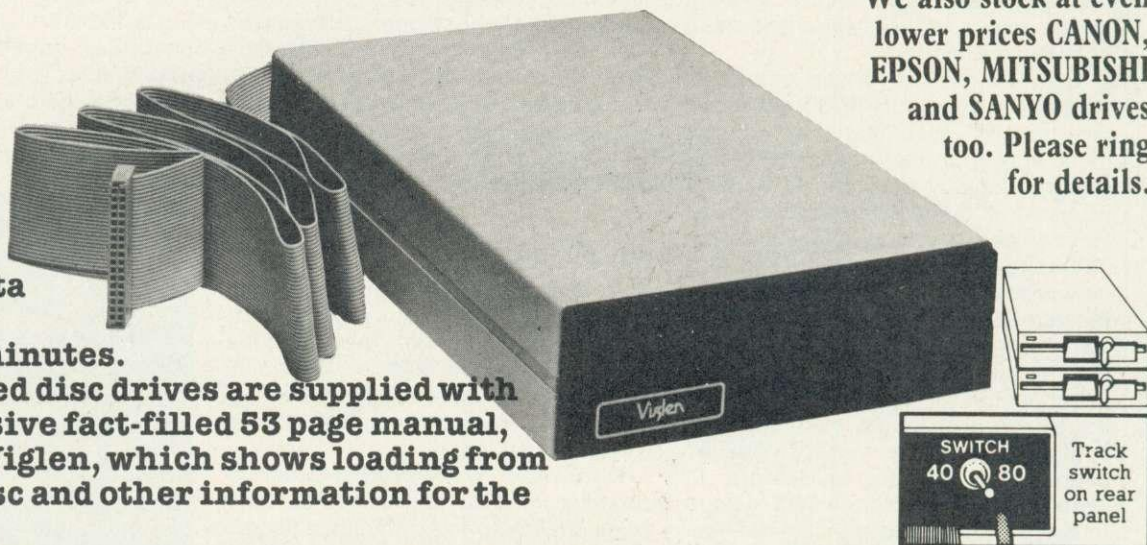
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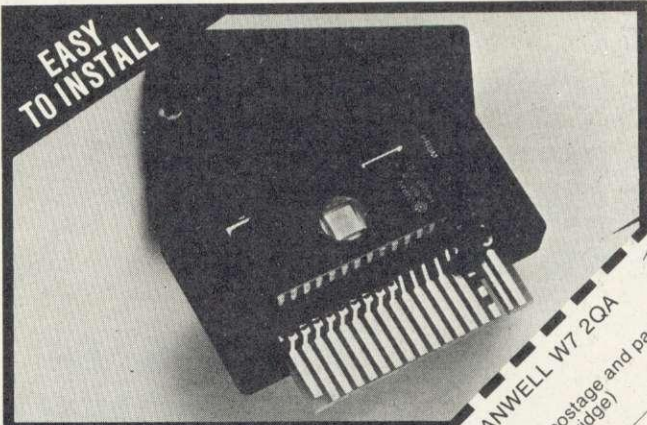
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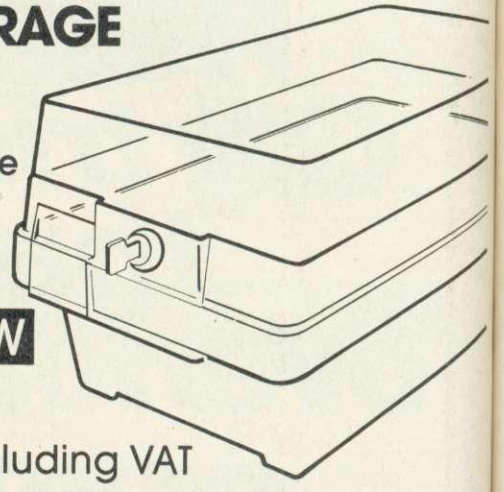
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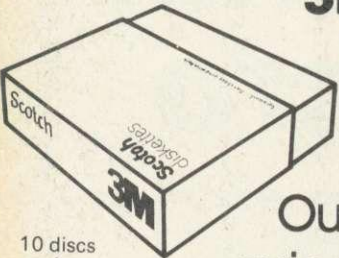
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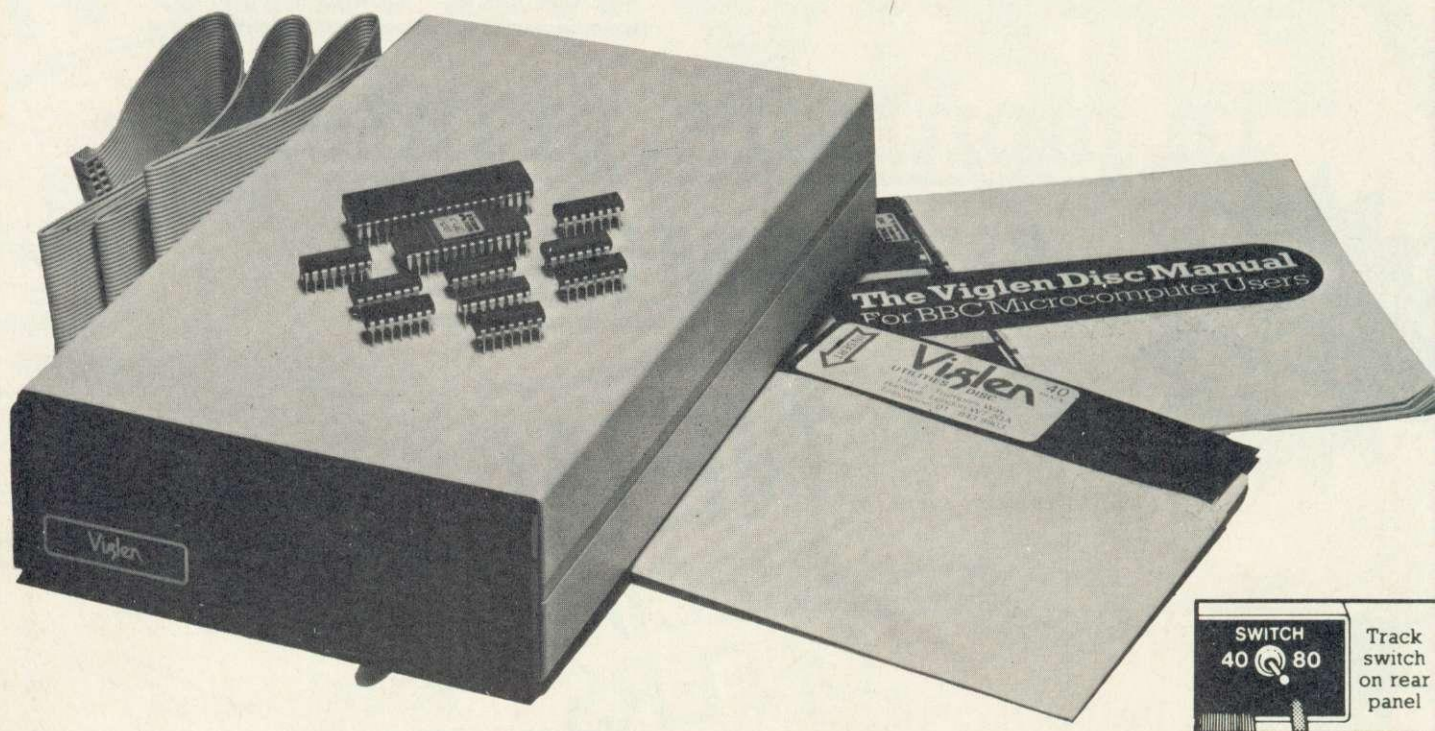
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Aut/6

PHILIPS COMPUTER MONITORS

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Viglen

DON'T BUY

just a colour monitor
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PHILIPS BM 7502 GREEN SCREEN MONO

From the highly successful 'Philips 80 Range', here is a monitor specially designed to display graphics and alphanumeric data with perfect clarity.

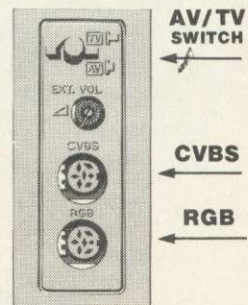
- 12" high resolution, 20MHz band width, anti glare screen
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- 2000 character (80 x 25) display
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- Suitable for the following computers:
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PHILIPS CT 2007 COLOUR TELEVISION + MONITOR

This very popular unit is not only an excellent Colour Television Receiver, but also a sophisticated computer monitor. Featuring:

- Free lead supplied for BBC Micro
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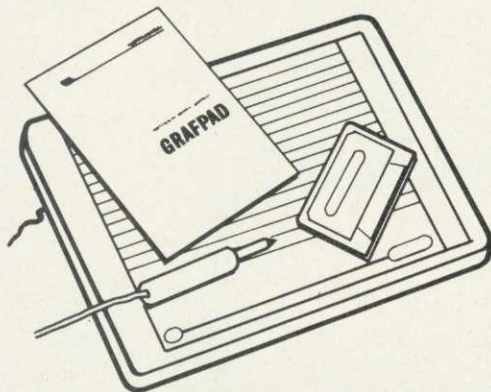
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SPECIAL OFFER FROM VIGLEN

* Scoop Viglen price **£99.00 inc. VAT**
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* Normally sold at **£143.75**

* **Special purchase**



This remarkable Grafpad from British Micro allows you to input information into your computer – very accurate and high resolution, not to be confused with other models which are both more expensive and less accurate. Supplied with all necessary cables, manual and sample programs, to allow you to develop your own application programmes.

Computer aided design programme. Drawing programme etc.

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CANON DRIVES Models 110 & 210

Although greater power consumption than most slimline ($\frac{1}{2}$ height) drives, these non-standard $\frac{2}{3}$ height Canon drives prove to be a good alternative to cassettes for the first time amateur user who does not envisage any further expansion to his system.

All Viglen drives come complete ready to use including all leads, 53 page fact filled manual exclusive to Viglen showing how to load from cassette to disk, utilities disk, including formatt, verify, screendump etc.

£89.00 for 110
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Technical Specification

Motor Start up time: 1 sec (Slimline drives 600 m/s).
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■ VECTOR 1 ➡

- ★ A systems Disk – only ONE needed for ALL your tapes.
- ★ 40/80 Format.
- ★ User Friendly.
- ★ Transfers more tapes than other systems.

Currently compatible with Acorn DFS only.
Price: £16.00 inc VAT + P&P.



WILTSHIRE MICRO CENTRE

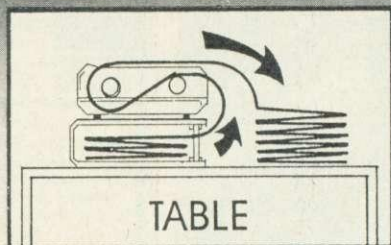
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Wilts.
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NEW!

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COMPUTER SUPPLIES

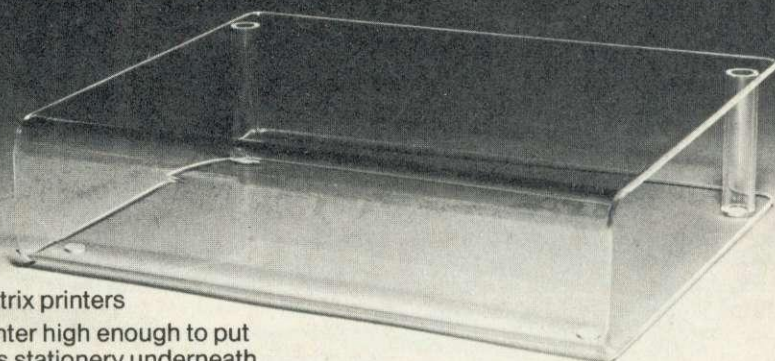


Printer Stand

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Carriage & Packing £3.00

A PRINTER STAND



- For dot matrix printers
- Raises printer high enough to put continuous stationery underneath
- Beautifully finished in clear perspex • Viglen quality every time
- Will accept paper up to 12½" wide • Non slip rubber pads

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VIGLEN COMPUTER SUPPLIES or debit my ACCESS/BARCLAYCARD No. _____

Name _____   Signature _____

Address _____

AU1/9

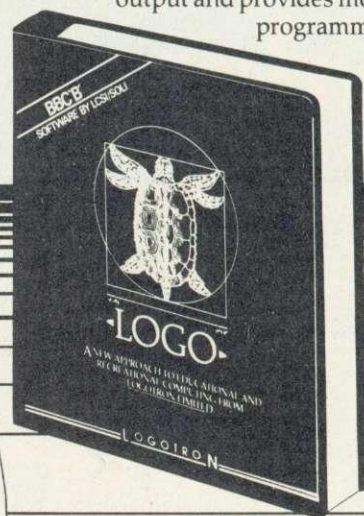
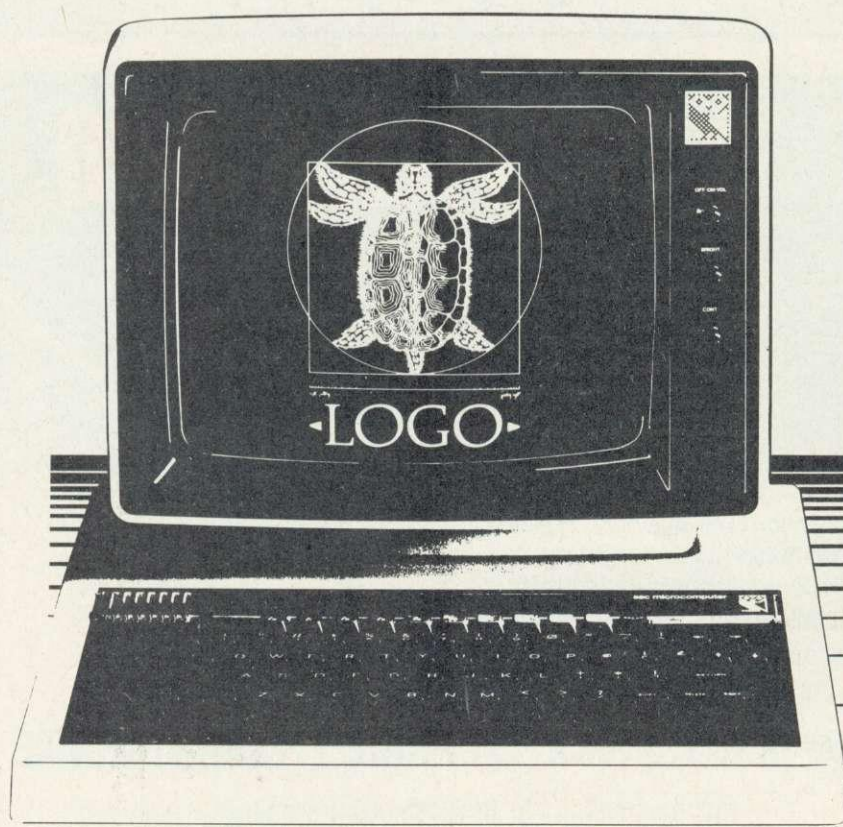
A full LOGO for the BBC model "B" from Logotron.

LOGO is a computer programming language, which appeals equally to children in primary school or to computer scientists at the Massachusetts Institute of Technology. Using LOGO, you unconsciously absorb advanced mathematical ideas and fundamental principles of computer programming. LOGO has been available on microcomputers only since 1982. Only this year has it been made available on British home computers like the Sinclair Spectrum and the BBC Micro.

LEONARDO WOULD HAVE LOVED IT!

Leonardo da Vinci would have loved it because LOGO gives full rein to a child's creative imagination, using visual images to convey profound ideas. LOGO could do for computers what perspective did for pictures, bring them alive.

Logotron's LOGO for the BBC "B" was written by LCSJ/SOLI, the software house responsible for LOGO implementations for Atari, Apple, IBM, Sinclair, Coleco, and NEC. It's the closest there is to an international LOGO standard, with turtle graphics and full list processing. The software is contained on a single 16k ROM, written in 6502 machine code, fully compatible with the 6502 second processor unit and Econet. Facilities are provided to drive floor turtles, create and use data files, and access routines written in machine language. Full access is provided to the BBC micro's operating system. An optional sprite board, also provided by Logotron, can be used to handle video output and provides more than 30 programmable sprites, allowing true animation.



Please send me further information concerning Logotron's LOGO for the BBC Model "B".

NAME

ADDRESS

..... Educational Establishment;

Home user; Dealer*; Distributor* *attach to company letterhead

If you want to know more about LOGO, send for a descriptive leaflet and price list.

To: Logotron, Dept. AU, 5 Granby Street, Loughborough, Leicestershire LE11 3DU, England.

LOGOTRON

Trade enquiries welcome.

Teaching the teachers

PETER Booth, the manager of the Manpower Services Commission scheme for microprogrammers in primary schools writes to us referring to our October article, 'Could do better!' In it Geoff Nairn pointed out the inadequacies of the government's generosity in putting a micro in each primary school. Many of the problems stem from teachers having no knowledge of how to use the machine, nor do they have any software.

Mr Booth's scheme, run using people from the MSC, aims to help teachers to help themselves. Programmers, often hobbyists or ITEC trainees, are drafted into schools to view the problems of programming for a class situation. The realities of the classroom are brought home to them while the problems of programming are outlined to the teacher, resulting in a series of programs which are now in regular use.

Unfortunately, this is not a nationwide scheme but limited to the Warrington area and is due mostly to the foresight of the former Primary Phase Adviser for the area, Mrs N Kilburn. MEP have a hand in its administration, as do the local authority, but its survival or otherwise depends on MSC funding which comes up for review in May 1985. It is hoped that the project will be seen as still worth supporting and it is an idea that other areas might consider.

GEOQUIZ WINNERS

THE following 10 entrants to our November Geoquiz win a £20 suite of four 'Exploring the Environment' programs on disc (courtesy BBC Publications) for their class: Maya Socolousky, North London Collegiate School, Edgware, Middx; Louise Smith, St Michael's Middle School, Colehill, Wilm-borne, Dorset; Martin Percival, Nicholas Breakspear School, St Albans, Herts; Elton Ward, Dartmouth High School, Great Barr, Birmingham; Fiona Mackenzie, Mundella Primary School, Folkestone, Kent; Fiona Renkin, Beaconside Junior School, Pen-rith, Cumbria; Andrew Coulton, Ripon Cathedral Choir School, Ripon, N Yorks; Hannah Summers, High March School, Beaconsfield, Bucks; Suzanne Gettings, Parkside Middle School, Cramlington, Northumberland; Sarah Hardy, Highfields School, Newark, Notts.
Answers: 1, 1953. 2, Ben Nevis, 1343m. 3, Alcock and Brown (Lt-Cdr Read's indirect flight also allowed). 4, approx 9070km (50km margin allowed). 5, Wandering. 6, in packs. 7, Tributary. 8, Rainy season. 9, Two from: Sahara, Kalahari, Namib, Lybian, Nubian, Arabian. 10, Antarctica.

Commentary by

Nick Evans,

who welcomes

reader feedback



New report hammers 'misguided' micro use

'BLUNDERING in the dark' - that's what a new report has to say about teachers' use of micros. However it's not the teachers' fault - lack of training in how to use them is to blame, as well as a dearth of information about the way their application can affect the learning process.

