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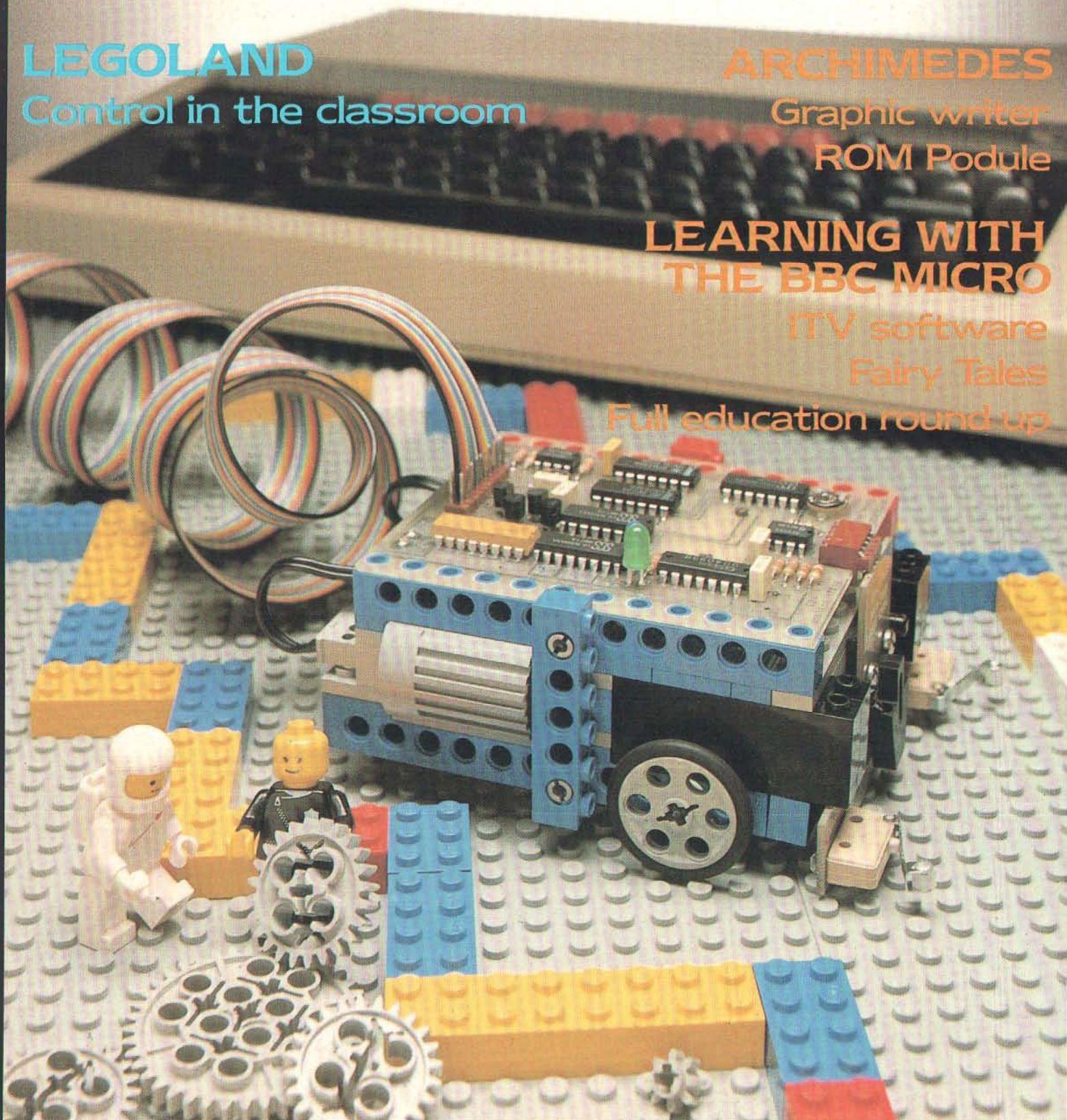
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Repton 3 is probably the best-loved of all of Superior's games. Our endearing lizard, Repton, is trapped in a netherworld amidst falling rocks, fearsome monsters and haunting spirits. A superb strategic game which includes character and screen designers enabling you to create your own scenarios. A & B Computing reported: "This is top quality; arcade action at its very best."

Crazee Rider, a fascinating motorcycle-racing game, features seven international racetracks. "It's fast, challenging and there's plenty to keep you entertained. Thoroughly recommended" remarked The Micro User.

Galaforce is the thinking-man's alien-zapping game; fast and furious, yet full of strategy. Oracle enthused: "You haven't lived until you've played this game. Buy it! — it's the ultimate in shoot-em-up. RATING: 20 (out of 20)!"

Codename: Droid is a challenging arcade-adventure. The quality of the graphics and animation must be seen to be appreciated. Electron User summed the game up by saying "CODENAME: DROID is brilliant . . . it's worth every penny!"

BBC Micro Dual Cassette.....£9.95 Acorn Electron Dual Cassette.....£9.95
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The ARTROOM pack consists of ARTROOM and ACE (Artroom Colour Extension). ARTROOM is an icon based full screen graphics package which can be controlled by mouse or keyboard. All the usual features are there including 'cut and paste' and our highly acclaimed ZOOM option plus an extensive graphics library to help you produce pictures quickly. An advanced printer dump is also supplied.



'ARTROOM...the best there is'—
Acorn User
Feb '87

'ARTROOM is the software for you.'
A & B Jan '87

ACE consists of two programs. COLOURIZER enables you to produce MODE 1 colour versions of ARTROOM screens and to dump them to a printer using a shaded printer dump. The MODE CONVERTER program will convert any graphics screen into a Mode 4 ARTROOM screen ready for loading into ARTROOM. Conversions can be made from Modes 0,1,2,5 and 7, yes SEVEN!

'...very pleased with the way Clares have introduced the colour facility.' A & B June '87.

ARTROOM and ACE will work with any mouse but we recommend DIGIMOUSE because it is well engineered using a non-slip ball and optical encoders. DIGIMOUSE also includes the unique 'LINEAR LOCK' facility that enables you to draw straight lines freehand.

'...impressed by Nidd Valley Digimouse' A & B June '87

This complete package is marketed by Olivetti in Italy, the home of style and design.

ACE A STROKE OF GENIUS!

DIGIMOUSE



BETA-BASE

BETA-BASE **SAVE £7**

£30 5.25 inch Disc £34 3.5 inch Disc

The Beta-Base pack consists of Beta-Base, the number one database for the BBC micro, and Beta-Base Utilities which extends the power of Beta-Base.

The main feature of Beta-Base is its ease of use which is achieved without sacrificing the power and flexibility required for the efficient manipulation of up to 65,000 records.

The Beta-Base Utilities provide seven new utilities. There are more powerful versions of Search and Sort and there is also a Mail Merge program which creates perfectly formatted letters containing data from your files.

'We use Beta-Base ourselves'
Mike Bibby, Editor of
MICRO USER.

'Rated best value for money'—ACORN USER Dec '84

When ordering please state the following:

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Disc size (5.25, 3.5)
Disc format (40 or 80)
DFS version.

N.B. If ordering for a Master or Compact please state DFS or ADFS. The ARTROOM pack is for the Master or Compact only but all other software is available for all machines.

Fontwise + Pack **SAVE £10**

£30 5¼ inch Disc

The FONTWISE+ pack contains FONTWISE+, the FONT EDITOR and 22 fonts. FONTWISE+ enables you to print very high quality text in a choice of 22 different fonts and 3 sizes. You do not need a special printer: just an EPSON RX or FX compatible. High quality is not the end of the story because you can also have both proportional and justified text. The output has to be seen to be believed.

FONTWISE+ is compatible with WORDWISE, VIEW, INTERWORD, MINI OFFICE II and EDWORD II.

'FONTWISE is better than many NIQ packages'—ACORN USER Sept '86

The FONT EDITOR is very easy to use and allows you to edit the current fonts or create new ones. Reviewers have praised the editor for its ease of use and faultless presentation.

'editor is impressively quick, smooth and easy to use'—A & B
EDITOR '...puts all previous designers to shame.'—BEEBUG July '86

Ask for a sample printout.



UTILITIES PACK **SAVE UP TO £30**

£50 5¼ inch disc £60 ROM £54 3½ inch disc

The UTILITIES PACK consists of RAMROD and MACROM. RAMROD is the ultimate toolkit ROM and it is compatible with the whole BBC range and includes a disassembler plus editors for DFS, ADFS, RFS, memory, Shadow memory, Sideways RAM, Tube plus lots more. RAMROD will take you to the furthest reaches of your machine and enable you to boldly go where no ROM has gone before!

'an ingenious collection of utilities...' BEEBUG Oct '86
'worth its weight in gold' A & B Jan '87

MACROM is a fast full featured MACRO ASSEMBLER that allows the use of macros, which are loaded from disc. MACROM has its own easy to use editor which automatically formats your source code. A HI version of MACROM is supplied for use with the second processor. A macro library and demonstrations are also supplied.

'Full marks for an excellent product.'—BEEBUG JUNE 1986

We are also making BROM+ available under this offer. Its main feature is the full scrolling BASIC editor which allows the user to edit a program as if dealing with text in a wordprocessor. There are many other features dedicated to making life easier for BASIC programmers.

'This is the best BASIC screen editor I have so far used.'
—MICRO USER August 85

For BROM+ add £25 on ROM,
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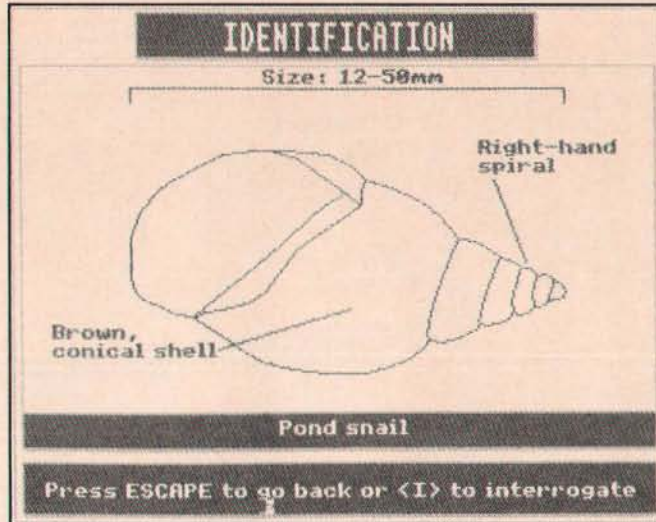
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**Volume
Five
Number
Four
April
1988**

Editor: Mark Webb
Assistant Editor: Clive D Grace
Assistant Editor (production):
Darrin Williamson
Designed by: Kathryn Howes
Ad. Manager: Sarah Musgrave
Copy Control: Francisca Perez

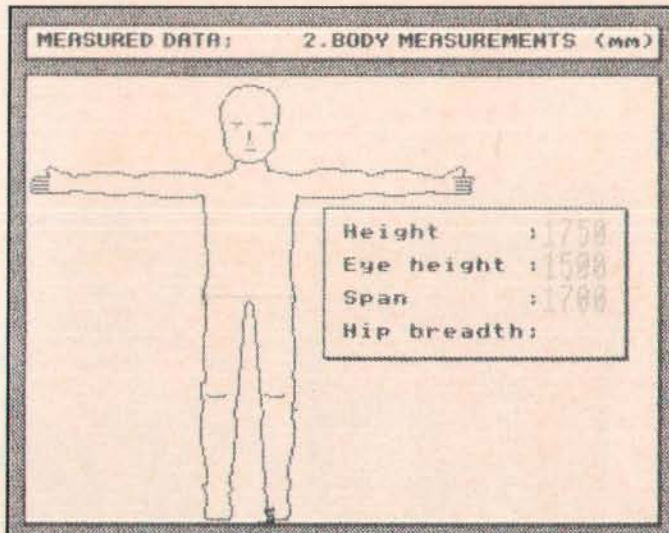
A&B Computing is published monthly on the first Friday of the month preceding cover date. Editorial and advertising enquiries to A&B Computing, Number One Golden Square, London W1R 3AB. Telephone: 01 437 0626. Software purchases on 0442 211882. Send to Reader Services, 9 Hall Road, Marylands Wood Estate, Hemel Hempstead, Herts, HP2 7BH. UK newstrade distribution by SM Distribution Ltd. 16-18 Trinity Gardens, London SW9 8DX. Telephone: 01 274 8611.



Overseas sales and non-newstrade sales by Magazine Sales Department, Number One Golden Square, London W1R 3AB, Tel: 01 437 0626. Subscription department (and back issues): Infonet Ltd, 5 River Park Estate, Berkhamsted, Herts HP4 1HL. Tel: 04427 76661-4.

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**ARGUS
PRESS
GROUP**



GORDON TAYLOR'S COVERAGE OF GRAPHIC WRITER HAS BEEN POSTPONED UNTIL NEXT MONTH.

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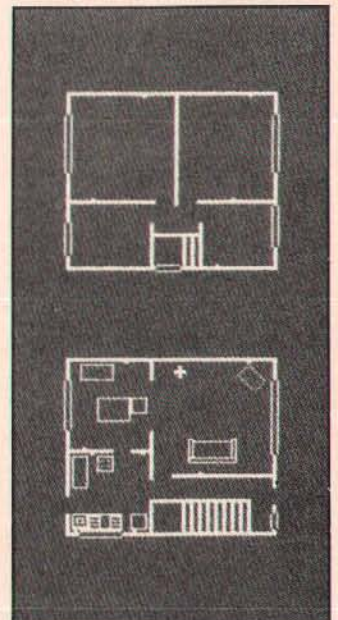
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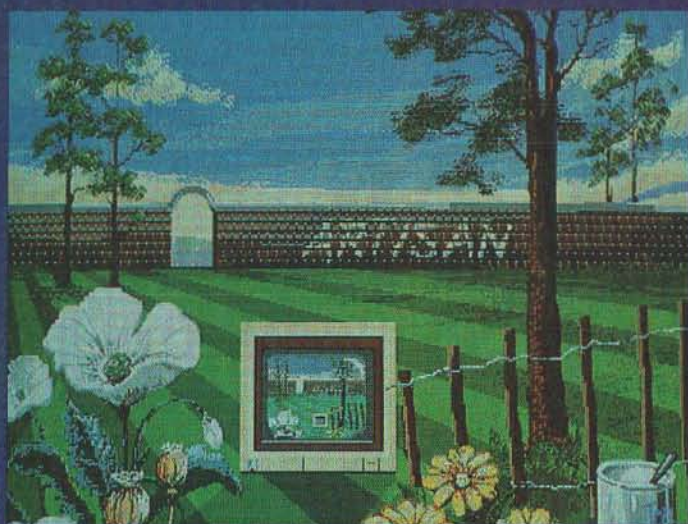
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rchimedes

HARNESS THE POWER



A computer like ARCHIMEDES needs software that can match its outstanding capabilities. Our new products do just that and one of the first areas that you will want to explore is the graphics capability. ARTISAN, from the authors of ARTROOM, is the ultimate in graphics packages. Just take a look at the screen shot reproduced here, as they say 'a picture is worth a thousand words'. We can't describe all the features here but some major functions are:

- Full screen
- WIMP environment
- Fast multi level scrolling zoom
- Magic brush
- Image distortion
- ECF designer

Plus all the usual features and some very unusual ones too.

£39.95

PICTURE THIS

—COMPETITION—

Can you do better than the picture shown here? If so you could win yourself a unique prize. If yours is judged to be the best picture then your masterpiece will be transferred to canvas by our artist Jon Warmisham (BA Hons Fine Art). The competition is open ended but the best picture each month will be featured in ACORN USER and a monthly prize will be awarded. Full details are contained in the ARTISAN pack.

Alpha-Base

Alpha-Base is the successor to the hugely successful Beta-Base, the top selling database for the BBC micro. Beta-Base files can even be transferred to Alpha-Base.

Alpha-Base incorporates all the suggestions and requests that we have received over the last five years. All of the standard Beta-Base facilities are there but in a much improved form. In addition there are many new features that will make your life easier. Some of the features are:

- Free format screens
- Multiple pages per record
- 400 fields & 27,600 characters per record
- 2.14 billion records per file
- Multiple display & entry forms
- Fast search & sort options
- Plain English entry of search criteria
- Five data types including formula & date
- Winchester compatible

At Clares we try to give you usable programs. This results in some arbitrary limits on the size of files in Alpha-Base. The limits of 400 fields and 27,600 characters per record are unlikely to restrict you but they enable us to save memory and provide additional features. The only other limitations are due to the hardware. Alpha-Base can handle 2.14 billion records but the ADFS can't!

£49.95

IMAGE WRITER

IMAGE WRITER is a sophisticated WIMP based wordprocessor with the ability to include graphics as well as to use various font combinations. Because Image Writer is document based you do not have to create page layouts for every page. You prepare your whole document in one go. Just type it, add the graphics and print it—simple. The graphics can be created with the built in graphics editor. Image Writer is designed as a first level DTP product and it uses the normal printer fonts to print both text and graphics in one pass. We will of course be producing a full feature DTP when ARCHIMEDES supports the fancy font printing. Image Writer will be available when you read this so please contact us for more information.

£29.95

ARCHIMEDES TOOLKIT MODULE

ATM is the first toolkit available for this powerful new micro. Many of the features that made RAMROD a top seller have been incorporated into ATM and a whole host of new features have been added including:

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- 8 Memory and disc searches (inc. wildcards)
- A scrolling disassembler
- A one line assembler (accessed from the disassembler)
- Shift and compare functions
- Catal and Exall for discs
- Winchester compatible

If you want to explore your ARC then order the ARCHIMEDES TOOLKIT MODULE today. It has enabled us to disassemble modules, discover many undocumented SWI calls and has been an invaluable aid in debugging software. You can even search for mnemonics.

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NEWS



Mary Rose

Cambridgeshire Software House's latest project is now ready and this most resourceful of educational software houses has taken a leaf out of the arcade companies' book with a 'tie-in' product. *Mary Rose - The Anatomy of a Tudor Warship 1510 - 1988* has been produced in conjunction with the Mary Rose Trust. The game involves the players trying to

recover for themselves many of the artefacts found on the Mary Rose by Margaret Rule and her team of Marine Archaeologists. Included in the package is a resource element put together by the Mary Rose Trust. It includes colour slides, a book of 'finds' and a copy of the Cowdry Print. Prices £24.50 Model B and Master 128, £28.00 Master Compact (excluding VAT).

Something Special this way comes

Rumour has it that **Bill Bonham** at Sherston Software has something special planned for release in April - it's a bit of a secret, but it seems a meg-release is on the way (or so I am told). Intrigued? Watch this space for more info next month!

Nasty Interactive Video

I was walking around the Videotex User show in January when a little man with a weedy moustache came up to me and tugged my A&B "old hack's" issue raincoat.

"Psst", he said; "Wanna video? It's free". He gave me a wink, and then scurried off to the bar (where, as we all know, most of the work is really done at professional exhibitions).

So imagine the scene, I'm standing here with an unlabelled video in my hands, given to me by a small greasy little man at a show in central London - the Barbican to be precise.

Rushing back to A&B, I put the video into a machine, and with a flood of anxiety, (*what if my Editor catches me with this thing?*) I settled down to half an hour's worth of "entertainment".

The Videotape was, in fact a classy update on the Domesday system and the new Ecodisc programs for the Interactive video setup currently being touted around educational establishments and large companies.

The new additions to the Domesday family - *Datamerge et al* were also covered in detail making it a very informative and (ahem) educational.

The Video is available as a VHS tape for educationalists, and schools through the usual Domesday dealers.

Desktop Image Analysis

An interesting application using the Cumana Touch Pad has been developed by the Institute of Ophthalmology. MIGIT, as it is known, is a simplified and low cost version of DIGIT software available for digitising pads such as Grafpad 2 and Summagraphics tablet. The touchpad and software - compatible with all versions of BBC Micro - on 40 or 80 track disc cost just £30.

MIGIT consists of a machine code digitising program, a measurement program and menu. MIGIT automatically selects mm, um or nm units of measurement. The pad is merely touched at any two points for the gap to be measured. A shape can be traced on the pad and line length, perimeter, area, radius of an equivalent circle, volume of an equivalent sphere, x and y Feret (caliper) diameters and roundness can be shown and printed out.

A full booklet is provided. Details from the Institute of Ophthalmology, Judd Street, London, WC1H 9QS. Tel: 01 387 9621 x244.

The Dread Dragon Droom Returns

And what a smashing program it is too. We've been playing this "game" more than Zarch of late, and indulging ourselves on the super graphics that form this package from Resource.

Probably one of the most colourful educational packages there is - "The Story So Far" is another chapter in the saga of the Dread Dragon Droom (great alliteration) - the only problem is that I wonder how many schools are going to have an Archimedes in the classroom!

Contact Resource at: ☎ (0302) 63800.



BEEBUG

For users of the BBC Micro,
Master and Compact

RISC USER

For Archimedes
users

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- An Acorn appointed specialist support and service centre.

BEEBUG

The magazine is now in its sixth year of publication with 20,000 subscribers throughout the world. Its proven format has been invaluable to serious BBC Micro and Master computer users in the home, education and business.

Each issue of BEEBUG provides 72 pages of articles, programs (utilities, applications etc), tutorials, workshops, reviews, hints & tips, news and information to beginners and experts alike.

RISC USER

This is the magazine for anyone interested in Acorn's RISC computer, the Archimedes. Launched at the same time as Archimedes, RISC User provides lively and informed coverage of what's happening in the world of Archimedes.

Reviews, hints, programs and articles are all specifically written for Archimedes, showing how to exploit the many features of this sophisticated computer. RISC User is all about the Archimedes, it does not contain modified programs originally intended for the Model B or Master.

BEEBUG and RISC User are both published 10 times a year and are only available on subscription, not through the shops.

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1083B Twin	33.35	31.68
1084B Logistix	113.85	108.16
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1087B Lisp	228.85	217.41
0900B PC Emulator	113.85	108.16
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0271D I/O Podule	90.85	86.31
0272D MIDI add-on to I/O	33.35	31.68

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Where two prices are shown, the first is our full price and the second our members price.

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0796C Serial Link Kit & Disc	18.16	17.25

See next column for details

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0926B Nominal Ledger	64.95	61.70
0927B School Administrator	79.95	75.95
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0929B Reporter	24.95	23.70
0930B Minotaur Game	14.95	14.20

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Connect up to four external disc drives to your Archimedes with our fully buffered disc drive interface. It fits neatly at the back of your machine and requires NO SOLDERING.

Stock code 0795C Members price £24.00

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This kit enables files to be transferred between BBC and Archimedes, in either direction, with the minimum of fuss. The software is menu driven and is fully compatible with DFS and ADFS. The three metre lead simply connects between the serial ports and the software is loaded via the Archimedes.

Stock code 0796C Members price £17.25

All Prices Include VAT.

Carriage

Carriage is denoted by the letter contained in the stock code. A-50p, B-£1, C-£2, D-£3, E-£3.75, F-£5.50, G-£7. When ordering several items, use the highest price code and half of each subsequent code. For courier delivery use code G.

Credit Cards



Access and Visa orders are welcome, and may be placed by letter or telephone (24 hours).

BEEBUG LTD,
Dolphin Place, Holywell Hill,
St. Albans, Herts., AL1 1EX.

(0727) 40303

Please telephone for a Free Information pack and Archimedes brochure.



Slogged Out

Slogger Ltd, the company well known for its support for the Electron have released a new series of products for the BBC Master and the Opus Challenger.

Their RAM disc is "fully Acorn ADFS compatible" (they say), fully DFS compatible (they say), allows further expansion at the rear of the unit (we hope), and has an internal power supply unit.

It comes in a number of configurations: 256K, 512K, 768K and 1024K – prices range from

£120 to £199 plus VAT.

Owners of the Challenger RAM disc systems need not get too peeved at Slogger's support as they have also announced a series of upgrade kits for the Challenger 3 and 4 RAM disc units by offering the extra 256K of memory and fitting instructions needed to boost the Challenger 3's total RAM disc capacity to 512K or the Challenger 4's 256K up to the total 1 Megabyte.

Contact Slogger at: 107 Richmond Road, Gillingham, Kent, ME7 1LX. ☎ (0634) 52303.

Seeing Double

Tubelink have recently produced a new extension ROM for the View Word processor and View-sheet, Acorn's equivalent spreadsheet.

DoubleView (as it is called) offers a "professional style split screen with a continual display of free memory, file name, printer driver name, and marker numbers" – so they tell me.

Doubleview also enables the user to work on two documents at the same time with a cut and paste clipboard enabling easy data transfer. So it is (in theory) possible to cut a sheet from Viewsheet and paste it into the middle of a document whilst in

View – similar to the clipboard facilities on the Apple Mac.

Tubelink also promise a better continuous processing system than the one set up by Acorn; there are utilities enabling the user to transfer data from View to ViewSheet and vice versa.

Perhaps the most interesting thing about this package is the fact that Doubleview offers "pop up" menus for both the View and ADFS commands. The sad thing is that this is all only available on the Master and the Master Compact so look elsewhere Beeb B owners.

Contact Tubelink at: PO Box 641, London, NW9 8TF. ☎ 01 205 9393.

Micro Studio brush up on the Archie

A three-disc package from Micro-studio containing digitized pictures for the Archie have become

available – this includes sprite artwork in colour with over a hundred different screens – at £29.95 I expect there are a lot of salivating Archie owners just waiting to get their hands on them!

Contact: ☎ (0353) 721736.



Parrot becomes Eagle shock horror!

I think the Parrot Corp have to be awarded some sort of prize for being the most consistently awful press releasing company (see last month's news item!).

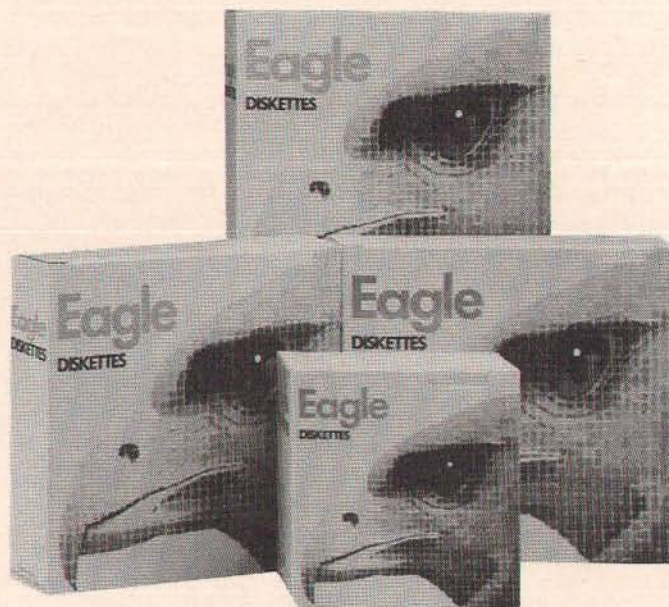
I think this one takes the biscuit

"The UK's only fully integrated floppy disc manufacturer, has launched two new products in response to the changing needs of the computer market".

Just who are these guys trying to kid? First we get the

wonderful "fully integrated floppy disc manufacturer" (whatever that means), and then we get the hard stuff in a later paragraph: "10 Mil Jackets engineered to conform to ISO, ECMA and ANSI specifications" whoopee!

Hot on the feathers of that decidedly awful press release came a saner, more interesting and far more worthy bit of blurb from Parrot telling us about their new range of economy discs called "Eagle" discs – nice packaging, but more importantly a nice price – pitching these discs fairly and squarely at educational establishments and small businesses.





Microlink launch their own modem

I think this is a first you know – an electronic mail service launching their own “low cost” modems with communications software and word processing software as well.

Other than that, there is very little useful information to pass on – the entry level package costs £99, and the top of the range model weighs in at a beefy £169 – the only thing that worries me is that these guys have the gall in calling it a “remarkable price breakthrough” – that may well be true, but in which direction?

One nice thing though is that the price does include one month’s free access to Telecom Gold, (Microlink is part of Telecom Gold) – but the most important information is which comms software and what word processor they are supplying as part of the bundle, is sadly lacking.

If interested, contact Microlink at: Europa House, Adlington Park, Adlington, Macclesfield, SK10 5NP. ☎ (0625) 878888.

Northern Fantasy

PMS, the innovative company who produced the BBC and Electron 6502 second processor for under £100 and many other goodies for the Beeb and the Elk have created a great little screen driver utility program. Offering 6 fonts on the screen at the same time, the package comes on PAL-PROM (squeezing more memory out of a standard BBC B socket

than is normally possible), it offers a sort of “postscript” capability for the BBC Micros screen or a dot matrix printer

The Package offers automatic proportional text and tabbing whilst in View, InterWord or Wordwise Plus, but no prices have been quoted as yet!

Contact PMS at: ☎ (03552) 32796.

Times they are a Changing

January 1988 saw the first BETT (British Education and Training Technology) Exhibition at the Barbican in London. This show replaces the High Technology and Equipment in Education Exhibition (in name more than anything else). This, as you’re

no doubt aware is the main platform to show off the latest in Hi-Tech learning equipment to all those concerned with computers and education. Most of the well-known names in the BBC field were there showing off their latest wares...

CEEFAX for PCs

BBC Telesoftware is to launch a new service of high quality software for the IBM PC (or compatibles – did you hear that all you Master 512 owners at the back?). The new information is broadcast along with the usual CEEFAX information, and is available to users with suitably equipped IBM PCs, or Master 512’s with Acorn Teletext adapters.

.COM and .EXE files will be broadcast, and a new colour coding facility is being incorporated so that BBC owners with ATS ROMs will not mix them up with the PC files. Rumours are that Macintosh files will be broadcast soon under a pilot scheme to see whether there is a market for Teletext on a Mac – it should be interesting to see how this affects the majority of BBC telesoftware users.

For more information about the PC telesoftware system contact: Jeremy Brayshaw, Telesoftware Organiser, CEEFAX, BBC Television Centre, Wood Lane, London W12 8QT.

Telesoftware and BBC approved Teletext adapters for the IBM PC are available from G.I.S. Croxton Park, Croxton, Cambridgeshire, PE19 4SY.

Hyperdriver

This, folks is getting to be a bit of a habit. So, this folks is probably going to be an ongoing regular spot in the news section – the DABs press news column. So, what have they done this month?

Hyperdriver is a powerful little printer driver for the BBC B and the Master –

Nothing too special about that, but, as usual, DABs have added their own little bits by including an NLQ (Near Letter

Quality) font, a CRT font (on screen text printed accurately – for once!), user definable macros and a great little preview facility.

I can’t wait to get my hands on this package judging by the dumps DABs sent us along with their leaflet – at £29.95 for a 16K EPROM (or disc image) and a 100 page manual, DABs look set to be onto another winner.

See you next month guys!

Contact DABs at: 76 Gardner Road, Prestwich, Manchester, M25 7HU. ☎ 061 773 2413.

HYPERDRIVER PRINT MODES

This is normal FX80 Pica
 This is normal FX80 Elite
 This is FX80 Proportional
 This is Emphasised
 This is Condensed
 This is Superscript
 This is subscript
 This is Double strike
 This is Italics
 This is Underlined
 This is Expanded
Here are just a few of the possible combinations (there are too many to show them all).
Expanded emphasised underlined Double strike
 Pica Expanded-condensed italics underlined
 Pica condensed ^{superscript}/_{subscript}
 Elite Expanded-condensed italics
 Condensed italics ^{superscript}/_{subscript}
 italics condensed double strike underlined
 Pica emphasised italics underlined
 Pica double strike italics underlined
 Elite double strike italics underlined
 superscript and subscript, either underlined
 Proportional italics underlined expanded
 Normal emphasised superscript or subscript
 Normal emphasised italics superscript or subscript
 Condensed italics, underlined superscript subscript
 Normal italics superscript and subscript underlined
 superscript underlined and subscript underlined

If your printer has features And you can mix codes
 feed you could change codes and vary the line spaces in
 the middle of any document, the same line
 in as to create large amounts singly or in any
 of text into a small space.
 combinations as your printer allows!
 (Even a letter if you like.)

These samples were produced using the VIEW wordprocessor and Hyperdriver on an Epson FX80. All formatting, tabulation and print mode selection was controlled exclusively by Hyperdriver commands embedded in the text.

VIEW was used so as to demonstrate microspaced justified text, (this is microspaced double strike elite at 8 lines per inch) but identical output can be produced using exactly the same Hyperdriver commands from say Inter-Word, Wordwise Plus, View Professional, or any wordprocessor or language that offers ‘s’ commands.

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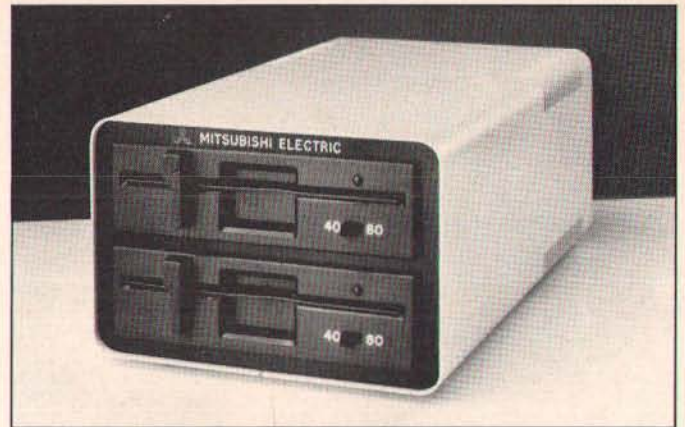
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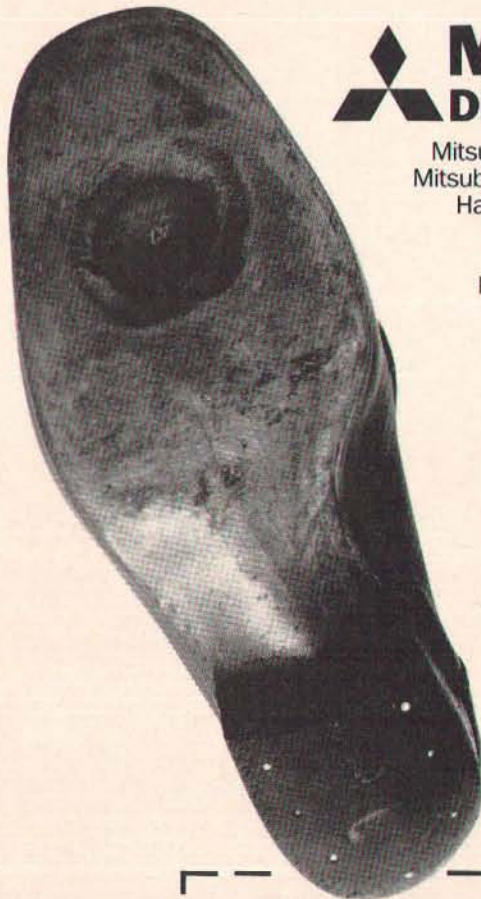
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| MF 50 AC Single Drive with PSU | <input type="checkbox"/> | £119.00 + £8 p&p |
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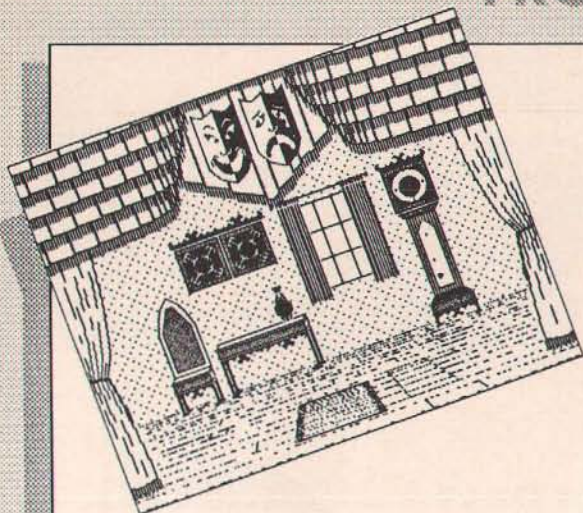
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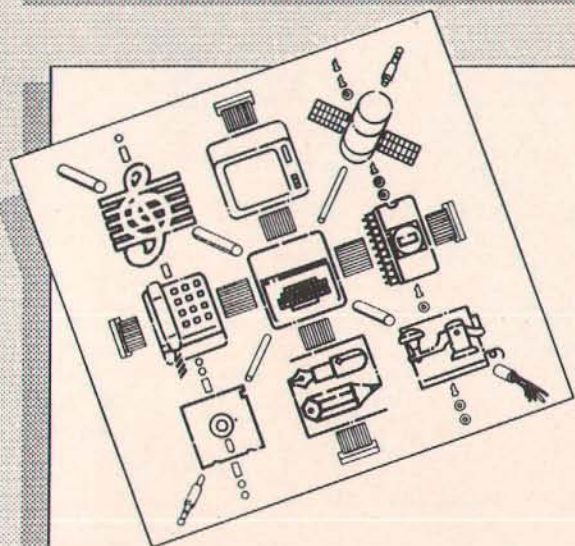
PNEUMATICS: Explains how pneumatic devices and circuits work.

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† BBC Version only

The pack includes the above software on BBC and MS-DOS format discs, along with a 48-page user guide, two audio cassettes, a 224-page book by Jaquetta Megarry, and a 116-page student guide.

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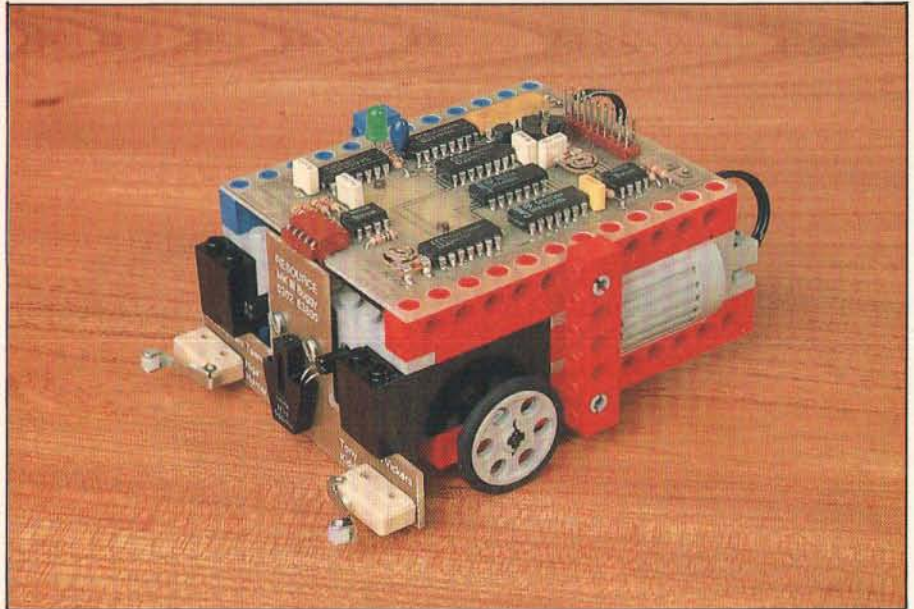
BUGGY RIDE

Much cheaper than most turtles, a buggy is becoming a very effective teaching aid

The kit under review comprises a small three-wheeled vehicle which the user assembles from Lego, plus the circuitry and software to drive it. It is offered by RESOURCE, a co-operative venture producing low-cost computer materials and software for educational purposes. The material supplied included the Lego Buggy Kit No. 1038, complete with assembly instructions, the control electronics and connecting cable, a program disc, four booklets and a set of six black and white "test tracks" on which the buggy can be made to do its tricks. The tracks are on A4 paper sheets, two of the tests occupying 2 sheets each. Of the booklets, one describes how to fit the electronics, and the others give brief details of three alternative items of software which are available on the disc, with examples. Although totally unfamiliar with Lego (I was raised on Meccano!) the job of assembling the buggy took less than an hour. The kit contains two Lego motors, each driving one front wheel through reduction gearing. The single back wheel is a small castor on a rotatable mount.

Although a limited differential control of motor speed is provided on the circuit board, the instructions point out that friction in the various parts may be a more significant cause of deviation from straight line travel than differences in motor speeds. Lubrication with a silicone oil is suggested as an aid, but I would term it essential. Castrol DWF was used, but any similar lubricant, such as the popular WD40, should work. The castor push-fit attachment is not too secure because there is little depth of engagement. This was no problem in the context of a review, but some appropriate adhesive might be useful in school use. Otherwise the buggy is very robust and will withstand any reasonable amount of handling.

The electronics occupies two boards, the main circuit being on a rectangular PCB with holes on two opposite sides which fit tightly over corresponding Lego pegs along the



Control in the classroom comes in the form of the buggy.

buggy. The second board is small and of an inverted-T shape. It carries three sensors, of which two are microswitches on the left and right extremes to detect collisions between the buggy and other objects, and the third is an infrared reflective detector, used to sense whether the surface below it is black or white. It is attached to the front of the buggy by two screws with self-locking nuts. The joint includes a spacer of resilient foam to allow some movement when engaging the 5-

way right-angled connector between the two boards. The main circuit board carries a buzzer (hooter might be a better term).

On arrival this was found to be hanging by its wires. Examination showed that it had been fixed to the board with dabs of adhesive – an ludicrous way of attaching a relatively heavy component. Fortunately there was just enough room to drill two small holes in the board, through which the buzzer was mounted using 12 BA screws and nuts. The finish

Resource have come up with an innovative product.



of this board left just a little to be desired – the hand soldered joints were moderately neat, but some component leads were not well trimmed, and the board was not properly defluxed or protected in any way against the handling it seems likely to get in practice. On test, one motor could not be reversed, although a check showed that the correct signals were reaching the board connector. A second board (Version 1.3) worked correctly. This did have holes marked out for the buzzer, but they were not drilled, and the buzzer, like the first, had come unstuck in the post. The circuit fault was almost certainly a “one-off” occurrence.

Umbilical tether

The buggy connects to the Beeb through the User Port, and a ribbon cable 2.54m long was supplied – an ample length. The 5V power supply is taken from the port, and the largest mean current required was found to be approximately 700mA with both motors stalled and the buzzer working – conditions that might occur in use. Normally a Beeb can easily cope with this demand, but care should be taken that the 5V supply is not already fully loaded (or overloaded!) by miscellaneous peripherals. The motor supply is pulsed, with a variable mark/space ratio. This allows more accurate speed control, and minimises power dissipation in the drive transistors.

The Resource software does not work with a second processor. On booting the disc a title screen appears, after which a menu offers one of three types of control software. The first is a version of the BBC *Control-It* software, designed for automation control as part of the Microelectronics Education Program, and having much in common with Logo. The only obvious difference between the full implementation and the buggy version appears to be that the latter does not use the analogue or printer ports, and there-

allowing access to the Buggy's sensors, and giving more control over the buggy than Buggy BASIC. We shall look at each of these software items in turn.

On selecting *Control-It*, the screen shows the front panel (see photo), and a small light appears on the buggy circuit board to confirm that it is active. The screen is divided by lines into a full width heading, with two side-by-side windows below. The heading contains a set of 8 boxes, each outlined in yellow, with three at the top left of the screen and the rest extending towards the right below them. Each box indicates the state of one bit on port B (the User Port), ie lines PB0 to PB7 inclusive. The lower boxes indicate the bit states on the five lines PB0 to PB4, which are used as outputs from computer to buggy, while the upper three (PB5 to PB7) do the same for inputs from the buggy. If any bit state is low (0V), the corresponding box has a black centre, but this is filled with yellow if the bit state changes to high (+5V). On the right is a clock showing seconds and tenths, which can be started, stopped and reset by the software.

The lower left hand window is headed by a Resource attribution, followed by a colon (:) prompt for command entry. The rest of the window is the program area. The right-hand window is used for information returned by the program, such as a help lists of commands, procedures, disc catalogues, output from print statements and so on.

The buggy can be controlled in immediate mode simply by typing in commands, one after another, or by a pre-prepared program. The function keys are programmed with the 30 most used key-words, a useful feature not mentioned in any documentation. The majority of the commands themselves are also omitted from the booklet, and you will need the full *Control-It* manual for these. The essential key-strip was not supplied either, but will be included in future issues.

Programs as procedures

Routines not available as specific commands can be implemented as procedures using a BUILD command. This clears the two lower windows and the prompt “Building [name]” appears, after which the constituent commands can be entered, finishing with [END]. Multi-statement lines are not permitted in *Control-It*. The procedure is invoked by using its name as a command, and it can be stored on disc. A complete program is built as a procedure, embodying commands and other procedures. Not more than 25 procedures may be used in any program. There is a very rudimentary editor, using the cursor, delete and TAB keys (the latter inserts a blank line). The normal copy facility cannot be used. All commands are automatically in lower case, but are shown here in upper case to distinguish them from the normal text.

The language uses several pseudo-variables such as SWITCH(n) which can be used

either to set or return the bit value on line n. INPORT is used with a variable to return an integer value for the whole port. CLOCK is used as a variable to return the clock reading (and, following START, STOP or RESET, as a command argument). COUNTER returns the current value of the FOR... NEXT loop counter. GET is used as in BASIC. Declared variables are limited to a maximum total of 26, and must not exceed 7 characters in length. They must be declared with LET, and should be carefully chosen, since they cannot be cleared subsequently. Procedures, on the other hand, can be DELETED. All the usual arithmetic operators can be used, also the logical operators AND, OR, NOT and EOR.