'Microcomputers in Education', a report by the Social Science Research Council, has a few unpleasant home truths to offer those who would wildly introduce the micro into the curriculum. Much well-intentioned but totally misguided development work has been undertaken by teaching staff, either in groups or as individuals.

'For the most part (there are important exceptions), the production of educational materials remains a "cottage industry", devoid of an adequate design base,' say the researchers, who also believe that many people undervalue the computer because of a lack of understanding 'of the process of learning and the organisation of knowledge'. They point to the work done in the

US and Canada where many teams work out their programming strategies based on 'sound models of learning and cognitive processes'.

It is argued that, instead of devolution to regional centres, as is the policy of MEP, design initiatives and control of development should be based on a national strategy.

Many people have wondered, as they have worked on projects for MEP or for local authorities, whether they are duplicating what someone else is doing in another part of the country. Moreover, there is much so-called 'educational material' around which would not withstand the scrutiny of learning theorists. What considerations have been assessed in your working groups?

Any useful guidelines that your area has drawn up that may be helpful to others? Any comments, MEP?

Microcomputers in Education by Morley Sage and David J Smith is available from the Social Science Research Council, 1 Temple Avenue, London EC4Y 0BD, price £2.

Attractive WHS Club offers

ONE interesting source of software and reading matter has been very slow in arriving but is now here at last - the W H Smith Home Computer Club.

The initial offers are quite attractive for schools but you must be prepared to buy six books a year and you are very much dependent on the suppliers making available relevant books.

Questions to ask yourself are: can the school afford it

(average prices probably £8-9), will the school want the material and who will use and control it (Library? Resources? Head Teacher?), and will you ultimately spend more than you would have intended in the normal course of events?

It's certainly one way of keeping up with newly published materials, if the example of other W H Smith clubs is anything to go by.

MRM pack avoids loads of trouble

ONE of the greatest problems for any school owning one or two micros is the moment when they decide to introduce the disc system. Suddenly, previously well-behaved programs will no longer load and the user has to introduce the relocation routine - if he can get at the code!

MRM Software has now introduced the E00 disc filing system. E00 is the 'Page' mark - the mark at which programs are loaded if one uses the tape system. Using discs however, part of the memory is grabbed so that Page has to move up to 1900, and this is where the problems originate.

MRM's package means that they no longer occur because



E00 DFS smooths transition to disc

extra memory space is included with the package. Page remains the same as for tapes.

The DFS consists of a small circuit board which may be fitted without soldering into the existing DFS socket. You will still need the disc upgrade, as it's only the filing system which is being altered.

The new DFS may replace the existing one or be used in tandem. MRM admits there are one or two minor drawbacks - *Disc Doctor* is not fully compatible; only four files instead of five are able to be open at any one time; and the 'BUILD' command must have lines of less than 100 words, but the advantages are obvious and most problems may be circumvented.

The price is £24.95 including VAT and postage.

★ ASTRONOMY ★

'SKY-BABY' is a highly sophisticated scientific program running on BBC-B (cassette loading). It caters for astronomers ranging from complete beginners to advanced amateurs and aspiring professionals, and for educational institutes.

'SKY-BABY' 's many features include:

- ★ Colour and brightness coded display of stars, planets, sun and moon in selected area of sky
- ★ View from any position on earth, any date and time specified by user
- ★ A library of all stars down to magnitude 4.0 (i.e., 469 stars) including coordinates, magnitudes and names
- ★ Orbital parameters of planets: sun and moon positional formulae
- ★ Star sizes plotted to indicate brightness; sun, moon and planets colour coded
- ★ Moveable 'space probe' to identify name and details of any object displayed on screen
- ★ Details of current position, rising and setting times of any selected object: provision for an additional user-specified object, e.g., known comet, galaxy, radio source, etc.
- ★ Detailed User Guide: sections on program use, astronomical nomenclature and positional astronomy, formulae used, fully annotated expanded program listing, etc., etc.
- ★ Auxiliary program to analyse and list contents of stellar library
- ★ Unhindered access to Author by phone most times: callers welcome

'SKY-BABY' package, consisting of C10 Cassette containing three files (program itself, stellar library, auxiliary program), and 35-page User Guide **£12.50** inclusive

Instructions for disc running, and running on Electron available on request.

SEE REVIEW
IN THIS ISSUE

payable to:

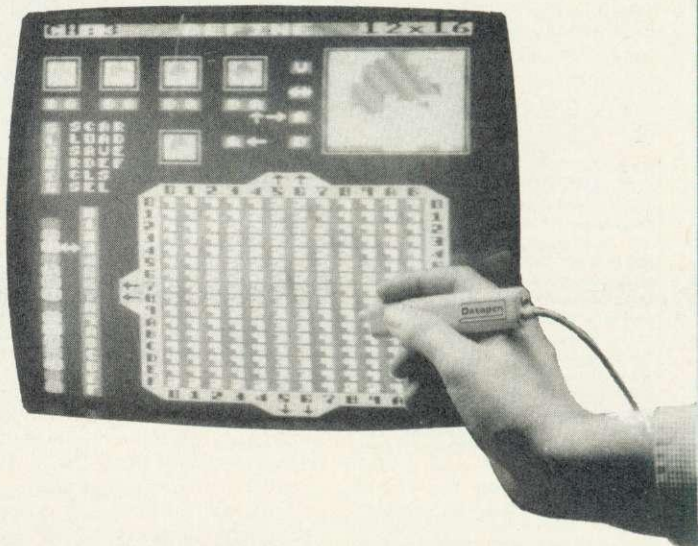
STELLAR ENTERPRISE, 84 Dudsbury Road, Ferndown, Wimborne, Dorset, BH22 8RG
Phone Bournemouth (0202) 575234

DEFINE A MULTICOLOUR SPRITE CREATOR, EDITOR & ANIMATION CONTROLLER FOR THE BBC B COMPUTER

DEFINE is a suite of programs providing all the sprite and animation facilities needed to produce high speed arcade type games using your own multicoloured characters (sprites).

The package is extremely easy to use, every command being made with a lightpen, or joystick, directly from the screen. Real size and enlarged views of your sprites are continuously updated while you define or edit them and you may test animation sequences in the editor package as you go along. New sprites may be created by editing old versions and the number of sprites you may define is unlimited. Sprites may be any size up to 12 × 16 pixels and each pixel may have any of the 16 standard mode2 colours. The software needed to animate your sprites is provided as a separate program, which you can merge into your own BASIC, or machine code, program, allowing high resolution positioning with fast, simple commands. The number of sprites, or clones, you may have at any one time is unlimited (except by computer memory) and the speed of movement can be very fast if desired — over 400 sprites per second may be printed from BASIC, or 700 per second from machine code. Of course, you may link sprites in your own programs, producing giant sprites, or sub-animation. A 24 page handbook is supplied as well as a BASIC example program.

LIGHTPEN OR JOYSTICK CONTROLLED



DEFINE tape version	£9.95	All prices inc. VAT & Postage
DEFINE disc version	£11.95	
Datapen Lightpen Pack (optional)	£25.00	

(Software included with lightpen; introduction and 2 drawing programs)

Datapen

Datapen Microtechnology Ltd., Kingsclere Road, Overton, Hants RG25 3JB
TEL: (0256) 770488

Access a world of Information WITH YOUR BBC MICRO

Today, there are literally hundreds of databases worldwide which can be accessed by your BBC micro. These include Prestel, Micronet, Homelink, Telecom Gold, various 'Bulletin Boards' and massive American data bases such as 'The Source' and 'DIALOG'. The equipment can also be used to send telex messages. The Pace range of inexpensive communications products are designed to provide accurate data exchange whilst being extremely flexible and easy to use.

NIGHTINGALE - The Modem



Nightingale is by far the most versatile modem available, at the price, for either home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between the BBC and other computers, including bulletin boards.

Nightingale has a built-in expansion capability, allowing the addition of auto-answer and auto-dial with battery back-up. The state-of-the-art modem chip technology employed in Nightingale requires minimal support circuitry resulting in low power consumption, low cost, high quality and extreme reliability.

Nightingale being 'hard wired' is not subject to the noise interference errors common to outdated acoustically coupled devices. In addition Nightingale features a simple self-test facility for easy installation.

Nightingale utilises a fully buffered RS 423/232 serial interface and is supplied complete with a lead suitable for connection to the BBC micro, other leads are available on request.

In order to use a versatile modem like Nightingale to its fullest potential, you will require equally sophisticated software. This is where Pace can offer you a total solution — Commstar, unquestionably the most comprehensive communications software available for the BBC. Commstar is currently the only package for the BBC micro which offers easy access to Prestel (and other viewdata services), together with user to user communication and exceptional file transfer capabilities.

Supplied on Eprom, Commstar is instantly accessible, simple to use and extremely flexible. Just look at the possibilities:- access Prestel, Micronet, Viewfax, Homelink and Telecom Gold, rummage through bulletin boards and chat to literally thousands of other computer users, but there's more. Commstar's versatility enables the BBC to be used as an inexpensive work station for a main frame or mini-computer.

COMMSTAR - The Software



The complete Nightingale/Commstar package for the BBC micro including the modem, cabling and the Commstar Eprom and manual is just **£139 plus V.A.T.**

Nightingale is available separately for the BBC and other computers at £119 plus V.A.T. and Commstar is £29.57 plus V.A.T. Further details are available, please telephone or write for comprehensive fact sheets.

SPECIAL INTRODUCTORY OFFER

For a limited period, when you order the Nightingale modem you will receive discount vouchers entitling you to the following:-

KNOWLEDGE-INDEX
20% discount off standard enrolment fee (normally £25)

This remarkable collection of databases includes over 22,000,000 items covering Agriculture, Books, Business, Electronics and Computing, Corporate and Company News, Education, Engineering, Government Publications, Legal Information, Magazine Articles, Mathematics, Medicine and News/Current Affairs (The enrolment fee also includes 2 hours of free access time).

one to one
50% discount off standard enrolment fee (normally £50)

One to one is an electronic message service designed to give you the communications capabilities of a telex at much lower cost. By using your micro fitted with a Nightingale modem you can produce telexes, letters, reports and contracts, and send them in seconds to any destination. Courier delivery, priority mail and radio paging are also included in this highly efficient communications service.



**PACE, 92 NEW CROSS STREET,
BRADFORD. BD5 8BS
Tel. (0274) 729306 Telex 51564**

"Bringing tomorrow a little closer"



TELL ME A STORY

Build a story as you move around Robert Southall's adaptation of the Acorn User activity board

164

EASY and inexpensive to construct, and with the associated software infinitely flexible in its use, *Story-board* is a development of Susan Kingsbury's activity board featured in the August *Acorn User*.

In this version up to seven separate stories can be contained within the program, and any one of these selected by the pupil. A 'surprise story' option selects a sentence at random from any of the stories held in the data lines. The program has numerous error-trapping devices incorporated to make it idiot-proof, and is intended to be operated by young children with the minimum of adult intervention. The design of the board has been improved and overlays and cut-out models invented to go with the stories.

New stories can be constructed around available models, or appropriate ones and overlays made by individuals or as a class activity. Sentences

can be typed into the program by changing the contents of the data lines and the program is re-saved with the new story.

With some careful thought the *Story-board* can be useful and stimulating to a wide age-range and offer many of the facilities found on similar commercial boards at ten times the price.

The following illustrative notes refer to the *Shops* program on yellow pages 119-121 and explain how the program is constructed and how to use it.

There are seven stories in the program (lines 2370 to 3070), and their titles are held in lines 3100 and 3140. Each story contains a heading and eight sentences of up to thirty-six characters. The story title is displayed in the menu, while the story heading shows on the screen when the story has been selected, and they are not necessarily the same.

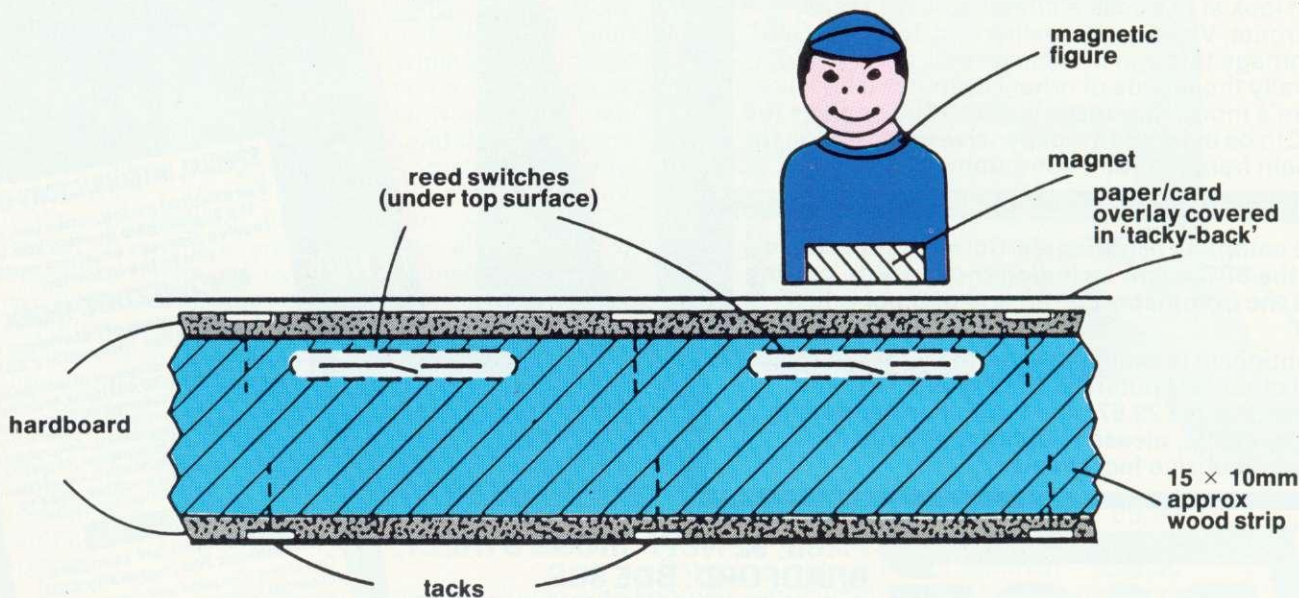
The stories are structured so there is

some progression in the degree of difficulty. A full circuit involves touring the board eight times, one of which is a question and answer session and another a 'surprise story'.

At each point visited by the magnetic figure a sentence associated with that point will appear on the screen. The idea behind the sentences in *Shops* is to encourage a positive reaction. For example, Story 1 gives cues to put the shop models out, Story 2 to put out the shopkeepers etc. It's possible to change the order of the points on the board by swapping the values of J between lines 1910 and 1980.

When all eight points have been covered the story will be printed out and the pupil is able to move on to the next story. A different set of sentences will be printed but each will refer to the same model at each point. For example, point 1 on the board refers to the newsagent's. The sentences at this

BOARD SECTION



All other connections are described on pages 112-113 in the August issue



SHOPS

Cut along the solid lines and fold along dotted lines
Write the name of the shop on the front
Decorate the windows

This template should be photocopied to provide the model shops

point are:

- Story 1 Line 1 The Newsagents
- Story 2 Line 1 Mr Brown is the Newsagent
- Story 3 Line 1 The newsagent sells newspapers and comics
- Story 4 Line 1 There are papers in the window
- Story 5 Line 1 Lizzie buys a comic and Poppy buys sweets

Story 6 Line 1 Lizzie spends 10p and Poppy spends 5p
Story number 8, the 'surprise story', will print sentences at random from any of the lines in stories 1-6. The selection will be only from the six sentences associated with that particular point on the board. For instance, point 1 (Newsagent's) will print only one of the six sentences shown above—to have a

sentence about the chemist or baker would be senseless. The resulting 'mixed-up' story can be quite amusing—try it with six different stories in the data lines.

Story number 7 poses questions about the shops and what they sell. At each point a question associated with it appears on the screen. As the program stands it will not accept input and the answers have to be written down.

Constructing the board

The wiring and connections to board and computer can be found in the August issue of *Acorn User*.

Cut two pieces of hardboard (300 × 400mm), position reed switches on underneath of one piece and glue. When dry, solder ribbon cable wires to switch connections.

Glue 15 × 10mm wood strips around the edge (a few tacks make it more secure) and complete assembly by gluing the other piece to the strips. It may be necessary to make a small notch for the ribbon cable. The result is a very sturdy 'sandwich'—but don't forget to mark the position of the reed switches on the upper surface of the hardboard! Lengthening the cable to 1.5m allows the board to be used at a greater distance from the computer.

As a final touch the board can be painted a nice bright colour. Overlays with drawn or painted scenes should be from A3 paper or card, and for extra durability they can be covered with transparent fablon or 'tacky-back'.

The *Shops* template should be photocopied eight times to provide the eight shops. (Keep the original for future use.) These can be coloured and the names of the shops written on the front—Newsagent, Baker, Chemist, Grocer, Greengrocer, Post Office—and then fixed to the overlay photocopied from pages 168 and 169. 3D models can be used for the shopkeepers or figures drawn on card, cut out and labelled with their names and weighted with plasticine. We give you ideas for drawing the shop fronts overleaf and on yellow page 121.

Running the program

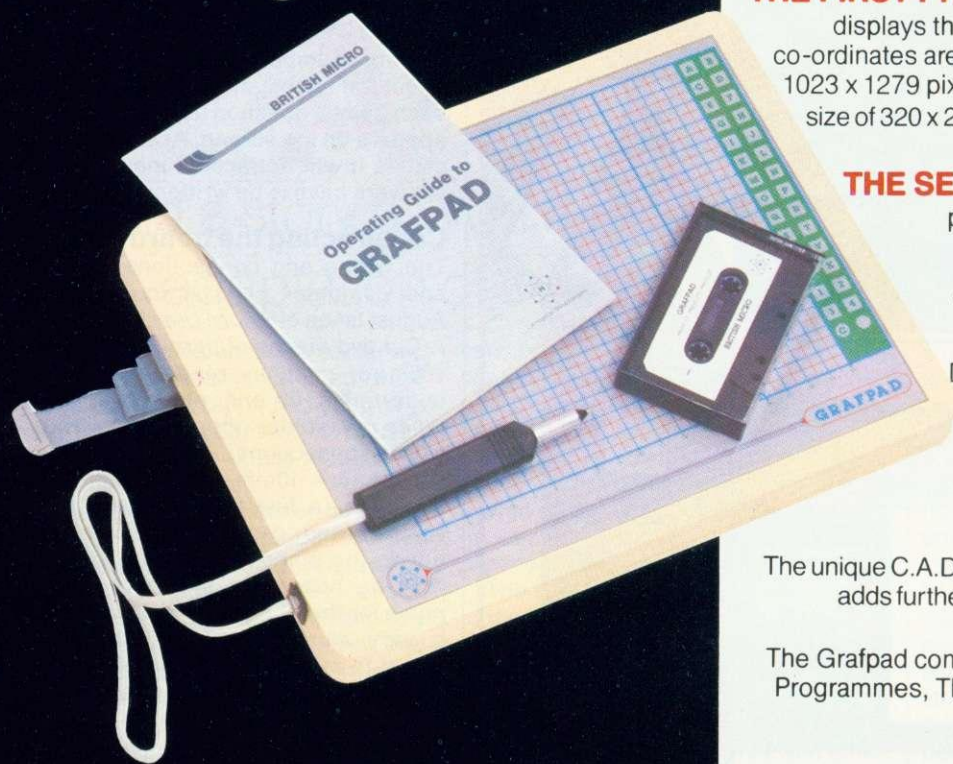
Type in the program from yellow pages 119-121 and save it on cassette or disc as 'Shops'. While debugging, or changing the listing it is a good idea to temporarily remove line 70, which disables the Escape key, so that you can interrupt the program while it's running. Once it is saved just CHAIN SHOPS to run it.

The Program Notes that appear are general notes (for adults) and are not returned to once the program is started unless the Break key is pressed.

You are then requested to input your

GRAFPAD

...for as many uses
as YOU
can imagine!



BBC MODEL B • SPECTRUM COMMODORE 64

With Grafpad you can now add a new dimension to your computer enjoyment, but most important, it helps you create your own application programmes by the simple use of the Grafpad!

The BBC Grafpad comes complete with cassette and disk comprising of three programmes.

THE FIRST PROGRAMME

displays the co-ordinates of your screen area. The co-ordinates are based on the screen with a grid size of 1023 x 1279 pixel, also in the Grafpad giving you a grid size of 320 x 256 pixels! This is to allow you to write your own graphic programmes.

THE SECOND PROGRAMME

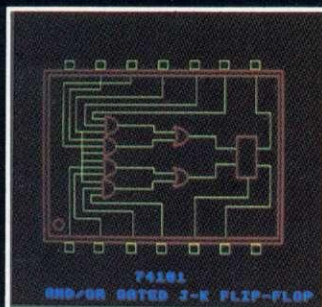
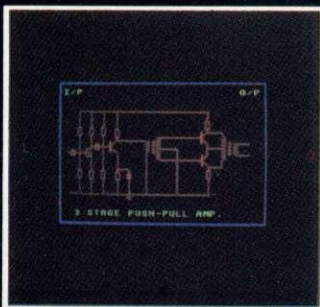
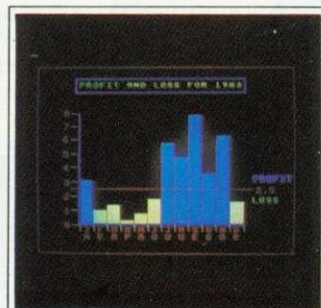
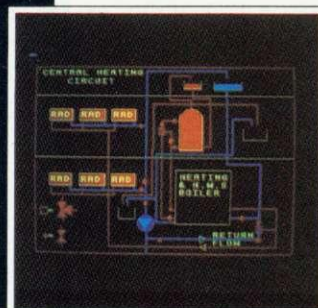
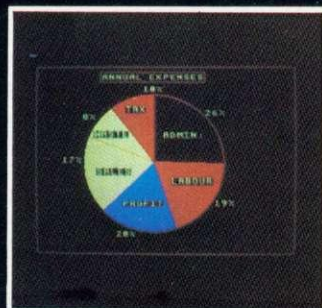
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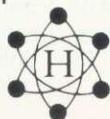
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(The above designs were drawn by a 12-year-old at our showrooms!)

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choice of colour of letters and background ('Paper'). There is a check to see that only colours within the range specified are selected and that letters and background are not the same colour. There is an option to change them after each story.

The player is requested to input his or her name and press Return. Up to ten letters can be typed in. The child is then asked by name if he or she would like to play *Storyboard*, pressing 'Y' or 'N' to answer, and is presented with the following eight stories to choose from:

1. Shopping
2. The shopkeepers
3. What do they sell?
4. In the shop window
5. Buying things
6. What do they cost?
7. What do you remember?
8. Surprise story!

When the number of the story selected is pressed, the story heading will be shown and the program waits for the first point to be visited. As each point is reached a sound signal is heard and the sentence printed.

When all eight points have been visited the message 'PRESS "P"' appears on the screen. The story will then be printed on the screen. The program allows you to visit up to fourteen points before automatically printing – only of use in the surprise story option when it's possible to get different sentences each time.

The child chooses whether to print-out the story on paper. If the printer isn't connected or switched on the program will continue. He or she can then choose another story, change the colour or end the program.

Surprise story

On selecting this option the data pointer is restored to line 2370 and all the sentences are read. A random 'jump' is created which will then select one of the sentences associated with that point.

Entering new stories

Each story contains a heading and eight sentences. The story heading

must be at one of the line numbers in the left-hand column.

To enter new lines from line 2390, type AUTO 2390,10 and <Return>. Be sure to include the blank lines (those containing ':') as the Read will be upset if they are omitted. Start each line with DATA and be careful not to include any commas in the line. The maximum line length is 36 characters including spaces. Press <Escape> when the story has been typed.

Further developments

An obvious improvement would be to add some graphics to the display – a moving figure, a scene, etc. There is a



small amount of memory for this.

Sound – has anyone produced animal noises on the BBC to go with a farm or zoo story?

An input routine could be added so that questions posed can be answered direct to the computer.

Children can be encouraged to write stories which can be entered into the program and 'played with'. Here are some suggestions for subjects – an airport scene, rooms of a house, rooms in the school, driving along a road, a

Program notes

70-80	Disable Break and Escape keys
90-100	Dimensions arrays
130	Displays program notes
150-180	Sets colour of letters and background
190	Gets players name
200	Displays story titles
210	Prints story heading and waits until figure is moved
220	Prints whole story on screen and to printer if required
230-350	Prints request for repeat story or end
360	Enables Escape key
370	End

Parts list for Acorn User Storyboard

1 piece of perspex 30 × 40cm from local signwriter.
8 dry-reed relay switches @ 40p each from Radio Spares Components Ltd, PO Box 427, 13-17 Epworth St, London EC2P 2HA (Form A, type 7-RSR-A, stock no 338-147).

treasure island, cowboys and indians, a visit to the zoo, a farmyard – the list's as vast as your imagination.

Procedures

- PROCInstruct** (1410-1590) Displays program notes.
- PROCSetup** (1610-1750) Requests input for letter and 'paper' (background) colour. 1720 Checks that letter colour input is in the range 0-7. 1740 Does the same for 'paper' but also checks that letter and paper colour are not the same.
- PROCGetname** (2060-2340) Gets players name and stores it in the variable NAMES\$. 2080 Turns cursor off. 2150 Checks to see if Return key has been pressed or if number of letters input has reached maximum (10).
- PROCMenu** (1100-1390) Reads and prints story titles held at lines 3100-3140 and awaits input of story number. 1270 Clears input buffer. 1370 Ensures that input is in the range 1-7. 1380 The variable Story holds the ASCII value of the story number chosen.
- PROCwait** (410-590) Reads story headings and sentences. Prints heading and awaits input from user port (ie when figure is moved to a point on the board). 440 Checks to see if option 8 (Surprise Story) has been chosen – in which case Reads sixty-four data lines instead of the usual eight. 500-570 Checks user port to see if figure has been moved. Calls PROCsentence which displays sentence on screen. 530 Checks if "P" (Print) has been pressed or if maximum number of points (14) have been visited.
- PROCprint** (610-710) Prints whole story to screen and calls PROCprinter if story is to be printed out.
- PROCdouble** (String\$, col, row) (950-1080) Accepts String\$ and prints in double height characters at co-ordinates col(umn), row.
- PROCsentence** (1870-2040) Accepts user port input and prints appropriate sentence in double-height letters. 1900 Checks to see if 'Surprise Story' option has been chosen, in which case generates a value for the variable 'jump'. This ensures the correct sentence for a particular point is printed. The instruction Press "P" appears when eight points have been visited, although it's possible to visit fourteen points before the story is automatically printed.
- PROCsound** (1770-1800) Produces a 'warble' when a switch is activated.
- PROCpause(P)** (1820-1850) Pauses program by going through a FOR...NEXT loop P times.
- PROCprinter** (730-930) Prints a 'personalised' story to parallel printer. 780-790 Checks if printer is connected and on. If not the program will 'END-PROC' and continue.

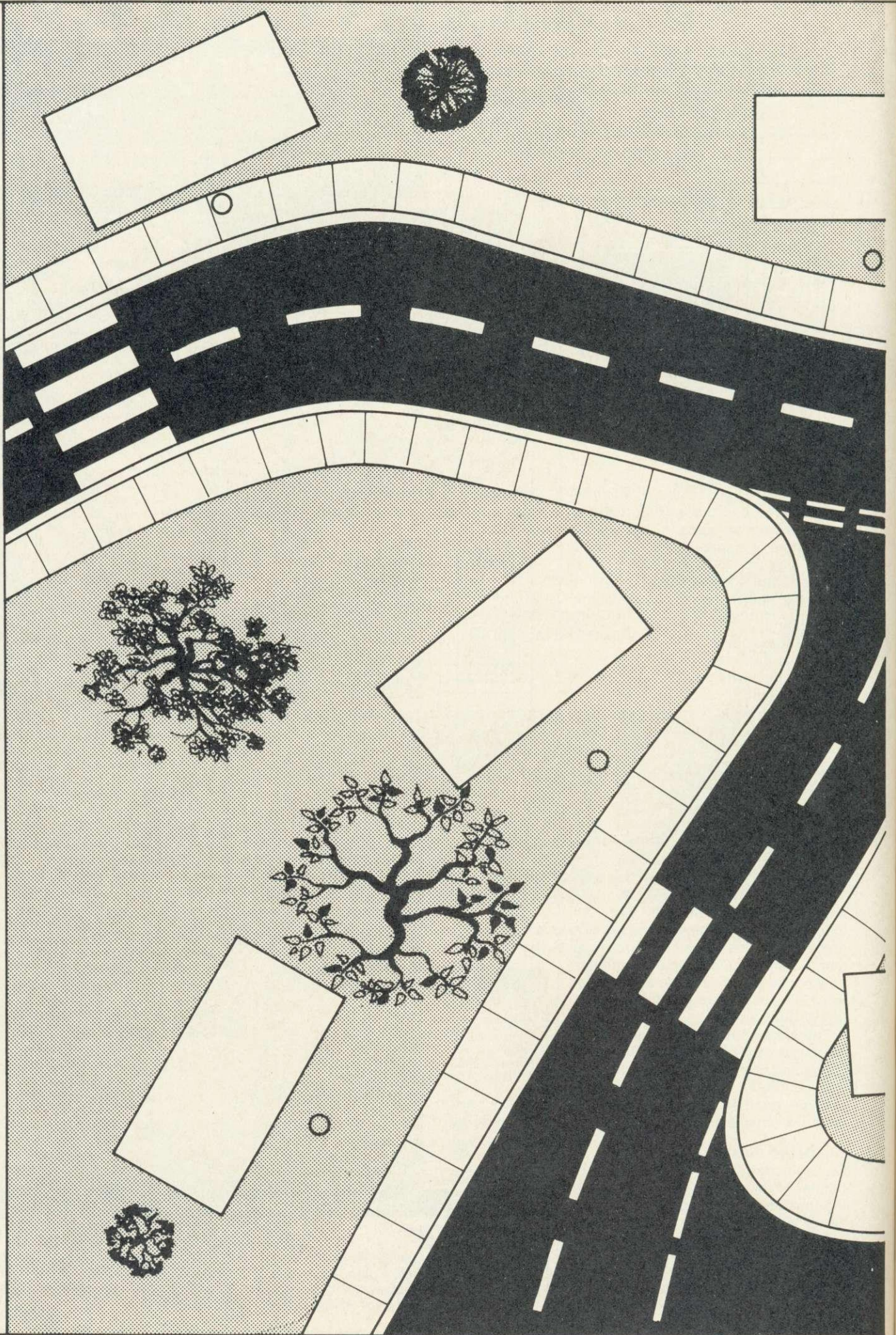
See overleaf for the Shopping overlay

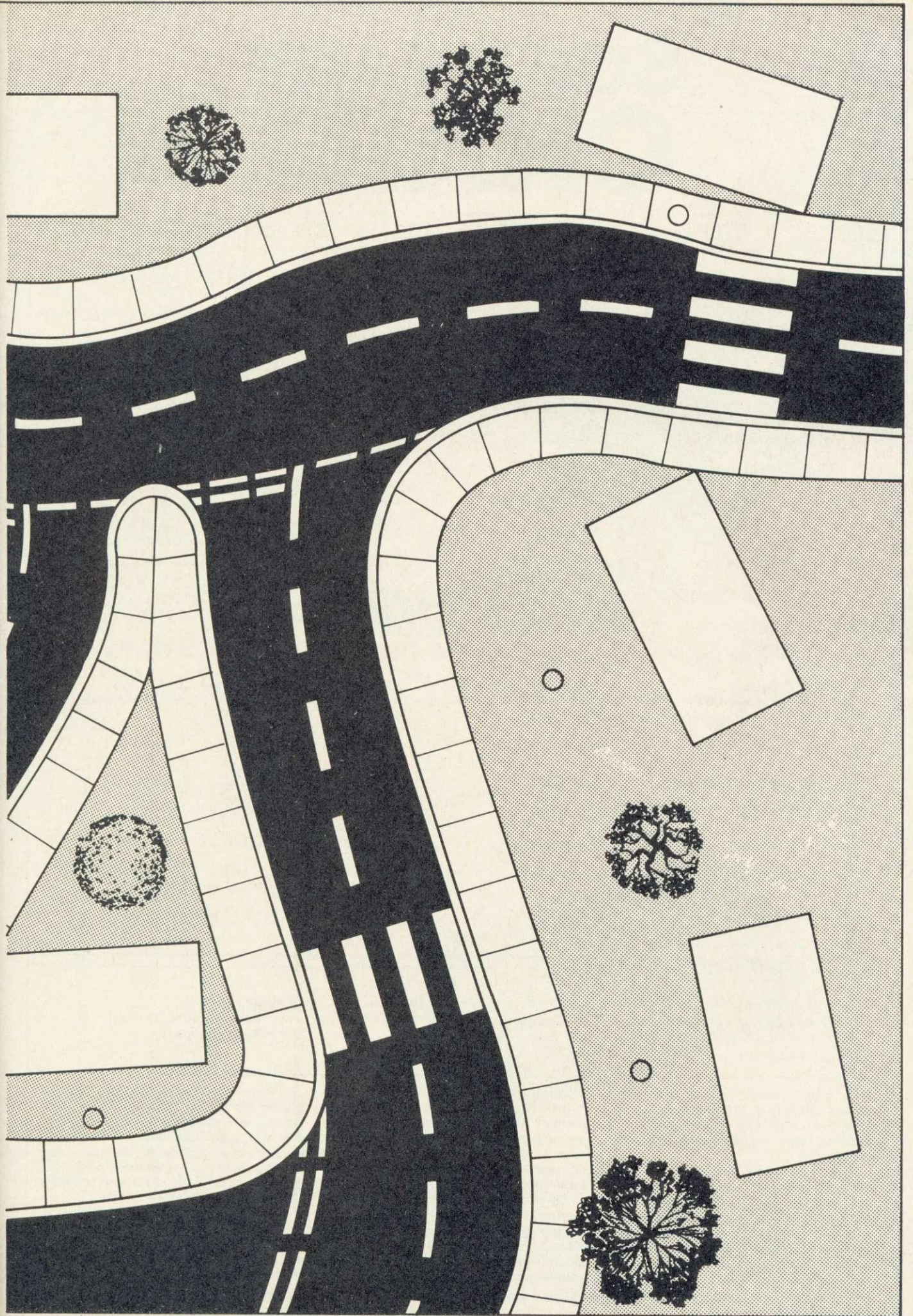
Data lines

2370	Surprise Story
2390-2470	STORY 1
2490-2570	STORY 2
2590-2670	STORY 3
2690-2770	STORY 4
2790-2870	STORY 5
2890-2970	STORY 6
2990-3070	STORY 7
3100-3140	Story Titles

1 User Port connector and 36in cable from Midwich Computer Company Ltd, Rickinghall House, Hinderclay Road, Rickinghall, Suffolk IP22 1HH (BBC22).
1 wooden animal with magnet attached from local toyshop.
Total cost about £11.

SHOPPING





SOFTWARE CHART

	TITLE	PUBLISHER	PRICE	MICRO	REVIEWED
1 (1)	Elite	Acornsoft	£14.95 (£17.95)	B/E	October '84
2 (5)	Frak!	Aardvark	£7.50	B	September '84
3 (9)	Jet Pac	Ultimate	£7.95	B	
4 (2)	Fortress	Amcom	£8.95	B	
5 (—)	3D Grand Prix	Software Invasion	£9.95 (£11.95)	B	September '84
6 (3)	Football Manager	Addictive	£7.95	B	
7 (—)	Pole Position	Atarisoft	£9.99	B	
8 (—)	Mr EE	Micro Power	£6.95 (£9.95)	B	
9 (—)	Gold Digger	Firebird	£2.50	B	
10 (—)	Eddie Kidd Challenge	Durell	£7.95	B/E	
11 (6)	Micro Olympics	Database	£6.95	B/E	
12 (8)	Chartbusters	Alligata	£9.95 (£13.95)	B	
13 (—)	Acid Drops	Firebird	£2.50	B	
14 (15)	Ghoul's	Micro Power	£7.95	B/E	June '84
15 (19)	Twin Kingdom Valley	Bug-Byte	£9.50	B/E	
16 (—)	Manic Miner	Soft Projects	£8.95	B	
17 (—)	Red Coats	Lothlorien	£6.95	B/E	
18 (—)	Chess	Acornsoft	£9.95 (£11.50)	B/E	
19 (4)	Aviator	Acornsoft	£14.95 (£17.95)	B	May '84
20 (14)	Battletanks	Superior	£7.95	B/E	September '84

B=BBC. E=Electron. Prices in brackets are for disc version.

BUBBLING UNDER

Mineshaft (Durell)
Return to Eden (Level 9)
Mini Office (Database)

Stock Car (Micro Power)
3D Bomb Alley (Software Invasion)
Java Star (Shards)

Zalaga (Aardvark)
Scrabble (Leisure Genius)
Snooker (Visions)

Compiled by RAM/Computer

THE whole chart has erupted this month, ringing in the changes for the New Year. Nine new entries, and six of those being replaced were new entries last month!

The two highest entries, from Software Invasion and Atarisoft, are obviously on the right track in the race for the top with *3D Grand Prix* and *Pole Position*. They suggest that there's a minor fashion for 'speed for speed's sake' games - no doubt souped up by the current BMX craze. This is confirmed by Eddie Kidd's leap to number 10 with his

Challenge from Durell.

British Telecom has got the right number with its Firebird label software priced at a creditable £2.50: *Gold Digger* and *Acid Drops* are new entries at number 9 and 13 respectively. We look forward to seeing Electron versions.

We stick by our comment last month that adventure games are losing out, but the exception is Bug-Byte's durable *Twin Kingdom Valley*, which has actually climbed four places. *Elite*, of course, maintains its lofty position at the top, and it's hard to see what will shift it.

The yo-yo-wielding caveman is back up the ladder to the number 2 slot, with Amcom's *Fortress* sliding slightly. *Football Manager* has slipped down the league this month to number six, making way for Ultimate's *Jet Pac*. Another sporty set, Database's *Micro Olympics*, has slipped a bit too.

One of the biggest surprises has been the nose-dive taken by the superb *Aviator*, overshadowed by its more glamorous stable mate, *Elite*. Still, we don't think it's quite ready to drop out of the chart yet.