The buggy motors and buzzer can be addressed in three ways, namely by using SWITCH [ON/OFF] ([BIT]) [BIT NUMBER], by OUTPUT [n] (where n is an integer placed on the whole bus), or directly by individual keywords. For the motors these are FORWARD, HALT and BACKWARD, each followed by one or two letters to specify the motor(s) in question. HOOT gives a short sound from the buzzer. Alternatively, signal destinations can be labelled, using LABEL [DESIGNATION] [NAME], eg: LABEL MOTOR B LEFT, or LABEL BIT 4 HOOTER. This assists device recognition, but prevents the use of calculated values. WAIT [seconds] is equivalent to a timing loop, during which the operational status quo is preserved.

Running round in circles

Two types of loop are implemented. REPEAT ...UNTIL is used as in BASIC, while FOR [n] (TIMES)...NEXT is restricted to positive counting with unity increments. TIMES is optional, and FOR EVER... NEXT will run indefinitely. Loops can be nested to a maximum depth of nine levels, which is likely to be adequate in this application. During execution (eg in recursion) procedures may be nested to a maximum depth of fifty.

Among utility commands are the usual SAVE and LOAD (used for procedures). STAR is used to pass a system command, so STAR CAT will catalogue the current disc. CAT on its own will catalogue only procedures, which are always in catalogue P, and LIST will catalogue all procedures in memory. CASSETTE [on/off] switches the cassette motor relay, and this can be utilised as an external control element. INVERTINPUTS toggles the three inputs between normal and inverted logic states, and may be needed with some commercial interfaces. HIDE can be used to conceal one or more parts of the status information, namely the input lines, output lines or clock. SHOW reveals any previously hidden status information, including the cassette status and analogue values, not normally displayed. CLONE produces an exact disc copy of a *Control-It* program already saved on another disc. The copy will carry the status of the HIDE and INVERT INPUTS options as well as the program, and



The control screen in action.

fore does not display their status. The second software option is Buggy BASIC, which provides some extensions to BASIC keywords, and is useful where students are already accustomed to BASIC but not necessarily to Logo. The third type of software is Control BASIC, again extending BASIC, but

R E S O U R C E B U G G Y

is useful in making programs available to other users or networks. SPEED [1 to 9] can be used to control the motor speed.

Other commands resembling BASIC equivalents include a single-line IF...THEN, (but there is no ELSE), and INPUT, which cannot include a prompt in quotes. PRINT alone gives a blank line, and takes a literal or expression as argument, but multiple arguments are not accepted. The correct delimiter is [RETURN], even with literals. Other delimiters may produce an error, otherwise they are either treated as literals or ignored. TRACE [ON/OFF] shows each program line on screen before it is executed. In the case of an IF statement, the action statement is displayed for a second time if the condition was true.

Control-It is well error trapped, and has numerous helpful error messages. A list, with explanations, appears in the full manual. ESCAPE is trapped, and gives the screen message "Interrupted" without actually interrupting anything. This may oblige the operator to hit BREAK, eg if the buggy is heading rapidly towards the edge of the table. However, ESCAPE will be made to turn everything off in future versions. BREAK leaves a corrupted screen. True, the legitimate exit is FINISH, but this still leaves things very untidy because of the way *Control-It* uses memory and pokes various locations. In either case a cold re-start is necessary. Most ROMs and Shadow RAM do not appear to interfere with *Control-It*, except that some claim workspace which *Control-It* overwrites. If you have *Spellmaster* as well as Shadow RAM, for example, first issue *WORKOFF and press CTRL/BRK, (or use *UNPLUG if appropriate).

Since *Control-It* must be doubly interpreted, so to speak, and involves various loops, most commands are noticeably slow. For example, when using the optical sensor to stop the buggy at a zone edge there may be as much as 40mm or more of overshoot, and markings less than about 10mm wide may not be detected at all. The understandably low motor torque, the inevitable directional drag of the ribbon cable and the variable friction in such unconventional bearings also mitigate against day-to-day repeatability of movements, while traction at the wheels varies considerably with the type of track surface. In addition, the minimum time interval acceptable to the program seems to be 0.3 second. This is a significant time at full speed, while a lower speed merely compounds the repeatability problems. Hence it is not easy to obtain decently repeatable actions using open-loop control programs. Closed-loop programs in which sensor feedback modifies the operations are preferable, and the buggy can thus demonstrate in rather broad terms how feedback improves performance.

Assorted BASICS

The second software item - *Buggy BASIC* (Version 2.03) adds 11 simple buggy commands to BASIC, and a RESOURCE message

appears on the start-up screen. HELP lists the extra commands, with brief descriptions. They are for open-loop control purposes only, ie feedback from the buggy sensors cannot be used to modify any control signal. Four commands produce simple motions - these are FWD [n], BACK [n], LEFT [n] and RIGHT [n]. The argument in each case is the time in seconds, thus RIGHT 1.5 makes the buggy rotate clockwise for 1.5 seconds. Similarly BEEP [n] produces a timed "beep" and WAIT [n] gives a pause with no action. HALT turns everything off. SEND [n], where n is an integer in the range 0 to 31 inclusive, puts the integer on the bus, the individual bit values starting the appropriate action, eg SEND 15 (binary 1111) runs both motors backwards. The commands FIND WHITE and FINDBLACK make the buggy hunt through increasing angles of rotation for a white or black line respectively. The hunt continues for about 10 seconds before generating an error. If either of the buggy microswitches is closed (except when moving backwards), the message "The buggy had a collision" appears, rather unhelpfully, since you already knew that, and the program can do nothing about it anyway. ESCAPE does stop everything, and error trapping with ON ERROR is possible.

The third software type is *Control BASIC* (version 2.64nll), which is similar to Buggy BASIC but does allow closed loop control, despite the fact that it adds only 5 commands and 4 pseudo-variables (only two appear in the booklet) to BASIC. The extra commands are BUGGY, PULSE, CYCLES, WIDTH and MAKE. BUGGY is needed at the start of each program to initialise the buggy, indicated by the lamp lighting on the vehicle. MAKE is used in either of two ways. If followed by PORT (one of the added pseudo-variables) and an integer in the range 0-31, the integer is put on the port, and the corresponding bit states give the appropriate result. For example, MAKE PORT 31 will cause both motors to run backwards while the buzzer sounds. MAKE can also be used with a variable to return the integer currently on the port, which reveals the full buggy status. For example, if the chosen variable has a value of 217 (binary 11011001) then the left bumper switch is closed, and the buggy is on a white surface with both motors running forward and the hooter sounding. However, more limited information is often easier to deal with, in which case another pseudo-variable BIT [n] can be used. This specifies the individual bit number [n], so that MAKE LBUMPER=BIT 6 will place the value for the left bumper microswitch (bit 6) in the variable LBUMPER. The pseudo variables are useable with all current buffer boxes.

All normal BASIC commands can be used, though different syntax is occasionally required. For example, each IF condition must be tested separately and followed by a colon. Extra colons are also needed with THEN and ELSE eg: 50 IF sensor=1:MAKE PORT 9 60 IF sensor=0:MAKE PORT 0 or: 30 IF sensor = 1 : THEN : MAKE PORT 9 : ELSE : MAKE PORT 0

PULSE BIT, CYCLES and WIDTH are normally used together, with suitable arguments, to control motor selection, operational duration and speed of rotation. The motor(s) are specified by one or two control bit numbers following PULSE BIT. The motors are fed with pulsed dc, and the arguments following WIDTH give mark and space times for each individual pulse, in microseconds (approximately). The handbook chooses times which add up to 1000 for each pulse, in which case the pulse width is about a millisecond. The number following CYCLES is the total number of pulses which will be supplied, after which the motor(s) will stop. Hence a value of 10000 here will run the motors for approximately ten seconds if the pulse width is a millisecond. Longer times will be proportional, but only up to 65535 pulses, after which the VIA timer will be reset. This is not in the booklet, but the program does give an "Illegal cycles" error if you ask for exactly 65536 - higher values are treated modulo this number. Of course the buggy would usually be at the end of its tether in less than 65 seconds!

Although the handbook doesn't tell you this either, error handling is possible if ON ERROR is followed by a colon. The colon may be followed by further instructions, eg to stop everything you can use: 10 ON ERROR:MAKE PORT 0:END Alternatively the colon may be followed by a procedure call or a GOTO.

CONCLUSION

This very useful teaching aid is an inexpensive introduction to simple robotics and control systems, and the alternative software implementations cover a useful range of programming ability and experience. Although the inevitable mechanical constraints on the buggy make all but the very simplest open-loop control by timing somewhat tricky, this does mean that the benefits of closed-loop control can be demonstrated clearly. The three types of software are all excellently idiot-proofed, and feel very "safe" in use. The causes of minor criticisms of the circuit board are easily rectified, while slight reservations about one or two software specifics are, to some extent at least, a matter of opinion. The documentation embodies much of the educational "See what happens if..." tradition - good for use by pupils, but surely Sir/Madam would welcome a crib without quite so many omissions? Nevertheless this product can be recommended, especially at the low price, and it should be welcome in schools already familiar with *Control-It*.

Factfile

The suppliers are RESOURCE, Exeter Road, off Coventry Grove, Doncaster. DN2 4PY. ☎:(0302) 63800/63784. The price is £64.95 complete, or £41.95 without the buggy kit, which is available separately for £24.00. All prices include postage, but exclude VAT (not paid by educational establishments). Inspection copies are available to bona-fide teachers.

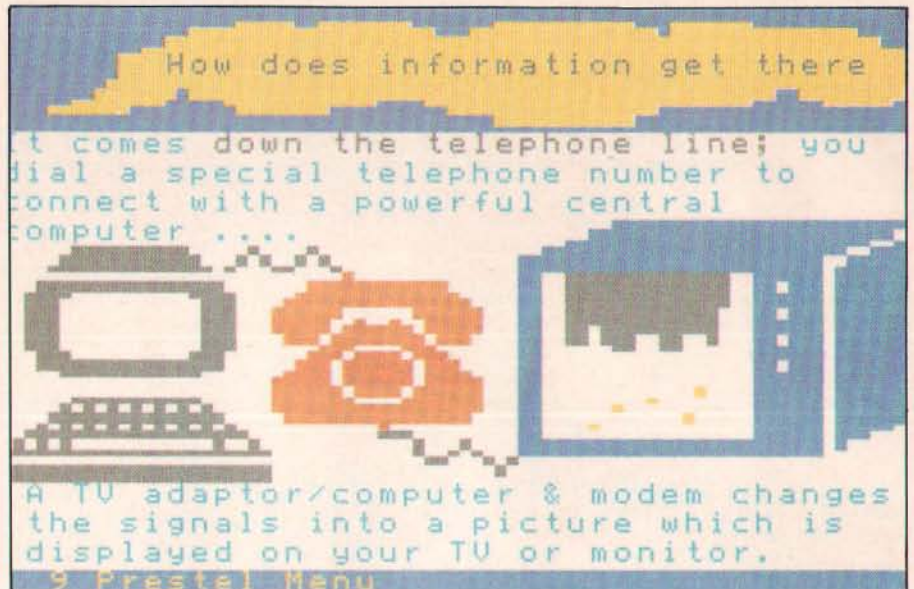
IN THE ROUND

If you fancy setting up your own viewdata bulletin board, why not let Rotaview be your host?

These days more and more importance is being placed on Information Technology. Although accessing distant high-powered multi-user computers is fun, it's not as much fun as setting up your own service for other people to access. By using the Rotaview software you can create your very own viewdatabase just like *Prestel* (although not as big!).

The Rotaview software was written by Information Technology and Marketing (ITM) Limited, and is sold exclusively under license by the Careers and Occupational Information Centre (COIC) under the auspices of the Manpower Services Commission.

Rotaview is completely disc based and comes in two versions depending upon the size of your disc drives. For 40 track drives you will only be able to use the editor software, which costs £50.00 + £7.50 VAT. To use the full Rotaview software, consisting of the editor and host, which costs £64.00 +



A colourful screen courtesy of Rotaview.

£9.60 VAT, you will need twin double-sided 80 track disc drives. You can upgrade from the 40 track to 80 track version at a later date for £24.00 + £3.60 VAT. Post and packing is £1.50 per order.

Opening the box

Rotaview comes supplied in an attractive box containing the system discs, a function key-strip, and a 124 page A4 comb-bound instruction manual.

Putting the boot in

Two discs are supplied with the package – the system and host, and the sample database disc. After inserting the system and host disc (referred to as the system disc from now on for simplicity) you are presented with a Mode 7 menu to select what you want to do.

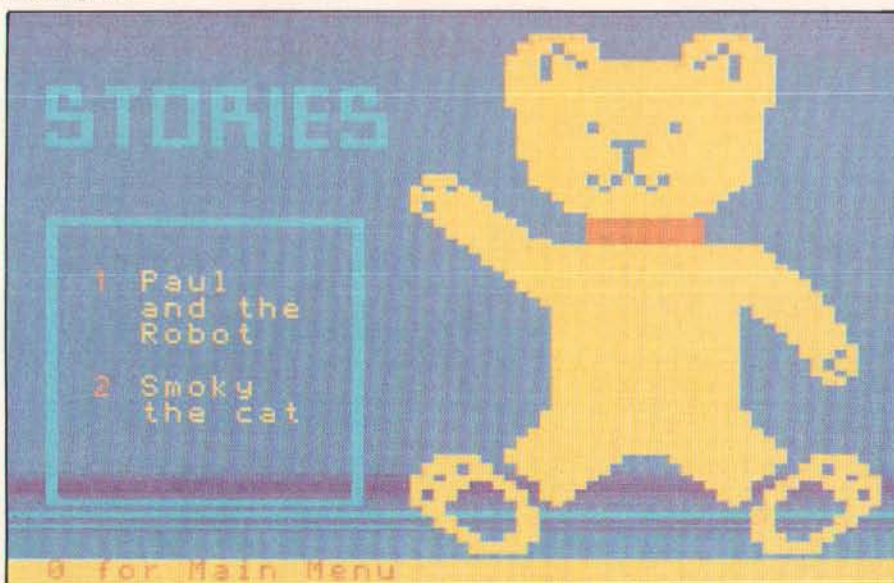
Creating your database

Before you create your database you need to format a disc to contain the information. Rotaview uses a special format for its database discs, and will modify a normally formatted disc when asked to. Throughout its use, the Rotaview host disc is always in drive 0, and any database discs are in drive 1. However, when using the 40 track version which is designed for single drive use, you are prompted at various stages to replace the system disc with the Data disc, or vice versa. You can store 99 individual frames on a 40 track database disc, and 397 on an 80 track one.

Using the frame editor

After the database disc has been formatted you can begin to edit your database. This is achieved by selecting the *frame editor* option from the main menu, which then produces a sub-menu of options. From here you can go off and edit individual frames, search the

Teddies galore.



Rotaview PAGE DESIGN

Short paragraphs are the key, three or four lines are long enough!

What you leave blank is as important as the written text. This is known as space.

Space is very necessary. Leave it all around your text. After all that's what it was designed for!

9 Editing Menu Return for more

database locally (see below), or go to the frame management functions.

As editors go, Rotaview's offers one of the best around. BASIC wordprocessor functions are provided like insert/delete lines or characters, automatic word-wrap, centering, indentation, and block move/delete operations, making editing as easy as possible. The function keys are used to evoke many of the facilities, and the key-strip comes in very handy. It also contains details of all the escape codes.

To aid presentation, text can be displayed in a multitude of differing heights, ie double, triple, quad, and even sextuple (very big!). Graphic boxes can be created at the press of a few keys in any desired colour, shape position.

To set the routing from a frame, its frame table can be examined and modified as necessary. Those who have edited on Prestel will find its layout very familiar.

Under the *frame management* section a whole host of utilities can be called upon to help maintain your database. Frame copying and deletion can be carried out and you can obtain a list of all the frame numbers currently used – this is very useful for spotting orphan frames.

You can obtain printouts of any frame from a suitable printer, ie Epson (or compatible), Microliner, or Integrex Colour Jet 132. Another useful facility is the ability to import and export any frames to/from a saved Mode 7 screen format.

Incorporated into Rotaview is the ability to view and manipulate teletext frames broadcast by CEEFAX (BBC1 and BBC2) or ORACLE (ITV and CH4/SC4). To use this you need the *Acorn Teletext Adapter* and the old *Teletext ROM*. Unfortunately, Rotaview was written before the advent of the *Advanced Teletext ROM (ATS)* and will not work with it. To circumvent this problem, and desired frames could be saved to disc (using the appropriate function) and imported into your database.

Included within the software are two terminal emulators, a viewdata one, and a

scrolling one (which could be used to access services such as Telecom Gold and TTNS). A sixteen entry phone book is provided and (if you have a DTI (Tandata or DaCom), GEC Datachat 1223a, or Miracle Technology Schools Modem) it will auto-dial for you, but only within the viewdata terminal.

After creating your database you can view it locally, just as if you were connected to it via the modem (but without the expense!). This is particularly useful when checking that your routing works correctly.

Rotaview also features a local carousel facility whereby a sequence of frames can be continuously displayed one after the other. You can create up to 10 carousel sequences at a time, each containing up to 80 frames. The time that each frame is viewed can be altered, so that enough time is given for a text page to be read.

To allow other people to connect to your database remotely, you need the 80 track version of Rotaview that contains the host software, and an auto-answer modem. Currently Rotaview will work with TTNS, DTI (both Tandata and DaCom), or a Miracle Technology Schools Modem.

When people dial in, they are initially presented with the Rotaview logo, then a frame asking them for their name and phone number before they are finally allowed to access your database. Their details are stored into a log file so you can see who has telephoned in.

A telesoftware formatter conforming to the

CET (Council for Educational Technology) standards is included so that people can download software from your database. The formatter converts the data in your program (be it BASIC, machine code, or whatever) into a sequence of characters that can be displayed on frames, and then downloaded and saved.

Rotaview will enable you to set up a viewdatabase of your own with very little fuss – within a couple of hours of receiving the software I had my own system (called "DaveTel" for want of a better name) up and running.


The Rotaview manual is very clear with step-by-step instructions, and the sample database disc an excellent example of what can be achieved.

In this review I have been unable (due to space considerations) to go into the exact construction of a viewdatabase. Needless to say, the Rotaview manual contains any information you are likely to need.

At the moment an ADFS compatible version is under development. This will offer a number of benefits including the ability to store far more frames on a database disc. It will also mean that it can be used on a Master Compact. There also exists the possibility of Rotaview being produced to work under MS/PC-DOS.

Factfile

For further information on Rotaview, and other software published by the Careers and Occupational Information Centre (COIC), please contact Doreen Carlton, ROOM N1108, Manpower Services Commission Head Office, Moorfoot, Sheffield S1 4PQ ☎ 0742-703116.



You can give the impression of movement by changing frames rapidly.

Each frame should be carefully related to the previous one to give the impression of continuity.

In the frames you have just seen, this was partly provided by the graphics letters 'outh' staying the same while 'y' danced.

Press 1 for a sequence with smoother movement.

0 Main menu 9 Screen design

ABACUS

Games players and 'serious' computer users sometimes seem world's apart but these worlds are on a collision course as we enter a new era of "Fusion" software ...

Fusion software can change your life. Take the case of Ernie Loam. Ernie had two passions in life – his vegetable garden and his computer. So it came as no surprise that Ernie wrote a program to help him plan out all those little jobs that have to be done around the vegetable patch during the year.

Ernie was very pleased with his program and called it Ernie's Year-round Veg Planner. He thought it might be of use to other gardeners and sent it off to all the software houses. Within two weeks, Ernie had enough rejection letters to wallpaper an aircraft hangar.

Then, Ernie noticed a small ad in a computer magazine – "Wanted! Software for development. We will take your program, maximise its potential and make it a runaway hit. Any tape or disc considered." Ernie decided to give it one last try and sent off his offering to the Fusion Software Development Corporation.

A reply came back by return of post:

Dear Ernie,

We sincerely believe that with Ernie's Year-round Veg Planner we have an international hit of awesome proportions. Please call into our office at the earliest opportunity to discuss the enormous, indeed staggering possibilities.

Yours sincerely, Len Da Vinci

Two days later Ernie was shown into Len's office. "Let me tell you a bit about myself," said Len, drawing himself away from the doodles of helicopters and submarines he was engrossed in, "I used to do freelance development work for all the big software houses. I developed more hits than anyone else."

"Excuse me," said Ernie, "but what exactly is software development?" "Software development is the art of taking something and turning it into something else entirely. You know Gauntlet? That started out as a

knitting pattern program for a pair of woolly gloves – until I got hold of it. Work was a day in day out doddle. But then I had a revelation. Why not keep in elements of the original and that way attract games players and utility buffs simultaneously? And so Fusion software was born."

"So where does my program come into all this?" asked Ernie.

"Ernie's Year-round Veg Planner will herald us into a new dimension of computing. It will combine entertainment with education, edification with gratification, decimation with cogitation – Ernie, we are talking destruction-assisted learning and if that isn't a buzzword for the 90s I don't know what it."

"I'm sorry," said Ernie, "but I don't seem to remember anything of that sort in my program."

"That's because it hasn't gone into development yet. So let's start developing right away. Talk me through the concept Ernie."

"It's very simple really. We go through the year and it reminds you when to plant your root vegetables and brassicas, when to ..."

"That's not quite what I had in mind. Tell me about the plot."

"It's about 30ft by 40ft with a little path going down the middle."

"No, no, what about the story? Do these vegetables have any enemies?" Ernie thought for a moment. "I don't suppose so, unless you count the aphids."

"Aphids?"

"They are tiny insects."

"Tiny's no good. Let me think. Is there a nuclear power station near the vegetable garden?"

"No."

"Well there is now. Radioactive dust from a meltdown disaster falls on the aphids and transforms them into giant, glowing,

armour plated monsters. What can the gardener do to protect his vegetables against these evil bugs?"

"Usually he has one of those little pump sprays," said Ernie.

"He'll have to have a full armoury of chemical weapons," said Len, "and a doomsday button as a last resort. Can you tell me anything else about these aphids?"

"They can reproduce themselves by a process called parthenogenesis."

"Brilliant", shouted Len, "gigantic irradiated aphids reproducing themselves all over the place. It's a nightmare. It's great! Wait. I feel a title coming on ... we'll call it, Vegatron Holocaust 2000!"

As the weeks passed, Ernie was sent demo tapes of the program's development. Fone was his lovingly constructed mono bar charts depicting parsnip yields. Instead there were 3-D graphics of aphid Armageddon.

Everything was changing, but Ernie had his little victories too, as with the title, which he managed to alter to; Ernie's Vegatron Holocaust 2000.

Ernie was still unsure that the world was ready for arcade sequences that included flashing messages about buying slug pellets or harvesting the curly kale. But Ernie's uncertainty was cushioned by the biggest advance payment in British software publishing.

"All this money is okay," said Ernie, "but I've no time for the allotment these days – it looks like a bomb's hit it."

Such has been the interest in Fusion software that even before the release of Vegetron, Abacus has been informed of other companies jumping on the "knowledge through carnage" bandwagon.

So there has never been a better time to dust off that old homemade utility and send it to a software house. Just mark it, "Fusion software" – they will do the rest.

ARCHIMIDES

ROM/RAM PODULE

This podule accepts a variety of ROM or RAM chips and includes ROM and RAM filing system software.

Seven 32 pin sockets can accept any combination of ROMs (16K to 128K) or RAMs (8K to 128K)

Battery and controller chip. Trickle charged battery ensures RAM contents are retained whilst computer is off (optional).

The controller ROM provided contains ROM and RAM filing system software, is fast, and totally Arthur compatible.

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The board accepts software such as the Archimedes versions of Inter-Word, Inter-Chart and Inter-Sheet and will accept the forthcoming document processor and drawing programs. It is compatible and fully obeys all Acorn podule standards. It requires the back-plane to be installed—available from us and Acorn stockists.

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THE

ARCADE

The first batch of 1988 software and some real winners – thankfully

Welcome!

Firstly, a big welcome to any new readers, proud owners perhaps of their first Acorn machines bought either for Christmas or in the sales. This is The Arcade – no more explanations, you'll soon catch up!

This is the first column I'll write in 1988 and already it looks like being another good year for games addicts. We have a handful of crackers and an early look at two more good games.

Plus, of course, a good batch of hints 'n' tips to keep you returning to old favourites or games that seemed to hard to begin with.

John Mackay delivers the next installment in his *Repoball* diary which is now drawing to a close. Shall we track down another friendly programmer? Is this a feature you enjoy? Are these redundant questions?

One omission I'm very aware of I'm afraid is the lack of a proper look at 'enhanced' Master versions of games. I'll continue to mention these as I become aware of them but without access to a machine, it is very hard to take a close look at them. Sorry.

Enough talk – on with the action!

Boulderdash

Tynesoft – Model B/Electron – Tape/disc

Graphics/sound 7 Playability 7 Originality 6
Options 2 player/demo Value for money 7 Lifespan 6
Overall 6

A great disappointment here, I'm afraid. *Boulderdash*, as you may know, was originally an American release for the C64 from First Star Software, very popular over here about three years ago for the C64 and, I believe, the Spectrum.

Nobody thought it worth coding a Beeb version – although at least one unreleased attempt exists out there in some collections. That was perhaps a sensible decision as the game doesn't really suit the machine at all. And, more importantly, we've since seen the amazing success of *Repton* which takes the



Boulder Dash – destined to become a Tynesoft classic.

game's basic idea and twists it into something exceptional.

That idea? Nothing more complex than screens of earth with diamonds to collect and falling boulders to avoid, I'm afraid. Three years ago it may well have been astounding; now it just looks tired and old fashioned.

Which is a shame for both Tynesoft (who've invested heavily in a number of US licences of which this is one) and programmer A.G.Bennett, a newcomer to the Tynesoft team.

It's an excellent conversion – that goes without saying – but nobody seems to have sat down and wondered what they were converting and why.

The graphics are small and the game plays very slowly. There are nice touches here and there and if you want an official version of the game then Tynesoft have done you proud. It's just a pity that the original game wasn't any better.

A case of the Rockford fails, perhaps?

Game of the month – Kourtyard

Godax Model B/Master/Electron Tape/disc £9.95/£11.95/£14.95

Graphics/sound 8 Playability 8 Originality 7
Options – Value for money 8 Lifespan 8 Overall 8

This can't be bad! Godax is a brand new company – *Kourtyard* is its first proper release – Game of the Month first time out!

Anyone would think that I've been bribed.

In fact, I have. Bribed by superlative gameplay, excellent graphics, editor options and a package that I guarantee will be on my 'best of 1988' list. How come?

It certainly isn't because this is programmer Mark Rogers' first game – although that is often a reason for watching for future releases, we make no allowances here for

experience.

No, more likely is the fact that here we have a multi-level (okay – four) arcade adventure of stunning size (each level is approximately 86 times screen size) and very attractive graphics – eight colours in Mode 2 for the technical amongst you.

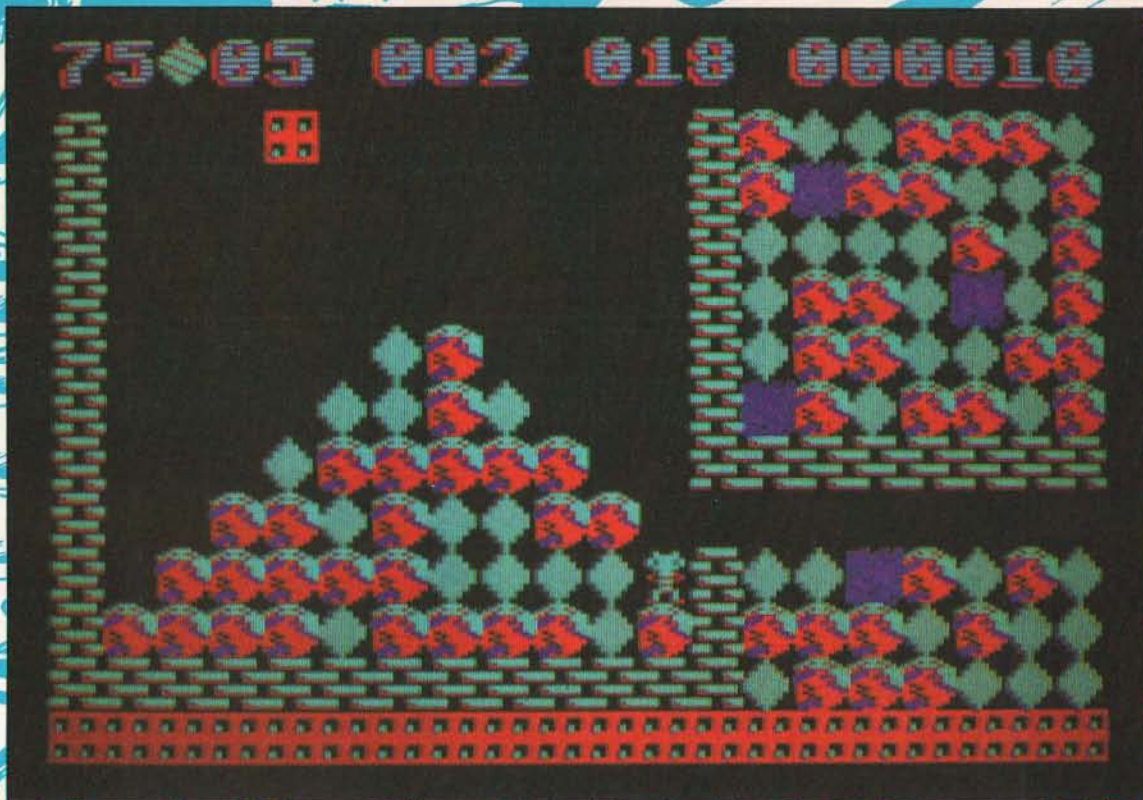
The gameplay is simple, not that it matters – you are King Arthur seeking to restore your throne. This you can only do by completing all levels, killing enemies, collecting objects and solving puzzles. So far, so much like a whole pile of games.

The graphics offer an overhead view, familiar to players of *Ravenskull*, and are very nicely detailed. A lot of work has gone into their design and it shows. The game is playable immediately and is easy enough for you to progress far enough to compel you to return to deeper levels when you fail.

ARCADE

Alley

Joe's



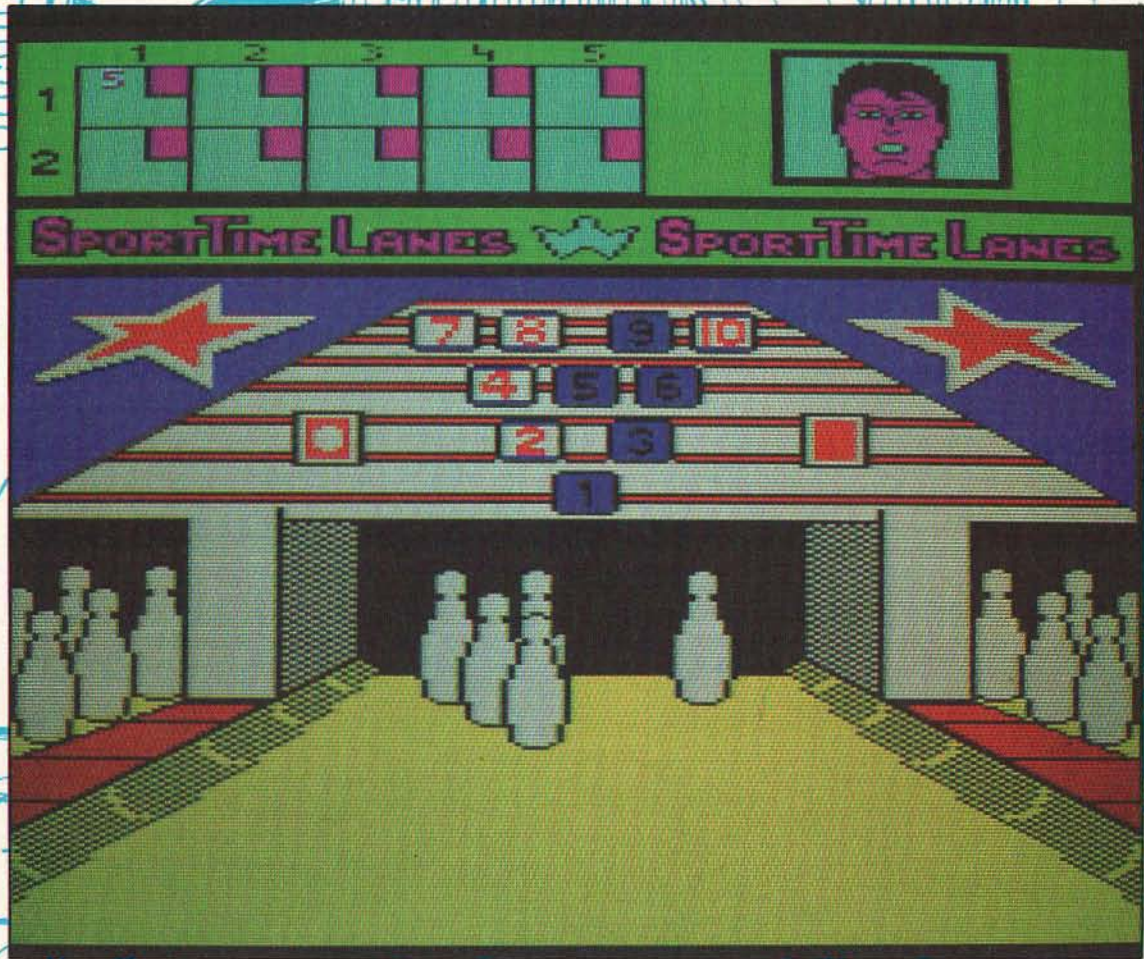
Fast and furious - Boulder Dash has colourful screens.



Game of the month! Kourtyard offers an adventure.



Cute to kill - shoot 'em up adventure with a difference.



A shot from indoor sports (just one of many games).

Did I mention the editor? There is an editor which allows you to load each level, change the graphics or difficulty and then save your version. Even if you found the original tiring (which I don't believe you would), this offers you a whole host of options. Easy to use too.

In short, this is a game that will appeal to all arcade addicts. Sure you need quick reactions here and there and mapping skills would not go amiss, but most importantly the game is very very playable.

And that's what counts for me anyway.

Mission Icarus

PHS/Powerhouse Software Model B/Master Tape/disc £7.99/£14.99

Graphics/sound 8 Playability 7 Originality 7
Options 1/2 players Value for money 6 Lifespan 7
Overall 7

A new software house for the BBC is always worth welcoming, especially when it is masterminded by ex-Bug Byte Steve Benfield. The first two releases are now ready, after several months of premature advertising.

Put don't put the flags out yet. The games offer good solid entertainment but the pricing levels seem idiosyncratic to say the least and, as far as I can tell, *Mission Icarus* will get some sort of release via Database Publications – you know, the Micro User folk (Who? – Ed).

This, the first release, is a more than competent game by Julian Avis, best known for *Dunjunz*. Unfortunately, this has quite a lot of the same feel of that earlier release – the two player option (although earlier it was four), the objects to be run over to gain energy or open doors, the exit doors that can only be entered when a level is clear of objects, etc etc.

Oh yes, that etc etc also includes the split-screen, overhead play which is attractive but distracting. Unfortunately, my copy of the game wouldn't load past the first level but if it is all of that standard then we have a pretty playable game here that won't, I don't believe, hold your attention for long.

As we've seen far too often, your mission is to clear a drifting spaceship of malfunctioning droids and destroy the central computer before time runs out. Originality would be nice; so too would be a look at the other 18 levels.

This should amuse you – just don't expect to have your mind blown as the PHS hype suggests.

Cute to Kill

PHS Model B/Master Tape/disc £7.99/£14.99

Graphics/sound 8 Playability 7 Originality 7
Options sound Value for money 7 Lifespan 7
Overall 7

I thought I was mistaken about this title – surely it should be *Cure to kill!* No, it's Cute the planet if not cute the game.

Imagine if you can, a melange of *Plan B* and *Codename: Droid* and you start to get the

feel of this game by Jason Chown, who's done something interesting in the past that for the life of me I can't recall. Sorry about that, Jason.

As ever, the plot involves exploring a series of catacombs, killing monsters, avoiding danger, collecting weapons, etc etc. The twist, I suppose, is that this is a sort of sequel to *Mission Icarus*, although the games are radically different in style and playability.

This one really doesn't offer you anything drastically new – the graphics are quite large and interesting, the routes through some screens needs a bit of planning, the ability to select up to a dozen weapons is quite a nice touch (though you have to find them first) and the game is of a good size with about 130 screens of action.

Lurking deep within the game there are 'enormous deadly mega-monsters' who sound quite cute, but I didn't have the time to delve that far.

A good solid arcade adventure with the emphasis on action, let down by a dumb title and a horrendously overpriced disc release.

Still, with its first two releases, PSH is a software company worth welcoming to the Beeb games scene. It will be interesting to see what they do next – at present I don't think they've really created an identity.



"A good solid arcade adventure with the emphasis on action"

Plan B (Part 2)

Bug-Byte Model B/Electron Tape £2.99

Graphics/sound 8 Playability 8 Originality 6
Options sound Value for money 8 Lifespan 7
Overall 7

One of last year's most underrated pleasures was *Plan B*, undiscovered by many of you apparently but the cause of much rejoicing by those who bought 'a budget game'.

It was, however, a real hot number of the Elk and so, unexpectedly, we have a sequel by the same team of Andrew Foord and Paul Brittan. And really it is just like playing the

original – there seems to be much more happening on screen at any time and the graphics are more detailed but (and it's a big but) the games are virtually identical.

Now I don't mind that when they're of such quality, but it's a shame they didn't try something a bit more original.

For those of you who missed out, the games consist of exploration, avoidance and destruction. Great fun! Explore a large computer complex with a war drone (finding keys to open doors), avoid the large number of nasty security robots and destroy computer parts. Your energy disappears rapidly, you need to keep your bearings and you can't help playing it again and again.

A great game – budget choice of the month and another winner. But I just can't wait to see what they can come up with next – let's see you try something new, lads!

Gisburne's Castle

Ricochet Model B/Electron Tape £1.99

Graphics/sound 4 Playability 4 Originality 5
Options key/joystick Value for money 4 Lifespan 3
Overall 4

I'm all for rereleasing games – we all know how hard it is to track down Beeb games even a few weeks old, let alone several years. But this 1984 Martech game by David Wainwright should have stayed in the vaults. Preferably under lock and key.

This 'arcade adventure' is, I'm afraid, an embarrassment. The graphics are poor, the plot weak and the speed of gameplay just unbelievable. More than about four moving objects on screen cuts the speed by half, which reduces to about a quarter whenever the hero (Robin Hood) moves down the screen.

Yes, just down the screen – you can zip left and right, even move up but just go and make a cup of coffee if you want to move down. Now too good a feature for a game that involves searching lots of screens, avoiding baddies who're firing at you, finding objects and ultimately rescuing Maid Marion from the Castle.

If you're fairly new to Beeb games playing, then I suppose it might be worth picking this up just to see how far (and how fast!) games have come in four years. If you're an old hand, don't bother – nostalgia ain't what it used to be.

The Pokes Disc – Issue 2

Mark Gidley – Model B – Disc £2.50

Scores not relevant but 9 overall

Now this is great value and a vindication of looking at 'home produced' material on these pages. Regular readers will know Mark Gidley – he's the one supplying lots of pokes and special programs every issue.

Now he's started his own series of poke software – cheap discs containing loads of cheat programs for recent Beeb software. Of course it's a bit of a gamble – some are for

tape versions when you might have the disc – but the value for money deal is unquestionable.

This, the second release, contains pokes for such programs as *Boulderdash*, *Bonecruncher*, *Krakout!*, *Star Wars*, *The Living Daylights*, *Uridium*, etc etc. In short, more than 60 cheat pokes for 17 games plus his own *Easipoke* program used on these pages.

If you hate typing in programs, if you only use one or two of these cheats, if you just want to support a dedicated gamer then send off for this today (Mark Gidley, 296 Newton Rd, Rushden, Northants NN10 0SY). The first issue should still be available and the next within the year.

I'm very impressed. I think you will be too. If I didn't get a free copy to review, then I'd send off my cheque today.

What higher praise can a journalist give?

The Mystery Squad and the Dead Man's Message

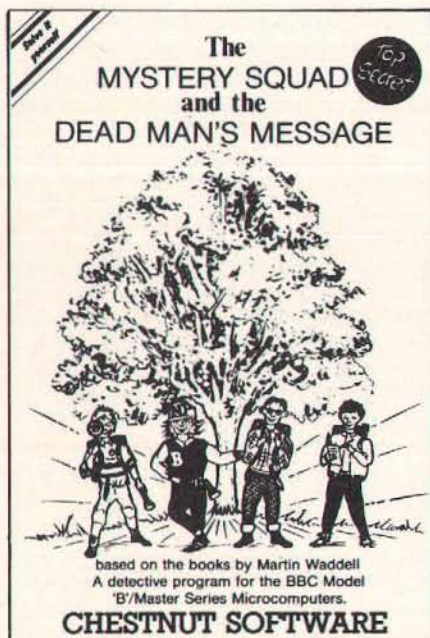
Chestnut Software Model B/Master Tape/Disc Price: n/a

Graphics/sound 3 Playability 4 Originality 5
Options – Value for money 3 Lifespan 2 Overall 3

I don't usually review adventures here, as you know. I certainly don't often look at educational games. And now I know why.

If this is the standard of 'exciting and original game' designed for 9-14 year olds in our schools, then we might as well cancel all computer studies right now.

Based on a series of books by Martin Waddell, this adventure offers you a text story running in the bottom third of the screen with poor visuals in the top two thirds. The 'game' consists of scrolling through a chapter of the story and then answering simple multiple choice questions. Score a maximum 70 points and you receive a 'Sherlock Holmes' detective rating.



I won't go into quite how awful this is – the graphics are awful, the story facile, the questions almost insulting and the programming by Colin Chappell devoid of any imagination.

No, what gets me annoyed is the sheer incompetence of the whole package. I don't consider 9-14 year olds particularly clever or analytical, but I certainly don't expect them to be treated like six year olds which is the impression I get from this release. After all, a fair number of letters I get to this column are from that age group and I can't see any of them doing anything more with this game than throwing it straight in the bin.

Perhaps you'll claim that I don't understand educational software. Perhaps I don't. However, I understand enough to know that it should inspire, it should excite, it should interest.

It certainly shouldn't include in the documentation the following sentence – 'as well as providing good reading practice'. Good reading practice might suggest 'as well' as a more likely start to the sentence. Enough said?

Mega Munch 1

RM Soft Model B/B+/Master Disc £4.95

Graphics/sound 3 Playability 3 Originality 3
Options – Value for money 4 Lifespan 3 Overall 3

Sometimes I regret the fact that The Arcade attempts to look at all new releases; after all, that policy means that I have to review this mail order only release (RM Software, 10 Stokesay, Bidston, Birkenhead L43 7PU).

What we have here is no less than three games programmed by Richard Millican and, sadly, no more than that either. The three games (*Keeper*, *Go*, and *Blocky!*) are not really worth your attention – you've seen similar as magazine listings.

Magazine listings, that is, from about four years ago!

I hate to crush initiative. I have a lot of time for people producing and selling their own software or magazines. All I ask is a modicum of quality and RM Soft has a long way to go to deliver that, I'm afraid.

Preview time

We're pretty lucky here in The Arcade. Maybe it's my natural charm, maybe it's the dedicated nature of our readers, but software houses are increasingly agreeable to giving us exclusive glimpses of games shortly to be released.

This month we have a couple of winners, even though they consist of yet another sports simulation and yet another overhead view arcade adventure.

Firstly, Tynesoft's *Indoor Sports*, licensed from Mindscape in the US. As sports simulations get more technically advanced (and when are we going to see an American football program for the Beeb?) or more esoteric, it's nice to see Tynesoft taking the trouble to provide unusual events to their

usual high standard.

Here we have bowling, darts, ping pong and air hockey to enjoy perhaps only the last is unusual – all coded with care and attention. Usual Tynesoft/Art Crew chunky graphics and busy screens are worth looking out for, although I've really only see demos of all four events. Another winner.

Interesting too to see the first real new release from the restructured Audiogenic – Roy Chartas *Guilddmaster*. ASL has high hopes for this; so do I. Admittedly the format is not new – large square graphics, overhead view, explore multiple screens, avoid nasties, collect keys, and so on.

However, despite it feeling very like *Ravenskull* (especially the flying beasts which patrol the screens), it has enough originality and skill to make it very playable indeed and some new touches (like tunnels which whip you across a couple of screens at a time) to make it very likeable.

It's fast, it's clean, it's great. And, despite similarities to this issue's *Kourtyard*, it's looking like the best contender for next issue's Game of the Month.

Every month I dread the final death of Beeb games software; every month I'm pleasantly surprised. Next month should be another classic month for us. Phew!

Repopall diary

Here we are again with John Mackay's day-by-day diary of game creation, indolence and cosmic guilt. Regular readers will recall that this month was originally going to be the final part.

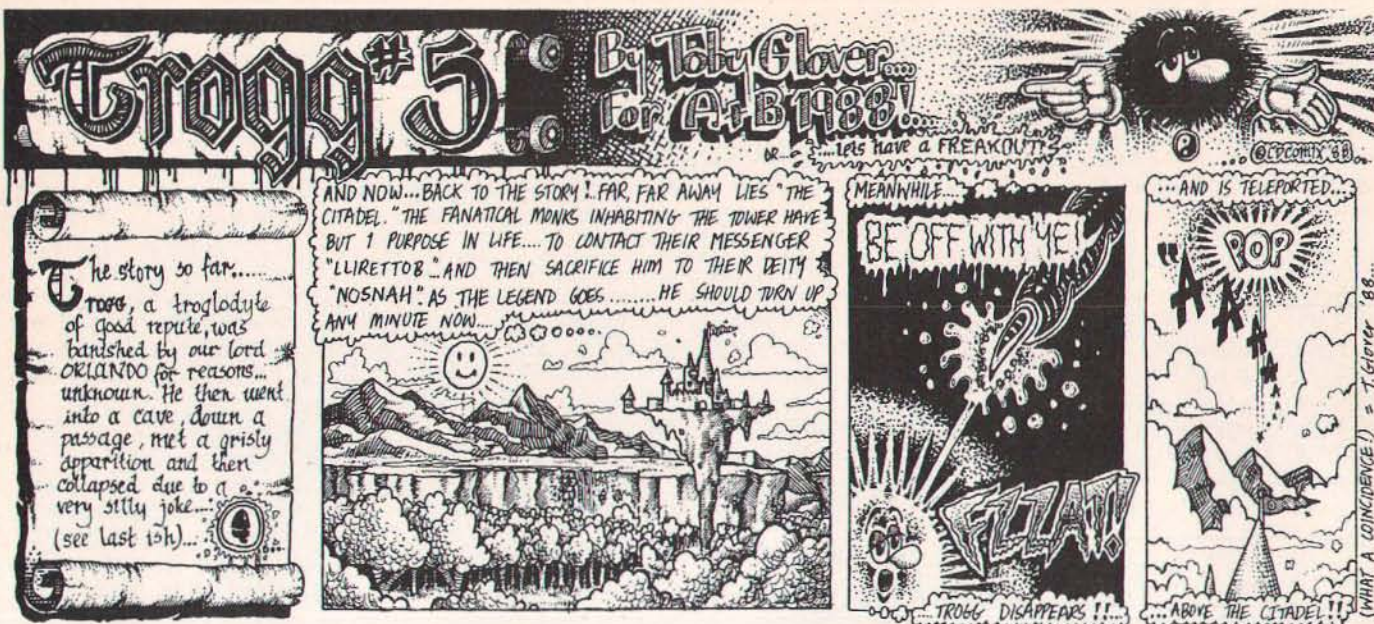
Well, not quite. In fact John has got rather further this month than I've got room to print so he's not that far behind. I should be able to convince him to wrap it up next month.

And, for the first time, I've seen a nice little demo with graphics, parallax stars and a landscape with a real feeling of depth. The final game should be worth waiting for but, as of now, it still hasn't been snapped up by a software house. Shame.

Anyway, on with the diary. Take it away John.

Tuesday, 15th December. A little work, little being the operative word. Ears are back to normal after the Dio concert.

Wednesday, 16th December to Tuesday, 5th January. An unscheduled break. Apart from drawing some sprites and linking all the code, the only work I could do on the game was in my head. The sprites are some of the best I've done though. Hooked a parallax starfield onto the scroll also, which looks quite smart. I managed to finally get a couple of games of *Wizball*. There goes my rotational animation along with my bouncing ball bit. You see, the Repo Ball came from those transparent poly something bouncing balls. I had always imagined our man Repo to have a protective coating of this stuff and this was to be used as a crude form of transport when the thrusters gave out. All isn't lost though.



The different rotations would have been a bit difficult to do in Mode 2's resolution so that saves me a fair bit of hassle. In practice I found the bouncing a hell of an annoyance. I want to just fire in there and start kicking some Saturnian arse. To hell with strategy for this game.

Wednesday, 6th January. This is typical. Twice I've used my sprite controller in a game and twice I've forgotten how to use it! Solution? Re-read it and label it for future reference. I'm also going to write a sprite mover so I can get plenty of decent movement patterns out of the same, small routine. These are the circular pattern algorithms that I mentioned earlier. Someone told me today not to do a Gary Partis special - the game running at the speed of light, aliens that look like something out of Sesame Street and movement patterns from the Frogger machine!

Thursday, 7th January to Tuesday 12th January. A dose of the cold that I had over Christmas has returned with a vengeance. No work.

Wednesday, 14th January. Started work at 2am. Hooked in my sprite control system which animates and keeps track of all the sprites. I had quite a few teething problems with this one. It exposed a bad bug in the interrupt routine which, I suppose, makes up for the trouble I had installing the swine. A good six hours it took to get this routine to talk with the rest of the program, a problem which wasn't helped by a great big spike who, while firing about the national grid, saw that I was working the graveyard shift, and decided to give me a visit. Total loss of program as I was finishing off a modification to the controller's tables and code.

The finished routine was a sight for sore eyes. Repo came up on the screen, the anti-flickering system kicked in and the screen could now be scrolled around the Ball who, alas, appeared upside down! The code now



Yet another still from the Repo Ball saga.

stretches from &1100 to &1F1C. This leaves 6K+ for the remaining code & a few extra graphics. I'll be able to put in a high score routine this time, I think!

Thursday, 15th January. Got rid of a screen glitch that appeared whenever the ball stopped suddenly, and typed in the bullet routine. The latter had a real bug in it. Two hours searching all over the code and related parts. The debugged piece looks good with 16 bullets coming out of the ball. The only snag is the amount of processor time that it chews up - about 6 character rows worth to move and redraw all the bullets. This sounds like bad news.

Friday, 15th January. Put in some more control bit and pieces and tidied up some ragged edges.

Saturday, 16th January. Everything went fine today up till 11pm. It was then I realised that I had overran my raster time. This might not be so bad except I had only one sprite on the screen at the time. This had me worried like hell for about 5 hours. The parallax starfield and the bullets put too much strain on the 6502 and the program fell to pieces on screen. The screen got messed up and caught a serious case of the shakes and the

Ball decided to make his exit through the left window.

After the program crashed, I inspected the memory and I found Repo Ball having a little nap on top of the interrupt routine. Interrupts crash at the slightest trouble, let alone a 98byte Repo Ball landing flat in the middle of them. To compound an already huge problem, five of the bullets decided they'd done enough for one day and stopped dead in their tracks. The reason for this turned out to be because the bullet enable table sat just in front of the interrupt routine. so the Repo Ball must have cruised through that on its way to Costa Del Interrupt.

I started timing the routines by marking a white line on screen when I started and finished them. This showed that all the routines running together would use up 34 characters of raster time before most of the game processing. I couldn't think of much to do except try and speed up the routines or cut sprites, reduce the height of the back-drop a bit and bin the starfield. This would have been a crippling blow to the game so, after seeing that the routines weren't going to get any faster, I decided to rethink the routines.

The scroll routine was the main glutton, chewing up about 96 pixels of raster time. This was mostly a self modifying routine, so it was already running fast. I decided on a totally different approach at the sacrifice of an extra 400 bytes and after a few test runs, it gave some pretty sensational results. It now only uses 35 pixels of raster time, a significant improvement on the previous one. It's not as powerful, though - it uses much more memory but I've got plenty kicking around at the moment and the game would be a lot better off with it.

As for sprites, at the moment I've got about eleven that make the grade. Any ones that don't, aren't saved due to the chronic shortness of catalogue space on Beeb discs.

The gameplay is something that I haven't mentioned in a fair bit. There have been quite a few changes and most of these were done over the festive weeks. Most, if not all of the guardians will be mobile as I didn't like the setup of a static one sitting eating up bullets. The mobile ones include the Alien I mentioned in an earlier instalment of the diary, a 32x32 brain with the eyeball right at the front a *la Salamander*, a huge bubble, a sphere, the bad Repo Ball, a robot on a jetpac, a flying fortress, an eyeball, a tripod and the Mothership.

That makes ten and I'm going to have to push it to get them all in. Some of them will be used twice on the smaller moons, to make up for the deficit. The Mothership's got tons of bits that you have to destroy before you can get at the weak spot (a hemisphere). This means it'll take a couple of minutes to do in.

Another thing is Repo's weapons. You start off with standard firing, and you work up, bypassing fast fire and 90 degree spread. Etc, etc.

Don't miss next month's exciting installment!

Bonecruncher codes

Practice time only – the following codes will allow you to access the screens but to win the prize you'll still have to play the game right through without passwords!

In order, then: no password; **BEGINNER; ATOMIC; COMPLEX; ANIMAL; NOMINAL; CABBAGE; TOLERANCE; OVERLORD; CRAZY CAVE; CROSSWORD; INTEREST; PEWTER; UNDERTAKE; COLLAPSE; GENERATOR; TORTURE; AMENDMENT; ULTIMATE; MONOTONE; COUNTDOWN; FATIGUE; SABOTAGE; DARKNESS; EXCALIBUR.**

Lots of you sent these in, but thanks to Zarn Hariden at Bristol Poly for being first.

Cheek!

The saga of the missing maps in The Arcade continues with Optimus suggesting a 'spot the map' competition. Mark an issue with the a cross where you think the designers ought to have put the map! (*Okay okay – so we can't all be perfect like your good self Dave – If you're not careful, I may just publish a few snippets from one of the magazines you used to write – Bribery? The thought never crossed my mind! – Ed*)

Impact!

A neat cheat mode from our Gary in his last Beeb game: press <Shift> and <Escape> on the high score table, read his message, press Return and then either jump a level by pressing J when playing or else press L on high score table for all level passwords.

Lizard time

Richard Koten has sent in a neat little listing that will play you the *Repton 3* tune. Ideal for all lizard fanatics – type it in, run it, record it, play it wherever you go on the walkman.

Nice original idea, Richard.
10ENVELOPE 1,1,0,0,0,0,0,126,-1,0,-1,126,0
20FOR A%=0 TO 13
30READ B%,C%
40SOUND 1,1,B%+24,C%/2
50NEXT
60DATA 96,10,108,5,96,10,96,10,108,5,96,10,100,5
70DATA 108,5,100,5,88,10,95,5,100,5,96,5,80,10

Dam good cheat

Anyone out there remember the dire *Dambusters* from Alligata? *The Fantoon* does – when, incidentally, are we going to get some readers with normal names, huh?

For infinite lives: ***LOAD DAM2** enter **P%=&162B:[NOP:NOP:]** and then **CALL&1SD0.**

Lazy special

This issue's special 'let's not bust a gut' cheat comes from Jon Brown and is for the tape version of Tynesoft's *Winter Olympics* – note, not *Winter Olympiad*.

Before loading type in:
***KEY0 CHAIN"" *KEY9 ZX (fourteen times)**
***FX 11,1**

Press f0 (function key 0) and in the first event complete it straight away by just holding down f9! Some speed – but it will only work for the first event as the game's code then wipes the function keys clear.

Similarly for *Micro Olympics*, enter ***FX 12,1** and ***FX 11,10** before loading the game as usual. Enter 'z' for left foot and 'Z' for right foot when prompted. At the start of a race, go to lower case characters, hold down 'Z' and tap <Shift>.

These are very sneaky and quite unlike anything anybody else has ever sent in. Any others?

Prize time!

You know how we like to have the major prizes on these pages. I mean the *really* big ones.

Well, Peter Calver at Audiogenic/Supersoft has got the message and has ten copies of a game to give away. Absolutely free.

You don't even have to answer anything. Just send him your name and address and whether you have a Beeb or Elk and the first ten will get a great game.

What game? Ah, the clever amongst you might like to think about that. It's the only Beeb/Elk game ever released by Supersoft...

Write to: **Supersoft, Winchester House, Canning Road, Wealdstone, Harrow, Middx HA3 7SJ** – mark it "Arcade Competition" please!

That's all, incidentally, the start of their tenth anniversary celebrations and it's all happening here in these hallowed pages.

A winner

You will recall a short competition we ran

concerning Tynesoft's *Winter Olympiad*. First to write in with the deliberate mistake and so win three Tynesoft games is C.Smith of East London.

The mistake? Look at the end of the biathlon section as you cross the finish line – it's spelt "FINSH".

*LOADing Soon

There may be a lot of games released this month, but I'm afraid the future looks a little quiet. But never fear, software houses continually surprise us with unexpected goodies. However, here is the future as far as I can tell:

- Tynesoft are being close-lipped for once! *Phantom 2* is still possible (most likely as extra screens), *Saigon* has been pushed back to March (or April, or May, or ...), and another sports simulation is in the planning stage (although whether this is the *Classical Olympics* that we've talked of before is still unsure) – all because of hot news about more US licences. So hot, in fact, that not even head software development honcho Dave Croft knows what he'll be coding as you read this!

- And this seems as good a spot as any to apologise to Tynesoft for my review of *Winter Olympics*. You may recall I complained about colour clashes in a 'window'. Don't worry – this was only in early copies sent out.

- Audiogenic are being fairly ruthless in their new incarnation. Don't hold your breath waiting for *3D Golf*, *Powerpack 3* or *Daxis* (as you expected it). Meanwhile *Scott Free* (the Peter Scott compilation) is still likely, as too is a new, super, 'unlike anything you've ever seen' football simulation. We'll see.

- And Superior? Word is they're looking for a quieter time after the rush of late '87 releases and that all new releases will be multi-format – that is, not just the Acorn range but Spectrum, C64, Amstrad, etc. A possible release is a new game by Mat (*Fortress*)Newman with the provisional title *Pouribus*, described as a kind of *Marble Madness* clone. Sorry not to be more precise but a new job has cut down on my investigative phone calls for the moment. Would it make you happy if I just whispered *Elite 2* in your ears instead?

- Rumours abound of an Orlando coded *Enduro Racer* conversion from Electric Dreams. I'll try and track this one down.

And Finally...

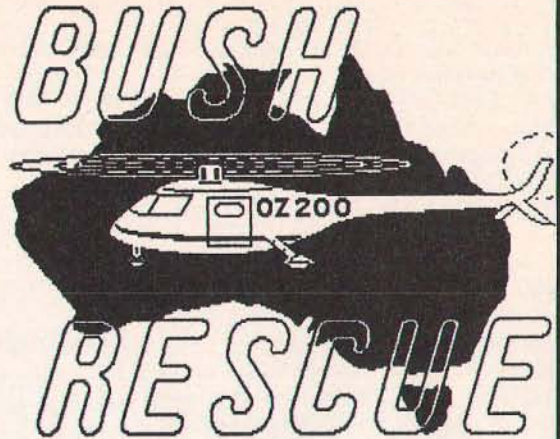
And finally, we crawl exhausted to the end of another column. It's been fun to write, I hope it's been fun to read.

Don't forget you can write witty letters, deliver pokes or hints and even tell me what you'd like to see in The Arcade via **Micronet mbx 919999020** or by post to: **Dave Reeder, The Arcade, A&B Computing, ASP Ltd, 1 Golden Square, London W1R 3AB.**

BUSH RESCUE A cross-curricular package for upper junior and lower secondary children.

A group of children plan a camping holiday in an Australian National Park. Using a viewdata system they make reservations at the camp site and book their rail and bus tickets. Additionally they must plan their stay by studying a map of the area and deciding what equipment they will need. When they arrive they become involved in a rescue drama: an injured hiker must be found and a helicopter navigated to the spot.

If you are planning any work on the environment, would like to see contour lines come to life, are seeking ways to cultivate some Aussie atmosphere in your classroom, or just want an exciting adventure then Bush Rescue could be the answer.



BBC B/B+/Master/Compact Disc package version
£21.00 + VAT

BBC Network version consisting of the package,
80 Track Disc and Networking instructions
£50.00 + VAT

4Mation Educational Resources
Linden Lea, Rock Park, Barnstaple, Devon EX33 9AQ
Tel: (0271) 45566 TTNS BOX 01:YNK045



Software
a viewdata simulation
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(with 3 levels of difficulty)
a helicopter navigation exercise
a bridge building puzzle
Epson printer facilities to produce:
a newspaper front page
a helicopter navigation certificate
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Printed materials
a reference manual
a large full-colour map
tourist guides
timetables
blackline masters

**4Mation
and
Jacaranda**

Bush Rescue was produced jointly by 4Mation Educational Resources and Jacaranda Software working on opposite sides of the globe but able to collaborate on an almost - daily basis using electronic mail. In this respect Bush Rescue may well be a unique educational package.

ECONET SOFTWARE FROM THE ADVISORY UNIT

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THE ADVISORY UNIT, ENDYMION ROAD, HATFIELD, HERTS AL10 8AU Tel (07072) 65443

All software is for BBCB, B+ and Master. Catalogue on request.

ITV SOFTWARE

Introduction

A project to launch a rival ITV micro computer founded late in 1983. Having accepted the inevitable, I suppose, it has embarked with considerable success on a number of initiatives in Television programmes to raise awareness of the micro and of the educational and social issues surrounding it. In addition to broadcast programmes, software publishing has been added to the range of print publishing to support ITV programmes. The first computer software for an ITV Schools TV programme was published early in 1984, designed to support the dramatised history series How We Used to Live, and the school year 1984/85 saw the start of new series of programmes cross-referenced to work possible with the school micro. In the first place, these developments were associated mainly with programmes for primary schools but now are available for young and old pupils alike. Incidentally most of the software mentioned in this review, is produced in association with GSN Software, unless otherwise stated.



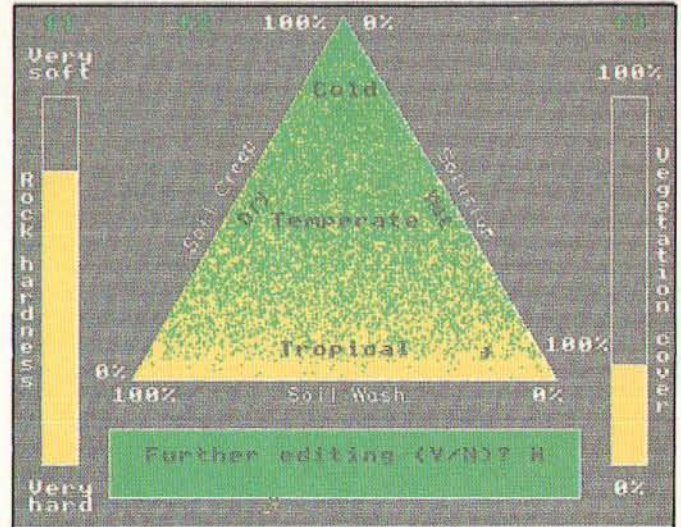
1. A map of Great Britain as seen from above – The BBC Micro's graphics are used well.

The Key

Pride of place in this collection of software from ITV must go to their database package, Key. It offers most of what I've been after for a long time in a database: one which can be used across a wide age/ability range and having strong graphic facilities. In producing Key they appear to have combined the best features of quite a number of packages: a menu system which is almost as easy to operate as Grass and Junior Find and offering both simple and complex search option; a command line or configured search similar to Quest; and a series of display options better than those in Dataprobe. So, youngsters can be introduced to the facilities of one database which will satisfy the needs of most school/college students and all for just £4.95.

Key Options

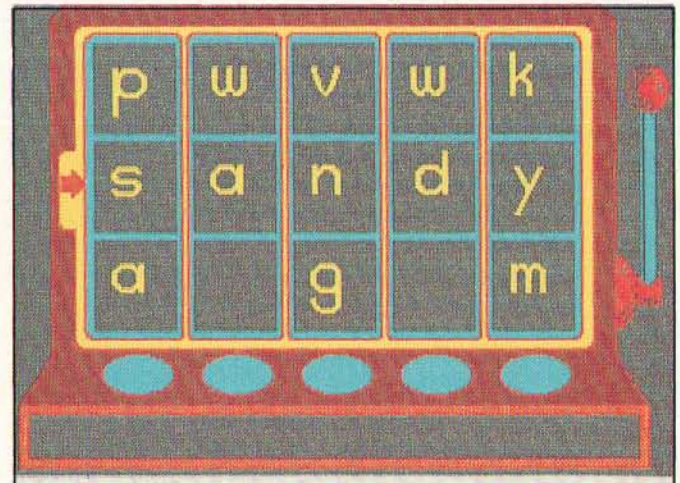
The first option offered on the main menu is Search and Sort, which in turn offers Search, Sort, Display, Sample or



2. The "temperate triangle" – a diagram on the BBC Micro used to show vegetation cover and rock hardness (amongst other things)

Select a New File. The simple search option is always menu based, while a complex search can be undertaken by any of the three methods mentioned above. As with any program which requires frequent access to data on another disc, a dual drive makes life easier. In addition to the basic word and numeric fields, Key can use a number of additional field types, like date, decimal, map co-ordinates, free text, which are available to advanced users. The only niggles I found in this section were the fact that the <Break> key hasn't been disabled and the occasions when I had to continue with a selected option although I knew I'd made a mistake because there's no <Escape> option at that point.

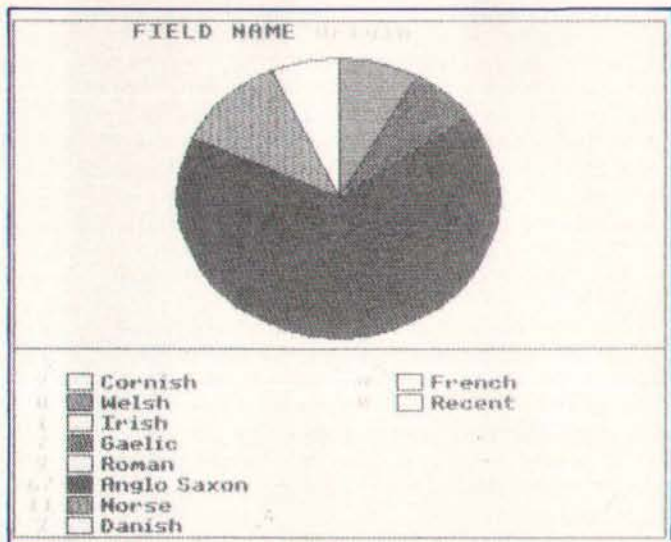
At the simpler level, creating and amending a datafile is a comparatively straightforward exercise. When all the fields have been entered the program calculates the maximum number of records which will fit onto the disc. If the number below the maximum is set, it's possible to alter this figure through the amend option, also to alter the number of records, fields and field types.



3. A slot machine - with a difference!

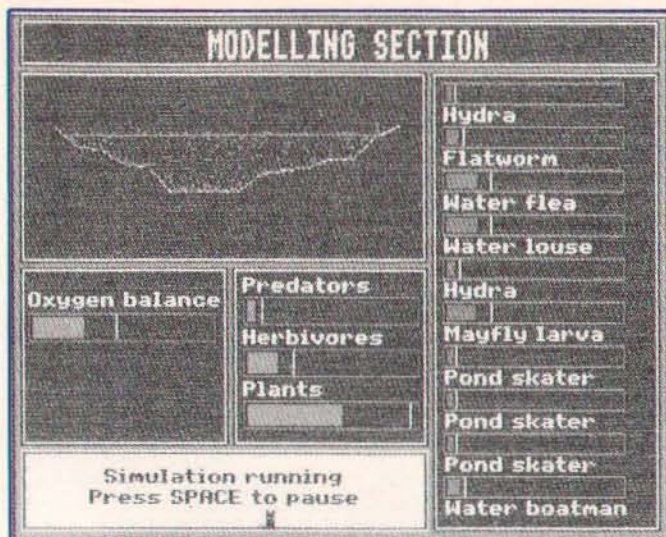
The display options, which are offered automatically following the completion of any search/sort routine or accessed directly from the search/sort menu, really are quite impressive. "Display Records" does just that, with <Space> being used to scroll through the records. If there is a graphic related to the record, pressing <Tab> displays it, while "P" prints it, but more of that later. "Graphics and Statistics" offers pie and bar charts, Venn diagrams, scattergraphs and statistics (mean, median, standard deviation, Spearman's R, and Chi square), but not a line graph for some reason. "Display Map": Some records may contain map co-ordinates and these can be displayed on a map. "Print Records": A dump facility is also available in all the other options, which gives a quality printout of all the displays.

Some excellent examples of the graphic facilities have been incorporated into several of the other database packages reviewed later, eg the map from Bug Hunt (Scientific Eye) and the graphics from the Pondlife and Birds (Science - Start Here!) packages. It is possible to add these facilities to your own data files - using the cursor keys, an AMX mouse (providing an AMX Art ROM is present in the machine) or a Grafpad. Personally, I find the Grafpad easiest to use, but even so it's a time consuming exercise and, as there's no screen grid, fixing co-ordinates for maps is not easy - at least I didn't find it so! I suspect, therefore, that these facilities will be best used in data files produced commercially or by those with some expertise!



4. A Pie chart displaying distribution of races

The manual is well-presented, making good use of an inverted font style for highlighting. While the contents pages are detailed, a manual of this size really needs an index. I'm not renowned for the careful reading of manuals, which sometimes causes more time to be wasted than saved, but do read the note on page seven about returning to the original file after carrying out a search, otherwise the records which fulfilled the previous search conditions will be retained! The handbook makes use of a series of headings to illustrate the facilities offered. Unfortunately, it fails to provide a sample file to match - in fact it doesn't have one at all! Instead it refers users to the Placenames datafile as a sample file, which may or may not have been purchased! As this costs only £1.95, I think it really should have been included in the KEY pack or, preferably, a small datafile to match the sample in the handbook, which can be searched fairly quickly.



5. Simulating a pond - note the various life forms up the side of the screen

should have been added. However, these are really minor criticisms of a very valuable package, which is already well supported with datafiles linked with quite a number of ITV's programmes, but don't expect another giveaway!

A KEY Utilities disc is available which enables users to convert datafiles created on other databases to be used on KEY, eg ASCII, QUEST, QUESTD and FIF formats.

Pond Life (A Place to Live - Granada)

A Place to Live is a series of programs aimed at the 9-13 age range and looks at natural history in "ordinary surroundings". This package is intended to aid the study of pond and stream life and be of use with both older and younger age groups than those indicated above and used with or independently of the TV programmes.

The activity pack which comes with the software is a very impressive and helpful resource - as it's available separately, it's well worth purchasing independently for any school's resources even if you haven't the cash for or the interest in the software. It includes an excellent teachers' guide packed with ideas for a project on ponds or streams, which will save any teacher many hours of work, a set of 60 well-produced A5 double-sided cards giving diagrams of and information about a selection of the most common freshwater plants and animals, a series of keys for identification, and some instruction/work sheets.

The software consists of two discs. The first offers the Identification and Interrogation options, while the second holds the Pond-modelling option. All three are available through the main menu which appears after the printer options have been selected. With the identification option, a series of questions is posed, eg How long is the body, has the creature got a shell, how many body sections does it have? When all the questions have been answered, five answers are possible: a single picture indicating a precise identification; 2, 3 or 4 pictures indicating the answers have been precise enough to reduce the possibilities with an option to view any of them; a list of creatures with an option to view - more than four alternatives are possible from the answers given; no creature fits the description, or too many "don't knows" have been selected. Unfortunately, it's not possible to add to the file, which some might consider is a weakness of this type of database. When a single picture has been produced, the use of the <Space> allows the drawing

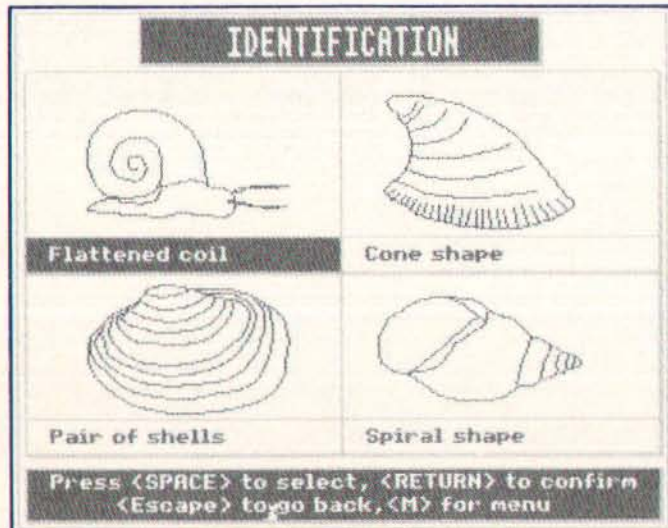
to be annotated, while pressing allows the datafile to be interrogated. This option is also available from the main menu.

Interrogating the file using the menu-based system is very simply achieved using <Space> to select the field, while <Return> commences the search. When this has been carried out, the screen indicates the number of matches found with an option to list them or view pictures of them. Then an opportunity is given to narrow down the search by selecting a second field.

For any group of youngsters from the age of eight up undertaking a project on pond life, the database with its simplicity of operation, detailed information and good illustrations together with the excellent activity pack mentioned earlier, will make a valuable contribution to the work. The success of the third part of the program, the pond/stream modelling, will depend to a great extent on the quality of work and depth of understanding in the earlier options.

A pond or a stream can be modelled, with an opportunity to decide on the length of the pond or the cross-section of the stream. The basic shape of the cross-section can be altered using the arrow keys and a water level selected. The types of vegetation and the animal species (max. 10) in the water are selected and indicated on the screen-display by bar graphs. Having all the information available on one screen is both a strength – simplicity of operation – and a weakness – the overall dimensions of the cross section remains the same and the scale is such that the plant life is not particularly effectively represented. I suppose youngsters should be given the opportunity to learn from their mistakes, but perhaps an occasional question poised at the right moment, eg if a group decides to fill a stream with sticklebacks and nothing else, might save an "ecological disaster"!

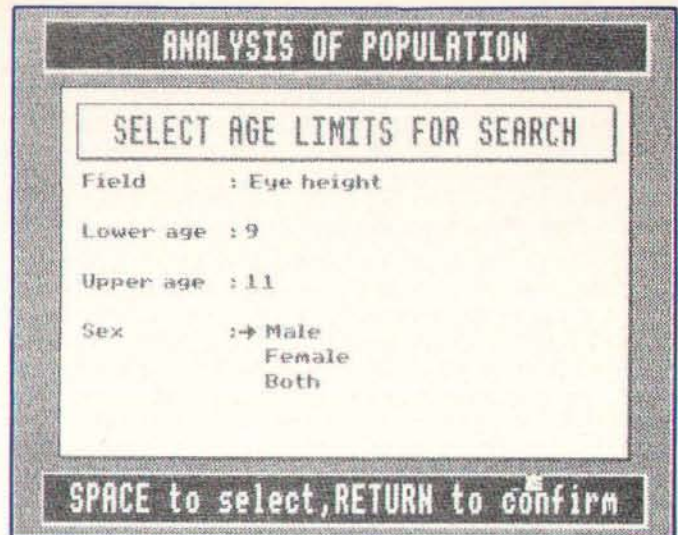
A secondary school colleague, not best-known for his interest in computers, said he thought this was the best science software he'd seen to-date. If it's good enough to encourage him sufficiently to use a computer, then it must be good!



6. Identifying different shells

Science – Start Here!

My first reaction when I saw the titles of the software produced to support this series was that I'd seen them before, many times. This is not surprising, as they are popular projects in primary/middle schools and many databases/files have been produced to go with them.



7. Searching with the database option

Of course, if you've got a dedicated database on one of these topics already, or have set up your own datafile using programs such as Junior Find, Grass, DIYBase, you may think that your money might be better spent on something else. I must admit my initial cynicism soon disappeared when I saw what the programs offer and the way they are presented.

There are two packs: the first contains three separate programs – Weather, Birds and Myself; the second has one program – Food. Each pack is available separately, but have the handbook in common. I looked at Myself in some detail.

The first thing to note is that although this is a dedicated database with fixed fields, one of the options on the main menu gives access to KEY for further work, eg searching and sorting, additional graphical displays and statistics. It includes data derived from a country-wide survey so that youngsters have some very useful information which can be used for comparison. Also, it can be used as a useful tutorial and enables a group of reasonably computer literate eight year olds to handle the program with very little interference from the teacher.

Access to this is through the Analyse Data (Population) option on the main menu. Several further menu options, usually selected by using the <Space>, the category, eg height, weight, reach, etc, age limit, sex, data type, eg class, UK, both, lead to an attractively produced bar chart display of the information.

The *Enter Pupil Data* option requires personal data, (sex, age, etc) in order to compile a range of block chart displays and measured data. The screen display illustrates clearly the measurements required, so that once again very little input from the teacher is required.

As mentioned earlier, there are two other databases in this pack. **Weather** includes three sets of information compiled from Met offices in various parts of the country since 1968 and allows users to record weather data on temperature, rainfall, hours of sunshine, wind and cloud cover. **Birds** has been extended from a simple data-recording system to enable users to consult a much simplified bird identification key which allows them to correctly name 13 common urban birds drawn from ten species and can print out a simple drawing of the bird, labelled to show the distinctive features. It also invites users to record information on observer data. The Food program in pack two considers the relationship

between the food we eat and the general health of our body system.

Many teachers and pupils fight shy of database work, often being overawed or simply finding it uninspiring. These programs, like the Castle and Manor packs from Resource, help to overcome these problems.

The Micro at Work (Granada)

If you're into a problem-solving approach then some of the most interesting software from ITV accompanies the **Micros at Work** series. "The programs relate directly to the more sophisticated applications shown in the films, thus aiming to help bridge the gap between the computer industry, commerce in the classroom." At the time of writing four packs have been published, with a fifth pack, "an easy-to-use desk-top publishing package for primary schools" expected in February (pre-publication publicity calls this Newsdesk, but this will be changed before it is released). Pack 2 (Routes, Postman, Robots, etc), which probably is the most suitable for use with the younger groups, is no longer actively promoted but is still available.

Lemon
Blue
Pale Blue
→ Lilac

SPACE
to change colour
RETURN
to continue

Description : Jogging suit.
Details : Cotton lined. Gathered cuffs
and ankles.

8. The shape of things to come? Colours are cleverly used with this package

Mail Order

Mail Order is designed to enable pupils in the 9-13 age group to create and control their own mail order catalogue, giving an insight into the decisions to be made about purchasing, pricing and selling goods. Disc two contains a wholesale catalogue of 60 sports goods and leisure-wear in a range of colours and sizes - From this disc, using the set-up option, retail catalogues and customer budgets can be set up by the users or generated by the computer. For this you need blank formatted discs - ensure this before you start, otherwise it's back to the beginning! This option also allows for the restocking of the wholesale catalogue and configuring the computer. The latter option caused me some concern because, despite the fact that I set the program up to work with a double-drive it still insisted on one occasion that the retail catalogue be transferred to Drive 0!

The catalogues can be displayed on the screen so that the user can view the goods in colour (with a neat option to change the display to match any of the colours available) in addition to obtaining the more typical datafile information such as catalogue number, size, colour, price etc. Printer options are available at

all important stages in the software and this allows catalogue pages, invoices and accounts to be printed - the handbook also includes photocopy masters.

Most of the work is expected to take place away from the computer and at the more advanced levels users can make up their own catalogues of items they think will sell and set about designing their own printed catalogues and other advertising materials, and making up their own wholesale catalogues. Back at the keyboard, it's possible to amend prices, so one group might like to see the effects of a sales week or special promotion, while the search option enables pupils to use the facilities in Key <RI> (on Disc One), which permits simple or complex searches of the wholesale catalogue to find items available in, for example, specific colours and/or size. They'll need to be warned not to waste time trying to use many of KEY's display options, which are not available!

The introduction to the handbook states that the software can be used at a variety of levels. "At the simplest it is within the reach of most primary school children; at its most sophisticated - when groups operate two competing retail catalogues - it provides a realistic business simulation which will tax students in the upper secondary school." While many of the concepts involved in the program are, generally speaking, more applicable to the upper range of the ages indicated for this program, it's the type of material which offers an interesting challenge to the brighter youngsters in the upper primary ages. Certainly, they'll find it more stimulating than several pages of money sums!

Dining Room £ 4,242

£21 £17 £38 £45

9. Design a room - with a BBC Micro!

Travel Agent/Air Traffic Control

This pack has been available since 1985. The Travel Agent program simulates the computer systems used by travel agents and tour operators. Individual decisions can be made about planning a holiday, costs can be calculated, choices discussed. Then, when the pupils try to book their holidays they are faced with the problems of unavailable flights and insufficient accommodation.

Air Traffic Control allows pupils to act as air traffic controllers facing an emergency which necessitates landing a number of aircraft safely at diversion airports. These have to be chosen according to the amount of fuel available and the distances to be flown. There are

three levels of difficulty ranging from little use of the computer to complex decision-making using the micro.

For those schools which haven't purchased any of these programs, there's a special offer pack available giving a very useful discount see the Factfile for details.

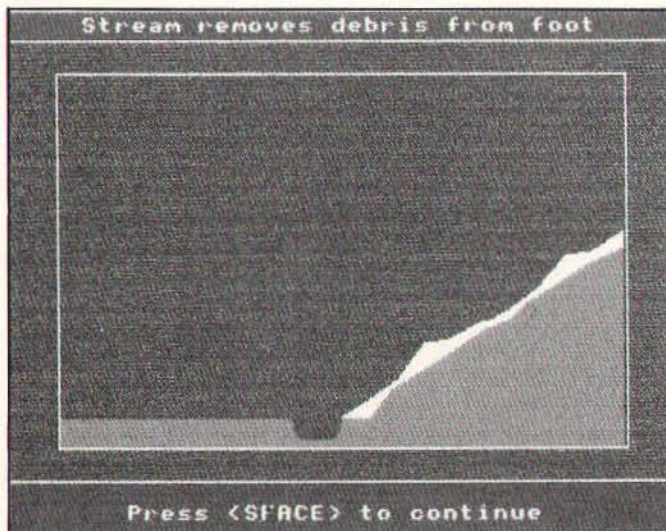
Slopes (Geography Today – Granada)

This series of TV programmes is intended for A-Level students. *"They adopt a problem-solving, hypothesis-testing approach using field-work techniques to collect and analyse data and, where appropriate, relate this data to general models."*

The first three options on the menu allow data files to be loaded, created or amended and gives the option of using a double-sided or twin disc drives. In the create option, up to 100 profiles may be entered – with up to 20 entries each – and these are displayed in table form which can be scrolled across the screen. Angles are entered from the base of the slope and can be between 0 and 60 degrees in subdivisions of 1/2 a degree.

The slope profile option will draw, in turn, the profiles contained in a given file and measure the degree of concavity or convexity of the slope. This and the histogram option requires information loaded in from one of the two datafiles provided or any datafile created as a result of field work.

The slope development model allows the selection of environmental factors which affect slope development and then shows graphically the ways in which slopes change over a period of time as they respond to these factors. Having selected this option you are asked whether you wish a stream at the base or whether you wish to have a straight or complex slope. If a straight slope is requested, you're given an additional option of selecting the slope (0 – 30 degrees); while a request for a complex slope leads to a further option of accepting a "default" slope or adapting it to your own requirements – using the cursor keys.



10. A study of erosion

The environmental factors – rock type, climatic conditions and vegetation – are very effectively displayed and can be altered very simply by using the function keys to select and the cursor keys to alter. After selecting the time element required, the slope development is displayed on the screen and can be stopped for discussion at any time using the

<Spacebar>. At the end of the time interval selected, the full pattern of slope development is retained on the screen until the <Space> is pressed, when the final slope shape is displayed, ie the eroded material is removed.

Pressing <Space> again gives further options: new environmental conditions while retaining the existing initial slope; a new slope; or return to the main menu. The first of these options returns you to the triangular graph. Unfortunately, for those who may wish to perform a series of experiments adjusting perhaps just one of the variables at a time, you are returned with everything reset to the default values. As there are no accurate scales available, there is an element of guess work in resetting the values.

Personally, I have always enjoyed physical geography, and I found this an interesting program which meets its aims admirably. There are two other programs in the series, Rivers, which allows the user to create, examine and modify river models on screen, and Status, a statistical package which includes all the main statistical tests needed for the analysis of geographical relationships. A Status Statistic Manual is available as an extra.

Conclusions

At a time when software houses are looking at the situation post-DTI software support, and not feeling too happy about it, we'll be looking to the BBC and ITV companies for more and more software linked to radio and TV programmes at reasonable prices. I was involved several years ago with the early telesoftware trials and I note that the BBC are putting out some of their programme notes on CEEFAX – gone are the days of 6d teachers' notes and 8d pupils' pamphlets! – so is it wishful thinking on my part that before long educational software from BBC and ITV will be available through CEEFAX and ORACLE?

Next Issue

In the May issue of A&B Computing I will be looking at even more releases from "ITV Software". These packages include "Shape Up", "Wordspinner", "Mr Magus is Waiting for You", "Design a House" and "The Years of Change".

These packages are available from the supplied address in the Factfile (below) – they represent packages from Thames, Yorkshire and Granada ITV software divisions.

Factfile

Unless otherwise stated, the software reviewed in this article is available to educational establishments through the normal channels for ITV materials. Others should contact ITV Association Ltd, 6 Paul Street, London EC2A 4JH. All prices quoted include VAT.

- KEY costs £4.95 (KEY Utilities cost £1.73).
 - Place Names £1.95 Science – Starts Here! Packs 1 and 2 £7.95 each PondLife £18.85 Scientific Eye £25.00
 - Micros at Work:
 1. Travel Agent/Air Traffic Control £13.90
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Memory

The Z88 comes with 32K of RAM built in, of which around 20K is available – enough for about 2,000 words of text. This is easily expandable to 416K by simply slotting in additional RAM packs (see back cover). With the introduction of soon-to-be-released 1 Mbyte packs, total RAM of 3 Mbytes will be available – enough to hold the complete works of Shakespeare.

Keyboard and display

The Z88 has a full QWERTY keyboard with virtually silent, short-travel keys. It includes special function keys, such as \diamond , \square , INDEX and MENU which make it exceptionally easy for novice users to quickly find their way around the sophisticated built-in software.

The screen is a state-of-the-art supertwist LCD, which provides a massive improvement on normal displays in both contrast ratio and viewing angle – providing a clear, sharp read-out. The screen's format is 8 lines x 106 characters, and provides a large working area of 8 x 94.

The remainder of the screen area consists of sections which hold menu details (including all the Z88's commands); a unique page map (which shows you where you are on a complete page); diary date; filing and directory details; and operating system details which give you information on the Z88's status (such as battery strength).

Software

The Z88 comes with a built-in suite of applications software, which is exceptionally capable, yet extremely easy to use.

The operating software, OZ, allows you to switch between, for example, word processing and spreadsheet applications – without the delay of loading separate disk-based software into the computer's memory. With the Z88, it's just a matter of pressing a couple of keys.



Built-in applications software includes *Pipedream*, which features word-processing, spreadsheet and database functions.

Word Processing Facilities include block marking and movement, searching and replacing, and multi-column layout. The display is fully WYSIWYG (What You See Is What You Get), showing bold, italics, underlining, centering, and dynamic page breaks as they appear on the printed page. Each page of the document is represented by a page map which shows the layout of the text.

Spreadsheet Invaluable for financial planning, this application allows you to define a series of formulae within cells (where a row and a column meet) and then to enter a series of numerical variables for manipulation. It allows profit and loss, cashflow and budgets to be quickly and easily arrived at.

Database This works on the same principle as spreadsheet – so data being stored for later retrieval is held in a known cell where it can, for example, be manipulated into ascending sequence.

Diary The Z88 diary software is a free-form

log that can be configured in any way you choose, within the constraints of the Z88's memory. It's particularly useful when used with the Z88's calendar and clock to find dates and set alarms.

Popdowns include a powerful calculator, clock, calendar and alarm. A printer editor allows you to configure Z88 codes to match a wide range of printers, and to store printer definitions if you're using more than one type.

Resident programming language is BBC BASIC with assembler. Communications to the outside world are achieved using a VT52 terminal emulation mode or the Import/Export facility which allow transmission and receipt of data files between the Z88 and other PCs.

Power supply

The Z88 runs on four commonly available AA batteries, which provide around 20 hours of active computing, or a year on standby mode. Switching off puts the Z88 into standby; all data in RAM stays live, drawing minimal power from the Z88's batteries. And when the batteries need to be changed, a special capacitor (or the mains adapter) preserves the data.

CONTINUED ON LAST PAGE OF ADVERT ▶

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(65C102 replaces the original Acorn 6502 2nd Processor)

This amazing package consists of the Acorn 65C102 'Turbo' Board, the Watford Co-Pro Adaptor and Acorn 1.2 DNFS ROM. The 'Turbo' board, running at 4MHz with 64k of additional RAM will increase the speed by between 50 and 200% depending on the application running, and allow a BASIC program of upto 44k in any screen mode. Simply by plugging in the Co-Pro and the DNFS ROM with its special Tube host code and you massively increase the power of any Model B.

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To use other co-processors you require a BBC B with DNFS 1.20 or higher, or BBC B+ fitted with 1770 DFS 2.20 or greater. Co-processors work exactly like a second processor.

Master owners may use Co-Pro to add a second Co-processor externally.

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NEW

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Some of the PCB Designer's features are:

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The above is only a taste of the superb features of this software, surely capturing previously unknown performance from the BBC Master computer. BBC B owners will need to fit at least one block of sideways RAM, Shadow screen memory and a disc drive. A trackerball or a mouse is also required.

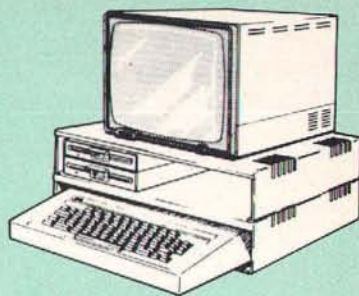
BBC PCB Designer is supplied on a 32K PAL PROM and comes complete with two discs and a comprehensive manual containing examples and useful information on PCB design.

By the way, as a bonus, PCB Designer is also suitable for many other schematic drawing applications such as circuit diagram drawing.