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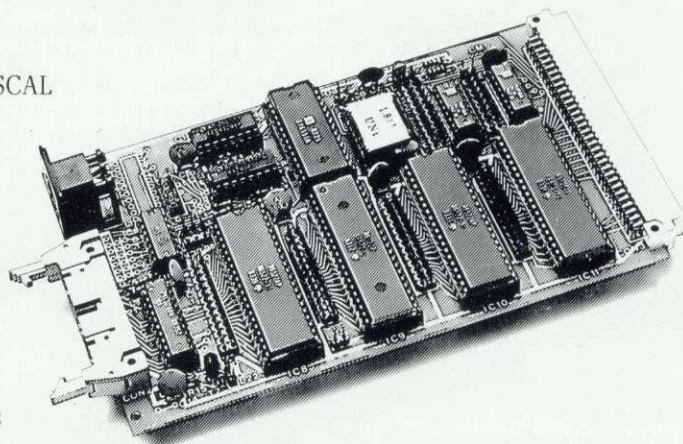


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Chandra Wickramasinghe sights his telescope on three software packages to send you into orbit

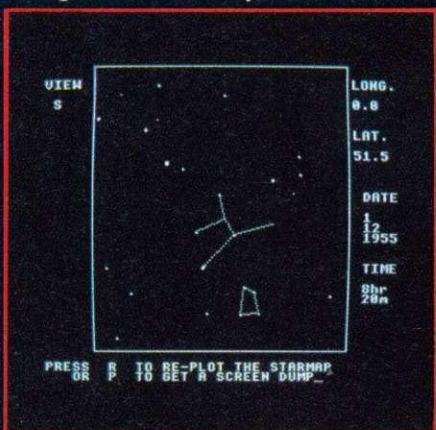
'Astronomy', BBC Soft, BBC B, £9.20 (£13.80 disc); 'Star Seeker', Mirrorsoft, BBC B and Electron, £9.95; and 'Sky Baby', Stellar Enterprise, BBC B, £12.50 (now published by Century at £12.95, see p207).

ASTRONOMY has long been neglected by software houses, especially in view of its popular appeal, with ever-growing viewing audiences for TV documentaries and series concerning the heavens. In a sense inventors of arcade games could be said to have stolen a march on educationalists in exploiting the space theme with profit! Along the line from *Space Invaders* to

reviewed here have a more serious educational purpose, however. BBCSoft's *Astronomy* by John Banks, *Star Seeker* by Mirrorsoft and Stellar Enterprise's *Sky Baby* by Ronald Alpiar are all substantially instructive and entertaining in their various ways, and each has much to commend it. They are all written for use on the BBC model B machine.

Astronomy by John Banks is my favourite of the three. It is directed mainly at a 10-14-year-old audience, but there is a lot of highly sophisticated and well-thought-out entertainment and enlightenment for adults as well. It's ideal for classroom instruction to illustrate difficult concepts in geography and elementary astronomy. Of the three packages it's the only one to exploit the colour and graphics potential of the Beeb to the full, and is the easiest to use.

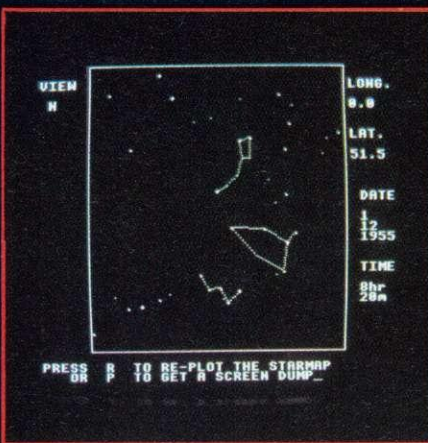
The first program of this package attempts to explain the phases of the Moon with colourful illustrations of the Moon's orbit around the Earth. Its day-



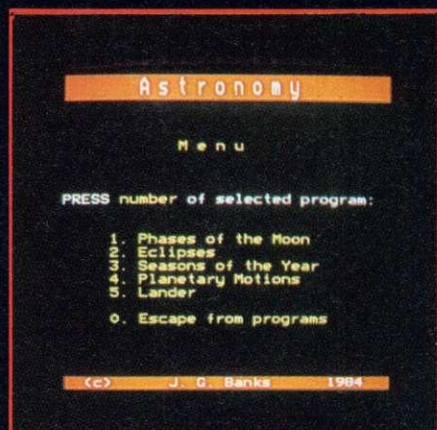
Starmap plotted by the Star Seeker package

the most recent achievements of Acornsoft's *Elite*, Beeb buffs have already been exposed to space-age exploits such as star wars and interstellar navigation. Apart from the obvious fun and adventure components of such games, it is perhaps significant that young micro-users have already been imbued with a sense of cosmic perspective.

The three program packages



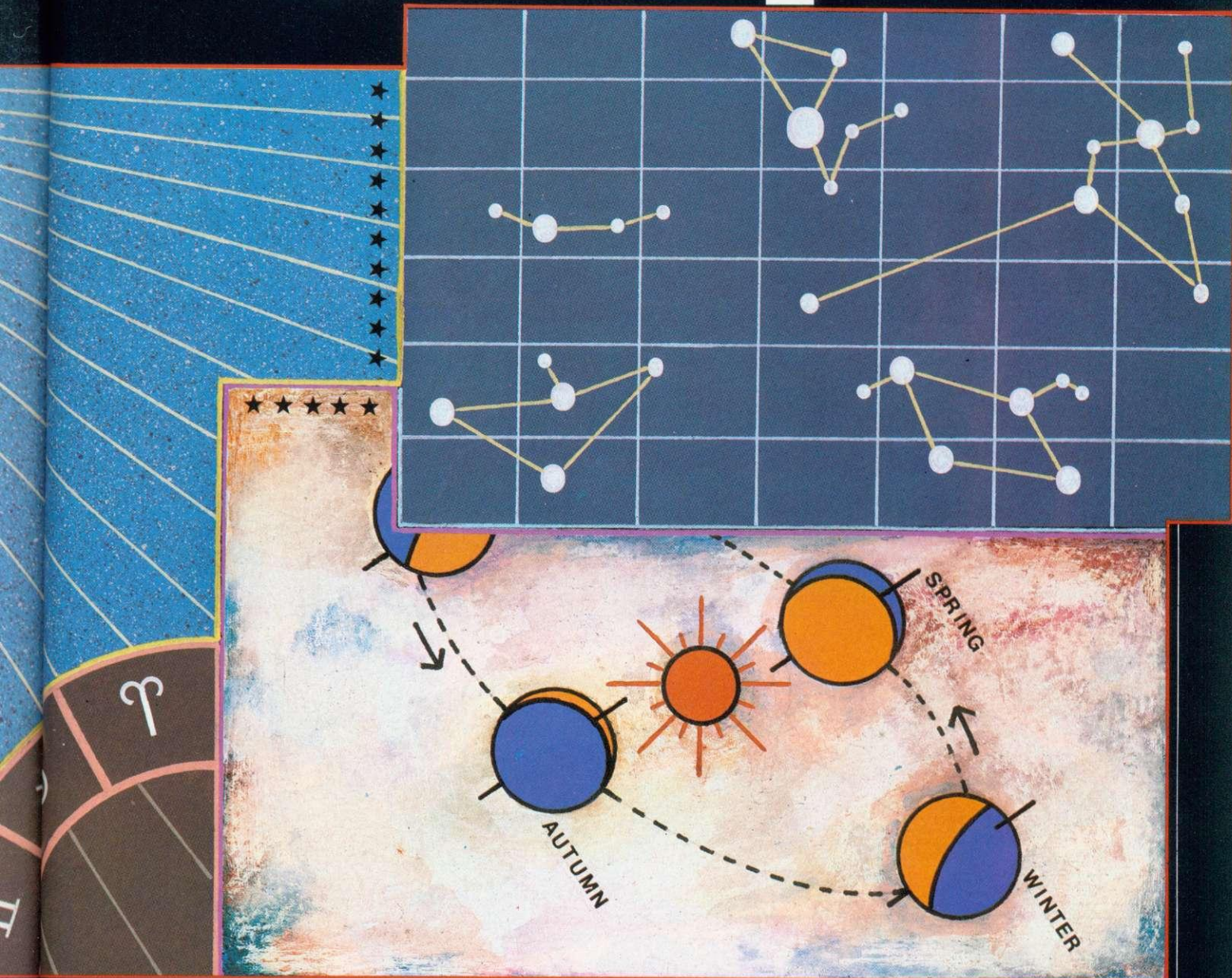
Star Seeker joins stars to show constellations



BBCSoft's Astronomy has five programs

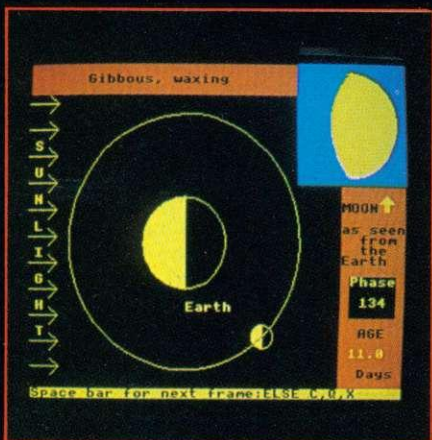
to-day appearance is depicted in relation to its monthly motion around the Earth. There is a choice of speeds; fast, slow or day-to-day single frames, displaying lunar motion and phases. There is also an option for an informative quiz on the Moon's phases in relation to its orbital path.

The second program attempts to show how eclipses of the Sun and Moon occur. The Moon is shown circling



around the Earth with sunlight coming as parallel rays from one side. Eclipses may occur at times of new Moon when it is directly between the Earth and the Sun, or at full Moon when the Earth itself stands between the Sun and the Moon.

The display runs automatically when the program is chained, and eclipses – partial, total, solar or lunar – are indicated in an inset.



Astronomy fully exploits colour graphics



Sky Baby includes dates on 469 stars

The display is undoubtedly impressive, but it is somewhat misleading because it conveys the false impression that eclipses occur very frequently. In effect actual eclipses of the Sun and Moon are rare because they are essentially a three-dimensional phenomenon. The representation given in the program's display is inevitably a two-dimensional one, and is therefore somewhat deceptive.

The third program of the package illustrates how seasons occur. The tilt of the Earth's axis is shown relative to the Sun's rays, and the changing inclination of the Sun's rays at midday is tracked down over the year at a large number of principal cities of the world. It offers many display options and is again ideal for instructional purposes, being beautifully illustrated and thoroughly entertaining throughout.

Lander, the final part of the package, is an educational game. The object is to land safely on one of the four inner planets of the solar system: Mercury, Venus, the Earth or Mars. You choose a planet and approach in a rocket from a long distance where the planet's gravitational pull is so weak that it can be ignored.

Your rocket can be fired directionally using one of the four cursor arrows, and it moves under your command but in strict accord with the well-known laws of physics. The motion of the rocket is simulated in an exceedingly realistic way and takes account not only of the gravitational attraction of the planet and of the Sun, but also of the

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frictional drag due to the planet's atmosphere. The program is intended primarily as a fun game, but is clearly packed with educational value. By playing it repeatedly the user can discover a great deal about the motion of planets, satellites and of the laws of physics that govern such motion.

The *Star Seeker* package is undoubtedly meant for the more serious-minded amateur astronomer. It has been designed as an introduction to astronomy and presumes no prior knowledge of the subject.

The first program concerns the dispositions of stars and stellar constellations. You have to input the longitude and latitude of the point from which observations are to be made, and the time and date. The program then plots the brightest stars visible at night from the chosen location at the chosen time. Several aspects can be chosen; north, south, east, west and overhead. Alter-



A book by Heather Couper, president of the British Astronomical Association, is included in the *Star Finder* package

natively the plot of the sky could be centred on a particular direction.

The sizes of the stars as plotted correspond to a magnitude scale for their visual brightness. In all the program carries the information needed to plot some 300 bright stars in 53 different constellations.

A particular star can be picked out on a star map plotted by the program, using the cursor arrows to position a cross on the screen. All the available information on this star can then be printed on the screen. There's an option to obtain close-up pictures of selected areas of star maps, and an option to join stars with dotted lines to show constellations.

The rotation of the Earth can be simulated to show how the stars change their apparent positions in the sky and rise and set as the night proceeds. A useful feature is a screen dump to enable you to get a hard copy of a star map on an Epson printer.

The second program deals exclus-

ively with the solar system. You can call for a variety of displays giving the disposition of the planets in the sky from a specified location on Earth, defined in terms of longitude and latitude, and at a specified date and time.

Many interesting options are available including statements of celestial co-ordinates, distance of a chosen planetary object from the Earth and Sun, its brightness, and times of rising and setting. There are also built-in facilities of screen dumps if your Beeb is connected to an Epson printer.

A highly topical and attractive feature is the inclusion of information on Halley's comet, due to make its closest approach to the sun in 1986. Astronomical momentum is already gathering with many observations being planned, for example in the GIOTTO project. It would be interesting to use *Star Seeker* to track this most newsworthy comet in the coming months.

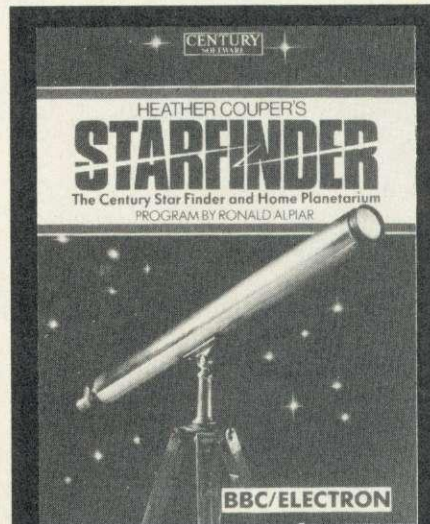
Altogether, this is an interesting, informative and most valuable package which is to be strongly commended to every Beeb owner with an interest in astronomical matters.

The program package *Sky Baby* by Ronald Alpiar is a highly professional job which would be a useful complement in many ways to *Star Seeker*. Written in Basic, the program is listed completely in the manual. Although more formal in its displays and generally a little less user-friendly than *Star Seeker*, it achieves much the same overall result. It includes data on the solar system, including the Moon, as well as some 469 individual stars.

This package is to be strongly recommended to the more professionally-oriented amateur. There's ample

scope for modifying the program to suit your individual needs, in particular by adding to the data file on stars supplied. With the extensive technical write-up provided in the manual this package could serve as a relatively painless way of learning astronomy.

Overall, the packages seem to me a timely and valuable addition to the educational software for the BBC micro.



The *Sky Baby* package has been republished by Century at £12.95. The booklet by Ronald Alpiar has been replaced with a book by Heather Couper, the recently-elected president of the British Astronomical Association. It runs on the Electron and comes with instructions for transferring to disc.

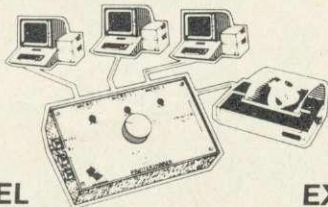
The route of Halley's Comet has been added, and a printer dump. A menu system is now used which should make the program easier to use.

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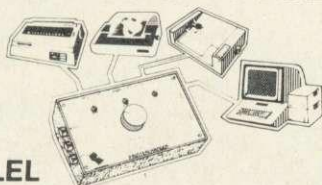
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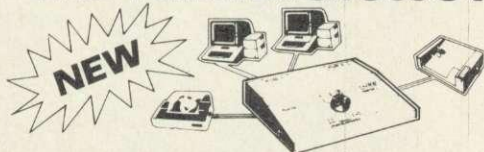
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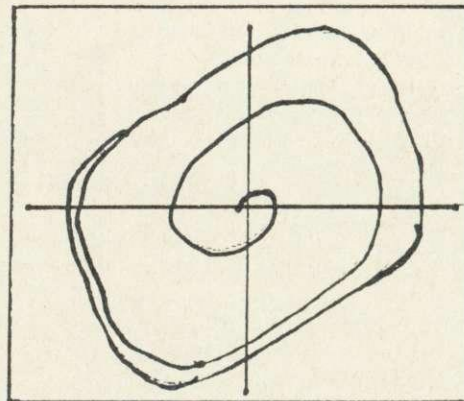
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Gateway to Karos

for the BBC Microcomputer Model B



Golden

Gateway

'Gateway to Karos', Acornsoft, BBC, £9.95

KAROS is a magical island, supposedly in some parallel universe, which you enter through a stone gateway at the start of this adventure. Beyond the gate you find a world that slowly but steadily becomes increasingly real, fascinating and tantalising as you explore it. You can't return through the gate until you obtain the mysterious Talisman of Khoronz—a task that took me four evenings, even with the help of the hints booklet.

Acornsoft has fed the large and growing number of us BBC micro owner adventure addicts with a steady supply of reasonably original adventures since the machine was launched. *Karos* comes from a new author, and is by far the best from Acornsoft to date. It leaves the majority of the competition some way behind, not through any great technical sophistication, but by virtue of its design.

The atmosphere is as consistent and convincing as in any adventure I've played, including the Level 9 or Infocom classics. Derek Haslam clearly has a great gift for building up a world in the player's imagination.

Whether *Karos* is a classic in its own right I am not so sure. The beautiful atmosphere and perfectly tuned problems, slowly increasing in complexity as the game progresses, are unfortunately tied to a very limited and wooden parser. In non-technical language, the adventure only understands a few verbs beyond the usual take, drop and compass directions. Not only that, it often misunderstands very simple modifications of commands. There's always a trade-off between the size of

an adventure, the size of its vocabulary and the intelligence of its parser, but *Karos* definitely errs on the side of neglecting the player's convenience. In particular ENTER and EXIT are understood very inconsistently, being compulsory for shops but useless in several caves. TURN OFF LAMP does not work, but SWITCH OFF LAMP does! There are a couple of bugs associated with the handling of objects, and don't press CTRL-V while you're playing—the BBC will switch mode, wiping out your adventure. This kind of crash-proofing should be standard on professional games.

If you're bored with the slow responses of Acornsoft's earlier Basic-driven adventures you'll be pleased to know that *Karos* is machine code driven. In other respects *Karos* lacks some technical polish—eg, the routine for unwrapping the compressed text occasionally inserts extra spaces before commas and full stops or leaves them out. Such problems are perhaps not worth bothering about in an adventure that has so much else to recommend it, but a really polished 'front end' would have made all the difference.

On the plus side colour is used in an original and constructive way, and the game's *tour de force* is keeping track of the player's bank balance, even with three different types of coins.

Despite these reservations this is a superbly designed adventure. The atmosphere steadily captures the imagination, drawing you into the web of conundrums that lead you to the two greatest treasures of Khoronz the Wizard, and back through the gate.

On the way there are some delightful discoveries: a secret valley, redolent of mystery and magic; a fishing village with talkative inhabitants; mines and mountains, forest and wilderness; several mazes (not too difficult); and my favourite, a sea voyage right round the island—once you have enough money to buy the boat, and enough wisdom to ignore the old sailor's advice! It's quite superb, being simultaneously a maze, a route to offshore islets that are otherwise inaccessible, an unexpected second route into the endgame in Khoronz's lair beneath the volcano and an invaluable source of information about the coastline of Karos itself.