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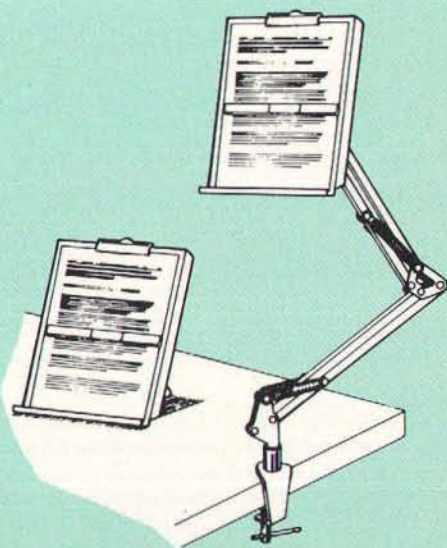


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- TAXAN 14" Multisync 770 Plus - An autoscanning Ultra high res, colour monitor. Ideal for Archimedes £449

- NEC JC-1401P3EE 14" Multisync Ultra Hi-res Intelligent Colour monitor. Auto scans frequencies between 15KHz to 35KHz. Text switch provides 7 colours for Database & wordprocessor. £495

- Philips BM7542 12" Paper White Monitor.
Attractively finished high res monitor. Has an etched glass anti-glare screen and a tilt stand for optimum viewing angle. 1000 x 850 pixels resolution coupled with high contrast makes it ideal for both word pro and graphics. The paper white display is ideal for DTP and CAD. Has a Video/Audio input.
Only £69

STAR BUY

- PHILLIPS 14" Hi-Res, dark glass, attractively finished Colour Monitor - supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display.

ONLY £195

ZENITH

"Now Test Bureau Recommended for use in Education"

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. (These are the same professional quality, stylishly finished monitors as used in the larger Zenith PC Sys.)

- Green (New Design) Hi-resolution £66
- Amber (New Design) Hi-resolution £70

N.B. carriage on Monitors £7 (securicor)

SPARE LEADS

- BNC Lead for Zenith or Philips £3
- Skart Monitor Lead £5
- RGB lead for TAXAN Monitors £3

SWIVEL BASES

for Video Monitors

Our professional type swivel bases have front adjustable control. This alleviates the need to lift the monitor when adjusting the viewing angle.

for 12" Monitors £9 (carr. £2.50)
for 14" Monitors £12 (carr. £2.50)

Anti-Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for all wordprocessor users. Hundreds of these screens are in daily use in various branches of one of the leading High Street banks.

£12

Acorn-Olivetti JP101 Ink Jet Printer

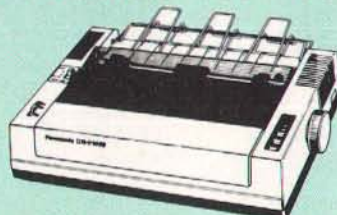
One of the main problems with most printers is that they are hopelessly noisy. How often have you wanted to print something late at night but not done so for fear of waking the children? Also ideal for those working in quiet environments such as libraries, etc. Silence the complaints with the serious solution from Watford at the amazing cost of only £59 (Offer valid while present stocks last)

JP101 accepts 9 1/2" standard fan fold paper or single A4 sheets. Tractor & Friction feed supplied as standard - print speed 50 cps.

Pack of 4 refills £10

Screen Dump ROM for JP101 £12

Panasonic KX-P1081



Attractively finished in BBC beige. Bi-directional, logic seeking. Has IBM and Epson RX compatible command calls. Speed: 120CPS draft mode, 24 CPS NLQ mode. Character width range from 5 cpi to 17 cpi. Up to 40 downloadable characters. Functions include, Proportional spacing, Justification, centering and left & right ranging.

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us).

Special Price: £149 (carr. £6)

Optional RS232 Interface: £39

Panasonic KX-P1082

This superb printer is very similar to the popular KX-P1081 printer but at 160 cps (40 cps in NLQ), a lot faster.

(Our LOW price also includes £35 worth of FREE BBC Cable and Dump Out 3 ROM).

Introductory Offer: £175 (carr. £7)

Panasonic KX-P3131 Daisy-Wheel Printer

This low-cost high-performance Daisy Wheel printer is ideal for anyone wishing to produce clear, immaculate letters or reports. It delivers, flawless text at 10, 12 & 15 CPS. Supports proportional spacing. Is Bi-directional, logic seeking. Printing speed: 17CPS. Has 6k printer Buffer. A printer of similar spec could cost a lot more than our ridiculously low price of:

Only £239 (carr. £7)

Single Sheet Feeder £175
Tractor Feed £90

FREE 32K extra Printer Buffer with every KX-P3131 purchased from us this month.

NEC P2200 PINWRITER

24 pin head; 168 CPS, LQ 56 CPS, 8K Buffer, Tractor/Friction feed. Numerous typefaces.

Cut Sheet Feeder £285
£59

NEC P660 PINWRITER

24pin; 216 CPS, LQ 76 CPS, 8K Buffer

£425

VARIOUS PRINTERS & ACCESSORIES

- Brother HR15 RS232 Daisy Wheel £275
 - Brother HR20 Daisy Wheel £349
 - Epson EX800 Printer £395
 - Epson EX1000 Printer £539
 - Epson FX800 Printer £295
 - Epson FX1000 Printer £399
 - Epson LQ800 Printer £399
 - Epson LQ850 Printer £439
 - Epson LQ1050 Printer £529
 - Epson LQ2500+ Printer £790
 - Epson LX800 Printer £186
 - Epson SQ2500 Printer £899
 - Epson Paper Roll Holder £17
 - EX800/1000 Colour Option £55
 - EX800/1000 Colour Ribbon £18
 - EX800 Cut Sheet Feeder £130
 - EX1000 Cut Sheet Feeder £195
 - FX/LQ/LX800 Single Sheet Feeder £135
 - FX/LQ1000 Single Sheet Feeder £169
 - Hi-80 Refills - Set of 4 Pens £7
 - LX800 Cut Sheet Feeder £75
 - LQ800 Tractor Feed £44
 - LQ1000 Tractor Feed £50
 - LQ2500 Cut Sheet Feeder £195
 - LX1000 Cut Sheet Feeder £305
 - Hitachi 672 Colour Plotter £475
- (Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer.

RS232	£27	RS232 + 2K Buffer	£52
IEEE 488	£65	RS232 + 8K Buffer	£62

KAGA/TAXAN PRINTERS

(IBM/Epson compatibles)

Kaga KP815 Printer	£249 (carr £7)
Kaga KP915 Printer	£350 (carr £7)
RS232 Interface.	£49
RS232 Interface with 2K Buffer	£69
RS232 Interface with 16K Buffer	£89

INTEGREX COLOUR JET PRINTER

- Colour Jet 132 Printer £525
- Paper Roll £6
- Screen Dump Software £10
- Colour Cartridge £14
- Black Cartridge £8
- 100 A4 OHP transparencies £55

PRINTER SHARERS

(Ideal for School environment)

Connects	Serial	Centronics
2 BBC Micros to 1 Printer	£25	£27
3 BBC Micros to 1 Printer	£36	£35
6 BBC Micros to 1 Printer	-	£99

PRINTER CHANGER

3 Printers to 1 Micro (Centronics) £65
(Cables extra, specify type required when ordering)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed

and re-fold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

£26 (carr. £2.50)

THE EPSON RX-FX-KAGA PRINTER COMMANDS REVEALED

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 RX-FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible Printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from BASIC and Wordwise.

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.

£5.95 (No VAT)

PRINTER LEADS

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

Standard length (4 feet long)	£6
Extra long (6 feet long)	£8
Compact's Special Centronics Lead	£9
RS232 Cable	P.O.A.
IBM Parallel 1 metre Cable	£9

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	Ribbons	Dust Covers
BBC Micro	-	£3.50
BBC Master	-	£4.00
Archimedes Micro pair	-	£9.00
Brother HR15/20	£3.00	£5.00
EX/LQ800	£7.50	£4.50
EX/LQ1000	£8.00	£5.00
RX/FX80/85/800/MX80	£4.00	£4.95
RX/FX100/1000	£7.00	-
Kaga/Texasan KP810/815	£5.25	£4.00
LQ2500	£9.00	£5.50
LX80/86/800	£4.00	£4.50
M1009/GLP	£4.00	£3.75
Panasonic KX1080/81	£4.50	£4.75
SQ2500	£25.00	£5.50
Star NL10	£4.00	£4.50
Microvitec Metal	-	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Listing Paper (Perforated)

1,000 Sheets 9 1/2" x 11" Fanfold Paper	£7
2,000 Sheets 9 1/2" x 11" Fanfold Paper	£12
1000 Sheets 9 1/2" x 11" NCR 2 Part Fanfold	£19
1,000 Sheets 15" x 11" Fanfold Paper	£9
1000 Sheets true A4 Fanfold Paper	£11
2000 Sheets true A4 Fanfold Paper	£20
Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50. 2K Sheets £3.00

PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

MEGABUFFER 256



This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. It allows the computer to print 256,000 character in a short time thus freeing the computer very quickly. In short it makes light work of printing large documents, screen dumps, etc. It is extremely simple to connect. The features are:

- Low Cost, High performance.
- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatibility with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in test unit for both the buffer & your printer.

In conclusion it can safely be said that MEGABUFFER 256 is the ultimate printer Buffer for both the amateur and professional user.

Only £125 (carr £2)

OFFICE MASTER



CASHBOOK - A complete "Stand Alone" accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cashbook system and will provide you with a computerised system complete to trail balance.

FINAL ACCOUNTS - Will take data prepared by the Cashbook module and produce a complete set of accounts as following: Trial Balance with inbuilt rounding routine; Notes to the accounts; VAT Summary; Profit & Loss A/C; Balance Sheet.

MAILIST - A very versatile program. Enables you to keep records of names and addresses and then print, examine, sort and find them, all with special selection techniques.

EASILEDDER - A management aid software tool designed to run alongside an existing accounting system. Essentially a Debit/Credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information.

INVOICES & STATEMENTS - Greatly reduces the time and cost of preparing Invoices and Statements by storing essential information like customer names, addresses and account numbers. Has VAT routines and footer messages facility.

STOCK CONTROL - Allows you to enter stock received, stock out, summary of stock items and current holdings together with details of total cost, total stock to minimum level, units in stock ordering, quantity and supplier detail.

All this for only **£21 (Disc)**

OFFICE MATE



- DATABASE
- BEEBCALC SPREADSHEET
- BEEBPLOT GRAPHICS

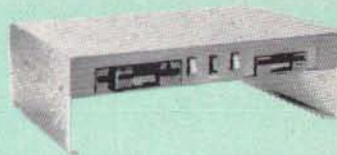
DATABASE - Set up a computerised card index system with powerful search facilities.

SPREADSHEET - Offers many calculation and editing features.

BEEBPLOT - Provides visual representation from Spreadsheet data.

OFFICE MATE Only £10 (Disc)

New Launch Offers Disc Drives DP35-800S



A Double disc drive - with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master Series is the 5.25 inch disk, the standard for the future will most certainly be the smaller, faster and more reliable 3.5 inch disks - now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system - called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk - leaving you more space to work with.

The 5.25 inch disk drive is 40/80 track switchable, and has its very own power supply running independently of the BBC Micro.

Watford's new plinth enables users to read, write and format disks both in DFS and ADFS format - currently the accepted standard for the Master Compact and the Archimedes, it also enables the user to read disks written for the Archimedes. Ideal for both BBC & Master.

Launch Offer: **£165 (carr. £7)**

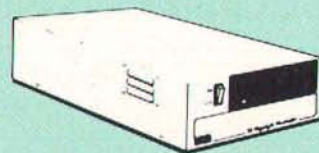
OKIMATE COLOUR PRINTER

The first ribbon transfer printer in its price range which offers fully versatile colour or black printing. A 24 element print head produces more than 100 shades with exceptional clarity. Ideal for use with Quest Paint or AMX Super Art.

Only: **£139**

BBC Screen Dump	£10
Colour Ribbon	£6
Black Ribbon	£6

30 Megabyte Winchester Drive



Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS - that's why we have bundled it with each Winchester drive, along with a full user guide and full utilities including file copy, 1000K save routines, Format and Verify - in fact all you need and more.

Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working - just compare the price with our competitors' 20 or 28 Mbyte discs!

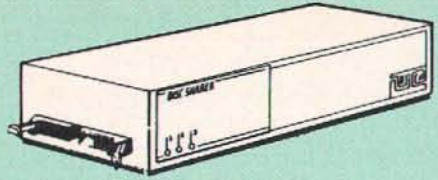
Compatible with the Master, and the BBC B (with 17" X disc interface).

Launch Offer **£449 (Carr. £12)**

At last, it's here!
**The Advance Reference Manual
for the BBC Master
£19.95**

NEW

DISC DRIVE SHARER



(Ideal for educational establishments)

At last, a low cost alternative to the Econet system. Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price: **£59** Price includes 3 Cables

NOW WITH EXTRA FEATURES AT NO EXTRA COST – Watford's latest DFS 1.44

- Incorporates Acorn's Official Tube Host Code so that those with 2nd processors no longer need to waste a ROM socket on the DNFS.
- Option to DOUBLE the speed of BPUT and BGET.

If you already have the Watford Electronics DFS and wish to incorporate these new facilities then simply return your existing DFS ROM to us together with £5 remittance for an upgrade. Please pack the ROM securely and address the package to our Upgrades Dept.

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for five years and has gained a large following amongst serious and educational users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS). (not Acorn's 1770 DFS)

- Complete Disc Interface Kit including DFS ROM and fitting instructions **£52**
- Acorn's 0.90 DFS Kit complete **£54**
- DFS Manual (Comprehensive) (no VAT) **£6.95** (P.S. Our DFS manual is the only comprehensive Manual available for the BBC micro and covers both Acorn & Watford DFSs).
- Watford's sophisticated DFS ROM only **£16**
- We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only **£12**
- DNFS ROM only **£17** ● ADFS ROM only **£25**
- Watford's DFS is exclusively available from Watford Electronics and their appointed dealers only. Every ROM carries a special label with LOGO and serial number.

NEW

WATFORD's Mk II Double Density DFS INTERFACE

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our MkII DDFS board has been adapted to allow the use of Acorn ADFS as well.

Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!

If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00**.

- Special introductory offer **£39.00**
- DDFS Manual (No VAT) **£6.95**
- We will exchange your existing DFS Kit for our sophisticated DDFS for only **£25.00**

Please note, as the MkII DDFS is a hardware and software upgrade, it is not possible for existing Watford DDFS users to simply exchange their ROM for the new version.

SPECIAL DISC DRIVE/DDFS OFFER

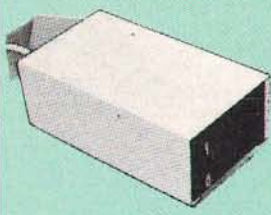
Type CLS400



- The popular Mitsubishi 400k Single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- Watford's popular DDFS Disc Interface (allows 720k storage). Will run in both Single and Double Density modes 40/80 track Software switchable.
- A comprehensive User Friendly Manual.

A Bargain at Only **£130** (£6 carr)
(Offer valid while stocks last)

3 1/2" DISC DRIVE OFFER



These top quality 3 1/2" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc. They run directly from the BBC B/Master's own PSU.

- Single 400K Drive **£69**
- Twin 800K Drives **£126**

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.

Then The Mysteries of Disc Drives and DFS Revealed is the book for you. It explains in detail the different types of systems available, how they are installed and how to use them. Many examples are given including pre-written programs to call various functions of the DFS available only through Operating System calls. Different types of disc, 40/80 tracks etc. are all explained. This book is ideal for the beginner confused by the plethora of choice available in the marketplace.

£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in antique brown leather look vinyl. Stores upto 20 Discs. Each disc can be seen through the clear view pocket.

£4

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use. Available in 3 1/2" & 5 1/4", please specify.

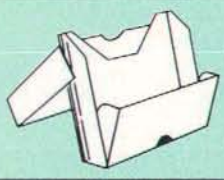
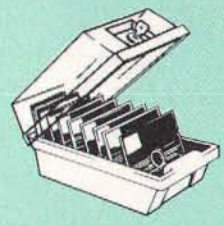
£7

ANTISTATIC LOCKABLE DISC STORAGE UNITS

Gives double protection – Strong plastic case that affords real protection to your discs. Antistatic helps avoid data corruption whilst in storage. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

- M35 – holds upto 50 5 1/4" discs **£6.00**
- M85 – holds upto 95 5 1/4" discs **£8.00**
- M25* – holds upto 25 3 1/2" Discs **£5.50**
- M50 – holds 50 3 1/2" Discs **£7.50**

* Not lockable



PLASTIC LIBRARY CASES

Holds up to 10 5 1/4" Discs. **Only £2.00**

DISC PLONKER RACK

When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the hazards of fingerprints, scratches, dust, coffee and an untidy desk.

Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. It holds up to eight 5 1/4" Discs.

Protection at Only: **£2**



DUST COVERS (For our Disc Drives)

- Single CLS (without PSU) **£3.20** Twin CLD (without PSU) **£3.85**
- Single CS (with PSU) **£3.95** Twin CD (with PSU) **£3.90**

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates capacity in single density mode. That within the brackets is the capacity in double density mode. All disc drive type numbers start with the prefix "C"

The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.

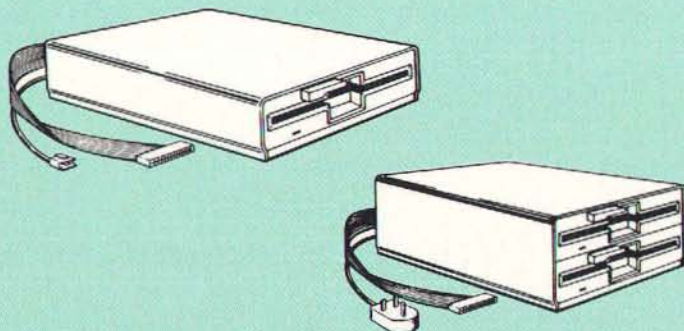
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.

Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packages" label other manufacturers drives with their own name). We buy the high quality JVC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. Ideal for Schools & Colleges. We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £5. (At Watford we anticipate your needs of tomorrow, not just today!)

When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space (your BBC, Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with Watford plinths. (Turn to the 6th page of our advert for the Plinths). P.S. All our 5 1/4" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
200K (360K)	CLS 200 £89		CS 200 £98	
400K (720K)	CLS400S £89	CLD 400 £168	CS 400S £99	CD400 £188
800K (1.44M)		CLD 800S £169		CD 800S £188

● TWIN Disc Drive Case, complete with Power Supply & Cables £43
Securicor carriage on Disc Drives £5 to £6

Prefix C = Cased Drive
L = Less PSU
S = Single
D = Double

Suffix S = 40-80 Switchable

e.g. CLS400S = Cased Disc Drive, Less power supply unit, single 5 1/4" 400K, (720K in double density); Double sided; 40/80 track switchable.

Cable to connect 5 1/4" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3 1/2" and 5 1/4" Disc
Drives
simultaneously to the BBC Compact £13

3M - DISKETTES

3M - SCOTCH Diskettes with Lifetime warranty from Watford Electronics your 3M Appointed Distributor.

- 10 x 5 1/4" S/S D/D 40 Track Diskettes (744) £8.00
- 10 x 5 1/4" D/S D/D 40 Track Diskettes (745) £9.75
- 10 x 5 1/4" S/S D/D 80 Track Diskettes (746) £12.50
- 10 x 5 1/4" D/S D/D 80 Track Diskettes (747) £12.75
- 10 x 5 1/4" 1.6M D/S D/D High Density Discs for IBM XT and AT £28
- 10 x 3 1/2" S/S D/D 40/80 track Discs £13.50
- 10 x 3 1/2" D/S D/D 40/80 track Discs £15



FREE This extremely useful and attractive Personal Leather Organiser worth upto £50 is yours when you buy from us, 5 Boxes of any of the 3M range of Discs that we advertise. Any of the above diskettes

TOP QUALITY 3 1/2" & 5 1/4" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box. We strongly recommend these Discs.

- 10 x M3 3 1/2" D/S D/D 80 Track Discs £15
- 10 x M4 5 1/4" S/S D/D 40 Track Discs £6.50
- 10 x M5 5 1/4" D/S D/D 40 Track Discs £8
- 10 x M7 5 1/4" D/S D/D 80 Track Discs £9
- 3" Double Sided Discs £3 each

Special BULK OFFER on 5 1/4" DISCS

(Supplied packed in Anti-Static Lockable Storage Units) (Lifetime warranty on Discs)



BULK PACK DISCS in lots of 100

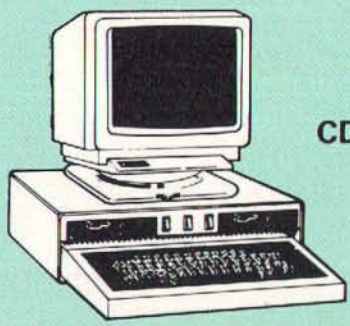
Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£35	£39	£45
● With Sleeves	£38	£42	£48

WATFORD'S WINCHESTER DRIVES



- 10 Megabyte Unit with ADFS £399
- 30 Megabyte Unit with ADFS £449
- 40 Megabyte Unit with ADFS £749

CDP800S



CDPM800S

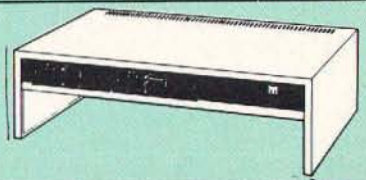
Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The switches are mounted on the front panel for ease of use.

CDP 800S for BBC Micro £192 (Securicor Carr. £7)
CDPM 800S for Master £196

(The above drive units are 2 Megabytes unformatted)

ACORN'S Twin 800K Disc Drives

Specially mounted side by side in a Master Plinth. Supplied complete with Cables. Plugs directly to the Master Computer.



RRP £350
Our Price: Only £175 (carr £7)

Continued

NOMINATED FOR



1987

QUEST MOUSE



QUEST MOUSE

The ultimate in Mouse technology, the Watford Electronics Quest Mouse must be the most powerful Mouse package yet produced for the BBC Micro. Featuring state of the art 32K ROM software the Quest Mouse package is filled with features essential to the budding artist. The Quest Mouse is a high precision, low profile and large footprint mouse. It has three large comfortable buttons and its RUBBER COATED STEEL BALL is smooth and easy to use on virtually any work surface. This also eliminates any directional bias that one encounters on the most well-known mouse for the BBC. The Quest Mouse is FULLY HARDWARE COMPATIBLE with the AMX MOUSE so that it will work with any of the AMX range of software.

The two parts of the Quest package are available separately so that existing Mouse owners can upgrade to the Watford's sophisticated Quest Paint software or replace their existing worn out mice for a minimum cost.

QUEST PAINT

The Quest Mouse software is supplied on a PALPROM unit to allow the sophisticated 32K program to be used from a single ROM socket. It is compatible with the BBC B, BBC B Plus and BBC Master Series machines.

The software is used to draw high resolution Mode 1 pictures in full colour. All menu selection and control of the drawing process is performed with the mouse so that you will hardly ever touch the keyboard.

SOFTWARE FEATURES

The software is far too powerful for us to describe it fully in such a small space. Below is a list of the various features. Please write to us for a fully descriptive leaflet.

Disk interface not required. Utilities disk has facility to create and print big screens. Colours applied can be solid, either pattern of user defined pattern. Drawing can use brush or airbrush. Brush shapes can be defined and stored. Airbrush sprays colour/pattern randomly with four jet sizes and even or center spread. Colour cycles. Colour protection to stop particular colours from being overwritten by selected drawing actions. All standard drawing facilities like: rubber, straight pencil lines, triangles, circles, ellipses, rectangles, parallelograms, polygons, etc are provided. All shapes can be solid or just a boundary line. Once a shape has been set up it can be repeated anywhere on the screen. Global colour replace in a rectangle. Powerful fill facility for areas and vertical/horizontal lines. Full cut and paste of rectangular areas with rotation and size with screens from Watford Beeb Video digitiser. Load and Save screens with colour pallet information, save brush and pattern definitions etc.

Take The Guesswork Out of Selecting a Mouse Package

With reviews like this how can you go wrong.

Popular Computing Weekly, 9-11 June '87

"What you actually get for your money is a well built, three button mouse (far superior to the AMX mouse)."

"Overall the combination of a quality mouse and decent art package gives Watford Electronics a real chance of supplanting AMX as mouse supremos."

Micro User June '87

"Quest Mouse and Quest Paint can hold their heads high in the market..."

A&B Computing June '87

"... Watford Electronics, a company famed for excellent hardware add ons and versatile software packages. Called Quest mouse, "this is a very special mouse driven drawing package..."

"... you will have one of the most comfortable and professionally built mice I have used in a long time. The buttons are responsive, the mouse movement is smooth and without directional bias - a pleasure to use."

"What we have here is probably the best art package there is for the BBC Micro..."

"Quest Paint is a major leap forward in BBC programming..."

"Quest Paint is an original piece of programming, it is friendly and well endowed with many useful facilities. I would comfortably say it is easier to draw good pictures with Quest Paint than it is with more expensive 'Professional' art packages for the Atari ST and the Commodore Amiga. A recommended buy if you are looking for the best in BBC micro based art packages"

Acorn User, September '87

"The mouse (Quest) performs well in the face of competition from AMX, Wigmore and the rest..."

"... this package represents excellent value for money. If you are interested in art then this program is for you to buy"

"Given time, I can see no reason why Quest Paint shouldn't take on the title of the definitive art package available for the BBC Micro to date"

"All in all, Quest Paint is a very professional package. It contains virtually every feature the budding artist could require"

"What makes Quest Paint so versatile is the addition of a sub-menu which allows you extensive control over each function"

"Until recently, Superart from AMS had been judged as the definitive mode 1 graphics package for the BBC micro. But now it has a serious rival in the form of Quest Paint, from Watford"

"As a measure of what is contained within Quest Paint, I would say it had all the features of Superart plus..."

"In most art packages, provision is given for drawing triangles and rectangles. Quest Mouse goes 14 better, allowing any regular polygon of upto 16 sides"

"One facility, not found on any other Art package to my knowledge, is the ability to access a digitiser from within the program". The reviewer concludes by saying, "The result is an extremely comprehensive and professional art package"

John Kilby, Head of Computer Science, Bishop Wulstan High School, Rugby, writes:

"Quest has been an excellent piece of equipment. The problem that seems to occur everyday is that at lunchtime the pupils rush to the computer room to make sure that they are first in the queue for the 'Quest' mouse"

Lt. Cln. C.G. Holton, G2 HQ 1 (BR) Corps, BFPO 39, writes:

"As ever your service is superb and the Quest Mouse proves every bit as good as the adverts claim"

Beeblet User Group, New Zealand Oct '87:

"One of its nicer features is that the top menu is done in Mode 0, the drawing itself is in Mode 1. Thus on screen together are two different Modes. A neat way around an old problem"

"PAN is used when a larger than one screen size image is required. The mind boggles at an A3 size drawing"

"I like it partly because of the mouse itself which is smooth and easy to handle but mainly I suppose because of the features I longed for and previously never got. Its easy to use with almost everything at your fingertips from the mouse. The software is simple where needed and complex where complexity is required"

ConQuest

Watford's Quest package is an extremely powerful and flexible drawing package, with very wide and unusual features. However, since its launch various suggestions for even more advanced & powerful facilities were received from the Quest users. ConQuest allows you these more advanced facilities, like, distortion of a cutout to any shape and a full font designer. If you also have a GXR ROM in your machine or you are using a BBC Master then ConQuest will take advantage of this to give ellipses at any angle, sectors and arcs, etc. Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- Pick filenames off the screen for loading and saving.
- Rotate a cutout to any angle and Distort it to any four sided shape.
- Has Built in Font editor.
- Default brushes and patterns on startup.
- 16 x 16 font available on start up.
- Ability to reset patterns, fonts and brushes to default at any time.
- ROM based enhanced Epson and compatible printer dump.
- ROM based enhanced extended picture routine.
- Ability to create and abort extended pictures.
- Improved disk access speed for extended pictures.
- User definable sideways RAM driver for incompatible sideways RAM systems.
- Ellipses at any angle on Master 128 (or B with GXR ROM).

QUEST MOUSE & QUEST PAINT	£59
QUEST MOUSE, QUEST PAINT, AMX PAGERMAKER & PAGEFONT	£85
QUEST MOUSE ONLY	£29
QUEST PAINT SOFTWARE	£32
QUEST FONT DISC	£12
ConQuest 32K ROM Package	£29
QUEST MAT	£3
Part-exchange your old Mouse for a New QUEST MOUSE for only	£23
GXR ROM for BBC Micro	£22

N.B.

1. Quest Paint supplied complete with Software in a 32K ROM, Comprehensive User Guide and a Utility Disc.
2. Quest Font Disc has 22 text FONTS for use within Quest Mouse.

MARK II LIGHT PEN

Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted.

Price Only £21

(Price includes FREE software Disc and Operating Manual)

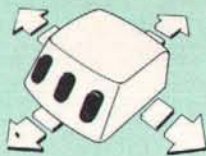
RB2 Marconi Tracker Ball

RB2 (AMX/Quest compatible)	£59
RB2 including Quest Paint	£85

FLEET STREET EDITOR

Software pack for BBC Micro	£31
Software pack for the Master	£39
Software Pack for Compact	£40
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

THE NEW Mk III AMX MOUSE



ONLY: £59 Inc. Super Art package
(carr £1.50)
(Please specify for BBC, Master or Compact)

FREE our popular Colour Art software pack worth £15 with every AMX Mouse package purchased from us.

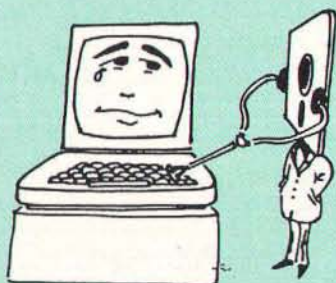
AMX MAT	£3
AMX MOUSE ONLY	£29
AMX DESK Package	£19
AMX UTILITY Package	£11
AMX SUPERART Package	£39
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32

We are giving away absolutely FREE, our PAGE-FONT disc with every purchase of STOP PRESS from us.

PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker **£9.50**

AMX DESIGN (ROM)	£59
AMX 3D ZICON Disc	£19
AMX Database Disc	£19
AMX XAM Educational	£15
AMX EXTRA EXTRA	£19
AMX MAX A gem of desktop (ROM)	£15

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

Coming soon WAPPING EDITOR

Watford Electronics brings the 'Freedom of Press' to your fingertips, with this most sophisticated DTP software ever written for the BBC range of Microcomputers. Wapping Editor utilises the latest technology, 64K! PAL-PROM device to complement our range of QUEST MOUSE based software. Contained within the PAL-PROM is all the software you require to publish your own newsletters and magazines:

- Mouse driven drawing package
- Wordprocessor
- Font designer
- Page make-up
- Page review
- In-built fonts

DRAWING PACKAGE

Imagine Quest Paint in mode 0 – this is it! Even if you are not considering publishing your own Newspaper, the Wapping Editor is worth having for this graphics facility alone! As with Quest Paint, the package may be used in conjunction with the Watford BEEB Video Digitiser. Features of this section include: Sophisticated Airbrush; Block copy; Move; Mirror & Rotate; User-definable brushes; Circles; Ellipses; Polygons; Fill and of course ultra-smooth flicker-free mouse movement.

WORD PROCESSOR

One feature which makes this package stand out is the inclusion of a versatile word processor. It is now no longer necessary to buy an additional wordprocessor before you can start publishing, although of course text may be taken from other Word processors like, View, Wordwise, Interword, Edward, etc.

FONT DESIGNER

This is the enhanced version of the highly acclaimed Font Designer in our ConQuest ROM. Unlike those in other DTP packages, the Wapping Editor's font editor allows redesign of ALL the keyboard characters – including the space! Special routines have been included to allow fonts from other DTP products to be loaded and re-saved in Wapping Editor format. This designer may also be used to create brush shapes for the drawing package.

PAGE MAKE-UP

At last page layout is no longer a chore. With this user friendly system, text and graphics can be positioned anywhere on the page with ease. Using the mouse, simply pull out a rectangle over the desired area of the page, specify the filename of the text or graphic to be used and click the mouse! With text, the typeface, justification and number of columns you require may also be specified.

PAGE REVIEW

A simple way to view any stored pages from the disc. Pages are shown in a condensed format allowing a whole page to be displayed on the screen.

IN-BUILT FONTS

In addition to being able to create your own fonts, several attractive and useful fonts are provided within the PAL-PROM itself. These are always available for use. No more frantic search for a 'font disc'!

Extensive use has been made of the mouse throughout, keeping keyboard entry to a bare minimum. Filenames for loading pictures, fonts, pages and text documents are picked off the screen with a single mouse click. The entire package is contained within the PAL-PROM, making 'system discs' unnecessary. Unlike some of its predecessors, the Wapping Editor allows you to store pictures, fonts, pages and text documents all on the same disc, greatly simplifying disc management.

Designed to run on the BBC B, B+ and Master series computers, this program will make use of any shadow or sideways RAM present. With Wapping Editor, DTP comes of age on the BEEB.

Don't settle for LESS, buy the BEST.

TED

THE ULTIMATE TELETXT SYSTEM

TED is one of a new generation of powerful 32K ROMs for the BBC B, B+ and Master computers and is compatible with disc, tape and network systems. It is in everyday use in schools, colleges and universities. Programmers, Prestel I.P.'s, Micronetters and exhibitors have also found it indispensable.

TED includes the most comprehensive teletext (Mode 7) screen editor ever written for the BBC micro, combining flexibility with ease of use. Its sophisticated facilities include line, column and block copying within AND between frames; text, in a variety of styles and sizes, entered directly from the keyboard; graphics and line drawing modes; search and replace; margins; printer dump routines and a library of in-built icons and typefaces. TED will edit ANY mode 7 screen and can even convert high-res graphics screens to mode 7! Included within the ROM is a fully Epson compatible mode 7 graphics dump routine giving a grey scale printout of exactly what appears on the screen.

Using '*SHOW' (a versatile carousel), collections of mode 7 screens may be 'routed' or displayed sequentially, making it ideal for creating and running 'Viewdata' information systems. Over 1200 frames may be stored on a twin 80 track drive. A unique feature of TED is '*SCROLL', which lets you create pages of up to 600 lines which may be viewed 'Wordwise style', automatically or manually. SHOWs and SCROLLs may be freely mixed and even used from within a BASIC program.

The package comprises a 32K ROM, a 117 page manual, a function-key strip and a demonstration disc containing examples of real-time animation and a sample 55-frame database. A stand-alone machine code routine is provided allowing SHOWs and SCROLLs to be displayed on machines not fitted with TED.

Price: £35

ROM-SPELL

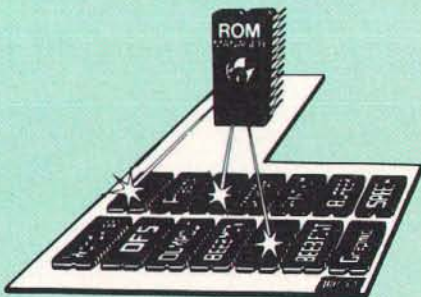


Probably the most advanced and fastest spelling checker available for the BBC Micro. Compatible with View, Wordwise and Wordwise Plus ROMSPELL is simple to use with easy editing of incorrect words. Full facilities for editing the user dictionary to allow customisation to your personal needs. Dictionary includes over 30,000 words and is supplied with a Comprehensive manual.

NOT compatible with 1770 DFS.
(Please state 40 or 80 track disc)

Price still only: £25

ROM MANAGER



Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs. Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

ONLY £20

Continued



ARIES CORNER

The Aries B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Comal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved *FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can also be used to extend any operating system buffer (such as the printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on your BBC micro - no flying leads to connect and no soldering. Provision of the on-board ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£80** (carr. £2)



CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Aries B-12 Sideways ROM Board

This board is extremely well made, simple to install, reliable when fully loaded and compatible with the Aries-B20 and the Aries-B32.

The B12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets for sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

The B12 system consists of two parts: a large detachable "mother board" which carries the extension ROM sockets and a small "base board" on a short ribbon cable, which plugs into the existing sideways ROM sockets. This two-board design eliminates the reliability problems previously associated with some other ribbon-cable based systems.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost.

Price: Aries B-12 **£40**
Aries B-12C **£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB' or 'HP-IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

All prices in this advert are
exclusive of VAT.

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● 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 lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for all professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY £15 (carr £2)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

- Complete System **£11**
- Spare Cartridges **£2.50**
- Spare Rack **£1.50**

16K Sideways RAM Modules

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector. Key points to note about this new addition to the Watford range of products are:

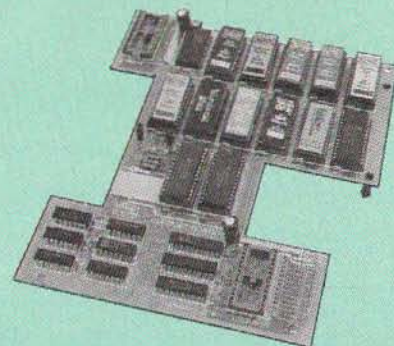
- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Ideal for professional software development.
- Supplied with utilities software disc.

Only: £18 (carr £2)

Optional extras

READ and WRITE protect Switches **£2** each
Battery for Battery Backup **£3**

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



In the May 1986 Micro User's independent review, the writer concludes, "The board has been well laid out. Its position is much better than others - not over the HOT RAM chips and further away from the disc controller area". "I give the solderless ROM board the thumbs up and wish it success".

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16.

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

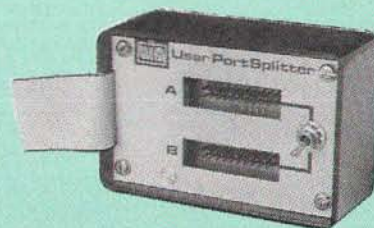
- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- No soldering required.
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish" allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£36**
(carriage £2)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

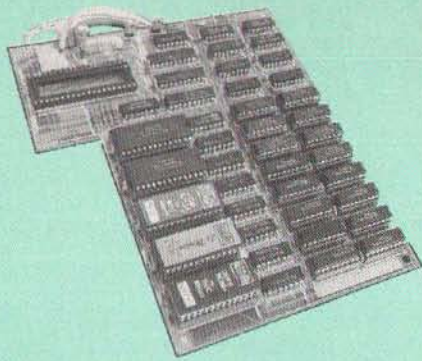
USER PORT SPLITTER UNIT



Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination.

Excellent Value at £21 (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with all BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

- ROM/RAM card with 32k dynamic RAM£39
 - ROM/RAM card with 64k dynamic RAM£52
 - ROM/RAM card with a massive 128k dynamic RAM£80
- (carriage on ROM-RAM Card £3)

OPTIONAL EXTRAS:

- 16k plug-in Static RAM kit£6
 - 16k Dynamic RAM for Upgrade£7.50
 - Battery backup£3
 - Read and Write protect switches£2 each
- Complete ROM-RAM board
All options installed£89

P.S.

Is your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford ROM/RAM Board and pay £5 less

Le Modem



The MODEM from Watford

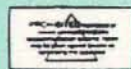
At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 & 75/1200 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- A complete communications terminal that transforms your BBC Micro into a very powerful World-wide data transfer system.
- Auto Dials, Auto answers, and is completely controlled by your micro. There are no external controls!
- Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.
- Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.
- Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELE-SOFTWARE to be downloaded.
- A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!
- FULLY controlled by simple "COMMANDS" allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!
- Connects to the 1MHz bus. A *AUDIO ON-OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.
- Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.
- Packaged in such a way that you need nothing else except a BBC Micro to communicate with computers all over the world.
- FREE Registration to MicroLink.

SPECIAL OFFER

Price: **£94**
(carr £3)



(Price includes, Le Modem, Software ROM, Cables & Comprehensive Manual)
(Write in for further details)

Minerva Systems Software

System Delta with Card Index	£55
System Programmers Ref. Guide	£19
System Gamma	£43
System Gamma Prog. Ref. Guide	£19
System Mailshot	£17
System Reporter	£17
System Intrer/View Link	£17
System Sales Ledger	£39
System Purchase Ledger	£39
System Nominal Ledger	£48
System Stock Management	£39
Order Processing/Invoicing	£39

APOLLO



The NEW Modem from Watford

Following numerous requests from you, our discerning customers for an APPROVED, Low Cost & High Performance modem with Auto Dial & Auto Answer facilities as standard) we bring you the versatile APOLLO Modem. Just compare the features and look at the price (which incidentally includes the cost of the Software, manual and BBC connecting cable). We are sure you will agree that Watford Electronics in their traditional way are giving you a super 'value for money' deal.

Just look at these features:

- V21 for Bulletin boards, Microlink, Telecom Gold, etc.
- V23 for Prestel, Home Banking, and other Viewdata services.
- Reverse V23 allows User run Viewdata service.
- 1200-1200 half duplex for communications.
- XMODEM, HEX and ASCII file transmission.
- Auto Dial of given 'phone number.
- Auto Answer for User's Bulletin Board.
- 80 column terminal with split screen facility.
- Prestel text screen dump.
- Fully BABT approved.
- FREE Registration to MicroLink.
- £6.50 off annual Membership to Micronet, Prestel and Telecom Gold.

The Apollo is attractively finished in matt black. It opens the doors to world communication to both, the Hobbyist and the Professionals alike. With baud rates varying from 300/300 Originate and Answer, 1200/75 and 75/1200 full duplex and 1200/1200 half duplex, virtually all the popular tele-services can be accessed. A comprehensive Comms ROM oversees the use of the APOLLO, providing simple commands for all the software controlled facilities. APOLLO is an ideal modem for both the first time buyer and the seasoned user. Join the Telecommunications Revolution - Buy a Watford APOLLO!

Only: **£94** (Carr £3)

Price includes, the Modem, Comm Software Cables & Operating Manual).
(Write in for full specification)

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£12
Delta 3B Twin Joysticks	£17
Delta 3C Joystick for Compact	£10
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc-Tape	£7

ATTACHE CARRYING CASE

For the BBC Micro. Attractively finished in antique brown leatherette. Lockable.
Only **£10** (£2 carr.)

Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE **£32** (carr £2)

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	£48
CARETAKER Basic Utility	£25
DISC DOCTOR	£28
Graphics ROM	£23
TERMI	£25
COMMUNICATOR	£49
SPEECH ROM	£24
Printmaster	£24

Wordwise

£24

Wordwise plus

£40

We are giving away absolutely **FREE**, the superb Word-Aid ROM worth £24, with every **WORDWISE PLUS** package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text-segment area.
- BBC B, B+ and Master compatible.

Only £24

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS DISC: £5

SPELL MASTER £45

Inter SHEET ONLY £37

INTER CHART

ONLY: £26

Inter-WORD

£38

MEGA-3 ROM

Interword, Intersheet & Interchart - 3 in one ROM

£85

INTERBASE £55

All Prices Exclusive of VAT

VIEW

VIEW WORDPROCESSOR 2.1 £35

VIEW 3.0 ROM £48

VIEW PROFESSIONAL £79

HI-VIEW £36

(for use with 6502 2nd Processor)

VIEW Printer Driver Generator £9

(Please specify Disc or Cassette)

VIEW SHEET (Acornsoft) £37

VIEWSTORE £39

VIEWSPELL with 80 track disc £29

VIEWPLOT Disc £22

(Please specify for Master 128 or Compact)

VIEW-INDEX £12

OVERVIEW Packs 1 & 2 for the Master £72

Watford's own Sophisticated VIEW PRINTER DRIVERS

Epson FX80 & Kaga KP (Disc) £8

Juki & Brother HR15 (Disc) £8

Silver Reed Printers (Disc) £8

Micros in Business (Disc)

An introduction to Business software for the BBC Micro from Acorn £43

ADVANCE COMPUTER PRODUCTS' ROMs

Adv. Disc Toolkit £29

Adv 1770 DFS for Mast/Compact £29

Adv 1770 DFS for BBC/BBC+ £29

Adv Disc Investigator £24

Adv. Control Panel £29

MINI OFFICE II

Disc Version £14.50

ROM Version £47.00

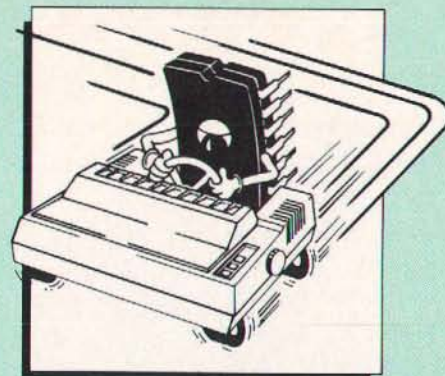
REPLICA 3

This new improved REPLICA 3 from Clares is a very powerful disc based TAPE to DISC Utility. It now transfers even more programs than ever before. Replica 3 will not work with all programs but then neither will anything else. 30,000 Replicas have been sold to date. It has to be good.

£13 (40 or 80 track)

Acorn's Speech Synthesiser package, complete
Special Offer £18

VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing only at a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redefinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute * command when printing.

Other features include a very powerful on screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

Price: Only £33

EPSON NLQ ROM

for the BBC Micro



Harness the full potential of your Epson RX or FX printer. The NLQ ROM makes Epson printers produce Near Letter Quality output with optional proportional spacing, enlarged and underlined. Accessed by simple * commands from Basic, Wordwise and View (with driver) or almost any other language.

(Send an SAE for sample printout)

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

£7

DUMPOUT 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 full Mode 7 graphics. Also provided are window setting utilities and OSWORD calls to plot and read Mode 7 graphics pixels.

Facilities:

- Vertical and horizontal scaling in all graphics modes and mode 7
- Rotation of image by 90, 180 or 270 degrees
- Left hand margin setting
- Screen dump window setting
- Colours appear as grey scale
- Two tone fast dump
- Colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered and User Port triggered dumps

The Micro User Feb. 1985.

"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC Micro... it must represent excellent value for money and surely cannot be beaten".

For use with the following printers:

GLP, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, M1009, NEC PC8023, DMP100/200/400, Panasonic KX1081/82, Männesman Tally and compatibles.

Only: £25

BBC SOFTWARE'S Popular Educational Software

- Maths with a Story 1 (Disc). 4 primary level maths programs **£11.25**
- Maths with a Story 2 (Disc) 4 further maths programs **£11.25**
- Picture Craft (Disc) 6 - 14 age group. Pack consists of flexible geometrical design & colouring programs **£17**
- WAVES: Science Topics (Disc) CSC O Level Physics program. **£14.95**
- RELATIONSHIP: Science (Disc) O Level Biology program. **£14.95**
- BONDING: Science (Disc) O Level Chemistry program. **£14.95**
- ELECTROMAGNETIC SPECTRUM (8 Discs) O Level program. **£14.95**
- ELECTRONICS IN ACTION (Disc) O Level program **£19.95**
- NEWTON & THE SPACE SHUTTLE (Disc) O Level program. **£20**
- ECOLOGY (Disc) O Level program. **£20**
- POLYMERS (Disc) O Level program. **£20**
- Classification & Periodic Table O Level. The suite is supplied with its own database of chemical elements which can be classified according to your own rule: **£20**
- FOOD & POPULATION (Disc) O Level program. **£20**
- MICROTECHNOLOGY (Cassette) O Level program. **£6.95**
- A VOUS LA FRANCE (2 Cassettes) A French language home study aid. **£17**
- DEUTSCH DIREKT! (Disc & Audio Cassette) **£20**
- Modern Master (Disc) **£11.25**
- ADVANCED TELETEXT SYSTEM **£9**
- PERIOD TABLE SOFTWARE **£20**
- USING YOUR COMPUTER (Cassette) 8-12 age **£24**
- Astronomy - Primary (Disc) **£11**
- Computers at Work - Primary **£16**
- Introducing Geography - Primary **£16**
- Introducing Geography 11-17yrs **£17**
- Electric Fields 6-14 years **£10.50**
- Statistics A level **£23**
- Bird Spy 9-12 yrs **£13**
- BlackQueen Contract Bridge **£13**
- Espana Viva - 3 Discs **£19.95**
- A Vous La France Disc **£21.50**

THE NLQ DESIGNER

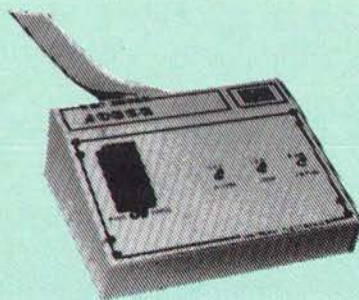
(The First & still the Best)
Supplied with over 25 Different fonts

A massively useful utility for users of the Taxan/Kaga KP810/910 or the Canon PW1080. This program allows you to define NLQ character sets to download into the printer's memory. Full on screen editing of the font. Requires 6264 RAM chip to be fitted in the printer.

Supplied with disc containing over 25 example fonts. (Please specify 40 or 80 track when ordering.) Fonts are: Italic, Courier, Courier Italic, Script, Copper Plate, Shadow, Bold, Double Print and Gothic etc. (P.S. This ROM is not suitable for Epson printers.)

- NLQ Designer ROM, FONT Disc and Manual **£25**
- (Write in for further details on all above ROMS)

ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.

Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.

The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.

The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs: From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£75 (£3 Carr)

TEX EPROM ERASERS

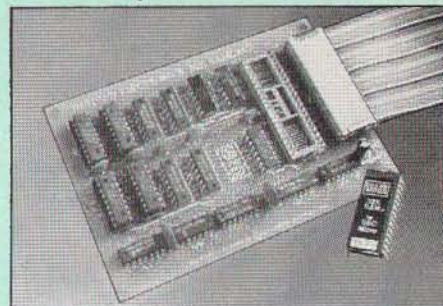
EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs!

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 (carr £2)**
- ERASER GT - Deluxe version erases up to 18 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30 (carr £2)**
- Spare UV tubes. **£9**

32K

SHADOW RAM- Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer - type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free - 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

● Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138,145,ADVVAL etc). Please note only a 12K printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Only £59 (carr £2)

(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32K SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89 (carr £2)**

Continued

BOOKS (No VAT on Books)

15 Hr Wordprocessing BBC/View	£4.95
15 Hr Wordprocessing BBC/WW & WW+	£4.95
30 Hour BASIC (BBC Micro)	£9.95
40 Best machine Code Routines	£7.95
50 Programs in BBC BASIC	£6.95
6502 Assembly Language Program	£19.95
6502 Application	£11.95
6502 Assembly Lang. Subroutines	£19.95
6502 Development Package	£7.50
6502 Reference Guide	£10.95
68000 Assembly Language Prog.	£19.95
68000 Machine Code Programming	£13.00
68000 Microprocessor Handbook	£14.95
68000 Programming the	£22.95
68000 User Guide	£8.95
6809, Programming the	£16.95
6809 Machine Code Programming	£7.95
8086/8088 Assembly Language Prog.	£11.95
8086/8088 Programming the	£16.95
Advanced Disc User Guide	£16.95
Advanced Prog. Guide to BBC	£9.95
Adv. Sideways RAM User Guide	£10.95
Advanced User Guide for BBC	£10.95
Advanced Graphics with BBC	£10.95
Assembly Language Programming on BBC Micro	£11.50
Adventure into BBC BASIC	£6.95
Amiga Hardware Ref Manual	£23.70
Applied Assembly Lang. for BBC	£9.95
ARM Assem. Lang. Programming	£12.95
Art of Microcomputer Graphics	£15.95
Assembly Lang. within BBC	£11.95
Basic ROM User Guide	£11.95
BBC B Compendium	£5.95
BBC BASIC for Beginners	£7.95
BBC Forth	£7.50
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BCPL The Language & its Compiler	£7.95
C Big Red Book of	£7.50
C for Beginners	£10.95
C for Programmers	£9.95
C Programming Lang.	£23.95
Complete FORTH	£6.95
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CP-M Bible	£16.50
CP-M Handbook with MPM	£9.95
CP-M Plus Handbook	£13.95
CP-M Soul of	£16.50
CP-M The software BUS	£8.95
Disc Drive Projects for Micros	£5.45
DISC FILING SYSTEM (DFS)	
Operating Manual for BBC	£6.95
DBASE Programming Language	£14.95
dBase III Plus	£12.95
dBASE III Plus, Quick Ref. Guide	£4.95
dBase III Tips & Tricks	£14.25
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Mastering Assembly Code	£8.95
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Mastering Interpreters & Compilers	£14.95
Mastering Music	£6.95
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Master Reference Manual Part 2	£14.00

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Using DOS + Amstrad PC	£9.95
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Z80 Applications	£15.95
Z80 Assembly Language Prog.	£19.95
Z80 Reference Guide	£9.95

NEW

THE COMPLETE BBC COMPUTER USER HANDBOOK

"Why has no-one written a book like this before? It's long overdue". If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

GENERAL - Uses and abuses of computers.

HARDWARE - How to design your own work station. Hardware additions (disc drives, ROMs, printers, 2nd processors, etc). DIY alterations.

HARDWARE RUNNING BBC-BASIC - All BBC machines are described with their differences. Compatibility between the various BBC machines. Networks. The Archimedes and its advantages.

GETTING ORGANISED - so that you keep track of your programs and control of your software. Setting up for easier programming sessions.

NEAT PROGRAMMING - Good style. Writing structured programs. Getting the best from BBC-BASIC, Graphics and screen displays. Speeding up programs. Saving space.

GENERAL PROGRAMMING TIPS AND HINTS - with a multitude of examples (eg input vetting, dealing with dates, blanking out function key messages, error trapping, disabling ESCAPE and BREAK, use of EOR with colour, etc).

DEBUGGING - Specific errors and how to handle them. How to test programs fully.

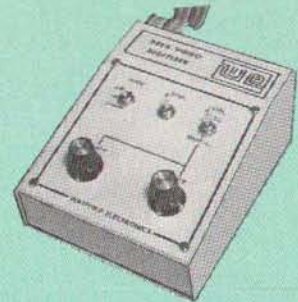
STANDARD PROGRAMS - Assessing word-processors, spread-sheets, databases, graphics packages, communications etc. How to customise them to your own requirements.

COMPUTERS AT HOME AND IN THE OFFICE - Introducing the computer to the office. Program

protection. Computers and the law. Communications. Selling your own programs. 28 FULL CHAPTERS, elegantly written and extensively indexed. To dip into, consult, or read-from cover to cover, again... and again... and again...

Only: **£14.95**

BEEB VIDEO DIGITISER



Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £3)

(Price includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)
(BBC B+ and Master compatible, except Master with Econet)

Magazine Maker

(As seen on TV)

A combination of the Pagemaker and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Pagemaker to illustrate magazines or newsletters - in fact anything that needs to be created on A4 size paper.

With Pagemaker's many features, a variety of pictures can be composed - the only limit being the imagination.

Pictures can be doctored using Pagemaker's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in wordwise and viewfiles plus much more.

Once created the picture can be printed out. The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00 (carr. £3)**



Z88 - £239.



A COMPLETE PERSONAL COMPUTING SYSTEM.

As an introductory offer, we are giving away 4 rechargeable batteries and a compact mains battery charger absolutely FREE with every Z88 bought this month.

The Z88 is much more than a stand-alone personal computer. It's the core of a comprehensive computing system, that allows you to take full advantage of the computer's remarkable potential. Accessories and peripherals include:

RAM Packs Up to three RAM packs can be plugged into the front of the Z88. They require no external power, and are available with 32K and 128K capacity. 1 Mbyte RAM packs will be available in the first quarter of 1988.

32K £17.35 128K £43.40

EPROM Packs Erasable Programmable Read Only Memory packs are the Z88's archiving medium, and are available in 32K and 128K. Whereas other machines have to rely on cassettes, diskettes or hard disks, EPROMs offer *solid-state* storage with very rapid access to data and absolute reliability. 1 Mbyte packs will be available in the first quarter of 1988.

32K £17.35 128K £43.40



EPROM Eraser When a data file has been saved onto an EPROM pack, it stays there until you decide to erase all the data on it. At that point, simply insert the pack into the EPROM Eraser, which completely deletes the data - leaving you with a blank EPROM pack, ready for re-use.

£34.75

PCLINK A package consisting of software diskette and RS232 serial cable, PCLINK allows the transfer and receipt of files between the Z88, and an IBM or compatible PC. As well as standard ASCII files, it converts Pipdream files into either Wordstar or Lotus files.

£21.70

Z88-BBC LINK connects the Z88 to the BBC Micro for file transfer purposes. Pipdream is compatible with View Professional.

£21.70

Serial Printer Cable connects the Z88 to any printer with a standard serial port.

£8.65

Parallel Printer Cable connects the Z88 to any printer with a standard parallel port.

£24.00

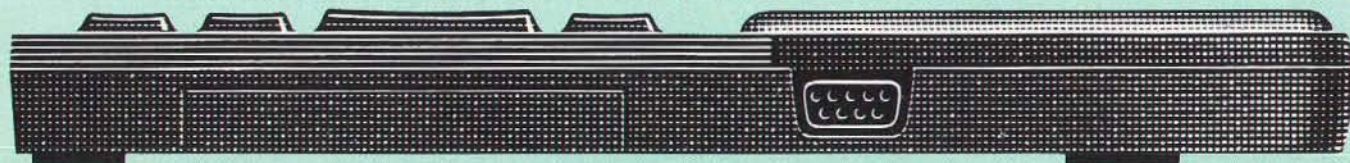
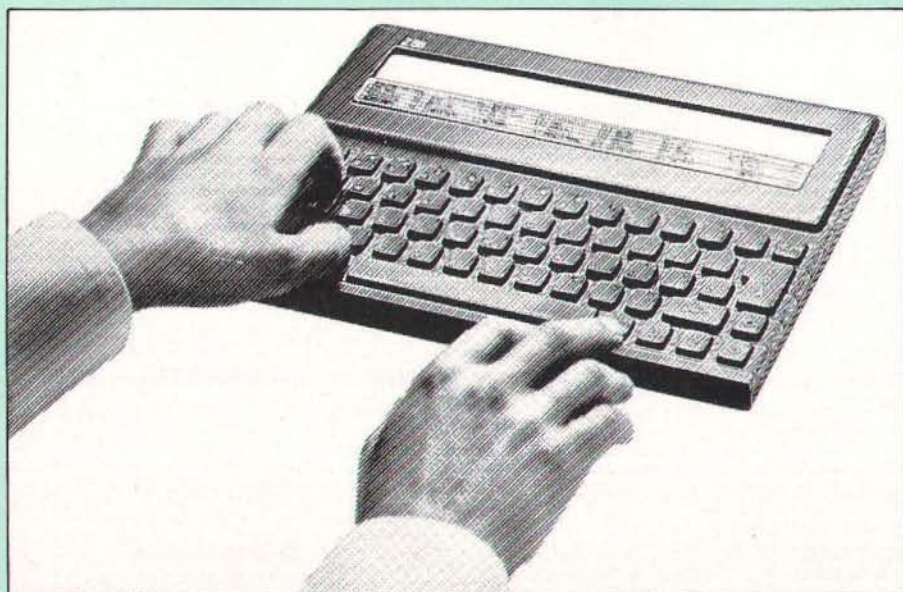
Modem BAPT-approved, 300 baud, line-driven, full duplex unit that allows the Z88 to talk to other computers via telephone lines.

£86.90

Mains Adapter helps preserve battery life, and is useful when the Z88 is in constant use in a fixed position.

£8.65

Z80 Bus is built in, and provides future expansion potential.



EMR

ANNOUNCES A GREAT WAY TO MAKE MUSIC WITH THE ARPEGGIO MUSIC SYSTEM FOR THE ARCHIMEDES

-NOW AVAILABLE-
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inc. VAT. P&P £2.00 extra.



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information on Computer MIDI music please write or phone.

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An Expert Tool for Introducing Information Technology across the Curriculum

"The potential for its use in schools is enormous"
New Scientist (24/9/87)

"Its ability to deal with real-life information is very impressive"
Times Educational Suppl. (6/11/87)

"If you are interested in artificial intelligence or in database work -
for any application - then take a serious look"
A & B Computing (Dec 87)

"The package is remarkably effective"
Computers in Schools (May 87)

"With packages like the history project [pack] MicroCODIL is
potentially a very powerful teaching tool"
Your Computer (Oct 97)

There are other highly favourable reviews in A & B
Computing (April 87), Acorn User (Nov 87), Educa-
tional Computing (April 87), Micro User (Feb 87)
and Network User (Mar/April 87).

MicroCODIL runs on BBC B, B+, Econet, Master and 2nd
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Phone now for a free leaflet, or send £5 for a BBC DFS
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ROLL UP! ROLL UP! FOR THE LATEST SOFTWARE FROM NORTHERN MICROMEDIA



Funfair

A simulation of a visit to a Funfair which
reinforces basic numeracy skills. Extensive
resource material in pack. BBC/Master

Crossword Call-up

This program creates crosswords which
have been designed around a small database,
holding clues and answers. Clues can be
linked to subjects and levels and therefore
the program is suitable for all ages, abilities
and curriculum areas. BBC/Master/Nimbus

Coming soon....

Pip's Island Adventure is a follow-up
to our best-selling Pip goes to the Moon,
aimed at top infants/lower juniors.

And many more

Software designed for teachers by teachers
in partnership with experienced program-
mers.

Catalogue available from Northern
Micromedia, Resources Centre, Coach
Lane Campus, Coach Lane, Newcastle upon
Tyne NE7 7XA (please enclose an A5 SAE
to value of 20p).

DO YOU HAVE A BBC MICRO IN YOUR HOME AND ARE YOU STILL DISSATISFIED?

If the answer is YES read on, help could be at hand.

- The sales demo made everything look so easy. My problems only started when I got it home.
- The manuals assume that I have done all this before. It just doesn't seem to do the same kind of things for me.
- Reference books are fine if you know what you are looking for. It's not just a case of new jargon, I simply don't understand what I have to do to make my micro achieve these results.
- I think of my computer now as little more than an expensive error of judgement. It only seems to be capable of playing games.
- My intentions and original objectives are quickly losing direction.
- What I really need is help at a personal level. Somewhere that I can turn to that actually knows my complete computer system.

HOW CAN I BENEFIT FROM YOUR KIND OF SERVICE?

- We strongly feel that the best results are achieved by you using your own equipment in your own home.
- The service has been specially set up to serve you, the users of the BBC micro. Our aim is to get you up and running then to show you how to make the best from your system.
- Once you are under way we can still be of help to you. We know that our customers not only need help at the beginning but later on too.
- This means that we can supply you with extensive educational and games software known to work with your BBC micro. We expect that you will want to see these and evaluate them before buying. If you are really interested a longer trial can be arranged for you at home.
- We aim to offer you our best independent advisory and tutorial service eg: a chance to compare one word processing package against another.
- You may need to get some repairs done at an authorised dealer or want to trade-in your existing micro for an upgrade. This would enable you to take advantage of the new software if required.
- We like to think we can provide our customers with what they really want.

If you have actually read this far then you may need some help.

In order that we can both make a start on this together

Telephone Anthony Kay on 01-878 7044

M I C R O
A D V I S O R Y
S E R V I C E S

Or return coupon to Micro Advisory Services
314 Upper Richmond Road West, London SW14 7JN

Name:

Address:

Home Tel: Office Tel:

Would you like to receive the questionnaire?
Yes No

The service is operating initially in Central London/Surrey M4 corridor.

ALARM CALL



When the alarm clock is operational, the built-in CMOS clock is monitored every half second and compared with the stored value representing the alarm time. When this has been reached there is a beep every half second until the ESCAPE key is pressed, whereupon the alarm is disconnected.

Note: this program is for Master 128 only

The program assembles a ROM image with the alarm time (as entered by the user) embedded in it. It is then transferred to RAM bank number four and a hard reset forced to enable the alarm. Thereafter every time a BREAK is performed the message "Alarm working" will be printed above the MOS message until the alarm is disabled.

**Use this
easy to install
alarm clock to
remind you of
appointments
or calls you
have to make
while working
at your
Master 128**



The reference values for the alarm time, flag and half-second timer are all stored in the RAM bank. This makes them immune to corruption by any other programs. Seven bytes at the bottom of the 65C12 stack are used when reading the time. This is necessary as OSWORD 14 will not write into the sideways RAM area (I'd be interested if anyone knows a way round that!) and this is probably the safest area to put so few bytes.

As the routine used events 4 and 6, any program which cancels interrupts, or redirects these vectors will temporarily disable the alarm. The alarm will however, be reconnected on the next BREAK and, provided the alarm time hasn't been passed, will operate normally.

```

10 REM Master Alarm clock
20 REM by Terry Blunt
30
40
50 ourrom=4
60
70 DIM base &200
80
90 zero=&90
100 time=&100
110 evntv=&220
120 romadd=&8000
130 oswrch=&FFEE
140 osword=&FFF1
150 osbyte=&FFF4
160
170 FOR I%=4 TO 6 STEP 2
180 P%=romadd
190 O%=base
200 [OPT I%
210 BRK
220 BRK
230 BRK
240 JMP service
250 EQUB &82
260 EQUB (copy-romadd)
270 BRK
280 EQUB "Interrupt Alarm"
290 .copy
300 BRK
310 EQUB "(C)"
320 BRK
330
340 .inform
350 LDX #&00
360
370 .iloop
380 LDA working,X
390 BEQ noinit
400 JSR oswrch
410 INX
420 BRA iloop
430
440 .service
450 PHP
460 PHA
470 PHX
480 PHY
490
500 LDX flag
510 BMI noinit
520 CMP #&FE
530 BEQ inform
540 CMP #&27
550 BNE noinit
560 LDA zero
570 PHA
580 LDA zero+1
590 PHA
600
610 LDA #&A8
620 LDX #&00
630 LDY #&FF
640 JSR osbyte
650 STX zero
660 STY zero+1
670 LDY #&30
680
690 LDA #entry MOD 256
700 STA (zero),Y
710 INY
720 LDA #entry DIV 256
730 STA (zero),Y
740 INY
750 LDA #ourrom
760 STA (zero),Y
770
780 LDA #&30
790 STA evntv
800 LDA #&FF

```

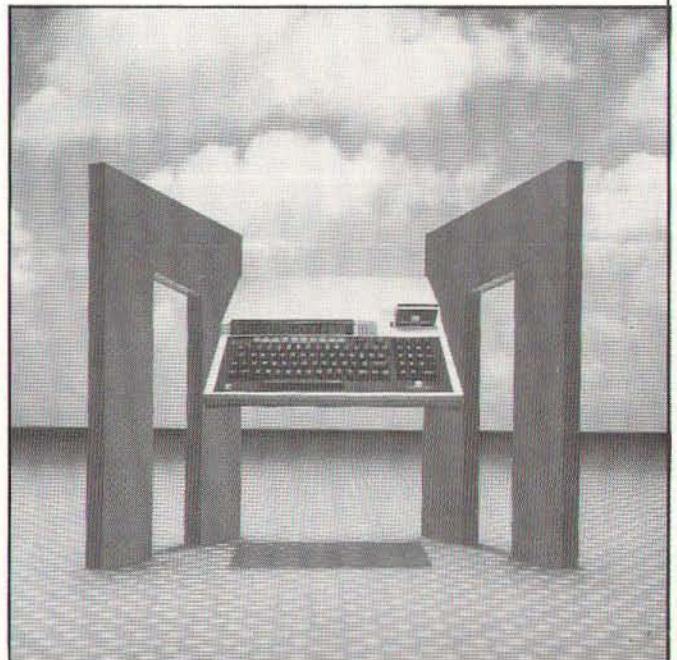
E N H A N C E R S

```

810      STA evntv+1
820      LDA #&0E
830      LDX #&04
840      JSR osbyte
850      LDX #&06
860      JSR osbyte
870
880      PLA
890      STA zero+1
900      PLA
910      STA zero
920
930 .noinit
940      PLY
950      PLX
960      PLA
970      PLP
980      RTS
990
1000 .entry
1010     PHP
1020     PHA
1030     PHX
1040     PHY
1050     CMP #&06
1060     BNE notesc
1070     LDA flag
1080     BNE done
1090     DEC flag
1100
1110 .done
1120     LDA #&7D
1130     JSR osbyte
1140
1150 .exit
1160     PLY
1170     PLX
1180     PLA
1190     PLP
1200     RTS
1210
1220 .notesc
1230     CMP #&04
1240     BNE exit
1250     DEC count
1260     BNE exit
1270     LDA #&18
1280     STA count
1290     LDA flag
1300     BMI exit
1310     BNE read
1320     LDA #&07
1330     JSR oswrch
1340     BRA exit
1350
1360 .read
1370     LDA #&01
1380     STA time
1390     LDA #&0E
1400     LDX #time MOD 256
1410     LDY #time DIV 256
1420     JSR osword
1430     LDY #&01
1440
1450 .test
1460     LDA time+4,Y
1470     CMP alarm,Y
1480     BNE exit
1490     DEY
1500     BPL test

1510     STZ flag
1520     BRA exit
1530
1540 .working
1550     EQU "Alarm working"
1560     BRK
1570
1580 .flag
1590     EQUB &01
1600
1610 .count
1620     EQUB &01
1630
1640 .alarm
1650     EQUW &FFFF
1660 ]
1670 NEXT
1680
1690 REPEAT
1700 PRINT'"Time " MID$(TIME$,17,5)'"
Alarm ";
1710 ?(alarm-romadd+base)=FNbcd(36)
1720 VDU 58
1730 ?(alarm+1-romadd+base)=FNbcd(96)
1740 PRINT'"All O.K. (Y/N) ";
1750 G%=GET AND 95:PRINT CHR$ G%
1760 UNTIL G%=ASC"Y"
1770
1780 OSCLI "SRWRITE "+STR$~base+" "+STR
$~O%+" "+STR$~romadd+" "+STR$~ourrom
1790
1800 ?&FE4E=&7F: ?&FEA0=&C0:CALL!(&FFFC)
1810
1820 DEFFNbcd(m%)
1830 x%=POS:y%=VPOS
1840 REPEAT
1850 PRINT TAB(x%,y%) SPC10 TAB(x%,y%);
1860 g%=GET
1870 IF g%>47 AND g%<58 VDU g%:a%=g%-48
ELSE a%=0:VDU 48,48:GOTO 1900
1880 g%=GET
1890 IF g%>47 AND g%<58 VDU g%:a%=a%*16
+g%-48 ELSE VDU 8,48,a%+48
1900 UNTIL a%<m%
1910 =a%

```



TELETEXT ADAPTER

Would you like access to free high quality software and over a thousand pages of information, but Prestel access charges and phone bills too expensive? Then read on!

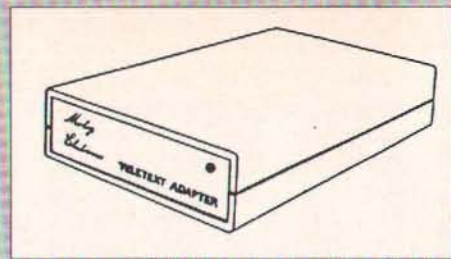
The answer is Teletext. Yes the same system everyone has seen incorporated into television sets, but with a difference. When Teletext is read by a computer you can actually use the data. The MORLEY TELETEXT ADAPTER introduces you to the world of Teletext at a price that won't break the bank. Inside it you will find the latest in second generation Teletext chip technology, which unlike our rivals who are still using chips designed more than ten years ago, will be fully compatible with any future advances in the Teletext system. With the Morley adapter you will get a state of the art unit that automatically tunes itself into the required station (no more messing around with screwdrivers or twiddling little knobs in the back of the case), a user friendly menu driven program, easy to follow instructions and a 12 month warranty. Add to this the free downloadable telesoftware and we are sure that you will agree that we are offering you one of the best bargains on the market today.

FEATURES:

- * Advanced design uses the latest technology, will handle ANY future enhancements to the Teletext

system e.g.: full field; 8 bit data transfer; 2k pages etc.

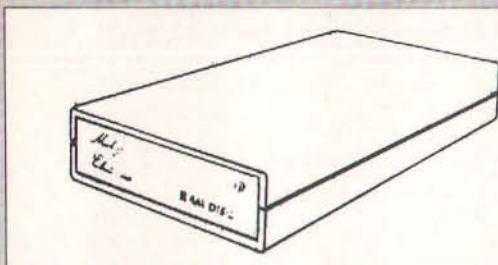
- * Simply plugs into the user port.
- * Low power consumption, less than 200ma. Optional power supply available.
- * User friendly menu driven software including extended OSCLI and OSWord commands for access from BASIC programs.
- * Supplied with 16k ATS (Advanced Teletext Software) and 16k support ROM software inc. printer dumps, page spoolers etc.
- * FREE Telesoftware, no access charges (updated weekly).
- * Save selected pages to disc/tape for later retrieval.
- * Full access to all Teletext services and channels e.g.: CEEFAX, ORACLE, 4-TEL.
- * Gives you a real-time clock at your disposal (*TIME).
- * Software upgrades to allow for any enhancements to the Teletext service, e.g.: extra channels, full field data on cable & satellite systems etc. (only the media charge).
- * Easy to follow comprehensive user guides.
- * No hardware limitations, it can for example receive virtually unlimited numbers of channels.
- * Utilis disc available including printer drivers allows pages to be selected and dumped direct to a printer



(no more TV or Radio Times to buy).

WHAT THE REVIEWERS SAID:

"... In terms of price, performance, future expansion possibilities and those little touches that show thought for the end user I would recommend the Morley unit."—(*Acorn User, January, 1986*).
 "... The Morley unit has been designed to ensure that its operation is simple and smooth. It is the ideal Teletext adapter for school use."—(*A&B Computing, June, 1986*).
 "... Using it over a number of months in different schools, it has proved utterly reliable, and may confidently be recommended."—(*The Times Educational Supplement, September, 1986*).
THIS IS THE BIGGEST SELLING TELETEXT ADAPTER CURRENTLY IN PRODUCTION WORLDWIDE, AND COMES WITH A FULL MONEY BACK SATISFACTION GUARANTEE.



Now available!
 The first true MEGA capacity RAMdisc for the BBC, BBC B+ and MASTER computers. This fully compatible unit, currently available in either 1 or 2

megabyte versions comes complete with operating software on ROM, power supply, and a comprehensive user guide.

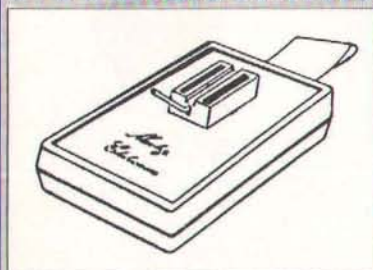
FEATURES:

One megabyte of RAM connected to the 1MHz bus. Used with the supplied ROM software programs and files may be saved and loaded from the RAMdisc in the same manner as from a floppy disc with a large increase of speed, for example, a 20k mode 0 screen takes about 3-4 seconds to load from disc and about 0.2-0.3 seconds to load from the RAMdisc. The RAMdisc ROM operates as a utility ROM

RAMDISC

working with the current filing system rather than as a separate filing system. Therefore ensures compatibility with any Acorn compatible DFS (not ADFS). The RAMdisc can be selected by a * command to take the place of any drive number from 0 to 9. If the RAMdisc replaces a floppy drive as 0 for example, all commands addressed to drive 0 will be intercepted by the RAMdisc. The default drive number is 4. Any 'Dangerous' * commands such as *COMPACT, *COPY, *BACKUP etc can be intercepted and the BBC's RAM from page 2 to &7FFF saved to RAMdisc workspace, and may be recovered using a * command. This prevents accidental corruption of any programs/data in RAM you may have been using at the time. The filing system wedge ROM supplied supports load/save, byte file access, all relevant OSFSC commands, and contains a formatter verifier and 'sector' editor for use with the RAMdisc. Catalogue structure allows up to 2,688 files. Well that's the spec., add to this our usual 12 month no quibble guarantee and we're sure you'll agree the Morley RAMdisc is the sensible alternative if increased storage capacity and speed is your requirement.

EPROM PROGRAMMER V2



The MORLEY EPROM PROGRAMMER V2 is a small self contained unit that plugs into the BBC or MASTER user port. It comes with a high quality ZIF (zero insertion force socket) and contrasting plastic case. Also included in the package is it's own user friendly menu driven software on ROM or disc. This state of the art unit, allows programming of 2764 (8k), 27128 (16k), and 27256 (32k) EPROMS. Not only does the hardware allow

programming of the usual NMOS devices, but will handle the new generation CMOS equally as well, and with the average time taken to program a 16k at less than 30 seconds we believe it to be one of the fastest programmers available today.

THE HARDWARE

The Unit is completely under software control, there are no knobs or switches to baffle the novice, and the extended features provided should excite the pro's.

THE SOFTWARE

The comprehensive user friendly software included in the package has two main parts, the first allows EPROMS to be read, programmed, verified and edited, also allowing a ROM image to be loaded or saved to disc. The second is a full ROM management system in its own right, which has a host of useful features and routines, such as KILL and RESURRECT ROM to disable or enable a sideways ROM, dump ROM image to buffer or disc, move ROM image in buffer to sideways RAM, and VIEW-SEARCH any sideways ROM.

The whole system is available now for less than the price of one WORDWISE chip. So get yourself the all new MORLEY EPROM PROGRAMMER V2 today and start using those expansion boards for what they were made for! ROMS.

Immediate delivery no quibble 12 month guarantee.

MASTER CARTRIDGES

DUALS— Designed and manufactured by Care Electronics to Acorn specifications. These high quality Master expansion cartridges will take two 16k sideways ROM's, and will, unlike similar cartridges available from other manufacturers, accept the new second generation programs, such as Computer Concepts Interword and Spellmaster ROM's.

QUADS— As Duals but take 4x16 EProm.

These Cartridges come in a high quality, robust, formed-plastic case, that fits neatly into either one of the of Master's cartridge slots.

MASTER SMART CARTRIDGE

This device was designed and manufactured jointly by Morley and Care Electronics.

The **Smart** cartridge will at the press of a button halt any program running in memory and execute any one of a host of useful built in, or user defined procedures, and once completed will return to the program and continue where it left off. The only limiting factor with this device is the programmers imagination. The **Smart** cartridge will prove useful to the novice, allowing him to do the simple things like dump any screen to printer, and made backups of protected tape or disc based software, but has an open ended specification for the advanced 'HACKER' allowing advanced programming techniques to be incorporated into almost any program at the touch of a button.

BUILT IN FEATURES (at the press of a button)

- Autosaves computer's entire memory.
- Freeze program at any point.
- Screen dump (any mode) to printer or disc.
- Allows any OSCLI command without disturbing memory.
- Copies 90% of protected software.
- Tape to disc, disc to tape.
- User friendly menu.
- Sound On/Off.

ALL CARTRIDGES COME WITH A 12 MONTH NO QUIBBLE WARRANTY

**NEW
PRODUCT**

MORLEY MASTER BOARD 'AA'

At long last the add-on all MASTER users have been waiting for, an internal ROM board.

No more need to turn the computer off to insert the cartridge containing the ROM you need to debug the program in memory.

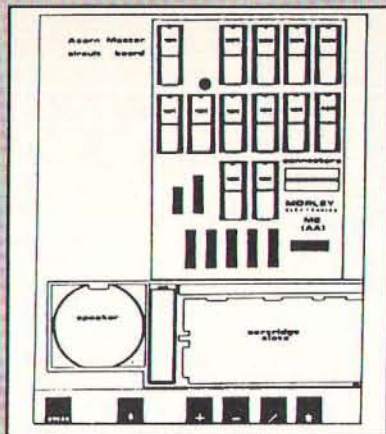
The new MORLEY MASTER BOARD "AA" allows you to have up to 8x16k and 4x32k extra Roms installed inside your MASTER and still leaves the cartridge slots free. This in effect allows your MASTER to support as many as 24, 16k ROMs installed permanently, whilst retaining the standard 4 x sideways ram banks and four banks by using cartridges

A staggering 32 ROM images installed and accessible at any time

Included in the package is a utility ROM which has many useful features such as 'FICOPY', a clever file transfer program that transfers files between DFS and ADFS formats or vice versa.

So for less than the price of four external cartridges you get a MASTER BOARD "AA" which with twice the capacity has got to be THE ROM expansion for the serious MASTER user.

The unit comes with the usual Morley, full no-quibble twelve months warranty, and our usual after sales service



MORLEY
ELECTRONICS

Unit 3, Maurice Road Industrial Estate,
Wallsend, Tyne & Wear NE28 6BY
Telephone: Tyneside (091) 2627507
Telex: 265871 A/B MONREF G
(Quoting Mag 70211)

THE COMPLETE RANGE OF TELETEXT SOFTWARE from M/B SOFTWARE

***NEW... DESIGN 7 PLUS** - now 'the best' is even better. Held in high regard by reviewers and hundreds of satisfied owners, DESIGN 7 has been further improved, with revised keypad & even more features. Design/load/save and MODE 7 screen with ease, up to full CEEFAX/Oracle standard. Will convert ANY MODE 7 screen to a BASIC procedure, for inclusion in your own programs. ROM version includes a file copier, printer dumps useable from BASIC etc. B/MASTER/COMPACT.

TELETEXT EMULATORS/SCREEN DISPLAYS/INFORMATION SYSTEMS - A complete range of teletext programs to cater for all needs, with full teletext adapter interfacing.

***NEW... DESFAX** - totally new version - streets ahead of the competition - run your own information/display system. Stores hundreds of screens on dual 80 track drives (96 screens on single-sided 40 track), with access to any screen with a SINGLE KEYPRESS. Lots of special effects - screens can scroll, slide, overwrite etc. Animation, loops, subroutines - send for details - not enough space here to even begin to describe the advanced features!! B/MASTER/COMPACT

***NEW... MASTERFAX** - 84 MODE 7 screens in memory at once. 148 screens possible with cartridge RAM. An advanced teletext/carousel program featuring SINGLE KEYPRESS or 3-digit page selection. Runs entirely from memory - no disc accesses after pages are loaded. Superb animation and other effects. MASTER/COMPACT only.

***NEW... VU-FAX** - 1000 screens and no disc accesses! Screens stored on MORLEY 1MByte RAM DISC. SINGLE KEYPRESS gives instant access to any screen (or emulate teletext). This is the ultimate MODE 7 screen management system - there is nothing else like it. MODEL B/MASTER 128.

***ALSO... MASTERcopy** - DFS/DFS, DFS/ADFS, ADFS/DFS, ADFS/ADFS file copier. Uses the MASTER 128's memory to the full to permit fast disc copying. 31 DFS files to ADFS disc in less than 2 minutes. Creates directories automatically. You will wonder how you ever managed without this program. Described by reviewers as 'unexcelled'. MASTER 128 and COMPACT's fitted with DFS ROMS.

ORDER FORM

To order simply complete and return by post enclosing your cheque/P.O. made payable to Morley Electronics, or by phone during office hours, quoting your ACCESS or VISA number.

Morley Electronics, Unit 3 Maurice Road Industrial Estate, Wallsend, Tyne & Wear NE28 6BY Telephone Tyneside (091) 2627507. Telex: 265871 A/B MONREF G (Quoting Mag 70211)

ALL PRICES INCLUDE VAT @ 15%

Qty.	Description	P&P Rate	Qty.	Description	P&P Rate
Qty. _____	Morley Teletext Adapters	119.83 (a)	Qty. _____	M/B Software Design 7+	9.89 (c)
Qty. _____	Morley Teletext Compact Version	138.00 (a)	Qty. _____	M/B Software Desfax	20.01 (c)
Qty. _____	Optional Power Supply	10.12 (b)	Qty. _____	M/B Software DesROM	12.88 (c)
Qty. _____	Teletext Utilities on disc	5.98 (c)	Qty. _____	M/B Software Mastercopy Disc	12.88 (c)
Qty. _____	1 Megabyte RAMdisc	199.87 (a)	Qty. _____	M/B Software Mastercopy ROM	14.95 (c)
Qty. _____	2 Megabyte RAMdisc	349.60 (a)	Qty. _____	M/B Software Masterfax	29.90 (c)
Qty. _____	Eprom Programmer V2	34.50 (b)	Qty. _____	M/B Software VU-Fax System inc RAMdisc	249.78 (a)
Qty. _____	Master ROM Boards "AA"	46.00 (b)	Qty. _____	5 1/4" Floppy Discs x 10	8.05 (c)
Qty. _____	Care Master ROM Cartridges	8.97 (b)	Qty. _____	27128 16k CMOS EPROM	3.68 (d)
Qty. _____	Master Smart Cartridge	39.79 (b)	Qty. _____	Info Pack + Demo Disc of all Software	FREE (c)
Qty. _____	Cad Calc Master Quad ROM Cartridges	14.95 (b)			

Please delete: Adapter software on ROM/Sideways RAM format/Software on 40/80 track disc.

Name _____ Phone no. _____
 Address _____
 Post Code _____
 Cheque No _____ Access/Visa No _____ Amount £ _____



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Write your own best sellers
with Fairy Tales



Earlier this month I was leafing through the pages of one of the other computer magazines and was somewhat surprised to read in one of the letters that good educational software is very thin on the ground.

Unfortunately, it would appear that the reader doesn't take this magazine, otherwise during the past six months alone he or she would have received detailed information on a very wide range of quality software for the primary sector. In fact, I would suggest that the problem for schools (and home users for that matter) these days is not so much a lack of quality educational software but a surfeit. After all, how much software can a school with a couple of micros handle in a year? This is a subject I'll be returning to in a future

edition when I'll look at a core pack of software for the primary school.

In the meantime, for Mr/Ms. M. Usher of Bradford, send for a copy of one of the programs that's given me the greatest pleasure since I started using computers. It emanates from one of my favourite software houses, RESOURCE, and was developed by Derek Allen, the author of *Droom, Dust* and another delightful program for infants I'll be looking at in next month's EDSOFT, *Albert's House*.

Fairy Tales

The handbook describes the package as a "dedicated version of a simple desk top publishing



package for Infant pupils", while RESOURCE's catalogue advertises it as "a desk top publishing program for use with all ages". My experience with the program over the past month or so certainly confirms that the program used in one form or another will be enthusiastically received by all ages. Probably I'm being a little pedantic if I say that calling it a book publishing package is a more realistic description than desk top, for that's what it is.

Each "book" contains up to 40 "pages" which are created using "text", "pictures" and "special characters". The disc has a library of 77 pictures which can be used to illustrate the pages, each of which may contain a maximum of eleven pictures from the library. The pictures may be placed anywhere on the page, but more of that later.

On loading the program, you are given three options: 1. Load a Book 2. Creating and Editing a Page/Book 3. See a Picture (from Library) The disc contains a partly written story which can be used to illustrate the first option. Selecting this you are asked at which page you wish to start. Obviously, first time round, it's sensible to start at the beginning – page one is earmarked as the title page – but the opportunity to start at any page is quite useful if you're continuing a

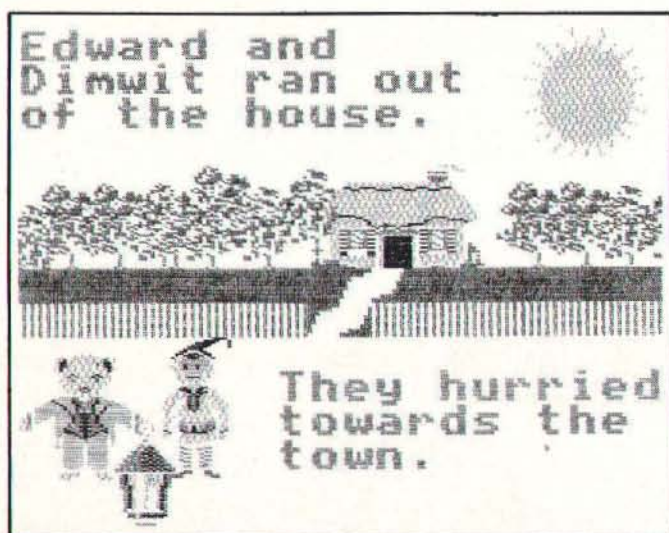


Figure one – A Normal Dump.

story or wish to look at a particular set of graphics. The other option uses the "J" key to jump to a specific page – ideal if you're dealing with branching stories. Page 21 (figure 4) is a good example of the use of the special character set, which have been used to create the buildings and the tree.

There is a built-in printer dump for Epson compatible printers. By pressing <TAB> followed by "N" or "P" you can obtain a negative (figure 1) or positive (figure 2) screen dump. The negative dump is suggested as the more effective but, naturally, doesn't compare with the full-colour screen display or a colour dump. To create my colour illustrations I normally use an Integrex Colourjet printer in combination with a Replay system (details of the programs in my *In the Print 3*, June 1987). However, as I haven't any Replays in the school's computers, I just had to find a way of putting a suitable dump in the program.

I knew that Mike Matson of 4Mation had been working on a screen dump program, and he came to my aid and put the Integrex option into the program for me. Not only does this offer a large or small printout



Figure two – A Reversed out Dump.

but also allows any of the colours to be changed (figure 6). This is marvellous since the best screen colour combinations are not always the best when transferred to paper. The Integrex blue is purple, which does not show up well against black, for example, so to be able to change this to cyan is very helpful, and the black background can be expensive on ink. Mike has made this dump available to RESOURCE and they are trying to find out the best way to market both options – at the time of writing there's not enough room on the disc for both dumps!

Approximately half the sample book is left blank, so you have the opportunity of trying your hand at editing the existing pages or creating your own and thereby completing the story – it's a good way to start! The function keys are used to good effect in this option. Most users will wish to position their pictures first then work the text around them. This is achieved by pressing <f1> following by the picture number (found in the library at the back of the handbook or the third option on the main menu). The picture appears in a box in the centre of the screen and is moved into position by means of the cursor keys and fixed with <RETURN>. The Change Picture option <f2> gives further options to select the Next picture, Clearing the highlighted picture or Moving it.

Obviously, there are going to be occasions when additional graphics may be desirable to complete the picture. Often this can be achieved by using the Picture Characters. The <TAB> key changes the lower case keys to produce the graphics (figure 5)

Simply typing will place double height text on the screen. The colours are changed (as for the Picture Characters) by using <f0> followed by the numeric keys or <Return> or <ESC> for a couple of flashing colour combinations. <f4> is used to type over a graphic character if required to finish off a word (there's no wrap-round facility). <f8> clears a page, which can be restored using <f7> – a facility also used in copying pages – while <f6> is a very neat option which "refreshes" the screen after overwriting – this tidies up a screen where there has been a deletion of a picture that has been previously overwritten (figure 6 – don't forget I also used this example to change the colours for the printer dump!).

In order to make a new book for your next creation it's necessary to create a new *Fairy Tales* disc. This is achieved through the teachers' options page, where

also it is possible to customise the disc so that the picture file and character set, the overwrite, clear page and show page building facilities are made available to the users or not, plus the setting of the maximum number of pictures to be used per page.