Gateway to Karos is an adventure for everyone. It is traditional stuff, magic, caverns, dragons and all, but exceptional in quality. Old hands will want it for their collections. Beginners could do worse than start here. The hints booklet will help you out if you're stuck, though it's best kept for emergencies: it's worth savouring this gem of an adventure.

Peter Voke

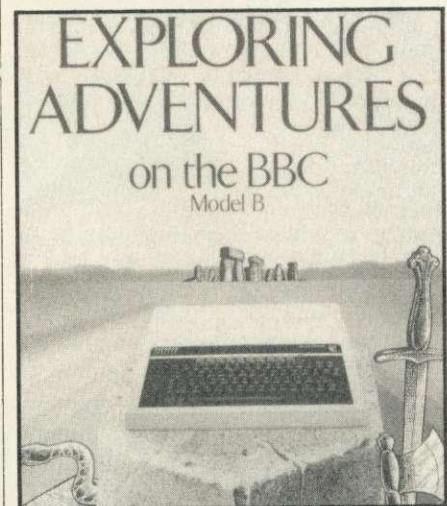
Unadventurous

guide

'Exploring Adventures on the BBC', by Peter Gerrard, Duckworth £6.95.

THIS book is fairly typical of the adventure handbooks around. There is a brief history of the 'pure text' adventure (nothing on graphics or sound.) The history was a bit too brief for me, but may well be of interest to a newcomer.

Like most adventure books, considerable attention is given to the construction of adventures, in this instance with a small case study in Basic. You will not get much in the way of sophistication, speed or originality in the *Underground Adventure* the case study is based on. You might learn one or two fairly simple things about how adventures are constructed; but if you seriously want to



write adventures you would be better using one of the adventure generators coming on the market.

There is the standard section of hints on well-known adventures. Here again, this book is rather weak. There is no mention of the later Acornsoft or Level 9 adventures, though *Philosopher's Quest* gets an honourable mention, and *Colossal Cave* is documented rather too thoroughly. As the original adventure, *Colossal* naturally deserves attention, but it is a shame to give away the secrets of some of the best puzzles.

Overall, this is not an exciting book. You are unlikely to think you are getting your money's worth, unless you are going to sit down and type in the case study adventure and read the appropriate section as you do so. Before you buy, take a close look at the competition.

Peter Voke

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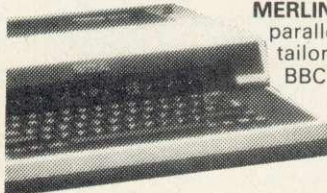
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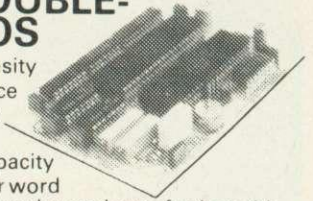
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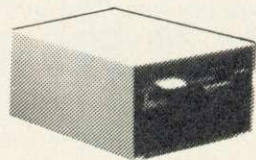
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The aliens

fight back

'Abatron', Clemoes Software, BBC and Electron (Plus-1 needed for joystick option), £6.95

IN the year 2001, Earth is controlled by a massive computer complex called the Aabatron. Unfortunately, it has been overrun by aliens and it is your job to clear the 20 rooms in your blaster buggy. *Abatron* is a fast-action, shoot 'em up game set in a number of enclosed areas which represent the rooms.

The program loads with a rather uninspiring header giving the instructions on a mode 2 screen, but from then on things get livelier as the nasties are displayed to the accompaniment of a stirring little tune, while a 'computerese' title scrolls smoothly across the top of the screen. The music is unique in using the cassette relay to mark time. It provides an interesting effect, but I wonder if continued playing would shorten the life of this component!

There are six different varieties of nasty and these are placed at various points on the screen, with your own buggy in the centre. As soon as the game starts, four or five of the aliens head for the walls and continuously circumnavigate them in both directions. You can move your blaster around with the keyboard, a joystick or a combination of both. Hitting stationary aliens scores for you, but hitting them on the move scores rather more. There are five speeds of play, from unbearably slow to unbearably fast, and the screens get progressively harder, with more aliens and the occasional flyer who decides to take a short cut up the screen. Oh, and the aliens shoot back!

The idea of having a number of rooms is perhaps more of a gimmick than a useful addition to the game, but the screens are well put together and as a variation on the straight 'blast the aliens rigid' concept, *Abatron* makes a very playable game from Clemoes. I'd be interested to see more from them.

Simon Williams

Spray a parrot

with your Beeb

'Airbrush', Peter Sharpe Software, Llwydfan, Minffordd Road, Penrhyndeudraeth, Gwynedd LL48 6AU, tel: (0766) 770528, BBC (40 track disc only), £7.95

THE *Airbrush* software package, supplied on disc, gives budding computer artists a means of simulating the airbrush painting technique. Whereas computer images generally have clear-cut lines and sharp boundaries between colours, this program allows soft-edge effects and less clinically sharp pictures, within the limits of the screen resolution and colours available. It works in modes 0, 1 or 2.

The higher the resolution, the better the airbrushing effect, but as ever, higher resolution has to be traded off against the number of colours which can be displayed simultaneously. In mode 2 all the non-flashing colours can be used, but the pictures are best viewed at some distance if the coarser pixel size is not to become distracting.

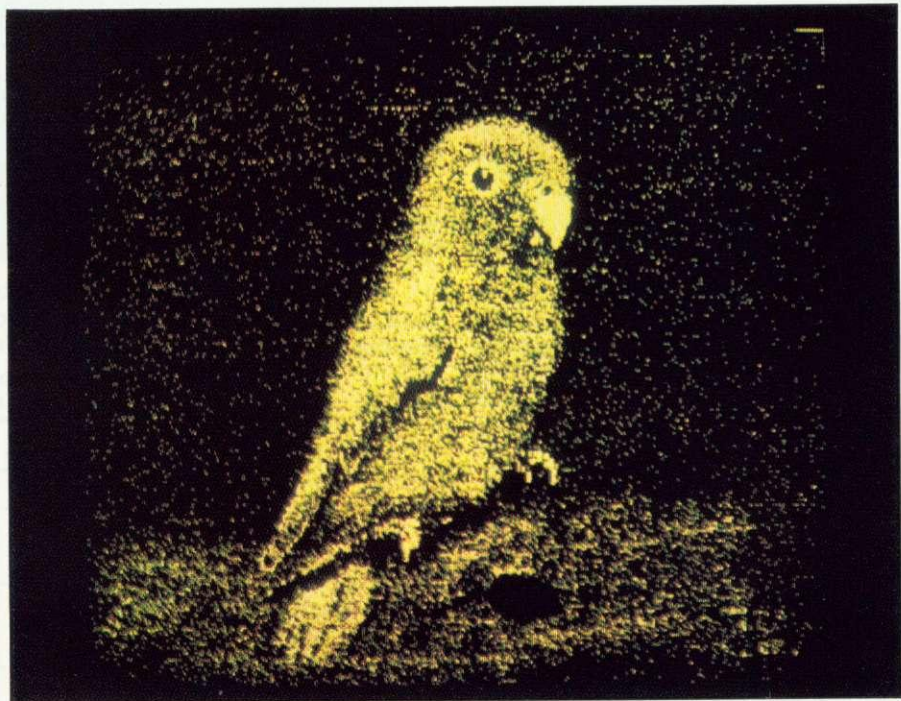
General instructions for use are included as a separate file on the disc, which also contains a number of sample pictures in modes 0 and 2. Control of the 'airbrush' is from the keyboard, using the cursor keys to move a cross-shaped cursor and the Tab key to apply the spray. The size of the cursor indicates the area covered by the spray and can be varied by means of the < and > keys. The shift key is used in

combination with any of the others to increase the auto-repeat speed as required.

A single press of the Tab key delivers a measured amount of spray to the area indicated by the cursor. Thus the density of spray can be controlled by the length of time that the Tab key is held down. Over-spraying and other errors can be corrected by re-spraying in the background colour.

To a limited extent, intermediate colours can be generated by mixing sprays of two different colours – eg, you can create orange by spraying the same area in red and then yellow. There is provision for saving and loading pictures on disc.

The program is capable of creating some impressive pictures, such as the examples on the disc – a picture of one is shown here. However, whereas computer drawing programs generally offer some assistance, this is essentially a free-hand drawing program and relies upon the eye of the artist to get all the shapes and proportions right. I found it useful to load a line drawing generated by a separate program, and use it as a guide to positioning the airbrush cursor. Some patience is also required as the procedure of repeatedly applying a measure of spray and then moving the cursor and/or adjusting its size is necessarily very time-consuming. **Malcolm Banthorpe**

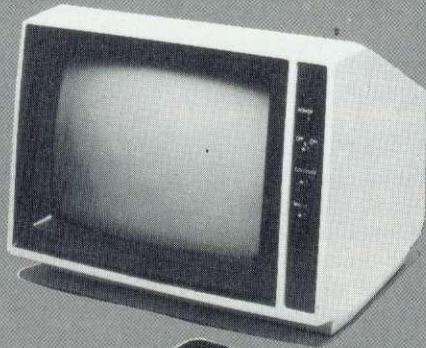


The Airbrush program includes examples of what you can achieve – such as this parrot

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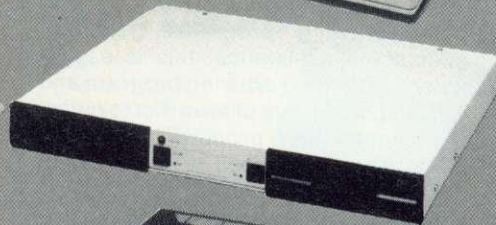
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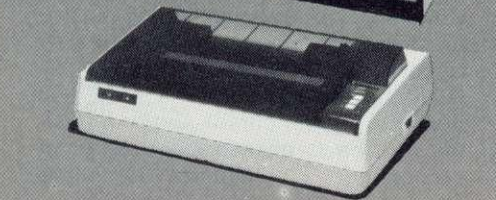
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Can you steer

a canister?

'Plutonium Plunder', Micro Power, BBC B, £6.95

THERE are times when it would be quite a relief to forget about *Pengwyn* and its numerous derivatives; a relief obviously not shared by Micro Power. This software house used to be a guarantee of an inventive new game or a solid adaptation of an arcade favourite, but several recent releases have rather undermined this position and *Plutonium Plunder* does little to restore it.

The new zingy cassette artwork suggests great things and the tape loads an initial screen, offering the player the opportunity to select his or her preferred keys – always a good sign. Once into the game proper, however, you realise what you're up against.

A number of 'hexoid pods' make up the walls of the maze and may be either shot up or propelled towards the marauding gnomes by different combinations of the direction and fire keys. Once these are out of the way, the four plutonium canisters of the title have to be pushed through a periodically open door to complete the screen.



Later further hazards are presented to hamper progress. The periphery of the screen is energised to a notional one million volts (CEGB permitting), and the hero of the saga performs neat pirouettes and drunken stumbles should he come into contact with it or any of the assorted nasties. Three lives later, you're asked to join the ranks of the famous, but very dead, in the Hall of Fame.

It really is about time that selling an arcade game relied on more than multi-coloured, smoothly-animated sprites and a storyline creamed from an early Asimov novella. Micro Power can come up with good, innovative games (most

recently *Jet Pack Jack* offered some interesting variations on a theme), but to my way of thinking, there's not nearly enough difference between *Rubble Trouble* and *Plutonium Plunder* to warrant the transmission of £13.90 in their direction.

Simon Williams

Conqueror's

challenge

Fletcher's Castle, Fernleaf Educational Software, tel: 0474 59037, BBC B, £9.95 (cassette), £12.95 (disc)

THE scene is England, shortly after the Battle of Hastings. You are Simon Fletcher, a Norman knight who apparently did rather well there as King William has given you a gift of land on which you have to build a castle before you can become lord of the manor.

This software package from Fernleaf Educational Software, comprising a cassette and a well-produced four-page booklet, is aimed at small groups of 8-12 year-olds. The booklet contains a work-planning sheet at the back and, sensibly, Fernleaf specifically states that permission for copying is granted. The program aims to develop language, planning and basic arithmetic skills, but could also be used as a way of reinforcing the history of the period.

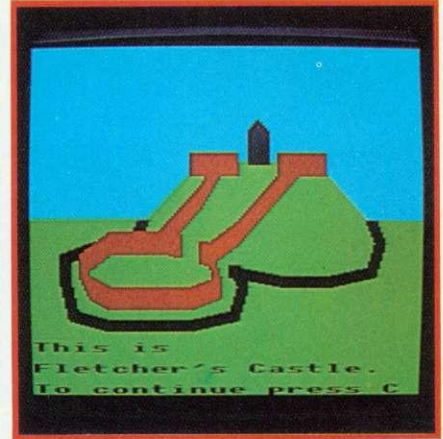
The game, because this is how the nine-year-olds will see it, requires the group to allocate resources to various tasks. The castle is a 'motte and bailey' which needs a ditch and mound, as well as trees to build the fence and tower. After choosing a site from three options on a map, the group are told about the work-load needed to complete each task. This varies according to the site – if you are near the forest less work is needed to cut and haul trees. The group are not specifically told this, but it is pointed out that each site has advantages and disadvantages.

The group has ten 'days' to complete the job. Each day, they allocate resources, (shades of *Yellow River Kingdom?*) and afterwards are told if workers or soldiers were lost in raids or accidents. The program then displays the half-built castle. Tasks include setting guards and foraging for food. Insufficient guards can result in heavy losses in raids, Anglo-Saxon peasant workers can run away or be lost through starvation.

The program is robust and should survive handling by eight-year-olds. It provides an environment conducive to reading and lively discussion. The use of the worksheet is clever because it encourages comparisons between

attempts and the use of arithmetic.

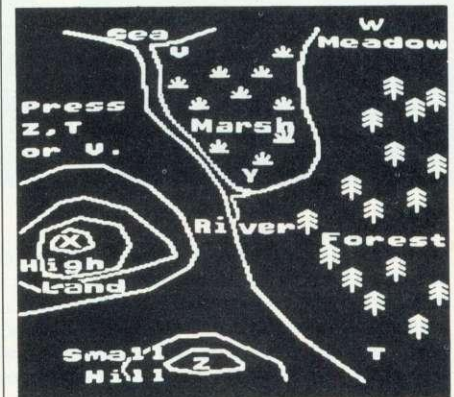
On the minus side, the writers have decided to use virtually no sound. I can see a case for this in the classroom, but it will be missed by many. The graphics used to draw the castle are slow, and could become annoying in time. There are no right answers in the booklet, which is correct in order to maintain the element of discovery, but some users may expect more from the teacher's notes.



Two minor comments – after ten days' labour and completing the castle, it would be nice to be told more than that you are likely to become lord of the manor. Also, it is interesting to see the forest on the map shown as all conifers, as I believe most English trees at that time were broad-leaved.

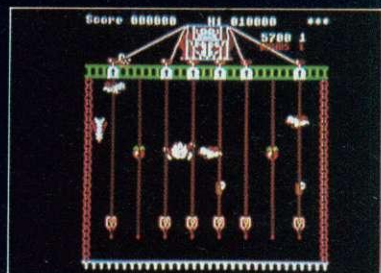
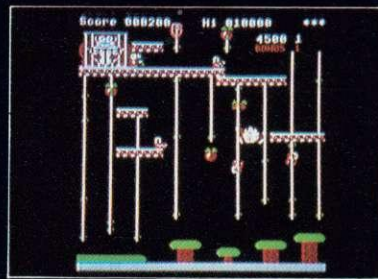
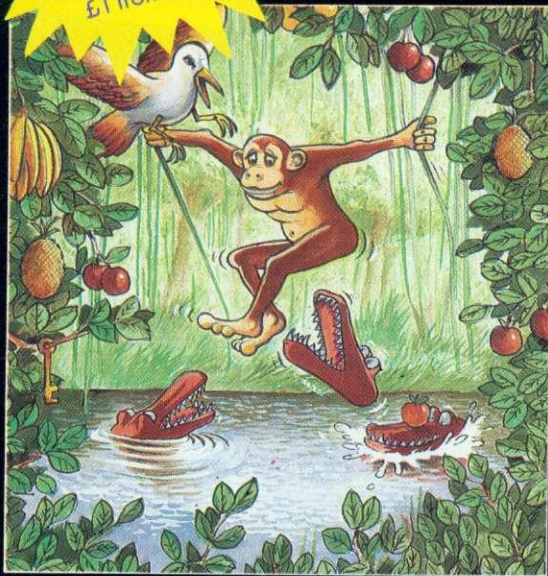
Overall, a useful addition to the primary school software library and a pleasant improvement on drill and practice.

Frank Jones



The children choose a site for the castle from this map. Each has its advantages: X or Z are on hilly ground – less work to build a mound but more to collect timber; T or W are close to the forest on relatively flat land but are hard to defend; V or Y are less likely to be attacked but are further from the forest. After making their choice the group is told about the work-load involved in each task – as it's to be a motte and bailey castle it needs a ditch and mound as well as a wooden fence and tower.

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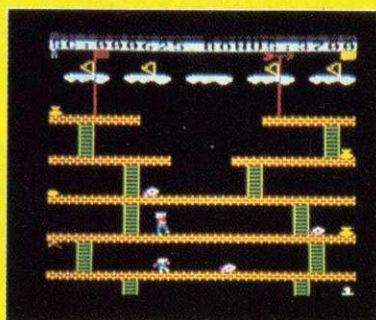
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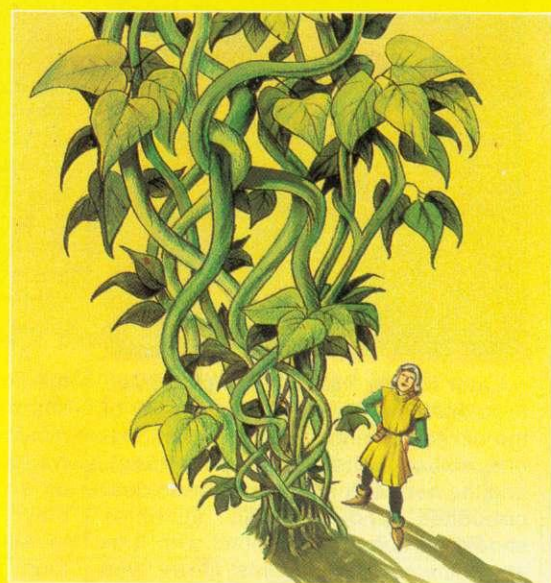


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THERE's little point in purchasing a lightpen unless there's a good supply of software for it, so this month we'll look at a selection of software available for the pens reviewed last issue. As there isn't enough room to comment fairly on every package available I've mentioned others worth considering in the suppliers table.

Graphics is an obvious area in which specially written software can be applied. To complement their excellent Colour Light Pen, RH Electronics provide three integrated graphics packages: *Light Pen Colour-Graphic*, *Art Master* and *Art Fun*.

The main program in *Colour-Graphic* is preceded by an auto-calibrate routine which ensures the lightpen operates smoothly with both the hardware and software.

Freehand drawing and shape creation are very simple to achieve. Colour changes may be made from the second menu at any time and all drawing continues in the selected colour. A rubber banding option ensures accuracy of size and position which can be sharpened by selecting one or both of the X, Y screen rulers. These, combined with the slow-reacting cursor, result in extreme precision of drawing.

Text may be placed anywhere on the screen using a special text cursor. A 'soft paint' option allows lines and shapes to be created temporarily in a contrasting colour before the final position of the object is chosen. Each region created may be coloured using an impressive fill routine. The fill is fast and precise and I like the ability to halt it at any point, allowing striped shapes to be created.

Sound is used to good effect and may be toggled on and off from the first menu. The keyboard may be used at any time for selecting the various options, but is really necessary only for clearing the screen (CTRL N... sensibly), loading, saving and to catalogue a disc or tape.

Documentation in the form of a 20-

SOFTWARE FOR LIGHT PENS

Continuing his
lightpen survey

Chris Drage looks
at software

page user's manual is excellent, and I found the advanced techniques section particularly useful. *Colour-Graphic* is a comprehensive program packed with an extensive range of facilities.

Entirely run from the function keys, *Art Master* includes an important feature of graphics design that *Colour-Graphic* omits - pixel mixing. It also allows the user eight brushes - one is a continuous line, another provides a 'random' brush stroke, and the other six are all capable of supporting 'mixed' colours and are graduated in size and shape.

Modes 0, 1 and 2 are available. In mode 0 no pixel mixing of foreground colours is possible, but all modes allow a mixed background.

There are up to five levels of sensitivity available. Level 0 follows the

pen's movements almost exactly. Levels 1 and 2 provide a delay in the output which I find useful for 'writing' on the screen. Levels 3 and 4 cause a substantial delay - ideal for constructing detail. A cursor may be toggled on and off to indicate the pen's current screen position.

Other features include X and Y locks as aids in drawing verticals and horizontals, and a point lock to enable straight lines and shapes to be created. Pictures may be saved and loaded from disc or cassette, and disc users are able to catalogue and access various disc surfaces. The 18-page handbook provides all essential information and contains a useful summary of the commands.

The ability to create pixel-mixed pictures so easily is a boon to any on-screen artist. However, the manual exaggerates when it states 'Art Master is one of the most versatile graphics manipulation packages available' - its real strength is its ability to interface with the other RH packages.

Art Fun allows you to select a portion of a mode 2 screen, 'blow it up' to the size of a mode 7 screen so that detail can be added with pixel accuracy, and then converted back to its mode 2 position.

You may load a screen previously created with *Colour-Graphic* or *Art Master* or work from scratch. In either case, on loading the program a blank mode 2 screen is presented. No menus are necessary as all choices are made using the function keys.

The 17-page handbook is clearly written and in a chatty style and covers all the steps.

In all, a very useful program for creating highly detailed, multi-image screens, and as an addition to the previous programs.

The RH Electronics suite of programs is comprehensive, providing useful and exciting features that enable the lightpen to be used as a powerful graphics creator - the only feature

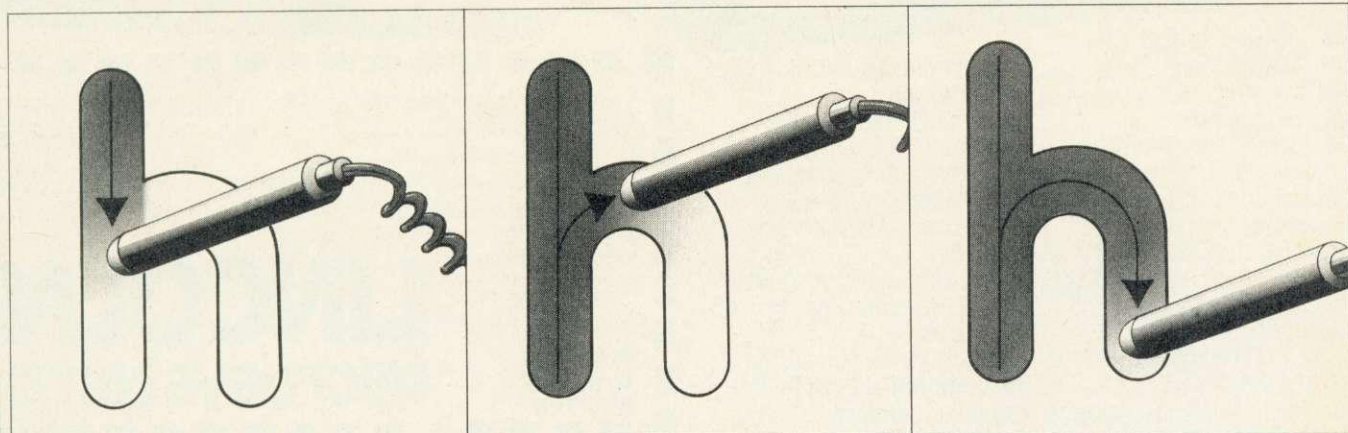
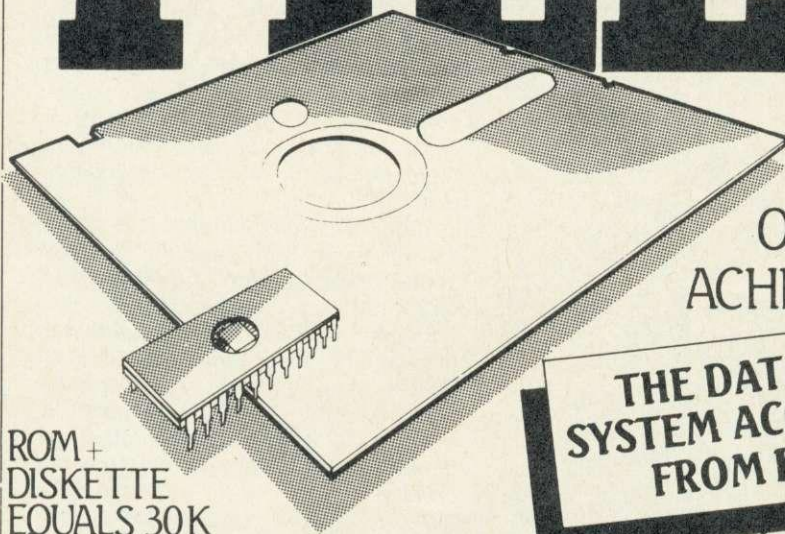


Figure 1. How 'Startwrite' encourages young children to form letters in the correct way

FILEAID



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ACHIEVE BIG MACHINE FACILITIES

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FROM BASIC

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P & P (AIR)

LINCOLN Microsystems V1.0 (c)1984

FILEAID Page 1

Record Description	Length
E.G (NEW)	
Field name	
Item_No%	4
Short_Name\$	30
Price_Each	5
Stock_Level%	4
Supplier_Name\$	40
Supplier_Ref\$	15
Supplier_Tel\$	15

Enter file size => 100

```

10REM Print out E.G File Records
20REM where the Stock_Level < 5
30REM
40REM Setup FILEAID System Variables
50 FRC%=0
60 FILE$="E.G"
70REM Setup E.G Record Variables
80 Item_No%=0
90 Short_Name$=""
100 Price_Each=0
110 Stock_Level%=0
120 Supplier_Name$=STRING$(30," ")
130 Supplier_Ref$=STRING$(15," ")
140 Supplier_Tel$=STRING$(15," ")
150REM FILEAID System initial call
160 *FINIT
170REM Position at top of E.G file
180 *FTOP
190REM Print out Qualifying Records
200 REPEAT
210 *FREAR
220 IF Stock_Level% > 4 THEN 250
230 PRINT Item_No%, Short_Name$
240 PRINT Stock_Level%
250 UNTIL FRC%=<>0
260 END
    
```

LINCOLN Microsystems V1.0 (c)1984

FILEAID

Audit Report E.G

Maximum Records	100	Reorg Count	0
Current Records Available	78	Recomm	
	22	Reorg	NO
Record Size	113	Drives	1
Total Fields	7		

Key Field Name	Item_No%	Len	4
<u>Access Statistics</u>			
Read	Replace	Insert	Delete R-Delete
218	30	78	0 0

End of Report

LINCOLN Microsystems V1.0 (c)1984

FILEAID

Backup Report # 1 E.G

Entries Processed	78	Entries Remaining	0	Status	WRITE
SEQ:	75				
KEY:	874				
SEQ:	76				
KEY:	908				
SEQ:	77				
KEY:	950				
SEQ:	78				
KEY:	953				

End of Report

- Indexed Sequential Access (Random)
- Dynamic Memory Management
- Record Fields may be Integer/Real/String
- Random Access
- Functions:-
READ/INSERT/REPLACE/DELETE/REVERSE-DELETE
- Sequential Access
- Functions:-
TOP/BOTTOM/READNEXT/READPREV
- Multiple Volume Support - Maximum 4 Drives
- Unlimited Number of Files per Program
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**LINCOLN
Microsystems**

that is missing is the ability to zoom.

Educational Software Co. of Southport support their Robin Educational Lightpen with a number of CAL programs – the one I find particularly useful is *Startwrite*.

There are many letter shape programs for the BBC micro where the screen is used as an electronic blackboard, drawing examples of letters for children to trace with their fingers, but *Startwrite* introduces a truly interactive letter-writing program. Letters are divided into families according to their shape – eg the 'big stick family' includes f, l, h, k, b, d and t – and recommended letter shapes of contemporary handwriting styles are followed (figure 1).

The screen clears to a white background and members of the 'small stick' family are drawn in order, in large, lower case red letters. The stroke starts in the right place and the letter is accurately constructed – infant teachers please note!

The child has to copy the letter on screen by tracing it with the lightpen. If it is begun correctly the pen pulls behind it a trail of green covering the original red. It's like tracing with a large felt tip pen; start in the wrong place or construct the letter incorrectly and the green 'dries up'. The reaction on five-year-old faces must be seen to be believed! Each letter is repeated for reinforcement. On completion the screen sequence ends with a written and spoken message: 'This is a . . .'. The Acorn speech chip has been programmed too.

Like all software from ESC, *Startwrite* is well documented with detailed, on-screen instructions. It is a program

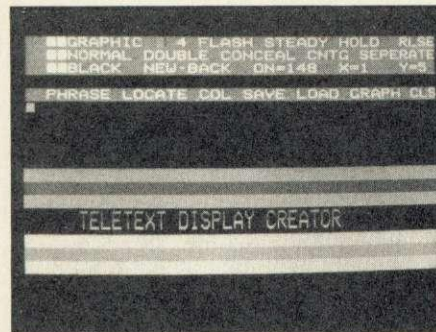


Figure 2. The Beeb's arrow keys are used to move the menu (here shown at the starting position) up and down the screen.

that will be welcomed both by infant teachers and teachers of remedial children alike. It's simple, accurate and remarkably effective. For sheer motivation it's excellent.

Perhaps the most important and exciting development from the Educational Software Co is the Robin Voice Box. Designed to work with the Robin lightpen, it adds a new dimension to educational software. With the Voice Box plugged into the user port and the lightpen in the analogue socket you're ready to begin.

With *Sentence Maker*, the Robin lightpen is used to choose words and make sentences from a page of words displayed. The sentence can be spoken out and either rejected or added to a list. The program is a cross between *Breakthrough To Literacy* and a *Language Master*. Like *Breakthrough* it allows the child to organise words into sentences, and is similar to a *Language Master* when it speaks and displays them. Three files of words are included with the program.

To produce speech files for any of the Robin speech programs the teacher needs the *Speech File Creator* program, also available from ESC. Because words are loaded from a file, the teacher can create and use individualised lists of words to suit particular needs. The maximum number of words per speech file for this program is 48, and they are displayed on the screen after loading.

The first word chosen is automatically started with a capital letter and placed in the display box. Spaces are also automatically inserted. Words may be added or deleted at the touch of the pen. Once the sentence is completed it can be spoken, edited and added to the list. A good feature is that each child's list can be printed out on any centronics printer, so a permanent record may be kept of progress.

For anyone who creates mode 7 teletext screens, the *Teletext Display Creator/Editor* from Datapen Microtechnology is a very useful package comprising three programs on tape and a handbook. Although supplied on cassette, details are given on how to produce your own disc versions.

The main program is entirely menu driven using the Datapen to fix the characters and codes on the screen. The menu is a very clever feature as it not only provides access to all the teletext codes but is movable as well! The BBC's arrow keys are used to move the menu up and down the screen out of the way of the working area – initially it's placed at the top (figure 2). Labels are used to signify most of the options; some toggle between alternative conditions, eg, contiguous and separated graphics. Selection is made by pointing

PRODUCTS AND SUPPLIERS

Supplier	Product	Price (disc)	Lightpens it will work with
RH Electronics, Chesterton Mill, French's Road, Cambridge CB4 3NP	Light Pen Colour-Graphic	£9.95 (£11.95)	RH Colour Light Pen
	Art Master	£9.95 (£11.95)	
	Art Fun	£9.95 (£11.95)	
	Edmaster	£12.95 (£14.95)	
	Wordmaster	£9.95 (£11.95)	
Educational Software Co, 108 Parthenon Drive, Liverpool L11 7AQ	Startwrite	£14.37 (£18.40)	Robin Educational Light Pen Datapen Light Pen
	Sentence Maker	£17.25 (£23.52)	
	Robin Voice Box System	£92.00	
	Speech File Creator	£15.00 (£17.65)	
	Robin Design	£10.00 (£15.88)	
	Super Draw & Paint	£10.00 (£15.88)	
	Talking Dictionary	N/A (£28.75)	
	Letter/Number Match	£15.00 (£18.55)	
Datapen Microtechnology, Kingsclere Road, Overton, Hampshire RG25 3JB	Teletext Display Creator	£9.95	Datapen Light Pen Robin Educational Light Pen
	Beebpen	£11.95	
	Define	£9.95	
	Cirkwik	£19.95	
Watford Electronics, Cardiff Road, Watford, Herts.	Pen-Pal	£11.50 (£12.65)	Any lightpen

the Datapen at a label and pressing the thumb switch.

A unique feature of the program is the provision to design graphic blocks on-screen. On the left of the menu is a 2 x 3 array. Using the pen, any of the six blocks can be illuminated and the resulting code noted on the menu and set to the appropriate token for placing on the screen. No more scouring the teletext tables of the *User Guide*.

Irrevocable actions such as text placement and clearing the screen are trapped and the program asks for confirmation. Unwanted characters are erased by overwriting the screen position with 'spaces' from the keyboard. Further options allow screens to be saved and loaded by giving an appropriate filename.

The 24-page handbook is excellent, giving not only program notes but also a detailed account of how teletext pictures are generated – a great help for beginners. There is a superb summary of all the alphanumeric and graphic characters together with their ASCII values and tokens.

Two other programs have thoughtfully been included to enable you to use saved screens in your own programs. Up to 20 may be used under control from your own software. This is ideal for demonstrations, creating 'bulletin boards' and teletext pages for program titles. Even animation is possible.

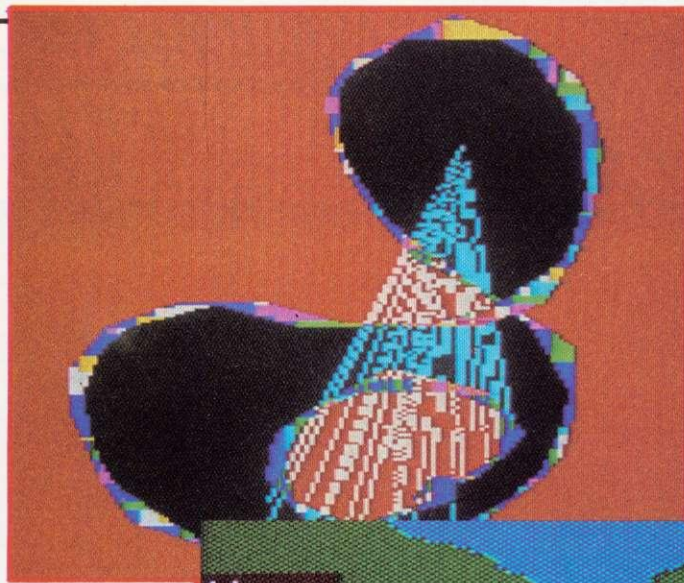
Teletext Display Creator is one of the best programs of its genre I have seen, and the lightpen is an ideal instrument for this application. The program ensures that teletext screens are quickly and efficiently created and edited. It offers real value for money.

Finally a program which will work with virtually any lightpen, including all those reviewed last month.

Ron Owen wrote his lightpen graphics program *Pen-Pal* as a result of trying to overcome problems he found in similar software on the market. He also wanted a program that would give the user the maximum freedom to create images on the screen. With *Pen-Pal* the screen becomes a canvas on which the artist or designer works, and the program's packed to the brim with options.

The package contains two programs, function key strip and detailed user's manual. The first program, *Loader*, configures the lightpen and screen and allows you to redefine up to 30 characters for use in the main program. Files of characters may be created for specialist applications.

The main program is written in mode 2, allowing all 16 colours to be used. As white is the background colour its most important use is for erasing mistakes. The screen menu appears on the right



The main program in the *Pen-Pal* package is written in mode 2, allowing all 16 colours to be used. Its most outstanding feature is a special effects option



Packed to the brim with options, the *Pen-Pal* program gives the user great freedom to create images on screen

hand side and presents eight colours plus seven options. All the options are mnemonic and logical, eg, r for Remote, c for Clear, i for Italic, l for Lines, s for Stripes, and d for Dots.

The last option, '?', indicates your choice of character from the keyboard. An asterisk indicates the selected colour and option. By choosing a new colour and placing the asterisk beside options, new options are toggled.

You can draw with lines, dots and sweeps of 'italic' lines. Shapes are easily created and coloured in using the 'stripes' option or by a simple fill. A problem arises here as the recursive fill routine runs out of memory, but by following the instructions in the manual the screen may be recovered and the fill continued – it is an irritation, though.

Detail may be constructed using the 'remote' option. This mode gives fine control at a slow speed. The choice of character from the keyboard is far greater than it seems – all the normal characters are available, plus a set of 27 from the function keys. There are all sorts of shapes and design-units which are very useful in creating detail. You can even 'paint' with a character.

The most unique feature of *Pen-Pal* is the 'tricks', or special effects option,

which invites experimentation. Starbursts, perspective aids, scaling, pixel-plotting and grids are all offered. Numerous permutations are possible by using 'tricks' with other options, and children love it. *Pen-Pal* has the facility to load and save pictures, but what's most exciting is its ability to interface with the new *Robin Design* package (also written by Ron Owen and marketed by Educational Software Co). Line and shape detail may now be zoomed in and out, enlarged or shrunk and positioned anywhere on the screen. Pictures may be interchanged between the two packages.

The 30-page user's manual contains a wealth of hints and tips on using the program. I especially welcomed the trouble-shooting section and the pages on possible educational uses. The addendum sheet provided is constantly being updated to enable *Pen-Pal* to be modified for use with new lightpens as they appear on the market.

Ron Owen provides full software support for his program, and will deal with queries, comments, discoveries and customising. The program is entirely listable and the author positively invites you to alter it and experiment – a refreshing attitude!

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NOW IN ROM and up to 500% faster.



SPELLCHECK provides an automatic spelling check for letters or documents and is the ideal companion to WORDWISE or VIEW. It is menu driven, easy to use and allows unknown words to be added to the dictionary, ignored or re-spelt. A new corrected copy of the text may then be saved to disc.

SPELLCHECK I (On Disc)

SPELLCHECK I is supplied on two discs with a starting dictionary of 6,000 words. Separate versions are available for WORDWISE and VIEW. (When ordering please specify).