One of the difficulties youngsters often face in producing pieces of creative writing is deciding on their audience: are they writing to please themselves, their classmates, or is it just for their class teacher? Using *Fairy Tales* they can produce "books" – electronic or hard copy – for their own class library or for others, eg upper juniors given the task of writing books for their younger brothers/sisters or the infant library. They can select their own characters from the picture library, or have limitations placed upon them by the class teacher, or prospective readers.

Groups or individuals can produce their very own books, or groups within a class made responsible for a few pages of an on-going saga – they can, of course, have several volumes if they wish! For the purist who thinks that everything including the art work must be the child's own, the program can be used to create numerous starting points. Conversely, some might like to use the art work as a stimulus, setting up a series of pages of graphics which can be used as the basis for discussion, sentence construction or developing a story around the given pictures. There will, I've no doubt, be a hundred and one uses. The old adage, "Nothing succeeds like success", is particularly relevant in the education of the young child, and many a youngster is going to be very pleased with himself after producing a couple of pages of his own book with *Fairy Tales!*

I know that there are several sequels on the way –

Fairy Land, Farm Land, Old MacDonald's Farm – and I hope Derek Allen's spent his Christmas holidays developing lots and lots of pictures. Number one priority to my mind, which should be quite a simple task, would be discs with the characters from *Droom & Dust*, to supplement those packs – yes, I know Big Norman and Brave Little Bit are on *Fairy Tales!* Then I'd like to see a *DIY Tales*, (RESOURCE have a program called *DIY Base*, which enables users to create their own dedicated databases) which would offer an ever-increasing number of graphic discs from which teachers (and children) would be able to create their own files of characters; an option which would enable pictures to be captured from other adventures and incorporated into the program; and lastly – for now! – what about a Concept Keyboard option?

I'll be amazed if it's not one of THE programs for 1988. In fact, if all the smashing stories that I'm sure are going to be produced using *Fairy Tales* and its sequels could be collected together, then RESOURCE could be renamed The Fairy Publishing Co (only kidding!) and hundreds of schools' libraries would be the richer.

Factfile

Fairy Tales is available from Resource, Exeter Road, off Coventry Grove, Doncaster DN2 4PY at £12.95 plus VAT

I understand that Mike Matson's *Dumper* program, which will enable users to dump many screens (not MODE7) to an Epson or Integrex printer, will be available to members of MAPE through the next MAPE Tape. Details of membership from Mrs G. Jones, 76 Holme Drive, Sudbrooke, Lincs LN2 2SF.

A&B & RESOURCE COMPUTING

COMPETITION!

RESOURCE and A&B Computing are jointly sponsoring a competition based on *Fairy Tales* – RESOURCE's new primary "desktop publishing" package.

Both schools and individuals are invited to submit sets of pages created using *Fairy Tales* – These may be presented either on disc, or as printouts. The winners will be those who produce the most imaginative and innovative stories using the package.

The Judges will be Dr Peter Avis – Director of RESOURCE, Mark Webb – Editor of A&B Computing, and Des Thomas – Educational Reviewer for A&B Computing.

The prizes will be:

- 1st prize £300 of RESOURCE software
- 2nd prize £200 of RESOURCE software
- 3rd prize £100 of RESOURCE software

No cash equivalents accepted, and RESOURCE retain the rights to all winning entries. All entries should be sent to: **Fairy Tales Competition, A&B Computing, No. 1 Golden Square, London W1R 3AB.** The Panel's decision is final.

You may purchase a copy of *Fairy Tales* at a discount price of £10.95 – a saving of £4 on the normal price. This offer is restricted to one copy – just cut out and fill in the form below.

£600 OF SOFTWARE MUST BE WON

Name:

Address:

.....

I require: BBC B/Master version
 (Please tick) Master Compact Version

Signed:

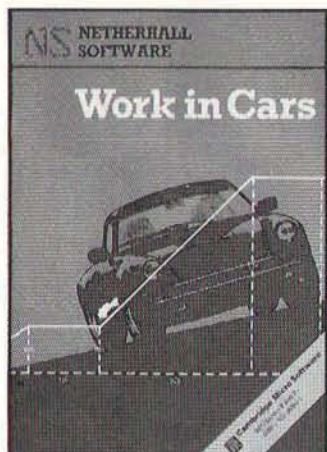
Date:

If you do not wish to cut up your copy of A&B Computing simply photocopy this page and send it off instead.

Ed NEWS

Solid state electronics

A complete course in solid state electronics comprising videodisc, floppy discs and manual, has been produced for the AIV system by Epic Industrial Communications. Price £2,300 + VAT. Discounts are available for multiple orders.



Work in Cars

A new title from the Netherhall

branch of Cambridge Micro Software. The animated program has been designed to illustrate the Law of Conservation of Energy by looking at a car in motion.

The effect of friction can be added and removed by students and the design of car and route altered to demonstrate factors affecting performance. Most suitable for GCSE physics groups, the program has also been used with A-level classes and should serve as a good instance of computer modelling for computer studies courses.

Key utilities

GSN have a utilities disc available for the popular *Key* database which is intended to support work linked to ITV Schools programmes. The support disc contains programs for transferring information from some other databases into *Key*, including ASCII and FIF files. The disc costs £1.50 + VAT. A demonstration data disc PLACENAMES is also available for £1.95.

Status is software providing a wide range of statistical tests and aimed mainly at geography and biology departments, but also with potential for economics, social studies and computer studies. *Status* selects appropriate tests for the student. Having answered a series of questions, the data is entered. The program explains calculations as they are carried out. Results can be displayed in graphical form. Price £19.50 + VAT.

Predictive typing

Clwyd Technics have found success with its *Keymaster* keyboard emulator for the BBC and *Predictive Typing* software. During typing the five most likely letters to be typed next are displayed at the bottom of the screen. The required letter is selected by

pointing. The system has been used successfully to improve the typing speeds of people who are only capable of limited movement. The Special Needs Technology Unit of the North East Wales Institute in Clwyd, which has close links with Clwyd Technics, has developed a special head-switch with which *Keymaster* can be operated.

Forthcoming AIV discs

The BBC announced two more videodisc projects at Interactive '87 – *Volcanoes* and *Countryside*.

Volcanoes is to be released in March jointly by BBC Enterprises and the educational division of the Oxford University Press. Rex Beddis, a highly experienced educational author for the OUP and an educational advisor for Avon, has designed a series of courseware modules which provide the core of the disc. A user can find out about aspects of vulcanology and plate tectonics. There is film of eruptions in Hawaii and Iceland as well as the Jovian moon Io. BAFTA award-winning animator Rod Lord has produced computer graphics to illustrate the principles involved.

Text of a book by Dr Peter Francis and a glossary and dictionary of related terms from the New Oxford English Dictionary – now computerised – are on the disc. Unknown terms can have definitions instantly displayed using a system christened *hypertext*.

Countryside is being sponsored by the Department of the Environment, The Earnest Cook Trust, ESRC, The Countryside Commission, the Development Commission, The National Farmers Union, The Nature Conservancy Council, British Gas and BBC Enterprises! The three main sections are real-life case studies, a simulation of a mixed farm in England and a database which includes population and agricultural censuses, biological records and soil surveys.



INFORMATION PACK



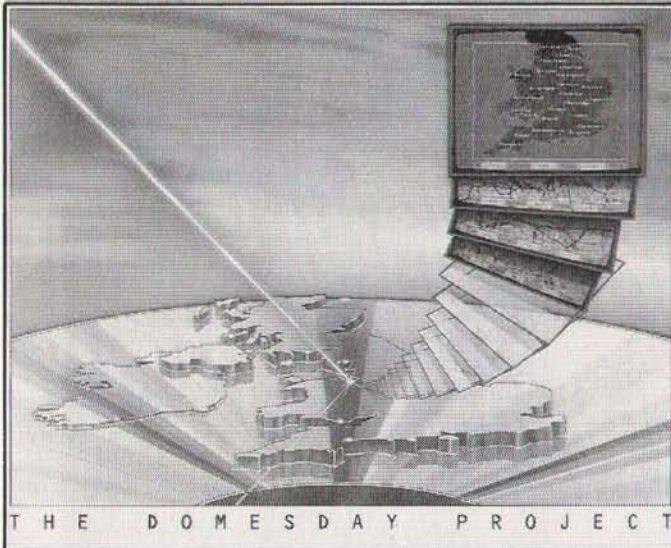
AIV LOGO

The Domesday support scheme has been extended by the production trio of Acorn, the BBC and Phillips. The £1300 discount is now available until March 31st.

The national project to investigate videodisc as an educational resource comes to an end in March and so far the signs have been encouraging. A report will follow to help guide investment in this type of technology. New funding may be forthcoming. The trial sites will keep their AIV systems.

A main stumbling block is the restriction caused by the copyright position on potential material. The research project has been able to use material which would not be released if publishing were on a commercial basis.

The project's own discs include a French language course with video footage and frames of a street artworked in 3D and animated frame by frame rather than by computer graphics overlay. The player can travel down streets according to instructions given by a friendly gendarme – reminiscent of micro software but with real voices and pictures. The reduced use of computer graphics, even in the maths packages is interesting. The producers have preferred to implement animation at the video stage.



T H E D O M E S D A Y P R O J E C T

Citizen support

Citizen Printers have introduced a booklet and disc package called *Getting started with the 120-D*. Written from the point of view of teachers, the booklet introduces the hardware features of the bestselling 120-D printer,

the range of print styles available and how to achieve them from BASIC, Wordwise and View.

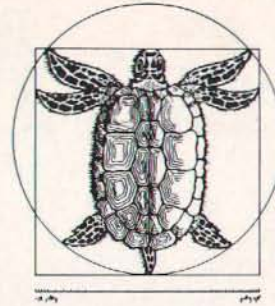
The utility disc has, among others, a demonstration of styles, tables questions, a word search program and a document editor.

Top of the form

Two interesting new PC based hardware/software combinations are Edpac and the Jaser Quizmaster. Jaser Electronics have developed a complete hardware and software package for the popular 'schools challenge' type inter school competitions. The equipment detects the first button

pressed, with audible and visual indication to the contestants and quizmaster.

DRS Data and Research Services have put together Edpac for student assessment. It uses optical mark reading to rapidly pull information off a standard assessment form.



Control Logo

Logotron Logo has a control extension module which adds a number of control primitives such as TURNON, SETCOUNT, INVAL,

USER, OUTSTATE etc. A new screen display has been written to improve speed for rapid switching or data capture. Documentation for Control Logo has been written by Bob Sparkes of the Stirling University Contol Unit, himself an experienced user of the system. The manual includes descriptions of a range of commercially available interfaces and robots with instructions for configuring Logo to talk to them.

Control Logo requires Logotron Logo and comes on disc priced £15.00 + VAT.

PC or not PC?

The availability of Archimedes seems only to have further confused the choices available to educational purchasers of micro-computers, **writes Ann Owen.**

Department of Education and Science recommendations that MSDOS be available – though not necessarily central to – all new micros, means that the software emulation on Archimedes becomes vital to its suitability. This is especially so now that the hardware second processor option appears to have been shelved. Acorn can only be right in suggesting that a 80186 processor would be a backward step at the

likely price. It could be compared with, say, the Amiga 2000 with 80286 boards available and 386 on the way. What's more the Amiga operating system and MSDOS work in tandem and can swap data with ease.

MSDOS lacks the range of educational software across the curriculum and there is no standard WIMP environment. It looks as though a wider range of computers is going to be needed to meet all the computing requirements of today's students. Acorn still have a major contribution to make but the grip of the BBC Micro standard seems to be loosening.

Technical Logo

Logo Software's Technical Logo (TL) is capable of controlling a Lego buggy via the Pilot One interface. TL uses feedback from two Pilot One optosensors to compare the speed of the two motors, stopping the faster motor until the slower has caught up. The buggy is not accurate enough to do turtle graphics.

TL works with either a screen display of inputs and outputs or a turtle graphics display, using

the normal Logo commands (FD, BK etc) to drive the Buggy as a floor turtle. The Pilot One version of TL costs £20 + VAT.

Logo Software believe that TL is exceptional because of its response time of 20 milliseconds, its 19 extra primitives in 2.5K bytes and its combination of the best features of Control BASIC and CLARE Control Logo.

TL is also available for Lego Technic and Fischer Technik kits and teaching material is available from Pilot One.

Factfile

MB Software, 4 Arden Close, Hadrian Park, Wallsend, Tyne & Wear, NE28 9YB. ☎ 091 26344026
 Pilot One, 22 Campbell Road, Bedford MK40 3DD. ☎ 0234 327688.
 Logotron ☎ 0223 323656.
 Logo Software 316a Richmond Road, Twickenham, Middlesex, TW1 2PD. ☎ 01 891 0989.
 Clwyd Technics Limited, Antelope Industrial Estate, Rhydymwyn, Mold, Clwyd, CH7 5JH. 0352 83751.

Acorn AIV, Acorn Computers Ltd, Cambridge Technopark, 645 Newmarket Road, Cambridge CB5 8PD. ☎ 0223 214411.

Photocopies of previous A&B articles are available, from Reader Services, 9 Hall Road, Maylands Wood Estate, Hemel Hempstead, Herts HP2 7BH. Price £1.50. ☎ 0442 211882.

"£229 for all that?"

"What's this - a new printer?"

"Yes, it's the very latest, the industry compatible Multi-font LC-10 from Star, there are features included as standard not found on printers sometimes twice the price..."

"Oh really - like what?"

"Well, there's the Star front control panel - so you don't have to fiddle with DIP switches -

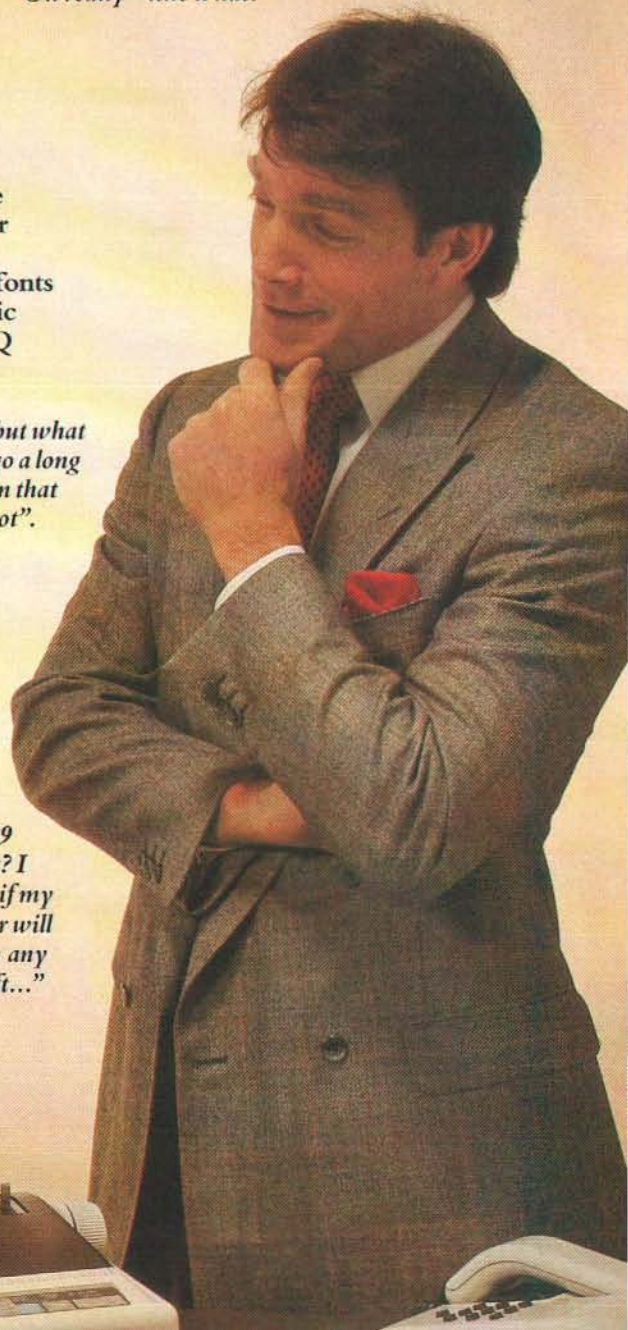
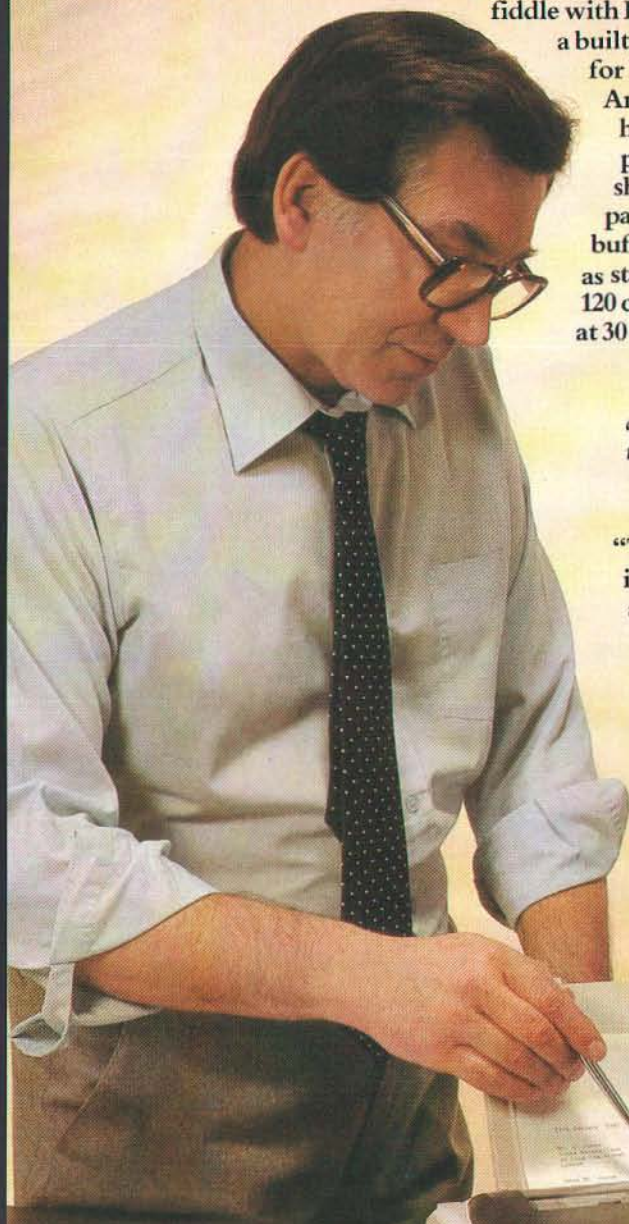
a built-in push tractor for low form tear-off.

And you don't even have to take the tractor paper out to autoloading single sheets with the LC-10's paper parking. There's a large 4K buffer - it's even got six NLQ fonts as standard. It prints at a realistic 120 cps and has a really fast NLQ at 30 cps".

"Hey, that sounds good, but what about quality? You'd have to go a long way to beat the print quality on that NL-10 you've got".

"True, but they've even improved on that and you can change all the resident fonts at the touch of a button".

"Hmm, that's really easy - £229 for all that? I wonder if my dealer will have any left..."



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Ealing, London W5 2BS.
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A division of
Star Micronics Co., Ltd., Japan.

Price excl VAT.

I'd like to find out if my dealer has any left. Please send me an LC-10 brochure
Please send me details of the Star range of dot matrix printers Or just call Belinda
on 01-840 1829.

Name _____ Company _____

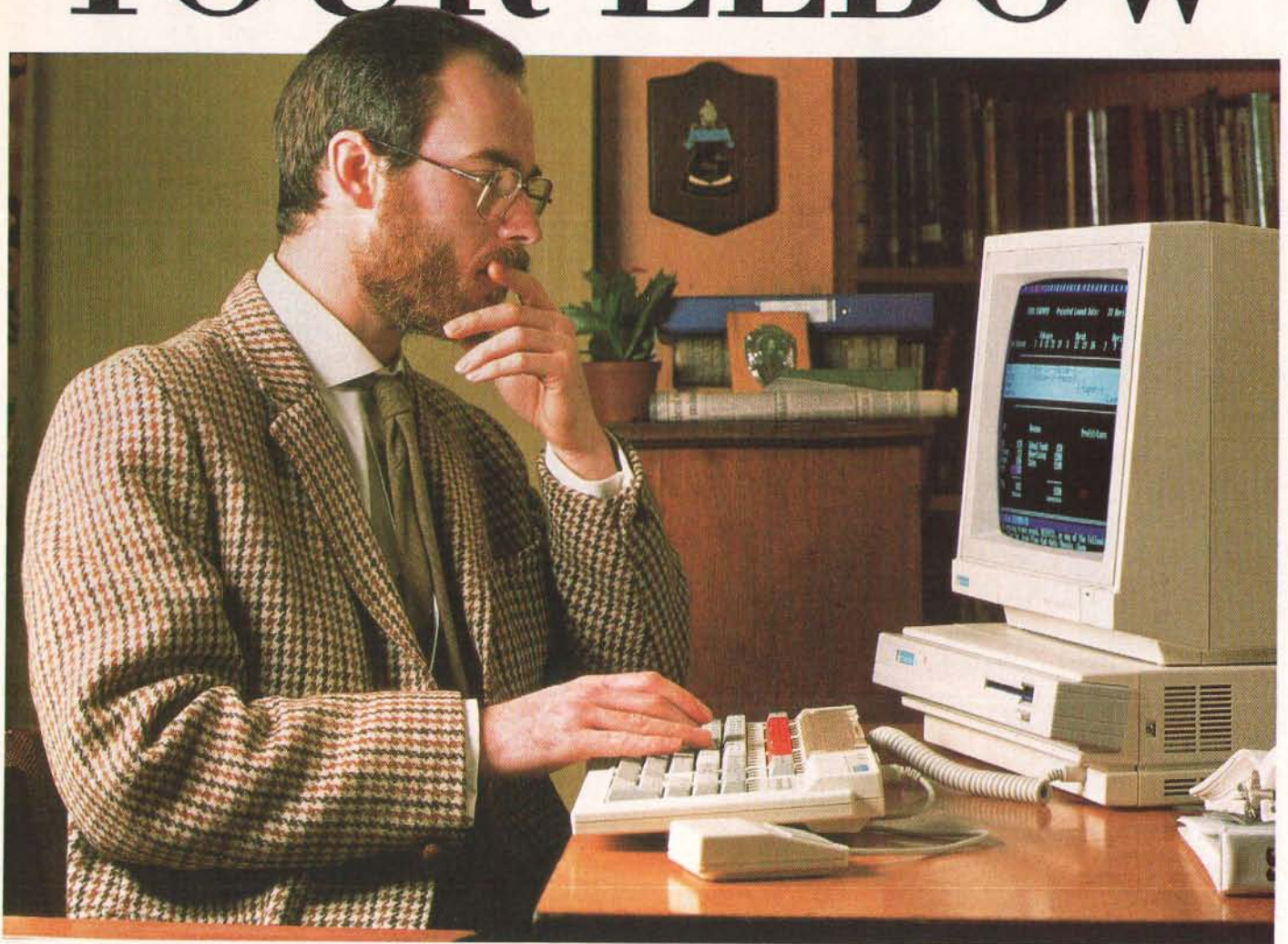
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Postcode _____

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LC AB4

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The benefits of such power include superb graphics for CAD and image processing, and considerable creative opportunities in the field of sound and music.

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| <input type="checkbox"/> Graphics applications | <input type="checkbox"/> Information retrieval | <input type="checkbox"/> Project Planning | <input type="checkbox"/> Home |
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ABE1

Archimedes

Archimedes

Ray Tracing Concepts

If your jaw dropped at the superb raytracing demonstration picture we published on the February Archimedes contents page then you'll be interested to know that it was created by the brilliant programmers at Computer Concepts. The same programmers are currently working on both drawing and desktop publishing packages for the Archimedes and they promise to be amongst the outstanding software packages of 1988, on any machine.

If you are interested in seeing the raytracing demo actually animated, then the first edition of the RISC User disc contains the full version and it's sensational.

Raytracing has come to the fore on the Amiga, especially the well-known Juggler demonstration. Watch out for similar graphics for the Archimedes in the near future.

Red Keys

Your full news roundup from the world of Archimedes.

Emulation Station

The 6502 emulator - Clive Grace looks at what's in store for your old BBC software.

Archimedes Report

Gordon Taylor ponders the ramifications of Computer Concepts' ROM Podule

Archimedes — the A in A&B Computing

RED KEYS

Sprite Power

We accidentally left you a bit of work to do in our February Archieball program, missing out Table A which contained our pre-drawn sprite designs for you to copy. They are presented here for those who couldn't match the screen representations of the sprites.

For anyone who got stuck, here's a brief run through of what you should do to use a sprite file. First insert your Welcome disc and CHAIN "Utilities.SEDIT", the Acorn sprite editor. Those with GXR ROMs will find themselves in familiar territory. Table A outlines the sprite designs for Archieball but you can use the editor to create alternatives if you wish.

Picture One shows the sprite file details, Picture Two the bat design in the editor. Once you are happy with each design, save the sprites under the filename "ArchbalSpr". You must then copy this file to the disc which contains your Archieball main program - use "COPY with the P parameter to prompt for a disc change.

Archieball loads the sprite file with the command SLOAD. SCHOOSE is used to select the sprites by name. Each sprite is drawn on the screen with the BASIC keyword PLOT &ED. The background colour for each sprite has to be specified "transparent" when designing in the sprite editor so that, when it is plotted in Archieball with GCOL 8,0, the screen background "shows through".

```
.Y.....MMMMMMMMM.....Y.
YBY..MMMMCMCMCMMM..YBY
BY..MMMMCCMMCCMMMM..YYB
YYBMRMMCMCMCMCMRMBYYY
YYBMRMMMMMMMMRMBYYY
YYBMRMMMBBMMRMBYYY
YYBMMMBB.....BMMMBYYY
YYY..BMB.....BMB..YYY
YYY..BB.....BB..YYY
.Y.....Y.
```

NAME: 1
WIDTH: 24
HEIGHT: 10
MODE: 9

.B.
BBB

```
BBB
.B.
NAME: 2
WIDTH: 3
HEIGHT: 4
MODE: 9
```

```
...BBBBBBBBB...
..BBBBGGGGBBB..
.YBBGGBBBBBBBY.
CYBBGGBBBBBBBYC
CYBBGGBBBBBBBYC
.YBBGGBBBBBBBY.
..BBBBGGGGBBB..
...BBBBBBBBB...
```

NAME: 3
WIDTH: 16
HEIGHT: 8
MODE: 9

```
...BBBBBBBBB...
..BBBBGGGGBBB..
.YBBGGBBBBBBBY.
CYBBGGGGBBBBBYC
CYBBGGGGBBBBBYC
CYBBGGGGBBBBBYC
.YBBGGBBBBBBBY.
..BBBBGGGGBBB..
...BBBBBBBBB...
```

NAME: 4
WIDTH: 16
HEIGHT: 8
MODE: 9

```
...BBBBBBBBB...
..BBBBGGGGBBB..
.YBBGGBBBBBBBY.
CYBBGGGGBBBBBYC
CYBBGGGGBBBBBYC
.YBBGGBBBBBBBY.
..BBGGBBBBBBB..
...BBBBBBBBB...
```

NAME: 5
WIDTH: 16
HEIGHT: 8
MODE: 9

```
...BBBBBBBBB...
..BBBBGGGGBBB..
.YBBGGBBBBBBBY.
CYBBGGBBBBBBBYC
CYBBGGGGBBBBBYC
.YBBGGBBBBBBBY.
..BBBBBBBBBBB...
...BBBBBBBBB...
```

NAME: 6
WIDTH: 16
HEIGHT: 8
MODE: 9

```
...BBBBBBBBB...
..BBBBGGGGBBB..
.YBBGGBBBBBBBY.
CYBBGGGGBBBBBYC
CYBBGGBBBBBBBYC
.YBBGGBBBBBBBY.
..BBBBGGGGBBB..
...BBBBBBBBB...
```

NAME: 7
WIDTH: 16
HEIGHT: 8
MODE: 9

KEY

- . Transparent
- R Red
- G Green
- Y Yellow
- B Blue
- M Magenta
- C Cyan

Archimedes software

A&B Computing Software Sale's first releases for the Archimedes are Adventurescape, Global View and Easyfont, all running in Archimedes native mode and taking advantage of new screen Modes and vast increases in speed.

Upgrades for existing Software Sale customers are available. Just send in your original

disc as proof of purchase and a new 3.5" Archimedes version will be supplied.

Archimedes Adventurescape price £15.00 Order product number DB86 Upgrade price £5.00 Order product number DB87

Archimedes Global View price £10.00 Order product number DB88 Upgrade price £5.00 Order product number DB89

Archimedes Easyfont price £10.00 Order product number DB90 Upgrade price £5.00 Order product number DB91

If you wish to order Archimedes software, turn to the Software Sale pages and fill in the order form with the appropriate product number and price.

Archimedes Data Management

Management Data Systems have announced the availability of their MPSS database system on Archimedes. MPSS has been used successfully for student profiling systems in schools, for questionnaire analysis and research in sociology. Features include searching on combinations of 20 or more fields, up to 250 fields per record, mail merge, wild character and logical operator searches. A typical file size would be 7000 by 100 character records on a single 800K drive.

Management Data Systems,
108 Parthenon Drive,
Liverpool L11 7AQ. ☎ 051 226 1214.

How do they do it?

Upgrading the Archimedes operating system to the (final?) 1.2 proved too much for Acorn's database system. It must have printed two sets of labels for every customer, or was the second copy just a backup?

Even worse, does this mean that Acorn think they have sold twice as many Archimedes as they really have?

Clare's Toolkit module can help you investigate Archimedes

We called December 1987 A&B Computing the "hurricane" issue because our typesetting machinery was put out of action by that blustery day back in November last. The effects were most noticeable on our look at Clare's Archimedes Toolkit module and the piece suffered irrevocably. We are therefore happy to present a rerun in Red Keys.

Clare's Toolkit module for the Archimedes comes on floppy disc which, on a single drive system, boots up and installs the toolkit routines as a module. Extended *CONFIGURE commands set up default values for use within the utilities and are saved to disc so that the values return for each session. If you wish to use Toolkit from your Welcome Disc then an obvious place to put the toolkit is the MODULES directory. For instance, once copied across you could issue the command:

```
*CONFIGURE PATH ":4.MODULES.
Toolkit"
which tells the system to look in
the MODULES directory on your
winchester disc to find any refer-
ence to "Toolkit".
```

Toolkit has proved instantly popular with program developers for the Archimedes. The utilities consist of the bare *commands and the memory and disc editors.

Different versions of *FIND search for a specified list of hex numbers (single wildcards), mnemonics, 32 bit word addresses with single wildcards and string searches (maximum 255 characters) with multiple wildcards. Wildcards are # and * by default but can be reconfigured. The penultimate parameter is the address in memory at which to start the search. The last is case dependency on/off (both of which can be taken from a default configuration).

Editing

You use WFIND for opcodes and MFIND for mnemonics when you need to find something and on arrival there are five formats of memory editor available. You enter via *MEMORY, into the default configured format: B for BIT, H for HEX, M for MNEMONIC, T for TEXT, W for WORD mode.

```

SET      HEX*
Escape
*BIT

Syntax : *BIT <start> [[+]<end>] (Error number &DC)
*BIT B000
000B000 .... 00000000 00000000 00000000 00000000
000B004 .... 00000000 00000000 00000000 00000000
000B008 .... 00000000 00000000 00000000 00000000
0
Escape
*FINEENVIRONMENT
-----
CURRENT ENVIRONMENT
-----

Exit handler                : 380A6D8
End of application workspace : 00A2000
Memory size                 : 0100000
Buffering                   : Off
Undefined instruction handler : 3803584
Prefetch abort handler     : 3803808
Data abort handler         : 3803844
Address exception handler   : 380387C
Error handler               : 3803498
Error buffer                : 0000AAC
Escape handler              : 3803540
Event handler               : 3803540
CallBack register save area : 380351C
CallBack handler            : 00008CC
BreakPoint register save area : 3803544
BreakPoint handler          : 000090C
Unused SWI handler          : 38002EC
Current MEMC state          : 36E0D84
Floating point emulation    : Off
    
```

The CTRL key plus the appropriate letter will move into another format. Cursor keys are used to move around the memory display, CTRL TAB continues any search and COPY toggles between binary, hex and decimal input. BIT mode displays one word per line, WORD mode displays four words per line, TEXT mode ASCII only (64 characters across) and MNEMONIC mode (disassembler) displays a single 32 bit word line.

In the latter mode, upon pressing any alphanumeric key you enter the 'one line assembler' which provides direct editing of the object code, with few restrictions. An acceptable line of ARM assembler is immediately assembled into place for testing without the need to reassemble the source file.

*BIT, HEX, MNEMONIC, TEXT and WORD display or dump memory in the standard formats to the current output stream, which can be a printer. The other toolkit commands do not allow printer output. *SHIFT

moves chunks of memory. You could, for instance, move an operating system module into user RAM, save it and amend it before reuse as a module.

*ENVIRONMENT prints out all the important addresses and routine entry points in Archimedes. *HCOMPARE and *WCOMPARE are used to do byte by byte or word by word comparisons of two blocks of memory, another vital function for the programmer.

Disc editing

The disc editor is a parallel utility (even down to the one line assembler!) to the memory editor and works on both 640K and 800K floppy and winchester formats. *AEDIT enters at specified drive, sector and offset within the sector.

*AEDIT 0 (drive) 3(sector)F0(offset)
The exact syntax depends on the track format in use.

Also included are the EXALL and CATALL commands with

wildcards, useful for development of the complete disc based program.

Conclusions

The daisywheeled 17 page manual is straightforward and clear. On discs, it wisely advises against the editing of vital information which the filing system requires and hints at a later version of Toolkit which will recalculate checksums automatically, allowing directory information to be edited.

Even if you are new to assembler programming, if you have a burning interest in the technical aspects of Archimedes then Toolkit is a marvellous way to investigate and to get to know the operating software in memory and on disc. The review copy was preproduction but hardly showed it. If you are intending to develop Archimedes software then toolkit will get you moving at the reasonable price of £39.95.

Fractal Magic

If you're wondering about the cover shot of the Archimedes – the landscape shown is a stunning example of just what can be done with an Arc.

Utilising the latest in fractal programming techniques (!) Keith Smilley has created some amazing scenes.



RESOURCEful Archimedes

RESOURCE, the local authority educational software publishing consortium are to publish a set of utilities for the Arc on behalf of Acorn. The *BBC to ARM* utilities allow programmers to identify and cure problems when converting software for the 6502 emulator.

Another bit of news is that RESOURCE's best seller, *DROOM*

has been re-written, and the new version for the Arc exploits the machine's graphics to the full.

The mathematical adventure is suitable for children of all ages, and it has now been enhanced to provide an environment in which all children will be motivated to tackle logical problems.

For more information ☎ (0302) 63800, or write to RESOURCE, Exeter Road, Doncaster, DN2 4PY.

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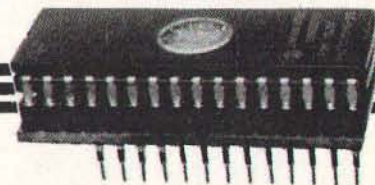
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ARCHIMEDES

REPORT

The PC Emulator speeded up, the ROM podules and faster applications

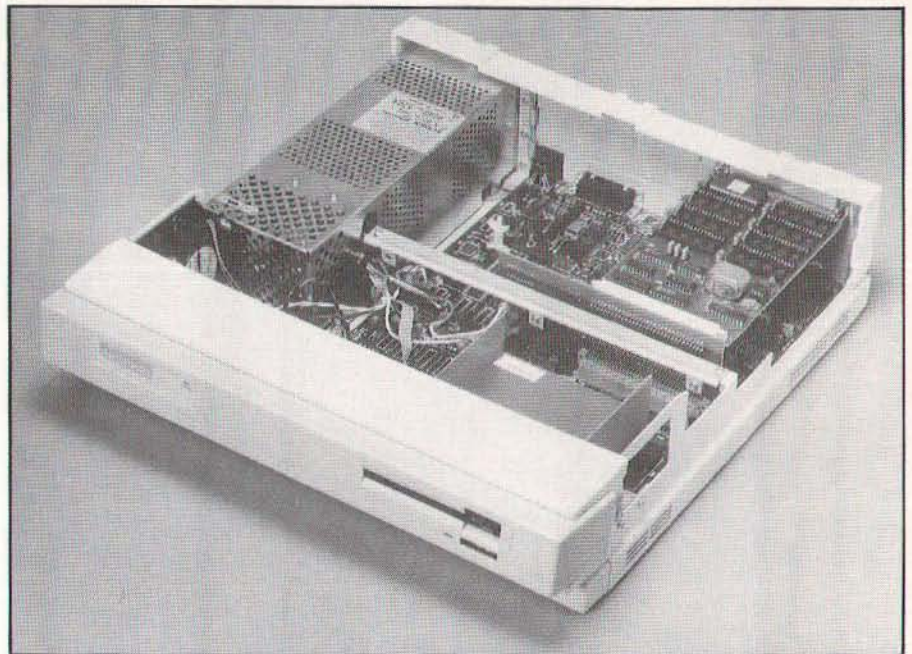
Introduction

For this, my ninth report on the Archimedes, I have looked at the Computer Concepts' ROM/RAM Podule, together with the specially-adapted versions of Inter-Word, Inter-Sheet, and Inter-Chart in ROM. I also give benchmark results for the latest version of the PC Emulator, which is significantly faster on most tests. Both the Podule and the PC Emulator increase greatly the capability of the Arc to run existing applications (beyond those written in BBC BASIC).

ROM/RAM Podule

Computer Concepts (CC) have recently released their ROM/RAM Podule, ahead of the Acorn equivalent. However, it is designed to be compatible with any Acorn ROM Podule fitted in the same machine. Unlike the Model B/Master, the ROM and RAM on the board is not within the main, 32-bit memory map, but is only 8-bits wide, and communicates with the Arc via a filing system (RFS). One reason for holding ROMs in the Arc is to be able to run them under the (8-bit) 6502 Emulator. Another is that 8-bit wide ROMs come as a single chip, and hence have a smaller minimum size, than 32-bit wide ROMs, (such as the Arthur Operating System), which require four separate chips.

Either Podule can be used to hold any suitable (eg "Tube-compatible") Model B/Master ROM, or those adapted for the Arc. However, not all Tube-compatible ROMs will work in the 6502 Emulator. For example, a View 3.0 ROM could be fitted in a ROM Podule, and the code loaded successfully into the Emulator, but will not run, because it is protected against working when in RAM. Likewise, the code of the CC applications supplied in ROM checks for the presence of the ROM. Podule-mounted software may be held in ROMs, Eproms, or RAM chips (which may be battery-backed). It could (in principle) include the 6502 Emulator, and



Archimedes bares his soul to show the podule and the backplane enabling it to be fitted at right angles.

applications which run in it, the PC Emulator, MS-DOS, and applications which run under it, and Archimedes applications which run under the Arthur Operating System. Since communication is via a filing system, the 8-bit ROMs can be used to hold code for running in 8- or 16-bit emulators, or the 32-bit "native" machine.

Installation

All podules for the Arc require the presence of a "backplane". One with four slots is fitted as standard to the 400 Series, and one with two slots may be fitted to 300 Series machines. (Unfortunately, you cannot at present fit a 4-slot backplane to a 300 Series machine, due to differences in the power supply connections). The Acorn upgrade kit also includes a fan. Fitting it involves sliding off the lid of the system box, plugging the backplane into the 64-pin connector provided, and connecting up the leads from the power supply. It is then secured by braces, retained by small bolts and nuts. The fan must also be mounted, and connected to the power supply. This is not difficult, but some users may prefer their dealers to fit it at the time of purchase.

Depending on whether the Podule is to occupy an upper or lower slot, the upper or middle blanking plate should be removed from the rear of the casing, whereupon the ROM/RAM Podule may be plugged into the backplane. One or two such ROM/RAM (or other) Podules may be fitted to 300 Series machines, and up to four to 400 Series machines. There are eight sockets on each CC ROM/RAM Podule, of which one is occupied by the "Manager ROM", and seven may be fitted with ROM or RAM chips.

The Computer Concepts ROM/RAM Podule is "smart", in that the Manager ROM contains an "Auto-configure" routine. When called, this detects the types and sizes of all the installed ROM/RAM chips, and sets solid state latches accordingly. This saves the user from having to adjust anything like as many links as on the Acorn Podule. One link per socket may be re-positioned to apply battery backup to a RAM chip.

Applications

Whereas Wordwise Plus for the Arc is available on disc, Inter-Word, Inter-Sheet, and Inter-Chart for the Arc will only be

ARCHIMEDES REPORT

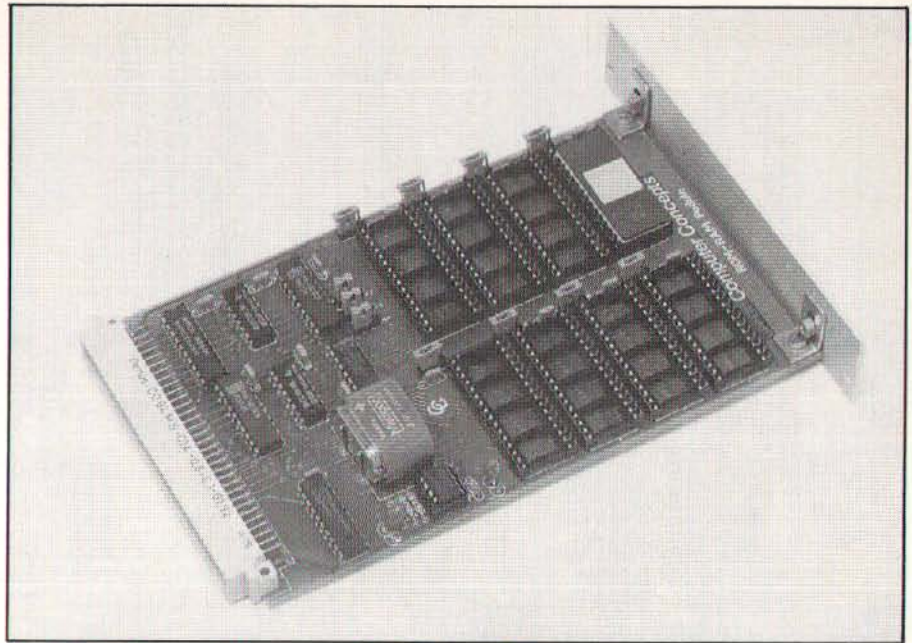
available in ROM. This also applies to the forthcoming 32-bit document processor, and the separate drawing package, (both from CC), which are listed in the Archimedes software catalogue. However, all such ROM-based applications have the advantages of loading fast and silently, while leaving more main RAM free for user documents etc. This latter is of particular significance with the 32-bit applications, running in the 305 machines, since it becomes much more practical to use "overlays" - especially when the standard machine has only one floppy disc drive. The ROMs may be of 16, 32, 64, or 128K each.

The Computer Concepts ROM/RAM Podule can also hold (static) RAM chips. These may be of 8, 32, or 128K, and used to hold images of ROMs, or as a RAM disc. (This echoes the way in which "sideways" RAM added to the Model B/Master Series could also be used as a RAM disc). Whereas the Acorn ROM Podule allows RAM in only two sockets, the CC Podule allows it in any (even all) of the seven available sockets. They are powered from the Arc when it is switched on, but a re-chargeable battery may also be fitted, so that the Podule RAM retains its contents when the machine is switched off. (The battery does not support the main RAM, so you must save your file to the RAM Filing System, and/or a disc filing system, before switching off).

The CC Podule with RAM chips thus offers a RAM disc even before Acorn has released the code for the main memory RAM disc. Because the RFS uses 8-bit RAM, it is slower than the RAMFS would be, but reportedly has a data transfer rate of some 300K per second - over 10 times that of the (very fast) Archimedes floppy drives, and equal to that of the (very fast) Archimedes Winchester hard disc. Having 32K of RAM enables you to hold the 6502 Emulator (which takes some 27K). Fitting a backup battery makes it practical to save a !BOOT file which can load the Emulator, and then your favourite (8-bit) application from ROM (or more RAM). If all seven available sockets held 128K RAM chips, the RAM Filing System would have a capacity of 896K, which is more than that of a top of the range floppy disc drive - though it would be far more expensive!

In Use

The CC Manager ROM code has been designed to be compatible with the hardware of both the CC and Acorn podules, and to control any number of either, if present. The ROM and RAM chips that are present may be listed with *ROMPOD n (where n is the Podule number), and you select the ROM/RAM Filing System with *RFS. Neither the RFS (nor the Acorn ROMFS) are recognized by the Desktop, so such operations can only be initiated via "*" commands. The current directory can then be catalogued to show that the



The ROM podule - vacated for now, save for the Manager ROM.