SPELLCHECK II (On Rom)

SPELLCHECK II is a completely new machine code program supplied in Rom. Operation speed is up to 5 times faster than SPELLCHECK I and larger pieces of text may be held in memory. The same version will also check both VIEW and WORDWISE. A dictionary disc is still supplied including 6,000 words, but a data compression technique is used to ensure that well in excess of 17,000 words may be stored on a 100K disc. Ingenious hashing and virtual file access routines have also considerably speeded up the time taken to check text. This sophisticated program is fully 6502 Second Processor compatible and uses the extra memory to further improve word retrieval time.



HELP ROM

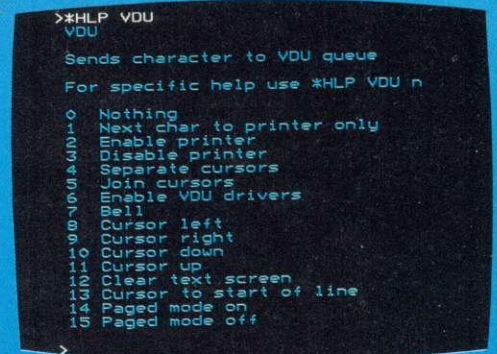
What is the second sound parameter...?
 How do I turn the cursor off?
 Is it FX3 or 4 that...?
 Do I need a comma or semi-colon in the PRINT statement?
 What logical colour is red?



Give your micro a mainframe utility

Most large mainframe computers have a comprehensive on-screen HELP facility to aid programming, save time and help you out when you get stuck. BEEBUGSOFT's new HELP Rom will give your micro a similar facility. Just plug it in, and every time you get stuck for a VDU call, a colour code, the parameters for a Basic command or whatever: the HELP Rom will provide an instant answer. Rather than wade through a book, simply type, for example, *HLP VDU (or just *H VDU) to find out all you need to know about VDU commands - or if you know that it is VDU23 that you want - type *H VDU23. The HELP Rom uses an ingenious compression technique enabling some 14,000 characters of text to be squashed into an 8K eprom, and provides help on a vast range of subjects, including the following major areas:

- BASIC KEYWORDS
- MEMORY ALLOCATION
- SCREEN MODES
- SOUND
- COLOUR
- TELETEXT
- VDU
- COMMANDS
- FX CALLS



HELP will not affect the normal *HELP command

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SPELLCHECK II £31

HELP ROM £25

SPELLCHECK I £19

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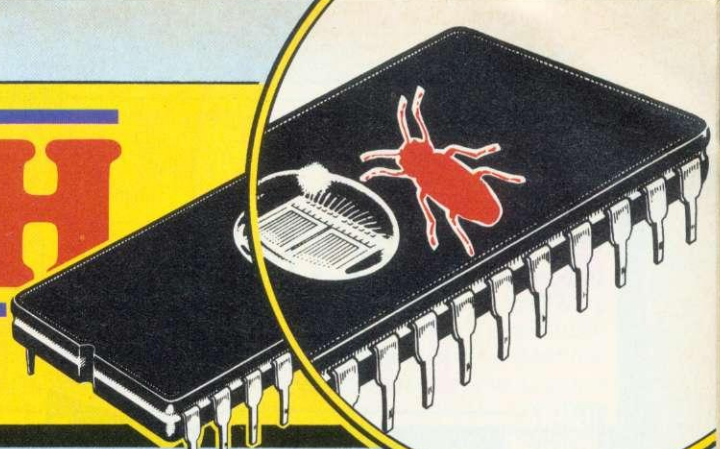
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B.B.C. Micro

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Dual screen memory workspace

Accelerator speed

Program screen

Instruction being executed with current statement highlighted

Current procedure name

Printer, Breakpoint, Trace, Single step, Status

Dual screen status

Values of variables in current statement

Values of other selected variables

Command entry

Control Screen

Tab toggles between screens



Space bar single steps



```

SLEUTH FR GS RP PrFn HCB status
1 0 1 3 10 HBT
7A
1000 FOR X%=0 TO num%: V% = FNval(X%) : IF
%<min% THEN min% = V% ELSE IF V% > max% THEN
ax% = V%
CP
PRC: minimax
VAR: X% = 2
      V% = 64
      min% = 8
      max% = 1023
SEL: dv = 1, 13
      range% = 1015
?LOAD "PROG"
?TRACE
?RUN 990
?

```



Major Features of SLEUTH

- **Single Stepping through Basic** - one statement at a time or a block (e.g. procedure) at a time.
- **Dual Screen Operation** - flip between your program screen and SLEUTH's control screen.
- **Breakpoints** - pause your program at any preset line number, or on the state of any variable.
- **Accelerator** - adjust the speed of your program from full speed to freeze frame.
- **Full Feature Control Screen** - monitor and update vital aspects of your program as it runs.
- **Trace** - a sophisticated line trace facility operating when program runs.

Control Screen Features

- Control screen entered at the press of a key.
- Select edit or single-step mode.
- Adjust program run speed (1-100%).
- View the current program line with the current statement highlighted.
- List the whole or any part of your program.
- Alter the next line number to be executed.
- Read and adjust the value of variables in the current statement.
- Read and adjust the values of any other specified variables or array parameters.
- Insert or remove breakpoints and conditional breakpoints.
- Return to the program screen or continue to single-step or to run at any speed.

any variable or update memory. You can even change the line number of the next instruction to be executed or alter the logic within a program statement. Then simply press the Space Bar to watch the next instruction execute.

Breakpoints may also be set up at any position in your program, these allow you to speed to the problem area and then see exactly what's happening. You may even set conditional breakpoints. e.g. Stop IF A%=20.

Advanced trace and decelerator facilities are also included. The decelerator allows you to alter the speed at which your program executes, actually as it is running.

SLEUTH is ideal for the novice and expert alike and will prove to be instantly invaluable, saving hours of debugging time. In addition, the single stepping facility makes it a powerful teaching aid.

SLEUTH allows you to single step through your Basic program instruction by instruction, watching your screen display as it is built up. Simply press the Space Bar to execute the next instruction. Alternatively you may watch SLEUTH's control screen as you step through your program. (Press Tab to toggle between your own screen and the control screen.) This will show you the next instruction to be executed and allow you to list any part of the program. Also displayed will be the contents of all variables associated with the current instruction and the values of other specified variables. At any time you may alter the values of

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The BBC Micro sound facilities have a lot of potential, MUROM will help you exploit this to the full.

Create your own tunes and sound sequences with ease, either with MUROM'S editor and a musical score or by using the Beeb to simulate a piano keyboard. Edit your creations with the full screen music editor. Then switch to the envelope editor to tailor the tonal quality and select instrument type. Alternatively select one of the predefined instrument envelopes.

Incorporate your music and sound sequences into any program of your own, to play back with or without MUROM plugged in. Playback is interrupt driven and may continue even while you run other programs.

Predefined instrument envelopes may be set up, e.g. *FLUTE, *SYNTH etc.

Instant sound effects may be called from Basic, e.g. *ZAP, *SIREN, *EXPLODE etc.

MUROM is accompanied by a full instruction manual and repertoire of music data on cassette.

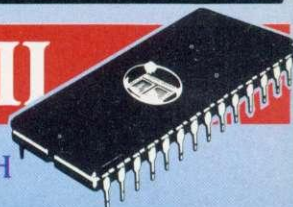
MUROM CHANNEL EDITOR									
NOTE	TEL	CHAN 0	CHAN 1	CHAN 2	CHAN 3				
		2	1	3	0				
		NO	EL	NO	EL	NO	EL	NO	EL
0008		C#1	1 0	F#0	5 4	SSS			
0009		D#1	1 0	www		SSS			
0010		E 1	1 1	www		SSS			
0011				www		SSS			
0012		A#1	1 0	www		SSS			
0013		B 1	1 0	www		SSS			
0014		D#1	1 0	D#3	5 1	SSS			
0015		D#2	1 0	www		SSS			
0016		F 2	1 1	SSS		SSS			
0017		SSS		SSS		SSS			
0018		SSS		SSS		SSS			
0019		SSS		SSS		SSS			
0020		SSS		SSS		SSS			
0021		SSS		SSS		SSS			
0022		SSS		SSS		SSS			
0023		SSS		SSS		SSS			
0024		SSS		SSS		SSS			
0025		SSS		SSS		SSS			

COMMAND SUMMARY

- *PLAY Calls the variable speed, interrupt driven playback routine.
 - *DISP Mode 7 display of tune playing.
 - *TEMPO Alter tempo.
 - *KEYB Use BBC keyboard as a piano keyboard.
 - *SCORE Call up full screen music editor.
- EDITOR SUB-COMMANDS:**
- MODE Change from editing a single channel to editing all channels consecutively.
 - GO Move editor to any note in score.
 - PLAY Enable single stepping of music.
 - OCTV Change octave of any channel.
 - ENVL Change envelope of any channel.
 - LOAD Load previously created music.
 - SAVE Save edited score to disc or cassette.
 - KEY Toggle note entry between note name and keyboard position.
 - *ENVP Sound envelope editor.
 - *FLUTE, *SYNTH ... etc. ten predefined envelopes.
 - *EXPLODE, *ZAP ... etc. ten predefined effects.
 - *TRANS Transpose up or down by a number of semitones.
 - *MONOC Disable colour output for monochrome screens.

B.B.C. & Electron

EXMON II



EXTENDED MACHINE CODE MONITOR NOW WITH DUAL SCREENS

```

05 0D EXMON II by Beebugsoft 12 CP
A X Y S P flags PC stack
45 07 01 FE 30 B BBC7 A0

05 0D EXMON II by Beebugsoft 12 CP
A X Y S P flags PC stack
00 00 00 FF 30 B 0000

8009 : 42 41 53 49 43 00 28 43 BASIC (C
8011 : 29 31 39 38 32 20 41 63 >1982 Ac
8019 : 6F 72 6E 0A 0D 00 00 80 orn.
8021 : 00 00 A9 84 20 F4 FF 86 .) t.
8029 : 06 B4 07 A9 83 20 F4 FF .) t.
8031 : 84 19 A2 00 86 1F 8E 02 .) t.
8039 : 04 8E 03 04 CA 86 23 A2 .) J.#
8041 : 0A 8E 00 04 CA 8E 01 04 .) J.#
8049 : A9 01 25 11 05 0D 05 0E .) %
8051 : 05 0F 05 10 0C A9 41 .) P.>A
8059 : 85 0D A9 52 85 0E A9 57 .) >R.>W
8061 : 85 0F A9 02 8D 02 02 A9 .) >R.>W
8069 : B4 8D 03 02 58 4C 0D BA 4 .) XL.>
8071 : 41 4E 44 80 00 41 42 53 AND .ABS
    
```

?P 8000
?SS 8000+9000" BASIC"
Found at 8009

60 New Commands for debugging and developing machine code

Our very popular machine code monitor has been enhanced by the addition of a number of new facilities, including Dual Screen Operation and full screen memory editor.

Now if you are debugging a game, or any other program with a visual display, you can single step through it instruction by instruction and actually watch the effect on the screen.

You can also revert to the monitor screen at the press of a key to examine registers, edit code, read variables, alter memory etc., and then switch back to your display screen and continue running (or single stepping), without losing your display.

Exmon II features include

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- * Move memory block.
- * Verify that two blocks are the same.
- * Relocate code to run at another location.
- * Fill memory with series of hex bytes or Ascii string.
- * Execute all * commands.
- * Single step with skip option.
- * Up to 10 breakpoints which may even be set in Rom.
- * Conditional breakpoints ... e.g. Break if register X=5.
- * User definable work area.

Note: The Electron version does not feature dual screens.

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MUROM £29.00 EXMON II £29.00

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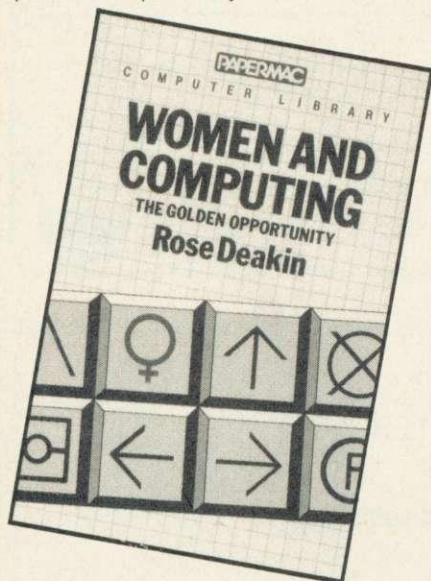
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Too few women in the micro world

'Women and Computing: The Golden Opportunity', Rose Deakin, Papermac, £5.95

IT IS undeniably worrying that in 1984 women and girls form such a small, and diminishing, proportion of entrants to computer training and employment.

The first part of Rose Deakin's book is a concise and readable assessment of this problem. She begins by matching the characteristics needed for successful use of a computer with the qualities required by more traditional



'women's jobs', showing that women have much to gain and to contribute by greater involvement in the subject. She surveys the evidence that too few are taking up these opportunities, and examines some possible reasons – the way computers are seen and used at home and school, and presented by advertisements and the media.

It may be that the introduction of micros in schools has had an adverse effect – causing girls to adopt attitudes

and make choices at an early age when they are too susceptible to group pressure to see where their real interests may lie. The author then proposes ways of changing both male and female attitudes, and to consider future variations on traditional work patterns.

The remainder of the book has a much narrower focus – it looks at opportunities for women to enter the computing field after child-rearing or other careers. Some suggestions make obvious sense: wordprocessing and book indexing are tasks which can be performed efficiently and economically at home, but I think the substantial prior training or experience required for successful freelance programming, consultancy or computer journalism is underestimated.

The final chapters contain brief factual summaries on computing terminology, current hardware and training courses; this information is obviously available elsewhere but it may be useful for the reader meeting the subject for the first time.

Susan Jones

First steps in

business usage

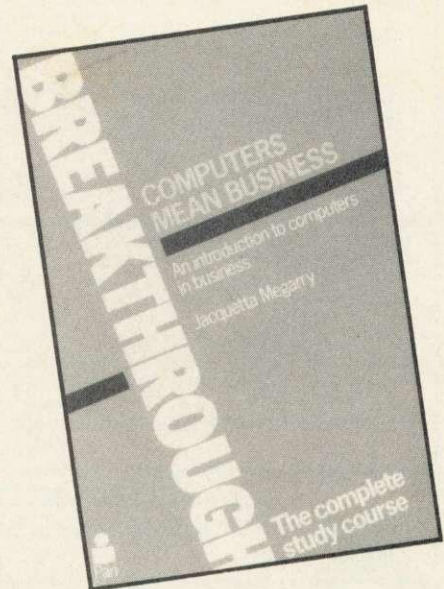
'Computers Mean Business: An Introduction to Computers in Business', Jacquetta Megarry, Pan Breakthrough, 336 pages, £2.95.

WITH Acorn moving into the business area, the time is ripe to look at such a book.

It's logically structured in four parts related to a sequence of five overlapping topics – understanding, applying, acquiring, managing and planning.

I read the book from the view of a businessman new to computers and found the style to be about right for the target reader – not condescending or too simple, but gradually building up the technical content. There are self-check questions to ensure you understand as you go along.

The first chapters are good introductions to hardware and software respectively, and Chapter 3 is an excellent guide to simple business systems. The important business applications of accounts systems, databases and wordprocessing are informatively explained, followed by a chapter deal-



ing with other types of software.

The more practical topics of how to obtain software and hardware are covered, including much good advice. I wasn't so happy with a chapter introducing programming. It's difficult to do this in only 18 pages, but I would have liked to see more stress on structured programming. This section ends with information on application software looking more at system design.

Part 4 deals with the problems of introducing computers into an organisation and is good sensible stuff. The final chapter takes a short look at the future.

A useful list of sources of further information, some suggestions for further reading, the excellent glossary and an index round off the book.

Excellent value at £2.95, this is a well written and relevant introduction to computers in business.

John Vaux

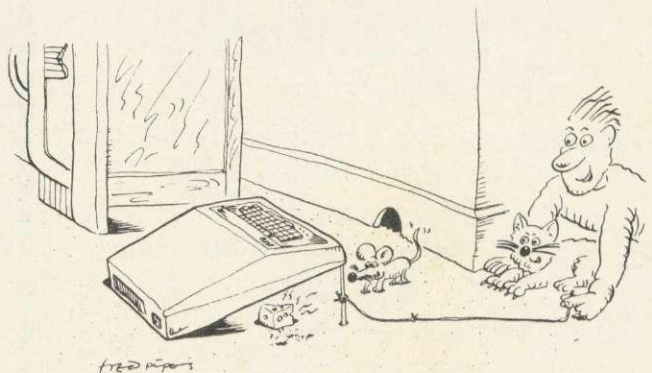
Old micros never die

'101 Things to Do with a Dead Computer', Fred Pipes, Hamlyn, £1.95

IS NOTHING sacred for this cartoonist Pipes? Using a BBC micro as a mouse trap is going a bit too far. But the Beeb comes off lightly in Fred's 101 and he saves the worst fate for a discarded Apple-lookalike. Meanwhile cast-off Sinclairs abound as favourite cheesegraters, cat flaps and roof tiles.

The author admits to owning a micro (and we know it's a BBC), so no doubt this book was born in the frustrating hours between first getting one and making it work... or not as the case may have been.

Tony Quinn



University Software

UNISTAT

STATISTICAL PACKAGE

MULTIVARIATE REGRESSION: Main output consists of estimated coefficients, t-stats, standard errors, R^2 , corrected R^2 , standard error of regression, F stat, and Durbin-Watson stat. Further output options: multiple correlation matrix, var-covar matrix, ANOVA of regression, residuals, plot of residuals, interpolation. Data options: Log/ln option for each variable, no-constant regression, choice of dependent variable, selection of independent variables, auto-omission of linearly dependent variables.

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All programs are datafile compatible with Matrix Operations program in UNIMAX package. Data matrix capacity examples (columns by rows): **CBM-64:** 2x1250, 5x700, 10x380. **BBC-B:** 2x750, 5x400, 10x200. **48K Spectrum:** 2x1800, 5x900, 10x500. **CBM-64 (disk):** £85, **BBC-B (disk):** £85, **48K Spectrum (mdvcart/cass):** £60

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A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X%: M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity. In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value. ONESHOT is not compatible with double density interfaces.

NEW

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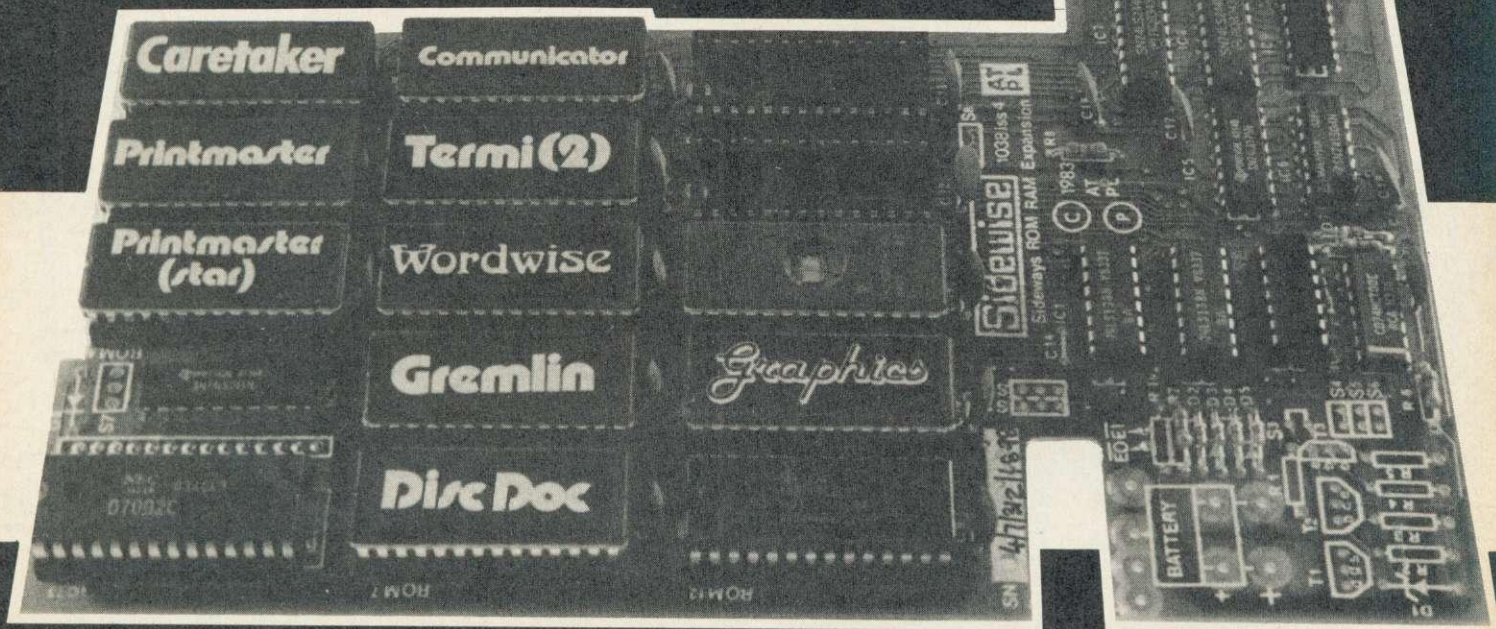
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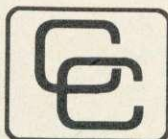
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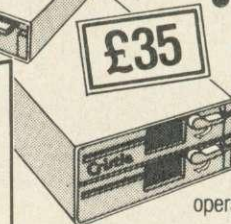
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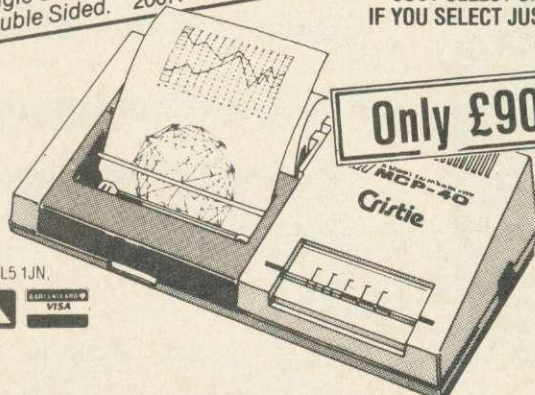


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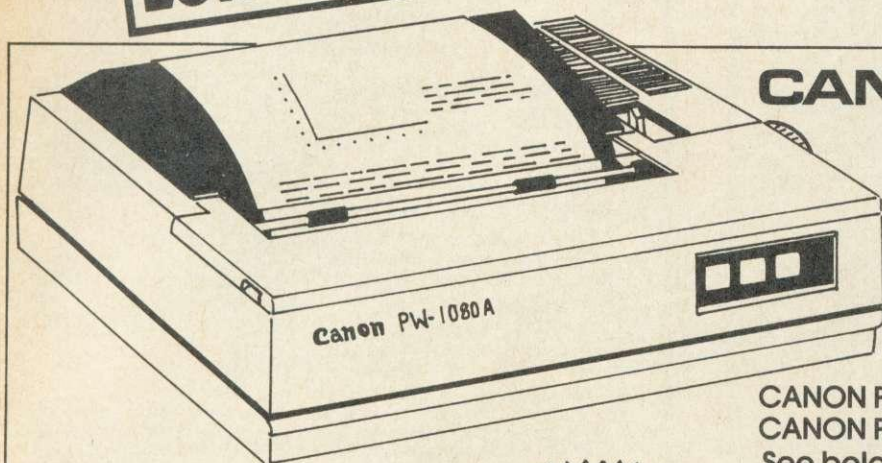
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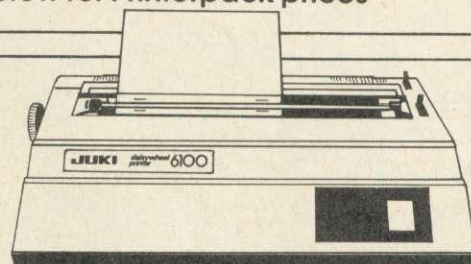
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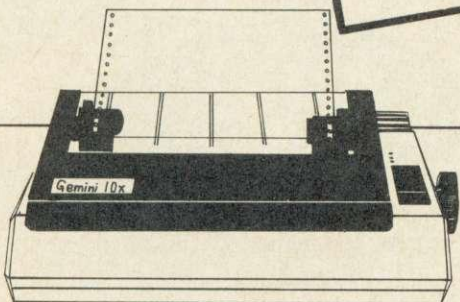


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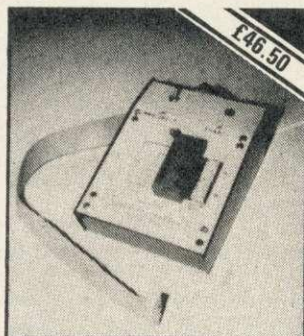
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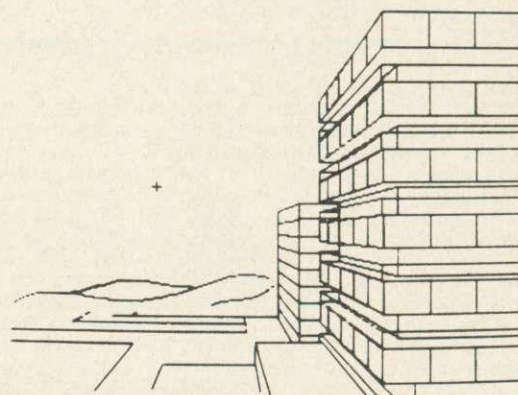
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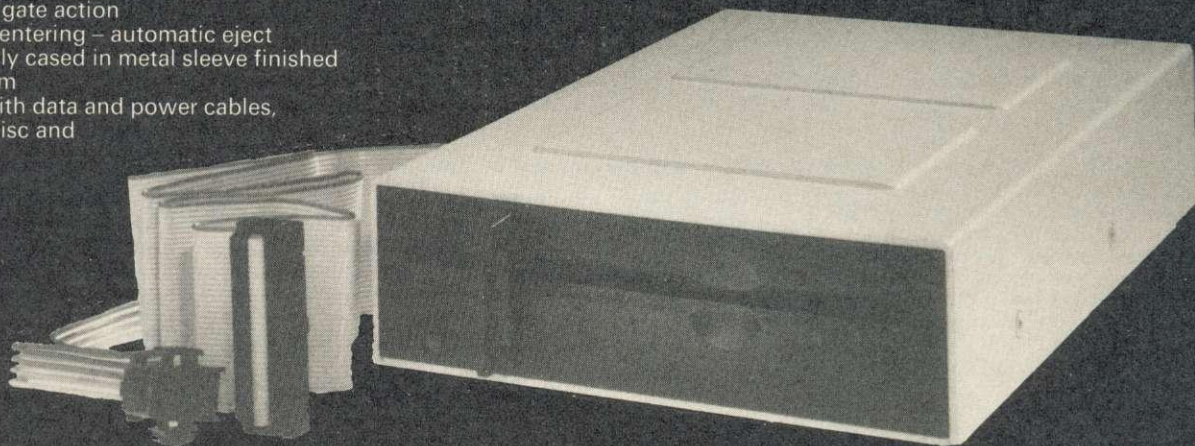
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■ **View** utilities - (A2.1 + Basic 2), auto-display every file's comment line - auto-load file/printer - disc £8. Driver S/C TP1 £7 or both £12. SAE details. D. C. Andrews, 28 Brunswick Drive, Harrogate HG1 2QW. (Specify 80/40).

■ **BBC** users! Pine computer tidy for BBC micro now available, from £11 for basic unit. Send SAE to Woodtech, 10 Dany-Coed, Blackmill, Mid-Glam, Wales.

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■ **Tele-Edit**. Create/edit mode 7 screen, teletext pages, simply and quickly. BBC B 1.2 complete package, keystrip, comprehensive instructions, £7.95. R. & J. K. Lund, 92 Stanford Road, Norbury, London SW16 4QA.

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■ **Hackers!** List the unlisted. A guide for the novice in tracing unlisted computer phone numbers, £3.50. Andersons, 56 Waterloo Road, Freemantle, Southampton.

■ **Insure** your discs against damage and wear. Use 'Twin' to make a safety backup of your favourite program. £8. J. E. Connett, Dene Croft, Westcott Street, Westcott, Dorking, Surrey RH4 3NY.

■ **Disk Duplicator II** will backup disks, including dual format types like itself, on Acorn or Watford 1.3 DFS. £8.95. H. Spurr, 13 The Avenue, Trimley St Mary, Ipswich IP10 OTT. Giro 52 004 6005.

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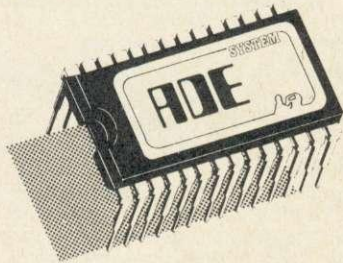
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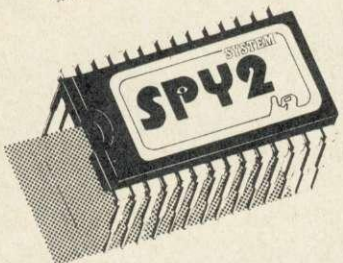
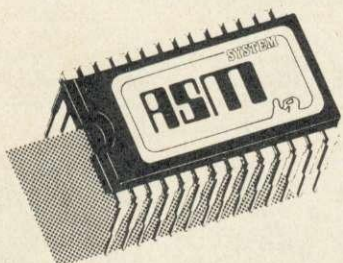
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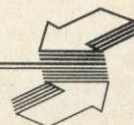
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ACORN
ABUSER'S

Diary

208

JANUARY

- 1 Tony Quip makes New Year resolution to give up telling jokes. No-one notices.
- 4 Acorn announces doubling Electron production.
- 11 Sinclair launches QL, 280-day delivery. Acorn shares jump 27p.
- 17 Electron production further increased – to three a week.
- 20 Acorn Inc. announces \$50 million in US orders.
- 23 Hermann and Pamela Hauser's third wedding anniversary. Company holiday.

FEBRUARY

- 11 Production director Jumbo Merriman writes off Jaguar XJS.

MARCH

- 2 Driftwood Publishing's bid wins *Acorn User*. Chris Curry launches first national 'win-a-million' competition.
- 5 Housewife Pru Cessor wins a million heat-sinks.
- 7 Acorn starts Formula 3 sponsorship.
- 8 Formula 3 trailer falls over cliff. Doesn't make hi-score table.
- 19 Acorn directors fly to Dublin.
- 22 Rex natus est.
- 25 *View* wins British Micro-computing 'best home software' award. What's up, Chas?

APRIL

- 4 Hermann and Pamela's fourth wedding anniversary. Company holiday.
- 10 Acorn orders 100 *Wordwise* chips.
- 16 Acorn Abuser gets Chris Curry by short and curls and reveals all about Tig.
- 17 Chris Curry donates two month's salary to RSPCA. Describes allegations of impending engagement to Tig as 'gruntless'.
- 22 Mad Alex escapes Acorn Customer Services. Joins Abuser to further his career.

AND so, gentle reader, we come to the end of yet another year. But what will 1985, the Year of the RAM, bring forth? Our silicon ball foretells of new hardware, certainly. Acorn has already announced the ABCs – and denied even more. New software too. Just when you thought it was safe to come out of the kitchen, there'll be Return of the Judder and Revenge of the Mutant Elitists from Soft Acorns, Frak Off! from Hardvark and B**gger 2 from Helicopter.

Then there are the perennial ques-

tions: Will there be a new BBC micro? Does '32016 available third quarter' mean this year? Does ABC really stand for A Big Computer? Are Chris Curry's initials really MSX? Who'll get Abused, and will Guy Kewney be allowed to carry on doing it to himself? You'll find the answers to all these questions before they happen, and less, in Acorn Abuser.

But for now, gentle reader, we'll take a look back at the Year of the Pig: the year that lay ahead a year ago. For in the past, there wilt thou find the future.

1984 REVIEW: YEAR OF THE PIG

MAY

- 4 Acorn announces takeover of Torch. Lotus doubles its sports car sales forecast.
- 15 Death of poet laureate.
- 17 Tom Heartbreak changes his name to avoid confusion with well-known marketing manager.
- 25 Soft Acorns moves into Betjeman House.
- 29 Soft Acorns refuses to discuss new version of *View*.

JUNE

- 6 Sales director Peter O'Teeth writes off Jaguar XJS.



- 11 Acorn race day. David Hunt survives three laps of Brands Hatch before crashing. Blames it on 'one of those things'.
- 17 BBC wins Acorn contract. Sinclair pulls his hair out. ITV complains to Monopolies Commission. Zebedee lost in BBC celebrations.
- 23 Finance director Peter Wingalot writes off Acorn racing car.

JULY

- 5 Chris Curry testifies before House of Lords. Announces policies of (i) non-sexist software and (ii) not selling software to 'dens of thieves', like schools.
- 7 Acorn – un gallina que no corre en el encierro de Pamplona.
- 19 First QLs shipped. *Acorn User* announces *Times* network for schools.
- 23 Hermann Hauser wins best-dressed md of year award.
- 24 *The Times* announces *Times* network for schools.

AUGUST

- 1 Surrey pensioner Sid E. Ways-ROM claims to have got his QL working.
- 7 Hermann and Pamela's fifth wedding anniversary. Company holiday.
- 8 Hermann finds bug in home diary program. Company unpaid overtime.
- 11 Acorn announces five-year support for BBC micro.
- 13 Model A dropped.
- 16 30,000 see *Acorn User* make an exhibition of itself.



SEPTEMBER

- 2 Research director John Heartache writes off company Capri, borrows Andrew McKintosh's Sierra.
- 3 John Heartache writes off Andrew McKintosh's Sierra.
- 4 Acorn R&D expands into recently vacated multi-storey car park.
- 8 Acornsoft launches *Elite*. Software boss David Johnson-Timelord becomes Galactic President.
- 15 Survey reveals BBC micro most reliable home computer. Silver Acorns awarded to soak-testers and keyboard bouncers.
- 16 Tony Quill's Beeb keyboard gives in. Ruins his chances of becoming even more harmless.
- 18 Tom Hohenberg denies existence of Acorn business machine.
- 19 Acorn previews range of business computers.
- 20 *Radio Times* takes it well.
- 25 Acorn announces record turnover and profits – shares nosedive. Acorn Inc. admits the word 'million' was a slight exaggeration.

OCTOBER

- 1 Acorn GmbH takes month's holiday in Munich.

22 Sinkliar launch Spectrum–: 'This time we got it right, they're in the shops!'

23 Spectrum– recalled from shops for keyboard surgery.

29 Soft Acorns announces cheap upgrade service for *View*.

NOVEMBER

5 Guy Kewney night. Effigies of historical traitor burnt throughout the land. National rejoicing.

6 Acorn Inc. votes Democrat.

9 New marketing man Gwen Mayhew denies existence of Acornsoft.

10 Acornsoft's Jeremy Post-stamp econets ABC 310 'flagship'.

11 Hacker breaks into HRH's Prestel mailbox.

13 Launch of Acorn Music 500 and Winchester Drives. Available soooooon.

14 Acornsoft launches *Paul Daniels Magic Show* and *The Complete Cocktail Drinker*. David Johnson-Hiccup loses two bunny rabbits in a bowler hat.

17 Jumbo Merriman buys total world supplies of 1,770 disc interface chips. Yet another 'no shortage' of 8271 interfaces.

20 Robert McRaker says of Soft Acorns new mega game: 'I don't feel that *Elite* will be the contraceptive to stop the growth of the *View* family.' David Johnson and Johnson made no comment.

22 Acorn Useless includes *Acheton* in Best Adventures of Year.

23 Acornsoft releases *Acheton*.

DECEMBER

21 Acorn Christmas party.

22 Flu epidemic hits Acorn.

30 Tom H*berg named Teddy Bear Of The Year and Orson Fact wins Barclays Bank-Sunday Times Investigative Hack of 1984 award.

31 Chris Curry knighted for advising on Prestel security.

A MERRY CHRISTMAS AND HAPPY NEW YEAR TO ALL OUR READERS

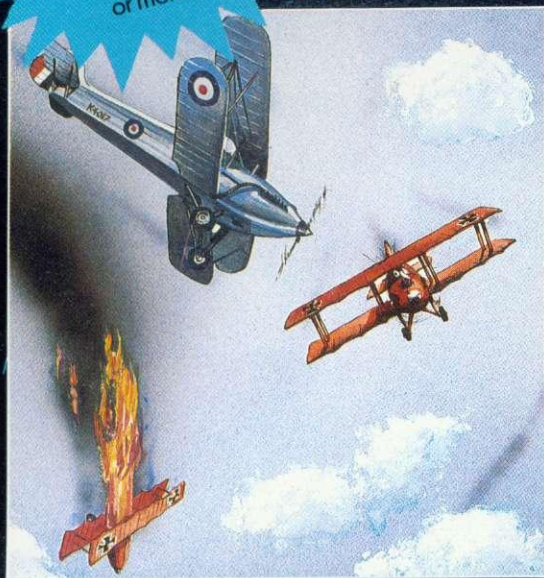
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Authors: Peter Johnson & David Lovekin.
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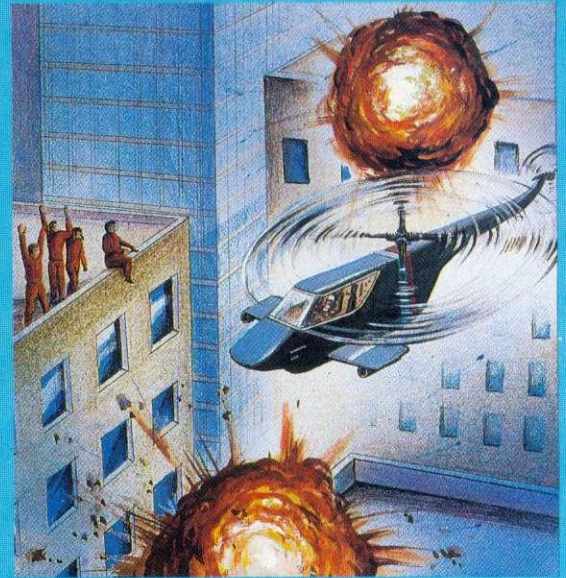


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Author: Peter Johnson.
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