The Arc can be configured to !BOOT at switch-on, and to use the RFS, (or the Run\$Path set to RFS, followed by ADFS). Hence, a !BOOT file held in battery-number and names of files can differ from those of the chips themselves, and all the usual filing operations carried out - as with the ADFS (but more quickly and quietly). Of course, those that involve writing to the "disc" require that RAM be present, but ROM files can be RENAMED or DELETED temporarily if required, since in the Arc, catalogues are "cached" in main RAM. The 6502 Emulator and many ROM applications will load and run on typing *65ARTHUR, then eg *NAME. However, the CC ROMs respond to *IWORD, *ISHEET, and *ICHART, first loading the Emulator automatically. To change between applications on the Arc, you have to enter *QUIT to leave the Emulator, before typing the next name.

backed RAM can load an application or other file, such as the 6502 Emulator, from ROM or RAM, or a disc in a specified drive. It may be of the Exec type, with *OPT 4,3, or BASIC, with *OPT 4,2, containing only eg *IWORD, since this loads the Emulator first. With the 6502 Emulator held in Podule RAM, along with such a !BOOT file, the Arc can !BOOT up Inter-Word in only 4.3 s. More importantly, it all happens quite automatically.

Such a !BOOT file can also set the many preferences that may be loaded into the machine every time it is switched on. (These are additional to those held in CMOS RAM, and similar to those built into the Arthur System ROM). They include "Aliases" for "*" commands (eg *MKDIR instead of *CDIR), and for Loading and Running files according to their type (eg BASIC programs, Sprites etc), "Options" for "Star" commands (eg

Fig. 1	WORD Times	PROCESSOR in	COMPARISON seconds	
Byte document 4000 words	Inter-Word Master 128 ADFS 640 K	ADFS 640 K	Inter-Word A Archimedes ADFS 800 K	RFS RAM
Load	4.5	4.8	3.4	1.7
Save	4.8	6.8	4.4	2.5
Search 32-line	3.7	8.4	8.4	8.4
Search 64-line	-	11.2	11.2	11.2
Scroll 32-line	16.0	13.4	13.4	13.4
Scroll 64-line	-	18.5	18.5	18.5
"FILER5" 16,177 words				
Forwards	71.4	76.5	64.5	48.0
Backwards	13.8	13.6	11.0	6.5

Figure 1. Speed Comparisons.

Fig. 2	SPREADSHEET	COMPARISON
	Times in	seconds
Liardet Model 13 columns	Inter-Sheet Master 128	Inter-Sheet A Archimedes
Replication - row/s	9	7.5
True capacity - rows	86	133
Recalculation - rows	11.6	8.9

Figure 2. Spreadsheet Comparisons.

adding V for "Verbose" to *COUNT), "Paths" (sequences of filing systems, drives and directories to be searched) for various file types, and changes to the format of system variables, such as the date.

"Homeblown" ROMs

An alternative to holding files in static RAM is to "blow" them into Eproms, which require no battery-backing. These too may be in any language that can run on the Arc, whether under the 6502 or PC Emulators, or directly in "native mode". The Manager ROM includes a "Make-ROM" utility, capable of handling Eproms of up to 128K, but you will either need an "Eprom blower" or can send your image on disc to Computer Concepts, who will put it into Eprom for a fee.

Documentation

The manual has over 30 A5 pages, and a highly professional appearance. Headings in various sizes help you to find the section you require, and the information provided - along with clear figures - covers both installation and use comprehensively.

Prices and Availability

The cost of an Acorn 2-slot backplane is £39 plus VAT (ie £44.85). This is avoided if you have one - either as standard (as in a 440) or already fitted, supporting another Podule, in a 305 or 310. It is available now.

The CC ROM/RAM Podule costs £49 as standard, or £59 with a rechargeable battery fitted, both plus VAT. RAM chips of 8K cost £5 each, and of 32K, £8.60, again plus VAT. (This is less expensive than the Acorn ROM Podule, which is expected to cost £59 plus VAT). Thus a CC Podule with a battery and 32K of RAM would cost £67.60 plus VAT (ie £77.74). All these are available now, either from CC or dealers. RAM chips of 128K are expensive at present, but prices are expected to fall.

The CC ROM/RAM Podule (especially if it has some RAM and a backup battery),

may be compared with a floppy disc drive upgrade for the Arc, which costs £125 Plus VAT (ie £143.75). Alternatively, for 305 machines, it may be compared with the 512K RAM memory upgrade, which costs £89 plus VAT (ie £102.35).

Conclusions on the Podule

Given that Wordwise Plus and the Acorn-soft ROM software is all available on disc, the cost of the CC ROM/RAM Podule (from £56.35), and the Acorn Backplane (£44.85, where applicable), may be seen by some as a surcharge on the CC ROM software. However, I selected Inter-Word, Inter-Sheet, and Inter-Chart as the best packages available for the Model B/Master in their respective fields (see A & B 86/11, Buyers' Guide). None better have appeared since, and the Arc versions (running under the "bundled" 6502 Emulator) compare remarkably well in price-performance with PC packages (which require the Arc PC Emulator - costing £99, if bought separately, or £60 if "bundled" with a machine - and run rather slowly), and with the Arc "native mode" packages that have appeared to date. The latter two categories include some very powerful packages, but they may be more expensive, and have more features and capacity than you actually need.

Software held inside the machine, whether in Eprom or battery-backed RAM, is more convenient, and secure against loss - which may be of particular value in schools.

Inter-Word A

I reviewed Inter-Word for the Model B/Master in A & B, 86/8, p 56, and previewed that for the Arc in A & B, 87/10, p 38, on the basis of a pre-release version. Since then, there have been changes both to the Arthur Operating System (from 0.3 of 256K, to 1.2 of 512K), and to Inter-Word A itself, affecting both features and performance.

Inter-Word on the Model B/Master Series is noted for its very fast "handling" - both automatic reformatting and scrol-

ling. This depends upon writing directly to the screen, which is "illegal", and not supported in the "Second Processor" environment of the 6502 Emulator. Moreover, the effective "clock speed" of the Emulator is only about 1.2 MHz, rather than the 2 MHz of a Model B/Master. Hence the Arc version of Inter-Word has a Relocatable Module, outside the Emulator, which supports writing directly to the Archimedes screen. Furthermore, the "Second Processor" environment does not allow switching between "sideways" ROMs, as on the Model B/Master, so the ROM-link feature has been omitted. These changes have increased the space available for user documents to 33,982 bytes - some 20 per cent greater than on a Master. The ROM-link menu has been replaced by a Colour menu, which allows 17 different features and "highlights" to be assigned any of the 16 distinct colours of Mode 12 (or 20) - selected from the full 4096 supported by the Archimedes.

Data can still be transferred between members of the "Inter-" family via files. Although the transfer is not automatic as with ROM-link, the ADFS floppy is appreciably faster on the Arc than on the Model B/Master, as is the ADFS Winchester. If RAM chips are fitted in the Podule, the RFS may also be used as a RAM disc - both to move data between applications, and to hold the document files, including those of multi-file documents.

Inter-Word A allows you to exchange the action of the Shift- and Ctrl-arrow keys - the default being consistent with other screen editors on the Arc (such as View, most PC packages, the ARM BASIC Editor, and Twin). This also ensures that Page Up and Down have the correct action. The Home key works correctly, but Arc applications habitually use the End/Copy key for Delete Right, and the Delete key for Delete Left, which differs from the PC convention. Inter-Word A supports the use of 40-, 80- and 132-column modes (this last displaying the maximum of 120 columns), and 25-, 32-, and even 64-line modes (this last only with a multi-frequency MonitorType 1).

Inter-Word has ample facilities for a business word processor, with the multi-file feature for handling long documents, and the option of an excellent "on-line" spelling checker (SpellMaster) - available now on the Model B/Master, and soon also on the Arc. Inter-Word documents are saved with a printer set-up, which is easily changed via a menu. However, it is also possible to load another printer driver, if you want to print the same document using an appreciably different printer. This is sufficient to exploit all the more affordable printers - dot-matrix and daisy-wheel - to the full, and to get the equivalent results from page (eg laser) printers. Moreover, the text may contain embedded (and concealed) control codes, which can be used to change print styles

(and even point sizes, with page printers), and "star" commands, which can be used to read in files (even dumped screen images/graphics, again provided suitable printer drivers are available). However, the additional point sizes, and embedded graphics cannot be previewed on screen. (A more powerful package, with page layout features and multiple fonts – such as CC's forthcoming document processor – would be needed to exploit most page printers to the full).

Performance

The times taken for various operations on two documents of different sizes in Inter-Word on the Model B/Master and the Arc (with various filing systems) are shown in Fig. 1. Searching from end to end of the 4000-word Byte document is somewhat slower on the Arc version, due to the lower clock speed of the 6502 Emulator, but it is still acceptable, while the other operations are actually faster, thanks to clever code (and much more space for it). Even scrolling in 64-line mode is very acceptable, considering that most word processors on the IBM-PC take twice as long (in 25-line modes), and some even four times. Loading and saving the 4000-word document are faster with the 800K floppy disc, and faster still with the RAM disc, but the differences become more significant with the longer, 16,177-word document, comprised of five separate "multi-"files.

Inter-Sheet A

I reviewed *Inter-Sheet for the Model B/Master in A & B*, 85/9, p 88, and then previewed a pre-release version for the Arc in *A & B*, 87/9, p 58. As adapted to the Arc, *Inter-Sheet* supports 40 columns x 25 lines, 80 x 32, 132 x 32, and 80 x 64 modes.

As before, they are selected by stepping round with a function key. In addition to "spreadsheeting" (ie calculations), *Inter-Sheet* can be used as an extension to *Inter-Word* – for laying out tables, complete with decimal tabbing, which can then be either imported into *Inter-Word* documents, or printed separately.

Performance

Since the 6502 Emulator offers a "Second Processor" environment, *Inter-Sheet A* has been relocated, which gives a "True Capacity" some 55 per cent larger than in a Master. See Fig. 2. Although the Emulator has an effective clock speed of only about 60 per cent of that of Model B or Master, the Recalculation rate is 77 per cent as high. Thus it is still faster than any other spreadsheet on a Master (and Lotus 1-2-3 on an IBM-PC).

Inter-Chart A

I reviewed *Inter-Chart for the Model B/Master in A & B*, 85/11, p 16, and 85/12, p 84, and mentioned a pre-release

		Times in seconds				
PCW Benchmarks	IBM-PC	Archimedes PC Emulator ver. 1.00	Archimedes PC Emulator ver. 1.09	Improvement	Speed relative to IBM-PC	
GW Basic 3.20						
IntMath	6.2	11.6	10.0	1.16	0.56	
RealMath	7.0	14.4	13.3	1.08	0.53	
TrigLog	52.5	131	101.3	1.29	0.53	
TextScrn	89.8	185	150	1.23	0.60	
GrafScrn	49.0	55	48.5	1.13	1.01	
Store F/D	36.1	38.6	38.6	1.00	0.93	
Store H/D	12.7	30.3	-	-	-	
Index	1.00	0.56	0.68	1.21	0.68	
Byte Sieve						
GW Basic 3.20	191	396.2	364	1.09	0.52	
Byte document						
WordStar 3.3						
Scroll	41	157	133.5	1.18	0.31	
Ability 1.2						
Scroll	-	111	89.5	1.24	-	
	IBM-PC from	times for PCW 87/11	PCW tests chart			

Figure 3. The PC Emulator – speed differences can be quite phenomenal.

version for the Arc in *A & B*, 87/9, p 58. *Inter-Chart A* has also been relocated. Where even the Master version had plenty of room for data, the Arc version starts with 43940 bytes free – some 50 per cent more.

Inter-Chart A can use any Arc screen mode from 0 to 15 for display (less the text modes 3, 6, 7, 11, and 14) which allows previewing graphs in all eight colours. As shown with the pre-release version, *Inter-Chart A* can output to either a Linear Graphics Plotmate A4S or A3 plotter, or to an Epsom-compatible printer. The in-built routine for "dumping" screens to a printer is designed for the modes 0 to 5 of the Model B/Master, but for higher screen modes, you can use the *HARDCOPY module that is present in the Arthur 1.2 Operating System, with FX, MX, and RX series printers.

Other CC ROMs

SpellMaster for the Arc is coming soon, but is being adapted to work in the Arc not just with *Inter-Word*, but also with the forthcoming CC document processor. The main dictionary will be used in the 8-bit ROM, and require only a small workspace, so saving nearly 128K of main 32-bit RAM. However, thanks to the fast routines of the RFS, the spell checking speed should be even higher than in the Model B/Master.

Conversely, *Inter-Base* will not be adapted for the Arc, since it is a 64K ROM. While it has been "stacked" onto 16K for use in a Model B/Master, it would have to be "unstacked" to run in a 6502 Second Processor or Emulator – and this would leave no space for user data!

Inter-changing

It is an advantage to be able to use an

application interchangeably on Arcs, as well as Model Bs and Masters. In the case of *Inter-Word A*, the keystrokes are almost identical, and the document files can be loaded and saved by either system (subject to disc size and format). Unlike transfers via ASCII files, this results in all the document format and print style information contained in control codes being retained (without the need for any conversion utility). Provided that all discs are in the ADFS 640K format, interchanging of *Inter-Word* (etc.) files between the Master Compact and the Arc is possible, since both use 3.5 inch drives as standard, and between Model B/Master 128 and Arc, if the latter is fitted with a 5.25 inch drive. Indeed, I used *Inter-Word* on both the Master 128 and the Arc 310 in writing this article – simply moving the discs between the two systems. If a document created on the Arc version became too large to fit in the Model B/Master version, it could easily be converted to the "multi-file" format. (The same procedure allows documents created on a Master Series machine to be fitted into *Inter-Word* on a Model B).

Interchanging files between the Model B/Master and the Arc versions of *Inter-Sheet* is slightly less easy, since the latter has been re-written to take full advantage of the 132-column display mode, (compared to the previous maximum of 105-columns) – making the worksheet files incompatible. However, much of the format of the data may be preserved, by "exporting" the "contents" of the worksheet from one version, and "importing" this into the other. The size of worksheets created in the Arc version would have to be limited to what would fit in the Model B/Master version.

In the case of *Inter-Chart*, the files may be used interchangeably between the two

versions (unless again those created in the Arc version are too large to fit into the Model B/Master version – but this is most unlikely).

Documentation

Inter-Word, Inter-Sheet, and Inter-Chart for the Arc all come with excellent A5 manuals, similar to those for the Model B/Master versions. Supplementary sheets detail both the changes in the applications, and their use with the CC ROM/RAM Podule.

Prices and Availability

Purchased outright, Inter-Word and Inter-Sheet for the Arc each cost £39, and Inter-Chart £25, all plus VAT – which is less than the Beeb versions. They are also available in part-exchange for original Model B/Master ROMs, at only £15 for Inter-Word A, and £10 for each of the others, again plus VAT.

Conclusions on Inter-Applications

In a new meaning of the name, the “Inter-” series enables more than BASIC programs to be inter-changed between the Model B/Master and the Arc. This is particularly useful where both types of machine are in use, especially when sharing the same network. Even with the cost of the Podule (and Backplane, where applicable), these applications are excellent value when compared with 16-bit software of similar quality – especially at the part-exchange prices.

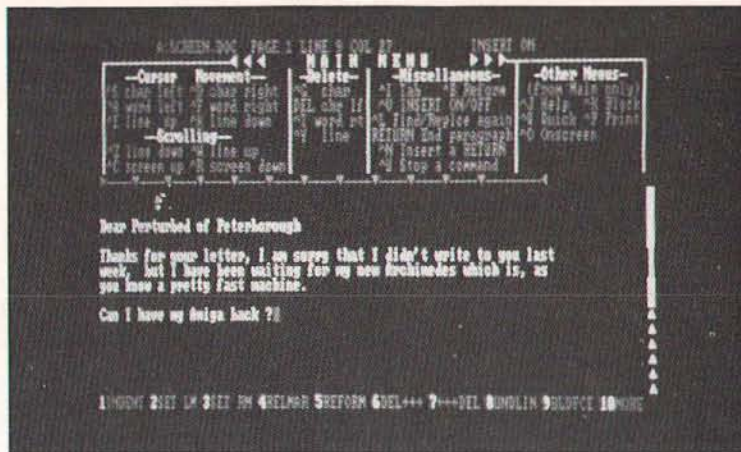
PC EMULATOR

I reviewed the PC Emulator on the 310 in A & B 87/12, p 64, and on the 440 in A & B 88/2, p 80, but Acorn have recently released a new version (1.09). (The version number shows briefly in the middle of the screen, when the Emulator is loading).

I have run a number of benchmark and other tests, comparing it both with the previous version (1.00), and the IBM-PC itself. The performance of this all-software Emulator is all the more important, in view of the delay likely before any hardware-based PC Podule appears – whether from Acorn or a third-party.

PC RAM

As before, the Arc PC Emulator is intended for use with a 310 or above. Although the “Emulate” file is longer – at 202,968 versus 191,208 bytes – the “PC RAM” created remains unchanged. With Arthur 1.2 fitted, all the “Sizes” at their default values, and no Modules “unplugged”, the PC RAM available in a 310 is 384K. Up to 576K can be provided by setting the ScreenSize to 10 (ie 80K), and all other “Sizes” to 0, and “unplugging” modules other than the essential UtilityModule, FileSwitch, SystemDevices, ADFS, and



Wordstar: Now working at reasonable speeds under emulation.

International. A 440 can of course provide the full 640K of PC RAM without difficulty.

PCW Benchmarks

For the GrafScrn test, I started with the listing given in PCW December 1986, p 165 – as opposed to that on the PCW Chart, November 1987. Similarly, for the Store test, I used KILL “TEST.***”, and not as listed on the Chart. The results of all the tests are shown in Fig. 3. The improvements are worthwhile and welcome – especially in TrigLog (29 per cent) and TextScrn (23 per cent). However, these – with IntMath- are still much slower than on a standard IBM-PC. Conversely, GrafScrn appears to be as fast as on a PC. The PCW Index, calculated according to PCW 88/2, p 122, and on seven and six tests respectively, was 0.68, versus 0.56, some 21 per cent better.

Byte Speed Test

The Byte Sieve test ran some 9 per cent faster. This improvement is closer to that for the PCW RealMath than the IntMath test, but the Sieve test is specified to use real variables (see Byte, Aug 85, p 34).

Byte Word Processor tests

The time to scroll the standard Byte 4000-word document, using WordStar 3.3, was 133.5s, versus 157s, some 17.6 per cent faster. However, scrolling in WordStar is still plagued by “plings” on screen, and then strangled noises, so that you have to lift the down arrow key after a while. Scrolling the same document, using the word processor in Ability 1.2, was some 24 per cent faster. Moreover, this is achieved without any visible or audible problems. At 89.5 s, it is about 50 per cent faster than WordStar 3.3, and approaching acceptability for serious use.

Documentation

This consists of only a leaflet covering installation and elementary use, since it is assumed that most buyers of the Emulator will be conversant with MS-DOS. However, a list of suitable books is included.

Likewise, the MS-DOS disc includes a copy of GWBASIC 3.20, but no documentation is supplied. Although Microsoft BASIC is the “de facto” standard, covered in plenty of books, there are fewer which document the new features of this recent version.

Price and Availability

The PC Emulator still costs £99 plus VAT separately, or £60 if “bundled” with a 310. Owners of earlier versions may obtain the latest by returning their original Emulator disc to Acorn Customer Services, together with £15 (inc. VAT), to cover copying, handling, and postage.

OVERALL CONCLUSIONS

Having originated on the Model B/Master, Inter-Word, Inter-Sheet, and Inter-Chart are not the “ultimate” packages for the Arc. If they were, there would be little case for buying one. However, they are highly capable, and less expensive than the Beeb versions – which helps to offset the cost of the necessary Podule (and backplane, where applicable). Moreover, using them on the Arc is familiar and file-compatible with those for the Model B/Master, while also enjoying the increased capability of other applications available for the Arc, now and in the future. I expect to look at more of these, including Clares’ Graphic Writer, Acornsoft First Word Plus, and Linear Graphics’ Lintrack, in forthcoming articles. Later this year, we should see the new document processor, and the drawing package, from Computer Concepts, that will also be supplied in ROM (and require a Podule). Meanwhile the Podule can provide the convenience of a RAM disc complete with battery backup. The performance of the Arc PC Emulator has been usefully improved- to the point where many PC packages run acceptably fast.

Factfile

- Acorn are at: 645 Newmarket Road, Cambridge, CB5 8PD. ☎ (0223) 214411.
- Computer Concepts are at: Gaddesden Place, Hemel Hempstead, Herts. HP2 6EX. ☎ (0442) 63933.

PROGRAMMING PROFILE

C is a powerful compiled programming language which is now available on almost all (serious) microcomputers as well as mini and main-frame machines. Until recently it was not available to users of Acorn computers, but all that has changed. First of all, two reasonable implementations of the language have been issued by Acornsoft and Beebug for use with the basic BBC Micro and Master series.

I reviewed these versions in detail in the February issue of A&B, generally preferring the Beebug version for various reasons including speed of compilation and better access to the BBC's operating system. However, I also pointed out that the usual advantages of C as a fast 'systems' language were not really available in the BBC versions because the small memory of the machine has rendered compilation into native machine code impracticable. Each version actually implements a 'virtual machine' within which the 'compiled' code is in fact interpreted.

True compiled C's are, however, available to users of more powerful Acorn products including the Archimedes series and the Master 512 co-processor. Unfortunately, I have not yet been able to lay hands on an Arc, but I understand that the Acorn C implementation is very powerful (not subject to the same faults as the independently produced BBC version) and will probably become the main systems language for the new series. That is to say it will be used for writing utilities, language compilers and other applications that would only be possible to achieve (if at all) by assembly language programming on the BBC Micro. As to the 512, there are, of course, many programming languages produced for the IBM PC and AT series which may or may not run on this semi-compatible system. I believe that the popular and excellent value Borland's Turbo C is compatible and I hope to test this out and report back in a later article. I have already tried out Turbo Pascal on the 512 which seems entirely compatible (and most impressive).

Owing to the relative standardisation of the C programming language an occasional column discussing C methods and providing some utility listings should be of potential interest to readers using any of these systems. However, the programs presented in this article have been tested only on the BBC versions (Acorn and Beebug) and include some machine specific features. In

Beginning a series of useful programming hints and utilities for C on the BBC Micro

general, transfer to the Archimedes C (where appropriate) should cause few problems due to the compatibility in operating system calls. Users of 512 based programming languages, however, should bear in mind that they are working in a simulated PC environment with no direct access to the BBC's OS calls, even though these actually produce screen displays etc. Hence, for example, a graphics library written for a 512 language would have to be written as though an IBM with standard colour card were being used.

Graphics library

My first experiments with programming in BBC C were aimed at providing utilities for programmers like me! One of the first priorities was to remedy the lack of a graphics library in the Acornsoft version, the product of which is shown in Listing 1. In general, I have used BBC BASIC names for equivalent functions except where this would result in arbitrary VDU numerics. Hence, for example, 'setcol' is used at line 29 in place of VDU 19 (the line numbers were added for convenience in listing by a utility described below).

Acorn C does not appear to support variable argument lists so I was not able to implement a general vdu command. The C intrinsic 'putchar' does the equivalent of a single vdu call and is used throughout this library - replaced by 'pc' by use of a macro to save typing.

Another macro 'pi' (not to be confused with PI the maths constant) does the job of

putting an integer (two byte) number to the vdu as required by some commands such as plot. Users can easily add additional functions themselves in like manner, for example to implement the additional graphics commands available on the Master series computers.

As the comments on Listing 1 show, the library also includes some functions not provided in the Beebug version of C. For Acorn users, I suggest that Listing 1 is typed in as a text file and save under the name "h.graphics". Any program needing to use the library can then #include the file, as shown in Listing 2 - a program which acts as a test and demonstration routine (Listing 1 cannot be run as it stands as there is no 'main' function). Beebug users who wish to incorporate the additional routines - and any extensions of their own - can actually add the additional functions into the system library provided by use of the excellent library management system provided by Beebug.

'UNIX' utilities

Once I started programming with these C's, I felt as though I were working in the more standard professional environment that I am accustomed to using on a UNIX system (apart from the frustrating slow and disc bashing compilation process). I never thought that I would miss UNIX, but I did! One of the strengths of this operating system is that it contains many utilities (written in C) for handling text files. This makes sense in an environment (unlike that provided for BBC BASIC programming) in which everything - program source, data and documentation files take the form of pure ASCII text. So, I thought, why not write some simplified versions of UNIX commands for use in this new BBC environment?

One of the nice things about C programs - implemented in both Acorn and Beebug versions - is that you can pass a variable list of arguments to compiled programs when they are called simply by typing them after the program name. This is achieved by specifying two parameters in main which by convention are called 'argc' and 'argv'. When called, argv will be any array of string pointers set to the list of words you type after the program name (and before pressing return) while argc will contain the number of arguments. Actually argv[0] simply points to the program name while argv[1] to argv

[argc-1] point to the 'real' arguments. Any numerical arguments have to be converted from text form before use (as in Listing 4, line 58 which converts the start line number).

Listing 2 provides a simple version of 'lp' (line printer) which sends text files to the printer (but not the screen). It requires at least one file name followed optionally by '-n'. By UNIX conventions, options are preceded by - signs. My version of 'lp' has only one option which is to print line numbers, if -n is appended. All listings shown here were produced by lp with the line numbers option on. One reason why this is useful is that error messages issued by both compilers refer to the line number in the source file where the error occurred, although these numbers are not normally visible in the text editors themselves (the Acorn editor and the Master's edit, however, have a 'go to line number' facility). I have also written 'lp' to add a header to the top of the file showing filename and time and date, and to issue a form feed to the printer between each file listed. Date stamping is by use of the Master

series MOS '*time' command and this should be deleted for users of the basic BBC system.

Unix 'more'

The second UNIX like utility is 'more' (Listing 4). What this does is to read the file specified off the disc and display a 'page' at a time for reading on the screen. The prompt '--MORE--' will appear at the bottom unless the end of file has been reached. Escape will return to the command line system but any other key press will cause the next page to be displayed. Again, the -n option for display of line numbers is implemented. This may optionally be followed by a starting line number so that the listing starts at the point specified. This is particularly handy for inspecting the region of a program identified as bug ridden by the compiler prior to entering the editor to repair the damage.

Initially, I tried to write 'more' using the C intrinsic 'getchar' to take the key presses after viewing each screen. However, this proved unsatisfactory since neither implementation does this as the equivalent of

BASIC'S GET - ie reading the ASCII value of a key pressed without printing to the screen. The Acorn implementation is particularly problematical as it stores all characters until Return is pressed and then executes successive getchars on each character in turn. Hence, I decided to implement a BASIC type 'get' function by calls to the operating system. As can be seen from the end of the listing, the two versions of C require quite different procedures for this machine specific function and are illustrative of the methods required to do this kind of thing.

These utilities can, of course, be used to print or display not just programs but any kind of pure text file, ie one not containing control codes embedded by word processors and so on. UNIX type commands can be used, for example, to manipulate databases held in text files, though such applications will require additional utilities to provide alphabetical sorts, searches for string patterns and so on. I plan to look at such applications in a later article.

```

1
2 /* <h.graphics>
3 /* Graphics library for C on BBC micro */
4
5 /* Jonathan Evans, November 1987 */
6
7 #define pc(c) putchar(c)
8 /* put char (1 byte number) to VDU */
9 #define pi(i) putchar(i % 256); putchar (i / 256);
10 /* put integer (2 byte number) to VDU */
11
12 /* A: already provided for BEEBUG C */
13 /* enter for ACORN version only */
14
15 cls() { pc(12); }
16 tab(x,y) char x,y; { pc(31); pc(x); pc(y); }
17 colour(c) char c; { pc(17); pc(c); }
18 mode(m) char m; { pc(22); pc(m); }
19 clg() { pc(16); }
20 plot(p,x,y) int p,x,y; { pc(25); pc(p); pi(x); pi(y); }
21 /* p - plotting mode, x,y - next graphics point */
22 move(x,y) int x,y; { plot(4,x,y); }
23 draw(x,y) int x,y; { plot(5,x,y); }
24 gcol(p,c) char p,c; { pc(18); pc(p); pc(c); }
25 /* graphics colour: p - plotting mode, c - logical colour */
26
27 /* B additional graphics commands for both C's */
28
29 setcol(l,p) char l,p; { pc(19);pc(l);pc(p);pc(0);pc(0);pc(0); }
30 /* set logical colour l to physical colour p (VDU 19) */
31 txtgra() { pc(5); } /* text at graphics cursor */
32 txttxt() { pc(4); } /* text at text cursor */
33 grawin(xl,y1,xh,yh) int xl,y1,xh,yh; /* define graphics window */
34 { pc(24);pi(xl);pi(y1);pi(xh);pi(yh); }
35 txtwin(xl,yb,xr,yt) char xl,yb,xr,yt; /* define text window */
36 { pc(28);pc(xl);pc(yb);pc(xr);pc(yt); }
37 clrwin() { pc(26); } /* restore default windows */

```

C - P R O G R A M M I N G

```

1 /* Test program for graphics library */
2
3 /* Jonathan Evans, November 1987 */
4
5 #include <h.stdio>
6 #include <h.graphics> /* graphics library file */
7 /* #include <h.stdlib> for BEEBUG version */
8
9 main()
10 {
11 mode(129);
12
13 /* check text functions */
14
15 txtwin(5,20,35,5);
16 colour(130); cls();
17 colour(1);
18 tab(1,10); puts("red text on yellow background");
19 clrwin();
20 colour(128); colour(3);
21 cont();
22
23 /* test graphics functions */
24
25 gcol(0,130);
26 clg();
27 setcol(1,4);
28 gcol(0,129);
29 txtgra();
30 rectangle(300,300,600,400);
31 move(120,900);
32 gcol(0,1);
33 puts("Blue rectangle on yellow background");
34 txtxt();
35 cont();
36 mode(131);
37 }
38
39 cont()
40 {
41 int c;
42 tab(5,29);
43 puts("PRESS RETURN TO CONTINUE");
44 c=getchar();
45 }
46
47 rectangle(x,y,w,h) int x,y,w,h;
48 {
49 grawin(x,y,x+w,y+h);
50 clg();
51 clrwin();
52 }

```

```

1 /* "lp" - version of Unix line printer command for the BBC micro */
2 /* ACORN C version */
3
4 /* Jonathan Evans, October 1987 */
5
6 /* Form:
7
8 lp file1 [file2..] [-n]
9
10 Sends variable list of files to printer with header
11 and sends form feed after each
12
13 -n option prints file with line numbers
14
15 */
16
17 #include <h.stdio>
18 #include <h.string>
19 #include <h.osdefs> /* replace by h.stdlib for BEEBUG version */
20
21 #define MAXW 255
22 #define FF putchar(12)
23 #define PRINTER call (OSBYTE,3,10,0) /* redirects output to printer */
24 #define SCREEN call (OSBYTE,3,0,0) /* restores output to screen */
25
26 /* For BEEBUG version replace last two lines by
27 #define PRINTER osbyte(3,10,0)
28 #define SCREEN osbyte(3,0,0)
29 */
30
31 #define TRUE -1 /* omit for BEEBUG version */
32 #define FALSE 0 /* omit for BEEBUG version */
33
34 main(argc,argv)
35 int argc; char *argv[];
36 {
37 int nfiles, lns;
38 char *opt = "-n";
39
40 /* check if -n option is present and set
41 variables accordingly */
42
43 if (strcmp(argv[argc-1],opt) == 0)
44 { lns = TRUE; nfiles = argc - 2; }

```

C - P R O G R A M M I N G

```

45 else { lns= FALSE; nfiles = argc - 1; }
46
47 /* check at least one file name in argument list */
48 /* if not stop, otherwise print files */
49
50 if (nfiles == 0) puts("File name(s) needed");
51
52 else prfiles(argv,nfiles,lns);
53 }
54
55 prfiles(flist,nfiles,lns)
56 char *flist[]; int nfiles, lns;
57 {
58     int f=0;
59     FILE *fpointer, *fopen();
60     while (++f <= nfiles)
61     { if ((fpointer = fopen(flist[f],"r")) == NULL)
62         /* attempt to open next file */
63         { printf("Can't open %s\n",flist[f]); break; } /* quit if fails */
64         else
65         { PRINTER;
66             printhead(flist[f]);
67             prfile(fpointer,lns);
68             fclose(fpointer);
69             SCREEN;
70         }
71     }
72 }
73
74
75 printhead(fname)
76 char *fname;
77 {
78     printf("FILENAME: %s      ",fname);
79     system("time"); /* time and date stamp - omit for non Master series */
80     puts("\n\n\n");
81 }
82
83 prfile(fp,lns)
84 FILE *fp; int lns;
85 {
86     char line[MAXW];
87     int lineno=0;
88     while (fgets(line,MAXW,fp) != NULL)
89         if (lns) printf("%4d %s",++lineno,line);
90         else printf("%s",line);
91     FF;
92 }

```

```

1 /* "more" - version of Unix command for the BBC micro */
2 /* displays file on screen one "page" at a time */
3
4 /* ACORN C version */
5
6 /* Jonathan Evans, October 1987 */
7
8 /* Form:
9
10 more filename [-n] [startline]
11
12 -n option displays file with line numbers
13

```

```
14 */
15
16 #include <h.stdio>
17 #include <h.string>
18 #include <h ctype>
19 #include <h.osdefs> /* omit for BEEBUG version */
20
21 /* For BEEBUB version add:
22
23 #include <h.stdlib>
24 #include <h.call>
25
26 */
27
28 #define MAXLINE 255
29 #define PAGELN 20
30 #define MAXWIDTH 79 /* assumes 80 column display mode */
31 #define DISESC osbyte(229,1,0)
32 /* disables escape key and causes it to generate Ascii 27 */
33 #define ENAESC osbyte(229,0,0) /* returns escape key to normal */
34
35 /* Omit following #defines for BEEBUG version */
36
37 #define osbyte(a,x,y) call(OSBYTE,a,x,y)
38 #define TRUE -1
39 #define FALSE 0
40 #define cls() putchar(12)
41 #define mode(m) putchar(22); putchar(m)
42
43 main(argc,argv)
44 int argc;
45 char *argv[];
46 {
47     int nfiles, lns, start;
48     char *opt = "-n";
49     FILE *fpinter, *fopen();
50     mode(131);
51
52     /* check if -n option is present */
53     /* and if so whether start line specified */
54
55     if (argc > 2 && strcmp(argv[2],opt) == 0) lns = TRUE;
56     else lns= FALSE;
57
58     if (lns && argc == 4) start = strtol(argv[3],NULL,0);
59     else start = 1;
60
61     /* check that file name is in argument list */
62     /* if not stop, otherwise attempt to open file */
63     /* and display contents on screen */
64
65     if (!(argc == 2) || (lns && argc > 2)) puts("File name needed");
66
67     else {
68         if ((fpinter = fopen(argv[1],"r")) == NULL)
69             printf("Can't open %s\n",argv[1]);
70
71         else display_file(fpinter,start,lns);
72     }
73 }
74
75 display_file(fp,start,lns)
```

```

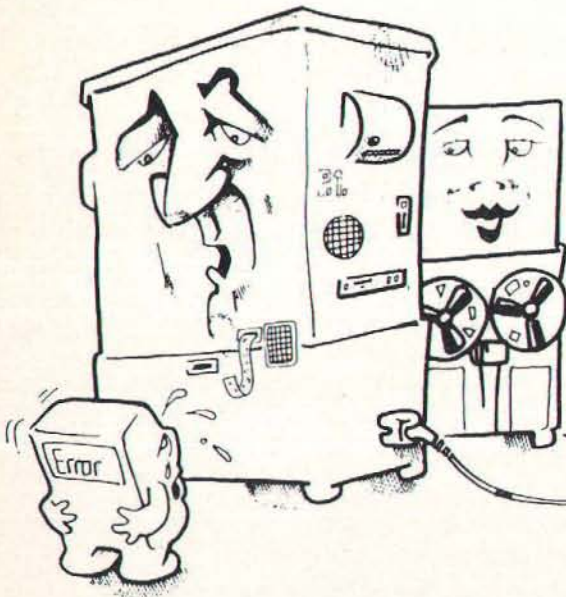
76 FILE *fp; int start, lns;
77 {
78     char line[MAXLINE], *pointer;
79     int lineno=1, lncount;
80
81     /* move to start line */
82     while (lineno < start)
83     { if (fgets(line,MAXLINE,fp) == NULL)
84         { puts("start line beyond end of file"); quit(fp); }
85         else lineno++;
86     }
87
88     /* display file on screen */
89     DISESC;
90     do
91     { lncount = 0;
92       cls();
93       while (lncount <= PAGELEN)
94         { if ((pointer = fgets(line,MAXLINE,fp)) == NULL) break;
95           else
96             {
97               if (lns) printf("%4d %s",lineno++,line);
98               else printf("%s",line);
99               lncount += nlines(line,lns);
100            }
101         }
102         if (pointer != NULL) prmore(fp);
103     }
104     while (pointer != NULL);
105     fclose(fp);
106     ENABSC;
107 }
108
109
110 prmore(fp)
111 FILE *fp;
112 /* prints 'more' prompt and waits for keypress */
113 {
114     int c;
115     printf("\n\n--MORE--");
116     osbyte(15,1,0);
117     c=get();
118     if (c == 27) quit(fp); /* Escape key pressed */
119 }
120
121 nlines(line,lns)
122 /* counts screen lines used in last print */
123 int lns; char *line;
124 {
125     int len, width;
126     len = strlen(line);
127     if (lns) width = MAXWIDTH -5;
128     else width = MAXWIDTH;
129     return (len/width + 1);
130 }
131
132 quit(fp)
133 FILE *fp;
134 {
135     ENABSC;
136     puts("\n");
137     fclose(fp);

```



```

138 exit(0);
139 }
140
141 get( )
142 /* returns Ascci value of keypress (BASIC GET)
143    OSRDCH called with no parameters
144    Ascii code return in A register */
145 {
146 struct _osret *blkptr;
147 ocall (blkptr,OSRDCH);
148 return (blkptr->A);
149 }
150
151 /* Replace with following definition for BEEBUG version
152
153 get( )
154 {
155 long c, call( );
156 call_buf registers;
157 c = call (OSRDCH,&registers);
158 return (c >> 24);
159 }
160
161 */
    
```



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PLAYING FOR REAL

Running a company is not a commonplace experience. But the BBC Micro can propel you instantly into the boardroom...and into crisis!

Playing *Beat the Boss* or *Crisis Management*, whether on your own or as part of a management team at school or college, will probably be an adventure into the unknown. Although many schools run their own enterprising small business schemes, these still don't ensure that everyone gets to be a manager – even if it is just for a few hours!

RBRC Software's trilogy – consisting of *Boss*, *Crisis* and *Cement Business Game*, are disc-based business simulations for the BBC Micro which offer that opportunity to any student who wishes to take it.

Beating the boss

Beat the Boss is an introduction to the *Fothergale Business Experience*, a title which reflects the "learning by doing" philosophy behind the simulations. The idea is that "making mistakes forms a critical part of the educational process".

What ever happened to the throw-away shirt? I'm sure it was even featured on *Tomorrow's World* once!! Well its future is ensured now that the Fothergale Co. Ltd is marketing the *Castaway (TM)* range of disposable shirts. And in order to "Beat the Boss", you have to make a profit "manufacturing" Castaways.

The boss in the title is a computer generated "control", he is also a bit of a helper because he shows you what he intends to do – a challenge because you must try to do better than him.

There is a fairly comprehensive introduction on the screen; after planning production and sales targets for the coming year you move on to monthly decision making – Some decisions can only be made or changed at certain intervals and there may be a time lag before decisions are carried out. Marketing support, production and raw materials scheduling are important factors in meeting targets without incurring

heavy costs.

There's plenty of help included in this simulation but even so there is a great deal of data to take into account and a notebook is a handy accessory. The player(s) have to accept some ground rules and unchanging and unchangeable costs and economic climate, reflecting the real world of a small business... success is not easy to come by.

Based on **GOLIATH CEMENT COMPANY**

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Cement Game

The first of these games to appear, (if I remember correctly), it concerns you, a veritable David running the Goliath Cement Company! It is more concerned with solving technical problems associated with the particular industry, a very realistic situation one imagines in the modern business environment. The student player will have to come to terms with jargon from the cement trade as well as the other business phraseology.

Crisis Management

Continuing the *Experience* but this time running a

S I M U L A T I O N S O F T W A R E

company from all points of view over a period of five years. Marketing, production, scheduling raw materials and manpower, administration and cash management all come into the equation. Only tax is left in the background. It is necessarily a team effort and crises are computer generated as well as self inflicted!

The five years that you run your business can be any consecutive five from a period 1979 to 1986, which makes for subtly differing economic climates. At the "board level" the tasks are split between sales, production, commercial and Managing Directors. Each manager has his or her own criteria for success.

There's much more complexity in *Crisis Management* and the manuals give much more background to the business environment and the technical aspects of making the Castaway product. Human resources, including wage negotiation, and financial monitoring and planning come more into play.

Software support

Each piece of software comes with a teacher's guide and a player's guide. The need for repeat playing is emphasised and explained: "This approach to information reflects the changing knowledge base that is occurring in our society... The tutor's task is to pose the relevant and pertinent questions. These are questions that students should be asking themselves, but which because of their initial lack of experience, they are unable to formulate."

I suggest you check disc filing system compatibility with RBRC before purchase since I did come across

some problems with both the 8271 and 1770 systems. Certainly you will need 80 track double sided drives to run the simulations mentioned here.

The manuals are printed from computer printed originals and are clearly laid out. The instructions are comprehensive, the business scenario clearly described and the business data to hand in appendices. The *decision determinants* - the pluses and minuses - are listed on separate reference cards. The overall presentation is however, a little boring, unlike the simulations! The Cement Game benefits from sponsorship by Blue Circle Cement and a colour chart of the cement making industry is included.

RBRC Software have successfully provided a graded set of business simulations for students in a range of business related subject areas. RBRC's background includes company training and there is a more realistic and demanding version of *Crisis Management* for 80 track double sided dual disc drive systems.

Future products from RBRC are likely to include *Buy 'em Down* and *Don't Panic*, both intended for the home market as well as education. Two further programs with more genuine learning content will be *Handling Time* which deals with the technique of discounted cash flow and an unnamed program dealing with breakeven analysis, profit planning and analysis. Also up and coming is *The Castaway Shirt Company* on three discs.

Factfile

RBRC Software, Guild House, 32 Worpole Road, London, SW19 4EF.
☎ 01 946 8641.

PINEAPPLE SOFTWARE

Programs for the BBC model 'B', B+, Master and Master Compact with disc drive

DIAGRAM II - now also available for ARCHIMEDES

Diagram II is a completely new version of Pineapple's popular 'Diagram' drawing software. The new version has a whole host of additional features which make it into the most powerful and yet quick to use drawing program available for the BBC micro. The new features mean that 'Diagram II' can now be used for all types of drawings, not just circuit diagrams. Scale drawings are possible and the facilities for producing circles and rubber banded lines together with the pixel drawing routines make any type of drawing possible. This advert has been produced completely using Diagram II.

Summary of Diagram II features:-

1. Works on all model BBC computers and makes use of Shadow memory if poss.
2. Rapid line drawing routines with automatic joins for circuit diagrams.
3. Rubber band line and circle drawing modes.
4. Makes use of the Acorn GXR rom to produce ellipses, arcs, sectors, chords and flood filling.
5. Pixel drawing mode allows very fine detail to be added.
6. Defined areas of screen may be moved, copied, deleted or saved to disc.
7. On-screen cursor position indication allows scale drawings to be made.
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9. Wordprocessor files may be loaded and formatted into defined areas.
10. Up to 256 LDC's if shadow memory available, 381 without shadow.
11. Compatible with Marconi Trackerball and most makes of 'mouse'.
12. All 'Diagram Utilities' are included.
13. Completely 'scaleable' print routines allow any area of the diagram to be printed either horizontally or through 90deg, in scales that may be varied in 1/2 steps allowing up to 18 mode 0 screens to be printed on an A4 sheet (still with readable text).
14. Smooth scrolling over the whole area of the diagram.

Diagram II consists of a set of disc files and a 16k Eprom. The disc is formatted 40T side0 and 80T side2. Please state if this is unsuitable for your system, or if you require a 3.5" Compact disc

DIAGRAM II - £55.00 + vat P & P free

MARCONI TRACKERBALL

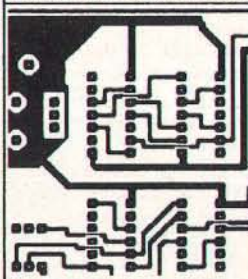
For Model 'B' and B+ (with Icon Artmaster)	£ 60.00	+ vat
For Master 128 (with Pointer Rom)	£ 60.00	+ vat
Bare Trackerball (no software)	£ 49.00	+ vat
Pointer Rom (available separately)	£ 12.50	+ vat
Trackerball to mouse adapters	£ 8.00	+ vat
Postage and Packing on Trackerballs	£ 1.75	

PCB

Pineapple's now famous PCB drafting aid produces complex double sided PCB's very rapidly using any model BBC micro and any FX compatible dot-matrix printer. The program is supplied on Eprom and uses a mode 1 screen to display the two sides of the board in red and blue either separately or superimposed. Component layout screens are also produced for a silk screen mask.

The print routines allow a separate printout of each side of the board in an expanded definition high contrast 1:1 or 2:1 scale. The print time is typically about 5 mins, for a 1:1 print of a 7" x 5" board. This program has too many superb features to adequately describe here, so please write or 'phone for more details and sample printouts.

£ 85.00 + vat Plotter driver to suit most plotters £ 35.00 +vat



PCB AUTO-ROUTING

This brand new addition to the PCB program greatly increases the power of the software and speeds the design of PCB's even more.

A list of up to 190 connections may be entered in the form of a 'rats nest' and then the computer does the rest! You may specify which side of the board you wish a track to be on or you may leave the choice to the computer, and you may also say whether tracks should be allowed to pass between I.C. pins. The program is in the form of a second Eprom and full features are available on a standard model 'B'. Please write or 'phone for full details.

COMPLETE AUTOROUTE PACKAGE £ 185.00 + vat
(Including manual Eprom)

ADFS Utilities Rom

ADFS is an invaluable utility for all ADFS users. It adds over 22 new commands to the ADFS filing system as well as providing an extensive Menu facility with over 35 sub commands covering areas such as repeated disc connection, saving and loading Rom images, auto booting of files and many more.

Copying of IFS discs onto ADFS discs can be made in one pass with automatic creation of the required directories on the ADFS disc. All functions are fully compatible with Winchester drives including *BACKUP which allows backing up of Winchester's onto multiple floppies.

New commands are as follows:- *ADU, *BACKUP, *CATAL, *CHANGE, *DFSADFS, *DIRALL, *DIRCOPY, *DIRDESTROY, *DIRRENAM, *DISCEDIT, *DRIVE, *FILEFIND, *FORMAT, *KILLADU, *LOCK, *MENU, *PURGE, *PWRBRK, *UNLOCK, *VERIFY, *VFORMAT, *WIPE

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Access

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Price: £30 + p&p (£2.50) + VAT

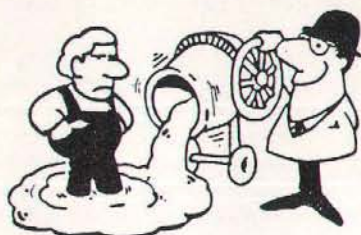
The Cement Business Game

The Goliath Cement Co Ltd, a small independent cement maker coping with all its problems.

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RML "Nimbus"

"Beat the BOSS"

The Cement Business Game

"Crisis Management"

"Don't Panic !"

"Buy 'em Down"

Handling Time



"Crisis Management"

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All doublesided 80 track for BBC/B, Master and for RML "Nimbus".

ZIP AND ZAP

One of the most flourishing areas of computer activity seems to be that of software protection – as fast as programmers can produce security systems to safeguard their products, 'hackers' are busy trying to break that protection, often for no more sinister reason than that 'it's there'. Occasionally this can be more than merely annoying and some software houses now go to extraordinary lengths to prevent unauthorised access to their (very expensive) programs. Much has been written on this subject and there will be more to come as the law attempts to catch up with this peculiarly 20th century 'crime'.

As a fairly productive programmer I have a tolerant attitude to hackers (so long as they keep off my modest programs) but my sympathies lie with those writing the programs, however ingenious the methods used by the hackers to pirate them. While not needing to resort to fanatical protection-at-all-costs methods (such as wiping discs rather than have someone copy them), I have found a simple protection system to be most desirable. The system described here is not unbreakable, but neither is it easy to crack and it has proved safe and reliable in use.

Two utilities

The system comprises two utilities; ZAP to encode a program, and ZIP to decode it again. In fact the two programs are almost identical and it is a simple matter to edit one into the other. A 'key' is used to scramble your file, thereby producing a coded version of it that can be left lying around quite openly as it is useless to anyone who does not know the key (any word or phrase up to 48 characters long). Also, there is no harm in leaving the ZAP and ZIP utilities on the same disc since the file contains no clue as to how it has been encoded.

This sort of password protection is popular in computer systems where several people have access to a computer, or files on tape or disc – in these situations it is neither convenient nor polite to scurry away with a disc as soon as the latest version of your masterwork has been committed to it.

A simple coding utility like the one presented here will protect your file with the minimum of fuss and you can rest assured that it is safe from prying eyes, (although the mere fact that it has been encoded will probably attract the attention of people who would otherwise have ignored it!). While it is not necessary to protect every file that you own, there are times when for personal or financial reasons you don't want everyone nosing through your programs.

ZAP and ZIP – a software protection system

Saving the programs

Both ZAP and ZIP are written in assembler and once they have been saved, they can be called up from your utilities disc with *ZAP and *ZIP respectively. There is no great improvement in speed to be gained by writing in assembler, since most of the time is spent reading bytes from disc and writing them back again – this is a slow process whatever method of coding is used; however, the bit manipulations that the program performs are much more natural in assembler than BASIC, so assembler it is.

Start by typing in ZAP and saving it (as, say ZAPSRce – Listing 1) before being tempted to run it. Running the program will generate a machine-code routine called ZAP which is automatically saved to disc. Now edit ZAPSRce to produce the ZIPSRce program (Listing 2) and save that before running it, just to be on the safe side. RUN will now save ZIP – and you're ready to go! Note that the only lines that need to be changed are 460, 1811, 1820 and 2170.

ZAPping your programs

The syntax for ZAP and ZIP is:

***ZAP/ZIP <source file> <destination file> <key>**

and each of the three fields must be present and separated from the others by at least one space. NB Trailing spaces will be taken as part of the key!!

<source file> is the program on disc that you wish to protect

<destination file> will be its new identity on the disc

<key> is a word or phrase of up to 48 characters. Any keyboard characters are accepted.

For example

***ZAP ZAPSRce Crunched Now is the winter of our discontent**

will build a new file on disc with the identity 'Crunched' – don't forget to delete the original program or take its disc away with you or the whole exercise is pointless!! A

quick *DUMP of 'Crunched' will verify that it has indeed been reduced to meaningless gibberish, so to retrieve it, try: *ZIP Crunched Decoded Now is the winter of our discontent and load 'Decoded' – it should have a familiar look to it.

Notice that the key must be reproduced EXACTLY for the decoding process to work so it should not be so long that you cannot remember it. Neither should it be so easy to guess that people who know you have it worked out in seconds – so don't use the name of your current girlfriend (or boyfriend – girls must read A&B Computing, too) and keep off 'industry standards' such as 'FRED' and 'QWERTYUIOP'. Another problem with using the other-half's name is that long-term files often prove difficult to recover...

Program Notes

Before discussing the program itself, we should consider a few of its characteristics.

Many simple encoding routines rely on EORing the bytes of the file with a short (often 1-byte) key. This is often sufficient to deter, but it is very easy to break and even a lengthy key can be found by a dedicated hacker as sequences of bytes become clear when only a part of the key is found. The current system uses a 'running-EOR' so that bytes are coded against the key and against the bytes coded so far – in this way it is necessary to find the whole key at once before any of the decoded material makes any sense.

A simple EOR process is its own inverse – in other words the program can be deciphered by simply repeating the *encoding* step and this is not desirable for a decent protection utility. Thus ZAPPING a ZAPPED file will only scramble it more and it can then only be unscrambled by ZIPPING it twice. This is the reason why two utilities are necessary, even though they are almost identical. Thus the fact that a file may have been ZAPPED several times with all sorts of keys should deter even the most assiduous hacker.

Because the key is entered at the keyboard (hence the name – no, I'm only kidding), it is comprised of characters in the ASCII range 32-126 (hex 20 – 7E) and using such a key to scramble the data leaves it with a definite 'imprint'. We can eliminate this effect by packing the bits of the key to produce a new key whose bytes are spread throughout the whole range 0-255 (hex 0 – FF) and this is done at the beginning of the ZAP (or ZIP) process.

Finally, the routine wipes the key area so that later users of the computer can't get hold of the key by dumping parts of memory.

If your file is small, it may be a good idea to wipe the disc input buffer too as it will contain the very last sector of your file. The exact location of the buffer depends on your DFS - with my Acorn DFS 1.2 it is at &1200.

Program description

The object code is less than two pages (&200 bytes) long and I have located it at &900, which is usually a free area. If this is not the case on your computer, adjust the value of the variable Code to suit. Six bytes of zero-page work space are used and the first location is defined by the variable Zero-Page.

Upon entry the routine reads the command line you have typed and reminds you of the correct syntax if the line contains any errors. Otherwise the key is extracted and scrambled for later use. Using standard routines for disc handling the input and

output files are opened and the main processing consists of a:

GET byte - encode it - PUT byte cycle which terminates when the last byte has been read from the input file. Both files are closed and the catalogue is updated before printing the completion message.

NOTE This program will not quite run on the Acorn Master because of a difficulty with the OSFILE command when A=1. On the Model B, this routine will write details from a parameter block to the disc catalogue - the reason being that the ZAPPED version needs to have the same characteristics as the original (ie load and execution addresses). However, on the Master this command will write away nearly all of the block, except for the file length which defaults to 16k; consequently ZAPPED Master files end up as &4000 bytes in length. I am not aware of the

way around this one - it certainly seems like a strange decision by Acorn to omit the file length and yet write away the other details, especially as OSFILE with A=5 will read correctly to the parameter block.

Program information

Zip and Zap requires disc drives and will run on the Model B and B+, but not Master 128 for the technical reasons given above.

The programs in this article have been listed using the *A&B Computing Checker*. The four digit hexadecimal number in brackets at the end of each line is the "checksum" for that line. It is **not** to be typed in.

With Checker installed, each program line is assigned a unique checksum when RETURN is pressed to enter that line.

◆ LISTING 1 ◆

```

10REM Zap Source Code (AA
77)
20REM R.Hughes (7B3D)
30 (BD94)
40REM ZAP Version 1.00
(0D5C)
50 (407A)
60Code=&900 (F7CF)
70Zero Page=&70 (7F4F)
80Buff=&7B0 (C57D)
90 (9BE5)
100P%=Zero_Page:0%=HIMEM-32
(9CBE)
110[OPT 4: (0BE8)
120.temp EQUB 0 (6D67)
130.scram EQUB 0 (51BD)
140.iphndl EQUB 0 (5B14)
150.ophdl EQUB 0 (1374)
160.bits5 EQUB 0 (F132)
170.bits8 EQUB 0:] (F55B)
180 (5228)
190Infl = Buff (E251)
200Outfl = Infl+16 (E343)
210Key = Outfl+16 (06DA)
220Fcb = Key (EE8C)
230 (55A5)
240OSFIND=&FFCE:OSBPUT=&FFD4
(9D6A)
250OSBGET=&FFD7:OSFILE=&FFDD
(CC5E)
260 (D6BC)
270FOR pass%=0 TO 2 STEP 2 (
F268)
280P%=Code (2F2E)
290[OPT pass% (B6DC)
300 jsr Spacestrip (3876)
310 beq Syntax (96AD)
320 ldx #255 (00DB)
330 jsr Getfile \ Get inpu
t file (13AB)
340 bcs Syntax (0F6E)
350 jsr Spacestrip (919A)
360 beq Syntax (07E0)
370 ldx #Outfl-Infl-1 (8262)
380 jsr Getfile \ Get outp
ut file (7DBF)
390 bcs Syntax (9D1C)
400 jsr Spacestrip (849E)
410 bne GoodSyntax (B776)
420 (68AA)
430.Syntax (5710)
440 brk (B5FB)
450EQUB 16 (CC2F)
460EQUB"Syntax: *ZAP <src> <
dest> <key>" (33BF)
470 brk (49AC)
480: (A54D)
490.GoodSyntax (584F)
500 ldx #255 (EE64)
510 stx scram (005A)
520 dey (89B0)
530\ Fetch and scramble key
(0204)
540.KeyLoop (23EC)
550 inx (BEFA)
560 iny (62EE)
570 lda (&F2),Y (50C5)
580 cmp #13 (93EA)
590 beq Returned (9D8C)
600 sta Key,X (3C5B)
610 adc scram (9F3F)
620 sta scram (AB81)
630 jmp KeyLoop (08A8)
640 (27A4)
650.Returned (B6B0)
660 lda #0 (D614)
670 sta Key,X (48B4)
680 (FC3B)
690\ Crunch the Key up (50E9
)
700 tax \ Points to crunc
hed Key (CD40)
710 tay \ Points to strai
ght Key (E7CF)
720 lda #8 (CE73)
730 sta bits8 (E4E7)
740 (7ED4)
750.ReptX (C13C)
760 lda #5 (36FC)
770 sta bits5 (41BA)
780 lda Key,X (3C09)
790 beq Crunched (3C37)
800 eor scram (8FF2)
810 (D8D8)
820.Rept5 (D0D6)
830 ror A (44BB)
840 rol Key,X (9397)
850 dec bits8 (84BC)
860 bne Eightok (A94A)
870 inx (4B82)
880 pha (7935)
890 lda #8 (6BD7)
900 sta bits8 (B498)
910 pla (A083)
920 (FF5F)
930.Eightok (D5FE)
940 dec bits5 (4653)
950 bne Rept5 (8B9E)
960 iny (FA2D)
970 bne ReptX (3078)
980: (9004)
990.Crunched (A5FB)
1000 inx (83AA)
1010 sta Key,X (1F36)
1020 (ECBC)
1030\ At this point, all para
ms OK (8AD2)
1040\ Open input file (5813)
1050 lda #&40 (8F8A)
1060 ldx #Infl MOD 256 (54E1)
1070 ldy #Infl DIV 256 (CE81)
1080 jsr OSFIND (0519)
1090 tay \ File handle
(8D33)
1100 bne OpenedIn (ED00)
1110 lda #ASC"I" (648E)
1120 sta label (F194)
1130.Whoops (D1F9)
1140 jsr Closeall (B57F)
1150 brk (181D)
1160EQUB 100 (7AFF)
1170EQUB"Can't open " (7967)
1180.label (E27A)
1190EQUB"O/P file" (C85F)
1200 brk (5287)
1210: (DD6B)
1220.OpenedIn (9D0A)
1230 sta iphdl (F3C0)
1240\ Open output file (EFD7)
1250 lda #&80 (D710)
1260 ldx #Outfl MOD 256 (2BD1
)
1270 ldy #Outfl DIV 256 (D2B2
)
1280 jsr OSFIND (F619)
1290 tay (59D8)
1300 beq Whoops (D91C)
1310 sta ophndl (56F3)
1320 (077C)
1330\ Great big coding loop !
!!! (B027)
1340.Gbcl (D5B3)
1350 ldy iphdl (506C)
1360 jsr OSBGET \ preserve
s X (7B06)
1370 bcs InEOF (1ADC)
1380 jsr Zappa (2F6F)
1390 ldy ophndl (8E06)
1400 jsr OSBPUT \ preserve
s X (AC90)
1410 jmp Gbcl (4D7E)
1420: (2E45)
1430.InEOF (9068)
1440\ Have finished input fil
e (CA15)

```

E N H A N C E R S

◆ LISTING 2 ◆

```

1450 jsr Closeall (7827)
1460 lda #7 (2069)
1470 sta Fcb+1 (5E03)
1480 lda #Infl MOD 256 (2E12)
1490 sta Fcb (C666)
1500\ Read input file cat det
ails.. (C845)
1510 lda #5 (A1C9)
1520 ldx #Fcb MOD 256 (F846)
1530 ldy #Fcb DIV 256 (BB54)
1540 jsr OSFILE (2C28)
1550 lda #Outfl MOD 256 (011F)
)
1560 sta Fcb (DA36)
1570\ ..and write to output f
ile (2E6E)
1580 lda #1 (8105)
1590 jsr OSFILE (BE5A)
1600 ldx #31 (1D9F)
1610 txa (F48B)
1620.Killkey (6CC2)
1630 sta Buff,X (3726)
1640 dex (B4B4)
1650 bpl Killkey (F189)
1660 brk (1DEA)
1670 brk (A9E6)
1680EQU$"Coding complete" (A9
5B)
1690 brk (7024)
1700: (90FA)
1710\ ZIP byte in A (4B69)
1720.Zappa (420B)
1730 sta temp (862D)
1740 inx (EABC)
1750 lda Key,X (54E9)
1760 bne Zal (E88B)
1770 tax (1239)
1780 lda Key,X (EF91)
1790.Zal (236D)
1800 eor temp (F156)
1810 eor scram (AD8A)
1820 sta scram (5A83)
1830 rts (471F)
1840: (E85A)
1850.Getfile (93FD)
1860 dey (0F4F)
1870.GetFloop (1DBD)
1880 inx (8DC6)
1890 iny (1989)
1900 lda (&F2),Y (5803)
1910 sta Infl,X (7070)
1920 cmp #13 (9FFF)
1930 beq Baleout (31FE)
1940 cmp #ASC" " (4C45)
1950 bne GetFloop (3BF7)
1960 lda #13 (9D2C)
1970 sta Infl,X (7165)
1980 clc (2373)
1990.Baleout (7C60)
2000 rts (CC2D)
2010: (5418)
2020 iny (9394)
2030.Spacestrip (9EA1)
2040 lda (&F2),Y (06EB)
2050 cmp #32 (07E0)
2060 beq Spacestrip-1 (9BFC)
2070 cmp #13 (1076)
2080 rts (CD02)
2090: (A250)
2100.Closeall (DE3F)
2110 lda #0 (D872)
2120 tay (B2A6)
2130 jmp OSFIND (B6AA)
2140.Last (1FAB)
2150:] (8C95)
2160NEXT (2AA6)
2170Osc$="SA.Zap "+STR$~Code+
"+STR$~Last (D40C)
2180OSCLI(Osc$) (295C)
>

10REM Zip Source Code (20
7A)
20REM R.Hughes (9E30)
30 (BD94)
40REM ZIP Version 1.00
(07B7)
50 (407A)
60Code=&900 (F7CF)
70Zero_Page=&70 (7F4F)
80Buff=&7B0 (C57D)
90 (9BE5)
100P%=Zero_Page:O%=HIMEM-32
(9CBE)
110[OPT 4: (0BE8)
120.temp EQUB 0 (6D67)
130.scram EQUB 0 (51BD)
140.iphdl EQUB 0 (5B14)
150.ophdl EQUB 0 (1374)
160.bits5 EQUB 0 (F132)
170.bits8 EQUB 0:] (F55B)
180 (5228)
190Infl = Buff (E251)
200Outfl = Infl+16 (E343)
210Key = Outfl+16 (06DA)
220Fcb = Key (EE8C)
230 (55A5)
240OSFIND=&FFCE:OSBPUT=&FFD4
(9D6A)
250OSBGET=&FFD7:OSFILE=&FFDD
(CC5E)
260 (D6BC)
270FOR pass%=0 TO 2 STEP 2 (
F268)
280P%=Code (2F2E)
290[OPT pass% (B6DC)
300 jsr Spacestrip (3876)
310 beq Syntax (96AD)
320 ldx #255 (00DB)
330 jsr Getfile \ Get inpu
t file (13AB)
340 bcs Syntax (0F6E)
350 jsr Spacestrip (919A)
360 beq Syntax (07E0)
370 ldx #Outfl-Infl-1 (8262)
380 jsr Getfile \ Get outp
ut file (7DBF)
390 bcs Syntax (9D1C)
400 jsr Spacestrip (849E)
410 bne GoodSyntax (B776)
420 (68AA)
430.Syntax (5710)
440 brk (B5FB)
450EQUB 16 (CC2F)
460EQU$"Syntax: *ZIP <src> <
dest> <key>" (D16F)
470 brk (49AC)
480: (A54D)
490.GoodSyntax (584F)
500 ldx #255 (EE64)
510 stx scram (005A)
520 dey (89B0)
530\ Fetch and scramble key
(0204)
540.KeyLoop (23EC)
550 inx (BEFA)
560 iny (62EE)
570 lda (&F2),Y (50C5)
580 cmp #13 (93EA)
590 beq Returned (9D8C)
600 sta Key,X (3C5B)
610 adc scram (9F3F)
620 sta scram (AB81)
630 jmp KeyLoop (08A8)
640 (27A4)
650.Returned (B6B0)

660 lda #0 (D614)
670 sta Key,X (48B4)
680 (FC3B)
690\ Crunch the Key up (50E9
)
700 tax \ Points to crunc
hed Key (CD40)
710 tay \ Points to strai
ght Key (E7CF)
720 lda #8 (CE73)
730 sta bits8 (E4E7)
740 (7ED4)
750.ReptX (C13C)
760 lda #5 (36FC)
770 sta bits5 (41BA)
780 lda Key,Y (3C09)
790 beq Crunched (3C37)
800 eor scram (8FF2)
810 (D8D8)
820.Rept5 (D0D6)
830 ror A (44BB)
840 rol Key,X (9397)
850 dec bits8 (84BC)
860 bne Eightok (A94A)
870 inx (4B82)
880 pha (7935)
890 lda #8 (6BD7)
900 sta bits8 (B498)
910 pla (A083)
920 (FF5F)
930.Eightok (D5FE)
940 dec bits5 (4653)
950 bne Rept5 (8B9E)
960 iny (FA2D)
970 bne ReptX (3078)
980: (9004)
990.Crunched (A5FB)
1000 inx (83AA)
1010 sta Key,X (1F36)
1020 (ECEC)
1030\ At this point, all para
ms OK (8AD2)
1040\ Open input file (5813)
1050 lda #&40 (8F8A)
1060 ldx #Infl MOD 256 (54E1)
1070 ldy #Infl DIV 256 (CE81)
1080 jsr OSFIND (0519)
1090 tay \ File handle
(8D33)
1100 bne OpenedIn (ED00)
1110 lda #ASC"r" (648E)
1120 sta label (F194)
1130.Whoops (D1F9)
1140 jsr Closeall (B57F)
1150 brk (181D)
1160EQUB 100 (7AFF)
1170EQU$"Can't open " (7967)
1180.Label (E27A)
1190EQU$"O/P file" (C85F)
1200 brk (5287)
1210: (DD6B)
1220.OpenedIn (9D0A)
1230 sta iphdl (F3C0)
1240\ Open output file (EFD7)
1250 lda #&80 (D710)
1260 ldx #Outfl MOD 256 (2BD1
)
1270 ldy #Outfl DIV 256 (D2B2
)
1280 jsr OSFIND (F619)
1290 tay (59D8)
1300 beq Whoops (D91C)
1310 sta ophndl (56F3)
1320 (077C)
1330\ Great big coding loop !
!!! (B027)
1340.Gbcl (D5B3)
1350 ldy iphdl (506C)
1360 jsr OSBGET \ preserve
s X (7B06)
1370 bcs InEOF (1ADC)
1380 jsr Zappa (2F6F)

```

```

1390 ldy ophndl (8E06)
1400 jsr OSBPUT \ preserve
s X (AC90)
1410 jmp Gbcl (4D7E)
1420: (2E45)
1430.InEOF (9068)
1440\ Have finished input fil
e (CA15)
1450 jsr Closeall (7827)
1460 lda #7 (2069)
1470 sta Fcb+1 (5E03)
1480 lda #Infl MOD 256 (2E12)
1490 sta Fcb (C666)
1500\ Read input file cat det
ails.. (C845)
1510 lda #5 (A1C9)
1520 ldx #Fcb MOD 256 (FB46)
1530 ldy #Fcb DIV 256 (BB54)
1540 jsr OSFILE (2C28)
1550 lda #Outfl MOD 256 (011F
)
1560 sta Fcb (DA36)
1570\ ..and write to output f
ile (2E6E)
1580 lda #1 (8105)
1590 jsr OSFILE (BE5A),
1600 ldx #31 (1D9F)
1610 txa (F48B)
1620.Killkey (6CC2)
1630 sta Buff,X (3726)

1640 dex (B4B4)
1650 bpl Killkey (F189)
1660 brk (1DEA)
1670 brk (A9E6)
1680EQUS"Coding complete" (A9
5B)
1690 brk (7024)
1700: (90FA)
1710\ ZIP byte in A (4B69)
1720.Zappa (420B)
1730 sta temp (862D)
1740 inx (EABC)
1750 lda Key,X (54E9)
1760 bne Zal (E88B)
1770 tax (1239)
1780 lda Key,X (EF91)
1790.Zal (236D)
1800 eor temp (F156)
1810 eor scram (AD8A)
1811 ldy temp (3D3E)
1820 sty scram (FB76)
1830 rts (471F)
1840: (E85A)
1850.Getfile (93FD)
1860 dey (0FAP)
1870.GetFloop (1DBD)
1880 inx (8DC6)
1890 iny (1989)
1900 lda (&F2),Y (5803)
1910 sta Infl,X (7070)

1920 cmp #13 (9FFF)
1930 beq Baleout (31FE)
1940 cmp #ASC" " (4C45)
1950 bne GetFloop (3BF7)
1960 lda #13 (9D2C)
1970 sta Infl,X (7165)
1980 clc (2373)
1990.Baleout (7C60)
2000 rts (CC2D)
2010: (5418)
2020 iny (9394)
2030.Spacestrip (9EA1)
2040 lda (&F2),Y (06EB)
2050 cmp #32 (07E0)
2060 beq Spacestrip-1 (9BFC)
2070 cmp #13 (1076)
2080 rts (CD02)
2090: (A250)
2100.Closeall (DE3F)
2110 lda #0 (D872)
2120 tay (B2A6)
2130 jmp OSFIND (B6AA)
2140.Last (1FAB)
2150:] (8C95)
2160NEXT (2AA6)
2170Osc$="SA.Zip "+STR$~Code+
" "+STR$~Last (353E)
2180OSCLI(Osc$) (295C)
>

```

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 Address P.C. HOOFTSTRAAT 62 III
 AMSTERDAM / The Netherlands
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	POOR	AVERAGE	EXCELLENT
Archimedes coverage	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Electron Computing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Arcade	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Home Office	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
News	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Programming	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Beginners articles	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Program listings	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hardware reviews	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Software reviews	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Software sale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. Are you aware of scheduled publication day?

- Yes No

4. If the answer to question 3 is yes, do you attempt to purchase the magazine on that day?

- Yes No

5. How do you normally obtain your copy?

- Chance purchase
- Newsagent shop collection
- Newsagent home delivery
- Subscription
- Passed on copy

6. If you are a subscriber, on which date did you receive this issue?

/ /

A&B COMPUTING READERS' SURVEY



7. If you do not obtain your copy by subscription, is it due to one of the following?

- Subscription too expensive
- Not every issue required
- Not aware subscription service available

7a. If you do not subscribe, from which type of newsagent do you most often obtain your copy?

- High Street shop
- Estate shop
- Corner shop
- Travel point
- Other, please state:

12c. How long have you owned this computer? (In months).

Beef: 3 YEARS electron: 2 years
Arc: 4 months

12d. Approx how many hours per week do you use your computer? (In hours).

25 hours

8. Which other computing magazines do you read and how do you rate them?

	NEVER READ	READ OCCAS.	READ REGULARLY
Acorn User	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Micro User	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Disk User	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electron User	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Educational Computing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Times Ed. Supplement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computer Trade Weekly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

BYTE, Dutch MAGAZINES

If read how does it compare with A&B Computing?

	NOT AS GOOD AS A&B	AS GOOD AS A&B	BETTER THAN A&B
Acorn User	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Micro User	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Disk User	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electron User	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Educational Computing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Times Ed. Supplement	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Computer Trade Weekly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

9. Which languages other than BASIC are you interested in?

- C
- Pascal
- Logo
- Assembler
- Other, please specify: *Fortran*
- Prolog*

10. Do you keep your copies of A&B for:

- Less than one month?
 - One month?
 - Three months?
 - Six months?
 - A year or more?
- IF KEPT, please answer the next question.

10a. How often do you refer to back issues of A&B?

- Once a week or more
- About once a month
- Once every three months
- Less often
- Never

11. How much of the time do you use your computer for the following purposes? (Please tick one box on each line):

	ALL THE TIME	MORE THAN HALF THE TIME	SOMETIMES	NEVER
Writing programmes	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Typing in games listings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Typing in utility listings	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Playing games	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Graphics/DTP	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Educational (as Teacher)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(as Student)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Business (wordprocessing, data base, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

12a. Which of these computers do you own? (Tick box).

ELECTRON	BBC B	BBC B+	MASTER 128	MASTER COMPACT	ARCHIMEDES
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

12b. Please tick the box for any of these computers if you are thinking of buying one within the next 12 months.

-
-
-
-
-
-

13. Please study the product groups shown, and tick any of the columns that apply to you.

Tick column (1) if you already own the product.
Tick column (2) if you do not yet own the product but definitely intend to buy one within the next 12 months.
Tick column (3) if you may buy the product within the next 12 months but are not yet sure.
In column (4) please indicate how often you use the product regardless of whether you own it or not.

PRODUCT	1 OWN	2 WILL BUY	3 MAY BUY	4 FRE-QUENTLY	INFRE-QUENTLY
INPUT DEVICES					
Light pen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trackerball/mouse	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Joystick	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Touchpad/concept keyboard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
OUTPUT DEVICES					
Dot Matrix printer	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Daisywheel printer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Plotter	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Colour/Ink Jet printer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Laser printer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PERIPHERALS					
Mono monitor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Colour monitor	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Modem	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Robotics/control devices	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
CONSUMABLES AND ACCESSORIES					
Paper/labels/stationery/ribbons	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Blank disks/Disk storage	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Spares/leads/connectors/components	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Dustcovers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Furniture	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Books	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
AUDIO					
Music s/w or h/w	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Speech s/w or h/w	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ADD ONS					
Coprocessor	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Extra RAM	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
STORAGE					
Floppy d/drives	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Hard d/drives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Econet system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
SOFTWARE					
Adventure Games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Arcade Games	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Communications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Programming	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Languages	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Educational	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Graphics/DTP	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Word Processing	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Business Administration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
School Administration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

14. With regard to the advertisements in A&B, do you:

- Read or look through most or nearly all the ads
- Just read or look through the occasional ad
- Read or look through some of the ads
- Very rarely/never look at the ads

15. How long do you spend reading A&B?

- Over 2 hours
- 1 1/2-2 hours
- 1-1 1/2 hours
- 1/2-1 hour
- Less than 1/2 hour

16. Approximately how much will you spend on computing in the next year?

- Nothing
- Up to £50
- £51-£100
- £101-£200
- £201-£500
- £501-£1,000
- £1,001-£2,000
- £2,001+

17. Thinking specifically about the advertising content, would you please rate the two main types of advertisement:

- | | DISPLAY | CLASSIFIED |
|-------------------|--------------------------|--------------------------|
| Very useful | <input type="checkbox"/> | <input type="checkbox"/> |
| Useful | <input type="checkbox"/> | <input type="checkbox"/> |
| Quite useful | <input type="checkbox"/> | <input type="checkbox"/> |
| Not very useful | <input type="checkbox"/> | <input type="checkbox"/> |
| Not at all useful | <input type="checkbox"/> | <input type="checkbox"/> |

18. Apart from yourself, who else reads or looks at your copy of A&B? (Please record the age and sex of each person, other than yourself, who reads the magazine).

- | | PERSON 1 | PERSON 2 | PERSON 3 | PERSON 4 |
|-----------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|
| SEX: Male | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Female | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| AGE: 9-14 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15-24 | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25-34 | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35-44 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45-54 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55-64 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65 plus | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

19a. How often do you visit computer outlets or buy mail order?

- | | OUTLETS | MAIL ORDER |
|----------------|-------------------------------------|--------------------------|
| Once a week | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Once a month | <input type="checkbox"/> | <input type="checkbox"/> |
| Once a quarter | <input type="checkbox"/> | <input type="checkbox"/> |
| Less often | <input type="checkbox"/> | <input type="checkbox"/> |
| Never | <input type="checkbox"/> | <input type="checkbox"/> |

20. How often have you ordered or bought items after reading an advertisement in A&B?

- Regularly
- Occasionally
- Never

21. Which of the following newspapers do you read?

- The Times
- The Daily Telegraph
- The Financial Times
- The Guardian
- The Independent
- The Daily Express
- The Daily Mail
- The Daily Mirror
- The Sun
- TODAY
- None

22. Do you own your own home, rent, or live with parents?

- Own
- Rent
- Live with parents
- Other, please state:

23. If you own your own home, what is the approximate value (your principal residence if you have more than one)?

- More than £100,000
- £75,500-£99,999
- £50,000-£74,999
- Less than £50,000

25. Please indicate below when you last did any of the following:

- | | IN LAST WEEK | IN LAST MONTH | LONGER AGO |
|-----------------------------------|--------------------------|-------------------------------------|-------------------------------------|
| At out in a restaurant | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Entertained at home | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Went to the theatre/ opera/ballet | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Went to a music concert | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Went to the cinema | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Attended a sporting event | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Visited an art gallery/ museum | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Went to a pub | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| Had a short break in a hotel | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Overseas holiday last 12 months | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

19b. Other than items purchased for your computing have you bought any other types of goods by mail order during the past 12 months?

- Yes No

19c. If the answer to the above question is yes, please state the type(s) of goods purchased:

-
-
-

28. Which of the following do you drink?

- | | MORE THAN ONCE A WEEK | ONCE A WEEK | LESS OFTEN |
|-------------|--------------------------|--------------------------|-------------------------------------|
| Beer | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Lager | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Wine | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Sherry | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Port | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Brandy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Gin | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Rum | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vodka | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Whisky | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Liqueurs | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| DON'T DRINK | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

24. Please tick the box which represents the annual total of your gross income:

- Under £6,500
- From £6,501 - £8,000
- From £8,001 - £10,000
- From £10,001 - £12,500
- From £12,501 - £15,000
- From £15,001 - £19,000
- Over £19,000

30. How many of the following items do you buy, on average, over a month?

- | | LESS THAN 1 PER MONTH | 1 or 2 | 3 or 4 | 5 or 6 | MORE | NEVER BUY |
|----------|-------------------------------------|-------------------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|
| A book | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A record | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| A tape | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

29. Where do you buy MOST of your drink from?

- An Off-licence
- A supermarket
- A Public House
- Other, please specify:

31. Are you a member of a book club?

- Yes No

32. Are you a member of a record club?

- Yes No

33. Are you a member of a computer club?

- BEEBUG
- MICRONET
- LOCAL U.G.
- Other, please specify: *Dutch*
- BBC - club*

34. Do you listen to commercial radio stations?

- Yes No
- If Yes, please specify stations:
-
-

35. Do you smoke...?

- Cigarettes
- Cigars
- Pipe
- Don't smoke

36. Do you own a:

- Stereo/Hi-Fi system
- Tape player/recorder
- Video recorder
- TV
- None of the above

37. Which of the following do you have?

- Bank current account
- Bank deposit or savings account
- Life assurance policy
- Any stocks or shares
- Access card
- Barclaycard (Visa)
- American Express
- Diners Club
- Unit Trusts
- Private medical insurance
- Personal accountant
- Building Society account
- A mortgage
- Any HP agreements
- Telephone

38. How many cars are there in your household?

- None
- One
- Two
- Three or more

39. What cars do you own?

VOLKSWAGEN polo

40. Is one or more of your cars a company vehicle?

- Yes
- No

40b. Do you usually buy your cars new?

- Yes
- No

41. How often do you tend to change your car(s)?

- Once a year or more often
- About every two years
- About every three years
- Less often

42. Name the three television programmes you watch most regularly.

NEWS
tomorrow's world
R.F.P.

43a. Have you used the A&B software service?

- Yes (please answer part b)
- No (please answer part c)

43b. If you have used it, have you been satisfied with the software and the service you have received?

- Yes
- No

43c. If you haven't used it, why not?

- Too expensive
- Limited choice
- Delivery period too long
- Other reason, please write in below:

44. Are you ...?

- In full time employment
- In part time employment
- Not employed at present
- Retired
- Student - full time
- Student - part time

44a. If in full time employment, state your occupation:

44b. If student, what subjects studied?

Physics

44c. Are you employed in a job where you influence the buying of Computer equipment?

- Yes
- No

45. Age (please tick)

- Under 15
- 15 - 18
- 19 - 21
- 22 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55 - 64
- Over 64

46a. Are you?

- Male
- Female

46b. What is your marital status?

- Married
- Single
- Divorced

46c. If you have children please indicate their age and sex (give details of the four youngest if you have more than four).

	FIRST	SECOND	THIRD	FOURTH
Age:				
1- 3 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4- 8 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9-12 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13-16 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Over 16 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sex:				
Male	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Female	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

46d. If you have children do they follow your interest in A&B Computing?

- Yes
- No

47b. If yes, please specify which ones:

ONLY Dutch ones
FIAREX

47a. Do you attend computer exhibitions?

- Yes
- No

TUCK INTO A THIRD FOLD

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2

FIRST FOLD

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SECOND FOLD

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 - 768K ADFS 80 Track (640K) or DFS 80 Track (3 × 200K) **£159+VAT**
 - 1024K ADFS 80 Track (1 × 640K & 1 × 320K) or DFS 80 Track (4 × 200K) **£189+VAT**
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(CHEQUE /  / 

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SLOGGER
0634 52303

C & F ASSOCIATES

BBC CASSETTE SOFTWARE

BBC DISC SOFTWARE

Title	Our		Title	Our	
	RRP	Price		RRP	Price
Bone Cruncher	9.95	7.75	Bone Cruncher	11.95	10.95
Elixir	9.95	7.75	Elixir	11.95	10.95
Spellbinder	9.95	7.75	Spellbinder	11.95	10.95
Life of Repton	6.95	5.95	Life of Repton	7.95	6.95
Winter Olympiad 88	9.95	7.75	Winter Olympiad 88	14.95	12.95
Play It Again Sam	9.95	7.75	Play It Again Sam	11.95	10.95
Spitfire 40	9.95	7.75	Spitfire 40	12.95	10.95
Palace of Magic	9.95	7.75	Palace of Magic	11.95	10.95
Arkanoid	8.95	7.20	Crazy Rider	11.95	10.95
Crazy Rider	9.95	7.75	The Hunt	12.95	10.95
The Hunt	9.95	7.75	Enthar 7	16.95	14.95
Spy vs. Spy	9.95	7.75	Village of Lost Souls	12.95	10.95
Paper Boy	9.95	7.75	Colossus Chess	14.95	12.95
Ransack	9.95	7.75	Codename Droid	11.95	10.95
Grand Prix Construction	9.95	7.75	Grand Prix Construction	11.95	10.95
Around World 40 Screens	6.95	5.95	Around World 40 Screens	7.95	6.95
Impact	9.95	7.95	Evening Star	14.95	12.95
Superior Collection 1	9.95	7.75	Mini-Office 2	16.95	14.95
Superior Collection 2	9.95	7.75	Mini-Office 2 (Master)	19.95	17.50
Computer His 4	9.95	7.95	Cholo	17.95	15.95
Village of Lost Souls	9.95	7.95	Elite	14.95	12.95
Codename Droid	9.95	7.75	Revs	14.95	12.95
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Graphics Pack 1	DB03	DB17	DB37	DE01
Musician	DB06			
Mode 7 Utilities	DB12			
Adventurescape III	DB20	DB28	DB35	
Combat Zone	DB21	DB30	DB32	
Easy Font	DB26	DB39	DB44	
ADFS Menu	DB27	DB31		
Graphics pack 2	DB29	DB34	DB38	DE29
Colour Ikon	DB36			
A&B Bibliography	DB40	DB53	DB54	
Statistics	DB41	DB42	DB43	
Games Compendium 1				DE45
Home Office	DB46			DE46
Graphics Constr. Set	DB49	DB50	DB51	
Compact 100			DB52	
Bibliography Upgrade	DB55			
Master Only		DB56	DB57	
A&B '87	DB58	DB59	DB60	
Getting Into Assembler	DB61	DB62	DB63	
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Sideways RAM	DB67	DB68	DB69	
Pascal	DB70	DB71	DB72	
Adventure Special	DB73	DB74	DB75	
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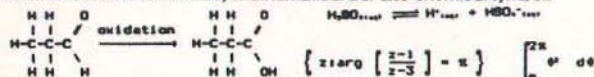
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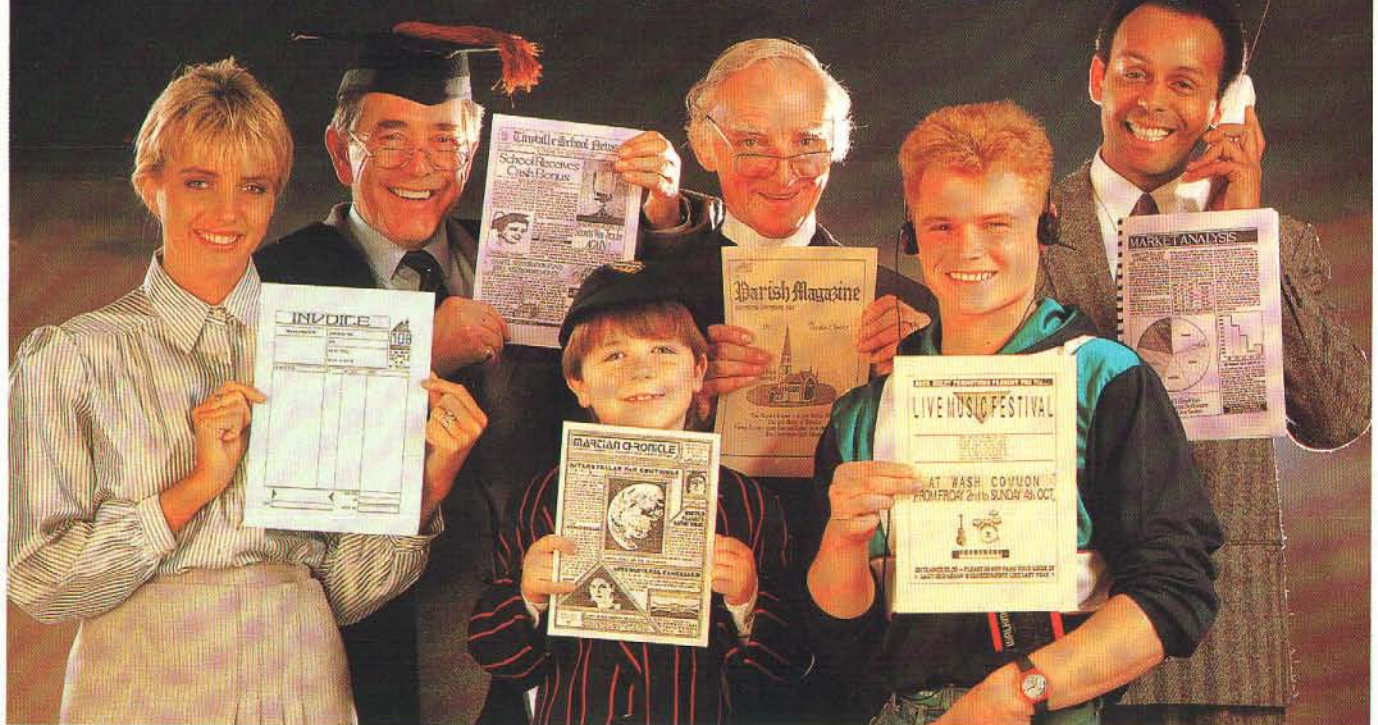
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Quest



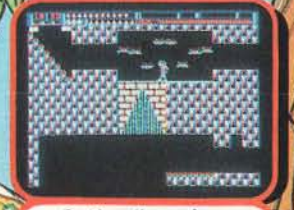
The Quest is under way



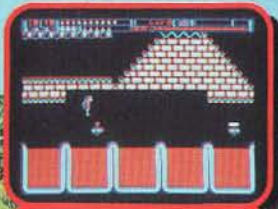
Making Sweet Music



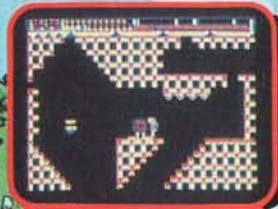
Visiting the Elephant House



Battling through a Killer Horde



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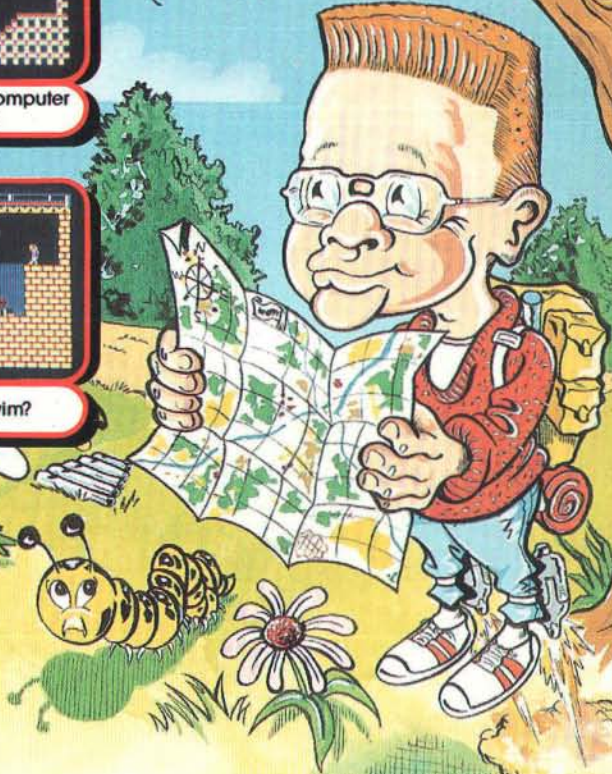
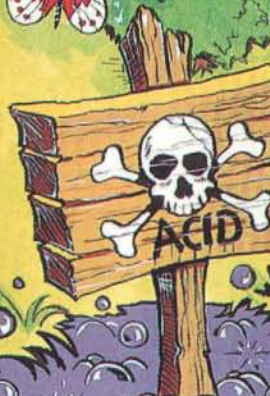
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The next day, as the sun is rising you excitedly get out of bed, pack your

rucksack with a few provisions, and then don your jet-boots — an astounding invention which enables you to fly for short periods of time. You amble over towards the wishing-well and slowly climb down the walls of the well. It's quite deep, but finally you reach the bottom. You then suddenly realise that you have left behind a very important item, the map.

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